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„Housing Affordability in East Asian Capital Cities: A Comparative Analysis of the Housing Markets of Beijing, Seoul, and Tokyo"

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TABLE OF CONTENTS

LIST OF TABLES V

LIST OF FIGURES VI

LIST OF APPENDICES VIII

LIST OF ABBREVIATIONS IX

I INTRODUCTION 10

1.1. TOPIC AND RESEARCH QUESTIONS 10

1.2. RELEVANCE OF THE RESEARCH 12

1.3. OUTLINE OF THE THESIS 16

1.4. LIMITATIONS 17

II STATE OF THE ART 18

2.1. THEORETICAL RESEARCH ON REAL ESTATE MARKET 18

2.1.1. REAL ESTATE MARKET THEORY 18

2.1.2. DETERMINANTS ON THE REAL ESTATE PRICE 19

2.2. THEORETICAL RESEARCH ON HOUSING AFFORDABILITY 20

2.2.1. PIONEER WORKS ON HOUSING AFFORDABILITY 20

2.2.2. PURPOSE OF ANALYZING HOUSING AFFORDABILITY 23

2.2.3. CONCEPT OF HOUSING AFFORDABILITY 24

2.2.4. COMMON APPROACHES AND MEASUREMENTS 31

2.2.5. DETERMINANTS OF HOUSING AFFORDABILITY 44

2.2.6. ASSESSING AND CROSS-COUNTRY COMPARISON OF HOUSING AFFORDABILITY 46

2.3. SUMMARY 47

III RESEARCH DESIGN 50

3.1. OVERVIEW OF THE THEORETICAL FRAMEWORK 50

3.2. THEORETICAL FRAMEWORK 51

3.2.1. REAL ESTATE MARKET 51

3.2.2. RELATIVE HOUSING PRICE 53

3.2.3. RATING OF THE PIR RESULTS 55

3.3. FRAMEWORK TABLE 56

3.4. CONSIDERATION OF THE FRAMEWORKS LIMITATIONS 57

IV EMPIRICAL PART 58

4.1. CHINA 58

4.1.1. REAL ESTATE MARKET 58

4.1.2. RELATIVE HOUSING PRICE 67

4.1.3. RATING OF PIR OF BEIJING 75

4.2. SOUTH KOREA 77
4.2.1. REAL ESTATE MARKET *77*
4.2.2. RELATIVE HOUSING PRICE *85*
4.2.3. RATING OF PIR OF SEOUL *91*
4.3. JAPAN 93
4.3.1. REAL ESTATE MARKET *93*
4.3.2. RELATIVE HOUSING PRICE *100*
4.3.3. RATING OF PIR OF TOKYO *107*
V ANALYTICAL PART 109
5.1. OVERVIEW 109
5.2. COMPARING OF ECONOMIC DEVELOPMENT 110
5.3. COMPARING OF THE RELATIVE HOUSING PRICE 116
5.4. COMPARING OF THE PRICE-TO-INCOME RATIO 121
5.5. SUMMARY OF THE MAIN FINDINGS 126
5.6. SIGNIFICANCE OF RESEARCH RESULTS 129
VI CONCLUSION 130
VII BIBLIOGRAPHY 135
VIII APPENDIX 153
ABSTRACT 164
ZUSAMMENFASSUNG 165

LIST OF TABLES

Table 1: PURPOSE OF HOUSING AFFORDABILITY 24
Table 2: RESIDUAL INCOME AND RATIO APPROACH 35
Table 3: AFFORDABILITY FACTORS UNDER DIFFERENT APPROACHES AND MEASUREMENTS 46
Table 4: DEOMPRAHIA INTERNATIONAL HOUSING AFFORDABILITY SURVEY ... 47
Table 5: DEOMPRAHIA INTERNATIONAL HOUSING AFFORDABILITY SURVEY ... 55
Table 6: FRAMEWORK 57
Table 7: CALCULATION OF AVERAGE HOUSING UNIT IN BEIJING 71
Table 8: PRICE-TO-INCOME RATIO CALCULATION FOR BEIJING 75
Table 9: CALCULATION OF AVERAGE HOUSING UNIT IN SEOUL 87
Table 10: PRICE-TO-INCOME RATIO CALCULATION OF SEOUL 91
Table 11: TOTAL FLOOR AREA PER HOUSING UNIT IN TOKYO 101
Table 12: PRICE-TO-INCOME RATIO CALCULATION FOR TOKYO (1) 105
Table 13: PRICE-TO-INCOME RATIO CALCULATION FOR TOKYO (2) 106
Table 14: SUMMARY OF TAXES IN CHINA, SOUTH KOREA, AND JAPAN ON REAL ESTATE 116
Table 15: SUMMARY OF THE MAIN FINDINGS 128

LIST OF FIGURES

Figure 1: A MINIMAL DEFINITION OF AFFORDABILITY 29
Figure 2: AFFORDABILITY FOR AN INDIVIDUAL CONSUMER 31
Figure 3: RESIDUAL INCOME APPROACH 36
Figure 4: RATIO APPROACH 40
Figure 5: SHARE OF HOME PURCHASES IN CHINA (%) 60
Figure 6: CHINA GDP (CURRENT US $) 61
Figure 7: ANNUAL GDP GROWTH OF CHINA (%) 62
Figure 8: COMPOSITION OF REAL ESTATE IN GDP (%) 63
Figure 9: POPULATIONS AGE CENSUS OF BEIJING 64
Figure 10: BEIJING'S PERMANENT POPULATION 65
Figure 11: AVERAGE SELLING PRICE OF RESIDENTIAL BUILDINGS (YUAN/ SQ.M.) 68
Figure 12: AVERAGE FLOOR SPACE PER PERSON IN BEIJING (SQ.M.) 70
Figure 13: AVERAGE FLOOR SPACE IN BEIJING (SQ.M.) 72
Figure 14: AVERAGE INCOME PER CAPITA IN BEIJING (YUAN) 73
Figure 15: BEIJING'S AVERAGE HOUSEHOLD SIZE (PERSON/HOUSEHOLD) 74
Figure 16: PRICE-TO-INCOME RATIO OF BEIJING 76
Figure 17: SHARE OF HOME PURCHASES IN SOUTH KOREA (%) 78
Figure 18: SOUTH KOREA GDP (CURRENT US $) 79
Figure 19: ANNUAL GDP GROWTH OF SOUTH KOREA (%) 80
Figure 20: COMPOSITION OF CONSTRUCTION IN GDP (%) 81
Figure 21: POPULATIONS AGE CENSUS OF SEOUL 82
Figure 22: POPULATION OF SEOUL 83
Figure 23: AVERAGE SELLING PRICE OF RESIDENTIAL BUILDINGS (WON/ SQ.M.) 86
Figure 24: AVERAGE FLOOR SPACE IN SEOUL (SQ.M.) 88
Figure 25: AVERAGE INCOME PER CAPITA IN SEOUL (WON) 89
Figure 26: SEOUL'S AVERAGE HOUSEHOLD SIZE (PERSON/HOUSEHOLD) 90
Figure 27: PRICE-TO-INCOME RATIO OF SEOUL 92
Figure 28: JAPAN GDP (CURRENT US$) 94
Figure 29: ANNUAL GDP GROWTH OF JAPAN (%) 95
Figure 30: COMPOSITION OF REAL ESTATE IN GDP (%) 96

Figure 31: POPULATIONS AGE CENSUS OF TOKYO 97
Figure 32: POPULATION OF TOKYO IN CITY AREA 98
Figure 33: AVERAGE SELLING PRICE OF RESIDENTIAL BUILDINGS (YEN/ SQ.M.) 101
Figure 34: IDEAL FLOOR SPACE PER HOUSEHOLD IN TOKYO (SQ.M.) 102
Figure 35: AVERAGE INCOME PER HOUSEHOLD IN TOKYO (YEN) 103
Figure 36: TOKYO'S AVERAGE HOUSEHOLD SIZE (PERSON/HOUSEHOLD) 104
Figure 37: PRICE-TO-INCOME RATIO OF TOKYO (1) 107
Figure 38: PRICE-TO-INCOME RATIO OF TOKYO (2) 108
Figure 39: CURRENT GDP OF CHINA, JAPAN, AND SOUTH KOREA (US $) 110
Figure 40: ANNUAL GDP GROWTH OF CHINA, JAPAN, AND SOUTH KOREA (%) 111
Figure 41: COMPOSITION OF REAL ESTATE IN GDP OF CHINA, JAPAN, AND SOUTH KOREA (%) 112
Figure 42: POPULATION BY AGE OF CHINA, JAPAN, AND SOUTH KOREA (%) 113
Figure 43: POPULATION OF BEIJING, TOKYO, AND SEOUL 114
Figure 44: AVERAGE SQ. M PRICE FOR RESIDENTIAL HOUSING IN BEIJING, TOKYO, AND SEOUL (US $ / SQ. M) 117
Figure 45: AVERAGE FLOOR SPACE PER HOUSEHOLD IN BEIJING, TOKYO, AND SEOUL (SQ. M) 118
Figure 46: AVERAGE INCOME PER HOUSEHOLD IN BEIJING, TOKYO, AND SEOUL (US $) 119
Figure 47: AVERAGE NUMBER OF PEOPLE PER HOUSEHOLD IN BEIJING, TOKYO, AND SEOUL 121
Figure 48: AVERAGE INCOME AND HOUSING PRICE IN BEIJING, TOKYO, AND SEOUL 123
Figure 49: RESULTS OF THE PRICE-TO-INCOME RATIO OF BEIJING, TOKYO, AND SEOUL 125

LIST OF APPENDICES

Appendix 1: GDP OF CHINA, JAPAN, AND SOUTH KOREA (CURRENT US $)..... 153
Appendix 2: ANNUAL GDP GROWTH OF CHINA, JAPAN, AND SOUTH KOREA (%) 153
Appendix 3: COMPOSITION OF REAL ESTATE IN GDP OF BEIJING, TOKYO, AND SEOUL (%) 153
Appendix 4: POPULATION OF BEIJING, TOKYO, AND SEOUL 154
Appendix 5: POPULATION BY AGE IN SEOUL 154
Appendix 6: AVERAGE HOUSING PRICE OF SEOUL..... 155
Appendix 7: AVERAGE FLOOR SPACE IN SEOUL 2005 – 2007 156
Appendix 8: JAPAN'S REAL ESTATE IN GDP ACTIVITY (%)..... 156
Appendix 9: POPULATION OF TOKYO IN 5 YEAR AGE GROUP (2000 – 2015) 157
Appendix 10: NEW AND EXISTING CONDOMINIUM SALE PRICES IN TOKYO (YEN) 158
Appendix 11: IDEAL SPACE IN TOKYO CALCULATION FOR 20M² X NUMBER OF HOUSEHOLDS + 15M² 160
Appendix 12: MONTHLY AVERAGE INCOME FOR HOUSEHOLDS IN TOKYO (YEN) 161
Appendix 13: AVERAGE INCOME AND HOUSING PRICE OF BEIJING, TOKYO, AND SEOUL (US $) 162

LIST OF ABBREVIATIONS

CPC	Communist Party of China
DESA	Department of Economic and Social Affairs
GDP	Gross Domestic Product
HUD	U.S. Department of Housing and Urban Development
IMF	The International Monetary Fund
NBS	National Bureau of Statistics
MLIT	Ministry of Land, Infrastructure, Transport, and Tourism
OECD	Organization for Economic Co-operation and Development
PIR	Price-to-income Ratio
SDG	Sustainable Development Goals
UK	United Kingdom
UN	The United Nations
USA	United States of America
VAT	Value Added Tax

I INTRODUCTION

1.1. TOPIC AND RESEARCH QUESTIONS

In many countries around the world, people are moving from the countryside to urban areas (United Nations, 2014). Due to the strong influx of people to cities, the 21st century may be considered as a great era of urbanization. This global phenomenon is observed in developing as well as in developed countries. According to the United Nations (2014), in 1950, 746 million people, approximately 18 percent of the world's population, lived in urban areas. By 2014 this number increased to 3.9 billion, or 54 percent of the world's population (United Nations, 2014). It is estimated by the United Nations (2014) that by 2050 the percentage of residents in cities will increase to 66 percent. The Director of the Population Division of the United Nations (UN) Department of Economic and Social Affairs (DESA) stated, "managing urban areas has become one of the most important development challenges of the 21st century" (United Nations, 2014).

As urbanization progresses, the demand for real estate in urban areas also increases. The real estate market plays an important part for any country's economy (Tupėnaitė et al., 2015, p. 15) and international trade (Cao, 2015, p. 3). Housing prices are increasing in many cities around the world, which has resulted in social protests (BBC News, 2019; Ben-Shahar & Warszawski, 2015, p. 1178; McDermott, 2019). The importance and value of housing for people is also stressed by Xi Jinping, the General Secretary of the Central Committee of the Communist Party of China (CPC). He stated in the opening ceremony of the 19th CPC National Congress in October 2017, that "houses are for living, not for speculating" (as cited by Haas, 2017).

The concern that residents cannot afford housing in cities has resulted in discussions by the public, as well as by policymakers and regulators (Ben-Shahar & Warszawski, 2015, p. 1178). The debate is centered around the appropriate relationship of income of an urban household and its housing expenditure cost.

In addition, the housing market and the issue of affordable housing are praised by scholars to be a key measurement for comparing the economic living standards of people between countries (Carswell, 2012, p. 13; Noguchi & Poterba, 1994, p. 2). Hence, this thesis quantifies and compares the development of the residential housing market of Beijing, Seoul, and Tokyo from 2000 to 2017.

RESEARCH QUESTIONS

The significant urbanization trend and real estate price development have spurred the question of whether housing in a city is affordable for residents. The concept of affordable housing encompasses two aspects. First, whether tenants can pay rent and second, if homebuyers are able to purchase a home without imposing a severe financial burden. The purpose of this master thesis specifically is to conduct research and compare the housing affordable for homebuyers across the sub-region of East Asia[1]. For this purpose, Beijing, the capital of the People's Republic of China (hereinafter referred to as China), Seoul the capital of Republic of Korea (hereinafter referred to as South Korea), and Tokyo, the capital of Japan will be analyzed to assess the affordable housing market.

The housing affordability with the focus on home purchase are selected as all three countries have a homeownership rate above 50 percent. This thesis attempts to understand and reflect the similarities and differences of the housing affordability development throughout the time period from 2000 to 2017. The year 2000 is chosen for the starting date, as it is the beginning of a new century and it allows to assess the market before the world economic crisis which started in 2007 from financial and real estate speculation in the United States of America (USA) (Global Policy Forum, n.d.). This world crisis impacted the gross domestic product (GDP) growth of all three countries, especially Japan, which recorded negative growth during that time period (World Bank Group, n.d.-b). The year 2017 has been selected as the end date as it has the latest available data, and thus, allows insight into the current housing affordability situation. Housing affordability can be reduced, in a simplistic sense, to the issue of a mismatch between the households' aspiration for housing and their resource inadequacy (Yip, 1995, p. 3). Hence, housing affordability aims to ensure that housing is affordable for all residents regardless of their income (Suhaida et al., 2011, p. 346).

Specifically, this thesis aims to answer the following research questions:

- How does the housing affordability situation differ in the cities Beijing, Seoul, and Tokyo between 2000 – 2017?

[1] In this thesis the term 'East Asia' is understood as the East Asian region which includes Japan, the Republic of Korea, the Democratic People's Republic of Korea, and Greater China (the People's Republic of China, Hong Kong Special Administrative Region of the People's Republic of China, Macao Special Administrative Region of the People's Republic of China, and the Republic of China)

Sub-research questions:

- Are the housing prices developing in equilibrium to the average income of households?
- Can people in the capital cities afford to buy real estate?

The mentioned research questions entail reviewing aspects such as economic and population development in these cities. In addition, examining the resident's income and housing prices is also a key aspect that needs to be assessed in order to comprehend whether the two have developed to a similar degree. Furthermore, the current scientific measurements and trends on housing affordability need to be addressed and presented. Adding to the trends is a debate about what an 'appropriate' relationship between a household's income and the housing expenditure would look like. This will be done to conclude to what degree housing in these cities is affordable for their respective residents.

1.2. RELEVANCE OF THE RESEARCH

There are several reasons which underline the relevance of this research study of the affordable housing situation in the sub-region of East Asia. First, the income on housing expenditures (Quigley & Raphael, 2004, p. 191). The real estate market is an important factor for a country's economy due to the following two reasons: firstly, it provides infrastructure and buildings, which are necessary for daily life and work (Tupėnaitė et al., 2015, p. 15). Secondly, it has a strong impact on the development of a nation's economy (Tupėnaitė et al., 2015, p. 15). According to Chen, Kawaguchi, and Patel, a change in property prices can also affect the consumer prices' inflation, which consequently also has an impact on a country's competitiveness (M.-C. Chen et al., 2004, p. 56). Likewise, "a vigorous and buoyant housing sector is an indication of a strong programme of national investment and are indeed the foundation of and the first step to future economic growth and social development" (Ajanlekoko, 2001, p. 2). However, real estate is not solely important to the economy but also to the people. For one, it is a basic human need to have a place for shelter and protection against weather, animals, and intruders. To have a shelter nowadays means having a living unit. Secondly, households are commonly devoting their largest part of their income on housing (Quigley & Raphael, 2004, p. 191). Quigley and Raphael also suggests that "changes in housing prices and rents will have large impacts on nonhousing consumption and household well-being" (Quigley & Raphael, 2004, p. 191).

Consequently, the objective of this research paper is to provide an insight into the housing market situation through the lens of housing affordability. As there is a lack of direct comparison studies of the housing affordability situation in the sub-region of East Asia, this thesis attempts to fill this gap and make a valuable and relevant contribution. Therefore, this research paper does not purely seek to analyze the current housing affordability situation in the chosen cities but also compares the development of the housing market of the cities. The significance and relevance of this thesis will be presented and grouped according to the subject areas in the following sections.

SIGNIFICANCE OF OWNERSHIP

The core purpose of housing is to protect the inhabitants against weather and dangerous circumstances. As a result, housing is among humankind's most elementary needs. The importance of owning a house is also engraved into many cultures, and this is particularly true for China. Chinese traditions and customs, e.g., require a man to buy a home before being able to get married. The importance of owning a home in these three countries is likewise reflected in the homeownership rate. All three countries have a homeownership rate above 50 percent. Japan and South Korea have a similar percentage. Japan had in 2013, a homeownership rate of 61 percent (Statistics Japan, 2017) and South Korea in 2017, a rate of 57 percent (Trading Economics, n.d.). China has the highest rate among the three counties, with a rate of 90 percent, dated in December 2014 (Trading Economics, n.d.).

Traditionally, property investment has been considered a good investment, and many households have seen it as a form of saving (Chen et al., 2004, p. 56). To what degree the affordability of housing has changed in the last decade will be examined in this thesis.

SIGNIFICANCE OF HOUSING COSTS

Housing affordability is also of relevance to people as the largest proportion of a household's income is being used to cover housing expenditure (Quigley & Raphael, 2004, p. 191), thus, making housing the most significant expenditure of a household. According to Quigley and Raphael (2004, p. 191), one household spends from one-quarter up to half of its income for housing, depending on the income level. As a result, households with a lower income are most affected by an unaffordable housing market situation.

Affordable housing is also significant to measure the financial burden of a home to the resident, as a relatively high financial burden for housing can leave the household in a situation with the

insufficient financial capability to afford other basic needs (Carswell, 2012, p. 13). Consequently, a change of housing or renting prices are affecting the affordability for non-housing consumption and goods as well as the well-being of the people (Carswell, 2012, p. 13; Quigley & Raphael, 2004, p. 191).

SIGNIFICANCE OF HOUSING AFFORDABILITY

The issue of affordable housing is of particular importance among households with lower incomes (Bogdon & Can, 1997, p. 46). Bogdon and Can (1997, p. 47) state that if housing is no longer affordable for low-income households, they are forced to move outside of cities. This would then lead to certain urban regions becoming solely for the wealthier residents. Confinement of the lower-income households to the urban areas would limit "their access to decentralized job opportunities and to better living environments and services" (Bogdon & Can, 1997, p. 47). Also, this would affect the social stability of a nation, as housing accessibility becomes a question of social equality. Social equality and stability are crucial for a society, especially in China, as the political situation is profoundly connected to a stable society, and as China's communist parties' legitimization to govern the country could be questioned if social unrest is occurring in China.

This topic has not only gained attention in China, but in many cities around the world, social protests related to high housing prices have also occurred (BBC News, 2019; Ben-Shahar & Warszawski, 2015, p. 1178; McDermott, 2019). Consequently, housing affordability has been widely discussed by the general public, as well as by policymakers and regulators (Ben-Shahar & Warszawski, 2015, p. 1178).

AGENDA 2030

The significance of affordable housing for people and households despite the income group they belong to is also reflected as a goal in the UN Agenda 2030 on sustainable cities. In 2015, the United Nations General Assembly affirmed 17 Sustainable Development Goals (SDGs) and 169 targets for the year 2030 (United Nations, n.d.-b). Among the 17 SDGs, the 11th goal has an objective to achieve sustainable cities and communities (United Nations, n.d.-a, p. 11). The United Nations predicts that "the number of people living within cities [is] projected to rise to 5 billion people by 2030, it's important that efficient urban planning and management practices are in place to deal with the challenges brought by urbanization"(United Nations, n.d.-a). The UN target is to "ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums" (United Nations, n.d.-b). Accordingly, this in-depth comparison of the

housing market between Beijing, Seoul, and Tokyo will offer an insight into their social and economic development.

SIGNIFICANCE OF THE SELECTED CITIES AND THEIR COMPARISON

This research paper will analyze and compare the housing affordability ratio of the capital cities of China, South Korea, and Japan. The capital cities are selected for the comparison, as capital cities function as a symbol of the country (Kirsch, 2005, p. 12). China, Korea, and Japan are selected as the research subjects in this comparative analysis as they are among the economically strongest countries in the East Asian region (World Bank Group, n.d.-a). Analyzing the housing affordability of the three countries will be particularly interesting. Even though China is the strongest economy in East Asia (World Bank Group, n.d.-a), it is considered to be a developing country, whereas Japan and South Korea are considered developed countries (Central Intelligence Agency, n.d.; World Population Review, 2019a, 2019b).

Despite their different regime systems, all three countries became economically strong in the last few decades (World Bank Group, n.d.-a). With the economic development, the income has risen as well (Kharas & Gertz, 2010, pp. 2 & 9). Thus, it will be enlightening to analyze to what extent the economic development is reflected in the housing market price development. As a communist party leads China, one might assume that the housing affordability ratio of Beijing is lower than Tokyo or Seoul.

A reason for choosing these three countries for the analysis is their annual population growth. While Japan's and Korea's growth rate has decreased this last decade, Japan's even negatively, China's growth rate has increased (World Bank Group, n.d.-d).

Furthermore, urban development in the three countries has steadily increased in the last decade (World Bank Group, n.d.-f). The influx of urban population has caused the need to analyze the housing affordability in order to define the housing need for future public policy purposes, and potential policy applications are, e.g., in the field of urban planners, taxation, and finance. Due to high population numbers, all three capital cities belong to the top 40 largest cities around the world. The Greater Tokyo Area was ranked as the most populated city in the world, with more than 38 million inhabitants (WorldAtlas, 2018). Beijing, with more than 20 million people, was ranked 7th (WorldAtlas, 2018), while Seoul is on the 32nd place with less than 10 million residents (WorldAtlas, 2018).

The purpose of this thesis is to ascertain whether the three economic strongest countries in Asia with their similar urban population and high homeownership rate have similar or different housing affordability issues. By conducting this research, the goal is to contribute with a comprehensive comparative paper to the housing affordability field. The results of which will be of value to investors, housing counselors, local residents, policymakers, and for evaluating the housing market trend (Ben-Shahar & Warszawski, 2015, p. 1178; W. Cai & Lu, 2015, p. 169; Gabriel et al., 2005, p. 37; OECD, n.d.-a).

1.3. OUTLINE OF THE THESIS

This research study analyzes and compares the housing market of the capital of China, South Korea, and Japan through the lens of housing affordability. For the purpose of answering the above-stated research questions, this thesis consists of six chapters. The first chapter provides the reader with an introduction to the topic, the research question, and its' relevance.

As the housing price is an important factor for measuring housing affordability, the second chapter aims is to introduce the reader to the topic of real estate markets and housing affordability. It will explore and introduce the reader to the theoretical economic influences on real estate prices. The chapter continues to explore the market; however, this chapter focuses on housing affordability. It will provide a comprehensive review of the theoretical background on housing affordability, followed by various concepts and definitions on the appropriate relationship between household income and housing costs. At the same time, different measurements and ratios on housing affordability with strengths and weaknesses will be presented and discussed.

Based on the second chapter, the framework will be developed and presented in the third chapter. The framework consists of the selected approach and measurement tool to assess the housing affordability situation in the three capital cities.

The developed framework will afterward be applied in chapter four. The established framework will be used and applied to examine the current housing market situation in all three cities. This chapter begins with a presentation of the real estate and economic specific development, followed by a review on the development of the price-to-income factors. This chapter ends with the presentation of the price-to-income ratio results.

The fifth chapter is the analytical part in which the findings of the housing affordability markets of the three capital cities will be presented. Parallel to the cross-country comparison of the ratio results, a discussion of the major findings will be made in this chapter as well.

Chapter six provides a summary of the major findings of this case study. On the bases of the findings in the empirical and analytical chapter, the research questions will be answered. Furthermore, an outlook and future research recommendations will be addressed in this chapter.

1.4. LIMITATIONS

The focus of the paper will be on the affordable housing markets in the three countries. Due to the limitation of this paper, this thesis will focus on the housing affordability situation of the capital cities. Although factors for housing are, among others, the physical housing conditions and location, these factors will not be discussed in the paper as the housing market will be assessed as a whole. Furthermore, national welfare reforms on housing will neither be discussed nor analyzed in this paper.

II STATE OF THE ART

2.1. THEORETICAL RESEARCH ON REAL ESTATE MARKET

2.1.1. REAL ESTATE MARKET THEORY

According to the neoclassical economic theory, a market is defined by a supply and demand behavior (P. Wang & Kang, 2014, p. 105). There are four fundamental assumptions in the supply and demand concept: "One, *demand comes first,* implying that Two, *supply adjust to demand*, *through marketing and production*; Third, *production takes time*, and consequently Fourth, *equilibrium is a theoretical idea*" (Lima, 2015, p. 8).

The nature and value of a market will vary with changing market conditions such as a "changing balance of supply and demand, changing knowledge, fashion, rules, expectations, credit conditions, hopes of profit and other circumstances" (Tupėnaitė et al., 2015, pp. 10–11).

Due to the real estate sector's extensive linkage to the industrial and financial sector, the real estate sector is a unique type of economic activity (Ahuja & Myrvoda, 2012, p. 3), and thus, acts as a crucial interlink in a national economic system (Jie et al., 2012, p. 123).

Harris and Arku (2006, p. 1007) state that economic development can also be affected by the construction and use of affordable housing as these impact employment, labor productivity as well as saving and investment. Additionally, the housing market plays "an important role in driving the development of related industries, maintaining the stability of the financial sector, and stimulating (or depressing) the economy" (Chi-Wei et al., 2018, p. 3171). Zhu (2003, p. 14) adds that high property prices can affect the GDP positively. Nevertheless, the linkage of the real estate market can also be the "reason of serious economic problems, including global crisis that started in the real estate market of the USA" (Tupėnaitė et al., 2015, p. 10).

Real estate assets have two main characteristics; they are heterogeneity and immobility (Tupėnaitė et al., 2015, p. 21). These assets make the real estate significantly different from other markets, for example, the automobile market. In the automobile market, a vehicle can be substituted with a different vehicle, and it does not matter where the vehicle was bought, as it can be easily be transported to its designated destination. Those options do not exist in the real estate market. A buyer needs a specific kind of real estate in a defined area. Real estate is bound

to a specific location and type, e.g., to change an office into a restaurant or an apartment can be very cost expensive, as well as moving real estate from one position to another. Another specialty of the real estate market is that housing is considered as consumption, and as an investment (Burns & Grebler, 1976, p. 104).

The supply and demand of the real estate market are divided into the type, and the area-specific distinctions and, thereby, the real estate market can be a highly segmented one (Tupėnaitė et al., 2015, p. 22). Due to its immobility, there are many real estate markets within one country. Inside a specific region, a market can be summarized, for example, a market for warehouses within Beijing can be summarized but not for China, as within different regions, the demand and supply for warehouses may vary. In contrast to the real estate market, other markets such as steel, coal, or financial products, which could be moved freely and substituted, could be summarized for one country.

There are numerous works and academic literature concerning the relationship between real estate investment and economic growth such as Burns and Grebler (1976); Chi-Wei Su, Zong-Liang Yao and Hsu-Ling Chang (2016); Green (1997); Harries and Arku (2006); Kiyotaki, Michaelides, and Nikolov (2011); Ortalo-Magné and Rady (2006); Wigren and Wilhelmsson (2007), as it is assumed that both branches “have several social consequences with various economic effects” (Jie et al., 2012, p. 125).

2.1.2. DETERMINANTS ON THE REAL ESTATE PRICE

The housing market is “one of the most volatile sectors of the economy” (M.-C. Chen et al., 2004, p. 55). Factors, which might be determinants of the real estate prices, are explained by Tsatsaronis and Zhu. Tsatsaronis and Zhu (2004b, p. 67) explain that there are long and short-term factors that affect the demand and supply of real estate.

The long-term determinants of real estate prices can be the disposable income of a household. Income is identified in many empirical studies as a driver of the housing price (Ortalo-Magné & Rady, 2006, p. 461). If, for example, a household has more disposable income, it may partly be used for an investment in real estate, which thereby leads again to an increase in real estate prices. Another factor is given by Tsatsaronis and Zhu (2004b, p. 67) is the shifts in the demographics, as a gradual change in the demographics to an increase of younger or older generations, can influence the real estate market as well. Younger and older people can be

divided into various age groups. The United Nations Population Fund (n.d.) and the World Bank (n.d.-c) divide the population into three age groups. The three groups are dependent youth (0 – 14 years old), working population (15 – 64 years old), and elders (65+ years old). Another demographic factor that can affect the housing market is the average number of people who live in one household, as an increase of single households leads to an increase in housing demand (Pettinger, 2017). Another demographic influence is the population of the city. Malpezzi, Mayo, and Gross (1985, p. 1) identified that cities in developing countries are growing at a much faster rate than cities in developed countries did.

The tax system can also encourage real estate ownership in contrast to other means of wealth accumulations by, for instance, tax benefits (Tsatsaronis & Zhu, 2004b, p. 67). Cruz ascertained that the "countries with the higher transaction costs are generally the ones with worse housing affordability conditions such as higher house-price-to-income ratios" (Cruz, 2008, p. 146). According to Tsatsaronis and Zhu (2004b, p. 67) are the last factors for the long-term causes of real estate supply the land availability, the price, the constructions, and investment costs to improve existing real estate.

However, real estate is fundamental to the local market. The planning and construction phase can be constrained by the growth of real estate stock, which consequently has a short-term effect on the real estate price. Therefore, differences across countries can lead to a diversity of real estate price dynamics. The price can be influenced by the prevailing conditions of financing a real estate, as well as by the transaction cost like a value-added tax (VAT), real estate tax, inheritance taxes, stamp, and registration duties. Another factor for short-term effects is the uncertainty of the prospect of real estate, which restrains risk-averse investors from investing in irreversible investments (Tsatsaronis & Zhu, 2004b, pp. 67–68).

2.2. THEORETICAL RESEARCH ON HOUSING AFFORDABILITY

2.2.1. PIONEER WORKS ON HOUSING AFFORDABILITY

Ernst Engel and Herman Schwabe, two German statisticians, are generally credited to have originated the concept of affordability (Bentzien, 2015, p. 121; Hulchanski, 1995, p. 473; Stigler, 1954, pp. 98–100; Tighe & Mueller, 2013, p. 80). In the 19th century, the two German statisticians had conducted a research on the relationship between income and household

expenditures (Bentzien, 2015, p. 121; Hulchanski, 1995, p. 473) and, thus, have laid the foundation for future research.

In 1857, Engel concluded in his research that the grocery expenditures of a household do not increase at the same rate as a household's income (Bentzien, 2015, p. 121; Jenkis, 1996, p. 363). Schwabe did similar research on a partial need-filing law in 1867, where he investigated the relationship between the income and rental expenditures of state and local civil servants in Berlin (Bentzien, 2015, p. 121). He discovered that the portion of rental expenditure decreases proportionally with increasing income (Bentzien, 2015, p. 121). Schwabe summarized the result as the following, "the poorer any one is, the greater the amount relative to his income that he must spend for housing" (as cited by Stigler, 1954, p. 100). This is also now known as the 'Schwabe's law' (Jenkis, 1996, p. 363). The term 'law' refers not to a legal rule but to the economist sense of an empirical rule (Jenkis, 1996, p. 363).

In the 1950s, economists analyzed the relationship between a household's income and its expenditures, which entailed a discussion about an appropriate relationship between those two factors (Hulchanski, 1995, p. 472). The economists aimed to determine housing demand elasticities that then can be applied to their models, so Hulchanski (1995, p. 472).

Prior to the 1980s, the works on the research topic of housing affordability were limited; however, since the 1980s, this topic has become popular among scholars (Wong et al., 2010, p. 4). The research on affordability has increased not just in the academic realm and professional real estate realm but also for policymakers as "housing affordability is regularly raised as a major policy concern" (Quigley & Raphael, 2004, p. 191). Scholars around the world are devoted to exploring the topic of housing affordability in various regions, such as Hancock (1993) in Great Britain; Anim-Odame (2016) a region in Africa; Lau and Li (2006) in China; Stone (2006b) examined the housing affordability indicators in the United States, as well as the Australian Housing and Urban Research Institute (2004; 2005; 2007), which published reports on the framework, concepts, measures, as well as approaches on the affordable housing topic in Australia.

Pioneer work was done by Hancock (1993), who examined in his paper "`Can Pay? Won't Pay?´ or Economic Principles of `Affordability´" the meaning of and practices to measure affordable housing. The paper examines various ways of measuring and defining affordable

housing. It insinuates that a ratio measurement is less useful than a residual income definition. The author then examines the housing cost of Glasgow in the years 1988 and 1989 with the focus on affordable rents.

Six different uses of the expenditure-to-income ratio are described by Hulchanski (1995) in his research paper "The Concept of Housing Affordability: Six Contemporary Uses of the Housing Expenditure-to-Income Ratio". According to Hulchanski, the users are to describe the household's housing expenditure, to analyze and compare household trends and types or to provide information for future administration rules, or to define housing needs. Other uses could be to predict the housing affordability both in the form of rent or mortgage and to select criteria to approve rent or mortgage of the households. Depending on the use of the measurement, different measurements would be implemented.

In order to judge the house price, data including rental cost and income of households from 46 different cities in the United States of America have been collected by Himmelberg, Mayer and Sinai (2005) in their study "Assessing High House Prices: Bubbles, Fundamentals and Misperceptions". The authors claim that the price-to-rent ratio, the growth rate of house prices, and the price-to-income ratio can be misleading as they neither take long-term interest rates into account nor predict different long-run growth rates.

Since 2005, the "Demographia International Housing Affordability Survey" (2018) is being published annually. The Survey uses a 'median multiple' approach to measure housing affordability of over 90 major metropolitans in nine different countries. This approach measures the linking of the median house price to the median household incomes. This approach allows comparing different housing markets based on a rating scale. A downside of this approach is that it fails to take house size and building quality into account. Despite the neglect to take certain factors into account, this approach is widely used to measure and compare housing affordability for house purchasing.

Stone (2006b) focuses on the residual income approach as an indicator for affordable housing in the article "What Is Housing Affordability? The Case of the Residual Income Approach". The article provides semantic and definition issues of affordability and the residual income approach. An overview of the historical debates in the United States of America and Great Britain is also given.

Many scholars and surveys examined the housing market of a city. However, the review of the literature demonstrates that scholars, policymakers, and researchers have until now not agreed on an all-encompassing nor a statutory definition of housing affordability. Instead, scholars, researchers, and policymakers provide several definitions, and each definition defines housing affordability based on various factors. In literature, policies, and research papers, the following factors are commonly used while describing housing affordability; housing price, income, wealth, loan, consumption, and taxes. The number of factors, their relationship to each other, and their influence on the affordable housing market make a definition of the housing affordability challenging. Yet, in order to conduct the empirical study on housing affordability, it is beneficial to present and discuss the major concepts and measurements for housing affordability.

2.2.2. PURPOSE OF ANALYZING HOUSING AFFORDABILITY

There are several reasons why the housing market, in particular, housing affordability, is being analyzed. Hulchanski (1995) provides a list of various purposes to measure housing affordability, see Table 1. Hulchanski (1995, p. 472) is basing the assessment on the extent that each measurement is valid and depends on its individual purports to measure the housing market. The purpose of measurement is "(a) to describe household expenditure, (b) to analyze trends, (c) to administer public housing by defining eligibility criteria and subsidy levels, (d) to define housing need for public policy purposes, (e) to predict the ability of a household to pay the mortgage or rent, and (f) as part of selection criteria in the decision to rent or provide a mortgage" (Carswell, 2012, p. 13). The results of a housing affordability measurement are of usage, among other things to housing researchers, mortgage lenders, and policymakers (Carswell, 2012, p. 13).

In this thesis, the housing affordability will be measured with two purposes; to provide an analysis of the recent housing market development in East Asian capital cities and to define the current market situation, which can then be used for public policymakers. The purpose of this research thesis is, thus, to present the reader with a picture of the Chinese, Korean, and Japanese capital housing market based on existing housing affordability indicators.

Purpose	Content
(a) Description	describe a typical household's housing expenditure
(b) Analysis	analyze trends, compare different household types
(c) Administration	administer rules defining who can access housing subsidies
(d) Definition	define housing need for public policy purposes
(e) Prediction	predictability of a household to pay rent or mortgage
(f) Selection	select households for housing units of pre-specified rent or mortgage

TABLE 1: PURPOSE OF HOUSING AFFORDABILITY

Source: Hulchanski, J. D. (1995). The concept of housing affordability: Six contemporary uses of the housing expenditure-to-income ratio. Housing Studies, 10(4), p.476. Author's design.

2.2.3. CONCEPT OF HOUSING AFFORDABILITY

2.2.3.1. DIFFERENT CONCEPTS OF HOUSING AFFORDABILITY

"In the United States and other countries around the world, housing *affordability* is one way to measure economic standards of living" (Carswell, 2012, p. 13). The term 'housing affordability' has been discussed greatly by scholars and policymakers (Bramley, 2012; Hulchanski, 1995; Maclennan, Duncan & Williams, Ruth, 1990; Stone, 2006b; Whitehead, 1991). A series of recent studies indicate that the rise of housing prices, coupled with rising interest rates and economic recession, are indicators for identifying the issue of affordable housing (Hancock, 1993, p. 127). Generally, affordable housing is intended for households with lower incomes to exceed the housing market without assistance (Milligan et al., 2004, p. ii). "The idea of affordable housing recognises the needs of households whose incomes are not sufficient to allow them to access appropriate housing in the market without assistance" (Milligan et al., 2004, p. ii). Carswell also considers that "as a standard-of-living measure, affordable housing is important for people's well-being, especially for lower income households" (Carswell, 2012, p. 13).

Linneman and Megbolugbe state that "talk of housing affordability is plentiful, but a precise definition of housing affordability is at best ambiguous" (Linneman & Megbolugbe, 1992, p. 371). Thereto stated Bramley "'affordability' has become a more important issue in housing policy, although it is still not fully enshrined in agreed standards, partly due to different views about how it should be measured and at what thresholds" (Bramley, 2012, p. 133). Bramley (2012, p. 133) furthermore points out that during the time leading up to the crisis, from the late

1990s until the late 2000s, real estate prices rose faster than income, and thus, posed an affordability issue, particularly for the group of potential first-time real estate buyers.

According to Stone (2006b, p. 151), housing affordability is the relationship between non-housing expenses and the cost of housing within the households' income. Hulchanski (1995, p. 471) identified that the term 'housing affordability' is in many nations commonly used to summarize the nature of which residents encounter difficulties in order to access housing. As a result, he declares that if a household is paying more than a certain percentage of its' income for the housing, the household has a housing affordability issue (Hulchanski, 1995, p. 471). Hence, the measurements to determine housing affordability therein lies in determining which percentage of income a household is able to spend for their housing without restraint.

Referring to the ability of a person to pay for housing indicates the amount of financial stress they must bear (Robinson et al., 2006, p. 2). The financial stress can be measured in two ways; first, it can be measured on how much income is used for the purchase (Robinson et al., 2006, p. 2). Second, the leftover percentage of income that can be used for purchasing other goods can also be measured (Robinson et al., 2006, p. 2). These two measurements can be used to quantify the financial stress a housing purchase or any other goods has on a household (Robinson et al., 2006, p. 2).

The percentage a household is able to spend of their income on housing without facing financial burden is not yet universally defined. In 1981, the Housing and Urban Development Act by the United States defined that families are able to spend 30 percent of their income on housing without financial burden, which has remained until today a 'rule of thumb' to determine the affordability for renting or buying a house (Hulchanski, 1995, p. 472; Linneman & Megbolugbe, 1992, p. 371; Schwartz & Wilson, Ellen, 2008, p. 1; Stone, 2006b, p. 152). A similar way to determine how much a household is generally able to afford for housing was done in the academic studies in the 19th century, which have formulated a 'one week's pay for one month's rent' rule (Hulchanski, 1995, p. 471; K. M. Lau & Li, 2006, p. 615).

