Household Debt and Business Cycles Worldwide

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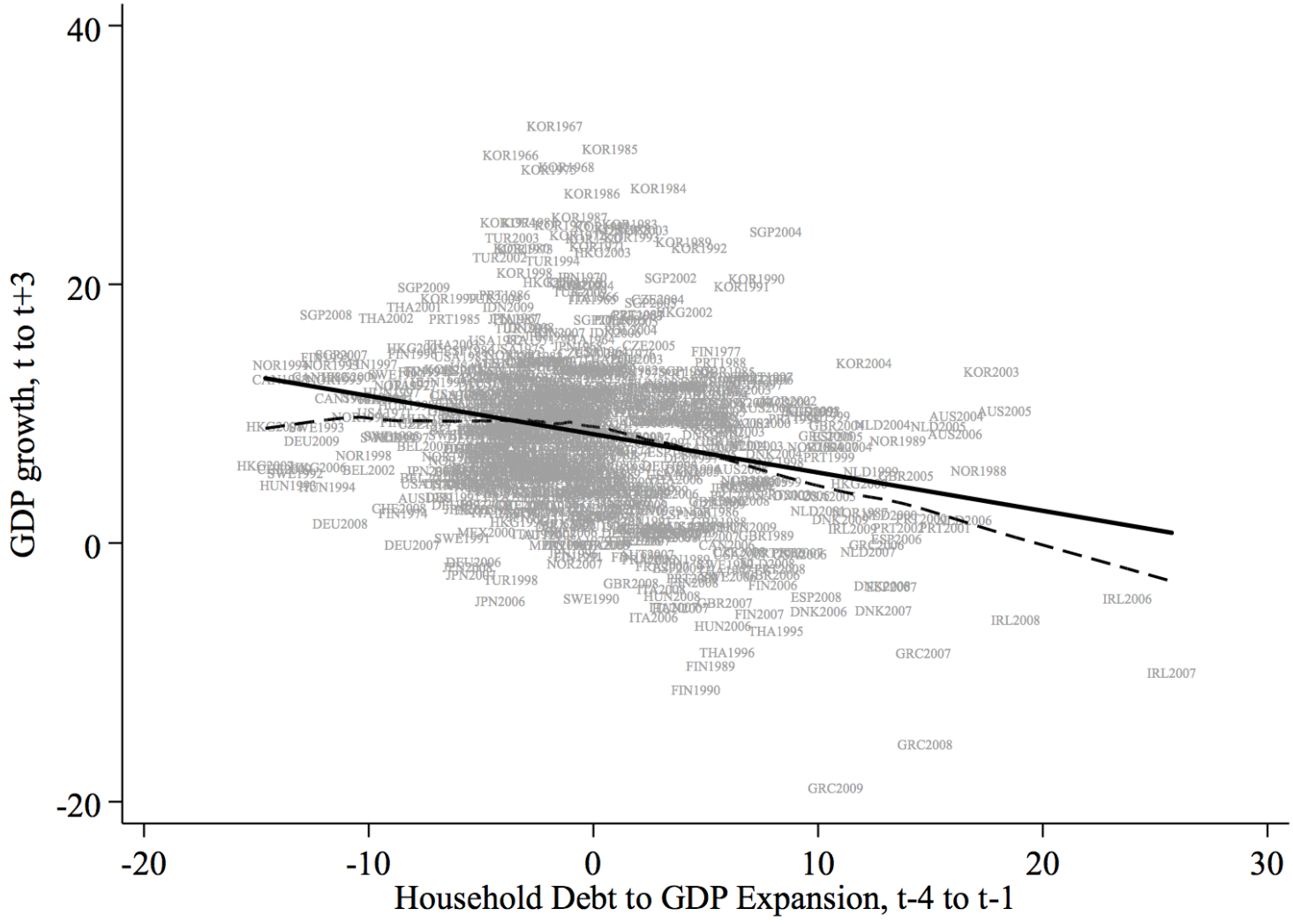
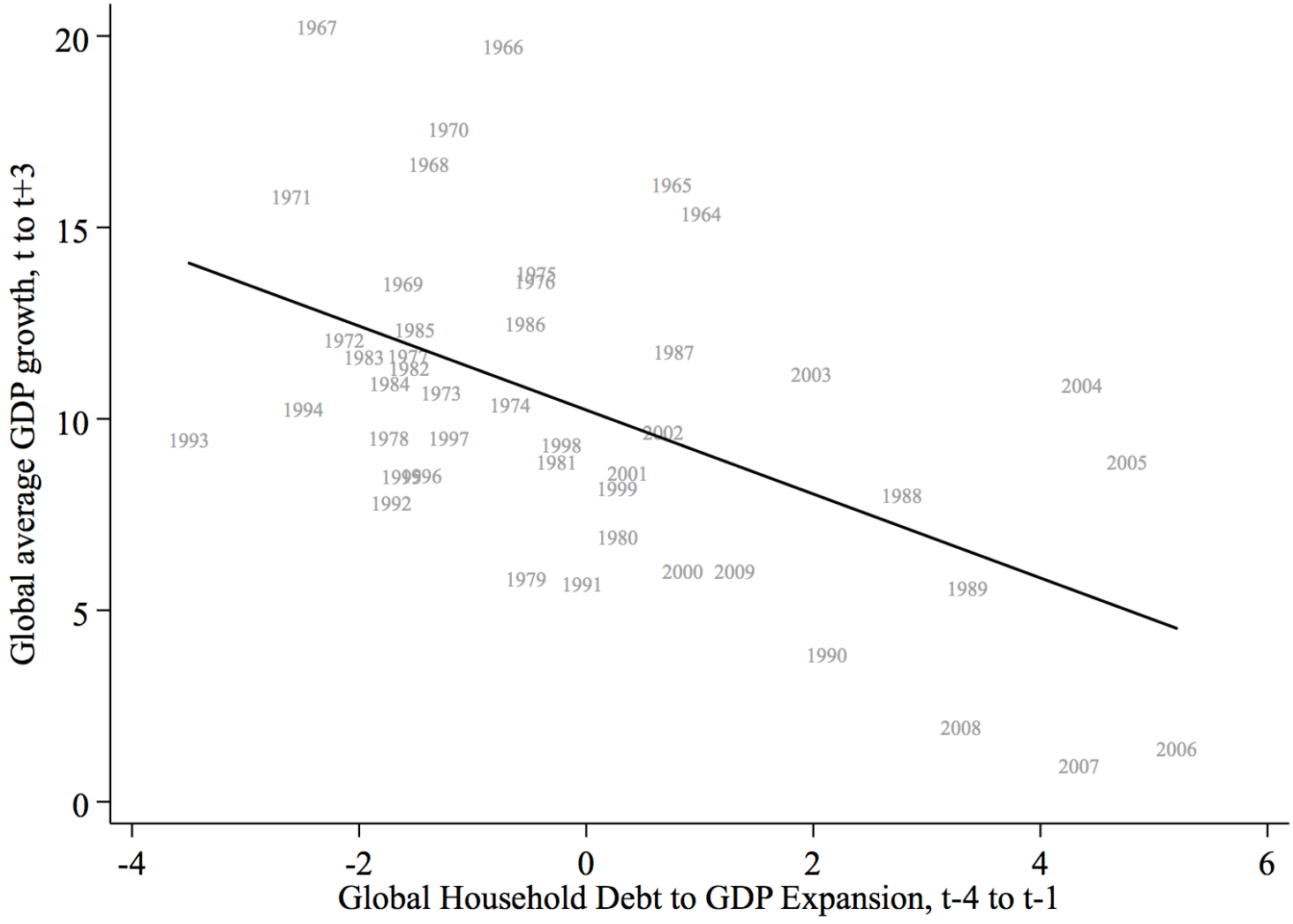
Motivation: Household Debt and Output Growth

