"The Real Effects of Financial (Dis)Integration: A Spatial Equilibrium Analysis of Europe"

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Summary

- A **quantitative** analysis of the real effects of **financial segmentation across countries**.

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This paper:

- Provides evidence of the decline in cross-border banking after the financial crisis of 2008.

- Develops a multi-country model where banks' endogenous allocation of funds across countries feeds into firms' access to capital and then output.

  - "Financial segmentation" is a friction to cross-border lending.

- Calibrate the model to assess the quantitative effect of financial segmentation on output.

  - changes in frictions that match the decline in cross-border lending in the data explain $\approx 23\%$ of output gap in Europe.

The Ingredients of the Model

- N asymmetric countries.

  - Differences in TFP, production technologies, factor endowments.

- Within a country: a representative household, a representative firm, a bank.

- The household deposits its (exogenous) savings in the domestic bank, which lends them to firms located both domestically and abroad.

- The bank is owned by the representative household: allocates funds to maximize the household's utility.

- What drive the bank's allocation?

  - **Efficiency:** allocate funds in countries with higher returns; and

  - **Risk Diversification:** allocating capital in multiple countries diversifies away the risk from country-specific fluctuations in TFP.

- Firms use labor and capital they rent from banks to produce output.

Conveying the Intuition with a Simpler Exercise

- Show pencil and paper solution of a simplified version the model:

  - two countries, and

  - deterministic TFP.

- In this scenario the only incentive for global banking is to achieve possibly higher returns: only the **efficiency motive** is present, no diversification motive.

- Except for a knife-edge case, the simpler model exhibits **geographic concentration in banking**.

Conveying the Intuition with a Simpler Exercise (cont.)

Bank's (and Household's) Problem

$$
\max_{\phi_{ii}} \quad \frac{c_i^{1-\gamma}}{1-\gamma}
$$

$$
\text{s.t.} \quad c_i \;=\; w_i + \phi_{ii} R_{ii} s_i + (1-\phi_{ii}) R_{ij} s_i
$$

$$
\phi_{ii} \;\geq\; 0
$$

$$
\phi_{ii} \;\leq\; 1
$$

Firm's Problem

$$
w_i \;=\; (1-\alpha_i) A_i K_i^{\alpha_i} L_i^{-\alpha_i}
$$

$$
R_{ii} \;=\; 1 + \alpha_i A_i K_i^{\alpha_i - 1} L_i^{1-\alpha_i} - \delta_i
$$

Financial Fragmentation

$$
R_{ij} = R_{jj} e^{-\theta_j}
$$

Market Clearing

$$
\phi_{ii} s_i L_i + \phi_{ji} s_j L_j + K_{i0}(1-\delta_i) = K_i
$$

Conveying the Intuition with a Simpler Exercise (cont.)

Solution of the Bank's (and Household's) Problem

First-order condition:

$$\left[w_i + \phi_{ii}(R_{ii} - R_{ij})s_i + R_{ij}s_i \right]^{-\gamma} \cdot s_i(R_{ii} - R_{ij}) - \lambda_L + \lambda_U = 0$$

● In a deterministic environment, the bank always adopts a corner solution: **pervasive domestic lending ($\phi_{ii} = 1$) or pervasive cross-border lending ($\phi_{ii} = 0$).**

[⟹ Go to Proof]

● In a two-country world, banks from both countries invest in the highest return country: **no bilateral cross-border lending**.

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- Once solved for ϕ_{ii}, market clearing delivers K_i, the firm's equilibrium conditions deliver w_i, R_{ii}, while cross-border returns are given by the assumption on financial fragmentation.

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- Other possible explanations:

  ○ **Market access and profit maximization** (not in this paper).

  ○ **Regulatory arbitrage**: can we interpret θ_j as such?

- Some evidence **against** the diversification motive of foreign activities: Fillat, Garetto, and Oldenski (2015).

Drivers of Cross-Border Banking

Market Access and Profit Maximization

- Banks maximize profits from lending and lend in foreign countries to expand the size of their market.

  ○ Motive featured in Niepmann (2016), Fillat, Garetto and Goetz (2015).

  ○ Exploits heterogeneity within the banking sector and (possibly) across countries.

  ○ Generates cross-border banking and bilateral banking flows also across deterministic and symmetric economies.

Drivers of Cross-Border Banking (cont.)