Maclennan and Williams have an altered viewpoint of housing affordability. They identified that housing affordability "is concerned with securing some given standard of housing […] at a price or a rent which does not impose, in the eyes of some third party (usually government) an unreasonable burden on household incomes" (as cited by Hancock, 1993, p. 129). However, this statement points out dimensions that are necessary to further define; the definition of

housing standard and the determination of an unreasonable burden of rent or price to the relation of the households' income. Bramley, more specifically defines the housing standard, "that households should be able to occupy housing that meets well-established (social sector) norms of adequacy (given household type and size) at a net rent which leaves them enough income to live on without falling below some poverty standard" (as cited by Hancock, 1993, p. 129).

Carswell (2012, p. 13) has a similar opinion, he points out that if the housing cost in relation to income is too high, this can lead the household not sufficiently to be able to cover their non-housing costs. Therefore, a person should be able to maintain a minimum standard of daily life without an unreasonable financial burden of housing cost or the fear of falling below the poverty line. Consequently, an accepted proportion between household income, the housing cost, and the non-housing costs need to be determined, which then can be used to measure housing affordability. However, as Stone (2006b, p. 163) argues, to achieve a similar living quality, a larger household often has to spend more on living expenses than a smaller household.

Therefore, housing affordability is considered to secure a living standard, which is reasonably costly and does not burden the household finances. Simply put, if the cost of the housing exceeds a given proportion, the housing will be regarded as unaffordable. To conclude, Bramley, Maclennan, and Williams belief is that the most compelling component to determine housing affordability lies in the relationship between housing and non-housing costs.

Whitehead (1991) illuminates the term for housing purchase more detailed, he states that "the standard may be defined in terms of the absolute amount of residual income remaining once the housing has been purchased, i.e. it is set at a level which allows the household to pay for the housing and still purchase a socially acceptable bundle of other goods. Alternatively, the standard may be defined in terms of a relative measure specifying the acceptable proportion of income to be spent on housing. This implies an acceptance of the underlying distribution of income and a view that housing should represent no more than a given element within that income" (Whitehead, 1991, p. 875).

Whitehead further examines the difference between housing 'need' and housing 'affordability'. According to him, "housing need is defined directly as the quantity and type of housing that society regards as minimally acceptable for each household" (Whitehead, 1991, p. 874). The housing standards, however, normally vary between the type of housing, the household size, as

well as age (Whitehead, 1991, p. 874). Accordingly, housing affordability measures the ability of a household to buy or rent their housing needs. Subsequently, on housing affordability lies a great emphasize on the income and housing price, stated Whitehead (1991, p. 876).

Bourassa made a similar definition to Whitehead and Stone. However, Bourassa (1996, p. 1869) further proposes that an income should be compared to a benchmark after the housing cost, such as mortgage payments, taxes, and maintenance expenses are deducted. He refers to this income after the housing cost as ‘after-housing poverty’ (Bourassa, 1996, p. 1869).

As Stone stated, indicators and standards are necessary “to arrive at conclusions - potentially contentious to be sure—about the overall extent of affordability problems and needs, as well as their distribution socially and geographically. They also provide an important foundation for the at least somewhat rational formulation, implementation, and evaluation of policies and practices that deal with affordability” (Stone, 2006b, p. 152).

A different approach to the term housing affordability includes Yang and Shen. They stated that “housing affordability is not a characteristic of housing but a characteristic of a housing service as it relates to the ability and the desire of consumers to pay for it” (Yang & Shen, 2008, p. 321). In order to be able to increase the housing consumption, some households choose to reduce the non-housing good consumption. Hereto states Kempson that “people differ in the way they allocate their money. Some choose to spend more on their housing and cut back on other expenditures; while others keep their housing costs low in order to spend more on other things. The higher the income the less need there is for such choices” (Kempson, 1993, pp. 26–27).

Malpass and Murie (1999, p. 163) add that the buyer’s perception towards the value of money, the length of time of the expenditure, as well as the disposable income all, play an important role in defining the term ‘affordable’. Malpass and Murie (1999, p. 163) are supporting their statement with the argument that young homebuyers typically regard a high number of mortgage payments as affordable. They argue that young homebuyers expect that over time they will have a rise of income while the mortgage payment will stay more or less the same, which in return will feel for the younger homebuyers less burdensome (Malpass & Murie, 1999, p. 163). Vice-Versa, are tenants expecting the rent costs to increase proportionally with the increase of income. Another consideration which needs to be addressed is that homebuyers

have a prospect of making a capital gain through the housing costs while tenant does not. They conclude that the view on what is affordable varies between home-buyers and tenants (Malpass & Murie, 1999, p. 163).

In sum, housing affordability is concerned with analyzing the housing market situation and measuring the affordability of a standard of housing to tenants or house-buyers, which does not impose a financial burden on the household. The measurement of housing affordability is commonly based on the proportion of the housing cost to the income of the household without having to sacrifice other necessary living costs. In a given time, the derived indicators thus allow to compare whether in relation to the median income, the housing has been affordable or not (Stone, 2006b, p. 158).

To add to a non-existing consensus of a definition on housing affordability, economists are wary with the rhetoric term of 'affordability' as it mixes various issues into one (Quigley & Raphael, 2004, p. 191). It jumbles issues together regarding "the distribution of housing prices, the distribution of housing quality, the distribution of income, the ability of households to borrow, public policies affecting housing markets, conditions affecting the supply of new or refurbished housing, and the choices that people make about how much housing to consume relative to other goods" (Quigley & Raphael, 2004, pp. 191–192).

On the bases of the above-presented debates for housing affordability, it can be concluded that there is no one clear, flawless, or unanimous definition for housing affordability. For the propose of this thesis, the definition for housing affordability will rely on the definitions by Carswell (2012), Stone (2006a, 2006b), Hancock (1993), and Whitehead (1991) as they defined that housing cost should not be an unreasonable financial burden for a household.

2.2.3.2. A MINIMAL DEFINITION OF AFFORDABILITY

As presented in the preceding section is the definitions of housing affordability closely linked to a household's income, housing costs, as well as spending on non-housing goods or services. These elements and their relationship are illustrated in a graphic by Hancock (1993, p. 129), see Figure 1.

Figure 1 shows a minimal definition of affordability based on the combination of the level of housing expansive, which are represented at the X-axis, shown as (H) and non-housing goods

on the Y-axis, shown as (Y) (Hancock, 1993, p. 130). “Y* and H* mark the socially-desirable minimum standards of the two goods defined for the individual, since we might expect that Y* and H* to vary according to the size and composition of the household” (Hancock, 1993, p. 130). The point E on the axes “indicates the consumption bundle about which affordability is concerned” (Hancock, 1993, p. 130). From a minimalist viewpoint, everything in region A would thus be considered to be unaffordable as the household would not be able to cover the housing nor the non-housing good expenses. An unambiguous indicator for affordability is the area B, as the households can cover both the non-housing goods as well as housing costs (Hancock, 1993, p. 130). Area C and D expose that the household is able to cover one of the two elements sufficiently but not both at the same time (Hancock, 1993, p. 130). However, more information will be needed on the households in the Area of C or D about preferences and limitations to determine if they have an affordable home (Hancock, 1993, p. 130). Hui (2001, p. 40) explains that the household in the area of C and D are only able to consume enough of either non-housing goods or housing but are then lacking the other. Strictly graphically read, the households, which fall into the area of B, C, or D have an affordable home (Hui, 2001, p. 40). Nevertheless, further intimation is needed for the households in the area of C and D to determine if they fall into the area due to preferences or opportunities as to some household might choose certain goods over the household necessity (Hancock, 1993, p. 130).

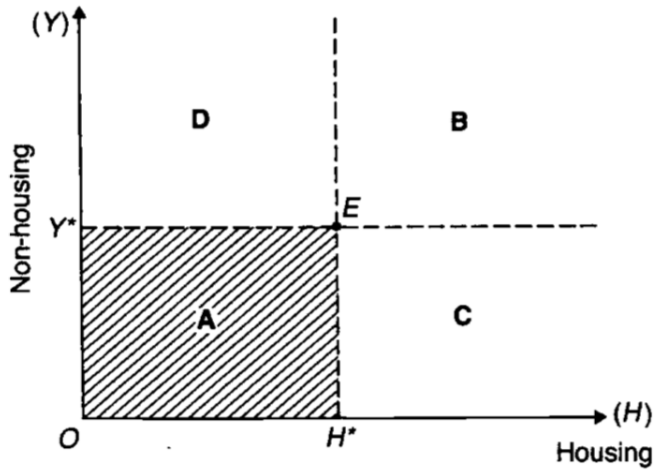

FIGURE 1: A MINIMAL DEFINITION OF AFFORDABILITY

Source: Hancock, Karen E. (1993). “Can Pay? Won’t Pay?” or Economic Principles of “Affordability.” Urban Studies, 30 (1), 127–145. p. 129

The measurement for this definition would thus be that housing is unaffordable if:

$$P^hH < P^hH^* \text{ and } P^yY < P^yy^* \text{ (Hancock, 1993, p. 135)}$$

In this formula P^h and P^y embody the unit prices for housing and non-housing expenses (Hui, 2001, p. 42). The socially acceptable minimum housing standard is H* and Y* is the socially acceptable minimum non-housing consumption (Hui, 2001, p. 42). H and Y are the actual housing and non-housing consumption patterns (Hui, 2001, p. 42).

2.2.3.3. AFFORDABILITY FOR AN INDIVIDUAL CONSUMER

However, Figure 1 shows "only the most relaxing condition of affordability without taking the income constraint of the household" (Hui, 2001, p. 40). Presuming that the income of the household is sufficient to purchase Y* as well as H* and the potential budget limits are represented in a line between F and G (Hancock, 1993, p. 130; Hui, 2001, p. 40), see Figure 2. Adding the income constraint into the graphic makes the affordability constraints more stringent (Hui, 2001, p. 40). The FG line shows the relation of income to the non-housing and housing costs (Hui, 2001, p. 40). Furthermore, the FG slope represents the budget constraints, which are determined by the household's income (Hancock, 1993, p. 130), which reveals the cost of substituting non-housing goods for housing (Hui, 2001, p. 40). Hui (2001, p. 41) explains that in Figure 2, affordability is only the case if the household's housing and non-housing consumption is positioned anywhere on the line FG. Hancock (1993, p. 130) clarifies that if a consumer has a consumption level within the shaded area, they cannot reach the point of E due to two reasons. Firstly, the given income, and secondly, the relative prices of the two goods (Hancock, 1993, p. 130). Consequently, the area between Y*FE as well as H*GE are considered to be an area in which housing is affordable (Hancock, 1993, p. 130). Consumers who have their consumption patterns either on the FG line or in the unshaped are of C or D are consuming insufficient of either housing (Y) or non-housing goods (H), whether because of an individual choice or other non-income constraints (Hancock, 1993, p. 130).

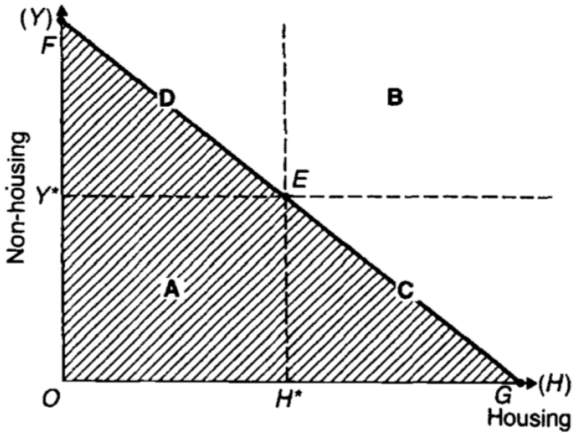

FIGURE 2: AFFORDABILITY FOR AN INDIVIDUAL CONSUMER

Source: Hancock, Karen E. (1993). "Can Pay? Won't Pay?" or Economic Principles of "Affordability." Urban Studies, 30 (1), 127–145. p. 130

2.2.4. COMMON APPROACHES AND MEASUREMENTS

2.2.4.1. OVERVIEW AND CATEGORIES

The selection above has shown that the literature offers a number of various definitions and approaches on housing affordability (eg., Aurand, 2017, 2017; Bramley, 2012; Hancock, 1993; Himmelberg et al., 2005; Hui, 2001; K. M. Lau & Li, 2006; Paris, 2007; Stone, 2006b; Yip, 1995). In order to address the debate of housing affordability to the fullest extent, this thesis will provide information on the various approaches and measurements on housing affordability. There are several approaches to evaluate the housing affordability issue, as the concept of housing affordability is complex, and some data can be hard to access. Some measurements have developed decades ago, are well-known, or used more frequently than others. Each measurement has its unique way of measuring housing affordability, and thus, its advantages and disadvantages. Consequently, each measurement has its specific focus and benchmark, which leads to the fact "that there is no one best measure for assessing the nature and degree of housing affordability problems" (Gabriel et al., 2005, p. 37). Therefore, it is of importance to identify the needs of the results while selecting a measurement method.

Due to the imprecise and non-uniform definitions on housing affordability as well as its various measurement methods, each mechanism has its specific focus and methods (Carswell, 2012, p. 14). The core of any measurement is, however, to quantify the discrepancy between what a household is expected to spend and what its current expenditures include (Bogdon & Can, 1997, p. 47). Many analysts made a set of pragmatic assumptions on what they consider to be

affordable housing and then applied those to their definitions and analyses on affordable housing (Paris, 2007, p. 1). The various methods are grouped by scholars in different approach categories, e.g., Carswell (2012); Stone, Burke, and Ralston (2011), and Yip (1995).

Carswell prearranged the various measures into six categories, "(a) the housing expenditure-to-income ratios, (b) the National Low Income Housing Coalition's housing wage, (c) ability to qualify for a mortgage, (d) residual income approaches, (e) market approach, and (f) other measures that don't fall into previously listed categories" (Carswell, 2012, p. 14).

Stone, on the other hand, categorizes the approach strategies for defining housing affordability into five approaches: "1. Relative — changes in the relationship between summary measures of house prices or costs and household incomes 2. Subjective — whatever individual households are willing to or choose to spend 3. Family budget — monetary standards based on aggregate housing expenditure patterns 4. Ratio — maximum acceptable housing cost/income ratios 5. Residual — normative standards of a minimum income required to meet nonhousing needs at a basic level after paying for housing" (Stone, 2006b, pp. 157–158).

Yip (1995, p. 56) explains that the concept of affordability should be operationalized in order to measure the cut-off level of affordability. In his research framework, he summarized the approaches and identified only three main approach categories; the Normative Approach, the Behavioral Approach, and the Subjective Approach (Yip, 1995, pp. 56–68).

As there are various ways to measure housing affordability, it is vital to screen the literature and to identify the most recognized and common practice which will be applied in this thesis. Consequently, in the following section, several measurement mechanisms of housing affordability, their strengths, and shortcomings, as well as their possible misleading results, will be discussed. The measurement mechanisms will be ordered into three categories, as described by Yip.

2.2.4.2. BEHAVIORAL APPROACH

The Behavior Approach assesses affordable housing by reviewing the housing consumption behavior of a household (Yip, 1995, p. 66). According to Yip, there are several ways to assess behavior. Bramley (1994, p. 105) defines one way as the "focus on normal housing consumer decisions, looking at what households with given incomes and characteristics, facing given

prices, choose to spend". This approach corresponds with the approach of Yang and Shen (2008, p. 321), who argue that housing affordability is related to the ability and desire of a person to spend on their housing. Additionally, Kimpson (1993, pp. 26–27) explains that people differ in their spending habits, while some choose to spend more on housing, some prefer to use the money on other goods.

Another method described by Bramley is to analyze "the evidence of housing problems" (Bramley, 1994, p. 105), by examining the households which are displaying problems affording their housing; particularly those households which are in debt due to rent or mortgages (Bramley, 1994, p. 105).

Yip (1995, p. 66), however, explains that previous research and studies using Behavioral Approaches gave inconclusive results. Yip (1995, p. 66) describes that there are two main reasons for the inconclusive results; for one, affordability was in those studies addressed as a specific issue, and secondly, the empirical data were insufficient to conduct a thorough investigation.

2.2.4.3. SUBJECTIVE APPROACH

A different approach to the housing affordability measurement is the Subjective Approach. In contrast to the Normative Approach and Behavior Approach, which uses systematic and objective research of data collection, the Subjective Approach is using subjective indicators provided by the households themselves. Stone points out that this "approach rests on the assumption of *homo economicus*: Since households are presumably rational utility-maximizers, every household is by definition paying just what it can afford for housing (Stone, 2006b, p. 159).

Stone, Burke, and Ralston view the Subjective Approach in the perspective that "housing affordability per se has no generalisable meaning; it is neither rationally possible nor socially desirable to establish a normative standard of affordability other than individual choice" (Stone et al., 2011, p. 17).

Kempson (1993, p. 26) recognized the individual decision of a household on how much they are willing to spend on housing, and consequently, the financial flexibility of household expenditure. He states that "people differ in the way they allocate their money. Some choose to

spend more on housing and cut back on other expenditures; while others keep their housing costs low in order to spend more on other things" (Kempson, 1993, pp. 26–27).

According to Yip, the Subjective Approach was "pioneered by Kearns and Colleagues (1993) in their study of housing association tenants in Scotland" (Yip, 1995, p. 67). Kearns and his colleagues conducted a survey in which the surveyed had to evaluate their affordability situation along a Likert scale (Yip, 1995, p. 67). The Likert scale ranged "from "very difficult to afford" to "very easy to afford"" (Yip, 1995, p. 68). As reported by Yip was the qualitative assessments then checked against the income and financial situation as well as other quantitative indicators of the particular household. This was done to detect anomalies between the subjective evaluation of the surveyed and objective evaluations of affordability (Yip, 1995, p. 68). The goal of this method is to determine the threshold level for affordability on the basis of the subjective assessment data, assuming that the individual household can evaluate their situation best, according to Yip (1995, p. 68).

Stone further points out that housing affordability might be subjective for higher-income households as they have "considerable discretion about how to allocate their resources" (Stone, 2006b, p. 159). Households with lower incomes have less discretion, and thereby, housing cost makes up a significant portion of their income (Stone, 2006b, p. 159).

Stone, Burke, and Ralston conclude "that 'subjectivity' of affordability is not only *not* universal, it is not even a continuum that increases with income" (Stone et al., 2011, p. 18). Stone (2006b, p. 159) contends that a threshold exists above which housing affordably becomes an increasingly subjective standpoint. However, Stone, Burke, and Ralston (2011, pp. 17–18) also point out that this declaration generates questions which are not discussed within this perspective, such as at what point the in the threshold is affordability changing to a subjective, and in what way should below the threshold the objective affordability be defined and measured.

2.2.4.4. NORMATIVE APPROACH

Yip explains that the Normative Approach refers to the "limits and norms of affordability in terms of certain threshold values" (Yip, 1995, p. 56). In short, affordable housing is identified by a list of benchmarks. He further enlightens that there are two norm sets that are commonly used to identify the housing affordability.

The first norm is dealing with the poverty line. Yip explains that the "income remaining after housing cost is paid for should not be lower than the poverty line" (Yip, 1995, p. 56), which can be measured with the residual income measurement (Yip, 1995, pp. 56–57). The second norm of the Normative Approach refers to the relationship between income and housing costs. Mathematically, this relationship can be calculated either through a ratio or difference approach, which is "the formal foundations of the prevailing affordability paradigm and its principal challenger, respectively" (Stone, 2006b, p. 157). The ratio measurement suggests that "the housing cost of a household should not exceed a certain proportion of the household's income" (Yip, 1995, p. 56). Among various measuring tools, the ratio and residual income measurement are the two most commonly used measurements to calculate housing affordability (Yip, 1995, p. 56).

Stone explains that "mathematically, the relationship between housing costs and incomes can be computed as a ratio or a difference" (Stone et al., 2011, p. 15). In Table 2, the different measurement approaches are presented. The theory behind the two approaches will be discussed in the following sections.

Residual Income Approach	Income-to-Expenditure Ratio Approach
disposable income – housing expenditures	$\frac{\text{housing expenditures}}{\text{disposable income}}$
= minimum amount for other consumptions	= affordable Ratio

TABLE 2: RESIDUAL INCOME AND RATIO APPROACH

Sources: (Hancock, 1993, p. 132; Heylen & Haffner, 2013, p. 554; Hui, 2001, p. 38; Stone, 2006b, p. 157; Yip, 1995, p. 56). Author's design.

2.2.4.5. MEASUREMENTS

2.2.4.5.1. RESIDUAL INCOME APPROACH

The residual income approach is a result of the recognition that a household has to pay its largest and least flexible part of its income for housing (Stone, 2006b, p. 163). Henceforth, "non-housing expenditures are limited by how much income is left after paying for housing" (Stone et al., 2011, p. 21).

Thus, the residual income approach calculates the household requirements after subtracting the housing cost (Hui, 2001, p. 38). The approach focuses on the adequacy of non-housing goods for households' consumption after the payment for housing goods (Hui, 2001, p. 38). In this approach, the income is the amount of money a home buyer household has after paying off mortgages (Carswell, 2012, p. 13) or the rent payment in case of a tenant household. Subsequently, the approach aims to guarantee a minimum level of non-housing consumption (Hui, 2001, p. 38; K. M. Lau & Li, 2006, p. 4).

In Figure 3, the X-axis, shown as (H) refers to the housing consumption, while the Y-axis, shown as (N), represent the non-housing consumption (Lau & Li, 2006, p. 5). H* is the minimum consumption of housing and H_{max}, the maximum housing consumption. H_{max} is set to avoid excessive consumption of housing (Lau & Li, 2006, p. 5). "Under this approach, housing benefit or subsidy is necessary for low-income group to raise their nonhousing consumption to the socially acceptable minimum standard" (Hui, 2001, p. 38).

If a household is calculated to be in area A, it is an indicator that there is inadequate consumption of goods for housing as well as for non-housing goods. The area D or B refer to that non-housing cost are acceptable, however, the housing cost might or might not be acceptable. The last area, C, reflects that the housing consumption is acceptable; nevertheless, the non-housing is not. In other words, housing is measured as affordable when residents can consume housing as well as non-housing goods (Lau & Li, 2006, p. 5).

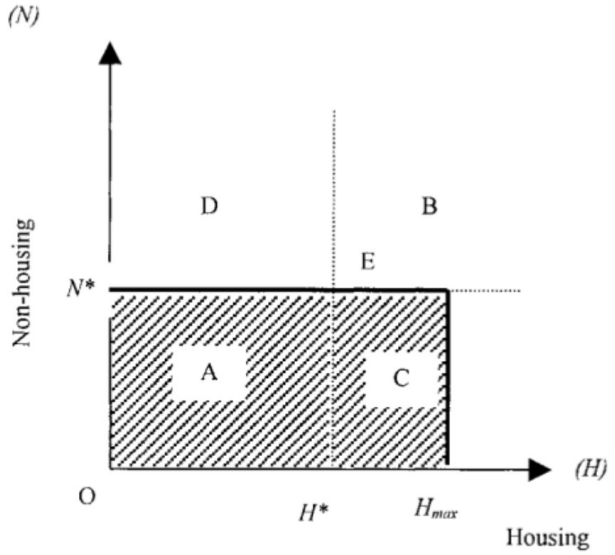

FIGURE 3: RESIDUAL INCOME APPROACH

Source: Hui, E. C. M. (2001). Measuring Affordability in Public Housing from Economic Principles: Case Study of Hong Kong. Journal of Urban Planning and Development, 127, 34-49. p. 38

DEBATE ABOUT THE RESIDUAL INCOME APPROACH

An advantage of the residual income approach lies in the explicit representation of the relationship between housing and none-housing costs (Gabriel et al., 2005, p. 27). A supporter of the residual income approach is Stone, as "housing costs tend to be inflexible and make the first claim on after-tax income for most households" (Stone, 2006a, p. 459).

Saunders, Patulny, and Lee (2005, p. 147) point out that the two main advantages of this approach are its transparency and flexibility. Transparency is assured as the costs for goods "used to derive the budgets can be readily scrutinized to assess their validity" (Saunders et al., 2005, p. 147). The ability to remove and supplement items displays the flexibility of this approach while adding or removing items in the calculation their impact can be ascertained (Saunders et al., 2005, p. 147). Because of its many advantages and detailed measurement, this approach is often used to examine housing affordability for lower and moderate-income households (Gabriel et al., 2005, p. 26,27).

Despite its advantages, this approach is also criticized for making too many judgments and assumptions of what is considered to be necessary household expenditures (Gabriel et al., 2005, p. 27; Saunders et al., 2005, p. 147). Stone (2006b, p. 163) presents two examples that display the weaknesses of this approach, e.g., comparing two households, one consists of a single person household and the other of a couple with three children. Both households have a similar after-tax income, however, to achieve the same quality of life, the larger household will have to spend more on non-shelter necessities than the one-person household (Stone, 2006b, p. 163). Hence, the smaller household can afford to spend more on housing than the larger household with the same income (Stone, 2006b, p. 163).

Stone (2006b, p. 163) furthermore gives a second example that demonstrates the flaw of the rationale. Comparing, for example, of two households that have the same size but different after-tax incomes, the amount they have to spend for non-shelter goods is similar (Stone, 2006b, p. 163). However, the household with a higher income can afford to spend a higher percentage of its income on housing (Stone, 2006b, p. 163).

The cases given by Stone indicate that generally speaking, the smaller household has to spend on average less for non-housing necessities to achieve a comparable standard of living than a larger household. This leads to the result that households with higher income can afford to

spend a higher percentage of income for housing than a household with a lower income (Stone, 2006b, p. 163). The residual income standard, thus, develops from a sliding scale, which integrates the maximum affordability amount and the portion of income, which may vary depending on the household size, type, and income (Stone, 2006b, p. 164). However, Stone (2006b, p. 164) also notes that this implies that some households may afford more on their housing than the ratio establishes while others may afford nothing.

Although supporters of this approach argue that the residual approach provides more accurate information on various housing types than a ratio measurement (Gabriel et al., 2005, p. 26) therein also lies its disadvantage, as this approach requires more onerous data than a ratio measurement, which might not always be easily accessible (Gabriel et al., 2005, p. 27). Thus, Gabriel et al. (2005, p. 27) describe this approach as complex and time-intensive.

MEASUREMENTS FOR INCOME APPROACH

The residual income approach determines the disposable income a household has after subtracting the housing expenditures. A housing is according to this approach affordable if the remaining income conforms to the "the socially acceptable minimum standard of nonhousing consumption" (Hui, 2001, p. 38).

As the residual income is defined by the difference between the disposable income of a household and their housing expenses (Heylen & Haffner, 2013, p. 554; Hui, 2001, p. 38) the calculation for affordable housing would be thus as following:

household's income - housing expenditures ≥ minimum level of social accepted non-housing consumption (Heylen & Haffner, 2013, p. 554; Hui, 2001, p. 38)

2.2.4.5.2. THE RATIO APPROACHES

According to Yip (1995, p. 54), the two most commonly used approaches for affordability are a ratio measurement or a residual income method. The ratio approach is the most recognized and has the longest and widest recognition for assessing housing affordability (Stone, 2006b, p. 162). Both measurements have indicators that measure the relationship between a household's income and their housing costs (Stone, 2006b, p. 162; Stone et al., 2011, p. 20).

A ratio approach is typically adapted to analyze the affordability through a measurement of the proportion or relationship between a household's income and their housing expenditures (Paris, 2007, p. 1; Stone, 2006b, p. 162). According to Stone (2006b, p. 162), is the relationship between the two factors often an outcome of unsatisfying and limited alternatives on the side of a household and is recognized in the ratio approach. A percentage method or benchmark level is typically used in a ratio approach to conclude the housing affordability (Hulchanski, 1995, p. 471; Stone et al., 2011, p. 44). In other words, housing is only affordable if it does not exceed a threshold of the ratio (Yip, 1995, p. 54). However, this ratio approach also proclaims that a household doesn't have enough money left for non-housing goods if the housing payment takes up more than a certain percentage of the income (Stone, 2006b, p. 162).

In Figure 4, the relationship between income, non-housing, and housing costs is presented. The ratio is symbolized with the OJ line, which divides the graph into two zones; white and dashed. The slope of the OJ line is representative of an increased ratio of the housing spending to the household income (Lau & Li, 2006, p. 4). The incline of the OJ line is caused by a definite ratio of the household's income to their housing and non-housing costs (Hancock, 1993, p. 132). Thus, the inclining of the OJ line is representative of an increased ratio of the housing spending to the household income (Lau & Li, 2006, p. 4). The X-axis, shown as (H), refers to the housing quantity, whereas the Y-axis, shown as (N), represents the income or house price (Lau & Li, 2006, p. 4). The socially acceptable minimum standard is integrating with this graph as N and H, given here as the example of point E (Lau & Li, 2006, p. 4). Point E is the combination of housing cost and non-housing goods, and thus, concludes that the household has reached its maximum affordable level for housing (Lau & Li, 2006, p. 4). The target ratio for this approach is to have the housing costs relative to the income, which is given at any point on the OJ line (Hancock, 1993, p. 132).

Consequently, everything on or exceeding the OJ line, which is shown in the Figure as the white area, is considered to be affordable (Lau & Li, 2006, p. 4). Vise-Versa, is any point below the line are considered to be an unreasonable burden for the household, and thus, by this definition, the housing would be unaffordable (Hancock, 1993, p. 132). This is to say that any point in the dashed region indicates unaffordable housing (Hui, 2001, p. 36).

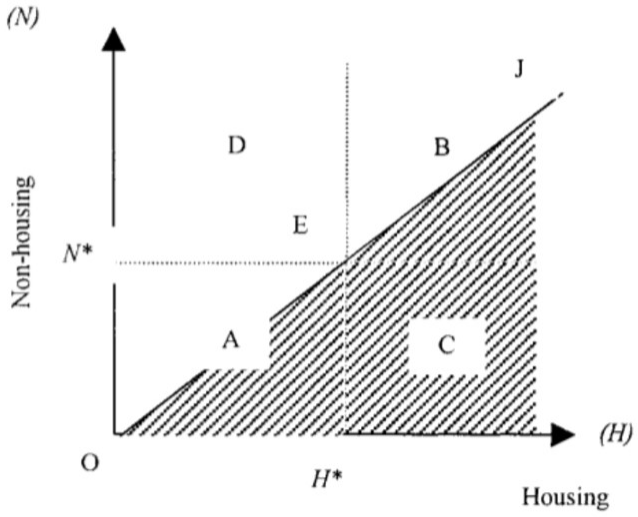

FIGURE 4: RATIO APPROACH

Source: Hui, E. C. M. (2001). Measuring Affordability in Public Housing from Economic Principles: Case Study of Hong Kong. Journal of Urban Planning and Development.127, 34-49. p. 37

DEBATE ABOUT RATIO APPROACH

As the ratio approach is based on pure numbers, the results of these mathematical equations are comparable across time and space (Stone, 2006b, p. 162). Consequently, they are often the subject of being used as a basis to construct indicators and normative standards on housing (Stone et al., 2011, p. 20).

An advantage of this approach is that the relationship between income and housing costs recognizes this ratio is a "result of difficult choices among limited and often unsatisfactory alternatives" (Stone et al., 2011, p. 20). Despite its advantage, its widespread acceptance, and usage, the ratio approach has some technical and conceptual flaws (Hancock, 1993, p. 133; Paris, 2007, p. 2; Stone, 2006b, p. 163). For example, Hancock points out that further information is needed of area D before it can be clarified as affordability, however, in the ratio approaching the area is unambiguously regarded as affordable (Hancock, 1993, p. 133). Similar classification differences are occurring in the C region, which in this ratio measurement is clarified as unaffordable (Hancock, 1993, p. 133). Additionally, he criticizes that the ratio definition does not define what an acceptable consumed opportunity-cost is and what amount is to be considered to be excessive (Hancock, 1993, p. 133). The consumed opportunity-cost is measured in terms of total costs (Hancock, 1993, p. 133). Hancock believes that opportunity-cost should be measured "in terms of the fraction of consumers' income absorbed" (Hancock, 1993, p. 133). For example, according to the ratio definition is a household in the white area of the A region experiencing housing affordability, however, their expenses for non-housing

goods and housing costs are underneath the socially acceptable minimum standard (Hancock, 1993, p. 133). Paris (2007, p. 2) explains that the income and non-housing costs change during a life cycle, which typically leads to a higher proportion of the income which is spent on the purchases of a house during the early years. Stone asserts that the "logical flaws in the ratio approach lead inexorably to the residual income concept" (Stone, 2006b, p. 163).

Although the ratio approach has its flaws, it is internationally used (Stone, 2006b, p. 162). The ratio approach can further be subdivided into two separate measurements (Lau & Li, 2006, p. 4). One approach is the ratio concerning tenants and their renting cost, known as the rent-to-income ratio (Lau & Li, 2006, p. 4). The second approach is the price-to-income ratio, which dealing with owners and their owing cost (Lau & Li, 2006, p. 4). The price-to-income deviated from a long-term housing trend and is often used as an indicator of the housing prices (N. Chen & Cheng, 2017, p. 293). Both the rent-to-income ratio and price-to-income ratio are both among the most widely used indicators to monitor the conditions of a housing market (André et al., 2014, p. 2127).

MEASUREMENTS FOR THE RATIO APPROACH

HOUSE PRICE-TO-RENT RATIO

The house price-to-rent ratio is commonly used to evaluate the housing market, focusing on the affordability for a tenant. This ratio is similar to a price-to-earnings multiple for stocks, which is "intended to reflect the relative cost of owning versus renting" (Himmelberg et al., 2005, p. 72). Thus, the results of the two ratios can show if renting or buying a home is more or less cost-effective (Himmelberg et al., 2005, p. 72). When the price of owning a home is relatively higher than renting a home, prospective homebuyers will have a preference towards not buying and instead rent a home (Himmelberg et al., 2005, p. 72). This leads to a decrease in demand for real estate and levels out the house prices with the renting prices (Himmelberg et al., 2005, p. 72). However, if for a long period of time the price-to-rent ratio remains high, it suggests that the real estate prices are sustained through unrealistic future price gain expectations which do not coincide with the fundamental rental value; this effect is known as a real estate 'bubble' (Himmelberg et al., 2005, p. 72). The equation for the price-to-rent ratio is the following:

$$\text{House price-to-rent} = R_G/100 \text{ (Global Property Guide, n.d.)}$$

The equation for the price-to-rent ratio is the gross rent price (R_G) divided by the factor 100 (Global Property Guide, n.d.). The higher the resulting number is, the lower is the price-to-rent ratio (Global Property Guide, n.d.).

MEDIAN MULTIPLE AND PRICE-TO-INCOME RATIO

The Median Multiple is a reflection of the ability of the residents to purchase a house. The Median Multiple is also known as the price-to-income ratio (PIR), it measures the ratio between local housing costs and the local pay ability (Himmelberg et al., 2005, p. 73). The basis of this measurement lies in the median price of a residential apartment and the median annual income of a household (Malpezzi & Mayo, 1997, p. 4). As the Median Multiple is based on two factors, the blueprint of this measurement is presented by the Annual Dermographia International Housing Affordability Survey (2018, p. 1) as follows:

$$\text{Median Multiple} = \frac{\text{median house price}}{\text{median household income}}$$

Zhang and Tan (2013, p. 87) have a similar formula for the price-to-income ratio. They depict the PIR to be a ratio result between the average price of a house and the annual disposable income of an average household (Zhang & Tan, 2013, p. 87). This depiction results in the following formula by Zhang and Tan (2013, p. 87):

$$\text{Housing-price-to-income ratio} = \frac{\text{average price of a set of residential housing}}{\text{average annual household disposable income}}$$

Lau and Li (2006, p. 619) broke down the ratio equation into four subfactors, which resulted in the following calculation:

$$\text{PIR} = \frac{AP * FA}{AY * nP}$$

The PIR is calculated by multiplication of the mean selling price per square meter (AP) times (FA), which stands for a pre-specified gross floor area per housing unit (m^2) (K. M. Lau & Li, 2006, p. 619). In other words, the average selling price per square meter will be multiplied by the average floor space needed for an average household size. This factor will be divided by a result of the multiplication of the annual income of a resident (AY) times the average number of people living in a household (nP) (K. M. Lau & Li, 2006, p. 619).

The OECD commented that "if the price-to-income ratio is above (below) their long-term average, house prices are considered to be overvalued (undervalued)" (OECD, 2016, p. 1). Chen and Cheng (2017, p. 293) further explain that if a housing price is potentially higher than the income of the household, the housing is considered unaffordable. This measurement is considered "capable of reflecting rapid changes in affordability conditions across time and have a comparability quality" (K. Y. Lau & Leung, 2001, p. 3).

30% EXPENDITURE-TO-INCOME RATIO

Another ratio approach is the 30 percent expenditure to income ratio. Hulchanski (1995, p. 471) contends that the roots of the affordability debate lies in the 19th century, during which the 'one week's pay for one month's rent' was a common expression. This expenditure-to-income ratio was used by landlords in northern America as well as mortgage lenders as selection criteria. Over time this unwritten rule of 'one week's pay for one month's rent' developed and moved upwards. For example, Canada changed the rule of thumb in the 1950s from 20 percent to 25 percent and in the 1980s to 30 percent (Hulchanski, 1995, p. 471).

The Housing and Urban Development Act of the United States (HUD) is using a percentage of a household's income to measure housing affordability (HUD User, n.d.). They have increased their percentage to a 30 percent benchmark for housing in the early 1980s (HUD User, n.d.; Linneman & Megbolugbe, 1992, p. 389). Until today, this 30 percent benchmark is commonly still referred to as a 'rule of thumb' to determine the affordability of housing (Hulchanski, 1995, p. 472; Stone, 2006b, p. 152). Carswell refers to the 30 percent rule as a "30% expenditure-to-income ratio [that] sheds light on how much income is available to cover nonshelter needs" (Carswell, 2012, p. 13).

The 30 percent rule defines that if a household spends 30 percent or less for their monthly income for their housing cost, this housing is considered to be affordable for the household (Carswell, 2012, p. 13). However, this also indicates that if a household is spending over 30 percent of their income on their housing costs, this housing is not considered to be affordable for this particular household. Vise-Versa, if the housing costs, e.g., rent, maintenance or mortgage, devour 30 percent or less of the resident's income, the housing is considered affordable (Carswell, 2012, p. 13). The equation for the 30 percent expenditure-to-income ratio is the following:

Monthly housing expenditure = 30% of households' income per month

Due to its easy and simple applicability, this formula is easy to understand and is, therefore, up until now, a commonly used measurement of housing affordability (O'Neill, 2008, p. 7).

DEBATE ABOUT 30% RATIO

Carswell believes that the results of this measurement can be a "valid and reliable quantitative indicator for housing research, analysis, and administration of programs […], depending on the research questions asked and methods used" (Carswell, 2012, p. 13). However, Carswell (2012, p. 13) also claims that the results are not valid and reliable in all cases. In contrast, Hulchanski is of the opinion that this ratio is an invalid and misleading result as this method "takes a descriptive statistical statement (the 30 per cent ratio) and dresses it up as an interpretative measure of housing need (or lack of need)" (Hulchanski, 1995, p. 482). Hulchanski (1995, p. 482) criticizes that a subjective declaration of what affordable housing expenditure is being used as a base for this ratio, which makes a general assumption on how much cash is needed to cover non-housing necessitates. Hulchanski (1995, p. 475) further points out that this method is based on a gross generalization about the average amount which a household tends to or ought to spend on their housing situation. Hulchanski (1995, p. 475) furthermore explains that the assumption about the amount that a household 'ought' to spend on their housing was a translation of observations on what households did spend for housing put into assumption to what they 'ought' to spend.

Another shortcoming of this 30 percent ratio is pointed out by Andrews (1998) and Aurand (2017). This ratio "ignores the different financial capabilities among families of varying income and size" (Aurand, 2017, p. 7). Aurand (2017, p. 7) states that for a household with an extremely lower-income housing cost which takes up 30% of their income is difficult and burdensome as they leave little for other necessities. Vise-Versa, a household with a high income, can afford to spent exceeding the 30 percent benchmark for housing without having to cut back on other necessities (O'Neill, 2008, p. 7).

2.2.5. DETERMINANTS OF HOUSING AFFORDABILITY

Although various measurement approaches are identified, two main factors that affect affordability are detected. Schwabe already investigated the two main fundamental factors in 1867 (Bentzien, 2015, p. 121), and since then, many approaches for affordable housing are built on those two main factors which affect affordability, namely, cost and income. The first main factor is housing cost. Housing cost, may it be rent or buying price, is affecting the affordability

of housing as it determines how much is required to pay for housing (Wong et al., 2010, p. 8). At the same note, income determines the ability of a household to pay for their housing and the more they earn, the more they can spend on housing without having to cut back on other non-housing goods (Kempson, 1993, pp. 26–27; Stone, 2006b, p. 163). Consequently, income is the second main factor that affects housing affordability (Wong et al., 2010, p. 8).

As the literature review has shown, other factors besides price and income can affect the extent of housing affordability. Especially other housing expenditures, such as tax, loan, rate, management, and maintenance fees, can affect the affordability as these factors are also deducted from the income, and thus, reduce the available money for paying the housing rent (Wong et al., 2010, p. 8).

Apart from housing expenditure, other non-housing expenses such as clothing, groceries, transport, education, medical care, etc. can be operationalized into vital costs to maintain an acceptable level of minimum living standard (Carswell, 2012, p. 13; Hancock, 1993, p. 129; K. M. Lau & Li, 2006, p. 616). These expenditures and their influence on housing affordability are considered in the residual income measurements, which calculate the required wealth after subtracting the housing costs (Hui, 2001, p. 38). This approach aims to assure a minimum level of non-housing consumption (Hui, 2001, p. 38; K. M. Lau & Li, 2006, p. 4), which concludes that housing becomes unaffordable if the basic living standard cannot be covered, and thus, also affects a household's ability to pay for housing (Wong et al., 2010, p. 8).

Maclennan and Williams stated (as cited by Hancock, 1993, p. 129), the importance of affordability as concerned with securing a standard of housing without an unreasonable financial burden on the household. Housing standards, however, may vary between the type, size, or age of the house (Whitehead, 1991, p. 874). Also, the concept formula by Hui, see Chapter 2, embedded the minimum housing standard as a factor on affordability, which indicates that housing quality also is a factor that affects the housing affordability situation.