- With nominal rigidities and monetary policy frictions, a rise in household debt can lower subsequent output growth
  - Empirical: Mian and Sufi (2014), IMF (2012)
  - Theoretical: Eggertsson and Krugman (2012), Guerrieri and Lorenzoni (2015), Farhi and Werning (2015), Korinek and Simsek (2014), Martin and Philippon (2014), and Schmitt-Grohé and Uribe (2015)
- Most empirical evidence limited to the Great Recession
- In a sample of 30 countries from 1960 to 2012, we show a rise in household debt in medium-run predicts decline in subsequent output growth and an increase in unemployment
- A rise in global household debt predicts a decline in global output growth, highlighting importance of trade linkages

Increase in Household Debt Predicts Lower Growth



Rise in Global Household Debt ⇒ Lower Global Growth



Distinguishing Models

- Results contradict standard open economy model in which rise in debt reflects better future income prospects
- Results more consistent with "demand externality" models
  - Rise in household debt associated with **consumption boom** and influx of consumption goods from abroad
  - **Heterogeneity** consistent with importance of price rigidities and monetary frictions: negative predictive relation stronger in fixed exchange rate regimes ZLB periods within floating ER regimes
  - Effect is **non-linear** with larger increases in household debt causing even bigger declines in subsequent output growth
  - Instrument household debt with sovereign spreads to isolate negative impact of **credit-supply driven debt booms** on subsequent output growth

What is New?

- Long panel country studies: Jordà et al (2013, 2014), Schularick and Taylor (2012), Dell'Ariccia et al (2012), Cecchetti, et al (2011), Krishnamurthy and Muir (2015)
- We present a number of new results to this literature:
  - Previous research focuses on credit growth and recession severity *conditional* on a recession; we are first to estimate *unconditional* relation between household debt increase an subsequent output growth
  - Separate predictive power of household versus firm debt
  - We examine the components of GDP and of imports during the household debt boom and bust
  - Instrumental variables estimates, and heterogeneity by exchange rate regieme
  - Global debt cycle, analysis of forecasting errors by IMF and OECD, and panel VAR evidence

Data

- Unbalanced panel of 30 mainly OECD countries, 1960-2012
- Annual, 900 country-years
- Credit series (BIS)
  - Total credit to private non-financial sector, $PD = HHD + FD$
    - Credit to households, HHD
    - Credit to non-financial firms, FD
  - Credit = loans and debt securities
- National accounts data, professional economic forecasts, micro trade data from standard sources

Benchmark Model: Future Productivity Shocks

What does theory say about the relation between increases in private debt and subsequent output growth?

- **Standard open economy model** where borrowing governed by PIH implies rise in debt presages **higher growth** (e.g., Aguiar and Gopinath (2007))
- Fundamental source of variation: productivity or permanent income shocks
- Private debt plays two roles:
  1. borrow to invest or consume given higher future productivity
  2. smooth out transitory shocks
- Either way, borrowing precedes higher growth

Alternative: Demand Externalities and Excessive Debt

- **Models with demand externalities** imply **opposite** relation: rise in debt predicts **lower growth** through aggregate demand channels
- Three key differences relative to benchmark
  1. Expansion in debt and subsequent reversal driven by **shocks to credit supply** or risk premia
  2. Price and monetary policy **frictions** translate borrowing and spending into changes in output
  3. **Borrowing can be excessive** from social planner's perspective because aggregate demand and fire sale externalities
- Fundamental source of variation is credit supply shocks, and decline in output happens even if future credit tightening perfectly forecastable!

