Global Liquidity and Drivers of Cross-Border Bank Flows

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Views of the authors not of the IMF

Paper:

http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2445454

Non-technical summary:

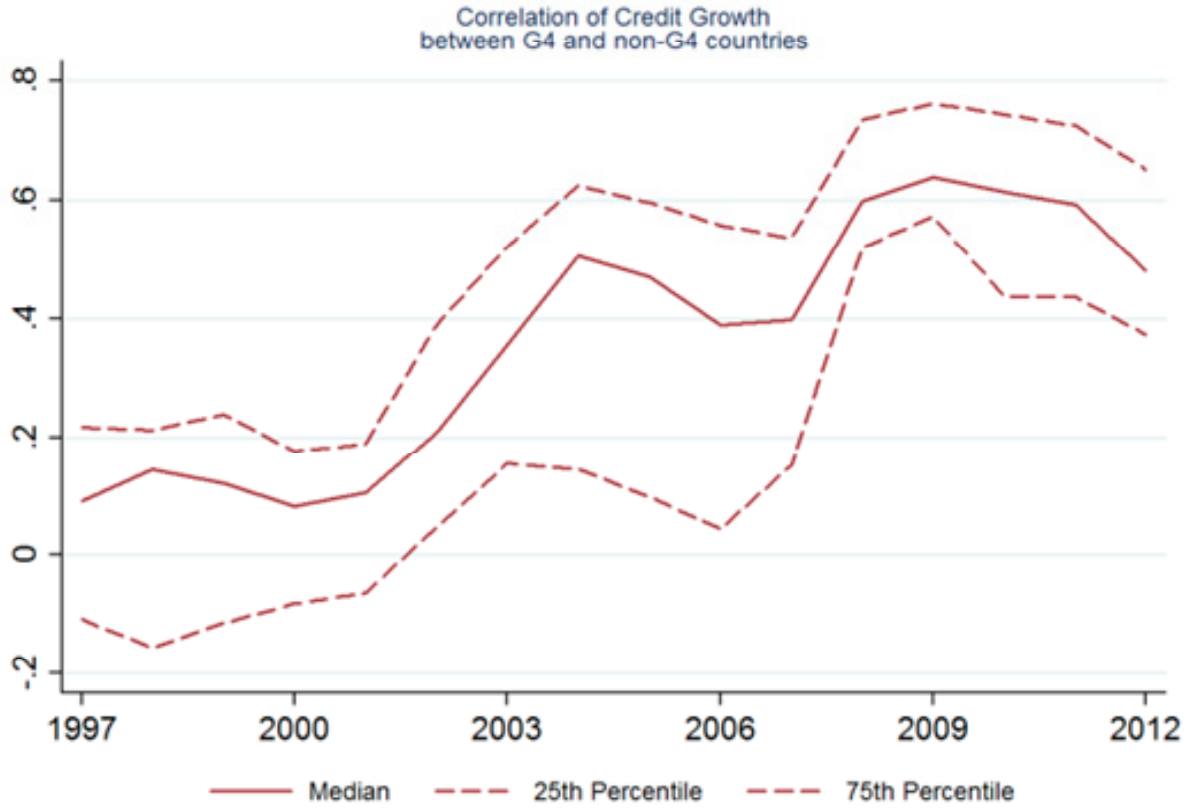
http://www.voxeu.org/article/primer-global-liquidity

OUTLINE

- Motivation – Why Global Liquidity?
- Literature & Data
- Results
  - Drivers of Global Liquidity
  - US vs. other G4 Drivers
  - Borrower Country Characteristics
- Conclusions / Policy

