



Macro-Prudential Policies to Mitigate Financial System Vulnerabilities

By

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Structure

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- III. Sources of systemic risks and EMs vs. ACs
 - Business and financial cycles: EMs vs. ACs
 - “Causes” of higher volatility in EMs
- IV. What MaPP have countries used and how effective have they been?
 - Tools used and empirical analysis of MaPP to reduce banking system vulnerabilities
- V. Conclusions
 - General observations, qualifications for EMs

I. Introduction/Overview

- With the financial crisis macro-prudential policies (MaPP) have received more attention
- But analytics/applications still at early stage
 - Many questions on: effectiveness, calibration, rules vs. discretion, adaptations, interactions with other policies, assignment, etc.
 - Empirical: so far largely aggregate perspectives
- Investigate MaPP role in banking vulnerabilities
 - How do they affect banks' behavior, i.e., growth of assets, leverage and non-core to core liabilities?
 - Differentiate by phase of cycle, and country type

II. Why are MaPPs needed and which exist?

- Still early days on theory/empirics of MaPPs
- Two types of systemic risks
 - Cyclical risks
 - Risks from interconnectedness
- MaPPs toolkit is evolving and of two kinds
 - Surcharges, limits on borrowers and financial institutions, taxation/levies, other measures
 - Two kinds: disincentives and buffers

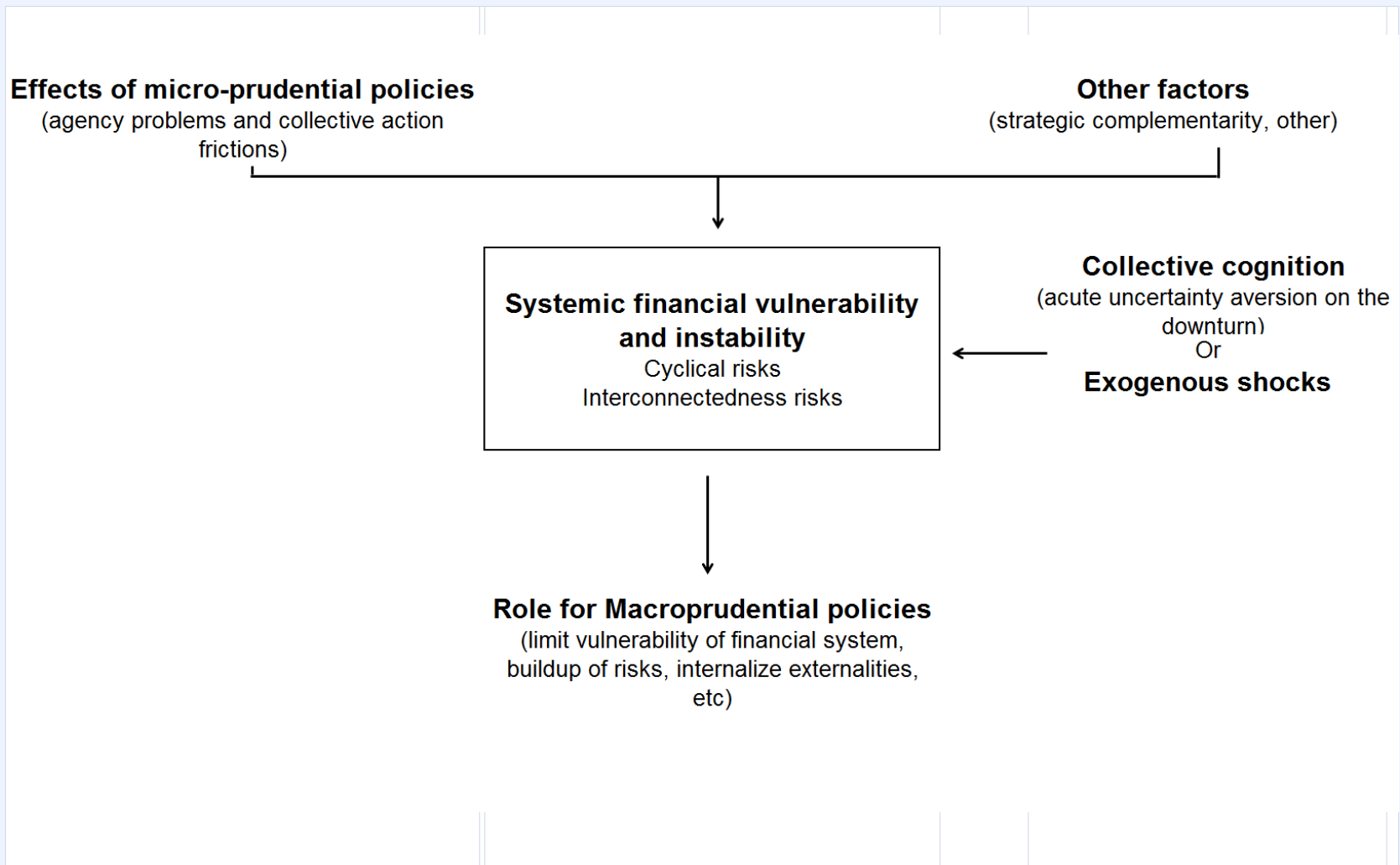
Literature on Why MaPP

- Early: Borio and White (2003) and White (2006)
 - Highlighted procyclicality of/in financial systems
- Brunnermeier, et. al. 2009; Hanson, Kayshap, Stein, 2011; De Nicolò et al, 2012; de la Torre et al, 2011
 - Conceptual motivations for MaPP
- Allen and Carletti (2011), Bank of England (2011), Schoenmaker and Wiertz (2011), many others
 - Classify sources of systemic risks and related MaPP
- IMF, 2012; Ostry et al 2011
 - Motivate and frame capital flow management tools
- Acharya 2011; Shin, 2011
 - Adaptations to EMs and DCs

Cyclical and interconnectedness risks

- Finance is procyclical, subject to booms/busts
- Runs often through asset valuation and leverage
- Justification for cyclical MaPP
 - Often market failures and externalities
 - Sometimes micro-prudential “causes”
 - E.g., capital adequacy requirements, remuneration, agency issues, etc., can lead to collective risk-taking
- Interconnectedness
 - Related to contagion within financial system (TBFT)
 - Interacts with cyclical risks in buildup/downturns

Summary of factors that can lead to systemic risks and the need for MaPP



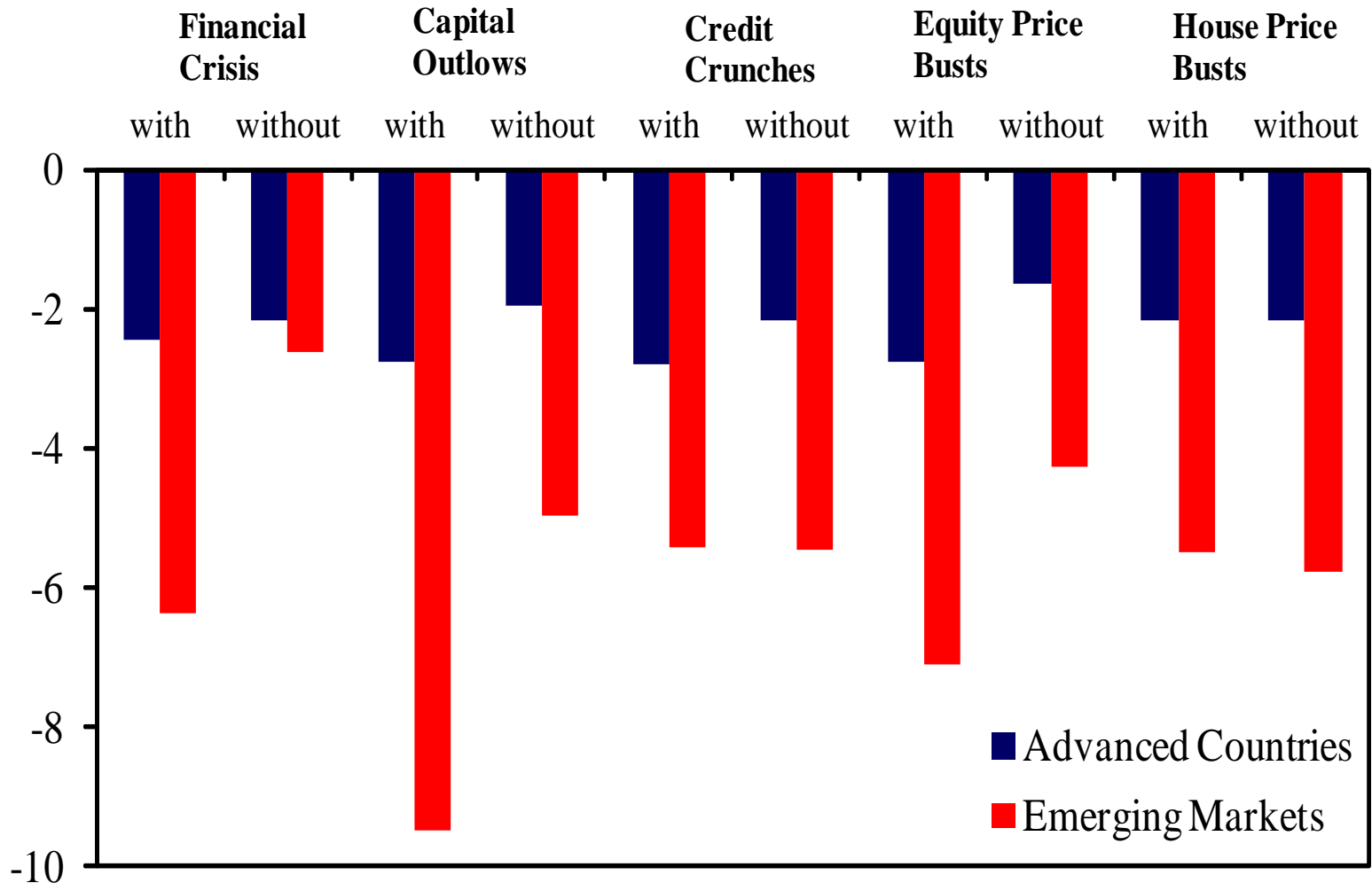
MaPP Toolkit, which is evolving

| | Policy Tool | | | | |
|---|---|---|--|---|---|
| | Capital requirements, provisioning, surcharges | Restrictions on financial sector balance sheet (assets, liabilities) | Restrictions related to borrower, instrument, or activity | Taxation, levies | Other (including institutional infrastructure) |
| Expansionary phase | Countercyclical capital requirements, leverage restrictions, general (dynamic) provisioning | Time varying caps/limits on: -mismatches (FX, interest rate) - reserve requirements | Time varying caps/limits/rules on: - DTI, LTI, LTV - margins, hair-cuts - lending to sectors - credit growth | Levy/tax on specific assets and/or liabilities | - Accounting (e.g., varying rules on mark to market) -Changes to compensation, market discipline, governance |
| Contractionary phase: fire-sales, credit crunch | Countercyclical capital requirements, general (dynamic) provisioning | Liquidity limits (e.g., Net Stable Funding Ratio, Liquidity Coverage Ratio) | Adjustment to specific loan-loss provisioning, margins or hair-cuts (e.g., through the cycle, dynamic) | Levy/tax (e.g., on non-core liabilities) | -Standardized products -OTC vs. on exchange -Safety net (Central Bank/Treasury liquidity, fiscal support) |
| Contagion, or shock propagation from SIFIs or networks | Capital surcharges linked to systemic risk | Institution- specific limits on (bilateral) financial exposures, other balance sheet measures | Varying restrictions on asset composition, activities (e.g., Volcker, Vickers) | Tax/levy varying by externality (size, network) | - Institutional infrastructure (e.g., CCPs) - Resolution (e.g., living wills) - Varying information, disclosure |
| | | Enhancing resilience | | | |
| | | Dampening the cycle | | | |
| | | Dispelling gestation of cycle | | | |

