

Understanding the pro-cyclicality of capital flows

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Questions

Questions

- Are capital flows in emerging economies pro-cyclical?
- If yes, why are they pro-cyclical?
- What are the consequences of pro-cyclical capital flows?
- What is the role of financial integration and financial development in reducing pro-cyclicality of capital flows?

Are capital flows in emerging economies pro-cyclical?

What does the literature say on cyclicity of capital flows?

- Capital flows are pro-cyclical for Mexico and Turkey and acyclical for the United States (Alper, 2002)
- Gross capital flows are pro-cyclical in emerging economies (Broner et.al 2013)
- Gross capital flows tend to be positively correlated with domestic investment (Smith and Valderrama, 2009).

Data

- We study cyclical nature of capital flows in both developed and emerging economies
- Set of developed economies: Australia, Canada, Denmark, New Zealand, Sweden and U.S
- Set of emerging economies: India, Hungary, Korea, Malaysia, South Africa, Poland, Turkey, Colombia, Indonesia, Thailand, Brazil, Chile, and Philippines
- Inflows of capital
 - Net purchases of domestic assets by non-residents
 - Sum of FDI, portfolio liabilities, other liabilities and financial derivatives liabilities (taking actual, not absolute values)
- Outflows
 - Net purchases of foreign assets by residents
 - Sum of Outward FDI, portfolio assets, other assets and financial derivatives assets

Methodology

- Annual data from 1990 onwards
- Hodrick-Prescott filter to extract the cyclical component of capital flows and GDP
- The cyclical component is used to study the correlation of capital flows with GDP
 - ① Pro-cyclical: if correlation is positive and exceeds 0.35
 - ② Counter-cyclical: if correlation is negative and absolute value exceeds 0.35
 - ③ Acyclical: if absolute value of correlation falls below 0.35

Cyclical nature of capital flows and output volatility: Developed economies

	Inflows	Outflows	Netflows	Gross flows	Output vol.
Australia	0.16	0.34	0.33	0.55	1.20
Canada	0.16	-0.15	-0.29	0.22	2.02
Denmark	0.16	0.16	-0.07	0.03	1.94
New Zealand	0.28	-0.13	0.21	0.04	1.94
Sweden	-0.36	0.28	0.56	-0.03	2.48
US	0.39	0.10	0.52	0.09	1.75
Median	0.16	0.12	0.26	0.006	1.93

Data source: Datastream, Authors' estimation

Cyclical nature of capital flows and output volatility: Emerging economies

	Inflows	Outflows	Netflows	Gross flows	Output vol.
Hungary	0.52	0.51	0.69	0.48	4.44
Korea	-0.21	0.54	0.08	0.57	2.90
Malaysia	-0.03	-0.16	0.09	-0.10	3.74
South Africa	0.54	0.38	0.59	0.53	2.15
Poland	0.20	-0.29	0.65	0.08	4.16
Turkey	0.72	0.75	0.49	0.82	5.99
Colombia	0.42	0.18	0.78	0.65	3.15
Indonesia	-0.10	0.32	0.62	-0.36	4.89
Thailand	0.27	0.06	0.61	0.17	5.31
Chile	0.58	0.31	0.02	0.44	3.00
Philippines	0.46	-0.04	0.54	0.34	1.9
India	0.71	0.16	0.66	0.72	1.82
Median	0.46	0.20	0.59	0.48	3.7

Data source: Datastream, Authors' estimation

Findings

- Capital flows in developed economies are acyclical
- Capital flows in emerging economies are strongly pro-cyclical
- The median output volatility in emerging economies is about 2 times higher than the median output volatility in developed economies

Why are capital flows in emerging economies pro-cyclical and consequences?

Why are capital flows in emerging economies pro-cyclical?

Plausible explanations by Kaminsky, Reinhart and Vegh (2004)

- In response to positive temporary productivity shock, borrow more to finance profitable investment opportunities
- In good times consumption is financed by borrowing from abroad
- Good times reduces country risk premium attracts foreign capital

Why are capital flows in emerging economies pro-cyclical? and possible consequences?

- Firm channel shaping cyclical pattern of capital flows (Aghion, Bacchetta, and Banerjee, 2004)
- When borrowing is limited by agent's wealth, capital flows are pro-cyclical and may intensify the business cycle fluctuations (Pintus, 2007)

Role of financial integration and financial development

Role of financial integration and financial development

- Greater financial openness can be beneficial for economic growth once certain identifiable threshold in financial depth and institutional quality attained (Kose, Prasad and Taylor, 2011)
- Financial integration may reduce business cycle fluctuations once a threshold level of financial development is attained (Aghion, Bacchetta, and Banerjee, 2004; Aizenman, Chinn, and Ito, 2008)
- Implication for pro-cyclicality of capital flows: Domestic financial development in the backdrop of financial integration may reduce pro-cyclicality of capital flows (Aghion, Bacchetta, and Banerjee, 2004)

Contribution

Contribution

- We propose a model of household channel shaping cyclical pattern of capital flows
- Presence of liquidity-constrained households (Honohan, 2006), adjustment cost of borrowing (Yakhin, 2008; Bhattacharya, Patnaik and Pundit, 2013) along with shock to trend growth (Aguiar-Gopinath, 2007) can explain the pro-cyclicality in capital flows
- Analysis of counter-factual
 - From an intermediate stage of financial development and openness, financial integration along with financial development can significantly reduce pro-cyclicality of capital flows.
 - Financial liberalisation and domestic financial development reduce output volatility, but absolute and relative consumption volatility may increase in the presence of a permanent income shock.

