‘Conventional’ Monetary Policy in OLG Models: Revisiting the Asset-substitution Channel – Online Appendix

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In this online appendix, we describe the impulse response functions (IRFs) of the model in Section 2 and the model in Section 4.

1 IRFs of the model in Section 2

We display the numerical impulse response functions for k_t and p_t for the following specification: $zf(k) = zk^{\alpha}$, $\alpha = 1/3$, $z = 10$, $i = 1.1911$, and

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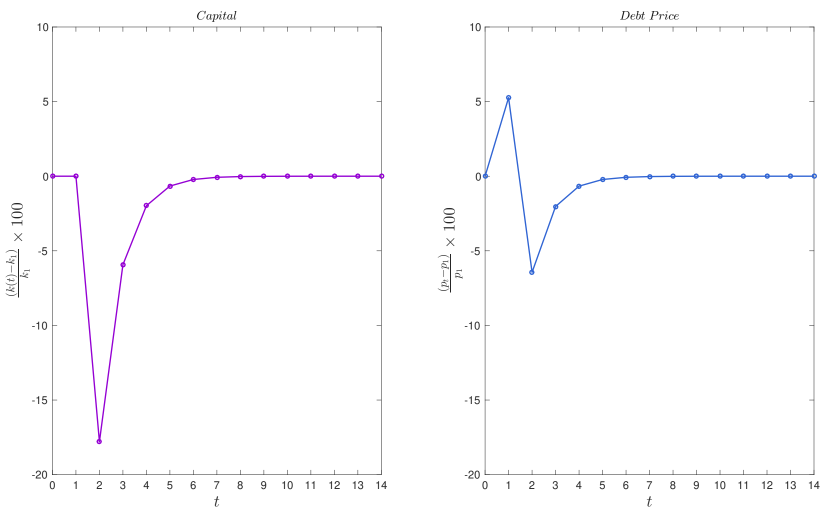
$i_2 = 1.8091$. To be consistent with the continuous-time model in section 4, these magnitudes for i and i_2 arise from treating a period as 20 years, assuming a steady-state real interest rate of 4% per year (i.e. the average real interest rate in the U.S.), and a deviation which raises i by 1.3% per year (i.e. one standard deviation of cyclical part of real interest rate). That is, $i = (1 + 0.04)^{20} - 1 = 1.1911$, and $i_2 = (1.04 + 0.013)^{20} - 1 = 1.8091$. We normalize k_0 and p_0 to be unity. Online Appendix Figure 1 displays the impulse response functions of k_t and p_t.



Online Appendix Figure 1: Impulse Response Functions of k_t and p_t

2 IRFs of the model in Section 4

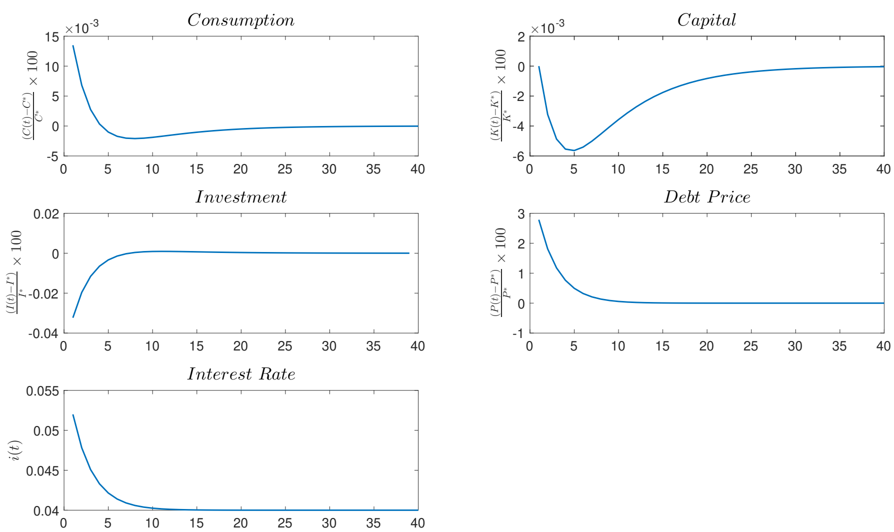
The model is calibrated annually using standard values from the literature and the U.S. economy. The parameter for the depreciation rate δ is set at 0.1

and the capital share α at 1/3. The mortality rate ρ is set to 0.013, which gives the average life expectancy (74.67) between 1960 and 2017. The average real interest rate is taken to be 4% and $i_0 = 0.04$. Guided by Proposition 5, we set $\theta = 0.035$, implying $\theta < i^* = 0.037 < i_0 < \theta + \rho$. For the persistence of the shock, η, we use hp-filter 100 to get the cyclical part ($\tilde{e}_t$) of US real interest rate from 1970 to 2018 (from World Development Indicators) and then run a regression of $\Delta\tilde{e}_t$ on $\tilde{e}_t$. We get $\eta = 0.43$, implying that the half-life is around 1.6 year. Because the steady state, C^*, p^*, and K^* change proportionally when z changes, we set $z = 1$. However, because the Jacobian matrix J depends on z, we also computed impulse response functions for $z = 0.1$ and $z = 10$ and found that they are not sensitive to the magnitude of z.

Table 1: Parameters

δ	α	ρ	i_0	θ	η	z
0.1	1/3	0.013	0.04	0.035	0.43	1

We study what happens when e increases by one standard deviation, 1.3%. If the change is permanent, the capital stock in the new steady state declines 11.6%, which is a large impact. When the shock follows (18) (that is in the main text), the impulse response functions of consumption, the capital stock, investment and the debt price are in Online Appendix Figure 2. Although the magnitude of the effects are small, there continues to be asset substitution between government debt and capital. There are some qualitative differences between the impulse response functions for the two-period models and the continuous-time model. In the two-period models, the change in the interest rate does not affect initial saving, which is given by the wage. In the continuous-time model, saving is affected because wealth changes when the value of debt changes.



Online Appendix Figure 2: Impulse Response Functions