The Housing Market Through Lens of Models with the Collateral Channel

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[1] The views expressed herein are those of the author and do not necessarily reflect the position of the Czech National Bank.

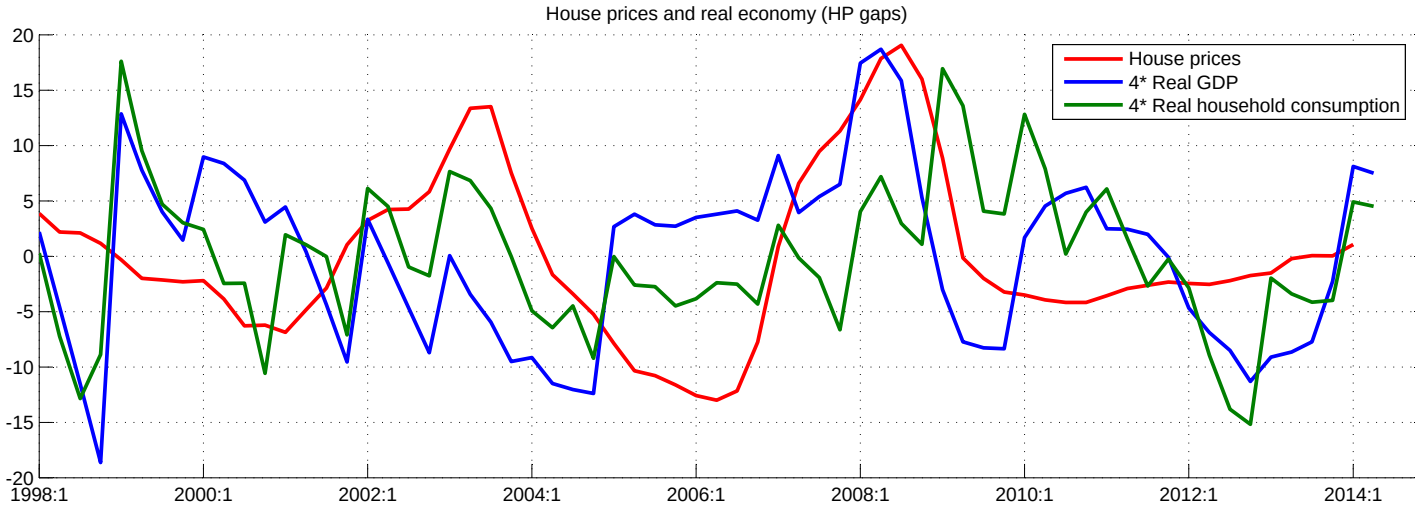
Selected research on the housing market

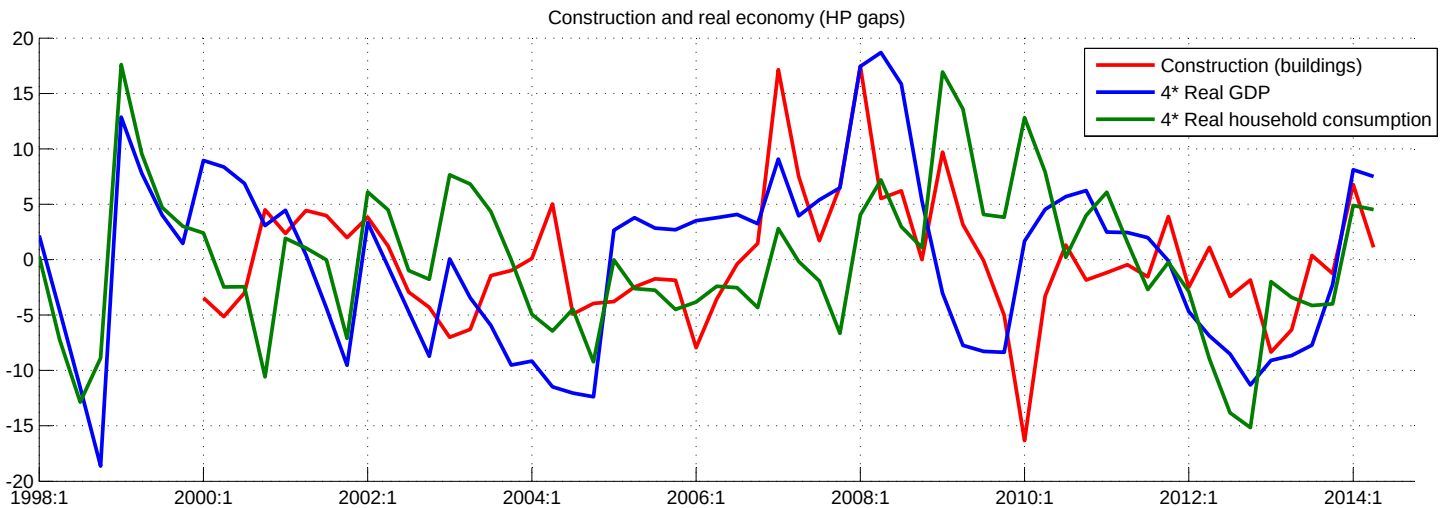
- JAN BRŮHA, MICHAL HLAVÁČEK, LUBOŠ KOMÁREK (2013): *Impacts of housing prices on the financial position of households.* In CNB Financial Stability Report 2012/2013, pp. 120-127
- JAROMÍR TONNER, JAN BRŮHA (2014): *Czech Housing Market through Lens of a DSGE model with Collateral Constrained Households.* CNB Working Paper 9/2014
- JAN BRŮHA, JIŘÍ POLANSKÝ (2014): *The Housing Sector over Business Cycles: Empirical Analysis and DSGE Modelling.* CNB Working Paper 12/2014

