



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

# Demographic structure and housing prices: East Asia and Europe

**Zonghie Han**

*Real Estate Faculty, Daegu University, Korea (South)*

*corresponding e-mail: zhan[at]daegu(dot)ac(dot)kr*

*address: Daegu University, Department of Real Estate, Jillyang, Gyungsan, Gyungbuk, 712-714 Korea*

## Abstract:

The recent booms in the global housing markets have been suspected to be bubbles owing to the weak economic circumstances after the 2008 financial crisis. While the behavioral economics stresses the role of irrational human psychology in the housing market, this study focuses on the demographic factors which can determine the scope of the housing demand. Simple plotting of some demographic categories shows that ages between 15 and 64 (working age population) as well as between 40 and 59 have similar trends to the housing price indices in representative countries in Europe and East Asia, UK, France, Germany, China, Japan and Korea.

**JEL Classifications:** J11, R30, O52, O53

**Keywords:** Working age population, housing price index, demographic cliff, Europe, East Asia

**Citation:** Han, Zonghie (2017). Demographic structure and housing prices: East Asia and Europe. *Business and Economic Horizons*, 13(3), 333-346, <http://dx.doi.org/10.15208/beh.2017.24>

## 1. Introduction

Even as the global economy has suffered from sluggish growth and a surge in debt-to-GDP ratios following the financial crisis of 2008, global housing markets have undergone an exceptional boom in recent years, especially in metropolitan cities. Observers talk about "overheating" of housing markets "just a few years after the last major wave of global correction" (UBS, 2016, p. 3).

One accompanying phenomenon is excessively low - in some regions negative - interest rates, which have been assumed, in both academic studies and in public opinion, to play a key role in forming housing booms. But Shiller (2005; 2008) deny the critical effect of the interest rates on the housing prices backed by the long-term historical data, and his argument seems to be plausible considering the fact that low interest rates have been an enduring market condition since the early 2000's, while global housing markets have experienced remarkable rises and falls over the same period. This raises the question of what other socioeconomic factors can explain the housing market effectively, setting aside the psychological and subjective elements. Since the classical study of Mankiw & Weil (1989), the variable population has been regarded as the vital factor determining the housing demand on the local and national levels. In explaining housing prices more focus can be directed at the population structure rather than the size of the population itself, for the life cycle of each generation influences the housing demand in different ways. Especially the concept of "demographic cliff" by Dent (2014) seems to be worth for further examination. This study, therefore, attempts to specify the demographic impact on the housing market by comparing the population structures of the main economies in Europe and East Asia with their housing price indices (HPIs). Three economies in each of Europe and East Asia are analyzed: UK, France, and Germany and China, Japan, and Korea.

The housing market in the UK does not show a continuous trend\*, even though the average housing price rise since 2014 is noticeable. French housing price level seems moderate since 2007, while housing affordability in Paris indicates a slight overvaluation of 0.82 in 2016. German housing market had long been regarded as stable, but the recent boom around big cities, where the price has jumped by more than 30 percent in five years, indicates the risk of a bubble. China also has a housing market characterized by a strong rally, while Japan is still enduring the notorious "lost decades" in the housing market. After the years of slump the Korean housing market has moved up and down.

This study considers several demographic variables to explain the recent movement of housing prices in these six countries. The **working age population (WAP)**, with its size and proportion to total population, plays a key role in macroeconomic activities and housing market. The concept of WAP is nowadays often connected with the phenomenon of population aging, which is occurring in most advanced economies. The issue arises of how the aging economies will cope with the dilemma of dependency ratio in the areas of public finance, pension, health and unemployment insurance and growth potential. However, this study concentrates on WAP, which seems to drive the housing market principally in the housing market due to the purchasing power and life cycle mechanics, rather than the retired population.

WAP, on the other hand, can be classified into several categories with regard to the housing market determinant, by asking "which age groups are most significant in demanding houses in the light of the disposable income, the number of household members and the dwelling culture". The answer to this question may produce different categorization within the working population, the ages between 15 and 64: the "core working population" of ages between 25 and 49; the "real working population" of ages between 25 and 54; and the "double-humped generation" of ages between 40 and 59.

Thus, those four demographic concepts are plotted in comparison to the HPIs of each country. This study depicts the correlation between demography and housing prices for the time range from 2000 until 2014, and then represents the forecasting of the plausible demographic variables from 2016 to 2030 in order to present estimations of the future housing markets.

## **2. Working age population (WAP) and housing price indices (HPIs)** (Figure 1 to Figure 6, Appendix)

At first WAP is compared with the HPIs in the six countries. In the UK and France, the meltdown of housing prices after the global financial crisis and the ensuing recovery is evident. The following UK HPI (1995=100) represents here only England and Wales owing to constraints in the database of the UK Land Registry (2015). The French HPI from the L'Institut national de la statistique et des études économiques (INSEE, 2015) also embodies only French metropolitan regions.

The development of the UK HPI since 2000 (Figure 1, Appendix) shows an almost parallel trend to WAP, with a correlation coefficient of 0.835. This raises the question of whether the surge in HPI after 2013 even could not catch up the tendency of WAP in the UK. But the graph only depicts the scale adjusting between the two variables, so it cannot confirm that the recent increase of the UK housing price can be attributed to the ongoing growth in WAP.

French WAP and HPI illustrated in Figure 2 (Appendix) show a similar situation to those of the UK. Both French WAP and HPI decreased after passing their highest peak near

---

\* London, Cambridge and Oxford have house price to earnings ratios that are far higher than the national average, while prices in Glasgow, Liverpool and Newcastle have not bounced back far from their lowest point during the financial crisis in 2009 (The Telegraph, 2016).

2010-2011, while the UK WAP continued to increase. The UK HPI also displays an upward drift until 2014, which indeed has continued in 2015 and 2016. The visually close cohesion of the French WAP and HPI in Figure 2 (Appendix) is remarkable (even though both have different scales), which can be affirmed by a correlation coefficient of 0.975.

