

HOUSEHOLD DEBT AND BUSINESS CYCLES WORLDWIDE

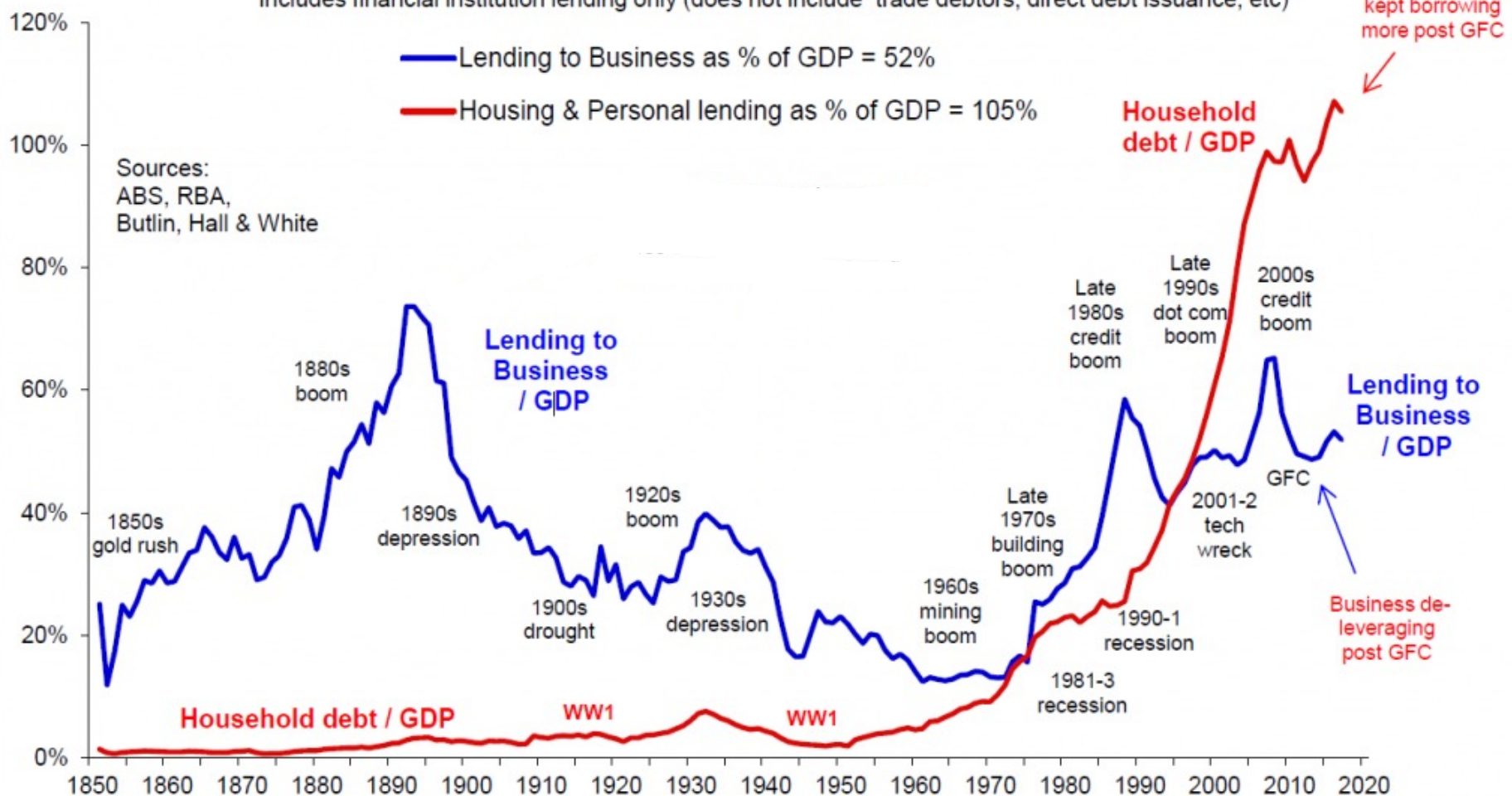
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QJE 2017

