

Bubble Thy Neighbor: Portfolio Effects and Externalities from Capital Controls

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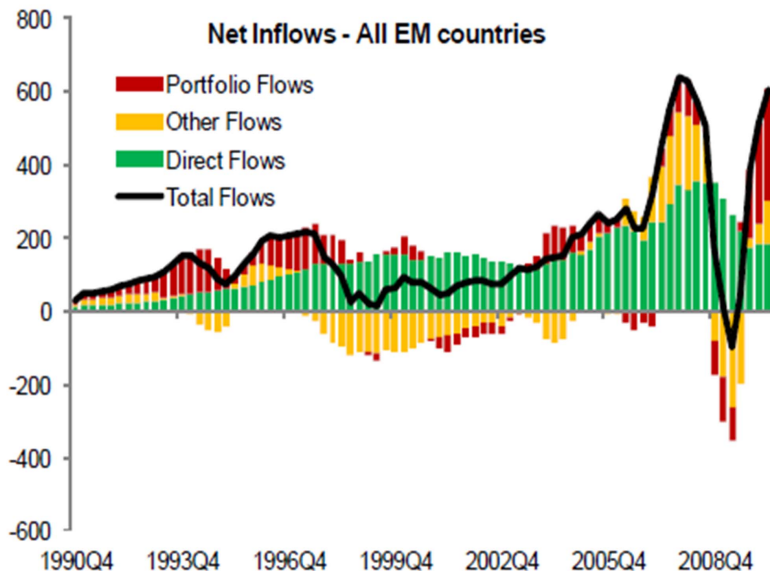
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Large and Volatile Capital Flows



Pro Capital Controls

- Surges in capital inflows can create challenges
 - Exchange rate appreciation/loss of competitiveness
 - Correlated with lending booms and bubbles
 - More vulnerable to sudden stops
- External factors
 - US monetary policy and other push factors of capital flows
 - Temporary factors: crisis-related shifts in risk appetite
 - Contagion and herding behavior of investors

Anti Capital Controls

- Capital controls inferior to needed policy reforms
 - Fixed / pegged FX regimes
 - Flawed monetary / fiscal policy framework
 - Change prudential supervision / institutional weaknesses
- Externalities from capital controls can be substantial
 - Raising incentives for others to implement capital controls

Policy Support for Capital Controls

- Recent support for limited controls on capital inflows
 - Part of policy toolkit to manage large and volatile inflows (IMF, 2011)
 - Evidence can shift composition of inflows to reduce vulnerabilities (Ostry et al, 2011)
 - Could reduce risk of bubbles/overheating?
- Unanswered questions:
 - Do these types of controls affect portfolio flows into the country?
 - If controls reduce inflows to one country, are there multilateral effects? If so, where?
 - Do externalities shift challenges to other countries? (i.e., Bubble thy neighbor)

This Paper

- Tests for portfolio effects and externalities of capital controls on investor portfolios
 - Portfolio rebalancing approach
 - Impact of Brazils changes to IOF from 2006-2011
 - Survey investors to structure analysis
- Results:
 - Large direct effects of capital controls on portfolio investment in Brazil
 - Significant spillover effects in other countries:
 - Positive for Latin America and dragon plays
 - Negative for control risk countries
- Implications:
 - Much of effect through signaling rather than direct cost
 - Multilateral effects suggest role for international coordination

Structure of the Talk

- Literature review (quickly)
- Investor surveys
- Empirical analysis
 - Events
 - Data
 - Model
 - Variables
- Results
 - Direct effects of controls
 - Spillover effects of controls
- Conclusions

Related Literature: Capital Controls

- Macroeconomic literature:
 - Capital controls do not seem to affect total capital inflows or exchange rates
 - Controls can affect composition of inflows making them safer
- Microeconomic literature:
 - Lifting controls on equity inflows leads to increased inflows, higher equity returns and higher investment (Henry, 2007)
 - Controls reduce the supply of capital and increase financial constraints, especially for smaller firms (Forbes, 2007)
 - Controls can shift the structures of country debt to strengthen country resilience to crises (Ostry et al. 2011)

Related Literature: Portfolio Allocation

- Policy that lowers returns in country will reduce share of portfolios allocated to country (Stulz, 1981):
 - Model showing how policy uncertainty, weaker govt. reputations cause outflows of capital (Chari and Kehoe, 2003)
 - Evidence that investors reduce investment in countries with less government transparency and more opacity (Gelos and Wei, 2005)
 - Foreign investors invest less in countries with more restrictions on foreign ownership, weaker investor protection, weaker disclosure (Gelos, 2011).
- Externalities?
 - Trade literature focuses on trade creation and diversion, no equivalent literature on capital flow diversion.

