report on implementation models

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August 30, 2023

1 Abstract

This document compares three models: the AM94 model (a rewarded or non-rewarded ϵ model situated between a null model and an AM model), the AM model (a modified two-stage ϵ model), and the SR model (a two-stage arbitration model). All convergence results are based on the convergence of states (2,1) and states (2,2), using the parameter values $\alpha = 0.25, \beta = 0.0005, \delta = 0.25, convergence_time = 500, and max_iteration = 100000$. These parameter settings align with those in AEU papers, even though they might not be optimal. Nonetheless, we can still gain insights into the mechanisms through simulations.

We run 10 sessions and take average of the results

2 experiments of AM94, AM, SR implementation model

2.1 AM94 with reward

Rewarded AM94 models can be compared with SR model for $\epsilon = 1$

2.1.1 AM94 with reward on $\epsilon = 0.5$

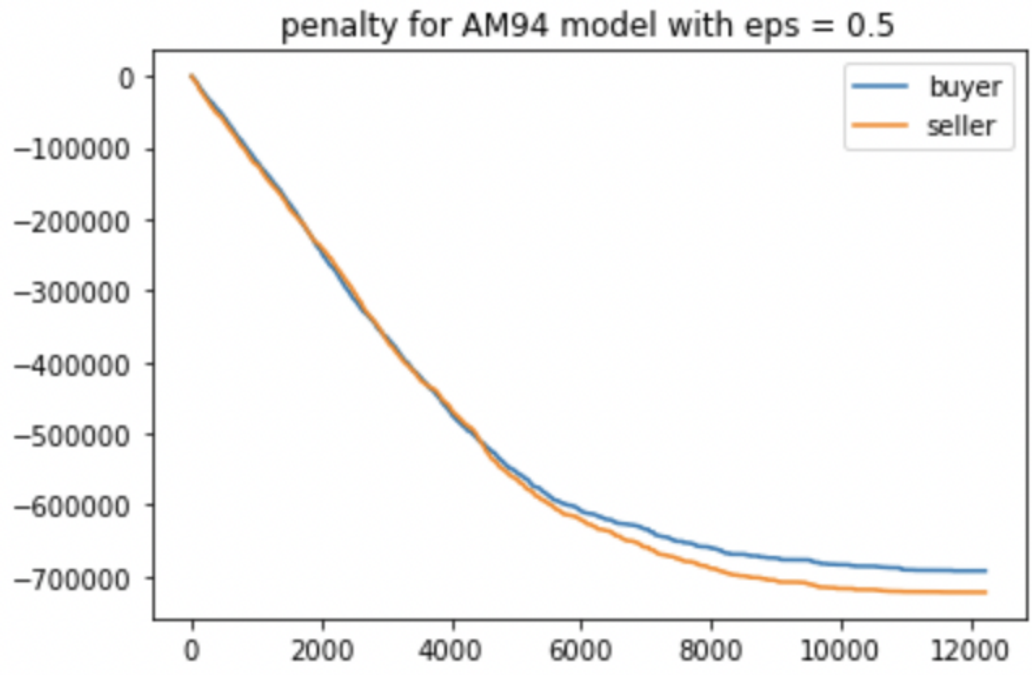

Figure 1: full penalty,with reward

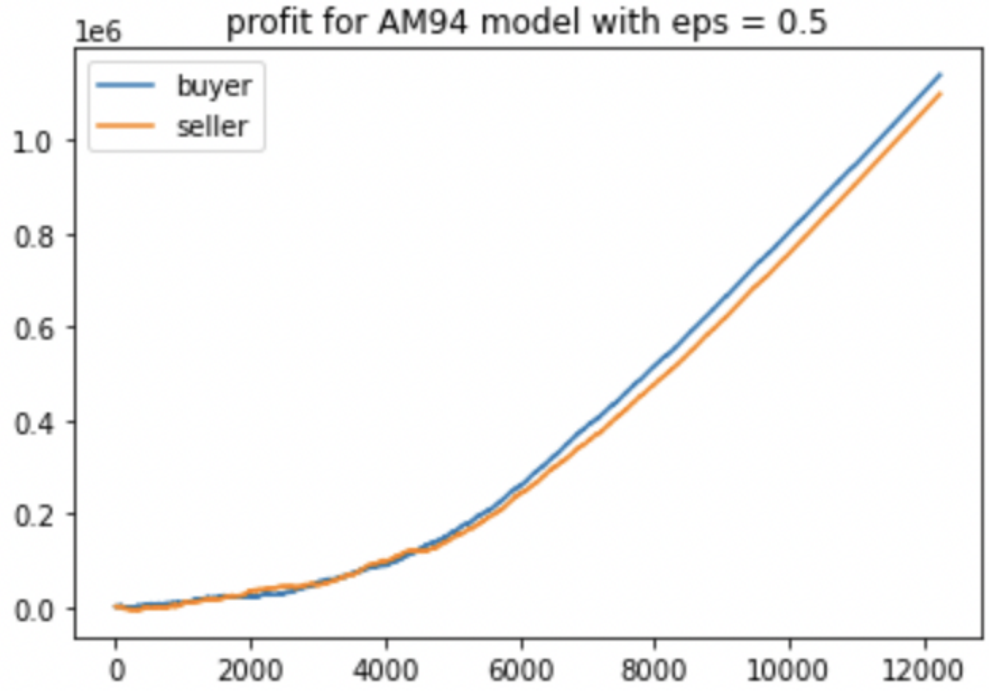

Figure 2: full profit,with reward

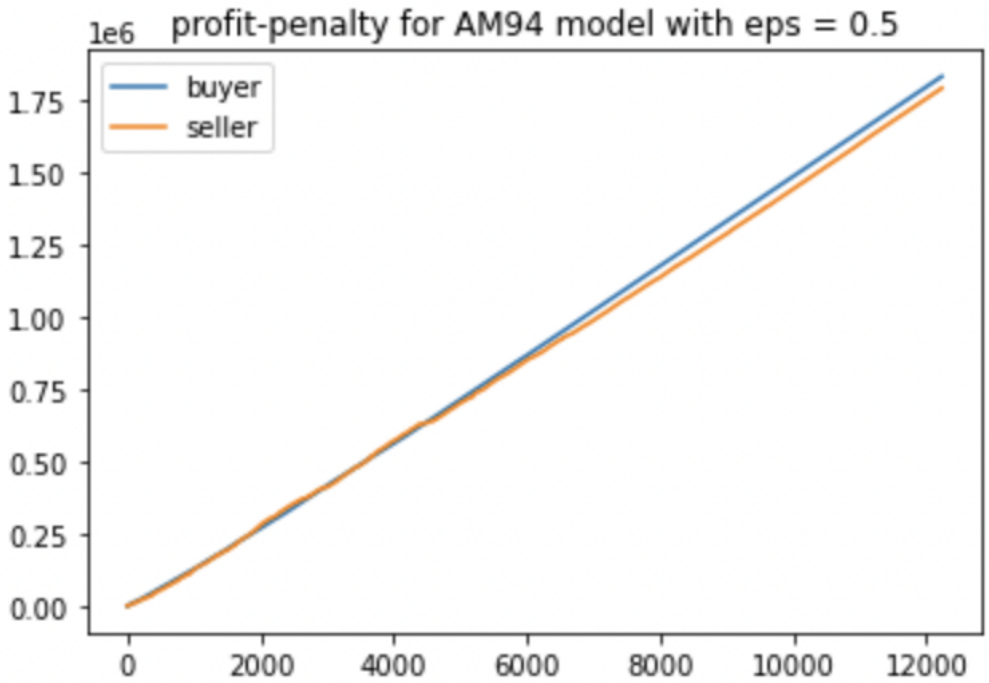

Figure 3: profit - penalty,with reward

If we consider only successful implementation situations, we can get other 3 pictures

