BANK FOR INTERNATIONAL SETTLEMENTS

Supply- and demand-side factors in global banking

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The views expressed in these slides are those of the authors and do not necessarily reflect those of the BIS.

Outline of talk

- What is this paper about?
  - Estimates "supply" & "demand" shocks in the CBS (2000-2015)
  - Evaluates the plausibility of the estimated shocks
- Methodological approach
  - Standard techniques and problems in applying to CBS
  - New methodology that respects "adding up constraints"
- Adjustments to the CBS data
  - Breaks in series
  - Exchange rate movements
- Results
  - Supply shocks and the 2007-09 Global Financial Crisis
  - Euro area sovereign crisis
  - Selected emerging economies

Methodology

- A standard approach
  - Regress bilateral growth on time-varying "creditor" and "borrower" fixed effects (Khwaja and Mian (2008))

$$\frac{L_{b,c,t} - L_{b,c,t-1}}{L_{b,c,t-1}} = \alpha_{b,t} + \beta_{c,t} + \varepsilon_{b,c,t}$$

  - Fixed effects interpreted as "supply" and "demand" shocks

- Two problems:
  - Fails to explain much of the aggregate growth in claims (low R2 values)
  - Bias induced by entry of new links (ie lagged credit=0, so growth undefined)

- Methodology in this paper
  - Based on Amiti and Weinstein (2013)
  - Enforces "adding up constraints" so that aggregate growth rates are respected
  - Identical to Khwaja and Mian (2008) with Weighted Least Squares (WLS), ***except***….
  - Contains an adjustment for entry of new links.

Intuition of the methodology

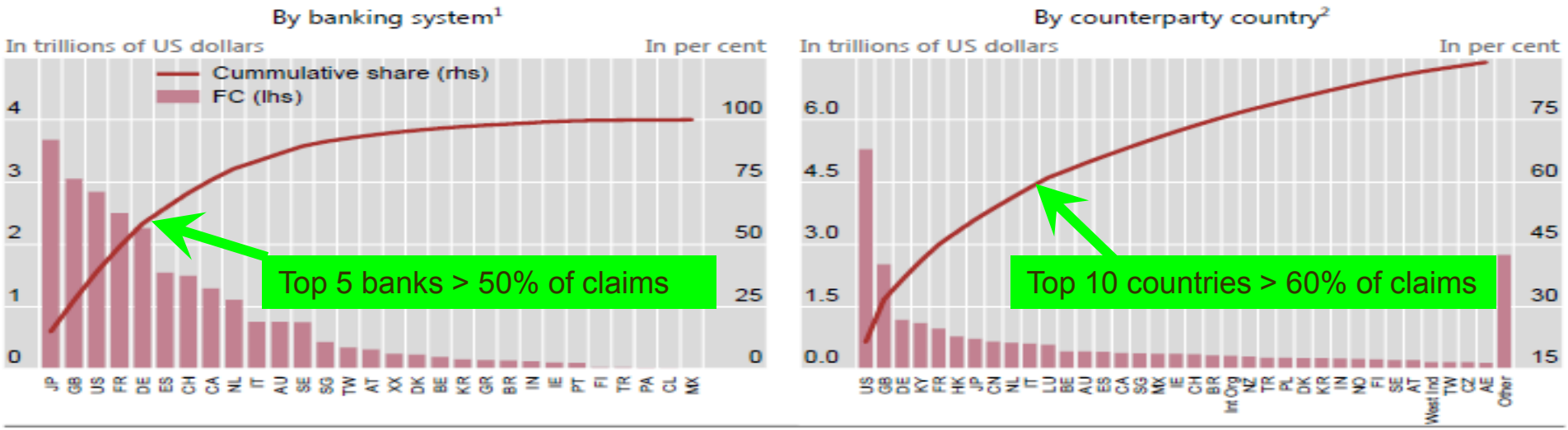
- Standard OLS regression weights each observation the same
  - Appropriate for unweighted arithmetic averages of bilateral growth rates

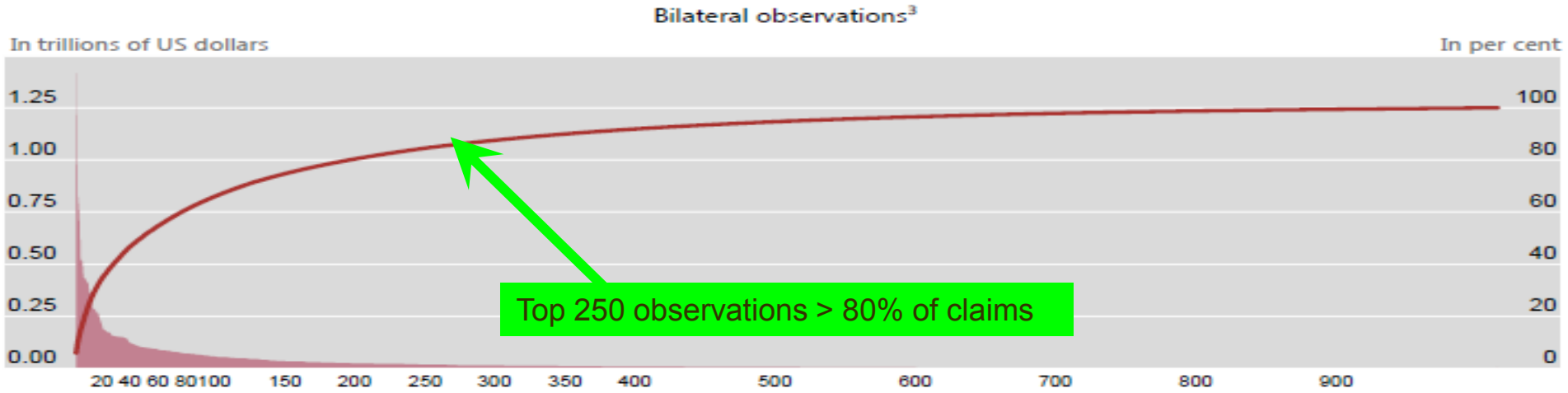
- Fundamental problem with the CBS:
  - Bilateral claims are highly concentrated (next slides)
  - Growth characteristics of small stocks are very different than those of large stocks
  - Dependent variable (growth rates) highly heteroskedastic
  - Unweighted arithmetic averages of bilateral growth rates don't reveal much
  - Bias induced by entry of new links (ie lagged credit=0, so growth undefined)

- Methodology used here
  - Decomposes growth to "common", "supply" and "demand" shocks
  - "Common" shock normalized as the median bilateral growth rate
  - "Supply" shocks unique to banking system
  - "Demand" shocks unique to counterparty countries

Concentration in foreign claims (FC)

At end-Q4 2015 Graph 1





[1] Bars show the total claims on all counterparty countries for the banking system listed on the x-axis. Banking system "XX" is a combination of banks headquartered in Hong Kong, Luxembourg and Norway which are masked due to confidentiality restrictions. The red line shows the cumulative share in all banking systems' claims on all counterparty countries. [2] Bars show all banking systems' combined claims on the counterparty country listed on the x-axis. The red line shows the cumulative share in all banking systems' claims on all counterparty countries. [2] Bars show bilateral claims (ie single banking system vis-à-vis a single counterparty country) ordered from largest to smallest, while the red line depicts the cumulative share in all banking systems' claims on all counterparty countries. The x-axis shows 964 observations (>1$ billion) out of 3,957 bilateral pairs with positive outstanding claims.

