

# Report

February 6, 2018

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## 1 Check list

- ☒ Do not round the state value to grids.
- ☒ Change the action of buying client capital from increments to choosing the exact value.
- ☒ Remove the depreciation factor and use an upper bound on the possible client capital.
- ☐ Make sure the action of quality  $> 0$  when client capital  $> 0$ : the firm must produce something when they are in the (have entered or being entering) the game.
- ☒ Change the cost of choosing a client capital value,
  - ☒ If  $k = 0$  and  $k' > 0$ : pay a entry cost. The total cost will be "client capital price\*( $k'-k$ ) + entry cost"
  - ☒ If  $k = 0$  and  $k' = 0$ : total cost=0

- ☒ If  $k > 0$  and  $k' > k$ : total cost = client capital price\*( $k'-k$ ) + maintenance cost\*k.
- ☒ If  $k > 0$  and  $k > k' > 0$ : total cost = -sale price\*( $k-k'$ ) + maintenance cost\*k'.
- ☒ If  $k > 0$  and  $k' = 0$ : obtain a scrap value. total cost = -sale price\*k - scrap value.
- ☒ Make sure that if client capital is 0, the cost to produce a nonzero quality product is infinity. (Use 30 penalty as infinity)
- ☐ Also, try to add a 0-profit constraint on actions, that is: enforce each firm must have nonnegative stage pay off at any stage.

## 2 The Model

### 2.1 Basic parameters

|                           |       |
|---------------------------|-------|
| Entry cost                | 0.03  |
| Client capital unit price | 0.005 |
| Maintenance unit cost     | 0.005 |
| Scrap value               | 0.01  |
| Unit production cost      | 0.01  |
| Number of normals         | 36    |

### 2.2 Grids

|                          |       |
|--------------------------|-------|
| State                    | 0:1:5 |
| Action of client capital | 0:1:5 |
| Action of quality        | 0:1:5 |
| Action of price          | 0:1:5 |

### 2.3 Equations

- Setup cost

$$C_s = \begin{cases} 0 & w = 0 \\ \frac{w^2}{20a} & w \neq 0, k > 0 \\ 30 & w \neq 0, k = 0 \end{cases}$$

### 3 Results