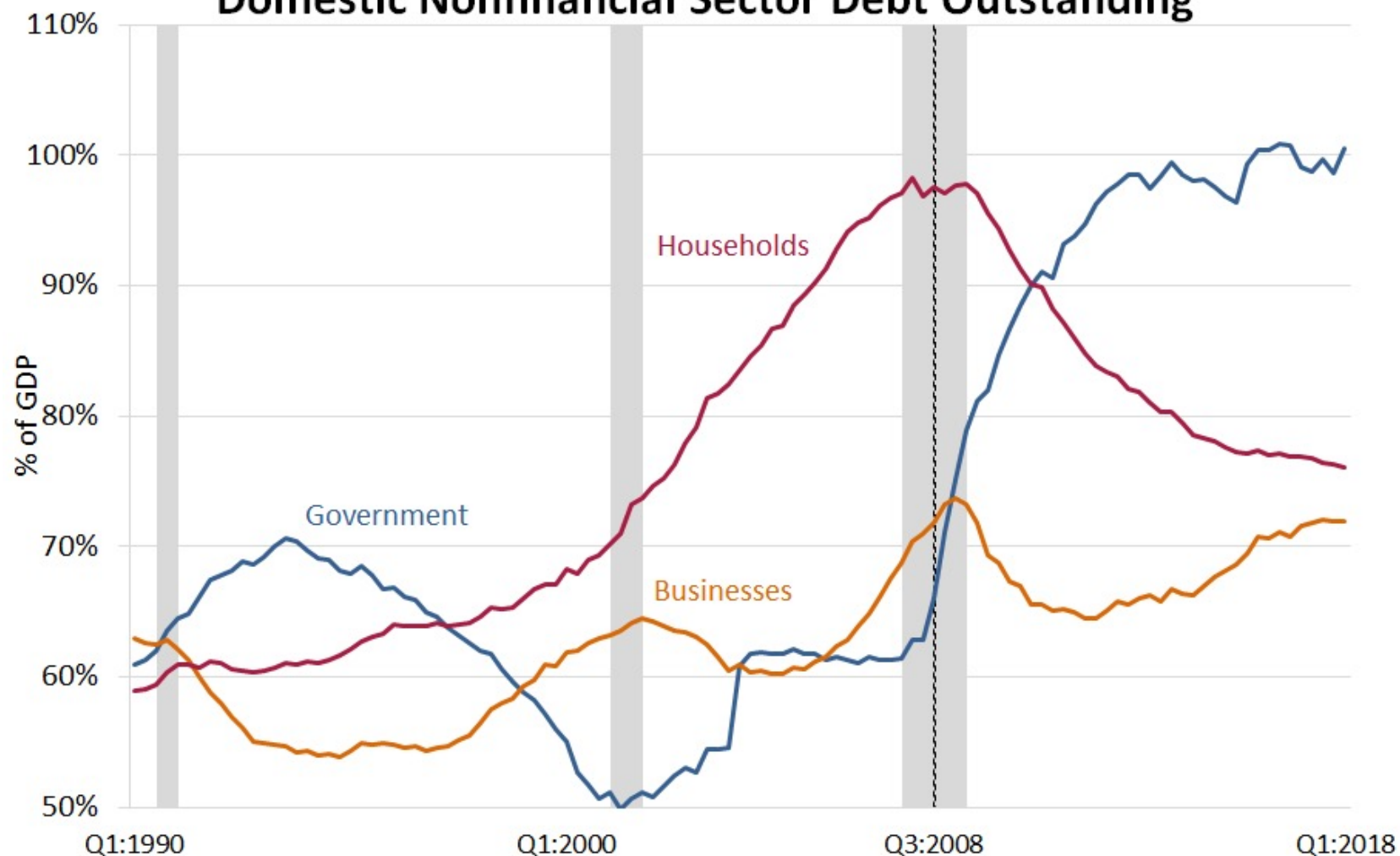
Business -v- Household Debt as % of GDP

Credit as
% of GDP

Includes financial institution lending only (does not include trade debtors, direct debt issuance, etc)



Domestic Nonfinancial Sector Debt Outstanding



SOURCES: Federal Reserve Board of Governors' Financial Accounts of the United States and FRED (Federal Reserve Economic Data).

Chart 3: Private Debt to GDP, 1740-2015



Source: U.S. Treasury; Mitchell; Measuringworth.com; UN data; Piketty & Zucman, Capital Is Back: Wealth-Income Ratios in Rich Countries 1700-2010, copyright Oxford University Press; Goldsmith; World Bank, U.S. Census; BEA; The Federal Reserve

HIGHLIGHTS

- Comprehensive empirical study of household debt and medium-run business cycles worldwide
- Purely descriptive but well-structured paper published in a top journal
- Confirms the predictive power of high household debt to subsequent economic downturn
- Evidence suggests credit supply shock, rather than credit demand shock, better explains the phenomenon

KEY FINDINGS

- An increase in the household debt to GDP ratio predicts a subsequent reversal in debt and lower subsequent GDP growth
- Household debt booms are associated with low interest spread, consistent with the credit supply shock theory
- Forecasters systematically overstate output growth toward the end of a boom in household debt
- Macroeconomic frictions (nominal rigidities, monetary policy constraints) are an important aspect of explaining the severity of the downturn
- Evidence of a global household debt cycle

DATA

- BIS *long series on total credit to the nonfinancial sectors* database
- Annual data range from 1960 to 2012
- 30 countries; 900 country-year observations
- Key variables:
 - Household debt / GDP
 - Nonfinancial firm debt / GDP
 - Debt: loans and debt securities

DYNAMIC RELATIONS: VAR

$$AY_{it} = a_i + \sum_{j=1}^p \alpha_j Y_{it-j} + \epsilon_{it}$$

$$Y_{it} = (y_{it}, d_{it}^F, d_{it}^{HH})$$

- Set $p = 5$ according to AIC criterion
- Identification: Cholesky decomposition (real log GDP ordered first)
- Iterative bootstrap procedure to correct the Nickell bias

