A Global Safe Asset for & from Emerging Economies

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International: Flight to Safety

- Risk-on, Risk-off  Flight-to-safe asset

Safe asset:
  - “Good friend analogy” is around/valuable when you need it
  - Safe asset tautology is safe because it is perceived to be safe
International: Flight to Safety

- Risk-on, Risk-off Flight-to-safe asset

- Problem: Safe asset is *asymmetrically supplied* by AE

  Flight-to-safety $\rightarrow$ cross-border capital flows
International: Flight to Safety

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- Problem: Safe asset is asymmetrically supplied by AE
  Flight-to-safety → cross-border capital flows

- At times of global crisis, issuance of new debt
  - For AE at inflated prices eases conditions
  - For EME at depressed prices worsens conditions

- Question: Who insures whom? “Poor insure rich Paradox”
  - Correct insurance only if buffer is large and debt long-term enough so that no new debt issuance needed & sell safe asset/reserves instead
Two Approaches

- **Approach 1: “Buffer Approach” (traditional)**
  - Lean against sudden stop (flight-to-safety) capital outflows
  - Precautionary Reserves
  - IMF liquidity lines
  - Central Banks Swap line arrangements

- **Approach 2: “Rechanneling Approach” (new proposal)**
  - “Global Safe Asset from & for Emerging Economies”
    with Lunyang Huang
    (Central Bank of Chile Conference 2017)
    formal analysis
1. “Buffer Approach” via Reserves Holdings

- South East Asia crisis 97/98: Sudden Stop/Flight-to-Safety ⇒ precautionary reserves

Source: Kieran (Wikipedia)
CIA World Factbook data 2011
1. “Buffer Approach” via Reserves Holdings

- South East Asia crisis 97/98: Sudden Stop/Flight-to-Safety ⇒ precautionary reserves
- **Negative carry** due to low yield of safe asset (exorbitant privilege)
  - As EME grows faster, it have to keep acquire foreign safe assets (export surplus required)
- Distorts exchange rates
1. “Buffer Approach” via Reserves Holdings

- **South East Asia crisis 97/98: Sudden Stop/Flight-to-Safety** ⇒ precautionary reserves

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  - As EME grows faster, they have to keep acquire foreign safe assets (export surplus required)

- **Distorts exchange rates**

- **Subsidizes private carry trades**
  - Carry traders undermine/undo official reserve holding
    - EME corporate sector $-borrowing
      - Bruno & Shin 2016
    - Hungarian/Polish household €-borrowing
      - Verner 2017
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2. Approach: “Rechanneling”

- Address root cause: Safe asset is supplied asymmetrically

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2. Approach: “Rechanneling”

- Address root cause: Safe asset is supplied asymmetrically

- Analogy

![Diagram showing Flight-to-safety (weakens defense) under attack/siege]
2. Approach: “Rechanneling”

- Address root cause: Safe asset is supplied asymmetrically

- Analogy
  - Two lines of defense
    - Stronger inner circle (keep)

  ![Diagram of two lines of defense with a safe haven under attack/siege.]

  - Flight-to-safety (weakens defense)

  - Under attack/siege
2. Approach: “Rechanneling”

- Address root cause: Safe asset is supplied asymmetrically

- Analogy
  - Two lines of defense
    - Stronger inner circle (keep)

![Diagram showing two lines of defense with inner circle kept and flight-to-safety weakened during attack/siege.]
2. Approach: “Rechanneling”

- Address root cause: Safe asset is supplied asymmetrically

Pool of Sovereign Bonds
2. Approach: “Rechanneling”

- Address root cause: Safe asset is supplied asymmetrically

- Create globally supplied safe asset via pooling & tranching
2. Approach: “Rechanneling”

- Address root cause: Safe asset is supplied asymmetrically

- Create globally supplied safe asset via pooling & tranching

- Expand ESBies idea for euro area to EME: “SBBS (Sovereign-Bond Backed Securities) for the world”
  Euro-nomics group 2011, 2016, 2017
International: Flight to Safety

- Risk-on, Risk-off

- Channels back some of flight-to-safety capital flows

  fewer cross-border capital flows

- Who insures whom? (rich the poor?)