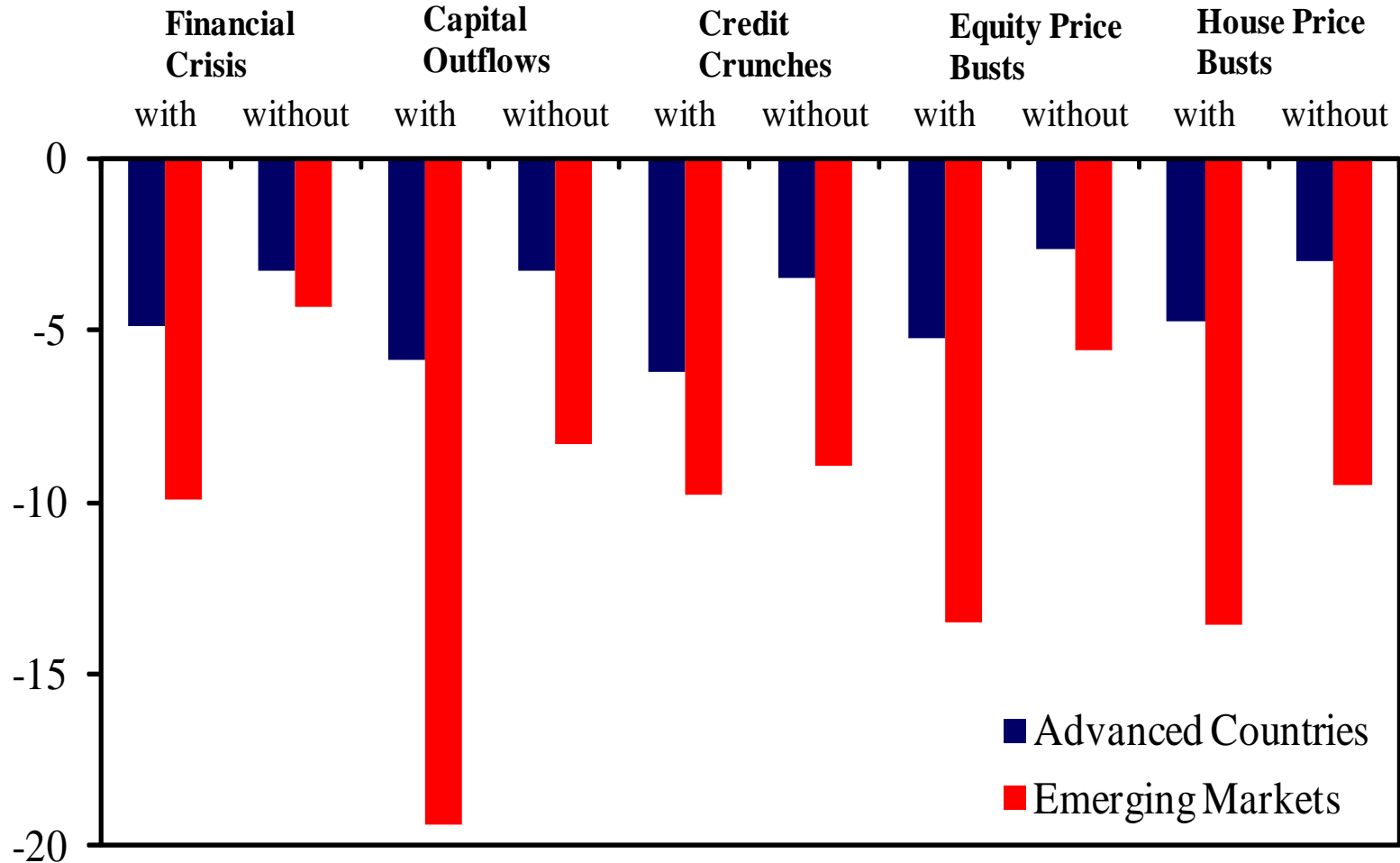
III. Sources of systemic risks and EMs vs. Acs

- Consider EMs and ACs typical patterns of:
 - Business and financial cycles, financial crises
 - Their interactions
 - recessions with financial busts
 - recoveries with financial booms
 - Differences between EMs and ACs
- Business and financial cycles more intense and stronger interactions in EMs than in ACs
 - More volatile and worse business with financial cycle

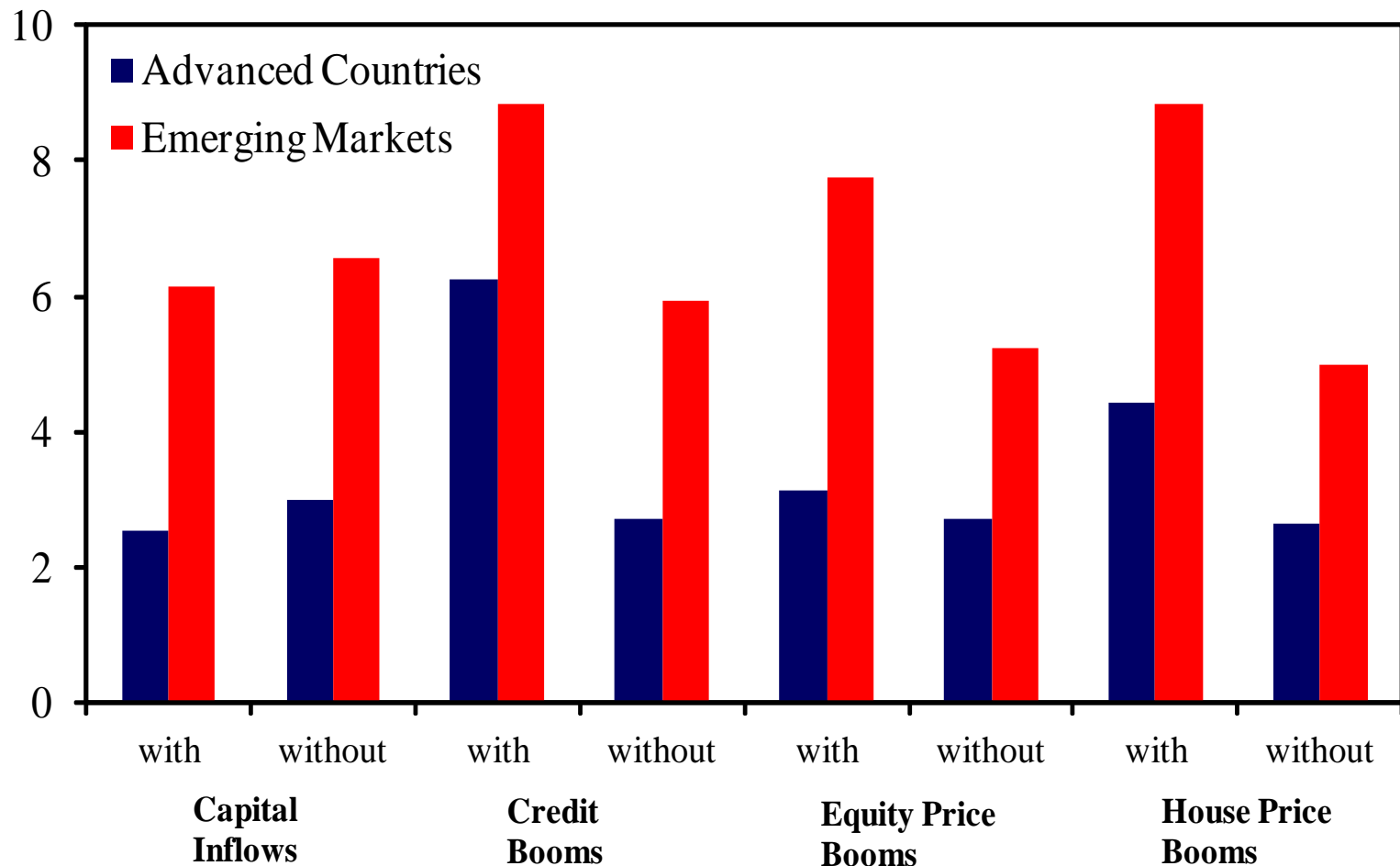
Recessions Associated with Financial Busts are Deeper in EMs *(percent change from Peak to Trough in output)*



Recessions Associated with Financial Disruptions have Greater Cumulative Loss in EMs than in ACs



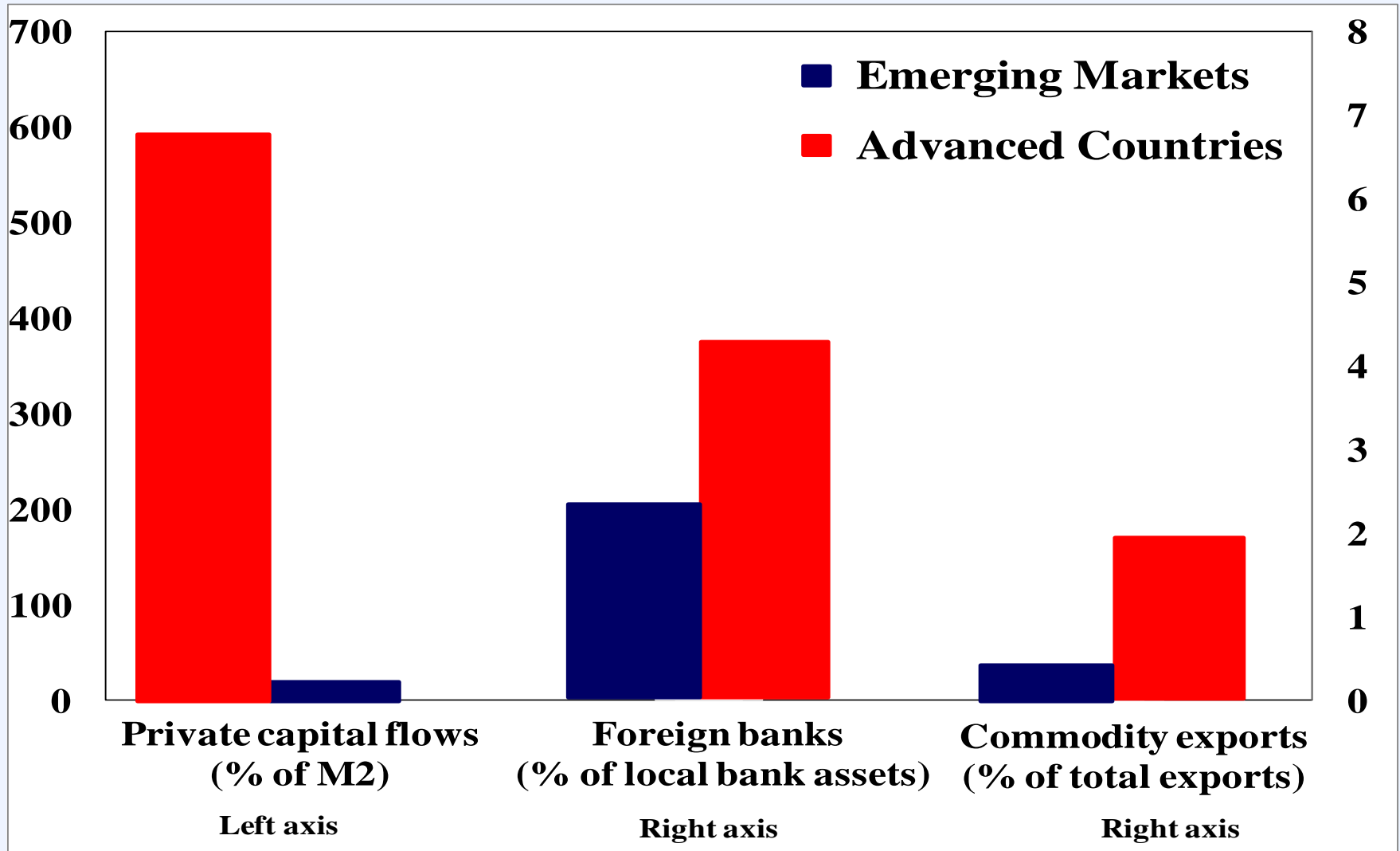
Recoveries Associated with Financial Booms are Stronger in EMs than in ACs (Higher Amplitude)