On the other hand, the relationship between the German HPI and WAP is weak in Figure 3. The directions of the trends in HPI and WAP correspond, but without any close correlation. In fact, the correlation coefficient for German HPI and WAP is -0.392, which indicates the possibility of a "housing bubble" after 2011 and an "undervaluation" before 2007.

In East Asia, we could not find published HPI data for China over the period 2000-2014, so the available average housing prices (AHP) are used instead. In Figure 4, the left axis represents WAP and the right axis AHP. WAP shows a similar trend with AHP, with a correlation coefficient of 0.937. China recently switched its population policy from "only one child" to "two children", but this will not have affected our data. A similar close relationship between WAP and HPI can be found in Japan (Figure 5; correlation coefficient 0.752) and Korea (Figure 6; correlation coefficient 0.959), whereas the gap between Japanese WAP and HPI has been wider since 2011. Of course, the Japanese breakdown of the housing market in accordance with WAP after 1990 is a famous phenomenon described in many studies.

In Europe and East Asia, five of the six economies, except Germany, show a close correlation between HPI and WAP.

### **3. Ages from 25 to 49; Core WAP** (Figure 7 to Figure 12, Appendix)

In demographic considerations regarding its impact on economic activities, several categories of the age groups were suggested in relation to the schematic life cycle. Influential factors in the housing market are disposable income, the number of family members, the residence culture and the extension of life span. Since 2000, the problem of population aging has begun to dramatically affect the socioeconomic structure of advanced countries via prolonged life expectancy, increased burden on social security and pension programs, and elderly poverty. The problem of secular stagnation, which has tried to specify the adhered low growth of the global economy, has often led to the destabilization of jobs in the course of the restructuring. Layoffs and early retirement, along with the retirement of the baby boom generation, may have a drastic negative effect on the housing market. On the other side, the improvement of the general health owing to the medical progress and the retraining of the restructured people can form a new economy where the elderly play a productive role, for the first time in human history.

This study lays aside the last case for follow-up studies, and focuses on the possibility that the main demanding force of the housing market is the subset within the working population age. The first subset is the **core WAP** (CWAP) aged between 25 and 49. The hypothesis of CWAP represents a pessimistic viewpoint that the rapid restructuring of the 21st century industry will offer older employees over 50 little chance to remain in the labor market.

The correlation coefficient of HPI and CWAP is 0.754 in the UK, -0.943 in France and -0.659 in Germany. In France and Germany, CWAP is not a key factor explaining the housing prices. In China and Japan, CWAP shows a strong relationship to AHP and HPI, with a correlation coefficient of 0.956 in China and 0.769 in Japan, while Korean HPI is not so strongly related to CWAP, with a correlation coefficient of 0.328.

In general, CWAP cannot be regarded as the major factor influencing the housing prices as WAP.

#### **4. Ages from 25 to 54: Real WAP** (Figure 13 to Figure 18, Appendix)

The second subset of WAP, the **real WAP (RWAP)**, contains the retiring age of the main housing demand group as 54.

In the UK, in comparison to Figure 7, RWAP reveals far less relevance to HPI than CWAP, with a correlation coefficient of 0.475 (Figure 13). French RWAP has a very similar depiction to CWAP with a correlation coefficient of 0.986, and it has little effect on HPI.

The relationship between German RWAP and HPI is not strong, with a correlation coefficient of 0.626. Chinese RWAP and API have a correlation coefficient of 0.9444.

In Japan and Korea, RWAP shows significant relevance to HPI with correlation coefficients of 0.924 and 0.959, respectively (Korea).

In summary, RWAP follows a very similar track to CWAP in France, Germany, Japan and China, but has a poor explanation power to the housing prices in European countries. Only the East Asian housing prices can be well explained by RWAP, which warrants further investigation.

#### **5. Ages from 40 to 59: Doubled humped generation** (Figure 19 to Figure 24, Appendix)

The concept of **double humped generation (DHG)** is based on the model of the property life cycle: the size of the disposable income and property shall reach the highest level in ages from 40 to 59 in the average life cycle. It is the narrowest subset of WAP considered in this paper.

UK DHG exhibits a similar trend to UK WAP, as is the case also in France. UK and French DHG have a good explanation power to HPI, with correlation coefficients of 0.8774 in the UK and 0.934 in France.

German DHG shows a closer relationship with HPI than WAP, but is not so well-fitted in the UK or France, with a correlation coefficient of 0.422. The inflection points of German DHG and HPI do not match in terms of direction, especially in 2012, in which a strong housing price surge has been observed in Germany. Chinese DHG shows an almost perfect match with AHP, with a correlation coefficient of 0.982.

In Japan, DHG is the only age group which stops falling and begins to increase (in 2011). The relationship between Japanese DHG and HPI is strong with a correlation coefficient of 0.909, which can be misleading just in comparison with the Japanese figures of WAP and CWAP. The trends shown in Figures 5 and 11 do not differ as much as in Figure 23, but the correlation coefficients lie under 0.77. Korean DHG shows an outstanding match to HPI with a correlation coefficient of 0.984.

To summarize, DHG can be classified as a key variable in explaining housing prices. The correlation coefficient exceeds 0.85 in five of six countries, 0.9 in four and 0.98 in two. Even in Germany with a correlation coefficient of 0.422, this is the only positive value of all four correlation coefficients considered.

Depicting the four demographic variables of WAP, CWAP, RWAP and DHG in relationship to HPI supports the conclusion that WAP and DHG are the best variables explaining the housing prices of the six economies over 2000-2014.