The following Table 3 provides a summary of the approaches and measurements as well as factors that influence housing affordability.

Approach	Measurement	Factors
Behavior Approach	Assesses Households Housing Consumption	• assess the amount households choose to spend on housing • analyze the evidence of housing problem e.g. debt

Subjective Approach	Scale Ranking	• homo economics
		• based on the individual decision on how much to spend for:
		  ○ housing costs
		  ○ non-housing costs

Normative Approach	Residual Income Measurement	• income • housing costs • a minimum level of non-housing consumption
	Ratio Measurement	• household's income • housing costs • non-housing costs
	Price-To-Income Ratio	• income per household • housing per m^2 • housing price per m^2 • number of people per household
	Price-to-Rent Ratio	• gross rent price
	30 % Expenditure-to-Income Ratio	• household's income • housing cost

TABLE 3: AFFORDABILITY FACTORS UNDER DIFFERENT APPROACHES AND MEASUREMENTS

Source: sources and analysis cited in this study. Author's design.

2.2.6. ASSESSING AND CROSS-COUNTRY COMPARISON OF HOUSING AFFORDABILITY

Housing costs and income are the two main factors in measuring housing affordability; however, they may vary greatly from one city to another, even within one part of a country to another. It is, therefore, beneficial to study housing affordability on a local level and compare the results. Paris (2007, p. 2) points out that the comparison is more valid when it was conducted over a short period. Paris (2007, p. 2) asserts that over long time changes in demographics, gender

division of labor, the proportion of persons in a household, as well as the amount of income, all results in a significant variation of household composition.

The most used index to assess affordability for purchasing a house is the Demographia affordability index (Thakuriah et al., 2016, p. 240). The survey uses the median housing price divided by the median household income, termed 'Median Multiple'. It additionally rates the ratio into four stages, from affordability to severely unaffordable (Demographia, 2018, p. 1). According to the index, see Table 4, housing affordability can be considered and graded from being affordable if the results of the price-to-income ratio reach 3.0 or less points up to severely unaffordable if the result is 5.1. or higher (Demographia, 2018, p. 1). In brief, affordable housing is if the ratio does not exceed three times the gross annual household income (Suhaida et al., 2011, p. 348). A high PIR ratio is not just in indicator of an unaffordable housing market, but also an indicator of an excess demand in the market (Cruz, 2008, p. 131). Despite the lake of theoretical justification of the stages, this index is praised for being a comparison tool to compare cities as it is robust and replicable (Thakuriah et al., 2016, p. 240).

Demographia International Housing Affordability Survey Housing Affordability Ratings	
Housing Affordability Rating	Median Multiple
Affordable	3.0 & Under
Moderately Unaffordable	3.1 to 4.0
Seriously Unaffordable	4.1 to 5.0
Severely Unaffordable	5.1 & Over
Median multiple: Median house price divided by median household income	

TABLE 4: DEOMPRAHIA INTERNATIONAL HOUSING AFFORDABILITY SURVEY

Source: 15th Annual Demographia International Housing Affordability Survey: 2019. (2018) p.1.

2.3. SUMMARY

The neoclassical economic theory defines a market by supply and demand behavior. As the supply and demand of a real estate market are built of type and area-specific distinguishes it as a highly segmented market. Additionally, real estate has two main characteristics; it is immobile and heterogeneous. The real estate sector is through its industrial and financial linkages, a unique type of economic activity, and it is indispensably linked with a nation's economic

system. Dynamic movements such as GDP, inflation, employment rate, equality, and market factors have an impact on income, which, in return, affects the housing affordability.

As the sections above demonstrated, there is a large number of theoretical and empirical research on the topic of affordable housing. The scholars used various approaches while pursuing demonstrating whether housing is affordable or not. Albeit, the debate about the definition and methods used to measure housing affordability has yet to be constant and universally accepted. While there is no universal definition of housing affordability, it is usually defined by the relationship or differences between income and housing costs.

Despite the lack of a universally accepted concept of housing affordability, there are various ways to approach the issue. The measurement mechanisms of housing affordability can be grouped into three approach categories; the Behavior Approach, Subjective Approach, and the Normative Approach. The Behavior Approach assesses affordability through the lens of the household's housing consumption behavior. However, previous works using this approach have shown inconclusive results. The Subjective Approach considers housing affordability as a subjective matter, and thus, uses indicators that are based on subjective responses of a household on their housing situation. Pioneers on this approach were Kearns and Colleagues in 1993, who asked tenants in a survey about their housing affordability situation, which was constructed on a Likert scale. The Normative Approach and Behavior Approach are both based on systematic and objective research of data collection. To measure housing affordability, the Normative Approach identifies a list of benchmarks and reflects affordability through ratio approaches. Depending on the list of benchmarks and the researched household types, e.g., homeowners or tenant, different measurements are used in the Normative Approach.

Depending on the approach and the measurements used to calculate housing affordability, different factors influencing housing affordability are detected. The two most common factors are the household's income and housing costs.

Although there is no consensus on which is the best approach to detect housing affordability. Carswell (2012, p. 13) points out that the expenditure-to-income ratios are most commonly used to measure affordability. It has been implemented by "government officials, researchers, advocates, mortgage lenders, and property managers" (Carswell, 2012, p. 13).

Given the many approaches, the thesis will use the ratio approach as it is the most recognized among scholars. The ratio approach analyzes the affordability through a proportion measurement and is thus, based on pure numbers and makes a cross-country comparison possible. The following Chapter Three provides a framework through which the housing affordability for homebuyers will be measured.

III RESEARCH DESIGN

3.1. OVERVIEW OF THE THEORETICAL FRAMEWORK

As the arguments, statements, and viewpoints in the above chapter have shown, there is no uniform definition and approach among scholars and experts to define housing affordability. In order to assess the housing affordability situation for homebuyers, this thesis will use the Normative Approach, a measure of the price-to-income ratio. The Normative Approach is selected due to its vast popularity among scholars as well as its identification of benchmarks, which allow the results of the three cities to be compared to each other.

For the purpose of this thesis, housing affordability will be measured and defined via a framework which comprises of three parts; first, the real estate market will be assessed, second, the relative housing price through the Normative Approach, and third, the results of the price-to-income ratio will be rated.

The first step of the framework will be to provide the reader with an overview of the circumstances of the real estate market, including the average number of houses people own. This step analyzes the economic development of the nation. This will be done in three sections; first, the GDP development will be examined; second, the demographic developments and third, the transaction costs of purchasing a housing will be inspected.

The second step captures the housing price of the cities. Stone (2006b, p. 153) describes housing affordability as a relationship between the housing and the living costs. The OECD reports that it is important to capture the housing prices as it reflects the financial burden a household would have to bear in order to purchase a home (OECD, 2016, p. 1). To calculate the housing price situation of the cities, this thesis will use the price-to-income ratio. The ratio will be used as a primary research indicator to determine the housing affordability development. It is selected as it is extensively used for evaluating housing markets by various international organizations such as the OECD (n.d.-b), World Bank (Khan, n.d., p. 4), the International Monetary Fund (IMF) (International Monetary Fund, 2019), the United Nations (UN-Habitat, 2018, p. 2), as well as renown scholars such as Cai (2011), Himmelberg et al. (2005), and Lau and Li (2006). The ratio is furthermore described in a World Bank report as a "basic affordability measure for housing in a given area since it is generally a weighing of median house prices to median

familial disposable income, expressed as a percentage or as years of income" (World Bank Group, n.d.-e, p. 510).

As an affordable housing price is defined as the appropriate ratio between the home price and household income, see theoretical discussion in Chapter 2, the results of the price-to-income calculation will then be evaluated in the third step. This will be done based on an international benchmark developed by Demographia, which rates the housing situation of cities in four categories, from affordable to severely unaffordable (Demographia, 2018, p. 1).

To summarize, the first step will assess factors that can influence the real estate price, the second step calculates relative purchase price, and the third step evaluates the purchase ability based on an international benchmark. All steps are required to provide a comprehensive and accurate result of the housing market and are thus vital to answer the research questions discussed above (*how the housing affordability situation of the three cities differed between 2000 – 2017*, *if the housing prices developed in equilibrium to the average income of a household*, as well as *if residents can afford to buy real estate in the capital cities*).

The next section includes a description of the calculation and evaluation procedures. This is followed by a comprehensive list of the data sources used throughout this thesis. Finally, the limitation of this framework is discussed.

3.2. THEORETICAL FRAMEWORK

3.2.1. REAL ESTATE MARKET

To understand the circumstances of each housing market, this thesis will first analyze cities' specific factors before computing the measurement of the relative housing price. Likewise, factors that influence a real estate market will be addressed in this part of the framework. This section is divided into three parts, economic development, demographic development, and lastly, the transaction costs for purchasing housing.

ECONOMIC DEVELOPMENT

A nation's economic development is greatly affected by its real estate market (Golob et al., 2012, p. 357). The real estate market is a driving force for various economic sectors such as construction and infrastructure development, which in turn have a substantial impact on a

nation's economic development as a whole (Golob et al., 2012, p. 357). Therefore, the economic development of each country will be discussed.

In order to understand the economic context of the three countries, three parts of the GDP development will be examined; the current GDP development, the GDP growth as well as the real estate share to the GDP between 2000 and 2017. The current GDP and GDP growth development will be presented based on the data given by the World Bank. The data for real estate share to the GDP will be taken from the national governmental statistics. The GDP growth rate is selected, as it provides a degree of the situation of the nation's household income and the business cycle (Tsatsaronis & Zhu, 2004b, p. 71). The real estate share to the GDP was selected as a criterion as it reflexes the importance of the real estate sector to the national economy.

DEMOGRAPAHIC DEVELOPMENT

A nation's population growth and population shift are an important factor in analyzing real estate price developments. According to Tsatsaronis and Zhu (2004b, p. 67), a shift in the demographics can influence the real estate price. Thus, the development of the demographics of each of the three cities will be examined with the aim of determining if there was a shift between 2000 and 2017.

This will be done in two stages. First, the population age distribution will be inspected to see if there was a generation shift. Using the age projection of the United Nations Population Fund (n.d.) and the World Bank (n.d.-c), the generations will be divided into three age groups; dependent youth (age 0–14), working population (age 15– 64) and elderly's (age 65+). In the second stage, the urban population development will be inspected by assessing the population growth to assess the housing demand. Data on the urban generations and the population growth will be taken from the official city's statistics.

TRANSACTION COST

The transaction cost for buying real estate in these cities will be based on five objects: real estate tax, value-added tax, inheritance tax, stamp, and registration duties.

Taxes on real estate are important as taxes can be a means to encourage real estate ownership (Tsatsaronis & Zhu, 2004b, p. 67). According to Cruz (2008, p. 139), individuals tend to postpone a purchase if the transactions cost are high. Hence, this section will examine the

specific real estate taxation for each country. The real estate tax and fees will be taken from Global Property Guide, PWC, KMPG, Deloitte, DLA Piper as well as national tax service webpages. Stamp and registration duties may also influence the real estate price, thus it's also of importance to exam the national requirements.

3.2.2. RELATIVE HOUSING PRICE

As declared above, the Normative Approach is chosen for the framework to measure the housing affordability of Beijing, Seoul, and Tokyo.

The measurement will be calculated to assess the relative average housing prices of the cities. This will be done with the Normative Approach on the bases of the price-to-income ratio, as discussed in Chapter 2. The price-to-income ratio uses the median housing price and the median income of the urban households to calculate the average housing price ratio. As part of the calculation, the average household incomes will also be determined and compared in order to analyze if the average housing price and average housing income have risen or declined at a similar rate.

PRICE-TO-INCOME RATIO

The housing affordability situation of the cities will be measured through a ratio approach, specifically the price-to-income ratio. The price-to-income ratio is derived from the concept that housing is affordable if the average housing price is in equilibrium with the average household's income.

The calculation of the price-to-income ratio is based on the formula by Lau and Li (2006, p. 7). The price-to-income ratio (PIR) is defined as follows:

$$PIR = AP*FA / AY*nP$$

To apply this calculation by Lau and Li (2006, p. 7), the following data need to be collected for each city:

- AP - mean selling price of residential building (price/m^2)
- FA - gross floor area per housing unit (m^2)
- AY - mean per capita annual income per urban household (amount)
- nP - average number of persons per urban household

The factor AP is the mean selling price for a residential building (K. M. Lau & Li, 2006, p. 7). The average selling price for residential buildings will be measured in price per square meter (K. M. Lau & Li, 2006, p. 7). The data on the average selling price for a house will be taken from the statistics collection of the national or metropolitan institute of each country in the national currency. The national currency in Japan is called Yen, in South Korea, Won, and in China, Renminbi, also known as Yuan.

The factor FA represents the standard gross floor area per household in square meters (K. M. Lau & Li, 2006, p. 7). The gross floor area per household represents the average floor space per person times the average household size (K. M. Lau & Li, 2006, p. 7). The average floor area per person in these cities will be conducted from official recommendations or national and metropolitan statistics.

The factor AY represents the mean per capita annual income per household (K. M. Lau & Li, 2006, p. 7). The data for this factor will be obtained from the official statistics of the city and used in the local national currency.

The factor nP represents the average number of persons per urban household (K. M. Lau & Li, 2006, p. 7). The national and metropolitan statistics will be used as the source for this factor.

After collecting the four factors, the full price-to-income ratio equation will be applied. In the first step, the average square meter price, factor AP, will be multiplied by the average floor area per housing unit, factor FA (K. M. Lau & Li, 2006, p. 7). The result of the multiplication is the average price of housing for an average household in the city. In the second step, the factor AY and nP are beeing multiplied (K. M. Lau & Li, 2006, p. 7) in order to calculate the average annual income per household in the city. The average price for residential housing for a household will be divided by the average annual income per household (K. M. Lau & Li, 2006, p. 7). The result of this calculation will be the average free-market price of housing in the cities. The result of the ratio calculation represents the relative housing price of a city. In order to determine the meaning of the price-to-income ratio, the ratio results will be rated according to the subsequent index.

3.2.3. RATING OF THE PIR RESULTS

After calculating the housing prices through the price-to-income ratio (PIR), the results of the ratio of the cities will be assessed and compared. The results of the assessment will provide insight into the degree of strain an average resident has to endure in order to purchase a home in the city. Furthermore, the ratio results provide information that can be used to compare the development of the housing market of the three cities to each other. This thesis rates the results of the PIR, also known as Median Multiple, on the bases of the index given by the Annual Demographia International Housing Affordability Survey (2018, p. i,1), see Table 5.

According to the index, housing is considered affordable if the results of the price-to-income ratio reaches 3.0 points or less (Demographia, 2018, p. 1). A ratio between 3.1 and 4.0 is considered to be moderately unaffordable (Demographia, 2018, p. 1). A ratio between 4.1 and 5.0 is considered seriously unaffordable. Every ratio above 5.1 indicates a severely unaffordable housing situation (Demographia, 2018, p. 1).

To summarize, housing is considered affordable if the PIR does not exceed three times the gross annual household income (Suhaida et al., 2011, p. 348). Despite the lack of theoretical justification of the stages, this index is praised for being a variable comparison tool and is considered robust and replicable (Thakuriah et al., 2016, p. 240).

Demographia International Housing Affordability Survey **Housing Affordability Ratings**	
Housing Affordability Rating	Median Multiple
Affordable	3.0 & Under
Moderately Unaffordable	3.1 to 4.0
Seriously Unaffordable	4.1 to 5.0
Severely Unaffordable	5.1 & Over
Median multiple: Median house price divided by median household income	

TABLE 5: DEOMPRAHIA INTERNATIONAL HOUSING AFFORDABILITY SURVEY

Source: 15th Annual Demographia International Housing Affordability Survey: 2019. (2018) p.1. Author's design.

3.3. FRAMEWORK TABLE

The main focus of this thesis is to assess and measure the housing affordability of the three markets. The summary of the criteria for the Framework is presented in Table 6. The Framework consists of three main criteria, first the real estate market, hereby factors which can influence the real estate price will be assessed, such as the economic, demographic, and taxation costs. The second criteria are the relative housing prices, which will be calculated through the price-to-income ratio. The price-to-income ratio consists of four factors that need to be collected before the ratio can be calculated. In the last criteria of the Framework, the results of the price-to-income ratio will be rated, which thus determines the housing affordability situation of the city. The three housing markets will be assessed separately in the empirical chapter. In the subsequent analytical chapter, the results of the Framework will be compared and discussed.

Criteria	Sub-Criteria	Objective of the criteria
1. Real Estate Market	Economic Demographic Transaction Cost	○ observe the economic development via: - current GDP (in US $) - annual GDP Growth (in US $) - real estate share in GDP (in US $) ○ observe demographic the development via: - younger vs. older Generation - urban population growth ○ observe the transaction cost via: - real estate tax - value added tax - inheritances tax - stamp tax - registration duties

2. Relative Housing Price	Price-to-Income ratio	○ observe the development of the average selling price per square meter for a house (price/ m^2) (in national currency) ○ observe the development of the gross floor area per housing unit (m^2) ○ observe the development of the average annual income per capita per household (in national currency) ○ observe the development of the average amount of people in one household
3. Rating of PIR	Determine Affordability Situation	○ observe the development of: - Result of PIR

TABLE 6: FRAMEWORK

Source: sources and analysis cited in this study. Author's design.

3.4. CONSIDERATION OF THE FRAMEWORKS LIMITATIONS

NUMBER OF HOUSES

In practice, some households may choose to buy more than one housing unit as an investment or for relatives. However, this thesis aims to measure the housing affordability on the assumption that each household only purchases one home.

INCOME

Although some households may have more than their monthly earnings as capital gain, this thesis only considers the earning as income for the calculation. Other income sources, such as stock dividends, rents, transfer, or subsidies from parents or other relatives, will not be taken into account in this thesis. The aspect of households' disposable income is based on the statistic yearbooks and will be examined in the empirical part. Furthermore, as this thesis analyses the general housing market situation in the three cities, the money income is taking and measured in pre-tax income as there are various tax regulations and variations between the three countries. Thus, pre-tax money income is selected as it is best suited for a cross-country comparison.

IV EMPIRICAL PART

4.1. CHINA

4.1.1. REAL ESTATE MARKET

4.1.1.1. OVERVIEW

The landscape in Chinese cities transformed from having low-rise buildings to a landscape with high-rise residential buildings, grand shopping malls, and skyscrapers. The opening-up campaign and reforms in China led to the marketization of real estate and urban space (Cao, 2015, p. xx).

At the end of 1978, the ruling Communist Party decided to carry out reforms, which lead to the opening of the country to international trade. One year later, in 1979, the central government had been encouraged to sell public housing to tenants (Yang & Shen, 2008, p. 319). This reform led to the privatization of over 80% of allocated Chinese public housing (Yang & Shen, 2008, p. 319). Since the early 1990s, the Chinese real estate market has been growing immensely. This is the case especially since 1998, when a market-oriented housing system was established, which replaced the welfare housing distribution system. The new system allowed a majority of the population to purchase housing from property developers (J. Wang & Xie, 2012, p. 388). The new system, with its private property rights system, brought legal changes with it, which "enhanced the protection of property rights, facilitating the rapid growth of market exchange, productivity and economic growth" (Cao, 2015, p. xxi).

Reviewing the property law of the People's Republic of China, a specialty of the Chinese real estate market was discovered. The Chinese government holds the right of ownership of all the land (PWC, 2018, p. China 3). However, individuals and enterprises may lease a land right. Article 12 of the 'Interim Regulations of The People's Republic Of China Concerning The Assignment And Transfer Of The Right To The Use Of The State-Owned Land In The Urban Areas' state that the maximum leasing term for residential purposes is 70 years (AsianLII, n.d.; 杭州法图网络科技有限公司, n.d.). However, in the Chinese 'Civil and Commercial Laws' book, subdivision 'Property Law of the People's Republic of China', article 149 states that "when the period of time for the right to the use of land for construction of residences expires, it shall automatically be renewed" (People's Republic of China, Civil and Commercial

Laws, para. 149). Thus, the homeowners have theoretically the right to apply for an extension of land-use rights.

The latest housing trend in China is the rising of the ratio of Chinese women who are purchasing property (Chencen, 2019). According to a report on the real estate ownership of women in 12 major Chinese cities, the ratio has increased from 5% in 2016, to 46% in 2018 (Chencen, 2019). According to Chencen (2019), the reasons for the new trend of the increase of female homeowners are that these female homeowners are assumed to be from wealthy families, well-educated, often not married, and career-driven. Other factors such as the past One-Child-Policy and the change of the marriage law in 2011, which requires physical proof of monetary contribution of the shared property in case of divorce, might have also effected this new female homeowner trend (Chencen, 2019).

Although this thesis is based on the price-to-income ratio to calculate the housing affordability, it needs to be noted that in China, real estate investment is often an investment for the entire family (Chencen, 2019; Wade, n.d.). This might be due to the high down-payment rate the main cities have, such as Beijing, Shanghai, Guangzhou, and Shenzhen (Clair, 2016). In Beijing, the down-payment for first time home buyers lies at 30 percent (Gao, n.d.), while in 2017, the down payment for a second home buyer rose from 50 percent to 60 percent (Zheng, n.d.).

SHARE OF HOUSING

National wide, China has a high homeownership rate of 90%. This high ratio placed China amongst the top 10 countries regarding the homeownership ratio in 2014 (Trading Economics, n.d.). Owning a home is an essential aspect of many cultures and families around the world; this is particularly true in China. The Chinese zeitgeist does connect homeownership to several social factors in China, and therefore owning real estate plays a significant role in Chinese society. The social aspects are for example the specific Chinese residence registration (hùkǒu 户口), as well as the marital status of the groom, as a Chinese tradition is that the man has to own a home before being able to get married (Chencen, 2019; Wade, n.d.). Thus, homeownership is a criterion for evaluating potential husbands, and therefore, a social necessity for men in China (Wade, n.d.). Consequently, buying a property is very important in China, and according to the article by Lee (2019), real estate accounts for over 70 percent of the private assets in China.

In the following Figure 5, the share of houses homeowners in China purchase is presented in a column diagram. The data show that the share of homeowners who own one home declined, from 70 percent in 2008, down to 46 percent in 2017 (Shu, 2019). However, the percentage of homeowners with two and even three homes increased. Homeowners of two homes, increased from 27 percent in 2008, up to 39 percent in 2017 (Shu, 2019). In 2008, 3 percent of homeowners owned three homes, and in 2017, the percentage increased to 15 percent (Shu, 2019).

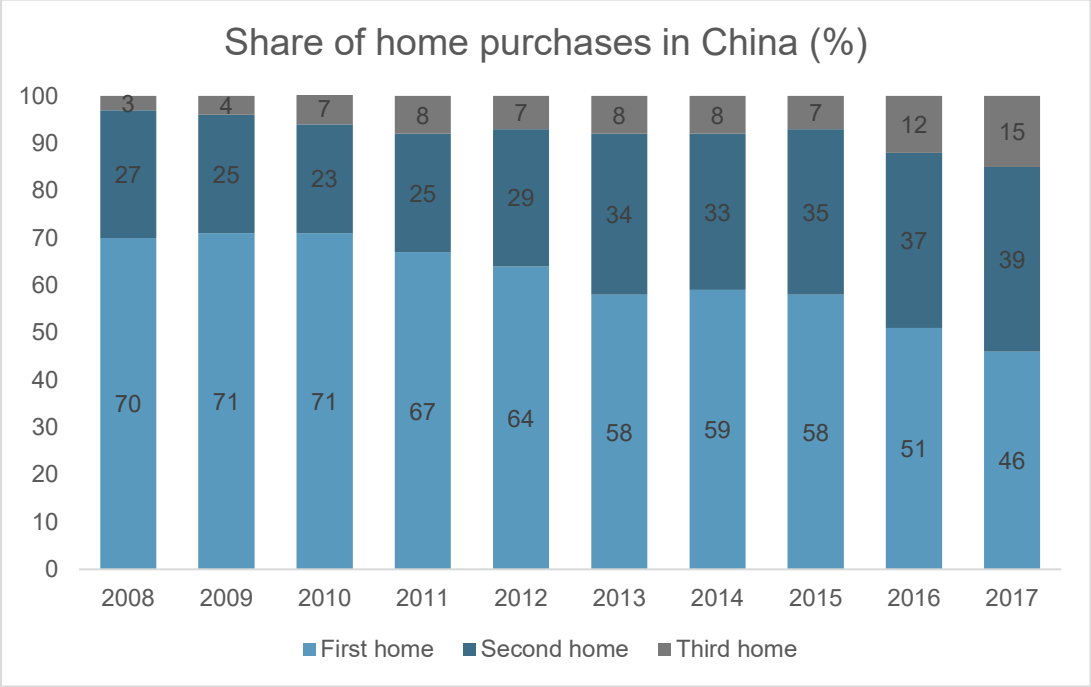

FIGURE 5: SHARE OF HOME PURCHASES IN CHINA (%)

Source: Shu Han. (2019, September 23). China: Home Purchase Distribution by Number of Homes Owned 2018. Retrieved October 26, 2019, from Statista website: https://cdn1.statista.com/statistics/941309/china-share-of-home-purchases-by-number-of-homes-owned/. Author's design.

4.1.1.2. ECONOMIC DEVELOPMENT

It is essential to comprehend the economic development, as a real estate market is intermediate linked with a nation's economic system (Jie et al., 2012, p. 123). This section presents the GDP development, as well as the share of the real estate sector to the Chinese GDP.

GDP DEVELOPMENT

China has the highest GDP rate among the Asian countries and the second-highest worldwide (World Bank Group, n.d.-b). Chinese current economic gross domestic product per year had grown gradually since 2000, as can be seen in Figure 6. A detailed description of the current

GDP is presented in Appendix 1. In 2000, the current GDP was 1.2 trillion US Dollars and rose to 12.1 trillion US dollars in 2017 (World Bank Group, n.d.-b), which is an increase of 900 percent.

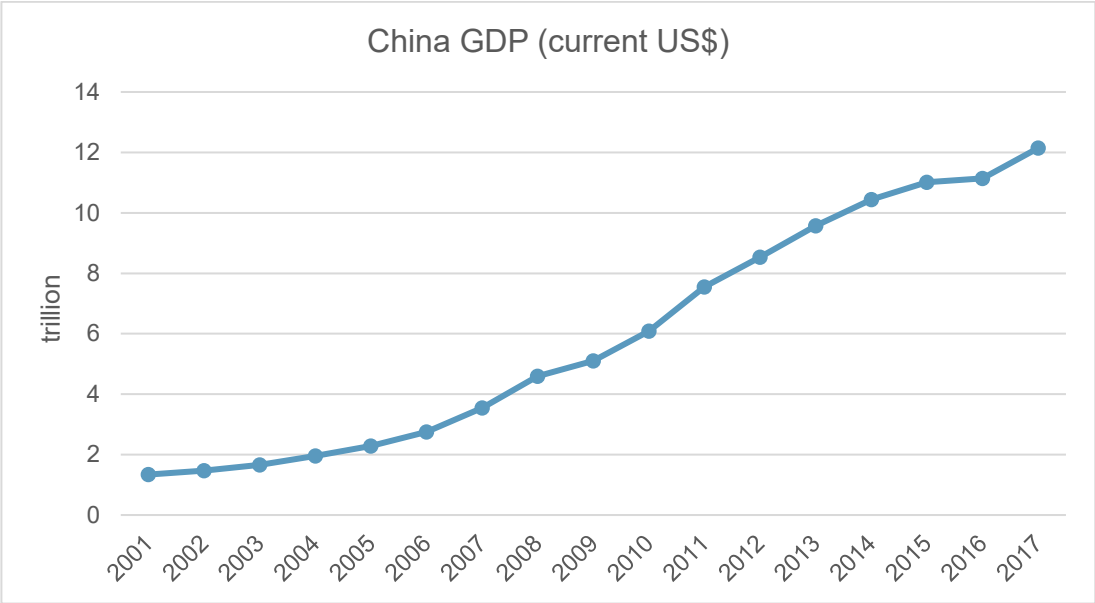

FIGURE 6: CHINA GDP (CURRENT US $)

Source: World Bank Group. (n.d.). GDP (current US$) | Data. Retrieved April 17, 2019, from The World Bank I Data website: https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?year_high_desc=true. Author's design.

Although the GDP rate was excessive, the annual GDP growth percentage show a different picture, see Figure 7 (World Bank Group, n.d.-b). Between 2000 and 2017, the most significant GDP growth was in 2007, but since 2007, the annual growth rate dropped (World Bank Group, n.d.-b). In 2000, China had a GDP growth of around 8.5 percent (World Bank Group, n.d.-b). The annual growth increased until 2007, with the height measured point of 14 percent (World Bank Group, n.d.-b). Since 2007, the annual growth decreased, with an exception in 2010. The lowest point was in 2018, with an annual growth of 6.6 percent (World Bank Group, n.d.-b). More detailed data can be found in Appendix 2.

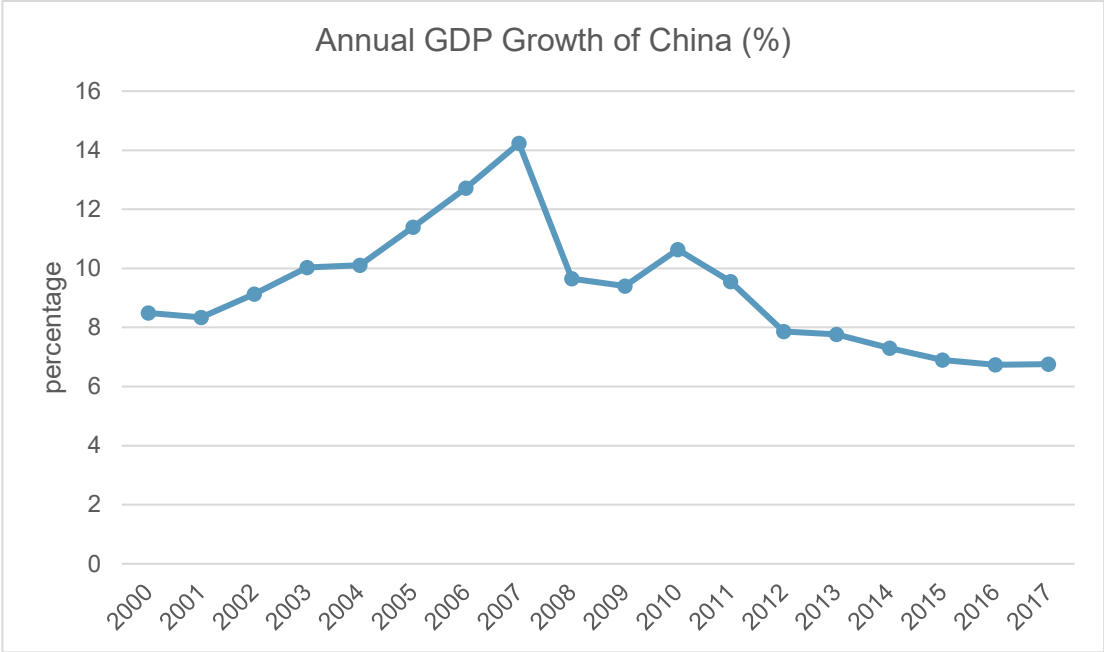

FIGURE 7: ANNUAL GDP GROWTH OF CHINA (%)

Source: World Bank Group. (n.d.). GDP growth (annual %) | Data. Retrieved May 29, 2019, from The World Bank I Data website: https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?end=2017&locations=CN-JP-KR&start=2006. Author's design.

COMPOSITION OF REAL ESTATE IN GDP

The Chinese real estate sector is an important sector to the Chinese economy (Cao, 2015, p. 8) and, therefore, also may, to a certain extent, affect the world economy. The real estate market, which was under the command economy illegal and in theory, non-existent (Cao, 2015, p. 7), has become a major part of the Chinese economic growth. In 2003, the real estate sector was awarded the status of a key industry of the Chinese economy, as shown by its share on the national economy (Cao, 2015, p. 8). The share of the real estate and construction industries in the GDP rose from 2.2 percent in 1978, to 6.5 percent in 2017 (National Bureau of Statistics of China, n.d., Chapters 3-2 Composition of Gross Domestic Product).

Figure 8 shows the composition of the real estate sector between 2000 and 2017. Further details of the data are in Appendix 3. Between 2000 and 2017, the percentage of real estate to GDP has increased continuously, with the exception of the years 2008 and 2014. In 2008 and 2014, the composition of real estate declined to the year before.

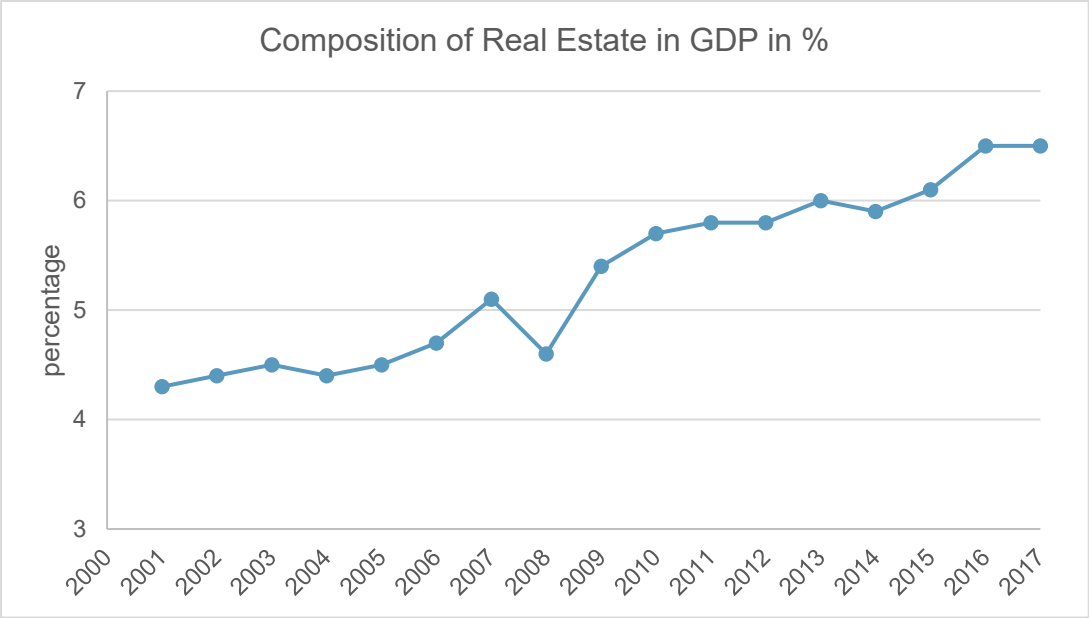

FIGURE 8: COMPOSITION OF REAL ESTATE IN GDP (%)

Source: National Bureau of Statistics of China. (n.d.). China Statistical Yearbook. Retrieved September 11, 2019, from China Statistical Yearbook website: http://www.stats.gov.cn/tjsj/ndsj/2018/indexeh.htm. Author's design.

4.1.1.3. DEMOGRAPHIC DEVELOPMENT

As stated by Tsatsaronis and Zhu (2004b, p. 67), shifts in demographics can influence real estate prices. Therefore, this section will assess the demographics development of Beijing. The evaluation of the demographic development will be made in two phases; first, the development of the people by age group will be assessed, and secondly, the urban population growth of Beijing.

YOUNGER VS. OLDER GENERATION

According to Tsatsaronis and Zhu (2004b, p. 67), a change in the demographics between younger or older generations can influence the real estate market. In Figure 9, the population shares of Beijing are presented. Due to a lack of data, the generation development of Beijing is obtainable for the years 2000, 2010, and 2017 (China Statistics Press, n.d.-b, secs. 3-1 Basic Statistics on Population Census, n.d.-b, secs. 3-5 Permanent Population by Age Composition).

The statistics show that the share of people between the age of 15-64 increase from 74 percent in 2000 to 79 percent in 2017 (China Statistics Press, n.d.-b, secs. 3-1 Basic Statistics on Population Census, n.d.-b, secs. 3-5 Permanent Population by Age Composition). While the percentage of people of working-age did increase to some extent, the percentage of older and youngsters decreased slightly. According to the statistics, the share of people being 65+ years

old decreased during the last 17 years from 13 percent in 2000, down to 11 percent in 2017 (China Statistics Press, n.d.-b, secs. 3-1 Basic Statistics on Population Census, n.d.-b, secs. 3-5 Permanent Population by Age Composition). Looking at the youngest people of the society, their percentage share of the Beijing population had around 14 percent in 2000, and in 2017 it had dropped to 10 percent (China Statistics Press, n.d.-b, secs. 3-1 Basic Statistics on Population Census, n.d.-b, secs. 3-5 Permanent Population by Age Composition). Despite the One-Child-Policy in China and since the beginning of the Two-Child-Policy in 2016, the population share of children in Beijing had declined since 2000.

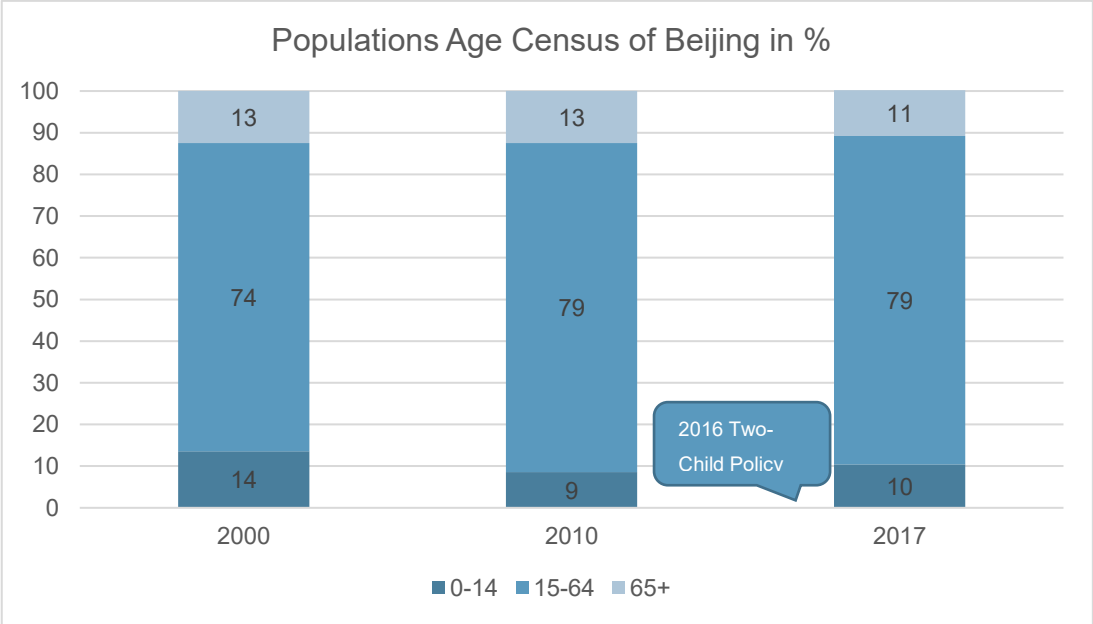

FIGURE 9: POPULATIONS AGE CENSUS OF BEIJING

Source: Beijing Statistical Yearbook 2018. (n.d.). Retrieved September 13, 2019, from Beijing Municipal Bureau of Statistics NBS Survey Office in Beijing website: http://tjj.beijing.gov.cn/nj/main/2018-tjnj/zk/indexeh.htm. Author's design.

URBAN POPULATION

More and more people are moving into cities, and the Population Division of the United Nations (2014) stated that managing urban areas will be a significant challenge of the 21st century. Adding to the urbanization trend, Malpezzi, Mayo, and Gross (1985, p. 1) identified that cities in developing countries are growing at a faster rate than cities in developed countries did.

Many people have and are still moving from rural to urban areas in China. Especially Beijing, as the capital and the political center, has attracted many people. In Figure 10, the permanent population of Beijing is presented. According to the Beijing Municipal Bureau of Statistics, the population of Beijing has risen from 13 million in 2000 people to over 21 million in 2017 (China

Statistics Press, n.d.-b, Chapters 3-2 Permanent Population (1978-2017)). This means that Beijing had a 130 percent population increased between 2000 and 2017. Since 2011, Beijing's population had fluctuated around 20 million permanent residences with the highest population point in 2016, with over 21.7 million people (China Statistics Press, n.d.-b, Chapters 3-2 Permanent Population (1978-2017)). A detailed description of the data is available in Appendix 3.

Putting Beijing's population in the context of the national population of China, which was 1,390,080,000 in 2017 (National Bureau of Statistics of China, n.d., Chapters 2-1 Population and its Composition), Beijing is home to 1.56 percent of the national population.

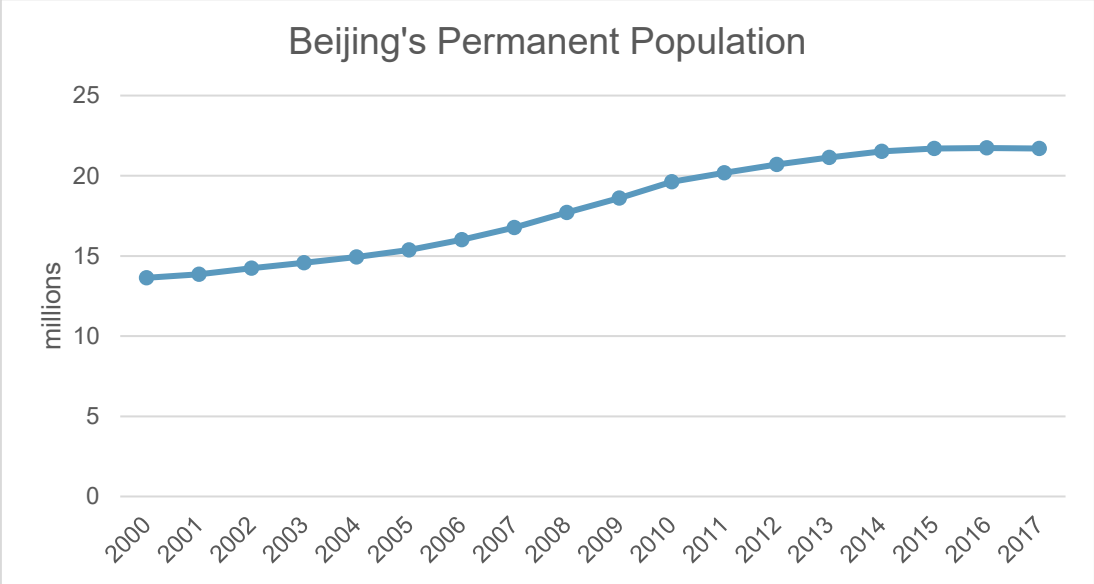

FIGURE 10: BEIJING'S PERMANENT POPULATION

Source: Beijing Statistical Yearbook 2018. (n.d.). Retrieved September 13, 2019, from Beijing Municipal Bureau of Statistics NBS Survey Office in Beijing website: http://tjj.beijing.gov.cn/nj/main/2018-tjnj/zk/indexeh.htm. Author's design.

