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Nonlinear Capital Flow Tax: Capital Flow Management and Financial Crisis Prevention in China

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Abstract

How to promote capital account liberalization while preventing financial crises is a challenging task for policymakers. This study proposes a nonlinear (progressive) capital flow tax as a solution. We first demonstrate that the collateral requirement of international borrowing can give rise to multiple equilibria and self-fulflling fnancial crises. We then show that the crisis equilibrium characterized by large exchange rate depreciation, capital fight and welfare loss can be eliminated by imposing a nonlinear (progressive) tax scheme on capital outfows wit ± u utfo = wS u

III. Empirical Analysis

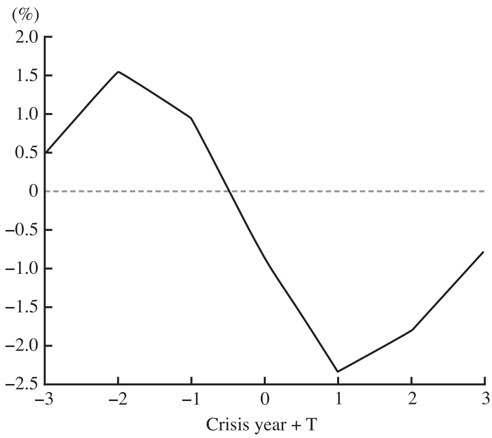
International

Financial Statistics

[2]

1. Costs of Financial Crises: Some Visual Evidence

2


(%)
2.0
1.5
1.0
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0
−0.5
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−2
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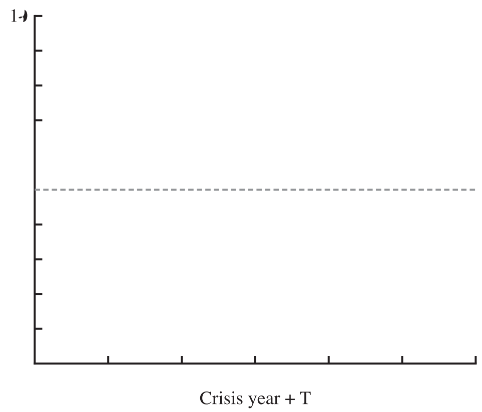
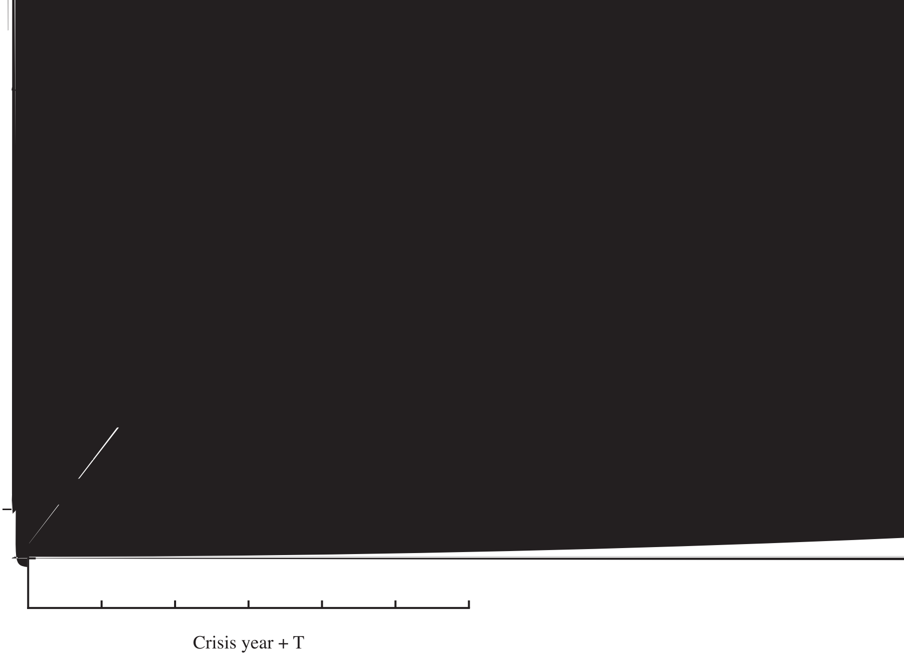
0
1
2
3
Crisis year + T