Investor Surveys - Hypotheses

- Interviews with 15 groups of investors (1-5 people/group)
 - Each fund had some international exposure
- General reaction to capital controls?
 - One of many costs of doing business (costs)
 - Can make country more attractive (costs)
 - Indicates anti-investor bias, increased policy uncertainty, that will deter investment (signaling, expectations)
- Actual response to specific controls?
 - Equity vs. Bond funds
 - Global vs. EME funds
 - Lagged adjustment for various reasons
 - Key role of benchmark

Investor Surveys - Spillover Groups

- Region (Latin America)
- Market characteristics
 - Large and liquid markets, large share of benchmark
 - Definition: countries that constitute at least 4 % of equity benchmark and 10 % of bond benchmark
- Dragon Play
 - Also benefit from growth in China
 - Commodity Exporters
 - Export-oriented emerging markets in Asia
- Control Risk
 - Controls in Brazil raise concerns about other countries
 - Inflow anxiety countries fairly open and investor friendly but recently enacted moderate controls
 - Control friendly countries that traditionally maintain widespread capital account restrictions (KAOPEN, Chinn-Ito, 2008)

Events

- Changes in IOF tax in Brazil from 2006-2011
 - IOF (Imposto de Operacoes Financeiras)- tax on foreign investment
 - Sensitivity tests look at impact of other changes in prudential regulations

Date	Description
March 2008	Introduced IOF of 1.5% on fixed income.
October 2008	IOF on fixed income reduced to 0%.
October 2009	Introduced IOF of 2% on fixed income and equities; Implemented 1.5% tax on converted ADRs.
October 2010	Increased IOF to 4% on fixed income; Then increased IOF to 6% on fixed income; Finance Minister Mantega also announced that other measures were under consideration.

Events

- Disadvantage of focus on one set of events
 - Insights may not generalize to other countries, other types of controls, other time periods
- Advantages:
 - Can more precisely estimate effect of control than by aggregating different experiences
 - Brazil is relatively open to foreign investors
 - Brazil is large emerging market and large share of key benchmarks
 - Well-publicized changes in controls in Brazil over this period → ideal natural experiment
- Overall strategy: start with example where most likely to see direct and spillover effects of controls

Emerging Portfolio Fund Research (EPFR) Data

- Information on portfolio flows and holdings across countries
- Over 16,000 equity funds and over 8,000 bond funds
- Most comprehensive dataset on international portfolio flows available at high frequency with detailed geographic coverage
 - CAVEATS:
 - Only includes information on mutual funds
 - Better coverage of equities than fixed income Captures about 5-20 % of total market capitalization for most countries, but believed to be representative
- Our analysis focuses on a subsample of fund groups with at least 5 percent of exposure to Brazil and at least \$1 billion AUM in Brazil at year end-2007
 - Global Emerging Market Equity funds, Global Emerging Market Bond funds, Latin American Regional Equity funds
 - Captures 26 % of foreign portfolio investment in Brazil's equities and 13 % in debt markets (EPFR vs. IIP)

EPFR Coverage

Equity Funds	N	Total AUM (\$bn 12/2010)	Avg % of AUM in Brazil	AUM in Brazil (\$bn 12/2007)
Africa Regional	300	2.7	0	0
Asia ex-Japan Regional	1,402	152.3	0	0
Emerging Europe Regional	1,535	25.8	0.1	0
Europe Regional	1,980	159	0	0
Europe ex-UK Regional	1,539	112.1	0.1	0
Europe, Middle East & Africa Regional	1,037	3.7	0	0
Global Emerging Markets	3,420	439	14.7	46.9
Global ex-US	3,784	710.9	1.8	11.4
Global	3,649	990.5	1.2	11.2
Latin America Regional	850	49.6	62	29
Middle East & Africa Regional	346	1.9	0	0
Middle East Regional	423	2	0	0
Pacific Regional	1,265	24	0	0
Total	21,530	2,673.50		98.4
Bond Funds				
Asia ex-Japan Regional	1,039	14	0	0
Emerging Europe Regional	814	2.3	0	0
Global Emerging Markets	3,277	137.3	15.2	10.9
Global ex-US	432	31.1	0	0
Global	3,310	442.1	1.2	3
Latin America Regional	930	0.8	20.2	0.2
Total	9,802	627.7		14.1

