Essays in urban economics and housing market capitalization

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Abstract

This thesis consists of three urban economics studies of housing market capitalization. These studies use house prices with hedonic price estimation to identify homebuyers’ willingness to pay for school quality, energy efficiency and future transportation improvement in the Helsinki Metropolitan Area in Finland.

In Chapter 1, we use boundary discontinuity research design to study whether school quality differences are capitalized into house prices. We find that one standard deviation increase in average test scores increases prices on average by 3 percent, which is comparable to findings from the U.K and the U.S. We argue that this surprisingly large effect is at least partly explained by the inelasticity of housing supply, as we use data from a densely populated urban area. We also show that the effect depends on local land supply conditions within the city and is highest in areas with inelastic supply. Furthermore, the price premium seems to be related to pupils’ socioeconomic background rather than school effectiveness.

Chapter 2 analyzes if homebuyers make technology choices that are economically efficient by considering how different heating technologies capitalize into house prices. We exploit variation in technologies that houses are locked into at construction time to identify the stand-alone value of having a cost-saving technology in the house. For the two main technologies, electric and district heating, the estimated price discount is 5-6% of the house value for electric heating, coming very close to the capitalized value of the cost differential obtained from external data on energy contract prices.

In Chapter 3, I quantify what is the magnitude of the housing market anticipation effect brought on by the announcement of a new metro line. I use the decision to build the West Metro as a quasi-experimental setting that created variation in the expected metro station accessibility in time and analyze if housing prices reacted to the announcement before the new metro line becomes operational. I find that housing markets adjusted to the information about the infrastructure investment swiftly after the construction works began in 2010. Apartments within 800 meters from the new metro stations include a positive price premium that converges around four percent even five years before the metro became operational.

Keywords economics, urban economics, housing market capitalization
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Summary

This thesis consists of three urban economics studies of housing market capitalization. These studies use house prices with hedonic price estimation to identify homebuyers’ willingness to pay for school quality, energy efficiency and future transportation improvement in the Helsinki Metropolitan Area in Finland. According to hedonic price theory, the price of a commodity can be valued by its’ characteristics and each characteristic has a unique implicit price in an equilibrium market (Rosen 1974). Applying the hedonic price theory to housing markets means that while the houses are visibly transacted, homebuyers actually buy combinations of different housing characteristics whose value can be identified separately.

However, identifying the value of an individual house characteristic using housing prices is not straightforward. A researcher is not able to observe all of the characteristics of a house that homebuyers are willing to pay for. If these omitted variables are correlated with observable house characteristics, a simple OLS regression models are not able to reveal how observable house characteristics are valued by homebuyers. These models suffer from omitted variable bias with biased and inconsistent estimates. In order to solve the true willingness to pay for an individual house characteristic, a researcher needs to figure out a plausible identification strategy that holds all unobserved house characteristics constant and allows for causal inference of the results.

In chapter 1, we study if school quality differences are capitalized into house prices in Finland. The Finnish case is of particular interest because in recent years the basic education system of Finland has gained something of a role model status in many countries. The reason for the interest is that by international comparison Finnish pupil achievement is high and at the same time school level achievement differences are among the lowest in the world.

Existing evidence from a number of countries shows that differences in school quality within an urban area are capitalized into house prices, revealing the valuation that homebuyers place on them (e.g. Black & Machin 2011). However, current empirical evidence is tilted towards countries where school quality differences are considerable, mostly the USA and the UK, and where residential location and school choice can potentially make a large difference in the education quality and life chances of children.
(Chetty et al. 2016). It is unclear whether these results can be generalized to countries where overall school quality is high and differences in general small.

The general problem in estimating the effects of school quality on house prices is that some neighborhood variables that affect prices are unobservable and may be correlated with school quality. This leads to endogeneity problems and biased estimates in a simple OLS regression model. However, if access to schools is spatially bounded, there should be a discrete change (or discontinuity) at the boundaries in school quality. In this case, a solution to the omitted variable problem (Black, 1999 and Gibbons et al. 2013) is to concentrate on houses at school catchment area boundaries and use the discrete change in quality for identification.

