Measuring Monetary Policy Spillovers using Aggregate Data: Bank Lending, Capital Controls, Macroprudential

Menzie Chinn
UW Madison and NBER
Hiro Ito
Portland State Univ.

The Transmission of Macroprudential and Monetary Policies across Borders
IMF/IBRN, Washington, DC
April 19, 2017

Introduction

- Increasing banking links call for investigation of how monetary policy spills over borders
- At the same time, macro prudential policies have become more pervasive
- A re-assessment is called for
- One route is to use micro banking data
- A complementary approach is to see what aggregate data can tell us
- In contrast to previous studies, impact across borders instead of across countries

Outline

- Methodology
- Empirics using standard data
- Using new financial development measures
- Incorporating measures of macro prudential measures
- Conclusions

Two-Step Approach to Measuring Linkages

Step 1: Estimate sensitivities

$$R_{it}^{F} = \alpha_{Fit} + \sum_{g=1}^{G} \beta_{Fit}^{G} Z_{it}^{G} + \sum_{c=1}^{C} \gamma_{Fit}^{C} X_{it}^{C} + \phi_{Fit} Y_{it} + \varepsilon_{it}. \qquad (1)$$

Step 2: Relate sensitivities to macro variables

$$\hat{\gamma}_{Fit}^{C} = \theta_0 + \theta_1 OMP_{Fit} + \theta_2 MC_{Fit} + \theta_3 LINK_{Fit} + \theta_4 INST_{Fit} + \theta_5 CRISIS_{Fit} + u_{Fit}. \qquad (2)$$

Step 1 – estimate γ's

$$R_{it}^{F} = \alpha_{Fit} + \sum_{g=1}^{G} \beta_{Fit}^{G} Z_{it}^{G} + \sum_{c=1}^{C} \gamma_{Fit}^{C} X_{it}^{C} + \phi_{Fit} Y_{it} + \varepsilon_{it}. \qquad (1)$$

- R^F : a return in local country

  Policy ST interest rates, sovereign bond term spread, changes in stock market price indexes, and changes in the REER
- X^c : a vector of corresponding returns of the "center economies"
- Z^G : global factors
  - **Real**: PC of the U.S., ECB, and BOJ policy rates, oil, commodity
  - **Financial**: VIX, Ted-spread
- Y : local factor (y/y IP growth)
- Rolling estimation w/ 36-month windows, each of 100 countries
- Model w/ and w/out China as one of the CEs

Step 2 – Relate γ's to Policies, Conditions, Institutions

$$\hat{\gamma}^{C}_{Fit} = \theta_0 + \theta_1 OMP_{Fit} + \theta_2 MC_{Fit} + \theta_3 LINK_{Fit} + \theta_4 INST_{Fit} + \theta_5 CRISIS_{Fit} + u_{Fit}. \quad (2)$$

- **OMP**: Open Macro Policies – Exchange rate stability, financial openness (Chinn-Ito), Int'l reserve accumulation
- **MC**: Macro conditions – infl. volatility, CA balances, public finances (budget balance or gov't gross debt)
- **LINK**: Import Demand by CEs, bank lending by CEs, FDI provided by CEs, degree of trade competition wrt CEs
- **INST**: LEGAL (PC of BQ, LAO, Anti-corrupt), Fin. Dev., MacroPru
- **CRISIS**: currency and banking
- 1986-2012, 3-yr panels, about 60 countries
- (i x 3 x t) γ's

Results from Aizenman, Chinn, Ito (2017)

- Financial development is measured using private credit to GDP
- Weight of USD in currency basket increases linkages
- Share of USD debt in total matters

