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SUERF-ESM HIGH LEVEL WORKSHOP

Safe guarding macro & financial stability in a fragile environment

Università Bocconi
IEP@BU
Institute for European Policymaking

Daniel Gros, IEP@BU, Director,
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Avant propos: so far, so good?

- High leverage plus low for long should have made financial system vulnerable.
- But despite large shocks and regime shift in monetary policy, the European (euro area) financial system has remained stable.
- Pockets of instability in the US and Switzerland, related to uninsured deposits – that remain a cause for concern.
- But public finance remains a cause for concern ………………

Vulnerabilities remain

- High (record) of public debt levels throughout developed world.
- Main thesis here that the cost of debt is convex (in the debt ratio).

- Plus several realizations of x sigma events over last years, both growth and interest rates (should be less of a surprise if one looks at history, see below).
- Increased acknowledgement of tail risks needed.

Sources of convexity of cost of public debt

Debt service cost of public debt increases more than proportionally with debt if risk premium increasing function of debt.

High risk premium on public debt increases cost of capital of private sector, thus reinforcing negative impact on debt ratio.

Other source for convexity: Increasing marginal cost of tax revenues needed to service higher debt level.

Convexity of cost of public debt via the risk premium

Interest rate on public debt = risk free rate + risk premium.

Risk premium = function of market risk aversion and debt/GDP ratio.

Debt service burden = interest rate * debt

=> risk free rate *debt + risk premium * (debt)

Second term is convex.

Marginal cost = risk free rate + risk premium + debt*marginal effect of debt ratio on risk premium

Intuition behind ‘convexity’

- Higher debt means higher risk premium which has to be paid (after transition) on whole debt.
- Increasing debt thus has two costs: interest rate on the increased amount of debt + higher cost on all the existing debt
- **=> Marginal cost of debt>interest rate**
- **(and difference increases with debt level)**
- Average cost hides marginal cost! Marginal cost can be >0 even if risk free rate <0.

Simplest model of risk premium

- Corresponds to assumptions in DSA:
- $$Average\ cost\ of\ debt \equiv i_t = r_t + \alpha(b_t - threshold)$$
- Where i_t = (average) interest rate on public debt,
- r_t = risk-less rate
- b_t = public debt as percentage of GDP.
- The second term, the risk premium, is key.
- Key parameter α represents the marginal impact of higher debt on the risk premium = risk aversion.
- Usually applies only above threshold (60 or 90 % of GDP?)

Model of risk premium II

- Total debt service cost is given by :
- $Interest\ expense \equiv b_t \cdot i_t$

$$= b_t\, r_t + \alpha(b_t^2 - threshold b_t)$$

- Interest rate expenditure (as a % of GDP) thus increases with the square of the debt to GDP ratio, b^2.
- The marginal cost of debt is:
- $Marginal\ cost\ of\ debt \equiv \frac{\partial(interest\ expense)}{\partial(b)} = r_t + \alpha(2b_t - threshold)$