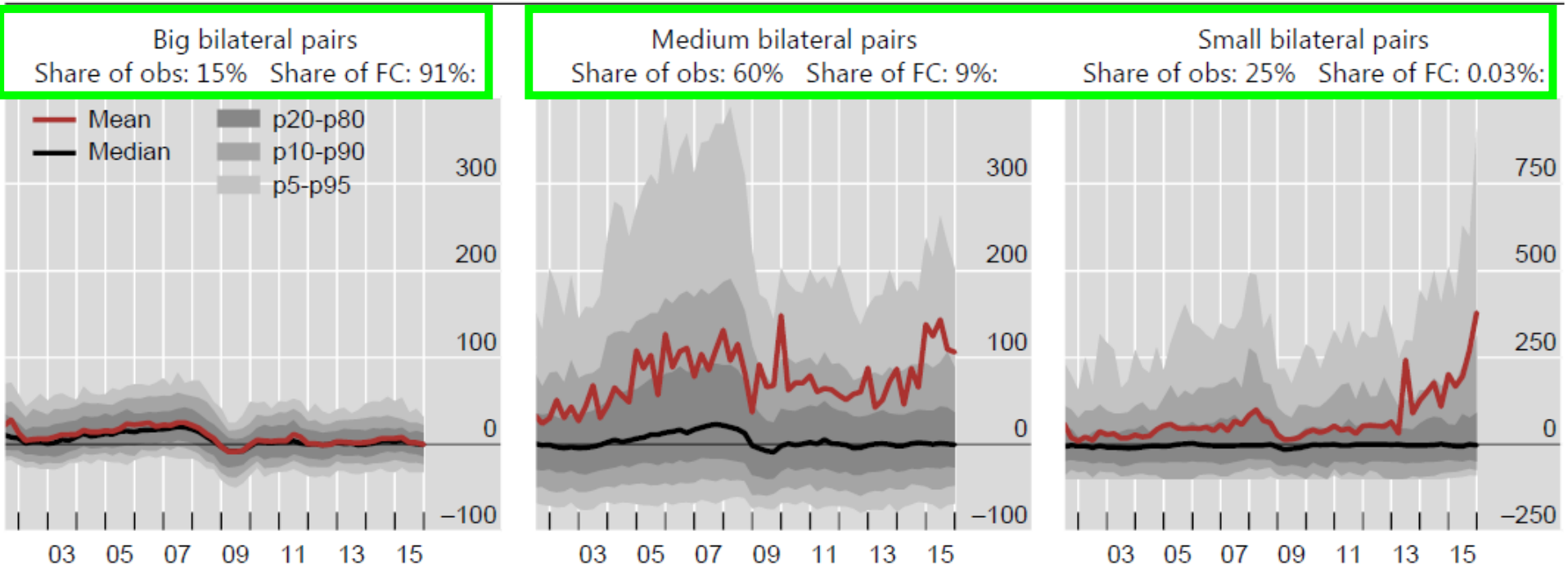
Source: BIS consolidated banking statistics (IC basis); BIS locational banking statistics; national data; authors' calculations.

Heteroskedastic growth rates in FC

Dispersion in the year-over-year growth in bilateral foreign claims[1]

In per cent

Graph 2



[1] Panels show the mean, median and selected percentile values (grey shaded area) of the year-over-year growth in foreign claims (adjusted for breaks in series and exchange rate movements). All bilateral (reporting bank vis-à-vis counterparty country) observations are grouped based on the outstanding stock of foreign claims; "big" observations are those were the outstanding stock of foreign claims is greater than the 75th percentile value for the sample as a whole, "small" observations are those that are below the 45th percentile value, and "medium" observations are all others not classified as "big" or "small".

Source: BIS consolidated banking statistics (IC basis); BIS locational banking statistics; national data; authors' calculations.

The predictive power of fixed effects regressions[1]

