On the importance of borrowing constraints for house price dynamics

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Introduction

Main question: How do down payment constraints shape house price dynamics?

Example (Stein 1995, QJE): Consider a hh that has a house worth 100 and a mortgage loan of 70. It has no other assets or debts, hence its net worth is 30.

The hh wants to move and buy a bigger house. Banks require a 20% down payment. Hence, the hh can buy a house worth 150, which would be 50 % "bigger" than its current house.

Assume now that house prices fall by 10%. $\Longrightarrow$ The hh's net worth falls to 20. $\Longrightarrow$ It can buy a house worth 100, which is only 10% bigger than its current one.

A fall in house prices may reduce housing demand.

This paper

Build an OLG model featuring large differences in hh leverage.

Disentangle analytically the various channels through which a change in the current house price affects the housing demand of a borrowing constraint household.

Calibrate the model to Finnish data.

Compare house price dynamics following big income and interest rate shocks with and without a down payment constraint.

Related literature

Stein (1995, QJE): Static model.

Ortalo-Magné and Rady (2006, RES): Dynamic, analytical results, but strong assumptions about preferences.

Iacoviello (2005, AER) and many others: Down payment constraint in a BC model. Analysis of log-linearized dynamics.

Model (1/2)

Households: Live J periods, after which receive "terminal utility" which depends on net wealth.

Saving vehicles: Housing and a financial asset.

Down payment constraint: Can only borrow up to a fraction $1-\theta$ of the value of the new house.

Intragenerational heterogeneity: Households get children at different ages.

Key simplifications: No uncertainty and no (non-convex) transaction costs -> We can solve for the fully non-linear dynamics very accurately.

Model (2/2)**: Household's problem**

The problem of a hh of age $j = 1$ at time t:

$$\max \sum_{j=1}^{J} \beta^{j-1} u(c^j_{t+j-1}, h^j_{t+j-1}) + \beta^J v(b^J_{t+J-1})$$

subject to the budget constraint

$$c^j_{t+j-1} + \overbrace{(p_{t+j-1} + p_{t+j-1}\kappa + \eta)}^{\text{House price + maint.cost}} h^j_{t+j-1} + a^j_{t+j-1} = \overbrace{y^j_{t+j-1}}^{\text{Income}} + \overbrace{b^j_{t+j-1}}^{\text{Net wealth}}$$

where

$$b^j_{t+j-1} = R_{t+j-1} a^j_{t+j-2} + p_{t+j-1} h^j_{t+j-2}$$

and the borrowing constraint

$$a^j_{t+j-1} \geq -(1-\theta)\, p_{t+1} h^j_{t+j-1}.$$

How does a reduction in house price affect housing demand?

- Without BC, As p_t goes down,
1) housing consumption becomes cheaper relative to other current consumption ($\longrightarrow h_t \uparrow$),
2) housing becomes cheaper relative to future consumption ($\longrightarrow h_t \uparrow$),
3) housing wealth is reduced ($\longrightarrow h_t \downarrow$).