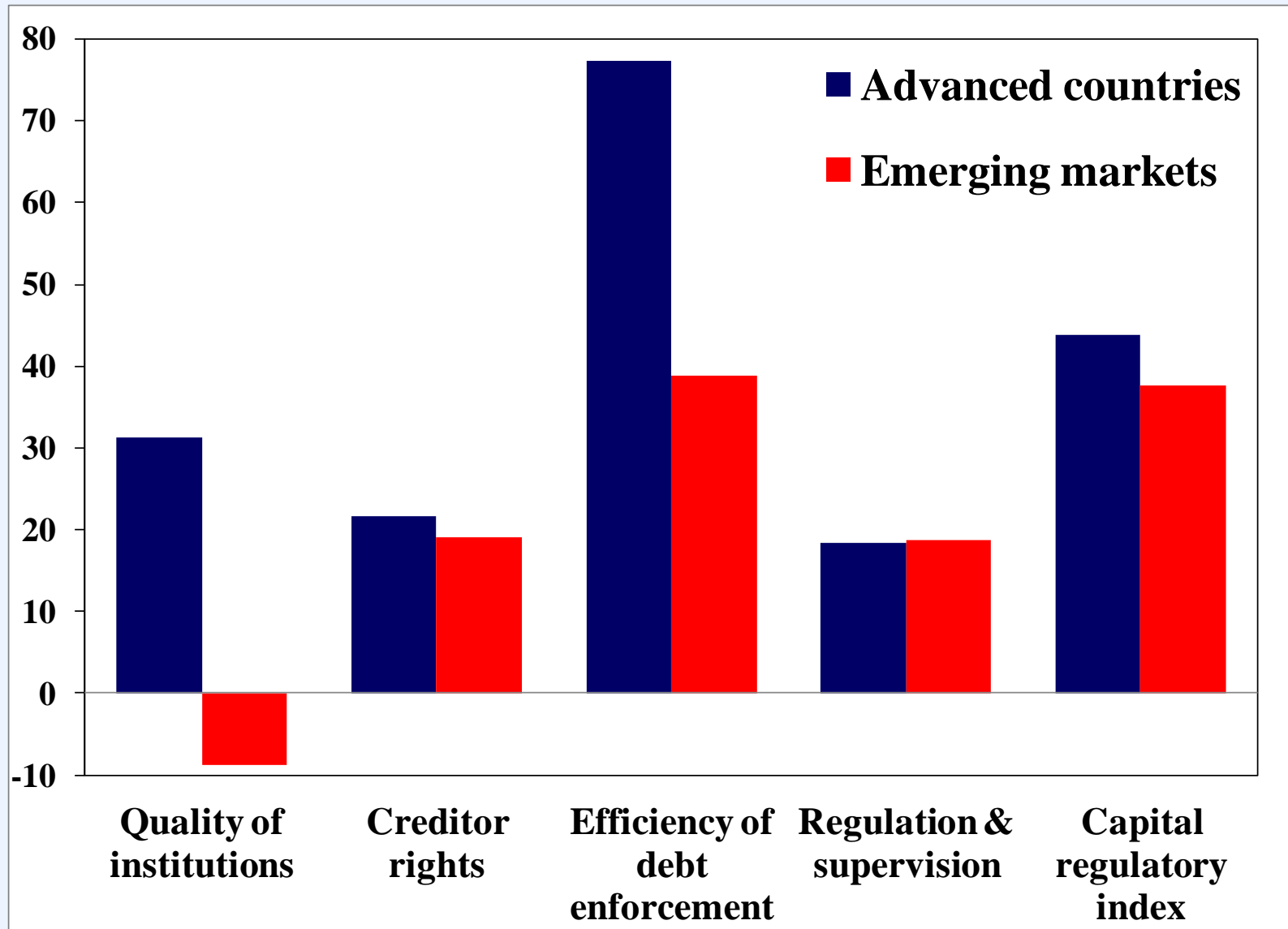
”Causes” of high volatility in EMs

- EMs are more exposed to shocks
 - Capital flows, Commodity, ToT, etc.
- Impacts of shocks are larger
 - Domestic transmissions amplify more

Exposures vary between EMs and ACs

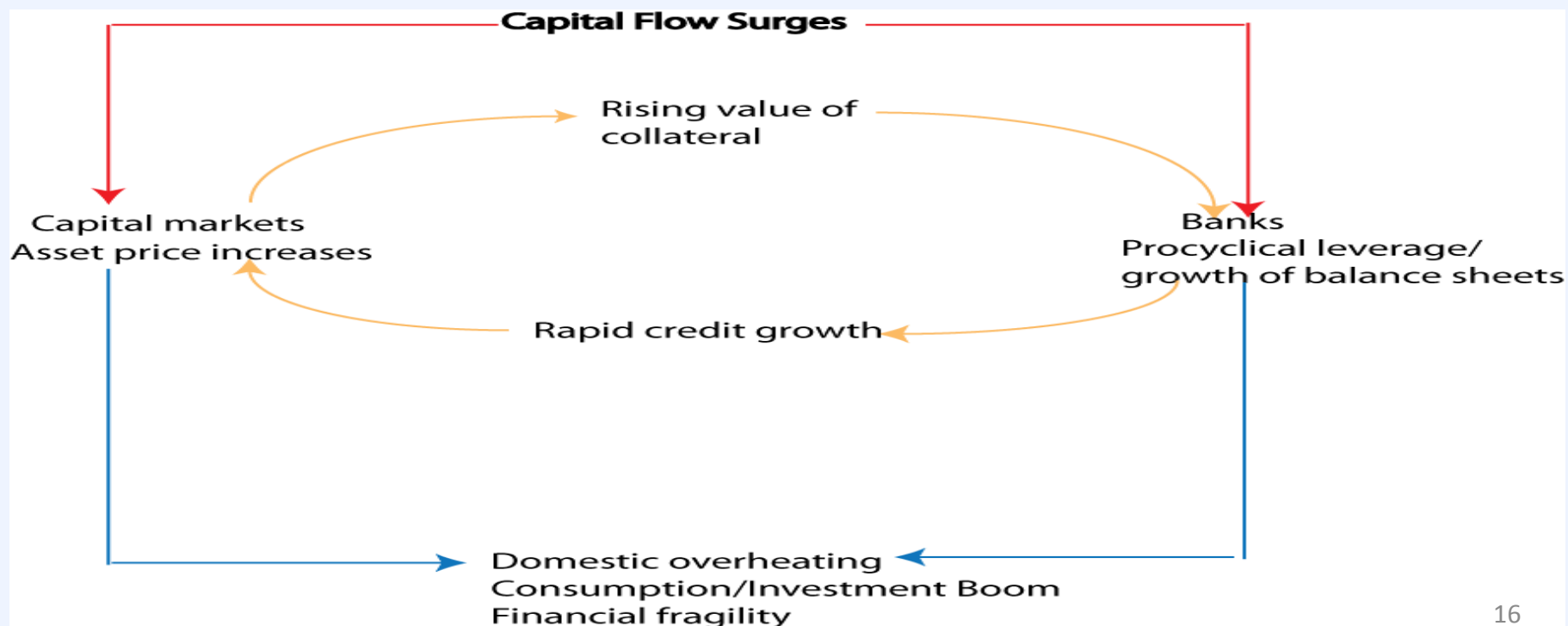


Transmissions vary, in part related to weaker institutional environment



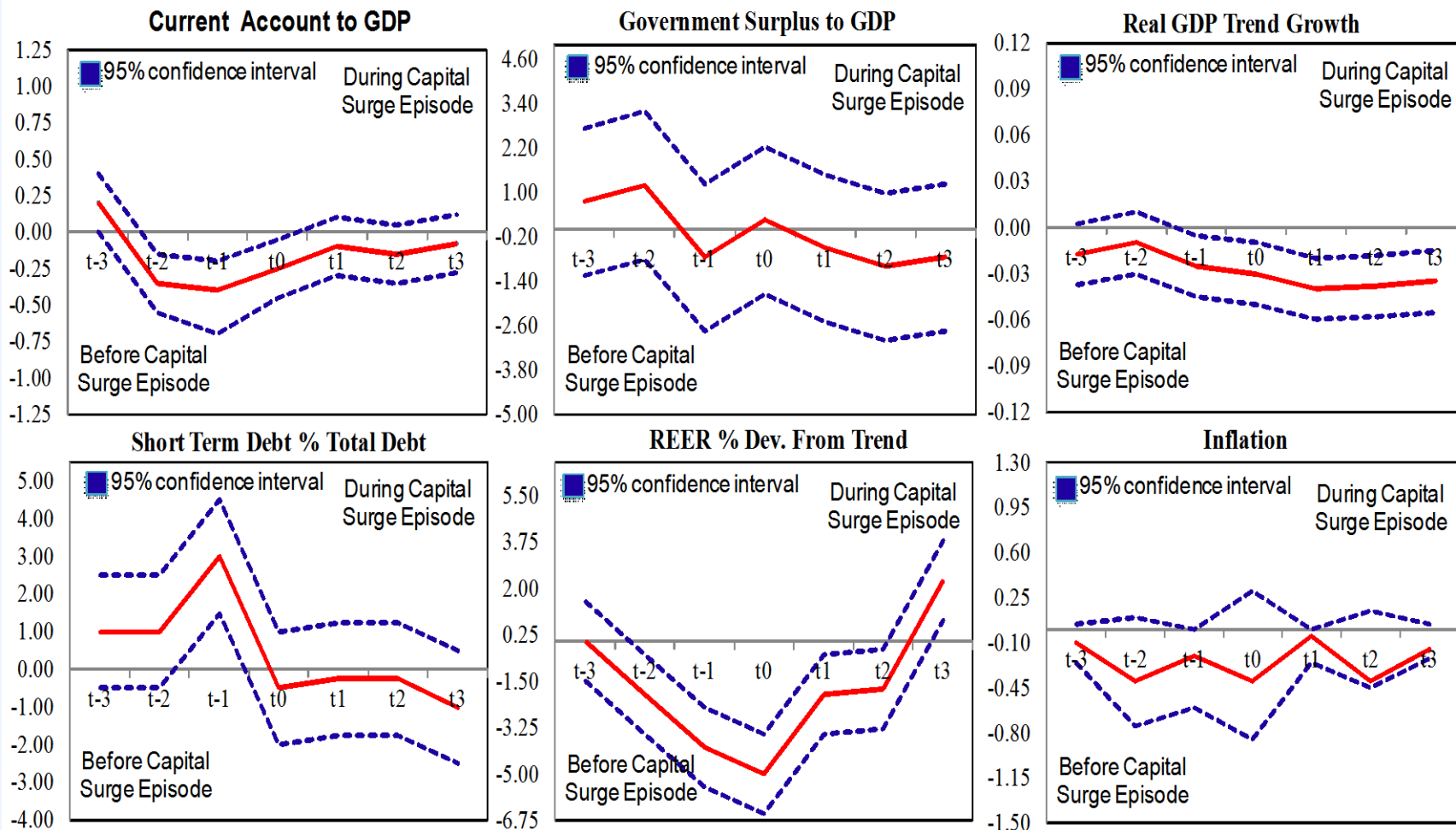
Implications for stability of domestic financial sector in emerging markets

