Household Debt and Economic Growth in Europe

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[1]The views expressed are purely those of the writer and may not in any circumstance be regarded as stating an official position of the European Commission.

Motivation

- The **2008-2013 double-dip recession** in Europe had severe effects on output and employment with over 6 million jobs lost
- Did **household debt** play a role in reinforcing the economic slump?
  - US: Mian and Sufi (2010); Mian et al. (2013)
  - International: Mian et al. (2017)
  - Europe: Gambetti and Musso (2017); Bentolila et al. (2018)
- Two main views:
  - *credit supply shock*: relaxation of lending standards
  - *expectation view*: inflated house prices

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The European Case

- The **integration of financial markets** and the **creation of a monetary union** contributed to the convergence of interest rates across European economies
- This encouraged **capital inflows to peripheral countries** that played a major role in supporting credit expansions to households (Blanchard and Giavazzi, 2002)
- An additional factor that might have played a role in Europe was the **loose monetary conditions** (Maddaloni and Peydró, 2011)

In this paper

Use a **loan-level** data set on household debt for 8 European countries

$\rightarrow$ aggregate micro information to analyze the **regional** impact

1. Build a measure to evaluate the mis-pricing on credit markets
   $\rightarrow$ evidence of a **credit supply shock** shock during the housing boom

2. **IV** to study the role of household debt on *output* and *employment*
   $\rightarrow$ regions hit hardest by credit supply, suffer most in 2008-11
   $\rightarrow$ recessionary effects are significantly larger in 2008-13

3. Analyze this effect across the **quartiles of the income distribution**
   $\rightarrow$ low- and middle-income borrowers more sensitive to CS shocks

Data

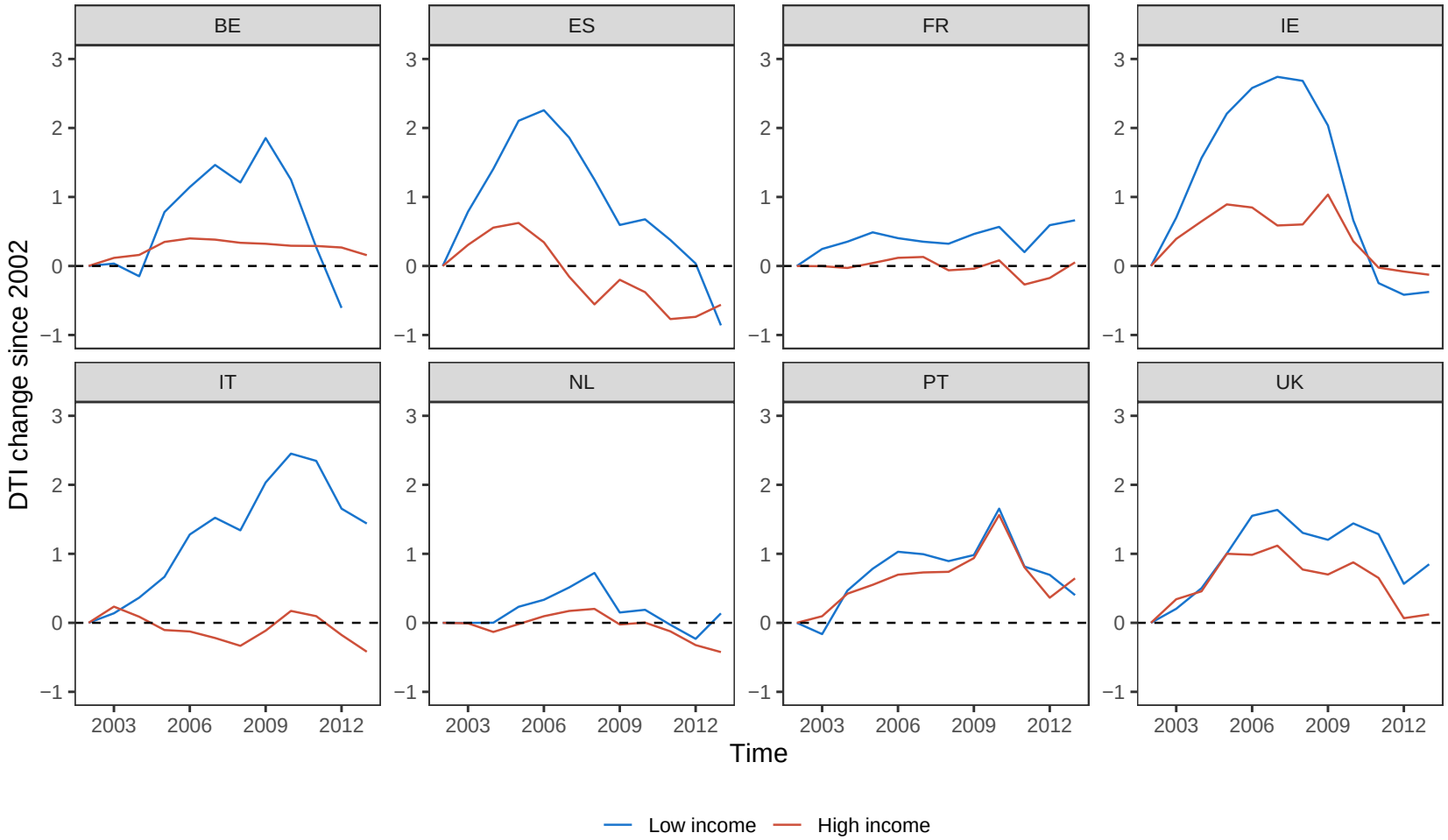
- European Datawarehouse (EDW) collects loan information from financial institutions that participate to the Asset-Backed Securities loan-level initiative of the ECB
- Over **10 million mortgages** originated between 2000-13 for Belgium, Spain, France, Ireland, Italy, Netherlands, Portugal and the UK
- Characteristics:
  - *loan* (e.g. amount at origination, interest rate and type, loan term)
  - *borrower* (e.g. annual income, employment status)
  - *asset* (e.g. property value, zip code)
- Aggregate the loan-level information at the **NUTS3 regional level**

