

# How do Borrowers Adjust in a Household Foreign Currency Debt Crisis

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The views in this paper are solely those of the authors and do not reflect the views of the European Central Bank or the Central Bank of Hungary.

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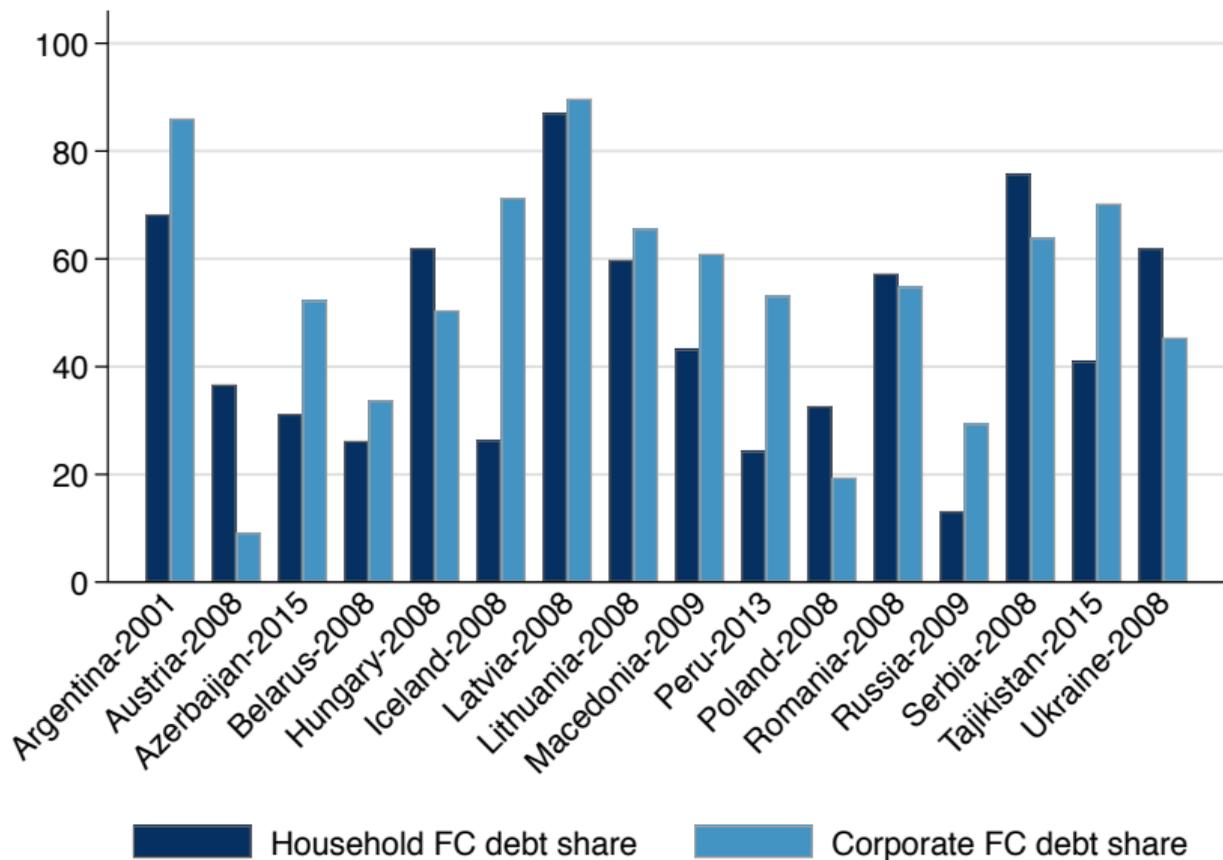
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- ▶ Less is known about **household** response to foreign currency debt revaluations
- ▶ Household balance sheet is an important transmission channel
  - ▶ In models of international financial crises (Lorenzoni 2014)
  - ▶ In heterogenous agent open economy macro models (de Ferra et al. 2019, Auclert et al. 2021)

# Household and Corporate FC Debt Exposures during Selected Crises



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# This Paper

- ▶ Examine the transmission of an **exchange rate shock** to household **consumption and labor supply** through **household foreign currency debt** positions
- ▶ Focus on the 2008 **currency crisis in Hungary**
  - ▶ 66% of outstanding household debt denominated in FC, mostly Swiss franc
  - ▶ Detailed household-level consumption survey data
- ▶ Exploit variation in the currency composition of household debt
  - ▶ **Compare foreign currency (FC) borrowers to similar local currency (LC) borrowers and non-borrowers**
  - ▶ Variation is driven by a policy change

# Main results

## Consumption response:

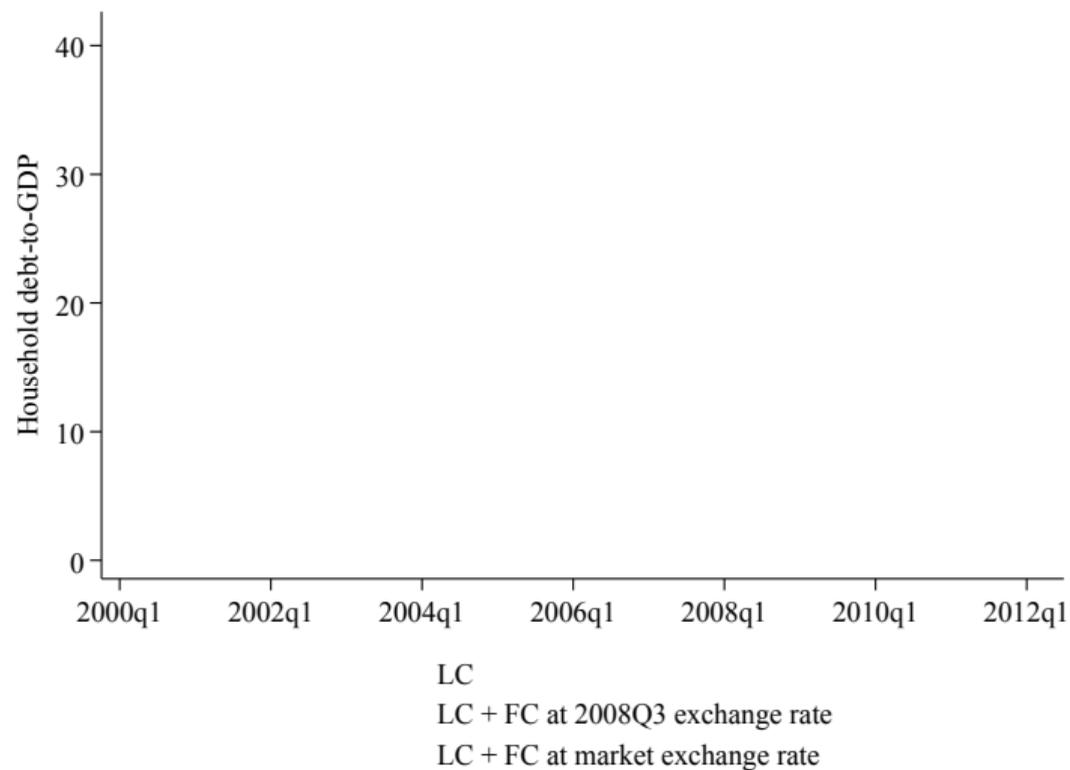
- ▶ Households with FC exposure reduce spending by 5% compared to similar LC borrowers
  - ▶ Marginal propensity to consume of  $\approx 1$  out of increased debt service
  - ▶ Consistent with liquidity constraints
- ▶ Reduction in both quantities purchased and prices paid
  - ▶ Substitution toward cheaper varieties
  - ▶ Consistent with *flight from quality*
  - ▶ Suggests non-homothetic preferences

## Labor supply response:

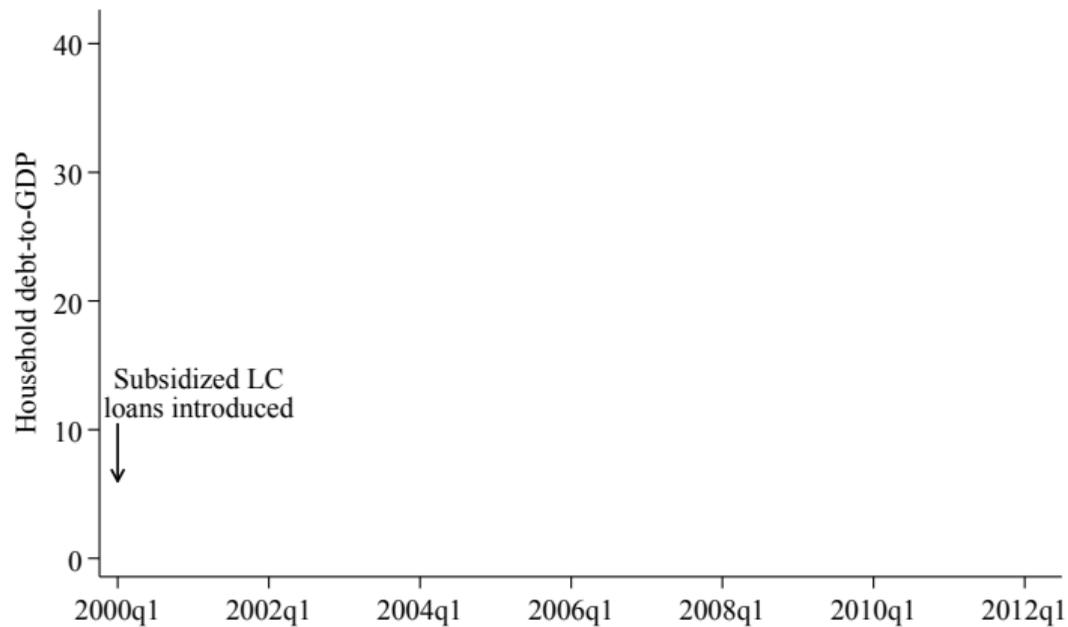
- ▶ No effect on labor market participation, unemployment, hours or earnings
- ▶ Adjustment towards foreign income streams
- ▶ Increase in home production
  - ▶ Substitution from money toward time-intensive goods

