

# $r - g < 0$ : Can We Sleep More Soundly?

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## Motivation and Questions

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- Standard economic models usually assume that  $r - g > 0$
- After the Global Financial Crisis, low interest rates in advanced economies raise doubts on whether  $r - g > 0$  is the norm
- $r - g$  is crucial in public finance
- Given low  $r - g$  today, should we worry less about the likelihood of defaults?

### **This paper explores:**

- Are the recent low differentials unique in the span of history?
- What are important drivers of the differentials?
- What is the relationship between  $r - g$  and sovereign default?

## Approach and Results

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This paper addresses the questions empirically, drawing primarily on the “Public Finances in Modern History” dataset (available on [imf.org](http://imf.org)) to compute the differentials for 55 advanced and emerging economies over up to 200 years

### Main results:

- Negative  $r - g$  prevail in both advanced and emerging economies
- Financial repression played a key role in the negative differentials
- Differentials computed using the effective interest rate are no higher prior to defaults
- Marginal rates often rise sharply and abruptly prior to sovereign defaults, but only a few months ahead

## Literature Review

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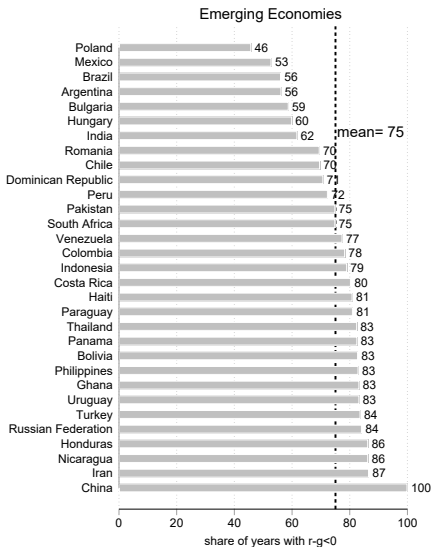
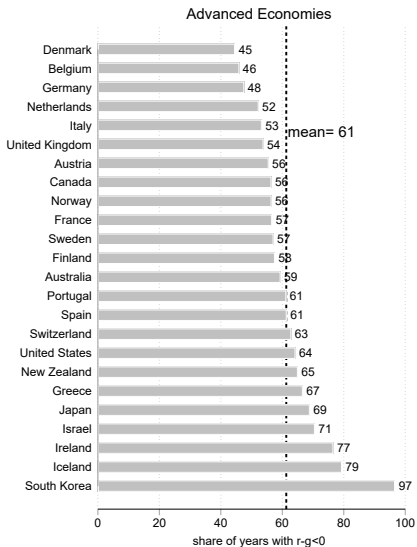
- *Interest-growth differential*: Ball, Elmendorf and Mankiw (95), Turner and Spinelli (11), Escolano, Shabunina and Woo (17), Barrett (18), Blanchard (19), Mehrotra and Sergeyev (19)  
**This paper**: large sample across time and countries
- *Financial repression*: Giovannini and De Melo (91), Reinhart, Kirkegaard and Sbrancia (11), Reinhart and Sbrancia (15), Chari, Dovic and Kehoe (forthcoming)  
**This paper**: both de jure and de facto financial repression measures, comparisons between financial repression and other contributors
- *Sovereign default*: Arellano (08), Broner, Lorenzoni and Schmukler (13), Badia et al. (19), among many others  
**This paper**: analyzes interest-growth differentials through the lens of sovereign defaults

## The Data

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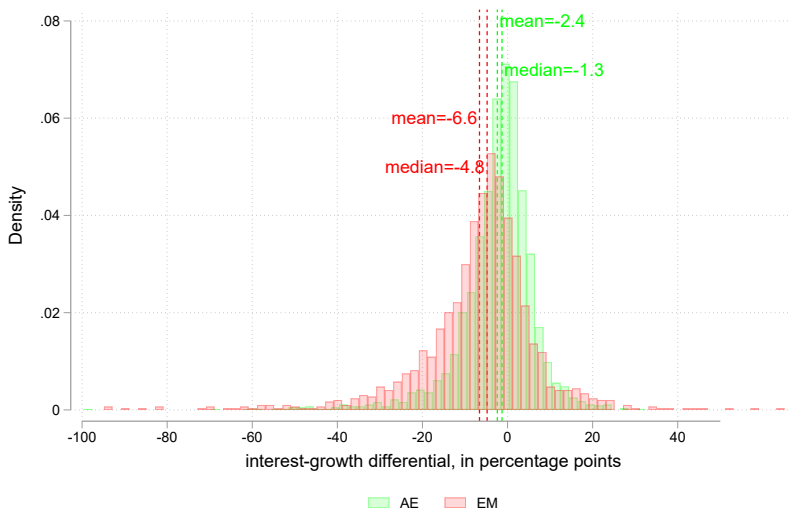
- $r - g$ : “Public Finances in Modern History” Mauro et al. (15)
  - largest coverage of country and time: 55 countries, over 200 years
  - effective interest rate on debt = interest bill / debt
  - $r - g$  = effective interest rate – growth + depreciation adjustment
- External public debt: MAC DSA, International Debt Statistics
  - AE since 1900, EM since 1970s or 1980s
  - data limited for EM early years
- Marginal interest rate
  - post 1990s: EMBI spreads + U.S. 10-year treasury bond yields
  - 1870 – 1914: Mauro, Sussman and Yafeh (02, 06)
- Financial repression: Abiad et al. (08), Chinn-Ito index
  - 91 countries, since 1970s
  - interest rate controls, capital controls, financial reform index
- Baseline estimates exclude hyperinflation ( $>100$ ) and extreme exchange rate collapse