- Capital flows—particularly debt and bank flows intermediated through the banking sector, can amplify financial (and real sector)



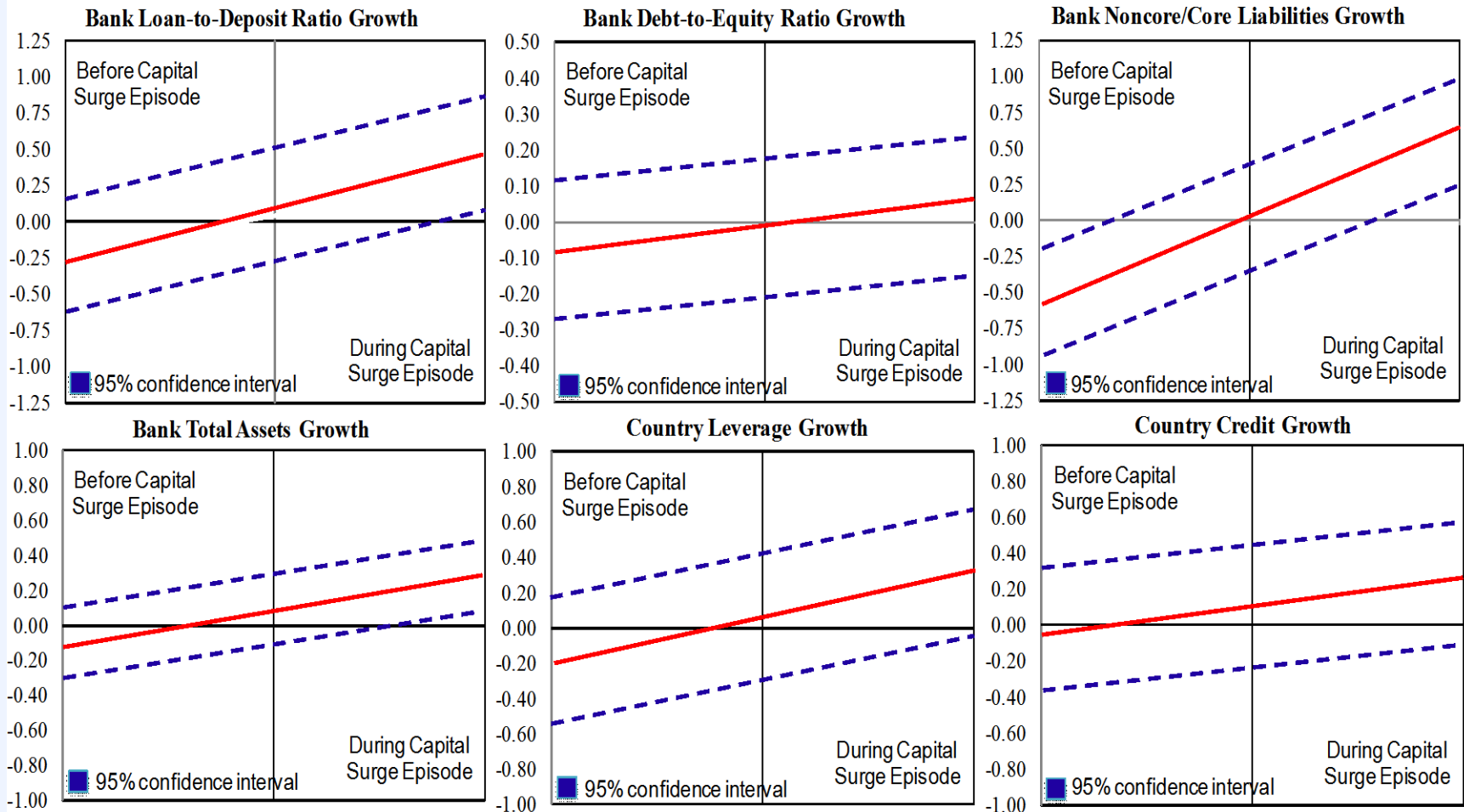
Capital flows surges are important element in boosting domestic economy

Growth of Macroeconomic Ratios During a Capital Inflow Surge Episode

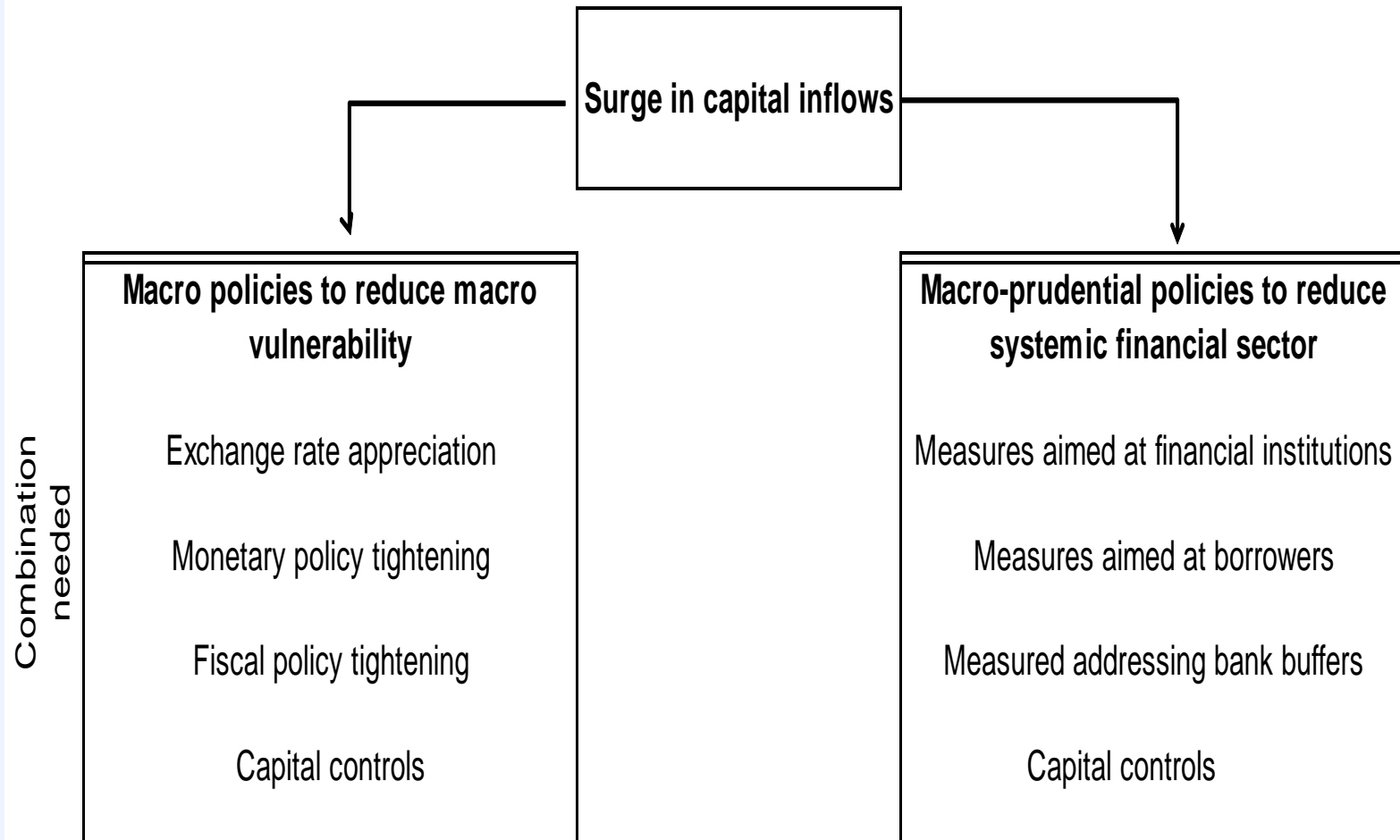


Surges are associated with increases in banking system vulnerabilities

Growth of Banking Systems Ratios During a Capital Inflow Surge Episode



Macroeconomic policies more limited for EMs → more MaPP



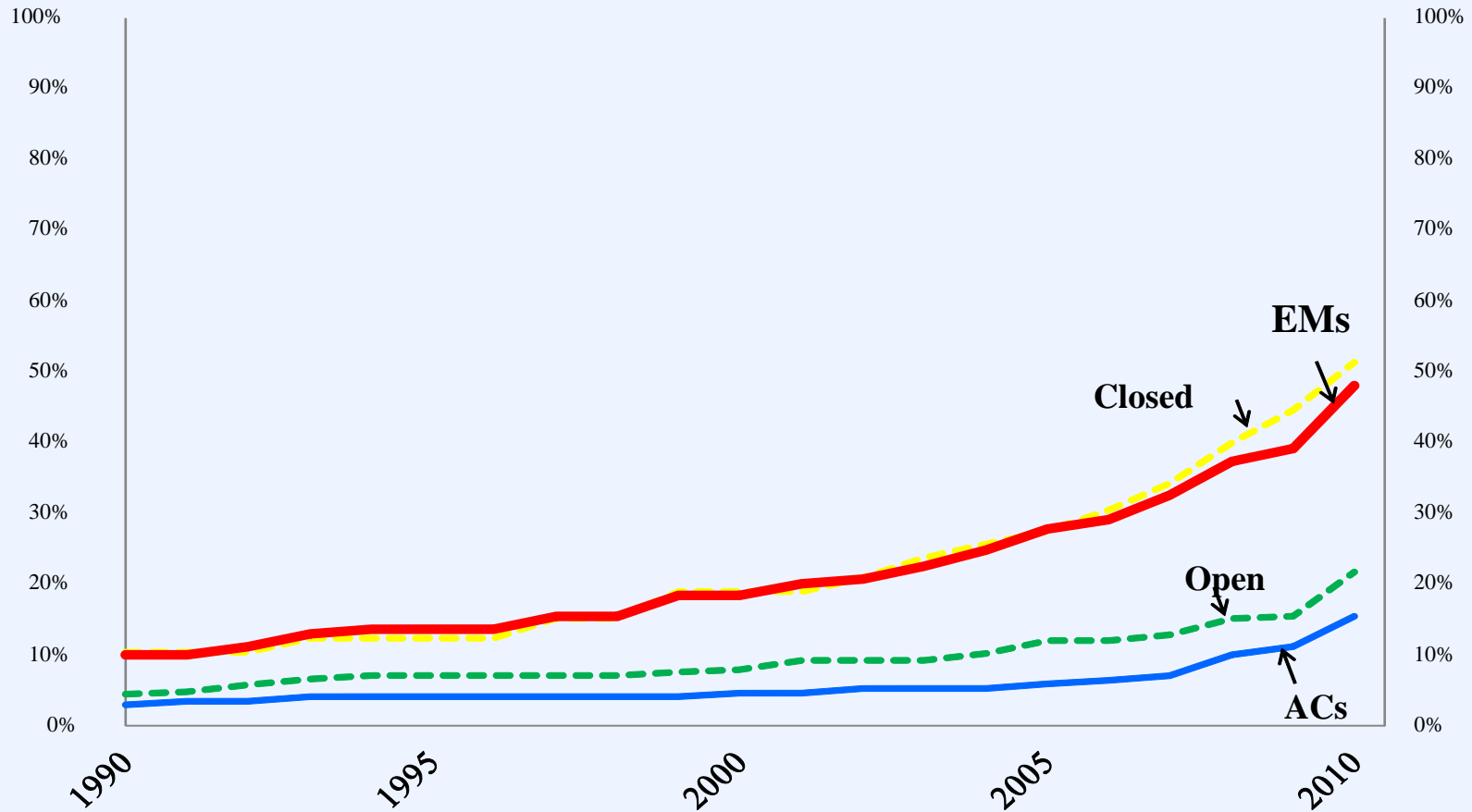
IV. What MaPP have been used and how effective are they?

