Remarks on the story of land prices, told by house prices

Risto PELTOLA, Mikko KORPELA, Finland

Keywords: mass valuation, land valuation, property taxation, land value tax, imputed land value, land price index, house price index

Summary

There is an implicit land price in house prices. This implicit price can be used for two purposes: to calculate land price index and to valuate land value. These two purposes, and challenges involved, are discussed in separate chapters. Land price indices, and the role of land prices in general house price appreciation, has recently been a field of intensive economic research related to analysis of housing markets and macroeconomic policy. This land price index story serves as a prologue and background to the interest of the authors, as a surveyor and a statistician, in our main task in mass valuation of land for property taxation purposes. There are pitfalls in translating house price data to land price indices and land values which are discussed based on literature and empirical research made by the authors.

FIG Commissions: Valuation and the Management of Real Estate – FIG Commission 9

1. INTRODUCTION

It's well known, that rising land prices explain most of the global house price boom that has taken place since World War II. Less is known that it may not have always been so. According to a recent study by Knoll et al, real house prices stayed constant from the nineteenth to the mid-twentieth century. Their study, published in a leading economic journal American Economic Review, consists of 14 advanced economies and a time span back to 1870.

Their findings have implications for the evolution of wealth-to-income ratios, the growth effects of agglomeration, and the price elasticity of housing supply. After the financial crash in 2008, which had its roots in housing and housing finance markets, the central banks have been worried and cautious about the relationship between housing markets and macro economy, and the economic research in this field is intensive. "Fluctuations in house prices, their impact on the balance sheets of consumers and banks, as well as the deleveraging pressures triggered by house price busts have been a major focus of macroeconomic research in recent years… Despite the importance of housing wealth to the macroeconomy, surprisingly little is known about long-run trends in house prices." They claim to fill this void in their paper. (Knoll et al).

We use the article by Knoll et al as a starting point in our work, where our point of view is property valuation. This is of course a separate but related focus, and an important one as well. What implications have the findings of Knoll et al, and other economists, in land valuation, if any? What is the story of land prices, told by house prices? In particular we try two answer two questions: Can we calculate a land price index based on house prices? Can we calculate land values based on house prices? How should we execute the latter task for mass valuation purposes in property valuation?

Our paper is divided in two parts to discuss these two questions. In the first part we introduce the findings on Knoll et al. We discuss the challenging task they have assumed, their methodology and their findings. We also update their calculations for a more recent period and perhaps a more accurate data in Finland.

In the second part, and for our main purpose as surveyor/statistician, we take a step further. As the focus of Knoll et al was housing stock in general, and the role land plays, our focus is individual properties and land and structure components in each and every property in the stock, to derive values for the property taxation base. How can the land share of total property value be calculated? Is the recent economic research relevant in that calculation?

The land value index is of course a temporal indicator, and land value change is a partial derivative of time change of house value. The spatial land value variation, on the other hand, is a partial derivative of spatial change of house value. Chapter two deals with temporal aspects of house value/land value relationship, and chapter three deals with spatial aspects, where time is fixed to present time, the most relevant time for practical valuation purposes. In short, chapter 2 deals with temporal effects of house prices to land values. Chapter 3 deals with spatial effects of house prices to land values.

2. TEMPORAL EFFECTS: HOW TO CALCULATE A LAND PRICE INDEX BASED ON HOUSE PRICES

In economics the need for land price indices has emerged as the role played by housing prices and housing wealth in macroeconomic issues has become evident. In the absence of good quality land price indices economists often use imputed land prices, based on housing prices, as a second-best solution. Let us introduce the technique used in an article by Knoll et al. Elegant as it is, and impressive in its broad scope, it has also severe limitations to function as a proper tool in measuring land price changes.

2.1. The Knoll – Schularick - Steger study

Knoll et al calculated a land price index based on house prices for 14 advanced economies, in some countries dating back to 1870. A house is obviously a mix of land and structures. According to Knoll et al notation, the land price index can be imputed as a function of house price and construction cost indices:

$$F(Z_t, X_t) = (Z_t)^{\alpha}(X_t)^{1-\alpha}$$

(1)

$$\frac{p_{t+1}^H}{p_t^H} = \left(\frac{p_{t+1}^Z}{p_t^Z}\right)^{\alpha}\left(\frac{p_{t+1}^X}{p_t^X}\right)^{1-\alpha}$$

and the imputed land price index can be traced out by employing

(2)

$$\frac{p_{t+1}^Z}{p_t^Z} = \left(\frac{p_{t+1}^H}{p_t^H}\right)^{\frac{1}{\alpha}}\left(\frac{p_{t+1}^X}{p_t^X}\right)^{\frac{\alpha-1}{\alpha}}$$

F= house, X = structures, Z = land
p^H = price of house, p^X = price of structures, p^Z = price of land
t = year, t+1 = next year
α = land share a house

The price variables are collected from a multitude of sources. The caveats in this data are many. The critical parameter α, land share of a house, is not observed at all. The authors use α = 0,5, and for robustness check also α = 0,25 and α = 0,75.

The main findings of Knoll et al are listed here:

- From the last quarter of the nineteenth to the mid-twentieth century, house prices in most industrial economies were largely constant in real (CPI-deflated) terms. By the 1960s they were, on average, not much higher than they were on the eve of World War I.
- They have been on a long and pronounced ascent since then, giving rise to a hockey-stick pattern of house prices in the long run. While house prices have increased in all countries over the past 140 years, there is also considerable cross-country heterogeneity.
- While construction costs have flat-lined in the past decades, sharp increases in residential land prices have driven up housing values. More than 80 percent of the increase in house prices between 1950 and 2012 can be attributed to land prices.
- In the period from the late nineteenth to the mid-twentieth century residential land prices remained, by and large, constant despite substantial population and income growth.

