Paper Replication

Johri, Khan, Sosa-Padilla. (2022) Interest Rate Uncertainty and Sovereign Default Risk

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The chosen paper: Interest Rate Uncertainty and Sovereign Default Risk, by Johri et al. (2022) published in Journal of International Economics, builds upon sovereign default models in the spirit of Eaton & Gersovitz (1981) and Arellano (2008). It is however different to Arellano (2008) in at least three aspects. First, as in Hatchondo, Martinez (2009) , it includes long-term bonds with a constant decaying coupon rate that the authors define as δ. It includes risk averse creditors, following Vasicek (1977) and recently Arellano & Ramanarayanan (2012), and Bianchi & Sosa-Padilla (2020) Third, it introduces stochastic volatility into the process of the world interest rate following Fernandez-Villaverde et al. (2011).

1 Github

The repository for this replication can be found in: https://github.com/jcmendev/Replication

It contains 2 main functions to run the results

1. Main_JKS.m: Code that runs the replication
2. Simulation_JKS.m: Code that runs the simulation

It contains 8 auxiliary functions

1. ergdist: Computes the stationary distribution of a Probability Transition Matrix.
2. getindex: Finds the index value of a point
3. getv0: Finds the value evaluated at debt equal to zero
4. gridmake: ndgrid equivalent to create grids for every combination of states
5. hpfilter: Computes trend and cycle from a series
6. MC_Rouwenhorst.m: Discretizes an AR(1) with Rouwenhorst method

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7. MC_Tauchen.m: Discretizes an AR(1) with Tauchen method

8. simulmarkov.m: Simulates a Markov Chain

2 Main File Description and Results

In file Main_JKS_Replication.m, we provide the main replication file of the paper. It is divided in blocks that contain the parameters definition, block building the state space, the punishment set-up in case of default, the value function iteration algorithm, and the policy extraction and other miscellaneous reporting codes. The model is incapable of generating default in equilibrium, therefore the long-run moments related to spread and results of spread do not replicate those in the paper.

2.1 Long-run moments

Table 1: Model Fit and "Replication" Fit

	Data	**Paper**	**"Replication"**
Debt/y	44	44	28.75
Spread	4.1	4.1	
SD Spread	1.9	2.1	
sd(c)/sd(y)	1.1	1.6	2.2
corr(c,y)	0.8	1.0	0.9
corr(Spread,y)	-0.5	-0.8	

2.2 Effect of interest rate on debt issuance

Figure 1: Effect of interest rate on debt issuance: "Replication"

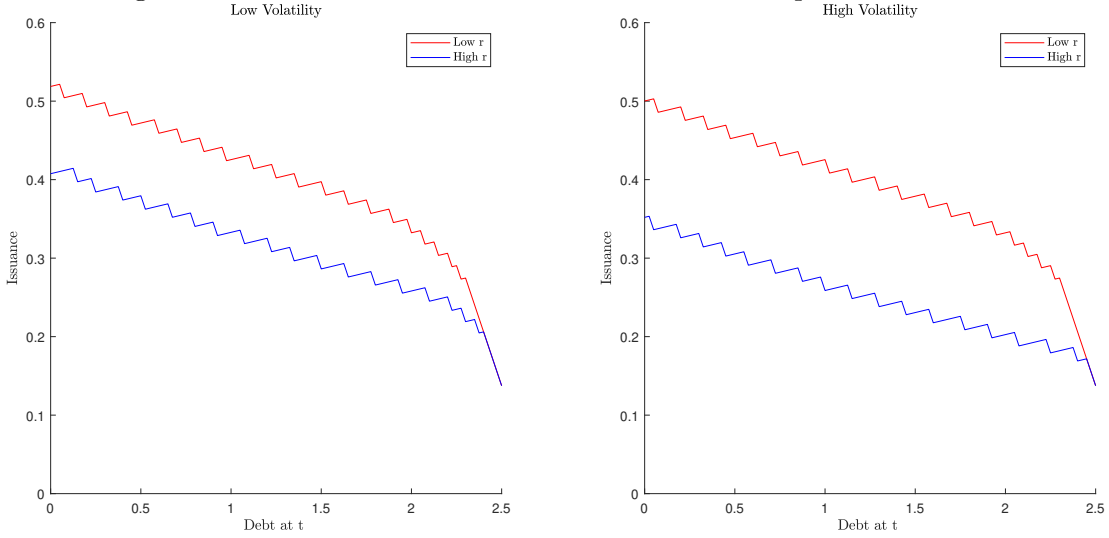
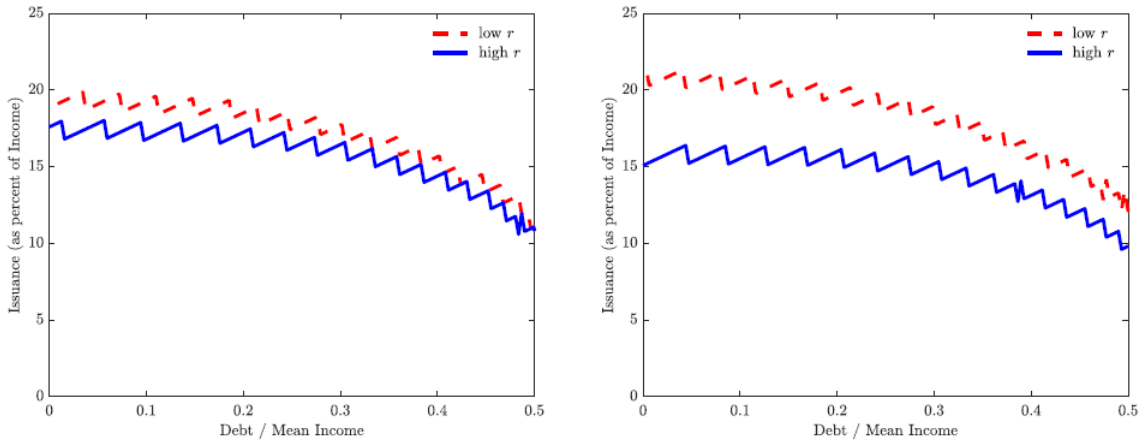