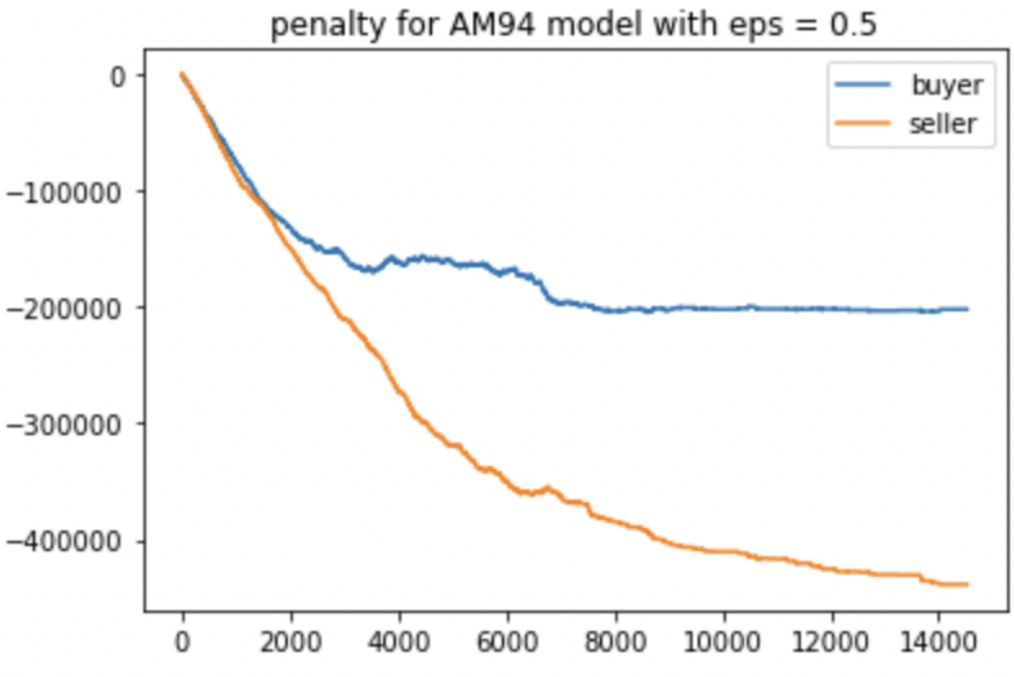

Figure 4: full penalty,with reward,implementation

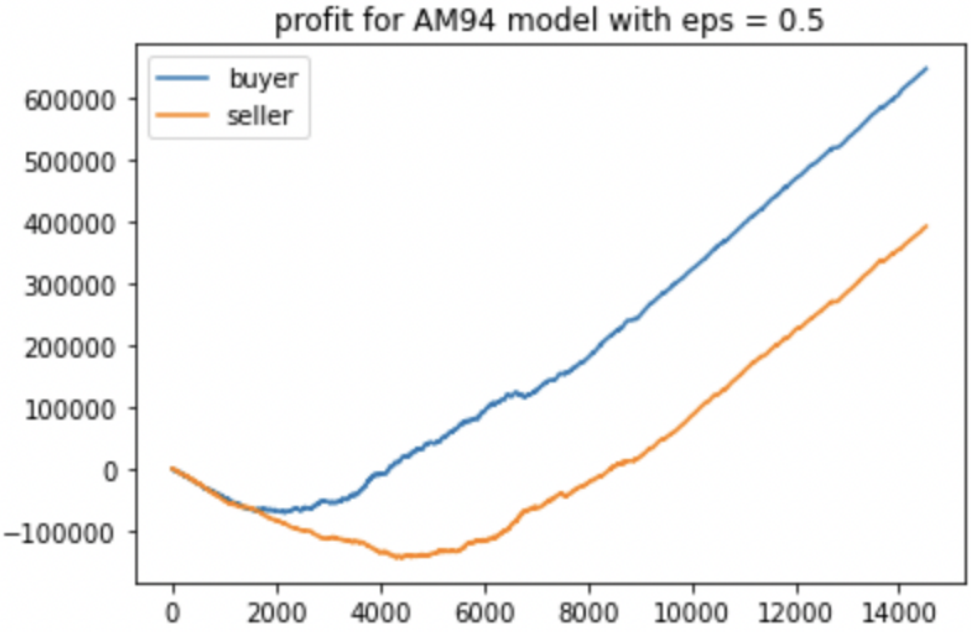

Figure 5: full profit,with reward,implementation

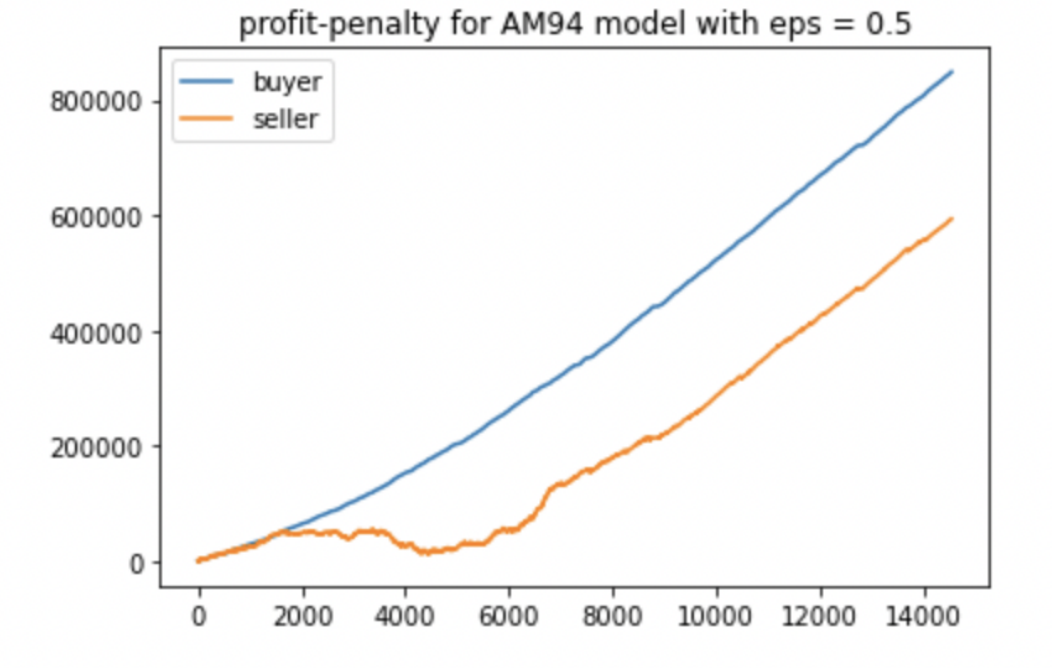

Figure 6: profit - penalty,with reward,implementation

2.1.2 AM94 with reward on $\epsilon = 0.4$

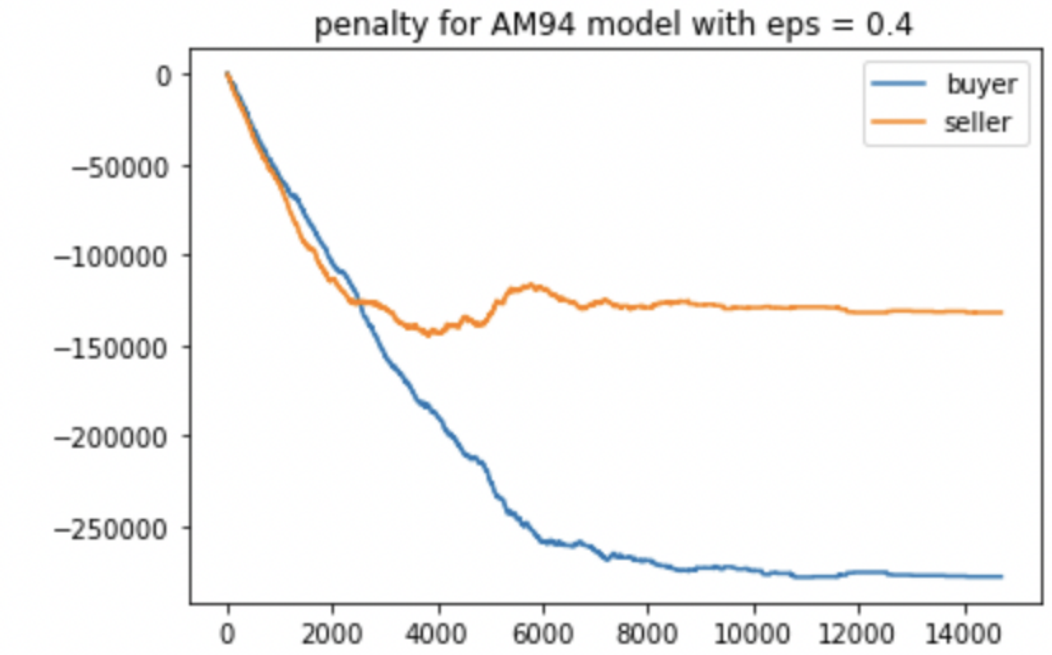

Figure 7: full penalty,with reward

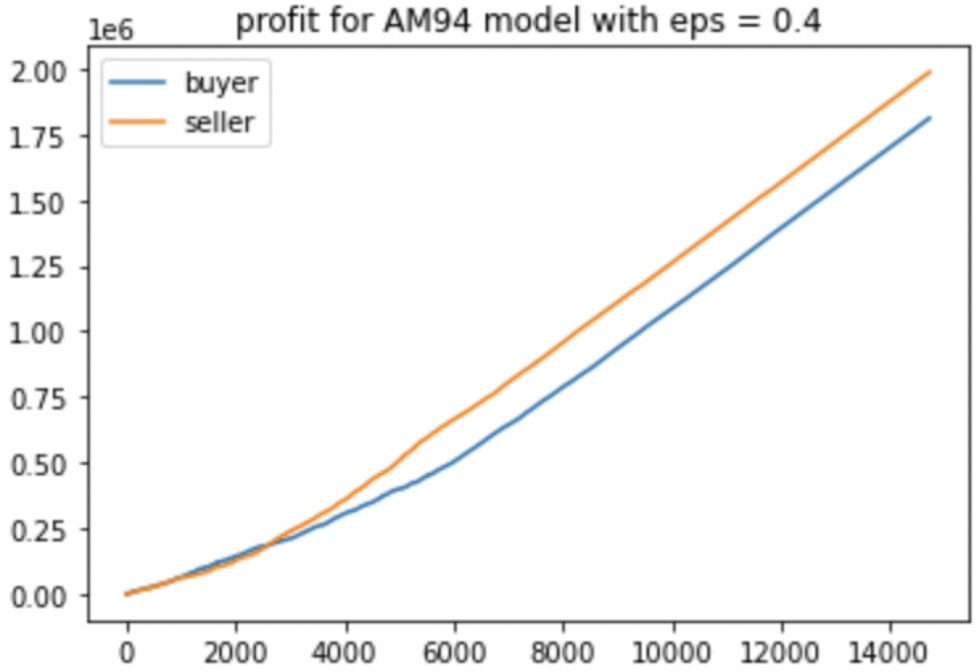

Figure 8: full profit,with reward

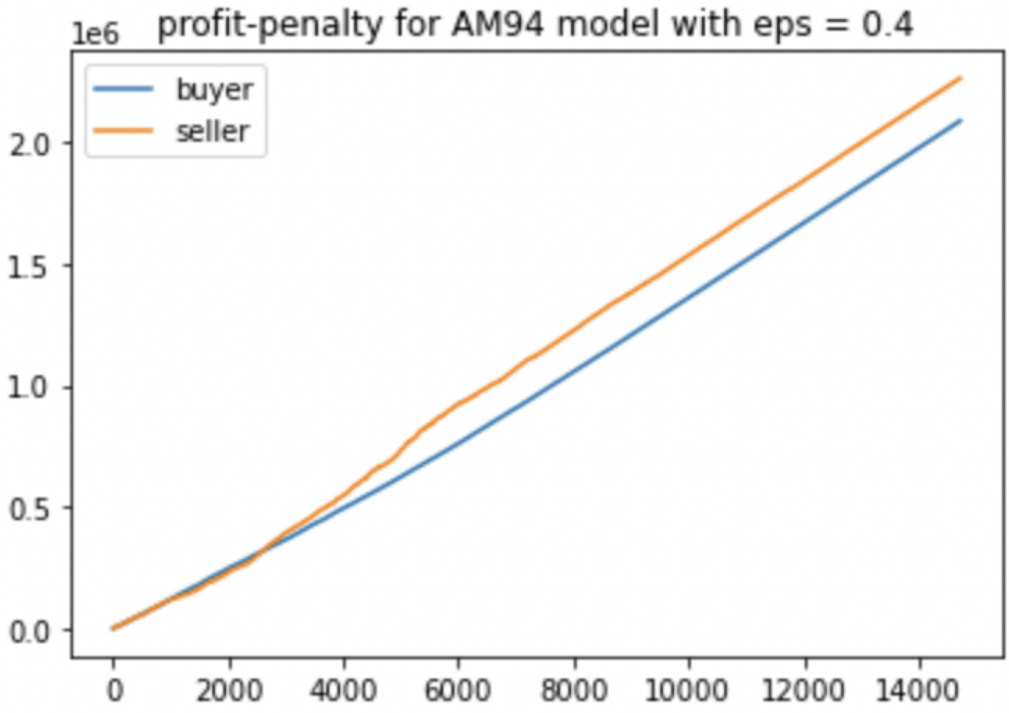

Figure 9: profit - penalty,with reward

If we consider only successful implementation situations, we can get other 3 pictures