DYNAMIC RELATIONS: VAR

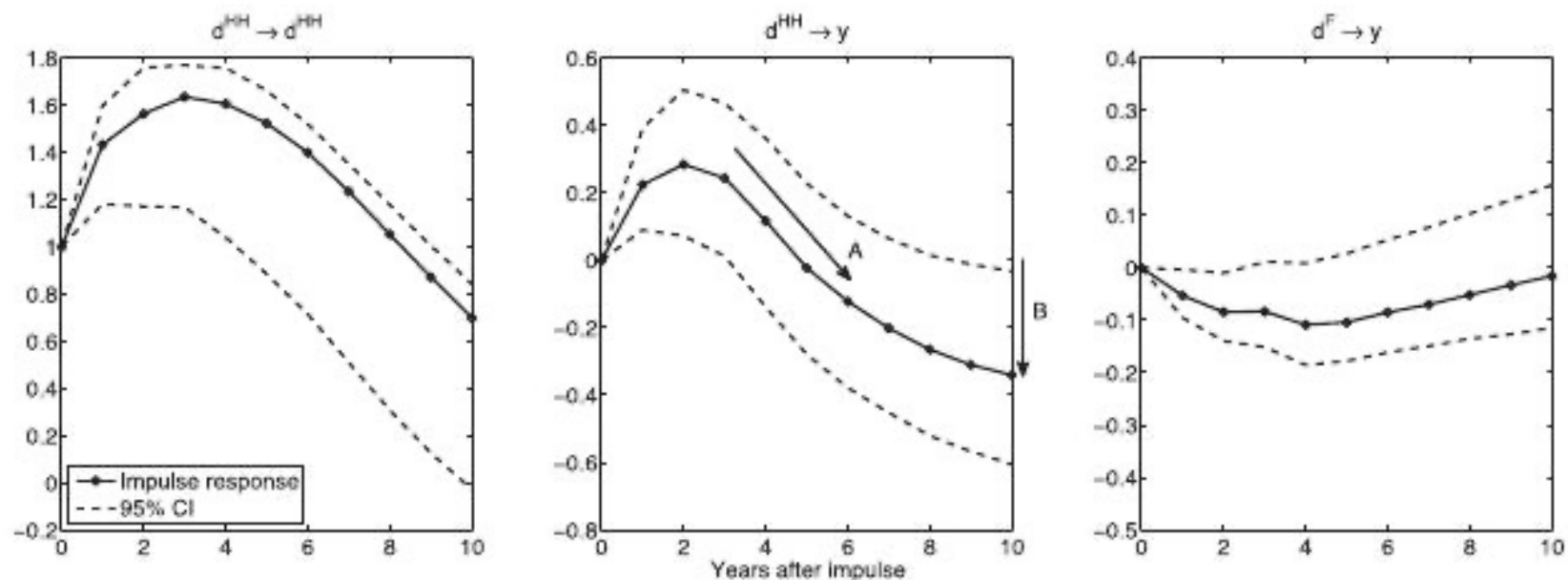


FIGURE I

Impulse Responses from a Recursive VAR in Real GDP, Nonfinancial Firm Debt, and Household Debt

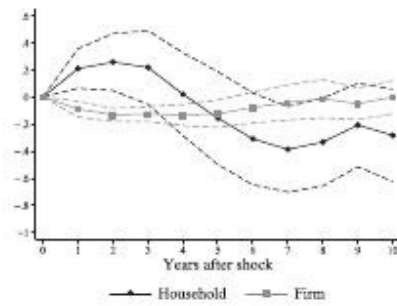
DYNAMIC RELATIONS: REGRESSION

$$\Delta_3 y_{it+k} = \alpha_i + \beta_{HH} \Delta_3 d_{it-1}^{HH} + \beta_F \Delta_3 d_{it-1}^F + u_{it+k}$$

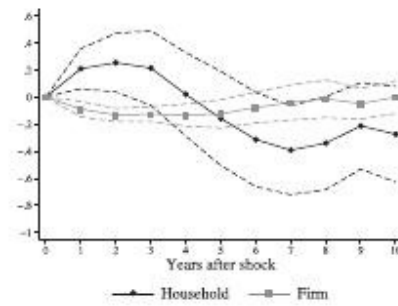
CREDIT EXPANSION AND CONTEMPORANEOUS AND FUTURE THREE-YEAR GDP GROWTH

	Dependent variable: $\Delta_3 y_{it+k}$, $k = -1, 0, \dots, 5$						
	$\Delta_3 y_{it-1}$ (1)	$\Delta_3 y_{it}$ (2)	$\Delta_3 y_{it+1}$ (3)	$\Delta_3 y_{it+2}$ (4)	$\Delta_3 y_{it+3}$ (5)	$\Delta_3 y_{it+4}$ (6)	$\Delta_3 y_{it+5}$ (7)
$\Delta_3 d_{it-1}^{HH}$	0.176* (0.0793)	0.121 (0.0810)	-0.0136 (0.0680)	-0.178** (0.0629)	-0.337** (0.0779)	-0.410** (0.0905)	-0.405** (0.102)
$\Delta_3 d_{it-1}^F$	-0.0430 (0.0556)	-0.140* (0.0550)	-0.159** (0.0437)	-0.108** (0.0362)	-0.0411 (0.0349)	0.0327 (0.0395)	0.0876* (0.0373)
Country fixed effects	✓	✓	✓	✓	✓	✓	✓
Test for equality of β_{HH} and β_F , p -value	.0465	.0184	.0905	.3558	.0017	.0002	.0002
R^2	0.0256	0.0631	0.0999	0.103	0.128	0.138	0.128
Observations	815	785	755	725	695	665	635

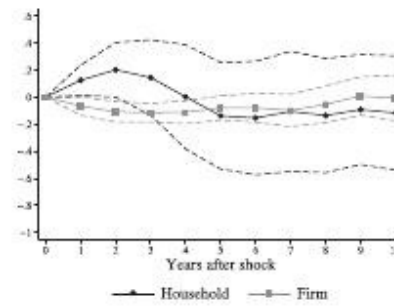
DYNAMIC RELATIONS: LOCAL PROJECTION



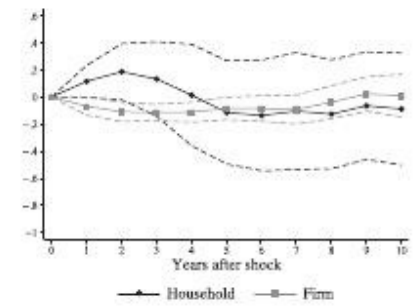
(A) Baseline: Jordà (2005) Local Projection VAR in levels on full sample



