International Financial Integration and Funding Risks: Bank-Level Evidence from Latin America

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Workshop on Banking and Institutions

Helsinki, May 15, 2017

Motivation

- International financial liberalization typically increases the propensity for financial crises (e.g., Gourinchas and Obstfeld, 2012; Catão and Milesi-Ferretti, 2014)
- However, the micro-level evidence on this relationship is scarce: What drives these findings?
- Few papers model the effects of liberalization and cross-border banking on the asset side of banks (e.g., Bruno and Shin, 2015; Hoffmann and Stewen, 2016; Dinger and te Kaat, 2016)
- But how does financial liberalization affect the funding structure of banks?

Approach

- We construct a bank-level panel dataset for more than 700 banks across Latin America during 1995-2013
- We apply dynamic panel data models to explore the effects of international integration on banks' stable funding ratios (defined as equity and long-term liabilities over total assets)

Theory

- Following financial liberalization, foreign investors can take positions in domestic banks
- Therefore, financial liberalization increases the distance between banks and investors, aggravating problems related to asymmetric information
- The cost of equity stays high, whereas short-term debt gets cheaper (e.g., Myers and Majluf, 1984)
- Empirical evidence is consistent with this shift in the relative costs of funding following capital account liberalization (e.g., Bekaert and Harvey, 2000)

Key Results

- International financial integration reduces the stable funding ratios of banks
- The size of this effect is contingent on two characteristics:
  - the interest rate in main financial centers
  - the degree of asymmetric information
- Large banks substitute stable funding with interbank loans; small banks increase the share of retail deposits (substitution effect)
- During crises, interbank loans and retail deposits prove to be volatile (given weak institutions)

Data

- Bank-level data for 17 Latin American countries, observed from 1995 - 2013 (Bankscope) => approx. 9,000 bank-year observations
- We match this data with a new de-jure index of capital account liberalization (Fernández et al., 2015a)
- Macroeconomic covariates mostly extracted from the World Economic Outlook Database (IMF)
- Latin America is an ideal laboratory for identification:
  - Most countries liberalized their capital accounts in the 1990s and early 2000s
  - Liberalization trend exogenously driven

The Exogeneity of Liberalization

- Most countries entered IMF-supported programs that promoted liberalization
- Especially during financial crises, the partisanship of the government determines degree of openness (Brooks, 2004)
- This is in line with Fernández et al. (2015b), who show that capital controls do not correlate with business cycle fluctuations

The Exogeneity of Liberalization

	(1) LIBERALIZATION	(2) DUMMY_LIBERALIZATION	(3) DUMMY_DELIBERALIZATION
OUTPUTGAP (t-1)	0.006	0.008	-0.021
	(0.46)	(0.54)	(-0.98)
CAPITALREQUIREMENT (t-1)	0.027	0.069	-0.016
	(0.93)	(1.70)	(-0.30)
INFLATION (t-1)	-0.001	0.001	-0.004
	(-0.42)	(0.37)	(-0.66)
REALEXCHANGERATE (t-1)	0.001	-0.005	0.001
	(0.34)	(-1.61)	(0.16)
SPREAD (t-1)	-0.003	0.002	-0.002
	(-1.22)	(1.12)	(-0.47)
Year FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Obs	221	221	221
R-squared (within)	0.265	0.235	0.321

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Methodology

$$STABLEFUNDING_{i,t} = \alpha_i + \gamma * STABLEFUNDING_{i,t-1} + \beta * LIBERALIZATION_{j,t} + \theta * X_{i,j,t} + \epsilon_{i,t}$$

- *STABLEFUNDING* : equity and liabilities with maturity above one year
- *LIBERALIZATION* : de-jure index of capital account openness (Fernández et al., 2015a), measuring inflow restrictions
- X : includes several macroeconomic and bank-level controls
- Blundell-Bond estimation as in Faulkender et al. (2012)
- For the sake of robustness, we also implement the Anderson-Hsiao estimator and IV regressions