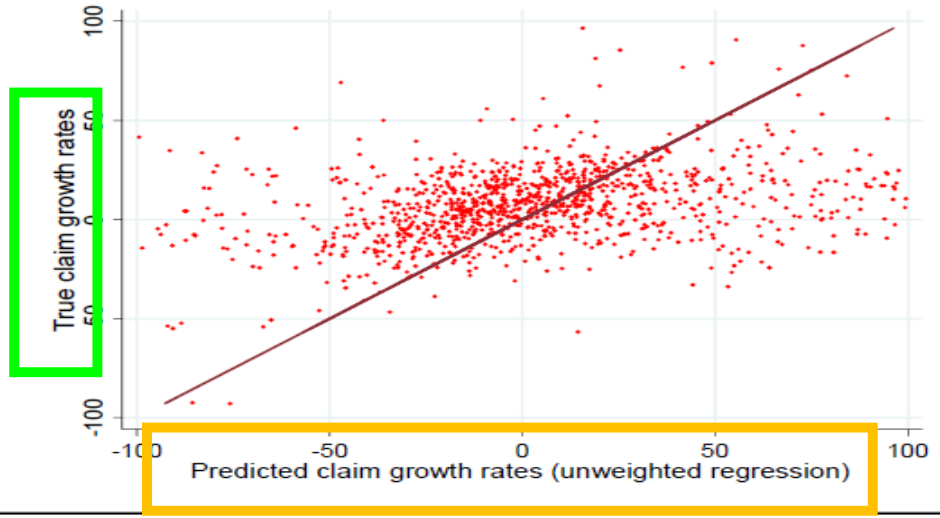
In per cent

Graph 6

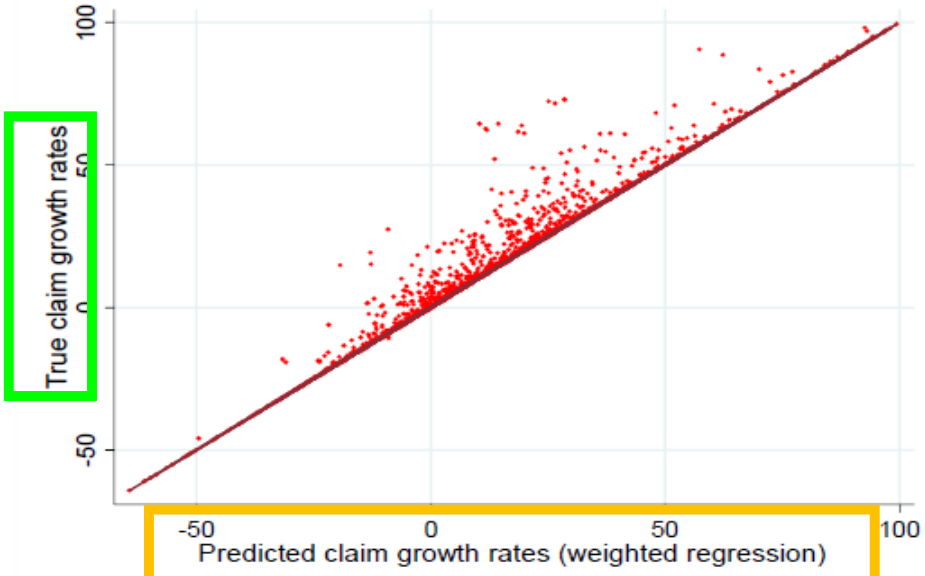
Aggregate claims on individual countries[2]

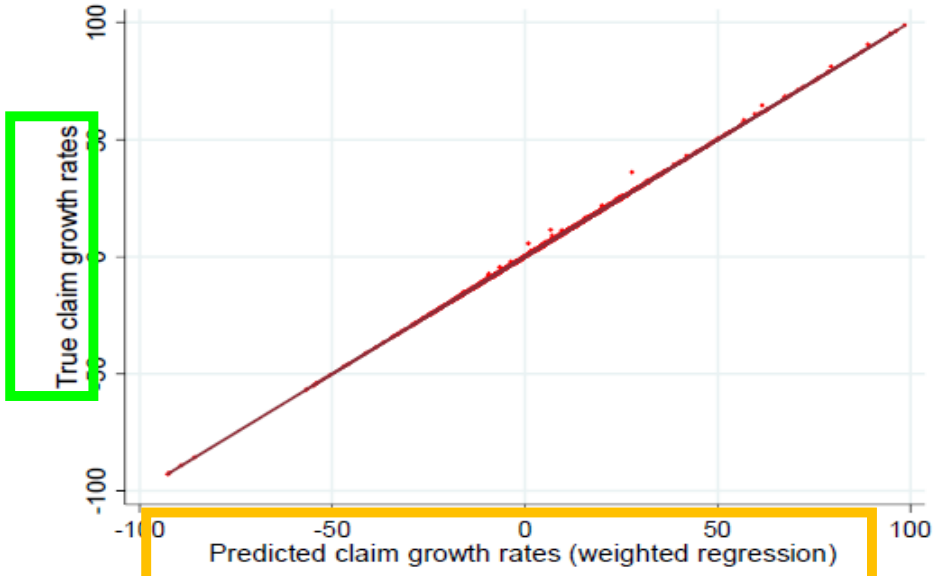
Aggregate claims of individual banking sytems[3]

Unweighted observations



Observations weighted by lagged outstanding claims[4]



