Housing Prices and Fundamental Factors: Evidence from Chile

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Model of Housing Market

Standard model:

$$(D) \quad h_t = \beta_0 + \beta_1 p_t^h + \beta_2 y_t - \beta_3 r_t^m + \varepsilon_t$$

$$(S) \quad h_t = \gamma_0 + \gamma_1 p_t^h - \gamma_2 cc_t + u_t$$

where h = (log) housing *stock*, p^h = (log) real house prices; y = (log) real per capita disposable income, r^m = real mortgage interest rate and cc = (log) real construction costs are all I(1) variables

Any change in mortgage lending standards or housing subsidies appear in ε_t

Reduced Form

$$(RF) \quad p_t^h = \frac{1}{\beta_1 + \gamma_1}\left(\beta_0 - \gamma_0 + \beta_2 y_t - \beta_3 r_t^m + \gamma_2 cc_t + \varepsilon_t - u_t\right)$$

$$\equiv \delta_0 + \delta_1 y_t - \delta_2 r_t^m + \delta_3 cc_t + v_t$$

Typical (time series) income and price elasticities of housing demand are $\beta_1 = -0.5, \beta_2 = 1.3$

Elasticity of housing supply γ_1?

- New supply appears to be fairly elastic in recent years
- Government built a lot of the new housing before then, so not sure

Long Run Relationship

$$(OLS) \quad \hat{p}_t^h = -0.40 + 0.26 y_t - 2.00 r_t^m + 0.45 cc_t$$

$$(ARDL) \quad \hat{p}_t^h = -0.74 + 0.27 y_t - 3.01 r_t^m + 0.52 cc_t$$

Low income response (given plausible elasticities)

Fairly high real interest rate response

- A one percentage rise in the real mortgage rate reduces real house prices by 2% to 3%

Data span is very short so exercise caution

- Very high speed of adjustment (EC coefficients in Table 5)
- Many ARDL coefficients insignificant (Annex Table)

Alternative Bounds Test for Co-integration

Pesaran, Shin & Smith (JAE, 2001)

Look at long run coefficients in ARDL model:

$$\Delta p_t^h = \pi_0 - \pi_1 p_{t-1}^h + \pi_2 y_{t-1} - \pi_3 r_{t-1} + \pi_4 r_{t-1} + \sum_{s=1}^{P} \Delta p_{t-s}^h + \sum_{s=0}^{P} \Delta y_{t-s} + \sum_{s=0}^{P} \Delta r_{t-s}^l + \sum_{s=0}^{P} \Delta cc_{t-s} + v_t$$

Test statistic is F statistic for $\pi_1 = \pi_2 = \pi_3 = \pi_4 = 0$

Distribution of F statistic is non-standard

Need to bootstrap because sample size T is small

Other Issues

No explicit housing stock dynamics:

$$(S) \qquad h_t^{new} = \gamma_0 + \gamma_1 p_t^h - \gamma_2 cc_t - \gamma_3 r_t(?) + u_t$$

$$(HS) \quad \Delta H_t = H_t^{new} - \delta H_{t-1} - DL_t$$

where *DL* = disaster losses and capitals denotes levels.

Possibly easier to construct estimates of housing stock and model inverted demand for housing

Useful when considering effects of disasters

Parameter Stability, Fundamentals and House Prices

Lending standards are important but:

- Do not have time series data on LTV's (so part of ε_t)
- Sample is fairly short ….extend it back in time?

Now suppose lending standards start to deteriorate towards the end of the sample

My suspicion is that:

- The fit of two step Engle-Granger and ARDL models with the usual suspects will still be good
- Recursive estimates will look okay

Maybe look at pseudo out-of-sample forecast errors

Fundamentals and House Prices (Cont'd)

Inter alia, need to supplement model results with survey evidence on lending standards and bank stress tests.

Need to track lending standards for the *marginal* group of home buyers

Before the U.S. subprime bust, average LTV ratios did not rise while non-government, first time buyer LTV ratios rose sharply