# Discussion of *Risky Bank Guarantees*

## Paper by T. Makinen, L. Sarno and G. Zinna

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**BCB Sao Paulo Conference**

**August 2017**

# Goal of the paper

**Fundamental Question**

What is the price of a sovereign **implicit** guarantee on the financial system?

- The guarantee impacts assets future payoffs
  - Sovereign CDSs through the sovereign solvency,
  - Claims on banks (equity, debt, CDSs, etc) through the actual guarantee on payoffs.

**Asset with guarantee**

Future payoff $X$ without guarantee, $Y \leqslant \underline{x}$, a.s.

$$\tilde{X} = \mathbb{1}\{X \geqslant \underline{x}\} \cdot X + \mathbb{1}\{X \leqslant \underline{x}\} \max(X, Y) \quad (1)$$

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## The theoretical framework (1/2)

- It is easy to calculate $Z = \tilde{X} - X$ and show that it is positive a.s.

$$Z = \mathbb{1}\{X \leqslant \underline{x}\} \cdot \max(0, Y - X)$$

- The guarantee increases the expected payoff **and** the price of the claim
- Do they vary one-to-one?
- It is easy to show that the RP is higher under guarantee if,

$$\frac{\mathbb{E}Z}{\mathbb{E}\varphi Z} \geqslant \frac{\mathbb{E}X}{\mathbb{E}\varphi X}, \quad \varphi = \mathrm{SDF}$$

**RP relationship**

The guarantee RP must be greater than the claim RP without guarantee.

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# The theoretical framework (2/2)

- Specific case: Bernoulli variables with high and low states, possibly correlated.

$$y_l < x_l \leqslant y_h = \underline{x} < x_h$$

- easy to work out closed-form solutions even when states are correlated.

**Two main predictions**

- Cet. par., risk premium is higher for institutions exposed to the government (banks whose survival depends more heavily on guarantee)
- Cet. par., risk premium decreases in the probability of the guarantee being realized.

## Empirical testing procedure (1/2)

Data: CDS and equity prices of 88 banks from developed countries, January 2004 to December 2015.

First procedure: Double portfolio sort

- first sort: **2 groups** of bank riskiness
  - leverage
  - deposits to total assets
  - equity volatility
- second sort: **2 groups** of exposure to the sovereign
  - sovereign are more willing to support banks with high deposits-to-GDP ratio.

**Results**

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Second procedure: Fama McBeth two-pass regression with standard risk factors.

- SDF is **linear** in the factors.
- Distinguishes exposure and price of risk from time-series and cross-section.

$\Longrightarrow$ Standard risk factors fail ($\alpha \neq 0$)

- Extract a new risk factor:
  - Do the time-series regression and extract PCs from residuals,
  - add the tradable version to the regression and do it again.

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## General Comments

- I like the paper a lot! Very clean and thorough investigation of implicit sovereign guarantees.
- The empirical assessment is very well done (a lot of details in the paper and robustness checks)

I will mostly focus my comments on the theoretical part

- Articulation between theory and empirics difficult
- In my view, empirics are self-sufficient
- Model is a toy model, but taken seriously in terms of implications.
- Maybe a different paper?

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## First observation on the guarantee

- Remember that the guarantee is:

$$Z = \mathbb{1}\{X \leqslant \underline{x}\} \cdot \max(0, Y - X) = \mathbb{1}\{X \leqslant Y\} \cdot (Y - X)$$

$\Longrightarrow$ It is an **put option** with random strike $Y$!

- Two (three) sources of uncertainty.
- The risk premium relationship between the guarantee and the original claim boils down to comparing the risk premium of a put option and the underlying.

**Relationship to the literature**

Can we use the large option pricing literature to answer this issue? If we assume that $(X, Y)$ are jointly Gaussian, there should be a way to work out a pricing model.

- The RP relationship can be reworked a bit as:

$$\mathrm{Cov}(\varphi, Z) \leqslant \frac{\mathbb{E}Z}{\mathbb{E}X} \cdot \mathrm{Cov}(\varphi, X) \tag{2}$$

- I ask: what is more important, the uncertainty about the guarantee **existence** or the actual amount?

$$\mathbb{1}\{Z > 0\} \quad \text{v.s.} \quad Z|Z > 0$$

- Let us decompose the relationship:

$$\pi \mathrm{Cov}(\varphi, Z|Z > 0) \leqslant \pi \frac{\mathbb{E}(Z|Z > 0)}{\mathbb{E}X} \cdot \mathrm{Cov}(\varphi, X)$$

$\Longrightarrow$ If $X \perp Z$ then $\pi$ does **not matter**.
$\rightarrow$ ex: $Y = W + X$ so $Z = \mathbb{1}\{W > 0\} \cdot W$

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# Digging in

Otherwise,

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$$\mathbb{E}(Z|Z>0)\frac{\pi\left[\mathrm{Cov}(\varphi,X|Z>0)-\mathrm{Cov}(\varphi,X|Z=0)\right]+\mathrm{Cov}(\varphi,X|Z=0)}{\pi\left[\mathbb{E}(X|Z>0)-\mathbb{E}(X|Z=0)\right]+\mathbb{E}(X|Z=0)}$$

- More likely to be true when r.h.s goes up.

$$\frac{\partial r.h.s}{\partial \pi} \geqslant 0 \iff \mathrm{Cov}(\varphi,X|Z>0) \geqslant \frac{\mathbb{E}(X|Z>0)}{\mathbb{E}(X|Z=0)} \cdot \mathrm{Cov}(\varphi,X|Z=0)$$

- Imagine that there is no guarantee on my claim $X$, I have to be more adverse to **the same payoff** when there is no guarantee on the other claims (seniority effect).
- This is, in principle, a testable implication.

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## Partly explicit guarantee

- Assume now that $\pi = 1$ so that the only uncertainty is on the amount.
- Same testable implications on a reduced subsample

$$\mathrm{Cov}(\varphi, Z|Z > 0) \leqslant \mathbb{E}(Z|Z > 0)\frac{\mathrm{Cov}(\varphi, X|Z > 0)}{\mathbb{E}(X|Z > 0)}$$

- In essence this gives you an idea of what is priced more in detail.

## The stochastic discount factor

- What you **really** want are the estimates from:

$$\varphi = \alpha + \beta_1 X + \beta_2 Z + \beta_3 \cdot \mathbb{1}\{Z = 0\}$$

- Or maybe

$$\varphi = \alpha + (\beta_1^+ + \beta_1^- \cdot \mathbb{1}\{Z = 0\})X + \beta_2 Z + \beta_3 \cdot \mathbb{1}\{Z = 0\}$$

- Can you update the two-pass regressions accordingly and still get significant results?
- Gut feeling: Most of the action through $\beta_3$.

## Endogeneity of guarantees and timing

- Sovereign's ability and willingness to act $\pi$ depend on the degree of TBTF and riskiness $\mathbb{E}X$, and its own solvency so on the aggregate state $\varphi$,
  $\Longrightarrow$ endogenous and likely to circle down.
- Implicit (or explicit) sovereign guarantees can change the dynamics of the agent's wealth, creating this premium effect.

**Question**

Does the paper have any normative implications about sovereign guarantees?

# Summing up

- You are only looking at a very simplistic theory model,
- which mixes uncertainties about presence and size of guarantees.
  $\Longrightarrow$ More *juice* to get out of it, maybe a separate paper?

Other comment:

- Why not using systemic risk measures for bank riskiness, such as SRISK?

**Conclusion**

Very well done paper, space for two!