Optimal Fiscal Policy without Commitment: Revisiting Lucas-Stokey Online Appendix

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The purpose of this online appendix is to provide some numerical examples under more general utility functions where the Lucas-Stokey optimal tax rates under commitment can be above the peak of the Laffer curve. The rest of the argument that policy is not time-consistent follows the same logic as in the main text (see Proposition 2) and is therefore omitted.

We consider a class of period utility function $u(c,n)$ that is increasing in consumption (c), decreasing in labor (n) and strictly concave in both c and n. We also assume that initial debt has the same structure as in the main text, i.e. $b_{-1,0} = b > 0$ and $b_{-1,t} = 0$ $\forall t \geq 1$. The Lucas-Stokey optimal policy must satisfy the following first-order conditions

$$\begin{aligned}
(u_{c,0} + u_{n,0})(1+\lambda_0) + \lambda_0\left[-(u_{cc,0} + u_{cn,0})\,b + (u_{cc,0} + u_{cn,0})\,c_0 + (u_{nn,0} + u_{cn,0})\,n_0\right] &= 0 \\
(u_{c,1} + u_{n,1})(1+\lambda_0) + \lambda_0\left[(u_{cc,1} + u_{cn,1})\,c_1 + (u_{nn,1} + u_{cn,1})\,n_1\right] &= 0 \\
u_{c,0}(c_0 - b) + u_{n,0}n_0 + \frac{\beta}{1-\beta}(u_{c,1}c_1 + u_{n,1}n_1) &= 0
\end{aligned}$$

where λ_0 denotes the Lagrange multiplier, and $0 < \beta < 1$ is the discount factor.

Following King and Rebelo (1999) and Trabandt and Uhlig (2011) we consider preferences consistent with balanced growth and featuring a constant intertemporal elasticity of substitution and a constant Frisch elasticity of labor supply taking the form (up to affine transformations)

$$u(c,n) = \frac{1}{1-\sigma}\left\{c^{1-\sigma}\left[1-\eta(1-\sigma)\,n^{\gamma}\right]^{\sigma} - 1\right\} \quad \text{if } \sigma \neq 1$$

or

$$u(c,n) = \log(c) - \eta\frac{n^{\gamma}}{\gamma} \quad \text{if } \sigma = 1,$$

where $\sigma > 0$ and $\gamma \geq 1$.

We solve the model under four alternative parametrizations for the risk-aversion and the Frisch elasticity parameters, namely (i) $\sigma = \gamma = 1$ (log-utility in consumption and linear "indivisible" labor); (ii) $\sigma = 1$ and $\gamma = 2$ (log-utility in consumption and unitary Frisch elasticity of labor supply), (iii) $\sigma = \gamma = 2$ which corresponds to the baseline calibration in Trabandt and Uhlig (2011), and (iv) $\sigma = 0.8$ and $\gamma = 2$ (risk aversion below one, and unitary Frisch elasticity of labor supply).

For each of these cases, Figure 1 plots the optimal level of future consumption as a function of the initial level of debt. We set $\eta = 1$, $g = 0.2$, and $\beta = 0.96$. To facilitate the comparison, both consumption and the initial level of debt are expressed as a fraction of the values corresponding to the allocation at the top of the Laffer curve, i.e c_1/c^{laffer} and b/b^{*}. As can be seen in the figure, and consistently with Proposition 1 in the main text, in all cases considered future consumption (c_1) is a decreasing function of initial debt. Also, there exists a threshold value of initial debt (b^{*}) above which the Lucas-Stokey optimal taxes are above the peak of the Laffer curve so that $c_1 < c^{laffer}$, which implies that the optimal policy under commitment is not time-consistent.

Figure 2 considers instead separable preferences of the form $u(c,n) = \frac{c^{1-\sigma}-1}{1-\sigma} - \eta\frac{n^{\gamma}}{\gamma}$ for $\sigma > 0$ and $\sigma \neq 1$ and $u(c,n) = \log c - \eta\frac{n^{\gamma}}{\gamma}$ for $\sigma = 1$, under the same parametrizations for σ and γ described earlier. Consistent with our main result, if the initial debt is high enough, optimal taxes are above the peak the Laffer curve, and thus $c_1 < c^{laffer}$.

Figure 1: Lucas-Stokey Optimal Policy with Balanced Growth Path Preferences

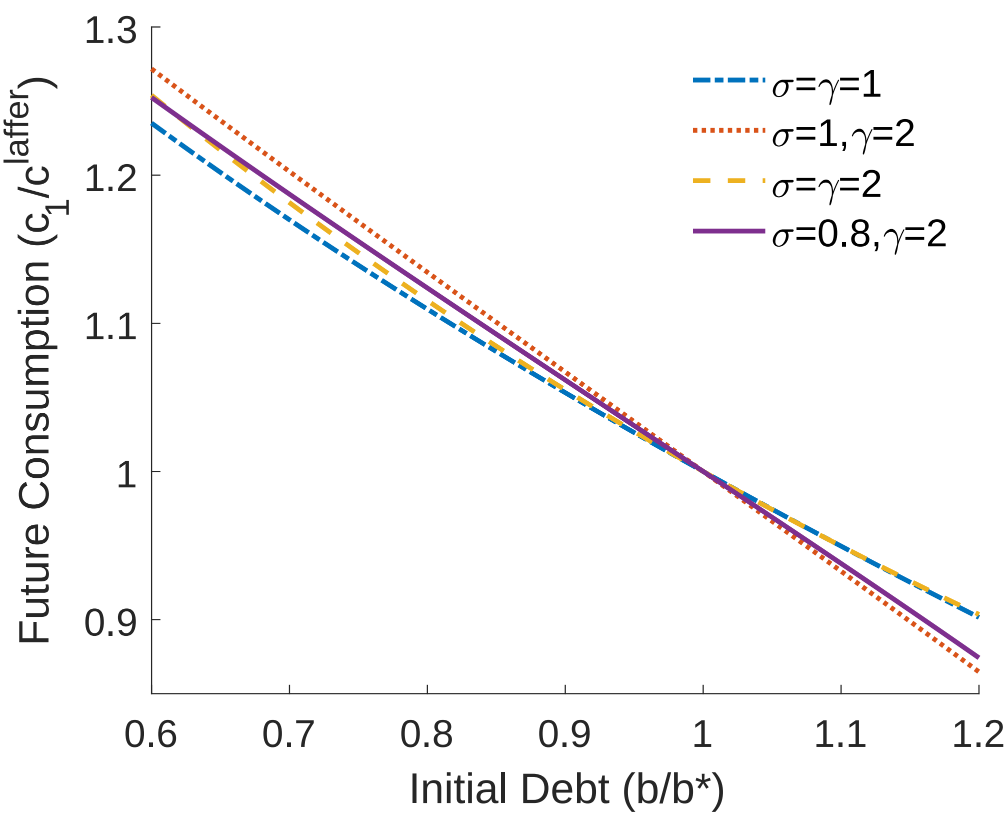

Figure 2: Lucas-Stokey Optimal Policy with Separable Preferences