Figure 2: Effect of interest rate on debt issuance: Paper



(a) Low σ_r (b) High σ_r

2.3 Effect of interest rate on debt policies

Figure 3: Effect of interest rate on debt policies: "Replication"

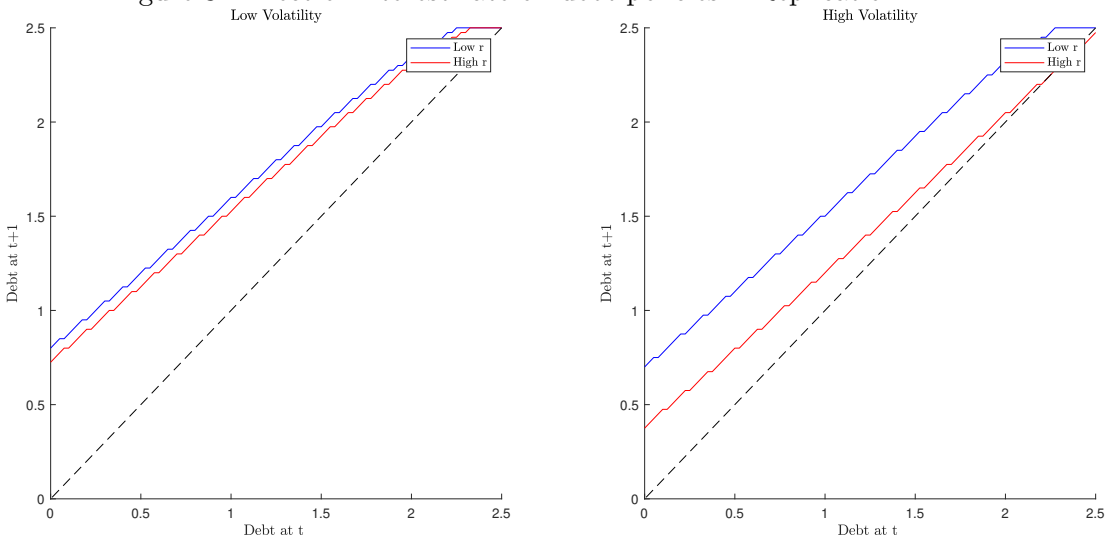
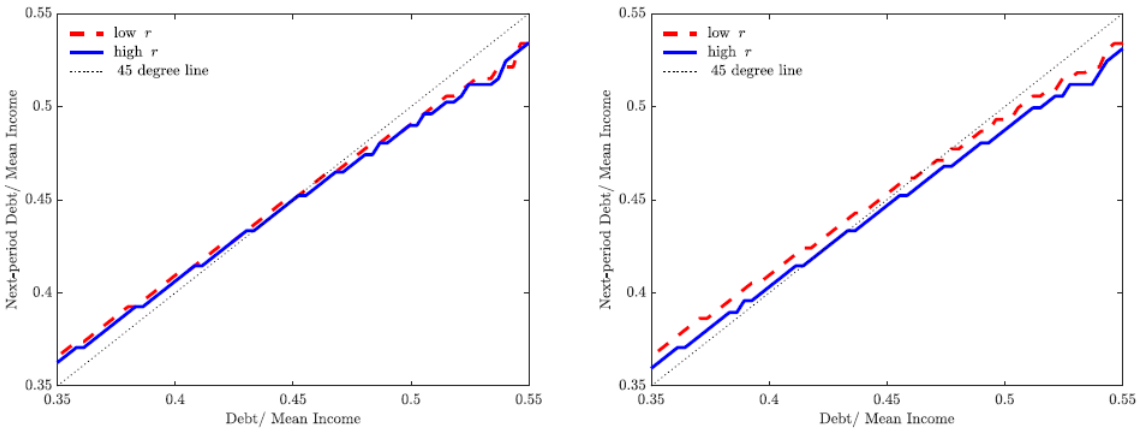


Figure 4: Effect of interest rate on debt policies: Working Paper



(a) Low σ_r (b) High σ_r

References

Arellano, C. (2008). Default Risk and Income Fluctuations in Emerging Economies. *American Economic Review*, *98*(3), 690-712.

Arellano, C., & Ramanarayanan, A. (2012). Default and the maturity structure in sovereign bonds. *J. Polit. Econ.*, *120*, 187–232.

Bianchi, J., & Sosa-Padilla, C. (2020). *Reserve accumulation, macroeconomic stabilization, and sovereign risk* (Tech. Rep.). National Bureau of Economic Research.

Eaton, J., & Gersovitz, M. (1981). Debt with Potential Repudiation: Theoretical and Empirical Analysis. *Review of Economic Studies*, *48*(2), 289-309.

Fernandez-Villaverde, J., Guerron-Quintana, P., & Rubio-Ramirez, J. F. (2011). Risk matters: The effects of volatility shocks. *Am. Econ. Rev.*, *101*, 2530–2561.

Johri, A., Khan, S., & Sosa-Padilla, C. (2022). Interest rate uncertainty and sovereign default risk. *Journal of International Economics*, *139*, 103681.

Vasicek, O. (1977). An equilibrium characterization of the term structure. *Journal of Financial Economics*, *5*(2), 177–188.