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

Asset Price Guarantees (Ljungqvist 2000)

Representative agent economy

$$E_t \sum_{i=0}^{\infty} \beta^i u\left(c_{t+i}\right)$$

assumes government guarantees minimum return r, Euler equation then becomes

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

with government budget constraint determining lump sum tax as

$$\tau_t = \max\left\{0, \left(r \cdot p_{t-1} - \left(p_t + d_t\right)\right) K_t\right\}$$

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 $d(1) > d(2)$):

$$p(1;0) \quad \left\{ \begin{array}{c} > \\ = \\ < \end{array} \right\} \quad p(2;0) \quad \text{iff} \quad \pi(1,1) + \pi(2,2) - 1 \quad \left\{ \begin{array}{c} > \\ = \\ < \end{array} \right\} \quad 0$$

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

$$\frac{dp(i;r)}{dr} \quad \left\{ \begin{array}{c} = \\ > \end{array} \right\} \quad 0 \quad \text{iff} \quad r \quad \left\{ \begin{array}{c} < \\ \geq \end{array} \right\} \quad r_0, \text{ for } i \in \{1,2\}$$

- Relative price effects of r, assume $p(i;0) > p(j;0)$

$$\frac{d\frac{p(i;r)}{p(j;r)}}{dr} \quad \left\{ \begin{array}{c} = \\ > \\ < \end{array} \right\} \quad 0 \quad \text{iff} \quad r \quad \left\{ \begin{array}{l} < r_0 \\ \in [r_0, r_1) \\ \geq r_1 \end{array} \right.$$

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 $r \in [r_0, r_1)$

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

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:

- Welfare effects: "Endowment-type model", distorsion do not affect output. But, consumption-saving-portfolio decision affected by prices.

- Guaranteed constant PRICE or RETURN (?)

  – Constant minimum PRICE guarantee for next period at $\underline{p}$, implies $r\left(s^t, s_{t+1}\right) = \frac{\underline{p}+d\left(s^t, s_{t+1}\right)}{p(s^t)}$.

  – Constant minimum RETURN guarantee for return into next period, r, implies $r = \frac{\underline{p}\left(s^t, s_{t+1}\right)+d\left(s^t, s_{t+1}\right)}{p(s^t)}$.

Guaranteed constant PRICE, $\underline{p}$, assume Ljungqvist model, with $d(1) > d(2)$ so that

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

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

- Positive autocorrelation: $p_1\left(\underline{p}\right) - p_2\left(\underline{p}\right)$ decreasing in $\underline{p}$

- Negative autocorrelation: $p_2\left(\underline{p}\right) - p_1\left(\underline{p}\right)$ increasing in $\underline{p}$

- If $\bar{p}$ is increased enough, guarantee activated in both states, and
$$p_1\left(\underline{p}\right) - p_2\left(\underline{p}\right) = \beta\left(\pi_1 + \pi_2 - 1\right) \cdot \left[d_1 - d_2\right]$$

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

$\rightarrow$ 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 $\widetilde{q}_t$
  - 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: $\rightarrow$ quarterly $Std(q) = 0.1\%$, $Std\left(R^{MEX}\right) = 24\%! \approx$

With risk neutrality

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

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

$$(E_t - E_{t-1})\,\frac{q_t^f}{q} = \frac{\frac{\delta\rho}{1-\delta\rho}}{\frac{\delta}{1-\delta}} \cdot \varepsilon_t$$

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

$$(E_t - E_{t-1})\,\frac{q_t^f}{q} = 0.0189 \cdot \varepsilon_t$$

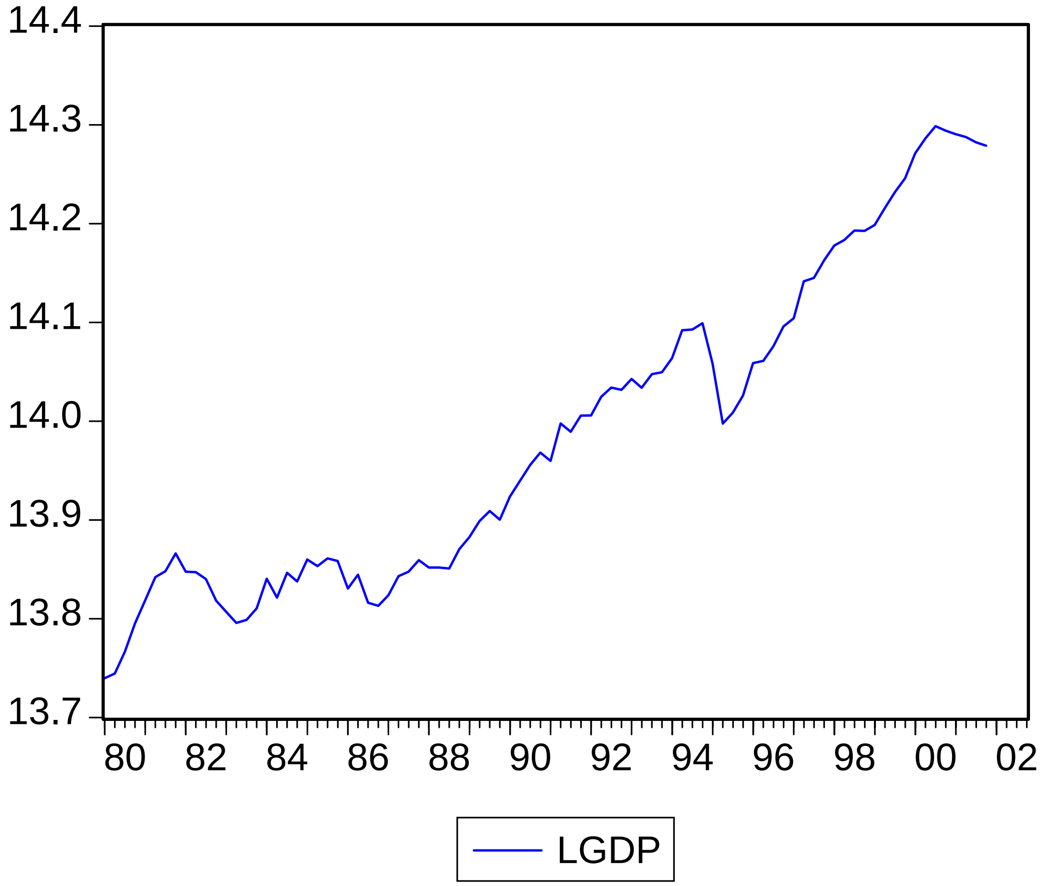
$\longrightarrow$ low ρ contributes substantially to low equity price volatility !