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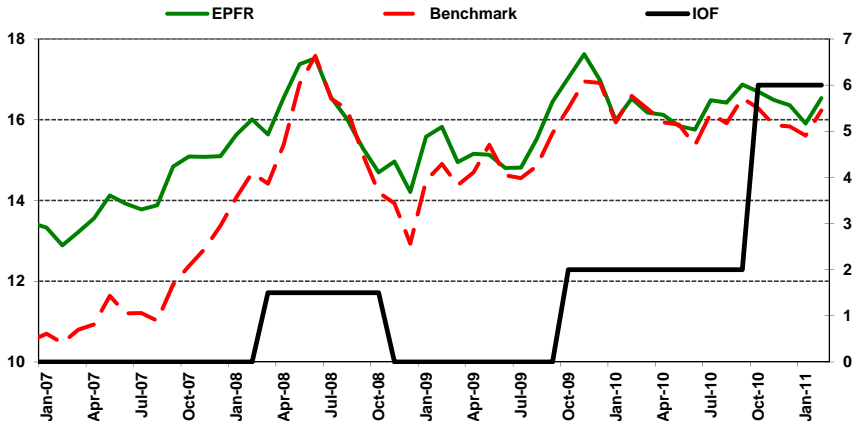
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Global Emerging Market Equity Funds



Empirical Model

- Build on Gelos and Wei (2005)
 - Each fund allocates its portfolio across countries based on: a country-fund fixed effect, any direct and spillover effects of capital controls, the country's weight in fund's benchmark, and macro controls:

$$w_{i,j,t} = \alpha_{i,j} + \gamma_D \text{Control}_t^{BR} + \gamma_S \text{Control}_t^{Ex-BR} + \beta w_{i,t}^{BM,j} + \delta \chi_{i,t} + \epsilon_{i,j,t}$$

$w_{i,j,t}$: share of the portfolio allocated to country i for fund group j at time t .

$\alpha_{i,j}$: country-fund group fixed effect.

$w_{i,t}^{BM,j}$: weight of country i in benchmark for fund group j .

$\chi_{i,t}$: set of macro control variables.

Control_t^{BR} : level of IOF at t if country allocation (i) is to Brazil.

Control_t^{Ex-Br} : level of IOF at t if allocation (i) is to country other than Brazil.

Control Variables

Variable	Definition
$w_{i,j,t}$	Share of fund j portfolio allocated to country i
Control Brazil	Level of IOF tax in Brazil * dummy = 1 if country i is Brazil
Control Ex-Brazil	Level of IOF tax in Brazil * dummy = 1 if country i is not Brazil
$w_{i,t}^{BM,j}$	Weight of country i in the MSCI/EMBI benchmark index
Other control events	Dummy = 1 if a capital control event takes place in country i (other than Brazil)
Global risk	U.S. VIX
Overweight	Deviation of lagged portfolio weight from its benchmark weight
Outperformance	6-month moving average of outperformance of country i vs. respective benchmark, lagged by one month
Interest spread	Country is interest rate differential versus the United States, based on the 3-month money market interest rate lagged by one month
Off-Benchmark share	Portfolio share held in countries that are not contained in the respective benchmark

Model Specification

- Focus on the first-difference and log-difference specifications
- Timing: Allow for changes in capital controls to affect portfolio allocations over a 3-month window
- Control measure: Test for effect of changes in the IOF (so magnitude of change matters)
- Benchmark:
 - MSCI EM Index for Global EME equity funds
 - JP Morgans EMBI Global Diversified Index for EME bond funds
 - MSCI EM Americas Index for Latin America Regional Equity funds

Endogeneity

- Capital controls is a reaction to increasing capital flows
- Endogeneity between share of portfolio allocated to Brazil and govt. decision to adjust IOF
- However:
 - Will bias estimates of γ_D downward
 - Lower bound of the causal effect