MOTIVATION

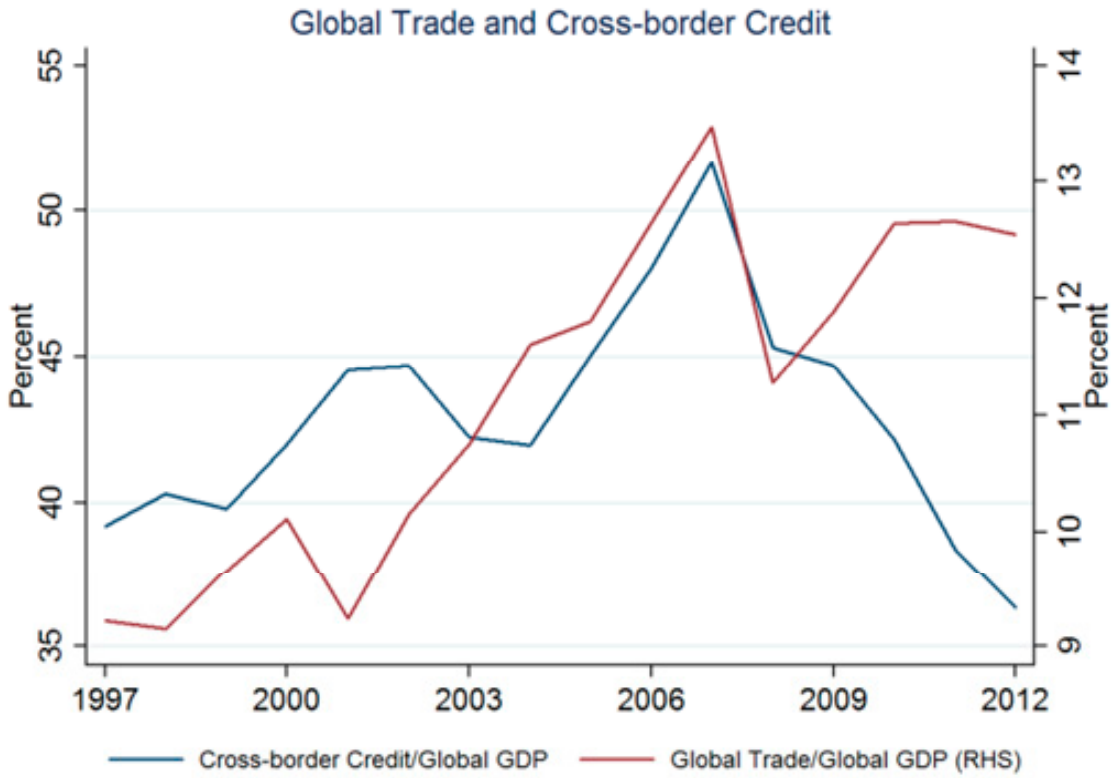
- The financial cycle is increasingly global



Rolling 5-year average correlations between total credit growth in the US, UK, Eurozone and Japan and the rest of the world.
Source: BIS and authors' calculations.

MOTIVATION

- Due to deeper real and financial integration



The share of trade and cross-border claims relative to GDP.
Source: BIS, IMF, and authors' calculations.

MOTIVATION

- G4 banks intermediate much of global credit
- Funding conditions – ease of credit – *within* G4 affect funding conditions globally
- Global Liquidity are G4 credit supply factors that affect the provision of cross-border bank credit

- Large dataset (77 countries, 1990-2012) :
  - Confirm earlier results (Rey, 2013; Bruno and Shin, 2014)
  - Lending to banks and non-banks
  - Relations appear in the 2000s' financial globalization period

KEY QUESTIONS / PREVIEW OF RESULTS

- **Which G4 financial conditions most relevant for GL?**

Uncertainty (VIX), US monetary policy (term premia),
UK/EA bank conditions (leverage &TED spreads)

- **Is GL US-driven, or do other G4 countries play a role?**

Not just US, UK/EA bank conditions key

- **How can borrower countries limit exposure to GL cycles?**

Better macro frameworks (flexible FX), bank supervision / regulation,
capital flows management; especially important in 'open' economies