# Background

## Household credit expansion in the 2000s

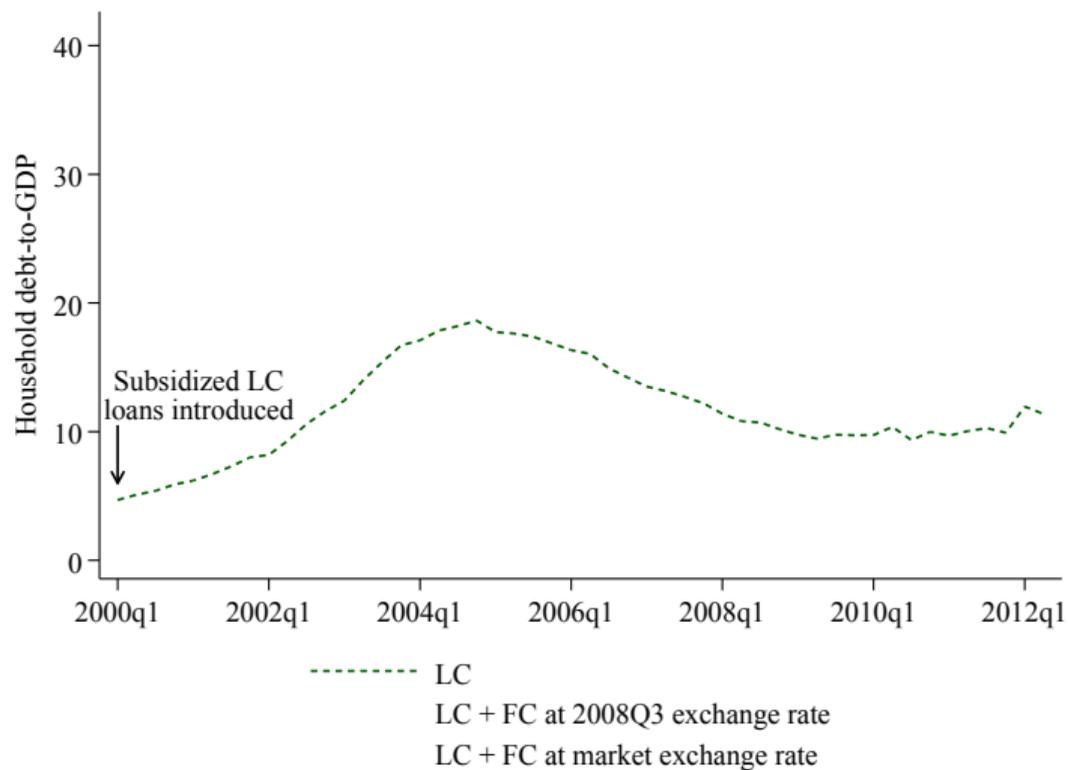


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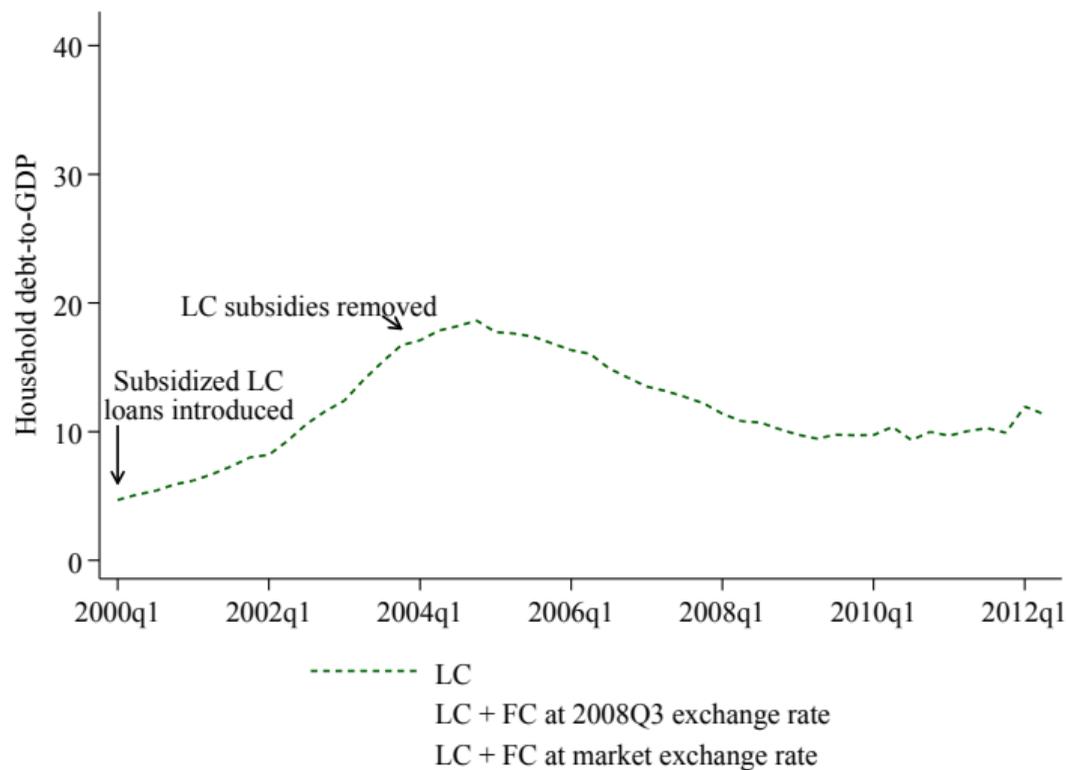


LC  
LC + FC at 2008Q3 exchange rate  
LC + FC at market exchange rate

## Household credit expansion in the 2000s

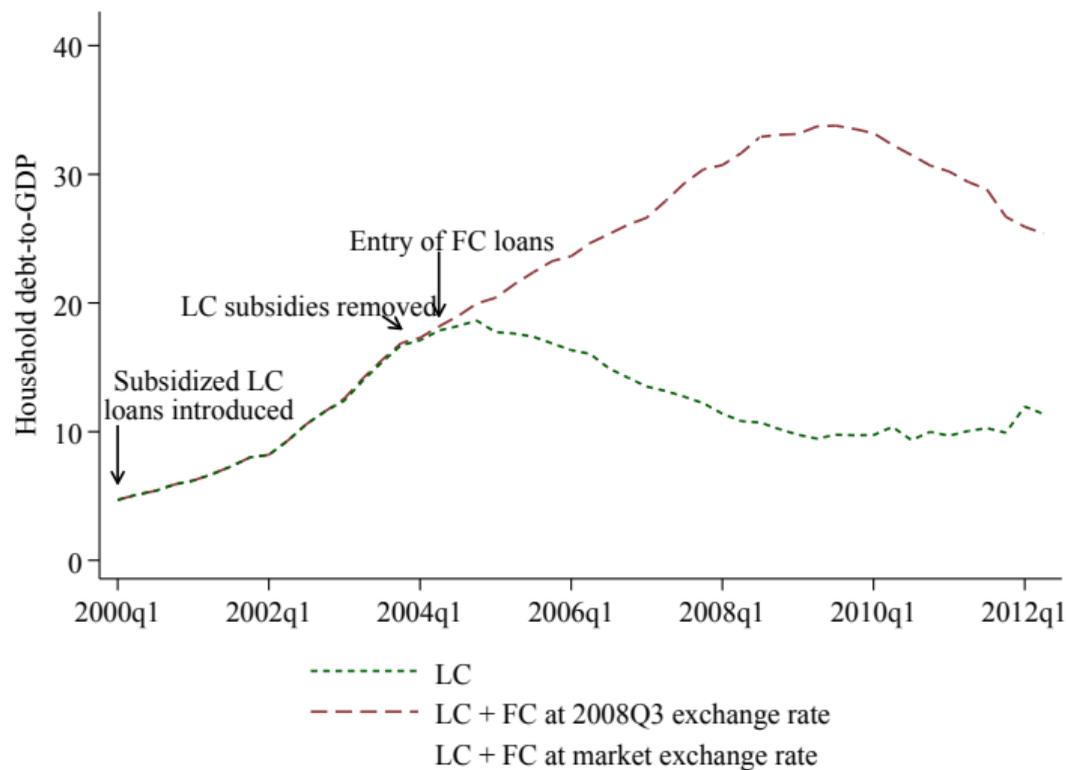


# Household credit expansion in the 2000s



► UIP deviation: 400bp difference between domestic vs foreign lending rates

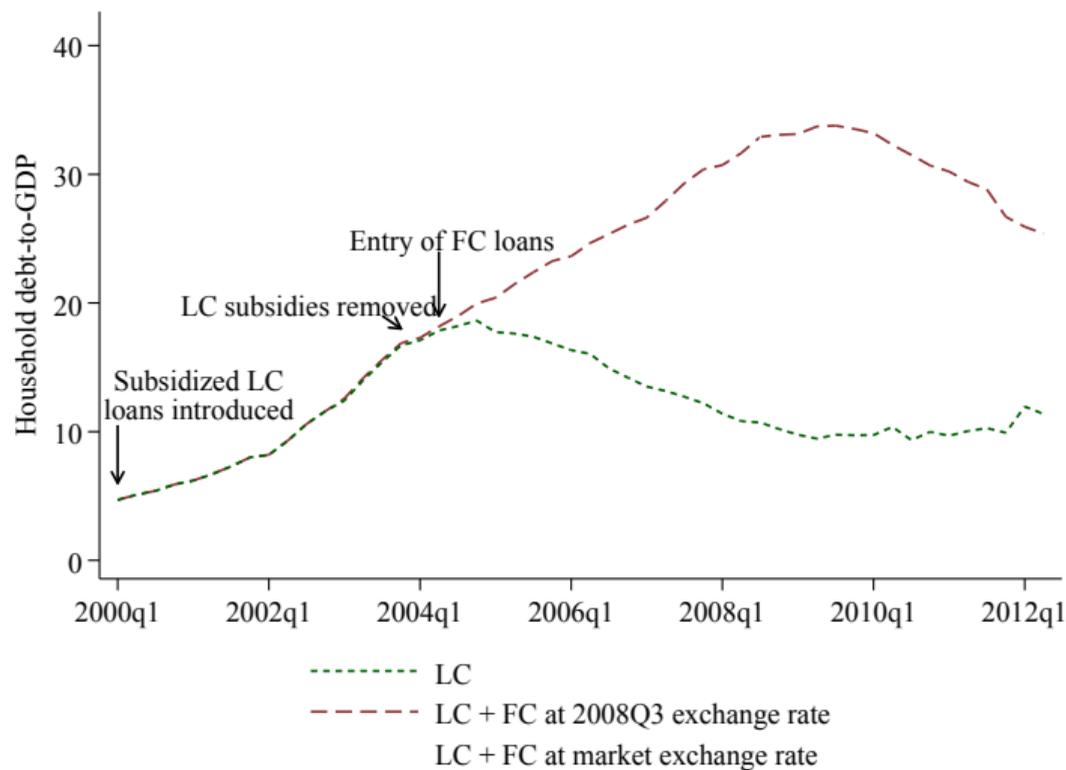
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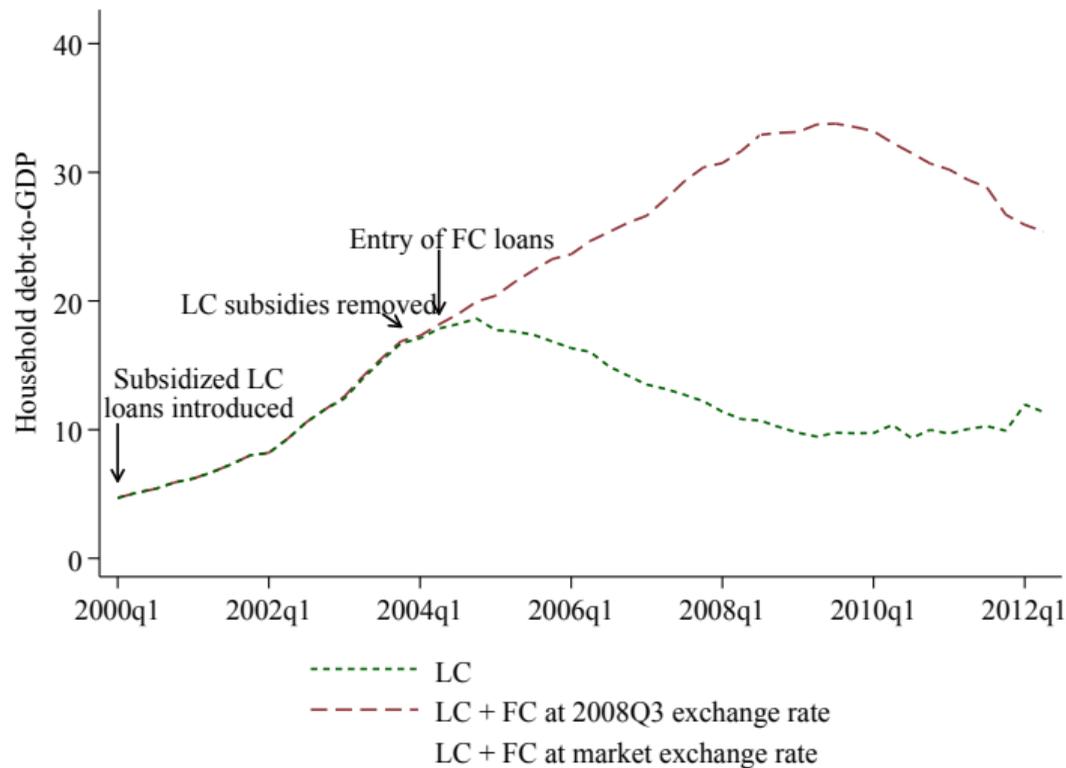
▶ Stable exchange rate environment

