Corporate Finance Problem Set 1

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Question 1

Variable	Value
z	1
q	1
K	77.24
I	11.58
M	0.96
C	9.38

Table 1: Steady state values

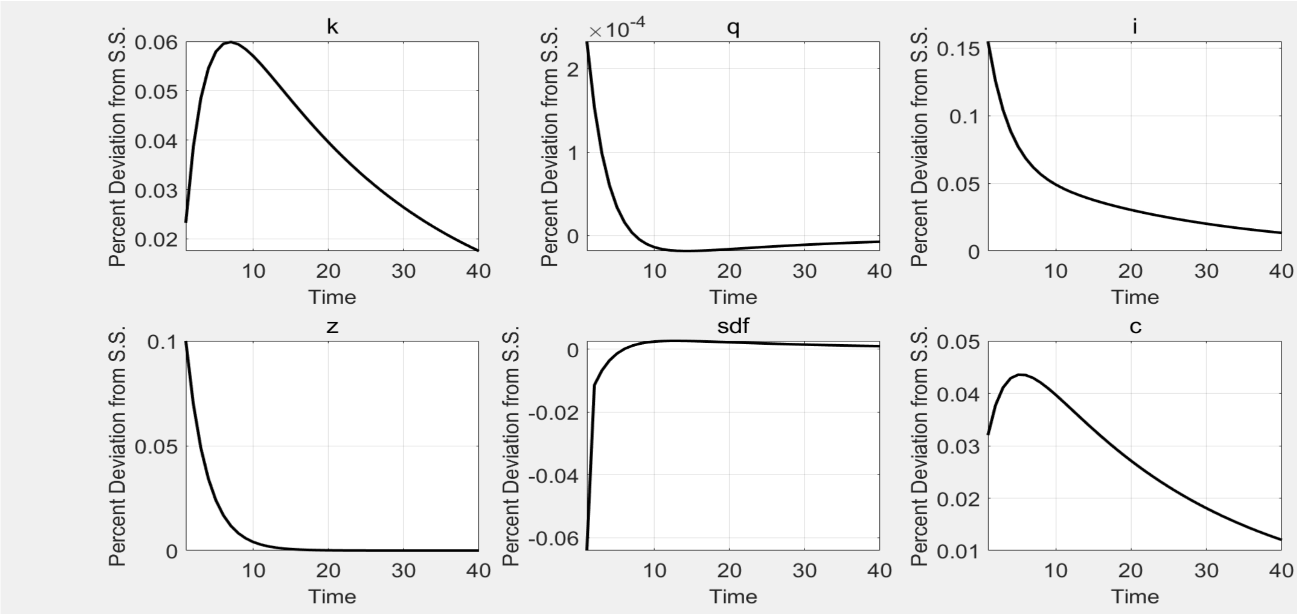
Question 2

Using parameters from Table 1:

	k	**q**	**i**	**z**	**sdf**	**c**
Constant	77.24	1.00	11.59	1.00	0.96	9.38
k(-1)	0.96	-0.00	0.11	0.00	-0.02	0.08
c(-1)	0.00	0.00	0.00	0.00	0.21	0.00
z(-1)	12.57	0.00	12.57	0.70	-0.43	2.10
ϵ_z	17.96	0.00	17.96	1.00	-0.62	3.00

Table 2: Coefficients of the decision rules for the linearized system.

One note on the impulse responses(below): the agent increases their investment for a considerable number of periods owing to two factors: (1) the persistence of productivity and (2) the desire to smooth utility across periods. as the agent is risk-averse, higher levels of consumption today make consumption tomorrow more attractive.



Impulse Responses to a one S.D. Productivity Shock

Setting $\gamma = 0$:

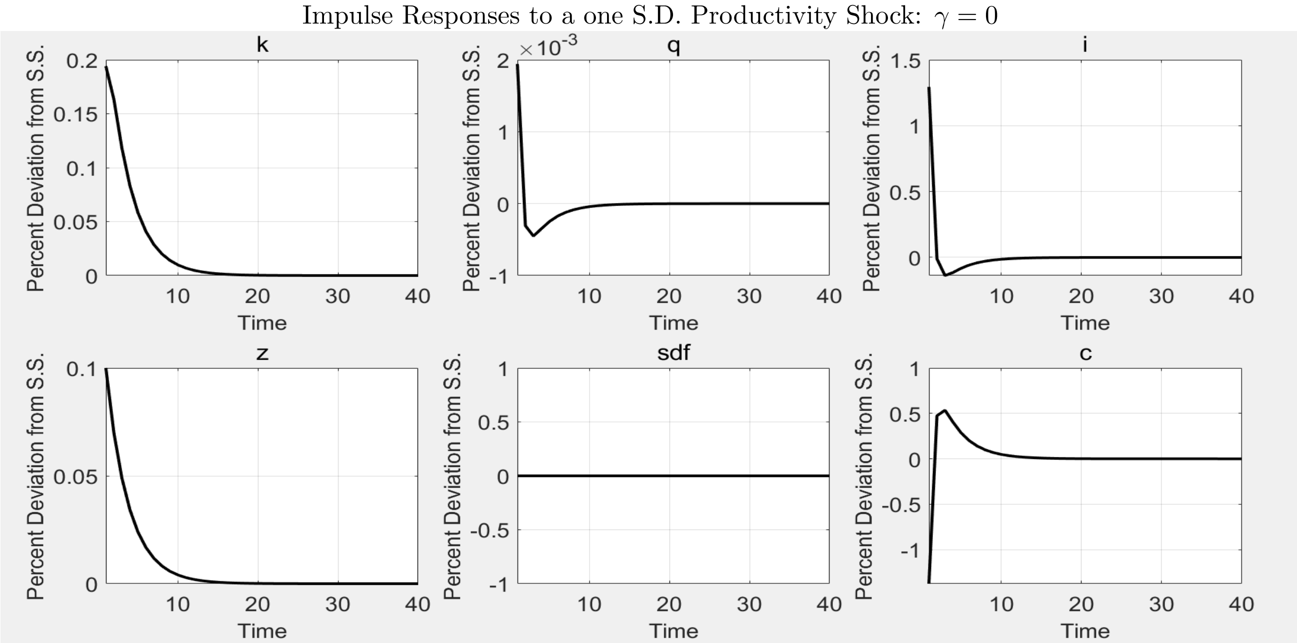
Clearly when $\gamma = 0$ the agent is risk-neutral and the SDF will not vary over time. We can see that consumption yesterday has no influence on the state of consumption today.

	k	**q**	**i**	**z**	**sdf**	**c**
Constant	77.24	1.00	11.59	1.00	0.96	9.38
k(-1)	0.14	-0.00	-0.71	0.00	0.00	0.90
c(-1)	0.00	0.00	0.00	0.00	0.00	0.00
z(-1)	104.96	0.01	104.96	0.70	0.00	-90.28
ϵ_z	149.94	0.02	149.94	1.00	0.00	-128.98

Table 3: Decision Rules when $\gamma = 0$

We see below that the IRF for capital is no longer hump-shaped. The agent no longer has a consumption smoothing motive so they invest more (10x the risk-averse agent) at time 0 when capital adjustment costs are 0, and then smoothly eat down their capital to the steady state level.

