6 Online Appendix (Not Intended for Publication)

6.1 Additional Simulation Results

6.1.1 Loss Function Surfaces for Alternate Gain Values

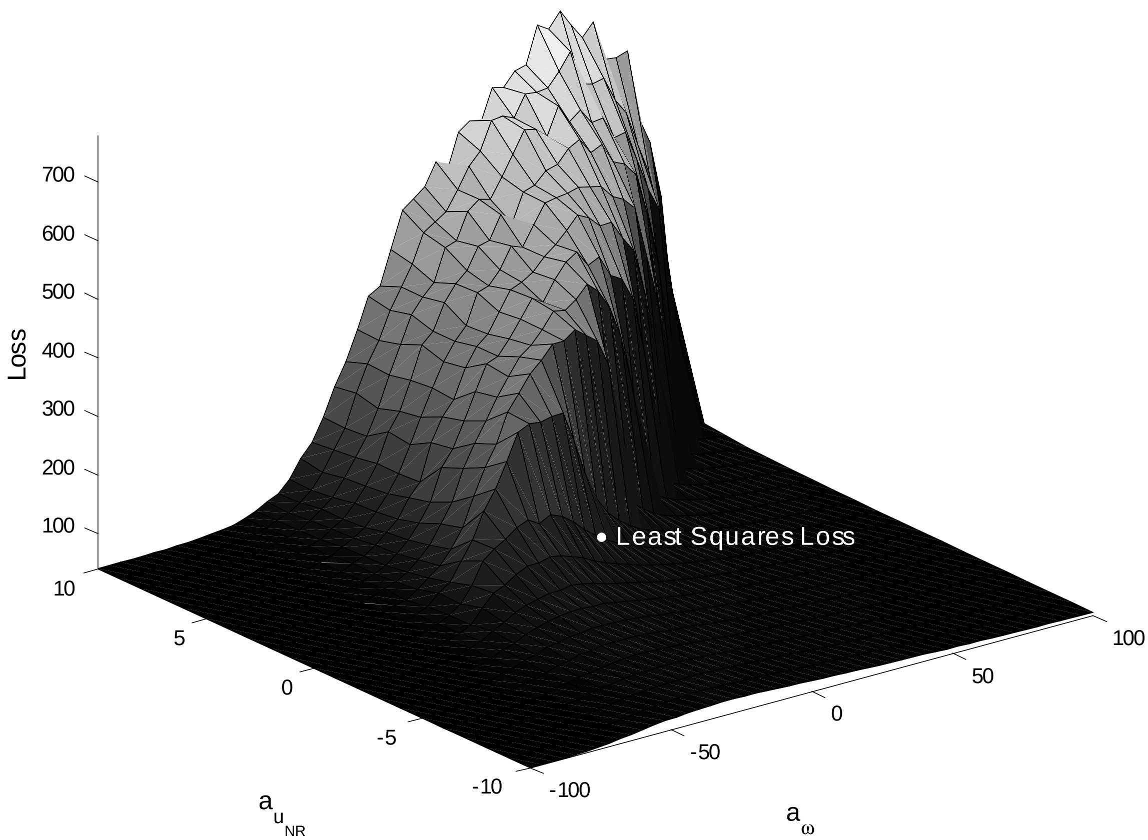

Figure 13. Loss Function ($L(x_t)$, 0.0025 gain).

