ECON 899A - Problem Set 6

Alex von Hafften*

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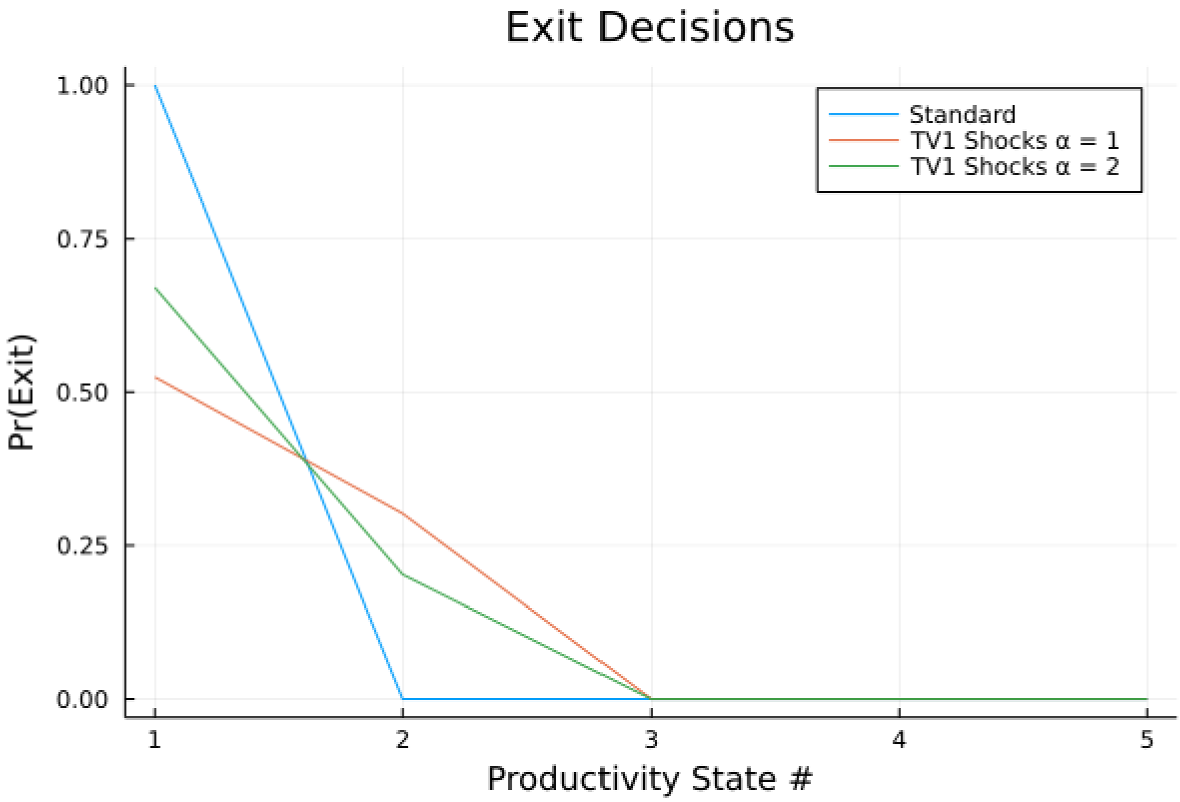
I compute standard Hopenhayn and Rogerson (1993) model as well as this model with TV1 shocks following the description laid out in the problem set.

For $c_f = 10$, the table shows my results:

	Standard	TV1 alpha = 1	TV1 alpha = 2
price_level	0.74	0.69	0.72
mass_incumbants	6.66	6.74	6.04
mass_entrants	2.64	4.22	3.51
mass_exits	1.66	2.81	2.31
aggregate_labor	179.83	188.89	182.62
labor_incumbants	142.63	139.51	136.65
labor_entrants	37.21	49.38	45.97
frac_labor_entrants	0.21	0.26	0.25

Explanation ...