Crisis year + T


Crisis year + T

β

Current account/GDP			
Real output gap			
Real exchange rate gap			
Public debt/GDP			
Foreign reserves/GDP			
Infation rate			
Capital account openness			
Openness × Real output gap			
Openness × Real exchange rate gap			
Openness × US monetary reversal			
Floating dummy			
Openness × Floating dummy			
	Yes	Yes	Yes
	Yes	Yes	Yes
R^2			

IV. A Benchmark Model

1. Setup of the Model

$$E_0\sum_{t=0}^{\infty}\beta^t u\ C_t$$

where E_0 $\beta \in$

$u\ \cdot$ $u\ \cdot$

$u\ C_t\ = \frac{C_t^{1-\sigma}-1}{1-\sigma}$, σ

C_t t

tradable, c_t^T c_t^N:

$$C_t = \left[\theta\left(c_t^{\ T}\right)^{\frac{\varepsilon-1}{\varepsilon}} + \ \ -\theta\ \left(c_t^{\ N}\right)^{\frac{\varepsilon-1}{\varepsilon}}\right]$$

where ε θ

at R

y^T

$$c_t^T + p_t c_t^N + q_t k_{t+1} + Rb_t = y^T + p_t w_t L + \; q_t + p_t d_t \; k_t + b_{t+1}$$

p_t

c_t^T and c_t^N, the household, also holds capital k_t q_t

Rb_t

y^T

$p_t w_t L$ b_t

d_t k_t

q_t $p_t d_t$

$$y_t^N = AK_t^{\alpha} L_t^{1-\alpha}$$

$\overline{K}$ A

y_t^N y^N

$$w_t \equiv \quad -\alpha \; AL^{-\alpha}$$

$$d_t \equiv \alpha AL^{1-\alpha}$$

$$c_t^T + p_t c_t^N + q_t k_{t+1} + Rb_t = y^T + p_t \quad -\alpha \; y^N + \; q_t + p_t \alpha y^N \; k_t + b_{t+1}$$

is always equal to the constant supply: k_t $\overline{K}$

$$b_{t+1} \quad \phi \quad y^T + p_t y^N$$

ϕ

y^T $p_t y^N$

p_t

p_t

$p_t,\ q_t\}_{t=0}^{\infty}$,

b_0 $c_t^T,\ c_t^N,\ k_{t+1},\ b_{t+1}\}_{t=0}^{\infty}$

t

$\beta^t\lambda_t$

$\beta^t\lambda_t\mu_t$

c_t^T $\lambda_t = \theta\ C_t^{\ -\sigma+\ \varepsilon}\ c_t^{T\ -\ \varepsilon}$

c_t^N $p_t\lambda_t = \ \ -\theta\ \ C_t^{\ -\sigma+\ \varepsilon}\ c_t^{N\ -\ \varepsilon}$

k_{t+1} $q_t\lambda_t = \beta\ q_{t+1} + p_{t+1}\alpha y^N\ \ \lambda_{t+1}$

b_{t+1} $\lambda_t\ \ -\mu_t\ \ = \beta R\lambda_{t+1}$

$$p_t = \frac{1-\theta}{\theta}\left(\frac{c_t^T}{c_t^N}\right)^{\frac{1}{\varepsilon}}$$

$$k_{t+1} = \overline{K} = 1$$

$$c_t^N = y^N$$

$$c_t^T = y^T - Rb_t + b_{t+1}$$

$\{p_t, q_t\}_{t=0}^{\infty}$, an initial

b_0

p_t

conditions, we obtain:

$$b_{t+1}\quad \phi\left[y^T + y^N\,\frac{1-\theta}{\theta}\left(\frac{y^T - Rb_t + b_{t+1}}{y^N}\right)^{\frac{1}{\varepsilon}}\right]$$

b_t

ε b_t

2. Analysis of Multiple Equilibria

$b_{t+1} = b_t,\ c_{t+1}^T\quad c_t^T,\ \forall t\quad 0$ βR

μ_t

$b_t = b_t = b$

$$b \quad \phi\left[y^T + y^N \frac{-\theta}{\theta}\left(\frac{y^T - R - b}{y^N} \right)^{\frac{1}{\varepsilon}} \right]$$

b b [3]

$\tilde{b}$ b_0 $\tilde{b}$ constitutes

$$b_t = b_0$$

$$c^T{}_t = y^T \quad R \quad b_0$$

$$p_t = \frac{1-\theta}{\theta}\left(\frac{y^T - R - b_0}{y^N} \right)^{\frac{1}{\varepsilon}}$$

$$\mu_t$$

$\forall t \quad 0$

b_0 $\tilde{b}$

ε b_1

b_1

$b_1 = b_0$ b_1

equation:

$$b_1 = \quad \left\{ b_0 \quad \phi\left[y^T + y^N \frac{1-\theta}{\theta}\left(\frac{y^T - Rb_0 + b_1}{y^N} \right)^{\frac{1}{\varepsilon}} \right] \right\}$$

$b_1 = b_0$

$y^T = y^N$

---

[3] $y^T \quad R \quad b$

rate is R β R

constraint is ϕ = σ

θ ε

ε

b_1

ε

ε b_0

b_0

R		
β	R	
ϕ		
ε		
y^T	1	
y^N	1	
θ		
σ	2	
b_0		

b_0, which is

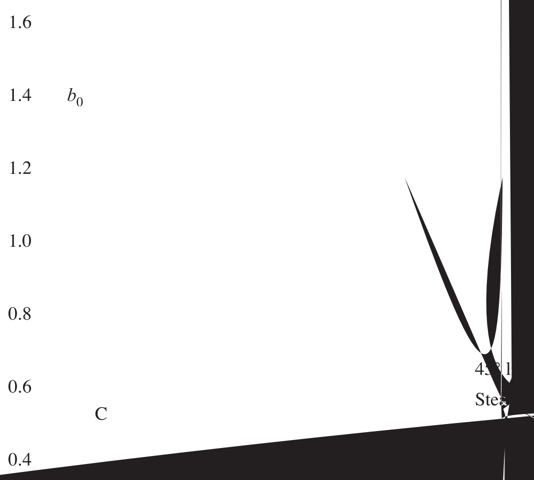
b_1

b_0

b_1

$b_1 = b_0$ is

b_1 c_1^T



43 1

Ste

litics, Ch

$$\Delta = 1 - \left(\frac{V^C}{V^A} \right)^{\frac{1}{1-\sigma}}$$

b_0 b_0

b_0

b_0	
	41

3. Nonlinear Capital Flow Tax

$$c_t^{T} + p_t c_t^{N} + q_t k_{t+1} + Rb_t = y^T + p_t \quad - \alpha \quad y^N + \quad q_t + p_t \alpha y^N \quad k_t + b_{t+1} - \Psi \quad Rb_t - b_{t+1} \quad + W_t$$

$$\lambda_t [\quad - \mu_t + \Psi' \quad Rb_t - b_{t+1} \quad] = \beta R \lambda_{t+1}$$