Descriptive Analysis - DTI

Our variable of interest is **Debt-to-Income (DTI)** which we define as total amount of new loans originated by a household in one year divided by its total annual gross income

Descriptive Analysis - DTI

DTI change for bottom and top income quartiles in the 2002-13 period

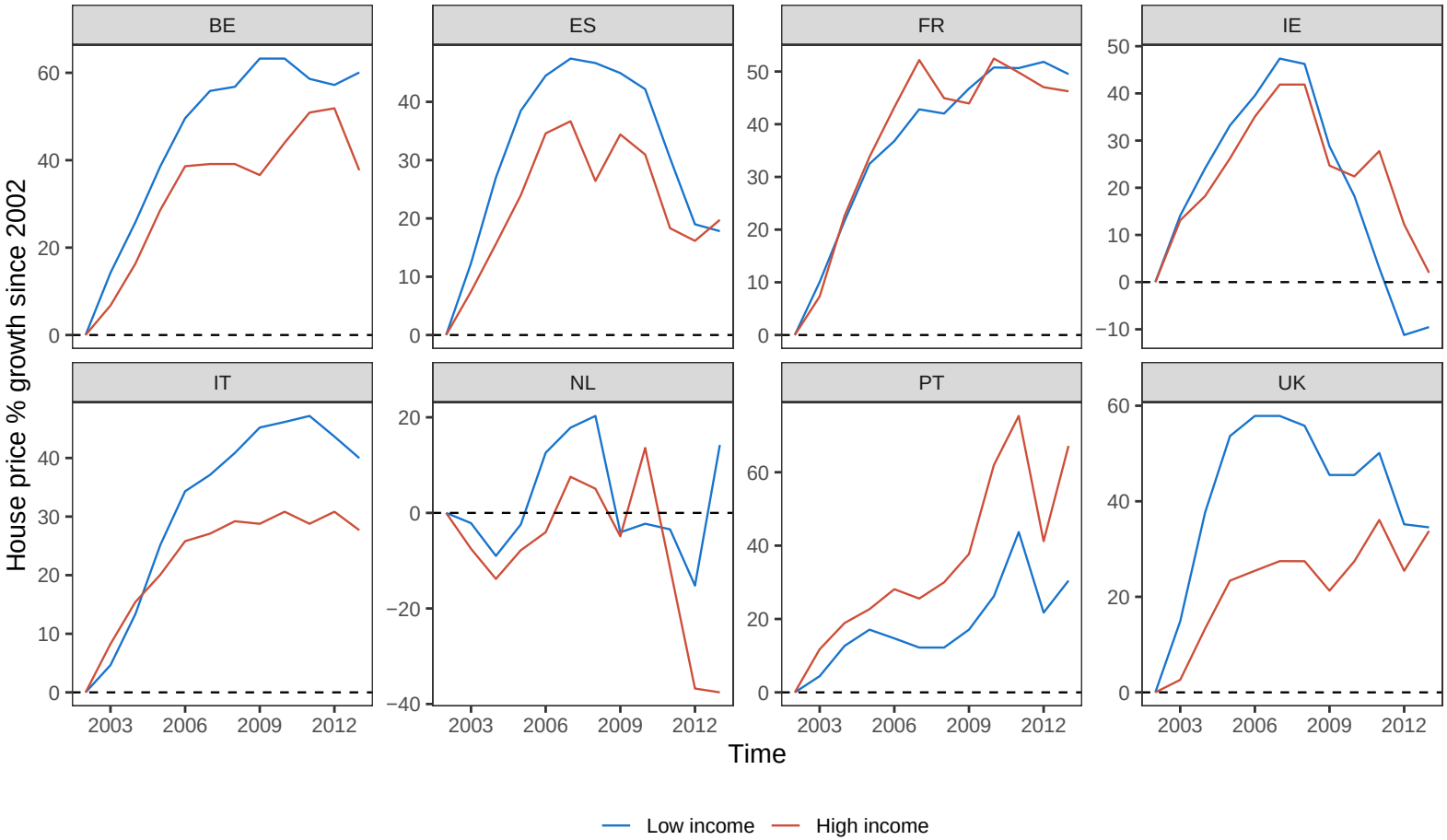


Leverage increases faster for low relative to high income (in all countries)

Total debt

Descriptive Analysis - House Prices

Percentage growth (relative to 2002) of the average house price for the bottom and top income quartiles in the 2002-13 period



Low-income house prices grew faster than high-income (not FR and PT)

The Model

Explain the effect of leverage pre-crisis on macro performance after 2008:

$$\Delta_h y_{g,2008+h} = \beta_h DTI_{g,2002-07} + \lambda_h' \mathbf{W}_{g,2000-03} + \varepsilon_{g,2008+h}$$

where:

- $\Delta_h y_{g,2008+h}$: growth rate of y in region g between 2008 and 2008+h
- $DTI_{g,2002-07}$: the average DTI in region g during the 2002-07 period
- $\mathbf{W}_{g,2000-03}$: a vector of control variables
- Macroeconomic outcome (y): GDP and Employment
- Control variables: Debt over GDP (2000-03), regional share of employment in manufacturing and non-tradable sectors, regional population density, dummy if region is urban

The Model

We expect $\hat{\beta}_h < 0$ if there was a **credit supply shock**:

- Financial integration and the monetary union led to the converge of interest rates across Europe (Blanchard and Giavazzi, 2002)
- Lower rates encouraged household borrowing (e.g., home buying)
- A rapid and excessive credit expansion predicts lower output growth (Jordà et al., 2015; Mian et al., 2017)

We expect $\hat{\beta}_h > 0$ in the **expectation view**:

- Increased borrowing in expectation, e.g., of future income growth

We estimate the model by **IV** using *credit shock* as an instrument for DTI

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Credit Shock

We measure the credit shock as the difference between the loan rate and the predicted rate (Hurst et al., 2016; Justiniano et al., 2022)

Loan-level regression of the rate on loan, borrower, and regional features:

$$r_{i,g,t} = \alpha + \beta' X_{i,g,t} + \epsilon_{i,g,t}$$

- *Estimation*: loans originated 2000-02
- *Prediction*: loans originated 2003-08

The **Credit Shock (CS)** is the aggregation of the shock by regions:

$$\epsilon^*_{g,t} = \frac{1}{N_{g,t}} \sum_{i=1}^{N_{g,t}} \left(r_{i,g,t} - \hat{\alpha} - \hat{\beta}' \boldsymbol{X}_{i,g,t} \right) = \frac{1}{N_{g,t}} \sum_{i=1}^{N_{g,t}} \hat{\epsilon}_{i,g,t}$$

CS interpretation

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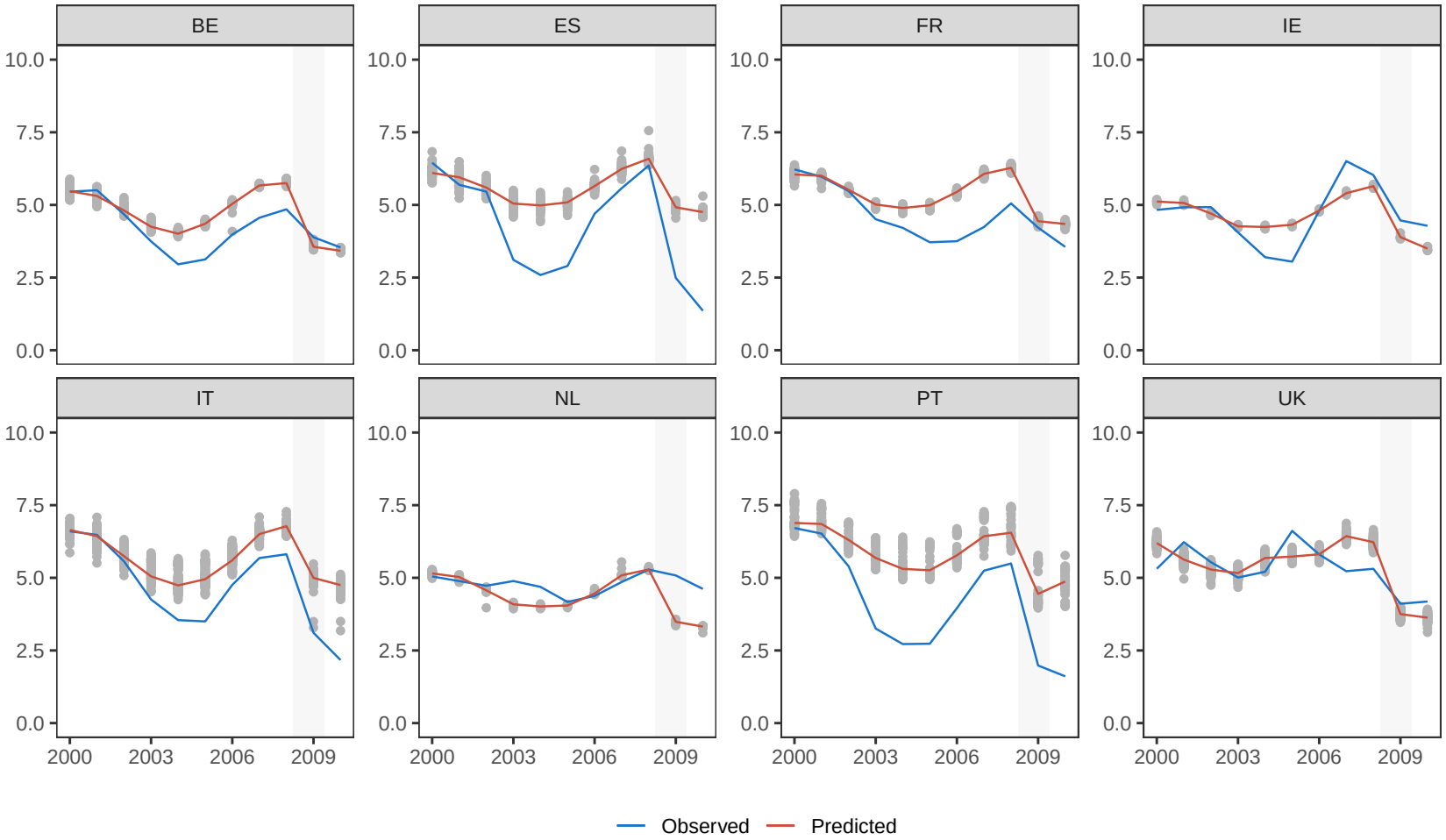
CS interpretation