4.1.1.4. TRANSACTION COST

After having reviewed the economic and demographic development of China and Beijing, this section will assess the transaction cost of real estate in China. First, the real estate tax and value-added tax will be outlined. After this, the inheritance tax will be reviewed. Finally, the stamp and registration duties will be discussed. This section aims to assess the taxation on real estate in China, according to the framework provided in Chapter Three, as real estate taxation can be a means to encourage real estate ownership (Tsatsaronis & Zhu, 2004b, p. 67).

REAL ESTATE TAX

While investigating China's tax system, 18 different kinds of taxes in three categories were discovered (State Taxation Administration of the People's Republic of China, 2019). Under serial number 8, is the real estate tax, this tax regards the owner of houses in an urban area and has to be paid by the owner of the house (State Taxation Administration of the People's Republic of China, 2019).

The real estate tax is constructed on the value or rental income of the real estate (PWC, 2019c). The tax is charged per annum and has three rates; one for self-occupied owners, one for personal-owned rented houses, and one for rented real estate for business purposes (PWC, 2018, p. China 8, 2019c). Regarding self-occupied houses, the real estate tax lies at 1.2% of the residual value of 70-90% of the original cost (State Taxation Administration of the People's Republic of China, 2019). The tax rate for the individual owner of a rented-out house lies at 4% of the rental income. Likewise lies the real estate tax rate at 4% for "enterprises and public enterprises and public institutions, social groups, and other entities" (State Taxation Administration of the People's Republic of China, 2019). 12% tax is charged for the rental income of real estate with business purposes (PWC, 2019c; State Taxation Administration of the People's Republic of China, 2019)

VALUE ADDED TAX

The serial number 1 of the tax system of China is concerned with the value-added tax (VAT) (State Taxation Administration of the People's Republic of China, 2019). In 2016, the value-added tax was applied to the real estate and construction industry (DLA Piper, 2015). The VAT is levied on entities and individuals who sell an immovable property within China (State Taxation Administration of the People's Republic of China, 2019). The VAT for real estate lies at 11% and will be added to the purchase price and is thus covered by the buyer (DLA Piper, 2015).

It should be noted that China's State Council issued a reduction of the VAT tax rate, effective from spring 2018 (KPMG China, n.d.). The VAT rate in China was reduced to 16 %, 10 %, and 6 %, respectively (State Taxation Administration of the People's Republic of China, 2019).

INHERITANCE TAX

When investigating China's inheritance taxes, it was found that at the present moment, China does not have an inheritance tax (PWC, 2019c).

STAMP DUTY

In China, the stamp duty is imposed on individuals who concluded or received certain dutiable documents (PWC, 2019c; State Taxation Administration of the People's Republic of China, 2019). Depending on the contract, agreement, and document, the rate of the stamp duty varies (About Teleport, Inc, n.d.). It varies between "0.005% on loan contracts to 0.1% for property leasing and property insurance contracts" (PWC, 2019c).

According to the Global Property Guide, the stamp duty in China is at a rate of 0.5% for both seller and buyer of a property (Global Property Guide, 2019) and will be imposed on the sales price (PWC, 2018, p. China 7).

REGISTRATION DUTIES

Regarding the registration duty for a residential real estate in China, lies the duty at 80 yuan per unit (China News Portal, 2016; JLL, n.d.), which is around 11 US Dollars.[2]

DEED TAX

Another tax on real estate is the deed tax which is a tax of the transfer of real estate property and is levied by the buyer (DLA Piper, 2015). The deed tax ranges from 3 to 5%, depending on the location of the real estate (DLA Piper, 2015; Global Property Guide, 2019).

4.1.2. RELATIVE HOUSING PRICE

PRICE-TO-INCOME RATIO

As declared in Chapter Three, the chosen approach for this case study is the Normative Approach. On the base of the price-to-income ratio, the relative housing price of Beijing will be assessed. In the subsequent section, the results will be used to determine the housing affordability situation of Beijing. The source of the data is the Beijing Statistical Yearbooks and the National Bureau of Statistics of China.

[2] Calculated by author, as of November 11, 2019: 1 USD = 7.01 Yuan

MEAN SELLING PRICE OF RESIDENTIAL BUILDING (YUAN/SQ.M.) (AP)

The first factor needed for the price-to-income ratio calculation is the AP factor, which represents the mean selling price of residential building per square meter in Beijing. The National Bureau of Statistics in China provides the data on the average selling price of residential housing from the years 2000 to 2017, which is published by the Press of China Statistics.

Figure 11 presents the average sold yuan price per square meter for a residential building in Beijing between the years 2000 and 2017. Although the selling price of a residential building was relatively stable in the early beginning of the millennium, the price has increased sharply since 2014. Between 2000 and 2017, the National Bureau of Statistics of China (n.d., bks. 2001–2018) measured that the price per square meter developed from 4,557 yuan in 2000, to 34,117 yuan per square meter in 2017. This increase means that the square meter selling price for a residential house in Beijing rose in 17 years, 648 percent. The lowest price per square meter was in 2003, with a price of 4,456 yuan per square meter (National Bureau of Statistics of China, n.d., bk. 2004). The highest price was in 2017, with over 34,000 yuan for a square meter in a residential building (National Bureau of Statistics of China, n.d., bk. 2018). Detailed data on the average selling price of residential buildings are available in Table 8.

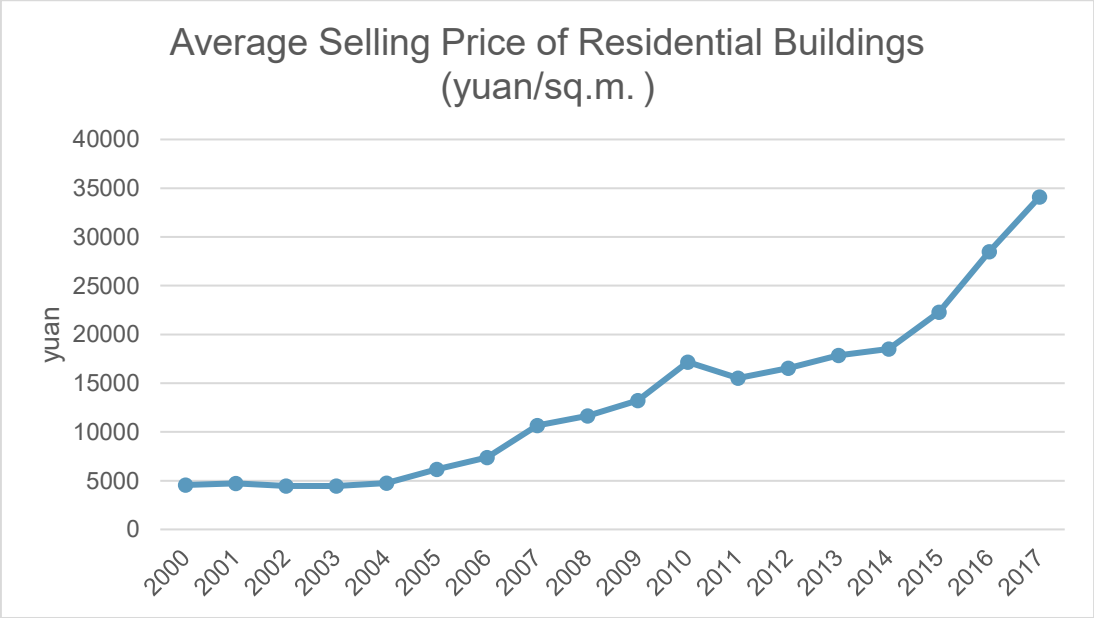

FIGURE 11: AVERAGE SELLING PRICE OF RESIDENTIAL BUILDINGS (YUAN/ SQ.M.)

Source: National Bureau of Statistics of China. (n.d.). China Statistical Yearbook. Retrieved September 11, 2019, from China Statistical Yearbook website: http://www.stats.gov.cn/tjsj/ndsj/2018/indexeh.htm (bks. 2001-2018). Author's design.

FLOOR AREA PER HOUSING UNIT (SQ.M.) (FA)

The factor FA represents the standard gross floor area per housing unit, that is to say, the average housing unit size. This factor will be calculated in two steps; first, the average floor space area per person will be collected and then multiplied by the average amount of people per household in Beijing. The results of this calculation will provide the average housing size needed for an average household in Beijing. The standard floor area per person can be found in the Beijing Statistical Yearbook collected by the Beijing Municipal Bureau of Statistics.

In Figure 12, the annual development of housing floor space per capita in Beijing is presented in a line diagram. The data of the years 2015, 2016, and 2017 derive from the Beijing Statistical Yearbook 2018 (n.d.-b, Chapters 5-1 Basic living condition). The data of the years 2002 to 2014 are taken from the Beijing Statistical Yearbook 2015 (n.d.-a, Chapters 8-1 People's Life (1978-2014)). The data of the per capita floor space in 2001 and 2000 was not available in the yearbook statistics, and thus, was not included in the calculation.

Although there is no data for the first two years, it can be seen that in Beijing, the average floor space per person has gradually increased between 2002 and 2017. The least floor space per person in Beijing was measured in 2002 with 19.22 square meters per capita (China Statistics Press, n.d.-a, Chapters 8-1 People's Life (1978-2014)). The highest measured space per capita was in 2017, with averagely 34.23 square meters per person (China Statistics Press, n.d.-b, Chapters 5-1 Basic living condition). This increase results in an increase of 78 percent.

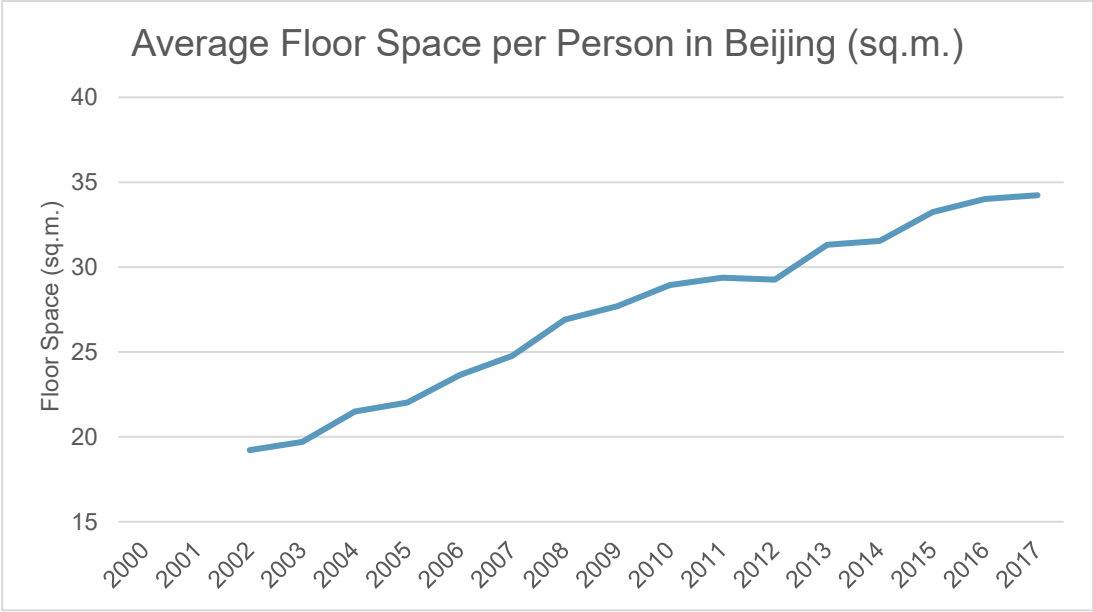

FIGURE 12: AVERAGE FLOOR SPACE PER PERSON IN BEIJING (SQ.M.)

Source: Beijing Statistical Yearbook 2015. (n.d.). Retrieved September 17, 2019, from Beijing Municipal Bureau of Statistics NBS Survey Office in Beijing website: http://tjj.beijing.gov.cn/nj/main/2015-tjnj/zk/indexeh.htm
Beijing Statistical Yearbook 2018. (n.d.). Retrieved September 13, 2019, from Beijing Municipal Bureau of Statistics NBS Survey Office in Beijing website: http://tjj.beijing.gov.cn/nj/main/2018-tjnj/zk/indexeh.htm.
Author's design.

In order to calculate the factor FA, the average floor space per person in Beijing will be multiplied by the average number of people in a household. The data of the number of people in a household were collected from the China Statistical Yearbook (see sections below). The results of this calculation are presented in the last column of Table 7; it provides the average housing size needed for an average household in Beijing.

Year	Average floor space per capita (sq.m.)	Average person per household	**Average floor space per housing unit (sq.m.)**
2000	-	2.91	**-**
2001	-	2.91	**-**
2002	19.22	2.87	**55.16**
2003	19.71	2.74	**54.00**
2004	21.49	2.79	**59.95**
2005	22.03	2.70	**59.48**
2006	23.65	2.64	**62.43**
2007	24.77	2.65	**65.64**

2008	26.90	2.58	**69.40**
2009	27.69	2.53	**70.05**
2010	28.94	2.45	**70.90**
2011	29.38	2.42	**71.09**
2012	29.26	2.53	**74.02**
2013	31.31	2.61	**81.71**
2014	31.54	2.49	**78.53**
2015	33.23	2.54	**84.40**
2016	34.02	2.62	**89.13**
2017	34.23	2.62	**89.68**

TABLE 7: CALCULATION OF AVERAGE HOUSING UNIT IN BEIJING

Source: Beijing Statistical Yearbook 2015. (n.d.). Retrieved September 17, 2019, from Beijing Municipal Bureau of Statistics NBS Survey Office in Beijing website: http://tjj.beijing.gov.cn/nj/main/2015-tjnj/zk/indexeh.htm
Beijing Statistical Yearbook 2018. (n.d.). Retrieved September 13, 2019, from Beijing Municipal Bureau of Statistics NBS Survey Office in Beijing website: http://tjj.beijing.gov.cn/nj/main/2018-tjnj/zk/indexeh.htm.
National Bureau of Statistics of China. (n.d.). China Statistical Yearbook. Retrieved September 11, 2019, from China Statistical Yearbook website: http://www.stats.gov.cn/tjsj/ndsj/2018/indexeh.htm (bks. 2001-2018).
Author's design.

Although the number of people per household has declined during the selected time, the average floor space per person increased. Hence, the average floor space per capita, and the calculated floor space per household have developed in a similar upwards degree, see Figure 13.

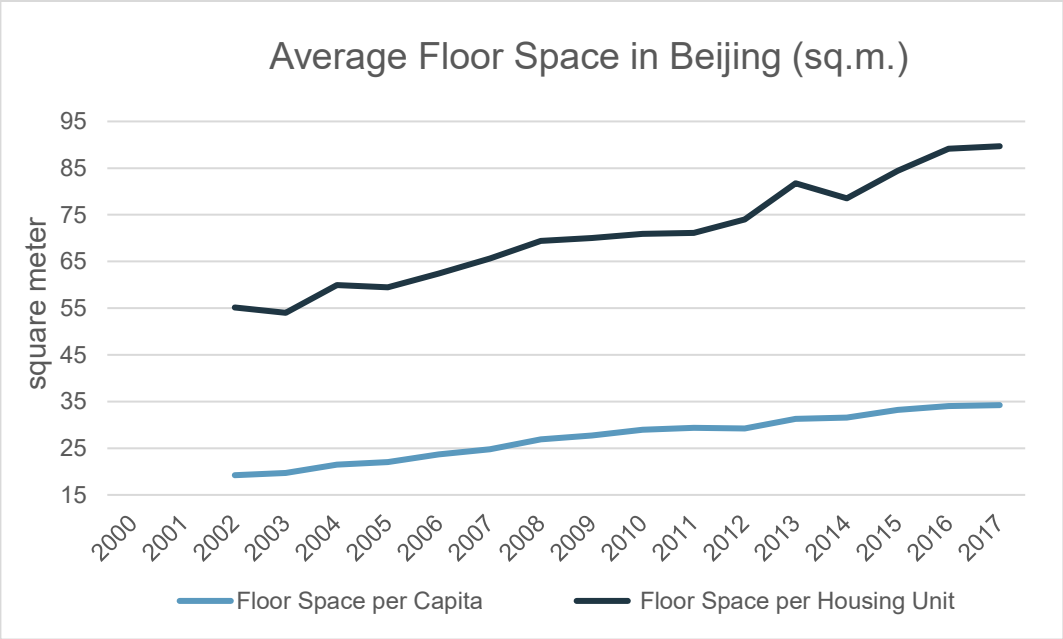

FIGURE 13: AVERAGE FLOOR SPACE IN BEIJING (SQ.M.)

Source: Beijing Statistical Yearbook 2015. (n.d.). Retrieved September 17, 2019, from Beijing Municipal Bureau of Statistics NBS Survey Office in Beijing website: http://tjj.beijing.gov.cn/nj/main/2015-tjnj/zk/indexeh.htm
Beijing Statistical Yearbook 2018. (n.d.). Retrieved September 13, 2019, from Beijing Municipal Bureau of Statistics NBS Survey Office in Beijing website: http://tjj.beijing.gov.cn/nj/main/2018-tjnj/zk/indexeh.htm.
National Bureau of Statistics of China. (n.d.). China Statistical Yearbook. Retrieved September 11, 2019, from China Statistical Yearbook website: http://www.stats.gov.cn/english/Statisticaldata/AnnualData/ (bks. 2001-2018). Author's design.

MEAN PER CAPITA ANNUAL INCOME PER URBAN HOUSEHOLD (YUAN) (AY)

The factor AY represents the average annual income per capita in an urban household, in this case, Beijing. The data for the average annual income of a household per capita is presented in the Chinese national currency Yuan and is taken from the Beijing Statistical Yearbook 2018.

Figure 14 shows the average annual disposable income per capita in Beijing from 2000 to 2017. According to the data, the average disposable income increased without exception. In 2000 the average income was at 10,349 yuan per capita per year (China Statistics Press, n.d.-b, Chapter ("China Statistical Yearbook 2018," n.d., Chapters 5-9 Basic Living Conditions Of Urban Households (1978-2017))). In 2017, the average income per person rose to 62,406 yuan per year (China Statistics Press, n.d.-b, Chapter ("China Statistical Yearbook 2018," n.d., Chapters 5-9 Basic Living Conditions Of Urban Households (1978-2017))). The escalation between 2000 and 2017, is an increase of over 500 percent, inflation is not reflected. A detailed numeric list can be found in Table 8.

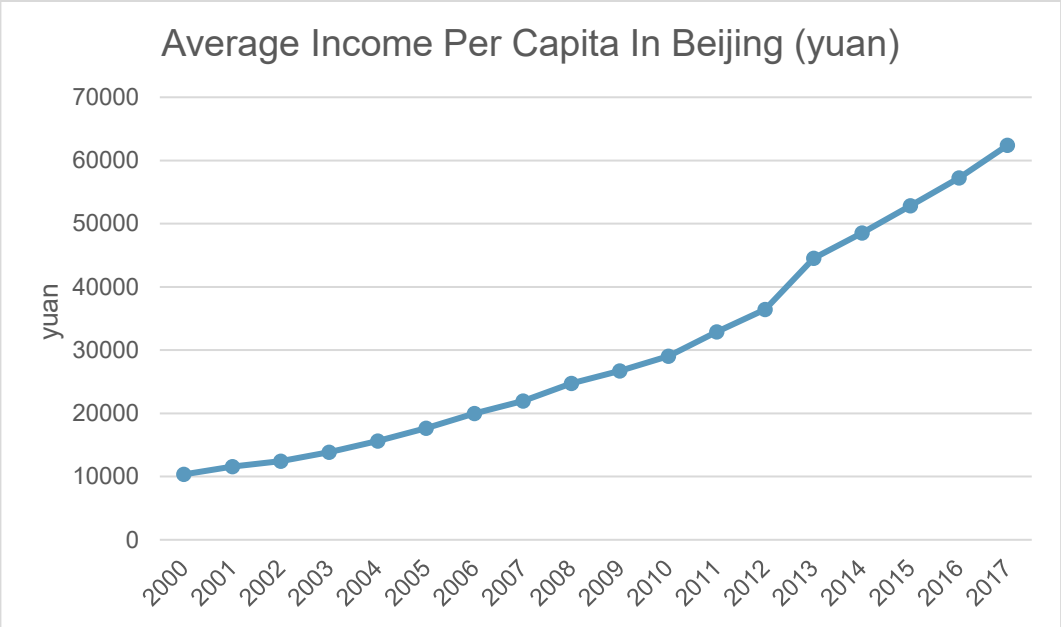

FIGURE 14: AVERAGE INCOME PER CAPITA IN BEIJING (YUAN)

Source: Beijing Statistical Yearbook 2018. (n.d.). Retrieved September 13, 2019, from Beijing Municipal Bureau of Statistics NBS Survey Office in Beijing website: http://tjj.beijing.gov.cn/nj/main/2018-tjnj/zk/indexeh.htm. Author's design.

AVERAGE NUMBER OF PERSONS PER URBAN HOUSEHOLD (NP)

The last factor for the PIR calculation is the nP factor. The factor nP stands for the average amount of people living in one household. The annual China Statistical Yearbook retains a record of the average population size per household categorized by regions.

In Figure 15 and Table 8, the average household size of Beijing's households is presented. The average household size developed from 2.91 people in 2000 to 2.62 in 2017 (National Bureau of Statistics of China, n.d., bks. 2001–2018). During the selected time frame, the average household size stayed below three people. In the years 2000 and 2001, the data had an all-time high of 2.91 people per household (National Bureau of Statistics of China, n.d., bks. 2001–2018). It can be observed that the housing size decreased gradually until its record low of 2.42 people in 2011 (National Bureau of Statistics of China, n.d., bks. 2001–2018). After its all-time low in 2011, the size per household in Beijing started to rise again up to 2.62 in 2016 and 2017 (National Bureau of Statistics of China, n.d., bks. 2001–2018). Between 2000 and 2017, the number of people per household have decreased by nearly 10 percent.

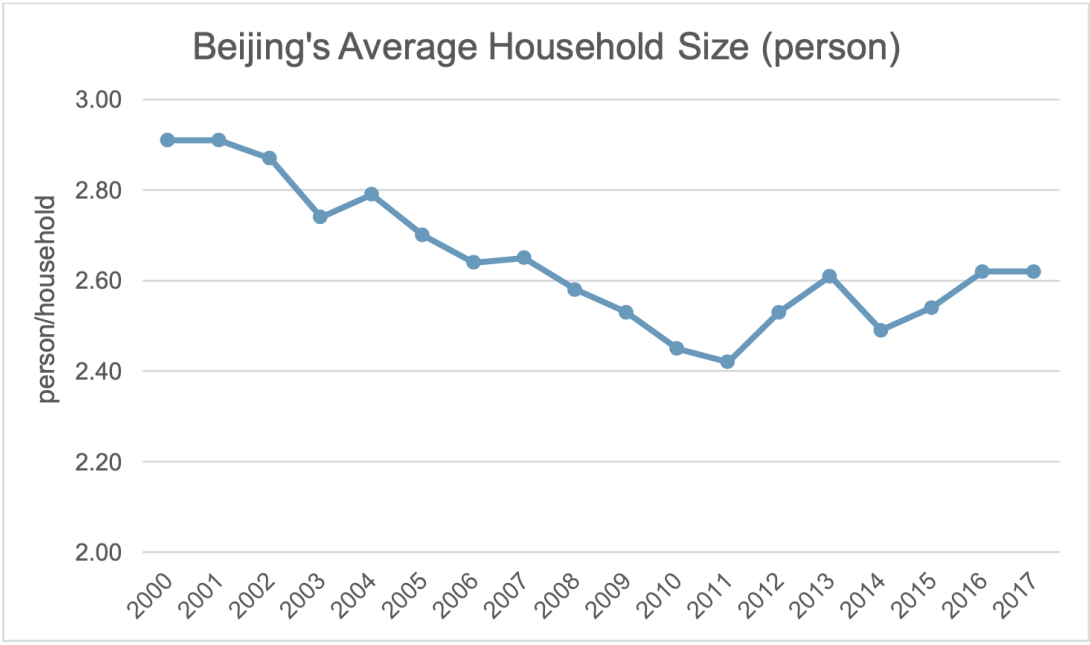

FIGURE 15: BEIJING'S AVERAGE HOUSEHOLD SIZE (PERSON/HOUSEHOLD)

Source: National Bureau of Statistics of China. (n.d.). China Statistical Yearbook. Retrieved September 11, 2019, from China Statistical Yearbook website: http://www.stats.gov.cn/english/Statisticaldata/AnnualData/ (bks. 2001-2018). Author's design.

PRICE-TO-INCOME RATIO CALCULATION

In Table 8, the four factors for the calculation of the price-to-income ratio is presented. The price-to-income ratio results are presented twice, once in a number on the last column of Table 8, and once, in a line diagram in Figure 15. As the data for the average floor space per capita in Beijing between 2000 and 2001 were absent, the calculation of the price-to-income ratio was not able to be calculated for these two years. The results of the calculation show that the price-to-income ratio increased during the last years. In 2002, the ratio was at six, and in 2017 it increased to a ratio of 18. This is an increase of over 170 percent. In the following section, the results of the calculation will be analyzed in more detail.

YEAR	AP	FA	AP*FA	AY	NP	AY*NP	PIR
2000	4557	-	-	10349	2.91	30115.59	-
2001	4716	-	-	11577	2.91	33689.07	-
2002	4467	55	245685	12463	2.87	35768.81	**6.87**
2003	4456	54	240624	13882	2.74	38036.68	**6.33**
2004	4747	60	284820	15637	2.79	43627.23	**6.53**
2005	6162	59	363558	17652	2.70	47660.40	**7.63**

2006	7375	62	457250	19977	2.64	52739.28	**8.67**
2007	10661	66	703626	21988	2.65	58268.20	**12.08**
2008	11648	69	803712	24724	2.58	63787.92	**12.60**
2009	13224	70	925680	26738	2.53	67647.14	**13.68**
2010	17151	70	1200570	29072	2.45	71226.40	**16.86**
2011	15518	71	1101778	32903	2.42	79625.26	**13.84**
2012	16553	74	1224922	36468	2.53	92264.04	**13.28**
2013	17854	82	1464028	44563	2.61	116309.43	**12.59**
2014	18499	79	1461421	48531	2.49	120842.19	**12.09**
2015	22300	84	1873200	52859	2.54	134261.86	**13.95**
2016	28489	89	2535521	57275	2.62	150060.50	**16.90**
2017	34117	90	3070530	62406	2.62	163503.72	**18.78**

TABLE 8: PRICE-TO-INCOME RATIO CALCULATION FOR BEIJING

Source: sources and analysis cited in this study. Author's design.

4.1.3. RATING OF PIR OF BEIJING

In Figure 16, the results of the price-to-income ratio calculation are presented in a line diagram. The results of the price-to-income ratio calculation on Beijing's residents' housing market show a rose in the unaffordability of housing since the start of the 21st century. As can be seen in the graph, the ratio has slightly decreased at the beginning of the millennium, to its lowest point of 6.3 in 2003. Since 2003 the PIR ratio increased to a mid-peak in 2010, with 16.8. After 2010, the ratio decreased yearly, until 2014, to a mid-low of a ratio of 12. Since 2014, the ratio has increased again to its highest measured point of 18.77, in 2017. Although the ratio has risen up and down between 2002 and 2017, the PIR was throughout the entire time above six, which means that the housing market in Beijing was severely unaffordable during the analyzed time.

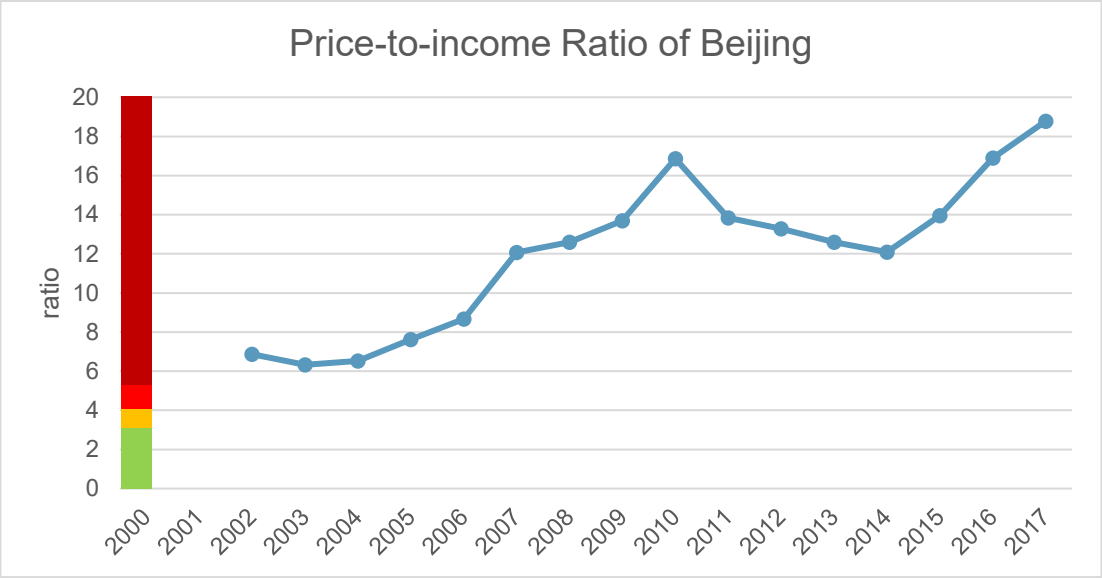

FIGURE 16: PRICE-TO-INCOME RATIO OF BEIJING

Source: sources and analysis cited in this study. Author's design.

4.2. SOUTH KOREA

4.2.1. REAL ESTATE MARKET

4.2.1.1. OVERVIEW

This part of the thesis aims to provide a comprehensive data set on South Korea and Seoul according to the framework of this thesis.

The capital of South Korea is Seoul, with its over 4,000-year history (Findlay, 2017). High rise apartment buildings dominate modern Seoul. South Korea is a country which is highly urbanized. Around half of the South Korean population lives in the metropolitan area of Seoul (Findlay, 2017).

Due to the rapid economic growth and urbanization, before the 1980s, South Korea had prior a housing problem (Kim & Park, 2016, p. 3). South Korea addressed the housing shortage in a pragmatic approach with a regulatory framework for the private sector (Kim & Park, 2016, p. 3). According to Kim and Park (2016, p. 3), the measurements had registered a positive result in the early 2000s. In recent years, the housing market saw a new trend toward renting instead of buying (Kim & Park, 2016, p. 3).

SHARE OF HOUSING

In 2017, South Korea had a homeownership rate of 57 percent (Trading Economics, n.d.). However, not every homeowner owned just one home, the percentage of the number of houses a homeowner owned in South Korea is presented in a column diagram in Figure 17. Between 2012 and 2014, the share of homeowners who owned one home declined. In 2012 around 89.3 percent owned one home, 9.2 percent two homes, and 1.5 percent owned more than three homes (Statistics Korea, n.d.). In 2014, the percentage of people who owned only one home declined down to 86.4 percent, while the percentage of people who owned two or more homes increased (Statistics Korea, n.d.). In 2014, the percentage of homeowners who owned two homes increased to 11.2 percent, and the percentage of people who owned three or more homes to 2.4 percent (Statistics Korea, n.d.).

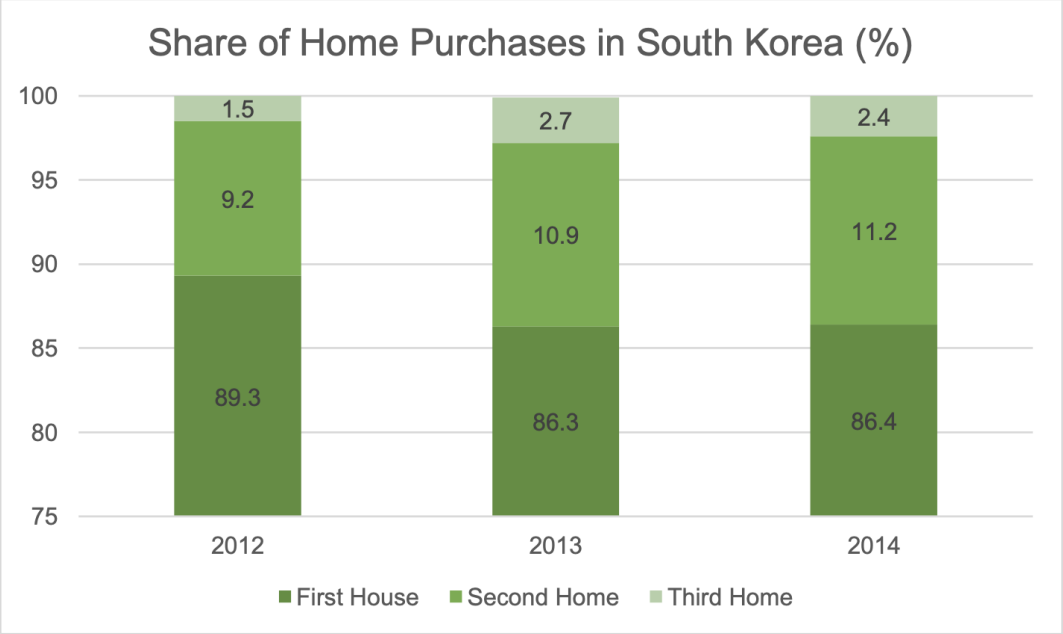

FIGURE 17: SHARE OF HOME PURCHASES IN SOUTH KOREA (%)

Source: Statistics Korea. (n.d.). Statistics of House Ownership. Retrieved October 26, 2019, from Statistics Korea website: http://kostat.go.kr/portal/eng/pressReleases/7/3/index.board. Author's design.

4.2.1.2. ECONOMIC DEVELOPMENT

In order to comprehend the housing market of a country, it needs to be noted that the real estate market is intermediately linked to a nation's economy (Jie et al., 2012, p. 123). Additionally, to the nation's economy, the real estate market also plays an important role in international trade (Cao, 2015, p. 3). Through supplying raw materials, luxury goods, and machinery to a country, the rest of the world also benefits from a flourished real estate market (Cao, 2015, p. 3). Thus, in this section, the Gross Product Production of South Korea will be examined between 2000 and 2017.

GDP DEVELOPMENT

South Korea had the third-highest GDP among the Asian countries (World Bank Group, n.d.-a). The current economic gross domestic product of South Korea had grown gradually since 2000. In 2001, as well as between 2007 to 2009, the GDP had a slight downfall, as can be seen in Figure 18. A detailed description of the current GDP is presented in Appendix 1. In 2000, South Korea's GDP was at five hundred billion, in 2017, the GDP rose to 1.6 trillion US Dollars a year (World Bank Group, n.d.-a). As mentioned, South Korea had a slight downfall of its GDP after 2007 up until 2009. The GDP fell from 1.2 trillion US Dollars in 2007, down to nine hundred billion US Dollars in 2009 (World Bank Group, n.d.-a). Between 2000 and 2017, the current GDP had increased by 188 percent.

FIGURE 18: SOUTH KOREA GDP (CURRENT US $)

Source: World Bank Group. (n.d.). GDP (current US$) | Data. Retrieved April 17, 2019, from The World Bank I Data website: https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?year_high_desc=true. Author's design.

However, looking at the annual GDP percentage growth of South Korea, it can be seen that the annual growth of South Korea has declined during the analyzed time. While in 2000, the annual growth was at 9 percent, in 2017, it declined to 3 percent (World Bank Group, n.d.-b), as can be seen in Figure 19. The highest measured growth was in 2000, with a 9 percent growth (World Bank Group, n.d.-b). The lowest point was in 2009, with annual GDP growth of 0.7 percent (World Bank Group, n.d.-b). Although in 2009, the lowest point was measured, the annual GDP growth peaked the following year to its third-highest point with an annual growth of 6.5 percent (World Bank Group, n.d.-b). The full data set can be found in Appendix 2.

FIGURE 19: ANNUAL GDP GROWTH OF SOUTH KOREA (%)

Source: World Bank Group. (n.d.). GDP growth (annual %) | Data. Retrieved May 29, 2019, from The World Bank I Data website: https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?end=2017&locations=CN-JP-KR&start=2006. Author's design.

COMPOSITION OF REAL ESTATE IN GDP

In Figure 20, the composition of construction to the South Korean GDP is presented. The data were taken from the Bank of Korea (2018). The data display that since 2000, the share of construction in the GDP has been steadily above 4 percent (Bank of Korea, 2018).

The composition of construction in the GDP had a peak in 2003, with a percentage of 6.2 (Bank of Korea, 2018). Since its peak in 2003, the composition of construction to the GDP had decreased down to its lowest measured point in the years 2011 and 2012, with 4.4 percent (Bank of Korea, 2018). However, since 2012, the construction composition increased to a share of 5.5 percent in 2017 (Bank of Korea, 2018). For more detail, see Appendix 3.

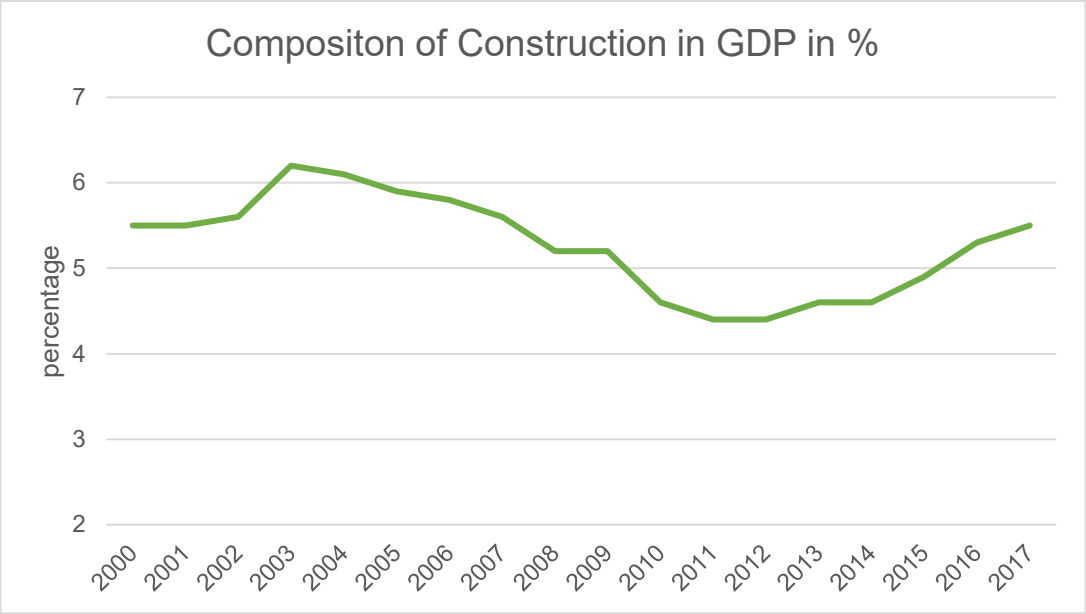

FIGURE 20: COMPOSITION OF CONSTRUCTION IN GDP (%)

Source: Bank of Korea. (2018). Visual 통계지표: GDP. Retrieved November 1, 2019, from Economic Statistics System website: http://ecos.bok.or.kr/jsp/vis/GDP/index_e.html#/gdp. Author's design.

4.2.1.3. DEMOGRAPHIC DEVELOPMENT

People are the main consumers of real estate; they are the driving stimulator for real estate demand. Thus, an important factor in analyzing real estate price development is to assess the population. According to Tsatsaronis and Zhu (2004b, p. 67), a shift in the demographics can influence the real estate price. Thus, the development of the demographics of Seoul will be examined in this section. This will be done in two phases; first, the population will be assessed by the development between younger and older generations, and second, the population development of Seoul will be analyzed.

YOUNGER VS. OLDER GENERATION

According to Tsatsaronies and Zhu (2004a, p. 67), can a change in the demographics between younger and older generations influences the real estate market. The Seoul Metropolitan Government presents, between 2014 and 2018, the age population of Seoul in a 5-year interval statistic, see Appendix 5. Based on the data, the population was grouped into three age groups; 0-14 years old, 15-64 years old, and over 65 years old. The results are presented in Figure 21.

The statistics show that throughout the analyzed time, the major population was between 25-64 years old, thus belonging to the working-age population. However, this age group had marginally declined, from 76 percent in 2014, down to 75 percent in 2015 (Seoul Metropolitan

Government, 2015, Chapter 서울시 주민등록인구 (연령별/구별) 통계). Similar was the population percentage of people under 14-years old also decreasing, from 12 percent in 2014, down to 11 percent in 2017 (Seoul Metropolitan Government, 2015, Chapter 서울시 주민등록인구 (연령별/구별) 통계). Although the children and working-age population group declined, the percentage of over 65-year-old people increased, from 12 percent in 2014, up to 13 percent in 2017 (Seoul Metropolitan Government, 2015, Chapter 서울시 주민등록인구 (연령별/구별) 통계).

