DEBT AND FINANCIAL CRISIS

EE462 Development Macroeconomics

Semester 1/2020

Reference: Koh, W. C., Kose, M.A., Nagle, P. S., Ohnsorge, and Sugawara, N. (2020). Debt and financial crises. *Policy Research Working Paper 9116*. World Bank.

Summary (1)

- Motivations:
  - There are recurrent episodes of rapid debt accumulation over the past 50 years.
  - High debt for EMDEs post significant risks for financial crises.

- Questions:
  - What are the main features of episodes of rapid debt accumulation?
  - What are the empirical links between debt accumulation and financial crises?
  - What are the major institutional and structural weaknesses associated with financial crises?

Summary (2)

- Methods:
  - An event study of debt accumulation episodes
  - Econometric models to examine linkage between debt and probability of financial crises
  - Case-studies of rapid debt buildup that led to crises

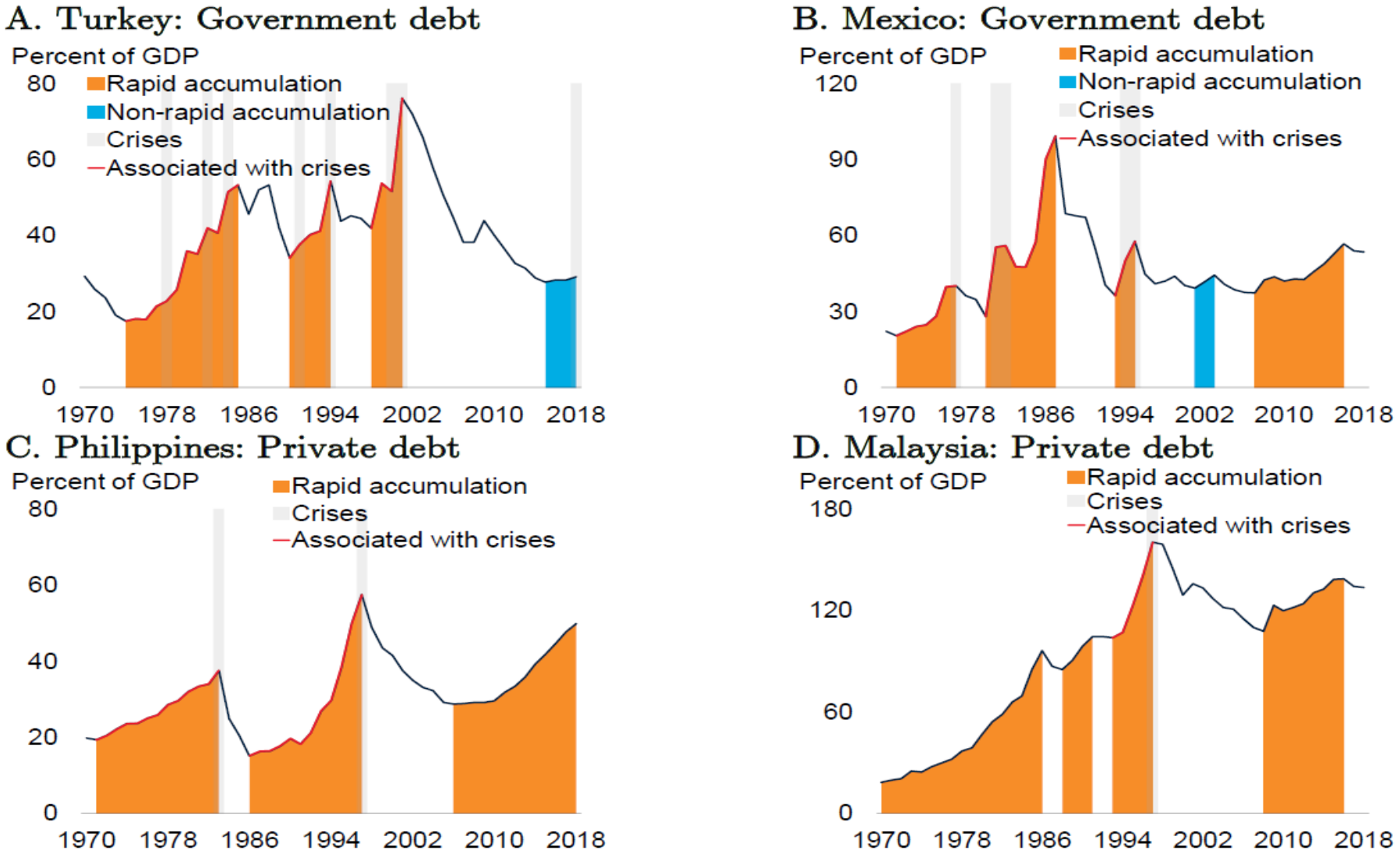
- Main Findings:
  - Episodes of debt accumulation are common, and about half of these episodes were associated with financial crises with worse economic outcomes.
  - A rapid buildup of debt, larger share of short-term external debt, higher debt service ratio, and lower reserves increased the likelihood of a financial crisis
  - Countries that experienced financial crises frequently employed unsustainable fiscal, monetary, and financial sector policies, and suffered from structural and institutional weaknesses.