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- ▶ UIP deviation: 400bp difference between domestic vs foreign lending rates
- ▶ Stable exchange rate environment
- ▶ Supply-side: Foreign banks expanding their retail market share

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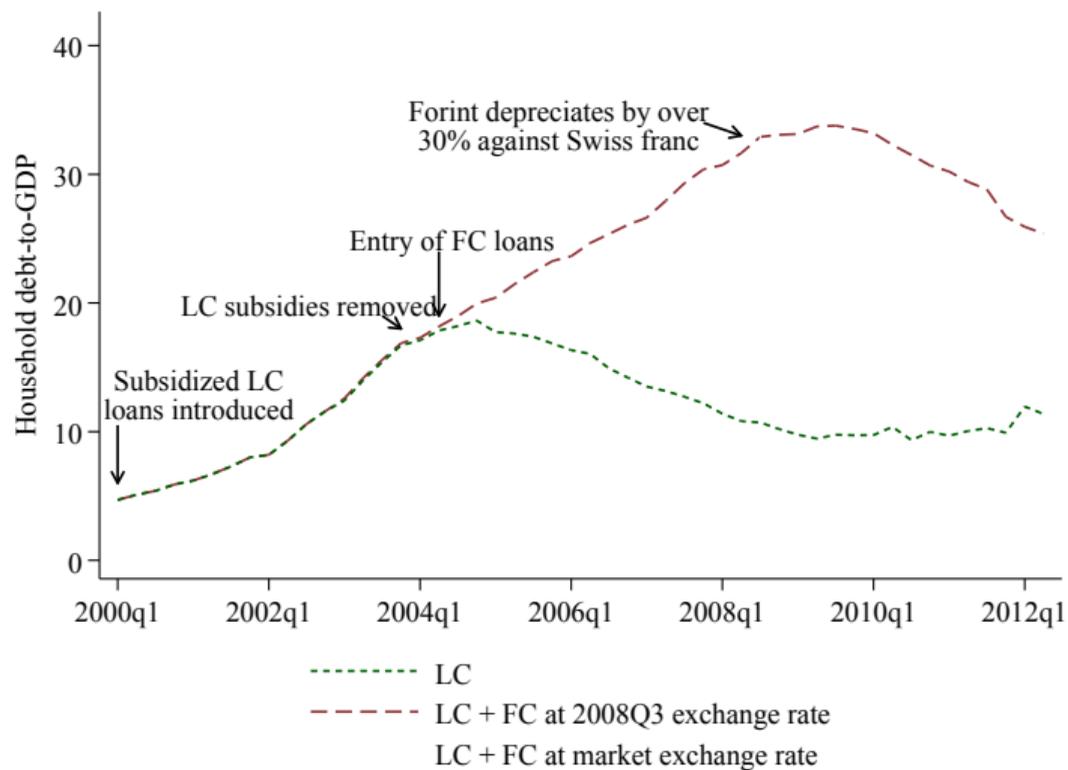
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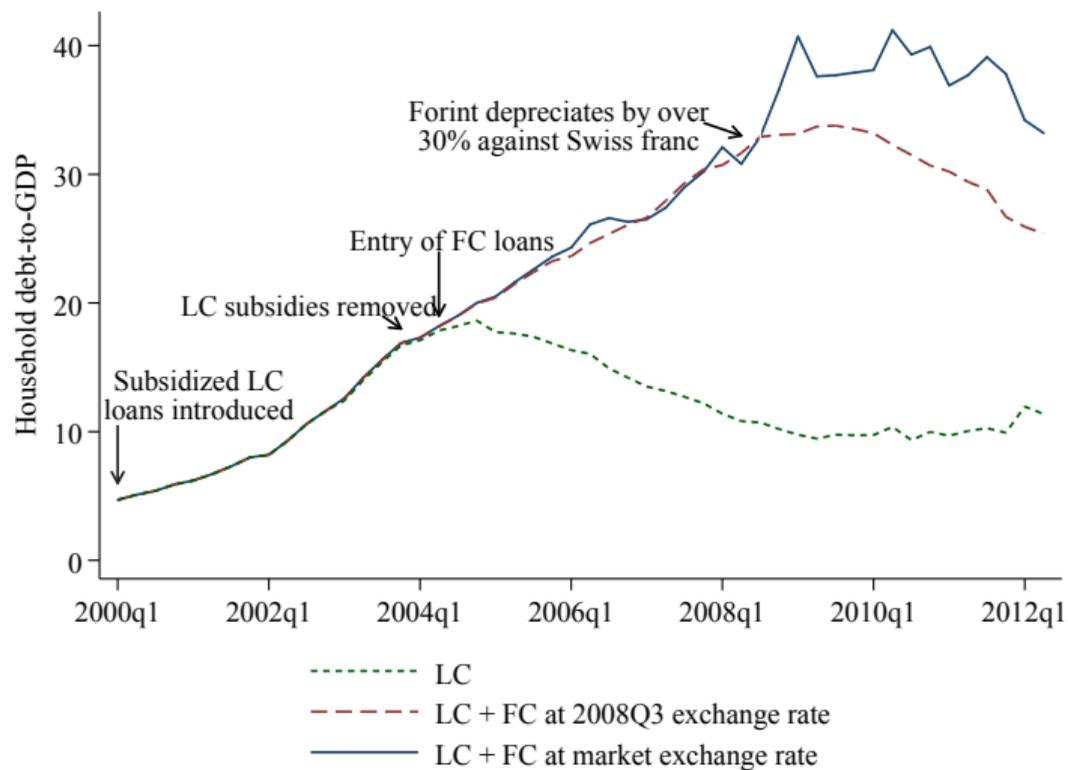
▶ Supply-side: Foreign banks expanding their retail market share

