

Capital Account Regulations, Foreign Exchange Pressure, and Crisis Resilience

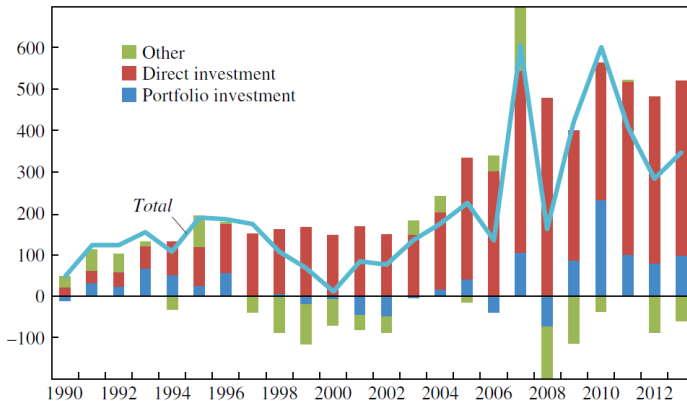
International Economics Association

Bilge Erten and José Antonio Ocampo
Columbia University

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Net Private Capital Flows to Emerging Markets, 1990-2012

Billions of current dollars



Source: International Monetary Fund, World Economic Outlook database.

Note: Data exclude changes in reserves and official capital flows.

Policy Options to Manage Capital Inflow Surges

<i>Macroeconomic Policy</i>	<i>Potential costs and limitations</i>
Fiscal tightening	Limited space, politically difficult, time lags
Reserve accumulation	Fiscal/social costs, may be difficult to sterilize
Allowing appreciation	Hurts competitiveness, Dutch disease
Reducing interest rates	Higher inflation, financial fragility risks
Capital account regulations	Must be countercyclical and difficult to evade

Goals of the paper

Illustrate the countercyclical macroeconomic effects of CARs

Address shortcomings of previous empirical studies:

- 1 Previous findings are primarily driven by sample selection.
 - Expand the dataset to cover 51 emerging and developing countries over 1995-2011.
- 2 Previous indices to represent regulations indicate the presence not the intensity of restrictions.
 - Use composite indices to capture intensity.
- 3 Previous studies generally do not account for endogeneity problems.
 - Use two instrumental variables, bilateral investment treaties with the U.S. and E.U. membership that prohibit the use of CARs.

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Preview of the results

- All CARs except the financial sector specific regulations are associated with lower foreign exchange pressure and reduced real exchange rate appreciation.
- Capital inflow regulations and financial sector restrictions enhance monetary policy autonomy.
- Increasing the restrictiveness of CARs in the run-up to the crisis reduced the growth decline during the crisis.
- Countries that used CARs experienced less overheating during the post-crisis recovery when there was a new surge in capital inflows.
- Overall CARs are countercyclical policy tools that promote macroeconomic stability.

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Outline of the presentation

- 1 Measuring capital account regulations and foreign exchange pressure
- 2 Counter-cyclical effects of capital account regulations on
 - Foreign exchange pressure
 - Real exchange rate
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 - Crisis resilience and post-crisis overheating
- 3 Conclusions and policy implications

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Measuring Capital Account Regulations (CARs)

Using IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* database, we extend the following indices up to 2011:

- 1 Capital inflow regulations (Schindler, 2009)
An average of binary regulations across money market instruments, bonds, equities, financial credits, collective instruments, and direct investment.
- 2 FX-related regulations (Ostry et al., 2012)
An average of restrictions on lending locally in FX, restrictions on purchase of locally issued securities denominated in FX, differential treatment of deposit accounts in FX, and limits on open FX positions.
- 3 Financial sector restrictions (Ostry et al., 2012)
An average of differential treatment of accounts held by non-residents, limits on borrowing from abroad, and restrictions on maintenance of accounts abroad.
- 4 Capital outflow regulations (Schindler, 2009) – coverage same as (1).

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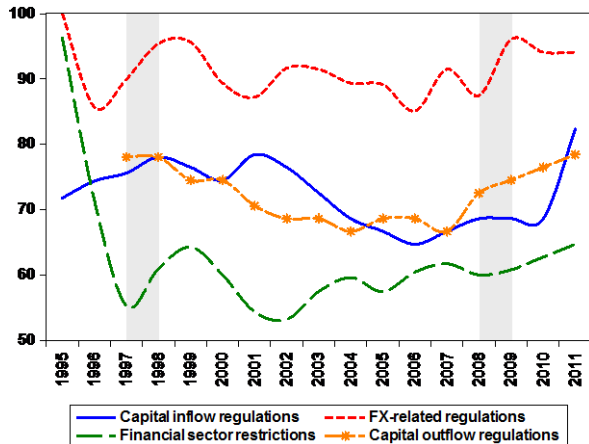
List of countries