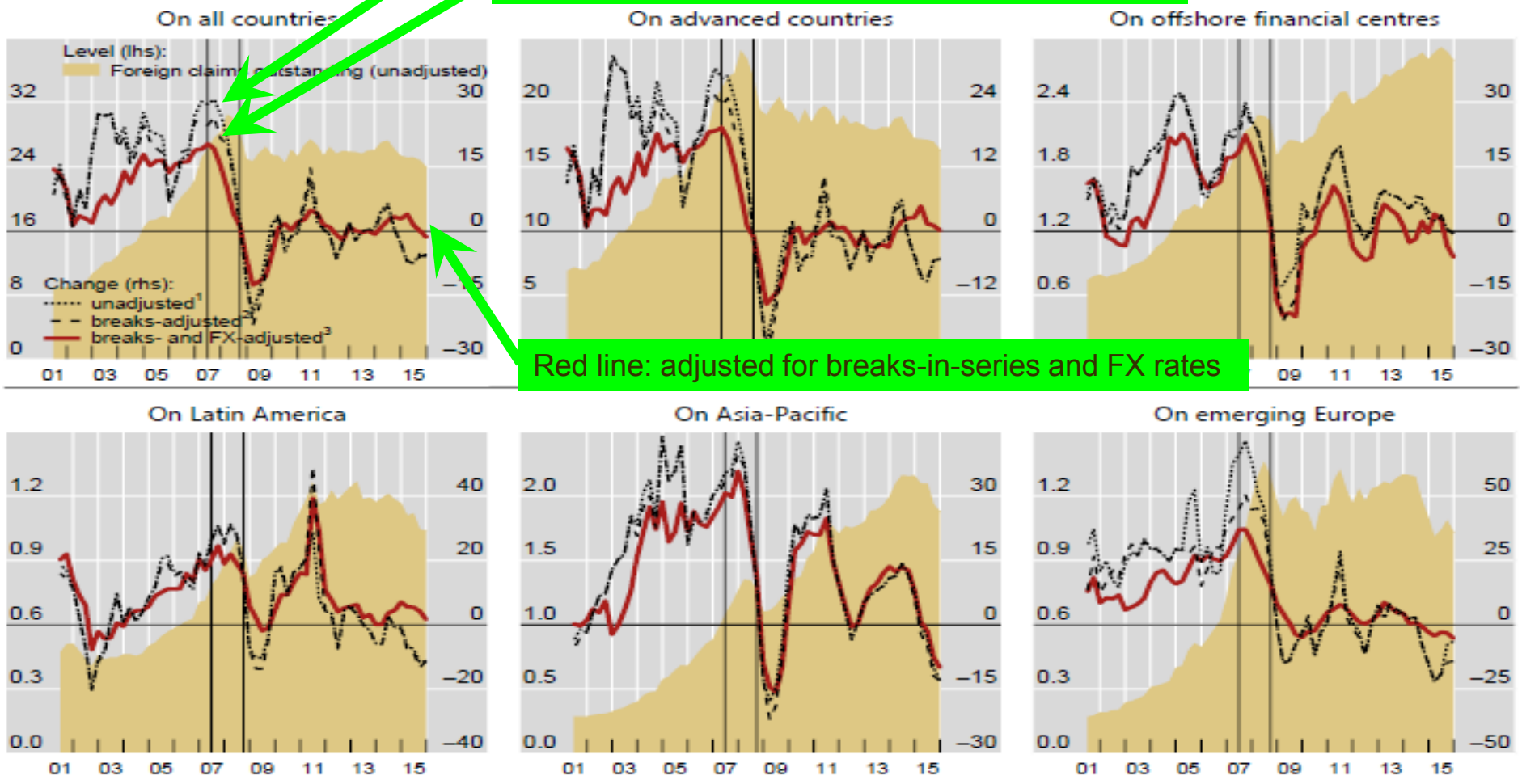


Output is only as good as the inputs

Solid black line: growth in raw data

Dashed black line: adjusted for breaks-in-series

Red line: adjusted for breaks-in-series and FX rates



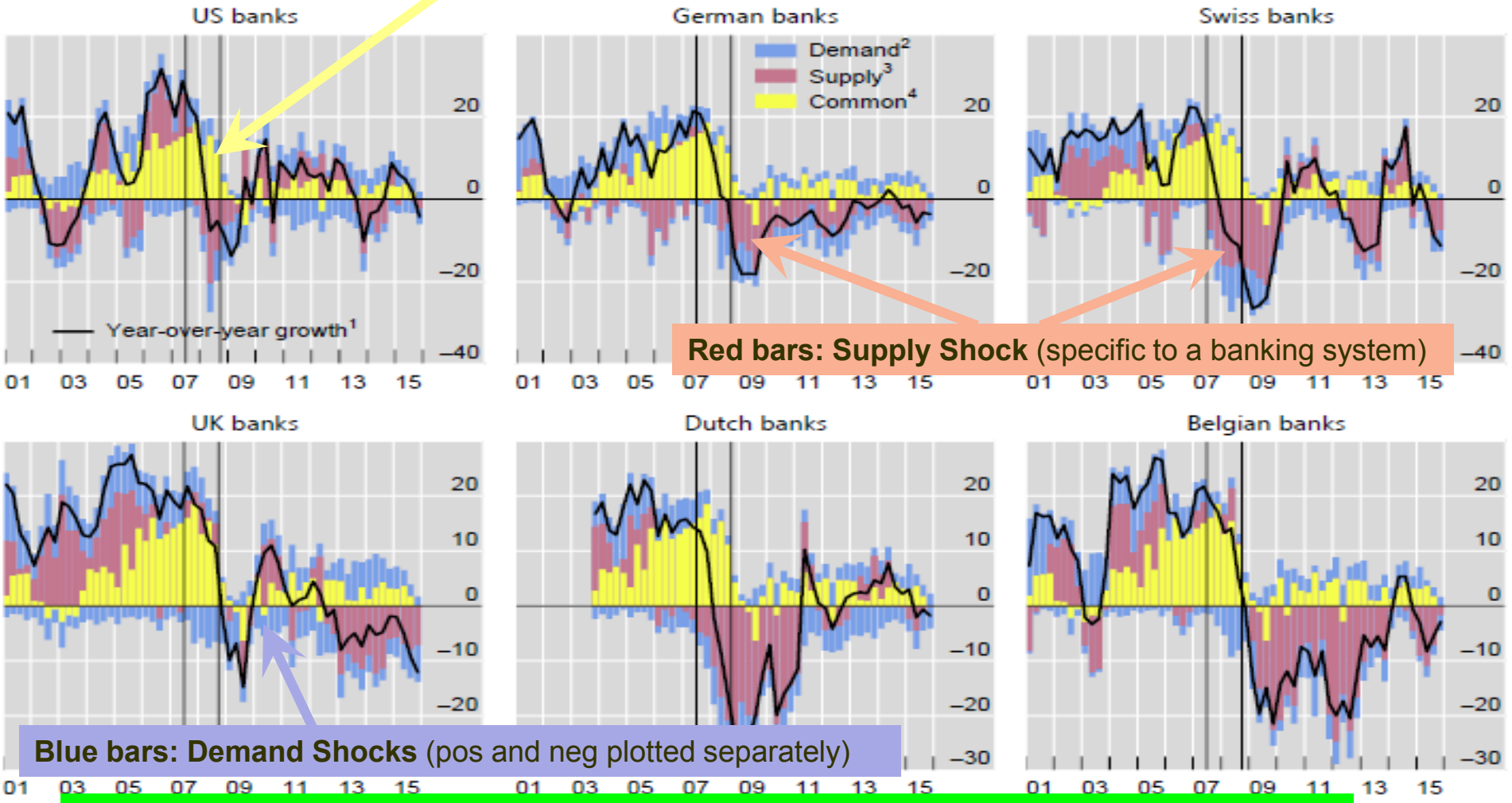
Bottom line: FX movements exaggerated growth pre-crisis, and exaggerated collapse during crisis

- *Asia-pacific: small FX effect since mostly cross-border in USD*
- *Emerging Europe: large FX effect since mostly cross-border in EUR and CHF*

Shocks to banking systems *most affected* during the global financial crisis

In per cent

Graph 7



Yellow bars: Common Shock (identical in all panels)

Red bars: Supply Shock (specific to a banking system)

Blue bars: Demand Shocks (pos and neg plotted separately)

Note:

[1] Yea … d for breaks in series … m in the panel title h … t are unique to banki…

