Coding Assignment 2

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1 Endogenous Labor Supply

(a) **Numerically solve for $V(a, w)$, $a'(a, w)$ and $c(a, w)$ for a tolerance of 10-9 on the norm of the difference between consecutive iterations on V with a policy function iteration step included.**

Found in final_code_labor.m

Novel elements in determining the natural borrowing limit: The natural limit now considered that given the labor hours steady state of 40/168 hours per week, while earning the lowest possible wage -min(w(1)), how much can this household borrow. Rather than the -min(exp(Y(1))) from assignment 1, this is replaced with minimum w * steady state n.

(b) **Graph the converged value function in (a, w) space for all w.**

Found in final_code_labor.m

(c) **Generate a series of 1000 simulated income innovations for the given normal distribution and simulate the model for 1000 periods. Discard the first 500 simulations. Create a *tileplot* of simulated w or a', n and c.**

Found in final_code_labor.m

(d) **Calculate the standard deviation of simulated n. Explain what you would qualitatively expect would occur to the standard deviation of n in the following cases.**

Found in final_code_labor.m

(a) **The borrowing constraint were zero.**

Borrowing constraint being zero means that household would not be able to borrow assets. This would force households to adjust labor when their income stream is low, working more. Their labor would thus follow variations in the income stream, increasing the standard deviation of n labor hours (supply).

(b) **The relative risk aversion parameter doubled.**

Households become more risk averse and will adjust their labor supply, working more to smooth consumption. As such, standard deviation of labor hours rises as consumers adjust labor frequently to match with income volatility.

(c) **The Frisch labor supply elasticity doubled.**

Households become more willing to provide labor given changes in wage. As such, labor supply becomes more sensitive and reactive increasing standard deviation of n.

(d) **Real wage volatility doubled.**

As real wage volatility increases, households will provide more labor to smooth consumption. Labor supply tracks income therefor as real wage volatility rises, standard deviation of n rises as well.

2 Variable Capital Utilization

(a) **N Numerically solve for $V(k,w)$, $k'(k,w)$, $u(k,w)$, $n(k,w)$ and $inv'(k,w)$ for a tolerance of 10-9 on the norm of the difference between consecutive iterations on V.**

Found in final_code_capital.m

(b) **Graph the converged value function in (k,w) space for all w.**

Found in final_code_capital.m

(c) **Generate a series of 1000 simulated income innovations for the given normal distribution and simulate the model for 1000 periods. Discard the first 500 simulations. Create a *tileplot* of simulated w or k', n, inv' and u.**

Found in final_code_capital.m

(d) **Calculate the standard deviation of simulated n, u, and inv'. Explain what you would qualitatively expect would occur to the standard deviation of each in the following cases.**

Found in final_code_capital.m

(a) ϕ_2 **doubled.**

When this parameter is higher, this causes depreciation to rise more quickly. As such, firms experience faster depreciation when using capital. Firms experience more volatility in capital utilization so i expect u standard deviation to rise. Firms will then invest more to offset these depreciation, increasing investment standard deviation. volatile capital utilization may lead to more volatile income, increasing volatility of labor supply.

(b) **The real interest rate doubled.**

Higher interest rate increases return on investment but may also introduce more riskiness so I expect standard deviation of investment to rise. Higher investment may increase capital utilization, allowing for smoother utilization so i expect standard deviation of u to decrease. Higher capital utilization may increase output, making wage less volatile, decreasing standard deviation of labor supply.