Part I: National Debt and Accumulation Episodes

- How to identify episodes of debt accumulation
  - A statistical algorithm is used to identify the cyclical turning points in the debt-to-GDP ratios.
  - An expansion phase is labeled as rapid accumulation episode if an increase in the debt-to-GDP ratios exceeds the maximum of ten-year moving standard deviations of debt-to-GDP ratios during that period.

- Episodes associated with financial crises
  - Rapid debt accumulation episodes are identified as being associated with financial crises if such a crisis occurred at any point between the start of the episode and the year of the episode's peak debt-to-GDP ratio, or within two years of the peak.

Figure 1. Country examples of debt accumulation episodes

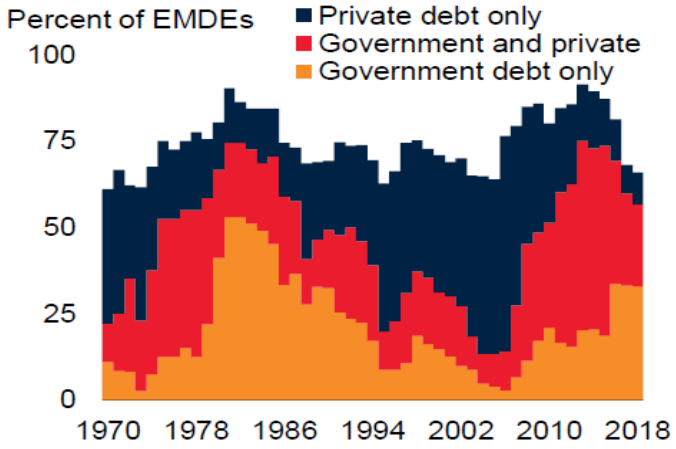


Sources: International Monetary Fund, World Bank.

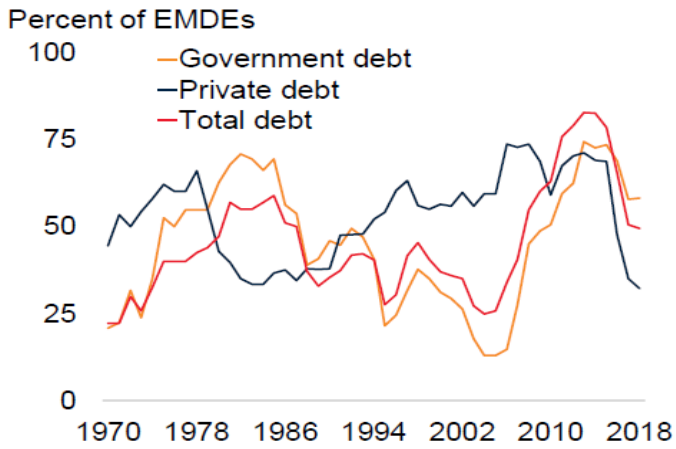
Note: Blue line indicates debt outside debt accumulation episodes. A period of debt accumulation is ident

