TOOLS FOR MANAGING FINANCIAL-STABILITY RISKS FROM CAPITAL INFLOWS

Marcos Chamon*

Research Department, IMF

XIV Annual Inflation Targeting Seminar of the Banco Central do Brasil

Rio de Janeiro, May 10-11, 2012

*Joint with Jonathan D. Ostry, Atish R. Ghosh, and Mahvash S. Qureshi. The views expressed in this presentation are those of the presenter and do not necessarily represent those of the IMF or IMF policy.

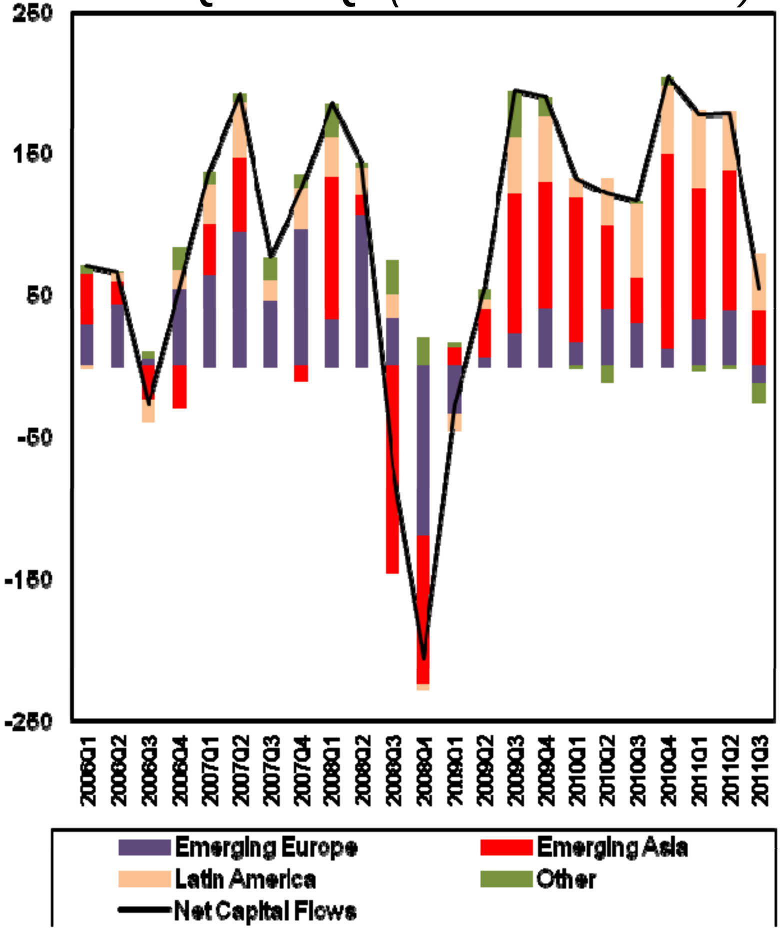
The Setting

- Capital flows to EMEs bring numerous benefits
  - Financing for productive investments/infrastructure needs
  - Consumption-smoothing/risk diversification
  - Technology transfer, know-how

  but can also raise macroeconomic concerns
  - Exchange rate, competitiveness, dynamic Dutch disease
  - General overheating
- and financial-stability risks
  - Excessive foreign borrowing/fragile external liability structures
  - Foreign currency exposure on unhedged balance sheets
  - Credit booms, asset price bubbles