Direct Effect of Controls

	First Difference	Log Difference	First Difference	Log Difference
<i>Control</i> ^{Brazil}	-0.037** (0.017)	-0.129*** (0.021)	-0.036* (0.018)	-0.062** (0.030)
<i>Control</i> ^{Ex-Brazil}	0.005 (0.006)	0.082 (0.210)	0.003 (0.006)	0.076 (0.213)
<i>w</i> ^{Benchmark}	0.723*** (0.042)	0.656*** (0.087)	0.729*** (0.041)	0.664*** (0.084)
Macro Variables	N	N	Y	Y
Observations	2,545	2,545	2,545	2,545
R-squared	0.468	0.14	0.479	0.151

- Significant effect on Brazilian allocations over 3 months following the launch of control
- Spillovers are not significant
- Robustness Checks
 - No significant effect in the month prior to the change
 - No significant effect in just the month the change is announced
 - No significant effect over an additional three months;

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Effects of Controls: By Fund Type

	Equity Funds		Debt Funds	
	First-difference	Log-difference	First-difference	Log-difference
<i>Control</i> ^{Brazil}	-0.050** (0.020)	-0.134** (0.056)	-0.033*** (0.004)	-0.289*** (0.077)
<i>Control</i> ^{Ex-Brazil}	0.007 (0.009)	-0.057 (0.160)	-0.001 (0.008)	0.263 (0.469)
<i>w</i> ^{Benchmark}	0.813*** (0.018)	0.984*** (0.036)	0.216*** (0.072)	0.284*** (0.094)
Other Macro Controls	Y	Y	Y	Y
Observations	1,485	1,485	1,060	1,060
R-squared	0.724	0.489	0.033	0.029

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- Significant effect on both equity and bonds flows
- Signalling effect seems to be important

Signals from Other Measures

- Brazil implemented several measures other than IOF that affect foreign investment
 - 07/01: increase banks capital requirement on forex exposure from 50% to 100%
 - 11/09: introduced 1.5% tax when foreigners convert ADRs into receipts for local shares
 - 01/11: introduced 60% URR on banks short FX positions
 - 03/11: 2% tax on local corporate offshore borrowing and 6% IOF on FX loans ≤ 1 yr
 - 04/11: extend IOF tax on FX loans to ≤ 2 yrs
 - 02/12: raised IOF tax on loans
- Find no significant effect of these measures on investor portfolio allocation
 - Suggests changes in these macroprudential measures do not send the same signal as changes in IOF on portfolio investment

Magnitudes

- What if Brazil reduced current IOF on fixed income from 6% to 0%?
 - Assume everything else remains constant
 - To get impact on flows, need to gross up EPFR data to make up for limited coverage of total flows
- Calculations:
 - Corresponds to increased portfolio investment in Brazil of \$28 billion to \$32 billion over 3 months only in the sample of EPFR funds.
 - Large relative to BoP annual portfolio flows (\$35.5 billion in 2009 and \$70.8 billion in 2010)
 - Moderate relative to stock of portfolio investment (\$441.5 billion at end 2009)
- CAVEAT: very rough calculations!

Externalities

- Given the large direct effect on portfolio allocation to Brazil: why no significant spillovers in initial estimates?
 - Insignificant because overwhelmed by other shocks that estimation doesn't accurately capture
 - Incremental funds from changes in Brazil allocation held in cash
 - Incremental funds from changes in Brazil allocated to countries not in the sample/benchmark
 - Heterogeneous effects across countries
 - Strong effects in some countries not captured in averages
 - Positive spillovers in some countries counteract negative spillovers in others

Externalities (cont'd)

- First test: spillovers to countries with high beta with Brazil
 - Countries that co-move with Brazil would be natural replacements in portfolios
 - Calculated as correlation between returns in country and returns in Brazil, controlling for returns in global EM benchmark
 - Use value of beta or dummy=1 for high beta countries
 - No significant spillovers to high beta countries

Investor Surveys - Spillover Groups

- **Region (Latin America)**
- **Market characteristics**
 - Large and liquid markets, large share of benchmark
 - Definition: countries that constitute at least 4 % of equity benchmark and 10 % of bond benchmark
- **Dragon Play**
 - Also benefit from growth in China
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Externalities by Groups