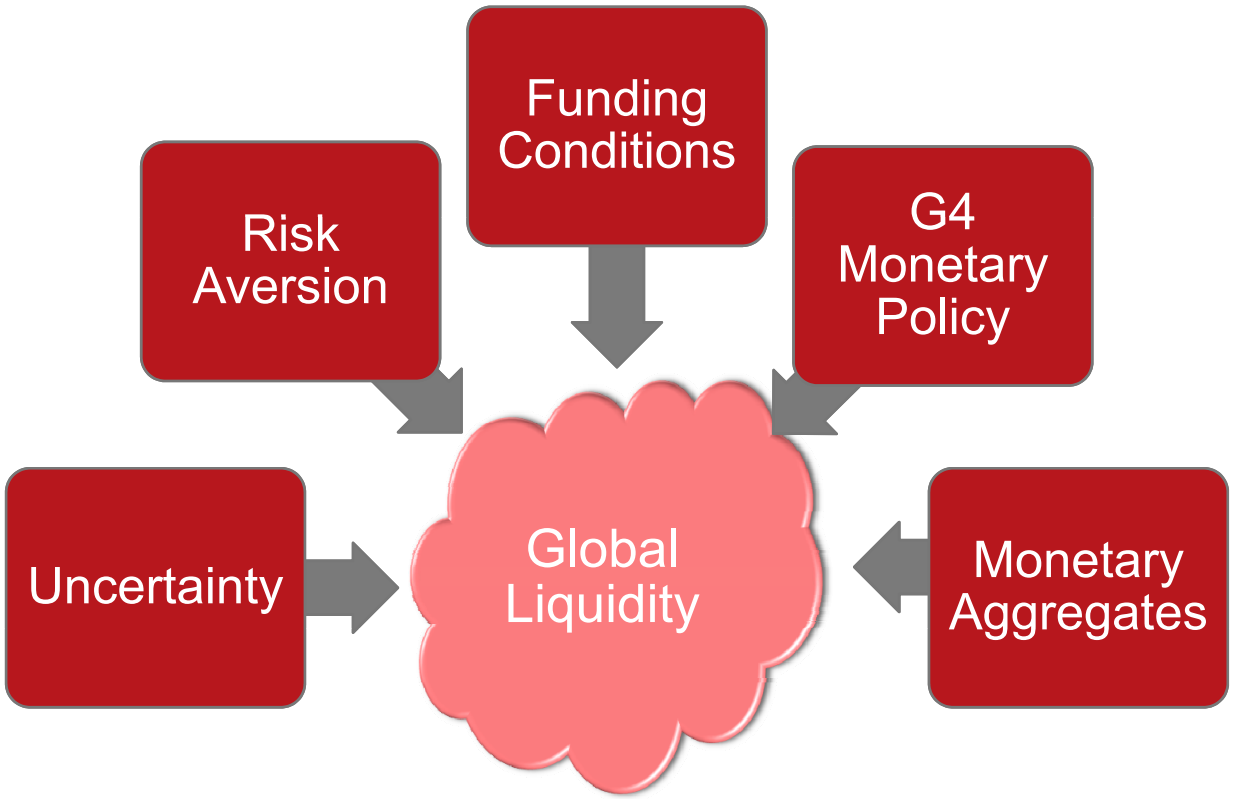
DEFINITION OF GLOBAL LIQUIDITY

$Q^S = Q(P, GL)$, where

Q^S is the quantity of financing provided,

P is the "price" (e.g. expected return differentials);

GL is a vector of "non-price" supply factors in financial centers



DRIVERS

1- Uncertainty and risk aversion

- Banks' / investors' risk attitudes (risk-on/ risk-off episodes).
  US VIX (Bekaert et al., 2013, Rey, 2013)

2- Funding conditions for global banks

- Banks' ability, willingness to take on risks.
  TED spread (short-term interbank minus government bond rate).
  Leverage of US dealer banks
  (Adrian & Shin, 2010; Bruno & Shin, 2014)
- We add EA/UK bank leverage, G4 credit growth

DRIVERS

3- Monetary Policy in G4

- Level of rates (Altunbas et al., 2014; Borio and Zhu, 2012; Jimenez et al., 2014; Bruno and Shin, 2013, 2014).
- Slope of yield curve (domestic opportunities less when yield curve is flat; may trigger cross-border bank loans)

4- Money aggregates

- M2 may affect buoyancy of lending.
  Growth in wholesale or NFC' deposits indicate ease of funding conditions (Hahm, Shin & Shin, 2013; Chung et al., 2014)

DATA

BIS International Banking Statistics (IBS), Locational

- 1990-2012, 77 borrowers, bank/non-bank breakdown, exchange rate adjusted (to capture actual changes in positions)

For each of G4 (US, UK, Euro Area, and Japan)

- VIX, TED spreads (3 month Libor minus 3 month govt bond yield), US dealer bank and G4 bank leverage, real credit growth, real policy rate (deflated with CPI), slope of yield curve (10 year minus 3 month government bond yield), growth in M2

Borrower country characteristics

- FX regime, capital controls, banking regulation, etc

METHODOLOGY

Panel regression, country fixed effects,
standard errors clustered at the borrower country level

$$\Delta L_{jt} = \beta_0 + \beta_1 DomesticFactor_{jt} + \beta_2 \Delta InterestSpread_{jt} + \beta_3 GlobalLiquidity_t + \gamma_j + \varepsilon_{jt}$$

- ΔL_{jt} is quarterly log difference in the FX adjusted stock of bank claims in borrower country j at time t
- $DomesticFactor_{jt}$ are proxies for country j demand at t
- $\Delta InterestSpread_{jt}$ is the change in the spread between local lending rates and US Fed Funds Rate
- $Global\ Liquidity_t$ is the set of G4 global liquidity drivers
- γ_j are country fixed effects

METHODOLOGY

Then introduce country characteristics
to analyze borrower country exposures to global liquidity

$$\Delta L_{jt} = \beta_0 + \beta_1 Domestic Factor_{jt} + \beta_2 \Delta InterestSpread_{jt} + \beta_3 Global Liquidity_t$$
$$+ \beta_4 BorrowerCharacteristics_{jt} + \beta_5 Global Liquidity_t * BorrowerCharacteristics_{jt} + \gamma_j + \varepsilon_{jt}$$

- $BorrowerCharacteristics_{jt}$:
  - (i) FX regime
  - (ii) Capital flows management tools;
  - (iii) Bank regulation and supervision
  - (iv) "Openness": quality of institutions, foreign bank limits
- Interaction to capture GL cyclicality

Q1- REGRESSION RESULTS: LENDING TO BANKS

Table 4 - Regression Results for Cross-Border Claims, for period 1990Q1-2012Q4

Panel A - Dependent Variable: Log Changes in BIS Locational Cross-Border Claims on Banks (in %)

