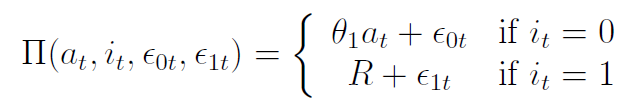
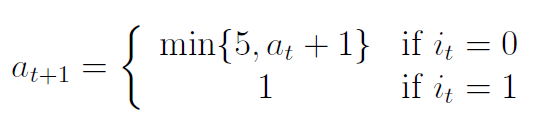
***Question 1***

The dynamic programming problem is:

Where:





The above problem is equivalent to finding the following value function

Where:

***Question 2***

\*Refer to code\*

***Question 3***

|  |  |  |
| --- | --- | --- |
| V0 | V1 | Pr1 |
| -10.1317 | -11.3652 | 0.2256 |
| -11.4797 | -11.3652 | 0.5286 |
| -12.6201 | -11.3652 | 0.7781 |
| -13.6731 | -11.3652 | 0.9095 |
| -14.6731 | -11.3652 | 0.9647 |

For the value that the firm is indifferent between replacing its machine or not for the following value of :

11.3652 -11.4797 = -0.1145

The probability that the firm will replace the machine if :

52.86%

The PDV of future profits is:



1 - 13.6731 = -12.6731

-1.5 – 11.3652 = -12.8652

PDV = **-12.6731**

The firm is not going to replace the machine

***Question 4***

Theta1 = -1.1484 R = -4.4464

|  |  |  |
| --- | --- | --- |
| V0 | V1 | Pr1 |
| -16.9575 | -19.0834 | 0.1066 |
| -18.6448 | -19.0834 | 0.3921 |
| -19.9958 | -19.0834 | 0.7135 |
| -21.2121 | -19.0834 | 0.8937 |
| -22.3605 | -19.0834 | 0.9636 |

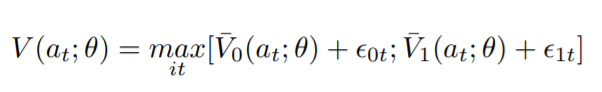
***Question 5***

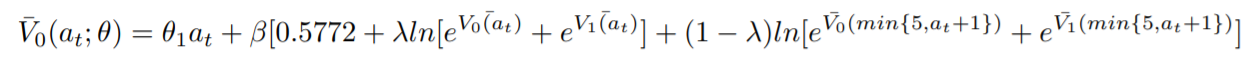
We don’t compute standard errors

***Question 6***

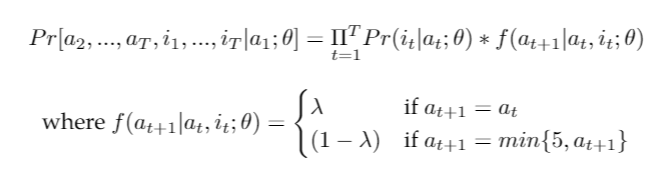
a)

The new dynamic programming problem is that the firm solves:







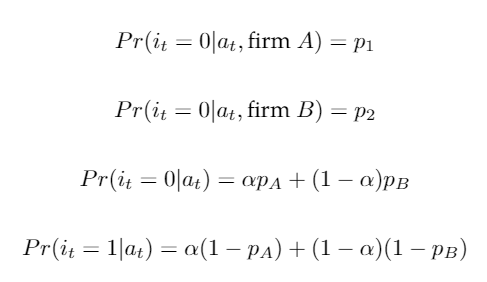
We cannot empirical identify from the data that we have at hand because it is a random sample of machines. We would need multiple time observations for each bus to indentify . In this case we have a probabilitstic state vector , and we would need panel data to maximize the joint likelihood of and . That is for any given bus, the likelihood is:

When we try to estimate we got -0.0363 and cannot have a negative value. So clearly this data is inadequate to identify

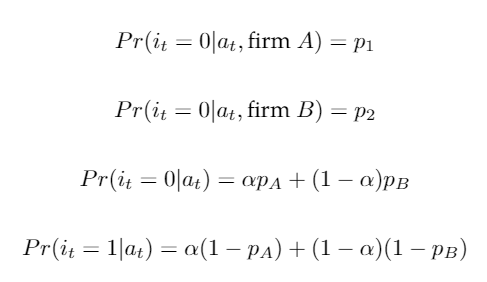
b) Firm A solves:

Firm B solves:

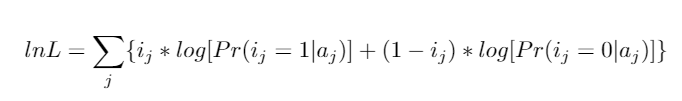
The probability of not replacing implied by the solution to the problem solved by firm A & firm B are:



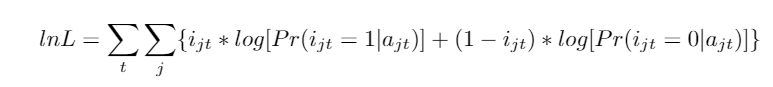
The overall probability of not replacement and replacement are these:

****

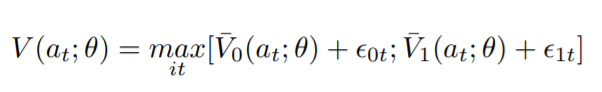
This is the log likelihood function:



c) With panel data, this would be the likelihood function:



d) The firm now solves this problem:



Where:

