The Relationship Between Spreads, Debt, and Growth

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Composition of Debt in EMEs and LIDCs

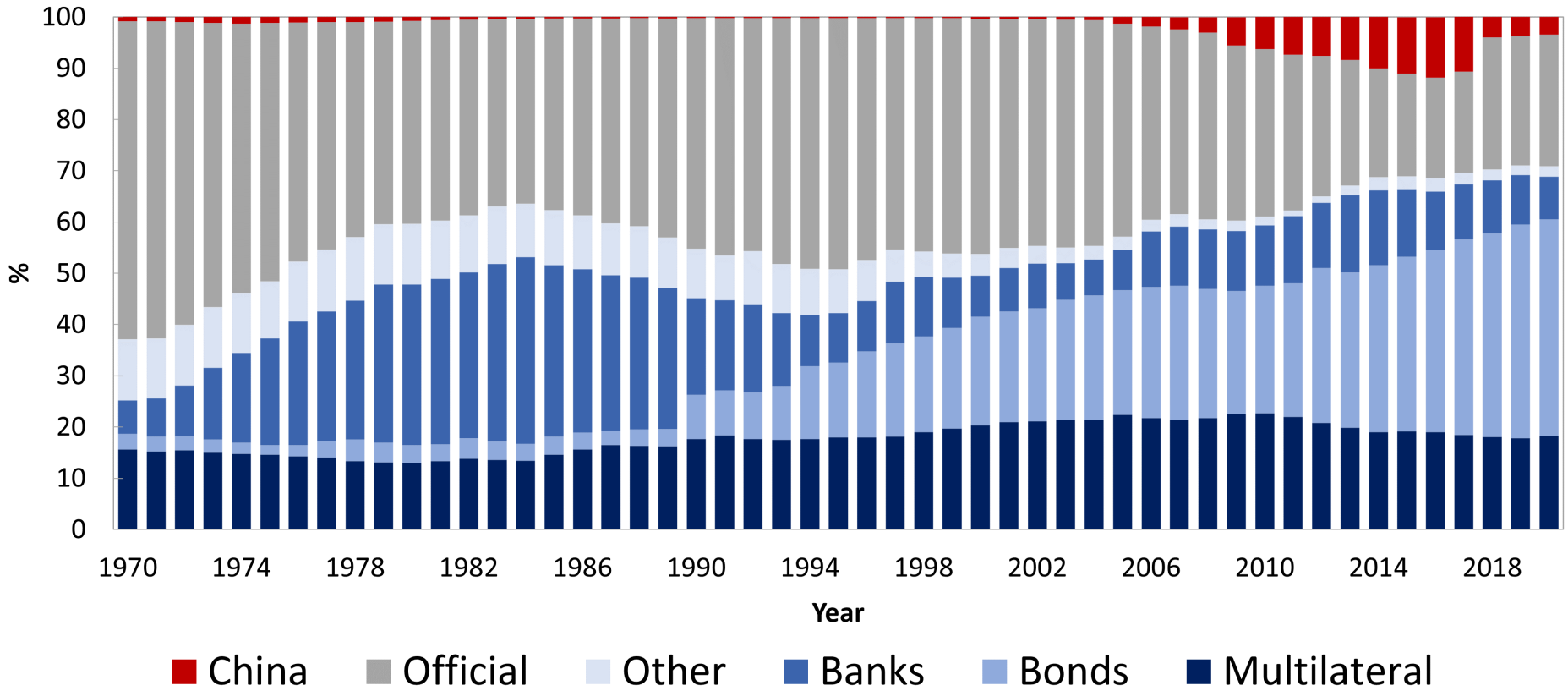

Figure: *Composition of debt in emerging market economies with access to private debt.*

Source: *World Bank IDS.*

Correlations of Growth and Debt Types

	(1) Output Growth	(2) Output Growth
WB Loans	0.1943***	
	(0.0661)	
Multi. Non-Con.		-0.2685***
		(0.0898)
Multi. Con.		0.2700**
		(0.1052)
Private		-0.0561
		(0.0565)
Constant	-0.0500	0.5936
	(21.4557)	(19.3129)
Fixed Effects	Yes	Yes
Controls	7	8
Observations	910	1,562
Countries	91	95