  - For AE: at inflated prices
  - For EME: at depressed prices

  Question: is buffer large (long-term) enough s.t. no new debt issuance needed & sale off safe asset
RoadMap

- Motivation
  - International: Flight to Safety

- Model Setup
  - Illustration
  - More detail

- Policy Analysis
  - Foreign Reserves: Buffering Approach
  - Tranching: Rechanneling Approach

- Global Safe Asset *from & for* Emerging Market Economies
Model Setup

- 3 Dates: $t = 0, 1, 2$

- Agents: entrepreneurs, households and foreigners

- Assets: Productive capital, domestic bonds and dollars

Timeline:

- Debt issuance
- Invest in capital
- Sunspot
- (Possible) Flight to Safety Crisis
- Capital payoffs
- Debt repayment/default

$t = 0$  $t = 1^-$  $t = 1^+$  $t = 2$
**Assets**

- **Capital:**
  - Only entrepreneurs can invest at $t = 0$
  - Output only at $t = 2$:
    - Entrepreneurs: $y_2^E = \tilde{A}K_1^E$; Foreigners: $y_2 = \eta\tilde{A}K_1^*$ ($\eta < 1$)
  - From $t = 1$, capital can be traded among agents, price $q_t$
  - TFP Shock:
Assets con’t

- Domestic Bonds:
  - The government issues zero coupon bonds at $t = 0$
  - Mature at $t = 2$ with a total face value $B_0$
  - Traded at $t = 0,1$ at price $p_t$
  - The government can repay up to a maximal lump-sum tax
    \[ T_2 = \tau \tilde{A}K_1^E \]
    i.e., \textit{Repayment} = max \{B_0, T_2\}
  - Is perceived “safe” when bonds are not expected to be default

- Dollars/ Treasuries:
  - Outside storage technology offers return $R$ per period
  - Low risk-free yield
Agents

- Domestic Entrepreneurs
  - Risk-neutral preferences:
    $\max E_0[C_0 + \beta C_1 + \beta^2 C_2]$  
  - The only agent that can invest in capital at $t = 0$
  - (Exogenous) Safe asset demand/constraint:
    $S_t^E \geq \beta^{2-t} \alpha K_t^E$
  - Possible safe assets:
    - dollars, domestic bonds when they are nearly default free
  - Prefer to invest minimal dollars: $\frac{1}{R^S} > \beta$
  - Low Initial wealth $W_0^E$, not enough to buy all domestic bonds
Agents con’t

- **Domestic households**
  - The same preference as entrepreneurs
  - Can not hold capitals
  - Initial wealth $W_0^H$, buys the rest of domestic bonds at $t = 0$

- **Foreigners**
  - Similar preference: $\max E_0[C_0 + \beta^* C_1 + \beta^{*2} C_2]$
  - Less patient than entrepreneurs: $\frac{1}{R^*} > \beta > \beta^*$

- **Additionally:**
  - For simplicity, crisis is unanticipated at $t = 0$
  - Debt-capital ratio $d = \frac{B_0}{K_0}, b^E = \frac{B_0^E}{K_0}, b^H = \frac{B_0^H}{K_0}$
  \[
d = b^E + b^H\]
Equilibrium at $t = 0$

- **Entrepreneurs:**
  - For sufficiently high $\tilde{A}$, prefer Capital > Domestic bonds > consumption > dollars
  - Hold domestic bonds for safe asset constraint: $b^E = \frac{B_0^E}{K_0} = \alpha$

- **Households:**
  - Buy all residual bonds supply
  - Indifferent between consumption and bonds: $p_0 = \beta^2, b^H = d - \alpha$

- **Foreigners:**
  - Holding nothing due to impatience (low valuation)

- Equilibrium going forward depends on realization of TFP shock
Equilibrium at $t = 1$

- Three possibilities:
  - $\bar{A}$ subgame equilibrium:
    - Fundamental is strong, no crisis
\( \bar{A} \) subgame equilibrium at \( t = 1 \)

