

The Housing Stock, Housing Prices, and User Costs: The Roles of Location, Structure and Unobserved Quality

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Housing: Microdata, Macro Problems

Motivation (1)

- ▶ We know a lot about why some households rent.
 - ▶ High transactions for buying/selling houses make owning sub-optimal for short-duration households.
 - ▶ Saving for downpayment is costly for young, wealth-poor households.
- ▶ These fit the data on who rents.

Motivation (2)

But why do some households prefer owning to renting?

Some theories:

- ▶ Tenant-landlord contracting frictions lead to low quality and/or high cost rentals.
 - ▶ Tax advantages (Gervais '02)
 - ▶ Insurance against rent volatility (Sinai & Souleles '05)
 - ▶ Many others.
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- ▶ However, little evidence that these motives are really strong enough to get rational households to own.

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- ▶ Use a very simple, unidentified, user-cost model to interpret results.
- ▶ Explore implications for national accounts and price indices.

Unsurprising fact 1

Table: Market share by distance: Greater London 2011 wave (%)

Distance	Owner-occupied	Private rented	LA or RSL
Less than 10 km	37.9	23.7	38.4
10 - 20 km	61.6	19.8	18.6
20 - 30 km	69.8	13.5	16.8
30 - 50 km	71.4	13.1	15.5
More than 50 km	72.9	13.4	13.7

Unsurprising fact 2

Table: Market share by dwelling size: Greater London 2011 wave (%)

Dwelling size	Owner-occupied	Private rented	LA or RSL
Less than 50 sq. m.	33.1	27.4	39.5
50 - 60 sq. m.	47.5	25.4	27.2
60 - 80 sq. m	60.3	17.1	22.6
80 - 100 sq. m.	74.6	12.6	12.8
More than 100 sq. m.	90.1	7.24	2.63

Unsurprising fact 3

Table: Market share by dwelling type: Greater London 2011 wave (%)

Dwelling Type	Owner-occupied	Private rented	LA or RSL
Semi detached	73.9	13.0	13.7
Detached	94.4	5.0	0.40
Bungalow	76.8	5.0	18.3
Converted flat	39.3	48.5	15.2
Low rise	32.2	26.7	38.4
High rise	20.7	19.7	48.1

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Model

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- ▶ Observable characteristics include location, type of dwelling (detached, semi-detached, etc.), size (square meters), number of bedrooms, and age of structure.
- ▶ Assume effect of unobserved characteristics completely captured by a two dimensional vector ε that we label “unobserved quality”.
 - ▶ Selection into owner-occupied sector is not perfectly correlated with prices.
 - ▶ Some characteristics might be more valued in the rental sector and some more valued in the owner-occupied sector.

- ▶ If dwelling unit is in rental sector, we observe rent.

$$\ln R(z, \varepsilon) = \alpha z + \lambda_1^r \varepsilon_1 + \lambda_2^r \varepsilon_2.$$

- ▶ If dwelling unit is in owner-occ sector, we observe value.

$$\ln \pi^o(z, \varepsilon) = \beta z + \lambda_1^o \varepsilon_1 + \lambda_2^o \varepsilon_2.$$

- ▶ Value in rental sector is the expected present value of future revenues minus costs.

$$\ln \pi^r(z, \varepsilon) = (\beta - \gamma)z + (\lambda_1^o - \lambda_1^s) \varepsilon_1 + (\lambda_2^o - \lambda_2^s) \varepsilon_2.$$

Selection equation

- ▶ Housing unit is sold to the sector where it has the highest value so that

$$P(z, \varepsilon) = \max_{\{own, rent\}} \{\pi^o(z, \varepsilon), \pi^r(z, \varepsilon)\}.$$

- ▶ Observe housing unit in the owner-occupied sector if

$$\ln \pi^o(z, \varepsilon) \geq \ln \pi^r(z, \varepsilon).$$

That is, if

$$\gamma z \geq -\lambda_1^s \varepsilon_1 - \lambda_2^s \varepsilon_2.$$

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 - ▶ Location function is a flexible polynomial in 2-dimensional geographic coordinates detailing location of property.
 - ▶ Geographic coordinates are measured in polar coordinates.
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 - ▶ We allow both distance from centre of London and direction to matter for dwelling prices, rents, and selection into the owner-occupied sector.
- ▶ Alternate specifications include number of bedrooms, kitchens, living rooms, baths, and a few other measures of property quality.

