Development Economics: Homework 2

Alba Miñano Mañero

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1 Praying for Rain: The Welfare Cost of Seasons.

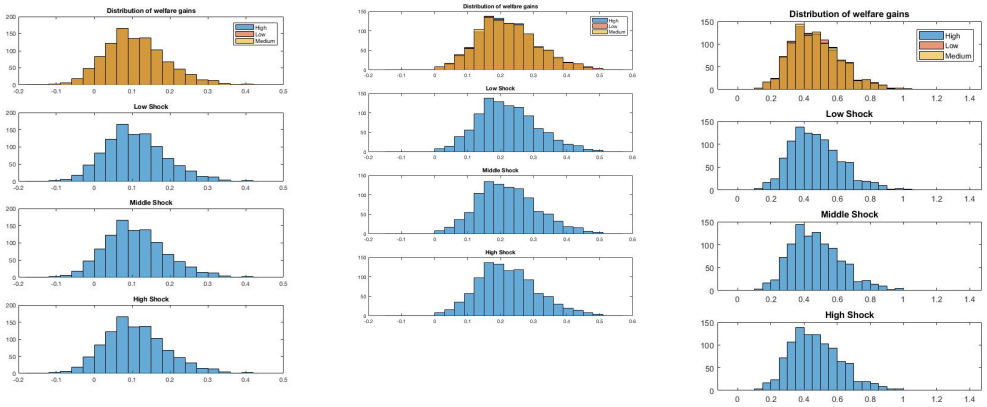
1.1 Deterministic Seasonal Component

Table 1: Medians of welfare gains

	Seasonal Shock	Nonseasonal Shock	Seasonal + Nonseasonal Shocks
Low Shock			
Log utility	0.0042	0.1026	0.1072
$\eta = 2$	0.0065	0.2137	0.2221
$\eta = 4$	0.0118	0.4569	0.4725
Middle Shock			
Log utility	0.0086	0.1026	0.1120
$\eta = 2$	0.0184	0.2139	0.2366
$\eta = 4$	0.0426	0.4564	0.5183
High Shock			
Log utility	0.0171	0.1026	0.1214
$\eta = 2$	0.0601	0.2151	0.2878
$\eta = 4$	0.1866	0.4573	0.7269

Table 1 reports the median of gains from eliminating the gains from eliminating the seasonal component, the non seasonal component and both shocks. The first thing to notice is that for all the utility specifications, welfare gains increase when the degree of seasonality is higher. This is in line with what would be expected for the given risk aversion: when the fluctuations in consumption are higher (i.e. high seasonal shock), there is more room to gain in welfare from moving to a de-seasonalized scenario. Notice also that as the degree of risk aversion increases, that is higher values of the eta parameter, gains are also higher. Moreover, the results of eliminating the non-seasonal shock only are always the same, as would be expected since it is unaffected by the degree of seasonality and, once again, gains are higher when η increases.

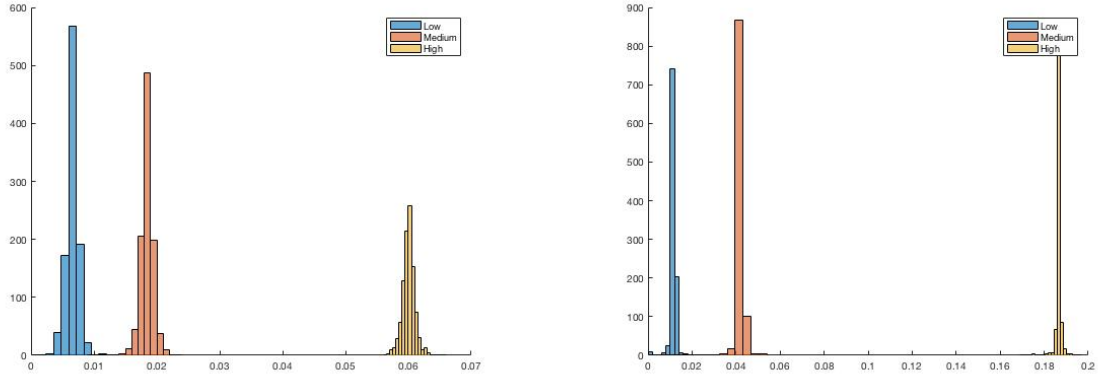
Figure 1: Welfare gains from non-seasonal component, log(left), $\eta = 2$ (middle) and $\eta = 4$ (right)