Variables	(1)	(9) 1990-2012	(10)	(11) 1990-2000	(12) 2001-2012	(13) 2001-2006
GDP Growth (lag)	0.227***	0.160***	0.175***	0.170**	0.138*	0.0417
	(0.0537)	(0.0530)	(0.0523)	(0.0771)	(0.0706)	(0.0775)
Inflation (lag)	-0.0981***	-0.0747***	-0.0859***	-0.0142	-0.0587	-0.108
	(0.0227)	(0.0237)	(0.0212)	(0.0350)	(0.0552)	(0.0736)
Change in Interest Rate Differential (Domestic rate - Fed Fund Rate)	-0.0223	0.0259	0.0413	0.0369	0.00422	0.0433
	(0.0308)	(0.0334)	(0.0349)	(0.0443)	(0.0449)	(0.0637)
CBOE VIX		-0.149***	-0.175***	0.0311	-0.166***	-0.138***
		(0.0289)	(0.0272)	(0.0516)	(0.0323)	(0.0427)
TED Spread		-0.222	0.296	-1.366	0.0178	-3.181
		(0.529)	(0.532)	(0.885)	(0.691)	(3.851)
US Bank Leverage		0.179***		-0.0437	0.105*	-0.133
		(0.0496)		(0.0876)	(0.0619)	(0.132)
Growth of Real US Credit			0.115**			
			(0.0463)			
US Slope of Yield Curve		-0.220		0.0541	-0.515**	-1.061***
		(0.151)		(0.255)	(0.209)	(0.345)
Real Federal Fund Rate			0.100			
			(0.0946)			
G4 Countries M2 (Annual growth rate)		0.0767***	0.0976***	-0.0612*	0.168***	0.133**
		(0.0240)	(0.0273)	(0.0317)	(0.0404)	(0.0525)
Country Fixed Effect	Y	Y	Y	Y	Y	Y
Observations	5,448	5,448	5,448	2,079	3,369	1,670
R-squared	0.013	0.048	0.043	0.014	0.065	0.021
Number of countries	77	77	77	65	77	74

- Proxies of demand significant across specifications
- VIX significant with large impact
- US dealer leverage & domestic credit growth (+)
- Slope of yield curve (-)
- Also increase with M2 growth
- Period 2001-12 driving the results

Q1- REGRESSION RESULTS: LENDING TO REAL SECTOR

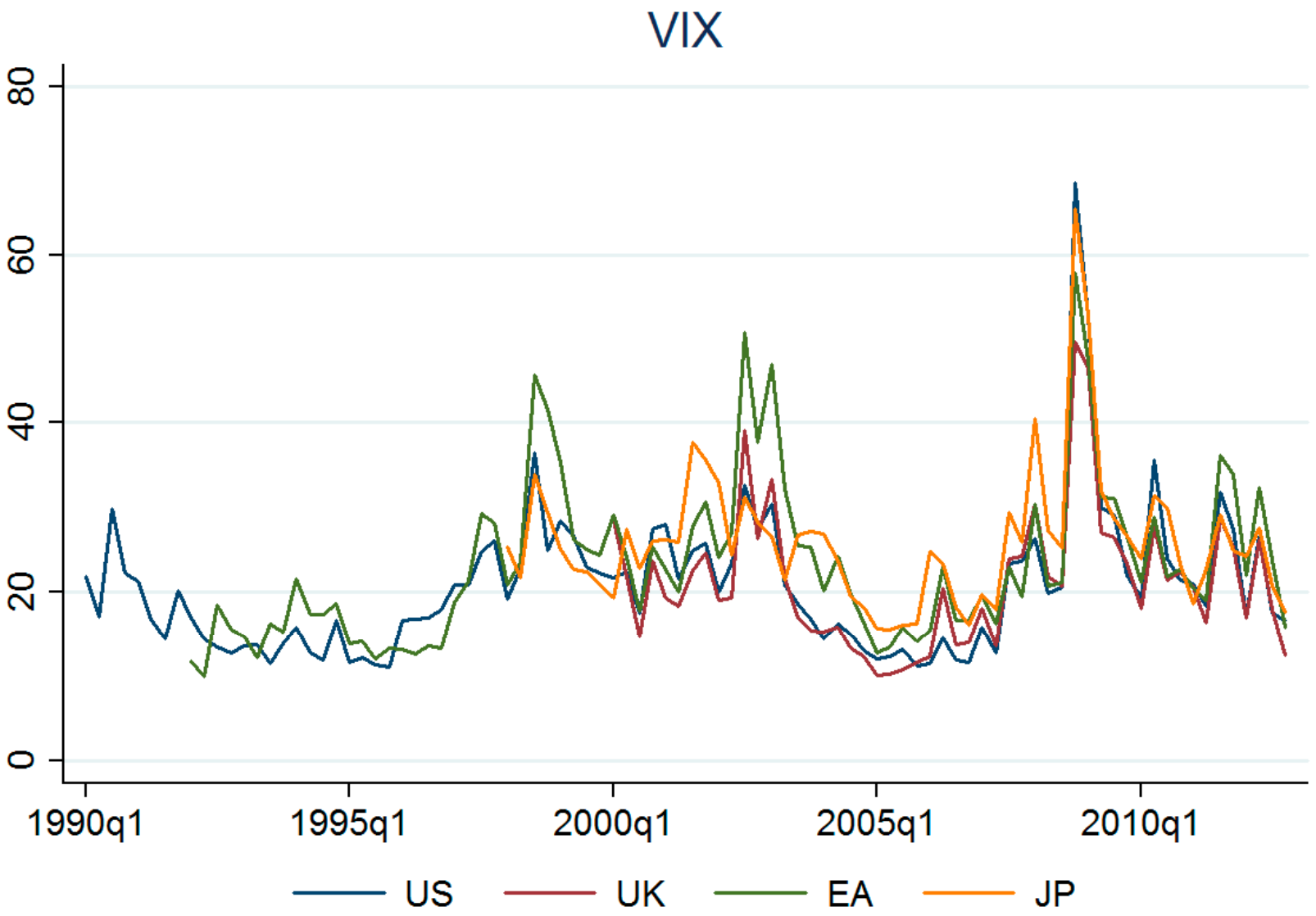
Table 4 Cont. - Regression Results for Cross-Border Claims, for period 1990Q1-2012Q4

Dependent Variable: Log Changes in BIS Locational Cross-Border Claims on Non-Banks (in %)

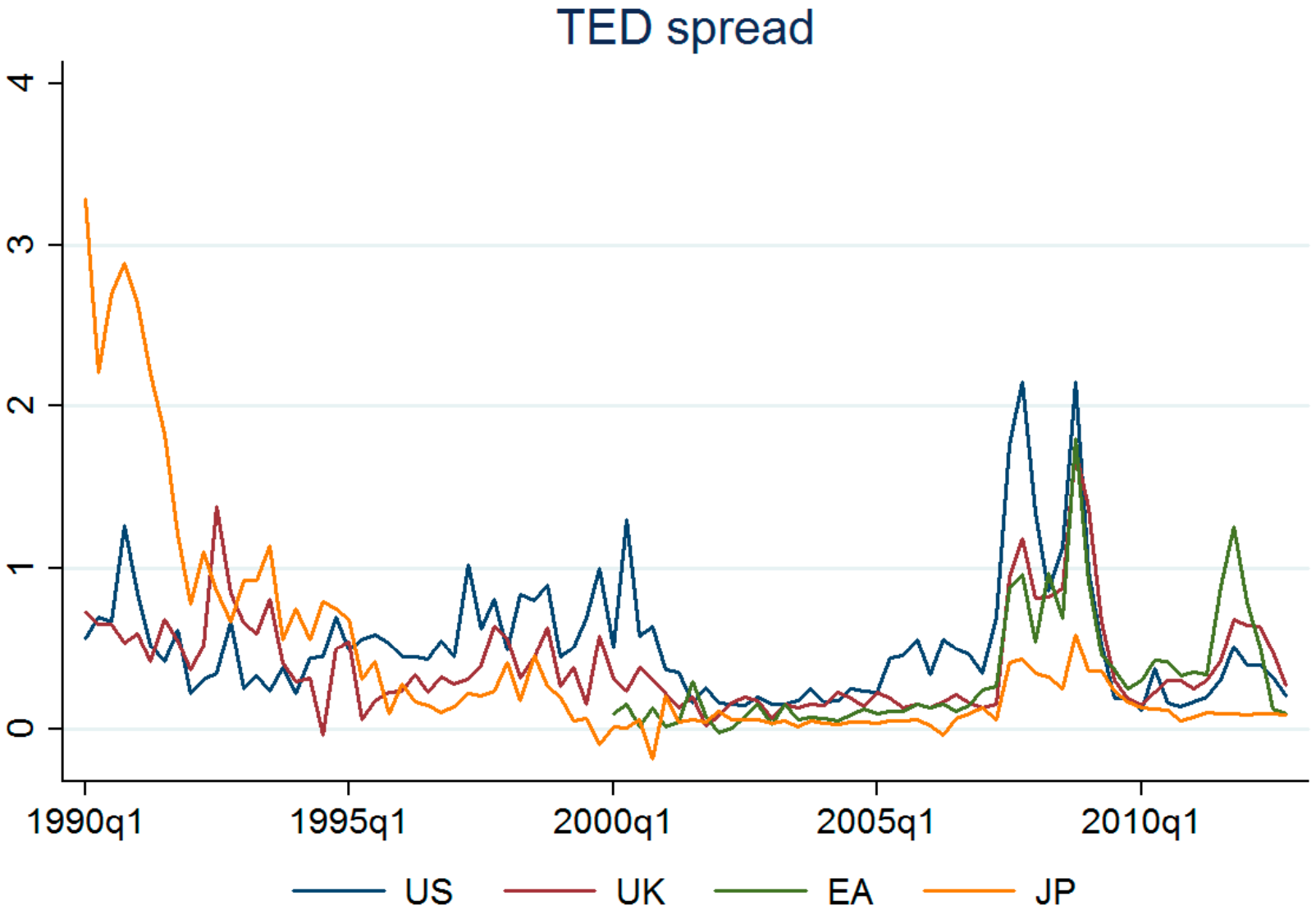
Variables	(1)	(9) 1990-2012	(10)	(11) 1990-2000	(12) 2001-2012	(13) 2001-2006
GDP Growth (lag)	0.182***	0.126***	0.141***	0.137***	0.126***	-0.0454
	(0.0298)	(0.0250)	(0.0267)	(0.0296)	(0.0387)	(0.0536)
Inflation (lag)	-0.0223	-0.00680	-0.0102	0.00804	0.0245	-0.0401
	(0.0197)	(0.0197)	(0.0192)	(0.0179)	(0.0365)	(0.0364)
Change in Interest Rate Differential (Domestic rate - Fed Fund Rate)	-0.0143	0.0171	0.0330	0.0258	-0.00775	-0.00873
	(0.0281)	(0.0268)	(0.0272)	(0.0353)	(0.0344)	(0.0289)
CBOE VIX		-0.0897***	-0.113***	-0.0246	-0.115***	-0.151***
		(0.0160)	(0.0156)	(0.0296)	(0.0210)	(0.0295)
TED Spread		-0.0969	0.403	-0.198	0.377	-3.269
		(0.329)	(0.328)	(0.610)	(0.413)	(2.623)
US Bank Leverage		0.150***		0.0789	0.103**	0.0417
		(0.0316)		(0.0564)	(0.0453)	(0.0594)
Growth of Real US Credit			0.141***			
			(0.0292)			
US Slope of Yield Curve		-0.303***		-0.185	-0.402**	-0.919***
		(0.0986)		(0.128)	(0.198)	(0.334)
Real Federal Fund Rate			0.0660			
			(0.0630)			
G4 Countries M2 (Annual growth rate)		0.0211	0.0331*	-0.00169	0.0137	0.00497
		(0.0153)	(0.0172)	(0.0259)	(0.0295)	(0.0388)
Country Fixed Effect	Y	Y	Y	Y	Y	Y
Observations	5,420	5,420	5,420	2,055	3,365	1,666
R-squared	0.015	0.056	0.050	0.019	0.070	0.041
Number of countries	77	77	77	65	77	74