## 6. Prospects in population and housing market

(Figure 25 to Figure 30, Appendix)

If developments of the housing prices can be explained well by WAP and DHG in six countries of Europe and East Asia, it can be expected that the features of the housing markets in the future will not deviate greatly from WAP and DHG. In this section we show the demographic prospects of those six countries from 2016 to 2030. The forecasts of WAP and DHG completed by the United Nations (UN Population Division (2015), World Population Prospects) offer some clues about the future movements of housing prices. The UK WAP is the only population group of all 12 considered demographic groups which is expected to grow continuously up to 2027, with an average annual growth rate of 0.175%, while UK DHG will decrease up to 2027. Thus, these two key variables of WAP and DHG exert opposing influence over future developments of housing prices. Actual observation of the UK housing prices for years ahead could back up one of the two demographic hypotheses in the end: WAP or DHG.

French WAP is expected to increase up to 2023, and then to decrease, while French DHG will decrease consistently. Therefore, the French housing market could face a serious recession after 2023, but situation before 2023 would depend on which will be more dominant in the housing market, WAP or DHG.

German WAP and DHG are expected to decrease continuously, with average annual growth rates of -0.9% and -1.3%, respectively. Therefore, German housing market will also face a corresponding downward pressure, *ceteris paribus*. But the recent refugee flows into the Europe have been concentrated in Germany, with more than one million since January 2015, and about 70% of refugees are workable men, who can be added to German WAP soon. So the pictures of German demographic development are not fixed as the United Nations predicted in 2015, but rather are flexible in the course of the refugees flow. In any case, the German demography may benefit from the inflow of young men group from outside of West Europe.

In China, WAP will diminish continuously, while DHG is expected to have two maximum peaks in 2020 and 2029. It will be also an interesting observation in the housing market, whether the housing prices will follow WAP or DHG.

In Japan, both WAP and DHG will decrease in the long run, while DHG is expected to increase slightly until 2021.

Korean WAP and DHG will decrease continuously in the next 15 years, with average annual growth rates of -0.73% and -0.66%, respectively. So, *ceteris paribus*, strong downward pressure is expected in the Korean housing market.

## 7. Conclusion

Booms in property markets worldwide after the global financial crisis of 2008 have been questioned both publically and academically, owing to the suspicion that the economic fundamentals are characterized as the secular stagnation connected with the macroeconomic inactivity and sluggishness in employment and income, and also due to the fear that global money-easing can create another property bubble which will then trigger another hard landing in the property market. Shiller (2005) emphasized the role of human psychology in the property market based on behavioral economics, which cannot be easily modelled and quantified as the traditional econometric approach. This paper presents a simple hypothesis, that demographic structure is an elementary factor that influences housing market demand, which can move independently of the macroeconomic stagnation and induce property booms, possibly assisted by the monetary policy of the unprecedented easing.

Simple plotting of some demographic variables in contrast to HPIs reveals that WAP (aged between 15 and 64) and DHG (aged between 40 and 59) show a persuasive correlation with housing prices in the period 2000-2014 in six representative economies in Europe and East Asia. If the explanatory power of the demographic structure is accepted, then these six economies will face significant downward adjustment in 2016 - 2030, although some countries such as the UK, France and China will experience rises and falls of WAP and DHG that may complicate future HPI prediction.

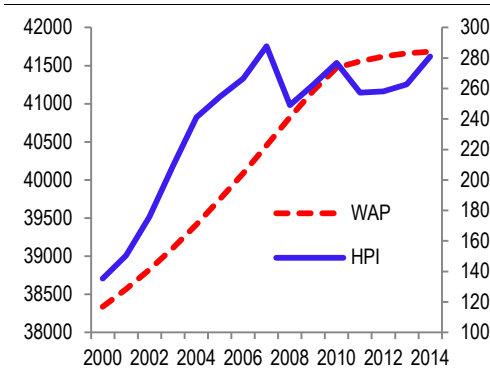
The mechanics of the housing market, especially concerning the course of housing prices, consists of the interaction between demand and supply forces, which are strongly influenced by the flexibility of land and construction regulations. This study concentrates on the demand side subjective to large-scale population changes. Hence, possible supply-side constraints need to be focused on in further research. Furthermore, the role of the demographic structure can be expanded and deepened by adopting other categories, such as "net housing demand" based on the "spending wave" of Dent (2014) and "dependency ratio" focusing on the increasing burden of the working generations. Additionally the impact of monetary easing needs to be examined in the context of the reciprocal action of the demand side in the housing market.

## References

- Bank for International Settlements (2015). Detailed data set on nominal residential property prices. <http://www.bis.org/>
- Dent, H. S. (2014). *The demographic cliff: How to survive and prosper during the Great Deflation of 2014-2019*. New York: Portfolio/Pengiuin.
- INSEE (2015). L'Institut national de la statistique et des études économiques [The French National Institute of Statistics and Economic Studies]. <https://www.insee.fr>
- KB Kookmin Bank (2017). Real estate Statistics in Korea. <http://nland.kbstar.com>
- Mankiw, N. G., & Weil, D. N. (1989). The baby boom, the baby bust, and the housing market. *Regional science and urban economics*, 19(2), 235-258.
- National Bureau of Statistics of the PRC. (2015). <http://data.stats.gov.cn>
- Shiller, R. J. (2005). *Irrational exuberance* (2nd ed.). Princeton, N.J.: Princeton University Press.
- Shiller, R. J. (2008). *The subprime solution: How today's global financial crisis happened and what to do about it*. Princeton, N. J.: Princeton University Press.
- Statista GmbH (2015). Das Statistik-Portal [Portal of Statistics]. <https://de.statista.com/>
- The Telegraph (2016) "House price affordability in London reaches a new low", 2016.11.25, <http://www.telegraph.co.uk/property/house-prices/house-price-affordability-london-reaches-new-low/>
- UBS (2016). *UBS Global Real Estate Bubble Index*. UBS Chief Investment Office WM's investment views.
- UK Land Registry (2015). UK House Price Index. Guidance. <https://www.gov.uk/government/publications/about-the-uk-house-price-index>
- WPP (2015). World Population Prospects (WPP). Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat. UN.

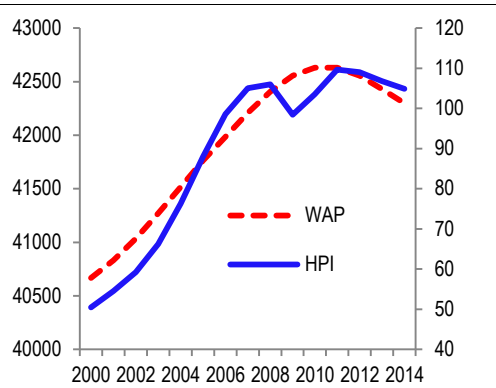
## Appendix

FIGURE 1. WAP AND HPI: UK



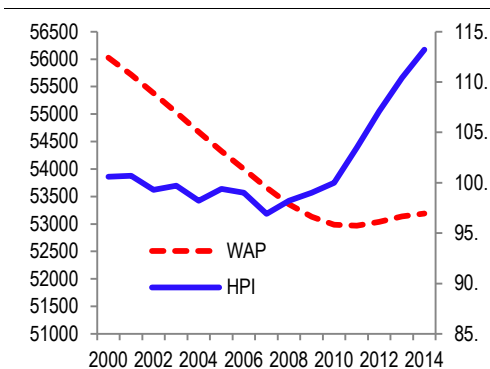
Source: WPP (2015); HM Land Registry (2015).  
 Note: HPI (right-side scale) 100=1995. WAP scale= $\times 1000$ .

FIGURE 2. WAP AND HPI: FRANCE



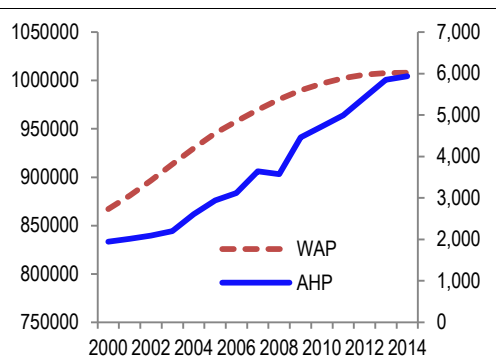
Source: WPP (2015); INSEE (2015).  
 Note: HPI 100=2010. WAP scale= $\times 1000$ .

FIGURE 3. WAP AND HPI: GERMANY



Source: WPP (2015); Statista GmbH (2015).  
 Note: HPI (right-side scale) 100=2010. WAP scale= $\times 1000$ .

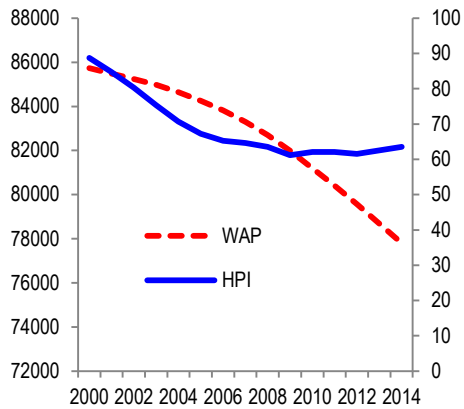
FIGURE 4. WAP AND AHP: CHINA



Source: WPP (2015); National Bureau of Statistics of the PRC (2015).  
 Note: AHP (right-side scale) - Yuan per m2. WAP scale= $\times 1000$ .

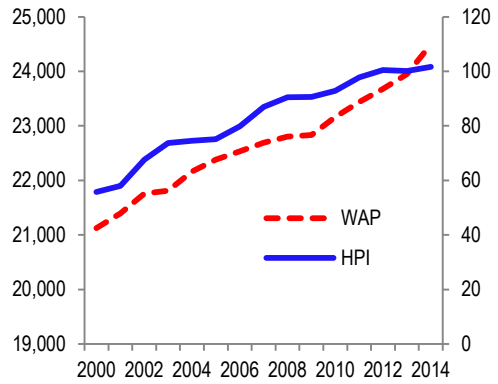


FIGURE 5. WAP AND HPI: JAPAN



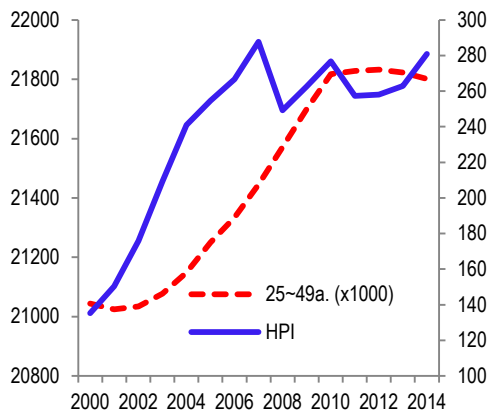
Source: WPP (2015); BIS (2015)  
 Note: HPI (right-side scale). WAP scale= $\times 1000$ .

FIGURE 6. WAP AND HPI: KOREA



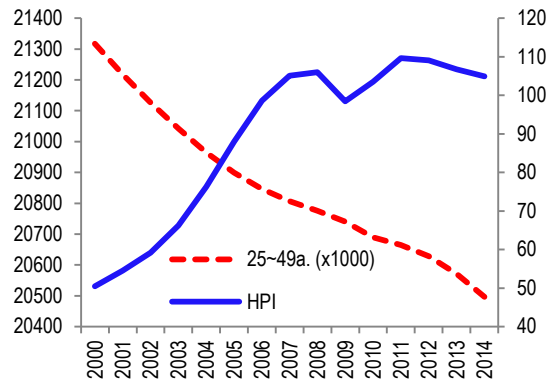
Source: KB Kookmin Bank (2015).  
 Note: HPI (right-side scale)=2013. WAP scale= $\times 1000$ .

