

MACROPRUDENTIAL POLICY AND HOUSEHOLD LEVERAGE EVIDENCE FROM ADMINISTRATIVE HOUSEHOLD-LEVEL DATA

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Household leverage cycles

1 U.S. household leverage growth

- ▶ 1980s: household debt-to-GDP ~50%
- ▶ 2008: ~100%
- ▶ 2018: ~75%

2 Negative consequences of “excessive” debt

- ▶ Household-level
 - ☹ Consumption and property maintenance
 - ☹ Default
 - ☹ Labor supply and mobility
 - ☹ Entrepreneurship and innovation
 - ▶ Aggregate effects
 - ☹ Drop in consumer spending, employment, and investment
 - ☹ Impairment of bank balance sheets
- ⇒ Longer and deeper recession, slower recovery

Policy responses aim to reduce household debt

1 Ex post: “bailout” bad debt in bad state of world

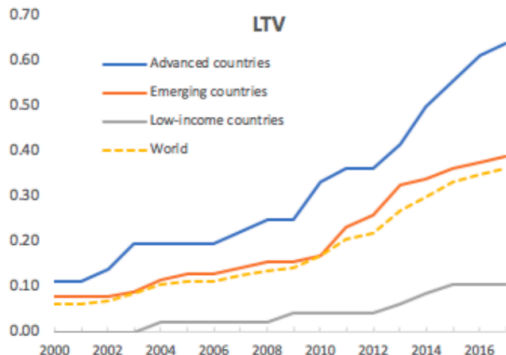
- ▶ HAMP, HARP, Countrywide settlement, etc.
- ▶ Benefits and costs?
 - ☺ Reverses negative consequences
 - ☹ Strategic default among healthy borrowers
 - ☹ Lower credit supplied to vulnerable borrowers going forward

2 Ex ante: “macroprudential” policies in good state

- ▶ Lender-based: e.g., countercyclical capital buffers
 - ☺ Reduce credit supply to households and firms
 - ☹ “Leakages” may render ineffective
- ▶ Borrower-based: e.g., PTI, DTI, and/or LTV limits
 - Great in theory, very common in practice
 - **Limited empirical evidence on effectiveness**

Increasing share of countries regulating household leverage

Source: Cerutti et al. (2018)



- ▶ LTV regulation popular, but limited evidence on success

Key empirical evidence on macroprudential policies

- 1** Lender-based macroprudential policies can be effective
 - ▶ e.g., Jimenez et al. (2017), Basten and Koch (2019)
- 2** However, lender-based policies may suffer from “leakages”
 - ▶ e.g., Kim et al. (2018), Aiyar et al. (2014)
- 3** Cross-country evidence on borrower-based policies mixed
 - ▶ e.g., Cerutti et al. (2017)
- 4** Micro-level evidence primarily focused on lender responses
 - ▶ e.g., Acharya et al. (2019), DeFusco et al. (2019)

What do we do? Micro-evidence on how households respond to a borrower-based macroprudential policy (leverage restriction)

This paper

Our objectives

- 1 Household finance response to macroprudential lending limit
- 2 Household financial distress and homeownership dynamics

Setting: Dutch households facing new mortgage LTV limit in 2011

- Highly relevant: levered households, boom-bust cycle in prices
- Amazing data: all HH balance sheets and housing transactions

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Household leverage in the Netherlands

Household leverage before 2011

- 1** High LTVs at-origination, often $\gg 120$
 - ▶ Demand: high transaction costs and unlimited MID
 - ▶ Supply: full recourse, gov't guarantees, securitized
- 2** Highly-leveraged households
 - ▶ 2010: 120% HH debt-to-GDP (vs 99% peak in US in '08:Q1)
- 3** Ugly recession
 - ▶ 2008-2013:
 - House prices fell 20%
 - # underwater households increased from 5 to 30%

