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Discussion of the paper :
"Fiscal Buffers, Private Debt, and Stagnation: The
Good, the Bad and the Ugly"
by Nicoletta Batini, Giovanni Melina and Stefania Villa

Workshop "Secular Stagnation and Financial Cycles"   Bank of Italy,
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What the paper is about

- I enjoyed reading the paper and I definitely learned from it!
- The authors provides a useful contribution to the understanding of the relation between private debt, public debt and the macroeconomy, especially in the aftermath of a severe contractionary shock
- They do so by developing a rich framework with all the features typically thought as relevant for characterizing the transmission of a financial crisis. These are, for example:

1. the collateral and leverage cycles
2. a link between private and public balance sheets
3. a role for the government as lender of last resort during deleveraging phases...
4. ...with the fiscal space in playing this role being more or less limited depending on sovereign risk considerations

What the paper does (Empirics)

- First, they conduct an empirical analysis on the interplay between private/public debt and output using country data since 1960
- Second, they develop a theoretical model whose predictions seek to reproduce those from the empirical evidence
- As for the empirics, they build on Mian et al. (2017) and show that:

1. the change in private leverage relative to GDP is negatively correlated with future GDP growth in the short-run
2. The effect is amplified if the initial public debt level is high
3. By contrast, the change in public debt relative to GDP is not correlated with future GDP growth

What the paper does (DSGE model)

The theoretical model predicts that, after a recessionary shock:

1. Through the financial accelerator, private deleveraging occurs, depressing output, prices and government revenues

2. If the initial level of private leverage is high, the recession is more severe and the deterioration of public finances is larger

3. If the initial level of public debt is high, the recession is *only slightly* more severe and the deterioration of public finances *slightly* larger

4. The government's financial assistance to credit-constrained agents mitigate deleverging and deflation. But fiscal space is needed to ensure that the intervention does not make public debt unstable

Empirical analysis

- The regression framework to illustrate the dynamic relation between GDP growth and changes in private debt is (Mian et al. 2017)

$$\Delta_3 y_{i,t+3} = \alpha_i + \beta_{prd}\Delta_3\left(\frac{PRD}{Y}\right)_{i,t-1} + \beta_{pud}\Delta_3\left(\frac{PUD}{Y}\right)_{i,t-1} + u_{i,t}$$

- This is fine and the findings are that the estimate of β_{prd} is negative and statistically significant, while that of β_{pud} is not significant
- Arguably, I question the approach of considering the regressors in level

$$\Delta_3 y_{i,t+3} = \alpha_i + \beta_{prd}\left(\frac{PRD}{Y}\right)_{i,t-1} + \beta_{pud}\left(\frac{PUD}{Y}\right)_{i,t-1} + u_{i,t}$$

- To explain how surges in debt impinge on the subsequent output growth, it is the change (over three years) of the private or public debt to GDP ratios that must be considered rather than the level

Empirical analysis

- This is important because this alternative approach is more than a robustness check
- The authors test for the presence of nonlinearities in the relationship between leverage and future output growth by focusing only on the specification with the regressors in level
- However, in testing whether the initial level of the public debt-to-GDP ratio introduces a degree of difference in the response of future output growth to leverage, it is the growth of debt (relative to the size of the economy) that matters
- Hence, the sample spitting analysis (with the two sub-samples of high vs. low level of public debt-to-GDP, $\left(\frac{PUD}{Y}\right)_{i,t-1}$) should be conducted in the specification where both the dependent variable and the regressors are in rates of change
- Do results continue to hold?
- Why was the threshold for splitting the sample set at the value of $\left(\frac{PUD}{Y}\right)_{i,t-1} = 0.95$?

Empirical analysis

- Another departure from the baseline regression framework is considered when, instead of using the future output growth, $\Delta_3 y_{i,t+3}$, as dependent variable, it is the future output gap to be used

- This is fine but this alternative method for measuring the cyclical developments in output (dependent variable) should be used also for the regressors of the equation, namely for the private and public debt-to-GDP ratios

- Hence, also $\frac{PUD}{Y}$ and $\frac{PRD}{Y}$ should be de-trended

Theoretical model

- Before analyzing the economy's response to individual shocks, the authors use artificial data and compute some unconditional correlation
- The model-based correlation between future output gap and private debt-to-GDP ratio is negative
- An interesting finding is that the size of this correlation is almost identical if the initial level of private debt is high
- The model-based correlation between future output gap and private debt-to-GDP ratio is therefore the same no matter what the initial level of leverage is
- I suggest that the authors should test in the data also for this possible nonlinearity and not only for the nonlinearity due to high vs low initial levels of *public* debt

Theoretical model

- By contrast, when the macro response to individual shocks is analysed, the responses of output, inflation, and debt to GDP to a house price shock are largely different depending on the initial level of private debt
- In particular, the effects are largely amplified if the initial level of private debt is high
- These findings suggest that the unconditional correlations and the correlations conditional to a house price shock are rather different
- Arguably, this implies that the house price shock is not a very relevant driving force of the business cycle although is suitable for characterizing the crisis's transmission

Theoretical model

- Conversely, when we come to amplification mechanisms associated with a high initial level of public debt my reading of the results on the responses to the house price shock is that this amplification is virtually absent
- Output (but also inflation and leverage) responds to the shock precisely in the same way no matter what the initial size of public debt is
- However, above a given threshold for the steady state of the level of public debt, from the virtual invariance of its responses, the model abruptly switch to the indeterminacy-instability region
- A discussion on this may be useful
- Moreover, one may wonder whether the size of the responses is proportional to the size of the shock, i.e. whether there are nonlinearities depending on the shock's size