Regulatory Arbitrage and International Bank Flows

The Journal of Finance, 2012

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2013, October 11
BCG Lab Seminar presented by Junho Park

Background

Definition 1 (Regulatory Arbitrage)

Regulatory arbitrage (or broadly jurisdictional arbitrage) refers to situations when a company can choose a nominal place of business with a regulatory, legal or tax regime with lower costs.

- The rapid increase in international banking and financial flows.
- Much of banking regulation and supervision remains national.
- The encouraged flow of bank capital:
  - improves capital market efficiency and
  - enhances global economic growth, but
  - *might lead to a "race to the bottom."*

Research Questions

Question 1

Is there a form of regulatory arbitrage taking place and do banks tend to move funds to markets with fewer regulations?

Question 2

If it exists, is there a possibility that it leads to a "race to the bottom"?

Main Results

Result 1

Yes, a form of regulatory arbitrage exists in banking.

- *Captal tends to flow from more restrictive to less restrictive jurisdictions.*
- *Banks in more restrictive jurisdictions are more likely to establish a branch in lighter regulations.*

Result 2

Probably not, the recipient country is required to have strong legal environments to enjoy the inflow of capital.

- Contribution of this paper:
  - To describe the importance of international banking regulation.
  - To highlight the need for regulatory coordination.

Data Sources

1. BIS[1] International Banking Statistics.
2. Djankov, McLiesh, and Schleifer (2007) data set and World Bank "Doing Business" data set.
3. Barth, Caprio, and Levine (2004, 2006, 2008) data set.
4. The BankScope database

[1] Bank for International Settlements

International Bank Flows

Definition 2 (Total Foreign Claims)

FCsr is the measure of total foreign claims from source country *s* to recipient country *r*.

Definition 3 (International Bank Flow)

The measure of international bank flows is defined as 100 times the log-difference of *FCsr*, that is,

$$100 \times \Delta \ln(FCsr)$$

- The main dependent variable.

Bank Regulation in the Recipients and Bank Inflows

$$\begin{aligned} BankInflow_{r,t} =& \alpha_0 + \alpha_1 Regulation_{r,t} + \beta_1 InstitutionalQuality_{r,t} \\ &+ \gamma_1 X_{r,t} + \phi_r + \mu_t + \epsilon_{r,t} \end{aligned} \tag{1}$$

- Dependent variable: aggregate bank inflow measure.
- Independent variable:
  - $Regulation_{r,t}$: the number of regulations, e.g., capital regulation, external audit, information disclosure ...
  - $InstitutionalQuality_{r,t}$: the creditor right index, property rights index, information sharing variable.
  - $X_{r,t}$: GDP per capita, population, land area.
  - ϕ_r and μ_t: country- and time-fixed effects.

Table III(A)

Regulatory Arbitrage and Aggregate Bank Inflows

- 1-7: OLS, 8: GDP weighted OLS.

	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]**
Independence of supervisory authority (recipient)					−1.25 [0.035]**	−1.33 [0.032]**	−1.10 [0.029]**	−0.85 [0.032]**
Official supervisory power (recipient)					−0.24 [0.184]	−0.23 [0.074]*	−0.36 [0.025]**	−0.47 [0.020]**
Loan classification leniency (recipient)						0.69 [0.022]**	0.59 [0.016]**	0.51 [0.012]**

