FINANCIAL REGULATION SHOULD BE STRENGTHNED WHEN HOUSE PRICES INCREASE

Research question

From 1857 until 2013, at least 35 severe financial crises lowered the GDP - between 8.2% and 46.6% - and the path from peak to recovery lasted 5 to 31 years. The housing market played a key role in many of them.

Between 2013 and 2018, the European Union witnessed a significant surge in housing prices. While overall prices in that period rose by less than 2%, the housing prices rose by 18.6 % on average (Figure 1), with significant heterogeneity from country to country (Figure 2). Furthermore, major urban centers witnessed increases often more than three times higher than the rest of the territory during this period.

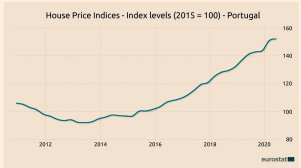


Figure 1

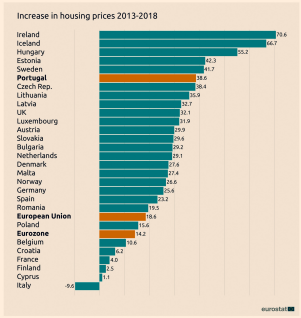


Figure 2

All these fast and significant variations in market prices beg the question: how should macroprudential policy* change? What should central banks do to adapt macroprudential policy to changes in house prices?

* The use of financial regulation to avoid systemic financial crisis.

Literature

The debt-deflation channel (Fisher (1933) is behind many financial crises. The existence of ocasionally-binding collateral constraints on credit may create a setting where a decrease in prices dampens demand, which in turn leads to lower prices: a positive feedback loop. Agents failing to internalize the effects of their borrowing decisions on prices leads to the market failure behind these crises: the pecuniary externality. Bianchi and Mendoza (2011) perform a quantitative analysis to evaluate the macroeconomic and welfare effects of this externality and policies to counter it. Bianchi and Mendoza's 2016 paper (Bianchi et al. (2016)) also consider important macroeconomic drivers of the economy according to empirical studies of credit cycles and financial crises: noisy news about future economic fundamentals (e.g. Schularick and Taylor (2012), Borio and Zhu (2012)) and regime shifts in global liquidity (e.g. Calvo et al. (1996); Mendoza and Terrones (2009); Shin (2013); Bruno and Shin (2015)).

In this framework, however, there was no focus on the distinction between housing and other forms of consumption. Empirical studies (for instance Fratantoni (2001) and Lustig and Van Nieuwerburgh (2004)) have shown that housing prices may be better explained if one makes this distinction. If the housing market is at the heart of so many financial crisis, the adequate modeling of preferences regarding housing goods and other forms of consumption should be critical.

This work extends Bianchi and Mendoza's model by introducing land, which allows us to study how macroprudential policy should change with external demand for housing.

Model

Household preferences:

$$U_t = \mathbb{E}_t \left[\sum_{i=0}^{\infty} \beta^i \frac{c_{t+i}^{1-\sigma} - 1}{1-\sigma} \right]$$

$$c_t = \left(\alpha \left[\omega \left(c_t^T \right)^{-\eta} + (1-\omega) \left(c_t^N \right)^{-\eta} \right]^{\frac{\eta_A}{\eta}} + (1-\alpha) \left((1-e) A_t \right)^{-\eta_A} \right)^{-\frac{1}{\eta_A}}$$

Agent's budget constraint:

$$q_t b_{t+1} + c_t^T + p_t^N c_t^N + (1-e)\, p_t^A A_t = b_t + y_t^T + p_t^N y_t^N + (1-(1-\Phi)e)\, p_t^A A_t$$

$$q_t b_{t+1} \geq -\kappa_Y \left(y_t^T + p_t^N y_t^N + e\, \Phi\, p_t^A A_t \right) - \kappa_A (1-e)\, p_t^A A_t$$

Market clears:

$$c_t^N = y_t^N$$

Exogenous stochastic Processes:

The system is defined by a level of Land (A_t), of debt (b_t), of tradable's production (YT_t), of the signal regarding the state of tradable's production (S_t) and of real interest rates (R_t). While b_t is endogenous, all other states are exogenous. R_t, $YT_t$and $S_t$all follow Markov processes, with the states for YT_t being defined by:

$$y_t^T = (1-\rho)\mu + \rho\, y_{t-1}^T + \epsilon_t^T$$

And the signal st being defined by:

$$p(s_t = i | y_{t+1}^T = l) = \begin{cases} \theta & , \quad i = l \\ \frac{1-\theta}{N-1} & , \quad i \neq l \end{cases}$$

where:
E_t is the expectation operator, conditional on information at time t; β is the discount factor; 1/σ is the elasticity of intertemporal substitution; $1/(\eta_A + 1)$ is the elasticity of substitution between goods (+services) and land; $1/(\eta + 1)$ is the elasticity of substitution between tradable goods and nontradable goods.

C_t is the consumption basket* ; CT_t is the consumption of tradable goods*; CN_t is the consumption of non-tradable goods*; A_t is the stock of land (to which the agent is endowed), assumed constant and non-depreciating*.

pN_t is the price of non-tradable goods denoted in tradable goods*; pA_t is the price of land denoted in tradable goods*.

b_t are holdings of one-period, non-state-contingent discount bonds*; q_t is equal to $1/R_t$, where R_t is the exogenous world gross real interest rate*; κ_Y represents DTI-kind restrictions; κ_A represents LTV-kind restrictions; e is the proportion of land rent to foreigners ; P is the rent-to-price ratio. θ is the signal precision
(*at period t)

Numerical approach:

The code utilized to obtain the results presented solves the decentralized equilibrium using the time-iteration method: the model is solved by backward recursive- substitution of the model's optimality conditions written in recursive form, thus computing the policy function. The same method is used to solve the Social Planner's problem (this time with the externality term in the euler equation). With the policy function obtained, a code that recursively simulates the economy is used to obtain the unconditional moments of the economy and moments conditional on sudden stops, and also to perform event analysis of sudden stops.

Calibration

The baseline calibration uses data from Spain, an example of an eurozone economy where housing prices played a key role in its financial crisis.

Parameter	Values
y^N	1
$\mathbb{E}\left[y^T\right]$	1
ρ_y^T	0.3478
$Var\left[y^T\right]$	1.369×10^{-2}
N_y^T	3
σ	2
η	0.205
η_D	0.51

Parameter	Values
β	0.9617
ω	0.3213
α	0.933
R^h	1.00194
R^l	0.98406
F^{hh}	0.7465
F^{hl}	0.7755
θ	0.76

Parameter	Values
κ_Y	0.10
κ_A	0.02

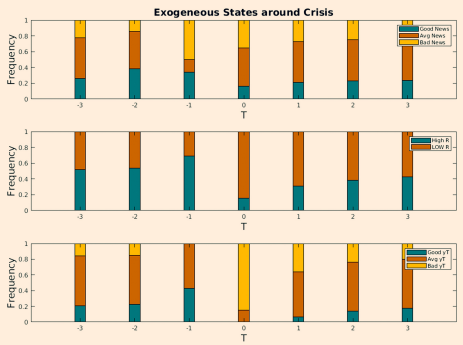
Results

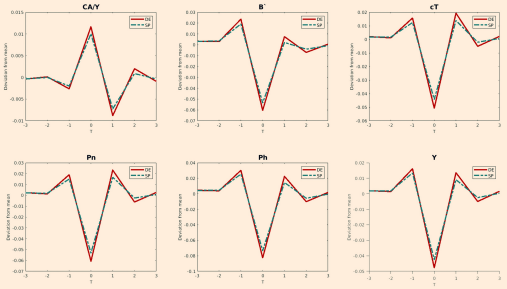
Without regulation, the probability of crisis is 2.241% in any given year. Depending on the macroeconomic environment, some years are more likely than others to give rise to a financial crisis. Figure 3 shows what was the interest rate, the production of tradable goods and services and the news regarding the following period, before, during and after the financial crisis.