FIGURE 7. CWAP AND HPI: UK



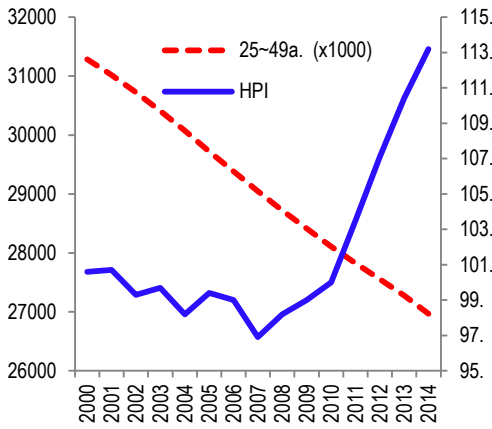
Source: WPP (2015); HM Land Registry (2015).  
 Note: HPI (right-side scale) 100=1995.

FIGURE 8. CWAP AND HPI: FRANCE



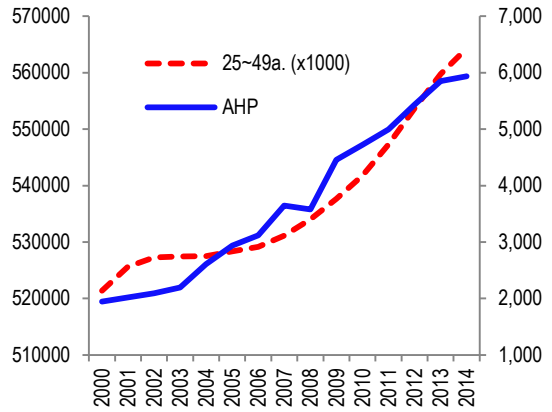
Source: WPP (2015); INSEE (2015).  
 Note: HPI (right-side scale) 100=2010.

FIGURE 9. CWAP AND HPI: GERMANY



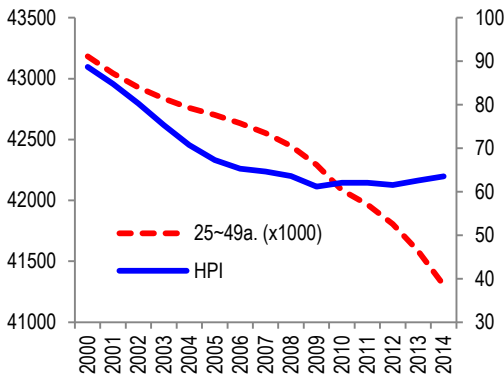
Source: WPP (2015); Statista GmbH (2015).  
 Note: HPI (right-side scale) 100=2010.

FIGURE 10. CWAP AND AHP: CHINA



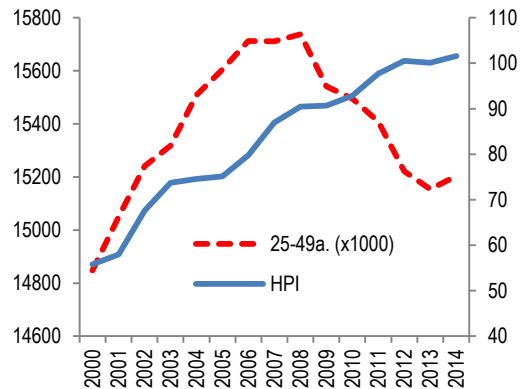
Source: WPP (2015); National Bureau of Statistics of the PRC (2015).  
 Note: AHP (right-side scale) - Yuan per m2.

FIGURE 11. CWAP AND HPI: JAPAN



Source: WPP (2015); BIS (2015)  
 Note: HPI (right-side scale).

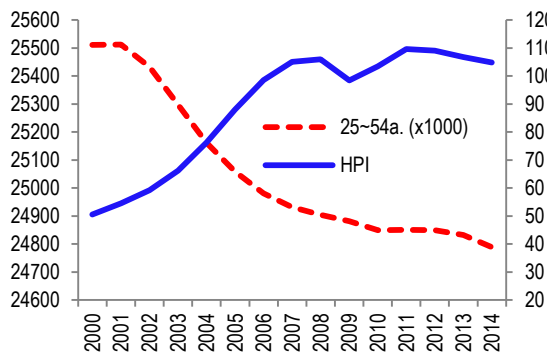
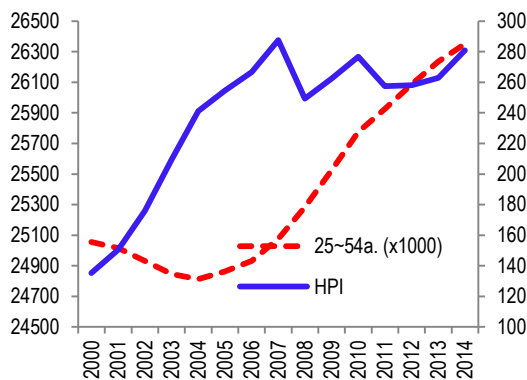
FIGURE 12. CWAP AND HPI: KOREA



Source: KB Kookmin Bank (2015).  
 Note: HPI (right-side scale)=2013.