	Link 1: ST-rate (CEs) → ST-rate (PHs)		Link 2:ST-rate (CEs) → REER (PHs)		Link 3: REER (CEs) → REER (PHs)		Link 4: REER (CEs) → EMP (PHs)	
	LDC	EMG	LDC	EMG	LDC	EMG	LDC	EMG
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exch. Rate Stability	0.087	0.200	2.486	2.990	0.779	0.862	-8.357	-7.307
	(0.265)	(0.294)	(0.648)***	(0.748)***	(0.072)***	(0.087)***	(2.261)***	(2.735)***
Financial Openness	0.461	0.531	0.282	0.648	0.093	-0.029	-4.564	-4.810
	(0.228)**	(0.257)**	(0.546)	(0.657)	(0.060)	(0.076)	(1.833)**	(2.280)**
IR Holding	-0.898	-0.788	-0.163	-0.252	0.806	0.610	0.912	2.192
	(0.680)	(0.833)	(1.904)	(2.205)	(0.210)***	(0.255)**	(5.904)	(7.793)
CA balance (%)	0.393	-0.539	-0.249	0.477	-0.165	0.020	-10.936	-10.536
	(0.959)	(1.238)	(2.766)	(3.269)	(0.306)	(0.378)	(7.621)	(11.044)
Gross debt (%)	0.177	0.200	0.110	0.668	-0.057	-0.103	1.652	0.770
	(0.121)	(0.126)	(0.334)	(0.379)*	(0.037)	(0.044)**	(1.041)	(1.201)
Inflation Vol.	1.006	0.829	-2.111	-3.462	-0.191	-0.367	4.210	2.304
	(1.713)	(1.591)	(3.677)	(3.803)	(0.406)	(0.440)	(13.842)	(14.195)
Trade Comp.	-0.442	-0.527	-2.285	-3.033	-0.806	-0.556	13.508	3.740
	(0.927)	(1.005)	(2.336)	(2.645)	(0.258)***	(0.306)*	(7.630)*	(9.036)
Trade demand	1.627	1.728	2.373	2.943	1.294	1.490	0.896	3.277
	(1.117)	(1.146)	(2.420)	(2.652)	(0.267)***	(0.307)***	(8.967)	(9.756)
Bank Lending	-0.157	0.133	2.860	1.740	-0.090	-0.275	-15.949	-10.734
	(0.452)	(0.590)	(1.508)*	(1.689)	(0.167)	(0.195)	(5.000)***	(5.369)**
Fin. Dev.	0.078	0.071	-0.022	0.065	-0.059	-0.040	-0.389	-0.328
	(0.038)**	(0.040)*	(0.099)	(0.109)	(0.011)***	(0.013)***	(0.336)	(0.384)
N	809	590	641	499	641	499	782	581
Adj. R2	0.01	0.02	0.03	0.05	0.27	0.27	0.06	0.04
# of countries	63	39	46	32	46	32	61	38
years	1989-2014	1989-2014	1992-2014	1992-2014	1992-2014	1992-2014	1989-2014	1989-2014

	Link 1: ST-rate (CEs) → ST-rate (PHs)		Link 2:ST-rate (CEs) → REER (PHs)		Link 3: REER (CEs) → REER (PHs)		Link 4: REER (CEs) → EMP (PHs)	
	LDC	EMG	LDC	EMG	LDC	EMG	LDC	EMG
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exch. Rate Stability	0.087	0.200	2.486	2.990	0.779	0.862	-8.357	-7.307
	(0.265)	(0.294)	(0.648)***	(0.748)***	(0.072)***	(0.087)***	(2.261)***	(2.735)***
Financial Openness	0.461	0.531	0.282	0.648	0.093	-0.029	-4.564	-4.810
	(0.228)**	(0.257)**	(0.546)	(0.657)	(0.060)	(0.076)	(1.833)**	(2.280)**
IR Holding	-0.898	-0.788	-0.163	-0.252	0.806	0.610	0.912	2.192
	(0.680)	(0.833)	(1.904)	(2.205)	(0.210)***	(0.255)**	(5.904)	(7.793)
CA balance (%)	0.393	-0.539	-0.249	0.477	-0.165	0.020	-10.936	-10.536
	(0.959)	(1.238)	(2.766)	(3.269)	(0.306)	(0.378)	(7.621)	(11.044)
Gross debt (%)	0.177	0.200	0.110	0.668	-0.057	-0.103	1.652	0.770
	(0.121)	(0.126)	(0.334)	(0.379)*	(0.037)	(0.044)**	(1.041)	(1.201)
Inflation Vol.	1.006	0.829	-2.111	-3.462	-0.191	-0.367	4.210	2.304
	(1.713)	(1.591)	(3.677)	(3.803)	(0.406)	(0.440)	(13.842)	(14.195)
Trade Comp.	-0.442	-0.527	-2.285	-3.033	-0.806	-0.556	13.508	3.740
	(0.927)	(1.005)	(2.336)	(2.645)	(0.258)***	(0.306)*	(7.630)*	(9.036)
Trade demand	1.627	1.728	2.373	2.943	1.294	1.490	0.896	3.277
	(1.117)	(1.146)	(2.420)	(2.652)	(0.267)***	(0.307)***	(8.967)	(9.756)
Bank Lending	-0.157	0.133	2.860	1.740	-0.090	-0.275	-15.949	-10.734
	(0.452)	(0.590)	(1.508)*	(1.689)	(0.167)	(0.195)	(5.000)***	(5.369)**
Fin. Dev.	0.078	0.071	-0.022	0.065	-0.059	-0.040	-0.389	-0.328
	(0.038)**	(0.040)*	(0.099)	(0.109)	(0.011)***	(0.013)***	(0.336)	(0.384)
N	809	590	641	499	641	499	782	581
Adj. R2	0.01	0.02	0.03	0.05	0.27	0.27	0.06	0.04
# of countries	63	39	46	32	46	32	61	38
years	1989-2014	1989-2014	1992-2014	1992-2014	1992-2014	1992-2014	1989-2014	1989-2014

Financial Development: Markets and Institutions

- Private credit to GDP is a blunt measure
- Svirydzenka (2016) index of “financial development” is the first principal component of two sub-indexes: development of financial markets (FM) and development of financial institutions (FI).
- Each of FM and FI is the first principal components of three variables: “depth,” “access,” and “efficiency,” respectively, i.e., there are FM-depth, FM-access, FM-efficiency, and FI-depth, FI-access, FI-efficiency
- Each of the six sub-indexes is the first principal components of the component variables.

Financial Development Index

Table 1. Data Sources

CATEGORY	INDICATOR	DATA SOURCE
Financial Institutions		
Depth	Private-sector credit to GDP	FinStats 2015
	Pension fund assets to GDP	FinStats 2015
	Mutual fund assets to GDP	FinStats 2015
	Insurance premiums, life and non-life to GDP	FinStats 2015
Access	Bank branches per 100,000 adults	FinStats 2015
	ATMs per 100,000 adults	IMF Financial Access Survey
Efficiency	Net interest margin	FinStats 2015
	Lending-deposits spread	FinStats 2015
	Non-interest income to total income	FinStats 2015
	Overhead costs to total assets	FinStats 2015
	Return on assets	FinStats 2015
	Return on equity	FinStats 2015
Financial Markets		
Depth	Stock market capitalization to GDP	FinStats 2015
	Stocks traded to GDP	FinStats 2015
	International debt securities of government to GDP	BIS debt securities database
	Total debt securities of financial corporations to GDP	Dealogic corporate debt database
	Total debt securities of nonfinancial corporations to GDP	Dealogic corporate debt database
Access	Percent of market capitalization outside of top 10 largest companies	FinStats 2015
	Total number of issuers of debt (domestic and external, nonfinancial and financial corporations)	FinStats 2015
Efficiency	Stock market turnover ratio (stocks traded to capitalization)	FinStats 2015

