

# Does Mortgage Regulation Affect the Supply and Demand for Alternative Home Financing?

## Empirical Evidence From a Swedish Experiment

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### Overview

- **Does mortgage regulation affect the supply and demand for alternative home financing?** How large is the willingness to pay for the unregulated alternatives?
- The question is pivotal in light of the **recent global increase in real estate prices, household debt, and debt-to-GDP ratios**, and regulators' response in widespread use of LTV ratios.
- We find that to achieve 1 dollar reduction in equity downpayment, a household is willing to pay about 1.8 dollars more in unregulated credit after the LTV cap is introduced.
- This increase is not followed by a decrease in other consumer loans; in stark contrast, it is complemented by a further increase in the latter in localities with more constrained homebuyers.

### Motivation

- While the most commonly tool is **LTV ratio cap**, the question of which type of loan should be used in its numerator (DeFusco et al., 2019) is less examined.
- This is important as **potential substitution between mortgages and unregulated credit may undermine the main purpose of the LTV cap**.
- Such substitution will increase borrowing costs, which for a given loan amount, reduces debt servicing ability.
- **The key insight from our analysis is that regulating mortgages can actually increase the total costs of home financing for many borrowers.**
- Our results have direct implications for the design and types of credit used in borrower-based macroprudential instruments.

### Identification

- **Only mortgages are often included in the numerator of the LTV ratio.**
- Yet, large amount of unregulated debt with high variation pre-exists at the apartment building level.
- This provides an exogenous variation in unregulated credit available for home financing.
- Allows for the first time to track changes in demand for the unregulated debt, which can only be used as a substitute for the equity downpayment.

### The Swedish Institutional Setting

- Swedish multi-dwelling homes, or **so-called co-ops**, borrow debt to fund the construction project. The co-op debt is then transferred to the homebuyers in a pro-rata share.
- **The total transaction value is the sum of transaction price and the share of the co-op debt.**
- The capital structure of the co-op is determined before the housing units are sold.
- **The share of the co-op debt as a percentage of the transaction price varies from 0 to 90%.**
- **In Oct. 2010, the Financial Supervisory Authority in Sweden introduced a LTV cap of 85%.**
- **the LTV cap applied to only personal mortgages.** Other loans, including co-op debt were not part of the LTV numerator.
- The transaction price is paid for by a combination of equity downpayment (min 15 percent after regulation) and personal mortgage.

### Hypotheses Development

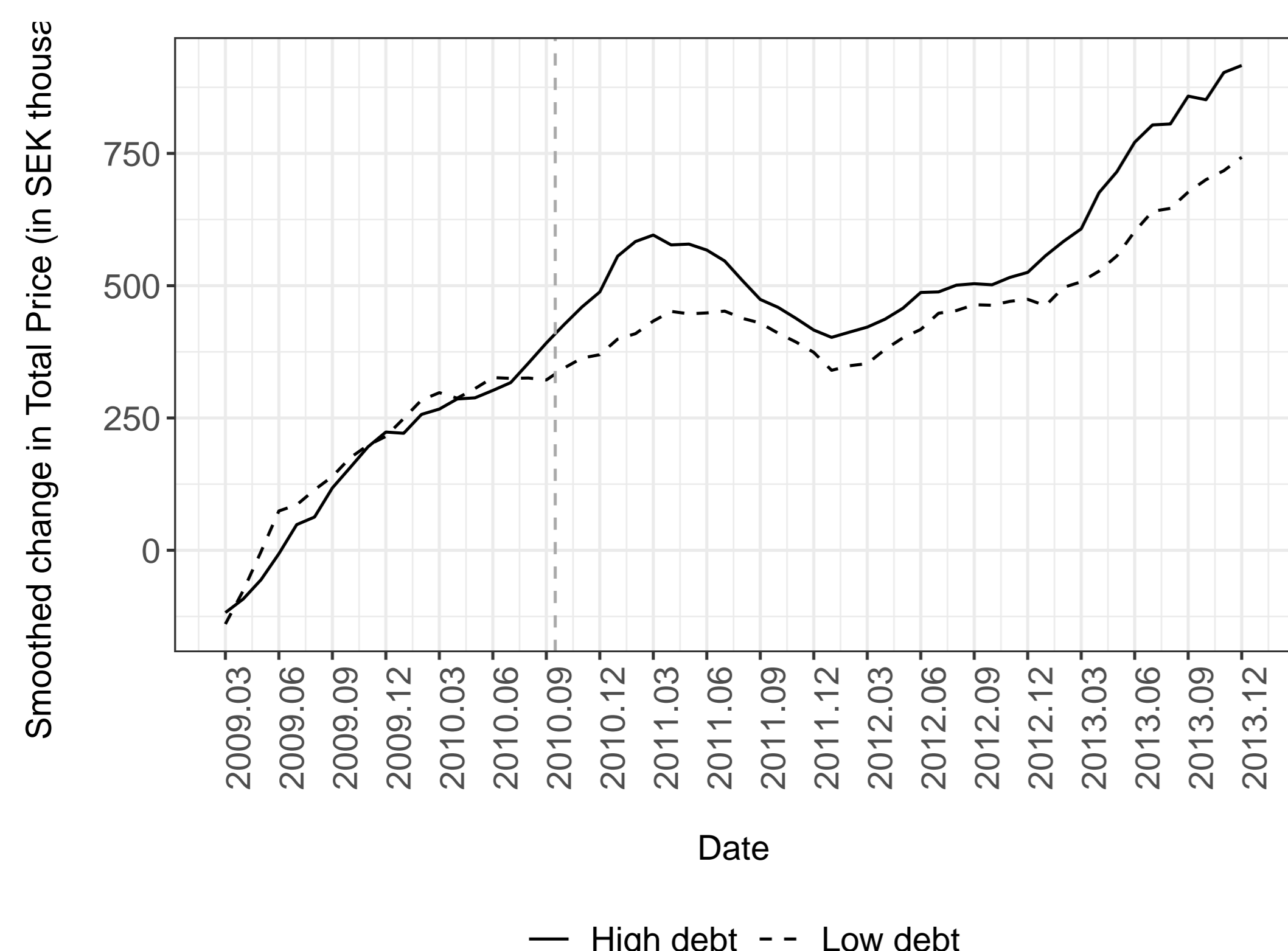
We use a simple search model of housing transactions to formulate testable predictions about the effects of LTV regulation on demand and supply for alternative home financing. After the introduction of the LTV cap in 2010 we hypothesize that:

- Prices of apartments with more co-op debt (and low transaction price), requiring less equity, increase relative to apartments without co-op debt.
- We test the hypothesis with a standard DiD specification ( $P_i$  is the transaction price):

$$\Delta P_{i,t} = \beta(\text{High Debt}_{i,t-1} \times \text{Post LTV}_t) + \text{Controls}_{i,t} + \epsilon_{i,t}, \quad (1)$$

### Result 1

We illustrate our main finding. The Figure plots the development in monthly house price indices for housing units, for the treatment (25% most levered co-ops) and the control group (25% lowest levered co-ops).



- The relative price of apartments that come with alternative home financing (i.e., highly levered co-ops) increases after the LTV regulation and persist throughout our sample period.
- Prices move in parallel until the introduction of the LTV cap in the second quarter of 2010.
- Complementary regression analysis reveal that households are willing to pay 1.8 dollars of unregulated debt to avoid 1 dollar of additional equity downpayment for a comparable (or the same) dwelling.
- In the aggregate, this has brought about a 16 percent increase in unregulated debt corresponding to 2.4 percent increase in total debt.

### Result 2

**H2: We next use the model to show that the “weighted average cost of capital” for home financing, which combines unregulated credit with a mortgage, will increase more after the introduction of an LTV cap in localities with relatively more high-debt co-ops prior to the regulation.**

- This is because constrained buyers who seek high co-op debt are also likely to look for other unregulated consumer debt.
- We test the hypothesis by estimating:

$$\Delta R_j = \beta D_j + \text{Controls}_j + \epsilon_j,$$

$\Delta R_j$  shows the change around the regulation in total interest paid (less interest on co-op debt) in region  $j$ , and  $D_j$  is average co-op debt level just before the regulation

- **We find that** one standard deviation increase in co-op debt is associated with an increase of 2900 SEK in interest costs of unregulated credit per average-sized household. At the same time, the average increase in interest payments was 4300 SEK per capita. The effect is large and is above the effect caused by higher prices.

### Result 3

**We then tweak the model to allow for some notion of wealth inequality.**

- We introduce a household specific “effective” LTV cap, which is a function of demographics.
- **H3: The willingness to pay for alternative home financing is decreasing in income and education and is higher for immigrants and among unemployed households.**
- To test the hypothesis, we let  $\xi_j$  denote a particular demographic score in region  $j$  (i.e.,  $\xi_j \in \{\text{income, education, immigrant, unemployed}\}$ ) and estimate the following regression:

$$\Delta P_{i,t} = \beta(\text{High Debt}_{i,t-1} \times \text{Post LTV}_t \times \xi_j) + \text{Controls}_{i,t} + \epsilon_{i,t}, \quad (2)$$

$\beta$  identifies if the effect of LTV regulation on the price differential between high and low debt apartments is larger in regions with presumably higher demand for alternative home financing and  $\text{Controls}_{i,t}$  includes all cross-products of  $\text{High Debt}_{i,t-1}$ ,  $\text{Post LTV}_t$ , and  $\xi_j$ .

- **We find that** the localities with the highest average income are not affected by the increased price effect for highly leveraged co-ops. This corresponds to roughly 25 percent of localities. In these regions the relative price increase of high debt co-ops is practically zero while the price increase is substantial in low income localities. We interpret this finding as direct evidence of how a LTV cap mainly affects medium to low-income households.

### Result 4: Endogenous supply

**Finally we endogenize the supply of co-op debt.**

- Tracking the capital structure of co-ops built after 2010 allows us to quantify the increase in supply of alternative home financing using the same methodology.
- **H4: The supply of co-op debt, unregulated credit only applicable to home financing, increases.**
- **We find that** developers increase supply of the debt in new housing by about forty percent.

### Summary

- Regulating mortgages can increase the total costs of home financing for many borrowers.
- Constrained households begin to demand housing units with disproportionately more unregulated debt in the secondary market.
- Narrowly defined mortgage LTV cap may cause quantitatively important inefficiency.
- More research needed to help understand to what extent, and which level of the LTV cap, is optimal in combination with alternative home financing that can, or cannot, be regulated.

### References

DeFusco, A. A., S. Johnson, and J. Mondragon (2019). Regulating household leverage. Working Paper.