Main Specification

	Blundell-Bond		Blundell-Bond / IV		Anderson-Hsiao	
	(1) STABLEFUNDING	(2) STABLEFUNDING	(3) STABLEFUNDING	(4) STABLEFUNDING	(5) STABLEFUNDING	(6) STABLEFUNDING
STABLEFUNDING (t-1)	0.661***	0.679***	0.653***	0.669***	0.421	0.420
	(14.45)	(16.86)	(13.59)	(16.18)	(1.46)	(1.46)
LIBERALIZATION	-1.408*	-1.619**	-1.840*	-1.729**	-2.141**	-2.103**
	(-1.67)	(-2.49)	(-1.78)	(-2.51)	(-2.56)	(-2.44)
Bank-Level Controls	YES	YES	YES	YES	YES	YES
Macro Controls	NO	YES	NO	YES	NO	YES
Obs	6660	6646	6660	6646	2865	2865
p (Hansen statistic)	0.21	0.10	0.50	0.06	0.32	0.31

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

- International financial integration reduces stable funding ratios of banks
- A 1-sd increase in liberalization is associated with a decrease in stable funding ratios on impact by 0.5 - 0.7 pp and by 1.4 - 1.7 pp in the long-run
- Low reductions in bank capital ratios can already increase probability of distress significantly (ECB, 2015)

The Interaction with US Monetary Policy

			Financial Crisis		*no Financial Crisis*	
	low US rate	**high US rate**	**low US rate**	**high US rate**	**low US rate**	**high US rate**
	(1) STABLEFUNDING	(2) STABLEFUNDING	(3) STABLEFUNDING	(4) STABLEFUNDING	(5) STABLEFUNDING	(6) STABLEFUNDING
STABLEFUNDING (t-1)	0.716***	0.543***	0.741***	0.468***	0.478***	0.616***
	(13.56)	(9.56)	(15.56)	(5.67)	(3.17)	(10.42)
LIBERALIZATION	-1.427*	-1.487	-0.450	-1.168	-2.693**	-1.131
	(-1.70)	(-1.40)	(-0.43)	(-0.63)	(-2.02)	(-0.90)
Bank-Level Controls	YES	YES	YES	YES	YES	YES
Macro Controls	YES	YES	YES	YES	YES	YES
Obs	3737	2909	2920	859	817	2050

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

- Our analysis is based on the presumption that liberalization changes the costs of funding. By this, it should interact with money market rates in world financial centers
- Indeed, effect of liberalization most pronounced during episodes of low US interest rates (long-run effect: 1.6 vs 1.0)
- Even when US rates are low, an opening of the capital account has no effect during financial distress, as foreign investors do not lend to Latin American banks

Sensitivity Analysis

- We make use of other de-jure and de-facto liberalization measures
- We drop some of the time periods from the sample (with lower Bankscope coverage)
- We restrict the sample only to commercial banks

=> Results are very robust to all of these robustness checks

Distance and Opaqueness

- Asymmetric information changes the relative costs of alternative types of funding
- The degree of information asymmetries is likely to be contingent on (i) the opaqueness (risk) of bank balance sheets and (ii) the distance between lenders and borrowers
- We interact *LIBERALIZATION* with the banks' shares of impaired loans and the weighted average distance between the banking systems and their counterparties (on the basis of the BIS Consolidated Banking Statistics)

Distance and Opaqueness

	(1) STABLEFUNDING	(2) STABLEFUNDING	(3) STABLEFUNDING	(4) STABLEFUNDING
STABLEFUNDING (t-1)	0.654***	0.653***	0.552***	0.630***
	(13.25)	(14.75)	(8.52)	(11.72)
LIBERALIZATION	-2.157**	-2.027***	20.308***	7.004
	(-2.35)	(-2.67)	(2.82)	(1.30)
LIBERALIZATION × RISK	-0.045*	-0.041*		
	(-1.83)	(-1.67)		
LIBERALIZATION × DISTANCE			-2.034***	-0.722
			(-2.87)	(-1.37)
RISK	0.031	0.028		
	(1.57)	(1.49)		
DISTANCE			1.976***	0.908*
			(3.25)	(1.85)
Bank-Level Controls	YES	YES	YES	YES
Macroeconomic Controls	NO	YES	NO	YES
Obs	5111	5111	2863	2849