Impulse Responses to a one S.D. Productivity Shock: $\gamma = 0$



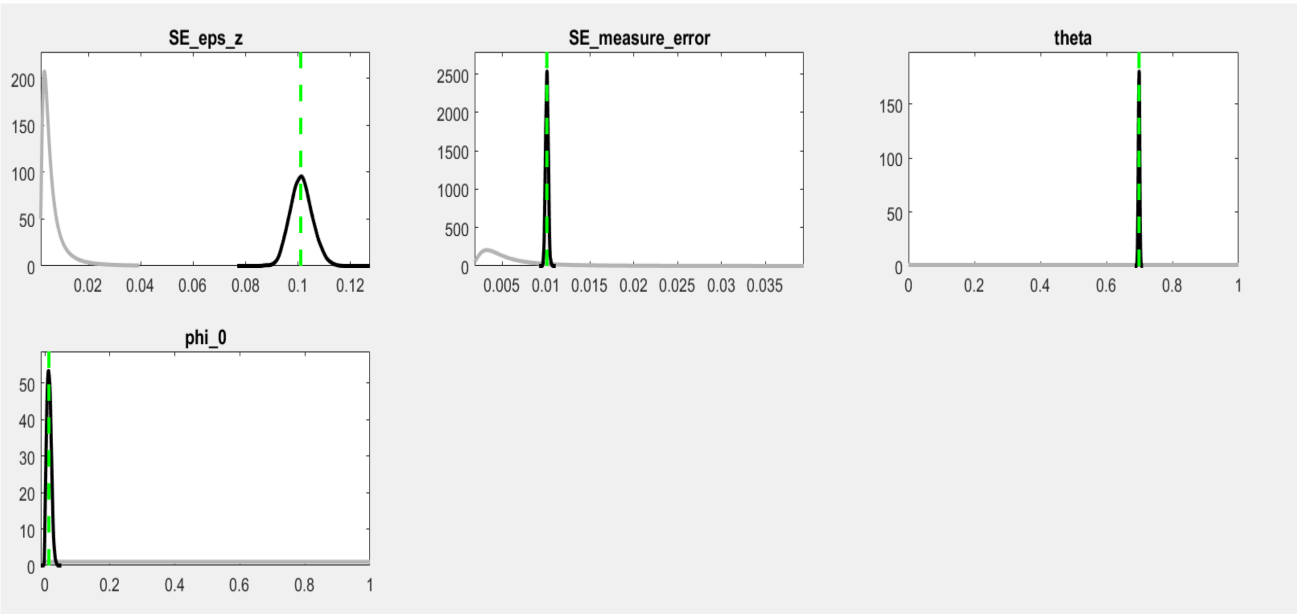
Question 3

The estimated coefficients of the linear model are: $\alpha = -22.47$, $\beta_1 = 22.52$ &$\beta_2 = 0.36$. Notably the constant term and marginal q are both not very predictive and usually very close to each other. Dropping one greatly attenuates the other(to ~ 0.008). The sign of β_2 is positive, which is somewhat perplexing as q is known to be a sufficient statistic in Hayashi's original model.

I think this is likely because the SDF is endogenous, and strongly negatively correlated with shocks to the productive capacity of the economy, while q hardly moves. Why does this matter? q captures the value of cash flows over long periods. But due to the risk aversion of the owners of firms, they may prefer a stronger response in the short run of investment to consumption smooth.

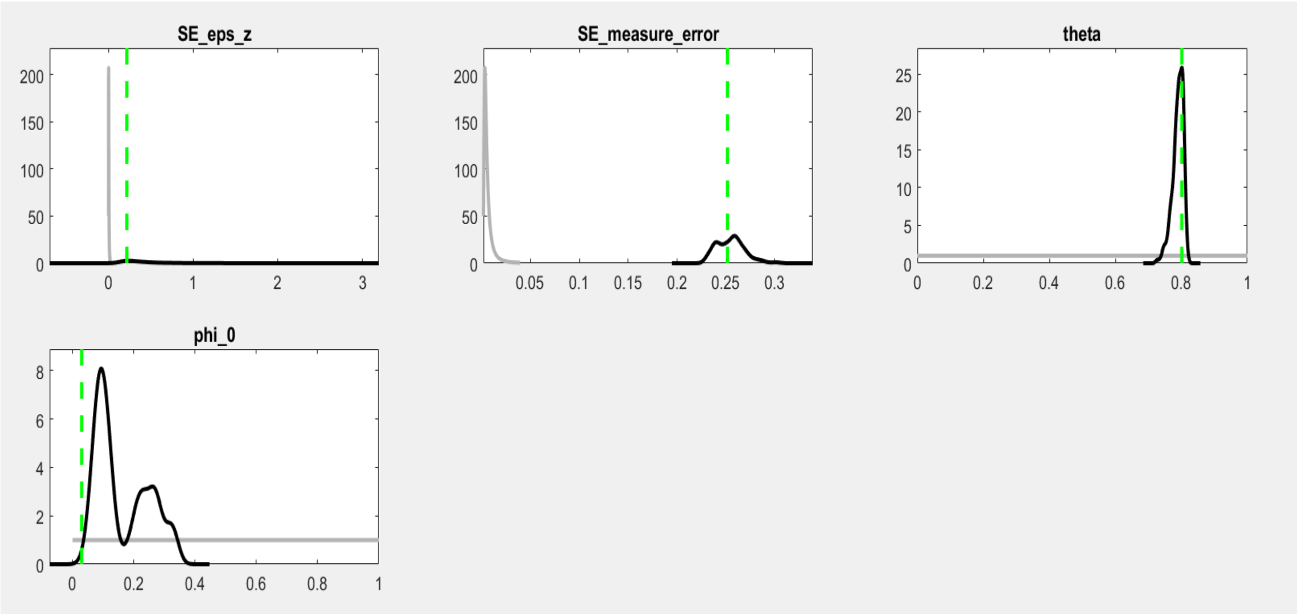
Question 4

Updating the new model's priors on the unknown parameters, we see considerable learning (at T = 2000) about the underlying model. All posteriors are centered on the true values of the underyling data ($\sigma_z = 0.1$,$sigma_q = 0.01$,$\theta = 0.7$,$\psi_0 = 0.01$, even given the priors which weren't close for some parameters (e.g. σ_z).



Priors (grey) and Posteriors (black)

Question 5



Priors (grey) and Posteriors (black)

The posterior for the standard deviation of the shocks to productivity is practically diffuse. Measurement error in q is also estimated to be considerably higher then from a data generated by a process with low measurement error.

θ, which governs the returns to scale of capital, is also considerably higher.

Finally, adjustment costs are estimated to be larger than in our model. Perhaps this is because q is considerably more volatile in the model than in our simulated data (where it is practically flat). It is also persistently away from 1 for long periods of time, implying rather substantial adjustment costs.