Putting the Breaks on Sudden Stops: The Financial Frictions-Moral Hazard Tradeoff of Asset Price Guarantees

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Objective of the paper:

Take a model that mimics features of “sudden stops” (Mendoza and Smith) and use it to examine effects of asset price guarantees (APG) (Ljungqvist (2000))

Motivation: APG support prices, but introduce distorsion

Results: (preliminary and incomplete) conjectured effects seem to be there

Next: State-contingent APG, welfare effects
Representative agent economy

\[ E_t \sum_{i=0}^{\infty} \beta^i u(c_{t+i}) \]

assumes government guarantees minimum return \( r \), Euler equation then becomes

\[ u'(c_t) p_t = \beta E_t [u'(c_{t+1}) \max \{p_{t+1} + d_{t+1}, r \cdot p_t\}] , \]

with government budget constraint determining lump sum tax as

\[ \tau_t = \max \{0, (r \cdot p_{t-1} - (p_t + d_t)) K_t\} \]
Endowment economy, with risk neutrality

- Assume 2 states $d_t \in (d(1), d(2))$:
  
  $$d(1) > d(2)$$

Solve for two prices $p(1), p(2)$

$$p(i) = \beta \sum_{j=1}^{2} \pi(i, j) \max \{ p(j) + d(j), r \cdot p(i) \} , \text{ for } i = 1, 2$$
• Prices when $r = 0$ (with $d(1) > d(2)$):

\[
p(1; 0) \begin{cases} > \\ = \\ < \end{cases} p(2; 0) \quad \text{iff} \quad \pi(1, 1) + \pi(2, 2) - 1 \begin{cases} > \\ = \\ < \end{cases} 0
\]

• Price effect of $r$: There exists a constant $r_0 \in (0, \beta^{-1})$, such that

\[
\frac{dp(i; r)}{dr} \begin{cases} = \\ > \end{cases} 0 \quad \text{iff} \quad r \begin{cases} < \\ \geq \end{cases} r_0, \text{ for } i \in \{1, 2\}
\]
• Relative price effects of $r$, assume $p(i;0) > p(j;0)$

\[
\frac{dp(i;r)}{p(j;r)} \begin{cases} 
= & 0 \text{ iff } r \begin{cases} < r_0 & \in [r_0, r_1) \\
\geq r_1 & \end{cases} 
\end{cases}
\]

if $p(1,0) = p(2,0)$, then $p(1,r) = p(2,r) \forall r$

• Prices when $r = \beta^{-1}$:

\[
p(i,r) = \frac{\beta}{1 - \beta} d(1).
\]
Intuition:

It can be shown, that $p(1) + d(1) \geq p(2) + d(2)$.

Thus, if start increasing $r$ from zero, guarantee gets first activated when come from high price state (assumed $p(i,0) > p(j,0)$), into state 2. Thus, for $r \in [r_0, r_1)$

$$1/\beta = \pi(i, 1) \max \left\{ \frac{p(1; r) + d(1)}{p(i; r)}, r \right\} + \pi(i, 2) \cdot r$$

$$1/\beta = \pi(j, 1) \max \left\{ \frac{p(1; r) + d(1)}{p(j; r)}, r \right\} + \pi(j, 2) \max \left\{ \frac{p(2; r) + d(2)}{p(j; r)}, r \right\}$$

In high price state are close to the guarantee becoming active, thus, the added capitalized value of the guarantees is larger because it is less discounted.
Mendoza -Bora Durdu model:


- Guaranteed constant PRICE or RETURN (?)
  
