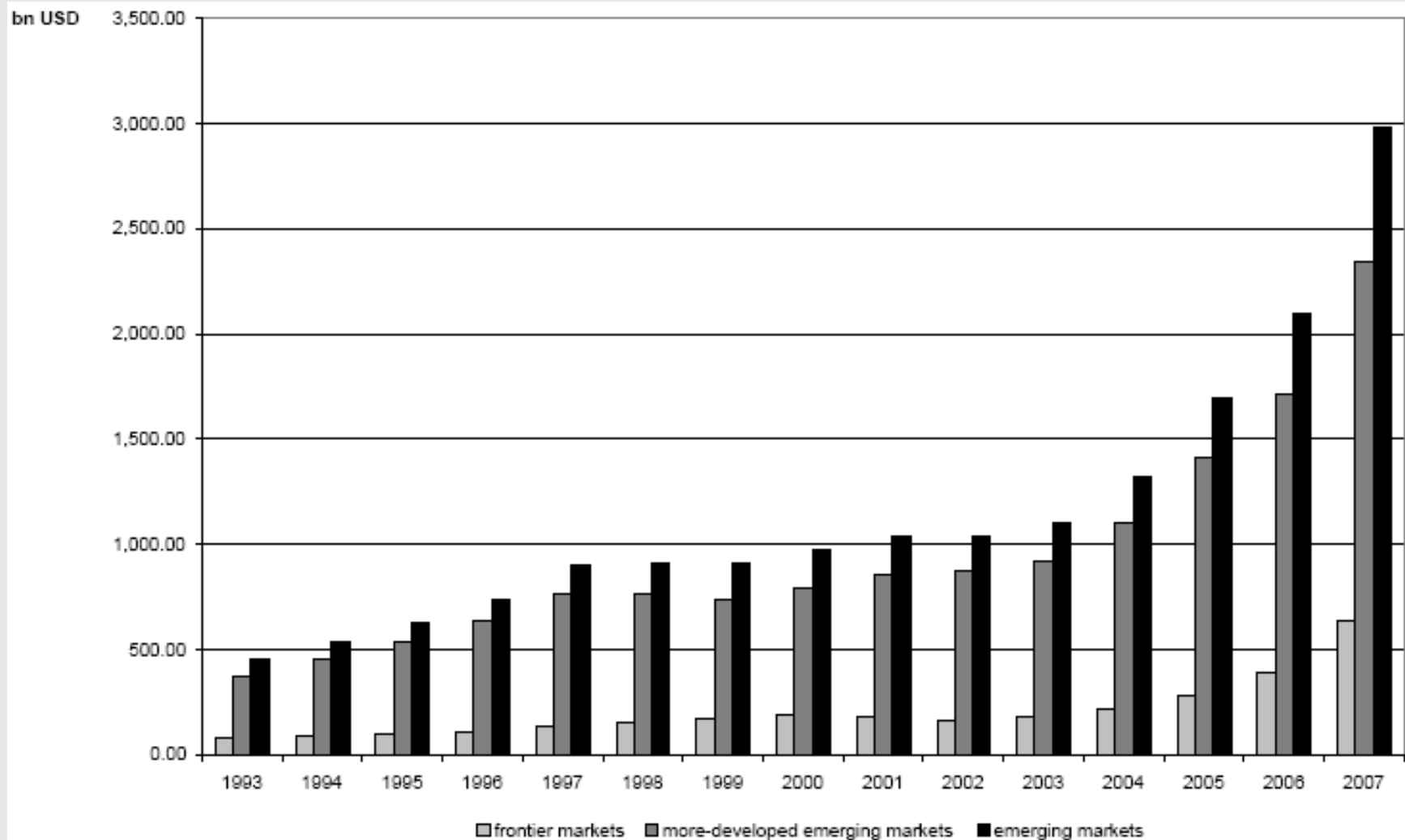


# Bank Lending to Emerging Markets: Empirical Evidence on Country-level and Bank-specific Determinants

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# Motivation I

Amount of foreign claims



## Motivation II

- Heckscher-Ohlin model predicts that capital may flow from rich to poor countries due to local differentials in the marginal product of capital.
- Motivated by the strong assumptions of the neoclassical growth model and referring to the “Lucas Paradox“, a growing strand of empirical research is focussing on country-level characteristics to better explain uneven flows of international bank lending (e.g. Papaioannou, 2009; Houston et al., 2009; Herrero and Pería, 2007; Janneau and Micu, 2002).
- Characteristics of the lending country’s banking system have been disregarded so far; controlling for these characteristics is important since the neoclassical growth model fails to explain different business and investment strategies (“black box of production functions”).