Algeria	Costa Rica	Guatemala	Korea	Peru	Tunisia
Argentina	Croatia	Hungary	Latvia	Philippines	Turkey
Armenia	Czech Republic	Iceland	Lebanon	Poland	Ukraine
Bosnia	Dominican Rep.	India	Lithuania	Romania	Uruguay
Brazil	Ecuador	Indonesia	Malaysia	Russia	Venezuela
Bulgaria	Egypt	Israel	Mexico	Serbia	Vietnam
Chile	El Salvador	Jamaica	Morocco	South Africa	
China	Estonia	Jordan	Pakistan	Sri Lanka	
Colombia	Georgia	Kazakhstan	Panama	Thailand	

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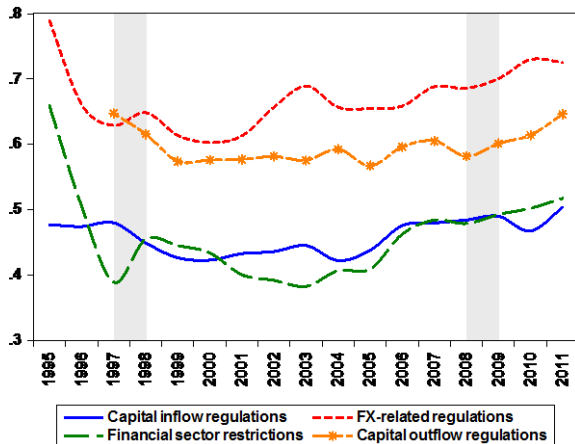
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Percentage of Countries with a Capital Account Regulation



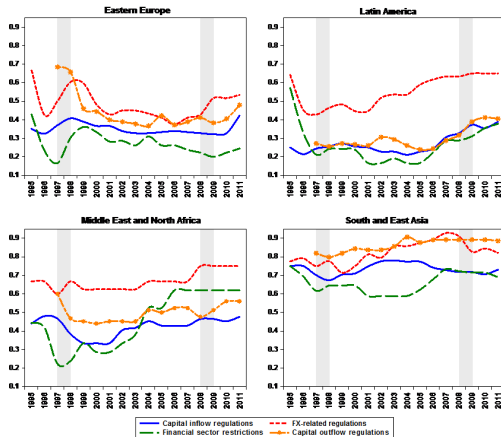
Source: Schindler (2009), Ostry et al. (2012) and estimates from IMF's AREAAR.

Evolution of Capital Account Regulations, Country Average



Source: Schindler (2009), Ostry et al. (2012) and estimates from IMF's AREAAR.

Evolution of Capital Account Regulations, Regional Averages



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Measuring foreign exchange pressure (FXP)

We define foreign exchange pressure index as a weighted average of changes in reserve accumulation and the real exchange rate that uses the inverse of standard deviations of each variable as weights.

$$FXP_{it} = (1/\sigma_i^{\hat{p}^N})\hat{p}_{N,it} + (1/\sigma_i^{\hat{a}})\hat{a}_{it+1}$$

- This measure is comparable across countries and over time.
- FXP is expected to rise during capital inflow surges and fall during periods of large capital outflows.

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Specification

Our baseline specification takes the form:

$$FXP_{it} = \alpha + \beta CAR_{it-1} + \delta X_{it} + f_t + r_i + u_{it}$$

where FXP_{it} is the foreign exchange pressure index;

CAR_{it-1} is the lagged capital account regulations;

X_{it} is a set of control variables;

f_t is the set of time dummies;

r_i is the region-specific fixed effects;

u_{it} is the error term.

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Baseline Panel Evidence, Dependent variable: FXP

	IV-2SLS				OLS			
	1	2	3	4	5	6	7	8
Inflow reg.	-0.92*** (0.32)				-0.30* (0.18)			
FX reg.		-1.48** (0.58)				-0.03 (0.21)		
Finan. rest.			-1.82* (0.94)				-0.10 (0.18)	
Outflow reg.				-0.82** (0.38)				-0.12 (0.14)
Cont 1	yes	yes	yes	yes	yes	yes	yes	yes
Obs.	672	625	614	602	672	625	614	602

Note: Dependent variable is the index of FXP (Mean = 0.77, Std dev = 1.50). CARs are instrumented with binary variables that take the value of 1 if the country has a bilateral investment treaty with the U.S. in year t (and zero otherwise); and if the country is in the European Union (and zero otherwise). All CARs are lagged one year. All regressions include regional and time fixed effects. Controls 1 include real GDP growth, real GDP per capita (log), institutional quality, and inflation rate. Clustered standard errors on country level in parentheses; *, **, *** indicate significance at 10%, 5%, and 1% levels respectively.

