Debt and Growth[1]

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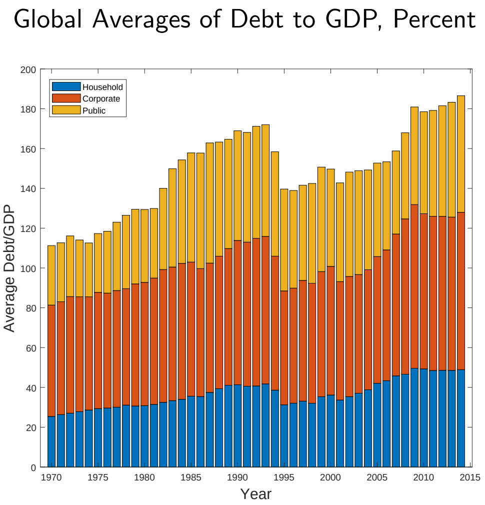
[1] The views expressed here are those of the authors and do not necessarily reflect views of the Federal Reserve Banks of Chicago and the Federal Reserve System.

Rising Global Debt



Global Debt and Growth

- What are the implications of such a large increase in indebtedness?
  - Debt might be beneficial for raising consumption, accelerating capital accumulation, and increasing future output.
  - Increased debt services might leave countries vulnerable to financial risks and lower GDP growth in the medium run.
- What is the relation between a debt expansion and output growth in the data?
  - Not all debt is the same, nor is the relationship between debt and output growth the same across countries.

What We Do

- This paper studies the empirical relation between debt and output growth in a panel of 72 countries over 1970–2014.
- We dissect debt data by
  - indebted economic sectors (households, firms, governments)
  - sources of financing (domestic, external)
    - external debt: FDI, foreign equity, foreign loans, reserves
- We compare countries across economic development (developed and developing).

What We Find by Indebted Sectors

- An expansion in household debt/GDP is negatively associated with output growth in the immediate and medium terms in both developed and developing countries.
  - The negative relation is nonlinear in developing countries.
- An increase in firm debt/GDP is negatively associated with immediate-term output growth in developed countries.
- An increase in public debt/GDP is negatively associated with medium-term output growth in developing countries.

What We Find by Sources of Debt

- An expansion in FDI or equity inflows is negatively correlated with output growth in developed countries, but positively in developing countries.
- An expansion in loans/GDP is negatively correlated with output growth in both groups.
- An increase in reserves/GDP is positively correlated with output growth in both groups.

Potential Channels

- Nominal rigidity or constraints on monetary policy: exchange rate regimes

  Curdia and Woodford (2010), Eggertsson and Krugman (2012), Martin and Philippon (2017), Farhi and Werning (2016), Korinek and Simsek (2016), Schmitt-Grohé and Uribe (2016), Guerrieri and Lorenzoni (2017)

- Linkages from debt expansions to output growth: consumption or investment

  Bernanke and Gertler (1989), Kiyotaki and Moore (1997), Caballero and Krishnamurthy (2003), Lorenzoni (2008), Brunnermeier and Sannikov (2014), Mian et al. (2013)

Potential Channels

- The negative correlation between a household debt expansion and output growth is stronger under a fixed exchange rate regime.
- An expansion of household debt is associated with a decline in subsequent investment growth instead of consumption growth in developing and developed countries.

Related Literature

- Public debt
  - Reinhart and Rogoff (2010), Cecchetti et al. (2011), Cecherita-Westphaland and Rother (2012), Baum et al. (2013), Panizza and Presbitero (2014), Kumar and Woo (2015), ...
- Private debt
  - Schularick and Taylor (2012), Jorda et al. (2013), Cecchetti et al. (2011), Mian et al. (2017), Bernardini and Forni (2017), ...
- External debt
  - Patillo et al. (2002), Chowdhury (2001), Lin and Sosin (2001), Changyong et al. (2012), Ramzan and Ahmad (2014), ...