Our empirical strategy is based on spatial differencing where we match each transaction in our data near a catchment area boundary to the nearest similar housing unit that lies on the other side of that boundary. We then estimate hedonic regression models using the differences between the matched transacted units. Using this boundary discontinuity research design, we find that one standard deviation increase in average test scores increases prices on average by 3 percent, which is comparable to findings from the U.K and the U.S. We argue that this surprisingly large effect is at least partly explained by the inelasticity of housing supply, as we use data from a densely populated urban area. We also show that the effect depends on local land supply conditions within the city and is highest in areas with inelastic supply. Furthermore, the price premium seems to be related to pupils’ socioeconomic background rather than school effectiveness.

Chapter 2 analyzes if homebuyers make technology choices that are economically efficient by considering how heating technologies capitalize into house prices. The sensitivity of consumers to the expected total costs of using energy technologies is of first-order importance for energy and climate policies designed to steer the technology choices through energy prices. If homebuyers’ choices are not responsive to energy efficiency, it makes little sense to design policies that seek to steer technology choices through taxes or other instruments working mainly through these prices.

In the literature on “Energy Paradox” or “Energy Efficiency Gap”, it has become standard to invoke behavioral arguments and myopia to explain the lack of good evidence on consumer rationality when it comes to choices of energy durables (e.g. Allcott and Greenstone, 2012; Allcott and Wozny, 2012). However, the technology choices are made
by heterogeneous individuals in heterogeneous environments; the literature on energy technology choices has generally been unable to control for heterogeneities that thereby provide convincing evidence for consumer responsiveness to policies.

We exploit variation in technologies that houses are locked into at construction time to identify the stand-alone value of having a cost-saving technology in the house. The result show that the market rewards and penalize the consumers for the technology choices – the technologies capitalize into housing prices. For the two main technologies, electric and district heating, the estimated price discount is 5-6% of the house value for electric heating, coming very close to the capitalized value of the cost differential obtained from external data on energy contract prices. Technologies act as “energy labels” with clear market valuation.

In Chapter 3, I quantify the magnitude of the housing market capitalization effect brought on by the announcement of a new metro line in Helsinki metropolitan area, the West Metro. This capitalization effect reveals the expected welfare effects of the metro investment for households living near the new transportation hubs, through homebuyers’ willingness to pay for a proximity to a forthcoming metro station.

The most obvious impact of the West Metro investment is the direct accessibility improvement near the new metro stations. Residents in targeted areas gain a direct saving on travel times to work, pleasure activities as well as services and there is potential for economic effects from improved accessibility. Improved accessibility induces infill development bringing more residents and services near the new transportation nodes improving further the desirability of these areas. However, the attractiveness of areas near the new transportation hubs can worsen if the vast number of transiting people leads to problems with congestion, local unease or even increased criminal activity. Even though it is not possible to identify all potential effects of the metro investment near the new metro station, housing prices can be used to derive the total net effects.

I use the decision to build the West Metro as a quasi-experimental setting that creates variation in the expected metro station accessibility in time and analyze if housing prices reacted to the announcement before the new metro line becomes operational. An empirical strategy that uses the variation in accessibility in time avoids the endogeneity issues of simple cross section analysis and grant more plausible identification of capitalization (e.g. Gibbons & Machin, 2005 and Billings, 2011). The identification of
the anticipation effect is based on a difference-in-differences approach that compares dwelling prices near the forthcoming metro stations and existent commuter railway stations after the investment is publicly announced and the constructions are started. I estimate a series of hedonic housing price models to figure out the geographic extent, timing and average magnitude of the capitalization effect. I find that the West Metro caused a clear anticipation effect. Housing markets adjusted to the information about the infrastructure investment swiftly after the construction works began in 2010. Apartments within 800 meters from the new metro stations, where the expected accessibility improvement was most evident, include a positive price premium that converges around four percent even five years before the metro became operational.

References:


