GLOBAL BANKING NETWORKS AND CROSS-BORDER CAPITAL FLOWS

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Views are my own and don't necessarily represent those of SF Fed or Federal Reserve System

OBJECTIVES:

➢ Introduce measures that capture the strength of relationships (built through bank-to-bank lending) in the international banking network

➢ Understand macroeconomic determinants of cross-country differences in bank relationships

➢ Test whether long-term bank relationships help explain cross-border, gross capital flows (Cross-section analysis)

➢ Test whether new bank relationships help explain year-to-year changes in cross-border, gross capital flows (Panel analysis)

➢ Highlight differences between developed and developing countries throughout analysis

BANK RELATIONSHIPS CAN BE REPRESENTED AS A NETWORK (GRAPH)

➢ Bank relationships are constructed from bank-to-bank lending activity via syndicated loans

➢ Network is *directed*

  ➢ Thus there may not be a path from one node to another (ex. can't go D->A)

➢ Edges have *weights*

  ➢ Weights are equal to the total amount, deflated by US CPI, bank A lent to bank B
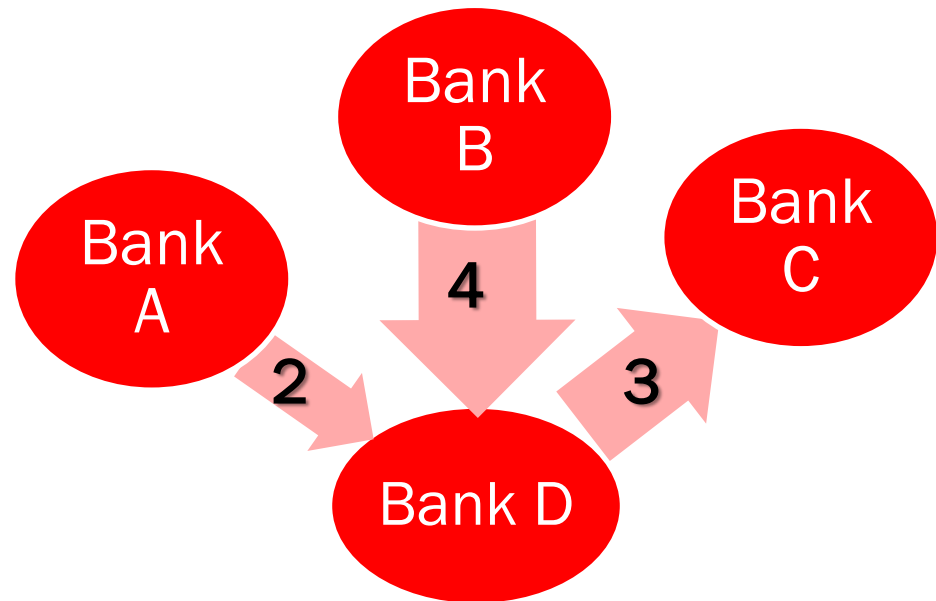
STATISTICS COMPUTED: NODE LEVEL

➤ Geodesic path is the shortest path between two nodes:

  ❑ $g_{AD} = g_{BD} = g_{DC} = 1$; $g_{AC} = g_{BC} = 2$

➤ OutEccentricity (InEccentricity) is the length of the longest geodesic path originating (terminating) in a given node

  ❑ $oe_A = 2$; $oe_D = 1$; $ie_D = 1$; $oe_C = 2$

➤ MeanFarness is the length of an average geodesic path originating *or* terminating in a given node: $mf_C = (2+2+1)/3 = 5/3$

➤ Betweenness is the share of geodesic paths between any pair *j* and *k* that go through node *i* : $b_A = 0$, $b_D = 1$

➤ Emission (Reception) is a sum of values of all edges incident from (to) a given node divided by the total lending value in the network