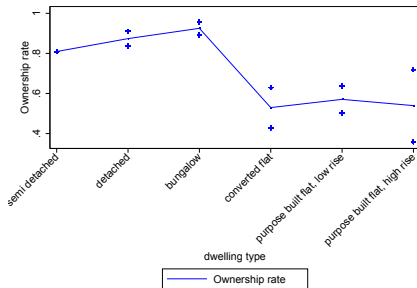
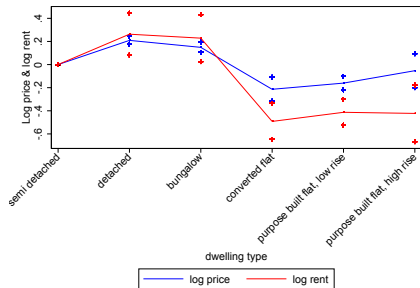
A note on identification

- ▶ Because the inverse Mills ratio is not a linear fn of z , the model is identified.
- ▶ Some people prefer to rely on instruments to estimate selection models.
- ▶ In this market, exclusion restrictions so that some variables affect selection into a housing sector but not value are difficult to justify.

- ▶ Data from restricted access version of English Housing Survey (EHS 2011-2014).
- ▶ 2011 wave consists of 17,500 households observed in 2008/09.
- ▶ Focus discussion on 2011 wave but look at other waves to check robustness over time.
- ▶ Focus on a single economic market: all properties within 140km of Trafalgar square ("Greater London").

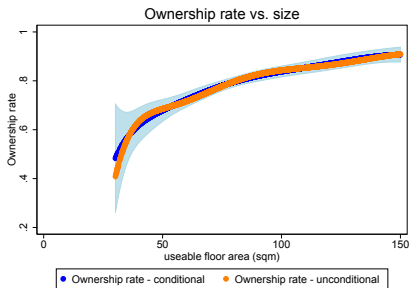
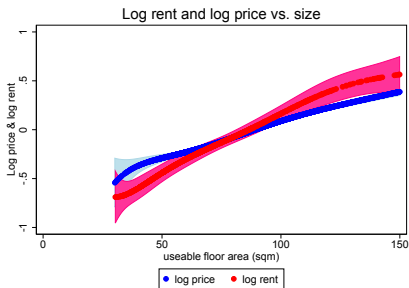
Prices and selection vs. dwelling type

EHS 2011



Prices and selection vs dwelling size

EHS 2011



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 - ▶ Expected capital gains $g^i(z, \varepsilon)$.
- ▶ User-costs in the two sectors satisfy:

$$\pi^o(z, \varepsilon) = \frac{u(z, \varepsilon)}{(r^o(z, \varepsilon) + c^o(z, \varepsilon) - g^o(z, \varepsilon))}$$

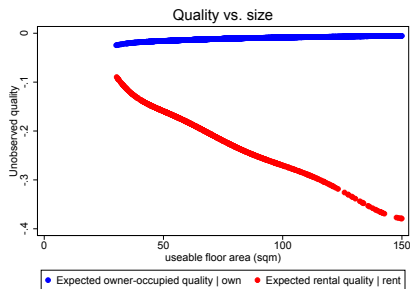
$$\pi^r(z, \varepsilon) = \frac{R(z, \varepsilon)}{(r^r(z, \varepsilon) + c^r(z, \varepsilon) - g^r(z, \varepsilon))}$$

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- ▶ More structure means more ownership $\rightarrow \frac{\partial \pi^o}{\partial z_s} > \frac{\partial \pi^r}{\partial z_s}$.
- ▶ But $\frac{\partial \pi^o}{\partial z_s} < \frac{\partial R}{\partial z_s}$

Unobserved qualities vs. dwelling size

EHS 2011



Capital Gains?

Could differences in expected capital gains by size/structure explain selection?

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Could differences in expected capital gains by size/structure explain selection?

- ▶ Likely not.
 - ▶ Data indicate that differences would have to be stable over time.
 - ▶ Would imply divergence of π^r and π^o for bigger properties (assuming RE).

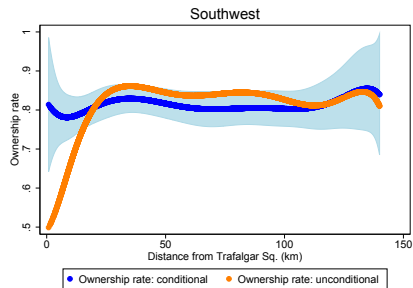
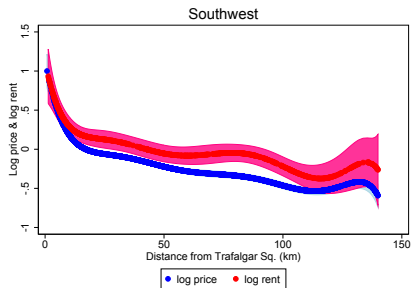
Costs?