- Similar to equilibrium at \( t = 0 \)
- Strong fundamental \((\bar{A})\) guarantees government repayment
- Asset positions unchanged
- Asset price changes due to time discounting:
  \[ q_{1,u} = \beta \bar{A}, p_{1,u} = \beta \]
Equilibrium at $t = 1$

- Three possibilities:
  - Fundamental $E_1 \tilde{A}$ equilibrium:
    - Weak fundamental, but no sunspot triggers crisis
Fundamental $E_1[\bar{A}]$-equilibrium at $t = 1$

- Similar to equilibrium at $t = 0$
- Weak fundamental ($\bar{A}$) but market confidence makes government repayment self-fulfilling
- Asset positions unchanged
- Asset price changes due to time discounting:
  - $q_{1,f} = \beta E_1[\bar{A}], p_{1,f} = \beta$
Equilibrium at $t = 1$

- Three possibilities:
  - Flight-to-Safety equilibrium:
    - Weak fundamental, sunspot triggers crisis
Flight-to-Safety equilibrium at \( t = 1 \)

### Flight to Safety:
- Entrepreneurs seek dollars
- Sell capital and bonds to foreigners at discounted price

\[
q_{1,s} = \beta^* \eta \quad \text{E}_1[\tilde{A}] < q_{1,f} \text{E}_1[\tilde{A}],
\]

Impatience Inefficiency

\[
p_{1,s} = \beta^* (1 - \pi_2 \quad h) \\
\text{haircut}
\]

- Entrepreneurs hold capital

\[
K_{1,s}^E = \frac{q_{1,s}K_0 + p_{1,s}B_0^E}{q_{1,s} + \alpha \beta} = \frac{\beta^* \eta \text{E}_1[\tilde{A}] + \beta^* (1 - \pi_2 h) b^E}{\beta^* \eta \text{E}_1[\tilde{A}] + \alpha \beta} K_0 = K_{1,s}^E(h)
\]

### Self-fulfilling default:
- Assume default happens only if \( A \) realizes (No default for \( \overline{A} \))
- Endogenous debt haircut:

\[
B_0 (1 - h) = \tau A K_{1,s}^E \leftrightarrow d (1 - h) = \tau A \frac{K_{1,s}^E(h)}{K_0}
\]

- Crisis existence condition: \( h > 0 \)
- In Fundamental \( \text{E}_1[\overline{A}] \) equilibrium: \( d < \tau A \)
Self-fulfilling Debt Crisis

- Minimal tax revenue in normal times $\tau A$
- Debt repayment $d(1 - h)$
- Minimal tax revenue in crisis times $\tau \frac{A K^E_{1,s}(h)}{K_0}$
Crisis vulnerability and Severity

- Let $x$ be the policy parameter

- Crisis vulnerability:
  - The area of $d$ (indebtedness) where a flight-to-safety crisis exists
  - Intuition: For sufficiently low $d$, implied $h(d) < 0$
  - In the baseline model:
    \[ V^B(x) = \max\{\alpha, d^b\}, \tau A \],
    \[ d^b \text{ solves } h(d^b) = 0 \]

- Crisis Severity:
  - The fraction of capital fire sold in a crisis
  - Output loss is linear in this measure
  - In the baseline model:
    \[ S^B(x) = \max\{0, \frac{\beta^*\eta E_1[\tilde{A}]+(1-\pi_2)\beta^*\alpha}{\beta^*\eta E_1[\tilde{A}]+\beta \alpha-\tau A\beta^*\pi_2 \alpha} \} \]

- Later analyze how policies affect these measure
RoadMap

▪ Motivation
  • International: Flight to Safety

▪ Model Setup
  • Illustration
  • More detail

▪ Policy Analysis
  • Foreign Reserves: Buffering Approach
  • Tranching: Rechanneling Approach

▪ Global Safe Asset from & for Emerging Market Economies
Foreign Reserves

- **Implementation:**
  - The gov can issue additional bonds (purchased by households) for purchasing reserves.
  - Face value of additional bonds: $b^R K_0$
  - Since $p_0 = 1/\beta^2$, reserves worth $R^2/\beta^2 b^R K_0$