  ❑ $E_D = 3/9 = 1/3$; $R_D = (2+4)/9 = 2/3$

Bank A   Bank B   Bank C   Bank D   4   2   3
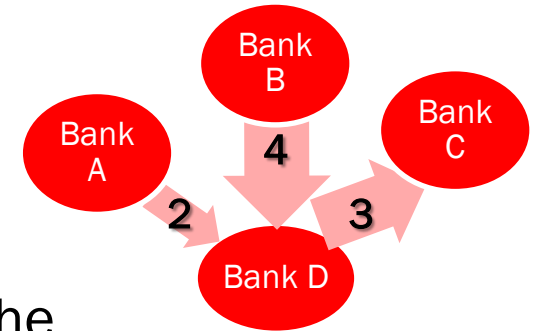
DATA

- Obtain all loans to banking institutions from Dealogic (split syndicates)
    - Deflate all loan values by US CPI (2000=100)
- For two samples, 1980-2000 and 2001-2007Q2, create an edge list:
    - Bank A (lent to) Bank B (amount) X
- Construct a network based on loans in both samples
- Compute network statistics for each bank
- Match banks to countries
- Create a bank-level and country-level data set
    - Country-level data set contains weighted averages of network statistics
- Merge with macro data from standard sources
    - e.g., IMF's IFS and BoP data, World Bank Data, EWNII, etc.

MACROECONOMIC DETERMINANTS OF BANK RELATIONSHIPS

➢ Data:

   ❑ 2001 through 2007:Q2 banking network

   ❑ Macroeconomic data for 1980-2000 for developed and 1990-2000 for developing countries,

➢ Procedure:

   ❑ Run a cross-country regression of network characteristics on a host of macro and institutional variables, separately for developed (rich) and developing (poor) countries,

   ❑ Retain variables that matter

MACROECONOMIC DETERMINANTS OF BANK RELATIONSHIPS, RICH

	(1) outeccentricity Rich	(2) ineccentricity Rich	(3) farness1 Rich	(4) betweenness Rich
Avg. GDP Growth	-490.2 (293.9)	-1811.6 (1288.4)	-408.0 (295.1)	-0.049 (0.086)
Trade/GDP	-9.72 (11.4)	68.0 (57.4)	14.4 (14.2)	-0.0014 (0.0032)
ICRG government score	874.6* (491.6)	68.0 (1206.6)	38.2 (335.0)	0.15 (0.11)
Inflation	-192.2** (71.0)	241.4* (139.8)	21.8 (37.2)	0.0024 (0.022)
Banking crisis	-3134.1** (1206.3)	-1837.0 (1738.7)	-783.5 (549.4)	-0.35* (0.19)
GNI (nominal)	0.86*** (0.25)	1.65** (0.59)	0.52*** (0.16)	0.00013** (0.000048)
Average distance	-165.3 (408.4)	1362.8 (880.9)	313.0 (262.8)	-0.026 (0.085)
Constant	-21.6 (3824.1)	-5793.2 (8715.9)	-671.2 (2430.5)	-0.65 (1.14)
Observations	1416	1416	1416	1416
Adjusted R^2	0.0016	0.0046	0.0062	-0.0031

MACROECONOMIC DETERMINANTS OF BANK RELATIONSHIPS, POOR

	(5) outeccentricity Poor	(6) ineccentricity Poor	(7) farness1 Poor	(8) betweenness Poor
Avg. GDP Growth	164.4***	86.0	43.0***	0.038
	(53.5)	(69.1)	(14.3)	(0.032)
Trade/GDP	-9.73	-20.9**	-4.75**	-0.0058
	(7.19)	(9.24)	(1.90)	(0.0046)
ICRG government score	468.0***	942.5***	203.9***	0.090*
	(152.1)	(165.8)	(32.5)	(0.052)
Inflation	-0.95*	-1.70**	-0.22	-0.00019
	(0.51)	(0.72)	(0.14)	(0.00018)
Banking crisis	-244.1	-600.2	-245.8***	0.080
	(296.7)	(420.5)	(84.8)	(0.11)
GNI (nominal)	0.67	3.37***	0.89***	-0.00038
	(0.96)	(1.05)	(0.27)	(0.00047)
Average distance	-547.6**	-305.6	-90.2	-0.16
	(235.2)	(290.5)	(59.7)	(0.14)
Polity score	53.7	188.2***	46.9***	0.024
	(39.3)	(39.1)	(8.51)	(0.017)
Constant	466.2	-3366.4*	-486.1	0.56
	(1781.2)	(1955.5)	(408.6)	(0.83)
Observations	696	696	696	696
Adjusted R^2	0.019	0.051	0.056	-0.0053