⇒ FC vs LC debt exposure determined by *timing* of borrowing

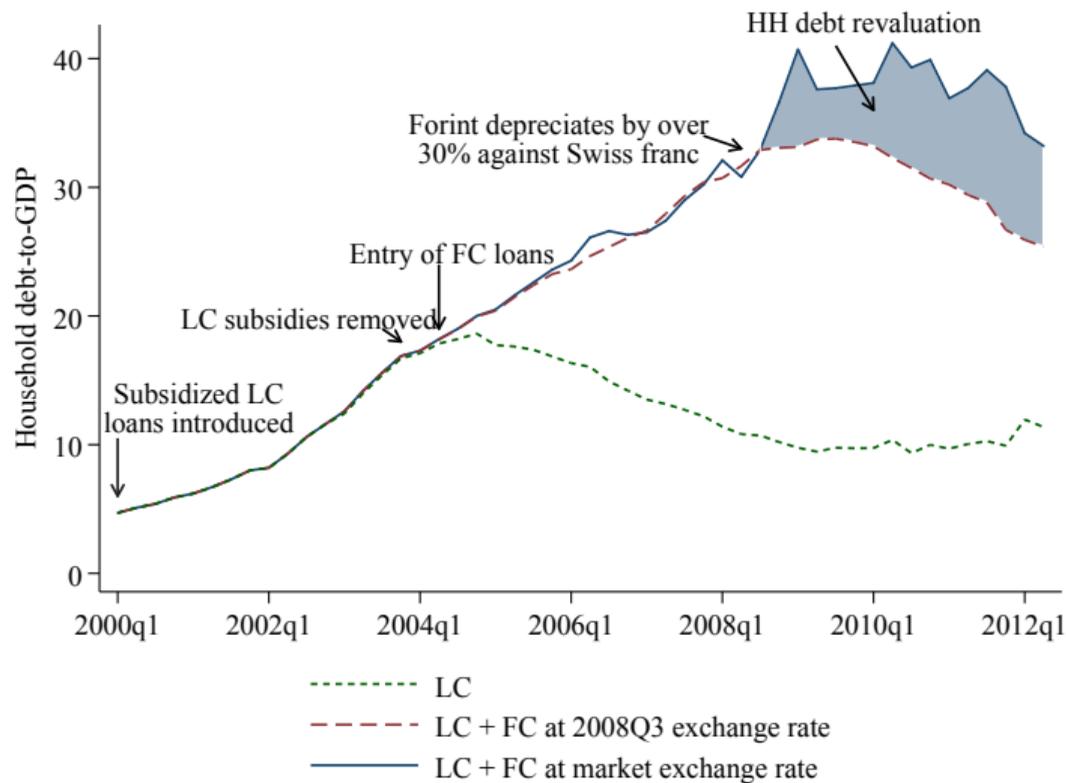
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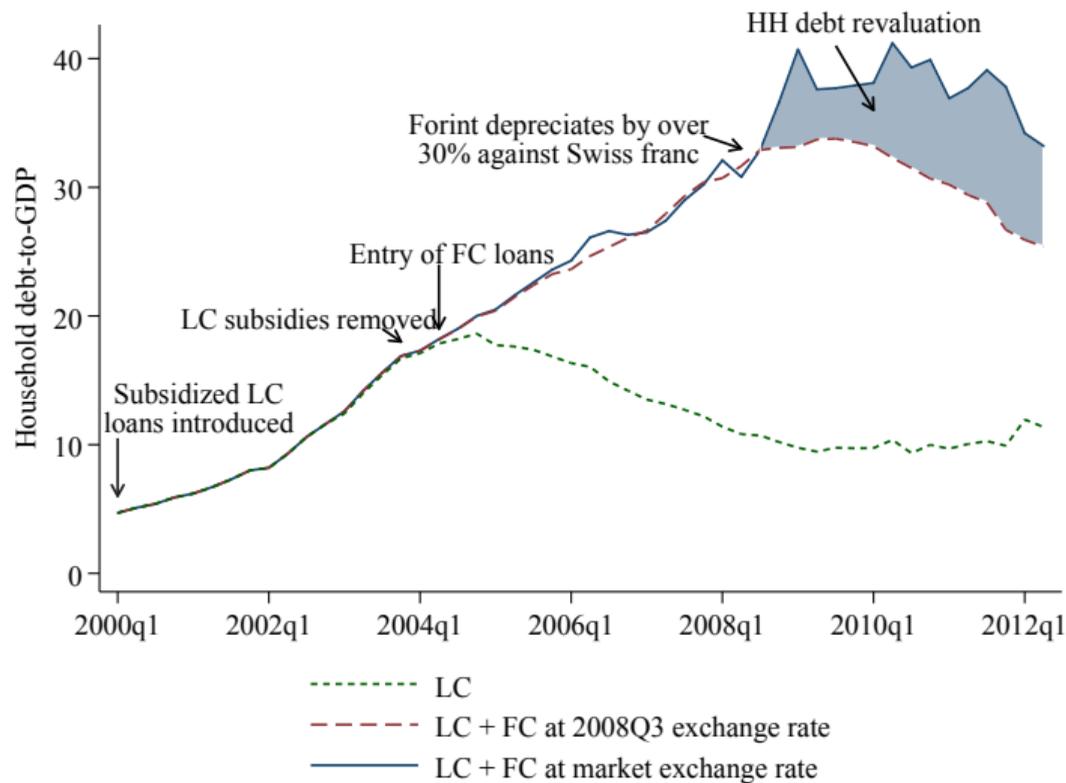


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► Raised HH debt-to-GDP by 6-10% of GDP

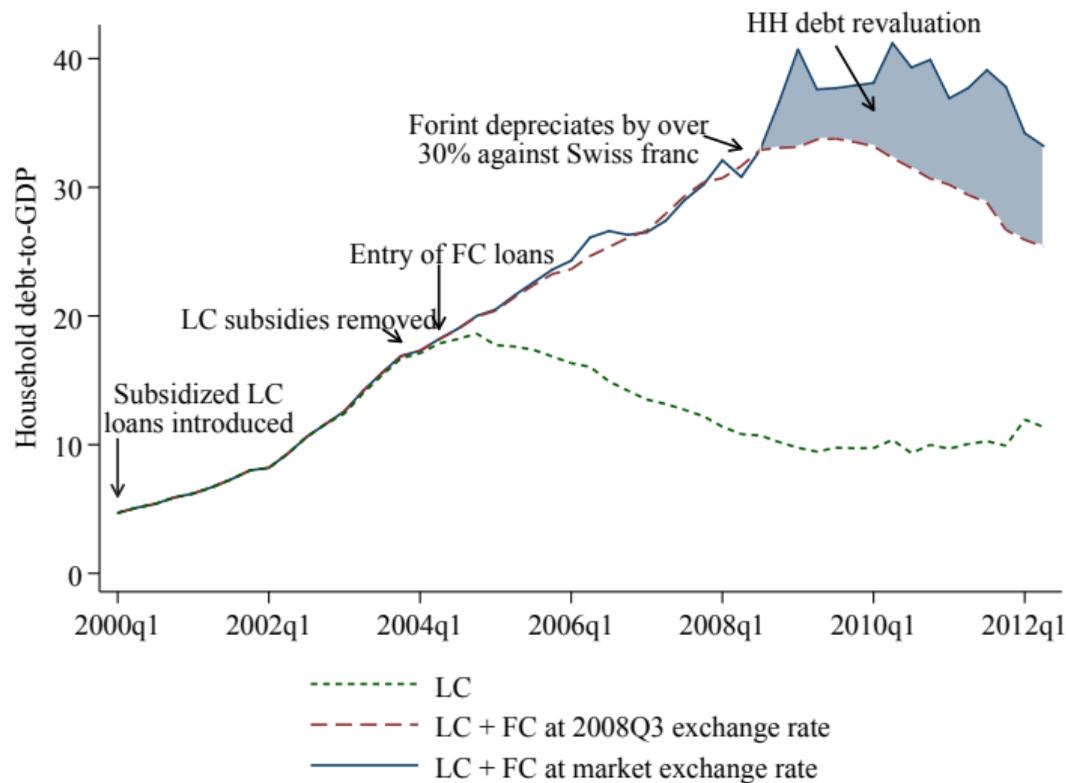
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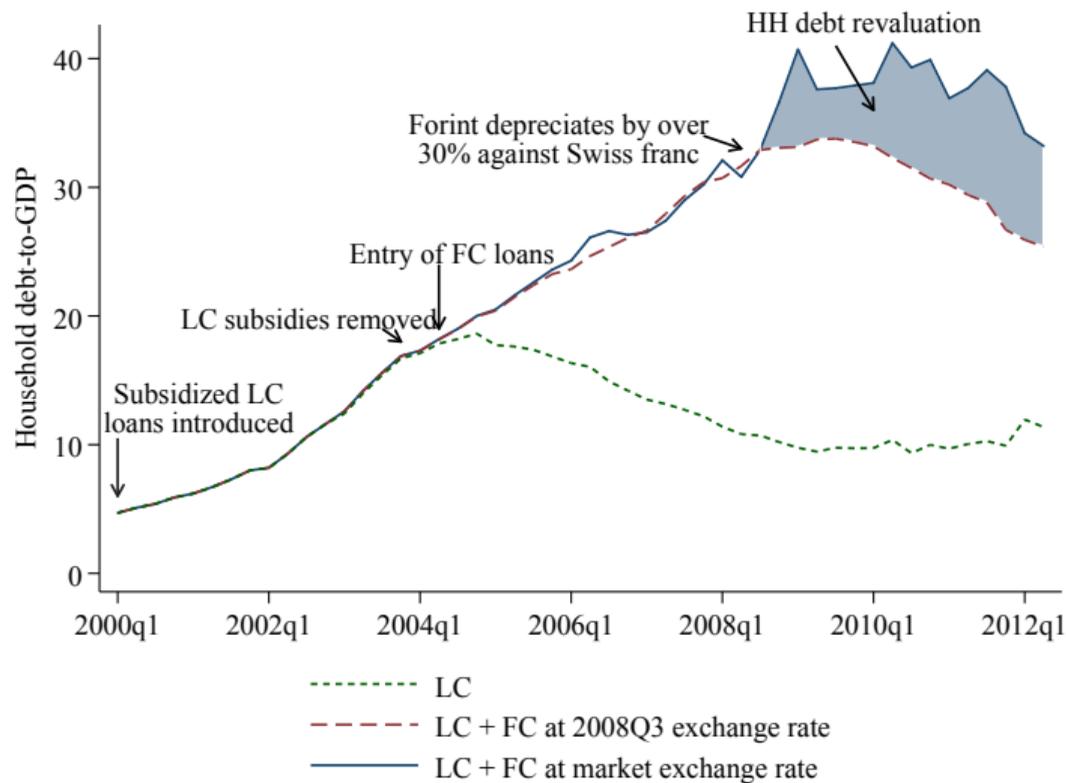
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- ▶ Raised HH debt-to-GDP by 6-10% of GDP
- ▶ FC exposure almost entirely unhedged
- ▶ Widespread phenomenon in emerging Europe in 2000s

# Data, Empirical Framework

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- ▶ Household Budget and Living Conditions Survey 2005-2012
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  - ▶ Primary outcome: non-durable consumption expenditure adjusted by Oxford scale (on 2007 prices)
  - ▶ Information provided on both *expenditures* and *quantities purchased* for three main categories (32% of total expenditure)
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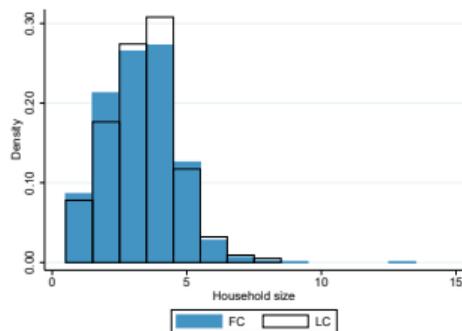
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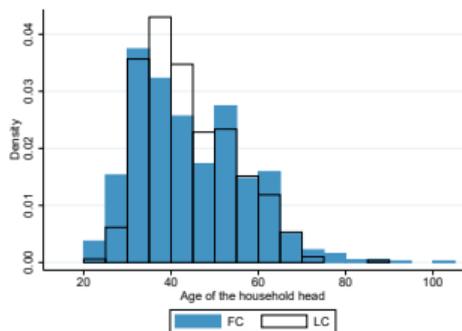
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- ▶ Labor market outcomes of all household members
- ▶ Household debt information includes loan currency denomination, loan size, and maturity
  - ▶ Provides household-level exposure to exchange rate depreciation through FC debt position

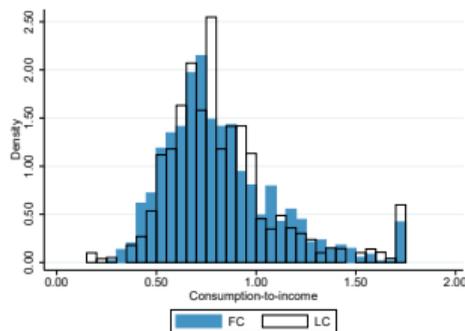
# Characteristics of FC Debtors and LC Debtors (Pre-Crisis)