- Similar to lending to banks, but M2 and inflation not as important
- Less sensitive to GL than lending to banks

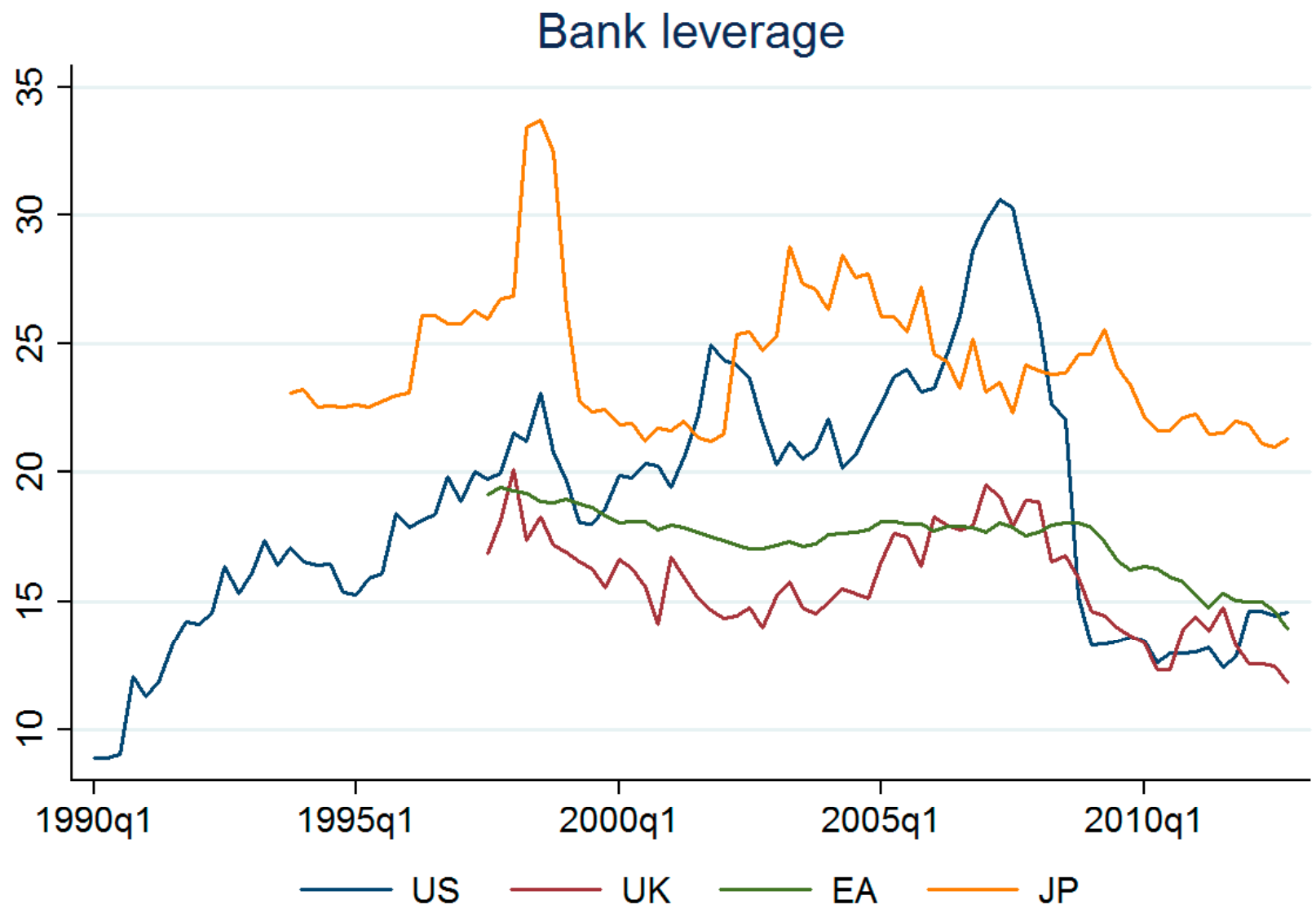
VIX – Similar across G4



TED SPREADS – Different across G4



BANK LEVERAGE – Also different across G4



Q2- US VS. OTHER G4 GL DRIVERS (TO BANKS)

Table 5 - Regression Results for Cross-Border Claims to Banks and Non-Banks, Individual G4 variables

Panel A - Dependent Variable: Log Changes in BIS Locational Cross-Border Claims on Banks (in %, period 2001-12)

S4 Economy		VIX	TED	Bank Leverage	Real Credit Growth	Real Policy Rate	Slope of yield curve	M2 growth (national currency)
US	Coefficient	-0.251***	-0.433	0.364***	0.284***	0.446***	-1.309***	-0.879***
	Standard error	(0.0294)	(0.668)	(0.0652)	(0.0791)	(0.138)	(0.242)	(0.139)
	R2	0.051	0.010	0.035	0.019	0.014	0.024	0.032
UK	Coefficient	-0.258***	-4.455***	0.930***	0.127**	0.454***	-1.214***	0.110**
	Standard error	(0.0337)	(0.861)	(0.159)	(0.0481)	(0.129)	(0.294)	(0.0458)
	R2	0.039	0.025	0.031	0.015	0.019	0.025	0.012
EA	Coefficient	-0.243***	-3.213***	0.624**	0.393***	0.0815	-1.338***	0.401***
	Standard error	(0.0291)	(0.764)	(0.285)	(0.0864)	(0.224)	(0.303)	(0.130)
	R2	0.046	0.019	0.013	0.025	0.010	0.025	0.017
JP	Coefficient	-0.271***	-8.463***	0.0617	0.0548	-0.250	1.941**	-1.580***
	Standard error	(0.0315)	(2.021)	(0.123)	(0.0916)	(0.435)	(0.878)	(0.348)
	R2	0.045	0.017	0.010	0.010	0.010	0.012	0.018

- VIX same across countries
- US TED insignificant, but other G4 have explanatory power