Empirical Methodology

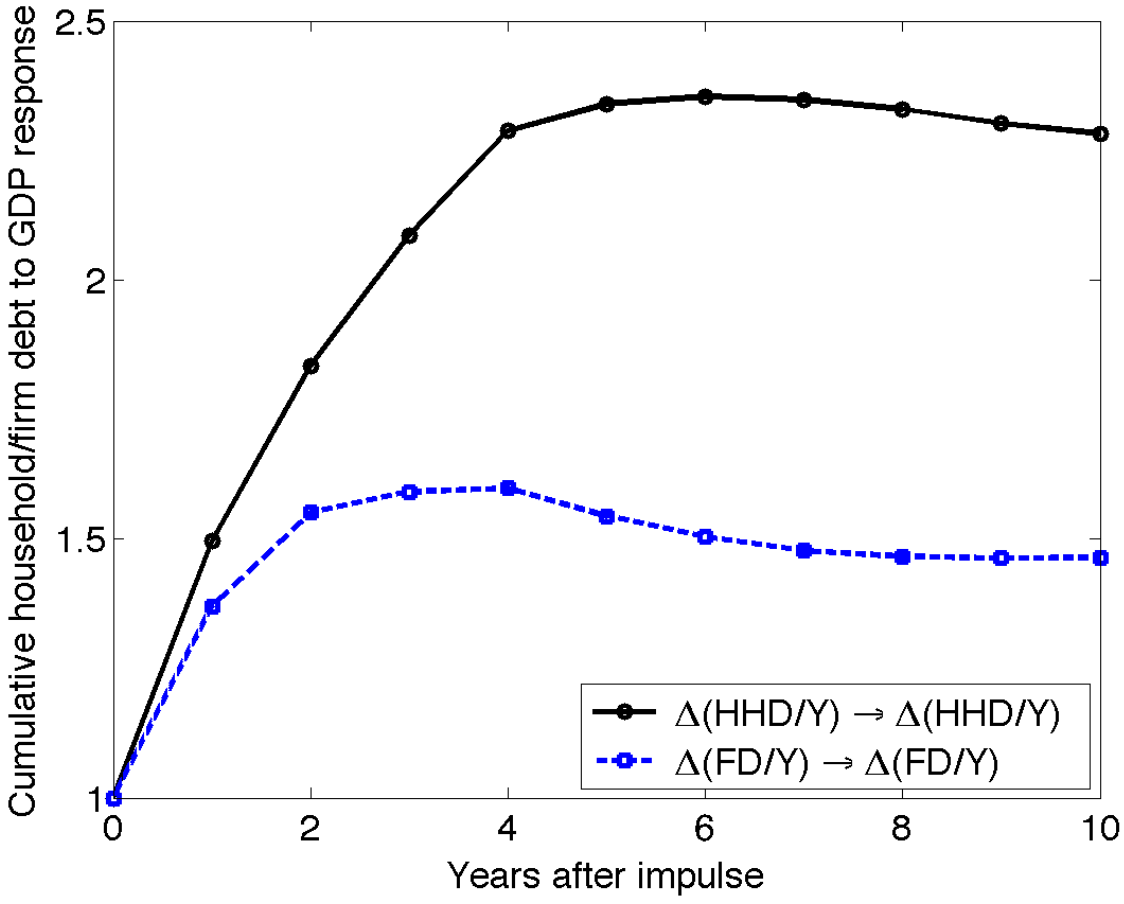
- Jordà (2005) local projections for horizon $h = 1, 2, \ldots$

$$y_{it+h} - y_{it} = \alpha_i^h + \beta_{HH}^h \Delta_3 \left(\frac{HHD}{Y} \right)_{it-1} + \beta_F^h \Delta_3 \left(\frac{FD}{Y} \right)_{it-1} + X_{it}' \Gamma + \epsilon_{it},$$

- Advantages: (i) Does not constrain the shape of the IRF (ii) Can be more parsimonious
- Use Δ debt to GDP to capture meaningful changes in debt
- Add lagged dependent variables, other controls (with lags)
- Time fixed effects introduced in context of "global factors"
- Standard errors clustered at country level
- Show robustness to standard SVAR