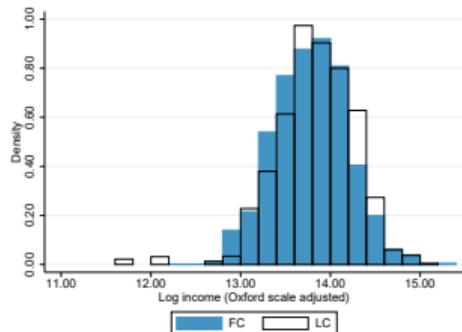
(a) Household size



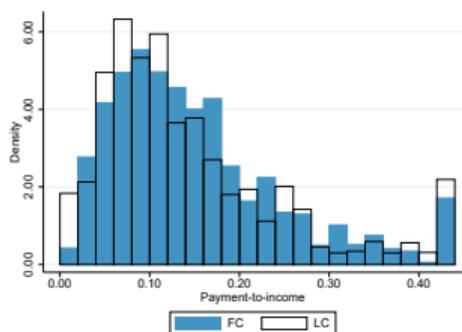
(b) Age of household head



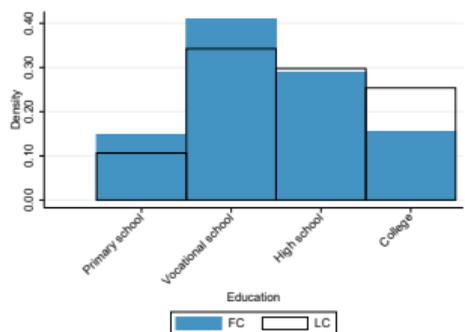
(c) Consumption to income



(d) Log income per capita



(e) Payment to income



(f) Education

# Empirical Framework

- ▶ Compare evolution of HH spending for FC debtors with LC debtors and non-borrowers:

$$\ln C_{it} = \alpha_i + \delta_t + \beta FC_i \times POST_t + \gamma NoDebt_i \times POST_t + \Gamma X_{it} + \varepsilon_{it}$$

where

- ▶  $\ln C_{it}$  is log consumption
- ▶  $\alpha_i$  and  $\delta_t$  are fixed effects
- ▶  $FC_i$  and  $NoDebt_i$  are indicators of household debt status
- ▶  $Post_t$  is a time dummy indicating post-2008 period
- ▶  $X_{it}$  are control variables interacted with  $Post_t$ : age, gender, education, region FE, contemporaneous income

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- ▶ Identifying assumption: **parallel trends**

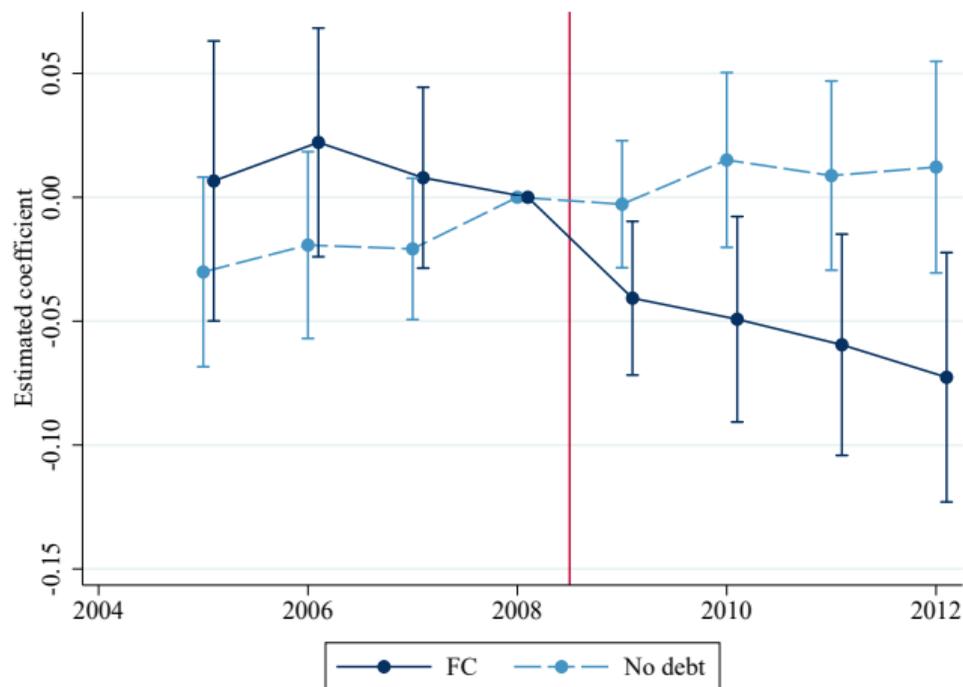
## Effect of FC Debt Exposure on Consumption

## Impact of Foreign Currency Debt Revaluation on HH Consumption

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- ▶ Calibrating using info from credit registry
  - ▶  $r = 5\%$ ,  $m = 18$
  - ▶  $\frac{\Delta c^{PI}}{\Delta c^{HtM}} = 1 - (1+r)^{-m} \approx 0.6$
  - ▶  $MPC^{PI} \approx 0.6$  and  $MPC^{HtM} = 1$

# Marginal Propensity to Consume

- ▶ Instrument loan payments with FC status
  - ▶ Currency denomination affects consumption only through increased loan payments

	(1)	(2)	(3)
Payment surprise	-0.957** (0.359)	-0.986** (0.354)	-0.920** (0.345)
Household & year FE	Yes	Yes	Yes
Household controls		Yes	Yes
Contemporaneous inc.			Yes
F statistic	110.9	116.5	117.2
<i>N</i>	59373	59321	59321

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- ▶ Point estimate consistent with hand-to-mouth model
- ▶ HH spending decline by 2012: \$931 (PPP)

## Heterogeneity in MPC

	Income in 2008		Liquidity in 2008		Education		Age	
	(1) Low	(2) High	(3) Low	(4) High	(5) Low	(6) High	(7) Young	(8) Old
Payment surprise	-1.228*	-0.666	-0.905*	-0.657	-1.131*	-0.863 <sup>+</sup>	-0.863*	-1.191
	(0.588)	(0.428)	(0.359)	(1.201)	(0.489)	(0.470)	(0.343)	(1.082)
Household & Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>N</i>	12594	12358	21007	3944	13679	11273	13357	11595

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# Margins of Household Adjustment

## Quantity and quality of expenditures

$$E_t - E_{t-k} = \underbrace{\sum_{j \in J_{t/t-k}} e_{jt} - \sum_{j \in J_{t/t-k}} e_{j,t-k}}_{\text{Intensive margin}} + \underbrace{\sum_{j \in J_{t/t-k}} e_{j,t-k} - \sum_{j \in J_{t-k}} e_{j,t-k}}_{\text{Exit}} + \underbrace{\sum_{j \in J_t} e_{jt} - \sum_{j \in J_{t/t-k}} e_{jt}}_{\text{Entry}}$$

$\underbrace{\hspace{15em}}_{\text{Extensive margin}}$

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Marshall-Edgeworth decomposition of intensive margin:

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- ▶ Homothetic preferences (e.g. CES): price change component=0
- ▶ “Flight from quality”: upward sloping *quality Engel curve*  $\Rightarrow$  price change component  $< 0$

## Quantity and quality of expenditures

	Total expenditures	Intensive		Extensive	
		Price	Quantity	Entry	Exit
FC × Post	-24705.7* (9860.08)	-5727.22* (2687.53)	-14559.68* (5860.49)	-9267.63 (5900.66)	964.18 (6189.76)
Household and Year FE	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes
N	39689	39689	39689	39689	39689
Percent of total	–	20.03%	50.92%	32.41%	-3.38%

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- ▶ 70/30 intensive vs extensive
- ▶ 70/30 quantity vs price

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- ▶ 70/30 intensive vs extensive
- ▶ 70/30 quantity vs price
- ▶ Consistent with substitution to lower quality products within the same product category
- ▶ Increased product-market search for lower prices of the same goods (Aguiar and Hurst 2005; Kaplan and Menzio 2015)

## Other channels

- ▶ No effect on labor supply
  - ▶ But increased probability of working abroad
- ▶ Increased home production
  - ▶ Substitute money-intensive goods with time-intensive goods

# Conclusion

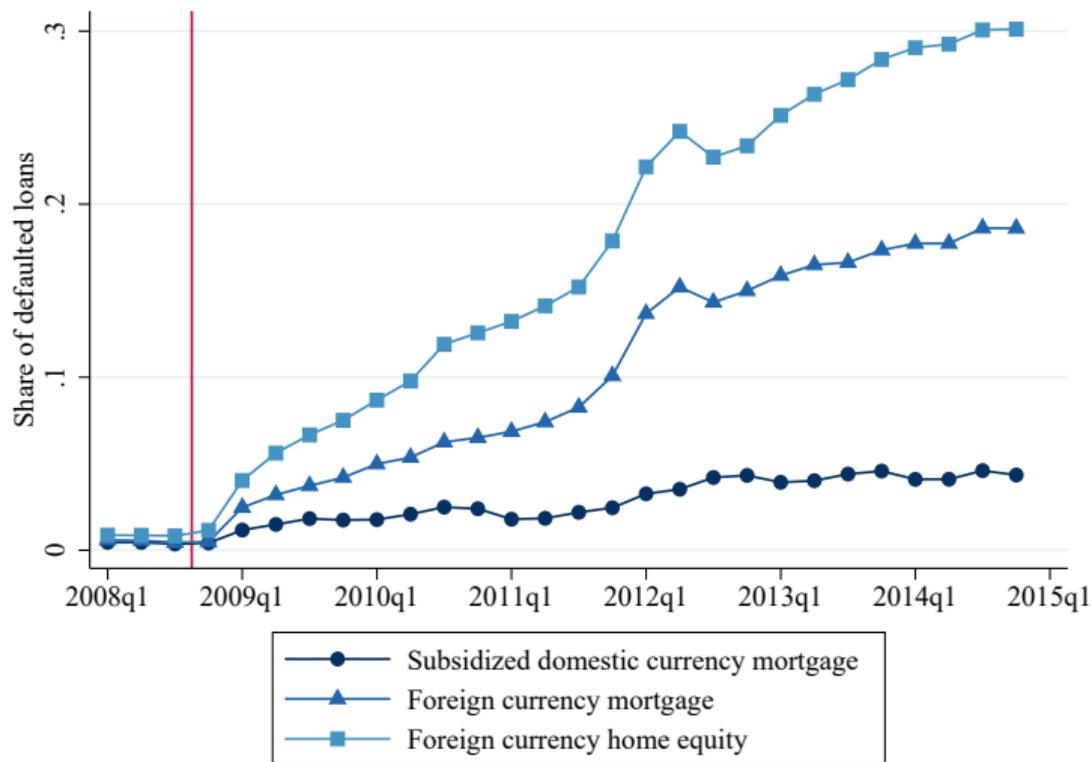
- ▶ Estimate transmission of **exchange rate shock** to **household consumption** through **foreign currency debt** exposure
- ▶ Strong household-level responses:
  - ▶ One-for-one decline in nondurable consumption
  - ▶ Flight from quality
    - ⇒ CPI can overstate inflation
  - ▶ Evidence consistent with models with liquidity constraints and non-homothetic demand
- ▶ Household FC debt can be an important component of the balance sheet channel in crises, especially because households are often unhedged
  - ▶ Role for macroprudential policy