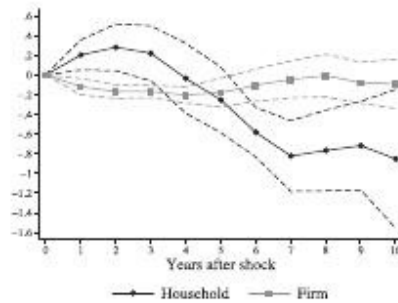
(B) Levels, include time trend



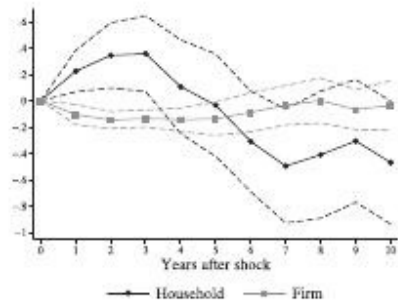
(C) Levels, excluding Great Recession



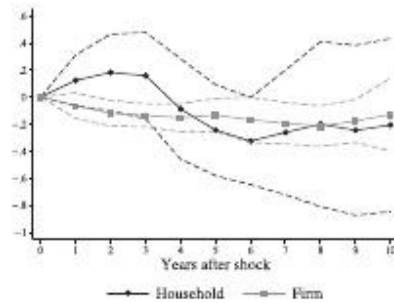
(D) Levels with time trend, excluding Great Recession



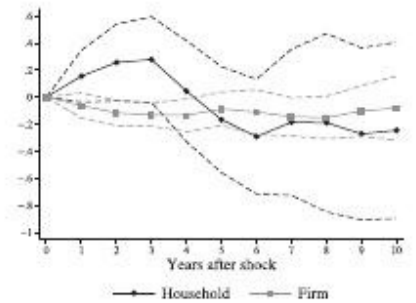
(E) First differences



(F) First difference, include time trend



(G) First difference, excluding Great Recession



(H) First difference with time trend, excluding Great Recession

DYNAMIC RELATIONS: SINGLE EQUATION

$$\Delta_3 y_{it+3} = \alpha_i + \beta_{HH} \Delta_3 d_{it-1}^{HH} + \beta_F \Delta_3 d_{it-1}^F + X'_{it-1} \Gamma + \epsilon_{it}$$

HOUSEHOLD DEBT EXPANSION PREDICTS LOWER SUBSEQUENT GROWTH

	Dependent variable: $\Delta_3 y_{it+3}$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta_3 d_{it-1}^{Private}$	-0.119** (0.0313)							
$\Delta_3 d_{it-1}^{HH}$		-0.366** (0.0772)		-0.337** (0.0779)	-0.333** (0.0771)	-0.340** (0.0868)	-0.325** (0.0839)	-0.192* (0.0959)
$\Delta_3 d_{it-1}^F$			-0.0978* (0.0391)	-0.0411 (0.0349)	-0.0464 (0.0354)	-0.0235 (0.0437)	-0.0519 (0.0395)	-0.0498 (0.0380)
$\Delta_3 d_{it-1}^{Gov}$						0.0534 (0.0430)		
$\Delta_3 d_{it-1}^{Net foreign}$							0.00793 (0.0523)	
$\mathbf{1}(\Delta_3 d_{it-1}^{Net foreign} > 0)$								0.736 (1.005)
$\Delta_3 d_{it-1}^{HH} * \mathbf{1}(\Delta_3 d_{it-1}^{Net foreign} > 0)$								-0.235+ (0.140)
Country fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
Distributed lag in Δy					✓	✓	✓	✓
Test for equality of β_{HH} and β_F , p-value				.002	.003	.003	.007	
R^2	0.0869	0.123	0.0364	0.128	0.131	0.126	0.168	0.181
Observations	695	695	695	695	695	627	636	636

WHAT HAPPENS DURING THE BOOM?