$$Marginal\ cost - Average\ cost = \alpha b_t$$

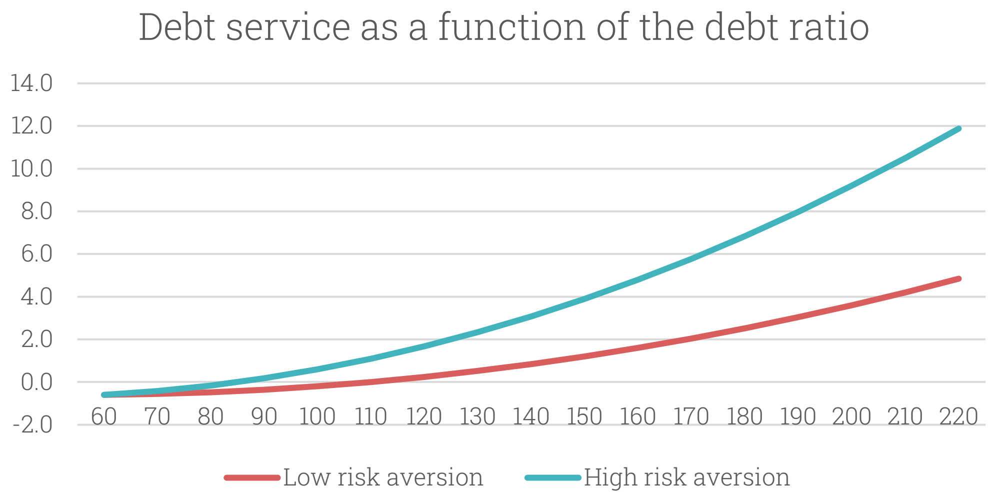
Model of risk premium III

- Trivial implication, the difference between marginal cost and interest rate is given by:
- $Marginal\ cost - \ Average\ cost = \alpha b_t$
- Difference increases in debt level.
- Not 'seen' directly by political system and thus ignored.

Model of risk premium: orders of magnitude

- Key parameter alpha.
- 'Old' DSA assumed alpha 0.03 (IMF) and 0.04 (Commission), but threshold 60 % of GDP:
- New Commission paper: alpha = 0.05 with threshold 90 % of GDP,
- At b_t equals 150 (% GDP), this yields 'spread' of 270, 360 and 300 basis points, higher than today's rates, but given an indication of threshold for TPI.

Alpha or risk aversion key for cost of debt



Consequences of variable risk premia

Uncertainty in risk premium

Debt service burden is a function of the degree of risk aversion and the square of the debt ratio.

= risk free rate *debt + risk aversion* $(\text{debt})^2$

Marginal cost of higher risk aversion increases with square of deb ratio.

A positive correlation between risk aversion and risk-free rate increases variability in debt service cost.

Negative shocks to growth increase debt ratio …….

(Intertemporal) Consequences of 'convexity'

- Debt can spiral out of control even with constant fiscal effort (constant primary surplus).
- Mechanism: Assume initially the primary surplus is not enough to cover debt service. Debt will then increase. But higher debt means higher debt service cost, accelerating the increase in debt.

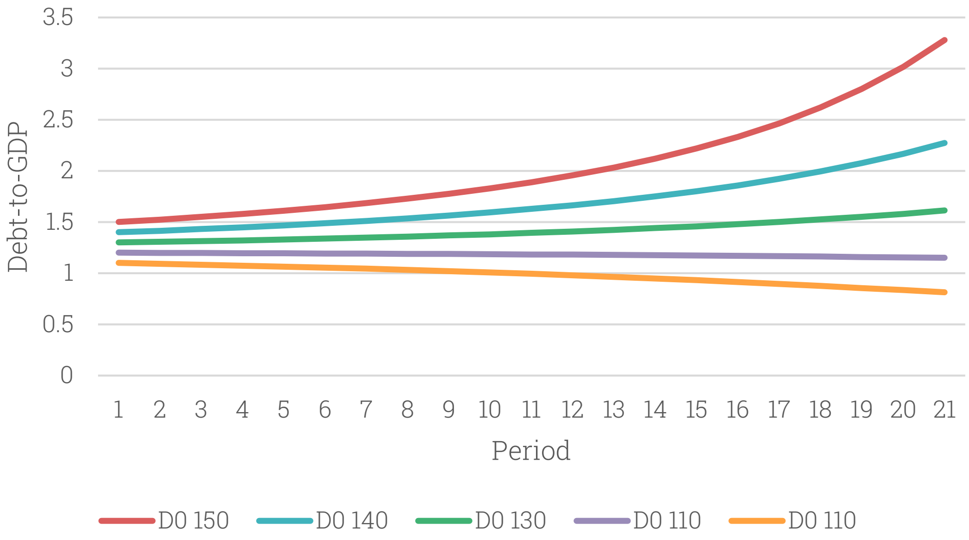
=> Higher debt = higher probability of negative debt spiral

- This 'doom loop' works even if r<g, just assume initial deficit large enough to more than compensate the favorable r<g, then increasing debt ratio leads to higher rates, etc. Explains Mauro (2019) that many defaults even with r<g on average.