Table 1.1: Factors Affecting the Five Links, 1989-2014

	Link 1: ST-rate (CEs) → ST-rate (PHs)		Link 2:ST-rate (CEs) → REER (PHs)		Link 3: REER (CEs) → REER (PHs)		Link 4: REER (CEs) → EMP (PHs)		Link 5: REER (CEs) → Stock Market (PHs)	
	LDC	EMG	LDC	EMG	LDC	EMG	LDC	EMG	LDC	EMG
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Exch. Rate Stability	-0.013	0.359	1.740	2.620	0.391	0.600	-6.924	-5.924	0.400	0.489
	(0.181)	(0.296)	(0.565)***	(0.759)***	(0.063)***	(0.089)***	(1.607)***	(2.692)**	(0.235)*	(0.290)*
Financial Openness	0.272	0.463	0.347	0.905	0.084	0.038	-3.986	-3.557	0.037	0.041
	(0.154)*	(0.237)*	(0.458)	(0.588)	(0.051)*	(0.069)	(1.345)***	(2.102)*	(0.181)	(0.216)
IR Holding	-0.005	-0.897	-0.091	-0.222	0.319	0.503	-1.981	-4.609	-0.657	-1.021
	(0.414)	(0.777)	(1.239)	(1.984)	(0.137)**	(0.233)**	(3.821)	(7.156)	(0.544)	(0.716)
CA balance (%)	-0.204	-0.706	0.922	-0.069	0.559	0.297	-9.060	-5.289	-2.252	-2.432
	(0.667)	(1.180)	(2.324)	(3.065)	(0.257)**	(0.360)	(5.833)	(10.488)	(0.683)***	(1.111)**
Gross debt (%)	0.114	0.206	0.186	0.803	-0.058	-0.101	0.969	0.857	-0.260	-0.310
	(0.082)	(0.121)*	(0.276)	(0.354)**	(0.031)*	(0.042)**	(0.763)	(1.156)	(0.102)**	(0.121)**
Inflation Vol.	1.487	1.178	-1.411	-1.375	0.432	-0.036	10.261	2.463	-3.502	-6.494
	(1.349)	(1.608)	(3.564)	(3.767)	(0.395)	(0.442)	(11.906)	(14.455)	(2.802)	(3.060)**
Trade Comp.	-0.664	-0.058	-1.653	-2.753	-0.006	-0.229	7.866	5.456	0.464	0.677
	(0.664)	(0.959)	(1.906)	(2.442)	(0.211)	(0.287)	(5.888)	(8.749)	(0.700)	(0.896)
Trade demand	1.533	1.604	2.968	3.271	1.203	1.458	4.191	7.098	-0.677	-0.381
	(0.855)*	(1.107)	(2.240)	(2.514)	(0.248)***	(0.295)***	(7.513)	(9.443)	(0.849)	(0.946)
Bank Lending	0.171	0.402	3.152	1.977	-0.151	-0.371	-16.743	-13.040	0.497	0.546
	(0.367)	(0.564)	(1.335)**	(1.494)	(0.148)	(0.175)**	(4.194)***	(4.970)***	(0.412)	(0.463)
Fin. Dev.	-0.056	0.536	-0.388	1.087	-0.916	-0.633	5.558	1.755	0.434	0.703
	(0.323)	(0.490)	(0.962)	(1.271)	(0.107)***	(0.149)***	(2.988)*	(4.525)	(0.408)	(0.470)
Currency crisis	0.537	0.440	-1.316	-1.448	-0.087	-0.111	4.381	2.108	-0.006	0.117
	(0.199)***	(0.250)*	(0.566)**	(0.644)**	(0.063)	(0.076)	(1.776)**	(2.237)	(0.198)	(0.222)
Banking crisis	-0.306	-0.390	0.963	0.931	0.001	-0.100	2.566	3.956	-0.533	-0.464
	(0.168)*	(0.236)*	(0.454)**	(0.556)*	(0.050)	(0.065)	(1.468)*	(2.137)*	(0.180)***	(0.219)**
N	1,124	616	806	524	806	524	1,091	607	611	496
Adj. R2	0.01	0.02	0.03	0.05	0.22	0.24	0.06	0.03	0.09	0.10
# of countries	82	39	52	32	52	32	80	38	40	32
years	1989-2014	1989-2014	1992-2014	1992-2014	1992-2014	1992-2014	1989-2014	1989-2014	1992-2014	1992-2014
F-test, OMP	0.36	0.15	0.02	0.00	0.00	0.00	0.00	0.01	0.32	0.28
F-test, Macro	0.32	0.28	0.80	0.11	0.06	0.11	0.22	0.88	0.00	0.00
F-test, Ext. Link	0.23	0.23	0.01	0.12	0.00	0.00	0.00	0.07	0.58	0.55
F-test, Inst. Dev.	0.86	0.27	0.69	0.39	0.00	0.00	0.06	0.70	0.29	0.14
F-test, All	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes: The estimations are conducted with the robust regression method due to the existence of outliers. * $p<0.1$; ** $p<0.05$; *** $p<0.01$. The second estimation is conducted for the estimates $\hat{\gamma}_{Fi}^{C}$ from the first-step estimation that does not include China as one of the center economies. Time fixed effects for the three -year panels and the constant are also included, though their estimates are not reported.