Figure 2. Episodes of rapid debt accumulation in EMDEs

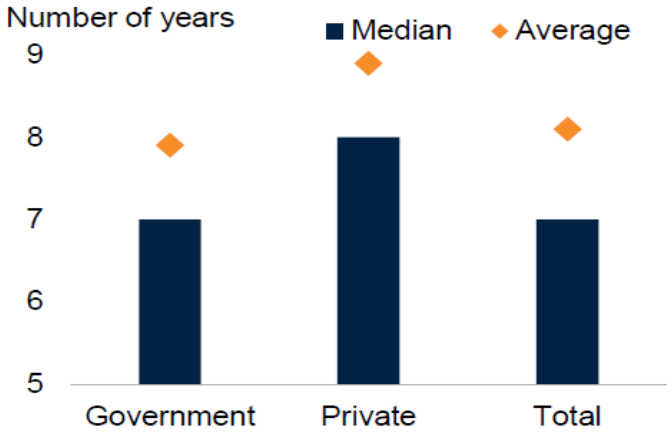
A. EMDEs in rapid debt accumulation episodes



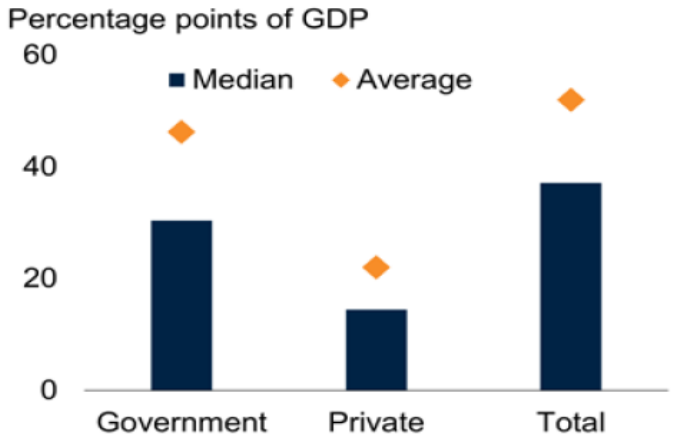
B. EMDEs in rapid debt accumulation episodes



C. Duration of rapid debt accumulation episodes



D. Change in debt during rapid accumulation episodes



Source: International Monetary Fund; World Bank.

What's the average duration of episodes?

What's the amplitude of the debt buildup as a percentage of GDP?

Table 1. Duration and amplitude of rapid debt accumulation episodes

Duration

	Number of episodes, by duration (years)					
	Associated with crises			No crises		
Years:	2-4	5-10	11-	2-4	5-10	11-
Government debt	41	59	37	27	74	18
Private debt	27	39	39	37	83	38
Total debt	31	40	35	29	78	24

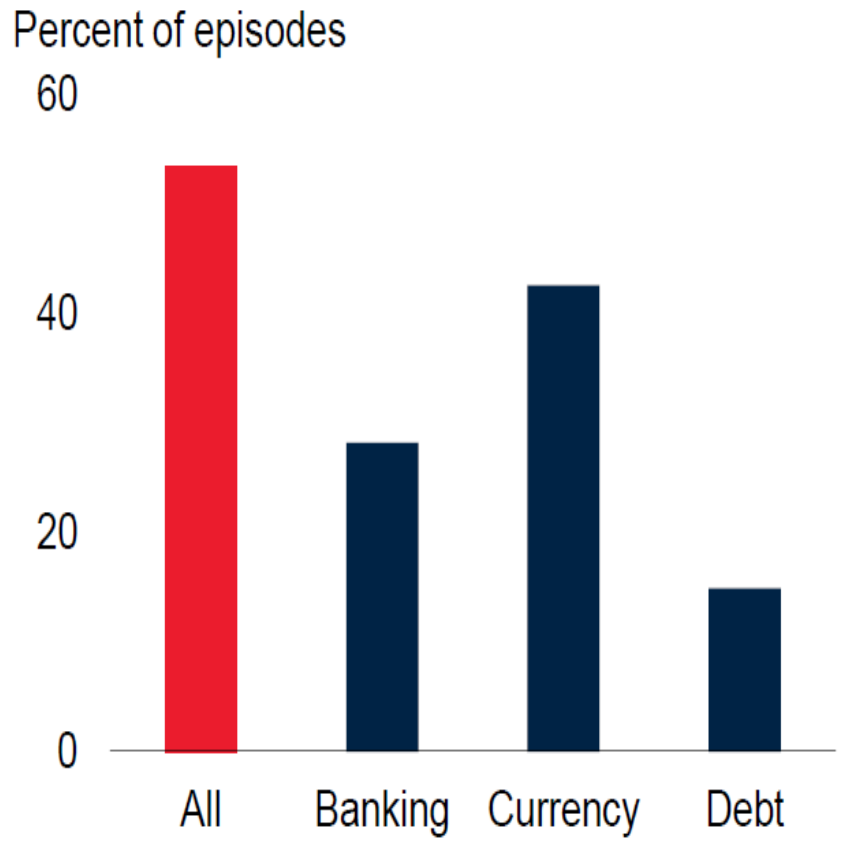
Amplitude

	Number of episodes, by amplitude (percentage points of GDP)							
	Associated with crises				No crises			
Percentage points of GDP:	-20	20-40	40-60	60-	-20	20-40	40-60	60-
Government debt	24	41	24	48	53	40	16	10
Private debt	66	17	13	9	97	48	11	2
Total debt	9	32	26	39	33	57	20	21

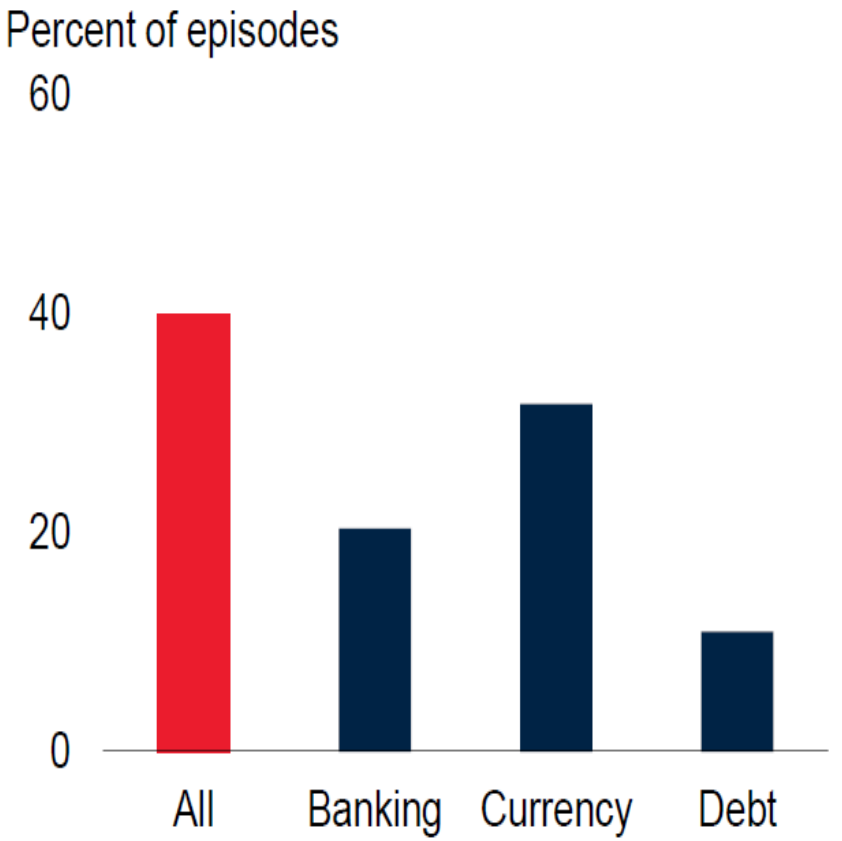
Note: Total debt refers to the sum of government debt and private debt. A period of debt accumulation is identified with the algorithm in Harding and Pagan (2002). When a change in debt-to-GDP ratios over an accumulation period is above the maximum of 10-year moving standard deviation of the ratios during the period, it is considered as a rapid debt accumulation. The duration of episodes refers to the number of years from trough to peak debt-to-GDP ratios. The amplitude refers to the size of the increase in debt-to-GDP ratios over the same period.