Instead of HP-filtered data, if we use linearly detrended real GDP for Mexico:

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

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

2. with some adjustments for the fact that the paper doesn't use real GDP, we have
$$\text{std}(\varepsilon) / \text{std}(\varepsilon_{paper}) \approx 0.7$$
$\rightarrow$ can increase volatility roughly 7 times (up to roughly 35 times if go to a random walk)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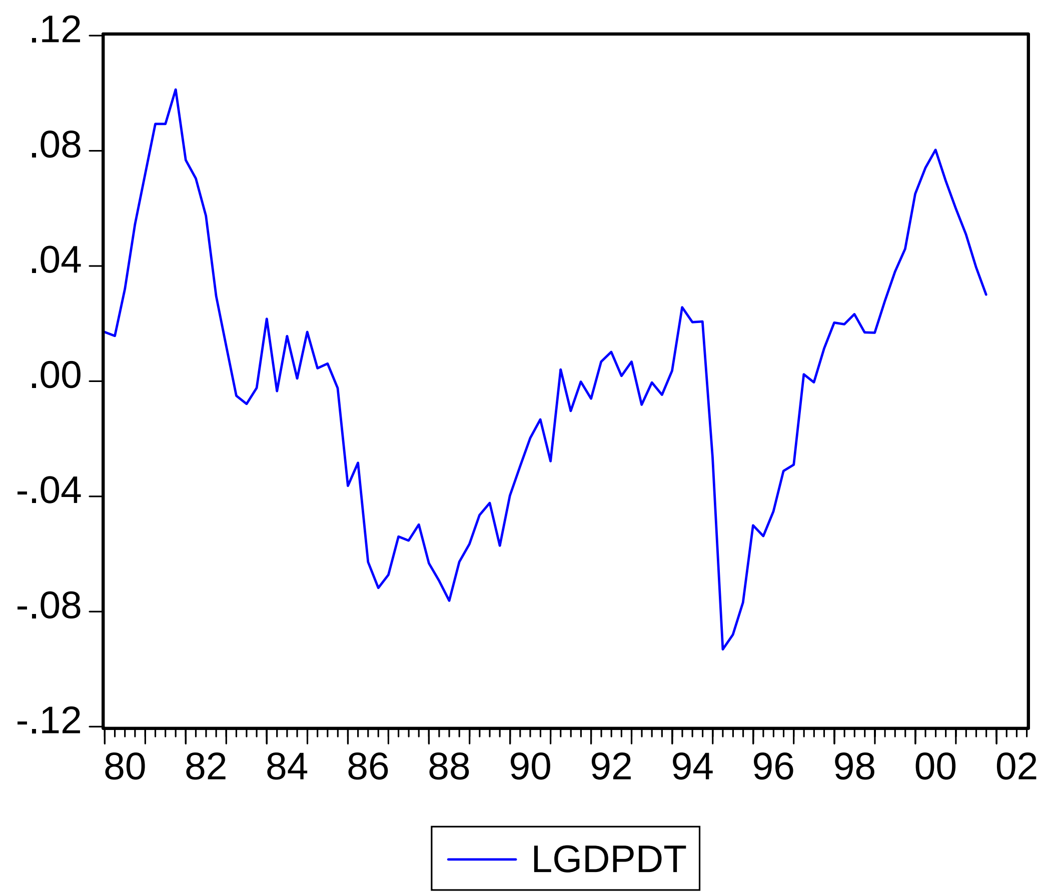
LGDP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LGDPDT

... other benefits of permanent component in output

- Constraints bind more often

- Increase consumption volatility relative to output volatility