**Thank you!**

# Additional results

- ▶ Robustness checks
  - ▶ Alternative equivalence scales [Results](#)
  - ▶ Propensity score matching [Results](#)
  - ▶ House prices [Results](#)
- ▶ General equilibrium [Results](#)
- ▶ Payment difficulties [Results](#)
- ▶ FC savings [Results](#)

## Rise in Default Rates on FC Loans



# Characteristics of FC Debtors, LC Debtors, and Non-Borrowers

	FC mean/sd	LC mean/sd	Non-borr. mean/sd	FC-LC difference b/t	Borrower-non-borr. difference b/t
Primary school	0.15	0.11	0.26	0.04*	-0.13**
	0.35	0.31	0.44	2.07	-11.29
Vocational school	0.41	0.34	0.30	0.07*	0.09**
	0.49	0.47	0.46	2.25	5.85
High school	0.29	0.30	0.28	-0.00	0.02
	0.45	0.46	0.45	-0.32	1.06
College	0.15	0.25	0.16	-0.10**	0.03*
	0.36	0.44	0.37	-4.18	2.35
Household size	3.27	3.37	2.43	-0.10	0.87**
	1.31	1.30	1.34	-1.34	21.68
Age	43.87	43.65	56.11	0.22	-12.31**
	12.50	10.35	15.27	0.33	-30.88
Female	0.17	0.14	0.30	0.03	-0.14**
	0.37	0.35	0.46	1.52	-12.70
Income (1000 HUF)	1049.15	1109.73	1062.83	-60.58*	7.07
	459.40	455.80	454.21	-2.28	0.50
Consumption to income	0.82	0.84	0.85	-0.02	-0.02
	0.30	0.33	0.33	-0.90	-1.61
Food exp. to income	0.20	0.20	0.22	0.00	-0.02**
	0.10	0.11	0.11	0.07	-6.16
Payment to income	0.15	0.15	0.00	0.00	
	0.09	0.10	0.00	0.45	
Have liquid assets	0.08	0.10	0.18	-0.02	-0.09**
	0.27	0.30	0.39	-1.39	-9.89
Capital	0.16	0.16	0.20	0.00	-0.04**
	0.37	0.37	0.40	0.20	-3.42
County capital	0.24	0.29	0.23	-0.05 <sup>+</sup>	0.02
	0.43	0.45	0.42	-1.89	1.41
Town	0.30	0.30	0.25	-0.00	0.05**
	0.46	0.46	0.43	-0.16	3.57
Village	0.30	0.25	0.31	0.05*	-0.03*
	0.46	0.43	0.46	2.02	-2.06
Observations	982	512	6156	1494	7650

## Labor supply: labor market participation and unemployment

<b>Panel A: Labor market status</b>				
	(1)	(2)	(3)	(4)
	Labor market participation		Unemployment	
FC × Post	-0.00726 (0.0135)	-0.00185 (0.0136)	0.00630 (0.0150)	0.00520 (0.0144)
Household & year FE	Yes		Yes	
Individual & year FE		Yes		Yes
Individual controls	Yes	Yes	Yes	Yes
$R^2$	0.689	0.899	0.517	0.723
$N$	154083	125953	74513	61299

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## Labor supply: Hours worked

<b>Panel B: Hours</b>				
	Primary job		Total	
FC × Post	0.201 (0.374)	-0.0131 (0.380)	0.433 (0.426)	0.192 (0.431)
Household & year FE	Yes		Yes	
Individual & year FE		Yes		Yes
Individual controls	Yes	Yes	Yes	Yes
$R^2$	0.518	0.731	0.504	0.707
$N$	36481	29579	36481	29579

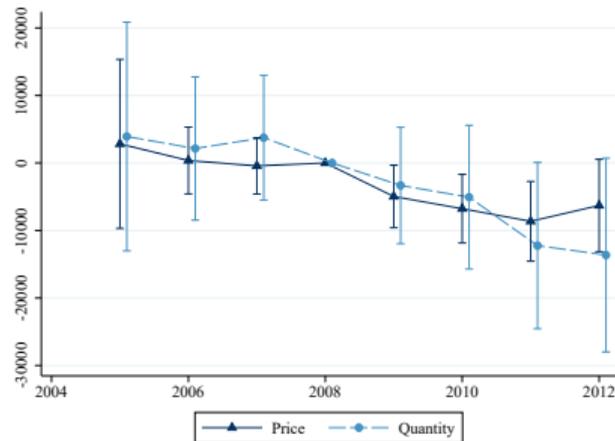
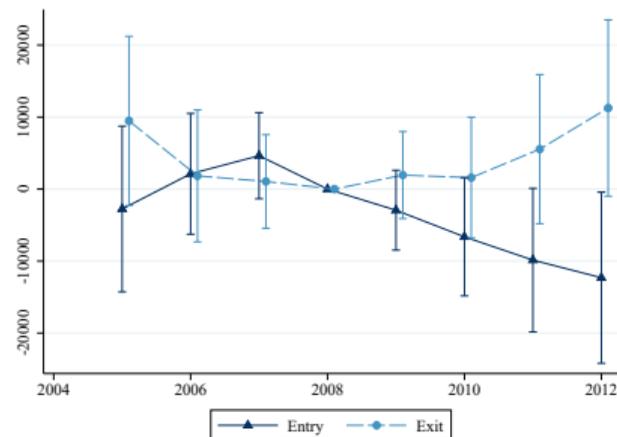
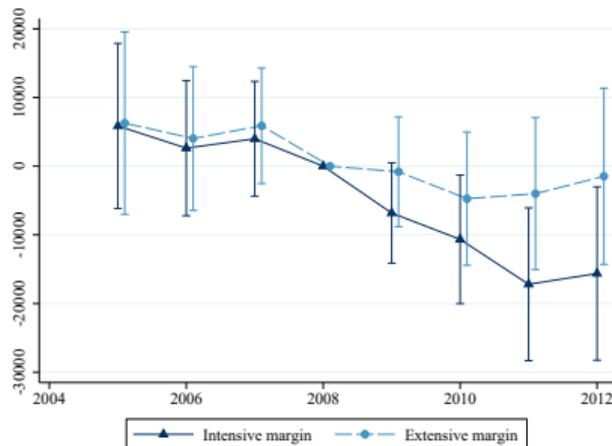
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## Labor supply: Income

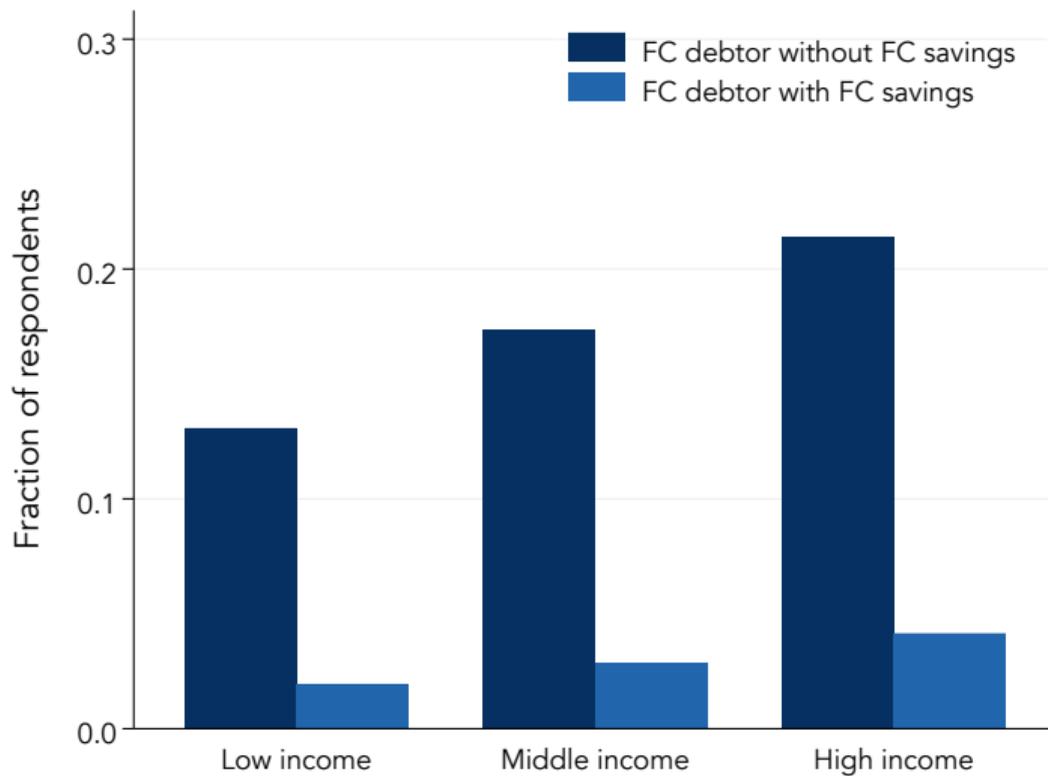
<b>Panel C: Income</b>				
	Net income		Income components	
	Total	Oxford adjusted	Wage income	Social and other income
FC × Post	-0.00739 (0.0176)	-0.0260 (0.0183)	-0.0333 (0.0292)	0.0213 (0.0364)
Household & year FE	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes
<i>N</i>	59373	59373	53043	55387