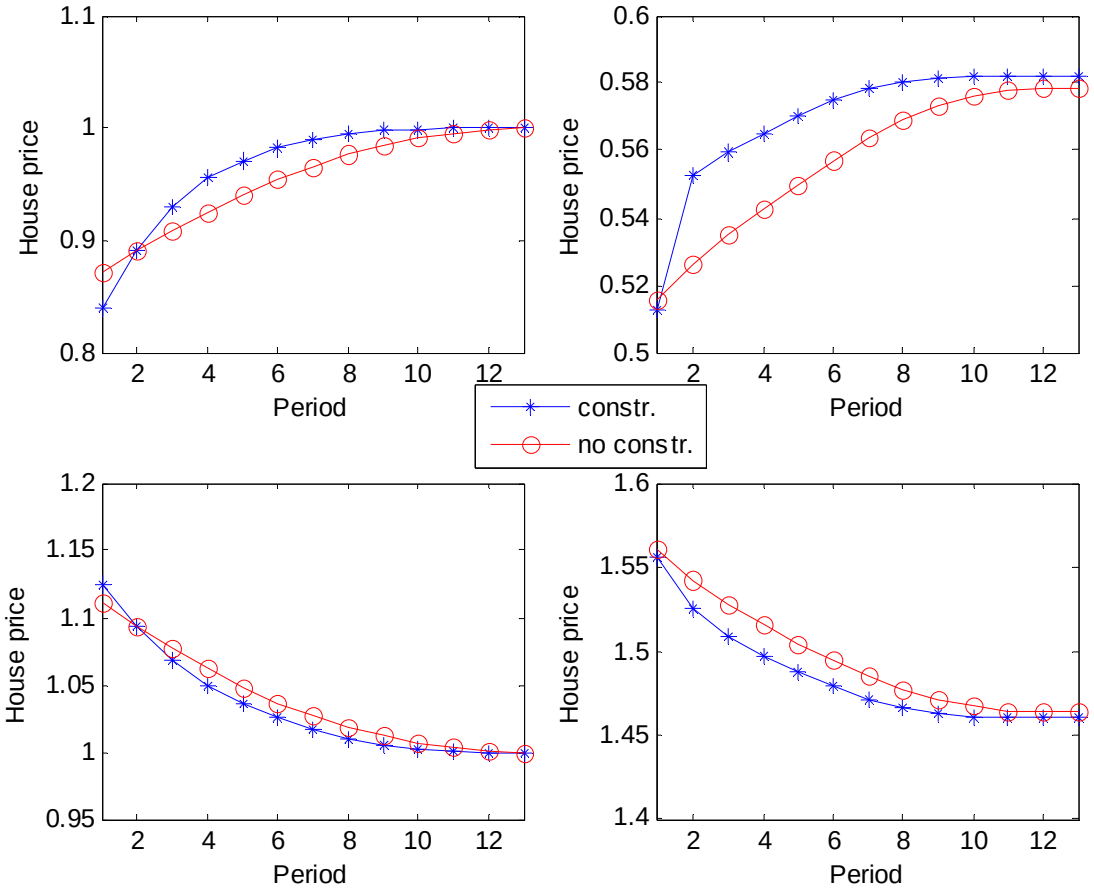
- With BC, four *additional* terms. As p_t goes down,
1) can borrow less ($\longrightarrow h_t \downarrow$),
2) for each unit of housing must give up more current consumption ($\longrightarrow h_t \downarrow$),
3) saving through house owning becomes cheaper ($\longrightarrow h_t \uparrow$),
4) for each unit of housing the hh is forced to transfer more resources to the future ($\longrightarrow h_t \downarrow$).