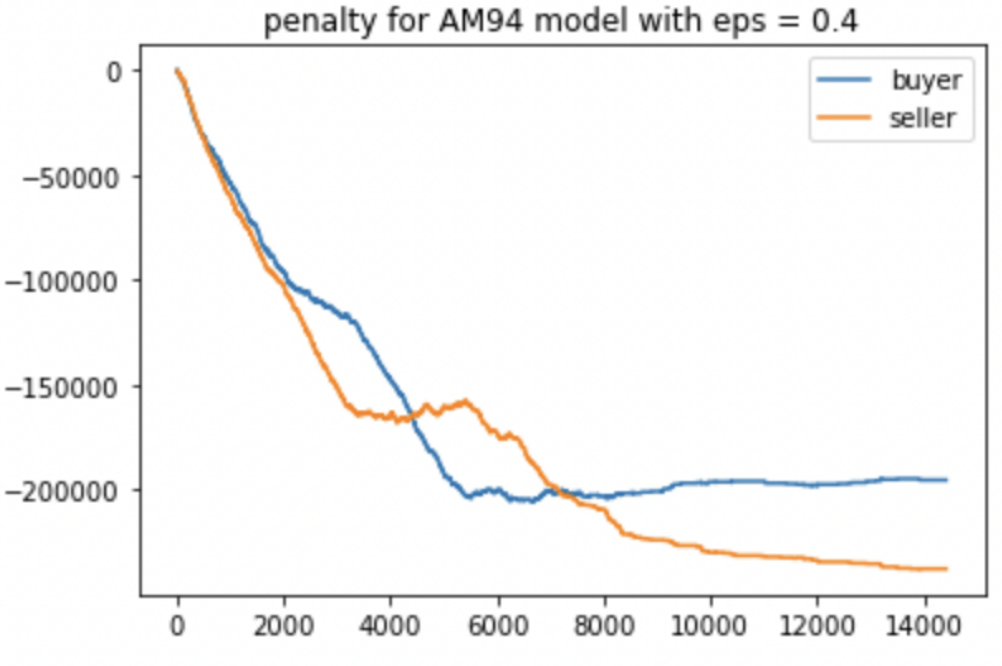

Figure 10: full penalty,with reward,implementation

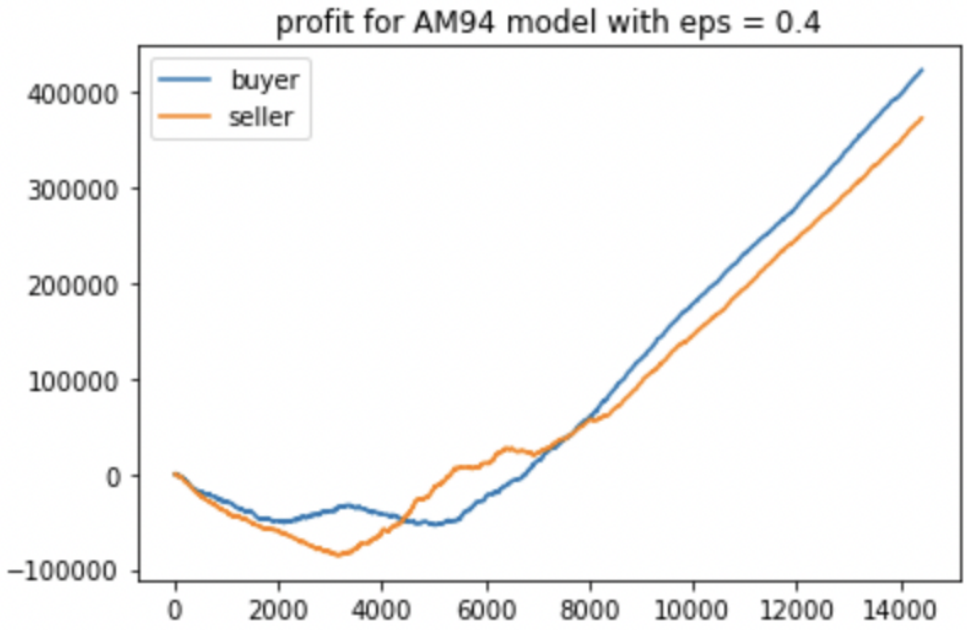

Figure 11: full profit,with reward,implementation

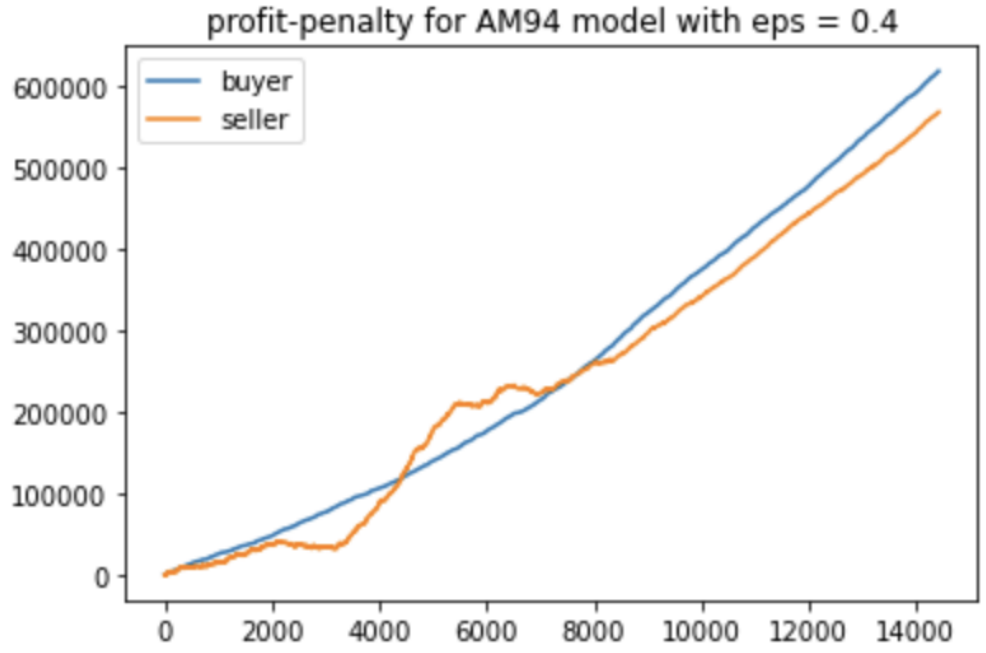

Figure 12: profit - penalty,with reward,implementation

2.1.3 AM94 with reward on $\epsilon = 0.3$

the turning point is around 0.33, so this result does not converge.

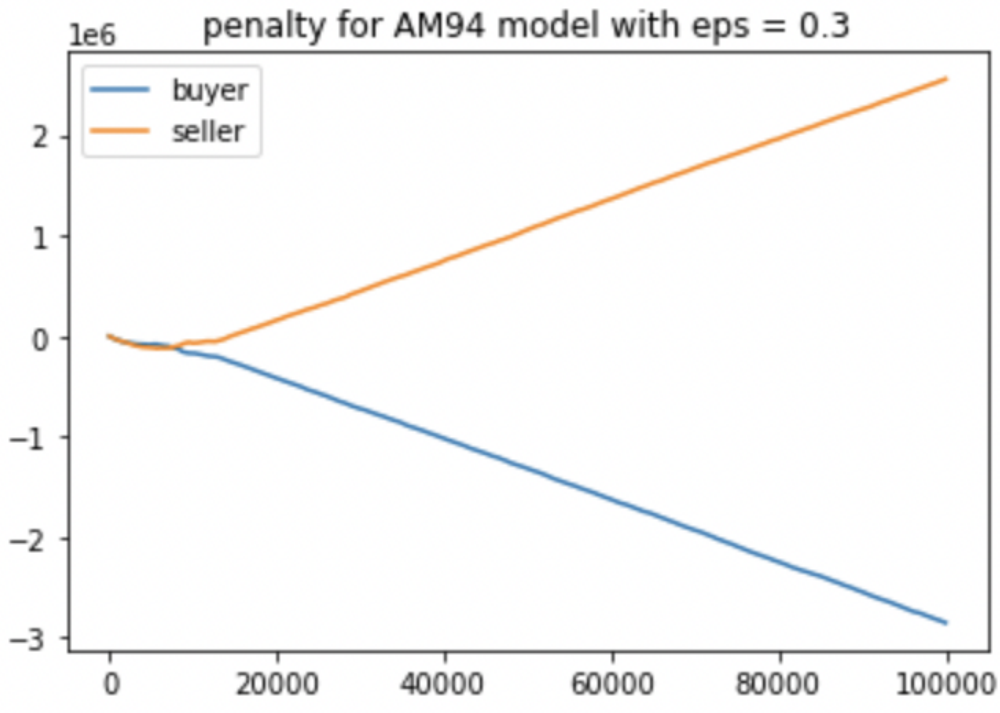

Figure 13: full penalty,with reward

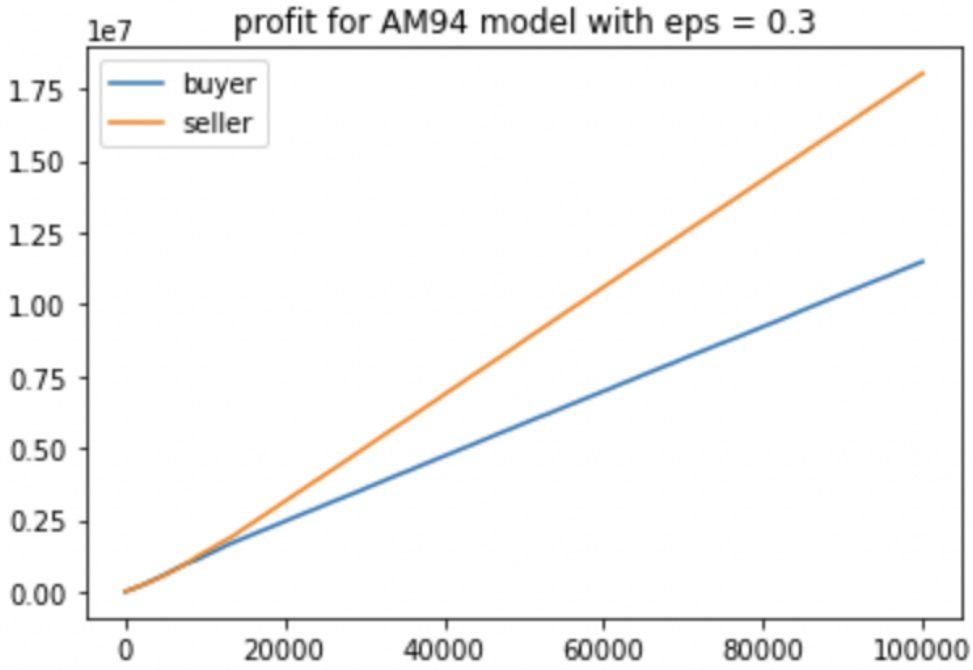

Figure 14: full profit,with reward

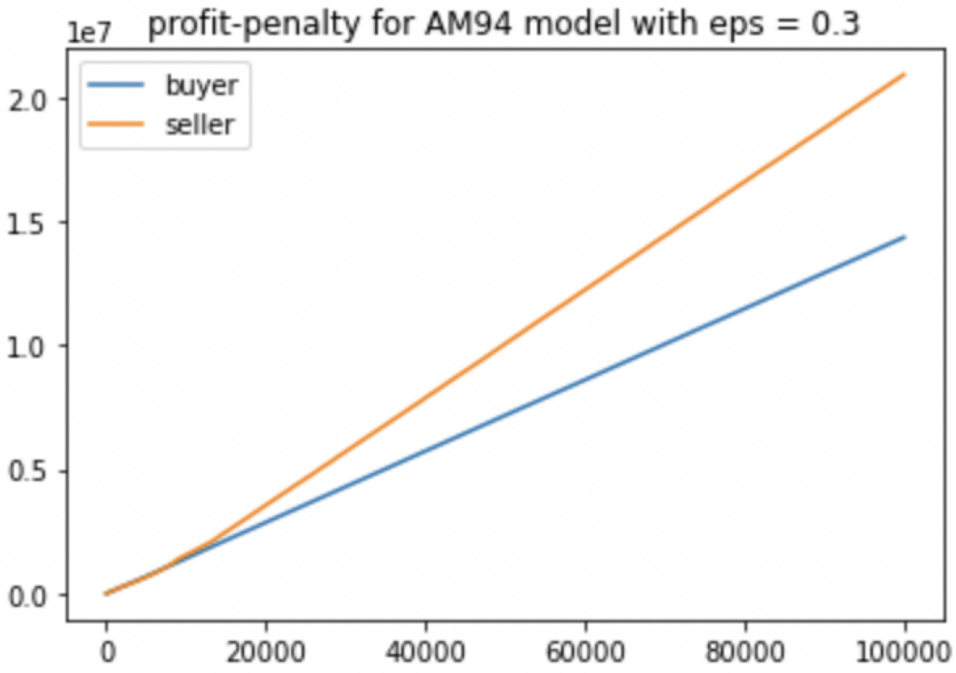

Figure 15: profit - penalty,with reward

If we consider only successful implementation situations, we can get other 3 pictures

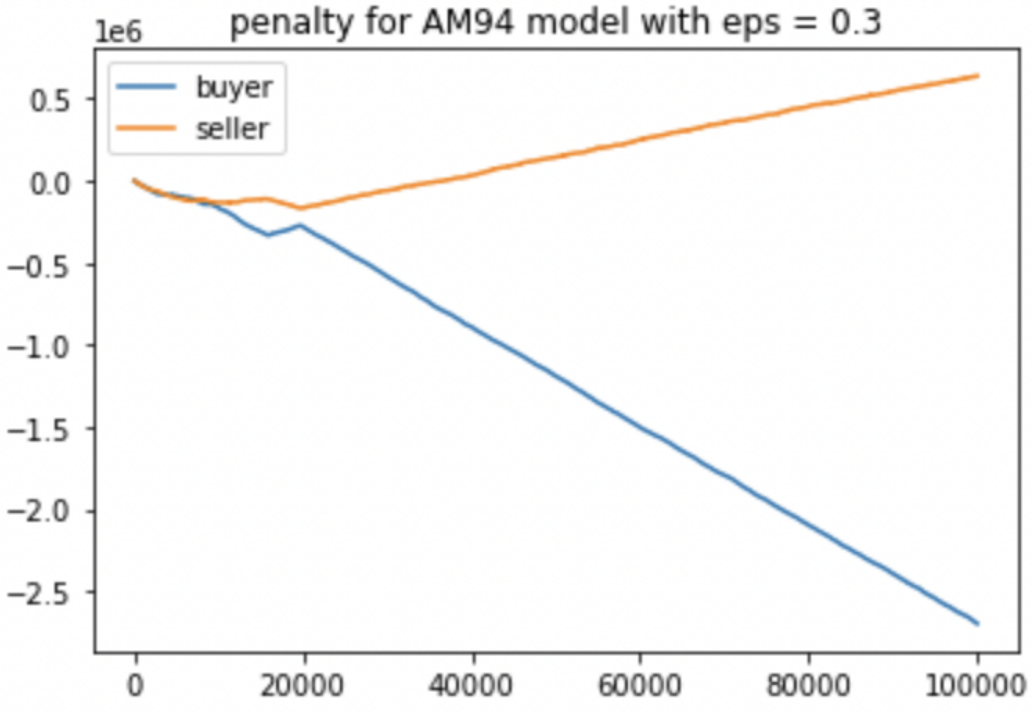

Figure 16: full penalty,with reward,implementation

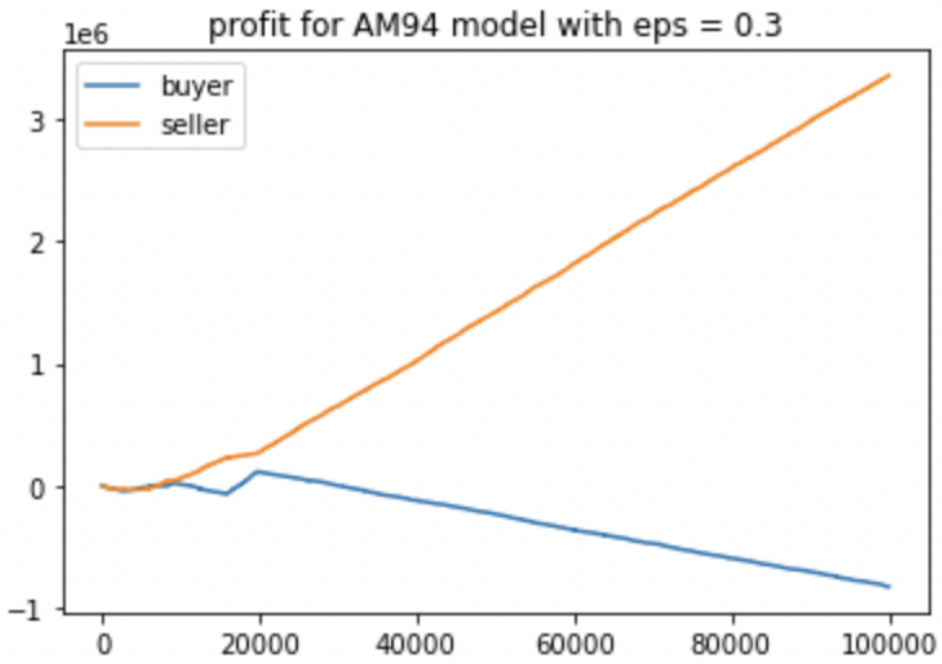

Figure 17: full profit,with reward,implementation

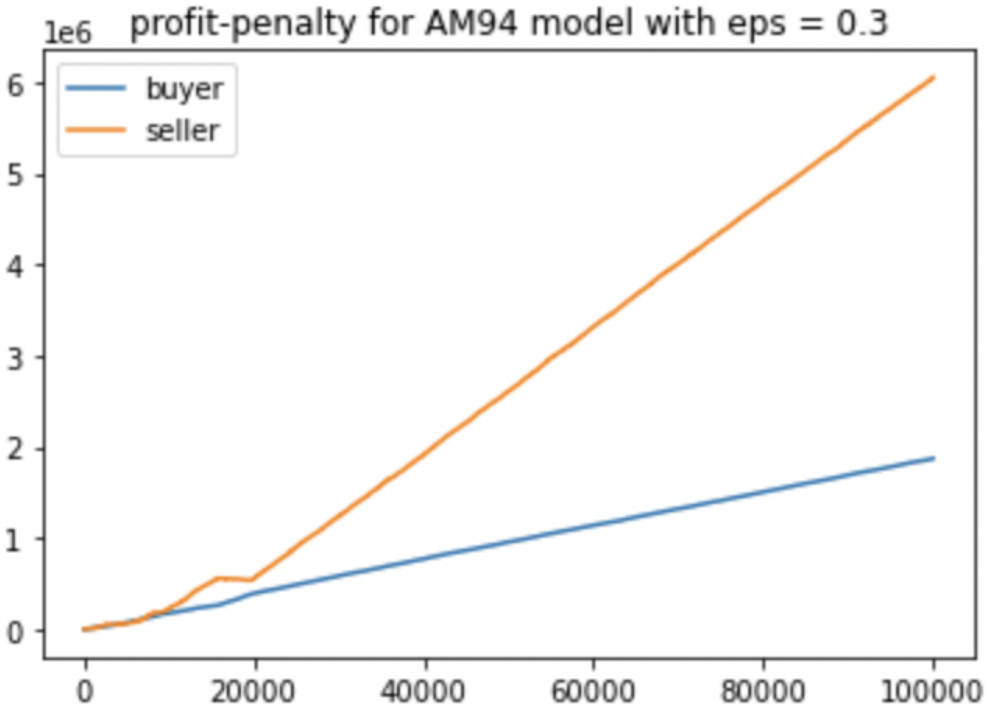

Figure 18: profit - penalty,with reward,implementation

2.2 AM94 with no reward

Non Rewarded AM94 models can be compared with AM model for $\epsilon = 1$

2.2.1 AM94 with no reward on $\epsilon = 0.5$

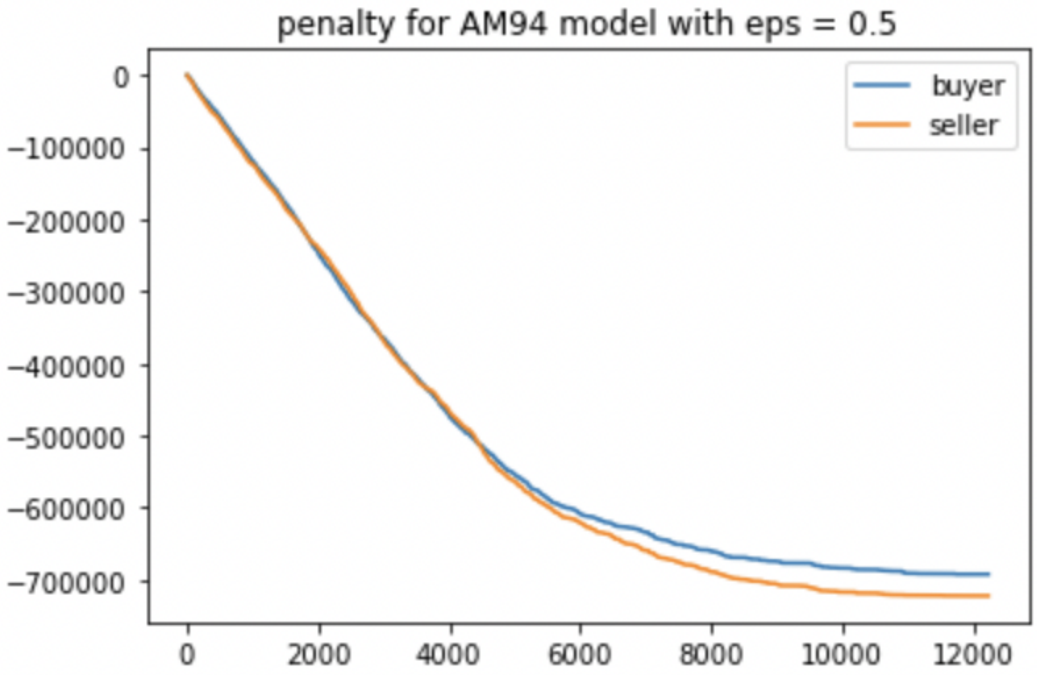

Figure 19: full penalty,no reward

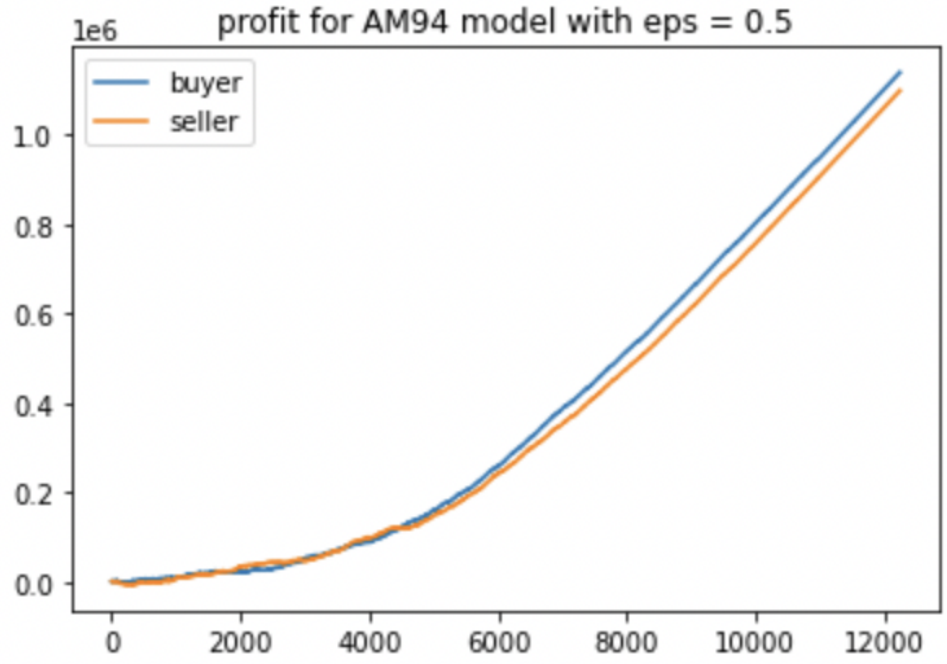

Figure 20: full profit,no reward

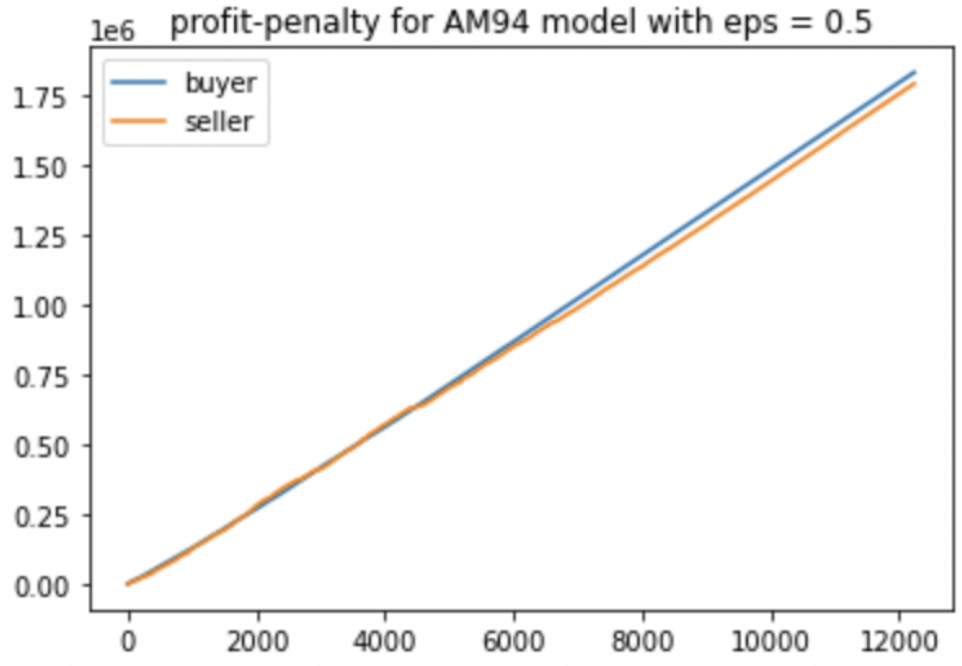

Figure 21: profit - penalty,no reward

If we consider only successful implementation situations, we can get other 3 pictures