Sourc…

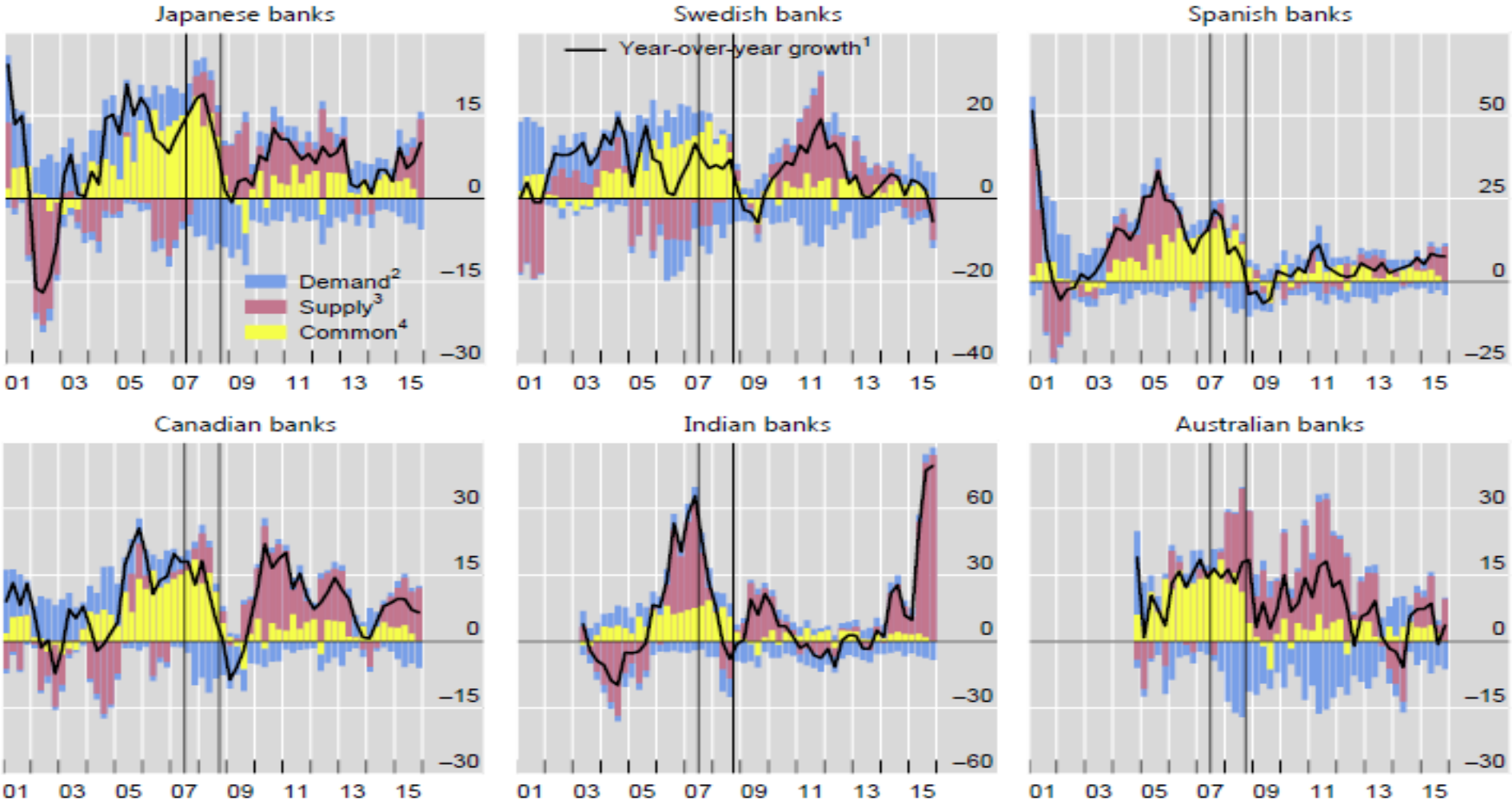
Key points:

- *Common shocks large pre-crisis ➔ All banks claims on all countries were rising rapidly*
- *Common shocks small post-crisis ➔ Banks had very different paths in 2009 - 2015*
- *Supply shocks dominant factor during crisis*
- *Mix of demand shocks depends on mix of counterparty countries*

Shocks to banking systems *less affected* during the global financial crisis

In per cent

Graph 8



Note: Vertical black lines indicate end-Q2 2007 and end-Q3-2008.

[1] Year-on-year growth in foreign claims of internationally active banks of the nationality indicated in the panel title, adjusted for breaks in series and exchange rate movements. [2] Estimated demand shocks to the counterparty countries on which the banking system in the panel title has outstanding foreign claims. Positive and negative demand shocks plotted separately. [3] Estimated supply shocks that are unique to banking system in the panel title. [4] Estimated shocks that are common to all banking systems and counterparty countries.

Source: BIS consolidated banking statistics (IC basis); BIS locational banking statistics; national data; authors' calculations.

Do the supply shocks make sense?

- Hypothesis 1: more toxic assets ➔ bigger supply shocks
  - Can't measure toxic assets directly
  - But can measure banks' cumulative losses during crisis (2008 – 2010)

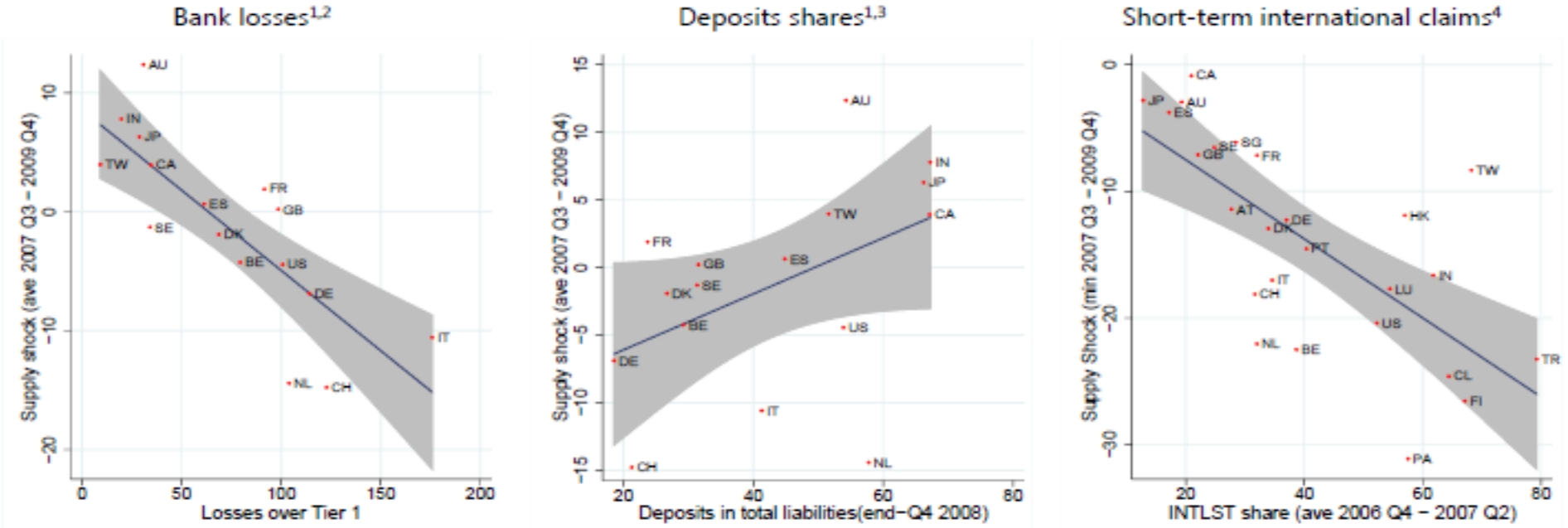
- Hypothesis 2: less stable funding ➔ bigger supply shocks
  - Measure stable funding as share of deposits in total liabilities on eve of crisis

- Hypothesis 3: Shorter-term claims ➔ bigger supply shocks
  - Measure as short-term international claims in total foreign claims on eve of crisis

Correlating supply-shocks with outside measures

Supply shocks during the financial crisis (Q3 2007 – Q4 2009)