Data

- A panel of 72 countries over 1970-2014: 21 developed and 51 developing countries
- GDP and components: World Bank's *World Development Indicators*
- Private and public debt: IMF's *Global Debt Database*
    - Private debt: stock of loans and debt securities issued by households and firms
    - Public debt: gross debt issued by the public sector
- Net foreign debt: *External Wealth of Nations Mark II* by Lane and Milesi-Ferretti (2016)
    - Four subcategories of foreign debt: FDI, equity, loans, and reserves

Summary Statistics

Table: Summary of Debt/GDP by Sectors, Percent

	mean	median	std.
Developed Countries			
Household Debt/GDP	56.24	53.15	26.45
Firm Debt/GDP	82.72	80.49	30.40
Public Debt/GDP	59.06	53.54	34.02
Developing Countries			
Household Debt/GDP	21.63	16.64	17.29
Firm Debt/GDP	47.52	41.74	27.30
Public Debt/GDP	44.46	39.14	28.82

Developing countries have lower debt/GDP ratios and use public debt disproportionately more.

Summary Statistics

Table: Summary of Foreign Debt/GDP, Percent

	mean	median	std.
Developed Countries	12.00	11.83	39.58
FDI/GDP	-1.74	-0.61	18.64
Foreign Equity/GDP	4.73	0.43	43.30
Foreign Loans/GDP	15.11	15.78	46.39
Reserves/GDP	5.88	4.12	6.31
Developing Countries	16.19	22.18	48.91
FDI/GDP	16.53	9.27	21.03
Foreign Equity/GDP	-1.66	0.00	15.92
Foreign Loans/GDP	16.44	17.45	29.13
Reserves/GDP	15.17	9.95	18.51

Developing countries borrow abroad more in FDI and loans, and save more in reserves.

Summary Statistics

Table: Summary of Three-Year Changes, Percent

	mean	median	std.
Developed Countries			
GDP	5.22	5.57	5.22
Household Debt/GDP	4.13	3.50	6.62
Firm Debt/GDP	4.01	2.98	11.25
Public Debt/GDP	4.23	3.10	11.70
Developing Countries			
GDP	7.46	7.58	11.12
Household Debt/GDP	3.23	2.53	5.93
Firm Debt/GDP	3.83	3.63	10.37
Public Debt/GDP	1.34	0.84	17.47

Developing countries grow faster and experience slower growth in debt.

Panel Regression Specification

- How a past debt expansion correlates with subsequent output growth?
- A panel regression with the country and time fixed effects:

$$\Delta_3 y_{it+k} = \beta^H \Delta_3 d^H_{it-1} + \beta^F \Delta_3 d^F_{it-1} + \beta^P \Delta_3 d^P_{it-1} + \delta X_{it} + \alpha_i + \gamma_t + u_{it}$$

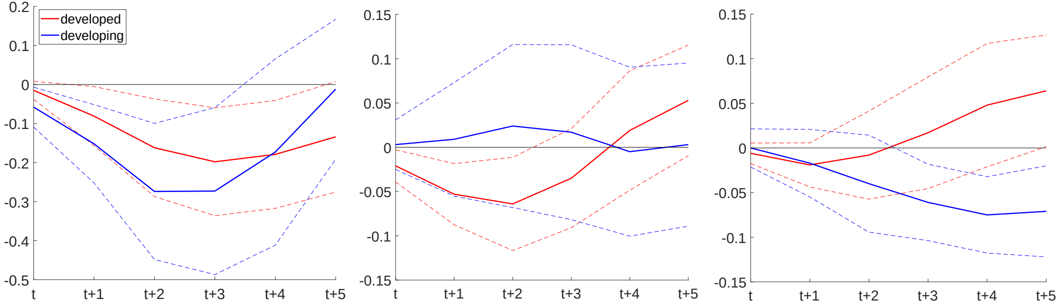
  - $\Delta_3 y_{it+k}$: 3-year change in logged GDP per capita, $y_{it+k} - y_{it+k-3}$
  - $\Delta_3 d^j_{it-1}$: 3-year change in the debt-output ratio, $d^j_{it-1} - d^j_{it-4}$
  - X_{it}: co-variate of population growth and saving rates
  - Included α_i and γ_t, together with the lagged dependent variable