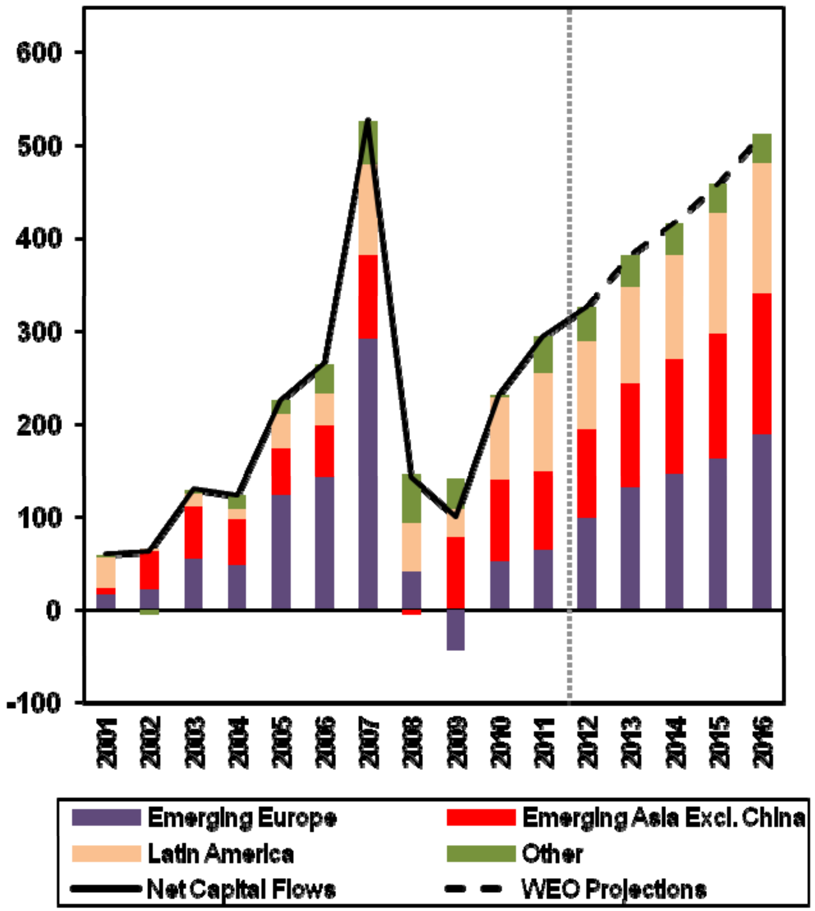
Capital Inflows Seem Likely to Persist…

Net Quarterly Capital Flows into EMEs, 2006Q1-2011Q3 *(billions of US dollars)*



Source: International Financial Statistics.

Net Annual Capital Flows into EMEs, 2001-2016 *(billions of US dollars)*



The Literature

- Large literature on capital controls
  - Magud, Reinhart and Rogoff (2006) provide a meta-survey
  - Limited effectiveness in terms of macro objectives (volume; exchange rate; monetary pol. autonomy)
  - Somewhat stronger evidence on altering composition/maturity of flows
- Little systematic treatment of nexus between capital controls, prudential measures, and financial-stability risks of inflows
  - Disparate literatures
  - Lack of indices for prudential measures

The Plan For Presentation

- Define the policy toolkit
- Construct indices of various policy measures (capital controls and prudential regulations)
- Examine association between policy measures and key vulnerabilities:
  - External liability structure (proportion of portfolio debt in total external liabilities)
  - Foreign currency lending by domestic banking system
  - Credit booms
  - Economic resilience in the event of crisis
- Robustness tests
- Conclusions

The Toolkit

- Capital controls
- FX-related prudential measures
- Other prudential measures

The Toolkit

- Capital controls
  - Measures that restrict capital flows by virtue of the residency of the parties to the transaction
  - Can be economy-wide or specific to a sector (e.g., financial) or an industry (e.g., strategic)
  - May apply to all flows or differentiate by type (portfolio vs. FDI; debt vs. equity) or duration (short-term vs. medium and long-term)
  - Taxes; unremunerated reserve requirements (URR); special licensing requirements;
- FX-related prudential measures
- Other prudential measures

The Toolkit

- Capital controls
- FX-related prudential measures (applies to regulated financial institutions)
  - Discriminate on the basis of the currency denomination of the transaction
  - Open position limits; limits on investment in FX assets; limits/capital charges on FX lending to unhedged borrowers
- Other prudential measures

The Toolkit

- Capital controls
- FX-related prudential measures
- Other prudential measures (applies to regulated financial institutions)
  - Do not discriminate either on the currency or the residency of the parties to the transaction
  - Max loan-to-value (LTV) ratios; credit growth limits; sectoral limits on loan concentration; asset classification and provisioning rules; counter-cyclical capital requirements

The Indices—Capital Controls

- De jure indices, based on IMF AREAR
- Economy-wide: Schindler (2008)'s indices on inflow controls, based on AREAR
- We construct a financial-sector specific index:
  - Fincont 1—*average of:*
    - restrictions on financial sector's foreign borrowing
    - differential treatment of non-resident accounts
  - Fincont 2—*average of:*
    - restrictions on financial sector's foreign borrowing
    - differential treatment of non-resident accounts
    - restrictions on foreign accounts

The Indices—Prudential Measures

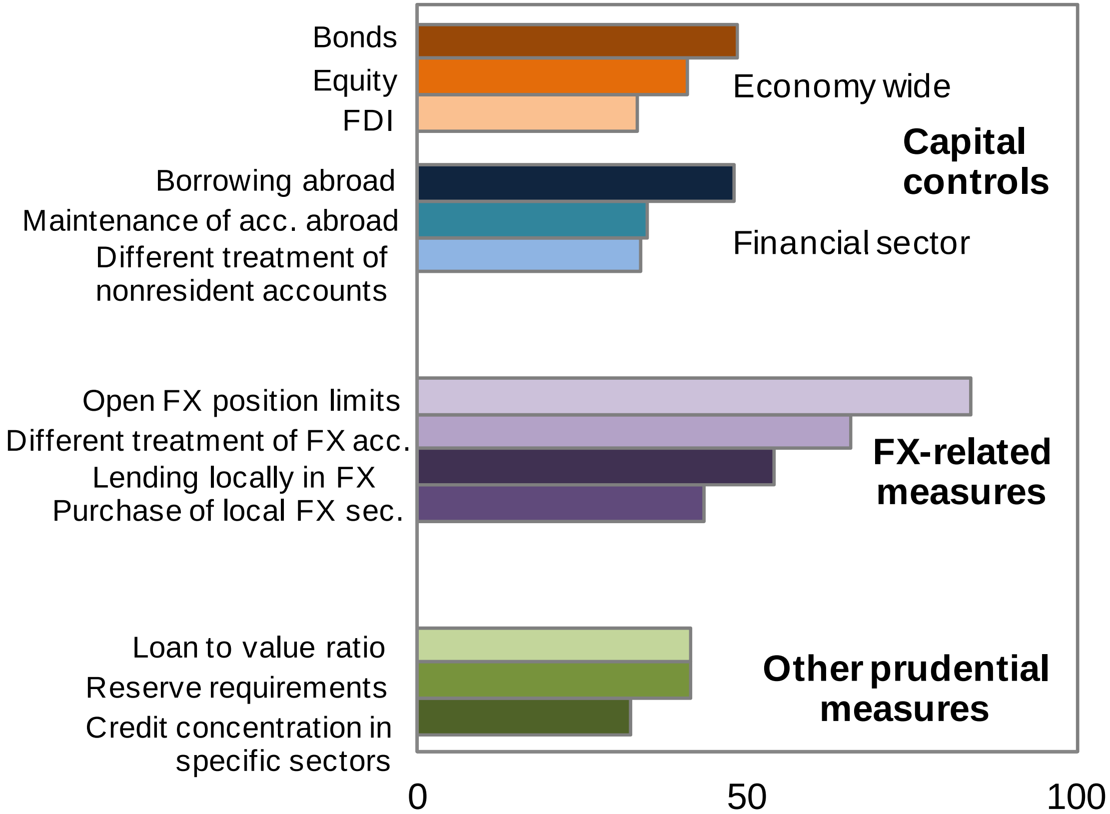
- De jure indices, based on IMF AREAR
- Foreign currency related regulations
  - FXReg1—*average of:*
    - Limit on lending domestically in FX
    - Differential treatment of deposit accounts in FX
  - FXReg2—*average of:*
    - Limit on lending domestically in FX
    - Limit on purchase of locally-issued securities denominated in FX
    - Differential treatment of deposit accounts in FX
    - Limit on open FX positions

The Indices—Other Prudential

- De jure indices, based on IMF desk economists
- Other prudential regulations
  - Domreg1—*average of:*
    - Reserve requirement
      - (0 if RR $<$ 10%; 0.5 if 10% $<$ RR$<$ 20%; 1 if RR $>$ 20%)
    - Limits on sectoral credit concentration
  - Domreg2—*average of:*
    - Maximum loan-to-value (LTV)
    - Reserve requirement
      - (0 if RR $<$ 10%; 0.5 if 10% $<$ RR$<$ 20%; 1 if RR $>$ 20%)
    - Limits on sectoral credit concentration

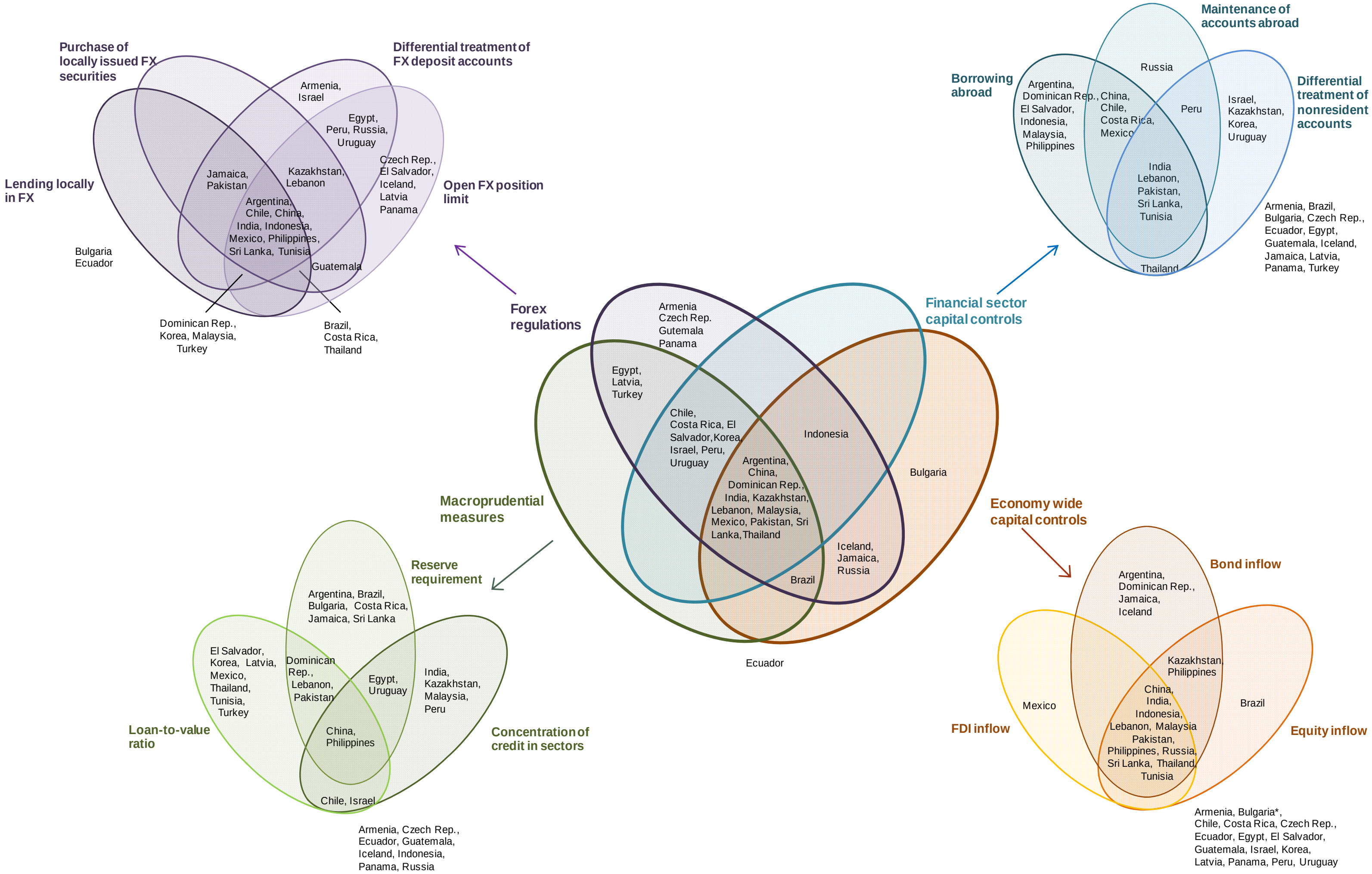
Eve of the Crisis

Frequency Distribution of Pre-Crisis Policy Measures*
(in percent of total observations)



Source: IMF's AREAER, Schindler (2009), and IMF country desk survey.
*Numbers reflect the share of countries with a measure in 2007.

Eve of the Crisis: Country Measures



Results I: Debt in Proportion to Total External Liabilities

- Cross section (2007; measures in 2003-05), Table 1:
  - Economy-wide capital controls significantly associated with lower debt
  - FX-related prudential significantly associated with lower debt
  - Capital controls significant when both included
  - External vulnerability index and institutional quality index included as additional regressors
  - Moving from 25th to 75th percentile of capital controls or FX-related prudential lowers debt share by about 7 percentage points
- Panel data (1995-2008), Table 2:
  - Economy-wide and financial sector capital controls significantly associated with lower debt
  - External vulnerability index, institutional quality index, M2/GDP, per capita income, region, and time dummies included as additional regressors;

Table 1. Policy Measures and Debt Liabilities: Pre-Crisis Cross-Section

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Kcont	**-11.52****							**-11.31***	-9.40	**-10.81***	**-12.95***	**-10.63***	**-9.69***
	(5.05)							(6.66)	(8.73)	(6.09)	(6.71)	(5.29)	(5.23)
Fincont1		-7.13						-1.09					
		(5.72)						(7.51)					
Fincont2			-10.58						-3.73				
			(6.41)						(10.54)				
Fxreg1				**-7.97***						-2.46			
				(4.49)						(5.73)			
Fxreg2					-8.61						0.85		
					(6.49)						(9.06)		
Domreg1						-2.68						-2.61	
						(7.86)						(7.56)	
Domreg2							-5.02						-3.82
							(8.24)						(8.01)
Vulnerability index	35.76***	42.81***	41.05***	39.08***	38.72***	45.12***	47.14***	37.79***	38.08***	37.39***	38.16***	40.83***	42.47***
	(10.56)	(12.03)	(11.75)	(10.61)	(10.73)	(10.20)	(11.03)	(12.80)	(12.44)	(11.12)	(10.95)	(9.92)	(10.47)
Institutional quality index	-43.64**	-31.61	-29.60	-34.74	-35.28*	-26.96	-21.22	-38.65*	-37.06	-40.58*	-40.05*	-36.72*	-33.04
	(19.24)	(20.00)	(20.99)	(20.63)	(20.06)	(21.88)	(24.47)	(20.41)	(22.58)	(20.22)	(19.83)	(20.38)	(23.76)
Observations	38	35	35	37	37	32	30	35	35	37	37	32	30
R-squared	0.39	0.35	0.38	0.39	0.38	0.38	0.43	0.39	0.40	0.42	0.42	0.43	0.48

Results II: Foreign Currency Loans in Total Domestic Credit

- Cross section (2007; measures in 2003-05)
  - Economy-wide capital controls significantly associated with lower proportion FX credit
  - FX-related prudential significantly associated with lower FX
  - Capital controls and FXReg1 significant when both included; Capital controls not significant while FXReg2 significant when both included
  - Policy measures lagged one year; also included institutional quality index and exchange rate regime
  - Moving from 25th to 75th percentile of capital controls and FX-related prudential lowers proportion of FX credit by 20-28 percentage points
- Panel data (1995-2008)
  - Economy-wide and financial sector capital controls and FX regulations significantly associated with lower FX credit
  - Institutional quality index, exchange rate regime, M2/GDP, per capita income, region and time dummies included as additional regressors

