Sovereign Risk Premium, Bond Liquidity and Foreign Reserve Accumulation

Chenyang (Tom) Wang   chenyaw5@uci.edu

University of California, Irvine

Introduction

- **Motivation**

Facts about the emerging economy:
- ▶ Emerging countries borrow much from foreign investors
- ▶ Large amount sovereign debt is denominated by foreign currency
- ▶ Volumn of foreign reserve increased substantially from the 1980s
- ▶ Number of sovereign defaults decreased from the 1980s

- **Key Question:**

How does Foreign reserve reduce emerging countries sovereign credit risk?

- **Methodology:**
- ▶ Choose sovereign credit default swap (CDS) spread as measurement
- ▶ Decompose sovereign CDS into risk and default premium
- ▶ Investigate which component is affected by foreign reserve accumulation
- ▶ Panel regression over 14 emerging countries across 20 year
- ▶ Use bond-level data, investigate the specific form of risk premium
- ▶ First paper to link foreign reserve accumulation with **bond liquidity**

Data

Monthly data for 14 typical emerging economies, including:
- Country level:
  - ▶ 5-year Sovereign CDS spread measure sovereign risk
  - ▶ Foreign reserve data from IMF CB balance sheet
  - ▶ Sovereign & Private debt/GDP, Risk averse, World rate

- Bond level:
  - ▶ Sovereign bond spread(consistent with CDS)
  - ▶ Bid-ask spread
  - ▶ Others: Coupon, Maturity, VIX, Rating

- Sample:
  - ▶ Time: Dec,2001- Dec,2018
  - ▶ Countries: Brazil, Bulgaria, Colombia, Egypt, Indonesia, Kazakhstan, Mexico, Peru, Philippines, Russia, South Africa, Thailand, Tunisia, Turkey
  - ▶ Source: Bloomberg, IMF, FRED, IDS

Reference

[1] C. Sosa-Padilla and F. Sturzenegger, "Does it matter how central banks accumulate reserves? evidence from sovereign spreads," *Journal of International Economics*, 2022.

[2] S. P. Y. Wu, "Corporate balance sheets and sovereign risk premia," 2020.

[3] F. A. Longstaff, J. Pan, L. H. Pedersen, and K. J. Singleton, "How sovereign is sovereign credit risk?," *American Economic Journal: Macroeconomics*, 2011.

[4] S. Gilchrist, B. Wei, V. Z. Yue, and E. Zakrajšek, "Sovereign risk and financial risk," *Journal of International Economics*, 2022.

[5] J. Bianchi, J. C. Hatchondo, and L. Martinez, "International reserves and rollover risk," *American Economic Review*, vol. 108, no. 9, pp. 2629–70, 2018.

[6] L. Chen, D. A. Lesmond, and J. Wei, "Corporate yield spreads and bond liquidity," *The Journal of Finance*, vol. 62, no. 1, pp. 119–149, 2007.

CDS Decomposition

- CDS spread can be decomposed into two components
  - ▶ CDS spread(premium) = Default premium + Risk premium
  - ▶ Default premium: captures the expected sovereign default probability
  - ▶ Risk premium: captures cov(sovereign default, investor good/bad state)