	1	2	3	4	5	6	7	8
Creditor rights (recipient)	5.83	6.11	6.22	5.96	5.98	6.93	7.03	7.89
	[0.063]*	[0.033]**	[0.032]**	[0.073]*	[0.034]**	[0.027]**	[0.032]**	[0.025]**
Info sharing (recipient)	2.42	2.30	2.45	2.19	2.20	2.16	2.72	1.58
	[0.028]**	[0.081]*	[0.026]**	[0.091]*	[0.032]**	[0.085]*	[0.067]*	[0.088]*
Number of days to enforce contracts (recipient)						−0.11	−0.12	−0.10
						[0.026]**	[0.038]**	[0.044]**
Property rights (recipient)	3.54	3.66	3.76	3.31	3.39	3.66	2.34	2.81
	[0.014]**	[0.027]**	[0.022]**	[0.052]*	[0.064]*	[0.033]**	[0.028]**	[0.021]**
Log income (recipient)	2.92	3.10	2.77	3.15	3.10	2.35	3.90	4.77
	[0.082]*	[0.018]**	[0.063]*	[0.012]**	[0.024]**	[0.089]*	[0.075]*	[0.056]*
Log population (recipient)	2.23	3.01	2.35	2.38	3.13	3.40	3.66	4.52
	[0.303]	[0.256]	[0.239]	[0.277]	[0.239]	[0.043]**	[0.047]**	[0.036]**
Fin liberalization (recipient)							0.81	0.97
							[0.039]**	[0.034]**
Growth opportunities (recipient)							1.76	2.06
							[0.017]**	[0.016]**
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

Interpretation of Table III(A)

- The more the country regulates, the more bank inflow is discouraged.
  - Bank capital tends to flow into less independent and weaker supervisory authority.
- Positive and significant assocation of institutional quality.
  - Legal environment and investor protection is important in determining bank flows.

Bank Regulation in the Source and Bank Outflows

$$\begin{aligned} BankOutflow_{s,t} =& \alpha_0 + \alpha_1 Regulation_{s,t} + \beta_1 InstitutionalQuality_{s,t} \\ &+ \gamma_1 X_{s,t} + \phi_s + \mu_t + \epsilon_{s,t} \end{aligned} \tag{2}$$

Table III(B)

Regulatory Arbitrage and Aggregate Bank Outflows

- 1-7: OLS, 8: GDP weighted OLS.

	1	2	3	4	5	6	7	8
Overall activity restrictions (source)		0.53 [0.025]**				0.92 [0.024]**	1.06 [0.017]**	1.16 [0.012]**
Restriction on banks owning nonfinancial firms (source)		2.33 [0.087]*				2.28 [0.017]**	2.19 [0.014]**	1.50 [0.017]**
Capital regulatory index (source)			0.28 [0.038]**			0.41 [0.097]*	0.65 [0.076]*	0.78 [0.057]*
Strength of external audit (source)				0.85 [0.032]**		0.74 [0.218]	1.27 [0.139]	1.72 [0.113]
Fin statement transparency (source)				2.62 [0.026]**		2.74 [0.030]**	2.45 [0.026]**	2.91 [0.021]**
Independence of supervisory authority (source)					1.05 [0.083]*	1.41 [0.542]	1.89 [0.389]	1.26 [0.446]
Official supervisory power (source)					1.83 [0.131]	1.76 [0.041]**	1.28 [0.037]**	0.78 [0.059]*

	1	2	3	4	5	6	7	8
Loan classification leniency (source)						−0.44	−0.32	−0.25
						[0.013]**	[0.018]**	[0.025]**
Creditor rights (source)	−3.24	−3.86	−3.31	−2.95	−2.90	−2.89	−2.77	−3.09
	[0.016]**	[0.022]**	[0.052]*	[0.141]	[0.113]	[0.024]**	[0.034]**	[0.026]**
Info sharing (source)	−1.55	−1.18	−1.56	−1.08	−0.84	−0.76	−0.97	−0.70
	[0.028]**	[0.030]**	[0.028]**	[0.030]**	[0.173]	[0.003]***	[0.015]**	[0.0061]***
Number of days to enforce contracts (source)						0.21	0.19	0.22
						[0.014]**	[0.017]**	[0.016]**
Property rights (source)	−4.61	−4.26	−4.62	−4.36	−5.70	−4.79	−5.17	−6.51
	[0.035]**	[0.063]*	[0.058]*	[0.062]*	[0.037]**	[0.035]**	[0.024]**	[0.018]**
Log income (source)	−1.02	−1.70	−1.56	−1.65	−1.74	−1.31	−1.82	−2.09
	[0.333]	[0.032]**	[0.330]	[0.281]	[0.036]**	[0.277]	[0.145]	[0.108]
Log population (source)	−2.01	−2.68	−2.13	−1.85	−2.53	−2.73	−2.98	−1.71
	[0.122]	[0.031]**	[0.120]	[0.124]	[0.081]*	[0.146]	[0.123]	[0.149]
Financial liberalization (source)							0.42	0.34
							[0.176]	[0.228]
Growth opportunities (source)							−1.49	−1.26
							[0.025]**	[0.030]**
Sample period	1996 to 2007						1996 to 2005	
Source country-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	238	238	238	238	238	238	181	181
Adj. R^2	0.30	0.31	0.32	0.30	0.32	0.36	0.37	0.41
Number of source countries	26	26	26	26	26	26	23	23