*This problem set is for ECON 899A Computational Economics taught by Dean Corbae with assistance from Philip Coyle at UW-Madison. I worked on this problem set with a study group of Michael Nattinger, Sarah Bass, and Xinxin Hu.

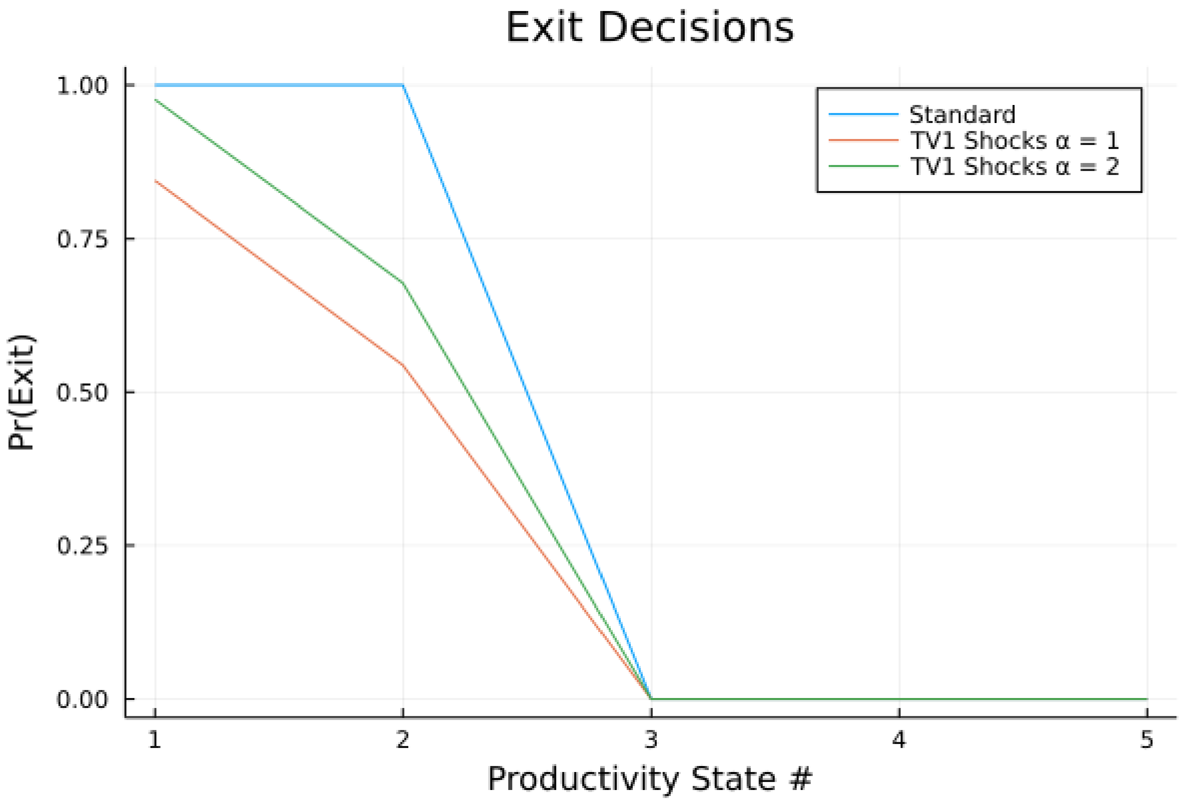


Explanation ...

Increasing $c_f = 15$, ...

	Standard	TV1 alpha = 1	TV1 alpha = 2
alpha	-1.00	1.00	2.00
price_level	0.89	0.86	0.88
mass_incumbants	0.94	1.91	1.34
mass_entrants	3.77	3.29	3.45
mass_exits	0.63	1.44	1.12
aggregate_labor	173.58	182.90	177.85
labor_incumbants	84.79	111.73	99.33
labor_entrants	88.79	71.16	78.52
frac_labor_entrants	0.51	0.39	0.44

Explanation ...