Knoll et al also have an interesting discussion on the reasons of the “hockey-stick” temporal pattern of house prices, their main finding perhaps. That discussion is not relevant for our purposes, as we are mainly interested in present and a more recent past.

As to Finland, figure 1 presents imputed land price index compared to real house price and real construction costs indices 1950-2012, from the data offered by Knoll et al. We can observe a near constant line for real costs, a rising curve for real house prices with strong cycles, and a steeper rising curve for real imputed land prices reflecting the business cycle observed in house prices. Knoll et conclude that in Finland house prices cause 96 % of the increase in real land prices, the highest number in the sample of 14 countries. Given the almost constant cost curve it’s easy to understand the technical reason for this result. Of course, the same effect would appear in any of the 14 countries if we assumed constant real production costs over time.

If true, figure1 beautifully illustrates the land price rises behind house price appreciation. So do most other figures that can be drawn on Knoll et al country data. However, there are problems involved in Knoll et al study, which we discuss soon.

2.2. Update on a more recent country data

We tested the Knoll et al methodology on the most recent country data (Finland) and tried some other improvements in the data. The results are shown in figures 2-7.

As to construction costs, figure 2 demonstrates, that substituting input prices with bid prices (offer prices by construction companies) do not change the overview of the cost landscape. In the long run input and bid prices have had the same slope. In fact, there is no real increase in construction costs in the long run. If the productivity in construction industry were increasing more slowly than in the economy as a whole we would expect rising real costs, but this does not seem to be the case according to Statistics Finland index numbers, neither according to bid price index numbers offered by consultancy company Haahtela.

Figure 3 illustrates how real house prices are rising and real construction costs are almost constant.

Figure 4 shows real imputed land prices based on real house prices and real construction costs. It is based on two assumptions of (constant) land share of house price: α = 0,3 and α = 0.5. Embarrassingly these assumptions produce strikingly different curves. This is because the construction cost curve is almost steady. We already noted that Knoll et al found Finland, in their data, to be a country with highest share of land prices as a cause of house price appreciation, at 96 %. When this number approaches maximum at 100 %, of course with low α land price appreciation is a multiple of house price appreciation.

Figure 5 compares real house prices and observed real land prices. They follow the same pattern: rising trend and high cyclicality. The difference between the curves is that both trend and cyclicality are higher for land, just as we would expect.

Figure 6 compares real imputed land prices, two of them, and observed real land prices. The latter is close to imputed curve when α = 0,5 is assumed, but very different when α = 0,3 is assumed.

Finally figure 7 makes the same comparison as figure 6 but for a shorter time span 1988-2021, and a log scale. Observed real land prices are close to imputed when α = 0,5 is assumed.

2.3. Conclusions on land price indices

Impressive, and elegant, as the Knoll et al study is, their treatment of land share seems elementary. The land share of a house prices is not endogenously calculated from the data, but must be given exogenously, artificially. They use α = 0,5, and for robustness check also use α = 0,25 and α = 0,75. All those numbers give similar results, we are told, which is a steeply rising land prices in the last ca. fifty years. As our simulation proves, this however is not true in the Finland data. Generally, the land share must vary a lot depending on location and also between countries. Even more evident is that the land share must rise over time in all or most of the countries. The land share itself should be an essential object of research.

Our main finding is the comparison of imputed land value and observed price indices in Finland. The imputed index is very sensitive to the chosen land share number. When a suitable land share number is chosen, observed and imputed indices do not differ much from each other. But why to use an imputed index, if an observed index is needed to prove its reliability, and given the non-constant land share in observed land prices and constant land share in imputed land values? Assuming constant land share in house prices is not only unrealistic, but also inconsistent with the Knoll et al results: almost constant construction costs, rising trend in real house prices, and steeply rising trend in imputed real land values.

Land value and land share of a house price are two sides of the same coin. Accordingly, there are two indices linked to each other: land price index and index of the land share of a house price. When you study land prices as a function of house prices you essentially study these both aspects. Preferably you should also publish your results on land share also and not just on land value.

What is to be done? Whereas house prices are rather easy to observe and model, construction costs seem to be the weak link in the Knoll et al and some other economists' approach. Construction costs are usually unknown to a particular property, the information is to the parties involved only. There are problems in definition of those costs: are infra costs included or not? What about the costs of preparation of the lot, which can be high in case of poor or polluted soil? The demolition costs? The extra costs of a small lot in cramped built-up area? All these tend to be higher in expensive locations Finally, the depreciation is hard to measure.

The crude level of construction costs can probably be measured for index calculation purposes. Figure 8 illustrates median cost numbers in different locations in Finland. Deducting them from house prices yields a land value as a residual. The data requirements are challenging given some variation in costs between locations and over time. However these challenges may be solvable for index calculation purposes. For purposes of valuation of any particular lot these challenges are, unfortunately, formidable and we may need to find other solutions. This is our topic in the chapter that follows.

3. SPATIAL EFFECTS: HOW TO CALCULATE A LAND VALUE OF A PARTICULAR LOT?

3.1. The valuation methods of urban residential land

The valuation methods of urban residential land can be divided into three broad categories:

a. direct comparison method
b. residual method, based on house prices and construction costs
c. land share method, based on house prices and observations of land prices The method in this article falls to the third category.

Imputing land values from house prices, aka. translating house prices to land values, essentially means calculating the land share of the residential property value, or the ratio of land values to house values.

This mass appraisal of land has been used for the revaluation of 2 million land parcels in Finland for property taxation purposes. This was carried out during the last five years for The Ministry of Finance and taxation authorities and involved years of development.

The institutional setting of property taxation, property markets and land use regulation in Finland, and data and tools used in mass valuation are briefly described are described in Peltola 2019 and 2021. In those sources can also be found the models producing constant quality land and housing prices and the crucial model to translate house prices to land values.