Household, Firm, and Government Debt

	$\Delta_3 y_{it}$	$\Delta_3 y_{it+1}$	$\Delta_3 y_{it+2}$	$\Delta_3 y_{it+3}$	$\Delta_3 y_{it+4}$	$\Delta_3 y_{it+5}$
			Panel A: Developed Countries			
$\Delta_3 d^H_{it-1}$	-0.015	-0.081*	-0.162**	-0.198**	-0.179**	-0.134
$\Delta_3 d^F_{it-1}$	-0.021*	-0.053**	-0.064**	-0.035	0.019	0.053
$\Delta_3 d^P_{it-1}$	-0.006	-0.019	-0.008	0.017	0.048	0.064*
Obs	622	622	622	622	601	580
			Panel B: Developing Countries			
$\Delta_3 d^H_{it-1}$	-0.058*	-0.152**	-0.274**	-0.273**	-0.173	-0.012
$\Delta_3 d^F_{it-1}$	0.003	0.009	0.024	0.017	-0.005	0.003
$\Delta_3 d^P_{it-1}$	0.000	-0.017	-0.040	-0.061**	-0.075***	-0.071**
Obs	462	462	462	462	427	390

Household, Firm, and Government Debt

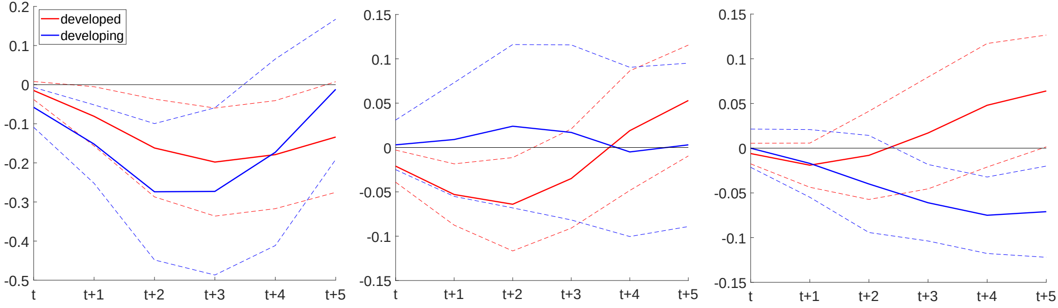
Figure: Coefficients on Changes in Debt/GDP



(a) HH Debt (b) Firm Debt (c) Public Debt

Household, Firm, and Government Debt

Figure: Coefficients on Changes in Debt/GDP

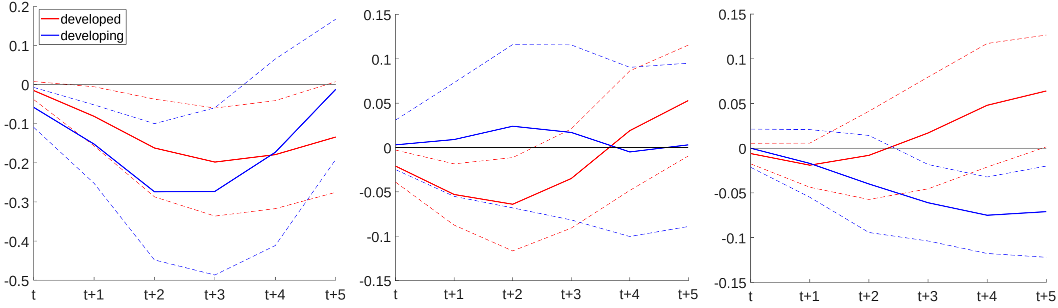


(a) HH Debt (b) Firm Debt (c) Public Debt

An expansion in HH debt is associated with lower output growth.

Household, Firm, and Government Debt

Figure: Coefficients on Changes in Debt/GDP

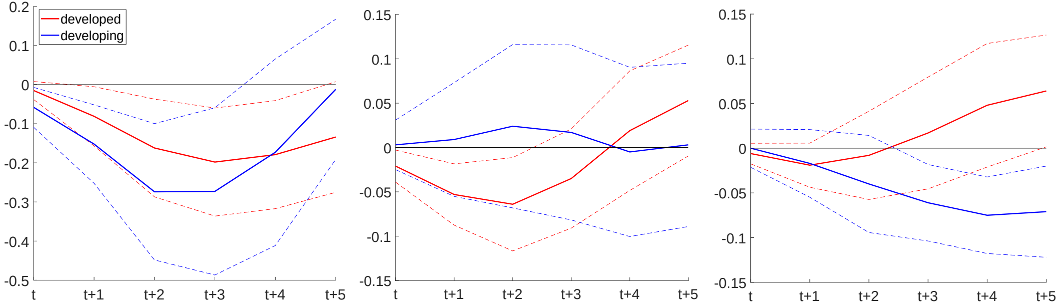


(a) HH Debt (b) Firm Debt (c) Public Debt

When HH debt/GDP rises by 6.6 ppts, output growth declines by 1.3 (1.8) ppts in developed (developing) countries over the next three years.