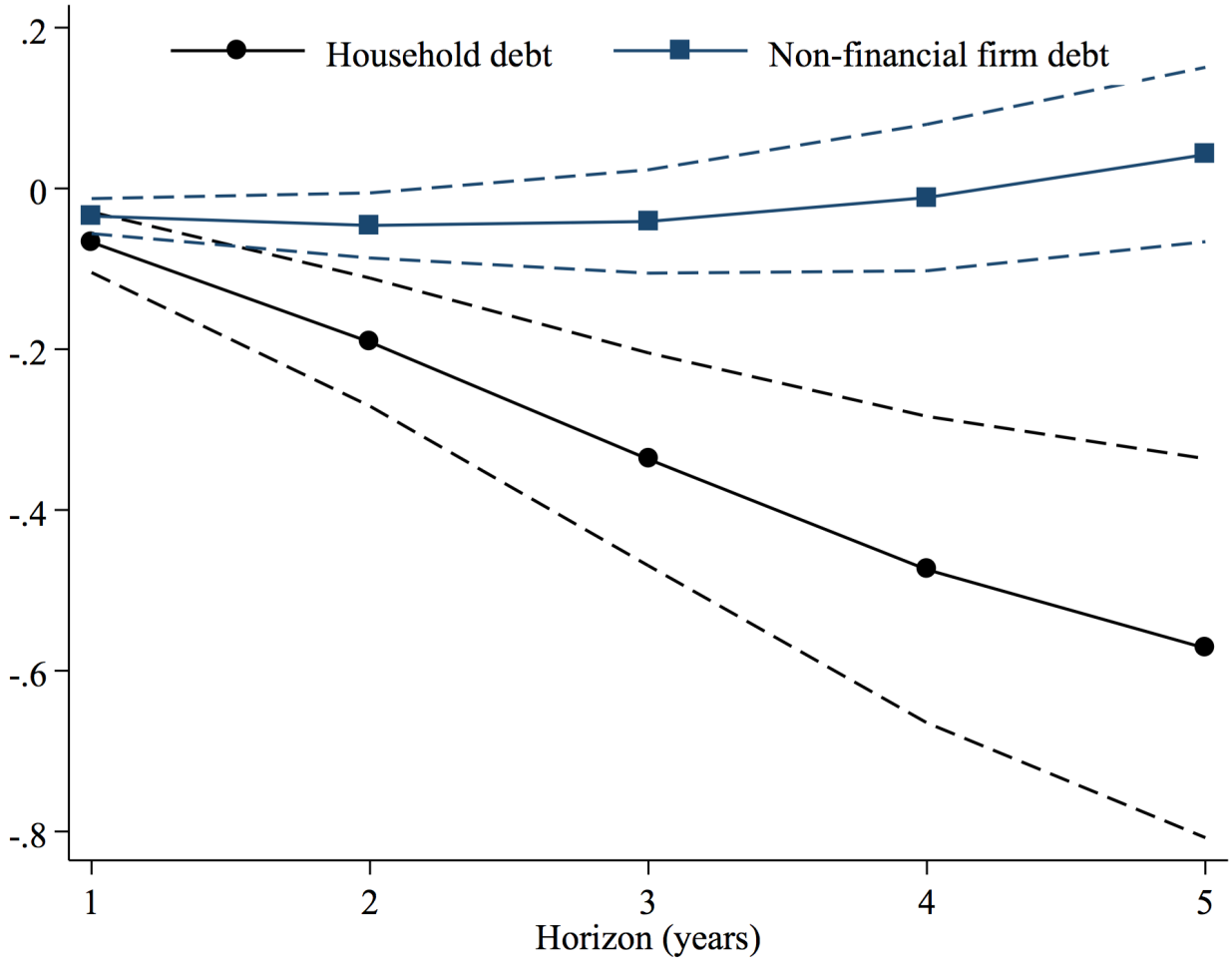
What is Time Horizon for a Debt Boom?

- Let the data speak using auto-regressive empirical model
- Shock to household/firm debt persists for 3-4 years



Rise in Household Debt Predicts Lower Subsequent Growth

$$y_{it+h} - y_{it} = \alpha_i^h + \beta_{HH}^h \Delta_3 \frac{HHD_{it-1}}{Y_{it-1}} + \beta_F^h \Delta_3 \frac{FD_{it-1}}{Y_{it-1}} + \epsilon_{it},$$



Rise in Household Debt Predicts Lower Subsequent Growth

	Dependent variable: $\Delta_3 y_{it+3}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta_3(PD/Y)_{it-1}$	-0.119**					
	(0.0297)					
$\Delta_3(HHD/Y)_{it-1}$		-0.366**		-0.337**	-0.333**	-0.340**
		(0.0691)		(0.0675)	(0.0641)	(0.0722)
$\Delta_3(FD/Y)_{it-1}$			-0.0978*	-0.0411	-0.0464	-0.0235
			(0.0363)	(0.0328)	(0.0332)	(0.0387)
$\Delta_3(GD/Y)_{it-1}$						0.0534
						(0.0441)
R^2	0.087	0.123	0.036	0.128	0.131	0.126
Country Fixed Effects	✓	✓	✓	✓	✓	✓
Distributed lag in Δy					✓	✓
Observations	695	695	695	695	695	627

Subsamples and Robustness

	Dependent variable: $\Delta_3 y_{it+3}$								
	(1) FE OLS	(2) FE OLS	(3) FE OLS	(4) FE OLS	(5) FE OLS	(6) FE OLS	(7) Arellano-Bond GMM	(8) OLS	(9) FE OLS
$\Delta_3(HHD/Y)_{it-1}$	-0.371**	-0.236*	-0.355**	-0.211**	-0.325**	-0.319**	-0.324**	-0.312**	
	(0.0796)	(0.0891)	(0.105)	(0.0644)	(0.0650)	(0.0709)	(0.0721)	(0.0668)	
$\Delta_3(FD/Y)_{it-1}$	-0.0275	-0.0693	0.000131	-0.0571	-0.0500	-0.0573	-0.0686	-0.0629	
	(0.0373)	(0.0698)	(0.0645)	(0.0339)	(0.0343)	(0.0392)	(0.0460)	(0.0409)	
$(\Delta_3 HHD_{it-1})/Y_{it-4}$									-0.298**
									(0.0640)
$(\Delta_3 FD_{it-1})/Y_{it-4}$									0.0202
									(0.0320)
R^2	0.165	0.106	0.127	0.080	0.179	0.154		0.182	0.152
Country Fixed Effects	✓	✓	✓	✓	✓	✓			✓
Lagged Δy controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sample	Developed	Emerging	Pre 1990	Pre 2000	Post 1980	Non-overl.	Non-overl.	Full	Full
Observations	529	166	227	436	617	233	203	695	695