- Begs the question what is the 'r' in r<g?
- Market anticipates this doom loop and precipitates crisis?

The risk premium doom loop:

Dynamic evolution of debt-GDP ratio from different starting levels



Source: Alcidi Gros 2019, https://www.europarl.europa.eu/RegData/etudes/IDAN/2018/624426/IPOL_IDA(2018)624426_EN.pdf

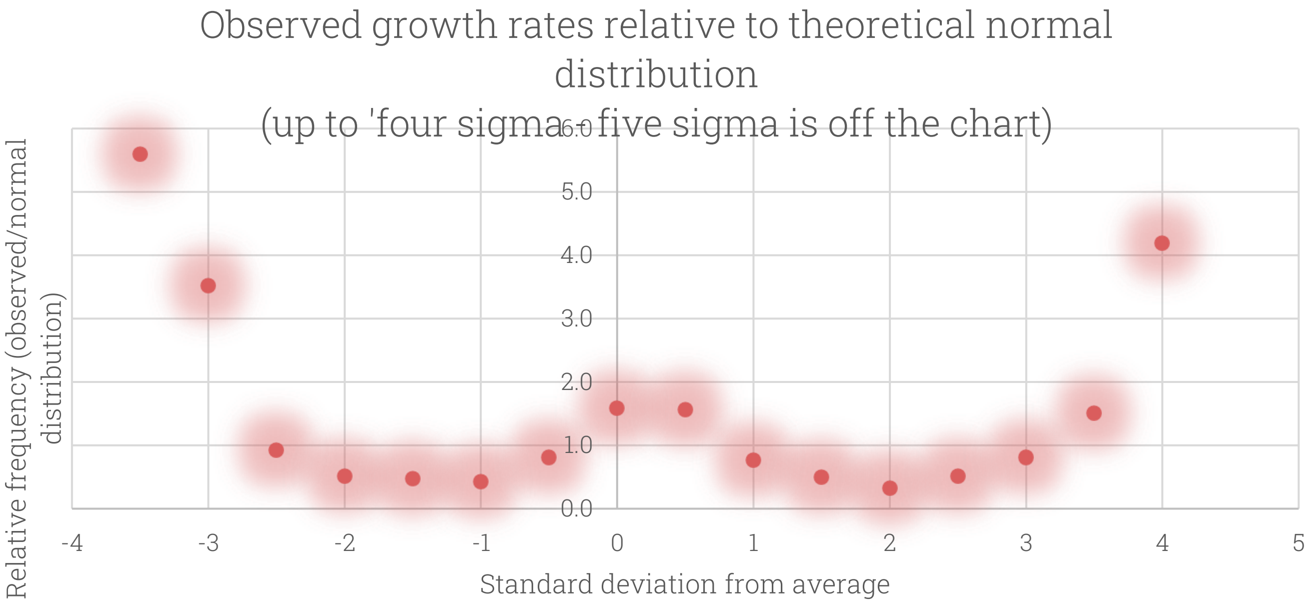
own calculations assuming 3% primary surplus, risk free rate equal to growth rate and risk premium increasing with 4 basis points
for every percentage point increase in debt ratio above 60% of GDP
Note: D0 110 stands for Debt at time 0, equals 110% of GDP, D0 120 stands for Debt at time 0, equals 120% of GDP etc.

Consequences of 'convexity': The danger from fat tails

- Large shocks can have catastrophic consequences when the cost of debt is convex.
- => Need to take into account extreme impact of low probability events
- Where could tail events arise from? Interest rates, risk premium or growth.
- One key source: History shows distribution of growth rates 'fat tailed'.

Fat tails in growth, particularly on the left side (last 150 years) Gros 2021

https://www.econpol.eu/sites/default/files/2021-10/EconPol_Policy_Brief_38_Public%20debt%20uncertain%20world.pdf



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Policy implications

— Commission proposals for Stability Pact reform seem to ignore two key issues.

1. The stochastic part ignores outliers.
2. Interest rates are assumed to converge beyond the transition period, doom loop ignored.