Household, Firm, and Government Debt

Figure: Coefficients on Changes in Debt/GDP

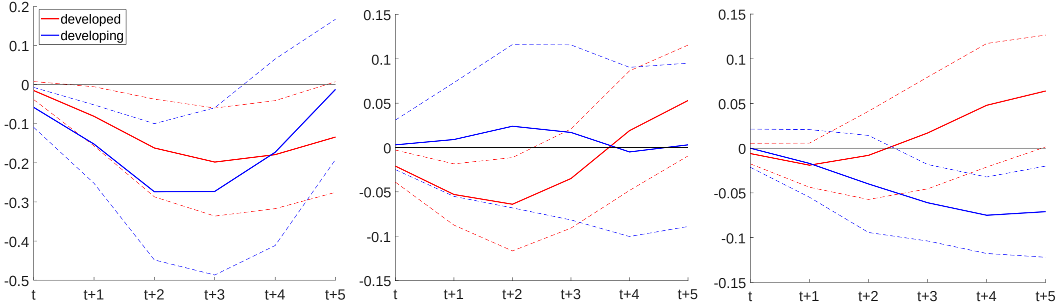


(a) HH Debt (b) Firm Debt (c) Public Debt

A rise in firm debt is associated with a smaller and more immediate negative effect on GDP growth only in developed countries.

Household, Firm, and Government Debt

Figure: Coefficients on Changes in Debt/GDP



(a) HH Debt (b) Firm Debt (c) Public Debt

Changes in public debt are negatively associated with medium-term output growth only in developing countries.

Test for the Nonlinearity

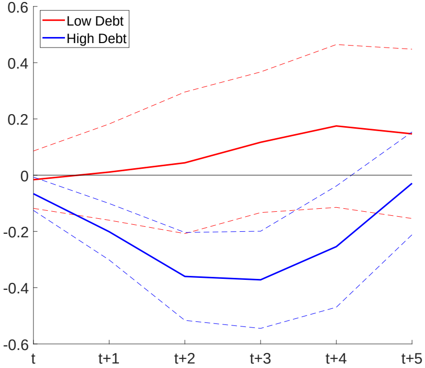
The regression specification:

$$\Delta_3 y_{it+k} = \sum_{j=\{H,F,P\}} \left[\beta_1^j 1(d_{it-1}^j > m_{it-1}^j) + \beta_2^j 1(d_{it-1}^j \leq m_{it-1}^j)\right] \Delta_3 d_{it-1}^j + \delta X_{it} + \alpha_i + \gamma_t + u_{it},$$

- m_{it-1}^j denotes the cutoff value of the debt-output ratios
  - The baseline sets the cutoff at the median values (robust for the 75th percentiles)
- The interest is whether β_1^j and β_2^j are different

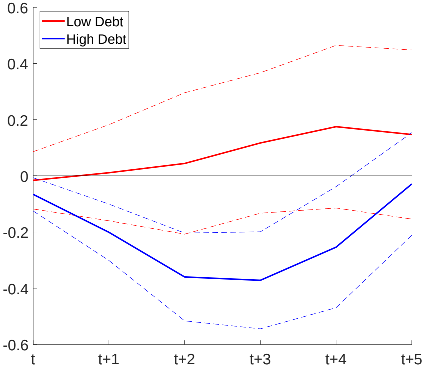
Evidence of Non-linearity

Coefficients on Changes in HH Debt/GDP in Developing Countries



Evidence of Non-linearity

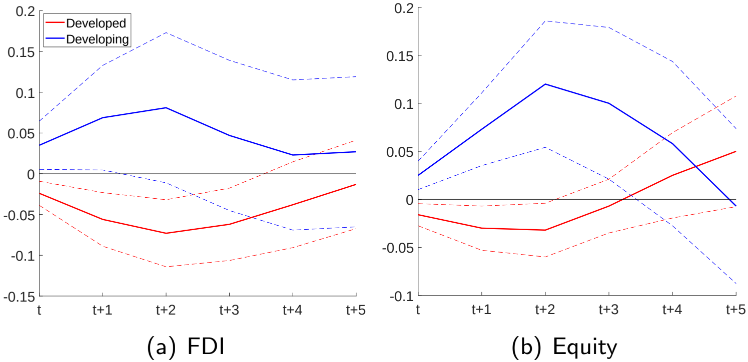
Coefficients on Changes in HH Debt/GDP in Developing Countries



Only when HH debt is high, a debt expansion is negatively correlated with subsequent output growth.