- UK/EA leverage, credit growth
- But US monetary policy
- M2 growth in US and Japan (-), but UK and EA (+)

Q2 - US VS. OTHER G4 GL DRIVERS (OUTSIDE REGION)

G4 Variables	Claims on Banks		Claims on Non-banks	
	Asia	West Hemisphere	Asia	West Hemisphere
US TED spreads	-2.817**	-0.908	-1.031	-0.299
	(0.973)	(1.070)	(0.641)	(0.332)
UK TED spreads	-5.640***	-5.006***	-3.845***	-2.142**
	(1.618)	(1.372)	(1.061)	(0.832)
EA TED spreads	-5.091***	-1.698**	-3.384***	-0.692
	(1.403)	(0.779)	(0.864)	(0.804)
US bank leverage	0.0827	0.251**	0.114	0.116***
	(0.0878)	(0.101)	(0.0767)	(0.0368)
UK bank leverage	0.409*	0.667**	0.412*	0.489***
	(0.207)	(0.290)	(0.191)	(0.0984)
EA bank leverage	-0.569	-0.803	-0.251	-0.0645
	(0.391)	(0.453)	(0.312)	(0.144)
US real credit growth	0.0641	-0.0733	0.166*	0.0264
	(0.0832)	(0.0888)	(0.0911)	(0.0415)
UK real credit growth	-0.0755	-0.0470	-0.0195	0.00488
	(0.0677)	(0.0646)	(0.0481)	(0.0250)
EA real credit growth	0.0566	0.199	0.139	0.190***
	(0.104)	(0.126)	(0.0955)	(0.0434)
US real policy rate	-0.00835	0.339	0.505*	0.284*
	(0.202)	(0.257)	(0.232)	(0.141)
UK real policy rate	-0.0204	0.00279	0.0589	0.0319
	(0.163)	(0.146)	(0.145)	(0.0886)
EA real policy rate	-0.986**	-0.154	-0.218	0.0247
	(0.384)	(0.568)	(0.301)	(0.156)
US slope of yield curve	-0.712*	-1.234**	-1.161***	-1.027**
	(0.389)	(0.426)	(0.314)	(0.361)
UK slope of yield curve	-0.126	-0.493	-0.241	-0.407**
	(0.385)	(0.360)	(0.286)	(0.145)
EA slope of yield curve	-0.0889	-0.739**	-0.273	-0.556***
	(0.416)	(0.330)	(0.305)	(0.122)