Market Access and Profit Maximization

A related example, for multinational banking:

"Spanish-based Santander (...) acquired Sovereign Bank in 2009 as the springboard for its US ambitions, [establishing] 700 branches and ATMs across nine northeastern states."

"Santander is the fourth-largest bank by deposits in Massachusetts and has 1.7 million US customers. Emilio Botin, chairman of the parent company, said last week during a visit to the United States that he hopes to see profits for the American business double in three years to $2 billion."
(The Boston Globe, October 26th 2013)

Drivers of Cross-Border Banking (cont.)

Regulatory Arbitrage

Houston, Lin, and Ma, "Regulatory Arbitrage and International Bank Flows"
(JF 2012):

Cross-country differences in regulation affect international bank flows.
Houston, Lin, and Ma (2012) find strong evidence that banks have
transferred funds to markets with fewer regulations.

Drivers of Cross-Border Banking (cont.)

Regulatory Arbitrage and Aggregate Bank Inflows

The dependent variable is aggregate bank inflows to 120 recipient countries, which is defined as 100 times the log-difference of total foreign claims (*FCr*) of 26 source countries to recipient country *r*, that is, $100 \times \Delta \ln(\Sigma sFCsr)$. For columns (1) to (7) the estimation is based on fixed effect OLS regressions. For column (8), it is based on GDP (in USD)-weighted OLS estimation. The country-level banking regulatory variables are time varying and are based on three major surveys spanning almost a decade by the World Bank (Barth, Caprio, and Levine (2008)). The values of the regulatory variables for the period 1996 to 1999 are taken from the first survey recorded in 1998/1999, for the period 2000 to 2003 are taken from the second survey that assesses the state of regulation as of the end of 2002, and for the period 2004 to 2007 are taken from the third survey that characterizes the environment as of the end of 2005. Detailed variable definitions can be found in Table I. Time-fixed effects and recipient country-specific effects are included in the regressions but not reported. *p*-values are computed using heteroskedasticity-robust standard errors clustered for recipient countries and are presented in brackets. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

	1	2	3	4	5	6	7	8
Overall activity restrictions (recipient)		−0.29 [0.015]**				−0.39 [0.035]**	−0.55 [0.021]**	−0.71 [0.014]**
Restriction on banks owning nonfinancial firms (recipient)		−0.86 [0.029]**				−0.88 [0.171]	−1.26 [0.281]	−1.70 [0.216]
Capital regulatory index (recipient)			−0.20 [0.086]*			−0.27 [0.020]**	−0.31 [0.073]*	−0.38 [0.058]*
Strength of external audit (recipient)				−0.83 [0.054]*		−1.48 [0.033]**	−1.81 [0.014]**	−2.32 [0.009]***
Fin statement transparency (recipient)				−1.27 [0.025]**		−0.95 [0.073]*	−1.63 [0.057]*	−1.98 [0.045]**

Sample period	1996 to 2007						1996 to 2005	
Recipient country-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,372	1,264	1,264	1,228	1,240	1,168	642	642
Adj. R^2	0.15	0.16	0.16	0.16	0.17	0.18	0.38	0.43
Number of recipient countries	120	111	111	108	109	103	71	71

[Data Source: Houston, Lin, and Ma (2012)]

Drivers of Cross-Border Banking (cont.)

Evidence Pointing Against the Diversification Motive

Fillat, Garetto, and Oldenski (2015):

With a sample of multinational enterprises (MNEs) from all industries (including banking) show that MNEs tend to have operations in countries whose GDP covaries more with the home country, against the diversification hypothesis.

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How is the matrix of cross-border banking flows related to the variance-covariance matrix of TFP?

Demand, Supply, and Endogeneity

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In the model:

- The amount of loans originating from a country is exogenous.

- The returns of cross-border loans are exogenous ($R_{ij} = R_{jj}e^{-\theta_j}$).

- The decrease in cross-border loans after the crisis is exogenous ($\theta_j \uparrow$).

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More realistically:

- The amount of loans in each country should depend on bank supply characteristics (efficiency, scale, management costs...) and on agents' loan demand.

- The returns of cross-border loans should equilibrate demand and supply for those loans.

- The decrease in cross-border loans after the crisis should be endogenous, and depend on an exogenous shock like the tightening of capital requirements.

Demand, Supply, and Endogeneity (cont.)