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

- 1-sd increase in liberalization leads to 0.57 pp lower stable funding ratios of banks at the 25th percentile and to 0.75 pp lower ratios at the 75th percentile of the distribution of opaqueness
- Stronger effect of liberalization in Uruguay than in Mexico/Guatemala

Further Results

- No different effect of liberalization on the stable funding ratio of small vs. large banks
- Large banks replace stable funding with interbank borrowing
- Small banks, in contrast, raise their shares of retail deposits
- In countries with weak institutions, most of the retail deposits are withdrawn during crises, justifying our definition of stable funding ratios
- Overall, this paper identifies a more unstable funding structure of small and large banks

Conclusion

- International financial integration reduces the average capital ratios of banks and shortens the debt maturities
- This effect is contingent on (i) money market interest rates in the US and (ii) the degree of asymmetric information
- Large banks have inflows of interbank funding; small banks benefit indirectly through increases in retail deposits
- Both types of funding are volatile in Latin American economies with weak institutions
- All in all, financial liberalization can increase the risks of banking sector instability not only through risky bank lending activities, but also through changes in the funding structure of banks

Baseline Results with Controls

	Blundell-Bond		Blundell-Bond / IV		Anderson-Hsiao	
	(1) STABLEFUNDING	(2) STABLEFUNDING	(3) STABLEFUNDING	(4) STABLEFUNDING	(5) STABLEFUNDING	(6) STABLEFUNDING
STABLEFUNDING (t-1)	0.661***	0.679***	0.653***	0.669***	0.421	0.420
	(14.45)	(16.86)	(13.59)	(16.18)	(1.46)	(1.46)
LIBERALIZATION	-1.408*	-1.619**	-1.840*	-1.729**	-2.141**	-2.103**
	(-1.67)	(-2.49)	(-1.78)	(-2.51)	(-2.56)	(-2.44)
SIZE	0.267	-0.162	-0.026	-0.202	-6.197***	-6.609***
	(0.98)	(-0.73)	(-0.09)	(-0.85)	(-5.25)	(-4.72)
PROFITABILITY	0.114	0.106	0.183*	0.119	0.160	0.161
	(1.14)	(1.24)	(1.74)	(1.36)	(1.48)	(1.45)
LIQUIDITY	0.014	-0.000	0.011	0.004	-0.045	-0.039
	(0.63)	(-0.02)	(0.46)	(0.17)	(-0.62)	(-0.54)
NONINTERESTINCOME	-0.005	-0.001	0.000	-0.003	-0.000	0.000
	(-0.56)	(-0.12)	(0.04)	(-0.33)	(-0.00)	(0.00)
PERCAPITAGDP		0.129**		0.148**		0.314
		(2.17)		(2.41)		(0.84)
CAPITALREQUIREMENT		0.262		0.160		-0.267
		(1.13)		(0.64)		(-0.57)
INFLATION		-0.059***		-0.054***		0.053
		(-3.06)		(-2.63)		(1.38)
REALEXCHANGERATE		-0.012*		-0.013*		0.023
		(-1.78)		(-1.80)		(1.03)
Obs	6660	6646	6660	6646	2865	2865
p (Hansen statistic)	0.21	0.10	0.50	0.06	0.32	0.31

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Bank Size Effects

	(1) STABLEFUNDING	(2) STABLEFUNDING	(3) RETAIL	(4) RETAIL	(5) INTERBANK	(6) INTERBANK
STABLEFUNDING (t-1)	0.626***	0.654***				
	(13.53)	(16.07)				
RETAIL (t-1)			0.718***	0.735***		
			(19.51)	(23.45)		
INTERBANK (t-1)					0.651***	0.644***
					(19.35)	(21.90)
LIBERALIZATION	-1.982*	-1.923**	4.380***	4.795***	-0.867	-1.541**
	(-1.87)	(-2.34)	(3.22)	(4.74)	(-1.06)	(-2.44)
DUMMY_LARGE × LIBERALIZATION	1.190	0.969	-3.818**	-5.644***	2.059*	3.630***
	(0.65)	(0.56)	(-2.02)	(-2.94)	(1.85)	(3.34)
DUMMY_LARGE	0.374	2.069	5.465**	4.057*	0.819	-1.833
	(0.14)	(0.88)	(2.22)	(1.72)	(0.64)	(-1.45)
Bank-Level Controls	YES	YES	YES	YES	YES	YES
Macroeconomic Controls	NO	YES	NO	YES	NO	YES
Obs	6190	6177	8389	8292	6629	6531