Interpretation of Table III(B)

- The opposite happens in the source country.
- Bank capital flow from independent and powerful authority to weaker supervisory authority.
- Higher institutional quality discourages bank outflows.

Standard Gravity Model

$$
\begin{aligned}
BankFlow_{s,r,t} = & \alpha_0 + \alpha_1 Regulation_{s,t} + \alpha_2 Regulation_{r,t} \\
& + \beta_1 InstitutionalQuality_{s,t} + \beta_2 InstitutionalQuality_{r,t} \\
& + \gamma_1 X_{s,t} + \gamma_2 X_{r,t} \\
& + \theta_1 \ln(Distance_{s,r}) + \theta_2 CommonLanguage_{s,r} \\
& + \eta_s + \phi_r + \mu_t + \epsilon_{s,r,t} \qquad (3)
\end{aligned}
$$

- Distance: potential information frictions and transaction costs.
- Language: potential cultural differences.

Table IV

Regulatory Arbitrage and Bank Flows

- 1-7: OLS, 8: GMM.

	1	2	3	4	5	6	7	8
Overall activity restrictions (source)		0.39 [0.014]**				0.30 [0.005]***	0.36 [0.005]***	0.29 [0.007]***
Overall activity restrictions (recipient)		−0.25 [0.013]**				−0.32 [0.013]**	−0.33 [0.011]**	−0.27 [0.014]**
Restriction on banks owning nonfinancial firms (source)		1.30 [0.071]*				1.56 [0.021]**	1.52 [0.020]**	1.22 [0.022]**
Restriction on banks owning nonfinancial firms (recipient)		−1.97 [0.014]**				−1.41 [0.149]	−1.42 [0.143]	−1.75 [0.116]
Capital regulatory index (source)			0.59 [0.027]**			0.25 [0.081]*	0.23 [0.078]*	0.18 [0.103]
Capital regulatory index (recipient)			−0.43 [0.072]*			−0.35 [0.033]**	−0.34 [0.026]**	−0.25 [0.031]**
Strength of external audit (source)				0.72 [0.028]**		0.52 [0.158]	0.70 [0.153]	0.61 [0.169]
Strength of external audit (recipient)				−0.26 [0.058]*		−0.47 [0.030]**	−0.65 [0.021]**	−0.53 [0.029]**

	1	2	3	4	5	6	7	8
Financial statement transparency (source)				1.60 [0.035]**		1.28 [0.027]**	1.85 [0.020]**	1.40 [0.026]**
Financial statement transparency (recipient)				−0.96 [0.022]**		−0.59 [0.064]*	−0.56 [0.062]*	−0.75 [0.036]**
Independence of supervisory authority (source)					0.94 [0.060]*	1.29 [0.140]	1.05 [0.199]	0.87 [0.254]
Independence of supervisory authority (recipient)					−0.71 [0.040]**	−0.55 [0.040]**	−0.83 [0.030]**	−0.68 [0.034]**
Official supervisory power (source)					0.46 [0.036]**	0.61 [0.056]*	0.66 [0.052]*	0.57 [0.070]*
Official supervisory power (recipient)					−0.39 [0.065]*	−0.35 [0.031]**	−0.52 [0.021]**	−0.65 [0.016]**
Loan classification leniency (source)						−0.26 [0.002]***	−0.27 [0.004]***	−0.22 [0.005]***
Loan classification leniency (recipient)						0.43 [0.037]**	0.41 [0.033]**	0.33 [0.039]**