Graph 9



Significant at 99%

R2 = 64%

Significant at 90%

R2 = 21%

Significant at 95%

R2 = 32%

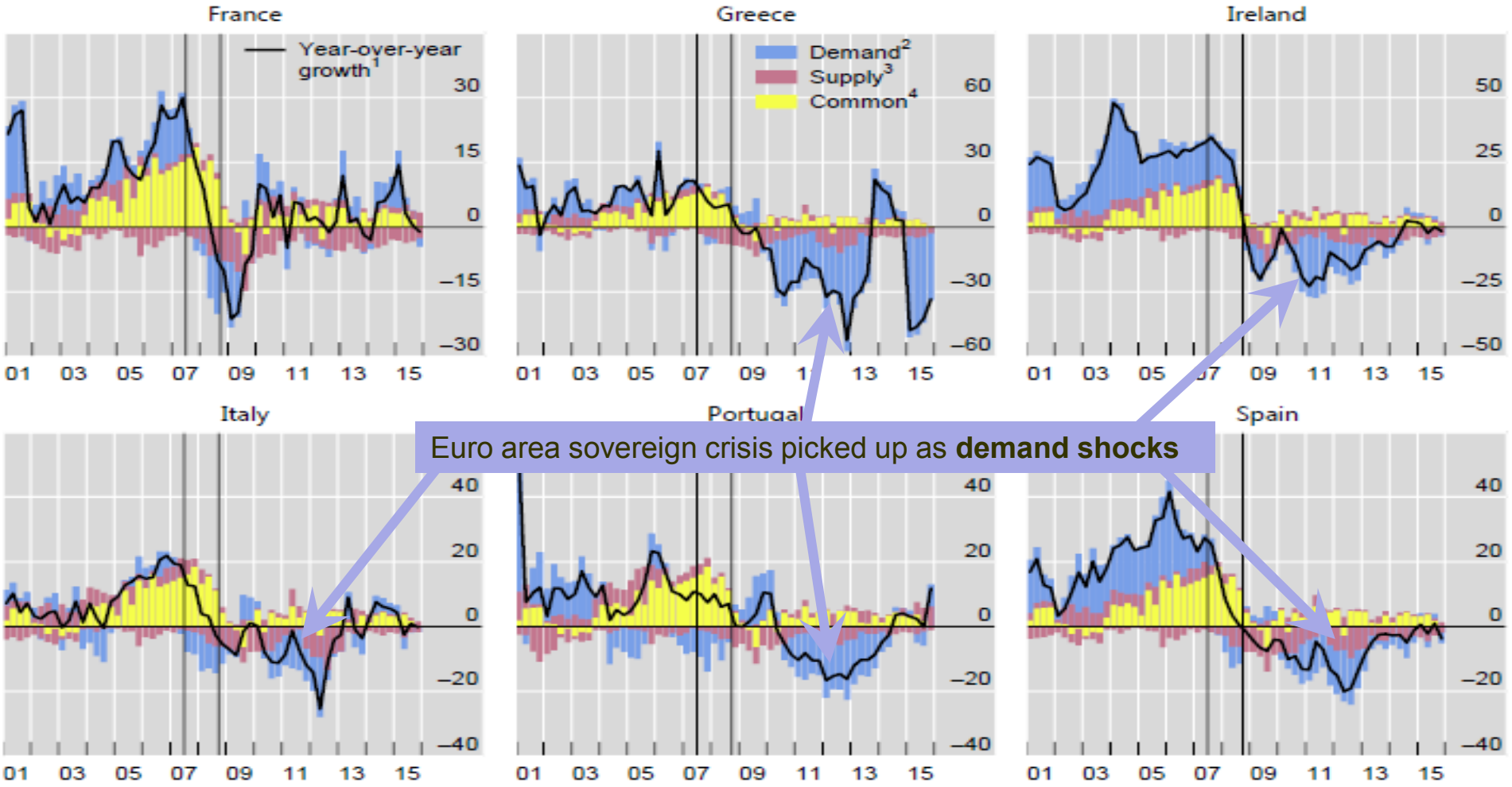
[1] The y ax … of the supply sho … 2009 for the bankin … s. Grey shaded ar … or the linear regre … ots each banking sy … ported between 2 … he same banks' cor … d-2008. For each indi … anking system aggregates, total credit losses are taken to be the larger value from two different sources: the maximum of non-performing loans reported in 2008–10 (SNL Financial), and reported credit losses on loans and securities (Bloomberg). [2] Total deposits as a percentage of total debt liabilities (including domestic banking liabilities) as of end-2008, weighted average across the major banks headquartered in the countries shown. [4] The y axis depicts the *minimum* value of the supply shock between Q3 2007 to Q4 2009 for the banking system listed in the panels. The x axis shows the share of each banking system's short-term international claims (INTLST) in total foreign claims on all counterparty countries; average over the 2006 Q4 – 2007 Q2 window. Short-term international claims are those with a remaining maturity of one year or less. Note that there is no maturity breakdown for local claims in local currencies (LCLC).

Source: Bloomberg, SNL Financial; BIS consolidated banking statistics (IC basis); BIS locational banking statistics; authors' calculations.

Shocks to foreign claims on selected euro area countries

In per cent

Graph 12



Note: Vertical black lines indicate end-Q2 2007 and end-Q3-2008.

[1] Year-on-year growth in foreign claims of all reporting internationally active banks on the country listed in the panel title, adjusted for breaks in series and exchange rate movements. [2] Estimated demand shocks to unique to the counterparty country listed in the panel title. [3] Estimated supply shocks to the constellation of banking systems that have outstanding foreign claims on the counterparty country listed in the panel title. Positive and negative supply shocks plotted separately. [4] Estimated shocks that are common to all banking systems and counterparty countries.

Source: BIS consolidated banking statistics (IC basis); BIS locational banking statistics; national data; authors' calculations.