## Data I

- **Dependent variable:** Foreign claims, retrieved from the BIS “Consolidated Banking Statistics”, between 13 OECD lending countries and 51 emerging markets from 1993 to 2007.
- **Control variables (“gravity model”):**
  - Gravity force element:  $Gravity_{i,j} = \frac{GDP_i \times GDP_j}{Distance_{i,j}}$
  - GDP per capita (income) of both the source and recipient country
  - GDP growth (business cycle, lagged) of both the source and recipient country

## Data II

### ■ Macroeconomic and institutional variables:

- Exchange rate agreement (lagged)
- Interest rate arbitrage (lagged)
- Country risk
- Financial reforms

### ■ Control variables of the lending country's banking system:

- Size
- Capital ratio
- Asset quality (lagged)
- Efficiency
- Earnings
- Liquidity (lagged)

## Empirical Model

- Model on panel data:  $y_{ijt} = \alpha_{ij} + \sum \beta_k g_{ijt, k} + \beta_2 x_{ijt} + \mu_t + \varepsilon_{ijt}$
- To control for heterogeneity in bank lending due to “common lender” relationships between single source and recipient countries, we include cluster-robust standard errors at the country-level (→ generalized Lagrange multiplier test based on White (1980)).
- Estimating a fixed effects model is appropriate since (1) our data almost covers an overall population (source OECD countries and emerging markets) and (2) a generalization of the Hausman approach by Arellano (1993) rejects the null hypothesis of no correlation between the individual specific effect and the independent variables.

## Main Findings

|                            | (1)                   | (2)                   | (3)                   |
|----------------------------|-----------------------|-----------------------|-----------------------|
| Gravity $(i, j, t-1)$      | 0.7587<br>(0.1200)*** | 1.2302<br>(0.4616)*** | 0.7912<br>(0.1526)*** |
| Income $(i, t-1)$          | -1.1748<br>(0.6358)*  | -2.9224<br>(1.3363)** | -0.3265<br>(0.8758)   |
| Income $(j, t-1)$          | 1.4766<br>(0.1518)*** | 0.3408<br>(0.8488)    | 1.4784<br>(0.1759)*** |
| Business cycle $(i, t-2)$  | 0.0208<br>(0.0103)**  | 0.0429<br>(0.0130)*** | 0.0058<br>(0.0157)    |
| Business cycle $(j, t-2)$  | 0.0102<br>(0.0041)**  | 0.0005<br>(0.0045)    | 0.0125<br>(0.0059)**  |
| Country-pair fixed effects | yes                   | yes                   | yes                   |
| Time fixed effects         | yes                   | yes                   | yes                   |
| Cluster country-pair       | yes                   | yes                   | yes                   |
| No. of obs.                | 7908                  | 3650                  | 4258                  |
| Wald $\chi^2$              | 78.76***              | 31.19***              | 57.62***              |
| Adj. R <sup>2</sup>        | 0.27                  | 0.24                  | 0.20                  |