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Controls China Bonds

Question

- **What are the effects of growth enhancing debt on *spreads*, *debt levels*, and *default probabilities*?**

Rescheduling Episodes

Number of episodes	502
Private creditors	238
World Bank	16
IMF	4
China	48
Paris Club	196
Mean per country	2.5
Mean duration	6.6
Mean external debt to priv.	10.1
Mean external debt to multi.	15.6

Table: *Default episodes summary statistics for emerging and low-income countries with access to private markets from 1970-2020.*

Source: *Horn, Reinhart, Trebesh (2022), Bank of Canada (2022), Bank of England (2022), and Medas et al. (2018).*

Defs. More | EME vs. LIDC

Changes in Debt Composition

- World Bank debt has two types of financing:
  - IDA: Concessional financing for the poorest countries. They have a zero or very low interest charge and repayments are stretched over 30 to 40 years
  - IBRD: Loans to middle-income and creditworthy low-income countries
- On average, as a percentage of GDP, Emerging Market Economies have 11.1% in private debt and 10.7% of multilateral debt
- On average, as a percentage of GDP, Low-Income Developing Countries have 6.6% in private debt and 22.1% of multilateral debt

Spreads and Productivity Debt

- An increase in productivity enhancing debt has ambiguous effects on spreads.
  - Higher GDP growth decreases spreads
  - Higher debt levels increase spreads

- Regression results indicate no correlation between World Bank loans and a country's spreads.

