Problem Set #3

Econ 899, Fall 2021

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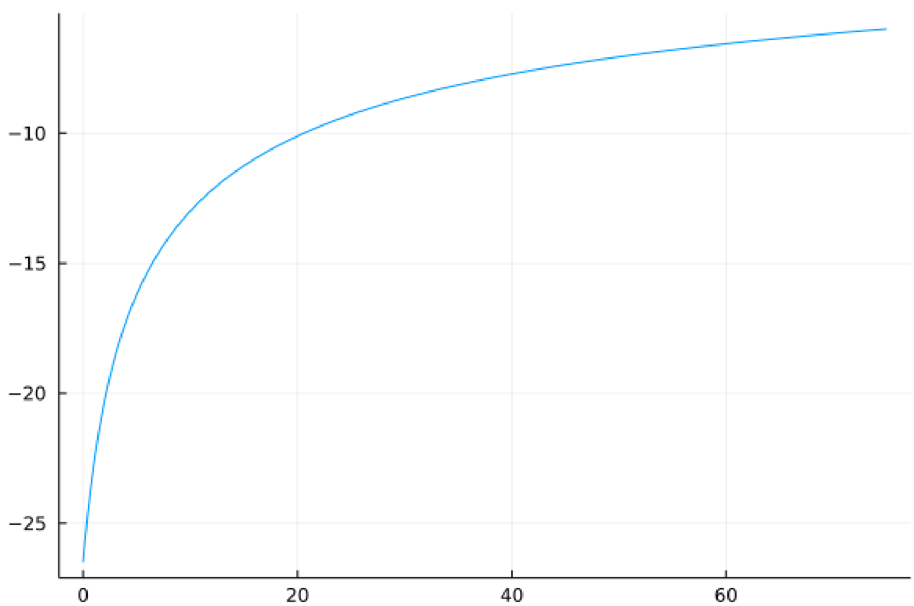
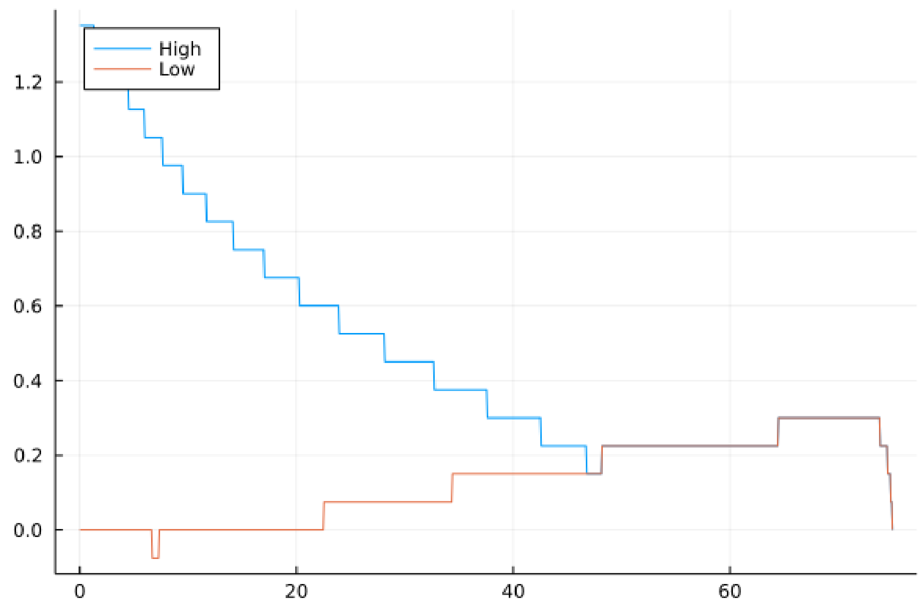
Exercise 1

- The value function over the possible asset choices of the age of 50 is drawn below. We can easily see the value function is increasing and concave.



- The savings function of the age of 20 is illustrated as follows. function over the possible asset choices for the age of 50 is drawn below. The value function is increasing and concave. The laws of motions for savings differ by z. For z_{High}, saving is decreasing in a until the retirement, but increasing after the retirement. For z_{Low}, saving is always increasing in a, regardless of whether the agent is working or not.



Exercise 2

- The steady-state distribution of agents over age, productivity, and asset holdings, $F_j(z,a)$, is computed in the julia code.

Exercise 3

- Results of policy experiments are presented below.

	Benchmark		No risk		Exogenous labor	
	with SS	without SS	with SS	without SS	with SS	without SS
capital (K)	3.348	4.604	1.078	1.312	7.348	10.421
labor (L)	0.341	0.364	0.164	0.167	0.753	0.753
wage (w)	1.456	1.595	1.263	1.344	1.455	1.648
interest (r)	0.024	0.011	0.048	0.036	0.024	0.007
pension benefit (b)	0.225	0.0	0.093	0.0	0.493	0.0
total welfare (W)	-35.8	-37.3	-44.9	-45.2	-23.1	-25.8
cv(wealth)	0.598	0.673	1.282	1.074	0.603	0.707

1. After eliminating social security, aggregate capital increases from 3.348 to 4.604, because households save more in their working ages for the life after retirement. Aggregate labor also increases (from 0.341 to 0.364), because labor tax (θ) is removed. The economy-wide welfare decreases from -35.8 to -37.3 and overall inequality measured by the coefficient of variation of wealth increases (from 0.598 to 0.673).

2. Without idiosyncratic risk (i.e., $z_{High} = z_{Low} = 0.5$), aggregate capital decreases from 3.348 to 1.078. This is because households have no motivation to insure against idiosyncratic income risks. After the removal of social security again, the economy-wide welfare slightly decreases from -44.9 to -45.2. Given that the absolute amount of decrease is far less than that of the benchmark, we can conclude that social security serve the role of an insurance device against idiosyncratic risk. However, it should be noted that the welfare comparisons across steady states could be misleading, because the impact of reform during the transition period is ignored.

2. Finally, we consider exogenous labor supply case. We can see aggregate labor is 0.753, indicating all agents in their working ages provide 1 unit of labor. Since labor supply is exogenously determined, social security system has no distortionary effect on labor supply. Still, aggregate welfare decreases when social security is eliminated, leading us to the same conclusion as before.