## Country-level Macroeconomic and Institutional Determinants

|                                       | (1)                    | (2)                    | (3)                     | (4)                    |
|---------------------------------------|------------------------|------------------------|-------------------------|------------------------|
| Gravity $(i, j, t-1)$                 | 0.7550<br>(0.1193) *** | 0.7827<br>(0.1526) *** | 0.6845<br>(0.1241) ***  | 0.5482<br>(0.1359) *** |
| Income $(i, t-1)$                     | -1.1941<br>(0.6356) *  | -0.4120<br>(0.7354)    | -0.9196<br>(0.6504)     | -1.9381<br>(0.7056)    |
| Income $(j, t-1)$                     | 1.4577<br>(0.1500) *** | 1.1250<br>(0.1879) *** | 1.3896<br>(0.1517) ***  | 1.3144<br>(0.1658) *** |
| Business cycle $(i, t-2)$             | 0.0194<br>(0.0103) *   | 0.0166<br>(0.0114)     | 0.0234<br>(0.0102)      | 0.0220<br>(0.0116)     |
| Business cycle $(j, t-2)$             | 0.0096<br>(0.0041) **  | 0.0086<br>(0.0048) *   | 0.0081<br>(0.0040) **   | 0.0102<br>(0.0048) *** |
| Exchange rate agreement $(i, j, t)$   | 0.2227<br>(0.1046) **  |                        |                         |                        |
| Interest rate arbitrage $(i, j, t-1)$ |                        | 0.0036<br>(0.0015) **  |                         |                        |
| Country risk $(j, t)$                 |                        |                        | -0.1038<br>(0.0361) *** |                        |
| Financial reforms $(j, t-1)$          |                        |                        |                         | 1.8217<br>(0.3687) *** |
| Country-pair fixed effects            | yes                    | yes                    | yes                     | yes                    |
| Time fixed effects                    | yes                    | yes                    | yes                     | yes                    |
| Cluster country-pair                  | yes                    | yes                    | yes                     | yes                    |
| No. of obs.                           | 7908                   | 5329                   | 7908                    | 6121                   |
| Wald $\chi^2$                         | 66.63 ***              | 39.51 ***              | 66.99 ***               | 51.02 ***              |
| Adj. R <sup>2</sup>                   | 0.27                   | 0.28                   | 0.26                    | 0.26                   |



## Structural Breaks in Time Series

- We split the entire sample into three subsamples:
  - Subsample 1: 1993-1998 (onset stage)
  - Subsample 2: 1999-2003 (crisis stage)
  - Subsample 3: 2004-2007 (recovery and boom stage)
  
- Since the break dates are known a priori, we employ a Chow test (1960) → Building subsamples for these three different time periods is appropriate.

## Bank-specific Determinants I – Size

|                            | (1)<br>Full period      | (2)<br>1993-1998        | (3)<br>1999-2003       | (4)<br>2004-2007        |
|----------------------------|-------------------------|-------------------------|------------------------|-------------------------|
| Gravity $(i, j, t-1)$      | 0.6428<br>(0.1241) ***  | 0.5801<br>(0.1849) ***  | -1.3622<br>(0.5593) ** | 3.0738<br>(1.3549) **   |
| Income $(i, t-1)$          | -1.7832<br>(0.6363) *** | 5.3508<br>(1.2241) ***  | -3.2280<br>(2.3547)    | -9.0691<br>(3.3849) **  |
| Income $(j, t-1)$          | 1.4335<br>(0.1535) ***  | 0.8620<br>(0.1536) ***  | 3.8693<br>(0.9168) *** | 2.1362<br>(2.8251)      |
| Business cycle $(i, t-2)$  | 0.0358<br>(0.0105) ***  | -0.0214<br>(0.0095) *** | -0.0079<br>(0.0122)    | -0.1377<br>(0.0445) *** |
| Business cycle $(j, t-2)$  | 0.0097<br>(0.0040) ***  | 0.0199<br>(0.0051) **   | -0.0131<br>(0.0050) ** | 0.0017<br>(0.0159)      |
| Size $(i, t)$              | 0.2309<br>(0.0608) **   | 0.0478<br>(0.0655)      | 0.3509<br>(0.0954) *** | -0.7493<br>(0.2318) *** |
| Country-pair fixed effects | yes                     | yes                     | yes                    | yes                     |
| Time fixed effects         | yes                     | no                      | no                     | no                      |
| Cluster country-pair       | yes                     | yes                     | yes                    | yes                     |
| No. of obs.                | 7908                    | 2348                    | 1864                   | 1200                    |
| Wald $\chi^2$              | 81.71 ***               | 52.81 ***               | 17.26 ***              | 36.66 ***               |
| Adj. R <sup>2</sup>        | 0.25                    | 0.30                    | 0.13                   | 0.34                    |
| F-test                     |                         | 8.81 ***                | 5.31 **                | 28.51 ***               |