- Literature on MaPP
- What tools have countries used?
- Empirical analysis of MaPP effects in reducing banking system vulnerabilities

Literature on How MaPP Matter

- Cross-country regressions
 - Lim et al. (2011): LTV and DTI caps, credit growth, reserve requirements, dynamic provisioning mitigate procyclicality
 - Crowe et al. (2011): LTV linked to cycle curb real estate boom
 - Detragiache (2012), Emerging Europe: capital ratio requirements, non-standard liquidity lower housing prices
- Case studies
 - Jiménez et al (2012), Spain: dynamic provisioning tame credit supply and help smooth downturn, uphold credit
 - Igan and Kang (2012), Korea: LTV/DTI limit mortgage credit
 - Tovar and others (2012), Latin America: reserve requirements (also) serve MaP, i.e., control credit growth

Use of MaPP: ACs vs. EMs and Open vs. Closed Capital Account* (% of countries using instrument)



* Index of MaPP usage in emerging markets (EMs), advanced countries (ACs), open capital account economies (Open) and closed capital account economies (Closed). The index represents the percentage of countries in our sample that have used macro-prudential policies. Sources: Lim et al. (2011); Fund staff calculations.

Lim et al. (2011);

Fund

Detailed Use of Macro-prudential Instruments by Country Classification

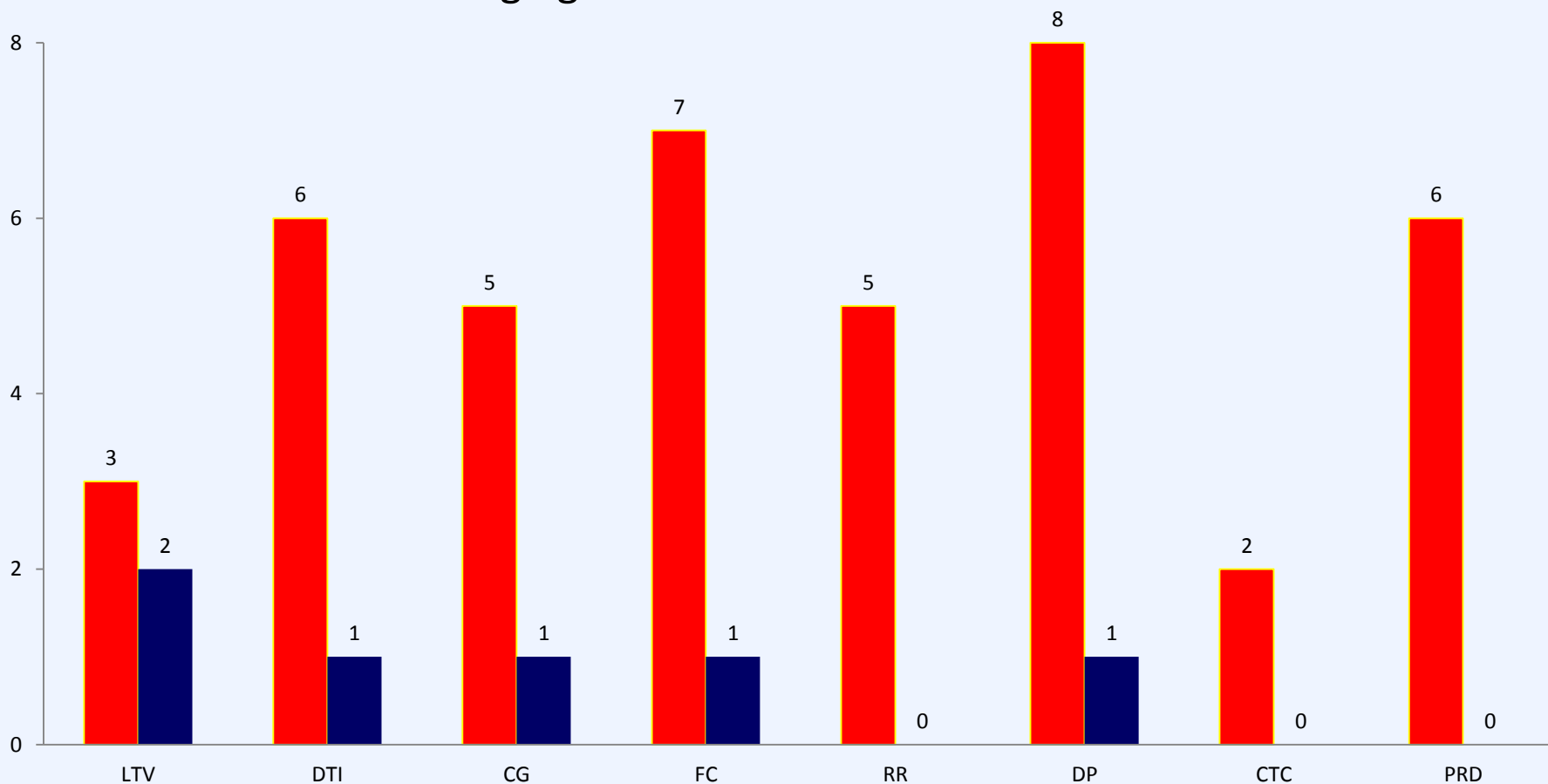
| Type of Instrument | Emerging Markets | Advanced Countries | Closed Capital Account | Open Capital Account | Total Nr. Countries | Total Nr. of Use | Total Nr. of Years | Frequency country-year | Frequency EMS-year | Frequency ACs-year |
|--------------------------|------------------|--------------------|------------------------|----------------------|---------------------|------------------|--------------------|------------------------|--------------------|--------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| LTV | 3 | 2 | 2 | 3 | 5 | 275 | 55 | 16% | 8% * | 67% * |
| DTI | 6 | 1 | 4 | 2 | 7 | 315 | 45 | 18% | 17% | 9% |
| CG | 5 | 1 | 4 | 1 | 6 | 228 | 38 | 13% | 15% * | 2% * |
| FC | 7 | 1 | 4 | 3 | 8 | 312 | 39 | 18% | 21% * | 5% * |
| RR | 5 | 0 | 5 | 0 | 5 | 120 | 24 | 7% | 10% * | 0% * |
| DP | 8 | 1 | 5 | 4 | 9 | 396 | 44 | 23% | 21% * | 16% * |
| CTC | 2 | 0 | 2 | 0 | 2 | 14 | 7 | 1% | 1% | 0% |
| PRD | 6 | 0 | 4 | 2 | 6 | 84 | 14 | 5% | 6% * | 0% * |
| Other | 12 | 1 | 6 | 6 | 13 | 728 | 56 | / | / | / |
| Total by classification: | 54 | 7 | 36 | 21 | / | / | / | 100% | 100% | 100% |

Star * denotes statistical significance at the 5% level on a two-group ttest. Countries are classified into emerging versus advanced economy countries (source: MSCI 2011), and open versus closed capital account countries (source: Chinn-Ito Index 2008). A country is defined as an open capital account country if its Chinn-Ito index is larger than the global mean in 2005, and a closed capital account country if its Chinn-Ito index is smaller than the global mean in 2005.

More often Use of MaPP in EMs, FX-related

(number of countries using instrument)

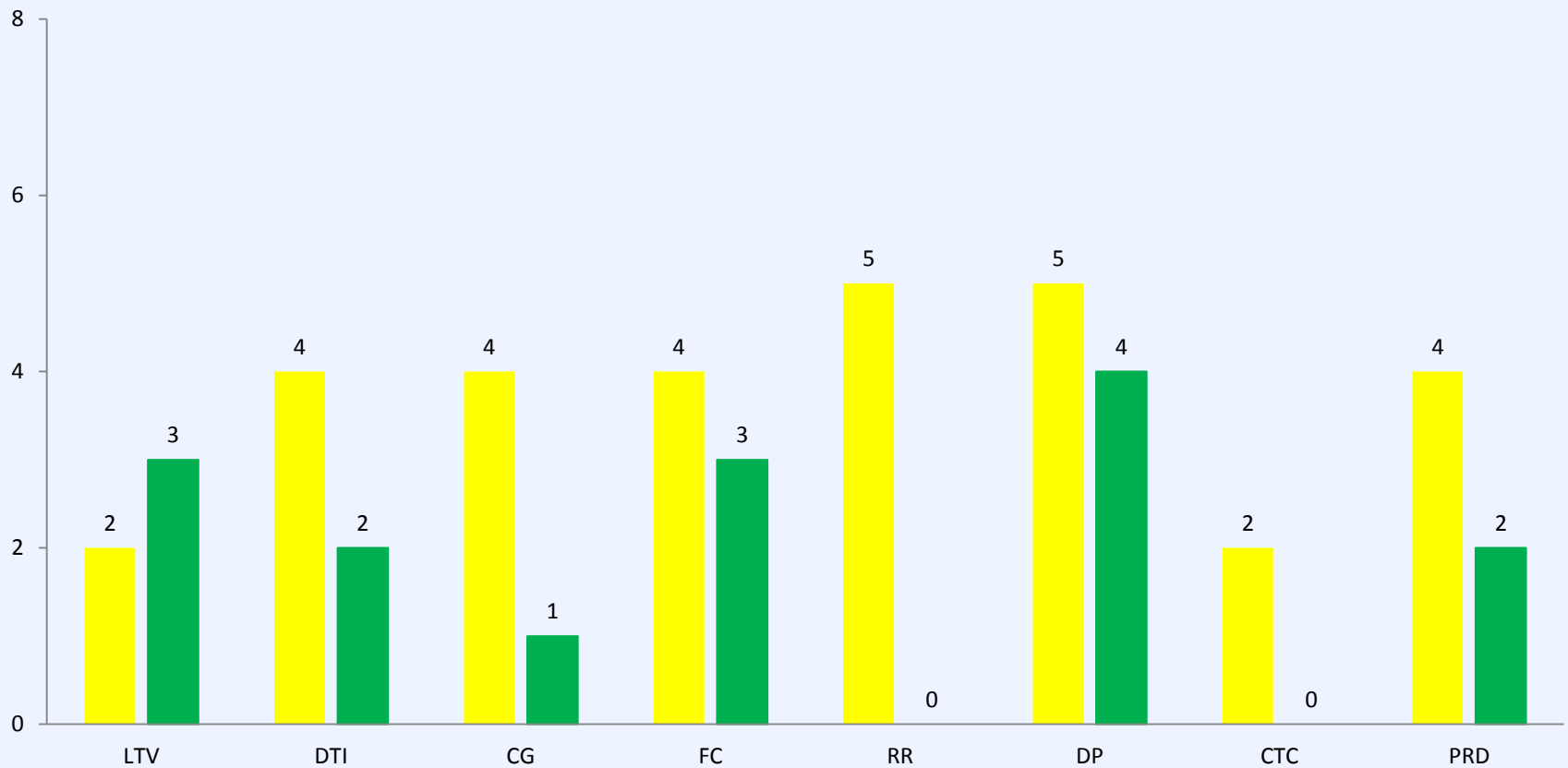
Emerging Markets Advanced Countries



More often Use of MaPP in Closed

(number of countries using instrument)