Household leverage in the Netherlands

2011 introduction of mortgage LTV limit

- 1 Maximum LTV ratio at-origination set to 106%
 - ▶ Announced 3/21/2011 and implemented 8/1/2011
 - ▶ Ratcheted down 1%pt per year to 100% by 2018
- 2 No “leakages”: all domestic/foreign banks and nonbanks must comply
- 3 Some exceptions for borrowers (“soft limit”)
 - ▶ Movers: allowed to roll negative equity
 - ▶ Stayers: if refinancing
 - ▶ Minimize by focus on **first-time homebuyers**

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Administrative data on universe of households

Link Statistics Netherlands (tax data) and Land Registry (housing transactions)

- Labor income
- Interest expense
- Mortgage payment

**Income statement
(income tax)**

**Balance sheet
(wealth tax)**

- Assets
- Bank accounts
- Debt
- Mortgage debt
- Housing wealth
- Net worth (equity)



**Housing
transaction
records**

- Homeownership
- Sales price
- Timing

► We focus on **non-self-employed first-time homebuyers**

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Key outcomes (mostly imputed from tax returns)

1 Mortgage debt choices

- ▶ *Mortgage Amount, Home Value, LTV, Mortgage Payment, Interest Expense*

2 Household leverage

- ▶ *Mortgage Payment/Income, Mortgage Debt/Income, and Total Debt/Income*

3 Household liquidity

- ▶ *Liquid Assets*

- Things we are collecting...

- ▶ Characteristics of home; borrower financials at time of purchase; family demographics at time of purchase; cash gifts

This paper

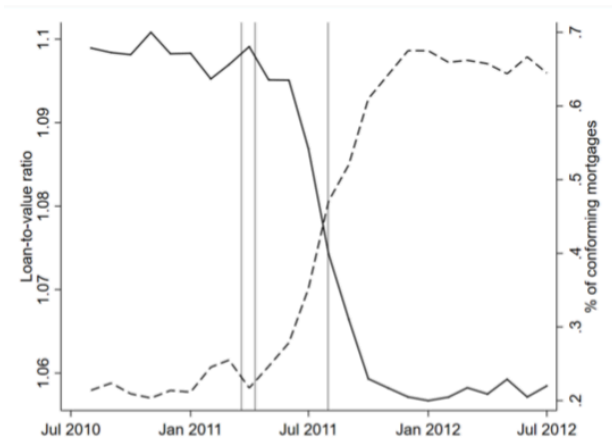
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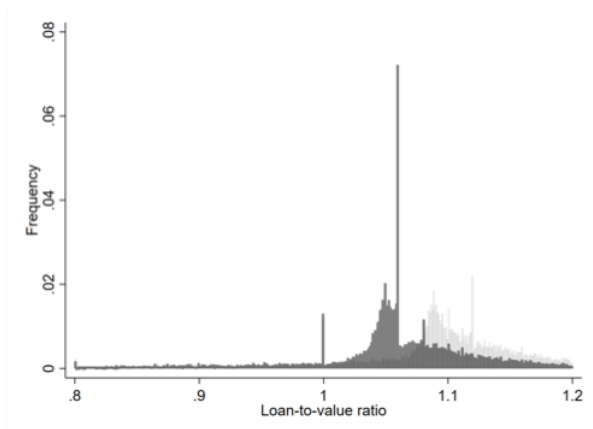
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LTV adjustments: dramatic shift in time-series



LTV adjustments: bunching at threshold



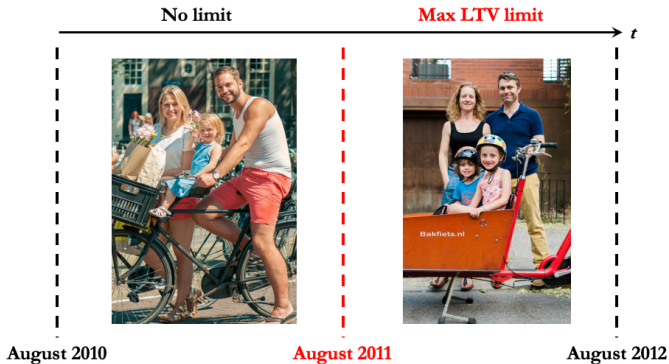
Measuring household-level effects of LTV limit