## Bank-specific Determinants II – Capital Ratio

|                            | (1)<br>Full period      | (2)<br>1993-1998        | (3)<br>1999-2003        | (4)<br>2004-2007         |
|----------------------------|-------------------------|-------------------------|-------------------------|--------------------------|
| Gravity $(i, j, t-1)$      | 0.7142<br>(0.1177) ***  | 0.4860<br>(0.1892) **   | -0.7548<br>(0.4981) *   | 4.3775<br>(1.2771) ***   |
| Income $(i, t-1)$          | -0.5083<br>(0.6271)     | 6.2103<br>(1.1538) ***  | -0.3349<br>(2.0499)     | -14.6250<br>(3.3336) *** |
| Income $(j, t-1)$          | 1.4469<br>(0.1521) ***  | 0.8016<br>(0.1525) ***  | 3.2352<br>(0.8777) ***  | -0.2338<br>(2.6529)      |
| Business cycle $(i, t-2)$  | 0.0125<br>(0.0099)      | -0.0269<br>(0.0096) *** | -0.0346<br>(0.0123) *** | -0.1572<br>(0.0490) ***  |
| Business cycle $(j, t-2)$  | 0.0105<br>(0.0040) ***  | 0.0197<br>(0.0051) ***  | -0.0139<br>(0.0050) *** | 0.0060<br>(0.0161)       |
| Capital ratio $(i, t)$     | -0.1175<br>(0.0268) *** | -0.1099<br>(0.0384) *** | -0.1145<br>(0.0381) *** | -0.1454<br>(0.0354)      |
| Country-pair fixed effects | yes                     | Yes                     | yes                     | yes                      |
| Time fixed effects         | yes                     | no                      | no                      | no                       |
| Cluster country-pair       | yes                     | yes                     | yes                     | yes                      |
| No. of obs.                | 7908                    | 2348                    | 1864                    | 1200                     |
| Wald $\chi^2$              | 80.03 ***               | 57.66 ***               | 15.85 ***               | 35.37 ***                |
| Adj. R <sup>2</sup>        | 0.28                    | 0.25                    | 0.06                    | 0.35                     |
| F-test                     |                         | 12.96 ***               | 5.62 **                 | 26.08 ***                |

## Bank-specific Determinants III – Asset Quality

|                            | (1)<br>Full period      | (2)<br>1993-1998        | (3)<br>1999-2003        | (4)<br>2004-2007        |
|----------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| Gravity $(i, j, t-1)$      | 0.8978<br>(0.1258) ***  | 0.5100<br>(0.2273) **   | -0.1978<br>(0.5629) *   | 2.3805<br>(1.2469) *    |
| Income $(i, t-1)$          | -1.9911<br>(0.6945) *** | 5.9027<br>(1.5014) ***  | -4.0983<br>(2.5195)     | -9.8136<br>(3.1532) *** |
| Income $(j, t-1)$          | 1.5034<br>(0.1544) ***  | 0.8784<br>(0.1617) ***  | 2.4939<br>(0.9894) **   | 1.9740<br>(2.5674)      |
| Business cycle $(i, t-2)$  | 0.0145<br>(0.0106)      | -0.0367<br>(0.0117) *** | -0.0155<br>(0.0134)     | -0.0803<br>(0.0455) *   |
| Business cycle $(j, t-2)$  | 0.0045<br>(0.0043)      | 0.0173<br>(0.0056) ***  | -0.0138<br>(0.0051) *** | 0.0040<br>(0.0161)      |
| Asset quality $(i, t-1)$   | -0.0549<br>(0.0309) *   | -0.0481<br>(0.0463)     | -0.0196<br>(0.0249)     | -0.7838<br>(0.1585) *** |
| Country-pair fixed effects | yes                     | yes                     | yes                     | yes                     |
| Time fixed effects         | yes                     | no                      | no                      | no                      |
| Cluster country-pair       | yes                     | yes                     | yes                     | yes                     |
| No. of Obs.                | 7159                    | 1696                    | 1864                    | 1200                    |
| Wald $\chi^2$              | 60.06 ***               | 46.02 ***               | 12.81 ***               | 39.90 ***               |
| Adj. R <sup>2</sup>        | 0.27                    | 0.25                    | 0.05                    | 0.33                    |
| F-test                     |                         | 11.80 ***               | 4.04 **                 | 26.27 ***               |