Explanation . . .

Appendix - Static Labor Demand

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

FOC [n]:

$$\theta psn^{\theta-1} = 1 \implies n^* = (ps\theta)^{\frac{1}{1-\theta}}$$

Appendix - Static Labor Supply

The HH problem:

$$\max_{C,N^s} \ln(C) - AN^s \text{ s.t. } pC \leq N^s + \Pi$$

$$\implies \max_{N^s} \ln\left(\frac{N^s + \Pi}{p}\right) - AN^s$$

FOC [N^s]:

$$\frac{p}{N^s + \Pi}\frac{1}{p} = A \implies N^s = \frac{1}{A} - \Pi$$

$$\implies C = \frac{(\frac{1}{A} - \Pi) + \Pi}{p} = \frac{1}{Ap}$$

Appendix - Steady State Firm Distribution

In this appendix, I find $\boldsymbol{\mu^*} = \begin{pmatrix} \mu^*(s_1) \\ \vdots \\ \mu^*(s_5) \end{pmatrix}$ explicitly in term of exit decision rules X, transition function F, and stationary distribution ν. From the problem set,

$$\mu^*(s') = \sum_s [1 - X(s)] F(s, s') \mu^*(s) + M \sum_s [1 - X(s)] F(s, s') \nu(s)$$

Stacking the five equations on top of each:

$$\begin{aligned}
\begin{pmatrix} \mu^*(s_1) \\ \vdots \\ \mu^*(s_5) \end{pmatrix} &= \begin{pmatrix} \sum_s [1 - X(s)] F(s, s_1) \mu^*(s) \\ \vdots \\ \sum_s [1 - X(s)] F(s, s_5) \mu^*(s) \end{pmatrix} + M \begin{pmatrix} \sum_s [1 - X(s)] F(s, s_1) \nu(s) \\ \vdots \\ \sum_s [1 - X(s)] F(s, s_5) \nu(s) \end{pmatrix} \\
\implies \begin{pmatrix} \mu^*(s_1) \\ \vdots \\ \mu^*(s_5) \end{pmatrix} &= \begin{pmatrix} [1 - X(s_1)] F(s_1, s_1) & ... & [1 - X(s_5)] F(s_5, s_1) \\ \vdots & & \vdots \\ [1 - X(s_1)] F(s_1, s_5) & ... & [1 - X(s_5)] F(s_5, s_5) \end{pmatrix} \begin{pmatrix} \mu^*(s_1) \\ \vdots \\ \mu^*(s_5) \end{pmatrix} \\
&\quad + M \begin{pmatrix} [1 - X(s_1)] F(s_1, s_1) & ... & [1 - X(s_5)] F(s_5, s_1) \\ \vdots & & \vdots \\ [1 - X(s_1)] F(s_1, s_5) & ... & [1 - X(s_5)] F(s_5, s_5) \end{pmatrix} \begin{pmatrix} \nu(s_1) \\ \vdots \\ \nu(s_5) \end{pmatrix} \\
\implies \boldsymbol{\mu^*} &= Z \boldsymbol{\mu^*} + M Z \boldsymbol{\nu} \\
\implies \boldsymbol{\mu^*} &= M (I - Z)^{-1} Z \boldsymbol{\nu}
\end{aligned}$$

where

$$Z = \begin{pmatrix} [1 - X(s_1)] F(s_1, s_1) & ... & [1 - X(s_5)] F(s_5, s_1) \\ \vdots & & \vdots \\ [1 - X(s_1)] F(s_1, s_5) & ... & [1 - X(s_5)] F(s_5, s_5) \end{pmatrix} = \begin{pmatrix} [1 - X(s_1)] & ... & [1 - X(s_1)] \\ \vdots & & \vdots \\ [1 - X(s_5)] & ... & [1 - X(s_5)] \end{pmatrix}' . \times F'$$