Predicted and Observed Interest Rates

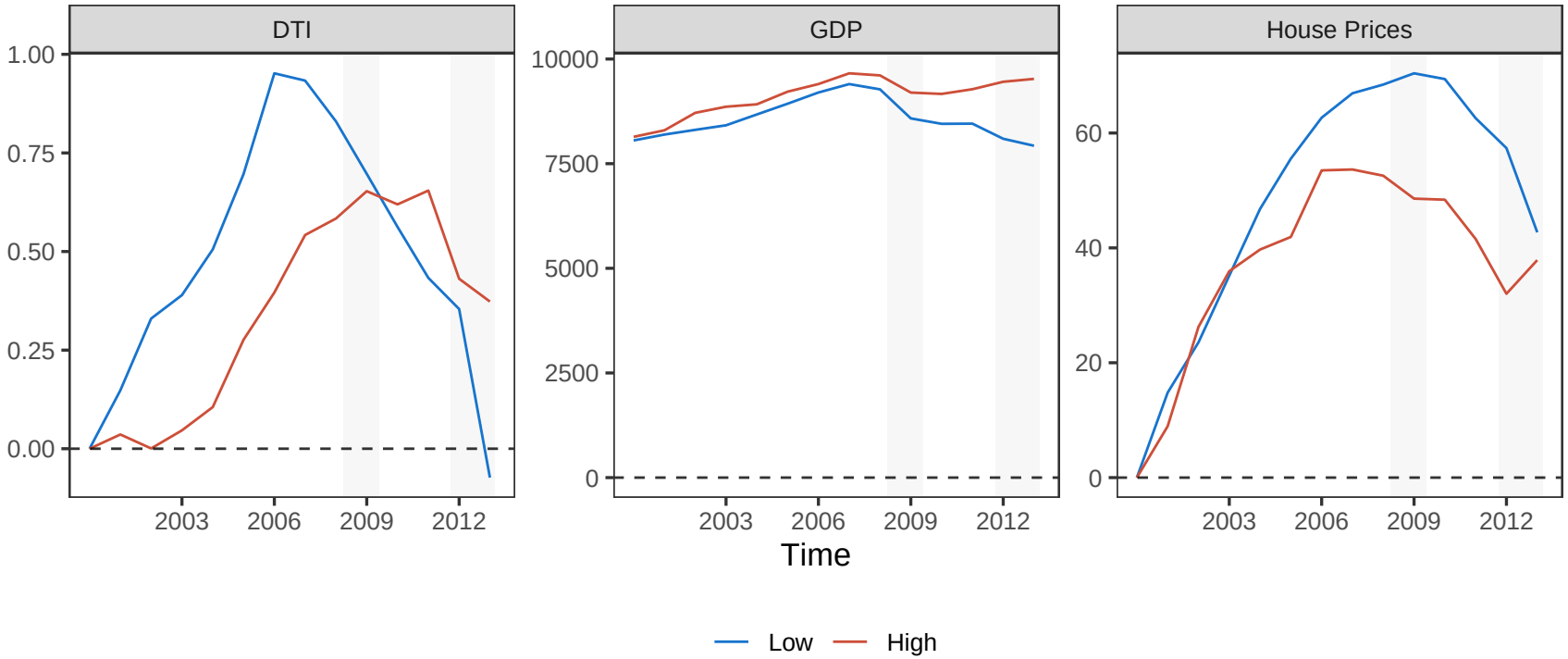
The predicted and observed (average) interest rate by country: dots around the predicted line represent the regional predicted interest rates