Conclusion, back to basics

1. The cost of public debt is likely to increase more than proportionally with debt ratio (risk premium increases and probability of speculative attack increases).
2. Marginal cost of debt > interest rate.
3. Need to consider 'fat tail' uncertainty. Even small likelihood of extreme event needs to be taken seriously because costs would be catastrophic.
4. => Makes sense to keep limits on debt.

The prudent person rule

Never compare a multiplicative, systemic, and fat-tailed risk to a non-multiplicative, idiosyncratic, and thin-tailed one.

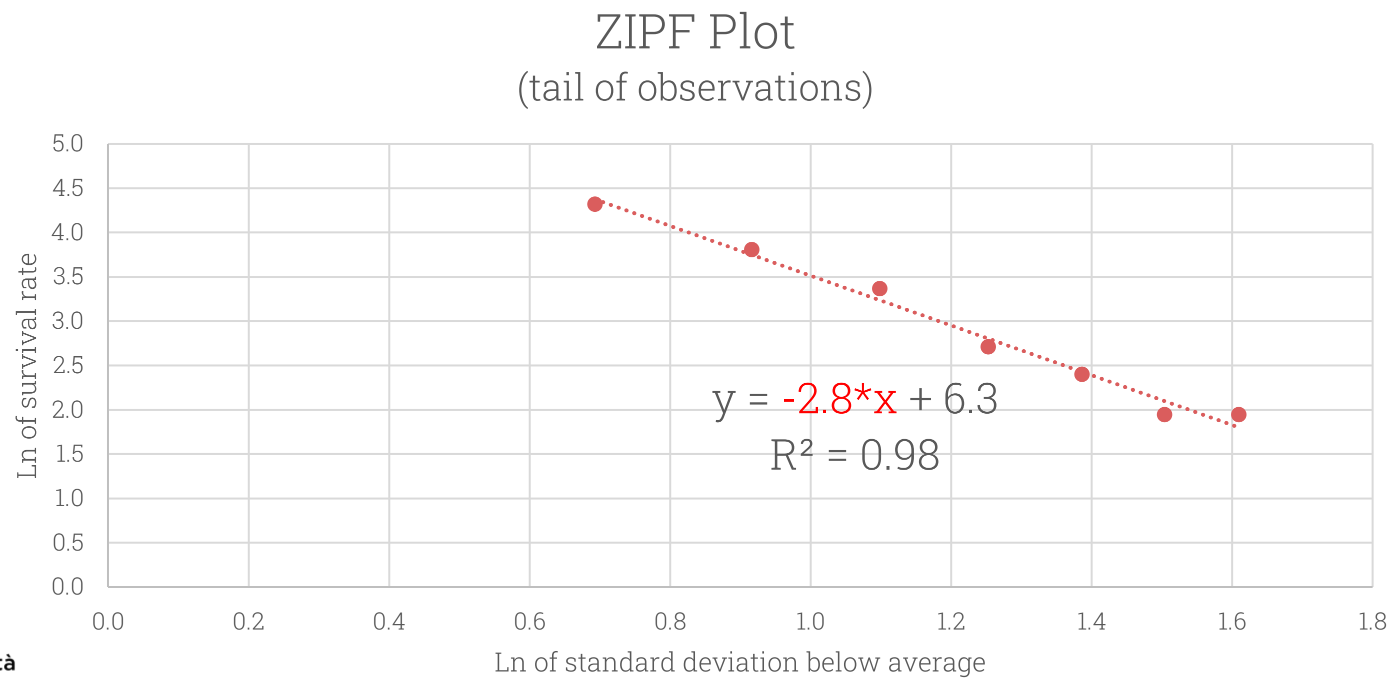
Nassim Nicholas Taleb, “Skin in The Game”

Supplementary material

1. ZIPF plot suggests Pareto left hand ‘tail’ for growth rates.

https://www.econpol.eu/sites/default/files/2021-

10/EconPol_Policy_Brief_38_Public%20debt%20uncertain%20world.pdf



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