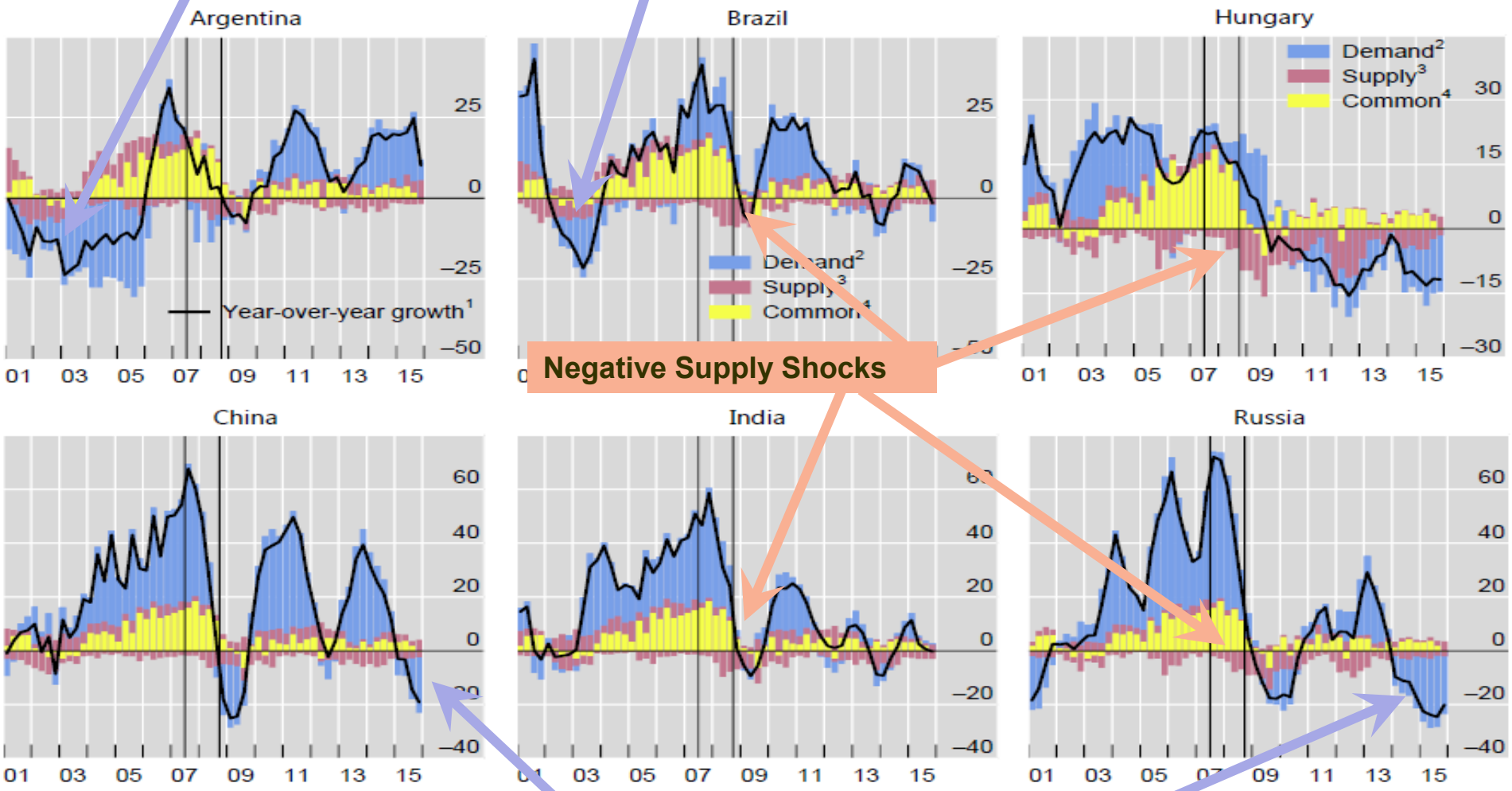
Shocks to foreign claims on selected emerging economies

In per cent

Argentina's default

Recession in Brazil

Graph 13



Note: Vertical black lines indicate end-Q2 2007 and end-Q3-2008.

[1] Year-on-year growth in foreign claims of all reporting internationally active banks on the country listed in the panel title, adjusted for breaks in series and exchange rate movements. [2] Estimated demand shocks to unique to the counterparty country listed in the panel title. [3] Estimated supply shocks to the claims on the counterparty country listed in the panel title. Positive and neg t are common to all banking systems and counterparty countries.

Source: BIS consolidated banking statistics (IC basis); BIS locational banking statistics; national data; authors' calculations.

Does claim structure matter for claim stability?

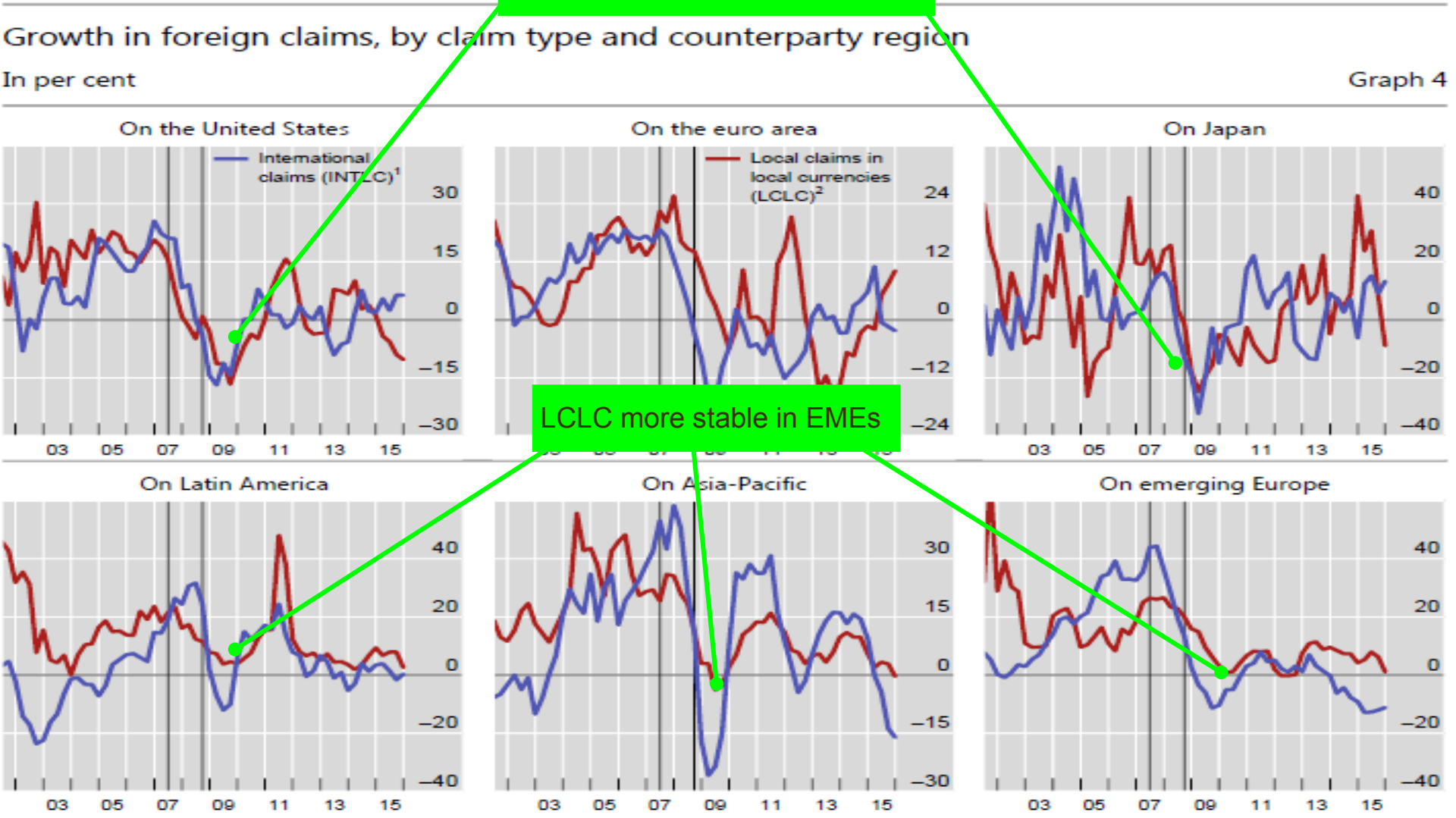
- Local claims more stable the cross-border claims
  - Cross-border more likely to be funded by wholesale liabilities
  - Local claims more likely to be funded locally and in the local currency