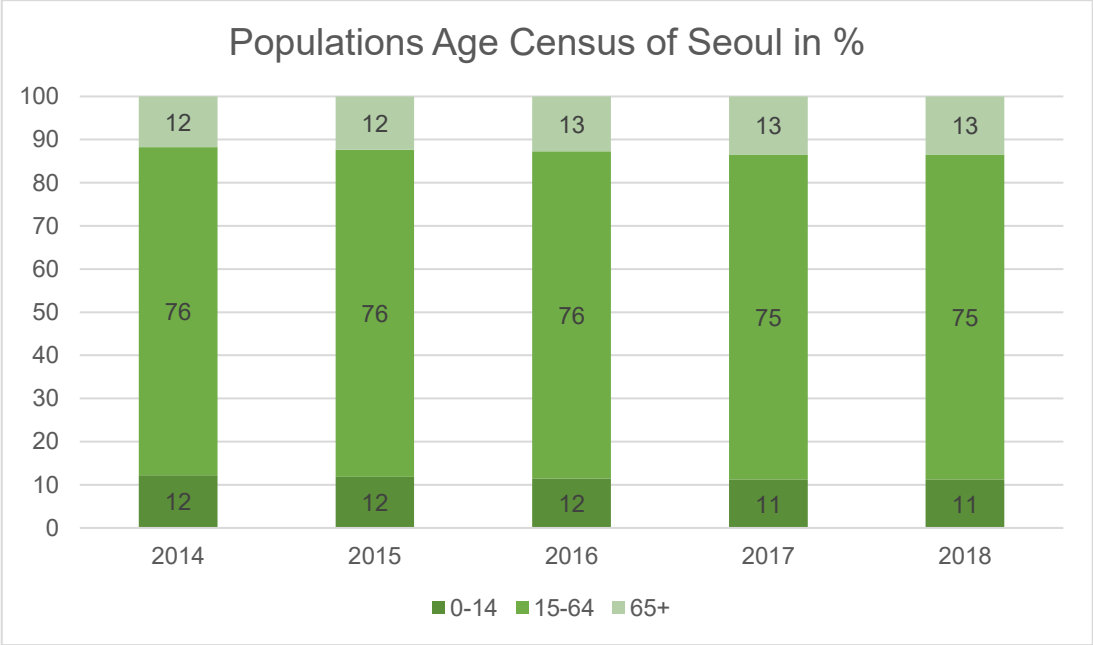

FIGURE 21: POPULATIONS AGE CENSUS OF SEOUL

Source: Seoul Metropolitan Government. (2015, January 26). 데이터셋> 데이터 이용하기 | 서울열린데이터광장. Retrieved October 19, 2019, from http://data.seoul.go.kr/dataList/datasetView.do?serviceKind=2&infId=10718&srvType=S&stcSrl=10718. Author's design.

URBAN POPULATION

The enormous increase of the urban population and with it the task of managing urban areas will be a major challenge of the 21st century, so stated by the Population Division of the United Nations (2014). The urban population of Seoul will be presented in Figure 22.

Seoul is the capital of South Korea and was ranked the world's 32nd largest city in the world of 2018, with around 10 million people (WorldAtlas, 2018). In 2017, the metropolitan area of Seoul had a population of over 25 million people, which made up at that time around half of the South Korean populations (Findlay, 2017).

In Figure 33, the population of Seoul is displayed based on the data of the Seoul Metropolitan Government (2017b, Chapter 주민등록인구(구별)). During the analyzed time, the population of Seoul was relatively stable between its lowest point in 2017, with 10.12 million and its highest point of 10.57 million, in 2010 (Seoul Metropolitan Government, 2017b, Chapter 주민등록인구(구별)). Since the year 2000, the urban population of Seoul has decreased by approximately 2.4 percent.

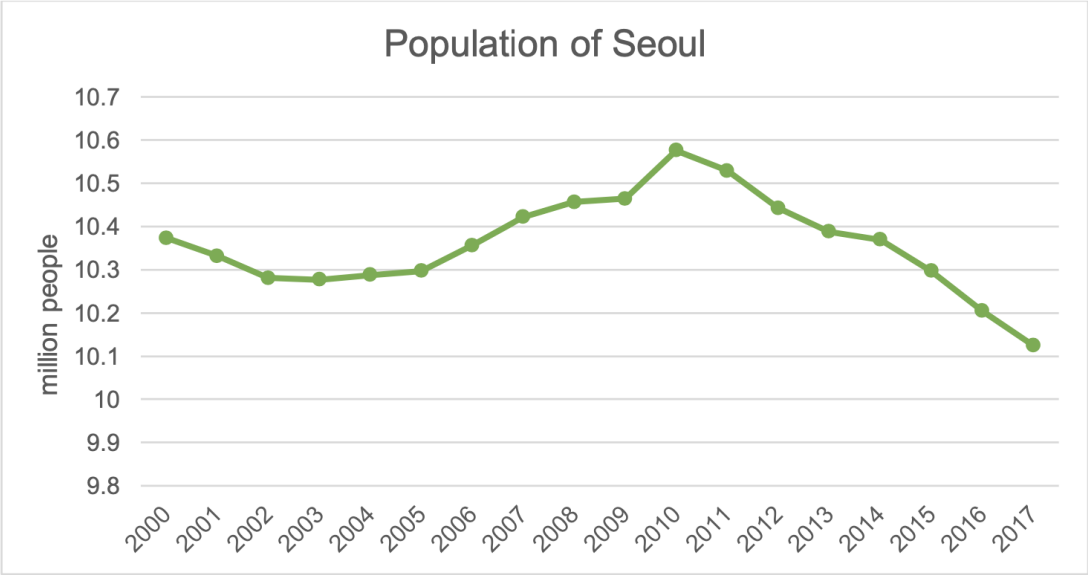

FIGURE 22: POPULATION OF SEOUL

Source: Seoul Metropolitan Government. (2017, December 26). 데이터셋> 데이터 이용하기 | 서울열린데이터광장. Retrieved October 19, 2019, from http://data.seoul.go.kr/dataList/datasetView.do?serviceKind=2&infId=419&srvType=S&stcSrl=419. Author's Design.

4.2.1.4. TRANSACTION COST

Tsatsaronis and Zhu (2004b, p. 67) stated that taxation could be a means to encourage or discourage real estate ownership. Thus, after having reviewed the economic and demographic development of South Korea and the capital Seoul, this section will assess the transaction cost of real estate in South Korea according to the framework provided in Chapter Three. The aim is to present the taxation on the property in South Korea, which includes the real estate tax, value-added tax, inheritance tax, stamp, and registration tax.

REAL ESTATE TAX

The annual property tax in South Korea is charged on the value of the property (PWC, 2019a) and ranges from 0.1 percent to 0.5 percent depending on factors such as the location and type of building (Global Property Guide, 2018a). For newly constructed or expanded real estate in

designated metropolitan areas, the property tax rate is applied times five for the first five years (PWC, 2019a).

VALUE ADDED TAX

The standard rate of the value-added tax is 10 percent in South Korea (PWC, 2019a), and is levied on the supply of goods or services (PWC, 2019a). The exceptions of the value-added tax are certain goods, e.g., medical and health services, unprocessed goods, and agricultural products (PWC, 2019a).

INHERITANCE TAX

The inheritance tax is imposed on the person or company that inherits an asset, in this case, property (PWC, 2019a). The tax rate varies from 10 – 50% and is levied on the fair market value of the asset (KPMG, 2018a, p. 31). Similar to the inheritance tax, a person who acquires a gifted asset is levied a tax, namely the gift tax (KPMG, 2018a, p. 31; PWC, 2019a). The gift tax varies the same as the inheritance tax, between 10 – 50%, depending on the market value of the gifted asset (KPMG, 2018a, p. 31; PWC, 2019a).

STAMP DUTY

In South Korea, the stamp duty is levied on documents that certify, change, alternate, create, or transfer the right of assets (KPMG, 2018a, p. 31; PWC, 2019a). The amount of stamp duty depends on the type of the original documents and varies between 50 Korean Won and 350,000 Korean Won (KPMG, 2018a, p. 31; PWC, 2019a). In case more than two parties are linked to the document, all parties' participant are liable for the stamp duty (KPMG, 2018a, p. 31). Recently the stamp duty was transformed into an electronic stamp system, thus making paper stamps redundant (PWC, 2019a).

REGISTRATION DUTIES

The registration tax is included in the acquisition tax; however, occasionally, a separate registration duty is charged (PWC, 2019a). The registration tax ranges from 0.2% to 5% and "is charged upon the act of registering the creation, alteration, or lapse of property rights or other titles and incorporation with the concerned authorities" (PWC, 2019a).

4.2.2. RELATIVE HOUSING PRICE

PRICE-TO-INCOME RATIO

For calculating the relative housing price in Seoul and thus assess the housing affordability, this thesis is using the Normative Approach, as defined in Chapter Three. According to the Normative Approach, the housing affordability will be assessed through the price-to-income ratio. The data for the price-to-income ratio calculation will be presented and analyzed in order to measure the housing affordability ratio of Seoul in the following section. The data will be taken from the Seoul Metropolitan Government as well as the online portal Statista.

MEAN SELLING PRICE OF RESIDENTIAL BUILDING (WON/ SQ.M.) (AP)

The AP factor, which represents the mean selling price of residential building per square meter in Seoul, is the first factor needed for the price-to-income ratio calculation. The data for this factor is taken from the Seoul Metropolitan Government webpage.

The Seoul Metropolitan Government provides the average sale price per square meter for residential buildings in Seoul. The data is presented in South Korean Won (hereafter Won) and on a monthly unit, between 2013 and 2017. However, before September 2015, the average sale price was presented in the traditional Korean measurement pyeong, one pyeong equals approximately 3.3 square meters (Seoul Metropolitan Government, 2014, Chapter 서울시 민간아파트 분양가격 통계). Since October 2015, the average housing price was presented per square meter. For the PIR calculation, the average housing sale price per square meter is needed; thus, the data were converted to the annual average square meter price. The original data can be found in Appendix 6.

In Figure 23, the converted average square meter price for a residential home is presented. The Figure shows that the average selling price per square meter in Seoul has gradually increased. While in 2013, the average selling price was at 5.4 million Won per square meter, it increased to 6.4 million Won per square meter in 2017 (Seoul Metropolitan Government, 2014, Chapter 서울시 민간아파트 분양가격 통계). Thus, the square meter price has increased by around 20 percent between 2013 and 2017. For a numeric description, see Table 13.

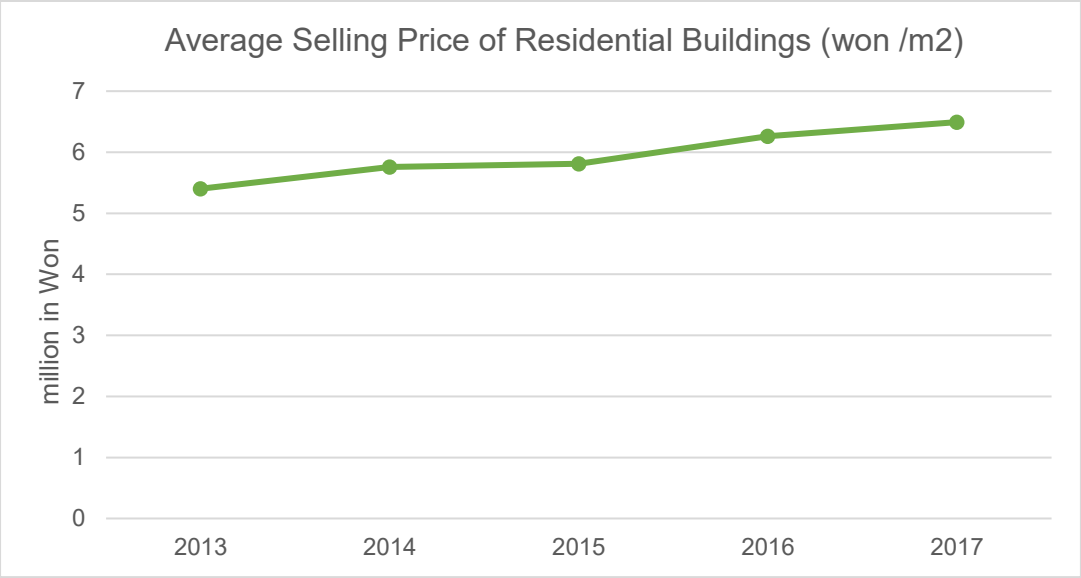

FIGURE 23: AVERAGE SELLING PRICE OF RESIDENTIAL BUILDINGS (WON/ SQ.M.)

Source: Seoul Metropolitan Government. (2014, October 21). 데이터셋> 데이터 이용하기 | 서울열린데이터광장. Retrieved October 21, 2019, from http://data.seoul.go.kr/dataList/datasetView.do?serviceKind=2&infId=10657&srvType=S&stcSrl=10657. Author's Design.

FLOOR AREA PER HOUSING UNIT (SQ.M.) (FA)

The second needed factor is the standard gross floor area per housing unit in Seoul. The Seoul Metropolitan Government (2017c, Chapter 서울시 1 인당 거주면적 통계) provided the statistic on the average floor space per housing in Seoul between 2005 and 2007. However, for the years between 2005 and 2007, there were no data available, and thus, the data from the Seoul Metropolitan Government was inoperable for the PIR calculation. Therefore, the data is excluded from the formula; however, it is presented in Appendix 7.

Due to the lack of data for the floor space per housing units in Seoul between 2013 and 2017, the average living space for South Korean provided by the online portal Statista is used. Statista provided the average living space per person in South Korea between 2006 and 2018. Based on the provided data, the average living space for a household was calculated. In order to calculate the average floor space per housing, the average floor space was multiplied by the average number per household provided by the Seoul Metropolitan Government. In Table 9, the data for the calculation is presented.

Year	Average Floor Space Per Capita (Sq.M.)	Average Person Per Household	**Average Floor Space Per Housing Unit (Sq.M.)**
2006	26.2	2.56	**67.07**
2007	-	2.52	-
2008	27.8	2.49	**69.22**
2009	-	2.48	-
2010	28.5	2.44	**69.54**
2011	-	2.44	-
2012	31.7	2.44	**77.34**
2013	-	2.43	-
2014	33.5	2.41	**80.73**
2015	-	2.39	-
2016	33.2	2.37	**78.68**
2017	31.2	2.34	**73.00**

TABLE 9: CALCULATION OF AVERAGE HOUSING UNIT IN SEOUL

Source: Seoul Metropolitan Government. (2017, December 26). 데이터셋> 데이터 이용하기 | 서울열린데이터광장. Retrieved October 19, 2019, from http://data.seoul.go.kr/dataList/datasetView.do?serviceKind=2&infId=419&srvType=S&stcSrl=419. Won So. (2019, August 8). South Korea: Living Space Per Person 2018. Retrieved October 26, 2019, from Statista website: https://www.statista.com/statistics/644523/south-korea-living-space-per-person/. Author's Design.

In Figure 24, the average living space per capita and household are presented in a line diagram. According to the data, has the average floor space slightly increased between 2006 and 2017. From an average of 26.2 square meters per person, up to 31.2 square meters per person (Won, 2019). The highest measured floor space was in 2014, with 33.5 square meters per person (Won, 2019). While the average floor space increased, the average number per person declined during the analyzed time; thus, the average floor space per household increased similarly. In 2006, the calculated average housing floor space was at 67 square meters and its highest point in 2014, with 80 square meters (Won, 2019). In 2017, the computed floor space declined slightly down to 73 square meters per household (Won, 2019). Nonetheless, between 2006 and 2017, the average floor space area per household increased by approximately 9 percent, and the average floor space per capita by around 19 percent.

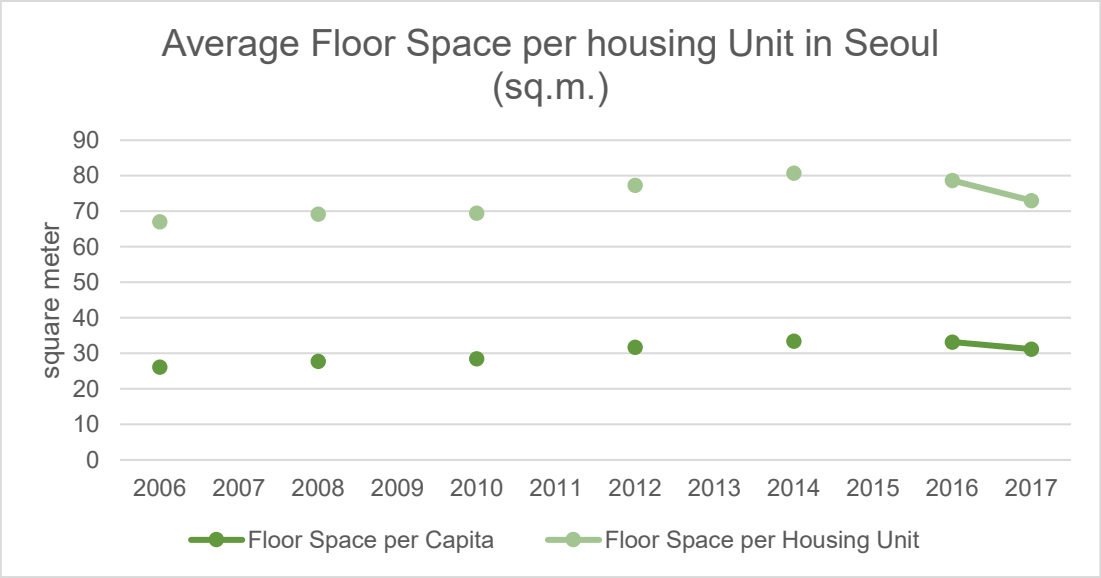

FIGURE 24: AVERAGE FLOOR SPACE IN SEOUL (SQ.M.)

Source: Seoul Metropolitan Government. (2017, December 26). 데이터셋> 데이터 이용하기 | 서울열린데이터광장. Retrieved October 19, 2019, from http://data.seoul.go.kr/dataList/datasetView.do?serviceKind=2&infId=419&srvType=S&stcSrl=419. Won So. (2019, August 8). South Korea: Living Space Per Person 2018. Retrieved October 26, 2019, from Statista website: https://www.statista.com/statistics/644523/south-korea-living-space-per-person/. Author's Design.

MEAN PER CAPITA ANNUAL INCOME PER URBAN HOUSEHOLD (WON) (AY)

The annual income per capita of Seoul is represented in the calculation as the factor AY. The data for the average annual income of a household per capita is presented in the South Korean national currency won and was taking from the Seoul Metropolitan Government's webpage.

As can be seen in Figure 25, the average income in Seoul had gradually increased since 2000. According to the data, the average income per capita was around 10 million won in 2000 and has increased up to 22 million in 2017 (Seoul Metropolitan Government, 2017a, Chapter 서울시 1 인당 지역내 총생산 및 지출 통계), which is an increase of nearly 120 percent. Between 2013 and 2017, the average income per capita increased by nearly 14 percent, inflation not be counted in. The lowest measured income was in 2000, and the highest in 2017. A numerical chart of the data is presented in Table 13.

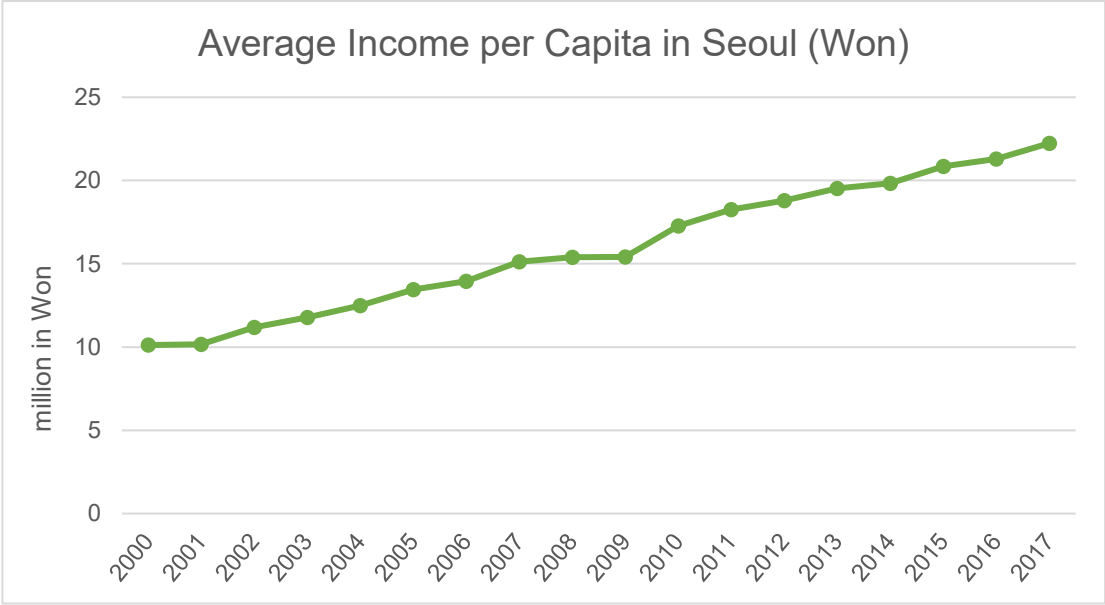

FIGURE 25: AVERAGE INCOME PER CAPITA IN SEOUL (WON)

Source: Seoul Metropolitan Government. (2017, November 21). 데이터셋> 데이터 이용하기 | 서울열린데이터광장—Income. Retrieved October 26, 2019, from http://data.seoul.go.kr/dataList/datasetView.do?serviceKind=2&infId=10932&srvType=S&stcSrl=10932. Author's design.

AVERAGE NUMBER OF PERSONS PER URBAN HOUSEHOLD (NP)

In Figure 26 and Table 13, the factor nP, which is the average number per household in Seoul, is presented based on the statistics given by the Seoul Metropolitan Government. The number of people living in one household had firmly declined since 2000. The highest measured people per household was in 2000, with 2.9 people (Seoul Metropolitan Government, 2017b, Chapter 서울시 주민등록인구 (구별) 통계). The lowest amount of people per household was in 2017, with an average of 2.3 people per household (Seoul Metropolitan Government, 2017b, Chapter 서울시 주민등록인구 (구별) 통계). This means that the number of people per household in Seoul had declined by around 20 percent during the observed time.

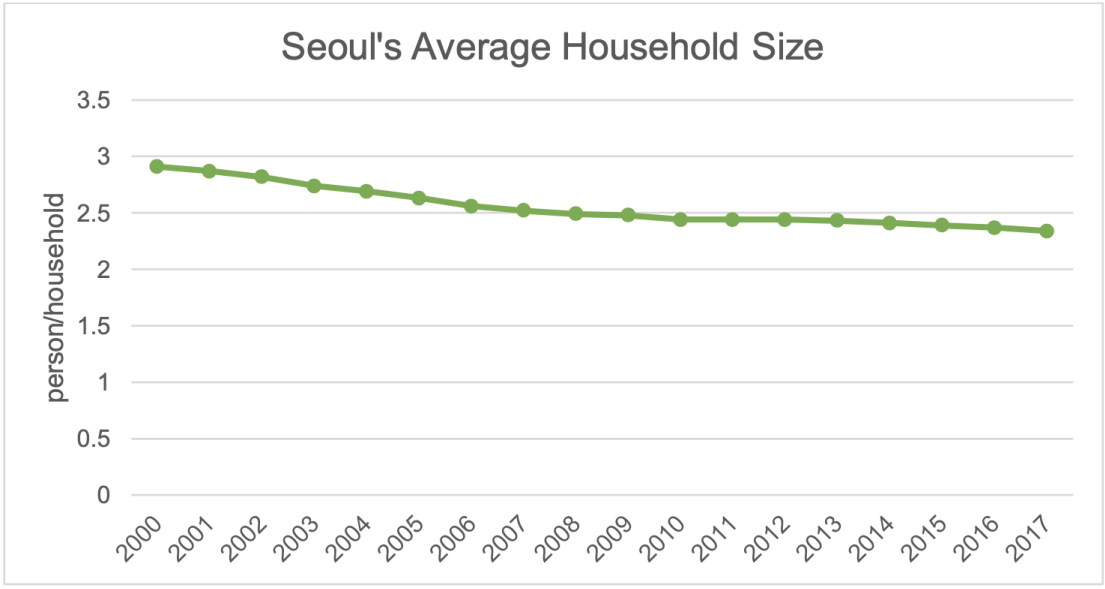

FIGURE 26: SEOUL'S AVERAGE HOUSEHOLD SIZE (PERSON/HOUSEHOLD)

Source: Seoul Metropolitan Government. (2017, December 26). 데이터셋> 데이터 이용하기 | 서울열린데이터광장. Retrieved October 19, 2019, from http://data.seoul.go.kr/dataList/datasetView.do?serviceKind=2&infId=419&srvType=S&stcSrl=419. Author's Design.

PRICE-TO-INCOME RATIO CALCULATION

The four factors needed for the price-to-income ratio formula is presented in Table 10. As the data for the average floor space price per square meter in Seoul between 2000 and 2012 were not available, the calculation of the price-to-income ratio was only able to be calculated for the most recent years. Nevertheless, the PIR results give insight into the housing price development of Seoul.

The results show that the price-to-income ratio has declined since 2014. In 2014, the ratio was at 9.72, and in 2017, it declined to 9.11. This is a decrease of around 6 percent in four years. In the following section, the results of the calculation will be formulated in a line diagram and analyzed in more detail.

YEAR	P	FA	AP*FA	AY	NP	AY*NP	PIR
2000	-	-	-	10118900	2.91	29445999	-
2001	-	-	-	10161300	2.87	29162931	-
2002	-	-	-	11185500	2.82	31543110	-
2003	-	-	-	11786700	2.74	32295558	-
2004	-	-	-	12493300	2.69	33606977	-
2005	-	85.04	-	13452800	2.63	35380864	-
2006	-	67.07	-	13955300	2.56	35725568	-
2007	-	-	-	15130000	2.52	38127600	-
2008	-	69.22	-	15401300	2.49	38349237	-
2009	-	-	-	15405300	2.48	38205144	-
2010	-	69.65	-	17276800	2.44	42155392	-
2011	-	-	-	18252300	2.44	44535612	-
2012	-	77.34	-	18795400	2.44	45860776	-
2013	5401742	-	-	19524800	2.43	47445264	-
2014	5756742	80.73	464741782	19831800	2.41	47794638	**9.72**
2015	5810040	-	-	20857300	2.39	49848947	-
2016	6261666	78.68	492667881	21294500	2.37	50467965	**9.76**
2017	6492500	73.00	473952500	22237100	2.34	52034814	**9.11**

TABLE 10: PRICE-TO-INCOME RATIO CALCULATION OF SEOUL

Source: sources and analysis cited in this study. Author's design.

4.2.3. RATING OF PIR OF SEOUL

As mentioned in the section before, in this section, the PIR ratio results are presented in a line diagram, see Figure 27. The results of the calculation show that the PIR had decreased since 2014.

The results of the calculation show that PIR had slightly increased between 2014 and 2016. However, from 2016 to 2017, the PIR ratio had decreased. According to the rating of the Demographia International Housing Affordability Survey, the housing in Seoul was seriously unaffordable during the measured time.

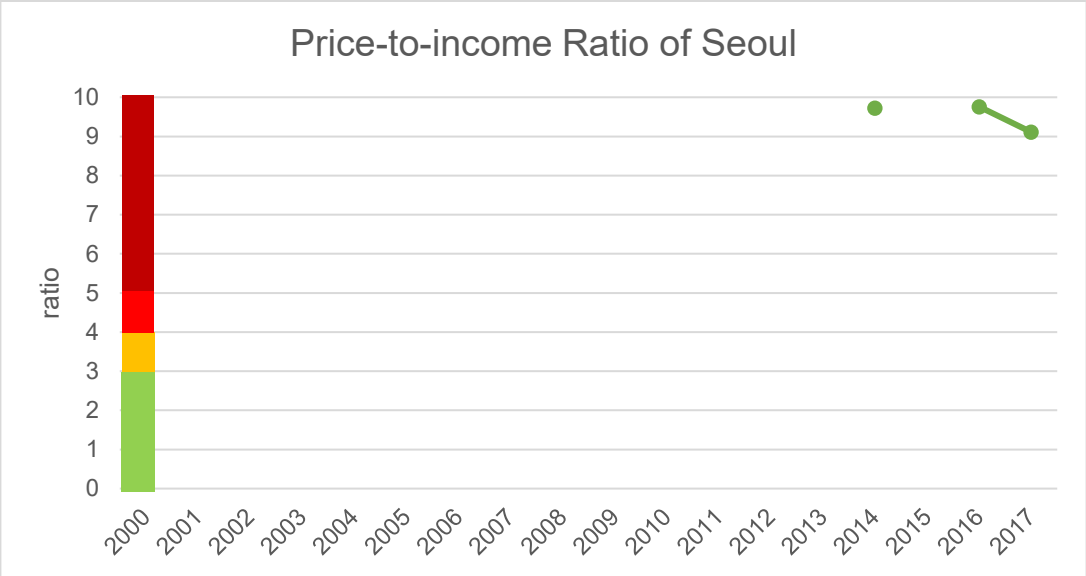

FIGURE 27: PRICE-TO-INCOME RATIO OF SEOUL

Source: sources and analysis cited in this study. Author's design.

4.3. JAPAN

4.3.1. REAL ESTATE MARKET

4.3.1.1. OVERVIEW

During World War II, much of the urban housings were destroyed, which resulted in a housing shortage (Noguchi & Poterba, 1994, pp. 2–3). In the 1950s and 1960s, rapid migration of people to urban areas increased the urban housing shortage, so Noguchi and Poterba (1994, pp. 2–3). During this period, industrial development had national priority over housing investment. Housing investments were discouraged, by example, non-existing mortgages from private financial institutions (Noguchi & Poterba, 1994, p. 3).

Since the 1980s, the Japanese housing market had attracted more attention due to the rapid housing prices increase (Noguchi & Poterba, 1994, p. 1). In the early 1990s, the decline of real estate values combined with a fall in the stock prices has resulted in concern towards some Japanese financial institutions and their fragility (Noguchi & Poterba, 1994, p. 1).

Low-rise buildings characterize traditional Japanese housing. Nowadays, Japanese cities display a landscape of skyscrapers, which reflects the housing need due to an influx of population in metropolitan areas. Adding the urbanization trend and the shrink of the Japanese population, small, and mid-sized cities are facing a decline in population (Berg, 2017). Furthermore, in Japan, a high building vacancy is reported (Brasor & Tsubuku, 2014).

Since 1868, Tokyo is the imperial capital of Japan (Nouët, 1990, p. 7). In 1943, Tokyo was reorganized, and the Metropolis of Tokyo was created (Nouët, 1990, p. 230). Presently, the Tokyo Metropolitan area encompassing 23 special wards, 26 cities, five towns, and eight villages (Tokyo Metropolitan Government, 2006).

HOMEOWNERSHIP RATE

Whereas the statistics of South Korea and China provide data on the amount of houses homeowners own, the Japanese statistics provide the homeownership ratio according to urban areas. According to the webpage of Trading Economics (n.d.) and Statistics Japan (2017) was Japan's homeownership rate in 2013, at 61 percent. Although the average homeownership rate

in Japan was high, the data show that the lowest homeownership rate was in Tokyo, with 46.41 percent, as of 2013 (Statistics Japan, 2017).

4.3.1.2. ECONOMIC DEVELOPMENT

This section will analyze the economic development of Japan between the years 2000 – 2017, according to the theoretical framework provided in the third chapter.

GDP DEVELOPMENT

From the beginning of the analyzed time until 2009, among the Asian countries, Japan had the highest GDP (World Bank Group, n.d.-a). In 2010, China outranked Japan; since then Japan, has the second-largest GDP in Asia (World Bank Group, n.d.-a). However, Japan not just outranked amount Asian countries but also worldwide. Japan was degraded from the second to third rank of the worldwide GDP in 2010 (World Bank Group, n.d.-a).

In Figure 28, the GDP development of Japan between 2000 and 2017 is presented. The development of Japan's GDP had its ups and downs, which can be seen in the Figure below. In 2000, Japan had a GDP of 4.88 trillion US Dollars, and in 2017, 4.85 trillion US Dollars (World Bank Group, n.d.-b). Thus, between 2000 and 2017, Japan's GDP declined by -0.61 percent. The highest measured GDP was in 2012, with 6.2 trillion US Dollars (World Bank Group, n.d.-b). The lowest assessed year was in 2002, with 4.1 trillion US Dollars (World Bank Group, n.d.-b). For interested readers, a detailed description of the GDP amount is presented in Appendix 1.

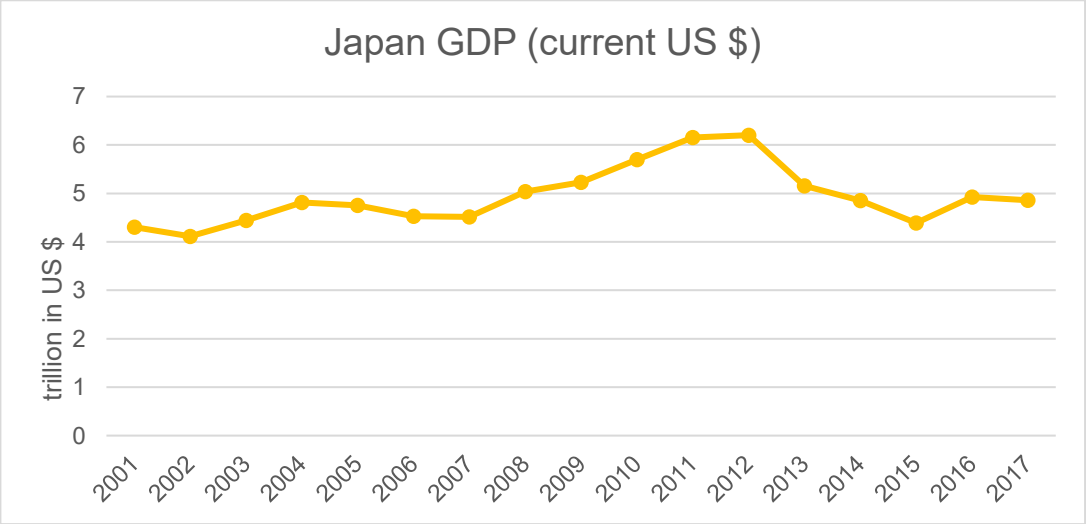

FIGURE 28: JAPAN GDP (CURRENT US$)

Source: World Bank Group. (n.d.). GDP (current US$) | Data. Retrieved April 17, 2019, from The World Bank I Data website: https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?year_high_desc=true. Author's design.

In Figure 29, the annual GDP growth of Japan is presented. In up and downtrend can be seen here as well. Despite the ups and downtrends between 2000 and 2017, Japan's annual GDP growth had declined. In 2000, Japan's annual GDP growth was at 2.7 percent, and in 2017 it only had an annual growth of 1.9 percent (World Bank Group, n.d.-b). During the analyzed time, Japan's lowest annual GDP growth was in 2009, with a negative growth of - 5.4 percent (World Bank Group, n.d.-b). The highest GDP growth was one year later in 2010, with an annual growth of 4.1 percent (World Bank Group, n.d.-b). A numeral description of the data can be found in Appendix 2.

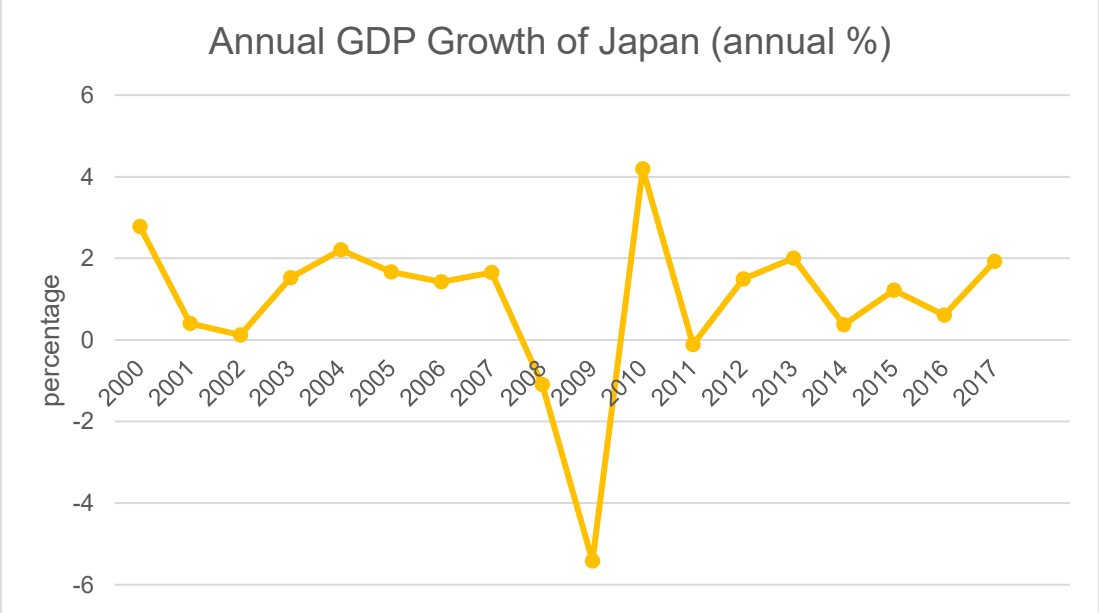

FIGURE 29: ANNUAL GDP GROWTH OF JAPAN (%)

Source: World Bank Group. (n.d.). GDP growth (annual %) | Data. Retrieved May 29, 2019, from The World Bank I Data website: https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?end=2017&locations=CN-JP-KR&start=2006. Author's design.

COMPOSITION OF REAL ESTATE IN GDP

In the Figure number 30, the real estate composition in the Japanese GDP is presented. The data was taken from the Japan Statistical Yearbook, the statistical yearbook presented the annual gross domestic product and divided it into various kinds of economic activity, based on the data the annual percentage of the real estate sector in GDP was calculated. Due to the absence of data, the composition of real estate to Japan's GDP was not able to be calculated for the years 2001 to 2004, and 2017. The original data of Japan's economic activity can be found in Appendix 8.

Throughout the analyzed time, the share of the real estate industry in the GDP was steadily around 11 percent (Statistics Bureau of Japan, n.d., bks. 2011–2019). The lowest measured percentage was in 2005, with 10.73 percent and the highest point in 2009, with 12.07 percent (Statistics Bureau of Japan, n.d., bks. 2011–2019). The composition increased to its highest point in the year 2009 (Statistics Bureau of Japan, n.d., bks. 2011–2019). Since 2011, the composition declined annually. Although between 2000 and 2016, the composition of real estate had up and downs, the starting point of the composition was 11.5 percent, and the last measured share was at 11.4 percent (Statistics Bureau of Japan, n.d., bks. 2011–2019). Since 2000, the annual real estate composition in the GDP has declined by negative 1.22 percent. Please refer to Appendix 3 for a more detailed numeral list.

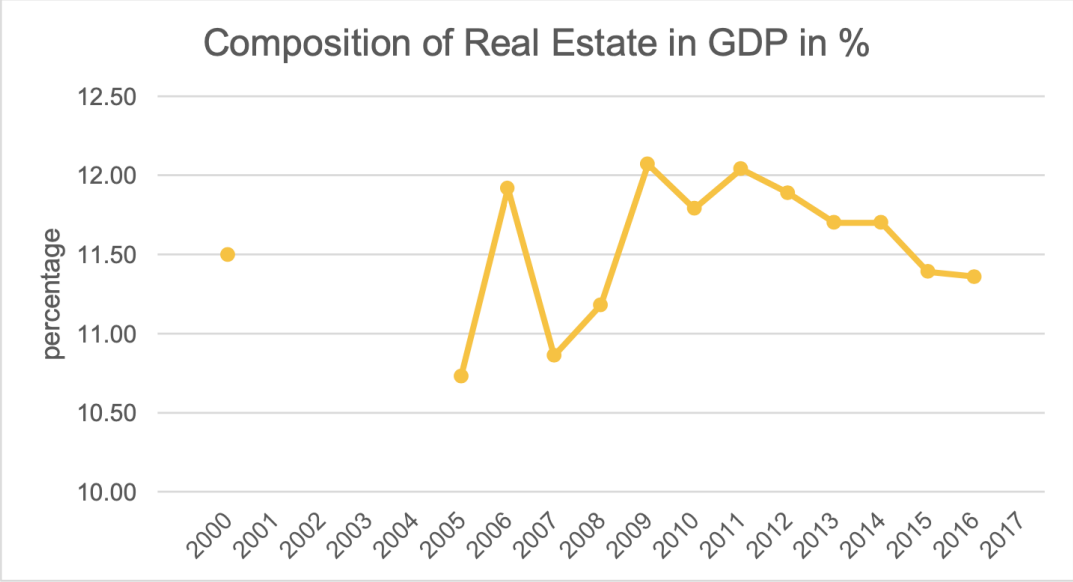

FIGURE 30: COMPOSITION OF REAL ESTATE IN GDP (%)

Source: Japan Statistical Yearbook. (n.d.). Retrieved October 7, 2019, from https://www.stat.go.jp/english/data/nenkan/index.html. Author's design.

4.3.1.3. DEMOGRAPHIC DEVELOPMENT

As housing is created for people, demographic development is an important factor in assessing housing affordability. According to Tsatsaronis and Zhu (2004b, p. 67), a shift in the demographics' influence the real estate prices. The demographics development of Tokyo will be observed in this section in two phases. In the first phase, Tokyo's population development between the younger and older generations will be assessed. In the second phase, the urban population development of Tokyo will be evaluated.

YOUNGER VS. OLDER GENERATION

The Tokyo Statistical Yearbook presents the age population of Tokyo in a 5year interval, see Appendix 9. Based on the data of the Tokyo Statistical Yearbook 2017, a breakdown of Tokyo's age population between 2000 and 2015 was made and is presented in Figure 31.