Calibration

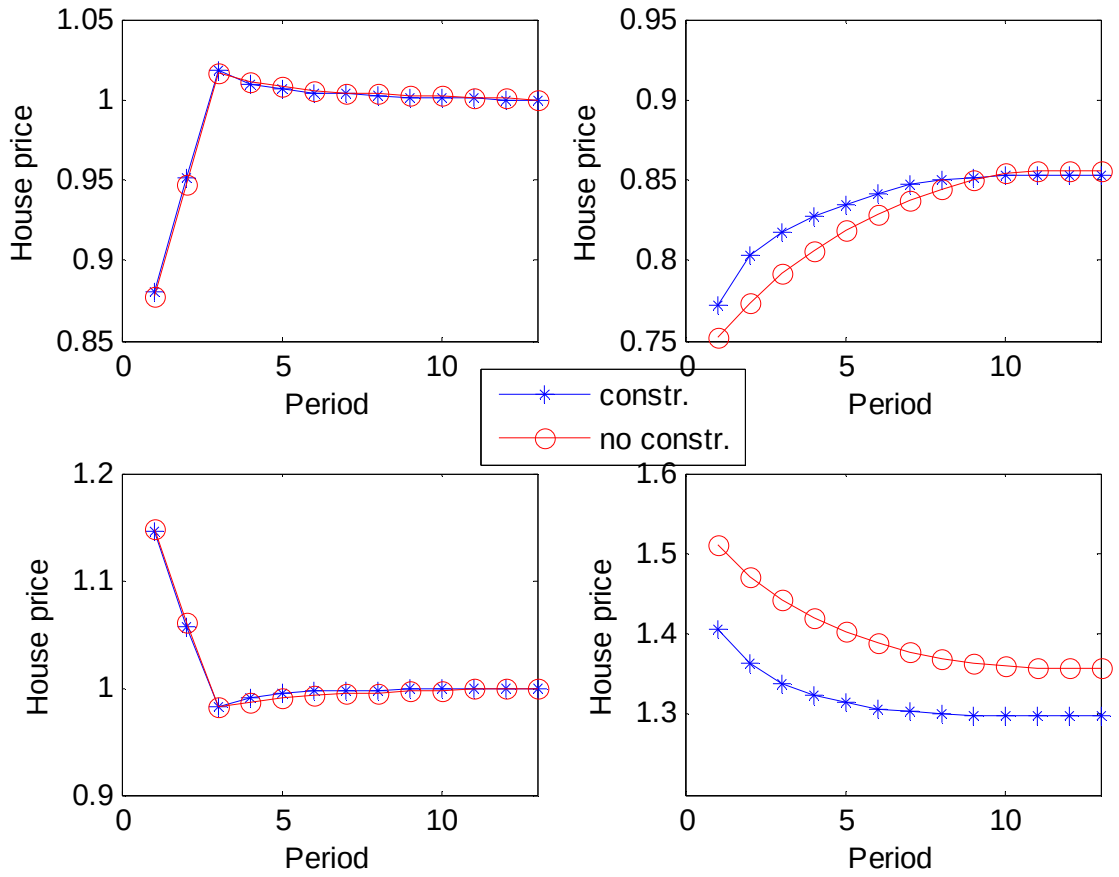
Model period 4 years, $J = 11$.
CES-CRRA utility function.
Targets from Finnish 2004 wealth survey.
Set income profile to match average age-income (wage+pension) profile.
Household types: $I = 3$, hhs of type 1,2,3 get two children in age 1,2,3, resp.

Choose prefence parameters so as to match
i) av. net-wealth-to-housing ratio
ii) av. net-wealth-to-income ratio
iii) av. net-wealth-to-income ratio in age J.

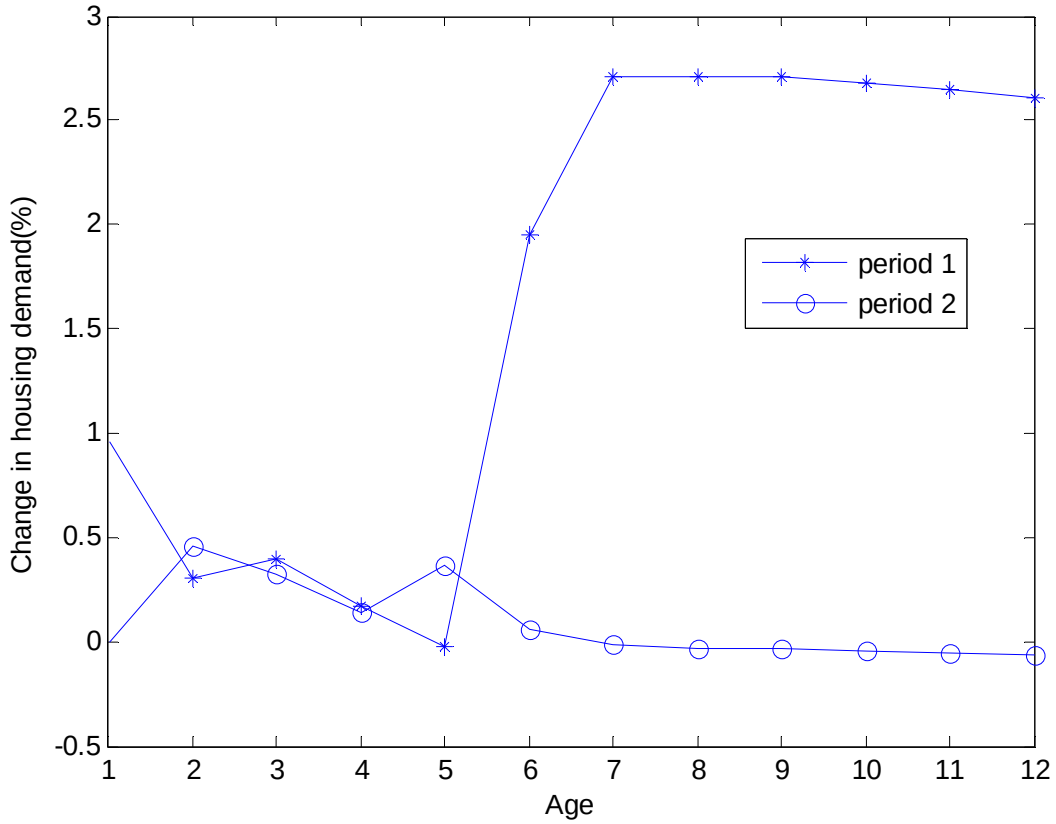
Large (temporary / permanent) income shocks