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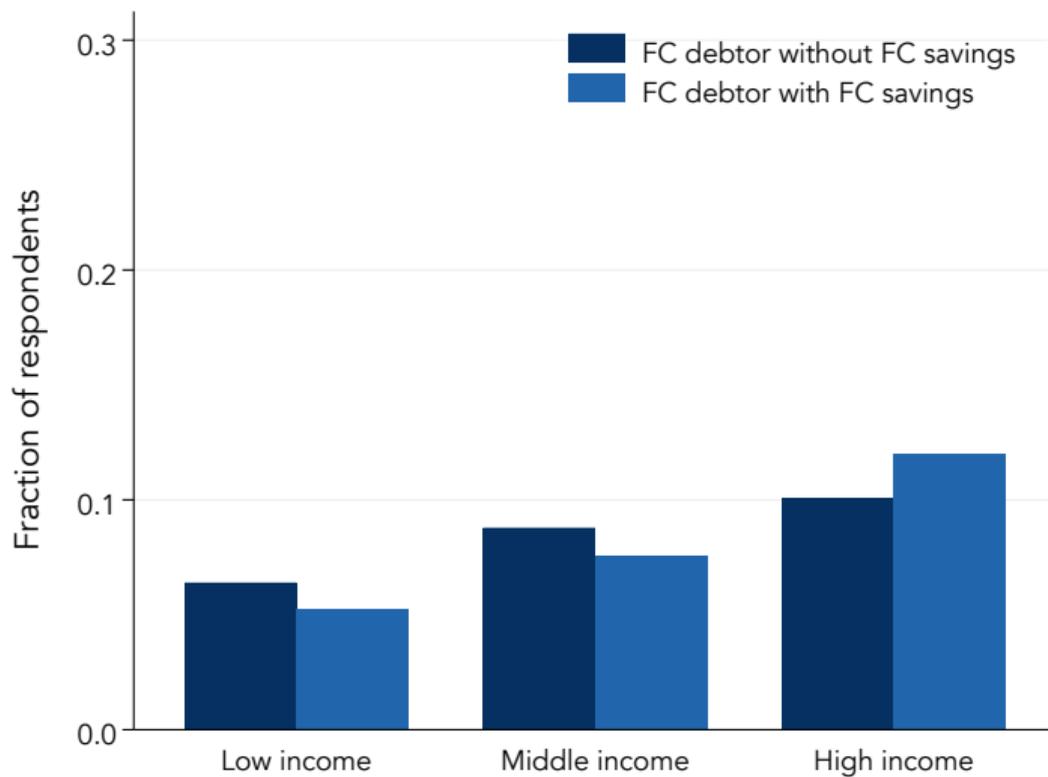
# Intensive and extensive margins



## Foreign currency exposure is unhedged in Hungary



## Foreign currency exposure and FC savings in CEE countries



# Characteristics of households borrowing after 2004

	FC mean/sd	LC mean/sd	FC-LC difference b/t
Primary school	0.15 0.36	0.14 0.35	0.01 0.14
Vocational school	0.41 0.49	0.36 0.48	0.04 0.55
High school	0.29 0.45	0.33 0.48	0.00 0.02
College	0.16 0.36	0.17 0.38	-0.05 -0.77
Household size	3.27 1.32	3.51 1.30	-0.25 -1.35
Age	43.75 12.53	45.81 10.32	-2.01 -1.42
Female	0.17 0.37	0.15 0.36	0.05 0.98
Income (1000 HUF)	1050.72 462.04	1138.88 560.38	-69.79 -0.91
Consumption to income	0.82 0.30	0.82 0.26	-0.02 -0.53
Food exp. to income	0.20 0.10	0.20 0.10	0.00 0.34
Payment to income	0.15 0.08	0.14 0.08	0.02 1.52
Have liquid assets	0.23 0.42	0.32 0.47	-0.10 -1.48
Capital	0.16 0.37	0.05 0.22	0.11* ** 3.67
County capital	0.24 0.43	0.27 0.45	-0.09 -1.34
Town	0.30 0.46	0.30 0.46	-0.00 -0.04
Village	0.30 0.46	0.38 0.49	-0.02 -0.24
Observations	961	52	1013

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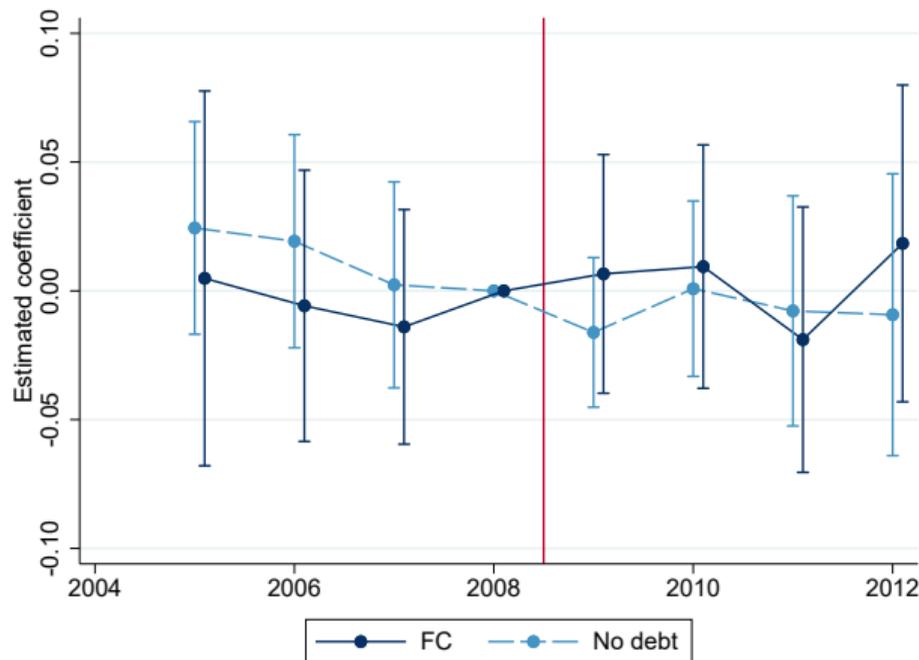
# Selection into foreign currency debt

- ▶ Pellényi-Bilek (2009)
  - ▶ Hungarian households in 2008
  - ▶ no evidence that Hungarian FC borrowers are better educated, wealthier or more risk-loving than their peers
- ▶ Beer-Ongena-Peter (2010)
  - ▶ Austrian households
  - ▶ Risk seeking, affluent, and married households are more likely to have FC
  - ▶ Financially literate or high-income households are more likely to take a housing loan in general
- ▶ Verner-Gyöngyösi (2020) and Gyöngyösi-Verner (2022)
  - ▶ Tárki Monitor Survey, Euro Project survey
  - ▶ FC and LC households have similar characteristics

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# Foreign currency debt exposure and house prices

## ► Self reported house prices



# Alternative equivalence scales

<b>Panel A: PPML</b>					
	Total		Per capita	OECD	Square Root
	(1)	(2)	(3)	(4)	(5)
FC × Post	-0.0325* (0.0148)	-0.0374** (0.0141)	-0.0515** (0.0174)	-0.0431** (0.0148)	-0.0415** (0.0143)
Household and Year FE	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes
Contemp. Household size		Yes			
<i>N</i>	59321	59321	59321	59321	59321
<b>Panel B: Marginal propensity to consume</b>					
	Total		Per capita	OECD	Square Root
	(1)	(2)	(3)	(4)	(5)
Payment surprise	-0.659 <sup>+</sup> (0.351)	-0.786* (0.335)	-1.123** (0.394)	-0.906** (0.339)	-0.872** (0.332)
Household and year FE	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes
Contemp. household size		Yes			
First stage F-statistics	1125.5	1127.1	692.8	969.8	1034.1
<i>N</i>	59321	59321	59321	59321	59321

## Propensity score matching

	LC control		LC & NoDebt control	
	(1)	(2)	(3)	(4)
FC $\times$ Post	-0.0499* (0.0231)	-0.0469* (0.0188)	-0.0513** (0.0170)	-0.0460** (0.0167)
Household & Year FE	Yes	Yes	Yes	Yes
Household controls		Yes		Yes
<i>N</i>	7125	7125	11856	11856

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## Payment difficulties

	Mortgage	Common cost	Utilities	Bank credit	Private credit
	(1)	(2)	(3)	(4)	(5)
<i>FC</i> × <i>Post</i>	0.0872** (0.0320)	0.0710* (0.0355)	0.0155 (0.0247)	0.0527 (0.0571)	0.159* (0.0659)
Household and Year FE	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes
Mean outcome in 2008	0.107	0.0891	0.160	0.0937	0.193
$R^2$	0.663	0.687	0.698	0.650	0.702
$N$	7579	18833	56904	7901	7145

Notes: +, \* and \*\* denote significance at the 10 percent, 5 percent, and 1 percent level, respectively.

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# Local Economic Impact of Debt Revaluation

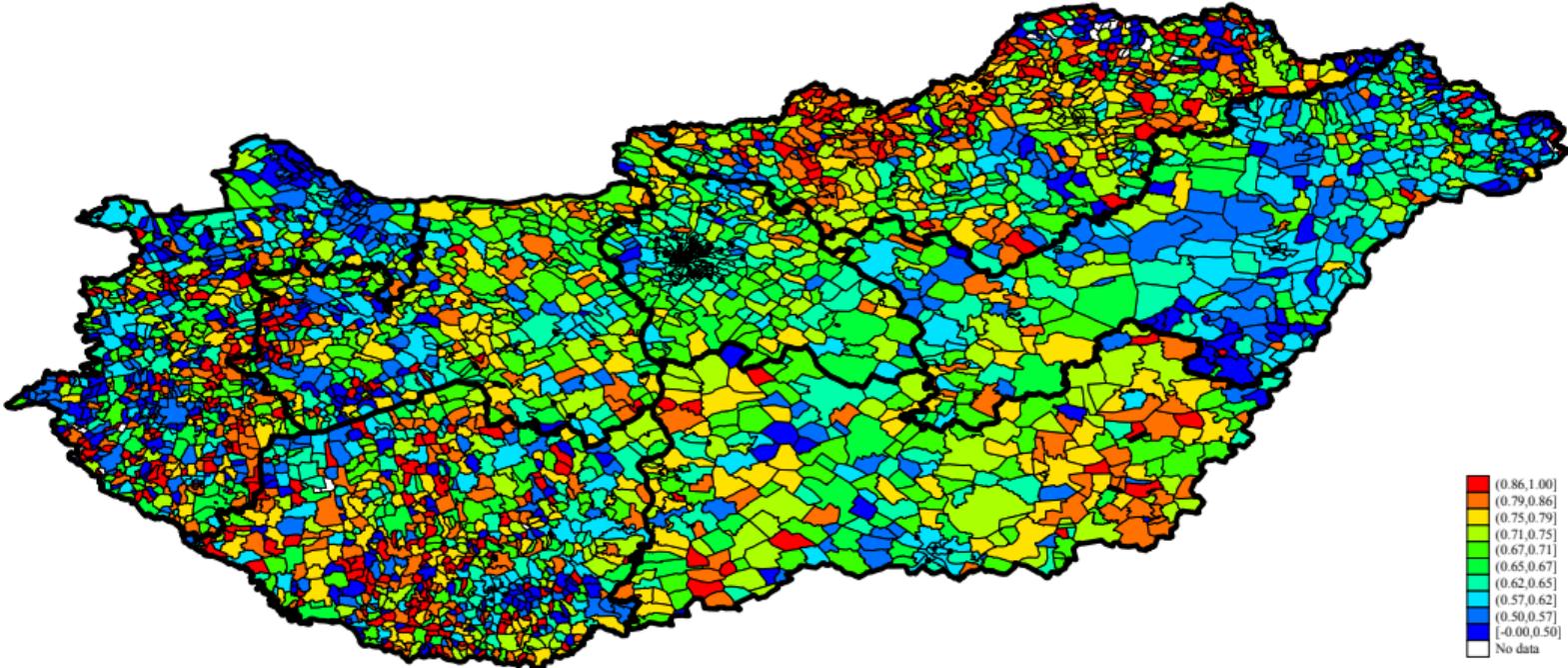
Verner and Gyöngyösi (2020)