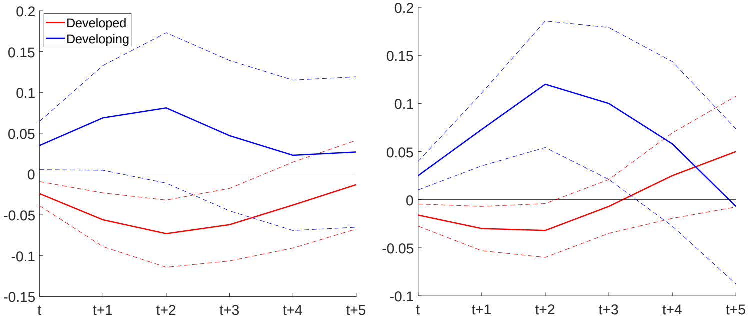
External Debt

Figure: Coefficients on Changes in Debt/GDP



External Debt

Figure: Coefficients on Changes in Debt/GDP

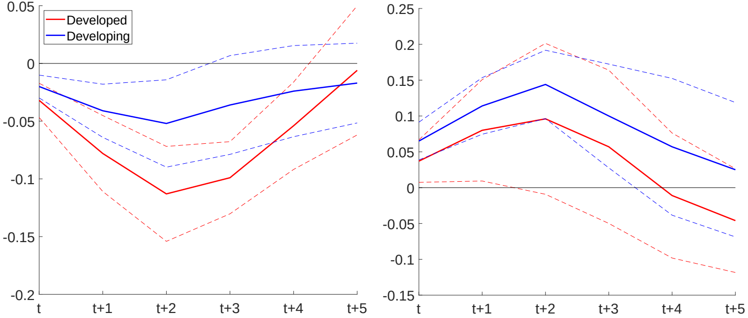


(a) FDI (b) Equity

An expansion in FDI or equity inflows is negatively correlated with output growth in the developed countries, but is positively correlated in the developing countries.

External Debt

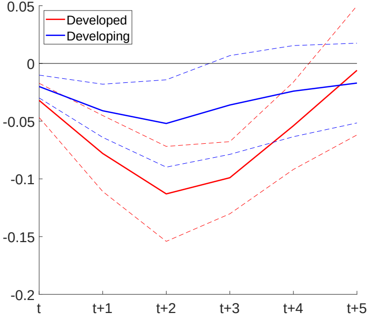
Figure: Coefficients on Changes in Debt/GDP



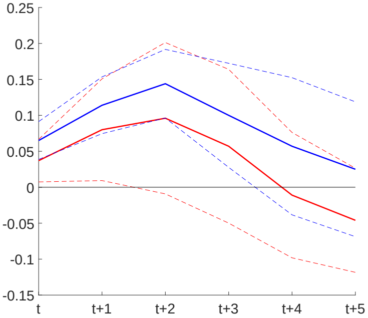
(a) Loans (b) Reserves

External Debt

Figure: Coefficients on Changes in Debt/GDP



(a) Loans

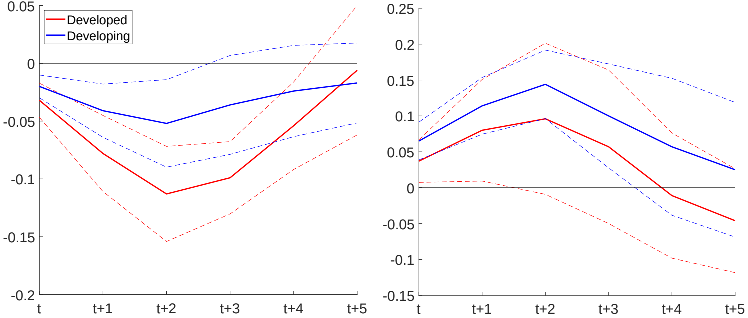


(b) Reserves

An expansion in foreign loans is negatively correlated with output growth in both groups and is particularly significant and strong in the developed countries.