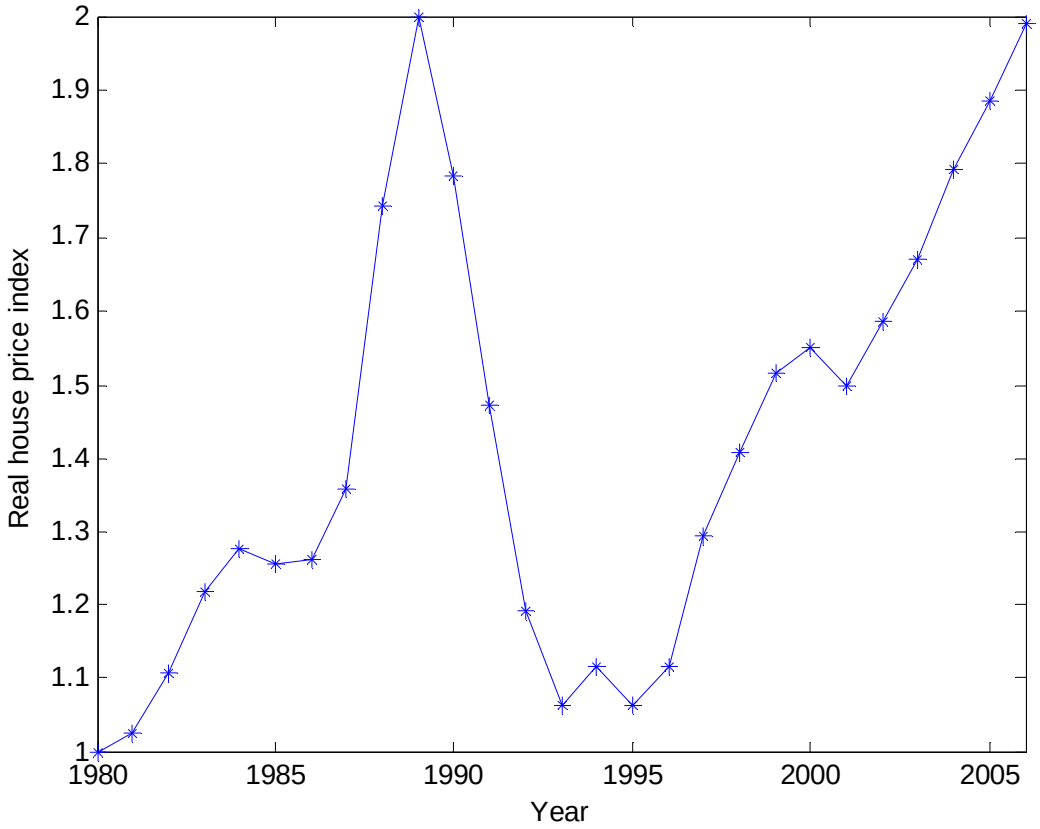
Large (temporary / permanent) interest rate shocks