- ▶ Main challenge
 - 1 We have a repeated cross-section of first-time homebuyers
 - 2 No obvious counterfactual (everyone's affected)

- ▶ Simple **before-versus-after comparison in a narrow window** around shock requires that
 - 1 Borrowers and/or lenders do not anticipate policy
 - 2 No confounding macroeconomic events

- ▶ We build a counterfactual
 - Control for kitchen sink of observables via OLS
 - Or via matching estimators
 - [Instrument for purchase decision using family variables]

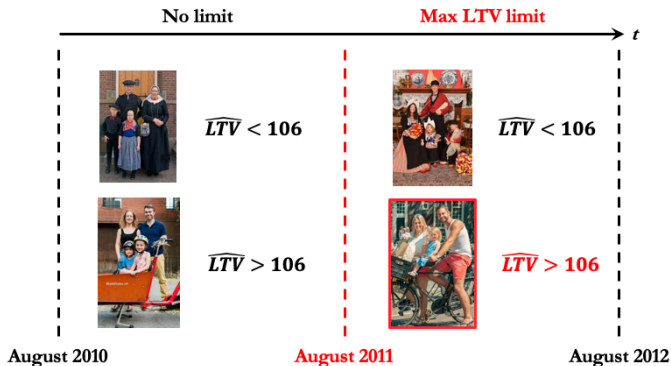
Measuring household-level effects of LTV limit



Measuring household-level effects of LTV limit

- ▶ We refine this approach to control for potential time effects
- ▶ DiD based on $\widehat{LTV} > 106$
 - “Affected” households can’t choose $LTV > 106$ in after period
 - Latent choice is unobservable
 - Identify them based on predicted LTV
 - Prediction based on unconstrained choices in the before period
- ▶ How do we do prediction?
 - Predict LTV or $1_{LTV > 106}$
 - Old dog: kitchen sink approach via OLS
 - [New tricks: machine learning via LASSO/random forest]

Measuring household-level effects of LTV limit



- ▶ \widehat{LTV} = prediction based on unconstrained choices in the before period

Mortgage borrowing outcomes

Dependent variable:	<i>LTV</i>	<i>log(Mortgage Amount)</i>	<i>log(Home Value)</i>
	[1]	[2]	[3]
<i>After</i> × <i>d(LTV > 106)</i>	-0.064*** (0.002)	-0.042*** (0.004)	0.018*** (0.004)
Postcode fixed effects	Y	Y	Y
Borrower control variables	Y	Y	Y
<i>N</i>	34,223	34,022	33,950
<i>R</i> ²	0.34	0.69	0.70

- 1 6.4%pt drop in LTV among affected households
- 2 Distributional consequences?
 - ▶ Differences by *Income*_{*t*}, *Liquid Assets*_{*t*-1}, and *Wealth*_{*t*-1}
 - ▶ Rich: constraint does bind (e.g., due to MID)
 - ▶ Poor: effect at least 20% larger

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1 Borrow 4.2%pt less, but do not buy cheaper homes

2 Interpretation?

- ▶ Borrow ~€9k less to buy house costing an additional ~€4k
- ▶ Funding gap ~€13k

Household debt and liquidity dynamics

Dependent variable:	<i>Mortgage Payment</i>	<i>Interest Expense</i>	<i>Payment /Income</i>	<i>Mortgage Debt /Income</i>	<i>Total Debt /Income</i>	<i>Liquid Assets</i>
	[1]	[2]	[3]	[4]	[5]	[6]
<i>After</i> × $d(\widehat{LTV} > 106)$	-2,354.52** (1,002.11)	-210.75* (105.56)	-0.032** (0.014)	-0.104*** (0.014)	-0.109*** (0.019)	-1,668.26*** (460.51)
Postcode fixed effects	Y	Y	Y	Y	Y	Y
Borrower control variables	Y	Y	Y	Y	Y	Y
<i>N</i>	32,296	32,296	32,296	34,001	34,223	34,223
<i>R</i> ²	0.10	0.51	0.09	0.54	0.50	0.59