Regressions

Debt Composition and GDP per Capita

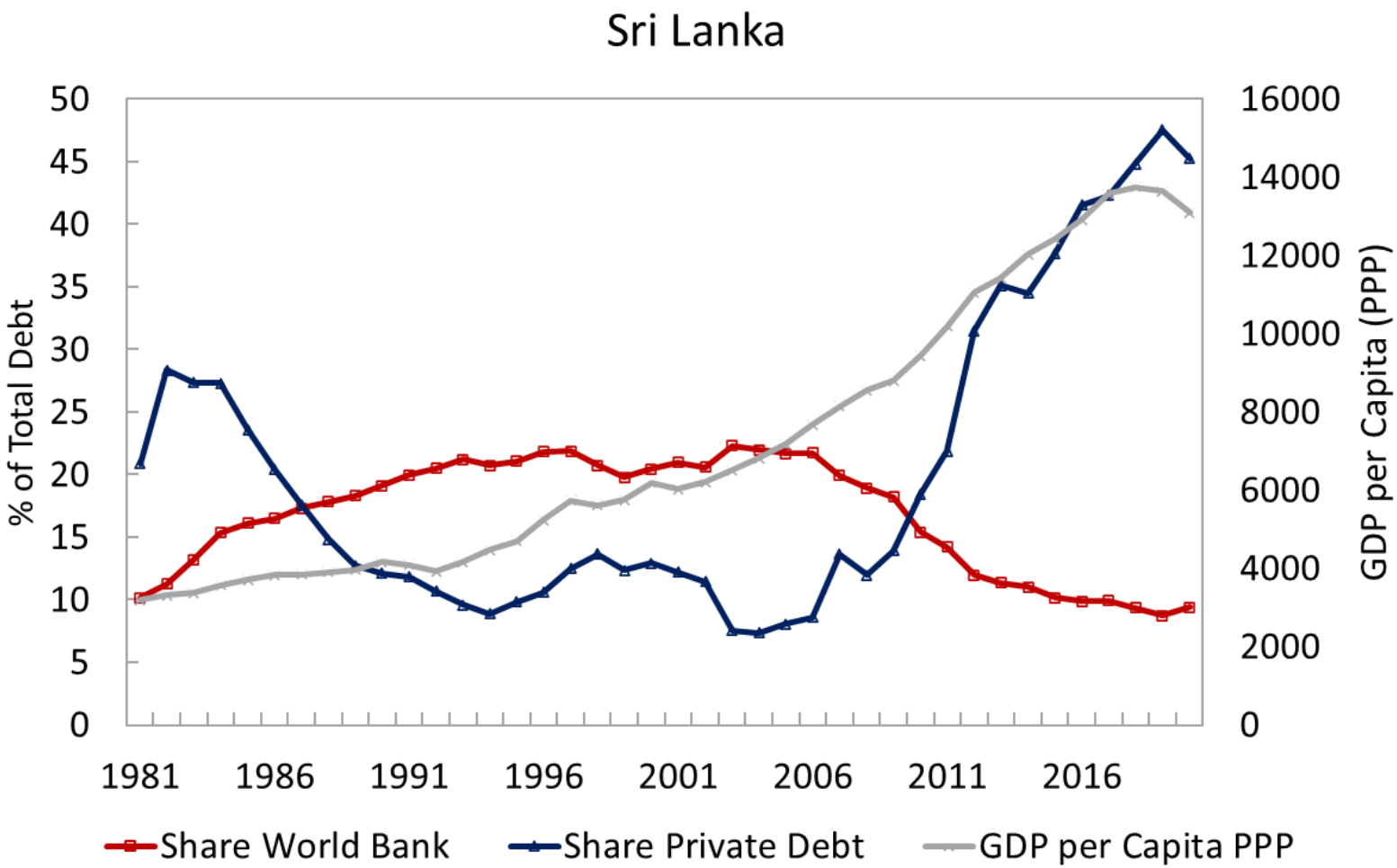

Figure: *Composition of debt and GDP per capita in Sri Lanka*

Source: *WEO and World Bank IDS.*

Debt Composition and GDP per Capita

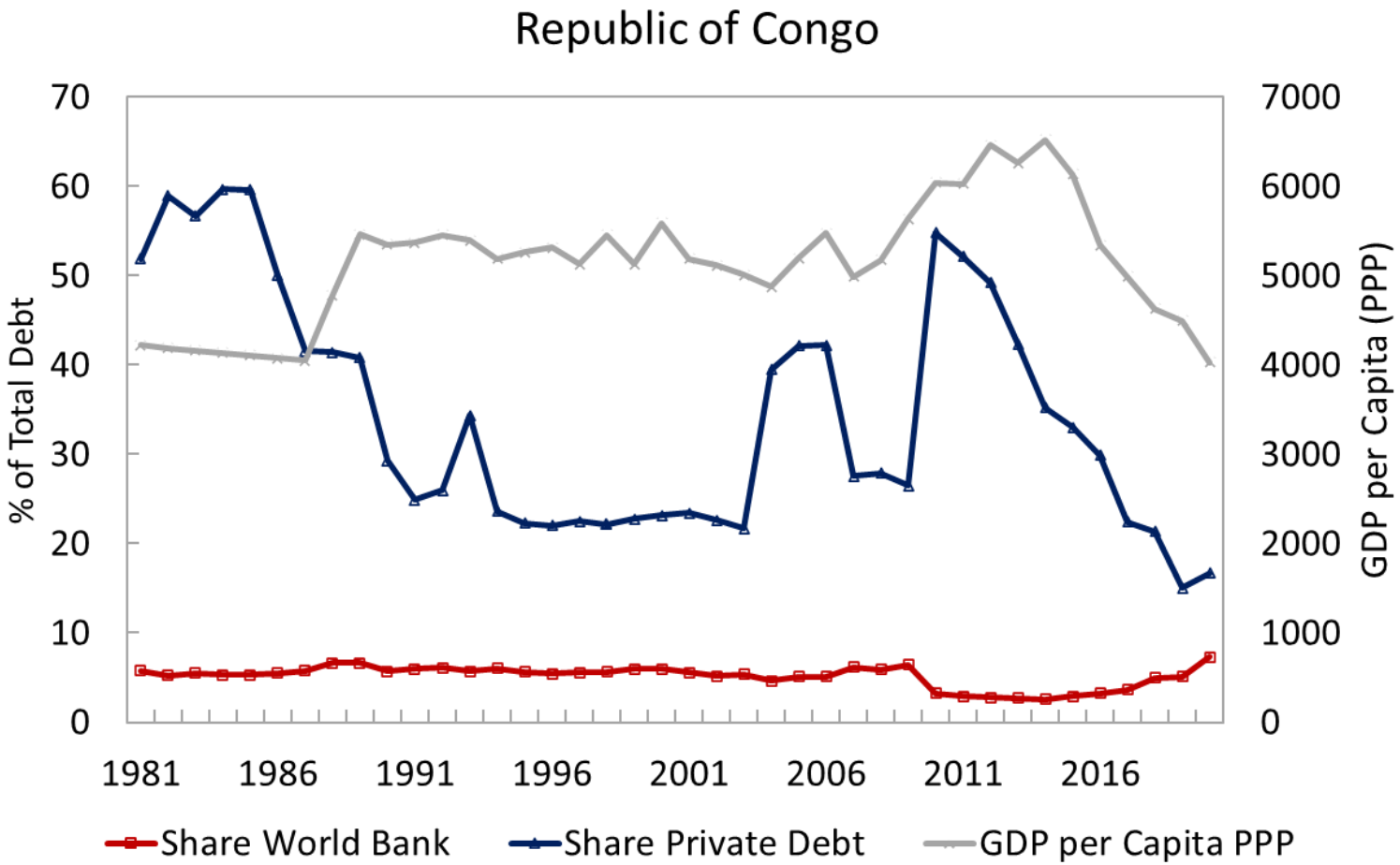

Figure: *Composition of debt and GDP per capita in the Republic of Congo*

Source: *WEO and World Bank IDS.*

Literature Review

- Hulten (1996) and Pritchett (2000) find evidence that a portion of public investment spending does not increase the stock of productive capital.

- Andersen et al. (2020) find that aid disbursements coincide with sharp increases in bank deposits in offshore financial accounts.

- Eaton and Gersovitz (1981), Arellano (2008), Aguiar and Gopinath (2006) study a small open economy model to study default risk and its interaction with output and foreign debt.

C.A.R.

Model Environment

- Sovereign default model in a dynamic small open economy.
- Two types of assets,
  1. Debt from the private sector b_t
  2. Growth enhancing debt ω_t
- One-period, non-state contingent bonds for both types of assets.
- Private sector debt is defaultable, growth debt is non-defaultable.
  - Exogenous probability of re-entry to private debt market following default

Income Process

- Income evolves according to some production function,

$$y_t = A_t z_t^{\alpha}$$

- A_t is productivity which follows a standard AR(1) process,

$$\ln(A_{t+1}) = \rho \ln(A_t) + \epsilon_t$$

- z_t will be interpreted as public investment in infrastructure.