Figures 1 to 3 show the distribution of these welfare gains under different possible values of η. The first figure show the distribution of welfare gains when removing the non seasonal shocks. The histograms match our previous results and the gains are always the same no matter the degree of the seasonal component. This is particularly evident in the log case, whilst for higher values of η, there are just some small differences in how many individuals experience the same gain. Notice also that as η increases the distribution is centered in a higher mean, in result with our median results. Finally, we have some negative welfare gains under log utility, probably because the degree of risk aversion is lower and these people were experiencing extremely good shocks (remember also that the non seasonal shock changes only across years so there are less fluctuations coming from this shock).

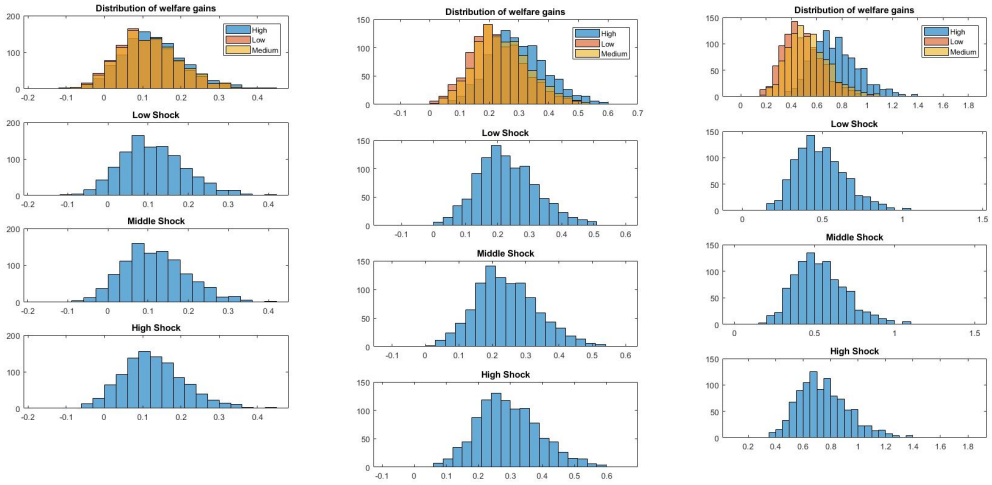
Figure 2 display the distribution of gains from eliminating the shock under $\eta = 2$ (left) and $\eta = 4$ (right). The one for log utility (not shown) shows that the gains are the same for everybody. Here, one can see that as above mentioned, welfare gains are centered on higher means as the degree of seasonality increases. Moreover, for $\eta = 4$, the distribution is more concentrated.

Figure 2: Welfare gains from de-seasonalizing, $\eta = 2$ (left) and $\eta = 4$ (right)



Finally, figure 3 shows the distribution of welfare gains from eliminating both components. What should be noticed from here is that overall gains are higher (i.e. the distribution is shifted to the right) when seasonality is high and, as before, overall gains are higher when we increase η (i.e. more risk aversion).

Figure 3: Welfare gains from seasonal and non seasonal component, log(left), $\eta = 2$ (middle) and $\eta = 4$ (right)