Ψ X_t

$b_{t+1} = b_t$

and μ_t βR=1, we also

$\lambda_{t+1} = \lambda_t$ X_t $R -$ b_t should

X_t $R -$ b_t, because

X_t $R -$ b_t

Ψ X_t X_t $R -$ b_t

Ψ X_t X_t, and

b_t b_t

(1) Why a Linear Tax Scheme Cannot Prevent Crisis

$R -$ b_t:

$$\Psi \quad X_t \quad = \begin{cases} \quad X_t \quad R - \quad b_t \\ \tau \quad X_t - \quad R - \quad b_t \quad X_t > \quad R - \quad b_t \end{cases},$$

in which τ X_t $R -$ b_t

can be written as:

$$\lambda_t \quad - \mu_t - \tau \quad = \lambda_{t+1}$$

τ

b^C_t

$$\mu_t = 1 - \left(\frac{y^T - Rb_t + b_{t+1}^C}{y^T - \ R - \ \ b_{t+1}^C} \right)^2 - \tau$$

$$\tau < 1 - \left(\frac{y^T - Rb_t + b_{t+1}^C}{y^T - \ R - \ \ b_{t+1}^C} \right)^2$$

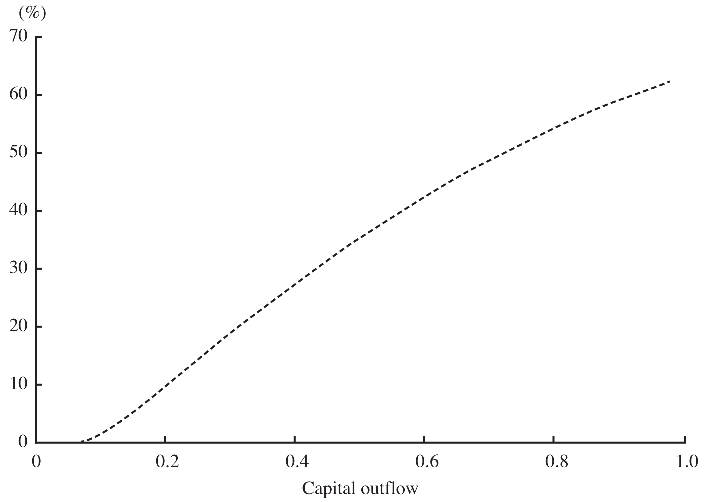
μ_t

$$\tau > 1 - \left(\frac{y^T - Rb_t + b_{t+1}^C}{y^T - \ R - \ \ b_{t+1}^C} \right)^2, \ \mu_t$$

(2) Nonlinear Capital Flow Tax

$\Psi \ X_t \quad \Psi \ Rb_t - b_t$

$\Psi\ X\ \ X$



V. Implementation of Nonlinear Tax and Policy Suggestions

1. Nonlinear Capital Flow Tax as a Policy Instrument

2. Implementation of Nonlinear Tax

X

$G\ x\ X$ $\tau\ x$

X:

$$\int_{x\ 0} \tau\ x\ dG\ x\ X\ = \Psi\ X\quad \forall X$$

$G\ x\ X$

X

$$G\ x\ X\ = \frac{x}{2X}$$

$$\int_0^{2X} \tau\ x\ dx = X \Psi\ X$$

$$\int_0^{2X} \tau \;\; x \;\; dx = T \quad X \quad - T$$

initial condition τ $T' \;\; x \quad \tau \;\; x$ $\tau \;\; x$

$$- \quad - \quad -$$

3. How to Deal with Tax Evasion

i x_i needs to pay τ x_i

$\frac{x_i}{2}$, the total

$2\tau\left(\frac{x_i}{2}\right)$ $\tau\left(\frac{x_i}{2}\right) < \tau$ x_i

τ'

c

n x_i

$nc + n\tau\left(\frac{x_i}{n}\right)$

n^*

$$c + \tau\left(\frac{x_i}{n^*}\right) - \frac{x_i}{n^*}\tau'\left(\frac{x_i}{n^*}\right) = 0$$

n^* n^* decreases in c c n^* [4]

1	
2	26
3	36
4	46
6	60

4

VI. Conclusions

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Economic Literature

IMF

Working Paper

Journal

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World Development

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Appendix

International Financial Statistics

International Financial Statistics