The statistics show that throughout the time, the major population was between 25 - 64 years old, thus, belonging to the working-age populations. However, this population declined, from 72 percent in 2000, down to 65 percent in 2015 (Statistics of Tokyo, n.d., Chapters 2-2 Population by 5 Year Age Group and Gender). The population of under 14-year-old people slightly decreased, from 12 percent in 2000, down to 11 percent in 2015 (Statistics of Tokyo, n.d., Chapters 2-2 Population by 5 Year Age Group and Gender). Although the share of the children population declined, the percentage of over 65-years-old people increased, from 16 percent in 2000, up to 22 percent in 2015 (Statistics of Tokyo, n.d., Chapters 2-2 Population by 5 Year Age Group and Gender).

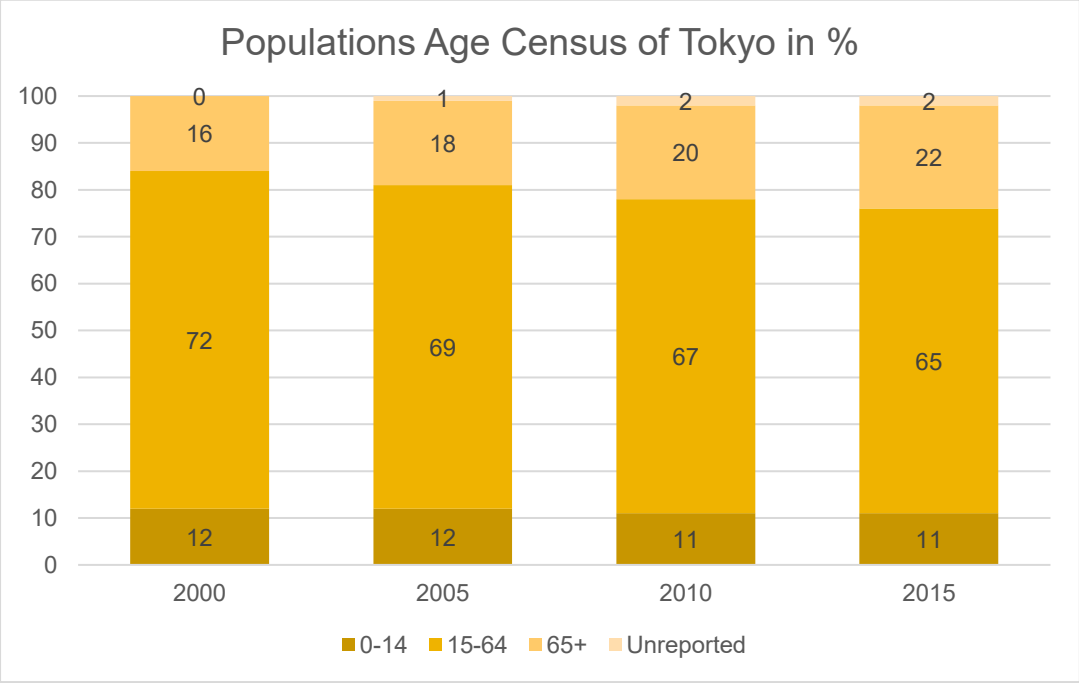

FIGURE 31: POPULATIONS AGE CENSUS OF TOKYO

Source: Statistics of Tokyo. (n.d.). Tokyo Statistical Yearbook 2017. Retrieved October 7, 2019, from http://www.toukei.metro.tokyo.jp/tnenkan/2017/tn17q3e002.htm. Author's design.

URBAN POPULATION

Tokyo, Japan's capital, is one of the world's largest metropolitan areas. In 2017, the great Tokyo metropolitan area was home for over 37 million people, which made up for 25 percent of the total Japanese population (Population Stat, n.d.). The population of the city area of Tokyo is lower than the population of the great Tokyo metropolitan area.

In Figure 32, the population of Tokyo is presented based on the data of the Tokyo Statistical Yearbook of 2017 (n.d., Chapters 2-1 Changes in Population). Since 2000, the population of Tokyo had increased. In 2000, twelve million people lived in Tokyo, and in 2017 the population grew to 13.7 people (n.d., Chapters 2-1 Changes in Population), which is an increase of 14 percent. A detailed number description of the urban population of Tokyo can be found in Appendix 4.

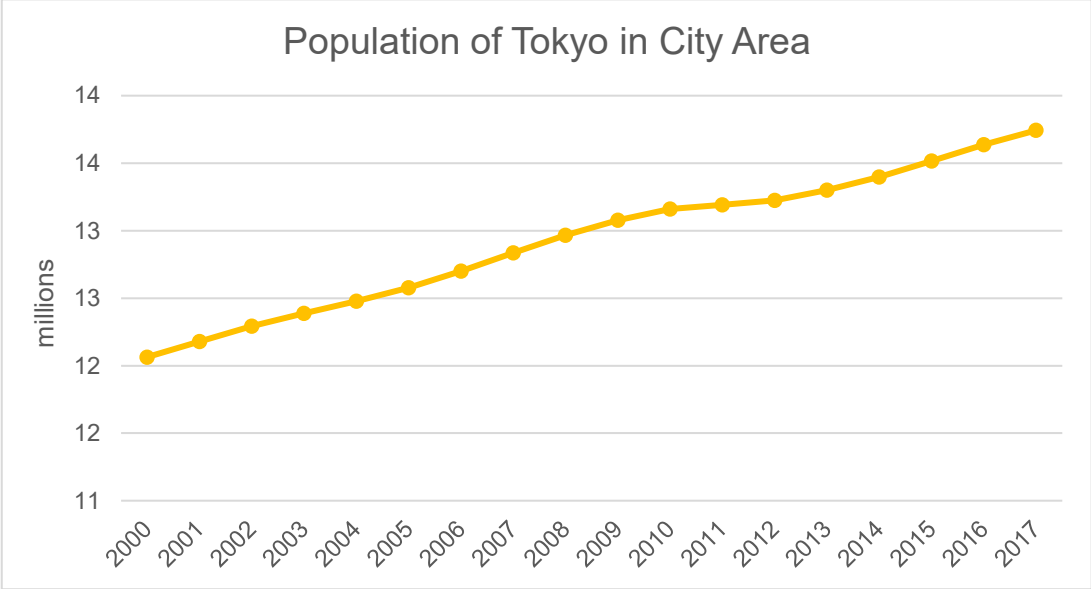

FIGURE 32: POPULATION OF TOKYO IN CITY AREA

Source: Statistics of Tokyo. (n.d.). Tokyo Statistical Yearbook 2017. Retrieved October 7, 2019, from http://www.toukei.metro.tokyo.jp/tnenkan/2017/tn17q3e002.htm. Author's design.

4.3.1.4. TRANSACTION COST

In this section, the transaction cost of the real estate in Japan will be assessed, consistent with the framework provided in Chapter Three. According to Tsatsaronis and Zhu (2004b, p. 67) can tax be a means to encourage or discourage real estate ownership. As this section aims to present the tax policies towards property in Japan, this section will present the real estate tax, value-added tax, inheritance tax, as well as the stamp and registration duties in Japan.

REAL ESTATE TAX

The city planning tax is levied together with the property tax (Global Property Guide, 2018c). The city planning tax lies at 0.3 percent of the measured value of the building or land (Global Property Guide, 2018c; KPMG, 2018b, p. 214). The property tax is taxed at 1.4 percent of the net book value of the real estate (KPMG, 2018b, p. 214). Thus, the owner of real estate or land is taxed 1.7 percent of the appraised value of the property by the local tax authorities (PWC, 2019b).

VALUE ADDED TAX

The standard rate of the value-added tax in Japan lies at 8 percent (DLA Piper, 2019; KPMG, 2016, p. 11; PWC, 2019b). This tax is applied when goods and services are sold or leased in Japan (KPMG, 2016, p. 11). Exempt of the VAT are residential and land leases (DLA Piper, 2019). As of October 2019, Japan increased its VAT to 10 percent (PWC, 2019b).

INHERITANCE TAX

In Japan, the inheritance tax is imposed on the inheritor of inheritance (PWC, 2019b). Consequently, the inheritance tax is levied on the inheritor of property (KPMG, 2018b, p. 217). The inheritance tax is a national tax and rates from 10 to 55 percent of the value of the inherited object (KPMG, 2016, p. 13, 2018b, p. 217).

STAMP DUTY

The stamp duty is imposed on certain taxable documents, for example, deeds and contracts (Deloitte, 2019, p. 5; KPMG, 2016, p. 13). The maximum liability amount is generally 600,000 Japanese Yen (KPMG, 2016, p. 13, 2018b, p. 214), which is around 5507 US Dollars[3].

REGISTRATION DUTIES

When a property is registered in Japan, the registration tax is charged (PWC, 2019b). The rate of the registration duty ranges from 0.1 to 2 percent of the taxable basis (PWC, 2019b). The taxable basis is depending upon the appraised property value (KPMG, 2016, p. 13), which is evaluated by the local government agencies between 60 and 80 percent of the market value of the property (Global Property Guide, 2018b).

[3] Calculated by author, as of November 11, 2019: 1 USD = 108,95 Yen

4.3.2. RELATIVE HOUSING PRICE

PRICE-TO-INCOME RATIO

In this chapter, the data for the price-to-income ratio calculation will be presented in order to measure the housing affordability of Tokyo. This calculation uses an average housing price as well as the average income of the urban household to calculate the average relative housing price in Tokyo. The data are obtained from the webpages of the Tokyo Statistical Yearbook and the Statistics Bureau of Japan.

MEAN SELLING PRICE OF RESIDENTIAL BUILDING (YEN/ SQ.M.) (AP)

The Land Institute of Japan presents the monthly average floor area of a unit per square meter in two parts, namely 'New Condominium Sales in Tokyo Metropolitan Area' (The Land Institute of Japan, n.d.) and 'Existing Condominium Sales in Tokyo Metropolitan Area' (The Land Institute of Japan, n.d.). Based on the date, the average square meter price per year was calculated, for more details on the original data refer to Appendix 10.

Figure 33 presents the calculated average square meter prices of the new houses, old houses, and the estimated average price. In Tables 10 and 11, the computed average selling price of residential buildings in Tokyo is presented in a numeral form. As Figure 35 shows, the average selling price per square meter in Tokyo had gradually increased. Comparing the prices of 2000 to the prices of 2017, it can be seen that the price range between the two types of apartments increased. While in 2000, the price difference per square meter was 214800 Yen, the gap grew to 362500 Yen in 2017. The lowest measured price for a new condominium was in 2002, with a price of 511 thousand Yen per square meter (The Land Institute of Japan, n.d.). The highest price for a new house was in 2017, with a price of 862 thousand Yen per square meter (The Land Institute of Japan, n.d.). The lowest price for a square meter for an existing condominium was in 2003, with 305 thousand Yen (The Land Institute of Japan, n.d.). In 2017, the price per square meter increased to 500 thousand Yen (The Land Institute of Japan, n.d.). Between 2000 and 2017, the price per square meter for new housing increased by 60 percent, while the price per square meter for existing housing increased by 54 percent. These price differences resulted that the average selling price increased by 57 percent.

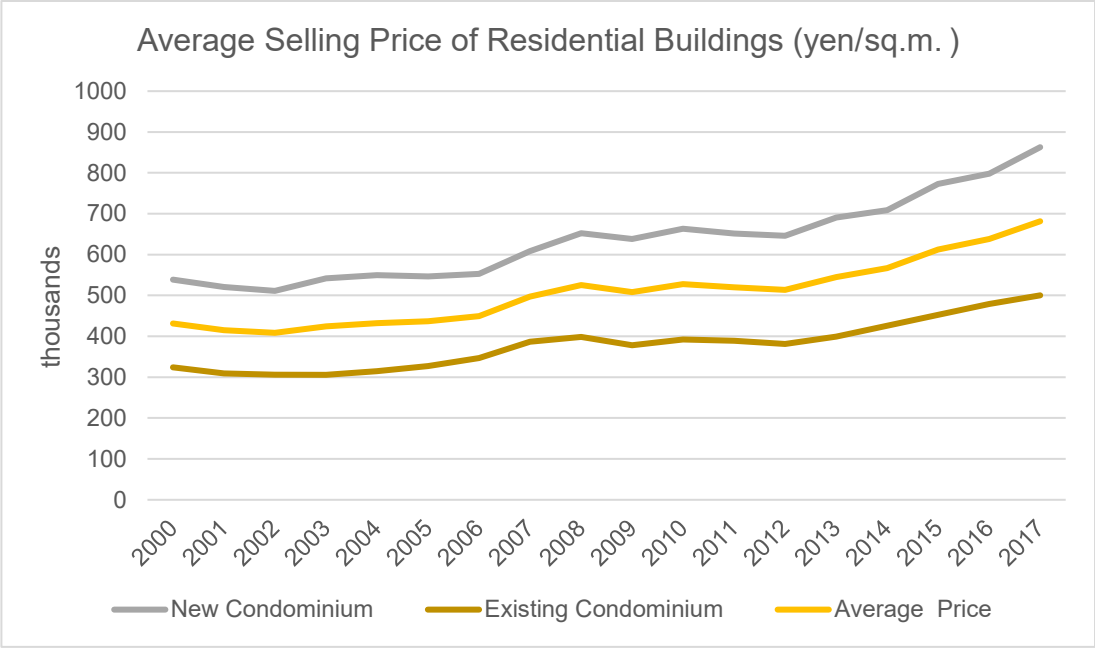

FIGURE 33: AVERAGE SELLING PRICE OF RESIDENTIAL BUILDINGS (YEN/ SQ.M.)

Source: The Land Institute of Japan. (n.d.). Retrieved October 9, 2019, from http://www.lij.jp/english/. Author's design.

FLOOR AREA PER HOUSING UNIT (SQ.M.) (FA)

The Tokyo Statistical Yearbook provides the data of the total floor area per housing unit. However, the data are presented in a five-year interval, and therefore the data for the total floor area per housing is only available for the years 2003, 2008, and 2013. The data are presented in Table 11 as well as Table 12.

The data show that the total floor area per housing unit in Tokyo was steadily around 64 square meters per housing unit (Statistics of Tokyo, n.d., Chapters 3-4 Dwellings, Households, Household Members, Dwelling Rooms per Dwelling, Tatami Units of Dwelling Rooms per Dwelling, Area of Floor Space per Dwelling, Tatami Units of Dwelling Rooms per Person, and Persons per Room by District and Tenure of Dwelling).

Year	Total Floor Area Per Housing Unit (Sq.M.)
2003	64.48
2008	63.94
2013	64.48

TABLE 11: TOTAL FLOOR AREA PER HOUSING UNIT IN TOKYO

Source: Statistics of Tokyo. (n.d.). Tokyo Statistical Yearbook 2017. Retrieved October 7, 2019, from http://www.toukei.metro.tokyo.jp/tnenkan/2017/tn17q3e002.htm. Author's design.

Japan's Ministry of Land, Infrastructure, Transport, and Tourism (MLIT), published in 2011 a paper on 'Basic plan for a living (national plan)'[4] (Ministry of Land, Infrastructure, Transport and Tourism, 2011, p. 22). The paper describes a guideline for the urban residential living area, the formula for an ideal livings space area of urban households of 2 or more people are the following:

$$20m^2 \text{ x household size} + 15m^2 \quad [5]$$

(Ministry of Land, Infrastructure, Transport and Tourism, 2011, p. 22)

On the bases of the provided formula, the ideal living space of households in Tokyo was calculated for more details, see Appendix 11. The results of the calculation for the ideal floor space in Tokyo are presented in Figure 34 and Table 13. Since 2000, the ideal floor space had steadily decreased. However, this is because the average number of people per household had declined in Tokyo.

Comparing the computed numbers to the three data given by the Tokyo Statistical Yearbook, it can be seen that in the years 2003, 2008, and 2013 the average total floor area per housing in Tokyo was below the computed ideal floor space according to the calculation of the MLIT.

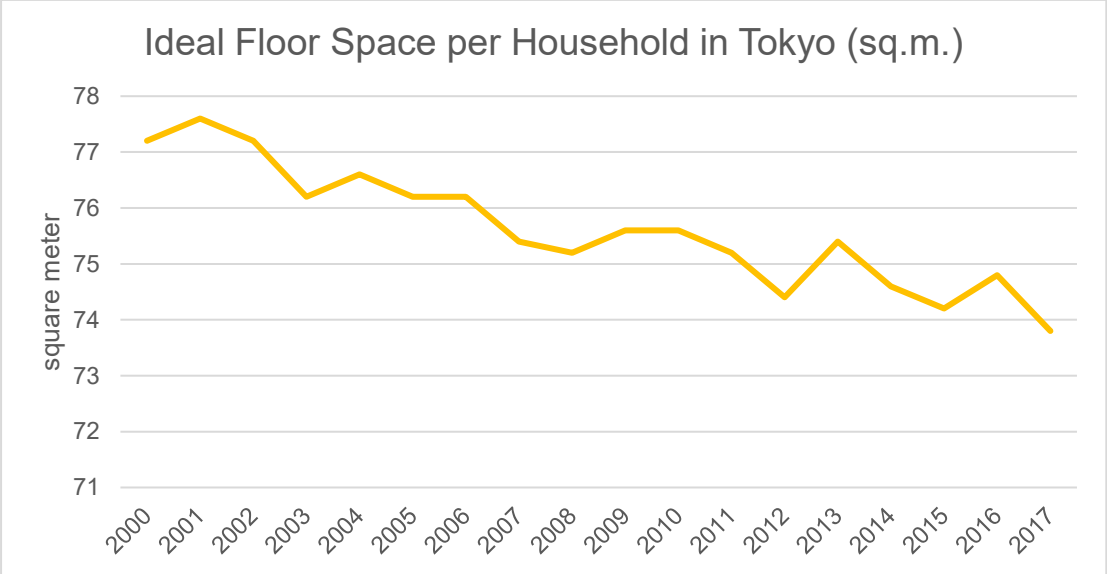

FIGURE 34: IDEAL FLOOR SPACE PER HOUSEHOLD IN TOKYO (SQ.M.)

Source: Calculation by Author. Author's design.

[4] Translation done by the author, original: 住生活基本計画(全国計画)

[5] Translation done by the author, original: 2 人以上の世帯 20m²×世帯人数+15m²

MEAN PER CAPITA ANNUAL INCOME PER URBAN HOUSEHOLD (YEN) (AY)

The third factor for this calculation is the average annual income per capita in an urban household. However, the Tokyo Statistical Yearbooks (2019, bks. 2000–2017) solitary obtains the average monthly income per household in Tokyo.

In order to acquire the data for the factor AY, the monthly average income presented by the Tokyo Statistical Yearbooks was be multiplied by twelve. In Appendix 12, the average monthly income per household of Tokyo is presented in the Japanese national currency, Yen. The average monthly income per household in Tokyo was multiplied by twelve and is shown in Figure 35 and in Tables 12 and 13. In order to avoid misunderstandings, the average annual income of a household in Tokyo is presented in Tables 12 and 13 as the factor; Annual.

The line graph in Figure 35 shows that since 2000 the average annual income per household in Tokyo had decreased. While in 2000, a household had an annual income of 7.7 million Yen, in 2017, a household had an annual income of 6.9 million Yen (2019, bks. 2000–2017). The average annual income per household had decreased to the second-lowest point in 2007, with an annual income of 6.8 million Yen (2019, bks. 2000–2017). In 2010, the annual income spiked up to 7.3 million Yen (2019, bks. 2000–2017). The lowest measured average annual income was in 2011, with 6.7 million yen (2019, bks. 2000–2017). From 2000 to 2017, the average annual income per household had declined by minus 9.9 percent.

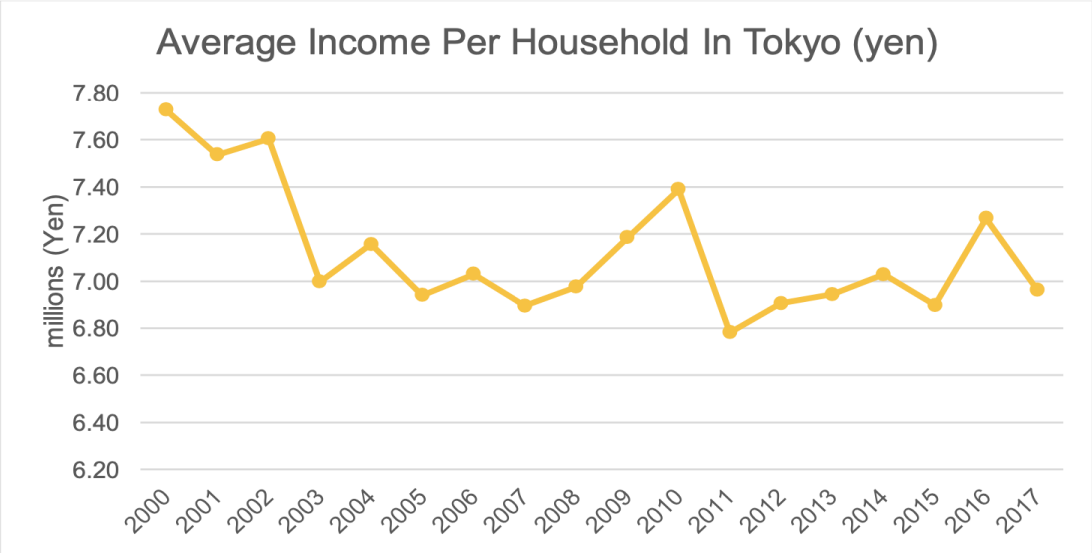

FIGURE 35: AVERAGE INCOME PER HOUSEHOLD IN TOKYO (YEN)

Source: Tokyo Statistical Yearbook. (n.d.). Retrieved October 9, 2019, from http://www.toukei.metro.tokyo.jp/tnenkan/tn-eindex.htm. Author's design.

AVERAGE NUMBER OF PERSONS PER URBAN HOUSEHOLD (NP)

The factor nP is the last needed factor, which represents the average number of persons per urban household, in this case, Tokyo. The average population size per household in Tokyo was collected from the Tokyo Statistical Yearbook (2019, bks. 2000–2017).

Figure 36 presents the development of the average household size of Tokyo between 2000 and 2017. The data reached an all-time high in 2001, with averagely 3.13 people per household (Statistics of Tokyo, 2019, bk. 2001). The line graph shows that since 2001, the average household size had gradually shrunk with an up and down wave (Statistics of Tokyo, 2019, bks. 2000–2017). The lowest measured household size was in 2017, with an average household size of 2.94 people per household (Statistics of Tokyo, 2019, bk. 2017). Between the starting and ending observation time, the household sizes in Tokyo were reduced by 5.5 percent. In Tables 12 and 13, the data are shown in numbers.

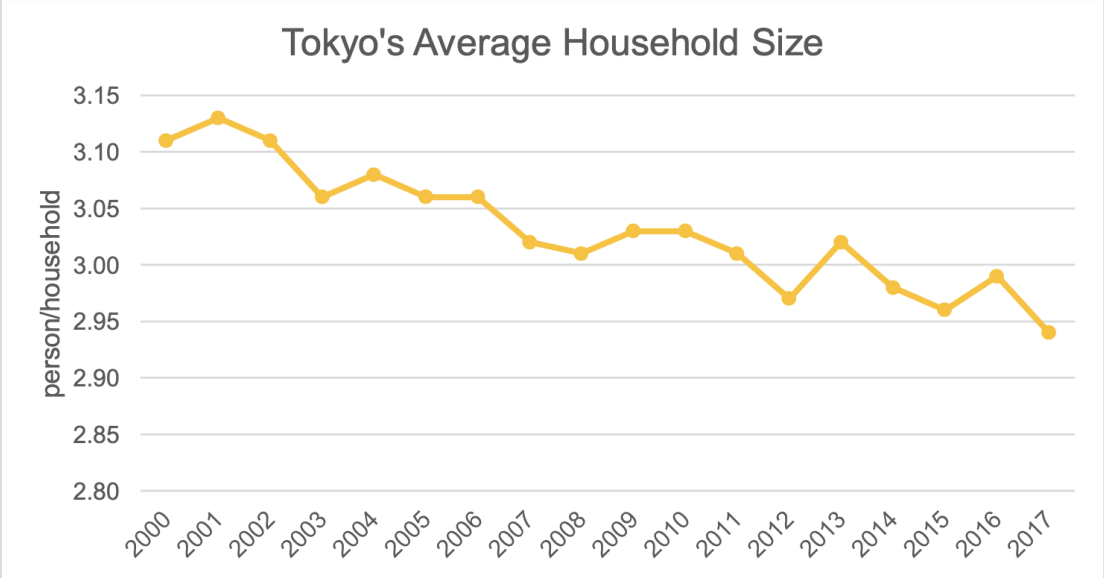

FIGURE 36: TOKYO'S AVERAGE HOUSEHOLD SIZE (PERSON/HOUSEHOLD)

Source: Tokyo Statistical Yearbook. (n.d.). Retrieved October 9, 2019, from http://www.toukei.metro.tokyo.jp/tnenkan/tn-eindex.htm. Author's design.

PRICE-TO-INCOME RATIO CALCULATION

This section is going to analyze the development of Tokyo's housing prices between 2000 and 2017, according to the price-to-income ratio calculation. The price-to-income ratio will be calculated twice. First on the data of the average housing space in Tokyo provided by the Tokyo Statistical Yearbook, and second on data of the calculated ideal urban housing size, which is based on the formula of the MLIT. In both tables, the factor AY is left out in the table, and

instead, the factors AY*nP are replaced with the factor Annual. The data for the factor Annual is taken from the Tokyo Statistical Yearbooks and represents the average annual income of a household in Tokyo.

In the last column of Table 12, the results of the price-to-income ratio calculation for Tokyo is presented. This table took the average housing size per household in Tokyo from the Tokyo Statistical Yearbook; thus, the ratio was only able to be calculated for the years 2003, 2008, and 2013. The results of the calculation are formulated in a line diagram in the next section, see section 4.2.3., Figure 37. Between 2003 and 2013, the PIR had increased by 29 percent.

YEAR	AP	FA	AP*FA	AY	NP	ANNUAL	PIR
2000	431600	-	-	-	3.11	7727352	-
2001	415250	-	-	-	3.13	7536816	-
2002	408600	-	-	-	3.11	7604532	-
2003	424000	64.48	27339520	-	3.06	6996780	**3.91**
2004	432150	-	-	-	3.08	7156464	-
2005	436950	-	-	-	3.06	6940080	-
2006	449650	-	-	-	3.06	7029816	-
2007	497550	-	-	-	3.02	6894168	-
2008	525400	63.94	33594076	-	3.01	6975516	**4.82**
2009	508250	-	-	-	3.03	7184676	-
2010	528000	-	-	-	3.03	7388976	-
2011	520200	-	-	-	3.01	6780852	-
2012	513850	-	-	-	2.97	6905280	-
2013	545350	64.48	35164168	-	3.02	6943536	**5.06**
2014	567100	-	-	-	2.98	7027632	-
2015	612750	-	-	-	2.96	6896796	-
2016	638600	-	-	-	2.99	7266360	-
2017	681550	-	-	-	2.94	6960756	-

TABLE 12: PRICE-TO-INCOME RATIO CALCULATION FOR TOKYO (1)

Source: sources and analysis cited in this study. Author's design.

In Table 13, the price-to-income ratio numbers are shown based on the ideal housing size in urban areas. In section 4.2.3., Figure 38, the results of the calculation are displayed in a line diagram. As the average housing size, and thus, also the average price for housing in Tokyo differs from Table 12, the PIR results of the two tables differ as well. Therefore, the PIR between 2003 and 2013 increased only by 28 percent. The results will be further analyzed in the following section.

YEAR	AP	FA	AP*FA	AY	NP	ANNUAL	PIR
2000	431600	77.2	33319520	-	3.11	7727352	**4.31**
2001	415250	77.6	32223400	-	3.13	7536816	**4.28**
2002	408600	77.2	31543920	-	3.11	7604532	**4.15**
2003	424000	76.2	32308800	-	3.06	6996780	**4.62**
2004	432150	76.6	33102690	-	3.08	7156464	**4.63**
2005	436950	76.2	33295590	-	3.06	6940080	**4.80**
2006	449650	76.2	34263330	-	3.06	7029816	**4.87**
2007	497550	75.4	37515270	-	3.02	6894168	**5.44**
2008	525400	75.2	39510080	-	3.01	6975516	**5.66**
2009	508250	75.6	38423700	-	3.03	7184676	**5.35**
2010	528000	75.6	39916800	-	3.03	7388976	**5.40**
2011	520200	75.2	39119040	-	3.01	6780852	**5.77**
2012	513850	74.4	38230440	-	2.97	6905280	**5.54**
2013	545350	75.4	41119390	-	3.02	6943536	**5.92**
2014	567100	74.6	42305660	-	2.98	7027632	**6.02**
2015	612750	74.2	45466050	-	2.96	6896796	**6.59**
2016	638600	74.8	47767280	-	2.99	7266360	**6.57**
2017	681550	73.8	50298390	-	2.94	6960756	**7.23**

TABLE 13: PRICE-TO-INCOME RATIO CALCULATION FOR TOKYO (2)

Source: sources and analysis cited in this study. Author's design.

4.3.3. RATING OF PIR OF TOKYO

As mentioned in the section before, is the price-to-income ratio of Tokyo was calculated twice, once based on the official average housing space and once based on the ideal housing space in Tokyo.

In Figure 37, the PIR of Tokyo of the three years is presented in a line diagram. The results of the calculation show that the PIR had increased. According to the rating scale of the Demographia International Housing Affordability Survey, was in 2003, the housing in Tokyo moderately unaffordable. In 2008, the ratio rose to 4.8, making the housing seriously unaffordable. The PIR increased to 5.06 in 2013, which positioned the housing market in the range of a severely unaffordable.

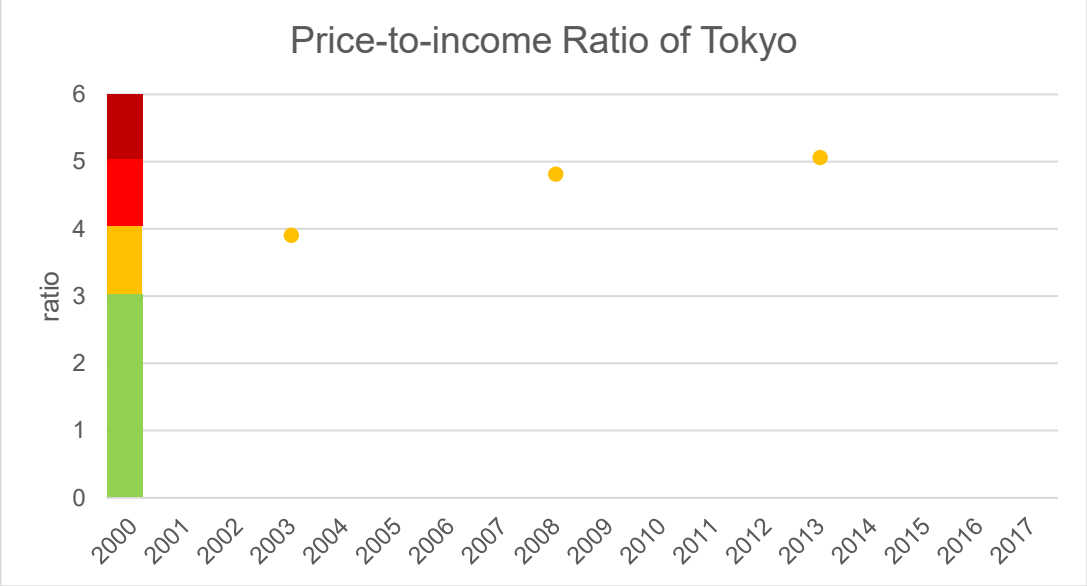

FIGURE 37: PRICE-TO-INCOME RATIO OF TOKYO (1)

Source: sources and analysis cited in this study. Author's design.

In Figure 38, the PIR of Tokyo is presented in a line diagram. The PIR is based on the calculation of the ideal housing space. The PIR had increased steadily in a wavy motion. Its lowest point was in 2002, with a ratio of 4.1 and its highest point in 2017, with a ratio of 7.2. Between 2000 and 2006, the housing of Tokyo was ranged seriously unaffordable. Since 2007, the housing in Tokyo had amplified to severely unaffordable.

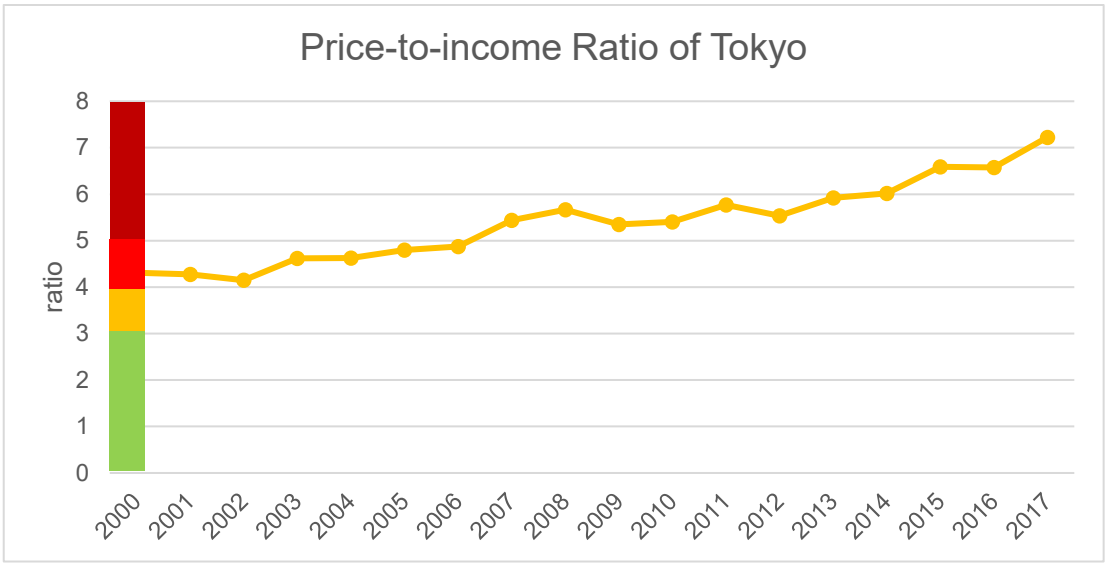

FIGURE 38: PRICE-TO-INCOME RATIO OF TOKYO (2)

Source: sources and analysis cited in this study. Author's design.

V ANALYTICAL PART

5.1. OVERVIEW

After having retrieved and assessed the data of the three case studies, namely China, Beijing in section 4.1, South Korea, Seoul in section 4.2, and Japan, Tokyo in section 4.3, this chapter is going to compare the three case studies and examine them for similarities and differences. This will be done to tackle the housing affordability situation of the three cities. The comparison will be made based on the structure of the framework, the real estate market, the relative housing price, and the price-to-income results. Subsequently, in Chapter Six, the main findings, relevance, and answer of the research questions will be presented.

All three countries recorded to have an urbanization trend during the 20th century, along with economic growth. The urbanization trend led to a housing shortage in urban areas. In Japan, these shortages were reported to have been in the 50s and 60s, intensified by housing destructions during World War II. Before the 1980s, South Korea had an urbanization trend, which was assumed to have been influenced by the nation's economic growth. In South Korea, the urbanization trend also resulted in a housing shortage. Timewise, China has experienced the most recent economic growth, which stimulated the migration of people to urban areas.

The housing ownership rate of all three countries is above 50 percent. South Korea and Japan have a relatively similar rate, South Korea had a rate of 57 percent in 2017, and Japan had a ratio of 61 percent in 2013. However, it needs to be noted that among the homeownership in Japan, the lowest rate was in Tokyo, with a homeownership rate of 46 percent. Within the three countries, China had the highest homeownership rate, with 90 percent in 2014. This might be explained by the Chinese culture, in which homeownership is a significant factor for the status in society, even though homeownership is limited for 70 years. While assessing the amount of homes people own, a clear trend towards multiple homeownership in China and South Korea was detected. South Korea and China both report having an increase of people who own a 2nd and a 3rd home. Although in South Korea, the percentage of multiple homeowners increased, they are still in the minority. In 2012, 10.7 percent of South Koreans people owned more than one home, and, in 2014, it increased to 13.6 percent. In China, the percentage of people who own several homes increased between 2008 and 2017. In 2017, 57 percent of homeowners owned more than one home in China. The high percentage of homeowners who own several

homes in China is especially remarkable, as China has a high down payment of currently 60 percent for a 2nd home. Due to an absence of data, the number of homes Japanese own could not be obtained.

5.2. COMPARING OF ECONOMIC DEVELOPMENT

ECONOMIC DEVELOPMENT

In Figure 39, the current GDP in US Dollars, of the three countries is presented. At the beginning of the observation, Japan had the highest GDP among the three Asian countries. However, in 2010 China outran Japan's economy and replaced its leading position. In 2017, China's GDP was 160 percent higher than Japan's. Between 2000 and 2017, China's GDP increased around 900 percent, while South Korea increased by 188 percent, and Japan by 0.6 percent.

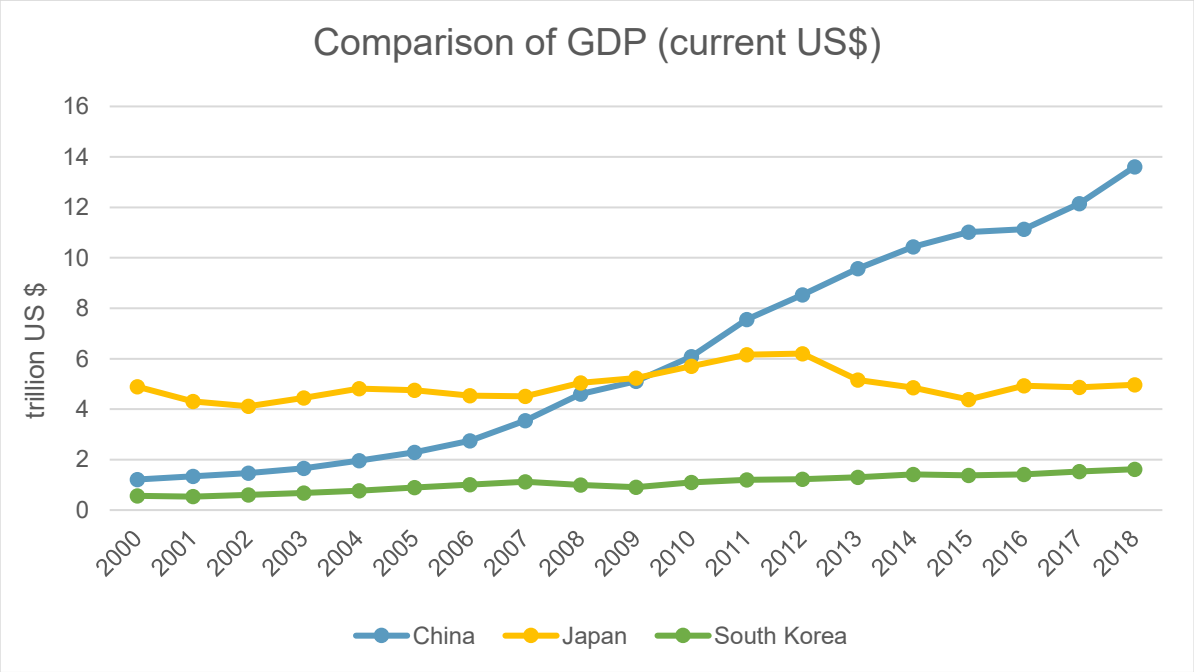

FIGURE 39: CURRENT GDP OF CHINA, JAPAN, AND SOUTH KOREA (US $)

Source: sources and analysis cited in this study. Author's design.

Figure 40 displays the second observation of the GDP, namely, the annual GDP growth in percent. Overall, the analysis showed a decline in GDP growth in all three countries. Especially after the year 2007, which was reported to be the starting point of the world economic crisis, all three countries show a decrease in growth. South Korea and Japan had the hardest decline between 2007 and 2009. Notably, Japanese growth had declined the strongest, to the point of

negative growth in 2009. Although 2007 was the starting point of the crisis, in this year, China also had its highest annual growth with 14 percent. Between 2000 and 2017, all three countries had lower annual growth in 2017 than in 2000. This might be an aftereffect of the world economic crisis. As this thesis analyzed the housing prices in the capital and not nationwide, the effect the high property prices of the capital cities had on the GDP is problematic to identify.

