Econ 581 Homework 4

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Exercise 1

Order 1 Approximation Moments

variable	mean	std. dev.	coeff. var.	rel. var.	corr-Y	auto-corr
C	2.600691	0.036174	0.01390938	0.501036945	0.7082	0.9783
w	2.337756	0.064899	0.027761238	1.000001832	1	0.8648
r	0.024875	0.00079	0.031758794	1.143999864	0.3811	0.8833
K	46.255027	1.526238	0.032996154	1.188571451	0.5038	0.9932
Y	3.489188	0.096864	0.027761187	1	1	0.8648
z	-0.023427	0.036107	-1.541255816	-55.51836903	0.9173	0.8267
I	0.888497	0.075685	0.08518318	3.068427175	0.9413	0.83

Order 3 Approximation Moments

variable	mean	std. dev.	coeff. var.	rel. var.	corr-Y	auto-corr
C	2.602613	0.036019	0.01384	0.509088	0.7081	0.9784
w	2.340479	0.063626	0.027185	1.000002	1	0.8640
r	0.024859	0.000789	0.031739	1.16752	0.3792	0.8850
K	46.366752	1.510441	0.032576	1.198307	0.5051	0.9933
Y	3.493252	0.094964	0.027185	1	1	0.864
z	-0.023427	0.036107	-1.54126	-56.6951	0.9163	0.8267
I	0.890639	0.07397	0.083053	3.055096	0.939	0.8282

Moments are very similar. Our cubic approximation generates means much closer to the theoretical values.

Exercise 2

Let $\alpha = .25$.
Quadratic Approximation Moments

variable	mean	std. dev.	coeff. var.	rel. var.	corr-Y	auto-corr
C	1.70348	0.025674	0.015071501	0.505844348	0.7235	0.9723
w	1.578374	0.047027	0.029794586	0.999994842	1	0.8583
r	0.025054	0.000966	0.038556717	1.294078009	0.3274	0.8993
K	21.00254	0.835738	0.039792235	1.335545636	0.4804	0.9933
Y	2.104499	0.062703	0.02979474	1	1	0.8583
z	-0.023427	0.036107	-1.541255816	-51.72912498	0.9414	0.8267
I	0.401018	0.047554	0.118583206	3.980004751	0.9279	0.8233

Let $\alpha = .40$.
Quadratic Approximation Moments

variable	mean	std. dev.	coeff. var.	rel. var.	corr-Y	auto-corr
C	4.296985	0.054169	0.012606281	0.509511047	0.7036	0.9815
w	3.746726	0.092701	0.024741868	0.999997949	1	0.8682
r	0.024769	0.00066	0.026646211	1.076966233	0.4284	0.8724
K	100.817705	2.738802	0.027165883	1.097969949	0.5255	0.9932
Y	6.244544	0.154502	0.024741919	1	1	0.8682
z	-0.023427	0.036107	-1.541255816	-62.29330208	0.8957	0.8267
I	1.947558	0.122591	0.062946007	2.544103713	0.9494	0.8329

With an increase in α, we have an increase in capital share and therefore investment. This causes an increase in GDP and consumption, but lowers the interest rate. Human capital has a higher value in the long run. The remaining moments are similar.

Exercise 3

Let $\rho = 0$.
Quadratic Approximation Moments

variable	mean	std. dev.	coeff. var.	rel. var.	corr-Y	auto-corr
C	2.620438	0.003826	0.001460061	0.109332155	0.2649	0.9539
w	2.382715	0.031819	0.013354094	0.999979874	1	0.0441
r	0.025042	0.000347	0.013856721	1.037617518	0.9639	0.0458
K	46.864336	0.172239	0.003675268	0.275211045	0.2649	0.9539
Y	3.556291	0.047492	0.013354363	1	1	0.0441
z	-0.001454	0.02	-13.75515818	-1030.012323	0.9957	0.03
I	0.935852	0.046625	0.049820912	3.730684335	0.9969	0.0309

Let $\rho = 0.50$.
Quadratic Approximation Moments

variable	mean	std. dev.	coeff. var.	rel. var.	corr-Y	auto-corr
C	2.617991	0.007547	0.002882745	0.188700092	0.3656	0.9659
w	2.377673	0.036324	0.015277122	1.000017161	1	0.4927
r	0.025044	0.000403	0.016091679	1.053336814	0.8957	0.4989
K	46.759624	0.333672	0.0071359	0.467105162	0.2707	0.9799
Y	3.548766	0.054214	0.01527686	1	1	0.4927
z	-0.003578	0.022655	-6.331749581	-414.4666992	0.9877	0.4724
I	0.930774	0.051932	0.055794425	3.652218208	0.9908	0.4733

Let $\rho = 0.99$.

Quadratic Approximation Moments

variable	mean	std. dev.	coeff. var.	rel. var.	corr-Y	auto-corr
C	2.723871	0.177976	0.065339364	0.785125951	0.9956	0.9837
w	2.456977	0.204473	0.083221373	0.999998399	1	0.9784
r	0.022725	0.000761	0.033487349	0.402388158	0.3797	0.9101
K	53.271234	4.158738	0.078067236	0.938065643	0.925	0.9916
Y	3.667129	0.305184	0.083221507	1	1	0.9784
z	-0.023042	0.08994	-3.903307005	-46.9026237	0.9866	0.9665
I	0.943259	0.129087	0.136852127	1.644432217	0.9916	0.9694

As ρ increases, we have an increase in standard deviation and autocorrelation nearing 1. This happens because the residual effects of external shocks persist for longer. Interest rate not as correlated to GDP and capital stocks have a higher covariance with GDP.