TABLE V
HOUSEHOLD DEBT INCREASES FINANCE CONSUMPTION BOOMS

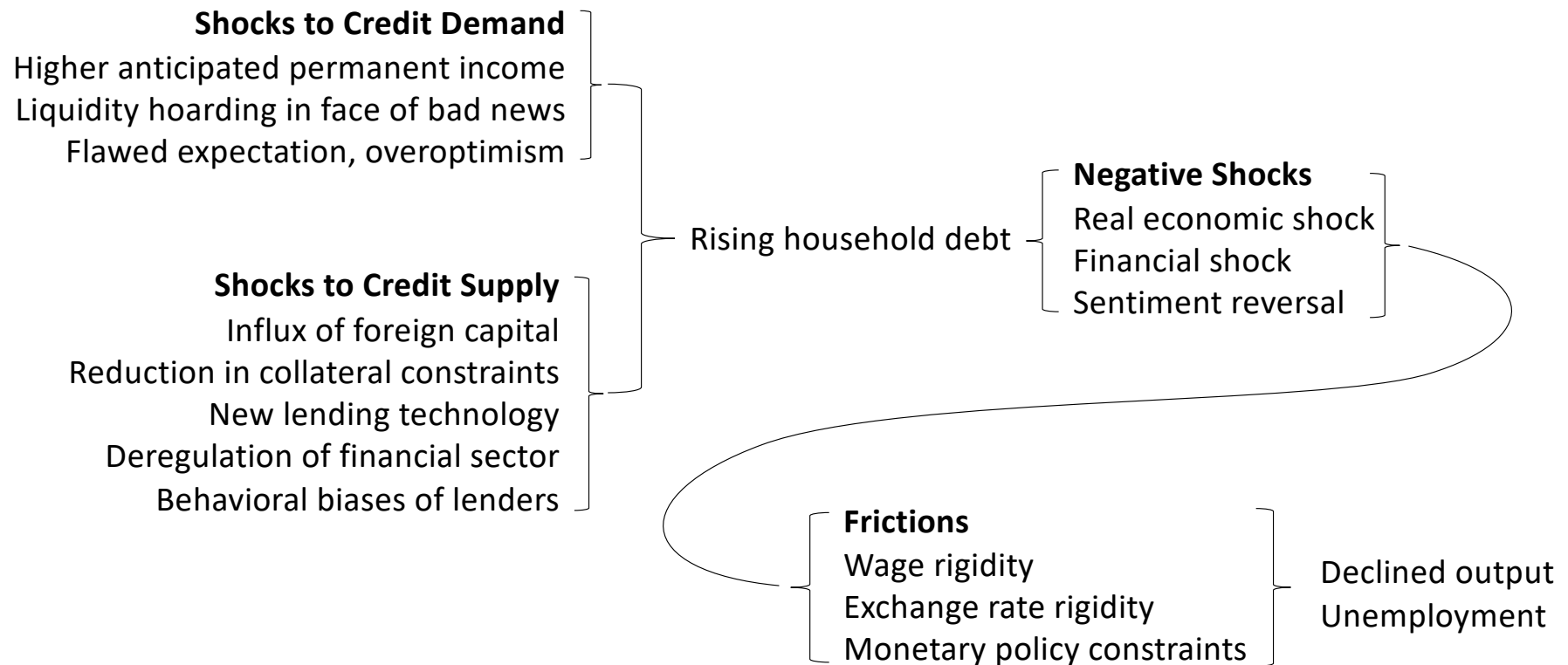
	$\Delta_1 \frac{C}{Y}_{it}$ (1)	$\Delta_1 \frac{C^{nondur}}{Y}_{it}$ (2)	$\Delta_1 \frac{C^{dur}}{Y}_{it}$ (3)	$\Delta_1 \frac{C^{services}}{Y}_{it}$ (4)	$\Delta_1 \frac{I}{Y}_{it}$ (5)	$\Delta_1 \frac{NX}{Y}_{it}$ (6)	$\Delta_1 \frac{CA}{Y}_{it}$ (7)	$\Delta_1 s_{it}^{MC}$ (8)	$\Delta_1 s_{it}^{XC}$ (9)
$\Delta_1 d_{it}^{HH}$	0.120** (0.0462)	0.0432** (0.0152)	0.0333** (0.00701)	0.0709** (0.0230)	0.0174 (0.0756)	-0.173** (0.0582)	-0.185* (0.0813)	0.152** (0.0500)	0.0371 (0.0365)
$\Delta_1 d_{it}^F$	0.0249+ (0.0146)	0.0200* (0.00781)	-0.0161** (0.00238)	0.0293** (0.00923)	-0.0194 (0.0264)	-0.0167 (0.0247)	-0.0125 (0.0207)	-0.0261 (0.0204)	-0.0400* (0.0197)
Country fixed effects	✓	✓	✓	✓	✓	✓	✓	✓	✓
R^2	0.0825	0.0802	0.0647	0.138	0.00216	0.0408	0.0374	0.0417	0.0129
Observations	690	466	466	466	688	695	648	695	695

Notes. This table shows the contemporaneous correlation between the change in household and firm debt to GDP and the change in total consumption to GDP, nondurable consumption to GDP, durable consumption to GDP, services consumption to GDP, investment to GDP, net exports to GDP, current account to GDP, the share of consumption imports in total imports, and the share of consumption exports in total exports. All specifications include country fixed effects. Reported R^2 values are from within-country variation. Standard errors in parentheses are dually clustered on country and year. +, *, ** indicate significance at the 0.1, 0.05, 0.01 levels, respectively.

THEORY

- Why does household debt expand suddenly?
- Why an increase in household debt presage lower subsequent economic growth?

THEORY ROADMAP



INTEREST SPREADS AND RISKIER BORROWERS: PROXY SVAR

- Use the mortgage-sovereign spread (MS spread) as an instrument for the household debt in the VAR setting
 - 1st stage: regress the residuals of household debt (u_{it}^{HH}) on MS spread
 - 2nd stage: regress (u_{it}^Y, u_{it}^F) on u_{it}^{HH} using the MS spread instrument
 - Identify structural shocks using additional restrictions
- Exclusion restriction:
 - MS spread might affect subsequent output through other channels other than household debt
 - However, most alternative channels would have the opposite effect
 - The estimates here are conservative in quantifying the negative effect of credit supply shocks on subsequent growth

INTEREST SPREADS AND RISKIER BORROWERS: FIRST STAGE

PROXY SVAR FIRST-STAGE REGRESSIONS

	Residual from VAR household debt equation		Residual from VAR firm debt equation	
	$\hat{u}_{it}^{d^{HH}}$ (1)	$\hat{u}_{it}^{d^{HH}}$ (2)	$\hat{u}_{it}^{d^F}$ (3)	$\hat{u}_{it}^{d^F}$ (4)
MS spread, residual	-0.341** (0.101)		-0.0182 (0.267)	
Low MS spread indicator, residual		0.689** (0.220)		0.0347 (0.588)
<i>F</i> -statistic	11.372	9.834	0.005	0.003
<i>R</i> ²	0.024	0.021	0	0
Observations	580	580	580	580

This is compelling evidence in favor of models in which credit supply shocks are on net more important than credit demand shocks.