■ Closed Capital Account ■ Open Capital Account



Effectiveness of MaPP

- While papers have analyzed role of MaPP
 - More aggregate economic or financial perspective
 - Credit, leverage growth, real estate booms/busts
 - Little micro-based analyses
- Analyze role of MaPP in banking systems
 - Growth in Leverage, Assets, Noncore-to-core
 - 4673 banks in 170 countries, of which 30 (7 ACs, 23 EMs) used at least one MaPP during 2000-2010
 - Sources: Bankscope, MaPP from IMF survey/desks

Summary Statistics: Banking

| Banking Variables | | | | |
|--------------------------------------|-------|---------|--------|---------|
| | Obs. | All | EMs | ACs |
| Leverage Growth (YoY) | 18799 | 0.3% | 1.0% | -0.2% |
| Asset Growth (YoY) | 18930 | 13.4% | 17.4% | 10.4% |
| Non-core to Core Liab. Growth (YoY) | 9796 | 0.2% | 1.9% | -2.2% |
| Total Capital Ratio (%) | 10978 | 16.9 | 18.9 | 15.3 |
| Liquidity Ratio (%) | 7967 | 76.8% | 72.0% | 82.8% |
| Stock Market Capital to GDP | 27742 | 87.5% | 63.5% | 103.8% |
| Leverage Ratio (Total assets/Equity) | 21235 | 15.2 | 10.7 | 18.6 |
| Assets (mil. USD) | 21243 | 32700 | 11100 | 48300 |
| Equity (mil. USD) | 21237 | 1869 | 840 | 2619 |
| Non-core Liabilities (mil. USD) | 18636 | 13700 | 4203 | 21000 |
| Core Liabilities (M1, mil. USD) | 16309 | 1890000 | 877000 | 3270000 |
| Non-core to Core Liabilities | 19827 | 8.2% | 5.2% | 4.7% |

Summary Statistics: Country Variables

| Country Variables | All | EMs | ACs |
|-------------------------------------|---------|----------|----------|
| M1 (mil. USD) | 1890000 | 236000 | 936000 |
| M2 (mil. USD) | 1300000 | 652000 | 2190000 |
| Exports (mil. USD) | 322860 | 176324 | 426682 |
| Imports (mil. USD) | 3254474 | 156858 | 444893 |
| Nominal GDP (mil. USD) | 1354845 | 612130 | 1881062 |
| Real GDP (mil. USD) | 1280000 | 95700000 | 55800000 |
| Central Bank Policy Rate (%) | 6.1 | 11 | 3 |
| Nominal Effective Exchange Rate | 100.1 | 102.5 | 99.1 |
| Real Effective Exchange Rate | 99.8 | 102.0 | 98.8 |
| Exchange Rate Classification | 2.3 | 2.4 | 2.2 |
| Nominal GDP Growth | 7.7% | 10.9% | 5.6% |
| Real GDP Growth | 4.6% | 4.9% | 4.3% |
| NEER Growth | 0.0% | -1.2% | 0.5% |
| REER Growth | 0.9% | 1.9% | 0.4% |
| Central Bank Policy Rate Change (%) | -10.4% | -7.9% | -13.0% |

Summary Statistics: Use of MaPP

| MAPP Variables | All | EMs | ACs |
|-------------------------------|------------|------------|------------|
| Loan-to-Value Ratio | 0.36 | 0.48 | 0.28 |
| Loan-to-Value Dummy | 0.42 | 0.57 | 0.31 |
| Debt-to-Income Ratio | 0.03 | 0.06 | 0.01 |
| Debt-to-Income Dummy | 0.07 | 0.13 | 0.03 |
| Credit Growth Caps | 0.08 | 0.19 | 0.00 |
| Limits on Foreign Lending | 0.08 | 0.16 | 0.02 |
| Reserve Requirements | 0.06 | 0.14 | 0.00 |
| Dynamic Provisioning | 0.08 | 0.11 | 0.06 |
| Counter-cyclical Requirements | 0.02 | 0.05 | 0.00 |
| Profit Redistribution | 0.02 | 0.04 | 0.00 |
| Other MaPP | 0.09 | 0.19 | 0.01 |

Variation: Closed, EMs, MaPP Users: Generally Higher Growth

| | Leverage Growth | Total Asset Growth | Non-core to Core Liabilities Growth |
|------------------------|----------------------------|-------------------------------|--|
| | Mean | Mean | Mean |
| Open Capital Account | 0.5% | 12.3% | 1.4% |
| Closed Capital Account | 1.3% | 18.4% | 1.8% |
| Advanced | 0.0% | 10.4% | -0.1% |
| Emerging | 1.3% | 17.2% | 2.6% |
| MaPP Usage | 0.8% | 15.8% | 3.3% |
| No MaPP Usage | -0.2% | 10.8% | -2.0% |

* Growth rates are expressed as the logarithmic yearly growth rates during 2000-2010.

Variation in Phases: EMs and Closed more Volatile

| | Expansionary Phase | | | Contractionary Phase | | |
|------------------------|--------------------|--------------------|-------------------------------------|----------------------|--------------------|-------------------------------------|
| | Leverage Growth | Total Asset Growth | Non-core to Core Liabilities Growth | Leverage Growth | Total Asset Growth | Non-core to Core Liabilities Growth |
| | Mean | Mean | Mean | Mean | Mean | Mean |
| Open Capital Account | 14.09% | 26.31% | 42.91% | -12.40% | -17.65% | -41.01% |
| Closed Capital Account | 16.98% | 34.09% | 51.33% | -15.38% | -23.96% | -48.76% |
| Advanced | 13.58% | 24.82% | 34.82% | -12.03% | -16.88% | -33.39% |
| Emerging | 16.29% | 31.97% | 51.57% | -14.71% | -22.26% | -49.14% |
| MaPP Usage | 15.56% | 31.07% | 50.76% | -13.76% | -21.26% | -46.72% |
| No MaPP Usage | 14.08% | 26.30% | 35.68% | -12.55% | -17.68% | -34.67% |

* Growth rates are expressed as the logarithmic yearly growth rates during 2000-2010.

Regression setup

- Seven MaPPs (country/time-varying dummies)
 - Caps on loan-to-value, caps on debt-to-income, limits on credit growth, reserve requirements, dynamic provisioning, and limits on foreign lending
- Country-level macroeconomic controls
- GMM panel regressions (to address endogeneity)
- Investigate if effect of MaPP varies by the intensity of financial cycle. Model:

$$\Delta Y_{i,c,t} = \alpha_{i,1} + \lambda_1 * \Delta Y_{i,c,t-1} + \beta_1 * \text{MaPP}_{j,c,t} + \phi_1 * \text{MaPP}_{j,c,t} * \Delta Y_{i,c,t-1} + \theta * X_{c,t-1} + \varepsilon_{i,t}^{\text{MaPP}}$$

Regression results: 2000-2010

| Explanatory Variables ↓ | Leverage growth | | | | Asset growth | | | | NCC growth | | | |
|----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|
| | (1) | (2) | (3) | (4) (Simultaneous) | (5) | (6) | (7) | (8) (Simultaneous) | (9) | (10) | (11) | (12) (Simultaneous) |
| Lag Dependent Variable | -0.118*** [0.031] | Yes | Yes | Yes | -0.533*** [0.017] | Yes | Yes | Yes | -0.467*** [0.018] | Yes | Yes | Yes |
| Lag Real GDP Growth | 0.257*** [0.055] | Yes | Yes | Yes | 0.213*** [0.085] | Yes | Yes | Yes | 0.284* [0.161] | Yes | Yes | Yes |
| Lag CB Rate Growth | -0.018* [0.009] | Yes | Yes | Yes | -0.032** [0.013] | Yes | Yes | Yes | -0.113*** [0.032] | Yes | Yes | Yes |
| Lag NEER Growth | -0.334* [0.180] | Yes | Yes | Yes | 0.743*** [0.132] | Yes | Yes | Yes | 1.412*** [0.270] | Yes | Yes | Yes |
| FX Rate Arrangement | 4.000** [1.888] | Yes | Yes | Yes | 1.739 [1.507] | Yes | Yes | Yes | 0.121 [0.336] | Yes | Yes | Yes |
| Lag Capital Adeq. Ratio | 0.013** [0.005] | Yes | Yes | Yes | 0.010*** [0.003] | Yes | Yes | Yes | 0.028* [0.015] | Yes | Yes | Yes |
| Lag Liquidity Ratio | 0.024 [0.098] | Yes | Yes | Yes | -0.074 [0.048] | Yes | Yes | Yes | -0.728* [0.389] | Yes | Yes | Yes |
| Other MaPP | -1.531*** [0.391] | -1.433*** [0.403] | -0.911* [0.810] | -0.911* [0.810] | -1.647** [0.678] | -1.781*** [0.661] | -0.235* [0.108] | -0.235* [0.108] | -10.239*** [3.494] | -9.008*** [3.401] | -11.675* [6.122] | -11.675* [6.122] |
| LTV | -0.939* [0.403] | -0.977* [0.486] | -4.845* [2.667] | -4.845* [2.667] | -2.162*** [0.774] | -2.333*** [0.752] | -0.687 [1.694] | -0.687 [1.694] | -15.854*** [5.123] | -13.027*** [5.023] | -29.251 [24.872] | -29.251 [24.872] |
| LTV X Lag Dependent Var | | | -0.683*** [0.200] | 0.918 [0.789] | | -0.091 [0.123] | -1.153 [2.083] | -1.153 [2.083] | | | -0.493*** [0.097] | -5.885 [7.295] |
| DTI | -5.476** [2.514] | -5.905** [2.496] | (omitted) | (omitted) | -3.915* [2.218] | -4.189* [2.214] | (omitted) | (omitted) | -3.983*** [1.526] | -1.819* [0.909] | (omitted) | (omitted) |
| DTI X Lag Dependent Var | | -1.638*** [0.356] | -1.596 [1.469] | -1.596 [1.469] | | 0.257 [0.221] | 1.381 [2.835] | 1.381 [2.835] | | -2.065*** [0.160] | 4.061 [10.118] | 4.061 [10.118] |
| CG | -0.021 [0.396] | 0.250 [0.390] | -1.472* [0.876] | -1.472* [0.876] | -0.648*** [0.204] | -0.729*** [0.225] | -0.930 [1.109] | -0.930 [1.109] | -1.912 [1.565] | 0.692 [0.933] | -3.766 [2.839] | -3.766 [2.839] |
| CG X Lag Dependent Var | | -0.831*** [0.205] | -0.122 [0.702] | -0.122 [0.702] | | -0.449*** [0.116] | -2.015 [2.057] | -2.015 [2.057] | | -1.000*** [0.076] | -8.061* [4.606] | -8.061* [4.606] |
| FC | -1.831*** [0.654] | -1.722*** [0.593] | (omitted) | (omitted) | -0.971* [0.437] | -1.656** [0.706] | (omitted) | (omitted) | 0.498 [0.325] | 0.182 [0.345] | (omitted) | (omitted) |
| FC X Lag Dependent Var | | -6.496* [3.761] | (omitted) | (omitted) | | 3.968 [3.186] | (omitted) | (omitted) | | -0.915*** [0.076] | (omitted) | (omitted) |
| RR | -0.279* [0.148] | -0.151 [0.133] | -0.946** [0.430] | -0.946** [0.430] | -0.087* [0.048] | -0.041 [0.073] | -0.280** [0.134] | -0.280** [0.134] | -0.216 [2.894] | -0.33 [2.895] | -2.252*** [0.591] | -2.252*** [0.591] |
| RR X Lag Dependent Var | | -0.581*** [0.166] | 0.109 [0.270] | 0.109 [0.270] | | -0.762*** [0.136] | 1.497*** [0.339] | 1.497*** [0.339] | | 0.186 [0.507] | -6.786 [4.326] | -6.786 [4.326] |
| DP | -0.074 [0.224] | -0.021 [0.230] | -0.915* [0.494] | -0.915* [0.494] | -0.536*** [0.122] | -0.534*** [0.124] | -1.568* [0.830] | -1.568* [0.830] | -1.74 [4.677] | -1.604 [4.382] | -2.669 [4.036] | -2.669 [4.036] |
| DP X Lag Dependent Var | | 0.854 [0.884] | -2.659 [3.175] | -2.659 [3.175] | | -0.745*** [0.362] | -14.262** [6.235] | -14.262** [6.235] | | 0.86 [0.650] | 5.196 [67.746] | 5.196 [67.746] |
| PRD | 2.907 [2.332] | 3.188 [2.264] | -1.006 [1.417] | -1.006 [1.417] | -3.192 [3.056] | -1.24 [2.103] | 0.665 [1.579] | 0.665 [1.579] | 3.166 [6.590] | 4.569 [5.593] | 4.988 [6.411] | 4.988 [6.411] |
| PRD X Lag Dependent Var | | 2.476* [1.446] | 3.296 [6.362] | 3.296 [6.362] | | 2.412 [1.577] | 10.423 [8.685] | 10.423 [8.685] | | 0.635 [0.389] | -14.528 [66.233] | -14.528 [66.233] |
| Observations | 5,676 | 4,091 | 4,091 | 4,091 | 5,695 | 4,107 | 4,107 | 4,107 | 5,695 | 4,107 | 4,107 | 4,107 |
| Number of banks | 1,290 | 939 | 939 | 939 | 1,292 | 940 | 940 | 940 | 1,292 | 940 | 940 | 940 |