- Decomposition: Remolona et al(2008) credit rating method
  - ▶ Moody's credit rating & issuer-weighted cumulative default rate
  - ▶ $1 - PD_t(T) \times (1 - RR) = \exp(-T \times RIEL_t(T))$
  - ▶ $PD_t(T)$: Default probability & RR: Recovery rate
  - ▶ Default premium = $RIEL_t$ & Risk premium$_t$ = CDS_t - $RIEL_t$
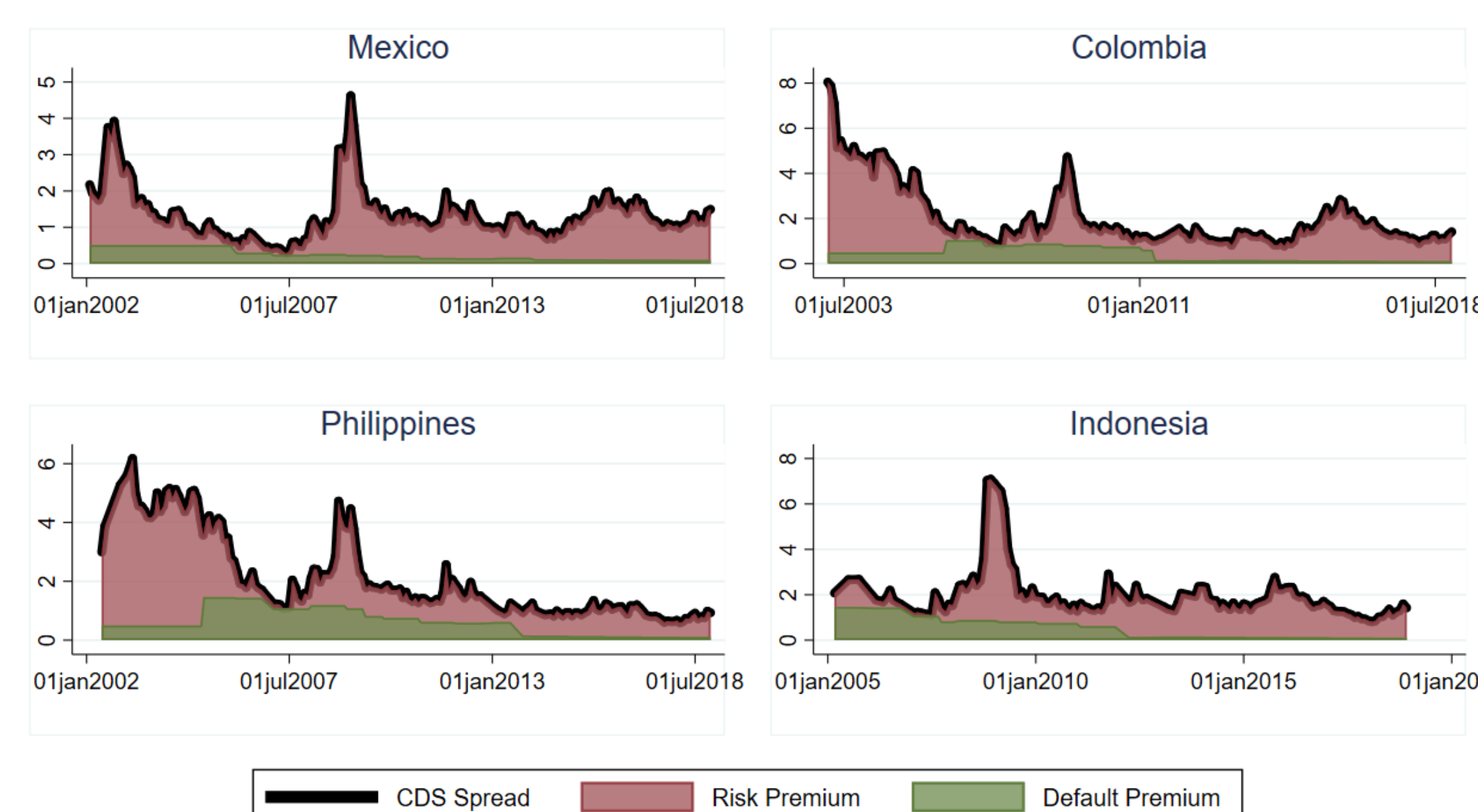
Foreign Reserve and CDS Components

- Panel regression: CDS and two factors on foreign reserve
  - ▶ Country fixed effects
 - ▶ Control for risk aversion, world rate, debt/GDP

	CDS		Risk Premium		Default Premium	
	(1)	(2)	(3)	(4)	(5)	(6)
Reserve Ratio	-3.458	-8.106**	-3.428	-8.211**	-0.0297	0.106
	(2.017)	(3.491)	(2.022)	(3.303)	(0.245)	(0.542)
Sovereign Debt	4.308**	9.864*	4.288**	9.564**	0.0195	0.300
	(1.766)	(4.751)	(1.878)	(4.390)	(0.374)	(0.761)
Rating	-8.573***	-7.387***	-6.292***	-5.501***	-2.281***	-1.886***
	(1.906)	(1.812)	(1.817)	(1.486)	(0.408)	(0.551)
Fixed Effects	No	Yes	No	Yes	No	Yes
Global Control	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1859	1859	1859	1859	1859	1859
R sq. adj	0.395	0.438	0.317	0.384	0.657	0.590

Cluster robust standard errors in parentheses.

- Results:
  - ▶ Foreign reserves significantly reduce sovereign credit risk
  - ▶ Mainly through **risk premium**, rather than default premium