FIGURE 13. RWAP AND HPI: UK

FIGURE 14. RWAP AND HPI: FRANCE

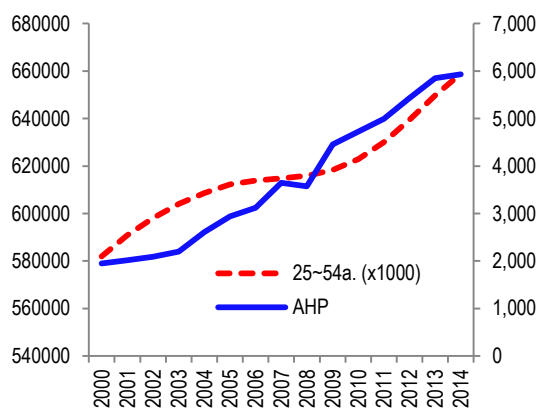
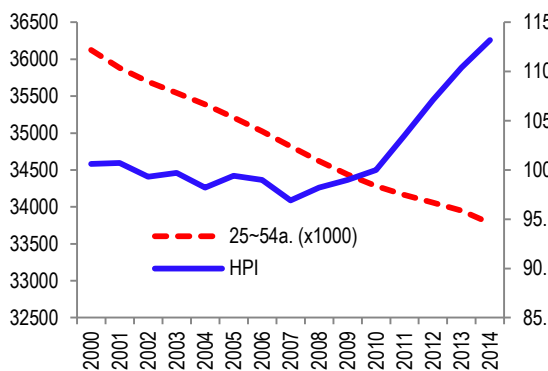


Source: WPP (2015); HM Land Registry (2015).  
 Note: HPI (right-side scale) 100=1995.

Source: WPP (2015); INSEE (2015).  
 Note: HPI (right-side scale) 100=2010.

FIGURE 15. RWAP AND HPI: GERMANY

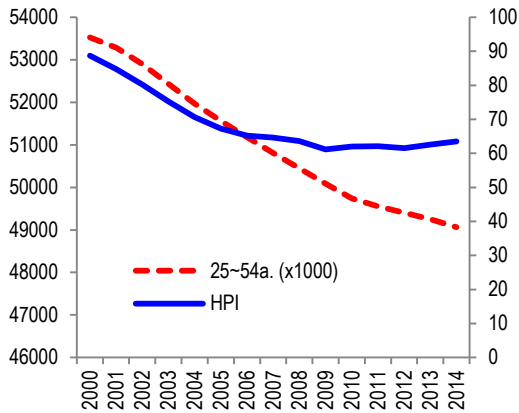
FIGURE 16. RWAP AND AHP: CHINA



Source: WPP (2015); Statista GmbH (2015).  
 Note: HPI (right-side scale) 100=2010.

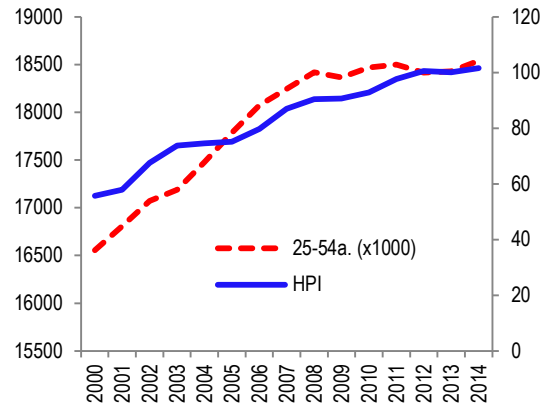
Source: WPP (2015); National Bureau of Statistics of the PRC (2015).  
 Note: AHP (right-side scale) - Yuan per m<sup>2</sup>.

FIGURE 17. RWAP AND HPI: JAPAN



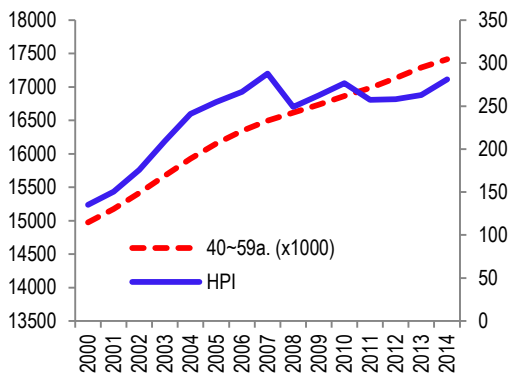
Source: WPP (2015); BIS (2015)  
 Note: HPI (right-side scale).

FIGURE 18. RWAP AND HPI: KOREA



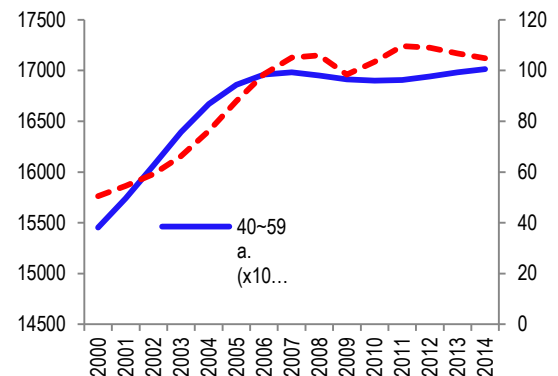
Source: KB Kookmin Bank (2015).  
 Note: HPI (right-side scale)=2013.

FIGURE 19. DHG AND HPI: UK



Source: WPP (2015); HM Land Registry (2015).  
 Note: HPI (right-side scale) 100=1995.

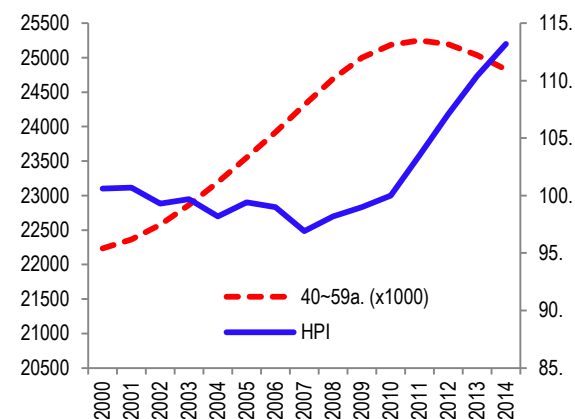
FIGURE 20. DHG AND HPI: FRANCE



Source: WPP (2015); INSEE (2015).  
 Note: HPI (right-side scale) 100=2010.