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Robustness with Additional Covariates: IV-2SLS (Dependent variable: FXP)

	1	2	3	4	5	6	7	8
Inflow reg.	-0.88** (0.36)	-0.99*** (0.36)						
FX reg.			-1.16** (0.55)	-1.51** (0.60)				
Finan. rest.					-1.52 (1.08)	-1.83 (1.33)		
Outflow reg.							-0.86** (0.35)	-1.06*** (0.32)
Cont 2	yes		yes		yes		yes	
Cont 3		yes		yes		yes		yes
Obs.	596	596	550	550	542	542	546	546

Note: Dependent variable is the index of FXP (Mean = 0.77, Std dev = 1.50). All CARs are lagged one year. All regressions include regional and time fixed effects. Controls 2 include controls 1, terms of trade (log), gross domestic saving (share of GDP), government consumption (share of GDP), and FDI inflows (share of GDP) in differenced form. Controls 3 include controls 2 and the exchange rate regime (binary variable equal to 1 for a de facto fixed exchange rate regime, and 0 otherwise). Clustered standard errors on country level in parentheses; *, **, *** indicate significance at 10%, 5%, and 1% levels respectively.

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Outflow reg.							-0.86** (0.35)	-1.06*** (0.32)
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Panel Evidence (Dependent variable: The Real Exchange Rate Changes), IV-2SLS

	IV-2SLS				OLS			
	1	2	3	4	5	6	7	8
Inflow reg.	-5.28** (2.19)				-1.76** (0.84)			
FX reg.		-8.16** (3.39)				-0.94 (1.12)		
Finan. rest.			-8.15 (5.96)				-0.38 (0.72)	
Outflow reg.				-4.23** (2.11)				-1.09 (0.84)
Cont 1	yes	yes	yes	yes	yes	yes	yes	yes
Obs.	732	684	671	656	732	684	671	656

Note: Dependent variable is the percentage change in real exchange rate (Mean = 1.72, Std dev = 10.70). All CARs are instrumented with binary variables that take the value of 1 if the country has a bilateral investment treaty with the U.S. in year t (and zero otherwise); and if the country is in the European Union (and zero otherwise). All CARs are lagged one year. All regressions include regional and time fixed effects. Controls 1 include real GDP growth, real GDP per capita (log), institutional quality, and reserves (% GDP). Clustered standard errors on country level in parentheses; *, **, *** indicate significance at 10%, 5%, and 1% levels respectively.

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Robustness: IV-2SLS (Dep. var: Real exchange rate)

	1	2	3	4	5	6	7	8
Inflow reg.	-6.05** (2.83)	-5.39** (2.41)						
FX reg.			-9.60*** (3.70)	-8.58*** (2.86)				
Finan. rest.					-10.37 (8.51)	-15.11 (10.58)		
Outflow reg.							-5.09** (2.30)	-5.03** (2.22)
Cont 2	yes		yes		yes		yes	
Cont 3		yes		yes		yes		yes
Obs.	649	597	603	551	594	543	595	547

Note: Dependent variable is the percentage change in real exchange rate (Mean = 1.72, Std dev = 10.70). All CARs are instrumented with binary variables that take the value of 1 if the country has a bilateral investment treaty with the U.S. in year t (and zero otherwise); and if the country is in the European Union (and zero otherwise). All CARs are lagged one year. All regressions include regional and time fixed effects. Controls 2 include controls 1, terms of trade (log), gross domestic saving (share of GDP), government consumption (share of GDP), FDI inflows (share of GDP), and the exchange rate regime. Controls 3 include controls 2 and the inflation rate. Clustered standard errors on country level in parentheses; *, **, *** indicate significance at 10%, 5%, and 1% levels respectively.

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Inflow reg.	-6.05** (2.83)	-5.39** (2.41)						
FX reg.			-9.60*** (3.70)	-8.58*** (2.86)				
Finan. rest.					-10.37 (8.51)	-15.11 (10.58)		
Outflow reg.							-5.09** (2.30)	-5.03** (2.22)
Cont 2	yes		yes		yes		yes	
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Monetary Policy Autonomy: Specification

The specification follows the empirical work on monetary policy autonomy and CARs in individual country cases (Clements, 2009, Baumann, 2012), and takes the following form:

$$\Delta \ln(s_{it}) = \alpha + \beta_0 \Delta \ln(s_{it-1}) + \beta_1 (i - i^f)_{it} + \beta_2 CAR_{it} + \beta_3 CAR_{it} (i - i^f)_{it} + \beta_4 X_{it} + f_t + r_i + v_{it}$$

where s_{it} is the nominal exchange rate for country i with reference to the USD; $(i - i^f)_{it}$ is the difference between domestic and foreign money market rates.