## Bank-specific Determinants IV – Efficiency

|                            | (1)<br>Full period     | (2)<br>1993-1998       | (3)<br>1999-2003        | (4)<br>2004-2007         |
|----------------------------|------------------------|------------------------|-------------------------|--------------------------|
| Gravity $(i, j, t-1)$      | 0.7597<br>(0.1202) *** | 0.5571<br>(0.1855) *** | -0.5069<br>(0.5402) *   | 4.0085<br>(1.3291) ***   |
| Income $(i, t-1)$          | -1.0769<br>(0.6306) *  | 6.2340<br>(1.1680) *** | -2.5659<br>(2.2796)     | -16.4154<br>(3.4379) *** |
| Income $(j, t-1)$          | 1.4721<br>(0.1517) *** | 0.8485<br>(0.1543) *** | 2.8835<br>(0.9483) ***  | 0.5467<br>(2.7287)       |
| Business cycle $(i, t-2)$  | 0.0194<br>(0.0103) *** | -0.0212<br>(0.0093) ** | -0.0062<br>(0.0128)     | -0.1772<br>(0.0547) ***  |
| Business cycle $(j, t-2)$  | 0.0104<br>(0.0041) *   | 0.0199<br>(0.0050) *** | -0.0135<br>(0.0050) *** | 0.0040<br>(0.0162)       |
| Efficiency $(i, t)$        | 0.0037<br>(0.0027)     | 0.0134<br>(0.0058)     | -0.0114<br>(0.0059) *   | 0.0058<br>(0.0043)       |
| Country-pair fixed effects | yes                    | yes                    | yes                     | yes                      |
| Time fixed effects         | yes                    | no                     | no                      | no                       |
| Cluster country-pair       | yes                    | yes                    | yes                     | yes                      |
| No. of obs.                | 7908                   | 2348                   | 1864                    | 1200                     |
| Wald $\chi^2$              | 65.87 ***              | 53.99 ***              | 12.98 ***               | 40.22 ***                |
| Adj. R <sup>2</sup>        | 0.27                   | 0.28                   | 0.04                    | 0.34                     |
| F-test                     |                        | 11.71 ***              | 8.83 ***                | 32.64 ***                |

## Bank-specific Determinants V – Earnings

|                            | (1)<br>Full period      | (2)<br>1993-1998       | (3)<br>1999-2003       | (4)<br>2004-2007         |
|----------------------------|-------------------------|------------------------|------------------------|--------------------------|
| Gravity $(i, j, t-1)$      | 0.7205<br>(0.1207) ***  | 0.5551<br>(0.1848) *** | -0.5389<br>(0.5004) *  | 4.0612<br>(1.3256) ***   |
| Income $(i, t-1)$          | -1.6265<br>(0.6295) **  | 5.5609<br>(1.1593) *** | -1.9369<br>(2.0566)    | -17.2131<br>(3.4365) *** |
| Income $(j, t-1)$          | 1.4556<br>(0.1537) ***  | 0.8430<br>(0.1546) *** | 2.9794<br>(0.8909) *** | 0.7247<br>(2.7347)       |
| Business cycle $(i, t-2)$  | 0.0302<br>(0.0098) ***  | -0.0211<br>(0.0094) ** | -0.0168<br>(0.0120)    | -0.2263<br>(0.0531) ***  |
| Business cycle $(j, t-2)$  | 0.0095<br>(0.0040) **   | 0.0199<br>(0.0051) *** | -0.0124<br>(0.0050) ** | 0.0034<br>(0.0161)       |
| Earnings $(i, t)$          | -0.2013<br>(0.0652) *** | -0.0851<br>(0.0860)    | -0.3979<br>(0.1550) ** | 0.7300<br>(0.3497)       |
| Country-pair fixed effects | yes                     | yes                    | yes                    | yes                      |
| Time fixed effects         | yes                     | no                     | no                     | no                       |
| Cluster country-pair       | yes                     | yes                    | yes                    | yes                      |
| No. of obs.                | 7908                    | 2348                   | 1864                   | 1200                     |
| Wald $\chi^2$              | 72.41 ***               | 53.80 ***              | 15.03 ***              | 39.31 ***                |
| Adj. R <sup>2</sup>        | 0.26                    | 0.28                   | 0.03                   | 0.33                     |
| F-test                     |                         | 9.96 ***               | 6.03 **                | 27.48 ***                |