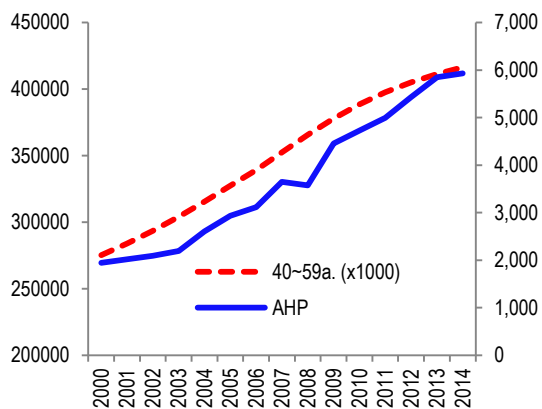
Business and Economic Horizons

FIGURE 21. DHG AND HPI: GERMANY



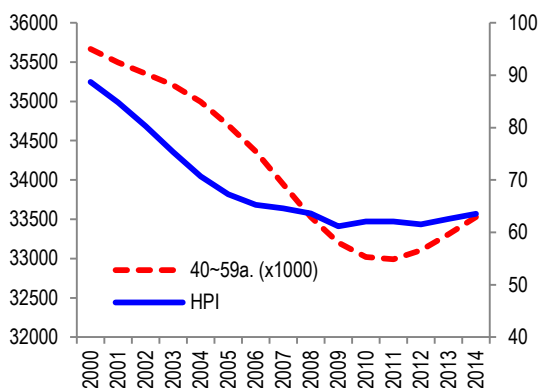
Source: WPP (2015); Statista GmbH (2015).  
 Note: HPI (right-side scale) 100=2010.

FIGURE 22. DHG AND AHP: CHINA



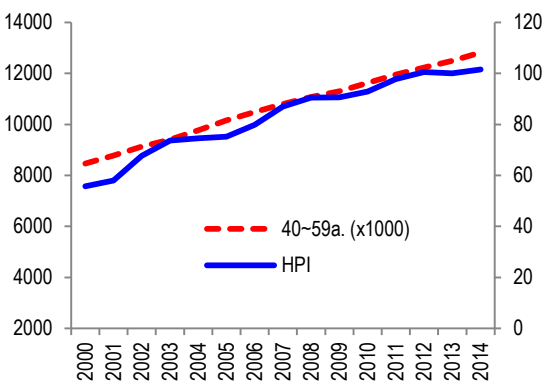
Source: WPP (2015); National Bureau of Statistics of the PRC (2015).  
 Note: AHP (right-side scale) - Yuan per m<sup>2</sup>.

FIGURE 23. DHG AND HPI: JAPAN



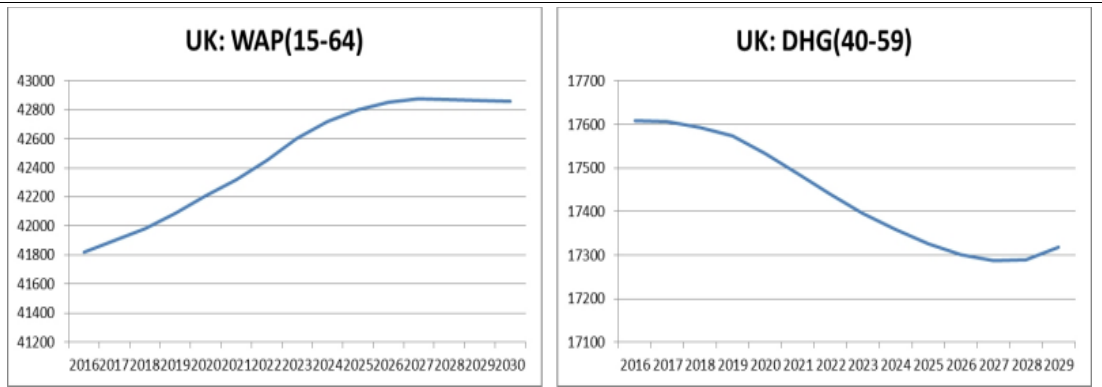
Source: WPP (2015); BIS (2015).  
 Note: HPI (right-side scale).

FIGURE 24. DHG AND HPI: KOREA



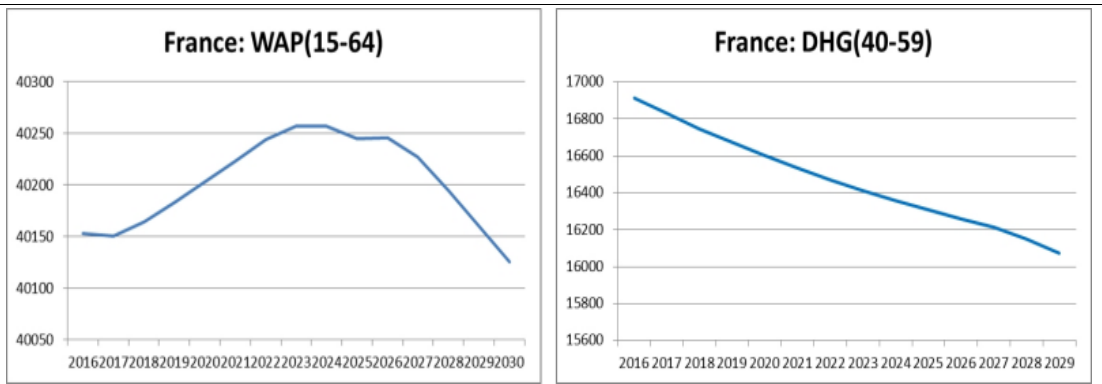
Source: KB Kookmin Bank (2015).  
 Note: HPI (right-side scale)=2013.

