

# Micro Effects of Macro Policies

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# Outline of the dissertation

**Title of the dissertation:** "Micro Effects of Macro Policies"

## Outline:

1. Being in good Hands: Deposit Insurance and Peers' Financial Sophistication (*Joint with G.Pasini, M.Mastrogiacom*)
2. Leverage Constraints, House Prices and Household Debt: Evidence from the Netherlands ← **today's talk**
3. Staggered Wages, Unanticipated Shocks and Firms' Adjustments (*Joint with J.Parlevliet, M.Mastrogiacom*)
4. The Housing Wealth Effect: a comparative analysis of Italy and the Netherlands (*Joint with M.Mastrogiacom*).

# Motivation: The credit driven demand channel

## Lessons from the Great Financial Crisis:

(Adelino et al (2016 RFS ; 2018 Ann.Rev.FE) Mayer et al (2009 JEP) Mian, Sufi et al (2009, QJE ; 2013, QJE ; 2018 JEP)

Di Maggio and Kermani (2017, RFS) Kaplan, Mitman, Violante (forthcoming, JPE) Bhutta, Keys (2016, AER)

- ▶ When credit is more affordable (low mortgage spreads) and available (OTD - securitization), households take on more debt.
- ▶ Increase in household debt boosts housing demand (and prices).
- ▶ Increasing house prices lead to borrow out of home equity and may fuel expectations of further increases.
- ▶ The crash was stronger in cities that experienced large credit flows, and led to consumption cuts, defaults and foreclosures.

## **Institutional response:** Macro-prudential policies (MPP)

- ▶ introduction of leverage constraints (LTI / LTV limits)  
(Cerruti Claessens Leaven 2017)

# Motivation: Facts from the Netherlands

## Mortgage Lending and Prepayments

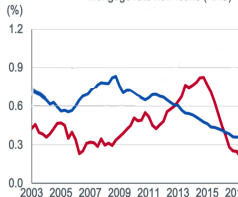
— Quarterly gross new mortgage lending (EURbn)  
— Annualised prepayment rate (RHS)



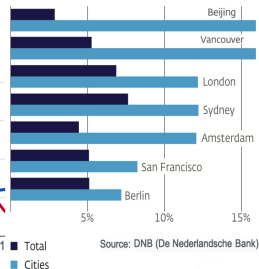
Source: Fitch Ratings, DNB (De Nederlandsche Bank)

## Mortgage Rates and Arrears

— Fitch Index 3m+ arrears  
— Mortgage rate new loans (RHS)



Source: Fitch Ratings, DNB (De Nederlandsche Bank)



Source: DNB (De Nederlandsche Bank)

- ▶ Ranked #2 worldwide for household debt (Source Oecd) and ranked #6 for house price growth (Source IMF).
- ▶ Housing market: supply shortage, large social rental housing sector (30%), low price elasticity (Source OECD) and expansion limits.
- ▶ Mortgage market: financial innovation (IOs, deferred-amortization products), perverse fiscal incentives (MID).

# This paper in one slide

**Focus:** Household debt at origination

**Research question:** disentangle effect due to housing and credit market.

## **#1 - Estimate the causal effect of leverage constraints:**

- ▶ I rely on exogenous and granular changes in LTI and LTV limits.
- ▶ I estimate bunching at the LTI and LTV limits.

## **#2 - Estimate the causal effect of increasing house prices:**

- ▶ I use changes in local house price indexes.
- ▶ I address reverse causality in house price - credit growth via IV

**Data:** DNB Loan Level Data + local house price indexes (NVM data)

# Institutional details: LTI and LTV rules

## The Loan-to-Value (LTV) rule:

- ▶ Maximum loan amount, given house collateral value.
- ▶ Same for everybody.
- ▶ Set to 106% in 2012, reduced by 1% a year til 2018 (100%) .

## The Loan-to-Income (LTI) rule:

- ▶ Maximum mortgage amount, given household income.
- ▶ Income and interest rate class specific, revised annually.
- ▶ Comply or explain rule.