Table 1.6: Factors Affecting the Five Links, High Bank Lending vs. Low Bank Lending by CEs

	Link 1: ST-rate (CEs) → ST-rate (PHs)		Link 2:ST-rate (CEs) → REER (PHs)		Link 3: REER (CEs) → REER (PHs)		Link 4: REER (CEs) → EMP (PHs)		Link 5: REER (CEs) → Stock Market (PHs)	
	High Bank Lending (1)	Low Bank Lending (2)	High Bank Lending (3)	Low Bank Lending (4)	High Bank Lending (5)	Low Bank Lending (6)	High Bank Lending (7)	Low Bank Lending (8)	High Bank Lending (9)	Low Bank Lending (10)
Exch. Rate Stability	0.066	-0.094	2.590	1.292	0.686	-0.011	-10.116	-5.106	0.164	0.266
	(0.235)	(0.303)	(0.865)***	(0.815)	(0.108)***	(0.064)	(2.996)***	(1.714)***	(0.377)	(0.322)
Financial Openness	0.170	0.425	1.579	-0.512	0.103	0.037	-5.022	-2.991	-0.061	0.014
	(0.198)	(0.258)*	(0.680)**	(0.654)	(0.085)	(0.051)	(2.479)**	(1.466)**	(0.293)	(0.240)
IR Holding	-0.164	-0.413	0.504	0.285	0.563	0.027	-3.411	-0.235	-1.051	-0.189
	(0.515)	(0.758)	(1.864)	(1.806)	(0.233)**	(0.142)	(6.944)	(4.473)	(0.811)	(0.855)
CA balance (%)	-1.094	0.323	-1.332	4.117	0.842	0.711	2.838	-11.428	-2.186	-2.900
	(0.925)	(1.121)	(3.790)	(3.326)	(0.475)*	(0.262)***	(11.690)	(6.375)*	(1.190)*	(0.953)***
Gross debt (%)	0.216	0.106	0.811	-0.470	-0.084	0.092	1.645	0.657	-0.188	-0.117
	(0.125)*	(0.140)	(0.503)	(0.442)	(0.063)	(0.035)***	(1.671)	(0.959)	(0.202)	(0.153)
Inflation Vol.	1.484	0.563	-14.728	-0.896	2.133	0.080	-7.545	15.570	-5.471	-4.470
	(1.997)	(2.040)	(9.212)	(4.126)	(1.154)*	(0.325)	(25.000)	(11.610)	(4.773)	(3.625)
Trade Comp.	-0.331	-1.343	-6.387	4.259	-0.378	-0.162	14.269	-4.722	0.954	0.360
	(0.803)	(1.401)	(2.796)**	(3.092)	(0.350)	(0.243)	(10.624)	(7.677)	(1.145)	(1.036)
Trade demand	1.714	0.900	4.593	-1.083	1.511	1.996	9.996	-10.735	-1.095	7.708
	(0.859)**	(2.601)	(2.563)*	(7.604)	(0.321)***	(0.599)***	(10.824)	(15.373)	(1.087)	(2.687)***
Bank Lending	0.091	1.901	1.694	-19.072	-0.037	-9.075	-19.284	106.546	0.738	-55.118
	(0.350)	(18.840)	(1.439)	(50.341)	(0.180)	(3.964)**	(5.610)***	(123.447)	(0.468)	(14.523)***
Fin. Dev.	0.546	-0.514	3.503	-3.508	-1.047	-0.394	1.277	6.118	0.652	0.592
	(0.435)	(0.542)	(1.419)**	(1.547)**	(0.178)***	(0.122)***	(5.335)	(3.800)	(0.671)	(0.584)
Currency crisis	0.424	0.677	-0.959	-0.950	-0.135	-0.040	12.437	-1.208	0.013	0.059
	(0.245)*	(0.345)**	(0.825)	(0.846)	(0.103)	(0.067)	(3.057)***	(2.056)	(0.307)	(0.272)
Banking crisis	-0.347	-0.370	0.453	1.841	0.014	-0.011	1.577	3.384	-0.221	-0.585
	(0.210)*	(0.288)	(0.724)	(0.633)***	(0.091)	(0.050)	(2.609)	(1.635)**	(0.299)	(0.241)**
N	561	562	403	403	403	403	546	544	305	306
Adj. R2	0.01	-0.00	0.06	0.04	0.30	0.18	0.10	0.03	0.09	0.15
# of countries	82	77	52	50	52	50	79	76	40	38
years	1998-2014	1989-2014	1998-2014	1992-2014	1998-2014	1992-2014	1998-2014	1992-2014	1998-2014	1992-2014
F-test, OMP	0.84	0.38	0.01	0.30	0.00	0.89	0.00	0.01	0.60	0.88
F-test, Macro	0.17	0.83	0.15	0.49	0.05	0.00	0.78	0.14	0.11	0.01
F-test, Ext. Link	0.21	0.81	0.03	0.56	0.00	0.00	0.01	0.67	0.35	0.00
F-test, Inst. Dev.	0.21	0.34	0.01	0.02	0.00	0.00	0.81	0.11	0.33	0.31
F-test, All	0.15	0.55	0.00	0.02	0.00	0.00	0.00	0.00	0.26	0.00

