ECON899. Problem set 6

Hanna Han and Anna Lukianova

October 19, 2022

Question 1

We solve the standard model and the model with TV1 shocks. First, we solve for the optimal labor demand n^*. The firm's profit maximization problem can be stated as follows:

$$\pi(s;p) = \max_{n \geq 0} psn^{\theta} - n - pc_f$$

Then, we take the first order condition with respect to n:

$$\frac{\partial \pi(s;p)}{\partial n} : \theta psn^{\theta-1} = 1$$
$$\Rightarrow n^* = \left(\frac{1}{\theta ps}\right)^{\frac{1}{\theta-1}}$$

Next, we solve for the labor supply N^s. The household's problem can be stated as follows:

$$\max_{C,N^s} \log C - AN^s \;\; \text{s.t.} \;\; pC \leq N^s + \Pi$$
$$\Rightarrow \max_{N^s} \log\left(\frac{N^s + \Pi}{p}\right) - AN^s$$

Then, we take the first order condition with respect to N^s:

$$\frac{\partial}{\partial N^s} : \frac{p}{N^s + \Pi} = A$$
$$\Rightarrow N^s = \frac{p}{A} - \Pi$$

Table 1: *Final model moments*

Moments	Standard	TV1 shock ($\alpha = 1$)	TV1 shock ($\alpha = 2$)
Price level	0.739	0.691	0.720
Mass of incumbents	6.647	6.728	6.035
Mass of entrants	2.656	4.243	3.527
Mass of exits	1.660	2.811	2.308
Aggregate labor	179.852	188.937	182.666
Labor of incumbents	142.398	139.314	136.481
Labor of entrants	37.454	49.623	46.185
Fraction of labor in entrants	0.208	0.263	0.253

Question 2

Table 1 contains model moments for the standard model, the model with TV1 shocks where $\alpha = 1$, and the model with TV1 shocks where $\alpha = 2$. The model moments differ across versions of the model although the moments from the model with TV1 shocks where $\alpha = 2$ more closely resemble those from the standard model. This is because a higher α indicates smaller variance of TV1 shocks and in the standard model, there are no random shocks which means the variance is 0. The price level in the TV1 shocks models are lower than that of the standard model. This is because the entry cost is the same across all models, but the average value of entering the market is lower in the TV1 shocks model than in the standard model. The rest of the moment differences are a result of the differences in price level.

Question 3

Figure 1 contains the exit decision rules in all model specifications. The probability of market exit differs across model versions. For the standard model, type 1 firms exit the market while all other firm types do not. For the TV1 shocks models, type 1 and 2 firms have a non-zero probability of exiting the market, but type 1 firms have a higher probability of exiting. This is because the random shocks change the continuation value, which means firm exit is not solely determined by firm type.

Question 4

Figure 2 contains the exit decision rules in all model specifications for the counterfactual case $c_f = 15$. For the standard model, we see that type 1 and 2 firms will exit the market. For the model with TV1 shocks, we see that the probability that type 1 and 2 firms exit the market increase.

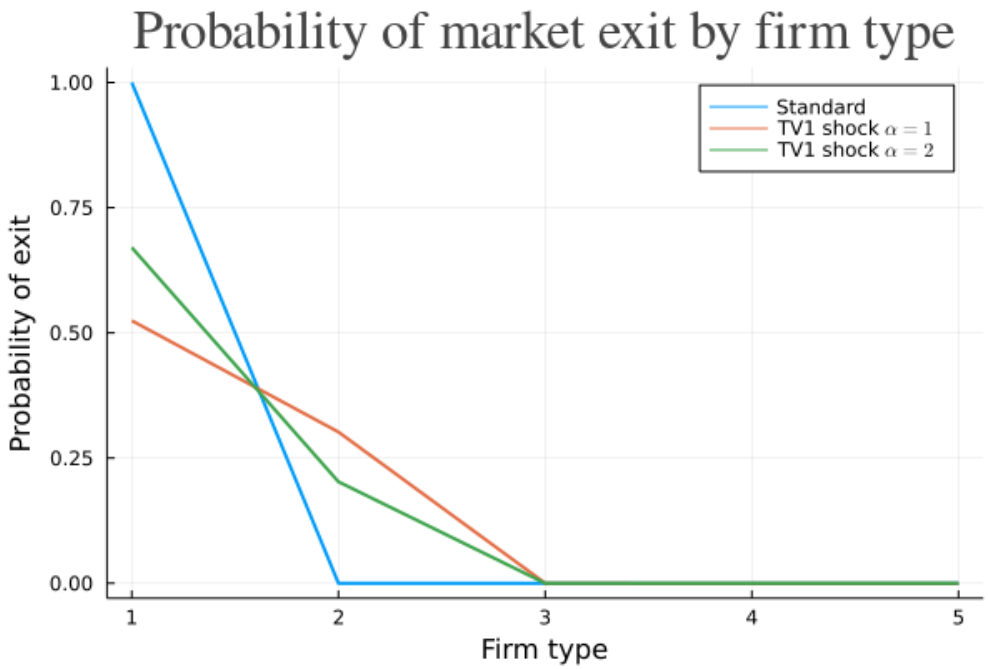

Figure 1: *Exit decision of firms by type when fixed costs to stay in the market are low ($c_f = 10$).*

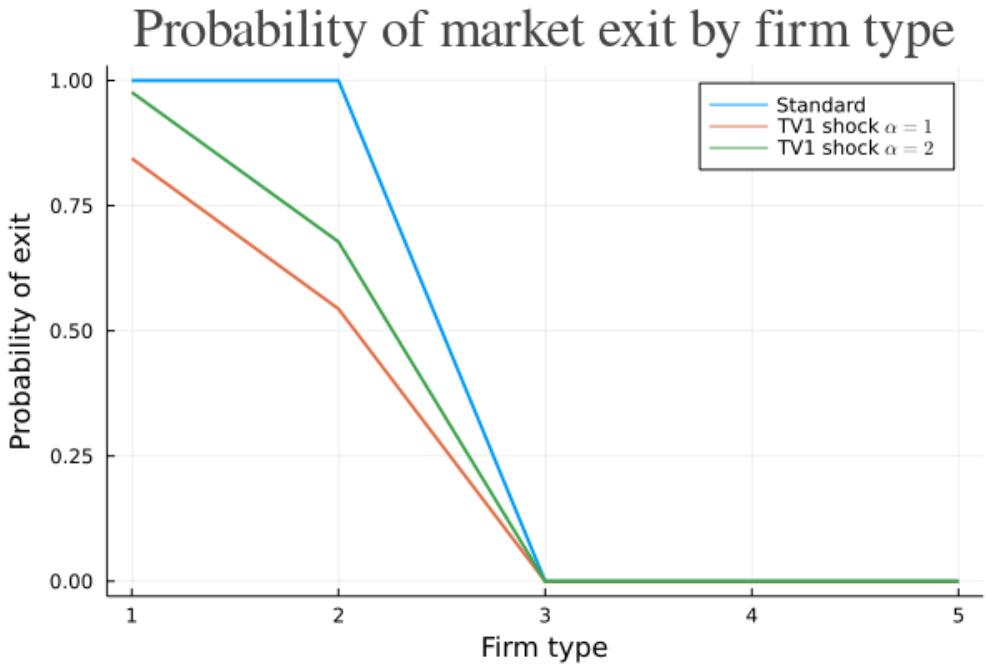

Figure 2: *Exit decision of firms by type when fixed costs to stay in the market are high ($c_f = 15$).*