- Fillat, Garetto, and Goetz (2015) develop a model featuring:

  - Loans, deposits, and interbank market activity that are endogenous and heterogeneous at the bank level and within bank across countries.

  - Endogenous interest rates on loans and deposits.

  - Capital requirements modeled following the Basel guidelines. A tightening of the capital requirement endogenously feeds into equilibrium loans at the bank-country level.

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In the trade-off between realism and analytical/computational feasibility it is important to **motivate modeling choices**.

Financial Integration and Banking FDI

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- This paper: incoming cross-border loans (CB) as a share of total loans.

  ○ Total loans are the sum of cross-border (CB) and "domestic" loans.
  ○ "Domestic" loans are *"total claims outstanding by resident banks of the respective country"*, so the concept of "domestic" is based on residence, not on nationality.
  ○ Example: when computing loans to Germany, the loans of affiliates of Italian multinational banks located in Germany are considered domestic loans.

$$\text{Fin. integration} = \frac{\text{Cross}-\text{border loans}}{\text{Dom. loans}+\text{Cross}-\text{border loans}+\text{Banking FDI}} \equiv \frac{CB}{DOM+CB+MB}$$

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- I prefer to think of financial integration in a way that is analogous to trade and FDI openness:

$$\text{Fin. integration} = \frac{\text{Cross−border loans+Banking FDI}}{\text{Dom. loans+Cross−border loans+Banking FDI}} \equiv \frac{CB+MB}{DOM+CB+MB}$$

Financial Integration and Banking FDI: Does It Matter?

A simple calculation (with US data) to quantify the role of banking FDI for the measurement of financial integration.

- Domestic loans and loans from banking FDI from the Share Data for US Offices of Foreign Banking Organizations (Selected Assets and Liabilities of Domestic and Foreign Owned US Commercial Banks plus US Branches and Agencies of Foreign Banks).

- Cross-border loans from BIS Statistics (Cross-border positions reported by banking offices located in BIS reporting areas).

- All data are in million US$.

	2007	2009
Domestic loans	6,074,155	5,901,781
Cross-border loans	3,858,661	3,447,650
FDI loans	1,054,476	1,019,380
CB/TOT (%)	35.12	33.25
(CB+MB)/TOT (%)	44.72	43.08
FDI adjustment (%)	27.33	29.57

Financial Integration and Banking FDI: Does It Matter? (cont.)