Notes: The estimations are conducted with the robust regression method due to the existence of outliers. * $p<0.1$; ** $p<0.05$; *** $p<0.01$. The second estimation is conducted for the estimates $\hat{\gamma}_{Fi}^{C}$ from the first-step estimation that does not include China as one of the center economies. Time fixed effects for the three -year panels and the constant are also included, though th eir estimates are not reported.

The Impact of Macroprudential Policies

- Use the dataset of macroprudential measures (Cerutti, Claessens, and Laeven, 2016) to examine whether the implementation affects the financial linkages between core and non-core.
- MPI is the sum of the dummies of 12 variables (0 – 12)
- MPI = Loan-to-value ratio cap (LTV_CAP) + Debt to income ratio (DTI) + Dynamic Loan-loss Provision (DP) +Countercyclical capital buffer/requirement (CTC) + Leverage (LEV) + Capital surcharges on SIFIs (SIFI) + Limits on interbank exposures (INTER) + Concentration limits (CONC) + Limits on foreign currency loans (FC) + FX and/or countercyclical reserve requirements (RR_REV) + Limits on domestic currency loans (CG) + Levy/tax on financial institutions (TAX)

Subsets of MPI: BORROWER and FINANCIAL

- BORROWER is a subset of MPI focusing on MaP's intended to affect the behavior of borrowers (0 – 2)
- BORROWER = Loan-to-value ratio caps (LTV_CAP) + Debt to income ratio (DTI)
- FINANCIAL is a subset of MPI focusing on MaP's intended to affect the behavior of financial institutions (0 – 10)
- FINANCIAL = Dynamic Loan-loss Provision (DP) +Countercyclical capital buffer/requirement (CTC) + Leverage (LEV) + Capital surcharges on SIFIs (SIFI) + Limits on interbank exposures (INTER) + Concentration limits (CONC) + Limits on foreign currency loans (FC) + FX and/or countercyclical reserve requirements (RR_REV) + Limits on domestic currency loans (CG) + Levy/tax on financial institutions (TAX)