	1	2	3	4	5	6	7	8
Creditor rights	−3.68	−3.74	−3.03	−2.74	−3.31	−2.68	−2.40	−1.83
(source)	[0.019]**	[0.014]**	[0.016]**	[0.059]*	[0.096]*	[0.026]**	[0.024]**	[0.034]**
Creditor rights	4.69	4.56	3.94	4.18	4.59	3.39	3.65	2.94
(recipient)	[0.018]**	[0.020]**	[0.070]*	[0.036]**	[0.048]**	[0.018]**	[0.019]**	[0.024]**
Info sharing	−0.66	−0.67	−0.39	−0.74	−0.72	−0.46	−0.68	−0.55
(source)	[0.011]**	[0.018]**	[0.061]*	[0.008]***	[0.011]**	[0.045]**	[0.040]**	[0.063]*
Info sharing	0.85	1.11	1.01	1.15	0.93	1.12	1.17	1.26
(recipient)	[0.074]*	[0.021]**	[0.027]**	[0.020]**	[0.063]*	[0.062]*	[0.062]*	[0.034]**
Number of days						0.08	0.10	0.08
to enforce						[0.030]**	[0.040]**	[0.057]*
contracts								
(recipient)								
Number of days						−0.14	−0.15	−0.12
to enforce						[0.014]**	[0.020]**	[0.024]**
contracts								
(source)								
Top five bank						−2.60	−3.64	−2.96
concentration						[0.092]*	[0.062]*	[0.075]*
(recipient)								
Government						−1.09	−1.67	−1.37
bank ownership					[0.035]**	[0.030]**	[0.038]**	
(recipient)								
Property rights	−2.34	−2.52	−2.55	−3.22	−2.29	−1.98	−2.44	−2.07
(source)	[0.035]**	[0.068]*	[0.063]*	[0.024]**	[0.114]	[0.035]**	[0.031]**	[0.042]**
Property rights	1.68	1.91	1.96	1.95	2.22	2.50	1.86	1.65
(recipient)	[0.031]**	[0.103]	[0.040]**	[0.108]	[0.067]*	[0.021]**	[0.030]**	[0.037]**

	1	2	3	4	5	6	7	8
Log income (source)	−1.54 [0.017]**	−1.09 [0.216]	−1.07 [0.170]	−1.72 [0.045]**	−0.98 [0.261]	−1.27 [0.252]	−1.16 [0.219]	−0.93 [0.294]
Log income (recipient)	2.63 [0.050]*	1.88 [0.027]**	1.82 [0.030]**	1.82 [0.031]**	1.21 [0.079]*	2.09 [0.051]*	2.11 [0.071]*	1.50 [0.091]*
Log population (source)	3.75 [0.039]**	2.80 [0.064]*	2.20 [0.269]	2.48 [0.041]**	2.16 [0.108]	1.34 [0.155]	1.60 [0.193]	1.29 [0.240]
Log population (recipient)	2.01 [0.481]	1.67 [0.104]	1.79 [0.220]	1.42 [0.318]	1.35 [0.170]	2.83 [0.030]**	2.48 [0.032]**	2.03 [0.040]**
Common language	2.51 [0.061]*	3.94 [0.068]*	3.99 [0.079]*	4.05 [0.179]	4.06 [0.039]**	4.05 [0.005]***	5.40 [0.007]***	4.30 [0.008]***
Log distance	−1.56 [0.072]*	−1.48 [0.122]	−1.85 [0.017]**	−1.71 [0.111]	−1.66 [0.012]**	−1.64 [0.184]	−1.38 [0.263]	−1.74 [0.258]
Financial liberalization (source)							0.37 [0.162]	0.29 [0.221]
Financial liberalization (recipient)							0.52 [0.011]**	0.42 [0.013]**
Growth opportunities (source)							−1.22 [0.027]**	−1.41 [0.037]**
Growth opportunities (recipient)							1.67 [0.029]**	1.16 [0.035]**
Sample period	1996 to 2007	1996 to 2005						
Observations	14,430	13,738	13,790	13,467	13,601	12,936	7,923	7,923
Number of source countries	26	26	26	26	26	26	23	23
Number of recipient countries	120	111	111	108	109	102	70	70
Adj. R^2	0.17	0.18	0.16	0.17	0.18	0.19	0.19	–
Sample period	1996–2007	1996–2007	1996–2007	1996–2007	1996–2007	1996–2007	1996–2005	1996–2005