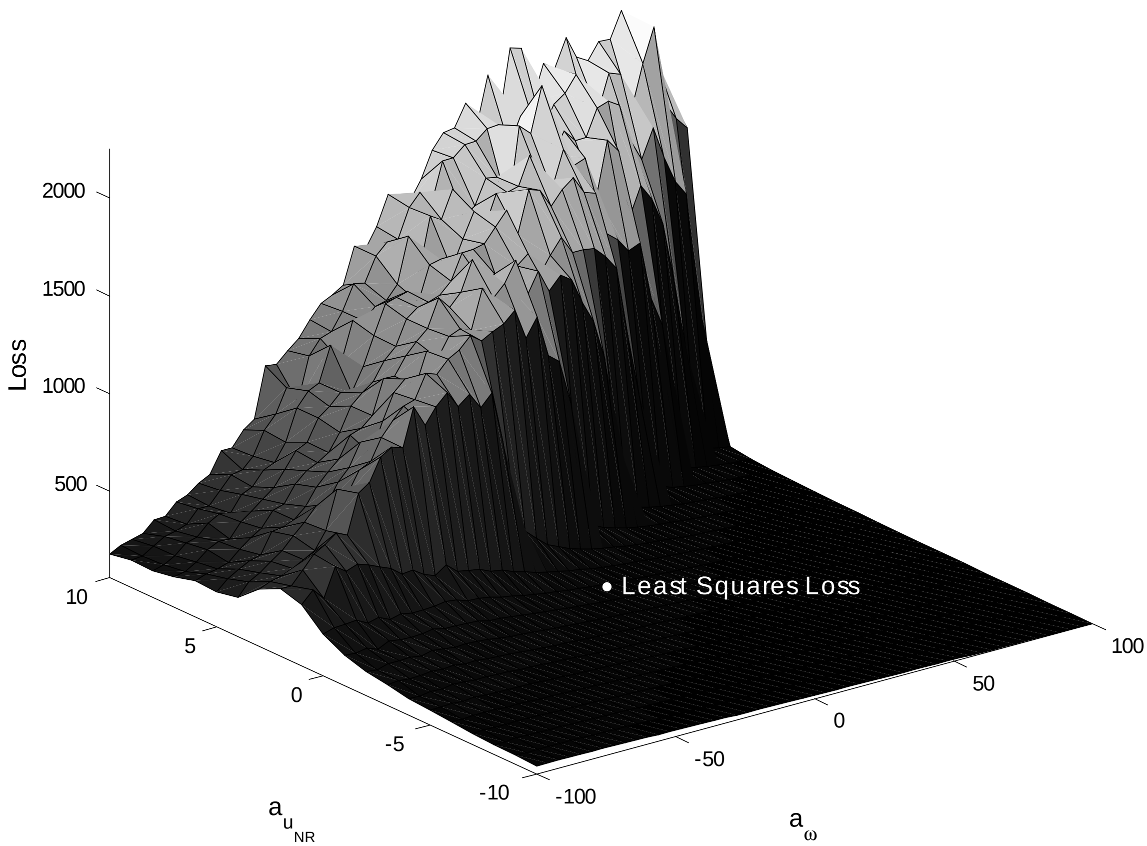

Figure 14. Loss Function ($L(x_t)$, 0.1 gain).