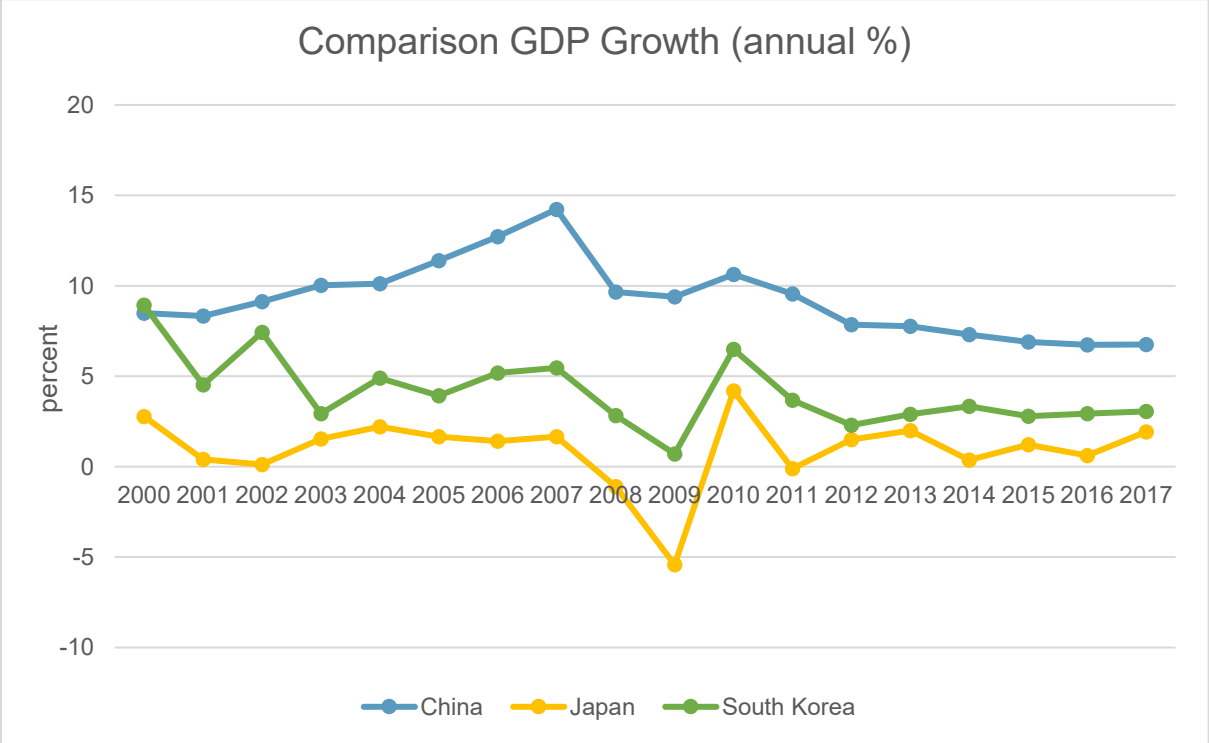

FIGURE 40: ANNUAL GDP GROWTH OF CHINA, JAPAN, AND SOUTH KOREA (%)

Source: sources and analysis cited in this study. Author's design.

In Figure 41, the composition of real estate and construction in the national GDP are being compared. According to the available data, Japan had the highest share of real estate composition in its GDP.

Comparing the data of the years 2000 to 2017, China's real estate composition had increased while South Korea's composition stayed the same. The composition of Japanese real estate also decreased slightly between 2005 and 2017. Noteworthy is to mention that the share of real estate in Japan did not decline in 2009, although the GDP had negative growth. Captivatingly, China had not the highest real estate composition among the three countries, although, since 2010, it had the highest GDP among the three countries and is considered a developing country. An explanation for China's real estate composition declination between 2007 and 2008, might be

the parallel drop in GDP growth. The recession of South Korea's and Japan's economy might explain the declination of real estate share in the GDP since 2009 in Japan, and since 2003 in South Korea.

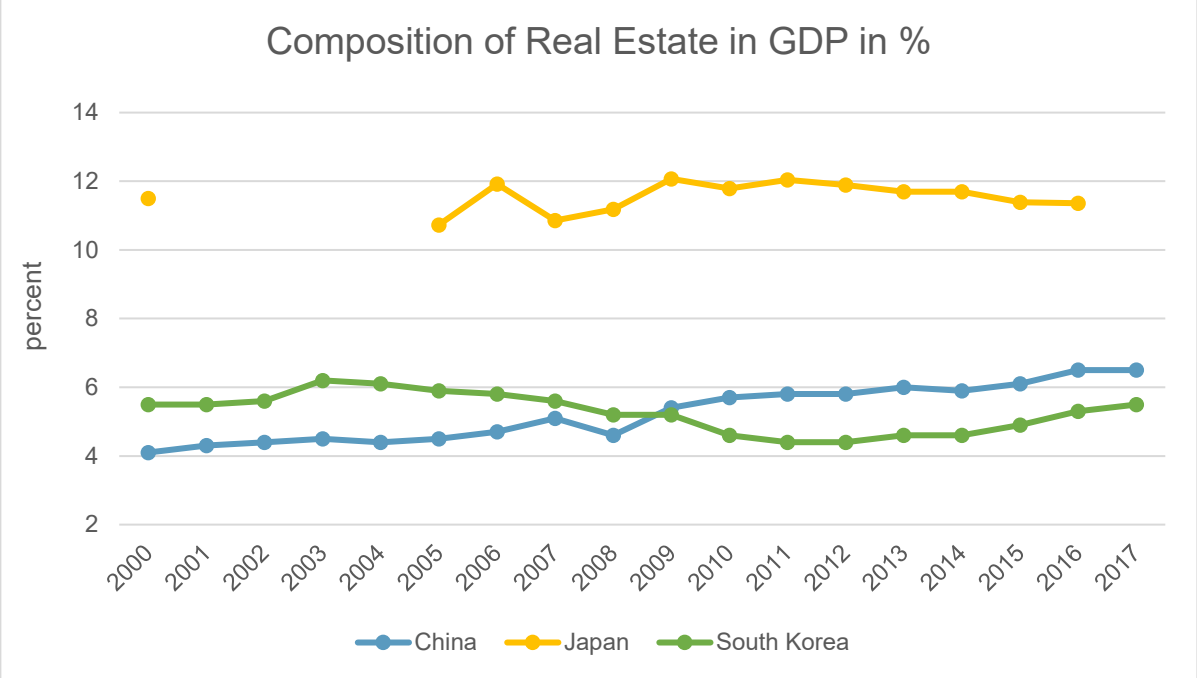

FIGURE 41: COMPOSITION OF REAL ESTATE IN GDP OF CHINA, JAPAN, AND SOUTH KOREA (%)

Source: sources and analysis cited in this study. Author's design.

DEMOGRAPHIC DEVELOPMENT

Although the time span of the collected population data varies, it sticks out that all three capital cities reported having a decrease of younger people, as seen in Figure 42. While Beijing's reports show that the percentage of working-age people increase between 2000 and 2017, Tokyo's and Seoul's working-age population declined. Thus, it appears that in Tokyo and Seoul, some of the working-age people drifted from the working-age group into the elder group. Tokyo and Seoul both report an increase in the elderly populations. Interestingly, comparing Beijing and Seoul's data from 2017 to Tokyo's data from 2015, Tokyo had the highest percentage of elderly people. The high percentage of elderly, and the low percentage of younger people in Tokyo, reflects the decline of birthrate and an increase in the aging population in Japan. An explanation for the decline of children in Japan might be the decline of the income of the households, see Figure 48, as children can be financially costly. However, a reason against this theory would be that the population of children also declined in Beijing and Seoul while their annual income had increased.

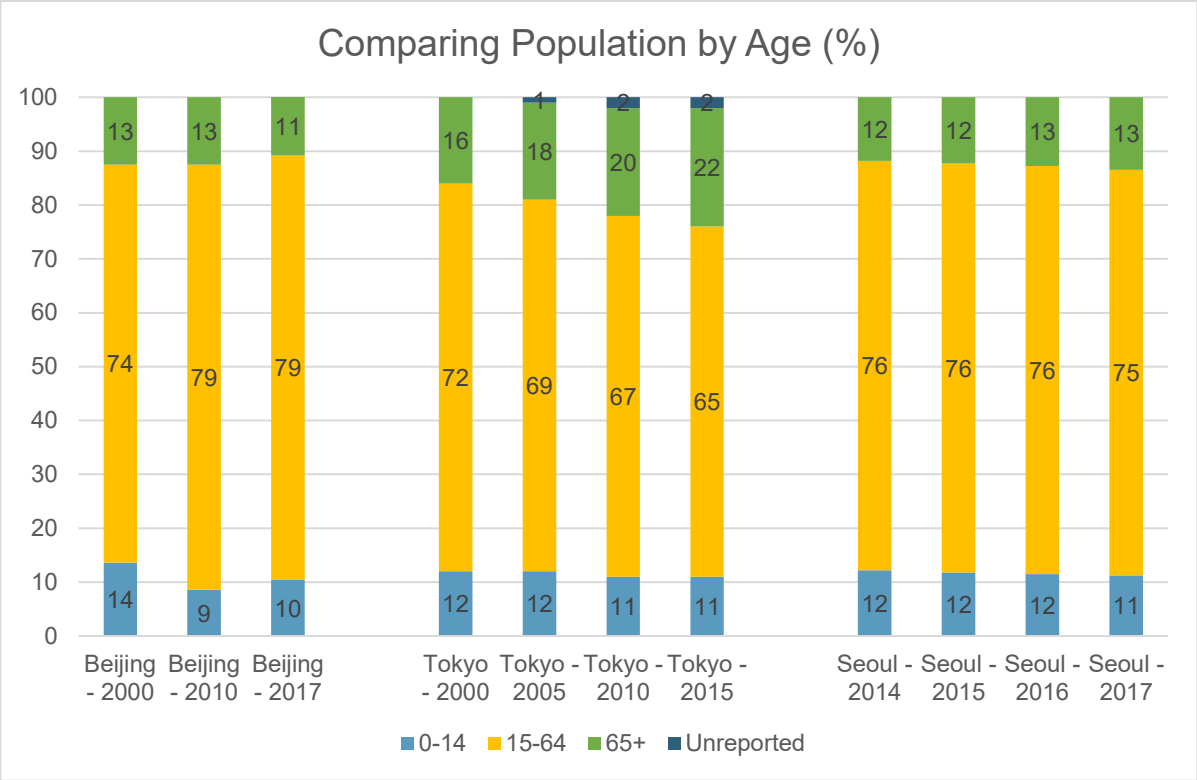

FIGURE 42: POPULATION BY AGE OF CHINA, JAPAN, AND SOUTH KOREA (%)

Source: sources and analysis cited in this study. Author's design.

In Figure 43, the urban population development of the three cities between 2000 and 2017 is presented. While comparing the population of the urban area to each other, two different trends are detected; decrease and increase.

Tokyo and Beijing record an increase of populations, particular Beijing's data display an enormous rise in population. Between 2000 and 2017, Beijing's population increased by 130 percent with the outcome that in 2017, it had more than 21 million citizens. The data of the age population in Beijing reported a decrease in younger and elderly people; thus, the high population increase must be influenced by an influx of people. This corresponds with the statement of the United Nations, in which the UN emphasized the challenge of the 21st century will be to manage urban areas due to a continuing urbanization trend. The enormous population increase also strengthened the statement of Malpezzi, Mayo, and Gross, in which they identified that cities in developing countries are growing faster, compared to cities in developed countries.

Between 2000 and 2017, Tokyo reported an increase in the population by 10 percent, while the population in Seoul had declined by 2.4 percent. Comparing the three capital cities to each other, in 2017, Beijing's population was almost the same as Tokyo's and Seoul's combined. However,

it should be noted that Tokyo and Seoul both have a great metropolitan area. In 2017, the metropolitan area of Tokyo reported a population of 37 million, which accounts for 25 percent of the Japanese population. It was reported that, in 2017, 25 million people lived in Seoul's metropolitan area. The high population of Seoul's metropolitan area meant that this area was home to around half of the South Korean people.

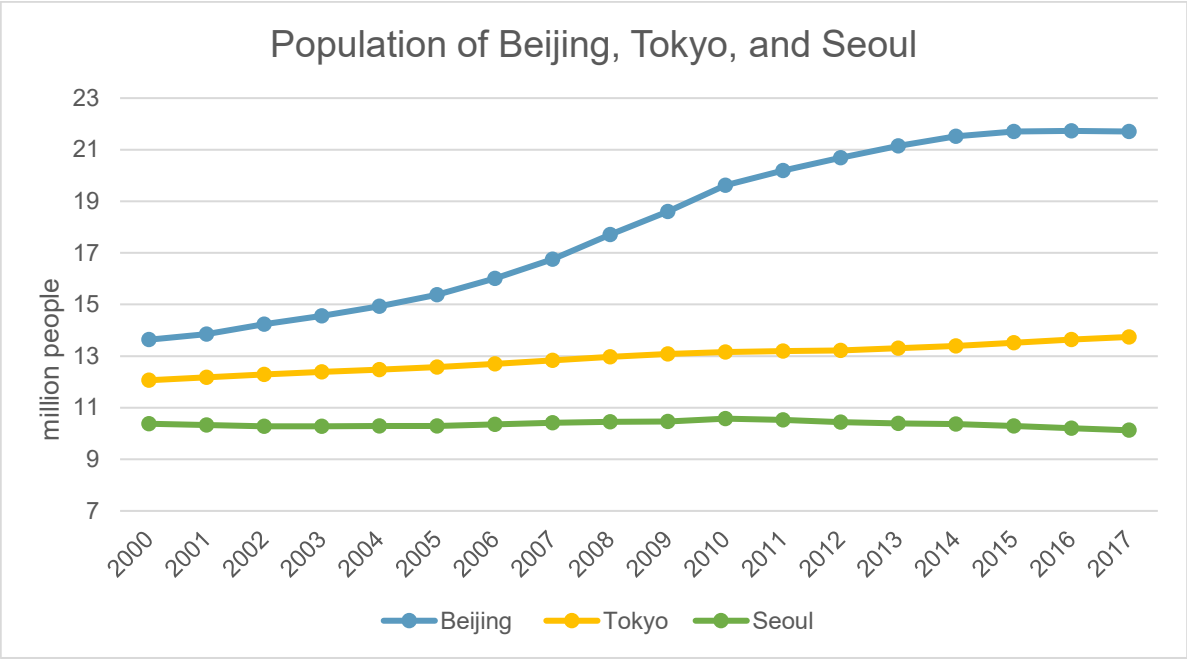

FIGURE 43: POPULATION OF BEIJING, TOKYO, AND SEOUL

Source: sources and analysis cited in this study. Author's design.

TRANSACTION COST

As taxes may encourage or discourage homeownership, and thus are a long-term influencer on the real estate prices. This section will compare the transaction and taxation cost on real estate in the three countries. A summary can be found in Table 14.

Comparing the annual real estate tax, South Korea had the lowest tax with 0.1 – 0.5 percent. China follows it with 1.2 percent for self-occupied housing. The percentage is calculated on 70 – 80% of the original real estate value. The highest real estate tax was in Japan, with 1.7 percent. However, comparing the VAT of the three countries, South Korea had a VAT of 10 percent, Japan the lowest with 8 percent, and China the highest with 11 percent. As some real estate might be inherited from family members, it is also essential to assess the inheritance tax. South Korea and Japan had a similar inheritance tax of 10 – 50 percent. However, in China, there is no inheritance tax, which thus did not affect the housing price. The absence of an inheritance tax in China might be because the government only lends the land right for 70 years. The stamp

duty in China is based on the value of the real estate, while in South Korea, the stamp duty can vary between 50 – 350,000 Won, around 0.04 – 300 US Dollars[6]. In Japan, the Stamp duty can be maximal 600,000 Yen, approximately 5,507 US Dollars[7]. Comparing Japan to South Korea, Japan had a higher maximal Stamp duty. Part of purchasing a real estate, the property needs to be registered, and thus, registration taxes are paid by the buyer. China had the lowest registration fee, with 80 Yuan, which was around 11 US Dollars[8]. South Korea had a registration tax between 0.2 – 5 percent, and Japan slightly lower with 0.1 – 2 percent of the property value. Adding to the cost, China imposed an additional deed tax, which ranged between 2 – 5 percent of the property value.

As Tsatsaronis and Zhu stated, can taxation encourage or discourage real estate ownership. According to this statement, China discouraged homeownership due to the high taxation on real estate, while the taxation of South Korea and Japan appeared to encourage homeownership. Adding up all expenses, in China, homeowners had to pay around 14.7 – 17.7 percent, plus 11 US Dollars registration tax for buying a property. While in South Korea, homeowners are levied 10.3 – 15.5 percent, plus the stamp and potential inheritance tax. Japan had the lowest tax amount, with 9.8 – 11.7 percent, plus the stamp duty and potential inheritance tax.

Although there is high taxation on real estate in China, China had a higher homeownership rate in 2014, than South Korea had in 2017, and Japan had in 2013. It appears that the high taxation on real estate does not affectingly discouragement homeownership in China. The high social value of homeownership in China might explain this effect. Correspondingly, the high down payment for 2nd homes in China might be a tool for discouraging multiple homes; however, according to the data, the ratio for 2nd and 3rd homes had increased.

The relatively low taxation system in Japan might encourage homeownership. In 2013, the homeownership rate lay at 61 percent. The low taxation on real estate, and thus, the encouragement for homeownership, might be due to a high building vacancy issue, as well as the high real estate share of the national GDP in Japan.

[6] Calculated by author, as of November 11, 2019: 1 USD = 1166.12 Won
[7] Calculated by author, as of November 11, 2019: 1 USD = 108.95 Yen
[8] Calculated by author, as of November 11, 2019: 1 USD = 7.01 Yuan

South Korea imposed high taxation on properties; subsequently, it might have discouraged homeownership. Despite South Korea's high transaction costs, it had the lowest real estate tax, and thereby, the government might support homeownership in the long run. However, compared to the other two countries, South Korea has the lowest homeownership rate, with 57 percent in 2017. By reducing the high transaction cost, South Korea might impact and reverse its high unaffordable ratio.

Cruz stated that countries with a high real estate transaction costs often have a housing affordability issue. Examining the price-to-income results and the transaction costs, this statement by Cruz can be confirmed. China had the highest transaction costs and the highest PIR results, while Japan had the lowest PIR results and the lowest transaction costs.

Country	Real Estate Tax	Vat	Inheritance Tax	Stamp Duty	Registration Duties	Deed Tax	**Total Cost**
China	1.2% (self-occupation)	11%	-	0.5 %	approx. 11 UD $	3-5%	**14.7 – 17.7%** + 11 US $
South Korea	0.1 – 0.5%	10%	10 – 50 %	0.04 - 300 US $	0.2 – 5 %	-	**10.3 –15.5%** + Stamp duty & inheritance tax
Japan	1.7% (including city planning tax)	8%	10 – 55 %	max. 5,507 US $	0.1 – 2 %	-	**9.8 –11.7%** + Stamp duty & potential inheritance tax

TABLE 14: SUMMARY OF TAXES IN CHINA, SOUTH KOREA, AND JAPAN ON REAL ESTATE

Source: sources and analysis cited in this study. Author's design.

5.3. COMPARING OF THE RELATIVE HOUSING PRICE

Apart from the economic and demographic development of the three countries, this thesis also analyzed the relative housing price via the price-to-income ratio. For this, four factors were conducted, and their development will be compared in this section.

MEAN SELLING PRICE OF RESIDENTIAL BUILDING (US $/SQ.M)

In order to compare the average selling price per square meter for residential housing, the data were converted into US Dollars[9], see Figure 44. According to the collected data, the average selling price per square meter had increased in all three capital cities. The highest recorded price for a square meter was measured in Tokyo. Between 2000 and 2017, the price per square meter in Tokyo had increased by 57 percent. However, compared to Beijing, Tokyo's increase was diminutive. At the same time span, Beijing's price per square meter had increased by 648 percent. This great increase in the square meter prices in Beijing brought the price near to the prices of the two developed countries. While in 2000, between Beijing and Tokyo, the price gap for per square meter was more than 3,000 US Dollars, the deficit shrunk to less than 1,500 US Dollars in 2017. In 2017, the gap between Beijing and Seoul was even smaller; the price per square meter of the two cities had a difference of less than 1,000 US Dollars. Unfortunately, the data for Seoul was only available for the years between 2013 and 2017. Nevertheless, these five years showed an increase in square meter prices. Overall it can be seen that all three capital cities had a rise in real estate prices. Although there is a price gap between these three cities, the data showed that yearly the price gap reduced.

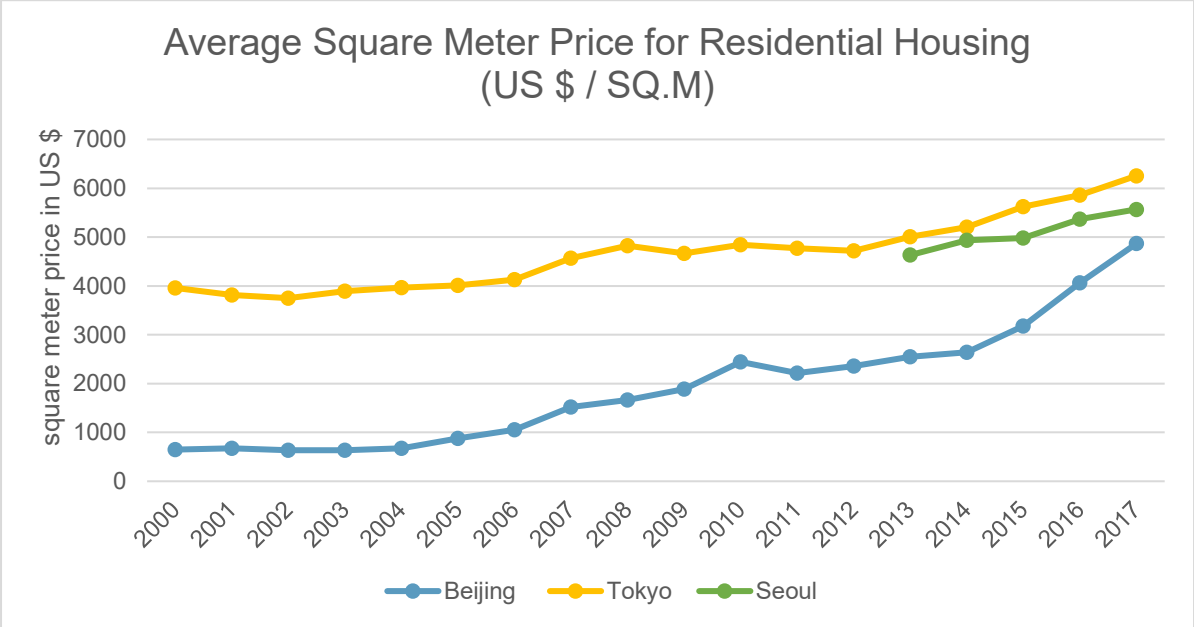

FIGURE 44: AVERAGE SQ. M PRICE FOR RESIDENTIAL HOUSING IN BEIJING, TOKYO, AND SEOUL (US $ / SQ. M)

Source: sources and analysis cited in this study. Author's design.

[9] Calculated by author, as of November 11, 2019: 1 USD = 108.95 Yen; 1 USD = 7.01 Yuan; 1 USD = 1166.12 Won

FLOOR AREA PER HOUSING UNIT (SQ.M.)

Regarding the floor space per housing in the capital cities, no similar trend was revealed, see Figure 45. The highest increase in floor space per housing was in Beijing. While in 2002, a household in Beijing had the lowest measured housing space, with 55 square meters. The data shows that since 2008, Beijing had reached the average living space of the other two cities and even surpassed them as of 2015. Hence, in the last few years of these studies, the average Beijing household had the most floor space among the three cities.

Even though the data provided by the Statistics of Tokyo showed that the average housing space remained the same, the calculated average ideal living space for a Japanese urban area had declined. This is due to the decline in the number per person per household. The available data for Seoul showed that, prior to 2014, the average floor space area had increased at a similar rate as to the average space per household in Beijing. However, since 2014 the average floor space per household in Seoul declined. Despite the shortage of data, Beijing's development sticks out. Beijing developed from having the least average floor space per household among the three capitals, to the capital with the highest floor space per household.

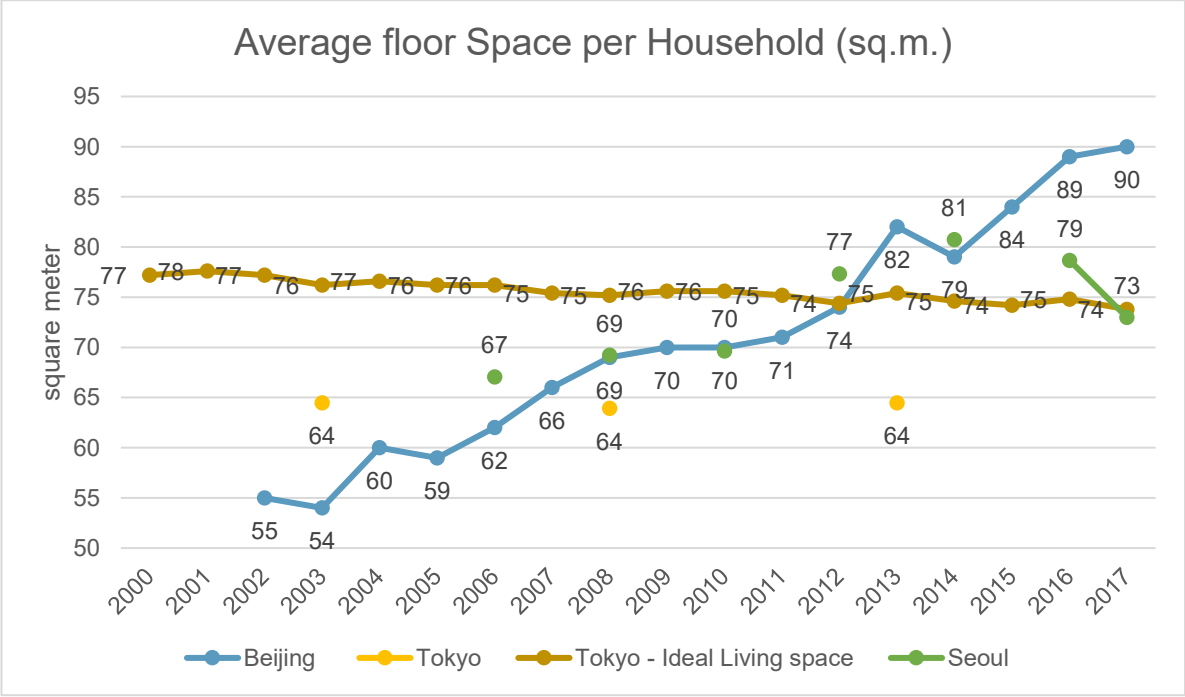

FIGURE 45: AVERAGE FLOOR SPACE PER HOUSEHOLD IN BEIJING, TOKYO, AND SEOUL (SQ. M)

Source: sources and analysis cited in this study. Author's design.

MEAN PER CAPITA ANNUAL INCOME PER URBAN HOUSEHOLD (US $)

This section examines and compares the changes in the average annual income per household between 2000 and 2017. The income was converted from each national currency to US Dollars[10] and are presented in Figure 46. Although in the calculation, by Lau and Li, the AY factor is the mean per capita annual income, the comparison of the income in the three cities will be made based on the average annual income per household in the cities, due to the absence of the annual income per capita in Tokyo. In order to measure the average income per household of Beijing and Tokyo, the factor AY was multiplied by nP, which is part of the price-to-income ratio measurement. However, this multiplication assumes that every person in the household is earning the average income salary, which might not be the case as the income of children and seniors might differ.

Despite the two different approaches to obtain the data, a downward trend of the average income per household in Tokyo, and an upward trend of the average income in Beijing and Seoul was detected. Among the three capital cities, the highest income per household was measured in Tokyo, albeit a declination since 2000. This average income decline might be due to Japan's economic recession. In contrast, since 2000, Beijing and Seoul had an increase in income, and thus, the income gap between Beijing and Seoul to Tokyo reduced.

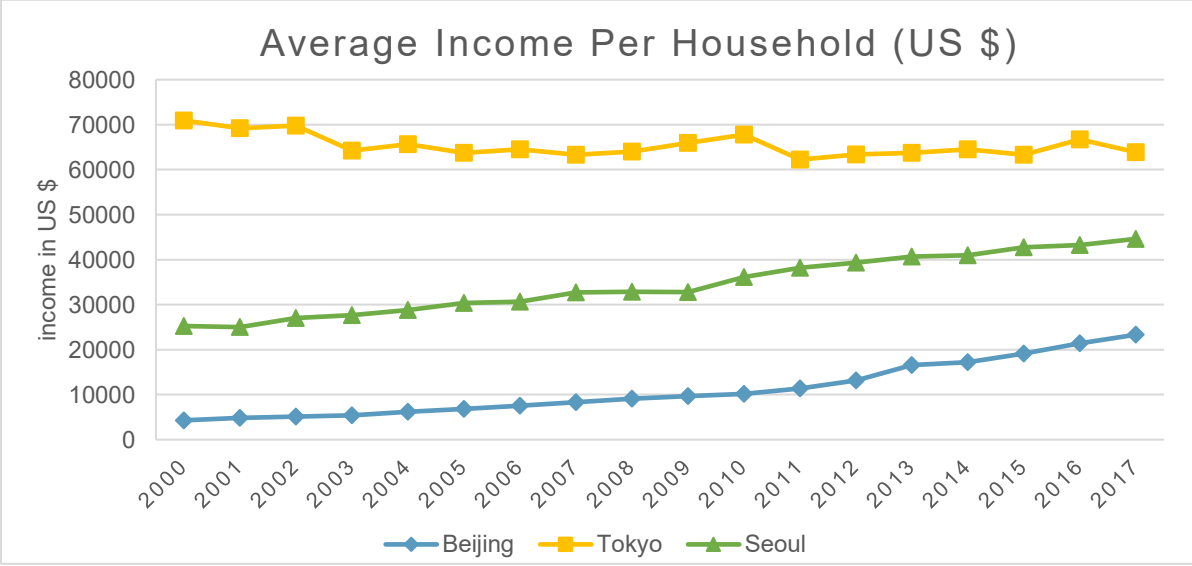

FIGURE 46: AVERAGE INCOME PER HOUSEHOLD IN BEIJING, TOKYO, AND SEOUL (US $)

Source: sources and analysis cited in this study. Author's design.

[10] Calculated by author, as of November 11, 2019: 1 USD = 108.95 Yen; 1 USD = 7.01 Yuan; 1 USD = 1166.12 Won

AVERAGE NUMBER OF PERSONS PER URBAN HOUSEHOLD

Figure 47 shows the average number of persons per household. While comparing the number of people belonging to one household, it can be seen that since 2000, in all three capital cities, the number of people per household declined.

Despite the overall declination of the average number of people per household, Tokyo had the highest average number of people per household during the entire analyzed time. In 2000, averagely 3.11 people lived in a household in Tokyo. In 2017, the average declined down to 2.94 people per household. Although the number of people in Tokyo had decreased, Beijing and Seoul recorded an even higher decline. While in 2000, the average household in Beijing record to have averagely 2.91 people, in 2017, it declined down to 2.62 people. The highest decline had Seoul. In 2000, Seoul had an average of 2.91 people per household. In 2017, the average household number declined down to 2.34 people.

At the beginning of the analysis, Beijing and Seoul had the same average number of people per household. Even though both capital cities started at the same point, Seoul saw a steady decline, whereas, in Beijing, the average number first declined, and since 200 an increased. Overall it can be said that during the analyzed time, the number of people in all three cities declined, however, at a different rate, and thus, the gap grew bigger.

It could be argued that the decline in the number of people per household is due to the decline of younger people in the capital cities. Consequently, the data suspected that people in these capital cities are having fewer or no children. Additionally, a decline in the average number per household leads to an increase in housing demand, as fewer people are living in one home, and thus, more homes are needed. Even though in all three cities, the number per person in one household declined, the average square meters per person increased.

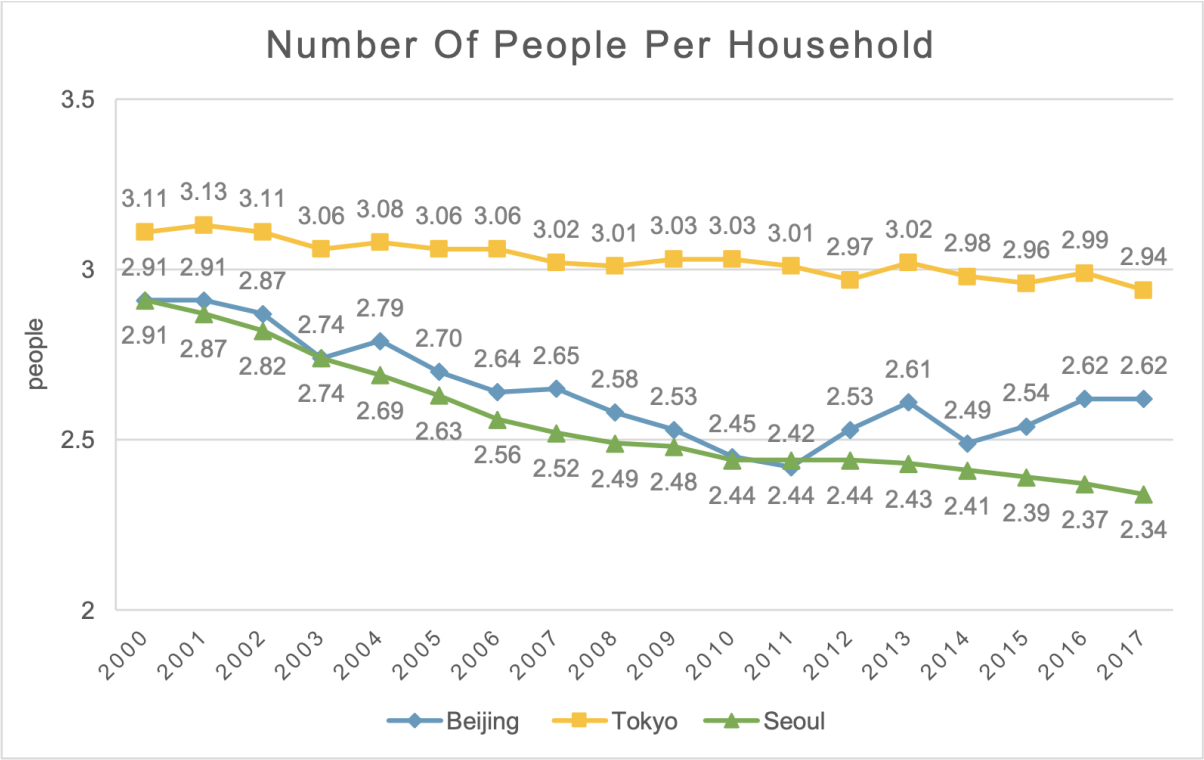

FIGURE 47: AVERAGE NUMBER OF PEOPLE PER HOUSEHOLD IN BEIJING, TOKYO, AND SEOUL

Source: sources and analysis cited in this study. Author's design.

5.4. COMPARING OF THE PRICE-TO-INCOME RATIO

After having discussed the economic and relative housing price development of the three countries and their capital, this section will compare and discuss the price-to-income ratio results. Due to an absence of data, the PIR was not able to be calculated for the entire selected time period. Nonetheless, the results of the PIR show the development of the housing affordability of the cities.

AVERAGE HOUSEHOLD INCOME VS. AVERAGE HOUSING PRICE

The results of the interior step of the calculation will be assessed before comparing the PIR results. This will be done as part of the aim of the thesis, which is to investigate the relationship between the average housing price and average households' income, in order to determine if the two have developed in equilibrium. In order to answer the research question, the development of the average income per household, and the average housing price of each of the three capital cities will be used. The data are the results of AP*FA and AY*nP, and thus, are already collected for the price-to-income ratio calculation. The complete data is available

in Appendix 13, and in Figure 48, the results are visualized in a line diagram. While assessing the development of the average income of households to the average housing prices in the capital, it was observed that the two drifted apart.

In Beijing, the average income increased between 2000 and 2017, by 443 percent and from 2002 to 2017, by 357 percent. Whereas since 2002, the housing price for average housing in Beijing had increased by 1159 percent. Particular, in the last years of the analysis, the average housing prices of Beijing have increased dramatically. Two factors influenced the extreme increase in the average housing price; for one, the square meter prices increased, and secondly, people are lived in bigger houses than at the beginning of the study.

In Seoul, the average housing income had increased by around 77 percent since 2000; however, between 2014 and 2017, the household's income only increased by nearly 9 percent. Compared to the average housing price development for an average housing size, Seoul's prices rose by only 2 percent. The relatively low increase in housing prices might be due to the decline of housing space. Because the average income of a household increased, more than the housing price did, the results of the price-to-income ratio between 2016 and 2017 had declined.

Since 2000, Tokyo's average income per household report to have declined by nearly 10 percent. Nevertheless, between 2003 and 2013, the average housing income declined by only 0.8 percent. At the same time, the housing price increased by around 28 percent. Although the income had decreased while the price increased, the income was steadily higher than the average housing price were, and thus, the results of the price-to-income ratio were the lowest of the three capital cities.

To sum up, it can be stated that there is no clear East Asian trend, and the housing prices are not developing in the same direction nor speed as the average income of a household.

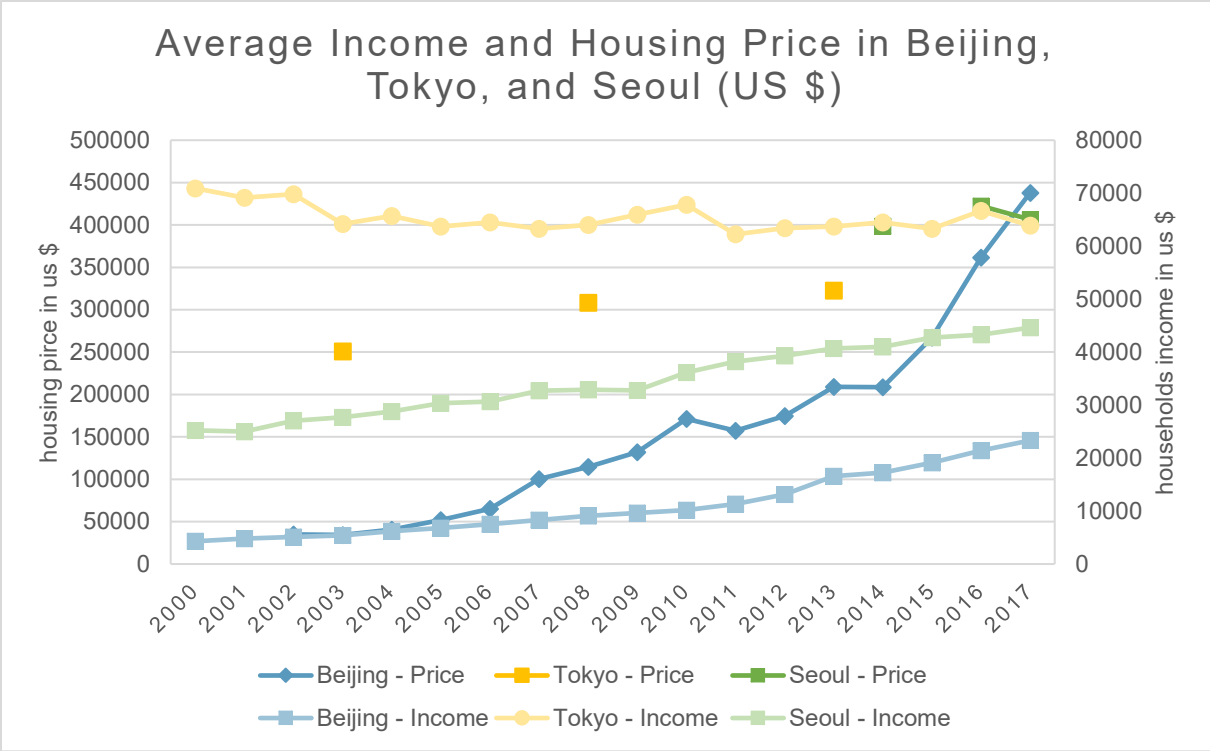

FIGURE 48: AVERAGE INCOME AND HOUSING PRICE IN BEIJING, TOKYO, AND SEOUL

Source: sources and analysis cited in this study. Author's design.

PRICE-TO-INCOME RESULTS

In Figure 49, the price-to-income results of the three capital cities are presented. The ratio represents the PIR results of the available data. The results demonstrate that during the analyzed time, the housing affordability in all three capital cities was seriously and severely unaffordable.

Surprisingly, Beijing had the highest price-to-income ratio results, and thus, the least affordable housing market. This result is surprising as China has a socialist market economy, and therefore, the author suspected that the housing affordability in Beijing would have the lowest ratio among the three cities. Throughout the analyzed time, both the average income and the average price per square meter increased. However, the price per square meter for housing rose at a higher rate and thus caused the PIR results to increase. The high housing price development of Beijing might have been influenced by the population growth of Beijing, as population growth contributes to an increase in housing demand. While the data of Beijing shows an influx of population, the population of children and people per household declined.

Until 2010, the PIR results of Beijing increased significantly. Between 2010 and 2014, the PIR results of Beijing dropped, which can be traced back to only a slight increase of the square

meter price and a parallel increased of income. Since 2014, the price per square meter increased again at a faster rate than the income, which led to an escalation of the price-to-income ratio. Beijing PIR results show that for local people, buying a home was severely unaffordable.

Although during the measured time, Tokyo had a serious and severely unaffordable housing market, it ranked the lowest among the three cities. Hence, compared to Seoul and Beijing, Tokyo had the best housing affordability situation. Tokyo's PIR was measured twice, first, based on the three data provided by the Statistics of Tokyo on the average housing space and second, on the bases of the ideal housing floor space in Tokyo between 2000 and 2017. The lowest results were computed in the first calculation, which was based on the three five-year interval data on the average housing space in Tokyo. The PIR results show that in 2003, 2008, and 2013 the housing situation in Tokyo was moderate to seriously unaffordable. The results of the second calculation resulted in the conclusion that between 2000 and 2006, Tokyo's housing market was seriously unaffordable. Between 2007 and 2017, the PIR results increased; hence Tokyo's market was severely unaffordable.

The PIR results are surprising as Japan had an economic crisis between 2007 and 2010, with even a negative GDP growth. The housing market in Tokyo appears not to be affected as severely. Likewise, the decrease in price per square meter, and the decline of income per household appears not to have affected the PIR results as strongly as suspected. This might be due to the decrease in children, as people might have more disposable capital. Overall it can be said that the PIR results of both calculations of Tokyo increased; nonetheless, the increase was faint and steady. Albeit both final PIR results show that Tokyo had a serious and severely unaffordable housing market, it has the lowest results among the three capital cities.

