Development Economics HWK 2

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Question 1

1. Deterministic seasonal component of consumption

Table 1 summarizes the welfare loss from removing the seasonal consumption risk under three scenarios when the deterministic seasonal component is high, middle, or low. The losses of each case is identical for the 1000 households simulated as each household in every month face exactly the same monthly deterministic shock component $g(m)$. The loss is larger when $g(m)$ comes from high risk scenario and it increases with η, which means that households consume more when there is higher seasonal shock to guarantee the utility level without shock.

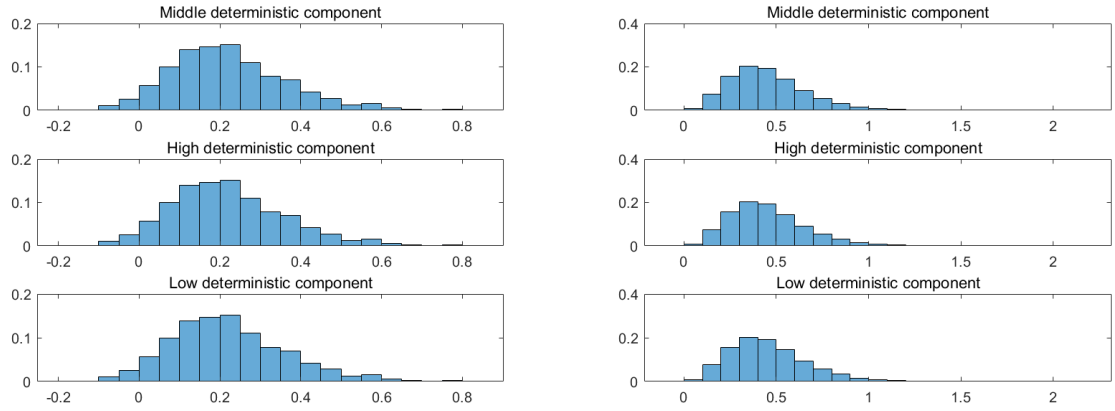
Figure 1 shows the distribution of welfare gain when $\eta = 2$ and there is no nonseasonal consumption risk $\epsilon_{i,t}$. Since the cost of nonseasonal risk is irrelevant with the seasonal risk level, the distribution in all three cases are identical. But there are variations across households because $\epsilon_{i,t}$ is relevant at household level. The mean gain increases with η.

2. Stochastic seasonal component of consumption

The gains from removing the stochastic seasonal component of consumption are shown in Figure 2. In both cases the welfare gain is the largest when the deterministic shock and the variance of stochastic seasonal shock is high. Thus household give up more consumption when the risks are high. The mean

Table 1: Welfare gain when removing seasonal consumption risk

Deterministic	Low	Middle	High
$\eta = 2$	-0.6347	-0.6392	-0.6540
$\eta = 4$	-0.6367	-0.6478	-0.6918