Include MPI, BORROWER, or FINANCIAL Individually

- Table 2.1 reports the estimation results when MPI simple aggregate is included in the estimations shown Table in 1.1
- Because MPI-related indexes are available for 2000-2013, the sample period now becomes 1998-2000, 2001-2003, 2004-2006, 2007-2009, 2010-2012, and 2013-14
- Three-year average of MPI is included

Table 2.1: Factors Affecting the Five Links w/ MaP, 1998-2014

	Link 1: ST-rate (CEs) → ST-rate (PHs)		Link 2:ST-rate (CEs) → REER (PHs)		Link 3: REER (CEs) → REER (PHs)		Link 4: REER (CEs) → EMP (PHs)		Link 5: REER (CEs) → Stock Market (PHs)	
	LDC (1)	EMG (2)	LDC (3)	EMG (4)	LDC (5)	EMG (6)	LDC (7)	EMG (8)	LDC (9)	EMG (10)
Exch. Rate Stability	-0.046	0.390	2.305	3.097	0.452	0.598	-8.210	-6.430	0.340	0.534
	(0.268)	(0.344)	(0.713)***	(0.937)***	(0.078)***	(0.106)***	(2.228)***	(3.341)*	(0.254)	(0.323)*
Financial Openness	0.381	0.622	0.740	1.309	0.091	0.067	-4.356	-4.366	0.079	0.184
	(0.215)*	(0.247)**	(0.529)	(0.660)**	(0.058)	(0.075)	(1.748)**	(2.273)*	(0.192)	(0.222)
IR Holding	-0.103	-0.895	0.330	-0.828	0.360	0.630	-3.920	-8.600	-0.266	-0.798
	(0.520)	(0.806)	(1.346)	(2.221)	(0.148)**	(0.252)**	(4.463)	(7.934)	(0.561)	(0.734)
CA balance (%)	0.113	-1.032	1.950	1.636	0.729	0.595	-9.553	-11.073	-2.017	-1.916
	(0.903)	(1.346)	(2.857)	(3.749)	(0.314)**	(0.426)	(7.418)	(12.612)	(0.703)***	(1.209)
Gross debt (%)	0.202	0.268	0.467	0.971	-0.087	-0.138	1.418	1.375	-0.336	-0.385
	(0.117)*	(0.136)**	(0.322)	(0.403)**	(0.035)**	(0.046)***	(0.987)	(1.292)	(0.103)***	(0.124)***
Inflation Vol.	2.226	1.058	-2.422	-1.299	0.597	0.149	2.294	-0.398	-2.171	-6.269
	(1.668)	(1.604)	(3.819)	(4.015)	(0.419)	(0.456)	(13.871)	(14.957)	(3.077)	(3.340)*
Trade Comp.	-0.930	-0.251	-3.434	-3.533	-0.076	-0.432	17.423	17.957	-0.260	-0.151
	(0.851)	(1.016)	(2.159)	(2.800)	(0.237)	(0.318)	(7.070)**	(9.750)*	(0.738)	(0.923)
Trade demand	1.693	1.189	2.656	3.169	1.125	1.358	6.147	5.652	-0.591	-0.343
	(1.096)	(1.110)	(2.442)	(2.732)	(0.268)***	(0.310)***	(8.792)	(9.897)	(0.852)	(0.952)
Bank Lending	0.353	0.367	3.430	2.459	-0.156	-0.320	-21.165	-16.471	0.632	0.716
	(0.581)	(0.566)	(1.434)**	(1.610)	(0.157)	(0.183)*	(4.740)***	(5.122)***	(0.414)	(0.467)
Fin. Dev.	0.283	0.798	-0.304	1.258	-1.002	-0.775	3.643	1.105	0.501	0.814
	(0.437)	(0.545)	(1.046)	(1.432)	(0.115)***	(0.163)***	(3.569)	(4.907)	(0.412)	(0.473)*
Currency crisis	1.095	0.502	-1.861	-1.650	-0.085	-0.097	1.409	-1.029	0.018	0.091
	(0.272)***	(0.284)*	(0.680)***	(0.800)**	(0.075)	(0.091)	(2.228)	(2.599)	(0.217)	(0.239)
Banking crisis	-0.428	-0.299	1.273	0.837	-0.021	-0.171	4.011	5.852	-0.584	-0.506
	(0.227)*	(0.253)	(0.535)**	(0.641)	(0.059)	(0.073)**	(1.872)**	(2.382)**	(0.189)***	(0.230)**
Macro-prudential	-0.064	-0.084	-0.096	-0.174	0.004	0.005	0.282	0.462	-0.081	-0.124
	(0.042)	(0.045)*	(0.102)	(0.119)	(0.011)	(0.013)	(0.357)	(0.418)	(0.035)**	(0.038)***
N	836	535	673	461	673	461	821	526	565	466
Adj. R2	0.03	0.03	0.04	0.07	0.22	0.24	0.06	0.05	0.10	0.11
# of countries	59	35	44	29	44	29	58	34	38	31
years	1998-2014	1998-2014	1998-2014	1998-2014	1998-2014	1998-2014	1998-2014	1998-2014	1998-2014	1998-2014