  - Constant minimum PRICE guarantee for next period at $p$, implies
    \[
    r\left(s^t, s^{t+1}\right) = \frac{p + d(s^t, s^{t+1})}{p(s^t)}.
    \]

  - Constant minimum RETURN guarantee for return into next period, $r$, implies
    \[
    r = \frac{p(s^t, s^{t+1}) + d(s^t, s^{t+1})}{p(s^t)}.
    \]
Guaranteed constant PRICE, $p$, assume Ljungqvist model, with $d(1) > d(2)$ so that

$$p(1; 0) > p(2; 0) \text{ iff } \pi_1 + \pi_2 - 1 > 0 : \text{positive autoc.}$$
$$p(1; 0) < p(2; 0) \text{ iff } \pi_1 + \pi_2 - 1 < 0 : \text{negative autoc.}$$

Can show that: (as increase $\bar{p}$ above lower price, initally)

- Positive autocorrelation: $p_1(p) - p_2(p)$ decreasing in $p$
- Negative autocorrelation: $p_2(p) - p_1(p)$ increasing in $p$
- If $\bar{p}$ is increased enough, guarantee activated in both states, and
  $$p_1(p) - p_2(p) = \beta (\pi_1 + \pi_2 - 1) \cdot [d_1 - d_2]$$
Margin Requirements and Trading Cost (Mendoza and Smith)

- Margin Requirements

\[- b_{t+1} \leq \kappa \cdot \alpha_{t+1} \cdot q_t \cdot K,\]

force agents to sell equity to reduce debt in low productivity states,

...Trading Cost generate price reduction to get international investors to hold more equity

→ sharp drops in consumption and current account reversals
\[-b_{t+1} \leq \kappa \cdot \alpha_{t+1} \cdot q_t \cdot K\]

- Adding APG:
  
  - increases $q_t$ ("fundamental" value) – does not prevent $q_t$ from dropping below $\tilde{q}_t$
  
  - international investors demand more (eee)

What state contingency?
Issues/suggestions

• Quantitative performance of Mendoza-Smith model
  - how frequent are “sudden stops”? (< frequency of binding constraints, 2% of the time)
  - business cycles properties of the model compared to data?
  - calibration of trading cost $a$?
  - do international investors increase equity positions in crises?

• Other policies: IFO lends in crises, charges premium interest rate
Issues/suggestions cont’d

- Equity prices not volatile enough in the model:
  → quarterly $\text{Std}(q) = 0.1\%$, $\text{Std}(R^{MEX}) = 24\%! \approx$

With risk neutrality

\[
q_t^f = E_t \sum_{j=1}^{\infty} \delta^j d_{t+j} \quad \rightarrow \quad \frac{q_t^f}{q} = 1 + \frac{1}{\delta} E_t \sum_{j=1}^{\infty} \delta^j \left[ \frac{d_{t+j} - d}{d} \right]
\]

with $q = \frac{\delta}{1-\delta} d$.

Assume

\[
\left( \frac{d_{t} - d}{d} \right) = \rho \cdot \left( \frac{d_{t-t} - d}{d} \right) + \varepsilon_t
\]
then

\[ (E_t - E_{t-1}) \frac{q^f_t}{q} = \frac{\delta \rho}{1-\delta \rho} \cdot \varepsilon_t \]

if (as in the model) \( \delta = 1/R = 0.9844 \), and \( \rho = 0.553 \), then

\[ (E_t - E_{t-1}) \frac{q^f_t}{q} = 0.0189 \cdot \varepsilon_t \]

\( \rightarrow \) low \( \rho \) contributes substantially to low equity price volatility!
Instead of HP-filtered data, if we use linearly detrended real GDP for Mexico:

\[ \rho = .936, \ \text{std} (\varepsilon) = .016 \]

1. 

\[ \frac{\delta \rho}{1 - \delta \rho} = 0.19, \ \text{compared to 0.0189 before} \]

2. with some adjustments for the fact that the paper doesn't use real GDP, we have

\[ \frac{\text{std} (\varepsilon)}{\text{std} (\varepsilon_{paper})} \approx 0.7 \]

\[ \rightarrow \text{can increase volatility roughly 7 times (up to roughly 35 times if go to a random walk)} \]
... other benefits of permanent component in output

- Constraints bind more often

- Increase consumption volatility relative to output volatility