Monetary Policy Autonomy: Specification

The specification follows the empirical work on monetary policy autonomy and CARs in individual country cases (Clements, 2009, Baumann, 2012), and takes the following form:

$$\Delta \ln(s_{it}) = \alpha + \beta_0 \Delta \ln(s_{it-1}) + \beta_1 (i - i^f)_{it} + \beta_2 CAR_{it} + \beta_3 CAR_{it} (i - i^f)_{it} + \beta_4 X_{it} + f_t + r_i + v_{it}$$

where s_{it} is the nominal exchange rate for country i with reference to the USD; $(i - i^f)_{it}$ is the difference between domestic and foreign money market rates.

Panel Evidence (Dep. var.: Nominal Exchange Rate Changes), IV-2SLS

	1	2	3	4
Interest diff. (IRD)	1.28*** (0.30)	-0.70 (0.86)	1.67*** (0.44)	1.48*** (0.45)
Inflow reg.* IRD	-1.05** (0.48)			
FX reg.* IRD		2.61* (1.37)		
Finan. rest.* IRD			-1.58*** (0.56)	
Outflow reg.* IRD				-0.82 (0.61)
Controls 1	yes	yes	yes	yes
Observations	652	625	612	600

Note: Dep. var. is percentage change in nominal exchange rate (Mean = 6.54, Std dev = 26.50). All CARs are instrumented with bilateral investment treaties with U.S. and EU membership. Regional and time FE added. Controls 1 include real GDP growth, real GDP per capita, institutional quality, reserves (% GDP), and exchange rate regime. Clustered s.e. on country level; *, **, *** significance at 10%, 5%, and 1% levels.

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Cross-section Evidence on Crisis Resilience (Dep. var: Growth Decline), OLS

	1	2	3	4	5	6	7	8
Inflow reg.	5.56** (2.25)	5.61** (2.52)						
FX reg.			9.91*** (3.62)	9.82*** (3.75)				
Finan. rest.					6.69** (3.04)	7.20** (3.17)		
Outflow reg.							6.50*** (2.31)	5.73** (2.36)
Cont 1	yes	yes	yes	yes	yes	yes	yes	yes
Obs.	40	40	38	37	36	35	40	40
R-sq.	0.29	0.29	0.39	0.40	0.36	0.36	0.34	0.32

Note: Dependent variable is the difference between real GDP growth rates in 2009, and averaged over 2003-08 (in percentage points; Mean=-7.5; Std dev=6.5). Capital inflow regulations, FX regulations, financial sector specific restrictions, and capital outflow regulations are averaged over 2007-09 for columns (1), (3), (5) and (7), and over 2005-07 for columns (2), (4), (6), and (8). Controls 1 include terms of trade change, growth in trading partners, and institutional quality. Constant included in each regression. Robust standard errors in parentheses; *, **, *** indicate variables significant at 10%, 5%, and 1% respectively.

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Cross-section Evidence on Post-crisis Overheating (Dep. var.: Growth Recovery), OLS

	1	2	3	4	5	6	7	8
Inflow reg.	-5.14** (2.20)	-5.11** (2.25)						
FX reg.			-6.16** (2.63)	-5.70** (2.64)				
Finan. rest.					-5.11** (2.50)	-4.68* (2.74)		
Outflow reg.							-3.76* (1.98)	-3.42* (1.94)
Cont 1	yes	yes	yes	yes	yes	yes	yes	yes
Obs.	42	42	44	43	43	42	47	47
R-sq.	0.21	0.21	0.21	0.19	0.21	0.19	0.19	0.18

Note: Dependent variable is the difference between real GDP growth rates averaged over 2010-11, and 2008-09 (in percentage points; Mean=6.02; Std dev=5.59). Capital inflow regulations, FX regulations, financial sector specific restrictions, and capital outflow regulations are averaged over 2007-09 for columns (1), (3), (5) and (7), and over 2005-07 for columns (2), (4), (6), and (8). Controls 1 include terms of trade change, growth in trading partners, and institutional quality. Constant included in each regression. Robust standard errors in parentheses; *, **, *** indicate variables significant at 10%, 5%, and 1% respectively.

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Conclusions

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- Illustrate the countercyclical macroeconomic effects of capital account regulations
- Address shortcomings of previous empirical studies

Results:

- Focusing on 51 emerging and developing countries over 1995-2011, we find that capital account regulations are associated with lower FX pressure, reduced real exchange rate appreciation, enhanced monetary policy autonomy, improved crisis resilience, and reduced post-crisis overheating.

Implications for policy:

- CARs as permanent measures which are adjusted countercyclically to offset destabilizing effects of procyclical capital flows.

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