

Lecture 14 – Housing: Cost of capital

Lars Nesheim

25 February 2008

1 Cost of capital complications

1. Housing is durable. In the simplest model, the user cost of owning a home of value V is $R = iV$. The user cost is also called the cost of capital.
2. Note, iV is the full interest cost whether one borrows money to buy or not
 - (a) Buy a house for £100,000, pay £20,000 in equity E , borrow $M = £80,000$ at $i = 0.05$. $M + E = V$
 - (b) Mortgage interest cost $iM = 0.05 * 80,000 = £4,000$
 - (c) Foregone interest from equity $iE = 0.05 * 20,000 = £1,000$
 - (d) Total interest cost equals $i(M + E) = iV = £5,000$
 - (e) User cost is not the same as the mortgage payment
 - i. The mortgage payment is $P_t = iM_{t-1} + \Delta M_t$ where M_{t-1} is the amount of the mortgage at time $t - 1$ and ΔM_t is the amount of the principal that the consumer pays back at time t . If M_{t-1} is the amount of the mortgage at time $t - 1$ and ΔM_t is the amount of the mortgage that the consumer pays off at time t , then $M_t = M_{t-1} - \Delta M_t$.
 - (f) What if the consumer must pay higher interest rates on borrowing than they receive from investments?
 - i. Suppose $i^B > i^L$ where i^B is the interest rate for borrowing and i^L is the interest rate for lending (or investing)?

3. Interest costs are not only costs of owning/renting a home. Other costs include:

- (a) Property tax or council tax at rate T : cost = TV
- (b) Operating cost (maintenance, repairs, insurance, utilities, book-keeping, etc.) at rate c : cost = cV
- (c) Capital gains at rate g : cost = $-gV$
 - i. If the value of the property increases at 3% per year, you buy a house at £100,000 and can sell it a year later for £103,000 you have made £3,000. This reduces your cost of ownership by £3,000
 - ii. If value falls by 5%, you can sell it a year later for £95,000 you have lost £5,000. This increases cost by £5,000

4. User cost with these considerations is

$$R = (i + T + c - g) V$$

5. User cost is the total cost of holding a house for one year

- (a) Imagine you have £100,000 in assets and you can either buy a house for £100,000 or invest the money elsewhere at $i = 0.05$ and rent the same house. $T = 0.01$, $c = 0.01$, and $g = 0.01$
- (b) If you buy the house
 - i. You earn zero interest income
 - ii. You spend £1,000 on property tax, £1,000 on maintenance/insurance.
 - iii. Direct costs are £2,000
 - iv. At the end of a year you have £101,000 minus £2,000 in direct costs: £99,000
 - v. But user cost is £6,000. Think of it as follows
 - A. Homeowner is both consumer and landlord
 - B. As consumer pays landlord £6,000 in rent: consumer housing costs = £6,000
 - C. As a landlord (owner of capital), income is £6,000 + £1,000 in capital gains and costs are £2,000 in direct costs

D. Homeowner has total income of £7,000, direct costs of £2,000, and rental costs of £6,000. The rental income and rental costs cancel out and the net expenditure is £1,000

E. At the end of the year you have £99,000

(c) If you rent from someone else

i. The owner of the house sets

$$R = (.05 + .01 + .01 - 0.01) V = £6,000$$

ii. You pay £6,000 in rent

iii. You earn £5,000 in interest

iv. Net expenditure is £1,000. At the end of 1 year you have £100,000 minus £1,000 in living expenses

6. So, if $R = (i + T + c - g) V$ then indifferent between renting and owning.

7. Inflation

(a) Let $\pi = \text{inflation rate} = \frac{p_{t+1}}{p_t} - 1$ where p_t is the price level for consumption.

(b) Must distinguish between real interest rate i^r and nominal interest rate i .

(c) Ignoring income taxes, the real interest rate or real cost of borrowing is approximately the nominal interest payment minus inflation

$$\begin{aligned} i^r &\simeq i - \pi \\ i &\simeq i^r + \pi \end{aligned}$$

i. If inflation is 5%, £100 pounds is worth £95 tomorrow, or £105 tomorrow is worth £100 today.

ii. If nominal interest rate is 10%, inflation is 5% you borrow £100 pounds you must pay £110 tomorrow, but £110 tomorrow is worth 104.76 which is approximately 105 pounds so the real interest rate is approximately 5%.

(d) When there is inflation of 2%, and real interest rate is 3%, the nominal interest rate must be 5%

- (e) The money you pay back is worth less
- (f) Borrow \$100 pay back \$100. 2% inflation it is only worth \$98.04.
Just to break even must charge 2% interest
- (g) Also, if nominal house prices increase by g percent, the real capital gains rate, g^r is

$$\begin{aligned} g^r &\simeq g - \pi \\ g &\simeq g^r + \pi \end{aligned}$$

- (h) Capital cost with inflation is

$$R = (i^r + \pi + T + c - g^r - \pi) V$$

or

$$R = (i^r + T + c - g^r) V$$

- (i) In a world without income taxes, with perfect markets and no uncertainty, inflation has no effect on user cost of housing. The user cost of housing can be expressed as before with real interest rates and real capital gains replacing nominal interest rates and nominal capital gains