2 Adding a stochastic non seasonal component

Table 2: Medians of welfare gains

	Low		Middle		High	
Low deterministic Shock						
	Seasonal Shock	Nonseasonal Shock	Seasonal Shock	Nonseasonal Shock	Seasonal Shock	Nonseasonal Shock
Log utility	0.0551	0.1026	0.1103	0.1026	0.2252	0.1026
$\eta = 2$	0.1095	0.2141	0.2273	0.2128	0.5000	0.2133
$\eta = 4$	0.2259	0.4529	0.4959	0.4538	1.2541	0.4164
Middle deterministic Shock						
	Low		Middle		High	
	Seasonal Shock	Nonseasonal Shock	Seasonal Shock	Nonseasonal Shock	Seasonal Shock	Nonseasonal Shock
Log utility	0.0597	0.1026	0.1151	0.1026	0.2305	0.1026
$\eta = 2$	0.1200	0.2135	0.2353	0.2128	0.5043	0.2143
$\eta = 4$	0.2717	0.4518	0.5458	0.4516	1.2964	0.4128
High deterministic Shock						
	Low		Middle		High	
	Seasonal Shock	Nonseasonal Shock	Seasonal Shock	Nonseasonal Shock	Seasonal Shock	Nonseasonal Shock
Log utility	0.0687	0.1026	0.1245	0.1026	0.2409	0.1026
$\eta = 2$	0.1598	0.2140	0.2727	0.2133	0.5338	0.2143
$\eta = 4$	0.3566	0.4516	0.5775	0.4493	1.1958	0.4268

Table 2 shows the median of welfare gains from removing the seasonals (deterministic + stochastic) and the non-seasonal shocks from consumption for all possible utility specifications. Broadly, one can draw the same conclusions as before: gains increase with the degree of seasonality whether in the deterministic or stochastic and with the degree of risk aversion. Moreover, notice also that the gains from removing non seasonality are essentially always the same, regardless the level of

seasonality, as would be expected since this is by definition a non - seasonal shock and these gains are increasing in the degree of risk aversion. Notice also that the highest gains are found for $\eta = 4$ (i.e. for more risk aversion) and for the high stochastic seasonality.

The next two figures show the distribution of welfare gains for $\eta = 2$ and $\eta = 4$ and all combinations of welfare gains. On the left, the distribution of gains for eliminating the seasonal shocks (deterministic + stochastic) and on the right the ones from removing the non seasonal shock. First of all, for all levels of η and all levels of the seasonal shock, the gains increase in the degree of seasonality of the stochastic shock. Similarly, for all degrees of stochastic seasonality gains increase with the degree of seasonality on the deterministic seasonal shock. Furthermore, gains are always higher the higher the degree of risk aversion. Finally, the figures on the right depict the gains from removing the deterministic shock. As could be seen from the medians, the gains are the same under all degrees of seasonality and are much higher with $\eta = 4$

Figure 4: Welfare gains with $\eta = 2$.

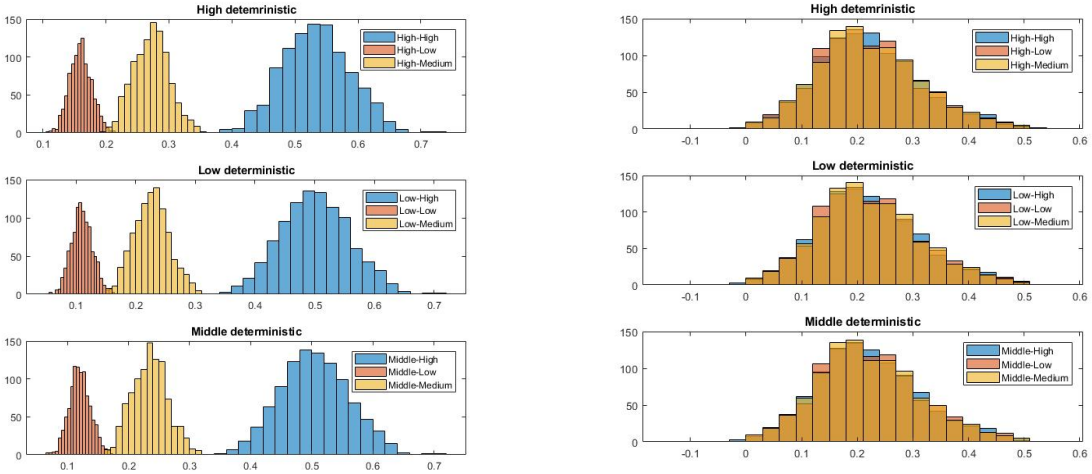
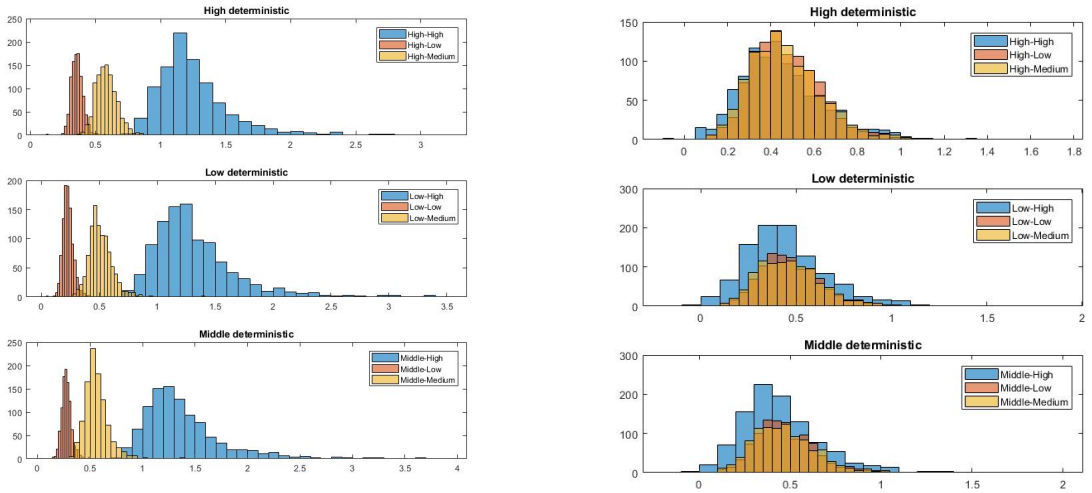