Figure 3. Crises during rapid debt accumulation episodes in EMDEs

A. Government debt accumulation episodes associated with crises



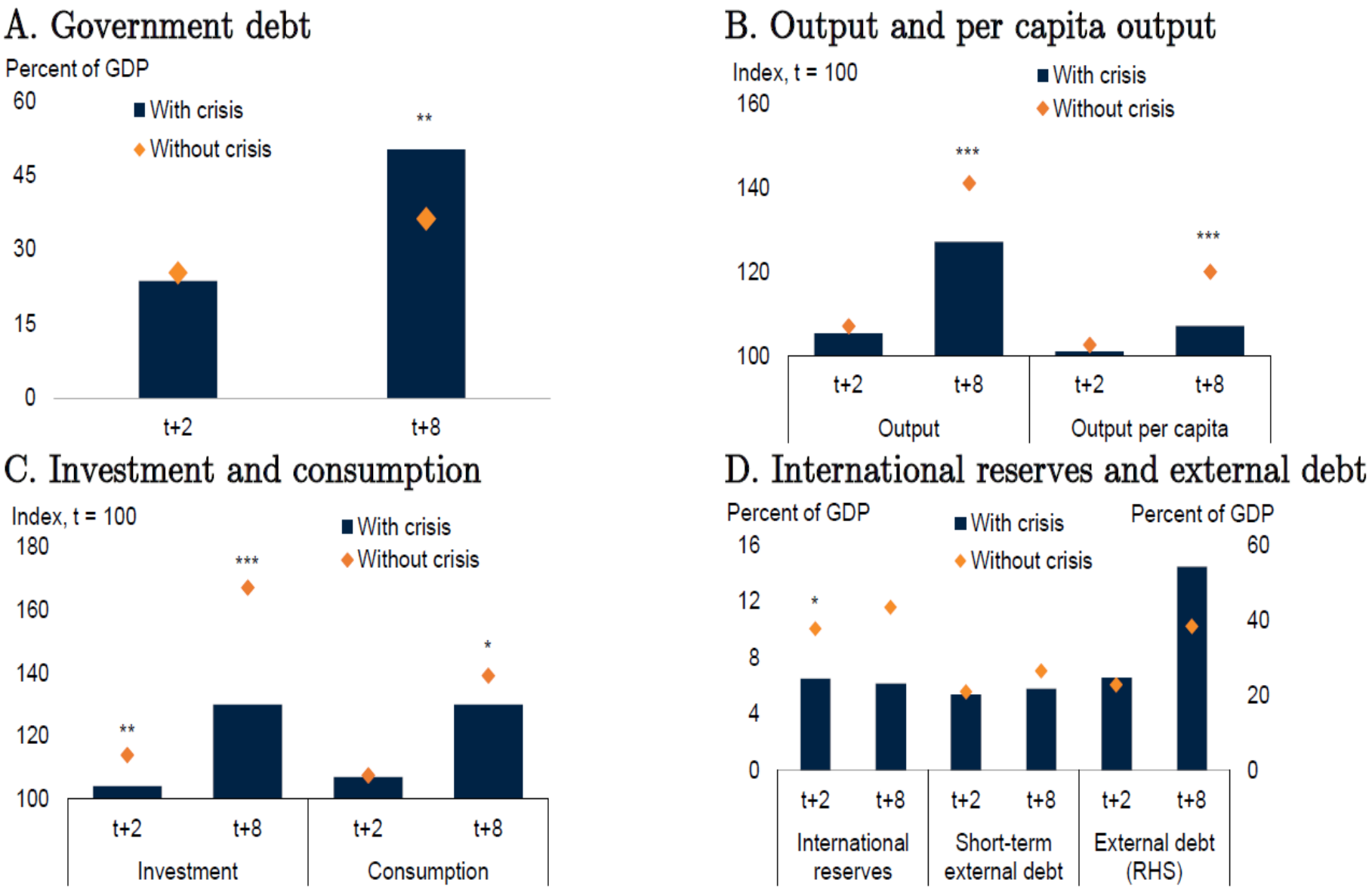
B. Private debt accumulation episodes associated with crises



Source: International Monetary Fund; World Bank.