- **Benefit-cost analysis:**
  - Given debt haircut $h^R$,
    \[
    \frac{R^2}{\beta^2} b^R K_0 - (1 - h^R) b^R K_0 = \\
    \left(\frac{R^2}{\beta^2} - 1\right) b^R K_0 + h^R b^R K_0
    \]
    - negative carry
    - debt forgiveness
Equilibrium

- Subgame equilibriums without crisis is similar

- Focus on flight-to-safety crisis with reserves
  - Fire-sale of capital the same as in baseline
    \[
    K_{1,s}^E = \frac{q_1 s K_0 + p_1 s B_0^E}{q_1 s + \alpha \beta} = \frac{\beta^* \eta E_1 [\tilde{A}] + \beta^* (1 - \pi_2 h^R) b^E}{\beta^* \eta E_1 [\tilde{A}] + \alpha \beta} K_0 = K_{1,s}^E (h^R)
    \]
  - Endogenous haircut \( h^R \):
    \[
    (b^e + b^h)(1 - h^R) + b^R (1 - h^R) = \tau A \frac{K_{1,s}^E (h)}{K_0} + b^R (\beta^2 R^2)
    \]
Equilibrium

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    K_{1,s}^E = \frac{q_1 s K_0 + p_1 s B_0^E}{q_1 s + \alpha \beta} = \frac{\beta^* \eta E_1[\tilde{A}] + \beta^*(1 - \pi_2^h h^R)b^E}{\beta^* \eta E_1[\tilde{A}] + \alpha \beta} K_0 = K_{1,s}^E(h^R)
    \]
  - Endogenous haircut \( h^R \):
    \[
    (b^e + b^h)(1 - h^R) + b^R (1 - h^R) = \tau A \frac{K_{1,s}^E(h)}{K_0} + b^R (\beta^2 R^2)
    \]
    - New Debt Repayment
    - Reserves
  - Crisis existence condition: \( h^R > 0 \)
Self-fulfilling Debt Crisis (With Reserves)

- Minimal tax revenue in normal times $\tau A$
- Carry Cost $b^R(1 - (\beta R^S)^2)$
- Debt repayment $d(1 - h)$
- Minimal tax revenue in crisis times $\tau A K_{1,s}^E(h)/K_0$
- Haircut $h$

Points:
- $h^*$
- $h^R$
Crisis vulnerability and Severity (With Reserves)

- $b^R$ is the policy parameter here

- **Crisis vulnerability:**
  - Compare to baseline:
    $$V^R(b^R) \supseteq V^B$$
  - Intuition: At $h^R = 0$, no debt forgiveness but negative carry

- **Crisis Severity:**
  - Compare to baseline:
    $$S^R(b^R) \leq S^B \iff h^R \geq 1 - (\beta R^\$)^2 \iff h \geq 1 - (\beta R^\$)^2$$
  - Intuition: If crisis is severe enough, debt forgiveness creates gain that exceeds negative carry
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Tranching

- **Implementation:**
  - Set up a SPV that purchases government bonds and issues a senior and junior bond.
  - Default loss is first absorbed by junior bonds
  - Total face value of senior bonds: \( sK_0 < dK_0 \)
  - Assume \( s > \alpha \), entrepreneurs are fully protected
  - Notations: \( b^{S,E}, b^{S,H}, b^{J,E}, b^{J,H} \)

- **Benefit-cost analysis:**
  - No cost within the model
  - Senior bonds are less likely to lose safe-asset-status
  - Owners of senior bonds (E) recover larger value even in defaults
Equilibrium

- Subgame equilibriums without crisis is similar
  - At $t = 0$, junior bonds and senior bonds are perfect substitutes
  - Assume entrepreneurs slightly prefer senior bonds

- Focus on flight-to-safety crisis here
  - Senior bonds haircut $h^S > 0 \iff h^J = 1$ (Junior bonds wiped out)
  - Fire-sale of capital the same as in baseline

$$K_{1,s}^E = \frac{q_{1,s}K_0 + p_{1,s}^SB_0^{S,E}}{q_{1,s} + \alpha\beta} = \frac{\beta^*\eta E_1[\bar{A}]+\beta^*(1-\pi_2h^S)b^{S,E}}{\beta^*\eta E_1[\bar{A}]+\alpha\beta} K_0 = K_{1,s}^E(h^S)$$