Figure 5: Welfare gains with $\eta = 4$.



3 Adding labour supply

Table 3: Medians of welfare gains, no correlation between non seasonal shocks and positive correlation between labour supply and consumption

Low deterministic Shock			
	Low	Middle	High
Labour Contribution	0.0753	0.1589	0.3742
Consumption Contribution	0.0565	0.1099	0.2269
Total	0.1377	0.2843	0.6983
Middle deterministic Shock			
	Low	Middle	High
Labour Contribution	0.1070	0.1901	0.4066
Consumption Contribution	0.0611	0.1148	0.2323
Total	0.1746	0.3243	0.7421
High deterministic Shock			
	Low	Middle	High
Labour Contribution	0.2566	0.3544	0.5886
Consumption Contribution	0.0701	0.1242	0.2427
Total	0.3460	0.5201	0.9822

Table 3 shows the median of welfare gains from removing seasonality for the case in which the process of labour supply and consumption are perfectly correlated, but there is no correlation between the non seasonal component. Labour supply has been re-scaled by average hours by Bick et al. so that on expectation working hours match the data. As we already saw, total gains increase on the degree of seasonality of the stochastic and deterministic seasonal components. Notice also that the gains coming from labour are always higher than those from consumption. Since I am not removing the non-seasonal shock, this might be do to the re-scalation of working hours, since on expectation consumption is equal to 1 but labour supply on expectation matches 28*30/7.

Table 4 reports the same result but when there is negative correlation between the labour and consumption process. The same conclusions as before apply. Notice also that, since nothing has changed in the consumption process, the gains from consumption are the same and total gains are very close. A for labor, gains are lower than before for high seasonality in consumption due to the negative correlation. Given this, total gains are slightly lower (i.e. you make the same gains of consumption but lower for labour because labour and consumption shocks are negative correlated). The opposite holds true for low degrees of seasonality in consumption. For middle, it is unclear and they are very similar in both cases.

Table 4: Medians of welfare gains, no correlation between non seasonal shocks and negative correlation between labour supply and consumption

Low deterministic Shock			
	Low	Middle	High
Labour Contribution	0.0801	0.1585	0.3565
Consumption Contribution	0.0565	0.1099	0.2269
Total	0.1421	0.2854	0.6865
Middle deterministic Shock			
	Low	Middle	High
Labour Contribution	0.1107	0.1882	0.3880
Consumption Contribution	0.0611	0.1148	0.2323
Total	0.1790	0.3246	0.7275
High deterministic Shock			
	Low	Middle	High
Labour Contribution	0.2617	0.3526	0.5753
Consumption Contribution	0.0701	0.1242	0.2427
Total	0.3532	0.5202	0.9658

Table 5 reports the median of welfare gains when there is perfect positive correlation between seasonal shocks and also between consumption and labour supply. Compared to Table 3 (no correlation), gains seem to be slightly lower and in some cases slightly greater. Notice that consumption gains do not change much with respect to the situation with no correlation, as expected. Thus, the lower total gains are due to lower gains from de-seasonalizing labor. Nonetheless, these gains are very close to the ones with no correlation which is what should be expected since I do not compute gains from eliminating the nonseasonal component, so gains shown here are only affected by the structure of correlation between labour supply and consumption and this has not changed. As a result, it may be that my numbers are by chance too different but in fact, the difference should be very small.