	Region		Market Size		Dragon Play		Control Risk	
	First-difference	Log-difference	First-difference	Log-difference	First-difference	Log-difference	First-difference	Log-difference
<i>Control</i> ^{Brazil}	-0.028*** (0.003)	-0.275*** (0.061)	-0.028*** (0.003)	-0.276*** (0.062)	-0.027*** (0.003)	-0.271*** (0.061)	-0.028*** (0.003)	-0.276*** (0.062)
<i>Control</i> ^{Ex-Brazil}	0.002 (0.009)	0.017 (0.187)	-0.002 (0.008)	-0.017 (0.308)	-0.018* (0.008)	-0.343** (0.139)	0.016 (0.010)	0.175 (0.232)
<i>w</i> ^{Benchmark}	0.847*** (0.021)	0.975*** (0.043)	0.847*** (0.021)	0.975*** (0.043)	0.845*** (0.022)	0.975*** (0.044)	0.845*** (0.022)	0.974*** (0.043)
<i>Region</i>	0.012** (0.005)	0.207*** (0.052)						
<i>Market Size</i>			0.009 (0.014)	0.098 (0.137)				
<i>Dragon Play</i>					0.025** (0.009)	0.416** (0.194)		
<i>Control Risk</i>							-0.018** (0.008)	-0.184** (0.070)
<i>Macro Controls</i>	Y	Y	Y	Y	Y	Y	Y	Y
Observations	1,086	1,086	1,086	1,086	1,086	1,086	1,086	1,086
R-squared	0.702	0.555	0.702	0.555	0.704	0.558	0.703	0.556

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<i>Control</i> ^{Ex-Brazil}	0.002 (0.009)	0.017 (0.187)	-0.002 (0.008)	-0.017 (0.308)	-0.018* (0.008)	-0.343** (0.139)	0.016 (0.010)	0.175 (0.232)
<i>w</i> ^{Benchmark}	0.847*** (0.021)	0.975*** (0.043)	0.847*** (0.021)	0.975*** (0.043)	0.845*** (0.022)	0.975*** (0.044)	0.845*** (0.022)	0.974*** (0.043)
<i>Region</i>	0.012** (0.005)	0.207*** (0.052)						
Market Size			0.009 (0.014)	0.098 (0.137)				
<i>Dragon Play</i>					0.025** (0.009)	0.416** (0.194)		
<i>Control Risk</i>							-0.018** (0.008)	-0.184** (0.070)
<i>Macro Controls</i>	Y	Y	Y	Y	Y	Y	Y	Y
Observations	1,086	1,086	1,086	1,086	1,086	1,086	1,086	1,086
R-squared	0.702	0.555	0.702	0.555	0.704	0.558	0.703	0.556

Externalities by Groups

	Region		Market Size		Dragon Play		Control Risk	
	First-difference	Log-difference	First-difference	Log-difference	First-difference	Log-difference	First-difference	Log-difference
<i>Control</i> ^{Brazil}	-0.028*** (0.003)	-0.275*** (0.061)	-0.028*** (0.003)	-0.276*** (0.062)	-0.027*** (0.003)	-0.271*** (0.061)	-0.028*** (0.003)	-0.276*** (0.062)
<i>Control</i> ^{Ex-Brazil}	0.002 (0.009)	0.017 (0.187)	-0.002 (0.008)	-0.017 (0.308)	-0.018* (0.008)	-0.343** (0.139)	0.016 (0.010)	0.175 (0.232)
<i>w</i> ^{Benchmark}	0.847*** (0.021)	0.975*** (0.043)	0.847*** (0.021)	0.975*** (0.043)	0.845*** (0.022)	0.975*** (0.044)	0.845*** (0.022)	0.974*** (0.043)
<i>Region</i>	0.012** (0.005)	0.207*** (0.052)						
<i>Market Size</i>			0.009 (0.014)	0.098 (0.137)				
Dragon Play					0.025** (0.009)	0.416** (0.194)		
<i>Control Risk</i>							-0.018** (0.008)	-0.184** (0.070)
<i>Macro Controls</i>	Y	Y	Y	Y	Y	Y	Y	Y
Observations	1,086	1,086	1,086	1,086	1,086	1,086	1,086	1,086
R-squared	0.702	0.555	0.702	0.555	0.704	0.558	0.703	0.556