Growth Enhancing Debt

- No micro-foundation for the lender of growth enhancing debt.
- Price of the growth enhancing debt is a function of current GDP $q^{\omega}(A, z, \omega')$.
  - The price is a decreasing function of GDP
- Debt is capped to a maximum $\bar{\Omega}(y)$ that evolves with the growth of the economy.
  - Saving with growth enhancing debt is not permitted

Sovereign's Problem

At the beginning of the period if the country is not in default, the government's problem is

$$V(A, z, b, \omega) = \max_{d \in \{0,1\}} \quad (1-d)V^R(A, z, b, \omega) + dV^D(A, z, b, \omega)$$

Sovereign's Problem

Conditional on choosing to repay its debt, the sovereign's problem is:

$$V^R(A, z, b, \omega) = \max_{c, b', \omega', i} U(c) + \beta \mathbb{E}[V(A', z', b', \omega')|A]$$

subject to,

$$c + b + \omega + i = y + q^b(A, z, b', \omega')b' + q^\omega(A, z, \omega')\omega'$$

$$z' = (1 - \delta)z + s \cdot i$$

$$s = f_R(\omega, b, y)$$

$$s \in [0, 1]$$

$$\bar{\Omega}(y) \geq \omega \geq 0$$

Sovereign's Problem

The value of default will be given by:

$$
\begin{aligned}
V^D(A, z, b, \omega) = \max_{c, \omega', i} \; & U(c) + \beta(1-\lambda)\mathbb{E}[V^D(A', z', \omega')|A] \\
& + \beta\lambda\mathbb{E}[V(A', z, 0, \omega')|A] \\
\text{subject to,} & \\
c + \omega + i &= y - \phi(y) + q^{\omega}(A, z, \omega')\omega' \\
z' &= (1-\delta)z + s \cdot i \\
s &= f_D(\omega, 0, y - \phi(y)) \\
s &\in [0, 1] \\
\bar{\Omega}(y) &\geq \omega \geq 0
\end{aligned}
$$

Lenders' Problem

Profits of the international lenders are given by:

$$\Pi(A, z, b', \omega') = -q^b(A, z, b', \omega')b' + \frac{(1 - \delta(A, z, b', \omega'))}{1 + r_f}b' + \frac{(\delta(A, z, b', \omega')}{1 + r_f}$$

The zero profit condition gives the price offered by the investors:

$$q(A, z, b', \omega') = \frac{(1 - \delta(A, z, b', \omega'))}{1 + r_f}$$

Controls of Growth Regressions

	(1) Output Growth	(2) Output Growth
ln(*LifeExpectancy*) Lagged	1.6548	1.3362
	(5.1698)	(4.6368)
ln(*Inflation*)	-0.3766*	-0.4139**
	(0.2149)	(0.2024)
Gross Debt Lagged	-0.0062	0.0018
	(0.0103)	(0.0104)
Corruption Control	0.2138	0.1476
	(0.7209)	(0.6578)
Stability Control	-0.5770	0.0276
	(0.3778)	(0.3534)
Population Growth	-0.4635*	0.0087
	(0.2394)	(0.1045)
Terms of Trade	0.0044	0.0029
	(0.0047)	(0.0060)
Primary Balance to GDP		0.1032**
		(0.0398)
Fixed Effects	Yes	Yes
Observations	910	1,562
Countries	91	95

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Back

Correlations of Chinese Debt and Growth

	(1) Output Growth
Chinese Debt	0.1328***
	(0.0487)
ln(*LifeExpectancy*)	0.4057
	(4.8366)
ln(*Inflation*)	-0.7752***
	(0.2552)
Gross Debt	-0.0092
	(0.0111)
Corruption Control	0.7806
	(0.7203)
Stability Control	-0.1923
	(0.3542)
Population Growth	0.1442
	(0.1161)
Terms of Trade	0.0069
	(0.0055)
Primary Balance to GDP	0.0971**
	(0.0399)
Constant	5.7102
	(20.0733)
Fixed Effects	Yes
Observations	1,567
Countries	94

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Back

Correlations of Bonds and Growth

Back

	(1) Output Growth
Bonds	-0.0469
	(0.0677)
ln(*LifeExpectancy*)	11.2921
	(10.7385)
ln(*Inflation*)	-0.7777**
	(0.3330)
Gross Debt	-0.0115
	(0.0211)
Corruption Control	2.7647**
	(1.2968)
Stability Control	0.0928
	(0.4261)
Population Growth	0.1456
	(0.2249)
Terms of Trade	0.0191**
	(0.0078)
Primary Balance to GDP	0.0652
	(0.0601)
Debt Service to GDP	-0.0047
	(0.0352)
Constant	5.7102
	(20.0733)
Fixed Effects	Yes
Observations	818
Countries	70

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Correlation Between WB Loans and Spreads

Back

	(1) EMBI Change
WB Loans	-3.8639
	(2.5475)
ln(*LifeExpectancy*)	-121.5182
	(177.7545)
ln(*Inflation*)	8.1281*
	(4.0837)
Gross Debt	-0.4644
	(0.2938)
Corruption Control	-37.7023*
	(21.6440)
Stability Control	14.2629
	(8.7809)
Population Growth	9.4647
	(8.5682)
Terms of Trade	-0.4510
	(0.2797)
Constant	581.3482
	(730.3981)
Fixed Effects	Yes
Observations	354
Countries	42

