

Economics G6220
Advanced Macroeconomic Analysis
Problem Set 7
Due May 6

The Temporariness Hypothesis With Downward Nominal Wage Rigidity

Consider a small open perfect-foresight economy populated by a large number of identical infinitely lived consumers with preferences described by the utility function

$$\sum_{t=0}^{\infty} \beta^t \ln c_t,$$

where c_t denotes consumption and $\beta \in (0, 1)$ denotes the subjective discount factor. Consumption is a composite good made of imported and nontradable goods, denoted c_t^M and c_t^N respectively, via the aggregator function

$$c_t = \sqrt{c_t^M c_t^N}.$$

The sequential budget constraint of the representative household is given by

$$d_t^h = (1 + r)d_{t-1}^h + (1 + \tau_t)(c_t^M + p_t c_t^N) - w_t h_t - y - x_t,$$

where d_t^h denotes debt acquired in period t and maturing in $t + 1$, h_t denotes hours worked, τ_t is a proportional consumption tax, w_t denotes the real wage in terms of importables, p_t denotes the relative price of nontradables in terms of importables, $y = 1$ is an endowment of exportable goods, x_t denotes a lump-sum transfer received from the government, and r denotes the real interest rate. Debt is denominated in terms of importables. The terms of trade are assumed to be constant and normalized to unity. Households are subject to the no-Ponzi-game constraint

$$\lim_{j \rightarrow \infty} \frac{d_{t+j}^h}{(1 + r)^j} \leq 0.$$

Assume that the household's initial debt position is nil ($d_{-1}^h = 0$). Households supply inelastically 1 unit of labor to the market each period. Suppose that the law of one price holds for importables, so that $P_t^M = P_t^{M*} E_t$, where P_t^M denotes the domestic-currency price of importables, E_t denotes the nominal exchange rate, defined as the price of foreign currency in terms of domestic currency, and P_t^{M*} denotes the foreign-currency price of importables. Assume that P_t^{M*} is constant and equal to unity for all t .

Firms in the nontraded sector produce goods by means of the linear technology $y_t^N = h_t$, where y_t^N denotes output of nontradables. Firms are price takers in product and labor markets and there is free entry, so that all firms make zero profits at all times.

The government starts period 0 with no debt or assets outstanding and runs a balanced budget period by period, that is, $x_t = \tau_t(c_t^M + p_t c_t^N)$. The monetary authority pegs the exchange rate at unity, so that $E_t = 1$ for all t . Finally, assume that $1 + r = \beta^{-1} = 1.04$.

1. Suppose that nominal wages are flexible and that before period 0 the economy was in a steady state with constant consumption of importables and nontradables and no external debt.

(a) Compute the equilibrium paths of c_t^M , w_t , W_t , p_t , the trade balance, and the current account under two alternative tax policies:

Policy 1: $\tau_t = 0, \forall t$

$$\text{Policy 2: } \tau_t = \begin{cases} 0 & 0 \leq t \leq 11 \\ 0.3 & t \geq 12 \end{cases} .$$

(b) Compute the welfare cost of policy 2 relative to policy 1, defined as the percentage increase in the consumption stream of a consumer living under policy 2 required to make him as well off as living under policy 1. Formally, the welfare cost of policy 2 relative to policy 1 is given by $\lambda \times 100$, where λ is implicitly given by

$$\sum_{t=0}^{\infty} \beta^t \ln[c_t^{p2}(1 + \lambda)] = \sum_{t=0}^{\infty} \beta^t \ln c_t^{p1},$$

where c_t^{p1} and c_t^{p2} denote consumption in period t under policies 1 and 2, respectively.

2. Now answer question 1 under the assumption that wages are downwardly inflexible. Specifically, assume that $W_t \geq W_{t-1}$ for all $t \geq 0$. Begin by computing W_{-1} under the assumption that before period 0 the economy was in a steady state with constant consumption of tradables and nontradables, full employment, no debt, and a nominal exchange rate equal to unity.
3. How would your answers to questions 1 and 2 change if τ_t was a tax only on consumption of importables (i.e., an import tariff)? Provide a quantitative and intuitive answer.
4. Continue to assume that τ_t is a tax on consumption of imported goods only. In class, in the context of a model with tradable goods only, we derived the result that policy 2 induces the same equilibrium paths of consumption, c_t , as policy 1 in the presence of imperfect credibility, that is, when the government announces and successfully implements policy 1 but households believe that policy 2 is in place and begin to believe in the permanence of the tariff cut only after period 11. How does this result change in the present model with tradables and nontradables? Consider the cases of flexible and downwardly rigid nominal wages.