3.2. Land value as residual and land value as a share of improved property value

A popular treatment in economics is interpreting land value as residual between value of improved property and construction costs. Alas, this works better in theory than in practice, as far as valuation is concerned. Even for statistical purposes the residual method has problems, which are illustrated in problems in construction cost indices. Bergman and Nyberg for instance observe embarrassing differences in measuring construction cost indices in different countries, which are based on different ways to estimate construction costs (Bergman and Nyberg 2021).

The construction companies calculate their maximum bidding prices for land based on the difference of future selling prices of homes and construction costs. The residual method certainly plays a role in land valuation. That role is limited at best, when land under existing structures is concerned. The quality of structures and the associated construction costs are difficult to estimate even for brand new structures, if you have to rely on public information only. The depreciation figures are hard to calculate accurately enough, and a difference of 1 %

in annual deprecation makes almost a 30 % difference after just 30 years, and a much larger difference in the residual value of land.

A more modest approach is to ignore the residual, and just use house price as signal of land value, and to empirically estimate the association of house and land price, and to produce the model of land value as a function of house price, or the land share of house prices. This is our approach. The residual value, with some smart assumptions used to calculate the reproduction costs, should produce same results. However, as such the residual approach seems simply unnecessary source of errors for most mass valuation purposes. It has use in special valuation purposes of course.

3.3. Modelling the elasticity of land prices to house price variation

Data points with a pair of land and house price observations are needed. Possible data point candidates are property units as such, grids of 250 x 250 square meters, larger grids, ZIP code areas, taxation areas or some other subdivision, preferable with little variation in prices within the area. We chose taxation areas, 4000 of them in whole country. Median of constant quality land and house prices were calculated. Figure 11. shows the plot of those median prices for those 1512 areas, where at least one sale of each type exists. Land median prices are based on both sales for lots for multi- and single-family houses.

The following elasticity models were estimated:

a. The effect of dwellings prices of condominiums in multi-family houses to prices of lots for multi-family houses
b. The effect of dwellings prices of condominiums in multi-family houses to prices of lots for single-family houses
c. The effect of single- family house prices to prices of lots for single-family houses
d. The effect of vacation home prices to prices of lots for vacation homes

In this article, only the first effect (a) is illustrated and discussed.

Figure 11 shows a plot of pairs on median dwelling and land prices.

Three lessons can be noticed from the figure.
1) There is a strong correlation between land and dwelling prices, or rising trend in plots,
2) The slope of the trend line is steep on the left, but less so on the right. The slope, or elasticity, is more than three on the left, but perhaps below 1½ on right.
3) The correlation is not even close to perfect.

There is plenty of variation in land prices around the trend. In fact, the deviation of land prices around the trend is embarrassingly high. Are house prices really good enough predictors of land prices?

There are obvious reasons to low correlation. The most important reason, in our view, are problems with the land sales data. Land sales data seems to be most embarrassing in the high end of dwelling prices, where some rather low land price levels seem to exist.

The declining elasticity implies, that a second term may be needed in the elasticity identity. Adding a second term, the square of dwelling price, to the global model is both statistically significant and of an expected sign, negative. However, the global model itself is not adequate. Local models perform better at least in the eight largest cities, which are our main focus. These local models perform better showing lower elasticities in large cities, as was expected. The second lowest elasticity is in capital city Helsinki, 1,48, implying that a 1 % difference in dwelling prices translates to a 1,48 % difference in land prices. The elasticities usually vary between 1,7 and 3. Lowest elasticities are in locations with most expensive land and housing.

Adding the square of dwelling price to local models was not helpful: it usually was not statistically significant and sometimes caused coefficient not to have the expected sign (first term positive, second term negative.) The model for the capital city, is Land price = 0,00413 * Dwelling price ^{1,48} Land price and land share values for different dwelling prices in Helsinki are given in figures 13-14 and in table 1.

Table 1. Land value and land share of dwelling price of a as a function of dwelling price in Helsinki.

dwelling price	land price	land share
1000	114	17 %
2000	317	24 %
3000	578	29 %
4000	885	33 %
5000	1231	37 %
6000	1613	40 %
7000	2026	43 %
8000	2469	46 %
9000	2939	49 %
10000	3435	52 %

However, even if the model for the capital city is simple and intuitively convincing, the data points behind the model are somewhat embarrassing (figure 12).

This figure is essentially the same as the upper right part of the whole country plot in figure 11. Again, we can notice a strong rising trend. A non-linear, declining elasticity is not clear due to large deviation around the trend. In fact, the deviation around the trend is the most embarrassing feature. We would have been glad with stronger correlation and less standard deviation. The higher the dwelling prices are, the more variation in land price levels seem to exist.

The poor performance of the land/dwelling elasticity model at the most expensive locations is probably caused by land price information. All sales are unique, and the special circumstances of each sale a difficult to find out, or they need a careful study. Some of the most common special factors are need for demolition of old structures, need for cleaning of poisonous soil, obligations to provide affordable housing or other social benefit, lots zoned for multiple uses, parking requirements, lots linked to transport infrastructure etc.

A more careful study of the land price observations is still needed in order to get land price statistics that is more consistent with dwelling price statistics. There are probably land sales that are below market value for reasons mentioned above. There is no easy way to filter them away and not to waste important information at the same time.

The dwelling price statistics in Helsinki is based on 70.000 transactions on 10.000 properties, the dwelling prices are easy to model to get a constant quality price, so there is no reasons to doubt that dwelling prices would not reveal the rank order of locations in terms of their land value.

Figures 15 and 16 illustrate, how dwelling prices were translated to land prices in the central, most expensive part of the capital city, in the most expensive part of the country using formula: Land price = 0,00413 * Dwelling price ^{1,48}. Eventually these figures determine the tax base and cause the property owners an obligation to pay the property tax to the city of Helsinki.