- ▶ How does household FC debt revaluation transmit to local economy?
  - ▶ 2/3 of borrowers have FC debt (1/5 of households)
  - ▶ Debt revaluation  $\approx 6 - 10\%$  of GDP
- ▶ Data:
  - ▶ Loan level data from HH Credit Registry  $\rightarrow$  Construct local exposure to HH debt revaluation (city/town/village)
  - ▶ Local outcomes: default rate, durables spending, unemployment rate

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# Local Economic Impact of Debt Revaluation

Local exposure to HH FC debt (FC debt share)



# Local Economic Impact of Debt Revaluation

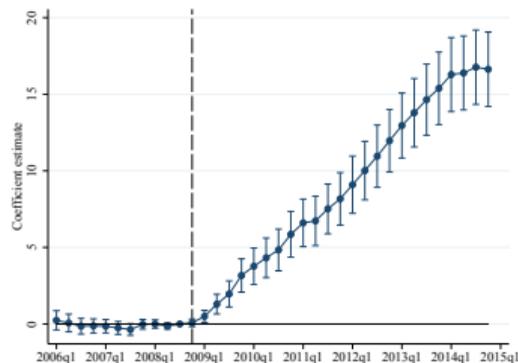
Local exposure to HH FC debt

$$Y_{zt} = \alpha_z + \gamma_t + \sum_{j \neq 2008} \beta_j \times \text{Local FC Debt Exposure}_{z08} \times \mathbf{1}_{t=j} + \epsilon_{zt}$$

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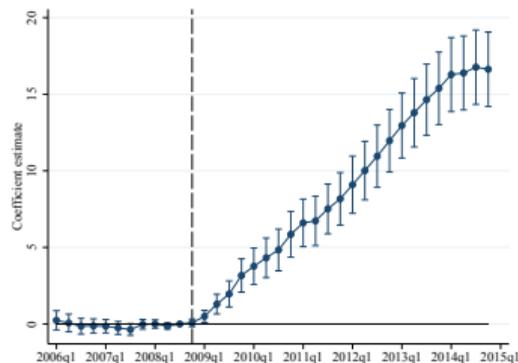


(a) Defaults

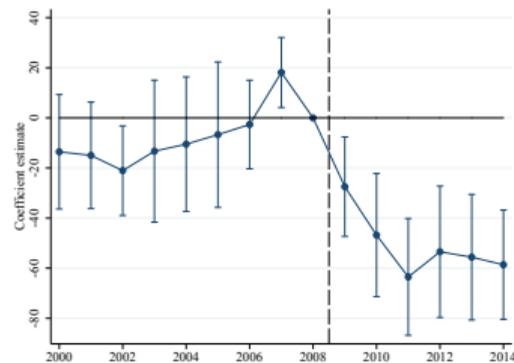
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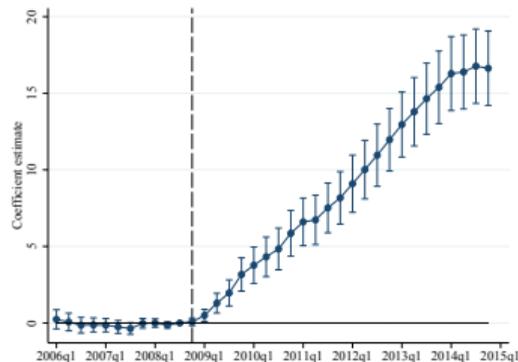


(b) Durable spending

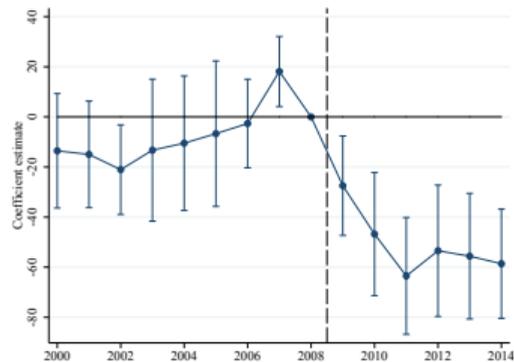
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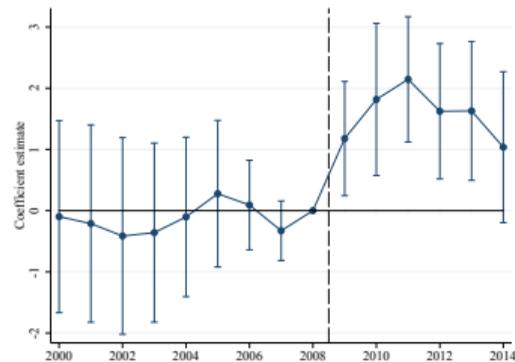
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(a) Defaults



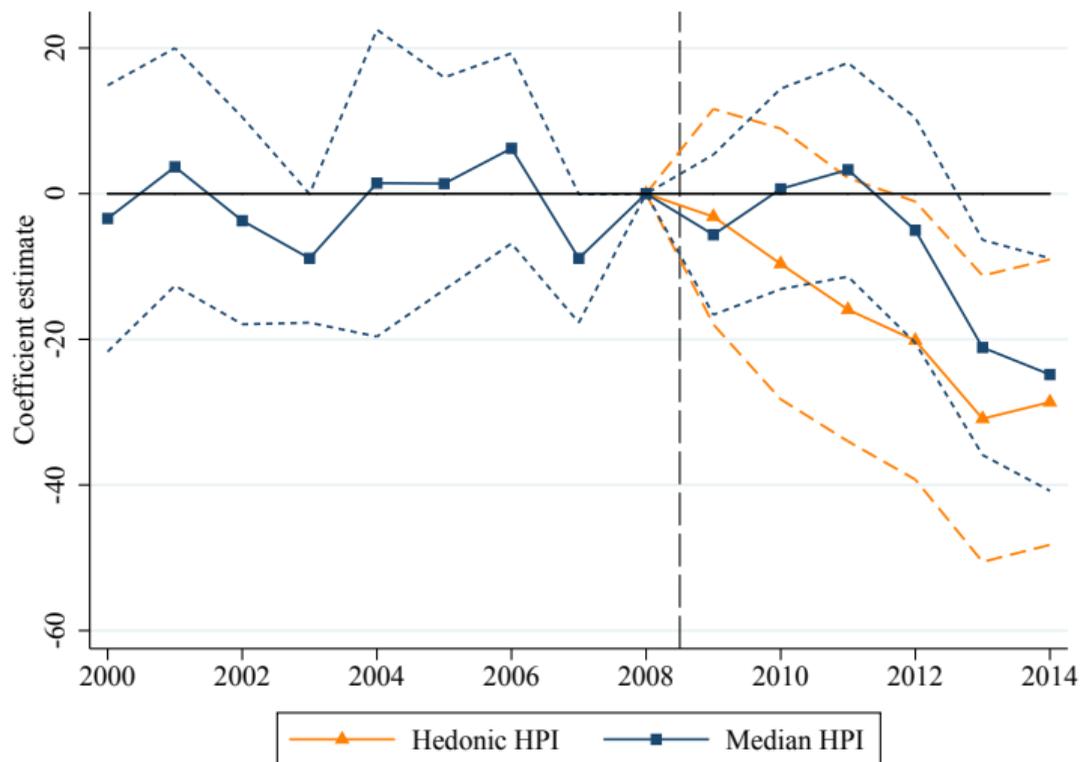
(b) Durable spending



(c) Unemployment rate

# Local Economic Impact of Debt Revaluation

Local exposure to HH FC debt

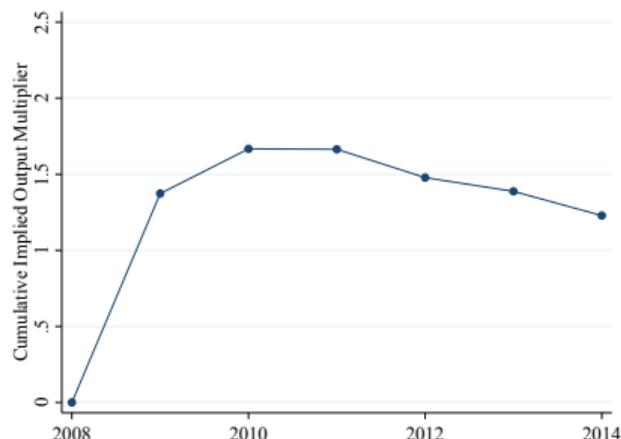


## Magnitude: Output Multiplier of Debt Service Shock

Integral multiplier: 
$$M_h = \frac{\sum_{j=2009}^h \text{OutputLoss}_j}{\sum_{j=2008:9}^h \text{DebtServiceShock}_j}$$

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Integral multiplier: 
$$M_h = \frac{\sum_{j=2009}^h \text{OutputLoss}_j}{\sum_{j=2008:9}^h \text{DebtServiceShock}_j}$$



- ▶ With MPC=1, comparable to estimates of cross-sectional fiscal multipliers (Chodorow-Reich 2019)
- ▶ Implies \$29k (PPP) increase in annual debt service destroys one job year

# Exchange rate expectations

Hungarian Banking Association (2006):

- ▶ „Since the vast majority of foreign currency loans have a longer term, a possible larger exchange rate fluctuation of a few days does not significantly change the repayment burden. **Therefore, households borrowing in foreign currency should not fear that they might suffer serious losses due to the exchange rate risk**”
- ▶ „**In the longer term, it is clear that the exchange rate of the forint - at least in real terms - will continue to appreciate**”
- ▶ „**Not only a permanent real depreciation of the forint can be excluded from the possible future scenarios, but also a significant and permanent nominal depreciation**”

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# Theory

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  - ▶ Natural hedge: HH net worth and consumption of FC debtors not differentially unaffected by exchange rate shock
  - ▶ Currency mismatch: HH net worth affected by exchange rate shock

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  - ▶ Currency mismatch: HH net worth affected by exchange rate shock
- ▶ What is consumption response to FC debt shock under currency mismatch?