## Bank-specific Determinants VI – Liquidity

|                            | (1)<br>Full period     | (2)<br>1993-1998        | (3)<br>1999-2003        | (4)<br>2004-2007         |
|----------------------------|------------------------|-------------------------|-------------------------|--------------------------|
| Gravity $(i, j, t-1)$      | 0.7702<br>(0.1302) *** | 0.5085<br>(0.1947) **   | -0.1720<br>(0.5962) *   | 3.9782<br>(1.3199) ***   |
| Income $(i, t-1)$          | -1.2316<br>(0.6768) *  | 6.3594<br>(1.2103) ***  | -4.3268<br>(2.7484)     | -16.1853<br>(3.4375) *** |
| Income $(j, t-1)$          | 1.4838<br>(0.1539) *** | 0.8190<br>(0.1537) ***  | 2.4574<br>(1.0229) **   | 0.6303<br>(2.7232)       |
| Business cycle $(i, t-2)$  | 0.0206<br>(0.0101) **  | -0.0281<br>(0.0099) *** | -0.0174<br>(0.0120)     | -0.1977<br>(0.0491) ***  |
| Business cycle $(j, t-2)$  | 0.0102<br>(0.0041) **  | 0.0199<br>(0.0051) ***  | -0.0135<br>(0.0050) *** | 0.0039<br>(0.0161)       |
| Liquidity $(i, t-1)$       | -0.1305<br>(0.3713)    | 1.1555<br>(0.5463) **   | -0.2428<br>(0.5496)     | -1.4420<br>(0.9982)      |
| Country-pair fixed effects | yes                    | yes                     | yes                     | yes                      |
| Time fixed effects         | yes                    | no                      | no                      | no                       |
| Cluster country-pair       | yes                    | yes                     | Yes                     | yes                      |
| No. of obs.                | 7908                   | 2348                    | 1864                    | 1200                     |
| Wald $\chi^2$              | 67.01 ***              | 55.55 ***               | 12.51 ***               | 34.04 ***                |
| Adj. R <sup>2</sup>        | 0.27                   | 0.26                    | 0.04                    | 0.34                     |
| F-test                     |                        | 4.90 **                 | 6.93 ***                | 20.33 ***                |

## Conclusion I

- Economic growth affects foreign bank lending to more-developed emerging markets and frontier markets differently.
- Exchange rate agreements and interest rate differentials benefit international lending whereas credit risk and the inability to implement financial reforms inhibit the process.
  - *The development of high-quality institutions and a good macroeconomic environment is in particular important for frontier markets.*



## Conclusion II

- Characteristics of the lending country's banking system matter for international bank lending.
  - The banking system's size positively affects the volume of foreign claims on emerging markets.
  - Banking systems either being better capitalized or exhibiting greater loan portfolio risks may conclude fewer loan agreements with borrowers in emerging markets.
  - “Gambling for resurrection” may not be a determinant of foreign lending, even during the onset or crisis stage.
  - *We suggest a careful reassessment of the adequacy of the regulatory framework on bank capital flows to emerging markets.*
- Necessity of further research on the impact of economic disruptions on OECD banking systems.

Thank you for your attention!

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