- Visualizing:
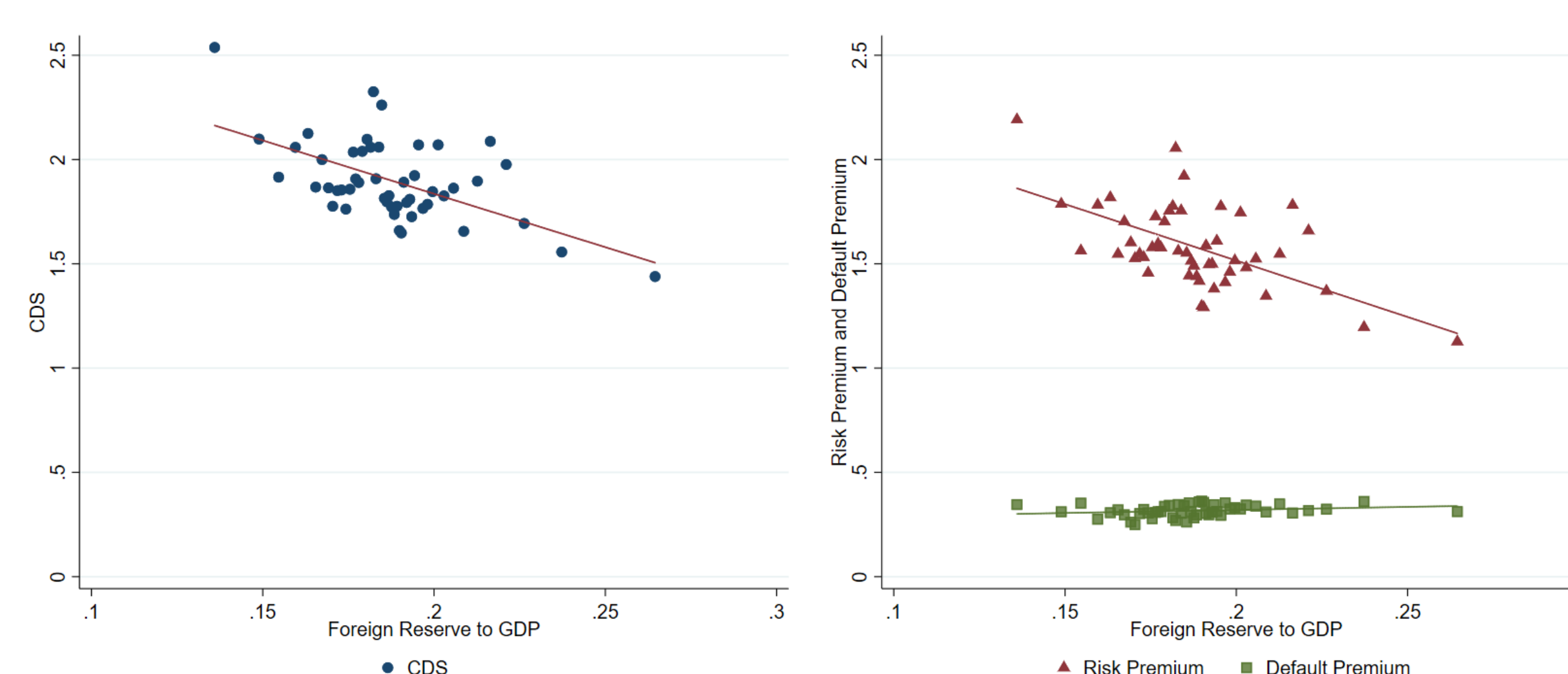
Bond Level Analysis

- Foreign reserves & Sensitivity to global factor
  - ▶ Showed sovereign risk is largely driven by the global factor (VIX)
  - ▶ Numerically show foreign reserves reduce sensitivity to VIX

	Sovereign Yield Spread			
	(1)	(2)	(3)	(4)
Reserve ratio	-1.668***	-0.969*	-0.026	0.213
	(0.147)	(0.759)	(0.354)	(0.891)
VIX	0.059***	0.078***	0.073***	0.088***
	(0.001)	(0.006)	(0.003)	(0.007)
Reserve ratio x VIX			-0.091***	-0.069***
			(0.015)	(0.024)
Bond FE	No	Yes	No	Yes
Year Dummy	No	Yes	No	Yes
Bond Control	Yes	Yes	Yes	Yes
Observations	23687	23676	23687	23676
R sq. adj	0.392	0.648	0.394	0.649

Time clustered robust standard errors in parentheses.