Notes: The estimations are conducted with the robust regression method due to the existence of outliers. * $p<0.1$; ** $p<0.05$; *** $p<0.01$. The second estimation is conducted for the estimates $\hat{\gamma}_{Fi}^{C}$ from the first-step estimation that does not include China as one of the center economies. Time fixed effects for the three-year panels and the constant are also included, though their estimates are not reported.

Borrower vs. Financial based Macroprudential

Table 2.2: The Effects of MPI and its Disaggregated Indexes, LDC vs. EMG

	Link 1: ST-rate (CEs) → ST-rate (PHs)		**Link 2:ST-rate (CEs) → REER (PHs)**		**Link 3: REER (CEs) → REER (PHs)**		**Link 4: REER (CEs) → EMP (PHs)**		**Link 5: REER (CEs) → Stock Market (PHs)**	
	LDC	EMG	LDC	EMG	LDC	EMG	LDC	EMG	LDC	EMG
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Macro-prudential	-0.064	-0.084	-0.096	-0.174	0.004	0.005	0.282	0.462	-0.081	-0.124
	(0.042)	(0.045)*	(0.102)	(0.119)	(0.011)	(0.013)	(0.357)	(0.418)	(0.035)**	(0.038)***
Borrower-based MaP	-0.174	-0.211	0.188	0.064	-0.012	0.006	1.084	1.976	-0.152	-0.196
	(0.117)	(0.115)*	(0.259)	(0.284)	(0.028)	(0.032)	(0.962)	(1.047)*	(0.089)*	(0.094)**
Financial Institution-based Map	-0.061	-0.088	-0.189	-0.317	0.009	0.008	0.185	0.279	-0.098	-0.165
	(0.052)	(0.060)	(0.125)	(0.159)**	(0.014)	(0.018)	(0.429)	(0.552)	(0.045)**	(0.051)***
N	836	535	673	461	673	461	821	526	565	466
# of countries	59	35	44	29	44	29	58	34	40	32

Conclusions

- The more bank lending core to periphery the more a rise in core short term rate causes local currency real appreciation for LDCs
- The more bank lending, the weaker the link between core REER appreciation and non-core EMP (holding constant other factors).
- Lower bank lending means weaker link between core and non-core REERs
- High bank lending weakens link between core REER and non-core EMP.
- The greater the presence of macroprudential measures, the weaker the correlation between policy rates
- The latter is driven by borrower-based macroprudential measures