(a) $\eta = 2$ (b) $\eta = 4$

Figure 1: Welfare gain when removing nonseasonal consumption risk

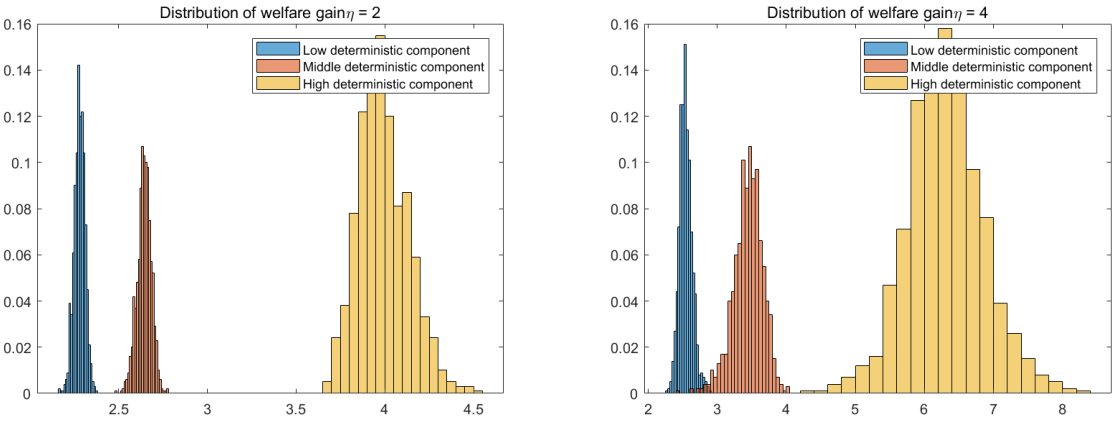
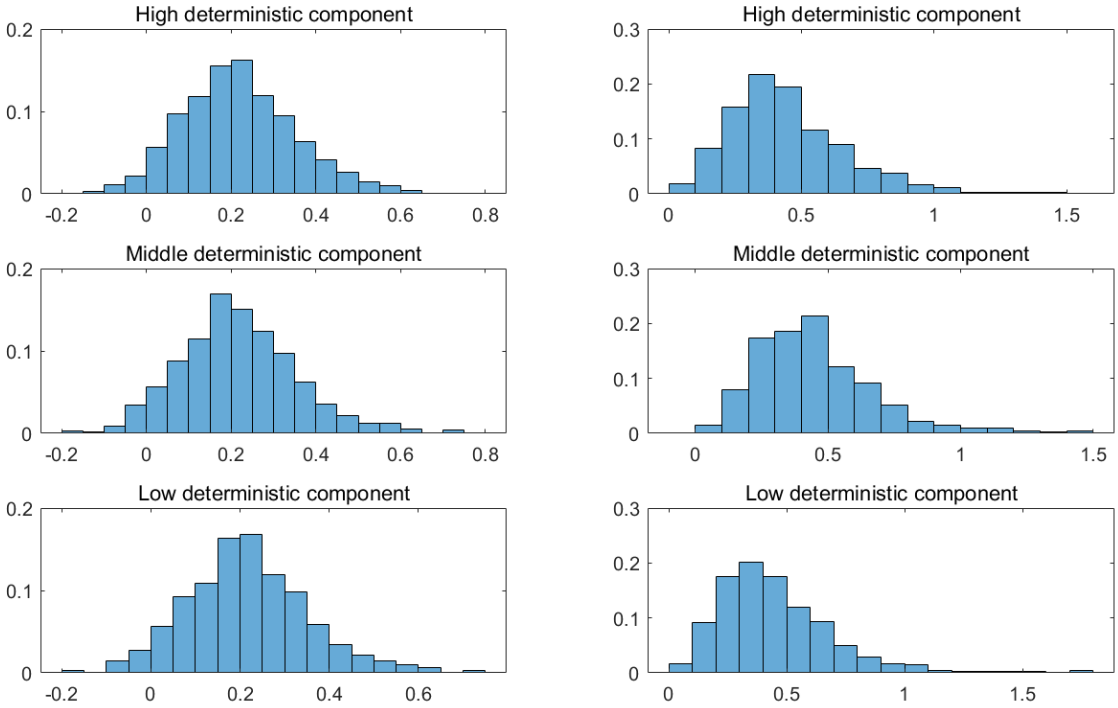


Figure 2: Welfare gain when removing seasonal consumption risk

gain increases with η as before but the distribution is more centered when η is small. As $1/\eta$ is the elasticity of substitution across each month and year, then a higher η implies less elastic consumption and households suffer more from seasonal shocks when η is large.

Figure 3 displays the welfare gain without nonseasonal risk. While the mean gain is approximately the same for three cases, there is minor difference in the distributions as the remaining seasonal risk is no longer constant for each season in each year.



(a) $\eta = 2$ (b) $\eta = 4$

Figure 3: Welfare gain when removing nonseasonal consumption risk

Question 2

Data generation

The deterministic seasonal and the stochastic seasonal components of labor supply that are highly positively correlated with those of consumption. Then I assume they are exactly equal. Then the correlation is set to 1. The deterministic seasonal and the stochastic seasonal component of labor supply that are highly NEGATIVELY correlated with those of consumption. Then I assume they are exactly OPPOSITE. The correlation is set to -1 in this case.

For the value of κ, I followed Bick.et al.(2018) and the first order condition of the utility maximization problem is $h = ((1-\theta)/((c/y - \bar{c}/y) * \kappa))^{\phi/(1+\phi)} = 28.5 * 30/7$ For poor countries $c/y - \bar{c}/y$ is between 0.1 and 0.5 (Fig. B1 in online appendix), I take 0.5 as an approximate value. Other parameters are $\phi = 1$ and $\theta = 0.3224$. Then it yields $\kappa = ((1-\theta)/0.3)/(28.5 * 30/7)^2$. Labor generated from GDP has been rescaled by 28.5 * 30/7.