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The Crisis Effects

	with a deposit insurance and weak institutions		
	STABLEFUNDING	RETAIL	INTERBANK
STABLEFUNDING (t-1)	0.709***		
	(13.88)		
RETAIL (t-1)		0.768***	
		(19.50)	
INTERBANK (t-1)			0.703***
			(13.17)
LIBERALIZATION	-6.002**	7.420***	-1.072
	(-2.42)	(3.26)	(-0.70)
CRISIS × LIBERALIZATION	4.949*	-5.275**	-1.439
	(1.86)	(-2.48)	(-0.66)
CRISIS	-4.745**	3.826**	1.079
	(-2.09)	(2.06)	(0.58)
Bank-Level Controls	YES	YES	YES
Macroeconomic Controls	YES	YES	YES
Obs	1621	2097	1653

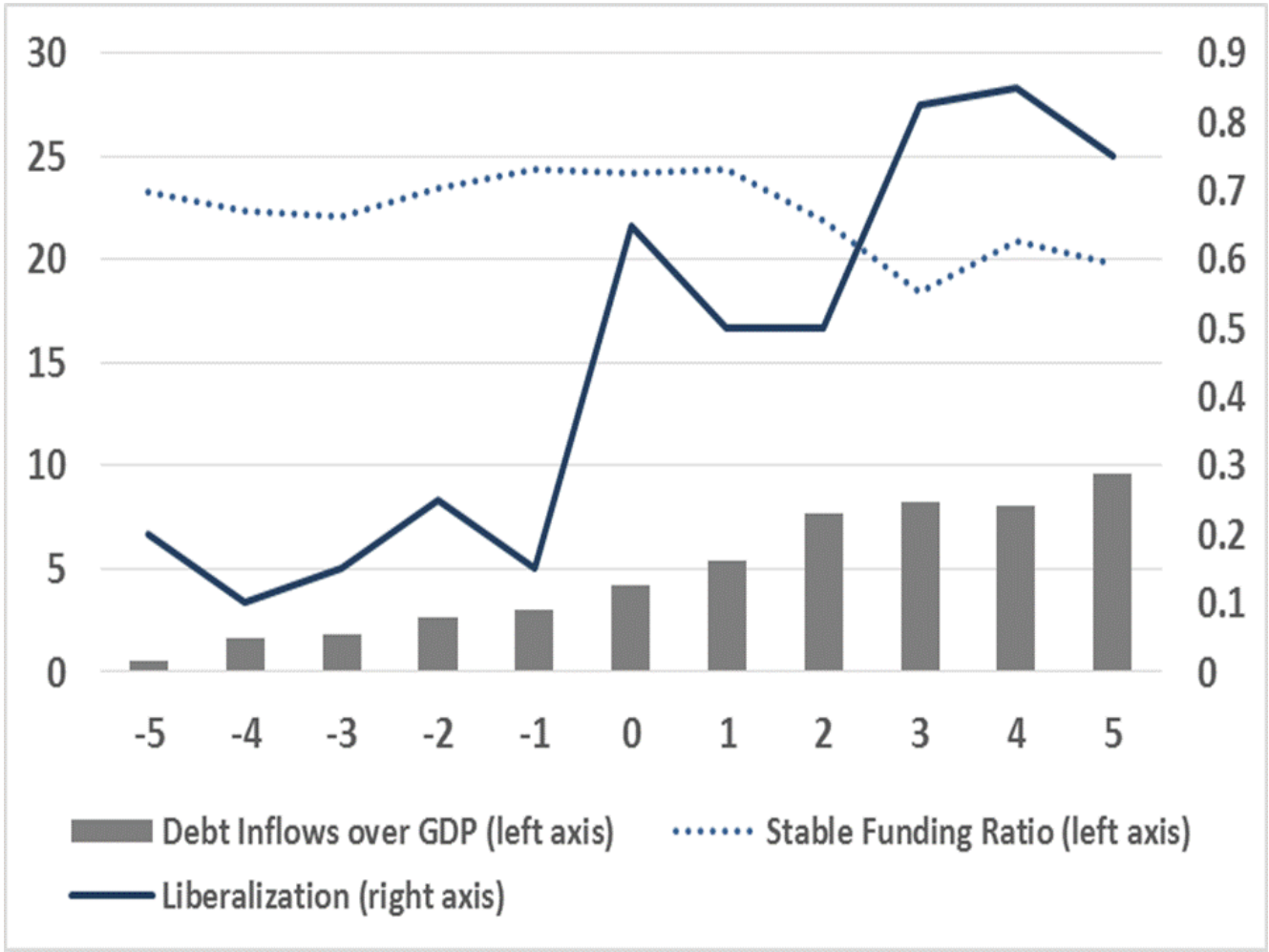
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The Crisis Effects