INTEREST SPREADS AND RISKIER BORROWERS: PROXY SVAR

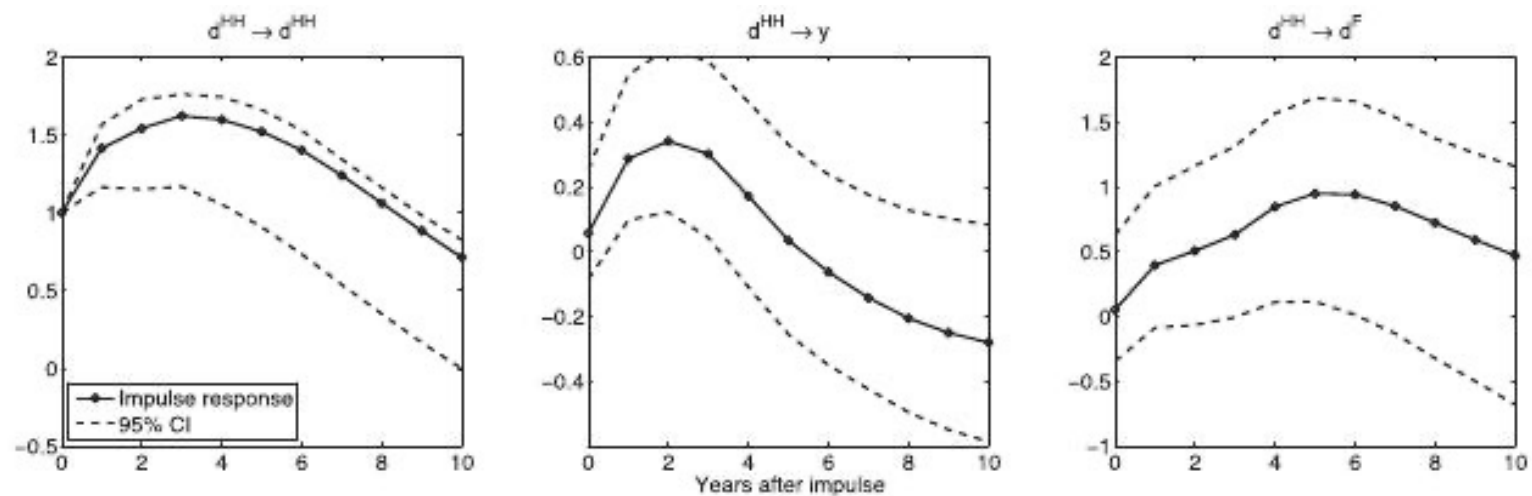


FIGURE IV

Impulse Responses to a Household Debt Shock Identified with the Mortgage Lending Spread in a Proxy SVAR

INTEREST SPREADS AND RISKIER BORROWERS: CROSS-SECTION

$$1^{\text{st}} \text{ stage: } \Delta_{02-07} d_i^{HH} = \alpha^f + \beta^f * z_i + u_i^f$$

$$2^{\text{nd}} \text{ stage: } \Delta_{07-10} y_i = \alpha^s + \beta^s * \Delta \hat{d}_i^{HH} + u_i^s$$

	Eurozone case and sovereign spread over U.S.				2000s boom and mortgage-sovereign spread			
	$\Delta_{07-10} y_i$ (1)	$\Delta_{02-07} d_i^{HH}$ (2)	$\Delta_{07-10} y_i$ (3)	$\Delta_{07-10} y_i$ (4)	$\Delta_{07-10} y_i$ (5)	$\Delta_{02-07} d_i^{HH}$ (6)	$\Delta_{07-10} y_i$ (7)	$\Delta_{07-10} y_i$ (8)
$\Delta_{96-99} spr_i^{real}$		-11.66** (3.428)						
$\Delta_{02-07} d_i^{HH}$	-0.170** (0.0404)		-0.222** (0.0479)	-0.218* (0.107)	-0.180 (0.118)		-0.296* (0.144)	-0.347 (0.306)
$\Delta_{02-07} d_i^F$				0.0326 (0.0833)				0.0975 (0.179)
$\Delta_{02-07} y_i$				-12.76 (14.36)				0.416** (0.103)
$\Delta_{00-04} spr_i^{MS}$						-10.28** (2.889)		
Equation	OLS	FS	IV	IV	OLS	FS	IV	IV
First stage F-statistic		11.6				12.669		
R^2	0.530	0.526	0.480	0.537	0.164	0.398	0.0952	0.362
Observations	12	12	12	12	21	21	21	21

RATIONAL OR BIASED EXPECTATIONS

- GDP forecasts: IMF World Economic Outlook & OECD Economic outlook
- Larger increases in household debt are associated with overoptimistic growth expectations and hence negative forecast errors

	Growth forecast		Forecast error					Forecast error sample up to 2006	
	$\Delta_2 y_{t+2 t}^{IMF}$ (1)	$\Delta_2 y_{t+2 t}^{OECD}$ (2)	$e_{t+1 t}^{IMF}$ (3)	$e_{t+2 t}^{IMF}$ (4)	$e_{t+3 t}^{IMF}$ (5)	$e_{t+1 t}^{OECD}$ (6)	$e_{t+2 t}^{OECD}$ (7)	$e_{t+1 t}^{IMF}$ (8)	$e_{t+1 t}^{OECD}$ (9)
$\Delta_3 d_{it-1}^{HH}$	0.0016 (0.023)	0.0013 (0.028)	-0.060** (0.020)	-0.17** (0.057)	-0.31** (0.091)	-0.070** (0.023)	-0.17* (0.071)	-0.035+ (0.021)	-0.042** (0.015)
$\Delta_3 d_{it-1}^F$	-0.029 (0.021)	-0.041* (0.017)	-0.019 (0.027)	-0.026 (0.045)	-0.031 (0.051)	-0.013 (0.015)	-0.0084 (0.029)	-0.029 (0.020)	-0.020* (0.0080)
Country fixed effects	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sample	Full	Full	Full	Full	Full	Full	Full	Pre-2006	Pre-2006
Test for equality of β_{HH} and β_F , p -value	.367	.227	.311	.089	.02	.053	.07	.863	.29
R^2	0.034	0.064	0.026	0.063	0.13	0.040	0.073	0.026	0.027
Observations	484	471	590	484	484	594	471	469	490