Interpretation of Table IV

- Banks do take advantage of regulatory gaps across countries.
- Bank capital flows from heavy regulations to less regulations.

Several Steps to Alleviate Reverse Causality Concerns

- To use growth opportunities.
- To use fixed effect regressions.
- To use instrumental variables:
  - For geographical endowment and ethnic fractionalization,
    - Latitude.
    - Ethnic fractionalization.
    - Independency of the country after 1776.
  - For regulation contagion,
    - The sample mean of the financial regulation measure.
  - For macroeconomic characteristics,
    - Dummy if the central bank is the bank regulator.
    - Gini coefficient.
- Result is still robust.

Regulatory Arbitrage and Banks' Foreign Expansion

- More direct evidence on regulatory arbitrage.
- Probit model:
  - Dependent variable: 1 if bank has foreign affiliates in 2008.

$$\begin{aligned} Pr(Y_{i,s,r} = 1) = & f(Regulation_s, Regulation_r, InstitutionalQuality_s, \\ & InstitutionalQuality_r, BankCharacteristics_i, \\ & CountryControl_s, CountryControl_r, \\ & Distance_{s,r}, CommonLanguage_{s,r}) \end{aligned} \tag{4}$$

Table VII

Probit Estimation: Bank's Foreign Affiliates and Regulatory Arbitrage

	1	2	3	4	5	6	7
Overall activity restrictions (source)	0.029				0.028	0.030	0.043
	[0.067]*				[0.031]**	[0.012]**	[0.023]**
Overall activity restrictions (recipient)	−0.018				−0.012	−0.014	−0.042
	[0.027]**				[0.019]**	[0.023]**	[0.014]**
Restriction on banks owning nonfinancial firms (source)	0.063				0.064	0.065	0.069
	[0.024]**				[0.037]**	[0.074]*	[0.031]**
Restriction on banks owning nonfinancial firms (recipient)	−0.049				−0.041	−0.036	−0.049
	[0.029]**				[0.020]**	[0.017]**	[0.028]**
Capital regulatory index (source)		0.027			0.027	0.021	0.049
		[0.018]**			[0.015]**	[0.021]**	[0.026]**
Capital regulatory index (recipient)		−0.011			−0.012	−0.014	−0.027
		[0.014]**			[0.016]**	[0.029]**	[0.012]**
Strength of external audit (source)			0.040		0.044	0.053	0.056
			[0.032]**		[0.038]**	[0.079]*	[0.013]**
Strength of external audit (recipient)			−0.032		−0.031	−0.047	−0.048
			[0.128]		[0.025]**	[0.031]**	[0.026]**
Financial statement transparency (source)			0.035		0.033	0.030	0.020
			[0.011]**		[0.030]**	[0.029]**	[0.015]**
Financial statement transparency (recipient)			−0.018		−0.024	−0.016	−0.032
			[0.019]**		[0.024]**	[0.019]**	[0.028]**