Measures of Financial Integration

cross-border loans/total loans — (cross-border loans+ FDI loans)/total loans
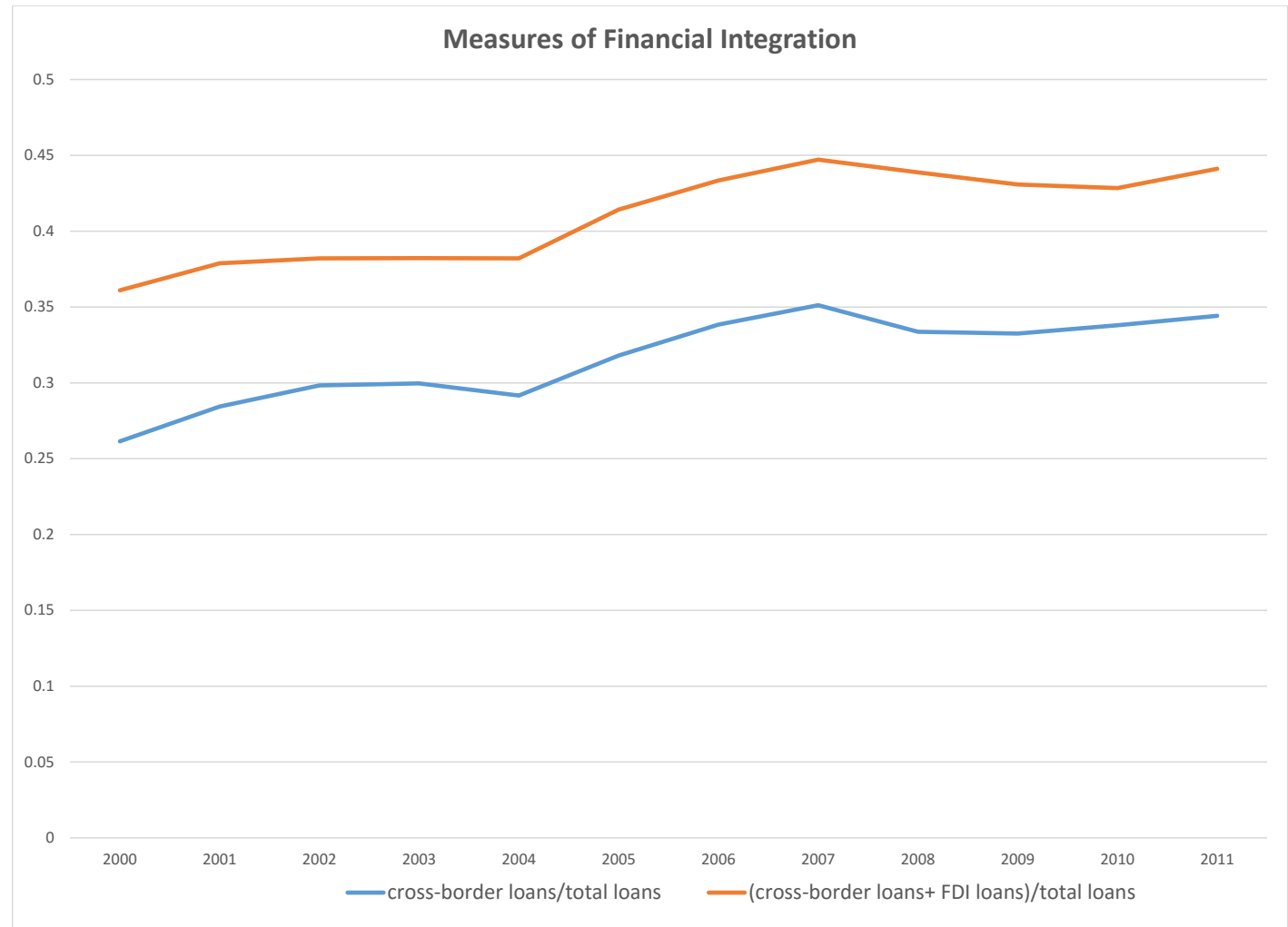
Financial Integration and Banking FDI: Does It Matter? (cont.)

- Conceptually incorrect to classify the loans of multinational banks as "domestic": the activities of multinational banks are an important manifestation of financial integration.

- Disregarding the activities of multinational banks has the effect of:

  - Underestimating financial integration in each year of the sample.

  - Likely overestimate the reduction in financial integration after the crisis (as multinational banks are likely to be more resilient than domestic banks).

Conclusions

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- I broadly suggested to:

  - clarify/motivate **modeling choices**;

  - a more explicit discussion of the **drivers of cross-border banking**; and

  - a more comprehensive **measurement** of financial integration.

Equilibrium in the Simple Deterministic Model

In a deterministic environment, the bank always adopts a corner solution: $\phi_{ii} = 1$ or $\phi_{ii} = 0$.

The bank's first-order condition is:

$$\left[w_i + \phi_{ii} R_{ii} s_i + (1 - \phi_{ii}) R_{ij} s_i \right]^{-\gamma} \cdot s_i (R_{ii} - R_{ij}) - \lambda_L + \lambda_U = 0.$$

By contradiction, suppose there is an interior solution: $\phi_{ii} \in (0, 1)$: then $\lambda_L = \lambda_U = 0$. There are three possible scenarios:

1. If $R_{ii} > R_{ij}$, the marginal utility of consumption is always positive, so the first order condition is never satisfied and it must be that $\phi_{ii} = 1$ (pervasive domestic banking).

2. If $R_{ii} < R_{ij}$, the marginal utility of consumption is always negative, so the first order condition is never satisfied and it must be that $\phi_{ii} = 0$ (pervasive cross-border banking).

3. If $R_{ii} = R_{ij}$, then ϕ_{ii} is undetermined, as banks are indifferent about where to lend.

Equilibrium in the Simple Deterministic Model

In a two-country world, banks from both countries invest in the highest return country.

WLOG, assume that Italy (country i) invests in Germany (country j):
$R_{ii} < R_{ij} = e^{\theta_j} R_{jj}$.
Hence:
$$R_{ji} = e^{\theta_i} R_{ii} < R_{ii} < R_{ij} = e^{\theta_j} R_{jj} < R_{jj}.$$

The two-country model does not predict bilateral cross-border banking.