Could differences in maintenance costs explain selection based on size?

- ▶ Would need costs in rental sector to increase faster with size than costs in the owner-occupied sector.
- ▶ Theoretical literature from 1980's discussing moral hazard in the rental market makes exactly this prediction.
 - ▶ However National Accounts data typically only finds a small different in maintenance cost between the two sectors.

Rents, Prices & Market share vs. Location

EHS 2011



Discussion of location results

$$\pi^o(z, \varepsilon) = \frac{u(z, \varepsilon)}{(r^o(z, \varepsilon) + c^o(z, \varepsilon) - g^o(z, \varepsilon))}$$
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- ▶ Maintenance costs as share of costs are higher further out because maintenance costs are proportional to the size and quality and independent of location.
- ▶ Investors may have expected higher capital gains close to centre of London (resulting in lower user-cost closer to centre).

Unobserved “rental” and “owner-occupied” quality

- Recall that “rental” and “owner-occupied” quality are defined as

$$\eta_1 = \lambda_1^r \varepsilon_1 + \lambda_2^r \varepsilon_2$$

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- ▶ Properties with 1% higher “rental quality” (η_1) are 1% less likely to be in rental sector.
- ▶ Properties with higher “owner-occupied quality” (η_2) are equally likely to be in either sector.

Unobserved “rental” and “owner-occupied” quality

One way to explain these results is as follows.

- ▶ Suppose there are two unobserved amenities:

1. Jacuzzi

- ▶ Increases flow utility from the property → Increases rents
- ▶ But also increases costs → Reduces selection into the rental sector
- ▶ Increased costs are capitalized into prices → Prices in the owner-occupied sector remain constant.

2. A Beautiful View

- ▶ No extra costs → No affect on selection.
- ▶ Increases flow utility → increased rents and prices.

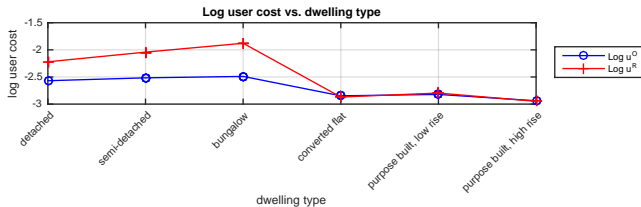
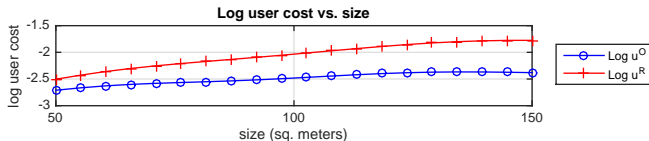
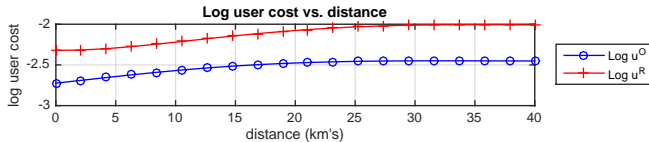
Implications

- ▶ Two dimensions of unobserved quality matter.
- ▶ Evidence suggests that rental units have lower average unobserved “rental” quality.
- ▶ May explain why many models in housing literature require “warm glow” from ownership to explain the high rate of owner-occupancy.

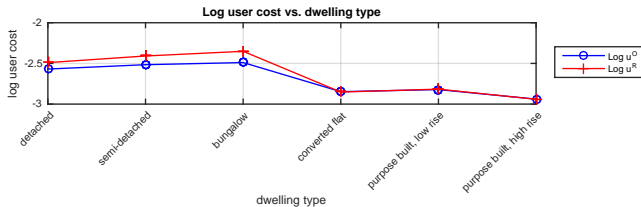
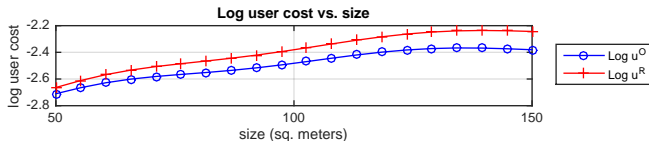
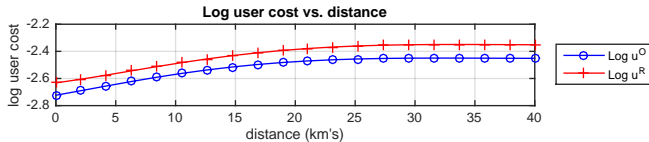
Estimating user costs

- ▶ We can use our estimates to back out how rental and own-occ user costs vary across properties
- ▶ To do so we need to observe what the level of user costs are in the rental sector for at least one type of property.
- ▶ Fortunately, Bracke (2015) reports the r/p for a set of houses that are bought and then rented out.
- ▶ Then every parameter is exactly identified, except ω_{33} , which can be narrowed down to one of two values.