**** p<0.01, ** p<0.05, * p<0.1*

Table Defaults

Number of defaults	
Unique	376
Two	47
Three or More	32

Table: *Default episodes summary statistics for emerging and low-income countries with access to private markets from 1970-2020.*

Source: *Horn, Reinhart, Trebesh (2022), Bank of Canada (2022), Bank of England (2022), and Medas et al. (2018).*

Back

Table Reschedulings by Income Group

Number of Episodes	EME	LIDC
Private creditors	149	123
World Bank	6	14
IMF	2	5
China	25	37
Paris Club	149	148
Mean per country	1.4	2.1
Mean duration	5.1	8.7
Mean external debt to priv.	12.3	8.3
Mean external debt to multi.	14.0	20.2

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Back

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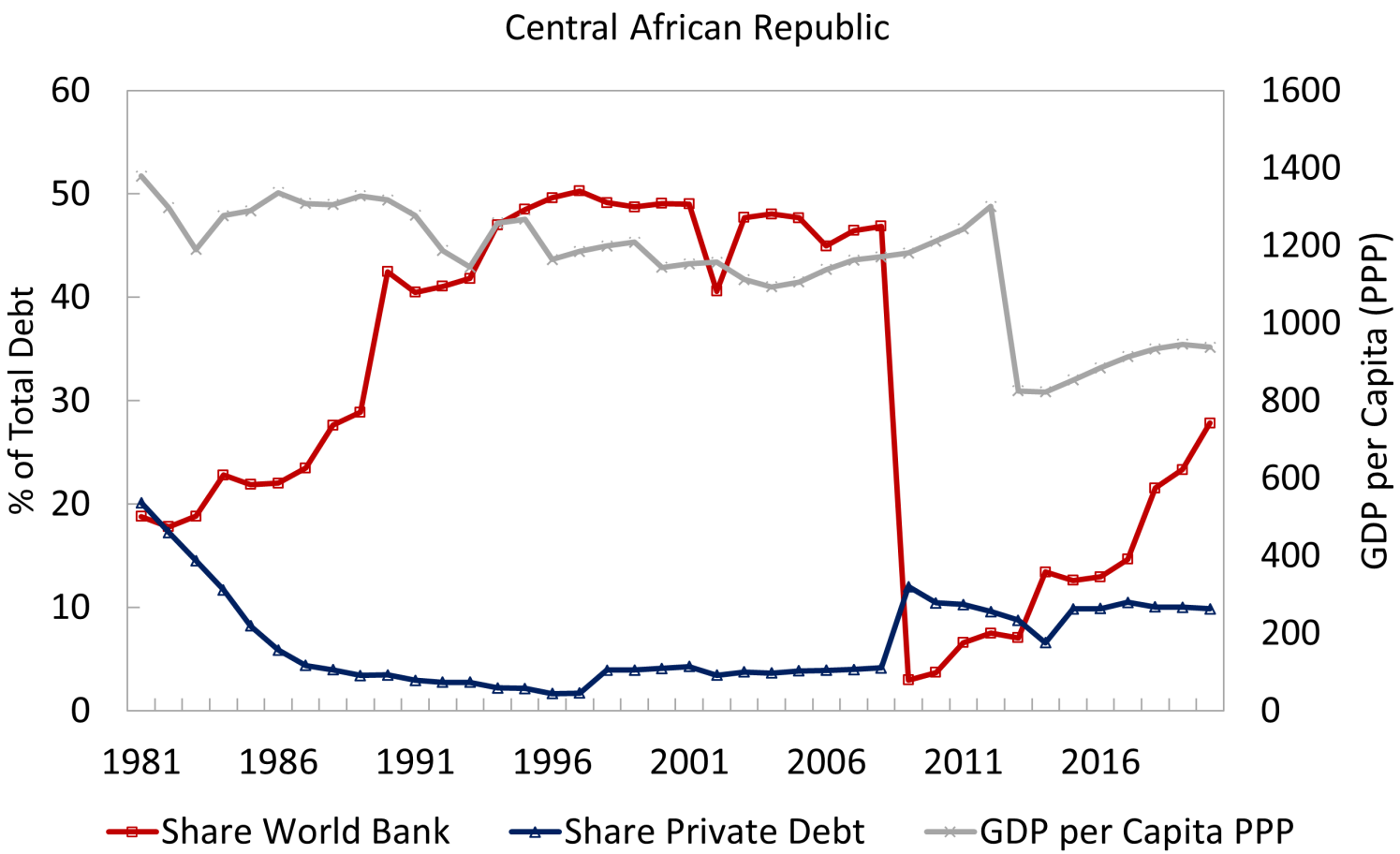

