The Dissipation of Climate Risk into Housing Prices

Outline framework -

Two independent continuum of households distinguished by land-ownership. Land is fixed in supply in the long run and the households that own land rent it at a rate $r(t)^D$. These households additionally, earn labour income and the rental income from capital. The regular households earn income from wage and capital.

There are two types of firms producing housing units, the first produces housing units in tandem with the sustainability building code. These housing units have a higher marginal cost of production but lower depreciation rate. The second type of firm produces housing units that do not comply with building regulations and have a lower marginal cost of production. Both firms have profit function given by,

$\pi_i(t) = P^i(t)D^i(t)^\alpha K^i(t)^\beta (A^i(t)L^i(t))^{1-\alpha-\beta} - r^D D^i(t) - rK^i(t) - w(t)L^i(t)$, where $i = \{c, u\}$

The **issue** here is to show the higher marginal cost of producing the housing units according to the building regulations.

The two types of housing units have the equation of motion given by, $\dot{H^i}(t) = D^i(t)^\alpha K^i(t)^\beta (A^i(t)L^i(t))^{1-\alpha-\beta} - \delta^i H^i(t)$, with $\delta^c < \delta^u$.

The households do not have a barrier to purchasing housing units, at the moment so the baseline model has all households simply allocating between climate and un-climate housing units. Housing units are not featured in the utility function and housing units are simply assets.

QHow to distinguish between the housing units in the wealth accumulation and the housing units for consumption?

Heathcote and Davis

Features:

- multi-sector business cycle model with different sectors exhibiting co-movement
- three sectors of intermediate goods - construction, manufacture and services
- each sector has its respective technological progress and technology has a stochastic component
- two final goods producers - consumption/-capital good producers and the producers of residential structures
- there are real estate developers who combine the residential structures with land to produce houses
- housing structures themselves depreciate over time so that $\dot{h(t)} = f(\cdot) - \delta_h h(t)$
- homogeneous households allocate expenditure across the consumption of final good, the capital stock to earn the rental rate and the consumption of housing units
- households earn the wage income, capital income and the rental income from renting land to developers
- the model is able to trace a path for the price of residential investment as a function of sectoral technological progress and the input shares in production
- the model is able to develop an analytical expression for the price of housing units as a function of the price of land and of residential structures

Diverging from this framework would entail **(i)** fixed supply of land in the long run, **(ii)** heterogeneous households such that there are two independent continuum of households, landowners and non-land owners, **(iii)** the introduction of climate related depreciation in the stock of housing units.

Steger, Grossmann, Larin

Features:

- model has the concept of fixed land supply. The paper distinguishes between residential land and non-residential land and states that residential land increases moderately during transition but is fixed in the long run,
- homogeneous households that earn income from labour supply and the profit of the real estate development firms
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