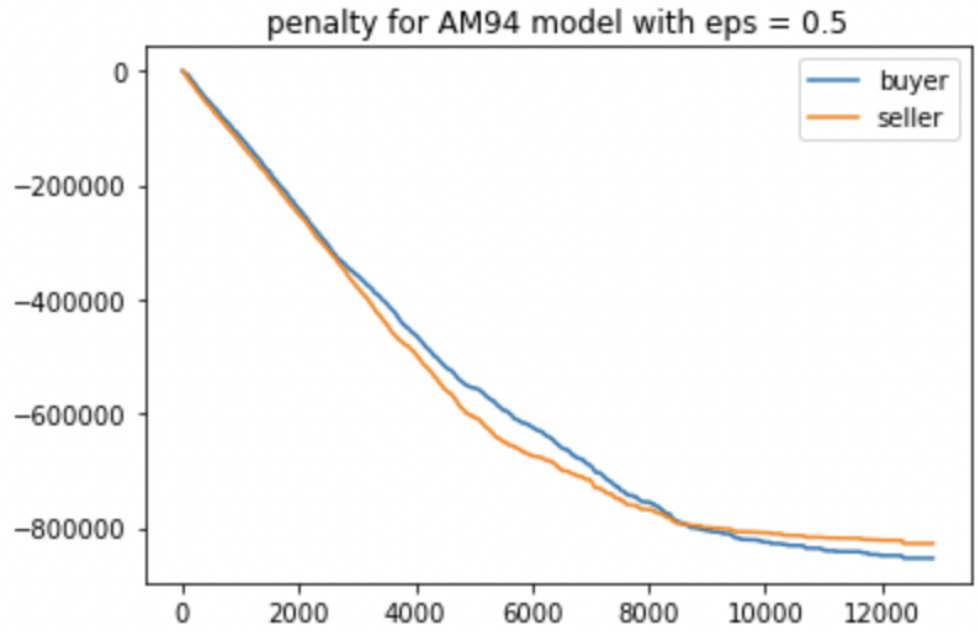

Figure 22: full penalty,no reward,implementation

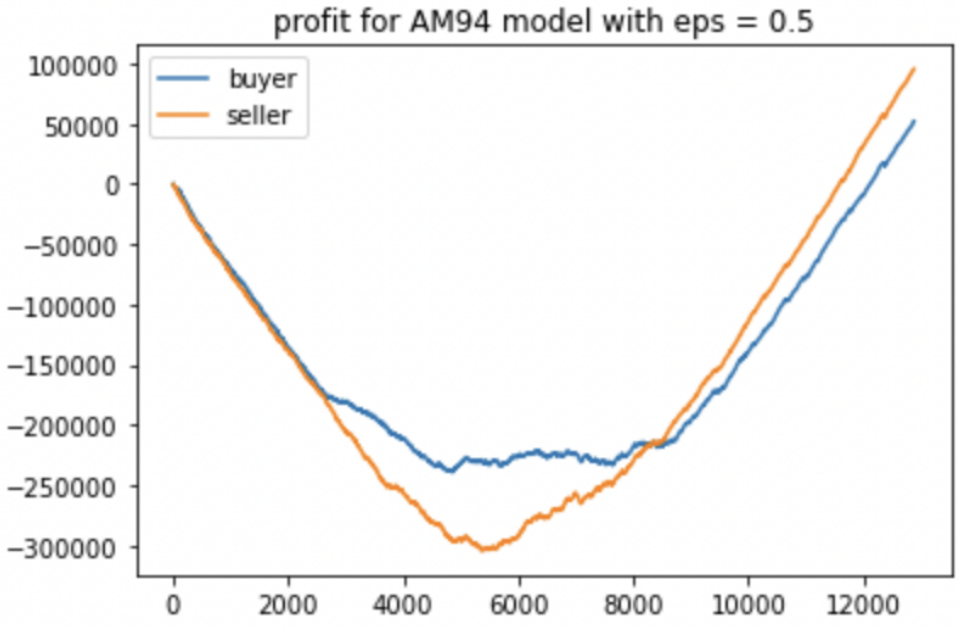

Figure 23: full profit,no reward,implementation

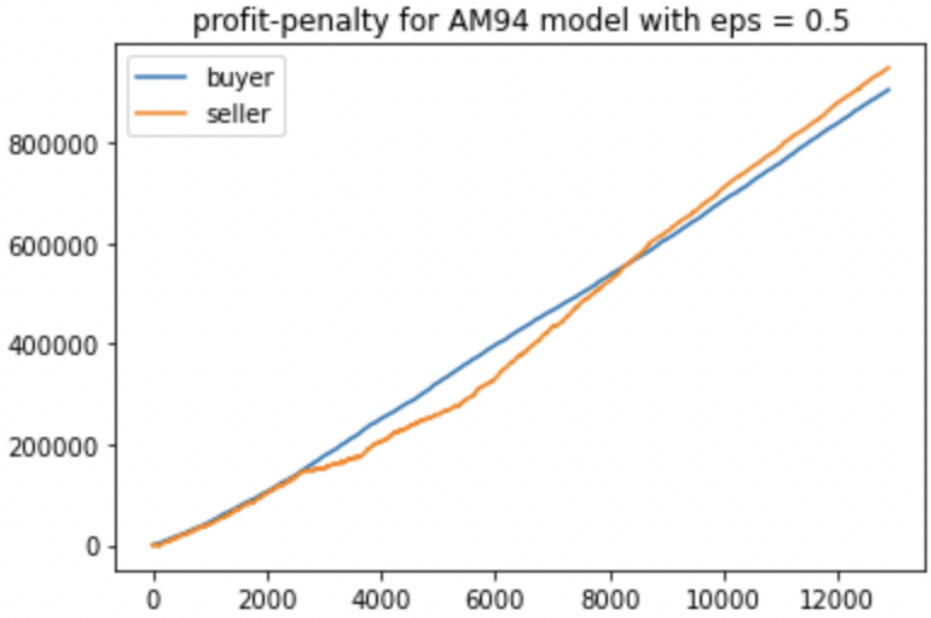

Figure 24: profit - penalty,no reward,implementation

2.2.2 AM94 with no reward on $\epsilon = 0.4$

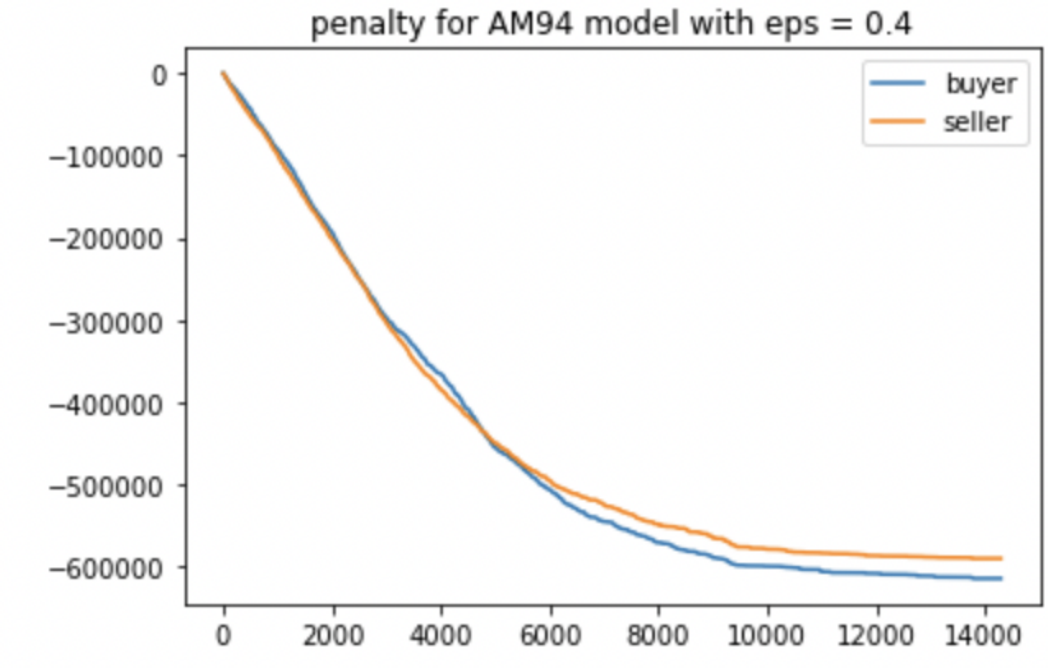

Figure 25: full penalty,no reward

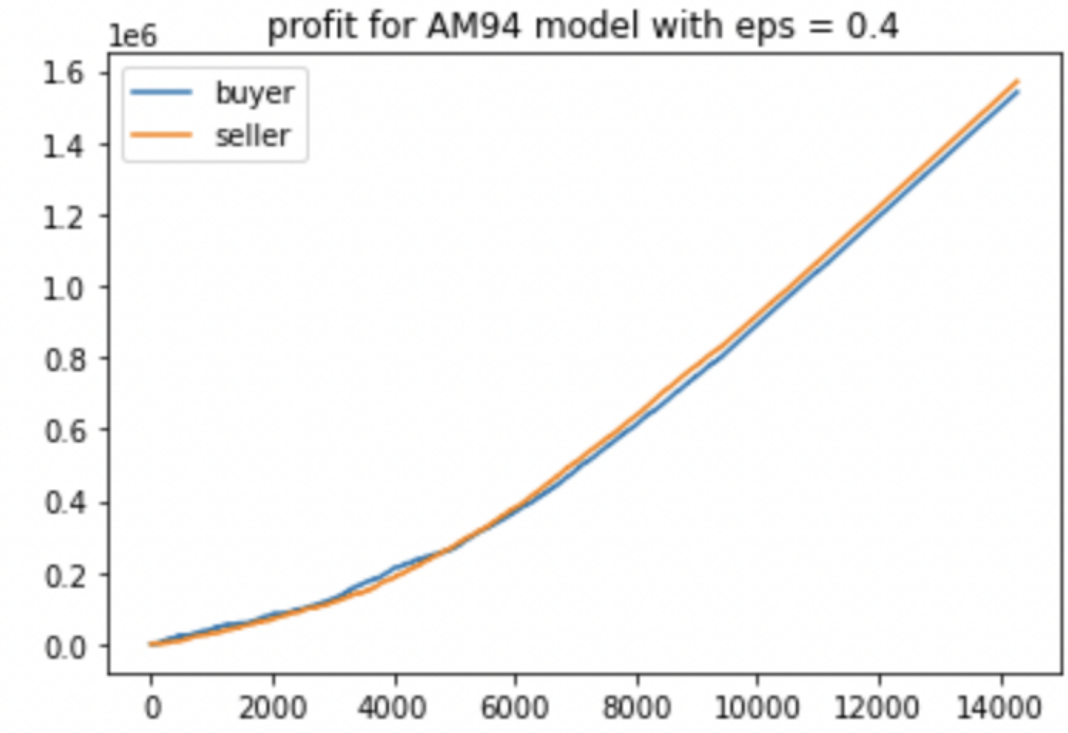

Figure 26: full profit,no reward

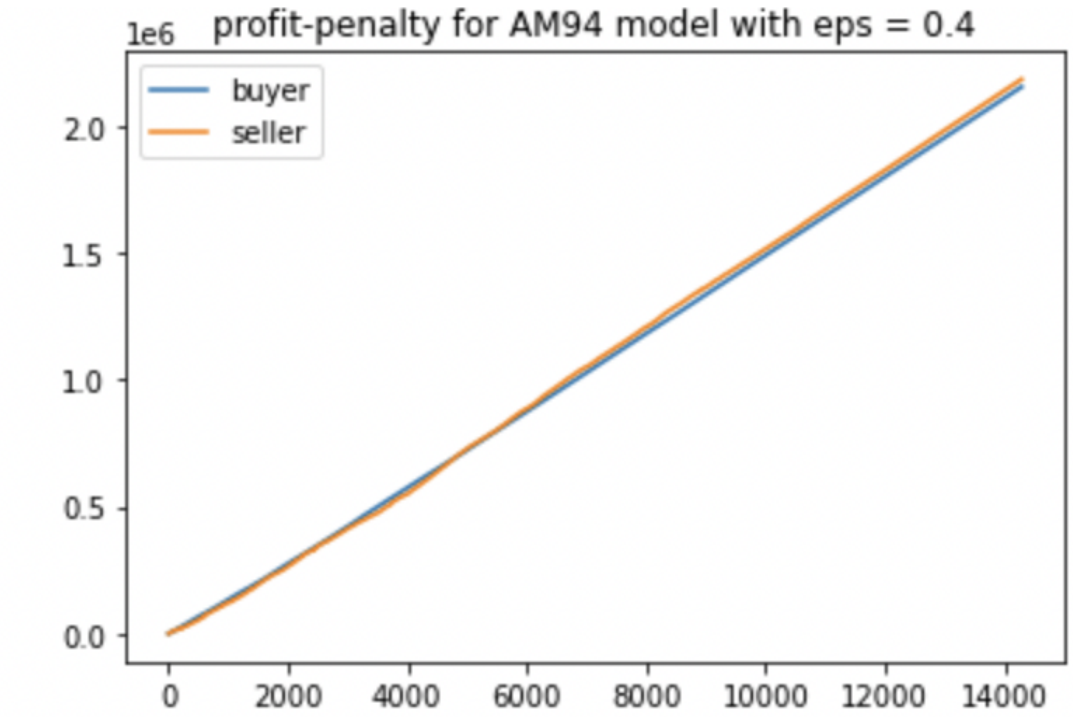

Figure 27: profit - penalty,no reward

If we consider only successful implementation situations, we can get other 3 pictures

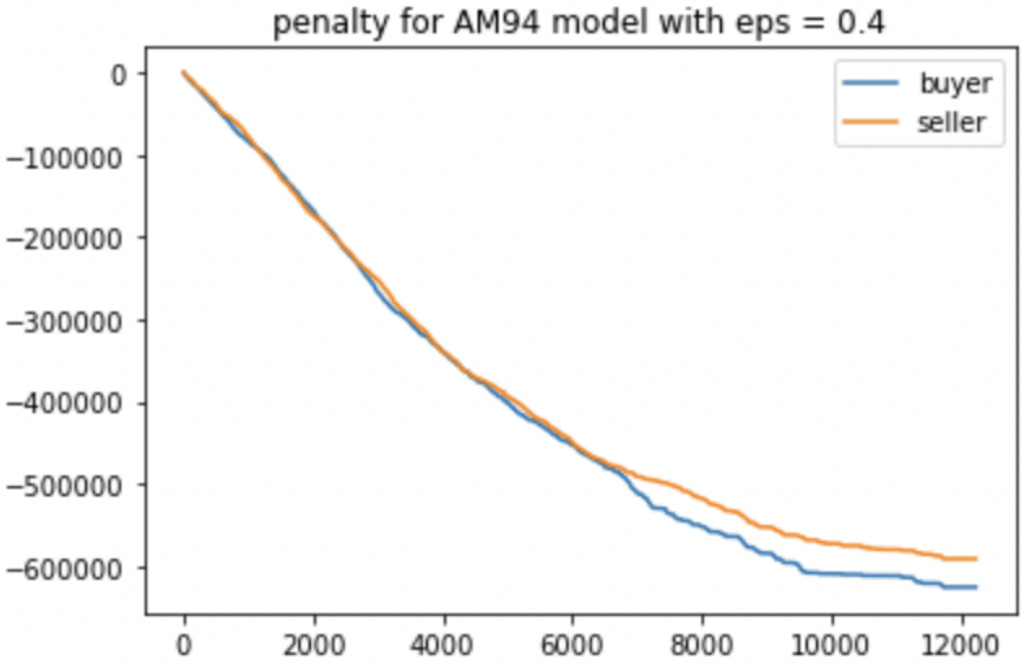

Figure 28: full penalty,,no rewardimplementation

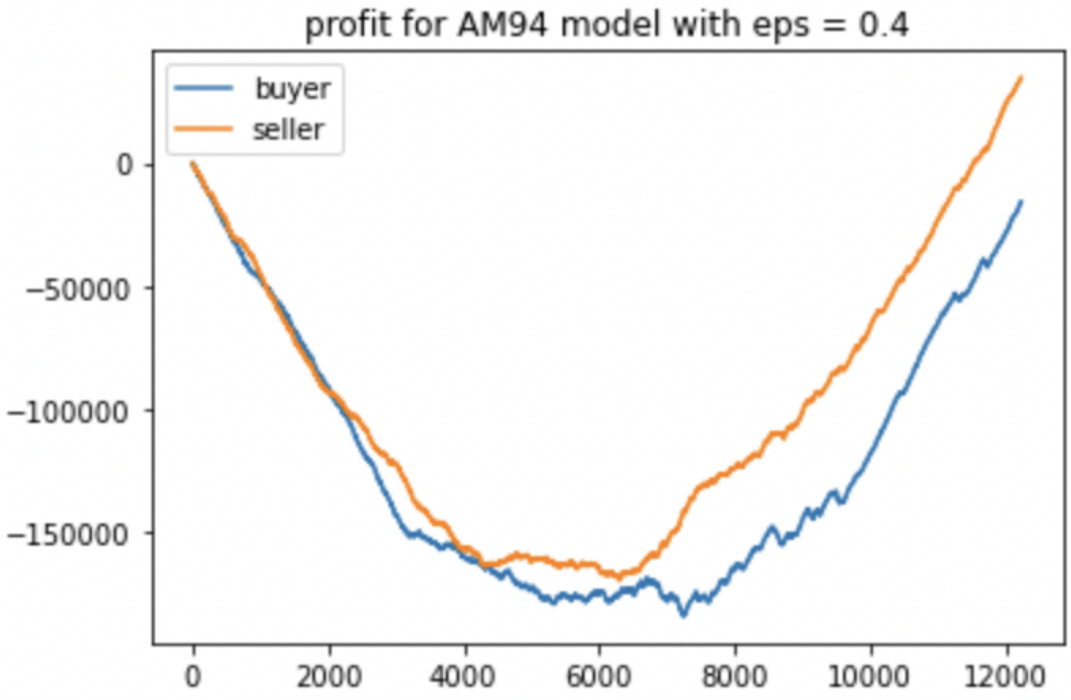

Figure 29: full profit,no reward,implementation

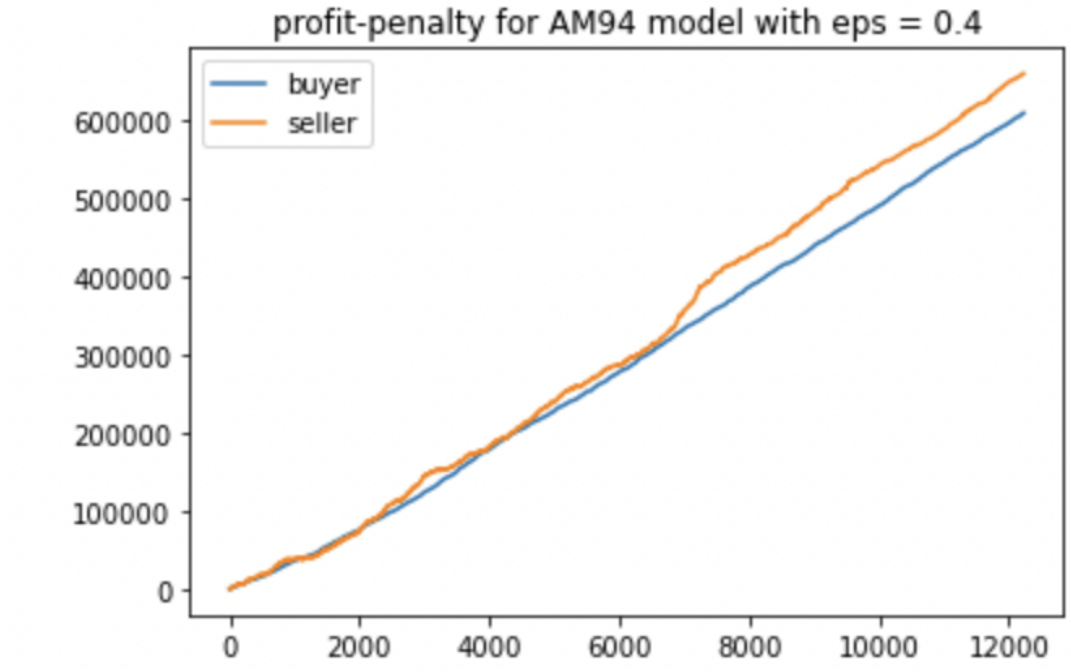

Figure 30: profit - penalty,no reward,implementation

2.2.3 AM94 with no reward on $\epsilon = 0.2$

the turning point is around 0.22, so this result does not converge.