- Local Intermediation (LINT)
  - Proxy for retail banking in EMEs
  - LINT = min(LCLC, LLLC)/FC

- Hypothesis: Higher LINT share ➔ smaller shocks (demand and supply)
  - Measure LINT on eve of crisis (ave 2006 Q4 – 2007 Q2)
  - Measure shocks as maximum observed 2007Q3 – 2009Q4

Stability of internation[illegible]laims

Local-in-local (LCLC) contract at same rate as cross-border



LCLC more stable in EMEs

Note: V

[1] Year- growth

Source:

er-year

Why? Instrument matters!!

Local positions in Emerging markets = Corp/Retail banking (eg loans, mortgages and deposits)

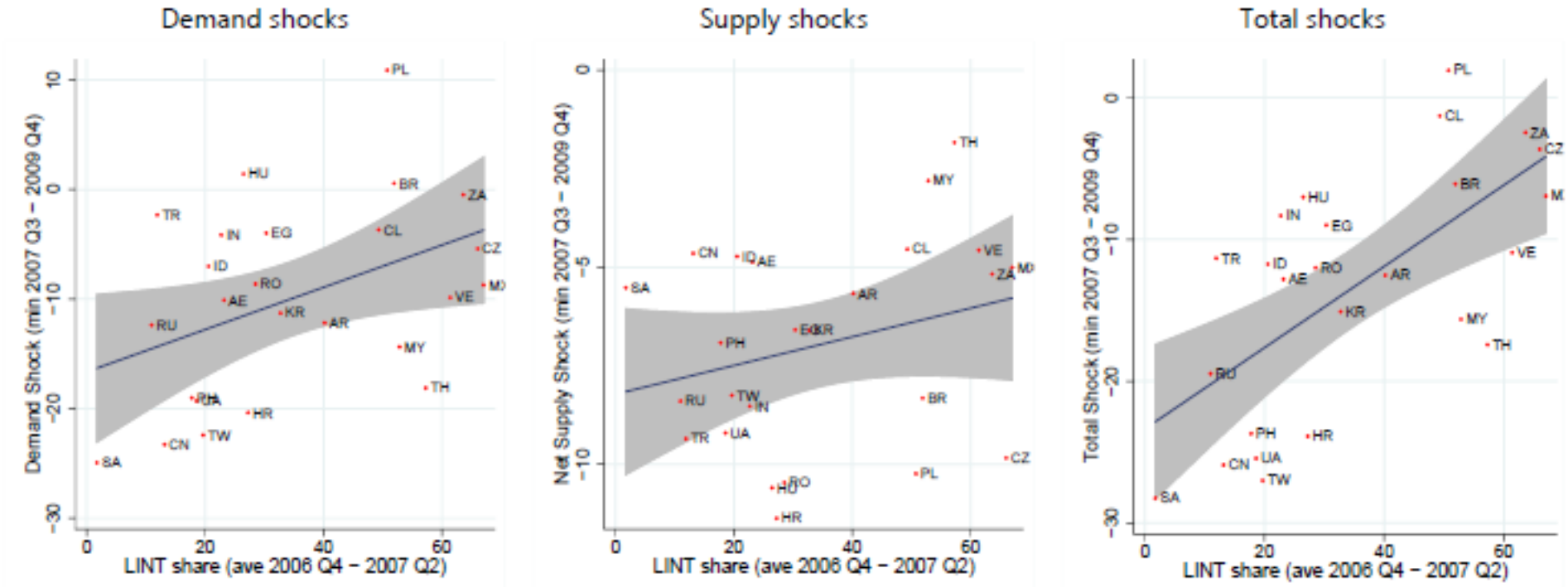
Local positions in Developed countries = Securities trading funded by ST wholesale funding

Local intermediation in EMEs (top 25 = 90% of FC on EMEs)

Estimated shocks and local intermediation in emerging economies (Q3 2007-Q4 2009)[1]

In per cent

Graph 15



Significant at 95%

R2 = 33%

Not significant
(but highly sig if max negative shock is used)

Significant at 99%

R2 = 43%

[1] The y-axe … f the estimated … shock (centre … mand plus net sup … erienced by ea … risis window. … ry, the local interm … ined as the su … f the minimu … local claims and local currencies and local liabilities (ie min(LCLC, LLLC) as a share of all creditor banking systems' total foreign claims the country; average value in 2006 Q4 – 2007 Q2. See footnote 31 in main text.

Source: BIS consolidated banking statistics (IC basis); BIS locational banking statistics; national data; authors' calculations.

Still to do…

- Statistical significance of the shocks
  - Simply WLS estimates straight-forward to calculate
  - Including entry of "links" more difficult ➔ bootstrapping techniques
- Taking into account "safe" vs. "risky" assets
  - "Flight to safety" (ie holdings of G7 govt bonds) boosts claims
  - Claims on US up since crisis ➔ holdings of reserves at the Fed
  - Should these be excluded? ➔ would likely increase size of negative supply shocks
- Correlate supply shocks with counterparty country metrics
  - "Openness"
  - Riskiness/Ratings (ie do banks cut claims on riskier countries first?)
- ???

That's it!
Thank you.
Questions?

How to adjust the CBS for FX movements

- FC = INTL + LCLC
- For LCLC: currency is know by construction
- For INTL: break into pieces
  - INTL = cross-border (XB)+local claims in foreign currencies (LCFC)
  - For XB: use currency breakdown in BIS locational by residency and by nationality
    - If cpty country is reporter, subtract interoffice liabilities of banks in country
    - Assumes all banks' claims on cpty country have same currency distribution
  - For LCFC:
    - If cpty country is a reporter, use BIS locational statistics *by nationality*
    - If cpty country is not a reporter, assume same distribution as XB