Rise in Household Debt $\rightarrow$ Higher Unemployment

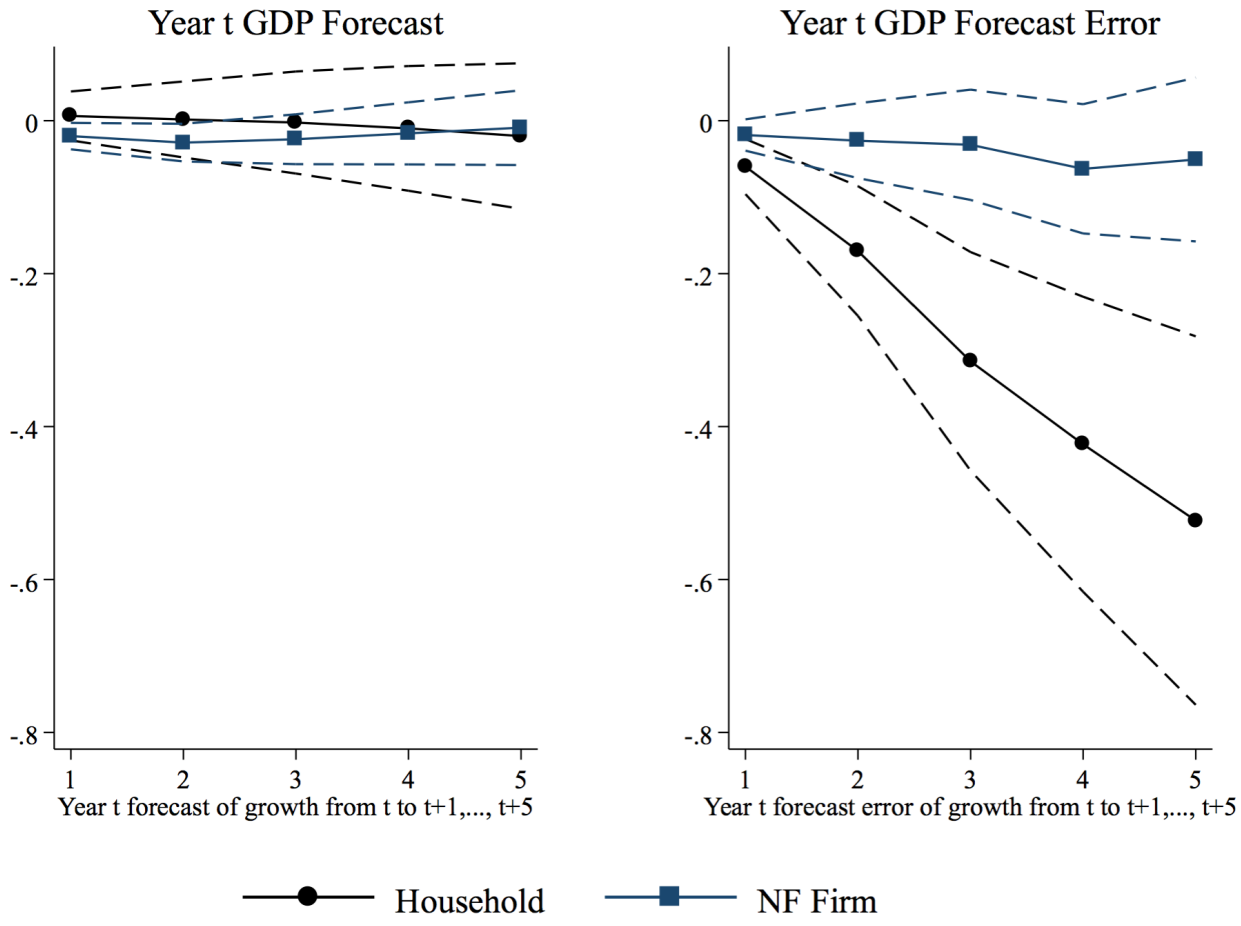
	Full Sample			Subsamples	
	(1) $\Delta_3 u_{it+3}$	(2) $\Delta_3 u_{it+3}$	(3) $\Delta_3 u_{it+3}$	(4) $\Delta_3 u_{it+3}$	(5) $\Delta_3 u_{it+3}$
$\Delta_3(PD/Y)_{it-1}$	0.0605**				
	(0.0138)				
$\Delta_3(HHD/Y)_{it-1}$		0.132**	0.105**	0.133**	0.150**
		(0.0320)	(0.0313)	(0.0460)	(0.0409)
$\Delta_3(FD/Y)_{it-1}$		0.0363**	0.0373**	0.0377^{+}	0.0491**
		(0.0129)	(0.0121)	(0.0190)	(0.0170)
Δu_{it-1}			-0.343**		
			(0.114)		
Δu_{it-2}			-0.236**		
			(0.0806)		
Δu_{it-3}			-0.292*		
			(0.117)		
R^2	0.119	0.145	0.207	0.121	0.183
Country Fixed Effects	✓	✓	✓	✓	✓
Sample	Full	Full	Full	Pre 2000	OECD Harm.
Observations	662	662	638	410	527

Alternative Explanations?

- A nuanced productivity shock story? Mean reverting shocks?
  - Distributed lagged output controls don't affect estimate
  - GDP growth actually positively auto-correlated in sample
  - Asymmetry of household and firm debt results
- Some omitted variable not seen by us? Rise in household debt predicts IMF and OECD forecast errors
- Over-optimism in general? Not mutually exclusive, but forecasters are not overly optimistic prior to boom
- Robustness to other predictors?
  - Country-specific time trends, RER appreciation (Gourinchas and Obstfeld 2012), net foreign debt, corporate credit spreads
- House prices?
  - Strong positive correlation between HHD and HP
  - Here we don't take strong stand on causation
  - House price growth also predicts growth slowdown, but household debt is more robust

Household Debt Expansions and Professional Forecasts

$$y_{it+h|t}^{Forecast} - y_{it} = \alpha_i^h + \beta_{HH}^h \Delta_3 \frac{HHD_{it-1}}{Y_{it-1}} + \beta_F^h \Delta_3 \frac{FD_{it-1}}{Y_{it-1}} + \epsilon_{it},$$



Results Supporting Demand Externality Models

- Non-linearity in basic result, already shown
- Debt increase finances a consumption boom, imports of consumption goods increase substantially
- Heterogeneity by exchange rate regime and zero lower bound constraint exposure
- Instrumental variables specification isolating credit supply shocks