3.4. Lessons from spatial imputation of house prices to land values

The intercept and the elasticity coefficient in local models were eventually chosen comparing different models with different filtering of sales data. The higher the intercept, the higher the effect on general land price level across the city. The larger the elasticity coefficient, the larger is land value variation within the city. We know that the elasticity coefficient is sensitive to how we filter the land sales data, how we interpret land sales data and how we make corrections to prices based on demolition costs etc, and if we add a power of dwelling prices to the elasticity model.

So far we are not able to learn to know the land sales data quite as good as we want. So the decision to choose the transformation formula of dwelling prices to land prices involved some discretion. Our estimates may overshoot or undershoot the real land values. We may also have interpreted the variation in land values to be too high or low. Especially, we had problems in the extreme values.

As to the general land value levels over- or undershooting, the problem is essentially a technical one. The property taxes are based on property rates that are fixed based on property values to produce a desired property tax income. The property values are known when the rates are fixed.

As to variation in land values, this is a more serious question of equity. The variation in land values in current property taxation has been too low to our understanding, and a clear improvement has been made, materializing in a larger variation in land prices. At the same time we know there is room to increase the accuracy.

The elasticity models are essentially models of land share of the total property value, or the ratio of land value to dwelling price. As we noted earlier, in Finnish property tax system the total property value is not the object of valuation, but the separate parts of it, land and structures, which are valued and taxed separately. However, this method could be used also to value the structures share and value when the total property value of residential property is known based on dwelling sales in the building.

4. CONCLUSIONS

In economics and macroeconomic analysis land prices indices and land value estimates have recently gained interest and importance. It’s like in the old days: according to Piketty valuing land was the first and foremost task of the economist of the classical age. There remains plenty to do to achieve results that are convincing over time and between countries. As to the residual method, measuring and modelling construction costs seems to be the main challenge to overcome. Direct observations of land values is an invaluable source of information in all approaches. They offer a reality check in the residual method, whether used in index calculation or in spatial valuation. There is a demand for statisticians and surveyors to contribute in land price index calculation to help policymakers in the analysis of housing and macroeconomic policy.

The valuation methods of urban residential land can be divided into three broad categories:

1) direct comparison method
2) residual method, based on dwelling prices and construction costs
3) land share method, based on dwelling prices and observations of land prices

The first is the most preferred method when land sales exist. This is often not the case in most expensive locations. The second is recommended by economic theory, but due to lack of public data on construction costs, its use for mass valuation of even newly built properties is limited at best. It’s use for the vast stock of properties of different ages is probably too challenging. It may even cause an unnecessary source of errors.

The method in chapter 3 of this article falls to the third category. Translating dwelling prices to land values essentially means calculating the land share of the residential property value. The idea in this article, is to make the best use of dwelling price data, the numbers of which in larger cities are typically tens or hundreds times the number of land sales, and a thousand times in some locations. Modelling dwelling sales data offers a rank order of land values and amplify the information offered by precious few land sales. It provides a fundament and a framework to properly interpret land prices, and to calculate land values where no sales exist. In fact translating dwelling prices to land values may often produce more convincing and consistent land values than land sales prices, where unique and idiosyncratic factors often play a dominant role.

The method of spatial imputation of land values, aka translating house prices to land values, requires a proper model specification and careful calibration. Local models are needed. Is a second power of dwelling prices needed in the model, or some additional terms? Perhaps, but for reasons of simplicity and easier interpretation simple models were preferred in this article.

The results are about to become practice in property taxation and produce assessments that are a significant quality improvement to current assessments.

Contacts:

Risto Peltola, Senior advisor
National Land Survey of Finland
Opastinsilta 12 C, 00520 Helsinki, Finland
+358 40 801 7674
risto.peltola@maanmittauslaitos.fi

Bibliography

Almy, Richard and Gloudemans, Robert. Fundamentals of Mass Appraisal. International Association of Assessing Officers Kansas City, Missouri

Bergman, Mats A. and Nyberg, Sten. Housing prices, construction costs and competition in the construction sector – a Swedish perspective. Nordic Economic Policy Review 2021

Bourassa, Steven C. and Hoesli, Martin Edward Ralph and Oikarinen, Elias, Measuring House Price Bubbles (January 6, 2016)

Davis, M. A., & Palumbo, M. G. (2008). The price of residential land in large US cities. Journal of Urban Economics, 63(1), 352–384.

Glaeser, E.L., Gyourko, J., Saiz, A. (2008) Housing supply and housing bubbles. Journal of Urban Economics 64(2), 198–217.

Haahtela -tarjoushintaindeksi.

Knoll, Katharina , Moritz Schularick, and Thomas Steger*, No Price Like Home: Global House Prices, 1870–2012† American Economic Review 2017, 107(2): 331–353

Oikarinen, E. (2010) An Econometric Examination on the Share of Land Value of Single-family Housing Prices in Helsinki. Research on Finnish Society, 3,. 7–18

Oikarinen E., Bourassa S., Hoesli M., Engblom J. (2018) U.S. metropolitan house price dynamics. Journal of Urban Economics 105: 54-69.

Oikarinen E., Bourassa S., Hoesli M., Engblom J. (2020) House price-income relationship revisited. Working paper.

Peltola, Risto Translating House Prices to Land Values - An exercise in Automated Land Valuation in Maricopa County, Arizona, USA David C. Lincoln Fellowship Symposium: Measuring the Value of Land January 28-29, 2021

Peltola, R., Krigsholm, P., Korpela, M. Kreivi. A. Standard Price Points in Spatial Interpolation. A Case Study. National Land Survey, Finland A presentation at the “2019 World Bank Conference on Land and Poverty” The World Bank - Washington DC, March 25-29, 2019

Piketty, T. (2014), Capital in the Twenty-First Century, The Bellknap Press of Harvard University Press. 7.