WE LEARNED

- Banks in developed (rich) countries
  - More politically stable – more likely to have reach
  - More frequent banking crises –less reach and intermediation
  - Larger countries – banks are better connected
  - *Overall, macro does not have much explanatory power*
- Banks in emerging markets are better connected if they have
  - Better politics
  - Faster growth
  - Lower inflation
  - Fewer banking crises
  - Also if they are less remote geographically

EFFECTS OF BANK RELATIONSHIP ON INTERNATIONAL CAPITAL FLOWS

➢ Use network data from lending between 1980-2000

➢ Use data on international capital flows 2001-2007:Q2

- ❑ Lane and Milesi-Ferretti

    - ▪ Total flows

    - ▪ Portfolio equity flows

    - ▪ Portfolio debt flows

- ❑ Balance of Payments statistics give same qualitative results

➢ Control for macro factors that were found to matter, as of 1980-2000 – turns out to be important!

RELATIONSHIPS AND INTERNATIONAL CAPITAL FLOWS, RICH, LMF DATA

Portfolio Equity

	(1) Rich	(2) Rich	(3) Rich	(4) Rich	(5) Rich
outeccentricity	0.20 (0.17)				
ineccentricity		0.15 (0.21)			
farness1			0.89 (0.75)		0.20 (0.81)
betweenness				1325.6** (597.5)	1238.4 (714.8)
Observations	21	21	21	21	21
Adjusted R^2	0.060	0.043	0.061	0.13	0.065

Macro controls included, but not shown.

RELATIONSHIPS AND INTERNATIONAL CAPITAL FLOWS, RICH, LMF DATA

Portfolio Debt

	(1) Rich	(2) Rich	(3) Rich	(4) Rich	(5) Rich
outeccentricity	0.48** (0.17)				
ineccentricity		0.29 (0.30)			
farness1			2.12** (0.86)		1.28 (1.30)
betweenness				2074.4*** (636.8)	1502.9 (938.5)
Observations	21	21	21	21	21
Adjusted R^2	0.19	0.11	0.19	0.21	0.19

Macro controls included, but not shown.

RELATIONSHIPS AND INTERNATIONAL CAPITAL FLOWS, POOR, LMF DATA

Portfolio Equity

	(6) Poor	(7) Poor	(8) Poor	(9) Poor	(10) Poor
outeccentricity	0.058* (0.032)				
ineccentricity		0.0074 (0.0076)			
farness1			0.043 (0.058)		0.044 (0.044)
betweenness				115.1*** (32.9)	115.1*** (31.7)
Observations	72	72	72	72	72
Adjusted R^2	0.86	0.84	0.83	0.90	0.90

Macro controls included, but not shown.

RELATIONSHIPS AND INTERNATIONAL CAPITAL FLOWS, POOR, LMF DATA

Portfolio Debt

	(6) Poor	(7) Poor	(8) Poor	(9) Poor	(10) Poor
outeccentricity	0.055*** (0.018)				
ineccentricity		0.022** (0.0082)			
farness1			0.11 (0.096)		-0.023 (0.055)
betweenness				76.5*** (13.7)	79.1*** (11.6)
Observations	46	46	46	46	46
Adjusted R^2	0.42	0.29	0.19	0.50	0.49

Macro controls included, but not shown.

WE LEARNED

➢ Not controlling for macro characteristics leads to spurious correlations

➢ For rich countries

  ❑ Bank relationships do not explain gross international equity flows

  ❑ Bank relationship explain gross international debt flows – countries that were more connected prior to 2000, experienced more debt inflows and outflows in 2001-2007

➢ For emerging markets

  ❑ Countries in which banks were more connected in international borrowing and lending prior to 2000 experienced larger gross debt inflows and outflows AND larger gross equity inflows and outflows in 2001-2006

PANEL APPROACH: OVERVIEW

- Build year-by-year cumulative network

- Examine changes in capital flows due to lagged changes in bank relationships; control for macro variables

- Add country fixed effects, allowing us to absorb time-invariant differences between countries.