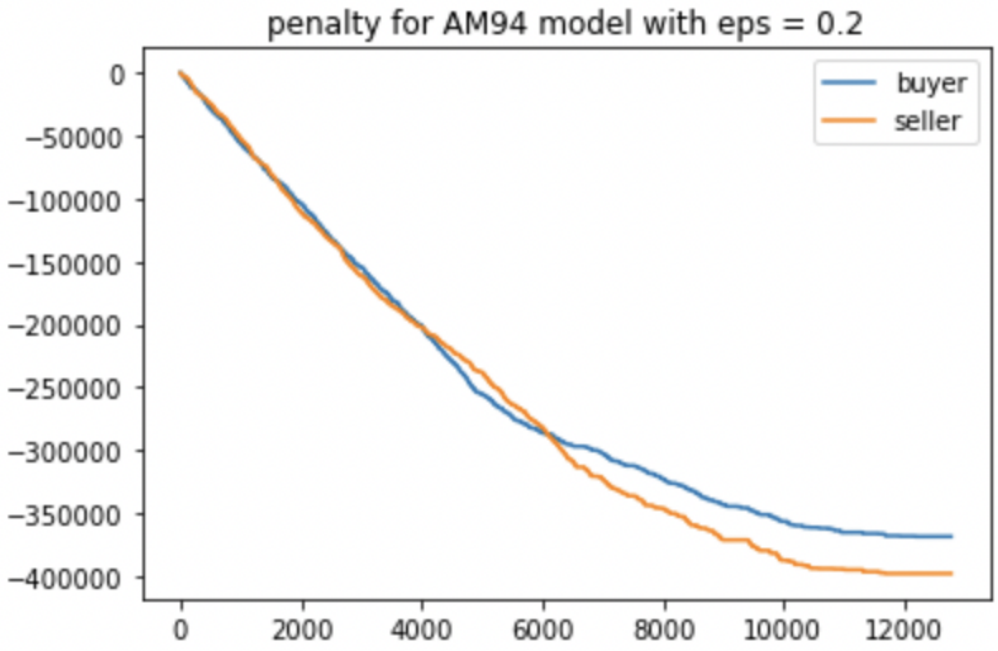

Figure 31: full penalty,no reward

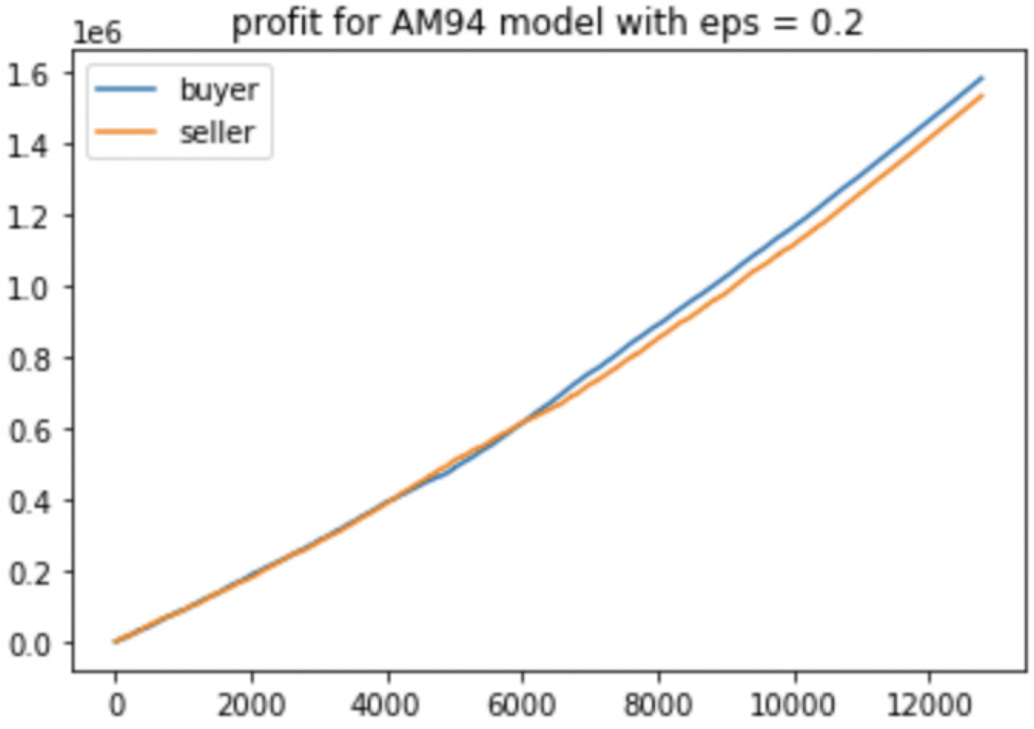

Figure 32: full profit,no reward

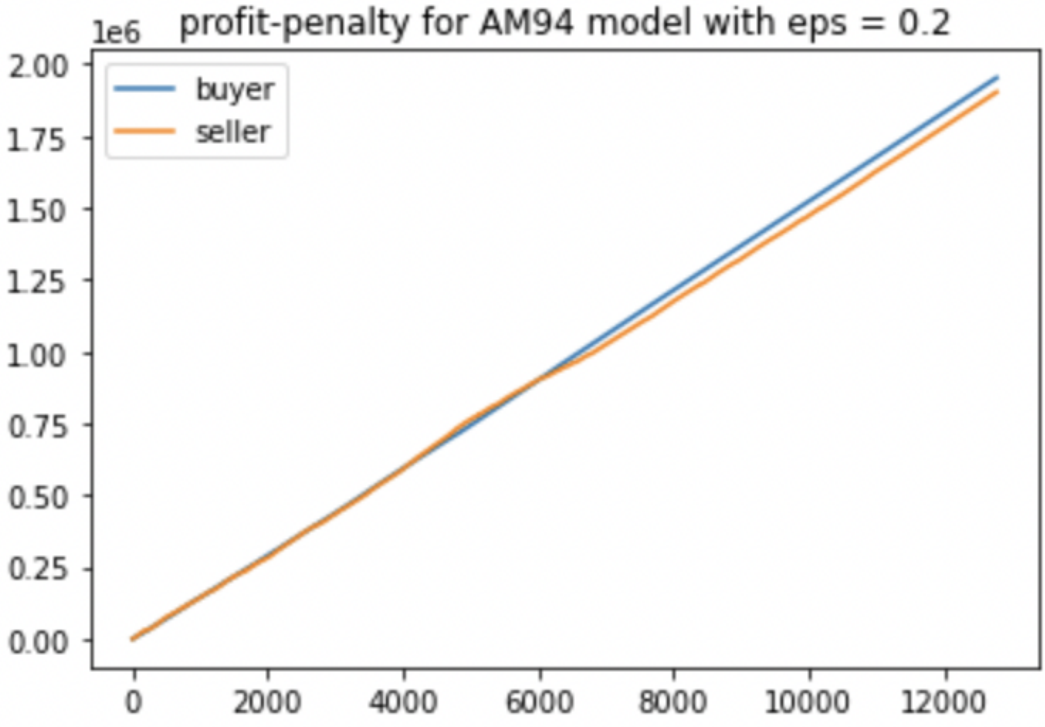

Figure 33: profit - penalty,no reward

If we consider only successful implementation situations, we can get other 3 pictures

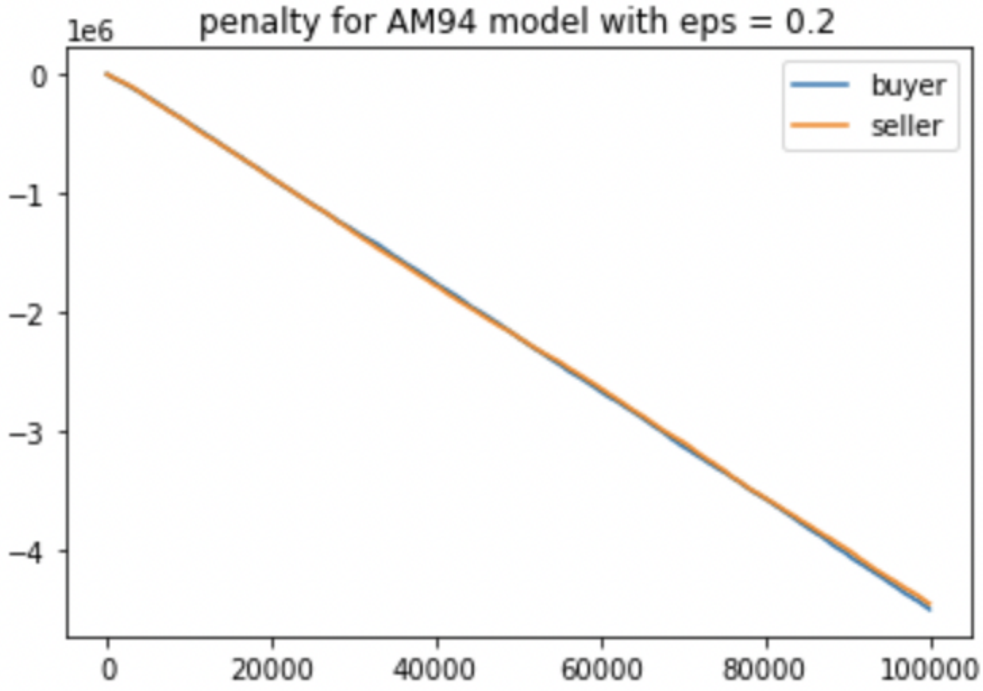

Figure 34: full penalty,no reward,implementation

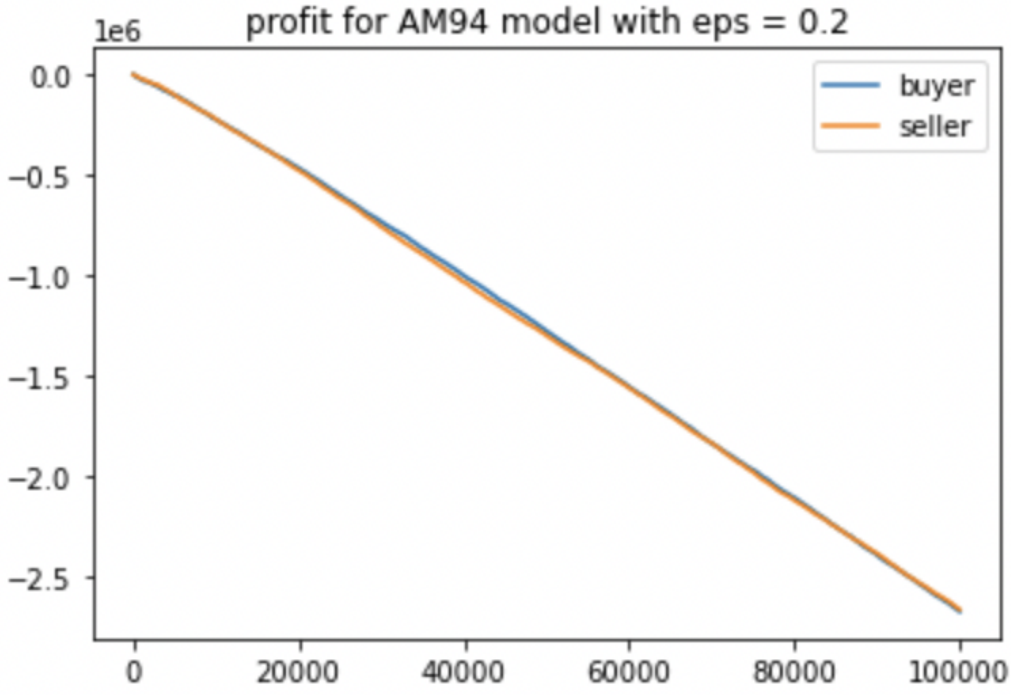

Figure 35: full profit,no reward,implementation

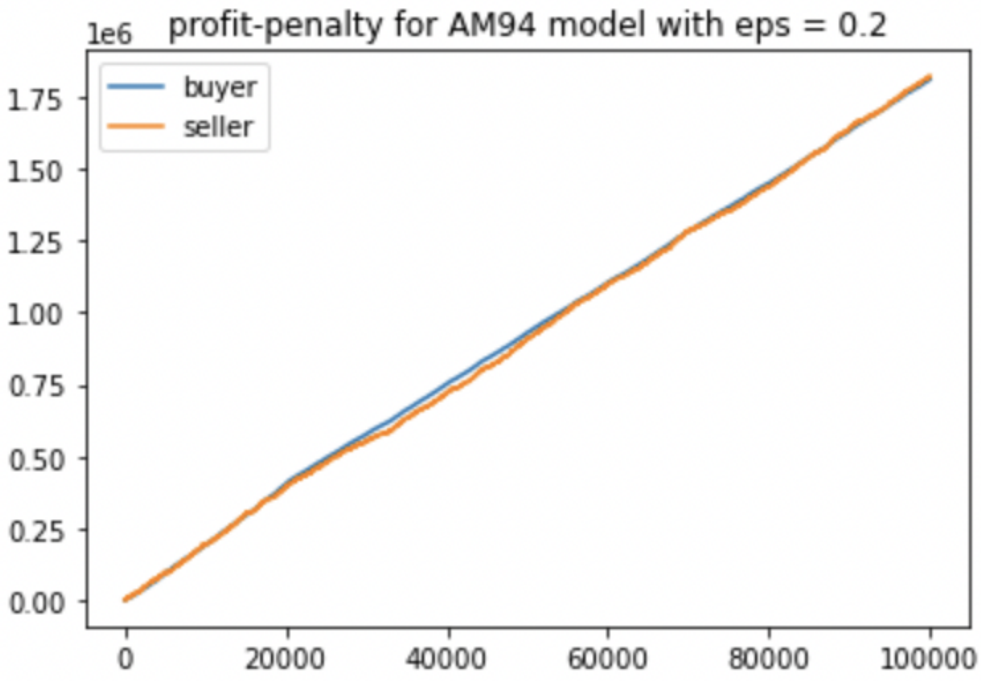

Figure 36: profit - penalty,no reward,implementation

2.3 AM model

AM models can be compared with AM94 and SR models, all with no reward.