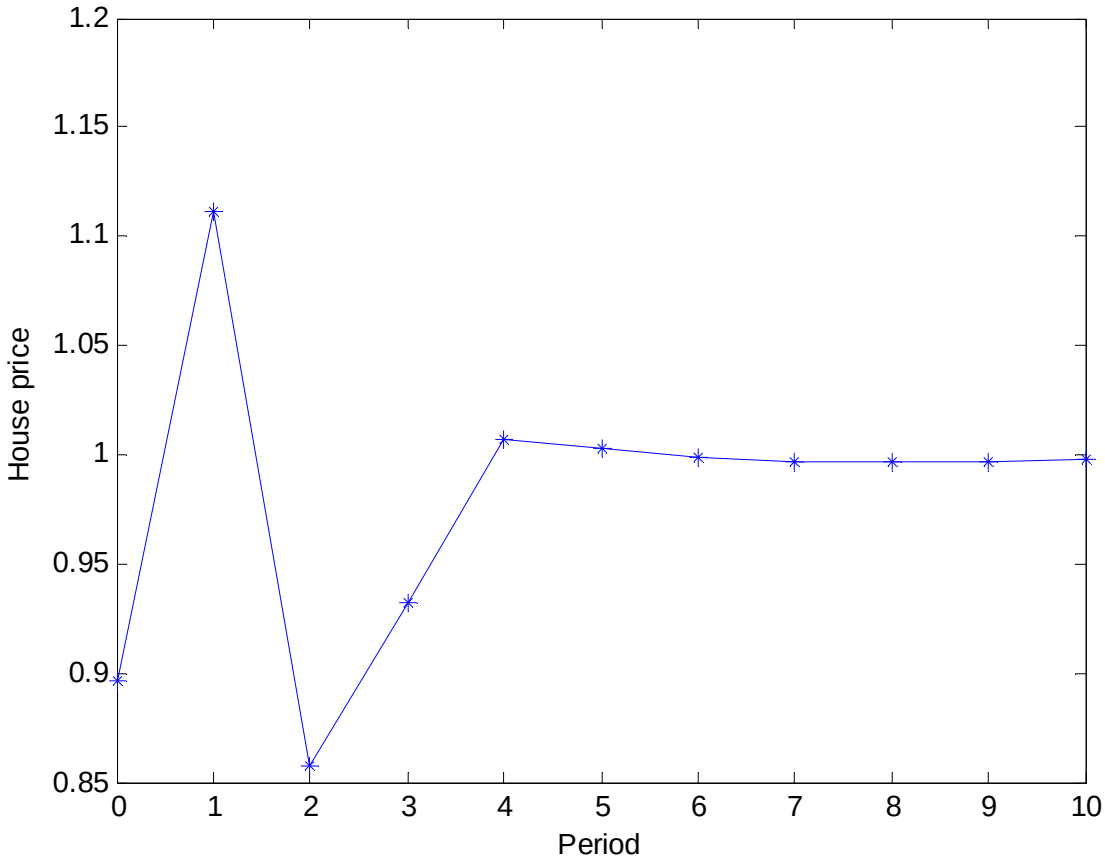
Is there a case for multiple equilibria?



Real house prices in Finland in 1980-2006



Mimicking the Finnish boom-bust-boom experience



Summary

In certain situation situations, down payment constraints can substantially shape house price dynamics.

Down payment constraints are especially important after negative income shocks.

Down payment constraints create anticipated capital gains to housing following negative income shocks. As a result, they tend to speed up convergence.

Asymmetric price dynamics after positive and negative income shocks.

There does not seem to be scope for multiple equilibria.

A reasonably calibrated quantitative model explains about half of the huge price fluctuations observed recently in Finland.