- ▶ Regress ΔYieldSpread to ΔVIX country by country
- ▶ Beta VIX captures the sensitivity to global financial volatility
- ▶ Visualize estimated sensitivity to Δ VIX and reserve ratio
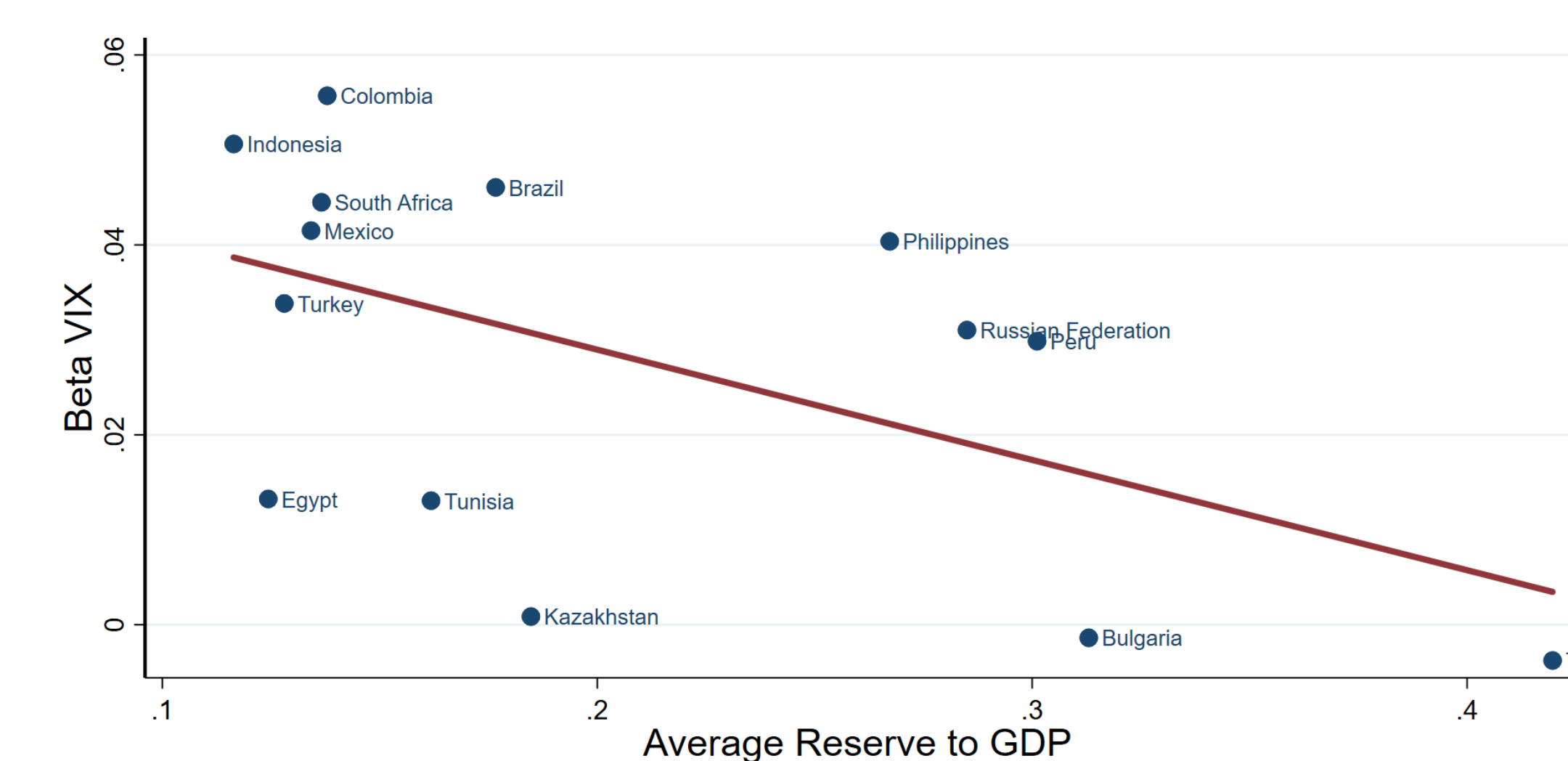
- Foreign reserves & Bond liquidity condition
  - ▶ Liquidity measures the easiness of trading in the secondary market
  - ▶ Bid-ask spread measures sovereign bond liquidity
  - ▶ Showed liquidity condition is crucial in bond pricing
  - ▶ Reserve can effectively improve bond liquidity condition

	Bid-Ask Spread			
	(1)	(2)	(3)	(4)
Reserve ratio	0.022	-0.549***	-0.931***	-1.691***
	(0.045)	(0.198)	(0.229)	(0.415)
VIX	0.011***	0.015***	0.003*	0.005**
	(0.001)	(0.002)	(0.002)	(0.002)
Reserve ratio x VIX			0.053***	0.066***
			(0.014)	(0.018)
Bond FE	No	Yes	No	Yes
Year Dummy	No	Yes	No	Yes
Bond Control	Yes	Yes	Yes	Yes
Observations	23687	23680	23687	23680
R sq. adj	0.098	0.373	0.101	0.378

Time clustered robust standard errors in parentheses.

Conclusion

- ▶ Foreign reserves significantly lower sovereign credit risk
- ▶ Mainly through reducing risk premium, not default probability
- ▶ Reserve reduces the sensitivity of sovereign risk to VIX
- ▶ Reserve improves liquidity condition of issued bonds