The papers mentioned above used Matlab as the computational platform:

- Tonner and Bruha (2014) and Bruha and Polansky (2014) are DSGE-based studies that use the IRIS toolbox.
- Brůha et al. (2013) is an empirical study that applies a computationally intensive statistical approach.

Cyclicality of house prices in the Czech Republic





Cyclicality of house prices in the Czech Republic

There have been two episodes of rises in the house price gap:

1. years 2002 to 2003:
   - attributed to exogenous event not related to the cycle: expectations of home owners that the E.U. entry (May, 2004) will cause a rise in housing demand (Komárek & Hlaváček, 2009),
   - occurred mainly in Prague (this corroborates the story),
   - when expectations proved wrong, the house prices rapidly declined.
2. years 2006 to 2008:
   - synchronized with the business cycle,
   - a significant drop after 2009.

- The construction index gap seems to lag the price gap.

Why are housing prices cyclical?

There are alternative theories linking house prices to the macroeconomy:

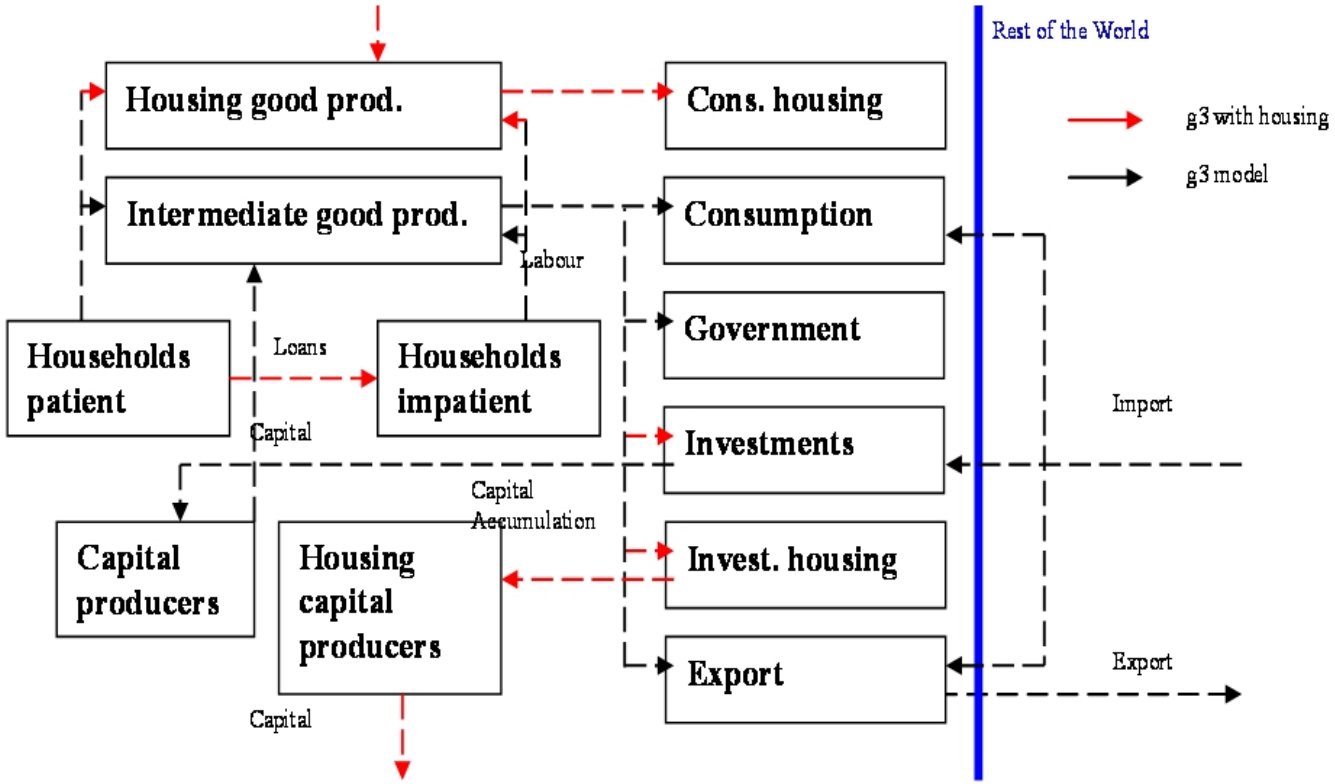
1. house prices affect macroeconomy through the collateral value for consumption or investment (e.g. Iacoviello & Neri, AER, 2010),
2. house prices are just symptom of cyclical fluctuations:
   - house prices rise in booms to equalize a relatively sticky supply with high demand in booms,
3. surges in house prices are linked to sunspots or agents' irrationality:
   - in good times, people are overoptimistic,
4. ... and possibly other theories