Figures

Chapter 2 figures, related to land value indices

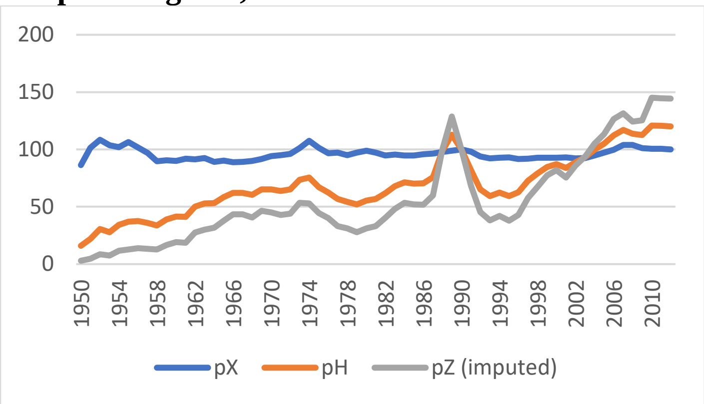

Figure 1. Real house prices, real construction costs and imputed land prices 1950-2012, Knoll et al

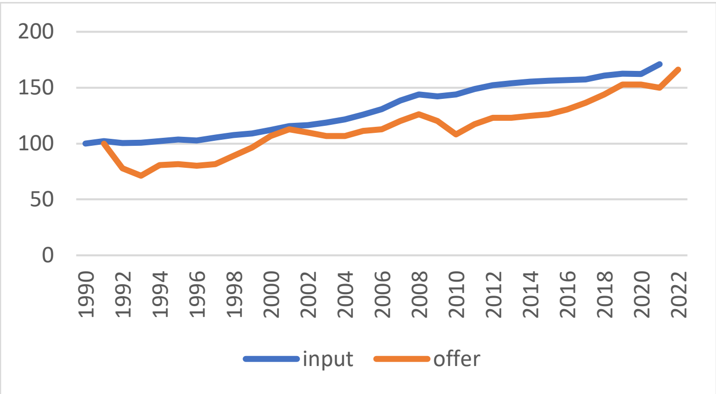

Figure 2. Construction costs: Nominal input prices vs. bid/offer prices 1970-2021. Source Statistics Finland and consultancy company Haahtela.

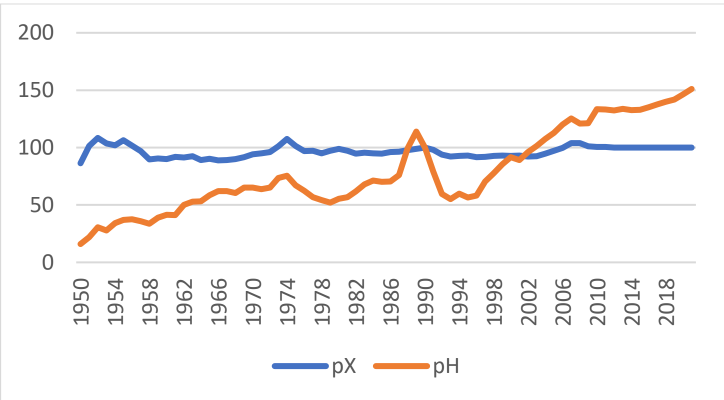

Figure 3. Real house prices and real construction costs 1950-2021

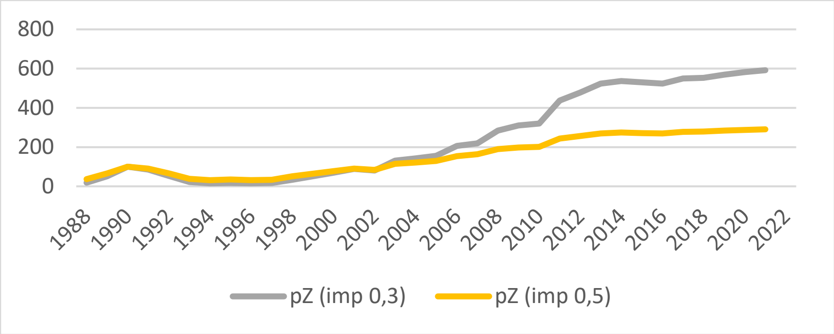

Figure 4. Imputed real land prices based on real house prices and real construction costs 1950-2021