	1	2	3	4	5	6	7
Independence of supervisory authority (source)				0.057	0.046	0.051	0.049
				[0.017]**	[0.012]**	[0.033]**	[0.009]***
Independence of supervisory authority (recipient)				−0.023	−0.025	−0.027	−0.029
				[0.015]**	[0.031]**	[0.029]**	[0.023]**
Official supervisory power (source)				0.036	0.037	0.038	0.039
				[0.011]**	[0.019]**	[0.053]*	[0.011]**
Official supervisory power (recipient)				−0.028	−0.025	−0.020	−0.049
				[0.051]*	[0.016]**	[0.014]**	[0.031]**
Loan classification leniency (source)					−0.044	−0.041	−0.057
					[0.060]*	[0.035]**	[0.038]**
Loan classification leniency (recipient)					0.025	0.024	0.021
					[0.030]**	[0.058]*	[0.013]**
Government bank ownership (recipient)					−0.361	−0.376	−0.355
					[0.037]**	[0.034]**	[0.034]**
Top five bank concentration (all banks) (recipient)					−0.208		−0.234
					[0.016]**		[0.035]**
Top five bank concentration (excl. foreign banks) (recipient)						−0.287	
						[0.016]**	
Bank size	0.016	0.015	0.014	0.016	0.017	0.018	0.016
	[0.130]	[0.178]	[0.118]	[0.133]	[0.042]**	[0.168]	[0.041]**
Bank net income	0.036	0.031	0.030	0.023	0.039	0.038	0.057
	[0.033]**	[0.089]*	[0.060]*	[0.113]	[0.171]	[0.047]**	[0.186]
Creditor rights (source)	−0.039	−0.034	−0.035	−0.032	−0.029	−0.038	−0.039
	[0.090]*	[0.058]*	[0.069]*	[0.022]**	[0.026]**	[0.036]**	[0.029]**
Creditor rights (recipient)	0.024	0.026	0.024	0.026	0.018	0.023	0.025
	[0.083]*	[0.060]*	[0.057]*	[0.046]**	[0.095]*	[0.063]*	[0.069]*
Info sharing (source)	−0.031	−0.032	−0.032	−0.031	−0.034	−0.038	−0.030
	[0.044]**	[0.024]**	[0.036]**	[0.078]*	[0.021]**	[0.069]*	[0.020]**

	1	2	3	4	5	6	7
Info sharing (recipient)	0.015	0.016	0.021	0.014	0.019	0.024	0.032
	[0.087]*	[0.008]***	[0.006]***	[0.086]*	[0.069]*	[0.037]**	[0.011]**
Property rights (source)	−0.024	−0.025	−0.020	−0.028	−0.037	−0.037	−0.027
	[0.053]*	[0.043]**	[0.008]***	[0.051]*	[0.084]*	[0.003]***	[0.078]*
Property rights (recipient)	0.019	0.022	0.015	0.024	0.029	0.021	0.026
	[0.062]*	[0.036]**	[0.029]**	[0.093]*	[0.043]**	[0.068]*	[0.019]**
Financial liberalization (source)							0.039
							[0.319]
Financial liberalization (recipient)							0.044
							[0.028]**
Growth opportunities (source)							−0.317
							[0.016]**
Growth opportunities (recipient)							0.712
							[0.018]**
Source countries	26	26	26	26	26	26	24
Recipient countries	111	111	108	109	103	103	70
Banks	301	301	301	301	301	301	284
Other control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	33,110	33,110	32,207	32,508	30,702	30,702	19,596

Conclusion

- There are "push" and "pull" effects in bank regulations.
- Capital is more likely to flow from restrictive markets to relaxed markets.
  - A form of regulatory arbitrage is taking place.
- Cross-country competition may help put the brakes on over-regulation.
- Remedy for the negative effect (race to the bottom) can be global coordination.

Discussion

Possible Critiques

- There are too much complicated data and tables.
- How can we distinguish between regulation and institutional quality?
  - e.g. transparency of financial statement (one of regulations) itself is related to creditor rights (one of institutional quality).
- Large bank inflows will affect the receipient country's regulation and growth opportunities.
  - Vector Autocorrelation (VAR) model to find the interaction.