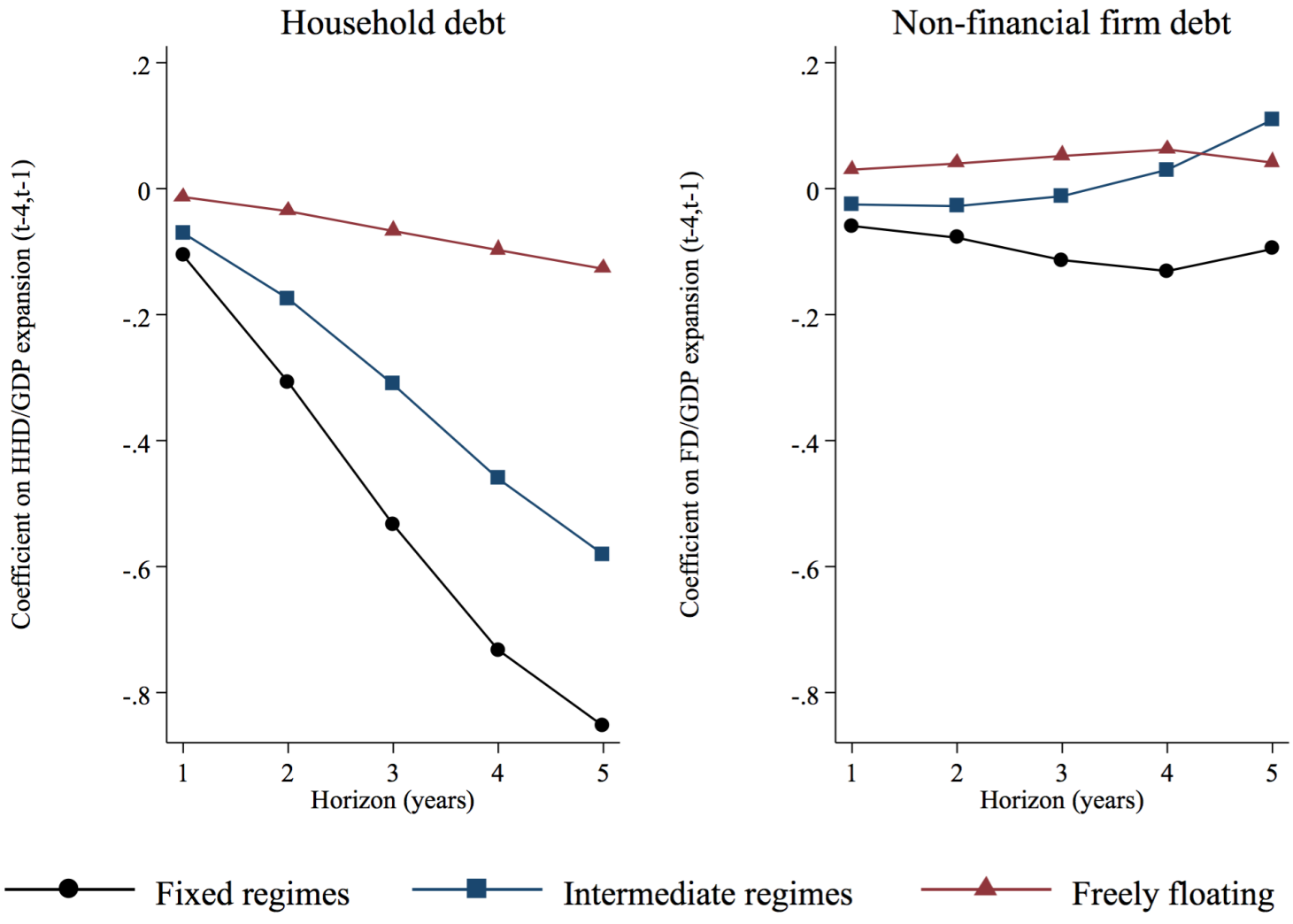
Household Debt Finances Consumption Booms

- HH debt expansion associated with higher consumption share of output, worsening external balance, and rising share of consumer goods in imports

	(1) $\Delta_1 \frac{C}{Y}_{it}$	(2) $\Delta_1 \frac{NX}{Y}_{it}$	(3) $\Delta_1 \frac{CA}{Y}_{it}$	(4) $\Delta_1 s_{it}^{MC}$	(5) $\Delta_1 s_{it}^{XC}$	(6) $\Delta_1 reer_{it}$
$\Delta_1(HHD/Y)_{it}$	0.120**	-0.173*	-0.185*	0.152**	0.0371	0.153
	(0.0402)	(0.0665)	(0.0843)	(0.0361)	(0.0326)	(0.130)
$\Delta_1(FD/Y)_{it}$	0.0249^{+}	-0.0167	-0.0125	-0.0261	-0.0400^{+}	-0.235*
	(0.0126)	(0.0205)	(0.0186)	(0.0167)	(0.0204)	(0.100)
R^2	0.082	0.041	0.037	0.042	0.013	0.030
Country Fixed Effects	✓	✓	✓	✓	✓	✓
Observations	688	695	648	695	695	614

Heterogeneity across Exchange Rate Regimes

- Impact of over-borrowing on demand should be most severe in economies with monetary policy constraints