6.1.2 Additional Time Paths

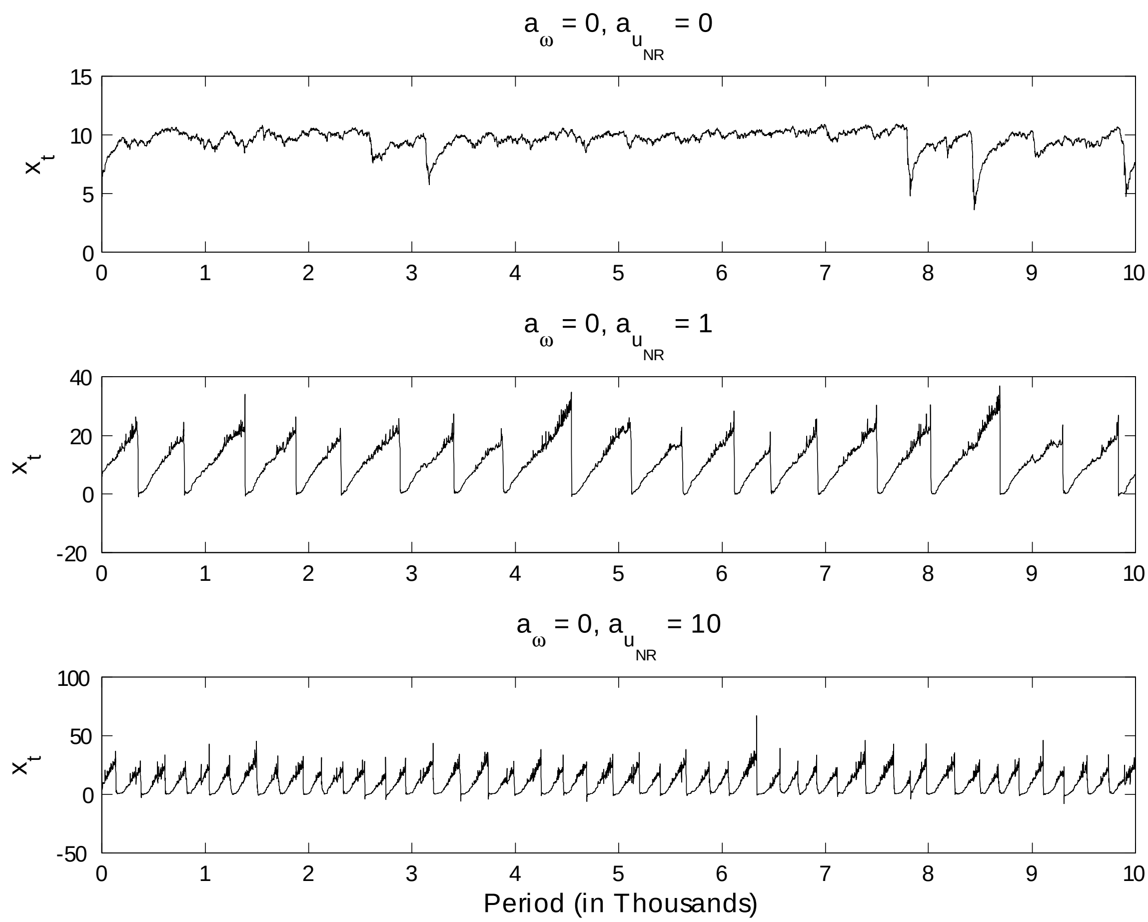

Figure 15. Targeted Inflation ($a_\omega = 0$, $a_{u_{NR}} > 0$).

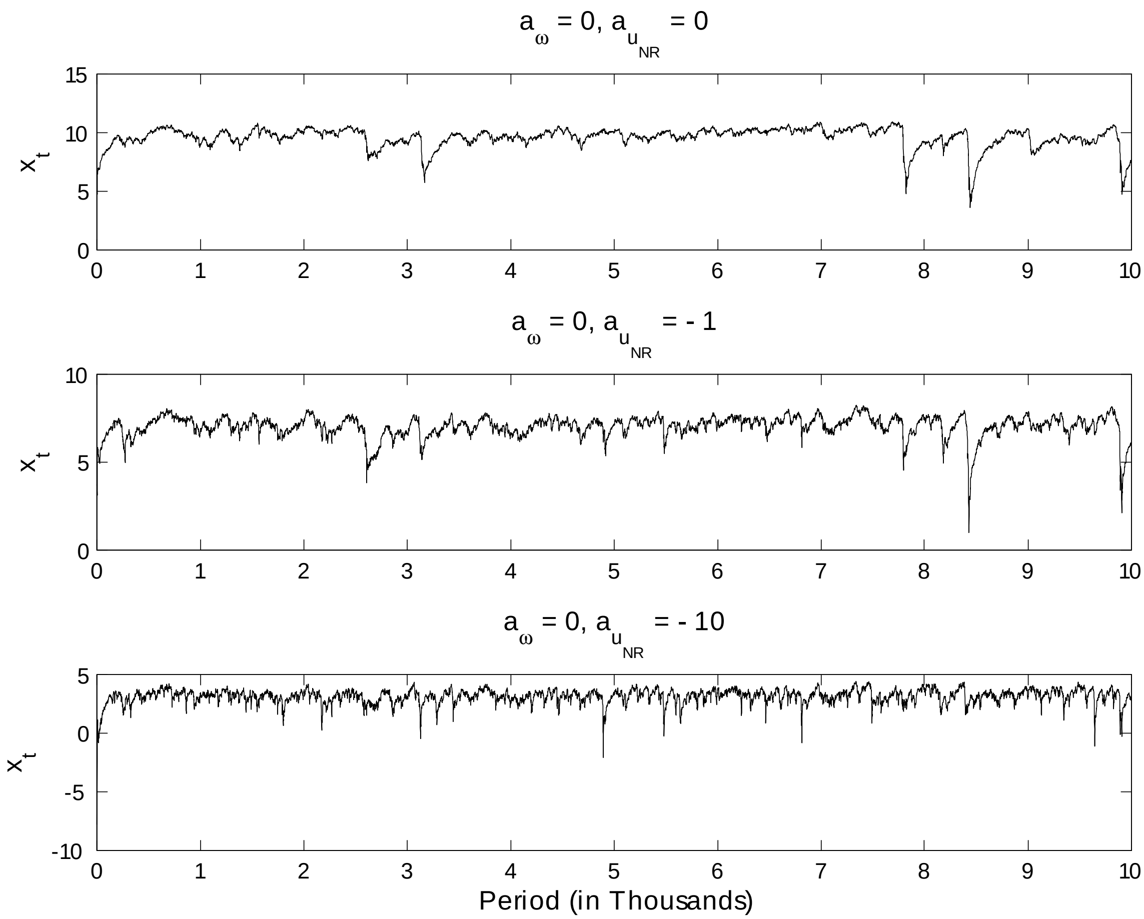

Figure 16. Targeted Inflation ($a_\omega = 0$, $a_{u_{NR}} < 0$).