CS for income distribution

Additional Evidence of CS

Change (relative to year 2000) of DTI, real GDP growth (in Euro), and house prices for the lowest and highest quartiles of the credit shock



The low CS quartile experienced a boom in DTI, followed by rising house prices and a severe GDP drop

IV: First-stage

Estimation results of the first stage regression for $DTI_{2002-2007}$ using the credit shock (CS) as the instrumental variable.

Dependent Variable: $DTI_{2002-2007}$	Estimate	SE
CS	-1.348***	0.057
Observations	490	
R^2	0.600	
F Statistic	120.960***	

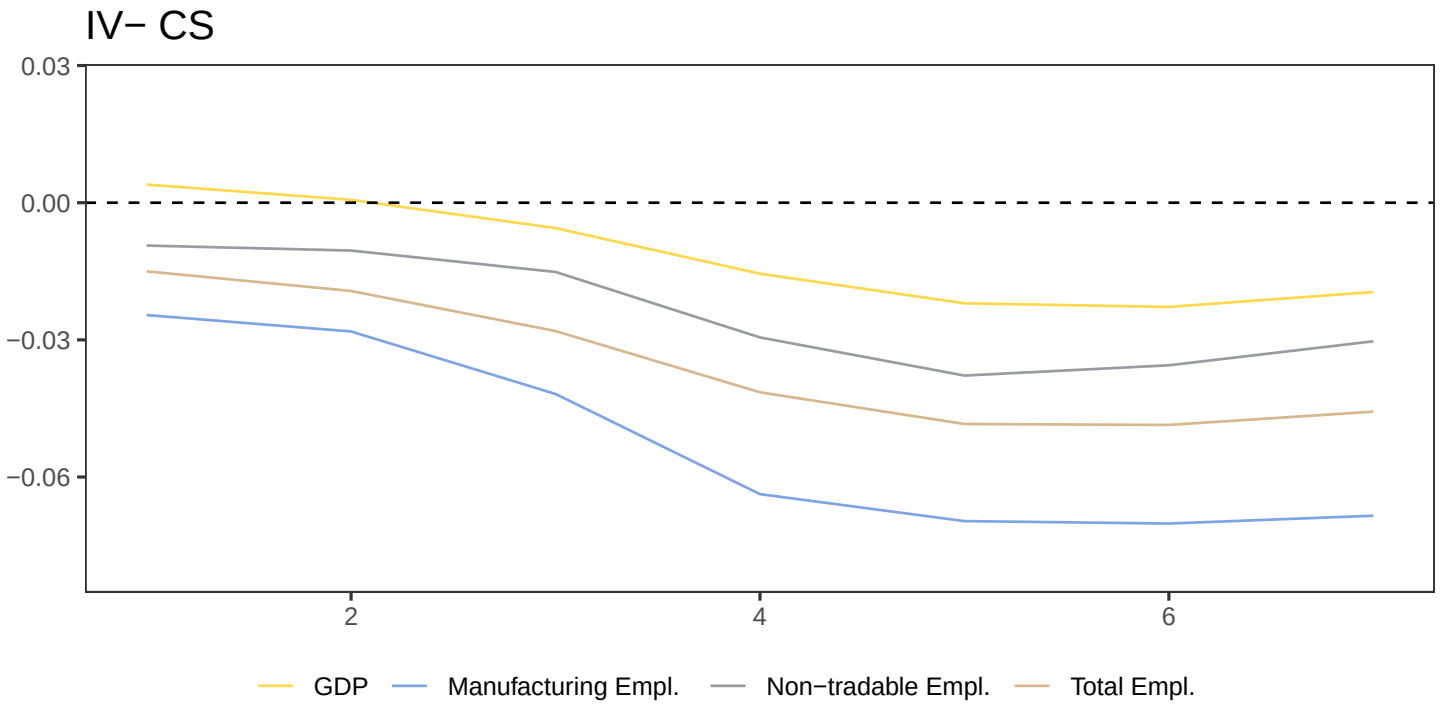
A 1% decline in CS is on average associated with an increase in DTI of 1.348 points, *ceteris paribus*.