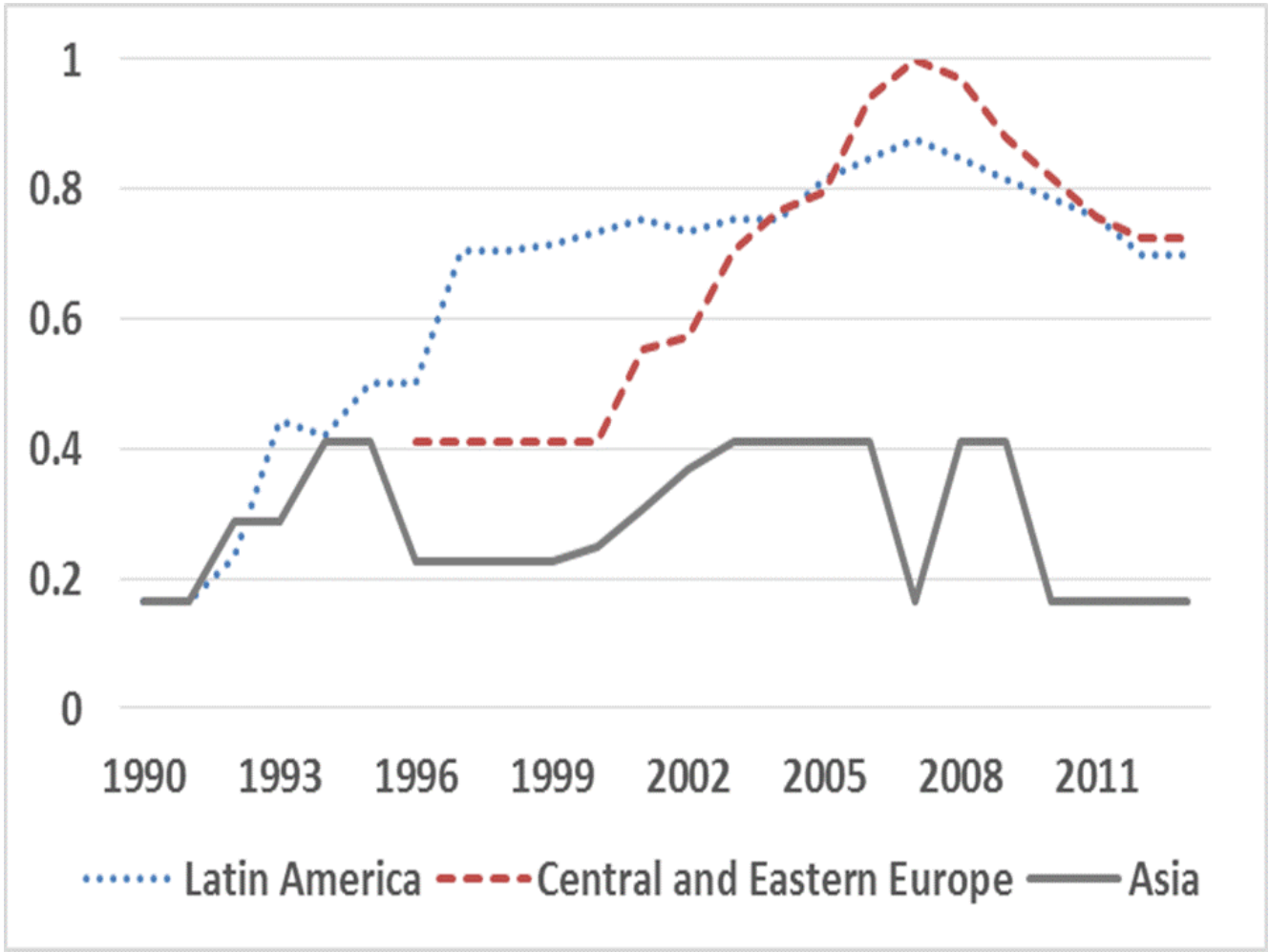
	without a deposit insurance			with a deposit insurance and good institutions			with a deposit insurance and weak institutions		
	(1) STABLEFUNDING	(2) RETAIL	(3) INTERBANK	(4) STABLEFUNDING	(5) RETAIL	(6) INTERBANK	(7) STABLEFUNDING	(8) RETAIL	(9) INTERBANK
STABLEFUNDING (t-1)	0.500***			0.721***			0.709***		
	(7.81)			(18.71)			(13.88)		
RETAIL (t-1)		0.427***			0.773***			0.768***	
		(8.48)			(24.15)			(19.50)	
INTERBANK (t-1)			0.511***			0.676***			0.703***
			(10.04)			(17.73)			(13.17)
LIBERALIZATION	-7.510*	-2.803	23.820***	-0.083	1.088	0.175	-6.002**	7.420***	-1.072
	(-1.75)	(-0.40)	(3.03)	(-0.13)	(1.49)	(0.34)	(-2.42)	(3.26)	(-0.70)
CRISIS × LIBERALIZATION	11.841	-5.627	-39.440***	1.415	-1.035	-0.412	4.949*	-5.275**	-1.439
	(1.46)	(-0.64)	(-4.36)	(1.29)	(-0.86)	(-0.54)	(1.86)	(-2.48)	(-0.66)
CRISIS	-10.918	6.845	33.254***	0.168	-0.338	0.575	-4.745**	3.826**	1.079
	(-1.52)	(0.86)	(4.15)	(0.26)	(-0.42)	(1.06)	(-2.09)	(2.06)	(0.58)
Bank-Level Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Macroeconomic Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Obs	1355	2179	1338	3670	4530	4006	1621	2097	1653