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Back

Debt Composition and GDP per Capita

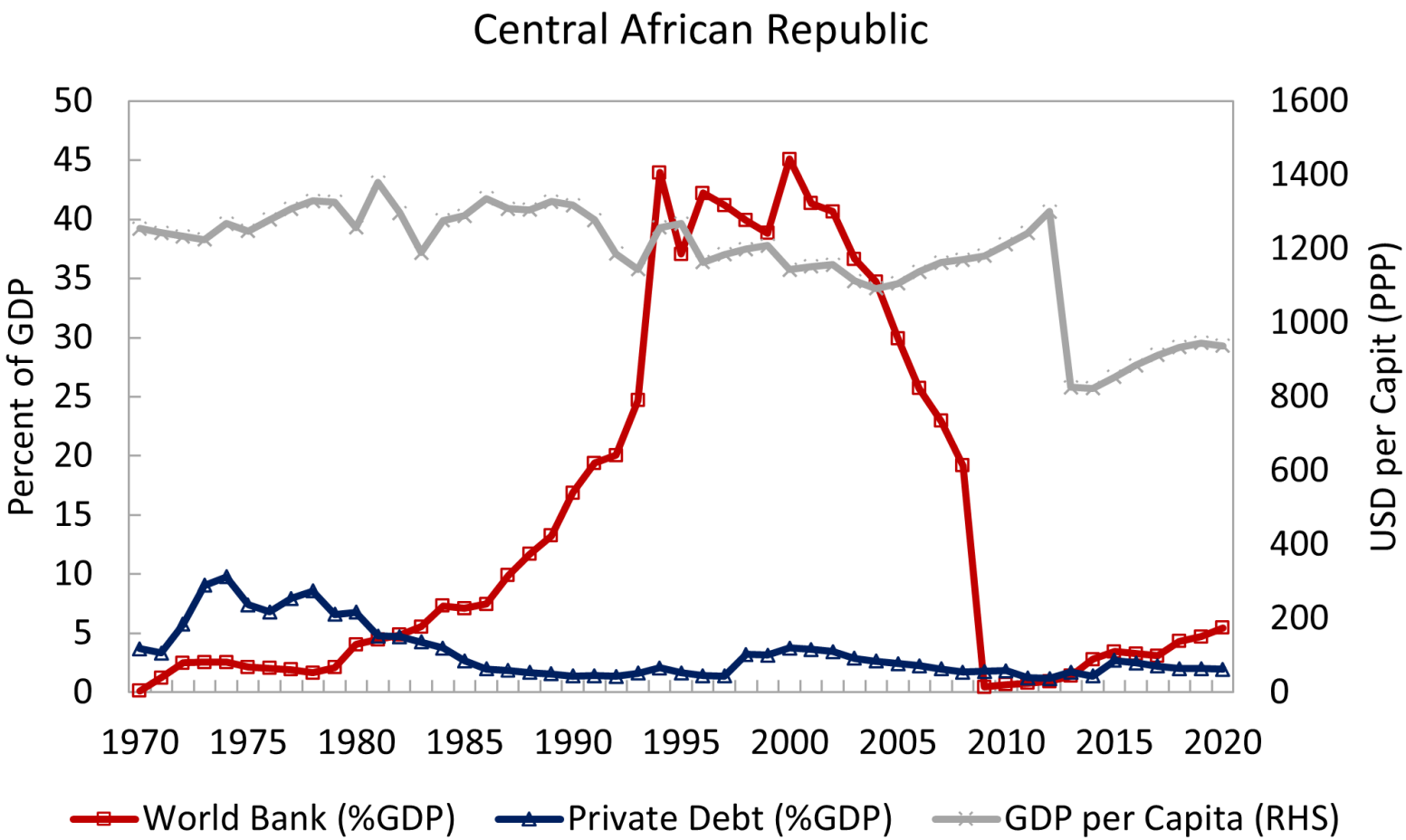

Figure: *Composition of debt and GDP per capita in Central African Republic*