External Debt

Figure: Coefficients on Changes in Debt/GDP

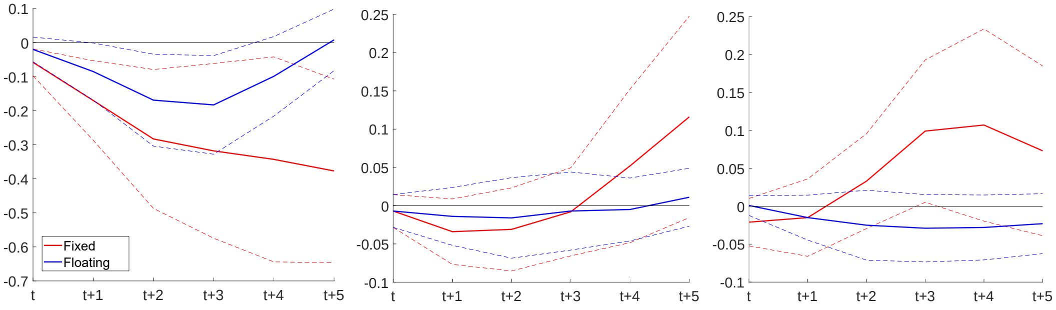


(a) Loans (b) Reserves

An increase in reserves is positively correlated with immediate output growth in both groups and is significant over longer horizons in the developing countries

Macro Friction: Exchange Rate Regimes

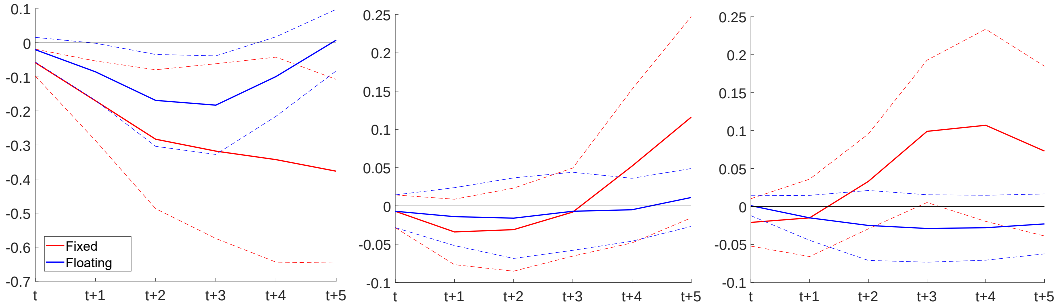
Figure: Coefficients on Changes in Debt/GDP



(a) HH Debt (b) Firm Debt (c) Public Debt

Macro Friction: Exchange Rate Regimes

Figure: Coefficients on Changes in Debt/GDP

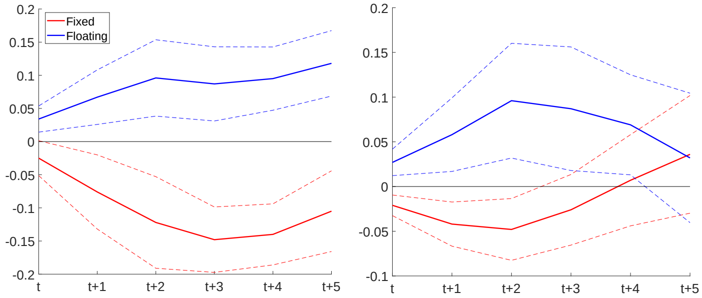


(a) HH Debt (b) Firm Debt (c) Public Debt

A household debt expansion is more negatively correlated with subsequent output growth under a fixed exchange regime. Nominal rigidities or constraints on monetary policy might be important for understanding this linkage.

Macro Friction: Exchange Rate Regimes

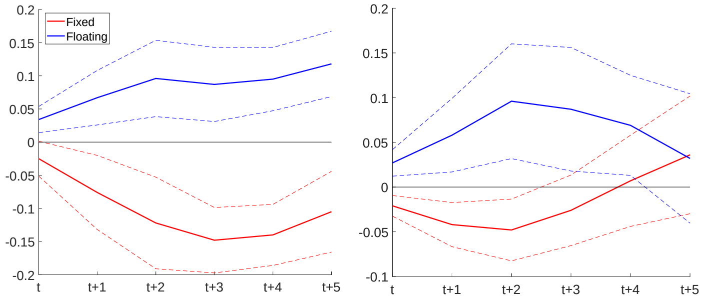
Figure: Coefficients on Changes in Debt/GDP