# Negative Differentials Prevail in A Span of Two Centuries



# Average Differentials Are Below Zero for Both Advanced and Emerging Economies

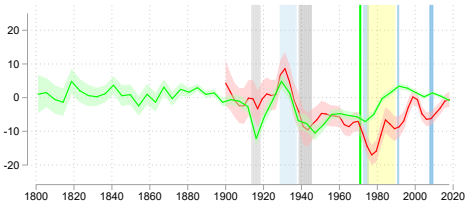
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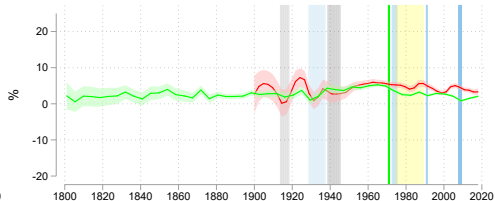
Note: The sample is consist of 2896 observations for advanced economies and 1650 for emerging economies.

# The AEs and EMs Diverged in the 1975 – 1990

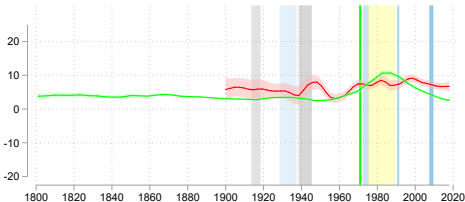
Interest-Growth Differential



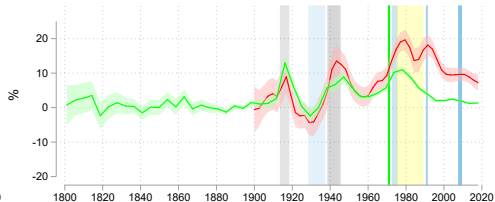
Real Growth



Interest Rate



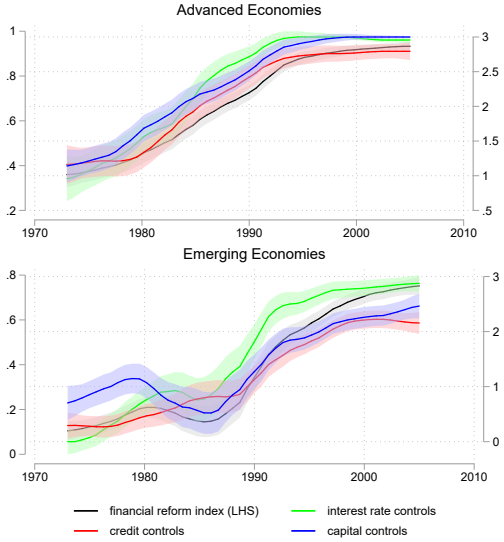
Inflation



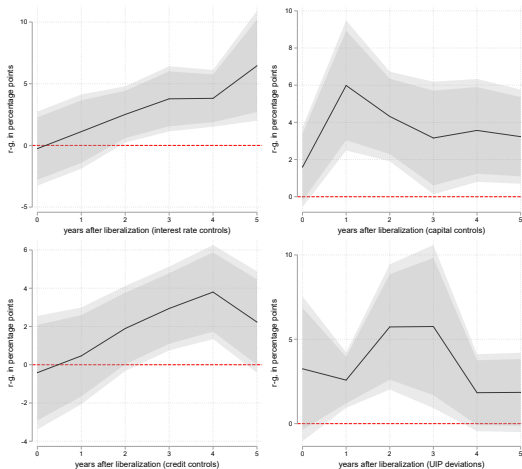
- WWI
- WWII
- Great Depression
- 1970s US, UK Recessions
- Oil price shock
- Great Recession
- Bretton Woods breakdown
- financial liberalization
- EM
- AE