Source: *WEO and World Bank IDS.*

Back

Event Study

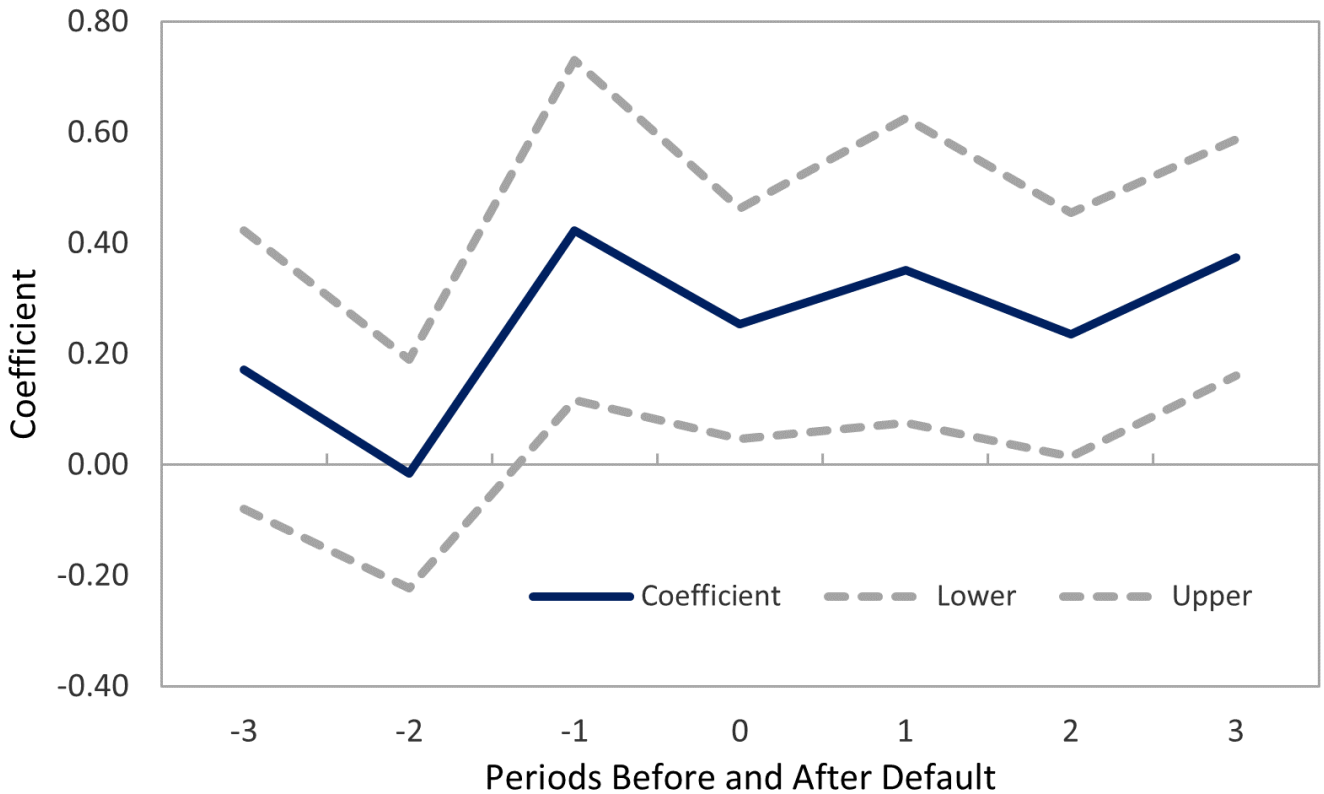

Figure: *Event Study Coefficient of Flows of World Bank Funds Before and After a Country has Defaulted*

Source: *World Bank.*

Back