(a) FDI (b) Equity

Macro Friction: Exchange Rate Regimes

Figure: Coefficients on Changes in Debt/GDP

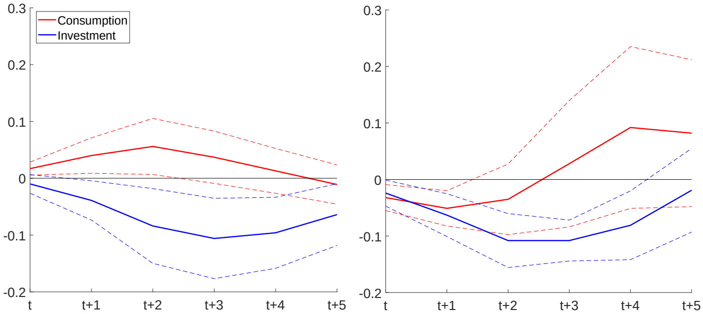


(a) FDI (b) Equity

An expansion in FDI or foreign equity debt is negatively correlated with future growth under fixed regimes, but positively related under flexible regimes.

Transmission through Consumption or Investment: HH Debt

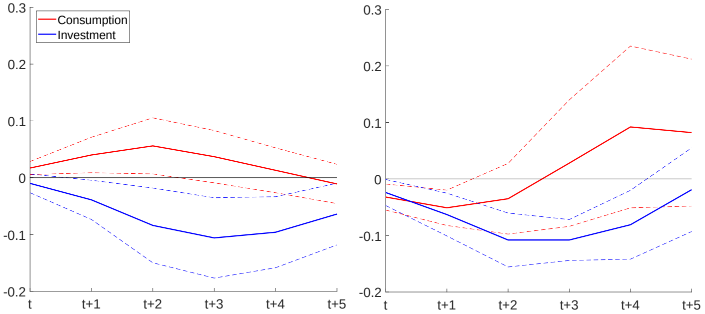
Figure: Coefficients on Changes in Household Debt/GDP



(a) Developed (b) Developing

Transmission through Consumption or Investment: HH Debt

Figure: Coefficients on Changes in Household Debt/GDP

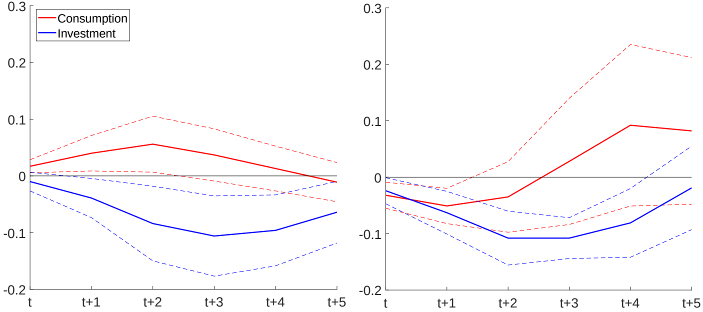


(a) Developed (b) Developing

An expansion of household debt is associated with a decline in subsequent investment growth in both developed and developing countries.

Transmission through Consumption or Investment: HH Debt

Figure: Coefficients on Changes in Household Debt/GDP

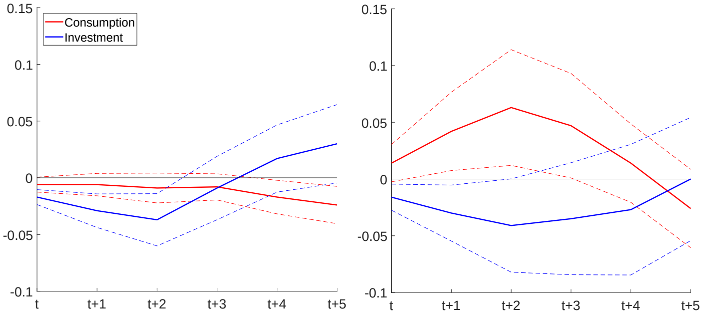


(a) Developed (b) Developing

An expansion of household debt is associated with a rise in near-term consumption growth in developed countries, but a decline in near-term consumption growth in developing countries.