# Financial Liberalization Happened in the 1980s for Advanced Economies but in the 1990s for Emerging Economies



# Differentials Rose after Financial Liberalization



- Local projection on 5-year horizons, controlling for macro and fiscal variables that could affect interest-growth differentials
- De jure measures are interest rate controls and capital controls full liberalizations, and de facto measures are structural breaks in deviations from uncovered interest parity (UIP)

## Financial Repression Significantly Suppresses Differentials, by Constraining Interest Rates and Limiting the Pass-through of Expected Inflation to Interest Rates

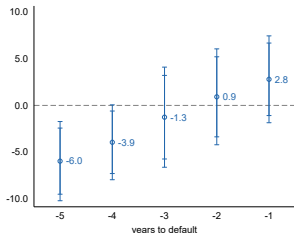
	financial regulations			capital controls		
	$r - g$	nominal $r$	nominal $g$	$r - g$	nominal $r$	nominal $g$
financial repression	-14.591** (5.38)	-10.209** (4.31)	1.399 (1.16)	-5.432** (2.09)	-4.750** (2.31)	0.375 (0.56)
inflation	0.949*** (0.25)	1.322*** (0.27)	0.863*** (0.07)	0.963*** (0.15)	1.389*** (0.17)	0.923*** (0.03)
repression × inflation	-0.598** (0.20)	-0.377* (0.22)	-0.051 (0.05)	-0.406** (0.20)	-0.317* (0.19)	0.009 (0.04)
$N$	1376	1376	1376	2221	2221	2221

Note: financial regulation index is available for 1973 – 2005, and capital control index for 1970 – 2017.

- $y_{it} = \beta_1 FR_{it} + \beta_2 \pi_{it} + \beta_3 FR_{it} \pi_{it} + \Gamma X_{it-1} + \Phi G_t + \alpha_i + \epsilon_{it}$
- Expected inflation instrumented by inflation last year

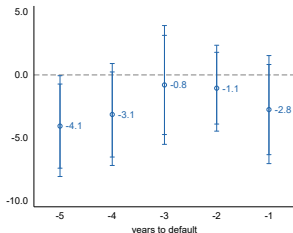
# Differentials in the Run-up to Defaults Are No Different From Those in Normal Times

Interest-Growth Differential



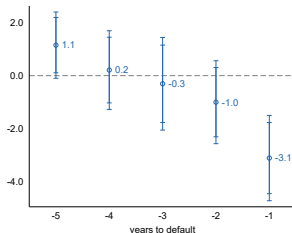
Note: No. of default episodes with all 5 pre-default years = 33  
No. of default episodes with at least 1 pre-default year = 49

Real Interest Rate



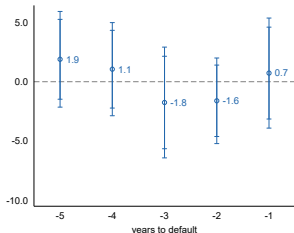
Note: No. of default episodes with all 5 pre-default years = 33  
No. of default episodes with at least 1 pre-default year = 49

Real Growth



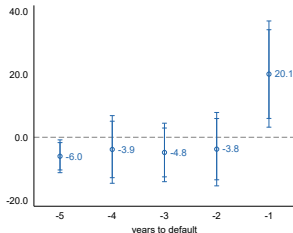
Note: No. of default episodes with all 5 pre-default years = 33  
No. of default episodes with at least 1 pre-default year = 49

Inflation



Note: No. of default episodes with all 5 pre-default years = 33  
No. of default episodes with at least 1 pre-default year = 49

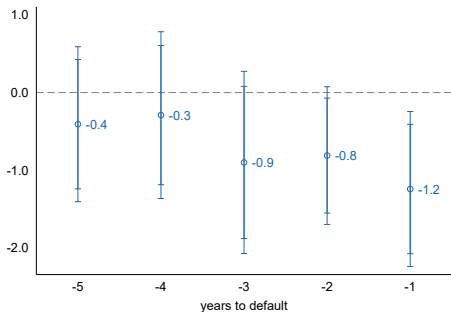
Depreciation



Note: No. of default episodes with all 5 pre-default years = 18  
No. of default episodes with at least 1 pre-default year = 27