Notes: The dependent variable is the bank leverage ratio growth (in (1) -(4)), the total asset growth (in (5) -(8)), and the non-core to core liabilities growth (in (9) - (12)). We control for the first lag of the dependent variable, the lag of real GDP logarithmic growth, the lag of the central bank policy rate change, the lag of the growth rate of the nominal effective exchange rate, for foreign exchange rate arrangements (0 = de facto peg; 6 = floating currency), for the lagged bank capital adequacy and leverage ratios, and for other macroprudential policy measures (countercyclical provisioning, countercyclical capital, restrictions on treatment of profits in regulatory capital). The macroprudential policy measures used are: LTV (caps on loan-to-value), DTI (caps on debt-to-income), CG (limits on credit growth), or FC (limits on foreign lending), RR (reserve requirements), DP (dynamic provisioning), or PRD (restrictions on profit distribution). Although regressed one at a time, MaPPs are shown in one column in (2), (3), (6), (7), (10) and (11) to save space. Columns (4), (8) and (12) show the MaPP coefficients for MaPPs regressed simultaneously. These are all GMM regressions which use lagged differences and the real GDP growth as instrumental variables for the dependent variable. The regressions control for a time trend (fixed effects) and for individual trends (country fixed effects). Robust standard errors are in brackets. Stars ***, **, and * represent significance at the 1, 5, and 10 percent levels respectively.

Regression results: controls

- Lagged dependent is negative
 - Some tendency for (market) forces to control risks
- GDP growth positive for all three risks
 - Business cycles affect financial developments/risks
- Interest rate mitigate risks somewhat
 - Small effects though
- Exchange rate regime matters
 - More risks in more floating regimes

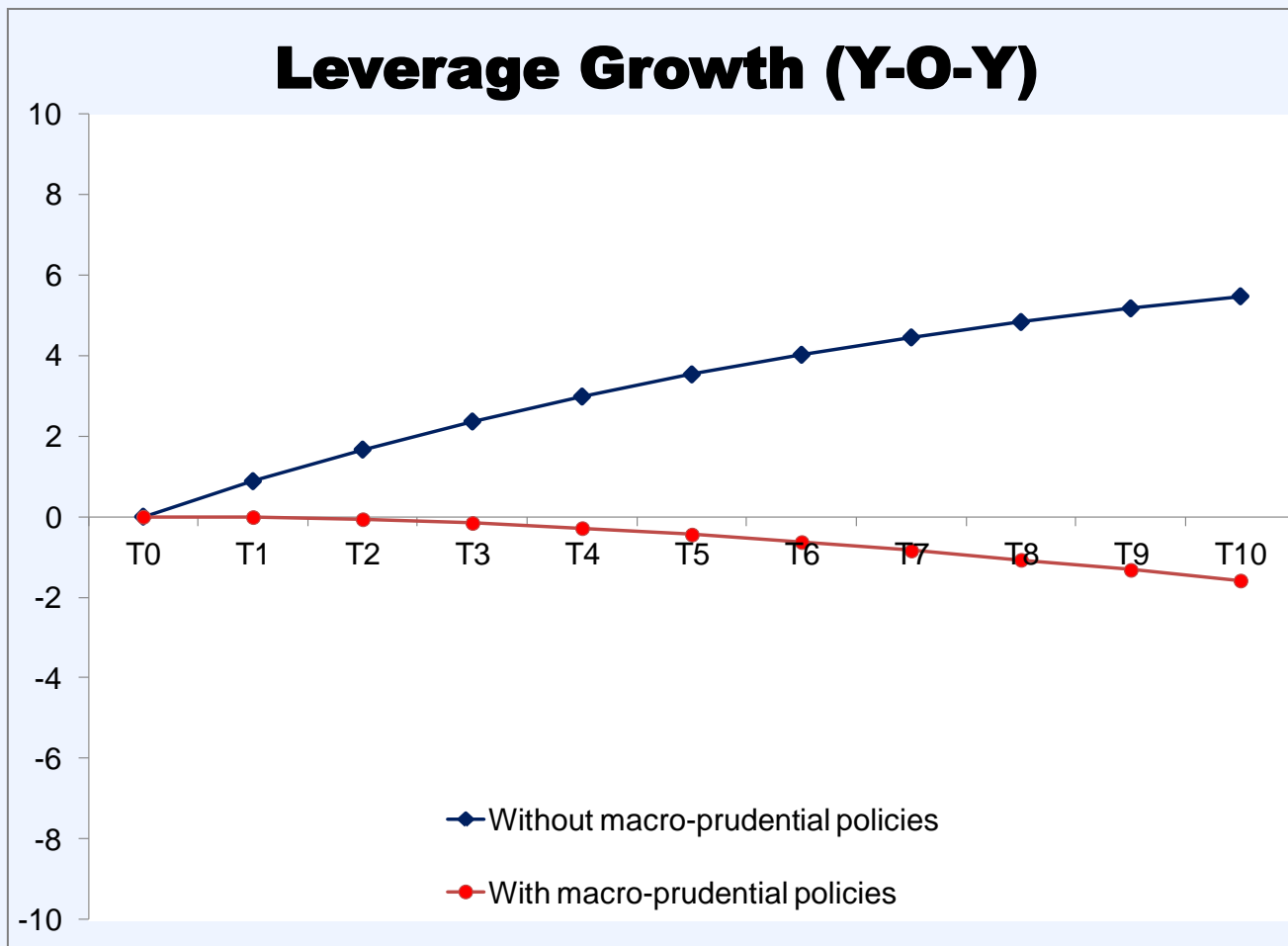
Regression results: MaPP

- Measures aimed at borrowers
 - LTV and DTI significant. LTV reduces growth of leverage by 0.9 pp, asset 2.2 pp, NCC 15.8 pp. DTI reduces growth of leverage 5.5 pp, assets 3.9 pp, and NCC by 3.9 pp. Also curb financial cycle
- Measures aimed at institutions (assets)
 - Credit growth (CG) and Foreign Currency (FC) significant. CG decreases growth of asset by 0.6 pp. FC decrease leverage growth by 1.8 pp and asset 1 pp. More effective during cycle

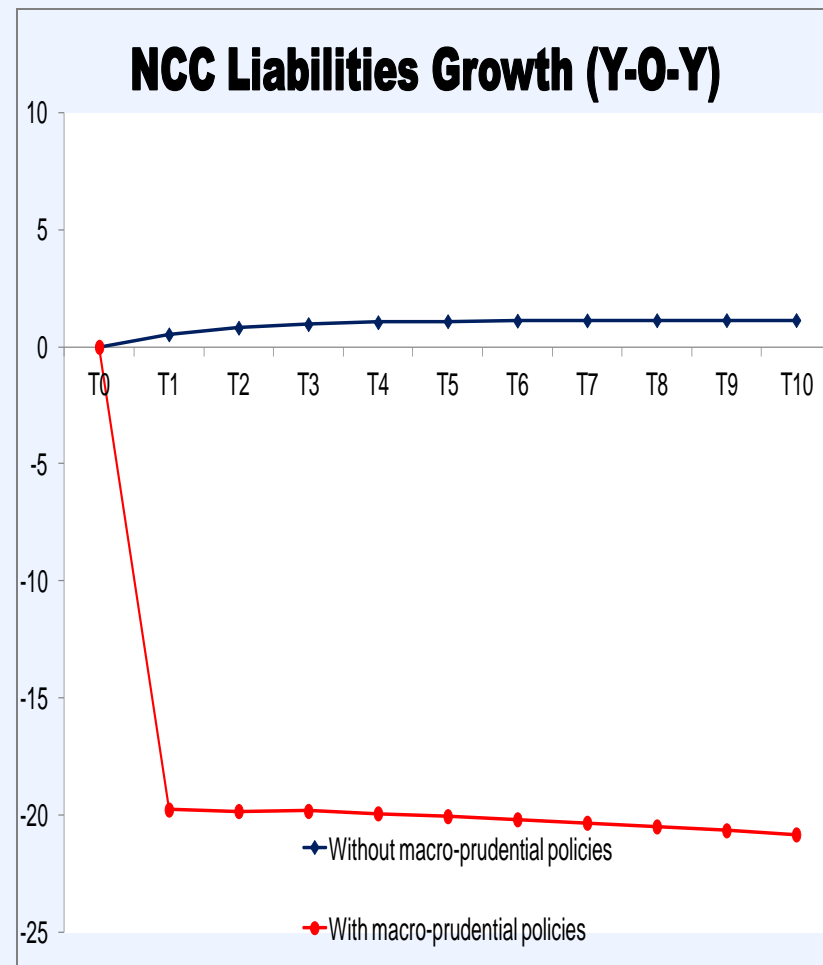
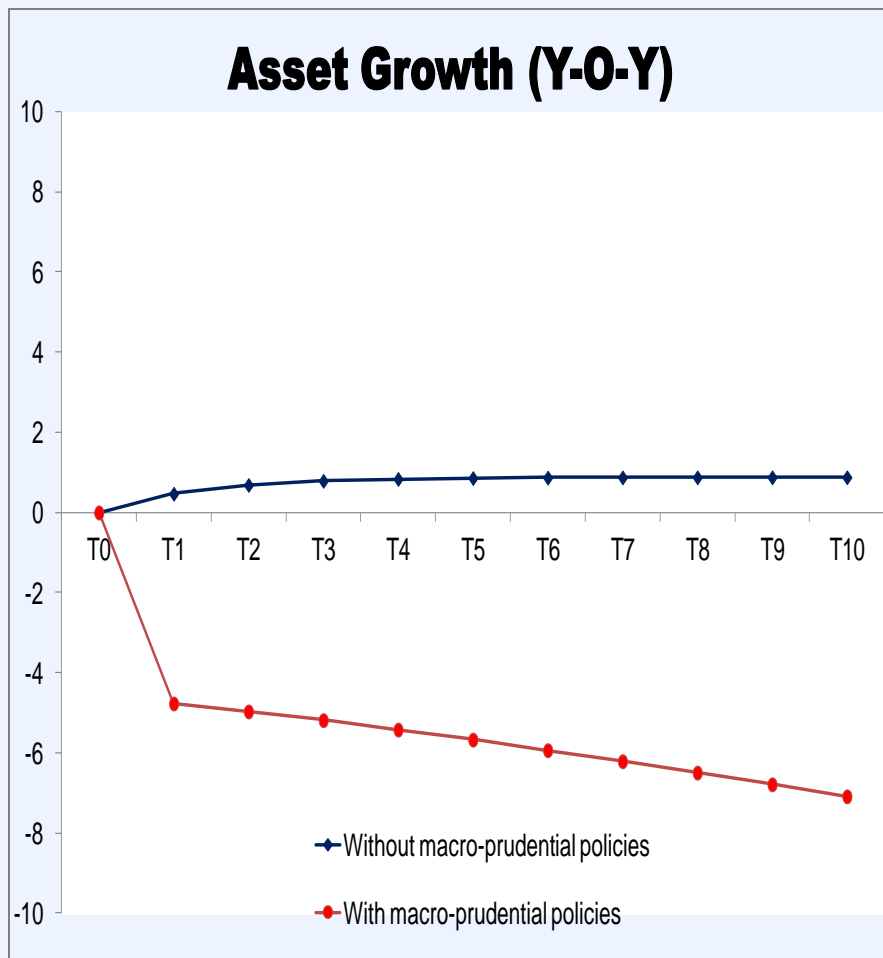
Regression results: MaPP