FIGURE 25. PROSPECTS OF UK WAP AND DHG (x1000)



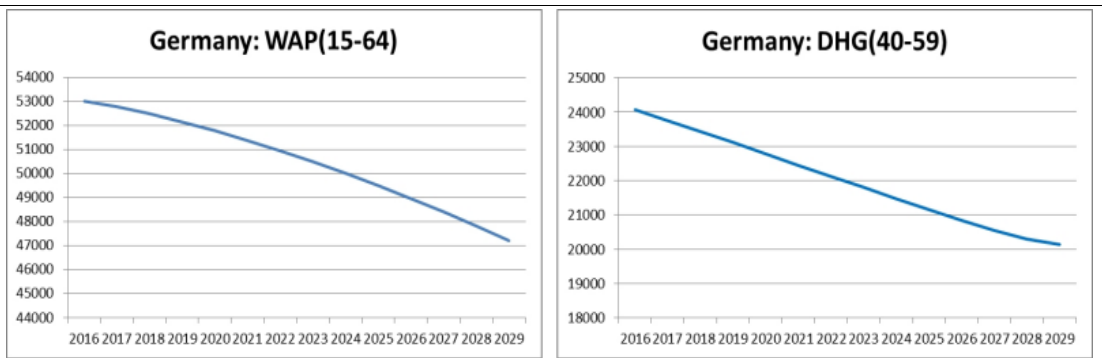
Source: WPP (2015); HM Land Registry (2015).

FIGURE 26. PROSPECTS OF FRENCH WAP AND DHG (x1000)



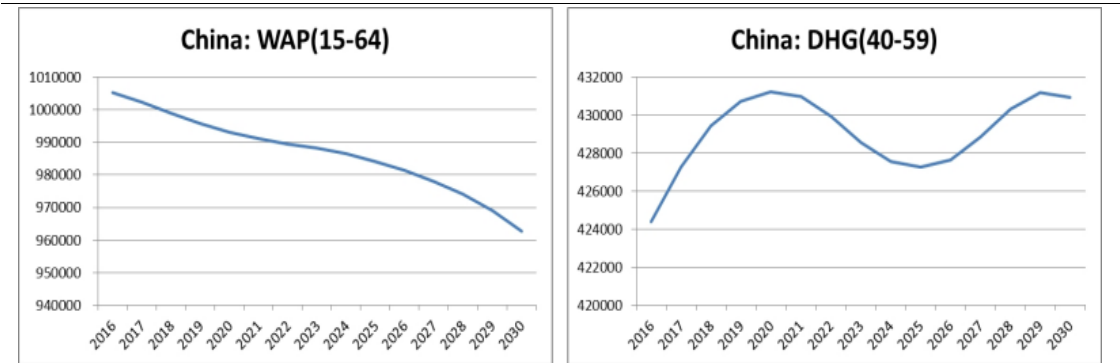
Source: WPP (2015); INSEE (2015).

FIGURE 27. PROSPECTS OF GERMAN WAP AND DHG (x1000)



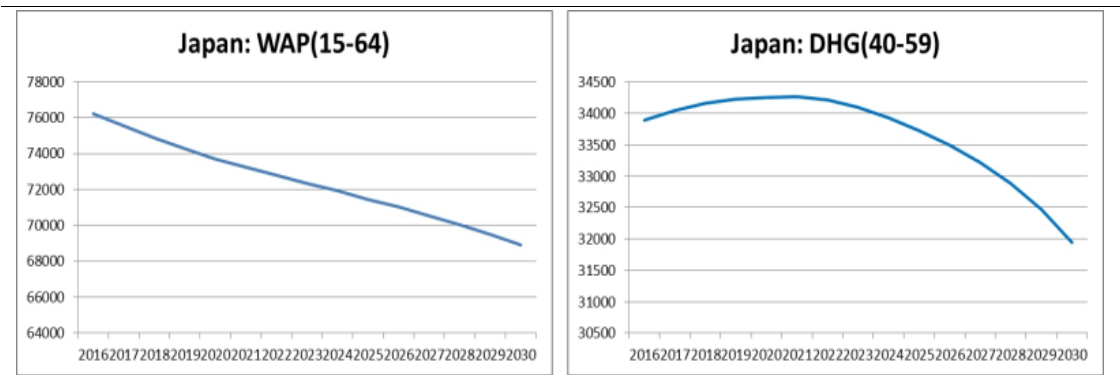
Source: WPP (2015); Statista GmbH (2015).

FIGURE 28. PROSPECTS OF CHINESE WAP AND DHG (x1000)



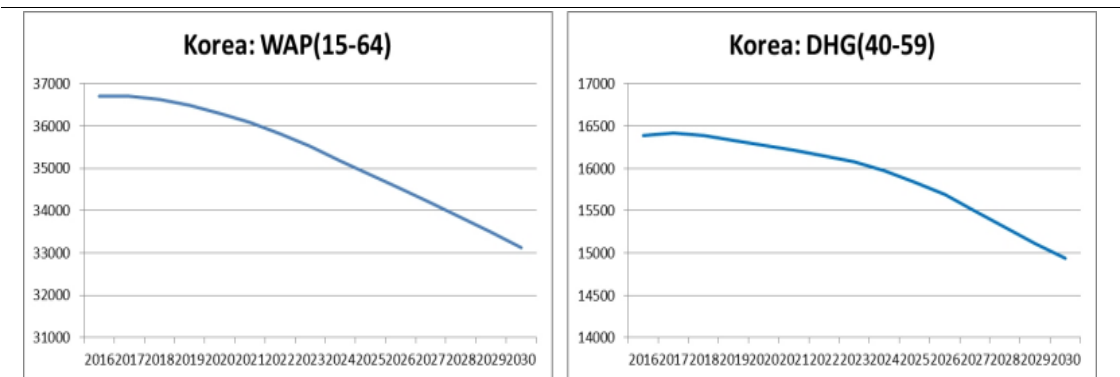
Source: WPP (2015); National Bureau of Statistics of the PRC (2015).

FIGURE 29. PROSPECTS OF JAPANESE WAP AND DHG (x1000)



Source: WPP (2015); BIS (2015).

FIGURE 30. PROSPECTS OF KOREAN WAP AND DHG (x1000)



Source: KB Kookmin Bank (2015).