FRICTIONS: NONLINEARITY AND HETEROGENEITY ACROSS EXCHANGE RATE REGIMES

	Nonlinearity	Fixed	Intermediate	Freely floating
	$\Delta_3 y_{it+3}$ (1)	$\Delta_3 y_{it+3}$ (2)	$\Delta_3 y_{it+3}$ (3)	$\Delta_3 y_{it+3}$ (4)
$\Delta_3 d_{it-1}^{HH} * \mathbf{1}(\Delta_3 d_{it-1}^{HH} > 0)$	-0.436** (0.106)			
$\Delta_3 d_{it-1}^{HH} * \mathbf{1}(\Delta_3 d_{it-1}^{HH} \leq 0)$	0.0655 (0.156)			
$\Delta_3 d_{it-1}^F * \mathbf{1}(\Delta_3 d_{it-1}^F > 0)$	-0.0537 (0.0367)			
$\Delta_3 d_{it-1}^F * \mathbf{1}(\Delta_3 d_{it-1}^F \leq 0)$	-0.0396 (0.0631)			
$\Delta_3 d_{it-1}^{HH}$		-0.534** (0.128)	-0.311** (0.0716)	-0.0673 (0.129)
$\Delta_3 d_{it-1}^F$		-0.113* (0.0495)	-0.0119 (0.0425)	0.0519 (0.116)

FRICTIONS: WAGE RIGIDITIES AND UNEMPLOYMENT

	Full sample		Fixed ER regimes	Intermediate	Freely floating
	$\Delta_3 u_{it+3}$ (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)
$\Delta_3 d_{it-1}^{HH}$	0.132** (0.0380)	0.105** (0.0390)	0.264** (0.0736)	0.0709+ (0.0367)	-0.0159 (0.0587)
$\Delta_3 d_{it-1}^F$	0.0363* (0.0153)	0.0373* (0.0158)	0.0615+ (0.0319)	0.0385* (0.0194)	0.0403 (0.0332)
Country fixed effects	✓	✓	✓	✓	✓
Distributed lag in Δu		✓	✓	✓	✓
Test for equality of β_{HH} and β_F , p -value	.026	.131	.001	.425	.506
R^2	0.145	0.207	0.397	0.235	0.254
Observations	662	638	211	296	120

HOUSEHOLD DEBT AND EXTERNAL ADJUSTMENT

	$\frac{\Delta_3 NX_{it+3}}{Y_{it}}$ (1)	$\Delta_3 \ln \frac{X_{it+3}}{M_{it+3}}$ (2)	$\frac{\Delta_3 X_{it+3}}{Y_{it}}$ (3)	$\frac{\Delta_3 M_{it+3}}{Y_{it}}$ (4)	$\Delta_3 s_{it+3}^{MC}$ (5)	$\frac{\Delta_3 NX_{it+3}}{Y_{it}}$ (6)	$\frac{\Delta_3 NX_{it+3}}{Y_{it}}$ (7)
$\Delta_3 d_{it-1}^{HH}$	0.17** (0.049)	0.39** (0.15)	-0.061 (0.13)	-0.23 (0.16)	-0.076* (0.035)	0.049 (0.052)	0.11+ (0.057)
$\Delta_3 d_{it-1}^F$	0.022 (0.021)	0.12+ (0.069)	-0.033 (0.057)	-0.055 (0.063)	0.013 (0.015)	0.031+ (0.019)	0.023 (0.020)
$\Delta_3 d_{it-1}^{HH} \times \text{openness}_i$						0.17** (0.027)	0.14** (0.036)
$\Delta_3 d_{it-1}^{HH} \times \rho_i^{Global}$							
Global- $_i \Delta_3 d_{it-1}^{HH}$							
Country fixed effects	✓	✓	✓	✓	✓	✓	✓
Distributed lag in Δy	✓	✓	✓	✓	✓	✓	✓
Year fixed effects							✓
Test for equality of β_{HH} and β_F , p -value	.013	.144	.868	.359	.026		
R^2	0.062	0.075	0.021	0.039	0.058	0.080	0.19
Observations	695	695	695	695	695	695	695

HOUSEHOLD DEBT AND EXTERNAL ADJUSTMENT

$$\rho_i^{Global} = \text{corr} \left(\Delta_3 d_{it}^{HH}, \frac{1}{N-1} \sum_{j \neq i} \Delta_3 d_{jt}^{HH} \right)$$