Transmission through Consumption or Investment: Firm Debt

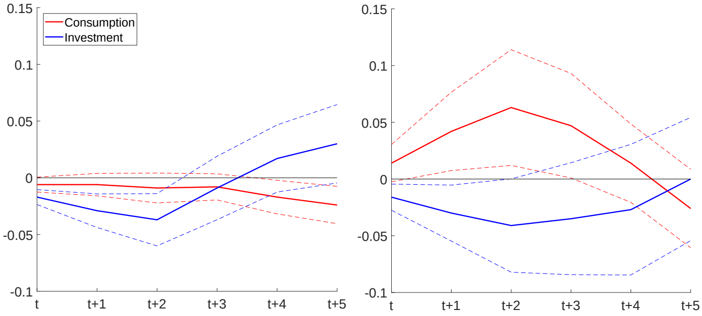
Figure: Coefficients on Changes in Corporate Debt/GDP



(a) Developed (b) Developing

Transmission through Consumption or Investment: Firm Debt

Figure: Coefficients on Changes in Corporate Debt/GDP

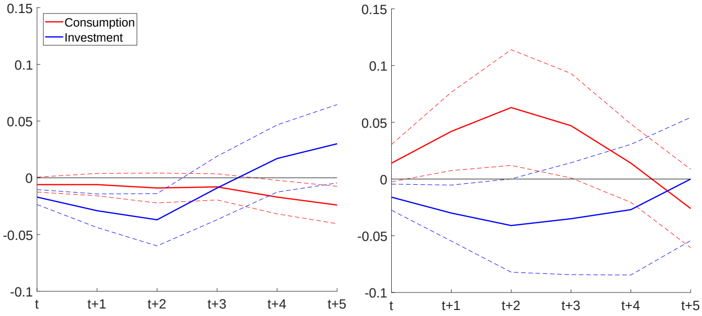


(a) Developed (b) Developing

An expansion of corporate debt is associated with a decline in immediate investment and consumption growth in developed countries.

Transmission through Consumption or Investment: Firm Debt

Figure: Coefficients on Changes in Corporate Debt/GDP

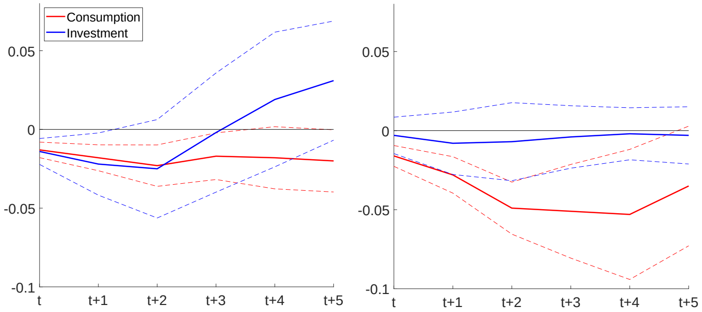


(a) Developed (b) Developing

An expansion of corporate debt is associated with a decline in immediate investment but an increase in consumption growth in developing countries.

Transmission through Consumption or Investment

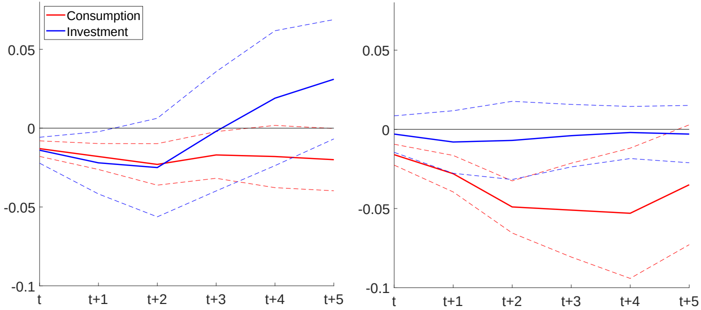
Figure: Coefficients on Changes in Public Debt/GDP



(a) Developed (b) Developing

Transmission through Consumption or Investment

Figure: Coefficients on Changes in Public Debt/GDP



(a) Developed (b) Developing

An expansion in public debt is associated with a significant decline in consumption growth instead of investment growth. The negative correlation is stronger in developing countries.

Conclusion and Future Work

- Provide a comprehensive analysis of the relationship between indebtedness and subsequent output growth
- Document strikingly different patterns for various types of debt across developed and developing countries
- Shed light on the potential channels from debt expansions to subsequent output growth
- Future work is to establish the relationship quantitatively and to conduct policy analysis

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