- Add year effects to absorb all common trends

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WE LEARNED

➢ For rich countries

❑ When importance in intermediation (i.e., betweenness) increases, there are fewer portfolio debt gross flows in the following year

▪ Results hold for both Lane and Milesi-Ferretti data and BoP data.

▪ Perhaps banks substitute bank loans for portfolio debt flows

➢ For emerging markets

❑ Results mostly consistent with the cross-country, cross-section analysis

➢ Overall

❑ In all regressions, the addition of network statistics to our set of explanatory variables make marginal contributions to explanatory variables.

CONCLUSION

➢ Bank relationships explain a substantial portion of cross-country differences in gross capital flows

➢ Why important?

  ❑ Supports the view that various capital flows are complementary

  ❑ Infers that stable economic and political conditions foster bank relationships that encourage capital flows

  ❑ Highlights the significance of relationship and information flows in determining international borrowing, lending, and portfolio asset purchases

RELATIONSHIPS AND INTERNATIONAL CAPITAL FLOWS, RICH, LMF DATA

Portfolio Equity (Panel)

	(1) Rich	(2) Rich	(3) Rich	(4) Rich	(5) Rich
LD.outeccentricity	-0.0017 (0.0022)				
LD.ineccentricity		-0.00097 (0.0027)			
LD.farness1			-0.0031 (0.0065)		-0.0025 (0.0061)
LD.betweenness				-3.94 (7.04)	-3.36 (6.69)
Observations	539	539	539	539	539
Adjusted R^2	0.28	0.28	0.28	0.28	0.28

RELATIONSHIPS AND INTERNATIONAL CAPITAL FLOWS, RICH, LMF DATA

Portfolio Debt (Panel)

	(1) Rich	(2) Rich	(3) Rich	(4) Rich	(5) Rich
LD.outeccentricity	0.0021 (0.0049)				
LD.ineccentricity		-0.0012 (0.0036)			
LD.farness1			0.021** (0.0091)		0.023** (0.010)
LD.betweenness				-5.31 (4.70)	-9.15** (3.69)
Observations	481	481	481	481	481
Adjusted R^2	0.40	0.40	0.40	0.40	0.40

RELATIONSHIPS AND INTERNATIONAL CAPITAL FLOWS, POOR, LMF DATA

Portfolio Equity (Panel)

	(6) Poor	(7) Poor	(8) Poor	(9) Poor	(10) Poor
LD.outeccentricity	-0.00035*** (0.00011)				
LD.ineccentricity		0.00014 (0.00013)			
LD.farness1			-0.00056** (0.00025)		-0.00070* (0.00037)
LD.betweenness				0.031 (0.064)	0.16** (0.073)
Observations	1422	1422	1422	1422	1422
Adjusted R^2	0.42	0.42	0.42	0.42	0.42

RELATIONSHIPS AND INTERNATIONAL CAPITAL FLOWS, POOR, LMF DATA

Portfolio Debt (Panel)

	(6) Poor	(7) Poor	(8) Poor	(9) Poor	(10) Poor
LD.outeccentricity	0.00022 (0.00038)				
LD.ineccentricity		0.00076** (0.00031)			
LD.farness1			0.0017 (0.0011)		0.0016 (0.0012)
LD.betweenness				0.11*** (0.034)	0.067 (0.042)
Observations	676	676	676	676	676
Adjusted R^2	0.0076	0.010	0.0094	0.0079	0.0080

DEFINITIONS OF FLOWS (EXTRA)

- Portfolio Debt Flows: bonds, debentures, notes, and money market or negotiable debt instruments

- Portfolio Equity Flows: Shares, stocks, participation, and similar documents that usually denote ownership of equity

- Total flows: Portfolio flows, FDI, Financial Derivatives, other investments