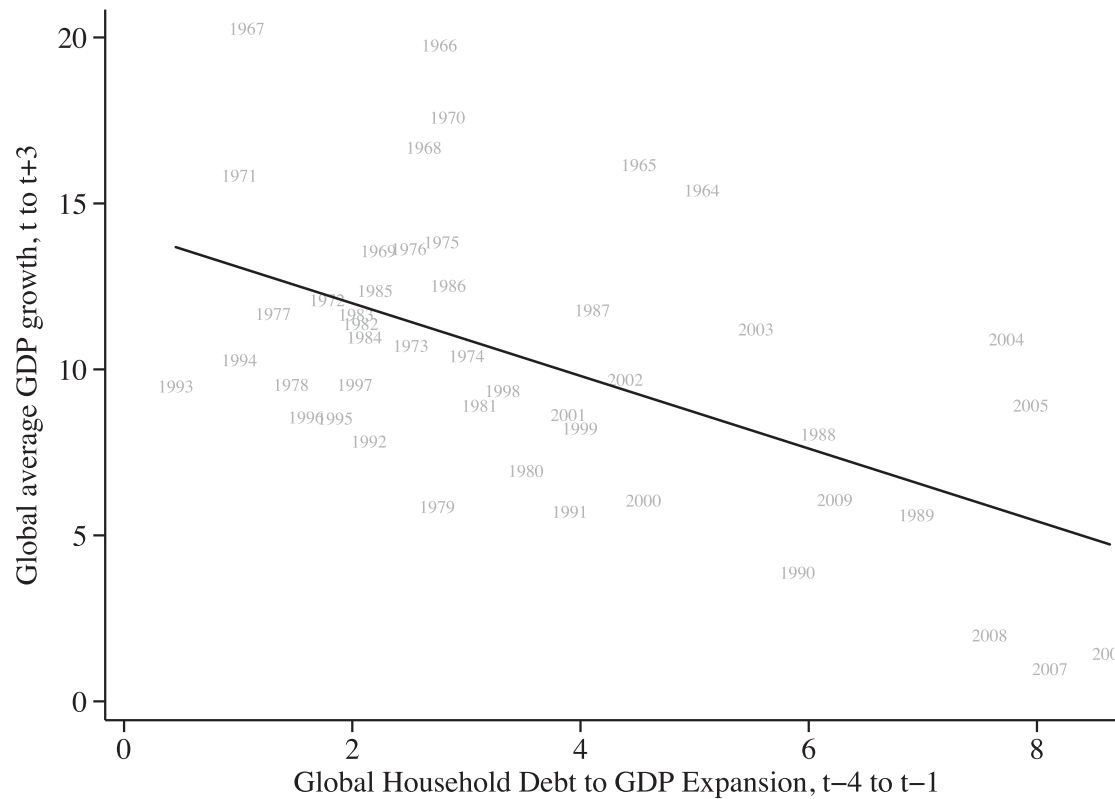
$$\text{Global}_{-i} = \frac{\text{Global Household Debt}}{\text{Global GDP}} \quad (\text{excl. country } i)$$

	$\Delta_3 y_{it+3}$ (8)	$\frac{\Delta_3 NX_{it+3}}{Y_{it}}$ (9)	$\Delta_3 y_{it+3}$ (10)
$\Delta_3 d_{it-1}^{HH}$	-0.22* (0.090)	0.25** (0.039)	-0.22** (0.060)
$\Delta_3 d_{it-1}^F$	-0.045 (0.036)	0.024 (0.020)	-0.063* (0.027)
$\Delta_3 d_{it-1}^{HH} \times \text{openness}_i$			
$\Delta_3 d_{it-1}^{HH} \times \rho_i^{Global}$	-0.33 (0.22)	-0.22** (0.071)	
$\text{Global}_{-i} \Delta_3 d_{it-1}^{HH}$			-0.74** (0.26)
Country fixed effects	✓	✓	✓
Distributed lag in Δy	✓	✓	✓
Year fixed effects			
Test for equality of β_{HH} and β_F , p -value			
R^2	0.16	0.080	0.22
Observations	693	693	693

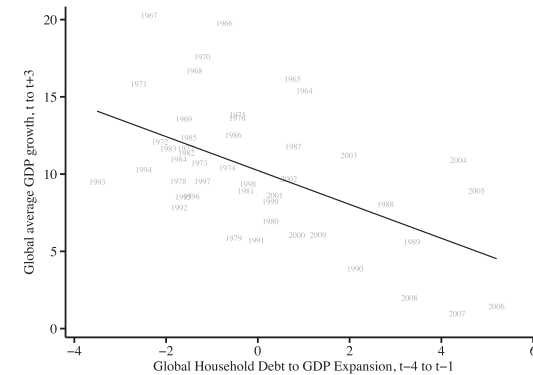
GLOBAL HOUSEHOLD DEBT AND GLOBAL GROWTH

	Dependent variable: global average $\Delta_3 y_{t+3}$				
	(1)	(2)	(3)	(4)	(5)
Global $\Delta_3 d_{t-1}^{HH}$	-1.094** (0.300)		-1.097** (0.311)	-0.966** (0.252)	-0.928** (0.288)
Global $\Delta_3 d_{t-1}^F$		-0.103 (0.192)	0.00896 (0.177)	-0.0756 (0.149)	0.0727 (0.192)
Global Δy_{t-1}				0.341 (0.244)	0.342 (0.257)
Global Δy_{t-2}				0.390+ (0.224)	0.426* (0.189)
Global Δy_{t-3}				0.477+ (0.258)	0.532+ (0.280)
Sample	Full	Full	Full	Full	Pre-2006
Test for equality of β_{HH} and β_F , p -value			.0072	.0076	.0037
R^2	0.295	0.007	0.295	0.471	0.426
Observations	46	46	46	46	40

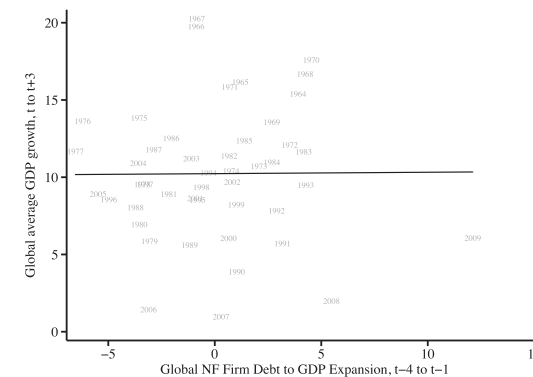
GLOBAL HOUSEHOLD DEBT AND GLOBAL GROWTH



(A) Household Debt



(B) Household Debt, Partial Correlation



(C) NF Firm Debt, Partial Correlation

CONCLUSION

- Caveat: The household debt channel reflects long-run development of financialization
 - However, this paper focus on short- to medium-run business cycle, which does not speak to the long-run institutional changes.
- Why is the medium-run impact of household debt growth on output larger than that of firm debt growth?
 - Consumers and the local economy are highly sensitive to housing net worth shocks
 - Business owners may be more sophisticated and rational in borrowing than average households
 - There are more developed institutional arrangements (bankruptcy laws) to deal with debt restructuring at the firm level compared to the household level