IV: Second-stage

	GDP	Total Employment	Manufacturing Employment	Non-tradable Employment
			2008-2011	
OLS	-0.011***	-0.028***	-0.036***	-0.016***
	(0.002)	(0.001)	(0.003)	(0.002)
IV (CS)	-0.006***	-0.028***	-0.042***	-0.015***
	(0.002)	(0.002)	(0.004)	(0.002)
			2008-2013	
OLS	-0.029***	-0.046***	-0.064***	-0.031***
	(0.002)	(0.002)	(0.003)	(0.002)
IV (CS)	-0.023***	-0.049***	-0.070***	-0.036***
	(0.003)	(0.003)	(0.004)	(0.003)

Impulse response

Change of β_h as a function of the horizon h (IV estimation)



Increasingly negative effect of household leverage on output and employment as the horizon increases

Conclusion

- Loan-level dataset of over **10 million** loans for 8 European countries
- The evidence indicates that **excessive borrowing by households** played a role in the European double-dip recession between 2008-13
- Our findings show the potentially large effects on the local economy of credit booms triggered by a **credit supply shock**
- Also in the case of Europe, the housing market played a major role by transmitting the credit supply shocks from the financial sector to the real economy through the balance sheet households

Working paper

The working paper is available in SSRN:

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3684399

Additional material:

- **EDW** preparation and representativeness
- **Housing Supply Elasticity** for the EU (Saiz, 2010)
- Detailed results of IV estimates for quartiles of **income distribution**

References I

Bentolila, S., Jansen, M., Jiménez, G., 2018. When credit dries up: Job losses in the Great Recession. Journal of the European Economic Association 16 (3), 650–695.

Blanchard, O., Giavazzi, F., 2002. Current account deficits in the euro area: The end of the Feldstein-Horioka puzzle? Brookings Papers on Economic Activity 2, 147–186.

Gambetti, L., Musso, A., 2017. Loan supply shocks and the business cycle. Journal of Applied Econometrics 32 (4), 764–782.

Hurst, E., Keys, B. J., Seru, A., Vavra, J., 2016. Regional redistribution through the US mortgage market. American Economic Review 106 (10), 2982–3028.

Jordà, Ò., Schularick, M., Taylor, A. M., 2015. Leveraged bubbles. Journal of Monetary Economics 76, S1–S20.

Justiniano, A., Primiceri, G. E., Tambalotti, A., 2022. The mortgage rate conundrum. Journal of Political Economy 130 (1), 121–156.

References II

Maddaloni, A., Peydró, J.-L., 2011. Bank risk-taking, securitization, supervision, and low interest rates: Evidence from the euro-area and the US lending standards. Review of Financial Studies 24, 2121–2165.

Mian, A., Rao, K., Sufi, A., 2013. Household balance sheets, consumption, and the economic slump. The Quarterly Journal of Economics 128 (4), 1687–1726.