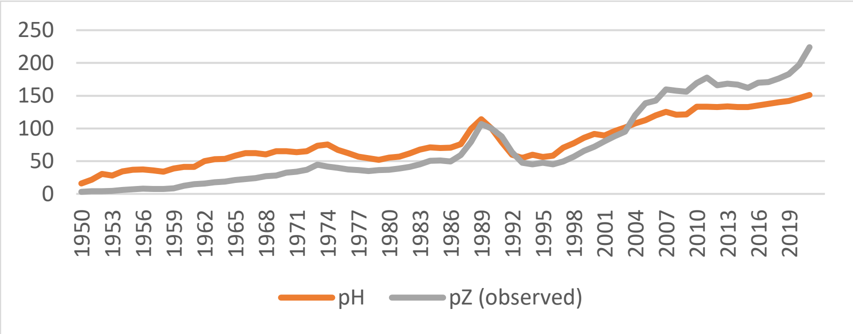

Figure 5. Real house prices and observed real land prices 1950-2021

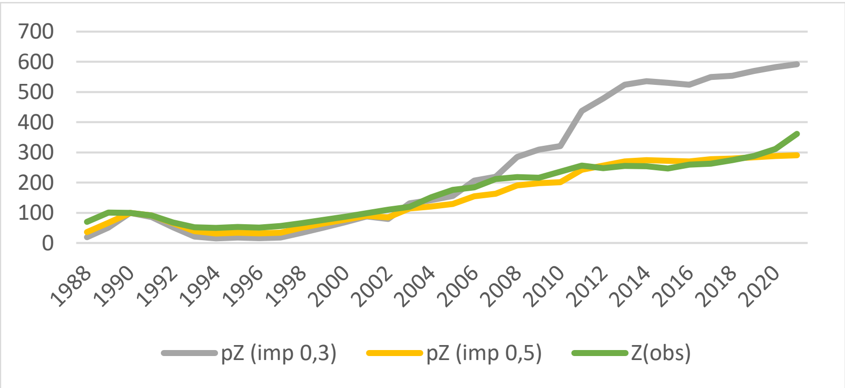

Figure 6. Real imputed and observed real land prices 1988-2021

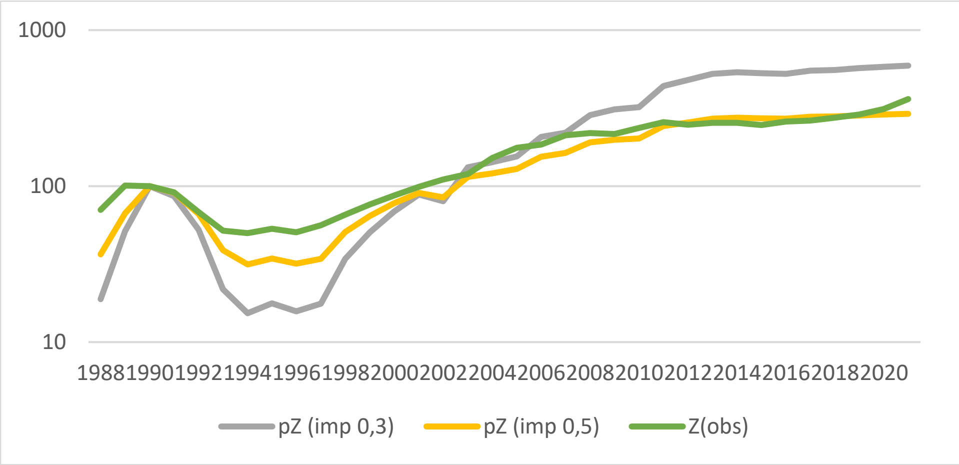

Figure 7. Real imputed and observed real land prices 1988-2021 (log scale)

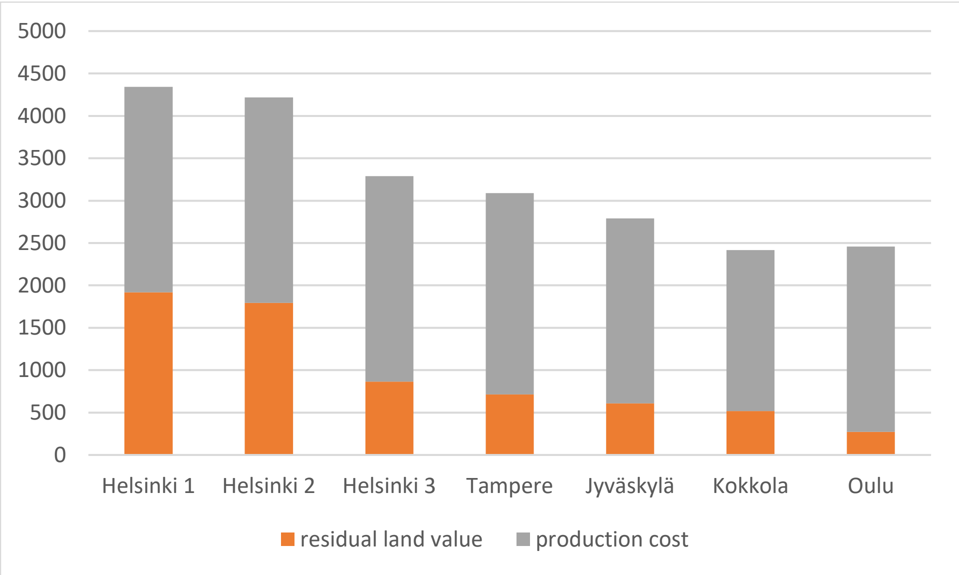

Figure 8. Land value as a residual = median new house prices minus median construction costs in different locations in Finland. Helsinki 1 = most expensive subregion of Helsinki. Source Statistics Finland

Chapter 3 figures, related to land value in a particular lot

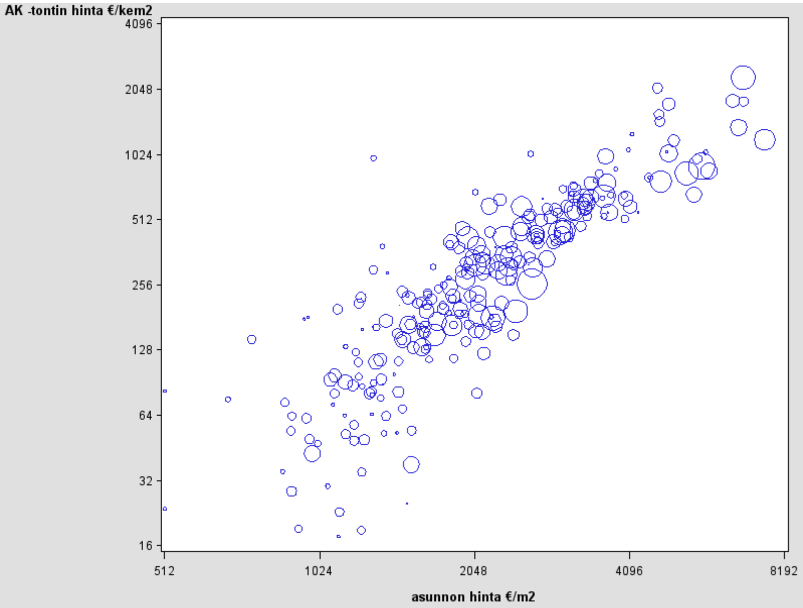

Figure 11. Observed median housing and land prices across the country, in zip code areas. The plots are from whole country, 1512 taxation areas. Bm2 = building right in square meters, or lot area times lot ratio. Size of circle is a function of number of land sales times number or dwelling sales. The larger the number of sales, the larger circle.