# Institutional details: The LTI rule

Bruto jaarinkomen	Hypotheekrente				
	3.75%	4.25%	4.75%	5.25%	5.75%
19500	3.0	2.9	2.8	2.7	2.6
20000	3.1	3.0	3.0	2.9	2.8
20500	3.3	3.2	3.1	3.0	2.9
21000	3.5	3.4	3.3	3.2	3.1
21500	3.6	3.5	3.4	3.2	3.1
22000	3.8	3.6	3.5	3.4	3.3
22500	3.9	3.8	3.8	3.7	3.6
23000	4.0	4.0	3.9	3.8	3.8
23500	4.1	4.1	4.0	3.9	3.9
24000	4.2	4.2	4.1	4.0	3.9
25000	4.4	4.3	4.2	4.2	4.1
26000	4.5	4.4	4.3	4.2	4.1
28000	4.6	4.5	4.4	4.3	4.2
55000	4.7	4.6	4.5	4.4	4.3
58000	4.8	4.7	4.6	4.5	4.4
61000	4.9	4.7	4.6	4.5	4.4
63000	4.9	4.8	4.7	4.6	4.5
65000	5.0	4.9	4.8	4.7	4.6
68000	5.1	5.0	4.9	4.8	4.6
70000	5.2	5.1	5.0	4.8	4.7
75000	5.3	5.2	5.0	4.9	4.8
77000	5.3	5.3	5.2	5.1	5.1
79000	5.4	5.3	5.3	5.2	5.1
85000	5.5	5.4	5.4	5.3	5.2
96000	5.6	5.5	5.4	5.4	5.3
110000	5.7	5.6	5.5	5.4	5.4

Figure: 2014 Nibud LTI limits Table (heatmap)

# Empirical analysis

**Question:** What is the effect of macroprudential limits and house prices on household debt at origination?

$$\ln(\text{loan})_{i,m,t} = \alpha + \beta_1 LTI_{i,t}^{\max} + \beta_2 P_{m,t} + \gamma' X_{i,m,t} + \epsilon_{i,m,t}$$

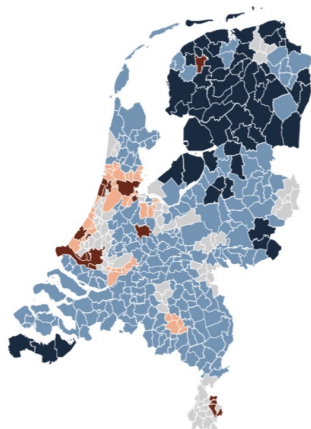
**Controls:**

- ▶ loan characteristics: NHG, int.rate, maturity, loan type.
- ▶ borrower characteristics: employment, income, age.
- ▶ property characteristics: house type, location, big city.
- ▶ bank, region, time, FE.

**Challenge:** Endogeneity house prices-mortgage debt

# Empirical analysis: IV

Share developed land



N.unoccupied dwellings



# Empirical analysis: IV

	Dependent variable: loan amount					
	OLS	IV-GMM	OLS	IV-GMM	OLS	IV-GMM
LTI limit	0.3779*** (0.0046)	0.2733*** (0.0205)	0.4656*** (0.0053)	0.4028*** (0.0116)	0.4403*** (0.0052)	0.3670*** (0.0126)
LTI limit $\times$ income			-0.0043*** (0.0002)	-0.0059*** (0.0003)	-0.0041*** (0.0002)	-0.0054*** (0.0003)
LTI limit $\times$ LTV constr.					0.0032** (0.0015)	0.0011 (0.0020)
Local house price index	0.0012*** (0.0000)	0.0031*** (0.0004)	0.0012*** (0.0000)	0.0030*** (0.0004)	0.0012*** (0.0005)	0.0028*** (0.0004)
controls	✓	✓	✓	✓	✓	✓
bank FE	✓	✓	✓	✓	✓	✓
time FE	✓	✓	✓	✓	✓	✓
region FE	✓	✓	✓	✓	✓	✓
region $\times$ time FE	✓	✓	✓	✓	✓	✓
Hansen's J (overid test)	-	0.0021	-	0.0022	-	0.0007
N observations (Nt)	216.829	216.829	213.481	213.481	213.481	213.481

- + 1 std.dev House Prices  $\Rightarrow$  + 13.4% HH debt
- + 1 std.dev LTI limits  $\Rightarrow$  + 12.9% HH debt

# Empirical analysis