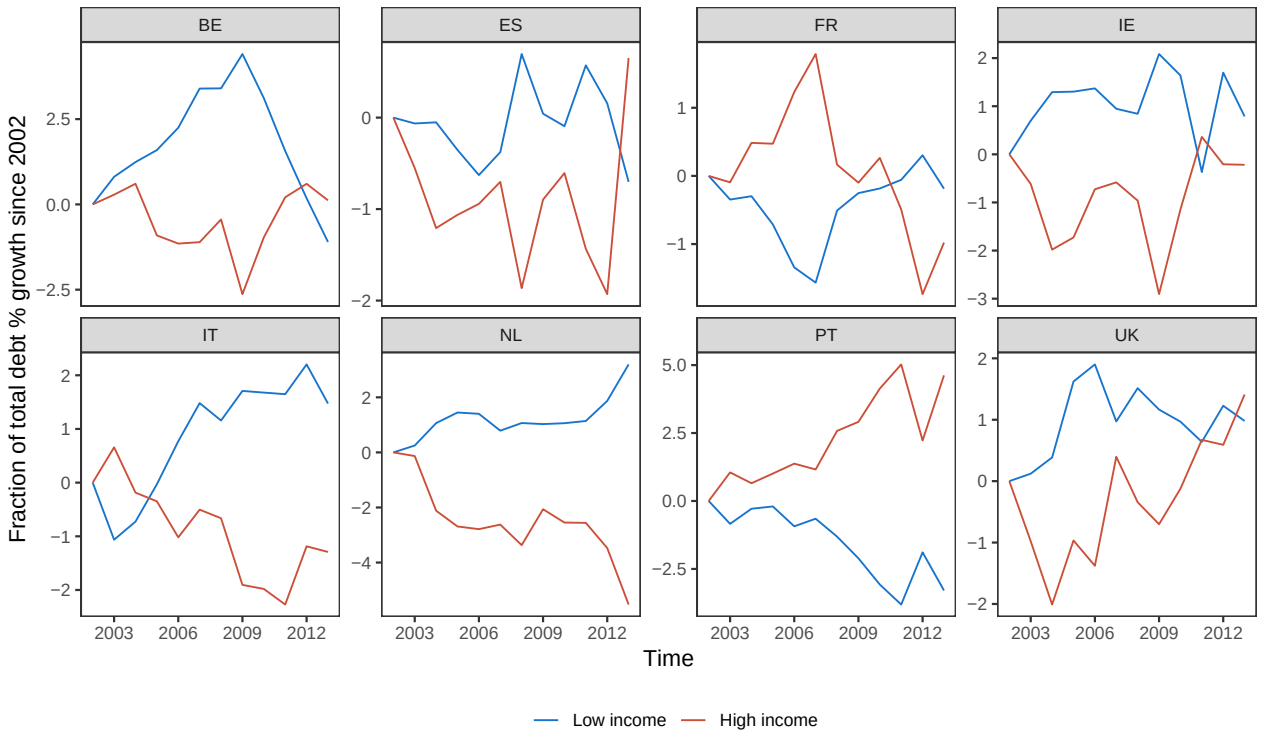
Mian, A., Sufi, A., 2010. Household leverage and the recession of 2007–09. IMF Economic Review 58 (1), 74–117.

Mian, A., Sufi, A., Verner, E., 2017. Household debt and business cycles worldwide. The Quarterly Journal of Economics 132(4), 1755–1817.

Saiz, A., 2010. The geographic determinants of housing supply. The Quarterly Journal of Economics 125 (3), 1253–1296.

Descriptive Analysis - total debt

Percentage growth (relative to 2002) of the fraction of total debt owned by the bottom and top income quartiles in the 2002-2013 period



In most countries (except FR and PT) low income households increased their borrowing more relative to high income

main

Credit Shock Interpretation

The *Credit Shock* (CS) is the aggregation of the shock by regions:

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The credit shock ϵ^*_t can arise because of a demand or a supply shock:

- *positive credit supply*:

  lenders are willing to lend on cheaper terms $\rightarrow \epsilon^*_{g,t} < 0$

- *positive credit demand*:

  households are willing to pay more $\rightarrow \epsilon^*_{g,t} > 0$ borrow more or at higher interest rates

main

CS by income distribution

Average CS by country for the bottom and top quartile households