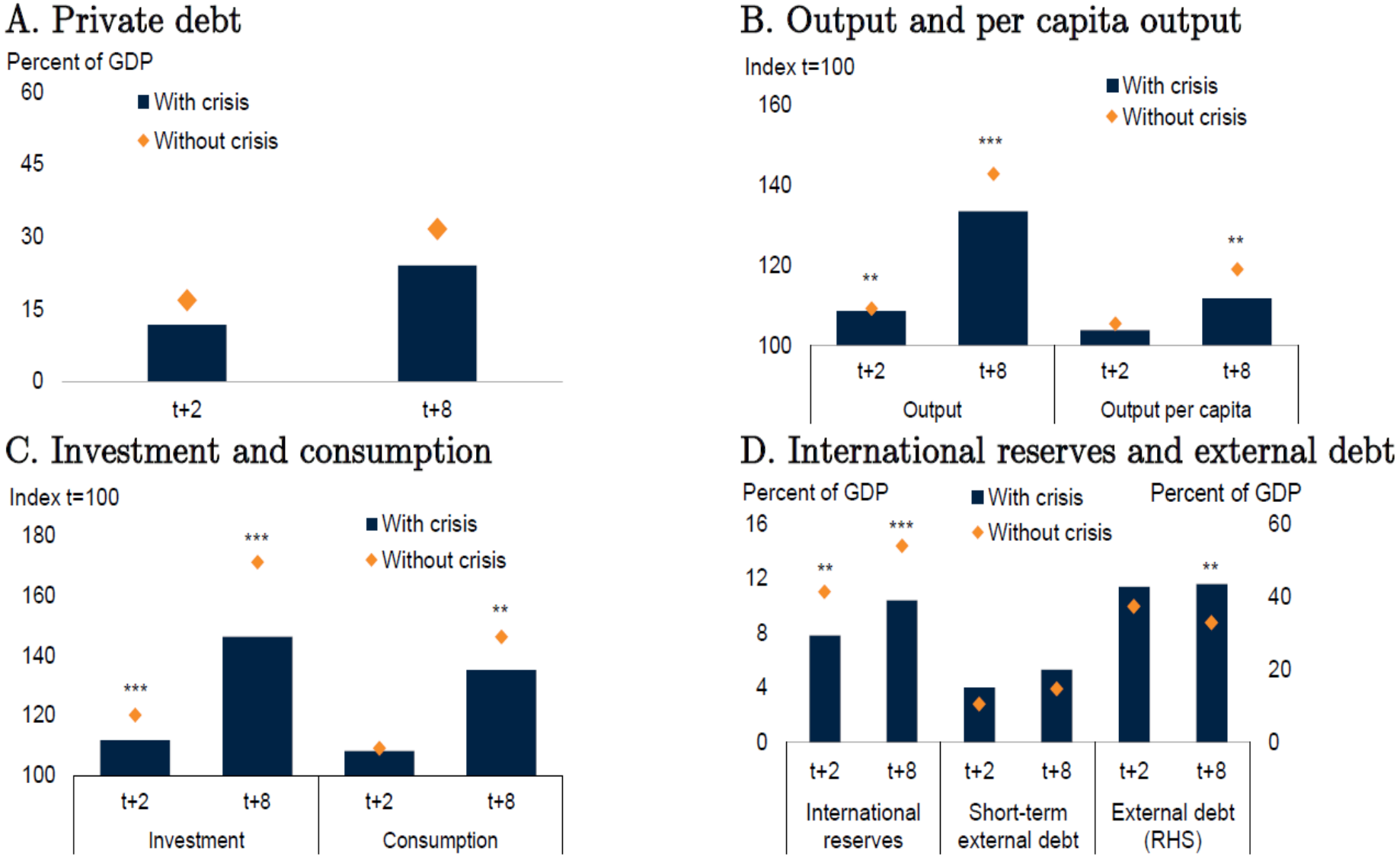
Note: Figures show the share of government and private debt accumulation episodes that ended in crises, both for all types of crises, and for individual types of crises.