- Endogenous haircut $h^S$:
  
  Baseline:  
  \[(b^E+b^H)(1-h) = d(1-h) = \tau A \frac{K_{1,s}^E(h)}{K_0}\]

- Crisis existence condition: $h^S > 0$
Equilibrium

- Subgame equilibriums without crisis is similar
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$$K_{1,s}^E = \frac{q_{1,s}K_0 + p_{1,s}^SB_0^{S,E}}{q_{1,s} + \alpha \beta} = \frac{\beta^*\eta E_1[\bar{A}] + \beta^*(1-\pi_2 h^S)b^{S,E}}{\beta^*\eta E_1[\bar{A}] + \alpha \beta} K_0 = K_{1,s}^E(h^S)$$

- Endogenous haircut $h^S$:
  - Tranching: $(b^{S,E} + b^{S,H})(1 - h^S) = s(1 - h^S) = \tau A \frac{K_{1,s}^E(h^S)}{K_0}$
  - $h^S$ can be solved from baseline model assume $d = s$

- Crisis existence condition: $h^S > 0$
  - Tranching is equivalent to eliminate $d - s$ debt burden in crisis
Crisis vulnerability and Severity (With Tranching)

- $s$ is the policy parameter here
  - But $\alpha \leq s \leq d$

- Crisis vulnerability:
  - Compare to baseline:
    \[ V^T(s) = V^B \mid_{d=s} \subset V^B \]

- Crisis Severity:
  - Compare to baseline:
    \[ S^T(s) = S^B \mid_{d=s} \leq S^B \]
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Tranching and Pooling

- Tranching can be strengthened via diversifying local shock
  - generalize the model to a continuum of ex-ante identical countries
- Set up international SPV to implement GloSBBies
Policy Analysis (Tranching & Pooling)

- $s$ (senior bonds/capital) is the policy parameter
  - But $\alpha \leq s \leq d$

- Crisis vulnerability:
  - Crisis exists iff
    
    $s > (1 - \pi^i_2) \quad \text{Issued} \quad d \quad \text{repayment of} \quad d^B \quad \text{defaulted country}$
    
    $d^B$ 
    
    $\quad \text{safe asset} \quad \text{default free country} \quad \text{repyment of}$
    
    $\quad \text{repayment of}$
    
    - For national tranching, crisis exists iff
      
      $s > d^B$

- Crisis Severity:
  - Compare to national tranching:
    
    $S^\text{GloSBies}(s) < S^T(s) = S^B|_{d=s} \leq S^B$
Conclusion

- **High Debt Level**
  - Domestic Challenge: Central Bank independence
  - International Challenge: Flight-to-Safety

- **Global Financial Architecture**
  - Buffer approach interventionistic
    - Reserve holding costly due to cost of carry & distortionary
    - IMF support very limited
    - Swap lines Limited (not all IMF member countries)
  - Rechanneling approach self-stabilizing (autonomous)

- **Tranching completes the market**
  - Allows catering to investors groups with different risk attitudes
  - Makes EME less crisis prone

- **International pooling and tranching**
  - SBBS/ESBies for the world
  - Expands IMF’s fire power
“Good friend analogy” - like reserve assets
- Safe/available at any horizon - “when it counts”
- Precautionary buffer
  - held in addition to more risky assets
  - Risk $\Rightarrow$ demand for safe assets $\uparrow$

“Safe asset tautology”
- Safe because it is “perceived to be safe”
- Safe independent of fundamentals
  - US Treasuries downgrade by S&P in 2011 $\Rightarrow$ yield $\downarrow$
  - German CDS spread $\Rightarrow$ yield during Euro crisis $\downarrow$
- Multiple equilibria
- Bubble
Model Setup

- Three Dates: \( t = 0, 1, 2 \)
- Time 0:
  - The government issues bonds maturing in date 2
  - Domestic agents invest capital and buy domestic bonds
- Time 1:
  - Potential flight-to-safety crisis
  - Capital and domestic bonds are fire sold to foreigners
- Time 2:
  - Capital produces output
  - The government partially defaults if tax revenue < maturing bonds