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Stylized Facts



Liberalization Across EM Regions



Summary Statistics

Country	1995	2000	2005	2010	2013
Argentina	62	99	80	79	56
Bolivia	6	12	14	15	12
Brazil	99	138	114	131	100
Chile	34	29	32	32	36
Colombia	28	33	29	62	72
Costa Rica	12	52	70	69	61
Dom. Republic	7	31	42	58	50
Ecuador	4	25	24	22	24
El Salvador	7	16	16	19	20
Guatemala	21	30	26	28	29
Mexico	27	46	53	90	132
Nicaragua	8	10	10	12	11
Panama	53	66	63	61	43
Paraguay	10	21	13	14	16
Peru	16	20	22	28	25
Uruguay	4	39	23	24	17
Venezuela	12	62	36	22	32
$\sum$	410	729	667	766	736

Summary Statistics

	Obs.	Mean	SD	10th	Median	90th
STABLEFUNDING	8982	27.15	22.33	8.77	19.15	62.69
LIBERALIZATION	8981	0.66	0.32	0.15	0.80	1.00
SIZE	8982	6.21	2.13	3.50	6.17	8.97
PROFITABILITY	8950	1.81	4.86	-0.36	1.50	5.12
LIQUIDITY	8849	47.24	22.87	19.17	44.06	81.13
NONINTERESTINCOME	8849	30.59	42.74	1.29	25.82	70.48
PERCAPITAGDP	8981	10.79	4.11	5.77	10.53	16.52
CAPITALREQUIREMENT	8981	9.71	1.43	8.00	10.00	11.00
INFLATION	8895	8.64	11.30	1.48	5.66	16.21
REALEXCHANGERATE	8981	107.21	29.69	81.76	102.73	125.30