These theories have different implications for policy.

DSGE Model with Collateral-constrained Agents

This part of the presentation is based on JAROMÍR TONNER, JAN BRŮHA (2014): *Czech Housing Market through Lens of a DSGE model with Collateral Constrained Households.* CNB Working Paper 9/2014

Tonner and Bruha (2014) has extended the core g3 model by the housing sector:



Results

Findings:

- Adding collateral constraints and house price index does not improve the consumption prediction
- Shock decomposition show little impact of house price on inflation, interest rate or real variables:
  - This holds for a wide range of calibration values.

Micro-econometric analysis of the collateral effect

This part of the presentation is based on JAN BRŮHA, MICHAL HLAVÁČEK, LUBOŠ KOMÁREK (2013): *Impacts of housing prices on the financial position of households.* In CNB Financial Stability Report 2012/2013, pp. 120-127

Currently, this research research is updated under the CNB Research Project D1/15

Our approach

- we use the 2007-2008 episode of rising house prices,
- we identify the regions with the significant rise in house prices,
- and we compare the consumption and savings of households owning a house / a flat with those who do not:
  - if the collateral channel is important, we would expect to see a rise in consumption of those households that own a house / a flat,
  - since these two groups of households (owners versus non-owners) could systematically differ, we use the **propensity score matching**,

Propensity Score Matching

PSM is a statistical technique that can be used for comparing units who differ in observable characteristics (potential confounders):

- developed by Rosenbaum & Rubin, 1983, Biometrika
- the potentially multivariate observable characteristics can be collapsed to a one-dimensional variable (*propensity score*)
- and the units can be compared based on this propensity score.

Two-step estimation:

1. first, we estimate the probit model that explains the house ownership based on household characteristics,
2. the fitted values (*propensity score*) can be used to compare households owning and not-owning houses.

Results

	Indicator	Consumption	Net savings	Gross borrowings	Deposits	House/apartment loan repayments	Savings drawn
		(CZK)	(% of net income)	(% of net income)	(% of net income)	(% of net income)	(% of net income)
Rental x own appart., 2007	Point estimate	**-20 048**	**-0,17**	**6,84**	**9,76**	**1,15**	**6,81**
	p-value	*0,01*	*0,50*	*0,00*	*0,00*	*0,00*	*0,00*
Rental x own house, 2007	Point estimate	**-28 239**	**9,24**	**2,36**	**6,33**	**1,07**	**2,41**
	p-value	*0,00*	*0,00*	*0,04*	*0,00*	*0,00*	*0,02*
Rental x own appart., 2008	Point estimate	**-16 734**	**1,29**	**4,43**	**6,73**	**1,02**	**5,07**
	p-value	*0,05*	*0,25*	*0,02*	*0,00*	*0,00*	*0,00*
Rental x own house, 2008	Point estimate	**-49 782**	**6,27**	**-3,46**	**-2,21**	**1,34**	**-3,58**
	p-value	*0,00*	*0,00*	*0,01*	*0,08*	*0,00*	*0,00*

Results: interpretation

1. House owners have lower consumption and higher net savings than non-owners.
2. This goes against the collateral channel.
3. Higher savings / lower consumption is not due to repaying housing loans by owners.

- PSM controls for *observable* characteristics, such as the socio-economic variables:
  - those cannot explain the results.
- Owners and non-owners can differ by *unobservable* characteristics, such as the impatience:
  - more patience households can have higher chance of owning a house,
  - but this would also weaken the relevance of the collateral channel.

Conclusions

Conclusions

We have tested the collateral channel of the linkage between property prices and the real economy:

- our micro-econometric analysis does not support the importance of this channel,
- likewise, the extension of this channel to the DSGE g3 model does not improve fit and forecasting properties.

The collateral channel may be important for countries like the U.S., but for European countries, it seems to be much weaker:

- In a related research, Bůha and Polanský (2014) have succeeded in replicating cyclical features of the housing market using the *standard demand mechanisms* in a DSGE model.