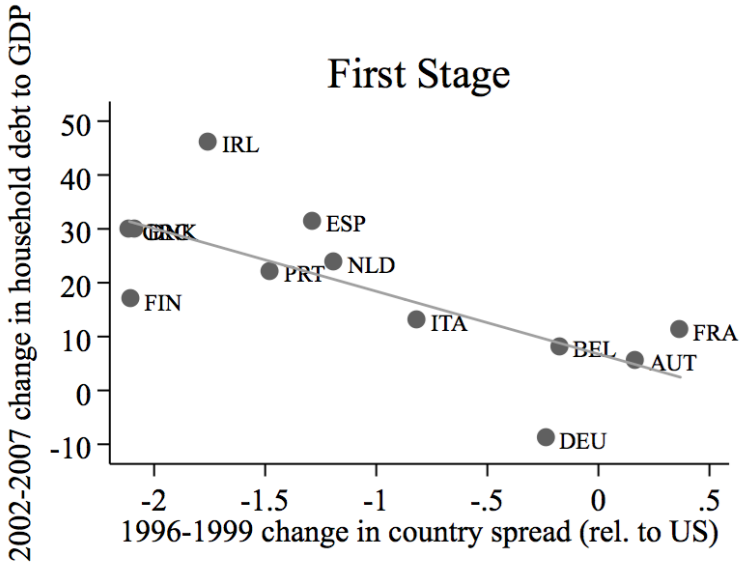
Credit Spread as an Instrument

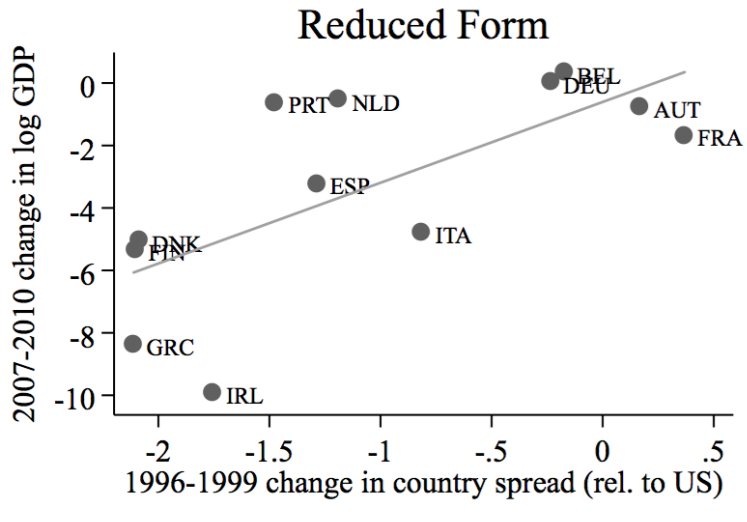
$$\Delta d_{it} = \alpha_i^f + \beta^f * z_{it} + u_{it}^f \quad (1)$$

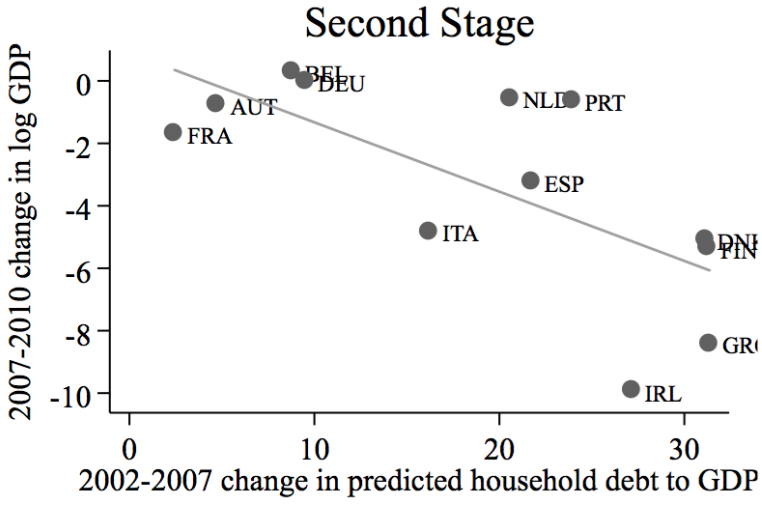
$$\Delta y_{i,t+h} = \alpha_i^s + \beta^s * \Delta \hat{d}_{it} + u_{it}^s \quad (2)$$

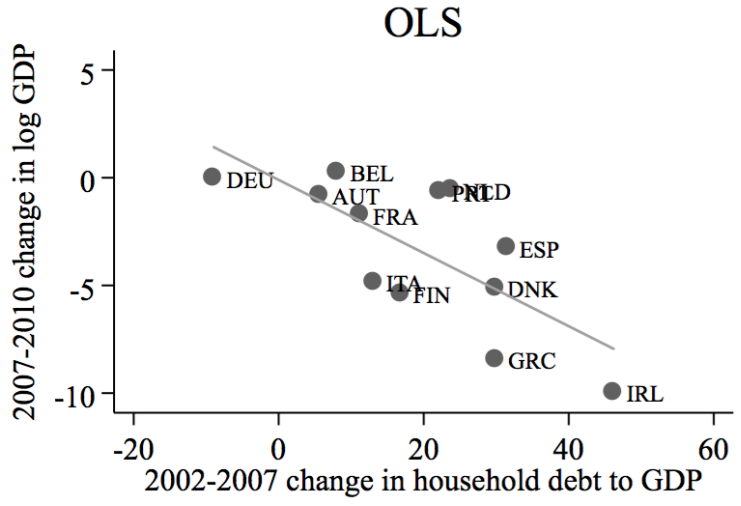
- Country spread spr_{it-4} as proxy for foreign credit supply
- Stories: increase in international investors' risk appetite; savings glut; decline in currency risk (e.g. introduction of Euro)
- A reduction in spread should be **good** news from a fundamentals perspective.