1 Mortgage debt servicing costs decline

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- 1 Mortgage debt servicing costs decline
- 2 Household leverage declines lockstep with mortgage leverage
 - ▶ No “leakages” to “unregulated” debt (i.e., personal loans)

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- 1 Mortgage debt servicing costs decline
- 2 Household leverage declines lockstep with mortgage leverage
 - ▶ No “leakages” to “unregulated” debt (i.e., personal loans)
- 3 Tradeoff? **Households consume liquidity** (~25% at median)

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Two consequences for households

1 Household financial distress:

- 😊 Lower household leverage and debt servicing costs
 - 😞 Higher upfront cost of buying \implies consume liquidity buffer
 \implies heightened risk of payment difficulties in short run
- \therefore We examine loan repayment performance

2 Financial exclusion:

- 😊 Benefits of LTV limit conditional on buying home
 - 😞 Higher downpayment may impede ownership among poor
- \therefore We examine extensive margin decision to buy a first home

#1 Household financial distress

1 Conceptual issues

- ▶ Loans are full recourse and government guaranteed
 - Mortgage foreclosure very unlikely
 - Focus instead on loan repayment performance
- ▶ Distress due to excessive mortgage debt can have severe consequences for households (e.g., consumption)

2 Data and measurement

- ▶ Loan-level data source from van Bekkum et al. (2018)
 - Monthly performance of large chunk of mortgage market
 - Cannot be linked to tax data (no wealth data)
- ▶ *Payment Arrears* = 1 if missed a loan payment

#1 Poor households less likely to exhibit financial distress

Dependent variable: <i>Payment Arrears</i>			
Household finance variable:		<i>Income_t</i>	
Sample:	All	Low	High
	[1]	[2]	[3]
$After \times d(\widehat{LTV} > 106)$	-0.023*** (0.007)	-0.026** (0.010)	-0.014 (0.009)
Postcode fixed effects	Y	Y	Y
Loan control variables	Y	Y	Y
Borrower control variables	Y	Y	Y
<i>N</i>	77,751	38,493	39,258
<i>R</i> ²	0.01	0.02	0.01

- ▶ 2.3%pt decline in arrears (baseline: 3.3%)

#2 Extensive margin transition into homeownership

- ▶ Goal: measure how LTV limit affects $\Pr(\text{Buy} \mid \text{Rent})$ for observationally similar households
- ▶ Revert to main data set and universe of renters
 - Identify renters pre-policy
 - Identify renters post-policy
 - Measure transition rate before-versus-after
- ▶ Modify DiD design
 - Predict LTV for renting population
 - Measure transition rate for affected-versus-unaaffected

#2 Poor households less likely to get on property ladder

Dependent variable: <i>Homeowner</i>					
Household finance variable:					
Sample:	All	<i>Income_t</i>		<i>Wealth_{t-1}</i>	
		Low	High	Low	High
	[1]	[2]	[3]	[4]	[5]
<i>After</i> × <i>d(LTV > 106)</i>	-0.002*** (0.000)	-0.004*** (0.001)	-0.003*** (0.001)	-0.006*** (0.001)	-0.002** (0.001)
Postcode fixed effects	Y	Y	Y	Y	Y
Borrower control variables	Y	Y	Y	Y	Y
<i>N</i>	1,965,072	982,468	982,486	982,432	982,499
<i>R</i> ²	0.03	0.02	0.05	0.04	0.02

- ▶ Low wealth households: 19.4%pt reduction in transition rate

Summary

- ▶ **Households respond to the LTV limit by reducing:**

- 1 Mortgage debt
- 2 Overall leverage (no “leakages” to unregulated debt)
- 3 Liquidity
- 4 Mortgage defaults
- 5 Transition rate into homeownership

- ▶ **Further potential implications for households:**

- 1 Does lower leverage improve resilience to negative shocks?
 - ▶ We already looked at this unconditionally
 - ▶ Default and consumption response to income/wealth loss
 - ▶ This really is the bigger question
- 2 Private wealth accumulation and inequality
- 3 Durable goods consumption at time of purchase
- 4 Role of institutional buyers (“buy-to-let”)