- Individual G4 GL matter most within own region (not shown)
- **UK and EA TED spreads for Asian, WH borrowers**
- Same for claims on non-banks

Q3- BORROWER COUNTRY CHARACTERISTICS (BANKS)

Table 7 - Interaction Effects of Country Characteritics with Global Liquidity Variables

Panel A - Dependent Variable: Log Changes in BIS Locational Cross-Border Claims on Banks (in %)

		X Variables					
		US VIX	UK TED	US Dealer Bank Leverage	UK real policy rate	UK slope of yield curve	G4 Countries M2 (Annual growth rate)
Exchange rate flexibility	1.305	1.634	1.382	4.180***	1.969**	0.915	1.610
	(0.954)	(1.007)	(0.841)	(1.130)	(0.765)	(0.769)	(0.998)
Exchange rate flexibility * X		-0.0134	-0.541	-0.132***	-0.270***	0.802***	-0.0689***
		(0.0113)	(0.475)	(0.0400)	(0.0915)	(0.176)	(0.0164)
Capital controls	-0.0110	-0.00284	-0.0270	0.0840	-0.00390	-0.0324	0.0274
	(0.0249)	(0.0307)	(0.0320)	(0.0563)	(0.0316)	(0.0251)	(0.0294)
Capital controls * X		-0.000415	-0.0158	-0.00518**	-0.0139***	0.0301***	-0.00346**
		(0.000802)	(0.0228)	(0.00232)	(0.00457)	(0.00971)	(0.00138)
Capital stringency	-0.565**	-0.403	-0.392	1.233**	-0.427	-0.967***	-0.411
	(0.269)	(0.285)	(0.288)	(0.561)	(0.296)	(0.269)	(0.366)
Capital stringency * X		-0.00629	-0.263	-0.0809***	-0.0785	0.423***	-0.0442***
		(0.00434)	(0.178)	(0.0254)	(0.0590)	(0.0946)	(0.0123)
Supervisory power	-0.136	-0.0620	-0.0212	0.420	0.0155	-0.316	0.0230
	(0.306)	(0.305)	(0.322)	(0.366)	(0.312)	(0.311)	(0.336)
Supervisory power * X		-0.00364*	-0.176*	-0.0250**	-0.0599**	0.258***	-0.0160***
		(0.00215)	(0.0896)	(0.0110)	(0.0281)	(0.0511)	(0.00424)
Institution quality 1/	-3.549***	-3.130***	-3.545***	-1.064	-2.761***	-3.734***	-2.956***
	(0.982)	(1.026)	(1.071)	(1.231)	(1.002)	(0.967)	(1.075)
Institution quality * X		-0.0155	-0.645	-0.0735**	-0.237***	0.606***	-0.0484**
		(0.0109)	(0.390)	(0.0367)	(0.0778)	(0.159)	(0.0197)
Limits on foreign banks	-0.0616	1.213	1.533	5.303**	0.207	-1.187**	0.0106
	(0.671)	(1.014)	(1.047)	(2.107)	(0.602)	(0.483)	(1.230)
Limits on foreign banks * X		-0.0561	-3.488**	-0.257***	-0.404**	1.091***	-0.0336
		(0.0351)	(1.440)	(0.0858)	(0.158)	(0.385)	(0.105)

- Flexible FX / capital controls reduce cyclical impact
- Stringent bank regulation & supervision reduce cyclical impact on banks
- Important for "open" countries: good institutions / foreign bank presence

CONCLUSIONS / POLICY RECOMMENDATIONS

- **GL matters for cross-border flows to banks, non-banks**
- **GL driven by VIX, US monetary, EA/UK bank conditions**
- **Borrower country policies :**
  - Macro (FX), cap controls, bank regulation & supervision
  - Especially for better institutions and foreign banks
  - Controls 25% → 75 % ⇔ Bank Flows 19% → 10%
- **Policy insight for**
  - Bi- and multilateral surveillance
  - Country policy to max gains from financial globalization
- **Questions for future research**
  - Other flows. Best indicators. Micro-evidence on channels. Theory