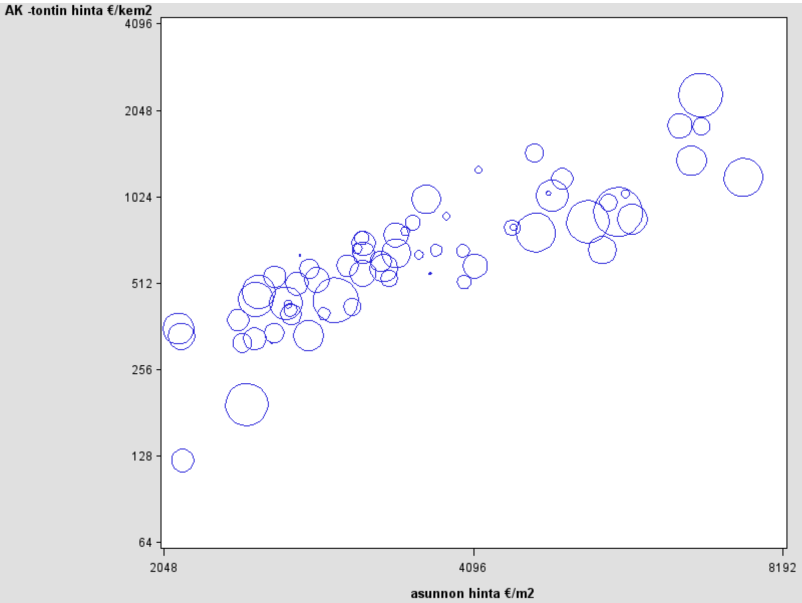

Figure 12. Observed median housing and land prices in the capital city, in zip code areas