Figure 4. Macroeconomic developments during government debt accumulation episodes



Source: International Monetary Fund, World Bank.

Figure 5. Macroeconomic developments during private debt accumulation episodes



Source: International Monetary Fund; Laeven and Valencia (2018); World Bank.

Part 2: Debt and Financial Crisis

- Use a panel of 139 EMDES during 1970-2018
- Use random-effect logit model
- Dependent var : whether the country has a financial crisis
- Factors: debt profile, capital account, current account, foreign factors, domestic macro, financial sector, banking sector, structural and institutional factors.

Table 6. Random effects logit model

Dependent variable: Crisis indicator (1 = crisis, 0 = no crisis)

	Debt crisis	Banking crisis	Currency crisis
Change in U.S. real interest rate	-0.067	0.015	0.253**
	(0.132)	(0.106)	(0.100)
GDP growth	-0.095***	-0.020	-0.006
	(0.025)	(0.025)	(0.020)
Short-term debt	0.026*	0.012	0.006
	(0.015)	(0.012)	(0.011)
Debt service	0.028***	0.029***	0.010
	(0.009)	(0.007)	(0.008)
Reserves cover	-0.573***	-0.163***	-0.115*
	(0.116)	(0.063)	(0.062)

Table 6. Random effects logit model

Dependent variable: Crisis indicator (1 = crisis, 0 = no crisis)

	Debt crisis	Banking crisis	Currency crisis
Change in government debt	0.014*		0.016**
	(0.008)		(0.007)
Change in private debt		0.055**	0.052**
		(0.023)	(0.026)
Change in government debt x Change in private debt			0.003***
			(0.001)
Concessional debt	-0.033***		
	(0.009)		
Funding ratio		0.002*	
		(0.001)	
Currency overvaluation			0.165***
			(0.015)
Currency mismatch			0.014
			(0.033)
FDI			-0.101**
			(0.046)
Constant	-2.678***	-4.161***	-3.617***
	(0.616)	(0.371)	(0.395)
No. of observations	3,089	2,797	2,395
No. of countries	106	106	99

Table 7. Probability of crises

Dependent variable: Crisis indicator (1 = crisis, 0 = no crisis)

		Probabilities			
	Points of interest	Debt crisis	Banking crisis	Currency crisis	Reference
Change in U.S. real interest rate	2 percentage points vs. unchanged			6.0 percent vs. 4.1 percent	Cumulative increase in U.S. Fed Funds rate from end-2015 to mid-2018 vs. no change in interest rate
GDP growth	-1 percent vs. 4 percent	1.9 percent vs. 1.2 percent			Average EMDE growth during crisis vs. non-crisis episodes
Short-term debt	30 percent vs. 10 percent	2.0 percent vs. 1.2 percent			Mexico's 1982 episode vs. EMDE non-crisis episodes
Debt service	50 percent vs. 15 percent	2.8 percent vs. 1.1 percent	5.5 percent vs. 2.1 percent		Mexico's 1982 episode vs. EMDE non-crisis episodes
Reserves cover	1 month vs. 4 months	3.1 percent vs. 0.6 percent	3.3 percent vs. 2.0 percent	5.0 percent vs. 3.8 percent	Mexico's 1982 episode vs. EMDE non-crisis episodes
Change in government debt	30 percentage points of GDP vs. unchanged	2.0 percent vs. 1.4 percent		6.6 percent vs. 4.1 percent	Median government debt accumulation episode vs. no accumulation
Change in private debt	15 percentage points of GDP vs. unchanged		4.8 percent vs. 2.2 percent	7.5 percent vs. 3.9 percent	Median private debt accumulation episode vs no accumulation
Concessional debt	50 percent vs. 25 percent	0.8 percent vs. 1.6 percent			Average EMDE crisis vs. non-crisis episodes
Funding ratio	200 percent vs. 90 percent		3.0 percent vs. 2.3 percent		Ukraine's 2008-09 share vs. EMDE non-crisis episodes
Currency overvaluation	15 percent vs. 0 percent			19.5 percent vs. 2.2 percent	Thailand's real appreciation 1994-97 vs. no appreciation.