Table 3: Policy Measures and Foreign-Currency Lending: Pre-Crisis Cross-Section

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Kcont	-39.62***							-41.57**	-40.13**	-28.36*	-22.60	-46.11***	-46.28***
	(13.30)							(15.409)	(17.664)	(15.025)	(16.624)	(12.118)	(12.801)
Fincont1		-7.05						3.04					
		(20.15)						(17.791)					
Fincont2			-26.16						-2.43				
			(19.72)						(21.948)				
Fxreg1				-41.71***						-27.51**			
				(9.34)						(11.428)			
Fxreg2					-55.21***						-37.82**		
					(11.312)						(14.804)		
Domreg1						-3.66						-8.57	
						(22.755)						(24.858)	
Domreg2							-7.91						5.16
							(20.651)						(25.569)
Institutional quality index	-58.22	-1.96	4.89	-28.99	-41.75	-35.47	-32.60	-49.43	-47.45	-49.20	-53.92	-48.58	-59.51
	(60.06)	(65.10)	(62.27)	(57.90)	(52.233)	(74.962)	(72.19)	(65.99)	(69.48)	(55.03)	(51.12)	(67.59)	(71.04)
Exchange rate regime	32.99***	35.09***	35.46***	22.14**	19.05*	27.96**	27.83**	37.00***	36.82***	27.37**	25.43**	28.95**	30.32**
	(9.75)	(11.81)	(12.03)	(9.44)	(9.522)	(12.478)	(13.18)	(10.54)	(10.61)	(10.78)	(10.87)	(11.63)	(12.68)
Observations	30	27	27	30	30	25	25	27	27	29	29	24	24
R-squared	0.47	0.33	0.37	0.50	0.53	0.24	0.24	0.49	0.49	0.57	0.58	0.52	0.52

Results III: Growth in Private Sector Credit/GDP

- Cross section (credit growth 2003-07; measures in 2003-05),   Table 5
  - Other prudential regulations significantly associated with lower credit booms
  - Other prudential regulations remain significant when capital controls included
  - Also included institutional quality index,and dummies for public or private credit bureaus.
  - Moving from 25th to 75th percentile of other prudential regulations lowers credit growth (03-07) by 1-1.5 percent per year
- Panel data (1995-2008), Table 6
  - Other prudential regulations significantly associated with lower credit booms; retain significance when capital controls included.
  - Institutional quality index, dummies for public or private credit bureaus, initial private credit to GDP ratio, real GDP growth, exchange rate regime, per capita income, region, and time dummies included as additional regressors;

Table 5: Policy Measures and Domestic Credit Booms: Pre-Crisis Cross-Section

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Kcont	-6.54							-8.10	-12.67	2.79	2.08	-7.83	-5.74
	(6.74)							(9.54)	(9.33)	(9.21)	(9.53)	(6.33)	(7.01)
Fincont1		-1.16						3.12					
		(7.25)						(10.05)					
Fincont2			1.31						9.33				
			(7.45)						(10.37)				
Fxreg1				-7.87						-13.15			
				(7.41)						(8.32)			
Fxreg2					-11.09						-14.10		
					(7.78)						(10.23)		
Domreg1						**-19.21****						**-15.81***	
						(8.79)						(8.30)	
Domreg2							**-15.22***						**-15.88***
							(7.87)						(8.03)
Institutional quality index	49.67**	59.94**	61.38**	48.98**	55.45**	35.25	43.36*	51.16**	45.46**	49.46**	59.98**	25.76	35.86
	(20.53)	(23.65)	(23.03)	(19.21)	(21.77)	(22.00)	(24.64)	(21.64)	(21.13)	(22.31)	(24.39)	(20.02)	(23.37)
Credit bureaus	-9.48	-7.18	-7.22	-5.78	-5.79	-9.76	-8.44	-10.87	-12.06*	-5.95	-6.20	-13.88*	-12.22
	(7.23)	(6.67)	(6.87)	(6.41)	(8.86)	(7.63)	(7.36)	(7.65)	(6.85)	(7.69)	(10.53)	(7.86)	(7.84)
Private credit to GDP (initial)	-0.20***	-0.19**	-0.20***	-0.21***	-0.21***	-0.18***	-0.17***	-0.17***	-0.18***	-0.22***	-0.22***	-0.14***	-0.14***
	(0.06)	(0.07)	(0.07)	(0.05)	(0.05)	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)	(0.05)	(0.05)
Observations	36	33	33	36	34	32	30	33	33	35	33	31	29
R-squared	0.31	0.26	0.26	0.27	0.28	0.31	0.27	0.28	0.29	0.37	0.36	0.37	0.38