Credit Spread as Instrument: The Eurozone









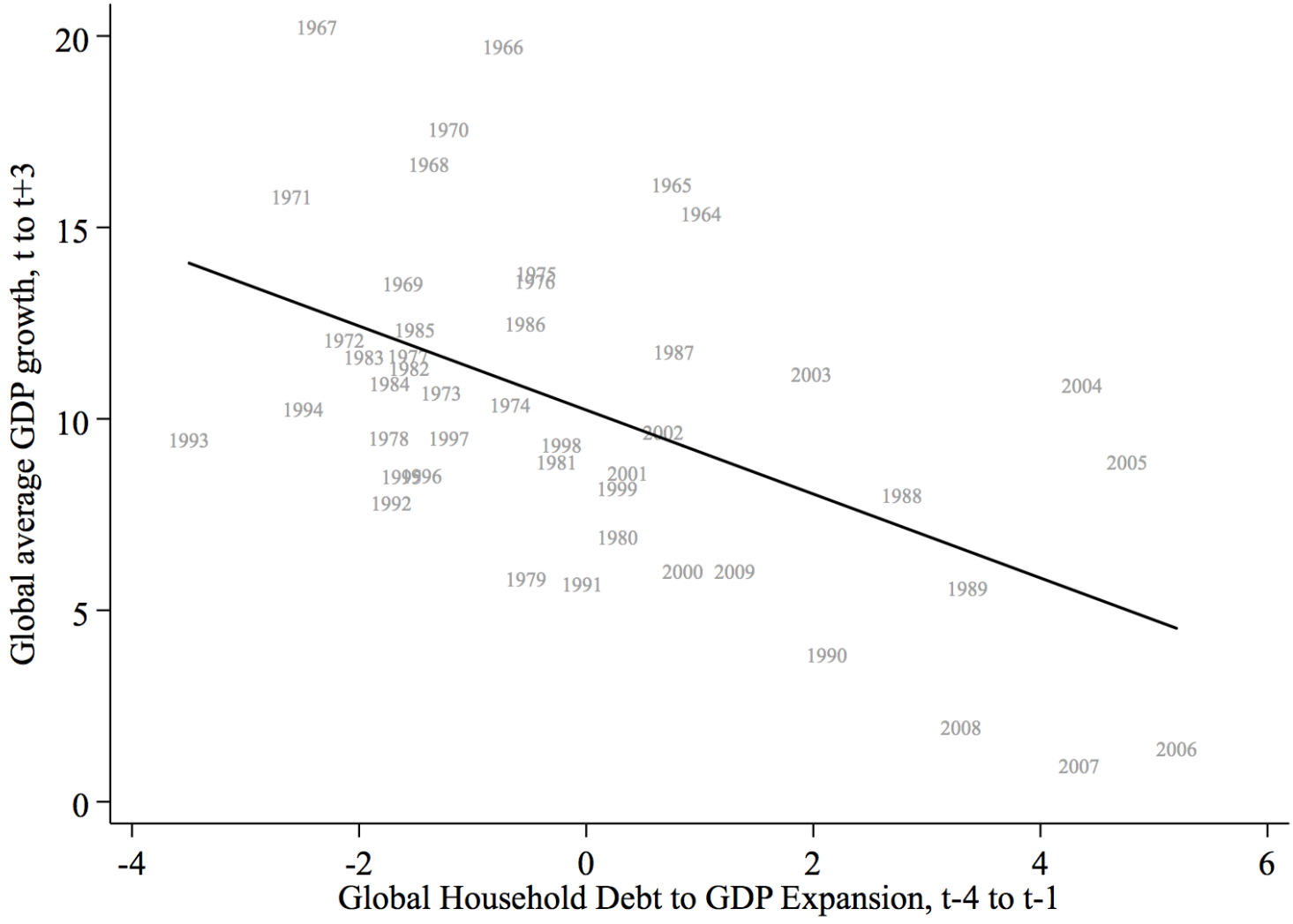
Credit Spread as an Instrument

	Eurozone Case		Full Sample: Nominal Spread			Full Sample: Real Spread		
	(1) $\Delta_{02-07}\frac{HHD}{Y}_i$	(2) $\Delta_{07-10}y_i$	(3) $\Delta_3\frac{HHD}{Y}_{it-1}$	(4) $\Delta_3 y_{it+3}$	(5) $\Delta_3 y^{IMF}_{t-1\|t-4}$	(6) $\Delta_3\frac{HHD}{Y}_{it-1}$	(7) $\Delta_3 y_{it+3}$	(8) $\Delta_3 y^{IMF}_{t-1\|t-4}$
$\Delta_{96-99}spr_i$	-11.66**							
	(3.428)							
$\Delta_{02-07}(HHD/Y)_i$		-0.222**						
		(0.0479)						
$\Delta_3(HHD/Y)_{it-1}$				-0.475*			-0.577*	
				(0.225)			(0.279)	
$spr^{nominal}_{it-4}$			-0.731**		0.0794			
			(0.167)		(0.149)			
spr_{it-4}						-0.669*		0.0584
						(0.246)		(0.109)
π_{it-4}			-0.108	0.250*		-0.506**	0.221**	
			(0.109)	(0.0983)		(0.176)	(0.0839)	
R^2	0.526	0.480	0.119	0.335	0.006	0.120	0.303	0.002
Country Fixed Effects			✓	✓	✓	✓	✓	✓
Distributed Lag in Δy			✓	✓		✓	✓	
First Stage F-statistic	11.6		19.2			7.4		
Observations	12	12	546	546	334	546	546	334

The Global Household Debt Cycle

- Analysis of components of GDP reveal that increase in net exports, driven by decline in imports of consumption goods, helps cushion the blow to GDP, especially for more open economies
- But what happens if all countries experiencing a debt hang-over at the same time?
- We find:
  - Countries with a household debt cycle more correlated with global household debt cycle see worse growth after increase in household debt
  - Global rise in household debt reduces scope for "exporting out of downturn"
  - Recent changes in global household debt matter for each country – an economic interpretation of time fixed effects
  - This generates a strong **global household debt cycle**

Rise in Global Household Debt ⇒ Lower Global Growth



Conclusion

- Rise in household debt predicts subsequent decline in output growth
- Unlikely to be explained by a productivity shock model, results more consistent with models with credit supply shocks, aggregate demand externalities, and excessive leverage
- Open questions
  - What is the source of credit supply shocks? Monetary policy in core countries? (Bruno and Shin (2014), Rey (2015))
  - What is the role of behavioral biases? Irrational movements in credit supply? Households borrow too much because of flawed expectations?
  - What is the role of housing?