6.2 On the Value of the Precautionary Parameter

Let a_t be the slope precautionary parameter employed at time t, and let l_t be the resulting loss. We define

$$L_t(a) = \sum_{s=0}^{t} l_s I(a_s = a)$$

as the total loss incurred as of time t when the precautionary parameter was a, where $I(\phi)$ is an indicator function that is 1 if ϕ is true and 0 otherwise. We define

$$L_t^2(a) = \sum_{s=0}^{t} l_s^2 I(a_s = a)$$

as the total squared loss incurred as of time t when the precautionary parameter was a and

$$n_t(a) = \sum_{s=0}^{t} I(a_s = a)$$

as the number of periods as of time t when the precautionary parameter was a. Thus the average loss as of time t when the parameter was a will be

$$\Lambda_t(a) = \frac{L_t(a)}{n_t(a)},$$

and the standard error estimate will be

$$\sigma_t(a) = \sqrt{\frac{\frac{L_t^2(a)}{n} - \Lambda_t(a)^2}{n_t(a)}}.$$

Also define

$$Z_t(a,b) = \frac{\Lambda_t(a) - \Lambda_t(b)}{\sqrt{\sigma_t(a)^2 + \sigma_t(a)^2}}$$

to be the Z score for comparison of $L_t(a)$ with $L_t(b)$.

Let $T > 0$ be an experimental time span. Let $\varepsilon > 0$ be the absolute value of the optimal precautionary parameter according to Section 2.2 and let $\phi^* > 0$ be the critical value of the

Z score for comparing $L_t(a)$ at different values of a. We propose the following algorithm:

1. If the optimal parameter is $\widetilde{a}$, employ it for T periods, $\widetilde{a}-\varepsilon$ for T periods, and $\widetilde{a}+\varepsilon$ for T periods.

2. If $-\phi^* < Z_t(\widetilde{a},\widetilde{a}-\varepsilon) < \phi^*$ and $-\phi^* < Z_t(\widetilde{a},\widetilde{a}+\varepsilon) < \phi^*$, there is no significant evidence so return to Step 1.

3. If $Z_t(\widetilde{a},\widetilde{a}-\varepsilon) \leq -\phi^*$ and $Z_t(\widetilde{a},\widetilde{a}+\varepsilon) \leq -\phi^*$, conclude a minimum, and employ $\widetilde{a}$ until $\Lambda_t(\widetilde{a}) > \Lambda_t(\widetilde{a}-\varepsilon)$ or $\Lambda_t(\widetilde{a}) > \Lambda_t(\widetilde{a}+\varepsilon)$, in which case go back to Step 1 and recheck that $\widetilde{a}$ is a minimum.

4. If $Z_t(\widetilde{a},\widetilde{a}-\varepsilon) > \phi^*$ or $Z_t(\widetilde{a},\widetilde{a}+\varepsilon) > -\phi$, conclude that $\widetilde{a}$ is not a minimum. Let

$$a' = \begin{cases} \widetilde{a}-\varepsilon & \Lambda_t(\widetilde{a}-\varepsilon) < \Lambda_t(\widetilde{a}+\varepsilon) \\ \widetilde{a}+\varepsilon & \Lambda_t(\widetilde{a}-\varepsilon) \geq \Lambda_t(\widetilde{a}+\varepsilon) \end{cases}.$$

   If $\Lambda_t(\widetilde{a}+\varepsilon) - 2\Lambda_t(\widetilde{a}) + \Lambda_t(\widetilde{a}-\varepsilon) > 0$, the loss function is locally convex and

$$a'' = a' - \varepsilon \frac{\Lambda_t(\widetilde{a}+\varepsilon) - \Lambda_t(\widetilde{a}-\varepsilon)}{\Lambda_t(\widetilde{a}+\varepsilon) - 2\Lambda_t(\widetilde{a}) + \Lambda_t(\widetilde{a}-\varepsilon)}$$

   is the result of taking a Newton step from a'. Employ the parameter a'' for a maximum of T periods as long as $Z_t(a'',a') \in (-\phi^*,\phi^*)$. If $Z_t(a'',a') \leq -\phi^*$ (or $Z_t(a'',a') < 0$ after T periods), return to step 1 with $\widetilde{a} = a''$.

5. Let $\widetilde{\varepsilon} = \mp\varepsilon$ if $a' \lessgtr \widetilde{a}$. Try $a'+\widetilde{\varepsilon}$ for a maximum of T periods as long as $Z_t(a'+\widetilde{\varepsilon},a') \in (-\phi^*,\phi^*)$. If $Z_t(a'+\widetilde{\varepsilon},a') \geq \phi^*$ (or $Z_t(a'+\widetilde{\varepsilon},a') \geq 0$ after T periods), return to step 1

with $\widetilde{a} = a'$. If $Z_t(a' + \widetilde{\varepsilon}, a') \leq -\phi^*$ (or $Z_t(a' + \widetilde{\varepsilon}, a') < 0$ after T periods), let $a' = a' + \widetilde{\varepsilon}$, double $\widetilde{\varepsilon}$, and repeat step 5.