- Measures aimed at financial liabilities
 - Reserve requirements (RR) significant for leverage and asset growth, also when cycle more intense
- Measures aimed at bank buffers
 - Dynamic provisioning (DP) and restrictions on profit distribution (PRD) not robust. DP reduces only asset growth, both in levels and cycle, but not leverage or NCC. PRD reduce pro-cyclicality of leverage growth, but positively with asset growth (but very few adopted measure since 2008)

Dynamics With and Without MaPP: Some Slowdown in Leverage



More slowdowns for Asset and Non-Core-to-Core Growth



Differences by Phase

- MaPP vary by the cycle
 - Some MaPP meant to be (dis)incentives
 - Some MaPP aim to create buffers
- Impact can be expected to vary
 - Buffers can work as disincentives in upturn (and work well in downturn)
 - Disincentives may work less well in downturns
- Empirically differentiate by phase

Regression results by phase

- MaPP primarily aimed at *expansionary* effective in both upswings and downswings. In contraction, however, prevent rebounds in growth in assets and NCC, actually lead to larger declines. Ineffective in restoring intermediation during adverse conditions
- LTV and DTI limits may act perversely during credit contractions and asset prices declines. As borrowers' net worth declines, LTV and DTI limits make it even harder to extend loans, leading to further declines in prices, and setting of perverse cycles

Regression results by phase

- MaPP which build *buffers* in good times generally reduce growth of leverage and assets during upswings, even more when stronger. Also help alleviate more severe decline during downswings
- These MaPP tools lessen crunch by leading to capital or liquidity buffers so that banks do not reduce leverage, assets, and NCC as much
- Also limits on profit redistribution help maintain, or at least reduce less, leverage and asset, in bad times as preserve capital

EMs vs. ACs, Open vs. Closed

- In general, many MaPP affect risks in EMs more
- In open capital account countries, less MaPP are used, but more effective at curbing bank risk
- Suggests not just direct international exposures that matter (to policy makers). Rather, possibly due to openness, these countries more generally greater domestic procyclical and more exposed to systemic risks, for which various MaPP can help

Overall Summary of Regression Results

| Effectiveness in economic terms | Non-core to core liabilities | | | Bank assets | | | Bank leverage | | |
|---------------------------------|------------------------------|--------------------------------|---------------------------|--------------------------------|---------------------------|---------------------------|--------------------------------|--------------------------------|---------------------------|
| | (1) Growth | (2) Pro-cyclicality | (3) Simultaneous | (1) Growth | (2) Pro-cyclicality | (3) Simultaneous | (1) Growth | (2) Pro-cyclicality | (3) Simultaneous |
| 1 | Loan to Value Caps (LTV) | Debt to Income Caps (DTI) | Credit Growth Caps (CG) | Debt to Income Caps (DTI) | Reserve Requirements (RR) | Dynamic Provisioning (DP) | Debt to Income Caps (DTI) | Limits on Foreign Lending (FC) | Loan to Value Caps (LTV) |
| 2 | Debt to Income Caps (DTI) | Credit Growth Caps (CG) | Reserve Requirements (RR) | Loan to Value Caps (LTV) | Dynamic Provisioning (DP) | Reserve Requirements (RR) | Limits on Foreign Lending (FC) | Debt to Income Caps (DTI) | Credit Growth Caps (CG) |
| 3 | Other MaPP | Limits on Foreign Lending (FC) | Other MaPP | Limits on Foreign Lending (FC) | Credit Growth Caps (CG) | Other MaPP | Loan to Value Caps (LTV) | Credit Growth Caps (CG) | Reserve Requirements (RR) |

1= Most effective in economic terms. 3= Less effective in economic terms.

| | |
|--|-------------------------------|
| | Most frequently effective |
| | 2nd most frequently effective |
| | 3rd most frequently effective |

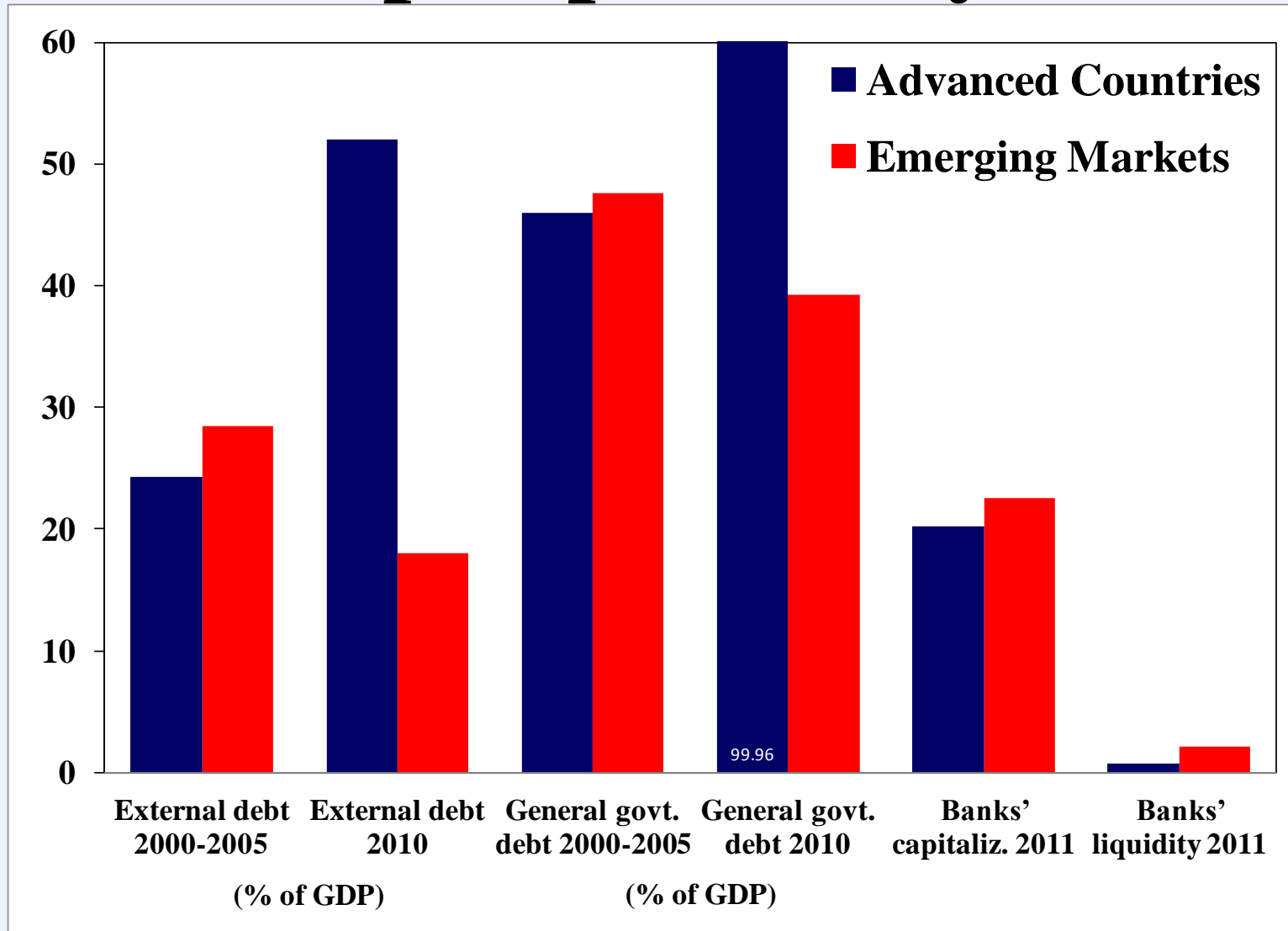
Economic impacts

- Two appear most often among three most effective: caps on DTI ratios and limits on credit growth
- In terms of frequency across different vulnerabilities, DTI caps rank highest
- In terms of reducing growth of leverage and asset, DTI caps economically most effective, while LTV caps best to reduce the growth of NCC
- To dampen pro-cyclicality of NCC, DTI caps most often effective, for asset growth RR, for leverage FC
- With other MaPP, RR often work quite well

V. Conclusions

- There is scope for macro-prudential policy
 - Pragmatic and discretionary within existing frameworks, targeted at specific markets/objectives
 - Ensuring resilience, avoiding cycles can reinforce
- Empirically: some evidence of success
 - But differentiate by phase and country, and MaPP
- But overall macro-prudential still at early stage
 - Too early to judge interactions with other policies
 - Likely mixture of rules and discretion and adaptations
 - More data, research and analyses on objectives, risks, calibration, etc. needed

EMs' current circumstances and prospects vary



While EMs Today are Doing Better, They Remain Exposed and Benefit from MaPP

- Current performance and situation stronger
 - EMs more independent growth poles
 - Macroeconomic and institutionally stronger
 - Better macroeconomic policies, stronger fiscal, better capitalized banking systems, less foreign finance
 - Current prospects better
- Yet remain exposed
 - To capital flows volatility
 - Rapidly changing financial sectors