Figure 13. Land value as a function of house price in the capital city

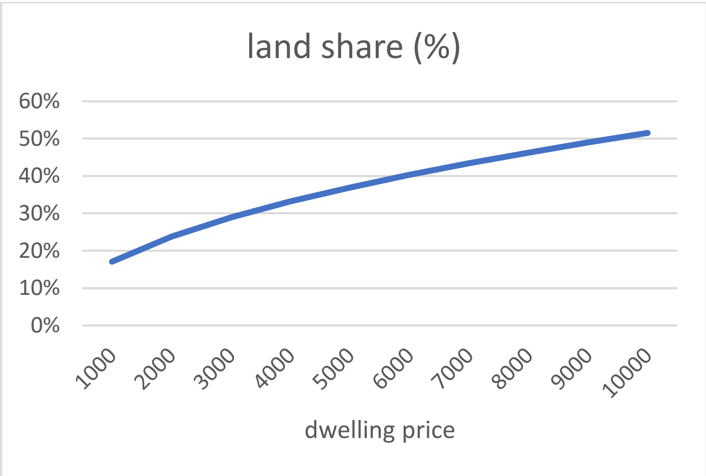

Figure 14. Land share as a function of house price in the capital city

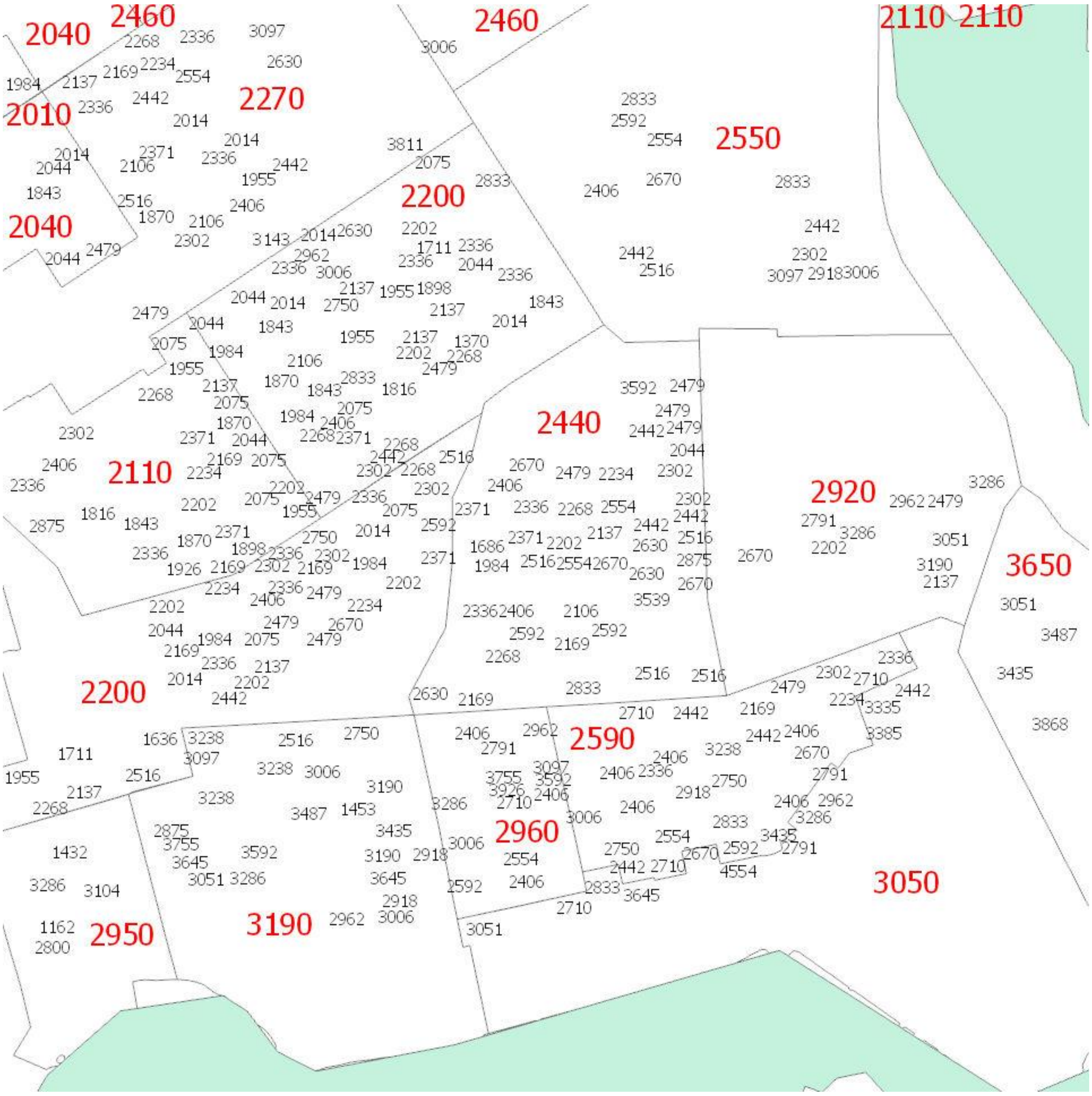

Figure 15. A map of imputed land prices in 500 properties in the center of the capital city. The map reveals the land value of ca. 500 residential properties with ca. 30.000 dwellings in 3 to 10 level buildings. Taxation values are determined by an assessment official based on numbers in red colors. He usually relies on these numbers and do not change them. The red large numbers are medians of the data points in the area. The numbers are in euros/m2 of building right. So a lot of 1000 m2 and lot ratio of 4 has a building right of 4000 bm2. If the unit taxation value is 2600 euros/bm2, the taxation value is 10,4 million euros.

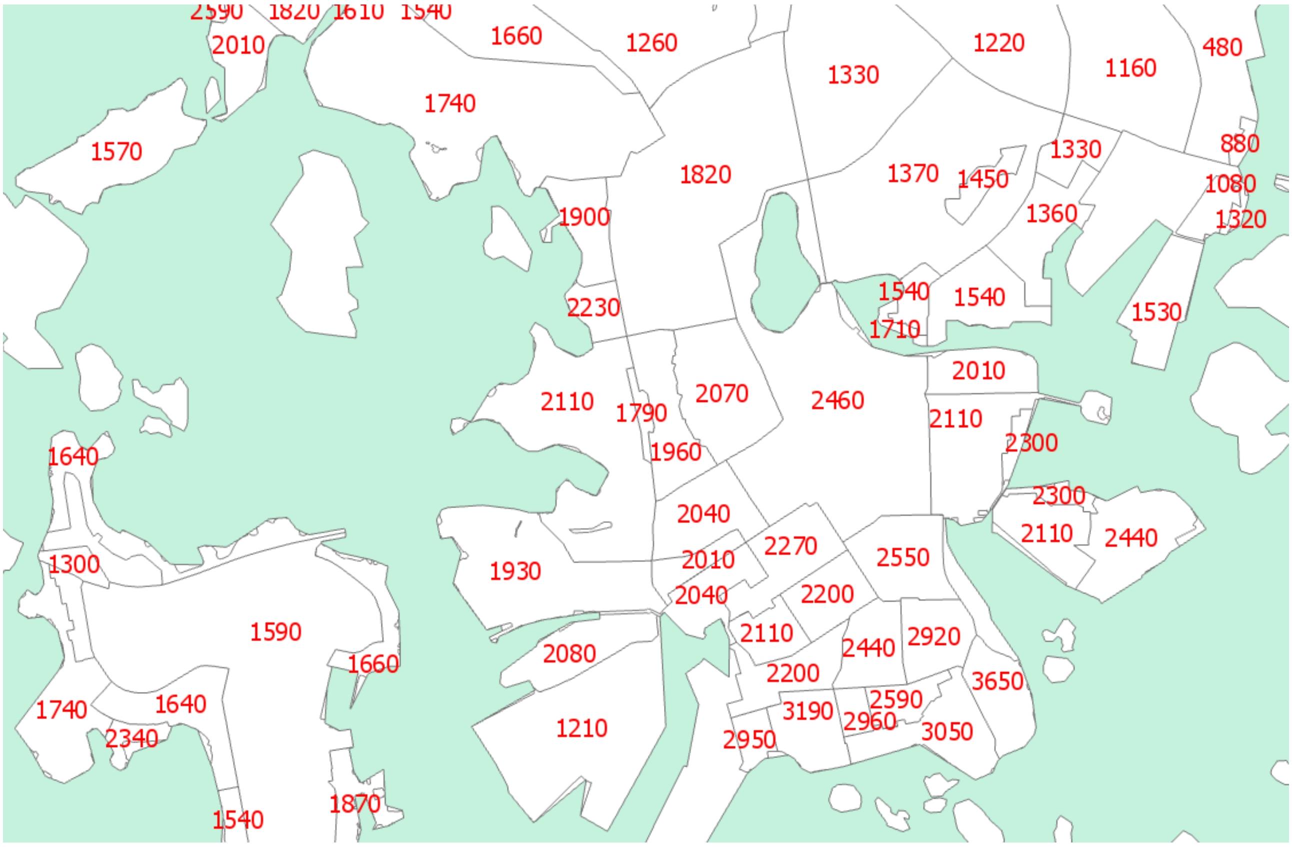

Figure 16. A map of median imputed land prices in taxation areas