Externalities by Groups

	Region		Market Size		Dragon Play		Control Risk	
	First-difference	Log-difference	First-difference	Log-difference	First-difference	Log-difference	First-difference	Log-difference
<i>Control</i> ^{Brazil}	-0.028*** (0.003)	-0.275*** (0.061)	-0.028*** (0.003)	-0.276*** (0.062)	-0.027*** (0.003)	-0.271*** (0.061)	-0.028*** (0.003)	-0.276*** (0.062)
<i>Control</i> ^{Ex-Brazil}	0.002 (0.009)	0.017 (0.187)	-0.002 (0.008)	-0.017 (0.308)	-0.018* (0.008)	-0.343** (0.139)	0.016 (0.010)	0.175 (0.232)
<i>w</i> ^{Benchmark}	0.847*** (0.021)	0.975*** (0.043)	0.847*** (0.021)	0.975*** (0.043)	0.845*** (0.022)	0.975*** (0.044)	0.845*** (0.022)	0.974*** (0.043)
<i>Region</i>	0.012** (0.005)	0.207*** (0.052)						
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<i>Macro Controls</i>	Y	Y	Y	Y	Y	Y	Y	Y
Observations	1,086	1,086	1,086	1,086	1,086	1,086	1,086	1,086
R-squared	0.702	0.555	0.702	0.555	0.704	0.558	0.703	0.556

Externalities - All Equities

	Global EM Equities		All Equities	
	First-difference	Log-difference	First-difference	Log-difference
<i>Control^{Brazil}</i>	-0.028*** (0.003)	-0.274*** (0.061)	-0.033** (0.014)	-0.581** (0.216)
<i>Control^{Ex-Brazil}</i>	-0.020** (0.009)	-0.673*** (0.141)	-0.020** (0.008)	-0.725*** (0.193)
<i>w^{Benchmark}</i>	0.843*** (0.022)	0.973*** (0.044)	0.802*** (0.016)	0.938*** (0.037)
Region	-0.01 (0.010)	-0.074 (0.159)	0.015 (0.015)	-0.238 (0.271)
<i>Market Size</i>	0.014** (0.006)	0.071 (0.120)	0.013 (0.009)	0.189 (0.189)
<i>Dragon Play</i>	0.029*** (0.006)	0.497** (0.197)	0.005 (0.009)	0.401** (0.196)
<i>Control Risk</i>	-0.038*** (0.006)	-0.410*** (0.107)	-0.027*** (0.008)	-0.860*** (0.209)
<i>Macro Controls</i>	Y	Y	Y	Y
Observations	1,086	1,086	2,219	2,219
R-squared	0.706	0.559	0.703	0.319

Externalities - All Equities

	Global EM Equities		All Equities	
	First-difference	Log-difference	First-difference	Log-difference
<i>Control^{Brazil}</i>	-0.028*** (0.003)	-0.274*** (0.061)	-0.033** (0.014)	-0.581** (0.216)
<i>Control^{Ex-Brazil}</i>	-0.020** (0.009)	-0.673*** (0.141)	-0.020** (0.008)	-0.725*** (0.193)
<i>w^{Benchmark}</i>	0.843*** (0.022)	0.973*** (0.044)	0.802*** (0.016)	0.938*** (0.037)
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<i>Macro Controls</i>	Y	Y	Y	Y
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	First-difference	Log-difference	First-difference	Log-difference
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	Global EM Equities		All Equities	
	First-difference	Log-difference	First-difference	Log-difference
<i>Control^{Brazil}</i>	-0.028*** (0.003)	-0.274*** (0.061)	-0.033** (0.014)	-0.581** (0.216)
<i>Control^{Ex-Brazil}</i>	-0.020** (0.009)	-0.673*** (0.141)	-0.020** (0.008)	-0.725*** (0.193)
<i>w^{Benchmark}</i>	0.843*** (0.022)	0.973*** (0.044)	0.802*** (0.016)	0.938*** (0.037)
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<i>Macro Controls</i>	Y	Y	Y	Y
Observations	1,086	1,086	2,219	2,219
R-squared	0.706	0.559	0.703	0.319

Conclusions

- Controls on capital inflows can have significant portfolio effects and externalities on portfolio investment
- Higher taxes in Brazil significantly:
 - Reduced portfolio allocations to Brazil
 - Increased portfolio allocations, particularly to dragon play countries
 - Reduced portfolio allocations to other countries at greater risk of instituting new capital controls
 - The magnitude of these effects is large relative to portfolio flows
- Much of the effect of capital controls occurs through signaling rather than the direct cost of the tax
- Significant externalities suggest need for international coordination in use of capital controls