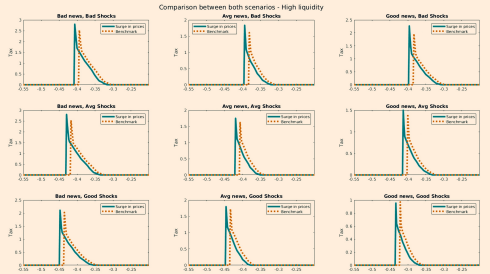
For a 10% increase in house prices, macroprudential regulation decreases the probability of crisis by 54.5%. Furthermore, it slightly dampens the effects of the crisis (Figure 4).

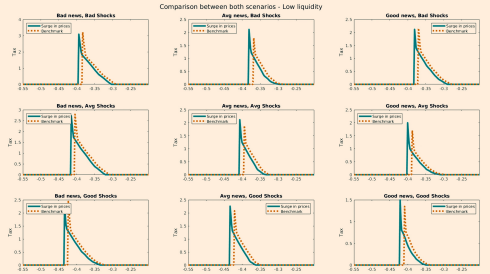
Optimal macroprudencial policy is gauged by using, as an instrument, a tax on debt. The higher the tax, the stronger should financial regulation be. Figures 5 and 6 show this tax as a function of debt for different states regarding the interest rate, tradable goods production and news regarding the following period.

The average optimal tax is 8,3% higher in the price-surge scenario. **The increase in financial regulation is commensurate with the increase in prices.**









Conclusions

These results challenge the previous understanding in the literature according to which optimal capital controls under these models are, short of a financial crisis, procyclical.
Even when - by construction - the increase in average land prices is completely exogenous and permanent, macroprudential policy should lean against the wind in most relevant settings. Financial regulation should be strengthened when house prices increase. Furthermore, the strengthening of macroprudential policy should be commensurate with the increase in prices.

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References

Bianchi, J. and E. G. Mendoza (2011), "Overborrowing, Financial Crises and 'Macro-Prudential' Policy?" IMF Working Papers, 11, 1

Bianchi, Javier, Chenxin Liu, and Enrique G. Mendoza (2016), "Fundamentals news, global liquidity and macroprudential policy." Journal of International Economics, 99, S2-S15.

Borio, C. and H. Zhu (2012), "Capital regulation, risk-taking and monetary policy: A missing link in the transmission mechanism?" Journal of Financial Stability, 8, 236–251.

Bruno, V. and H. S. Shin (2015), "Cross-Border Banking and Global Liquidity." The Review of Economic Studies, 82, 535–564.

Calvo, G. A., L. Leiderman, and C. M. Reinhart (1996), "Inflows of Capital to Developing Countries in the 1990s." Journal of Economic Perspectives, 10, 123–139.

Fisher, I. (1933), "Debt-Deflation Theory of Great Depressions." Econometrica, 1, 337–357.

Fratantoni, Michael C. (2001), "Homeownership, committed expenditure risk, and the stock- holding puzzle." Oxford Economic Papers, 53, 241–259.

Lustig, Hanno N. and Stijn G. Van Nieuwerburgh (2005), "Housing collateral, consumption insurance, and risk premia: An empirical perspective." The Journal of Finance, 60, 1167– 1219.

Mendoza, E. G. and M. E. Terrones (2009), "Durdu Menodza - Precautionary Demand for Foreign Assets in Sudden Stop Economies." Journal of Development Economics, 89, 194– 209

Schularick, M. and A. M. Taylor (2012), "Credit Booms Gone Bust: Monetary Policy, Lever- age Cycles and Financial Crises, 1870-2008." American Economic Review, 102, 1029–1061.

Shin, H. S. (2013), "The second phase of global liquidity and its impact on emerging economies." In Asia Economic Policy Conference.