Results

The welfare gain is again the same across households when the seasonal shocks of consumption are removed. For simplicity, I assume the correlation between seasonal components of labor and consumption to be either 1 or -1 for positive or negative correlation. Since we are looking at the welfare gains or losses separately for consumption and labor, the welfare changes are only related to the utility function of consumption. The seasonality in labor supply does not affect the consumption.

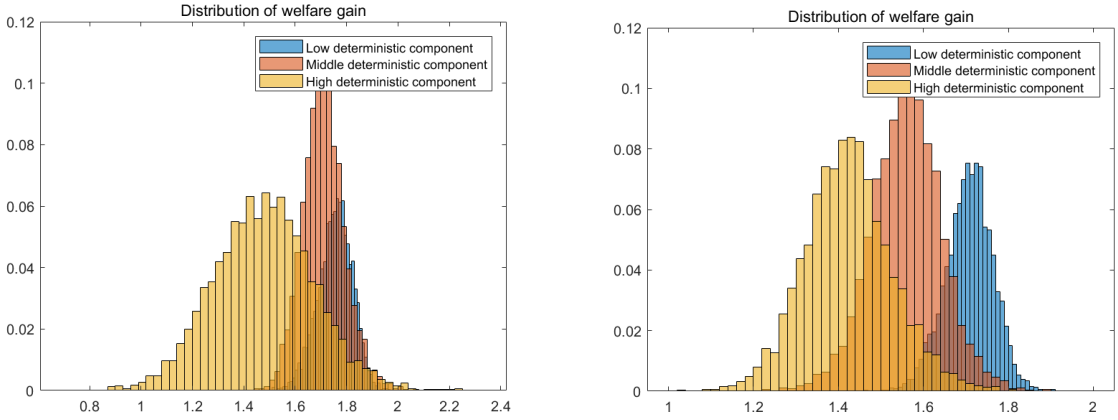
The welfare gain increases if higher risks are removed. The sign of the correlation between seasonal components of labor and consumption does not affect the welfare gain as both negative and positive correlation yield the same amount for each case. The absolute level of correlation matters however.

The welfare gain when seasonal labor supply risks are removed behaves differently from consumption and similar to previous Figure 2 because here the functional forms of the utilities are the same. Given that there is disutility from working, the values in this case can be interpreted as a welfare loss.

The correlation of nonseasonal components of labor and consumption seems to have no significant effect according to Figure 5. And the consumption also remains the same for all households. (I don't know what happened)

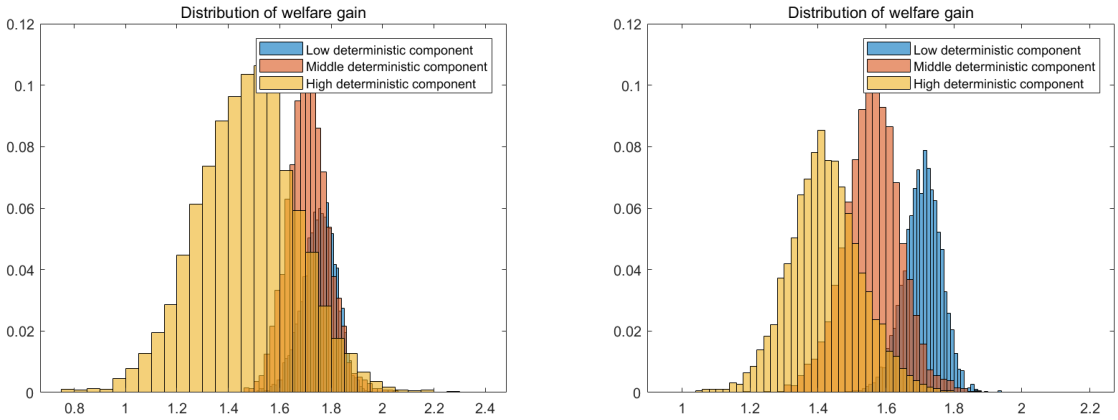
Table 2: Welfare gain when removing seasonal component of consumption

Seasonal component	Low	Middle	High
Positive Corr. btw. seasonal components of labor and consumption	2.1073	2.4094	3.1213
Negative Corr. btw. seasonal components of labor and consumption	2.1073	2.4094	3.1213



(a) Positive correlation (b) Negative correlation

Figure 4: Welfare gain when removing seasonal labor supply risk



(a) Positive correlation (b) Negative correlation

Figure 5: Welfare gain of removing seasonal labor supply risk when nonseasonal components of consumption and labor are correlated