Empirical User Costs (1)



Empirical User Costs (2)



Contracting costs in rental sector

- ▶ Assume discount factors are equal across sectors:

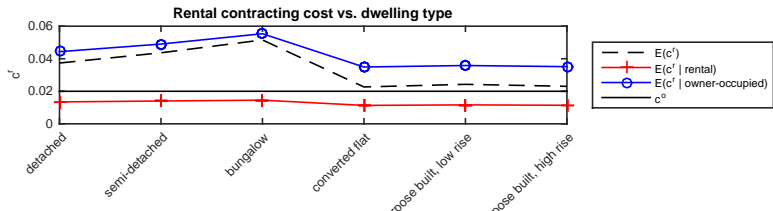
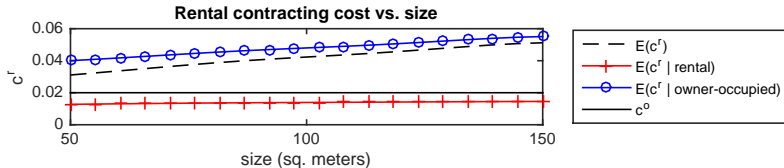
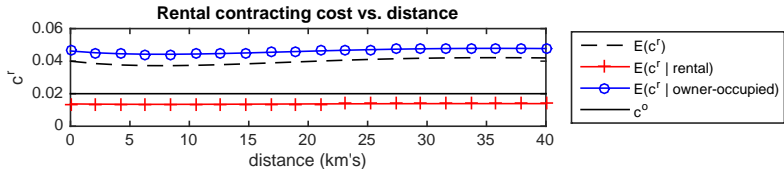
$$r^r(z, \varepsilon) = r^o(z, \varepsilon).$$

- ▶ Assume expected capital gains are equal across sectors:

$$g^r(z, \varepsilon) = g^o(z, \varepsilon).$$

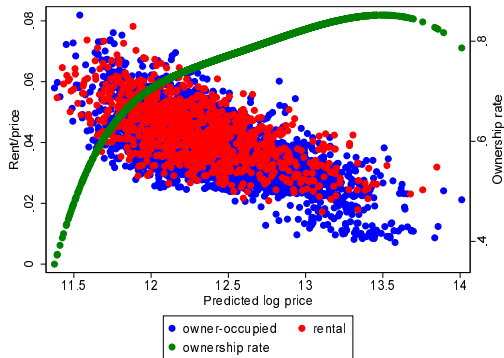
- ▶ Then we can estimate magnitude of contracting frictions in rental sector.

Contracting costs in rental sector

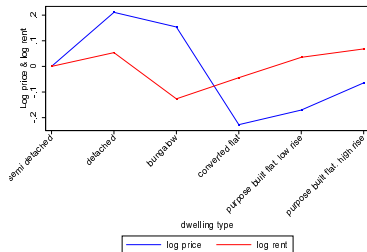
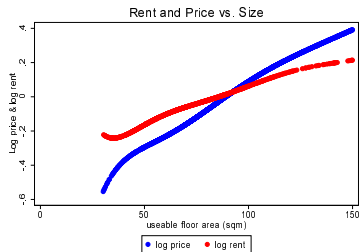
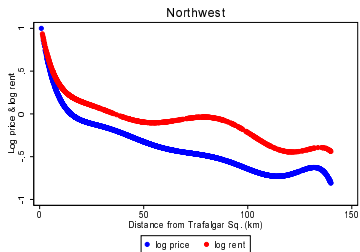


- ▶ Selection on unobservables is statistically important. How important?
- ▶ It turns out to be qualitatively quite important.
- ▶ To illustrate this, we re-estimate our hedonic equations without first controlling for selection.
- ▶ A number of puzzles pop up if you looked through this mis-specified lens.

Bias r/p



Bias r/p



Final Point: What's next

- ▶ Most structural, quantitative models of homeownership choices assume one dimensional housing quality.
 - ▶ Housing quality is a function of house characteristics
 - ▶ Conditional on quality, tenure, savings, etc... are not fns of housing characteristics.
- ▶ This appears to be a poor approximation.
- ▶ Homeownership decision should be modeled jointly with decision on location vs "size".