Table 6 reports the same results when there is perfect negative correlation between the non seasonal shocks. Even if there are differences, the same reasoning as before applies and since these gains do not consider the non seasonal components, one should expect them to be close to Table 4. Indeed, they seem to be in line with the results from Table 4 but differences are slightly greater as compared to the ones between Table 3- Table 6. Table 7-8 show the same analysis when the non seasonal shocks are negatively correlated. In spite of the small differences, gains are essentially the same as compared to when there is no correlation, as expected according to the above reasoning.

Table 5: Medians of welfare gains, positive correlation between non seasonal shocks and positive correlation between labour supply and consumption

Low deterministic Shock			
	Low	Middle	High
Labour Contribution	0.0670	0.1487	0.3763
Consumption Contribution	0.0562	0.1095	0.2269
Total	0.1278	0.2793	0.6970
Middle deterministic Shock			
	Low	Middle	High
Labour Contribution	0.0806	0.1713	0.4131
Consumption Contribution	0.0609	0.1144	0.2323
Total	0.1488	0.3047	0.7425
High deterministic Shock			
	Low	Middle	High
Labour Contribution	0.1429	0.2486	0.5359
Consumption Contribution	0.0698	0.1238	0.2426
Total	0.2243	0.4071	0.9065

Table 6: Medians of welfare gains, positive correlation between non seasonal shocks and negative correlation between labour supply and consumption

Low deterministic Shock			
	Low	Middle	High
Labour Contribution	0.0657	0.1538	0.4060
Consumption Contribution	0.0562	0.1095	0.2269
Total	0.1285	0.2825	0.7232
Middle deterministic Shock			
	Low	Middle	High
Labour Contribution	0.0800	0.1743	0.4457
Consumption Contribution	0.0609	0.1144	0.2323
Total	0.1488	0.3117	0.7802
High deterministic Shock			
	Low	Middle	High
Labour Contribution	0.1445	0.2504	0.6006
Consumption Contribution	0.0698	0.1238	0.2427
Total	0.2263	0.4075	0.9764

Table 7: Medians of welfare gains, negative correlation between non seasonal shocks and positive correlation between labour supply and consumption

Low deterministic Shock			
	Low	Middle	High
Labour Contribution	0.0670	0.1487	0.3763
Consumption Contribution	0.0562	0.1095	0.2269
Total	0.1278	0.2793	0.6970
Middle deterministic Shock			
	Low	Middle	High
Labour Contribution	0.0806	0.1713	0.4131
Consumption Contribution	0.0609	0.1144	0.2323
Total	0.1488	0.3047	0.7425
High deterministic Shock			
	Low	Middle	High
Labour Contribution	0.1429	0.2486	0.4131
Consumption Contribution	0.0698	0.1238	0.2426
Total	0.2243	0.4071	0.9065

Table 8: Medians of welfare gains, negative correlation between non seasonal shocks and negative correlation between labour supply and consumption

Low deterministic Shock			
	Low	Middle	High
Labour Contribution	0.0657	0.1538	0.4060
Consumption Contribution	0.0562	0.1095	0.2269
Total	0.1285	0.2825	0.7232
Middle deterministic Shock			
	Low	Middle	High
Labour Contribution	0.0800	0.1743	0.4457
Consumption Contribution	0.0609	0.1144	0.2323
Total	0.1481	0.3117	0.7802
High deterministic Shock			
	Low	Middle	High
Labour Contribution	0.1445	0.2504	0.6006
Consumption Contribution	0.0698	0.1238	0.2427
Total	0.2263	0.4075	0.9764