Results IV: Crisis Resilience

- If policy measures reduce vulnerabilities, then downturn in event of crisis should be smaller (Table 7)
- Cross-section (change in growth 2008-09 relative to average 2003-07)
  - Capital controls, FX-related and other prudential regulations associated with smaller growth decline
  - Capital controls, other prudential retain significance when both included
  - Growth in trading partners, terms of traded and institutioanl quality index added as additional regressors;
  - Moving from 25^{th} to 75^{th} percentile of economy-wide controls or FX-prudential lowers growth decline by 3-4 percentage points respectively.
- Panel (1995-2008)
  - Capital controls associated with smaller growth decline in past crises

Table 7. Policy Measures and Crisis Resilience: Global Financial Crisis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Kcont	**5.15****							**5.98****	**7.12*****	2.34	**5.43***	**4.20***	3.66
	(2.30)							(2.31)	(2.52)	(2.65)	(3.14)	(2.38)	(2.65)
Fincont1		0.13						-2.91					
		(3.27)						(3.12)					
Fincont2			1.20						-4.11				
			(3.07)						(3.38)				
Fxreg1				**5.28****						3.97			
				(2.16)						(2.47)			
Fxreg2					4.23						-0.33		
					(2.78)						(3.10)		
Domreg1						**4.65***						**4.73***	
						(2.72)						(2.70)	
Domreg2							3.12						2.75
							(2.53)						(2.49)
Terms of trade change	0.13	0.16	0.15	0.13	0.14	0.14	0.08	0.18	0.17	0.12	0.13	0.12	0.07
	(0.10)	(0.12)	(0.11)	(0.088)	(0.10)	(0.10)	(0.10)	(0.12)	(0.11)	(0.09)	(0.10)	(0.09)	(0.11)
Growth in trading partners	1.10	2.18*	2.13*	0.65	0.62	0.17	0.10	2.15**	2.22**	0.82	1.13	0.63*	0.52
	(0.74)	(1.09)	(1.11)	(0.78)	(0.83)	(0.33)	(0.38)	(0.85)	(0.86)	(0.77)	(0.83)	(0.36)	(0.37)
Institutional quality index	-4.91	-6.88	-6.69	-8.30	-7.97	-2.98	-7.70	-4.85	-2.75	-6.53	-5.03	1.61	-2.88
	(8.67)	(10.33)	(10.04)	(8.12)	(9.53)	(8.49)	(9.87)	(9.16)	(8.78)	(8.41)	(8.88)	(7.56)	(8.98)
Observations	40	36	36	39	39	33	31	36	36	39	39	33	31
R-squared	0.24	0.19	0.19	0.27	0.18	0.15	0.09	0.29	0.29	0.29	0.24	0.24	0.16

Robustness

- Numerous robustness tests …
  - Additional regressors to capture political stability, stock market capitalization, overall regulatory quality, financial market development and soundness of financial system
  - For crisis resilience regressions also include reserves, and monetary and fiscal policy stance over the crisis
  - Alternative indices (use first principal component of sub-indices instead of averages)
  - Also use alternative indices for capital account openess (e.g. Chinn and Ito 2008 or Quinn and Toyoda 2008).

Robustness

- Numerous robustness tests …
  - Endogeneity concerns
    - Countries may strengthen restrictions in response to surge in inflows
    - Presumably less of a problem for composition of flows
    - Use Bilateral Investment Treaty with US (which generally prohibit use of capital controls), and EU membership as instruments for capital controls
  - Country sample

…key results remain robust

Conclusion

- We develop new indices of financial sector capital controls, FX, and domestic prudential measures
- We find that controls on inflows and FX-related measures are substitutes in terms of shifting external liability structure away from debt, and discouraging FX-denominated bank lending; Both can complement other prudential measures which slowdown credit booms

	Outcome			
	Debt Liabilities (% of Ext. Liabilities)	FX Credit (% of Total Domestic Credit)	Credit Booms	Growth Resilience Global Financial Crisis
Capital Controls	✓	✓	X	✓
FX Prudential	✓	✓	X	✓
Other Prudential	X	X	✓	✓

Conclusion

- Effect of controls on inflows and FX-prudential measures on composition of flows/credit but not volume is the ideal outcome from a prudential perspective
  - Result should be interpreted with usual econometric caveats, (and recognizing the scope for evasion and migration to unregulated corners of the financial system)
  - Future research should consider the costs of these measures to inform a cost-benefit analysis of the alternative policies