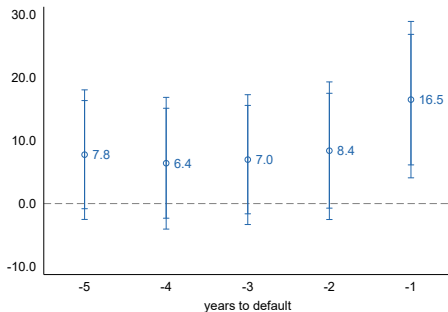
# Primary Deficits and Public Debts Are Larger In the Run-up to Default than in Normal Times

Primary Balance, in percent of GDP



Note: No. of default episodes with all 5 pre-default years = 33  
No. of default episodes with at least 1 pre-default year = 48

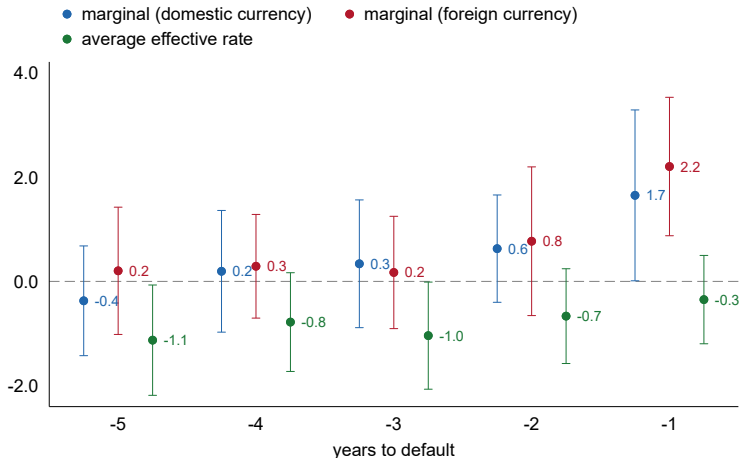
Public Debt, in percent of GDP



Note: No. of default episodes with all 5 pre-default years = 33  
No. of default episodes with at least 1 pre-default year = 49

## In Contrast to Effective Rates, Marginal Rates Are Higher in the Run-up to Default

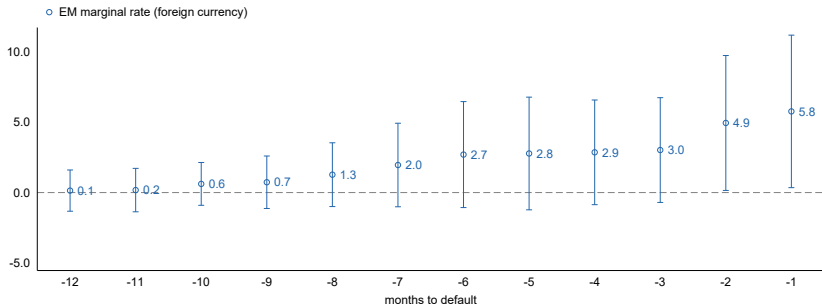
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Note: No. of default episodes with domestic marginal rates in all 5 pre-default years =17, foreign =13  
No. of default episodes with domestic marginal rates in at least 1 pre-default year =21, foreign =22

## However, Marginal Rates Rise Only Few Months Prior to Default

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Note: No. of default episodes =15

## Conclusion

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- Drawing on a large dataset of interest-growth differentials covering 55 countries over two centuries, we find that
  - Contrary to the assumptions in theory, negative differentials are the norm in all countries
  - Greater prevalence of negative differentials in emerging than advanced economies is largely confined to 1975 – 1990
  - Differentials computed using the effective interest rate are no higher prior to defaults
  - Marginal rates rise sharply prior to sovereign defaults, but only a few months ahead
- For those who lose sleep over possible sovereign defaults,  $r - g < 0$  should not provide reassurance.



**Extra**

## Negative Differentials Are Often Associated with Low Primary Balance and Reduction in Debt, and It Is More Pronounced in the Recent Decade

	r-g	interest rate	growth	inflation	primary balance	change in debt
<b><i>post-war</i></b>						
r-g	1					
interest rate	0.2	1				
growth	-0.4	-0.1	1			
inflation	-0.8	0.3	-0.1	1		
primary balance	-0.1	0.1	0.2	0.1	1	
change in debt	0.3	0.1	-0.4	-0.0	-0.3	1
<b><i>post-GFC</i></b>						
r-g	1					
interest rate	0.4	1				
growth	-0.9	-0.4	1			
inflation	-0.5	0.1	-0.0	1		
primary balance	-0.4	-0.3	0.4	0.0	1	
change in debt	0.6	0.3	-0.6	-0.3	-0.6	1