Model

Assumptions

- Small open economy
- Continuum of infinitely lived households and firms
- Heterogeneous households
 - Liquidity-constrained households: Fraction λ of households with no access to financial service, can not save and borrow
 - Ricardian households: Fraction $1 - \lambda$ of households can save, borrow and smooth consumption
 - Financial development captured by a decline in λ
- Households supply unit labour inelastically
- One internationally traded risk-free bond
- Quadratic adjustment cost of borrowing
 - Financial integration is captured by a decline in the coefficient of adjustment cost of borrowing

Preferences

- Optimisation by Ricardian households

$$\text{Max } V_t = E_t \sum_{t=0}^{\infty} \beta^t \log(C_t^R) \quad (1)$$

$$\text{sj. to } C_t^R + I_t^R + B_t^R - \frac{B_{t+1}^R}{1 + R_t} + \frac{\kappa}{2} \left(\frac{\frac{B_{t+1}^R}{\Gamma_t} - \bar{b}^R}{\frac{Y_t}{\Gamma_{t-1}}} \right)^2 Y_t = R_t^K K_t^R + W_t \quad (2)$$

- Interest rate on bond

$$R_t = R^* + \psi(e^{\frac{B_{t+1}^R}{\Gamma_t} - \bar{b}} - 1) \quad (3)$$

- Total consumption

$$C_t = \lambda C_t^L + (1 - \lambda) C_t^R. \quad (4)$$

Shocks

- Production

$$Y_t = e^{a_t} K_t^{1-\alpha} \Gamma_t^\alpha \quad (5)$$

- Technology

$$a_t = \rho_a a_{t-1} + \epsilon_t^a \quad \epsilon_t^a \sim N(0, \sigma_a^2) \quad (6)$$

- Growth of labour productivity

$$\Gamma_t = g_t \Gamma_{t-1} \quad (7)$$

- Growth shock

$$\ln \left(\frac{g_t}{\mu_g} \right) = \rho_g \ln \left(\frac{g_{t-1}}{\mu_g} \right) + \epsilon_t^g; \quad \epsilon_t^g \sim N(0, \sigma_g^2) \quad (8)$$

India: A case study

Calibration

Parameter values

Parameters		Values	Sources
Discount factor	β	0.98	Aguiar and Gopinath, 200
Rate of Depreciation	δ	5%	Virmani, 2004
Share of labour	α	0.7	Verma 2008
Interest rate elasticity of indebtedness	ψ	0.001	Aguiar and Gopinath, 200
Adjustment cost parameter	ϕ	2.82	Aguiar and Gopinath, 200
Mean trend growth rate of labour productivity	$\mu_g - 1$	4.7%	Estimated for India
Steady state foreign debt to GDP ratio	B_{ss}/Y_{ss}	23.75%	Data on external debt
1-(No. of bank accounts/population)	λ	0.487	Average of 1992-2010
Persistence in TFP shock process	ρ	0.495	Estimated for India
Volatility in TFP	σ_a	0.015	Estimated for India
Persistence in labour productivity growth shock	ρ_g	0.261	Estimated for India
Volatility in labour productivity growth shock	σ_g	0.020	Estimated for India

Parameter of adjustment cost of borrowing κ is chosen to match moments from data and the simulated series

Results

Comparing moments: Period 1992-2011

Statistic	Data*	Moments
		Model $\kappa = 10, \lambda = 0.487$
$\frac{\sigma^c}{\sigma^y}$	1.05	1.02
ρ_{GF}^y	0.70	0.73
ρ_{INFLW}^y	0.72	0.72
ρ_{OFLW}^y	0.15	0.61

**Source: Ghate, Pandey and Patnaik, 2013

Permanent income shock, financial frictions and pro-cyclical capital flows

In response to a positive shock to trend growth of productivity

- Liquidity constrained households raise consumption by the same amount of rise in income
- Unconstrained households anticipate higher future income
- Raise current consumption by more than the rise in income via borrowing against future income
- Frictions endogenously easing in good times cause strong pro-cyclicality of capital flows

Policy implication

Analysis of counter-factual under alternative values of κ and λ

Statistic	Scenario				
	Benchmark	Dev	Lib	Lib & Dev	Lib & Dev
	$\kappa = 10$ $\lambda = 0.487$	$\kappa = 10$ $\lambda = 0.001$	$\kappa = 0$ $\lambda = 0.487$	$\kappa = 1$ $\lambda = 0.350$	$\kappa = 0$ $\lambda = 0.001$
σ^y	3.20	3.19	2.59	3.16	2.61
σ^c	3.27	3.34	3.21	3.23	4.32
$\frac{\sigma^c}{\sigma^y}$	1.02	1.05	1.23	1.02	1.65
ρ_{GF}^y	0.72	0.70	-0.29	0.20	-0.37
ρ_{INFLW}^y	0.75	0.70	-0.30	0.14	-0.38
ρ_{OFLW}^y	0.61	0.61	-0.29	0.25	-0.36

Permanent income shock, financial frictions and pro-cyclical capital flows

- Financial integration reduces adjustment cost of borrowing and hence pro-cyclicality of capital flows
- Access to foreign finance allows investment smoothing and hence decline in output volatility
- But unconstrained household can raise consumption even more causing absolute and relative consumption to rise
- Financial development allows more people to respond to permanent income shock causing larger fluctuations in consumption volatility

Summary

- Domestic financial frictions, adjustment cost of borrowing and the presence of a permanent income shock may generate pro-cyclical capital flows
- From an intermediate stage of financial development and openness, domestic financial development alone can only mildly reduce pro cyclicity of capital flows
- The interaction of financial liberalisation with financial development can significantly reduce the pro cyclicity of flows
- Output volatility declines with financial development and integration
- The absolute and relative consumption volatilities may increase beyond a threshold level of financial openness and development

Thank you