Similar to Beijing and Tokyo, the average household's size in Seoul declined. However, unlike the other two cities, Seoul also had a decrease in the urban population. Unfortunately, due to a deficiency of data, the PIR for Seoul was not able to be computed for the entire time period. Further research on the PIR results of Seoul needs to be made in order to make a proper comparison between the three capital cities. Nonetheless, the three calculated results show that Seoul's housing market situation in 2014, 2016, and 2017 was severely unaffordable. Due to an increase in income, and a decline in housing prices, the PIR results of Seoul declined slightly between 2016 and 2017. The analysis leads to the conclusion that between 2014 and 2017, the housing market of Seoul was severely unaffordable; however, less so than Beijing.

The results of the PIR show that all three capital cities had a severely unaffordable housing market in 2017. Nonetheless, there are differences, while in 2017, an average household in Beijing would have to work for more than 18 years, without spending anything, to afford a house in their city. At the same time, an average household in Seoul would only have to work for around nine years to afford housing, without spending anything on other goods. According to PIR calculation, which was based on an ideal living standard space, a family in Tokyo would have to work for seven years. This is a factor affecting the living standard of people, as a household buying a home in a market with a lower PIR result is able to pay off their home quicker, and thus, would have more money for non-housing goods.

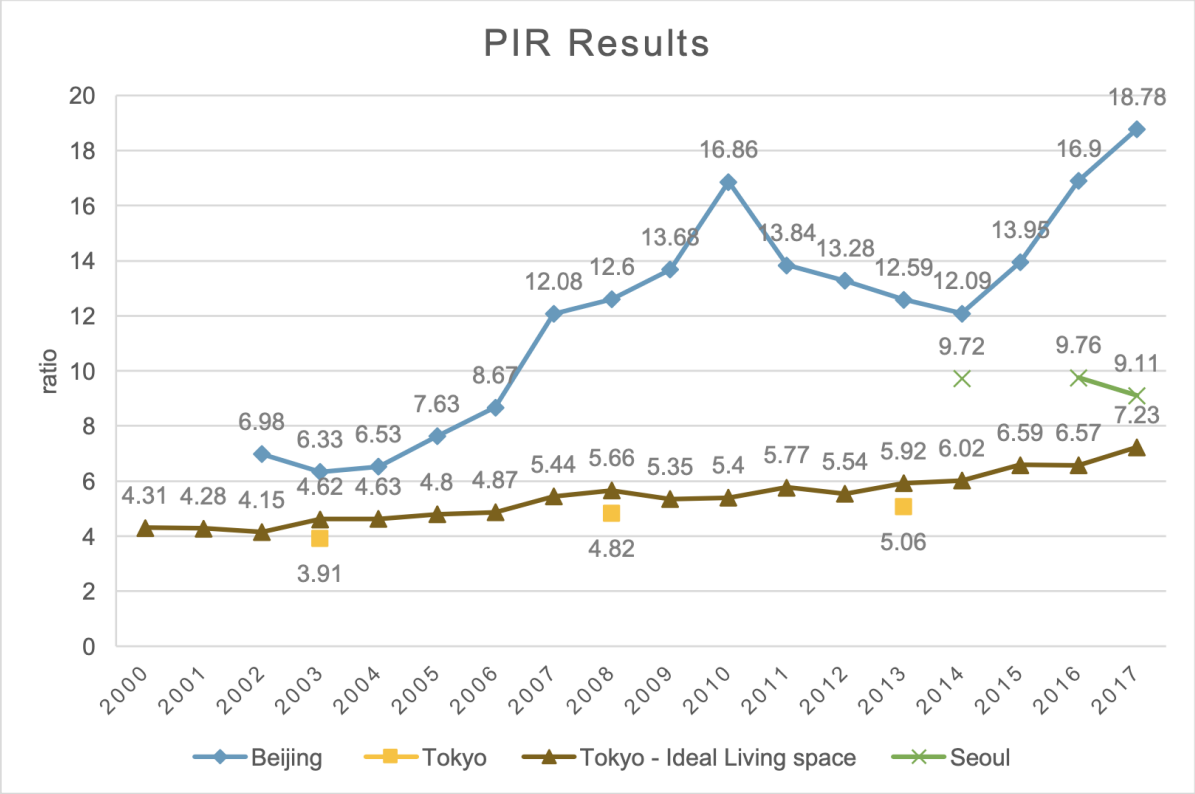

FIGURE 49: RESULTS OF THE PRICE-TO-INCOME RATIO OF BEIJING, TOKYO, AND SEOUL

Source: sources and analysis cited in this study. Author's design.

5.5. SUMMARY OF THE MAIN FINDINGS

After having measured and compared the criteria of housing affordability of the three cities, this section is a brief but comprehensive overview of the main findings presented in Table 15.

Criteria	Sub-criteria	China	South Korea	Japan
1. Real Estate Market	Overview	- homeownership rate of 90% (2014) - land rights for 70 years - female homeownership rate increased - down payment 30% for 1st and 60% for 2nd home - real estate as a family investment project - increase of the share for 2nd and 3rd housing - in 2017, 57% owned more than one home	- homeownership rate of 57% (2017) - prior 80s housing shortage - new trend towards renting - share of 2nd and 3rd housing has increased - in 2014, 13.6% owned more than one home	- homeownership rate of 61% (2013) - Tokyo lowest homeownership rate of Japan with 46%, (2013) - housing shortage after WWII - 50s and 60s urbanization trend, led to housing shortage
	Economic	- increase of current GDP since 2000 by 900% - GDP growth declined since 2000, highest point in 2007 - composition of Real Estate in GDP increased, between 4.1 – 6.5%, slight downfall in 2008	- increase of current GDP since 2000 by 188% - GDP growth declined since 2000, highest point in 2000 - composition of real estate to GDP steadily between 4.4 – 6.2%	- slight decrease in current GDP since 2000 by -0.6% - GDP growth declined since 2000, highest point in 2010, negative growth in 2009 - composition of real estate to GDP between

				10.5 – 12.5%, overall decline of -1.22%
	Demographic	- between 2008 and 2017 decline of the young and senior population, increase of working population - urban population increase up to 21M (2017); increase of 130%; Beijing's population make up ~ 1.6% of the national population	- between 2014 and 2018, increase of senior population, decline of the working and youngster populations - urban population steadily around 10M (2017), slightly decrease of -2.4%; Metropolitan area 25M population (2017), make up ~ 50% of the national population	- between 2000 and 2015 decline of the younger and working populations, increase of senior population - urban population increase up to 13M (2017), increase of 10%, metropolitan area 37M (2017), make up ~ 25% of the national population
	Transaction Cost	- real estate tax for self-occupied is 1.2% - 11% VAT - No inheritance taxes - 0.5% stamp duty - registration duties approx. 11 UD $ - 3 – 5% deed tax	- real estate tax is 0.1 – 0.5% - 10% VAT - 10 – 50% inheritance tax - 50 to 350,000 Won stamp duty - registration duties are 0.2-5%	- real estate tax is 1.7% (incl. city planning tax) - 8% VAT - 10 – 55% inheritance tax - max. 600,000 Yen stamp duty - registration duties are 0.1 – 2%
2. Real Market Price	Price/M2	- since 2000 the average selling price of a square meter increased by 648%	- between 2014 and 2017 the average selling price of a square meter increased by 30%	- since 2000 the average selling price increased by 57%

	Floor Space	- average floor space per housing unit increased from 55 sq.m (2002) up to 89 sq.m (2017)	- average floor space per housing unit increased from 67 sq.m. (2006) up to 73 sq.m. (2017)	- average floor space per housing unit at 64 sq.m. (2003 – 2013) - ideal floor space per household decrease from 77 (2000) down to 73 (2017)
	Income	- since 2000 the average income increased by 500%	- since 2000 the average income increased by nearly 120% - between 2014 – 2017 increase by nearly 14%	- since 2000 the average income declined by -9.9%
	Number Per Household	- average number per household decreased from 2.9 (2000) down to 2.62 (2017)	- average number per housing decreased from 2.9 (2000) down to 2.3 (2017)	- average number per household decreased from 3.11 (2000) down to 2.94 (2017)
3. PIR Result		- since 2000 severely unaffordable - ratio between 6.3 and 18.7 - highest ratio in 2017 with 18.7	- since 2000 severely unaffordable - ration between 9.1 and 9.7 - highest ratio in 2016 with 9.7	- 2000 – 2006 seriously unaffordable - 2007 – 2017 severely unaffordable - highest ratio in 2017 with 7.23

TABLE 15: SUMMARY OF THE MAIN FINDINGS

Source: sources and analysis cited in this study. Author's design.

5.6. SIGNIFICANCE OF RESEARCH RESULTS

Through this comprehensive comparative paper on the housing affordability development of the three cities, we gained an insight into the current dynamics of the housing situation of the cities, and thus, gained insight into the competitiveness of the cities in an international context. This research paper can be considered to provide the knowledge and understanding of the dynamism of the housing affordability situation. The findings of this thesis might be of use for the countries' housing and development policymakers.

Urban policies are greatly linked with affordable housing, and thus, also social policy. In many societies, housing has long been a significant objective of policymakers (W. Cai & Lu, 2015, p. 169). Thus, the outcome and findings of these analyses will be useful for current and future urban developers and policymakers.

However, also other policymakers might consider the findings of the comparative analyses helpful for constructing policies. According to Bogdon and Can, there are several policy concerns related to affordable housing, such concerns about "neighborhood quality, racial discrimination and segregation, and the concentration of low-income households in central cities" (Bogdon & Can, 1997, p. 46). Complementary defines the Organization for Economic Co-operation and Development (OECD) as "access to good-quality affordable housing [is] a fundamental need and key to achieving a number of social policy objectives, including reducing poverty and enhancing equality of opportunity, social inclusion and mobility" (OECD, n.d.-a).

The purpose of this research master thesis paper is to provide an insight into the housing market of the cities based on an existing housing affordability indicator. It is imperative to analyze the housing affordability of the cities as part of analyzing the economic strength, sustainability, and social equality of the capital cities, which can also be seen as a reflection of the countries aim. The results of housing affordability results might be of value for investors, housing counselors, and residents as they need to be able to afford housing.

VI CONCLUSION

The influx of people in Asian urban areas has led to the rise of megacities, including the capital cities with ten million residents or more. With urban population growth, the demand for housing in the capital cities has increased as well. The aim of the thesis was to assess and compare the residential housing market of the capital cities of the East Asian Region. The housing market is interlinked with a country's economy. Housing affordability is part of analyzing social equality and sustainability. The major subject of the investigation, thus, is to investigate the affordable housing situation of the three cities. The housing affordability was assessed through the Normative Approach while using the price-to-income ratio.

The main objective of this thesis was to answer the following research questions: ***"How does the housing affordability situation differ in the cities: Beijing, Tokyo, and Seoul between 2000 – 2017?"***. Corresponding to the research question, the sub-research questions were examined, ***"Are the housing prices developing in equilibrium to the average income of households?"*** and ***"Can people in the capital cities afford to buy real estate?"***

To answer the research questions, the literature on the topic was first reviewed, and a set of criteria was established. The literature was reviewed in two phases; first, the literature related to the real estate market, and second, the literature related to housing affordability. While reviewing the literature and various approaches, the two most important factors for calculating housing affordable are identified; income and housing cost. In this sense, the Normative Approach with the price-to-income ratio was selected to be used to measure the housing affordability of the three capital cities. This approach was selected as it allows an international comparison and is widely used by international organizations and scholars. To answer the research questions, a framework was developed, which included factors that may influence the housing price as well as the price-to-income ratio calculation. The selected time frame was from 2000 to 2017. The year 2000 was the start as it is the beginning of the millennium. The year 2017 was selected for the end date, as this data was the latest available data, and thus, allowed an insight into the current housing affordability situation.

The findings of the framework showed that long-term determinants of the real estate prices are heterogeneous. South Korea and China are imposing high taxation on property, and this may be viewed as a discouragement for homeownership. High taxes are affecting the housing prices negatively, and thus, also the housing affordability. Although high taxation discourages

homeownership, China and South Korea had the highest homeownership ratio. Moreover, China had the highest ratio of homeownership despite the fact that Beijing's housing prices had the steepest increase.

Another determinant of real estate prices is the demographics development. Here, the data demonstrated that the population in Seoul declined since 2000, which might have influenced the real estate price positively. In Beijing, the population had increased dramatically, along with its real estate prices. Although Tokyo's population and average real estate prices had increased, those increases were not as steep as Beijing's. Further, the demographic data of Tokyo and Seoul demonstrated an increase in the elderly population. This may have a positive long-term influence on their respective real estate markets, as the driving price population is the working population, which declined both in Tokyo and Seoul but increased in Beijing. Additionally, all three capital cities report having a decline in the average number of people per household, which may also lead to an increase in housing demand as more single homes are needed.

The income of a household is also a long-term determinant of the real estate price. The household income comparison revealed that while Seoul's and Beijing's average income increased, the average income in Tokyo declined. This would have a positive effect on the housing market in Seoul and Beijing as people have more money to spend on housing. However, the housing prices in all three capital cities have risen more rapidly than the income, and thus, the housing market remained unaffordable.

By applying the analytical framework, the similarities of the housing affordability situation in the three cities are detected. The housing affordability measurements for Beijing, Tokyo, and Seoul have revealed that the housing market in all three capital cities is unaffordable for residents. Given the fact that in Beijing, the average house prices have risen more quickly than the average income, Beijing is experiencing a severe housing unaffordability crisis since the year 2000.

The price-to-income ratio results showed that Beijing had the most unaffordable housing situation throughout the analyzed time. The PIR results of the three capital cities revealed that all three capital cities had a severely unaffordable residential housing market. Although the PIR for Tokyo and Seoul was calculated only for a few years, broadly translating the findings indicated that Tokyo had the lowest PIR results and thus the best housing affordability situation. Between 2014 and 2017, Seoul's residential housing market has been less unaffordable than

Beijing's. During the analyzed time, Beijing's housing was the least affordable, and Tokyo's most affordable. This concludes that among the three capital cities, the housing market in Tokyo is the most sustainable and enables its residents to spend the most money on non-housing goods, which indicates good living standards, social equality, and sustainability.

Furthermore, the analysis leads to the conclusion that it is difficult for people in those three capital cities to purchase houses solely with their household's income. This is due to the fact that average households' income has not increased in the same direction nor at the same pace as housing prices. In Tokyo, the data shows a decline in the average income and an increase in average housing prices. While the findings showed increases in both income and housing prices in Beijing, they rose in different intensities. It is difficult to arrive at certain conclusions concerning Seoul's housing price development as the data were incomplete. However, it displayed a slight decline while the income has risen steadily since the beginning of the analysis.

In summary, the results demonstrate that households wanting to purchase properties are experiencing a housing unaffordability issue in all three capital cities. Beijing and Seoul have severely unaffordable housing situations. In particular, Beijing's unaffordability situation has intensified in the last ten years of the study. The main conclusion drawn from this thesis is that the housing markets of the East Asian capital cities have an unaffordability crisis, and thus, are not sustainable.

OUTLOOK AND FUTURE RESEARCH RECOMMENDATIONS

Having assessed the affordable housing markets of the three capital cities, this section will provide an outlook as well as future research recommendations on the topic. The analysis showed that although it appeared that Beijing had a peak in 2010, since 2014, it has risen again and even higher than in 2010. Tokyo's PIR results did not show a specific ratio peak; however, it increased steadily. Thus, the data suggests that in Beijing and Tokyo, the price-to-income ratio will increase further. Seoul's results suggest that the housing affordability situation will improve in the near future due to the fact that population and housing prices are decreasing whilst average income continues to increase.

The outcomes of this thesis further show that all three capital cities will have to deal with the decline of children and a shrinking number per household. Particular, the data of Tokyo suggests that it will have a rising share of the elderly population.

The Chinese government is planning the metropolitan region, Jing-Jin-Ji Metropolitan Region (Li et al., 2018, p. 2), which includes Beijing. This mega project might reduce Beijing's high immigration. As this mega project might affect the housing market of Beijing, further research in this field would be of relevance. Although the housing prices are much higher than the income in Beijing, housing is still purchased. This effect might be due to the belief that salaries will continue to rise. However, the GDP growth has declined in recent years, which might affect income. Thus, it might be of interest in future research to analyze the income development, as the high gap between income and housing prices result in an unaffordable housing market. Although the quality of building in the countries was not examined in this thesis, this field is of high importance as well. The real estate sector is an important driver for national GDP. The hypothesis is thus that buildings are of a minor quality, which means that buildings have a short lifecycle and will have to be rebuilt again after a few decades, which would then affect GDP positively. In the future, research is needed to apply and test this hypothesis by, for example, measuring the average useful life of residential buildings before they depreciate.

The annual GDP growth of Japan has declined since 2000. Concurrently, the average income per household has also declined. Although the population of Tokyo has increased since 2000, the data showed an increase in elderly people and a decline in the working and children populations. With a decline of the income and working population, Tokyo's housing market prices might remain static or sink, as fewer people result in a housing demand declination. Supported by the high real estate GDP percentage suggests a high real estate supply. Further research in the supply field of real estate, as well as observation of the market of Tokyo and Japan, will be needed.

Similar to Japan, the economic growth of South Korea has slowed down. However, the average household income has not declined but increased. As this thesis was only able to observe the housing price of Seoul between 2013 and 2016, it is difficult to interpret if the housing price has had its peak in 2016 or not. Thus, further research regarding the housing price development is needed to identify the trend of the housing price in Seoul. Nonetheless, factors such as a shift towards smaller households, a decline of Seoul's population with fewer children, and an increase of the elderly are hinting that the future housing in Seoul will be more affordable. This trend would be amplified if the income will further increase, and the average housing prices decline.

Due to the limitations of this research, only the housing market for buying a home in the capital cities was investigated. Further research on the housing market for home renters is needed to confirm these unaffordability findings, e.g., through the price-to-rent ratio. To what extent the housing unaffordability findings of the three capital cities are exceptions or a domestic-wide issue, further research in other cities would need to be studied. In addition, it will be of interest to include the supply of housing in the cities in their research as the neoclassical economic theory assumes that supply follows the demand.

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VIII APPENDIX

APPENDIX 1: GDP OF CHINA, JAPAN, AND SOUTH KOREA (CURRENT US $)

Country Name	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
China	1,21135E+12	1,3394E+12	1,47055E+12	1,66029E+12	1,95535E+12	2,28597E+12	2,75213E+12	3,55034E+12	4,59431E+12	5,1017E+12	6,08716E+12	7,5515E+12	8,53223E+12	9,57041E+12	1,04385E+13	1,10155E+13	1,11379E+13	1,21435E+13
Japan	4,88752E+12	4,30354E+12	4,11512E+12	4,44566E+12	4,81515E+12	4,75541E+12	4,53038E+12	4,51526E+12	5,03791E+12	5,23138E+12	5,7001E+12	6,15746E+12	6,20321E+12	5,15572E+12	4,85041E+12	4,38948E+12	4,92667E+12	4,85995E+12
South Korea	5,61633E+11	5,33052E+11	6,0902E+11	6,80521E+11	7,64881E+11	8,98137E+11	1,0118E+12	1,12268E+12	1,00222E+12	9,01935E+11	1,0945E+12	1,20246E+12	1,22281E+12	1,3056E+12	1,41133E+12	1,38276E+12	1,4148E+12	1,53075E+12

Source: World Bank Group. (n.d.). GDP (current US$) | Data. Retrieved April 17, 2019, from The World Bank I Data website: https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?year_high_desc=true. Author's design.

APPENDIX 2: ANNUAL GDP GROWTH OF CHINA, JAPAN, AND SOUTH KOREA (%)

Country Name	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
China	8,491508492	8,33991055	9,130645945	10,03560303	10,11122346	11,39577594	12,71947902	14,23138804	9,654289373	9,399813171	10,63614046	9,55091409	7,859627493	7,768615284	7,299518921	6,90531667	6,736675253	6,757007611
Japan	2,779632825	0,406335903	0,117992777	1,528220148	2,204687882	1,662670405	1,420006556	1,654183881	-1,0935406	-5,4164128	4,191739259	-0,11542134	1,495089586	2,000267841	0,374719476	1,222921041	0,609093181	1,928757251
South Korea	8,924426034	4,525306764	7,432433614	2,933217902	4,89984045	3,923677392	5,176153818	5,463396393	2,829223173	0,707509946	6,496793586	3,681688569	2,292397846	2,896204935	3,341447761	2,790236167	2,929304795	3,062768462

Source: World Bank Group. (n.d.). GDP growth (annual %) | Data. Retrieved May 29, 2019, from The World Bank I Data website: https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?end=2017&locations=CN-JP-KR&start=2006. Author's design.

APPENDIX 3: COMPOSITION OF REAL ESTATE IN GDP OF BEIJING, TOKYO, AND SEOUL (%)

Country Name	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
China	4,1	4,30	4,4	4,5	4,4	4,5	4,7	5,1	4,6	5,4	5,7	5,8	5,8	6	5,9	6,1	6,5	6,5
Japan	11,50	-	-	-	-	10,73	11,92	10,86	11,18	12,07	11,79	12,04	11,89	11,70	11,70	11,39	11,36	-
South Korea	5,5	5,5	5,6	6,2	6,1	5,9	5,8	5,6	5,2	5,2	4,6	4,4	4,4	4,6	4,6	4,9	5,3	5,5

Source: National Bureau of Statistics of China. (n.d.). China Statistical Yearbook. Retrieved September 11, 2019, from China Statistical Yearbook website: http://www.stats.gov.cn/tjsj/ndsj/2018/indexeh.htm; Bank of Korea. (2018). Visual 통계지표: GDP. Retrieved November 1, 2019, from Economic Statistics System website: http://ecos.bok.or.kr/jsp/vis/GDP/index_e.html#/gdp; Japan Statistical Yearbook. (n.d.). Retrieved October 7, 2019, from https://www.stat.go.jp/english/data/nenkan/index.html. Author's design.

APPENDIX 4: POPULATION OF BEIJING, TOKYO, AND SEOUL

Country Name	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Beijing	13636000	13851000	14232000	14564000	14927000	15380000	16010000	16760000	17710000	18600000	19619000	20186000	20693000	21148000	21516000	21705000	21729000	21707000
Seoul	10373234	10331244	10280523	10276968	10287847	10297004	10356202	10421782	10456034	10464051	10575447	10528774	10442426	10388055	10369593	10297138	10204057	10124579
Tokyo	12064101	12178176	12292467	12388222	12477934	12576601	12700327	12835130	12965871	13077625	13159388	13191203	13225551	13301154	13398087	13515271	13636222	13742906

Source: Beijing Statistical Yearbook 2018. (n.d.). Retrieved September 13, 2019, from Beijing Municipal Bureau of Statistics NBS Survey Office in Beijing website: http://tjj.beijing.gov.cn/nj/main/2018-tjnj/zk/indexeh.htm; Seoul Metropolitan Government. (2017, December 26). 데이터셋> 데이터 이용하기 | 서울열린데이터광장. Retrieved October 19, 2019, from http://data.seoul.go.kr/dataList/datasetView.do?serviceKind=2&infId=419&srvType=S&stcSrl=419; Statistics of Tokyo. (n.d.). Tokyo Statistical Yearbook 2017. Retrieved October 7, 2019, from http://www.toukei.metro.tokyo.jp/tnenkan/2017/tn17q3e002.htm. Author's design.

APPENDIX 5: POPULATION BY AGE IN SEOUL

year	0~4 Years old	5~9 Years old	10~14 Years old	15~19 Years old	20~24 Years old	25~29 Years old	30~34 Years old	35~39 Years old	40~44 Years old	45~49 Years old	50~54 Years old	55~59 Years old	60~64 Years old	65~69 Years old	70~74 Years old	75~79 Years old	80~84 Years old	85~89 Years old	90~94 Years old	95~99 Years old	100 Years old
2014	411.132	393.451	459.224	594.242	727.181	793.943	933.328	831.542	922.878	862.244	865.450	801.260	552.102	439.917	345.255	225.363	119.127	58.767	22.532	5.967	4.688
2015	401.736	393.870	420.313	575.896	731.898	780.413	886.056	834.251	882.934	871.552	837.594	817.172	595.890	455.406	348.379	235.634	130.679	62.607	23.280	6.523	5.055
2016	385.158	389.807	398.660	548.556	723.557	786.192	832.939	839.476	832.729	893.889	805.522	827.159	639.536	451.804	351.562	252.525	141.998	66.212	24.214	7.074	5.488
2017	358.848	383.928	394.060	513.886	710.866	804.676	788.419	843.213	797.861	895.452	788.454	822.599	657.191	465.476	357.537	279.394	152.988	70.628	25.948	7.621	5.534
2018	358.848	383.928	394.060	513.886	710.866	804.676	788.419	843.213	797.861	895.452	788.454	822.599	657.191	465.476	357.537	279.394	152.988	70.628	25.948	7.621	5.534

Source: Seoul Metropolitan Government. (2015, January 26). 데이터셋> 데이터 이용하기 | 서울열린데이터광장. Retrieved October 19, 2019, from http://data.seoul.go.kr/dataList/datasetView.do?serviceKind=2&infId=10718&srvType=S&stcSrl=10718. Author's design.

APPENDIX 6: AVERAGE HOUSING PRICE OF SEOUL

Timescale	Seoul
2013.09	16.645
2013.10	18.112
2013.11	18.357
2013.12	18.189
2014.01	17.925
2014.02	17.925
2014.03	18.016
2014.04	18.098
2014.05	19.446
2014.06	18.867
2014.07	18.742
2014.08	19.274
2014.09	19.404
2014.10	19.759
2014.11	20.242
2014.12	20.269
2015.01	20.670
2015.02	20.670
2015.03	19.415
2015.04	18.842
2015.05	18.367
2015.06	18.374
2015.07	18.152
2015.08	18.443
2015.09	17.969
	Tausend Won / pyeong

Timescale	Seoul
2015.10	5.841
2015.11	6.050
2015.12	6.041
2016.01	6.108
2016.02	6.111
2016.03	6.173
2016.04	6.241
2016.05	6.264
2016.06	6.208
2016.07	6.254
2016.08	6.285
2016.09	6.283
2016.10	6.400
2016.11	6.370
2016.12	6.443
2017.01	6.450
2017.02	6.464
2017.03	6.370
2017.04	6.366
2017.05	6.400
2017.06	6.667
2017.07	6.573
2017.08	6.172
2017.09	6.507
2017.10	6.578
2017.11	6.657
2017.12	6.706
	Tausend Won / ㎡

Source: Seoul Metropolitan Government. (2014, October 21). 데이터셋> 데이터 이용하기 | 서울열린데이터광장. Retrieved October 21, 2019, from http://data.seoul.go.kr/dataList/datasetView.do?serviceKind=2&infId=10657&srvType=S&stcSrl=10657. Author's Design.

APPENDIX 7: AVERAGE FLOOR SPACE IN SEOUL 2005 – 2007

Average Floor Space in Seoul 2005 - 2007

Year	2005	2006	2007
Seoul	85.04 m2	82.61 m2	83.70 m2

Source: Seoul Metropolitan Government. (2017, December 26). 데이터셋> 데이터 이용하기 | 서울열린데이터광장. Retrieved October 20, 2019, from http://data.seoul.go.kr/dataList/datasetView.do?serviceKind=2&infId=219&srvType=S&stcSrl=219. Author's design.

APPENDIX 8: JAPAN'S REAL ESTATE IN GDP ACTIVITY (%)

Year	Gross domestic product (Yen)	Kind of economic activity - Real Estate (Yen)	Percent of Real Estate activity (%)
2000	502,990	57,864	11.50
2001	-	-	-
2002	-	-	-
2003	-	-	-
2004	-	-	-
2005	503,903	54,042	10.73
2006	507,365	60,465	11.92
2007	512,975	55,721	10.86
2008	501,209	56,013	11.18
2009	471,139	56,879	12.07
2010	482,384	56,890	11.79
2011	471,311	56,726	12.04
2012	475,110	56,505	11.89
2013	480,128	56,181	11.70
2014	513,876	60,128	11.70
2015	531,986	60,590	11.39
2016	538,446	61,168	11.36
2017	-	-	-

Source: Japan Statistical Yearbook. (n.d.). Retrieved October 7, 2019, from https://www.stat.go.jp/english/data/nenkan/index.html. Author's Design.

APPENDIX 9: POPULATION OF TOKYO IN 5 YEAR AGE GROUP (2000 – 2015)

Population by 5 Year Age Group and Gender

		12 年	17 年	22 年	27 年
		2000	**2005**	**2010**	**2015**
総 数	**Total**	**12.064.101**	**12.576.601**	**13.159.388**	**13.515.271**
0～4	years old	477.014	476.692	500.269	524.939
5～9		462.053	481.382	484.303	499.632
10～14		481.852	466.593	492.799	493.559
15～19		640.095	562.968	546.573	566.729
20～24		991.457	859.742	785.911	753.698
25～29		1.118.725	981.230	949.354	863.678
30～34		1.020.691	1.121.689	1.038.768	969.877
35～39		877.029	1.026.016	1.164.057	1.038.390
40～44		731.320	885.146	1.053.232	1.154.214
45～49		773.398	736.656	905.561	1.048.170
50～54		955.871	770.054	740.091	891.332
55～59		839.781	938.669	760.764	722.755
60～64		737.511	813.422	905.914	725.312
65～69		654.925	705.944	771.396	854.575
70～74		504.291	612.400	654.931	713.342
75～79		349.344	451.357	544.554	583.971
80～	and over	401.896	525.826	671.350	853.628
不 詳	Unreported	46.848	160.815	189.561	257.470

Source: Statistics of Tokyo. (n.d.). Tokyo Statistical Yearbook 2017. Retrieved October 7, 2019, from http://www.toukei.metro.tokyo.jp/tnenkan/2017/tn17q3e002.htm. Author's design.

APPENDIX 10: NEW AND EXISTING CONDOMINIUM SALE PRICES IN TOKYO (YEN)

YEAR	month	New Condominium Sales in Tokyo Metroporitan Area average per sq, meter 10 thousand Yen	Existing Condominium Sales in Tokyo Metropolitan Area price per sq, meter 10 thousand Yen
2000	1	53,90	32,3
	2	55,40	33,0
	3	54,10	32,7
	4	53,80	33,1
	5	53,70	32,7
	6	55,60	32,4
	7	53,10	32,7
	8	53,60	32,1
	9	49,50	31,7
	10	54,00	31,9
	11	59,20	32,5
	12	51,00	31,9
2001	1	51,00	31,4
	2	52,10	31,7
	3	54,10	31,3
	4	50,90	30,6
	5	53,80	30,9
	6	52,60	30,8
	7	54,70	31,4
	8	50,50	31,0
	9	49,90	30,6
	10	52,60	30,0
	11	53,00	30,6
	12	50,20	31,0
2002	1	49,40	30,0
	2	51,40	30,8
	3	51,00	30,3
	4	52,20	30,7
	5	49,30	30,8
	6	53,80	30,8
	7	51,80	31,2
	8	49,50	30,9
	9	50,30	30,2
	10	50,00	30,3
	11	51,30	30,6
	12	53,50	30,8
2003	1	52,70	30,4
	2	53,20	30,0
	3	55,20	30,9
	4	52,30	30,2
	5	52,90	30,6
	6	56,90	30,7
	7	54,10	31,2
	8	54,10	30,0
	9	53,70	30,6
	10	55,40	31,1
	11	55,80	30,7
	12	54,40	30,6
2004	1	53,80	31,1
	2	56,70	31,2
	3	55,20	30,8
	4	52,10	31,3
	5	53,70	31,6
	6	55,70	32,0
	7	59,40	31,4
	8	56,10	31,1
	9	53,10	32,1
	10	56,60	31,8
	11	55,30	32,0
	12	51,80	31,4
2005	1	52,70	32,4
	2	54,10	32,1
	3	52,00	32,2
	4	56,20	31,9
	5	55,10	33,1
	6	54,30	32,7
	7	59,40	32,4
	8	59,10	33,1
	9	52,10	32,7
	10	54,50	33,3
	11	54,40	33,8
	12	51,70	33,6
2006	1	50,40	32,9
	2	53,50	34,2
	3	55,50	33,8
	4	58,70	34,4
	5	54,00	34,6
	6	56,60	34,1
	7	61,80	34,9
	8	52,10	35,1
	9	55,10	34,7
	10	57,80	35,1
	11	55,40	35,7
	12	52,30	36,4
2007	1	52,00	37,0
	2	61,40	36,9
	3	61,40	37,7
	4	62,70	38,1
	5	62,50	36,9
	6	64,40	38,5
	7	70,50	39,1
	8	53,90	39,0
	9	58,30	40,1
	10	61,40	39,5
	11	63,60	40,5
	12	58,30	40,6
2008	1	57,50	41,1
	2	64,80	40,5
	3	67,10	40,0
	4	70,70	41,0
	5	63,90	40,7
	6	63,20	40,5
	7	71,80	39,8
	8	67,60	39,4
	9	61,80	39,1
	10	67,20	38,6
	11	68,00	38,6
	12	59,30	38,8
2009	1	59,00	37,8
	2	65,40	37,8
	3	65,00	37,6
	4	60,40	37,2

2009	5	63,90	37,6
	6	63,20	38,0
	7	66,50	37,6
	8	61,10	38,5
	9	62,40	37,7
	10	66,20	37,8
	11	69,40	37,4
	12	63,90	38,5
2010	1	60,60	38,6
	2	67,90	38,6
	3	70,90	38,7
	4	62,40	39,1
	5	66,30	38,7
	6	64,10	38,5
	7	67,00	39,5
	8	66,20	39,5
	9	70,90	39,6
	10	66,30	39,6
	11	68,40	40,4
	12	65,30	40,3
2011	1	60,50	39,8
	2	67,50	40,1
	3	65,30	39,2
	4	67,40	38,6
	5	67,20	38,9
	6	62,80	38,5
	7	63,70	38,3
	8	72,80	39,3
	9	62,20	38,8
	10	62,90	38,5
	11	65,00	38,2
	12	64,30	38,8
2012	1	64,40	38,8
	2	62,20	38,7
	3	66,40	38,8
	4	62,00	38,4
	5	69,20	37,6
	6	62,80	37,7
	7	64,80	38,0
	8	69,10	38,0
	9	58,30	37,7
	10	60,90	38,0
	11	72,10	38,1
	12	63,10	38,3
2013	1	68,90	39,8
	2	62,70	38,7
	3	67,20	39,7
	4	66,10	39,4
	5	69,30	40,1
	6	68,60	40,0
	7	72,70	39,3
	8	67,70	40,0
	9	71,20	41,0
	10	71,13	40,2
	11	69,40	41,2
	12	74,30	40,5
2014	1	66,00	41,5
	2	70,80	41,7
	3	73,00	41,7
	4	70,30	42,4
	5	72,20	41,3
	6	68,30	42,5
	7	77,10	41,0
	8	77,50	43,7
	9	66,50	42,5
	10	63,80	43,5
	11	73,70	44,2
	12	71,00	44,9
2015	1	63,90	43,7
	2	81,20	45,0
	3	73,60	45,3
	4	75,80	44,6
	5	67,90	45,3
	6	82,90	45,3
	7	85,00	45,2
	8	82,40	44,8
	9	76,10	46,3
	10	75,90	45,8
	11	87,10	46,0
	12	76,20	45,4
2016	1	78,10	46,8
	2	83,50	47,1
	3	80,20	47,8
	4	82,60	46,5
	5	82,30	47,0
	6	82,30	47,8
	7	80,60	47,3
	8	79,80	47,7
	9	78,60	49,1
	10	79,30	48,6
	11	74,90	49,7
	12	75,50	49,8
2017	1	97,60	49,4
	2	85,20	49,3
	3	79,00	49,3
	4	85,60	50,4
	5	86,10	49,5
	6	84,00	49,6
	7	95,20	49,5
	8	87,10	50,5
	9	84,60	50,7
	10	81,10	50,2
	11	83,50	50,2
	12	86,40	51,9

Source: The Land Institute of Japan. (n.d.). Retrieved October 9, 2019, from http://www.lij.jp/english/. Author's design.

APPENDIX 11: IDEAL SPACE IN TOKYO CALCULATION FOR 20M² X NUMBER OF HOUSEHOLDS + 15M²

Year	Average Person Per Household		Ideal Floor Space Per Housing Unit (Sq.M.)
2000	3.11		77.2
2001	3.13		77.6
2002	3.11		77.2
2003	3.06		76.2
2004	3.08		76.6
2005	3.06		76.2
2006	3.06		76.2
2007	3.02		75.4
2008	3.01		75.2
2009	3.03	20m² X	75.6
2010	3.03	Number of	75.6
2011	3.01	Households	75.2
2012	2.97	+ 15m²	74.4
2013	3.02		75.4
2014	2.98		74.6
2015	2.96		74.2
2016	2.99		74.8
2017	2.94		73.8

Source: Tokyo Statistical Yearbook. (n.d.). Retrieved October 9, 2019, from http://www.toukei.metro.tokyo.jp/tnenkan/tn-eindex.htm; Ministry of Land, Infrastructure, Transport and Tourism. (2011). 住生活基本計画(全国計画). p. 22. Author's design.

APPENDIX 12: MONTHLY AVERAGE INCOME FOR HOUSEHOLDS IN TOKYO (YEN)

Year	Monthly Income (Yen)
2000	643946
2001	628068
2002	633711
2003	583065
2004	596372
2005	578340
2006	585818
2007	574514
2008	581293
2009	598723
2010	615748
2011	565071
2012	575440
2013	578628
2014	585636
2015	574733
2016	605530
2017	580063

Source: Tokyo Statistical Yearbook. (n.d.). Retrieved October 9, 2019, from http://www.toukei.metro.tokyo.jp/tnenkan/tn-eindex.htm. Author's design.

APPENDIX 13: AVERAGE INCOME AND HOUSING PRICE OF BEIJING, TOKYO, AND SEOUL (US $) [11]

Year	Beijing – Housing Price	Tokyo – Housing Price	Tokyo / Ideal Living space – housing Price	Seoul – Housing Price	Beijing – Income per household	Tokyo – Income per household	Seoul – Income per household
2000			305824		4296	70926	25251
2001			295763		4806	69177	25009
2002	35048		289527		5103	69798	27050
2003	34326	250936	296547		5426	64220	27695
2004	40631		303834		6224	65686	28819
2005	51863		305604		6799	63700	30341
2006	65228		314487		7523	64523	30636
2007	100375		344335		8312	63278	32696
2008	114652	308344	362644		9100	64025	32886
2009	132051		352673		9650	65945	32763
2010	171265		366377		10161	67820	36150
2011	157172		359055		11359	62238	38191
2012	174739		350899		13162	63380	39328
2013	208849	322755	377415		16592	63731	40686
2014	208477		388303	398537	17239	64503	40986
2015	267218		417311		19153	63302	42748
2016	361701		438433	422485	21407	66694	43279
2017	438021		461665	406435	23324	63889	44622

Source: National Bureau of Statistics of China. (n.d.). China Statistical Yearbook. Retrieved September 11, 2019, from China Statistical Yearbook website: http://www.stats.gov.cn/tjsj/ndsj/2018/indexeh.htm (bks. 2001-2018).
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Beijing Statistical Yearbook 2018. (n.d.). Retrieved September 13, 2019, from Beijing Municipal Bureau of Statistics NBS Survey Office in Beijing website: http://tjj.beijing.gov.cn/nj/main/2018-tjnj/zk/indexeh.htm.
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[11] Calculated by author, as of November 11, 2019: 1 USD = 1166.12 Won; 1 USD = 108.95 Yen: USD = 7.01 Yuan

Seoul Metropolitan Government. (2017, December 26). 데이터셋> 데이터 이용하기 | 서울열린데이터광장. Retrieved October 19, 2019, from http://data.seoul.go.kr/dataList/datasetView.do?serviceKind=2&infId=419&srvType=S&stcSrl=419.
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Tokyo Statistical Yearbook. (n.d.). Retrieved October 9, 2019, from http://www.toukei.metro.tokyo.jp/tnenkan/tn-eindex.htm.

ABSTRACT

The influx of people in cities led to the emergence of megacities. With the population growth in cities, the demand for living space in cities, especially in capitals, has also increased. This demand has led to changes in the housing markets in capitals. In order to quantify the changes, this thesis compares the development of affordable housing in the three East Asian capitals Beijing, Tokyo, and Seoul, over the period 2000 to 2017.

This affordability analysis is carried out in three stages: 1. investigation of the real estate market, 2. calculation of the relative housing price, and 3. evaluation of the price-to-income ratio. The analysis shows that despite the different levels of economic development, economic systems, and property rights, the housing markets in these cities are very similar. All three cities have unaffordable housing markets. Beijing had the most significant development, with housing affordability deteriorating the most out of the three cities.

ZUSAMMENFASSUNG

Der Zustrom von Menschen in Städten hat zum Entstehen von Megastädten geführt. Mit dem Bevölkerungswachstum in Städten ist auch die Nachfrage nach Wohnraum in Städten, insbesondere in Hauptstädten, gestiegen. Diese Nachfrage hat zu einer Veränderung der Wohnungsmärkte in den Hauptstädten geführt. Um die Veränderung zu quantifizieren, vergleicht die vorliegende Arbeit die Entwicklung des bezahlbaren Wohnraums der drei ostasiatischen Hauptstädten Peking, Tokio und Seoul, in dem Zeitraum von 2000 bis 2017.

Diese Bezahlbarkeitsanalyse wird in drei Stufen erstellt: 1. Untersuchung des Immobilienmarkts, 2. Berechnung des relativen Kaufpreises sowie 3. Bewertung des Verhältnisses vom Kaufpreis zum Einkommen. Die Analyse zeigt, dass trotz der unterschiedlichen wirtschaftlichen Entwicklungsstände, Wirtschaftssysteme und Eigentumsrechte, die Städte sich wenig unterscheiden. Alle drei Städte haben eine unbezahlbare Wohnungsmarktsituation. In Peking ist diese Entwicklung am weitesten vorangeschritten. Hier zeigt sich die deutlichste Verschärfung des Wohnungsmarktes innerhalb der letzten zehn Jahren.