2.3.1 AM on $\epsilon = 0.4$

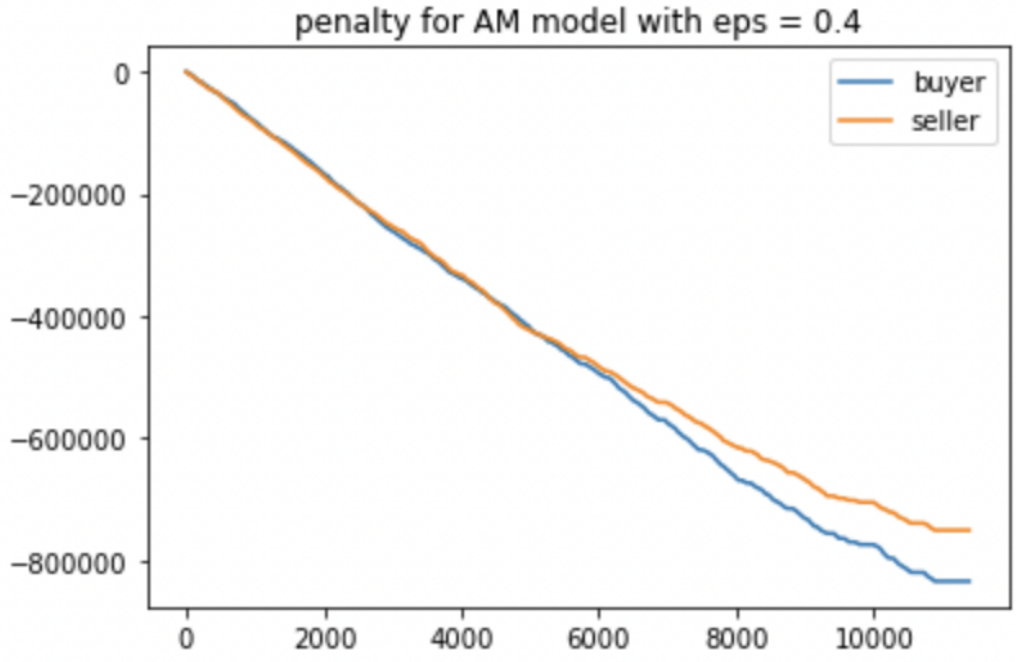

Figure 37: full penalty

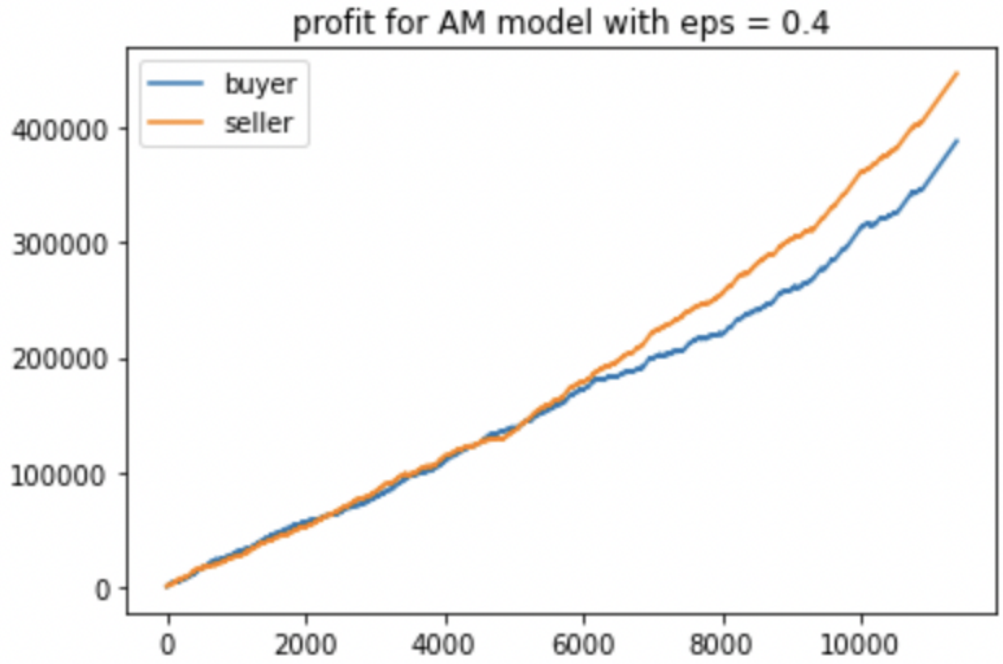

Figure 38: full profit

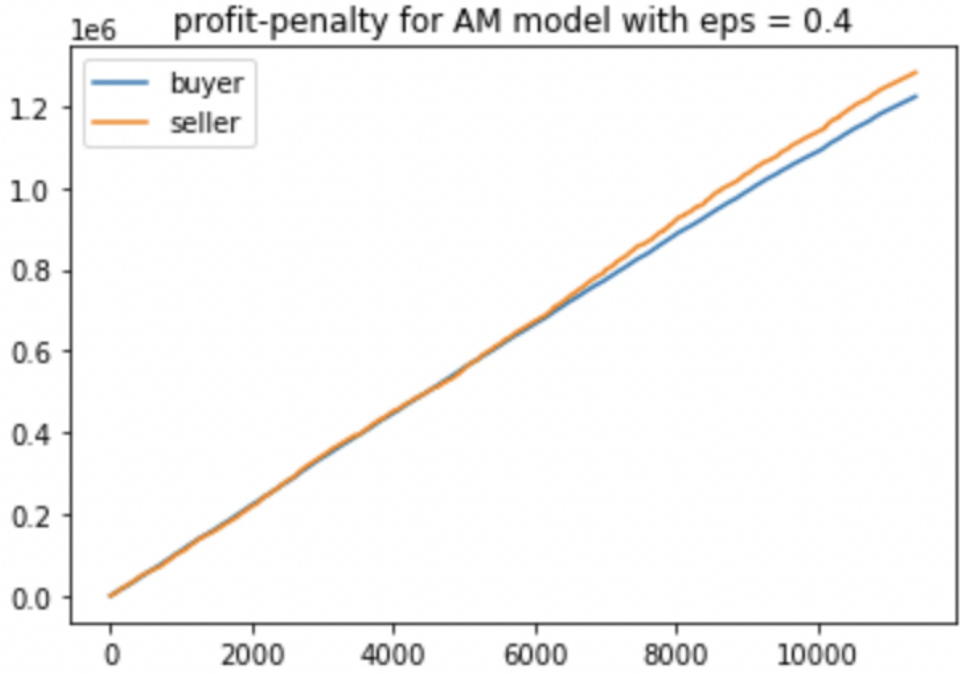

Figure 39: profit - penalty

If we consider only successful implementation situations, we can get other 3 pictures

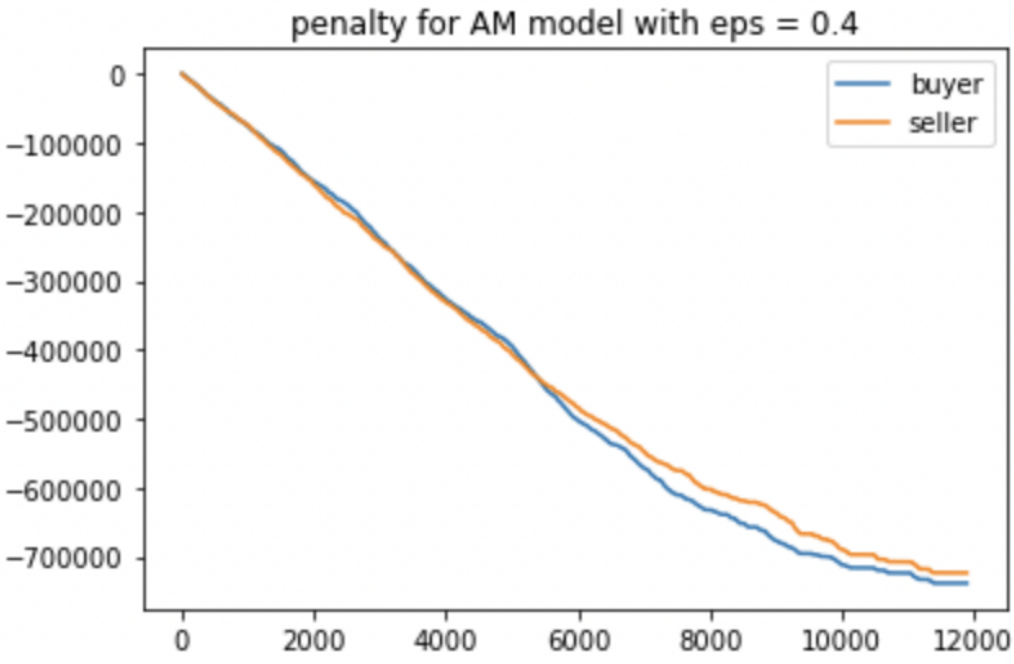

Figure 40: full penalty,implementation

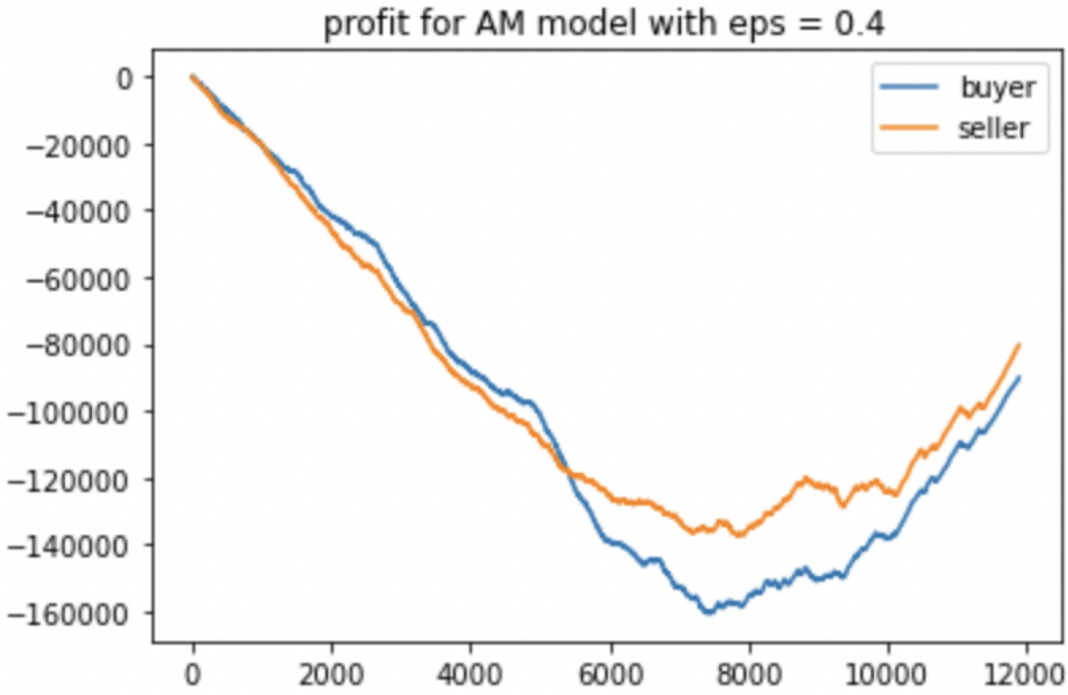

Figure 41: full profit,implementation

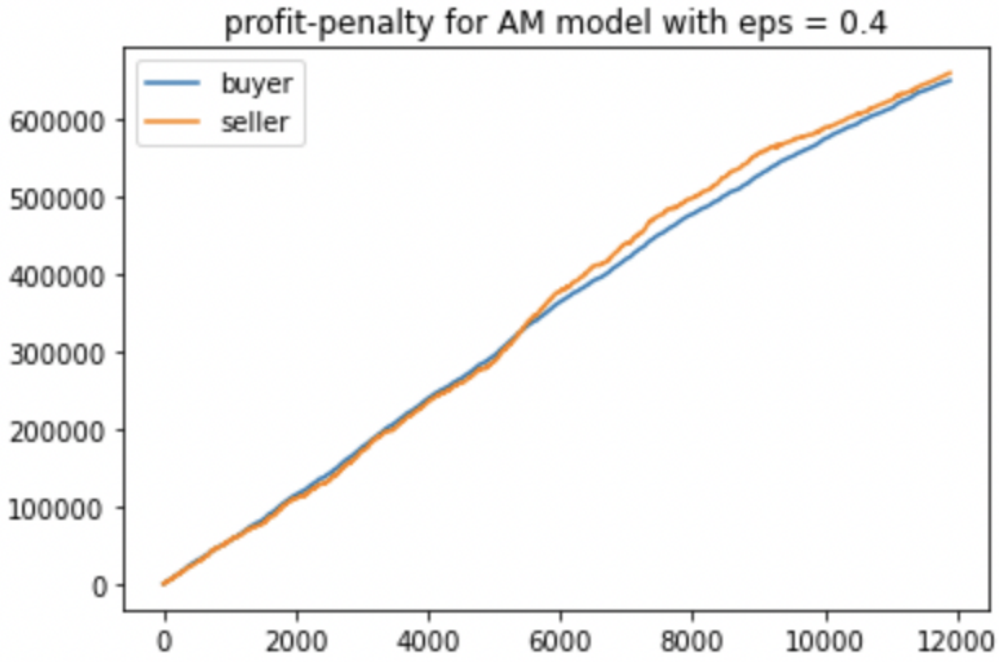

Figure 42: profit - penalty,implementation

2.3.2 AM94 with reward on $\epsilon = 0.3$

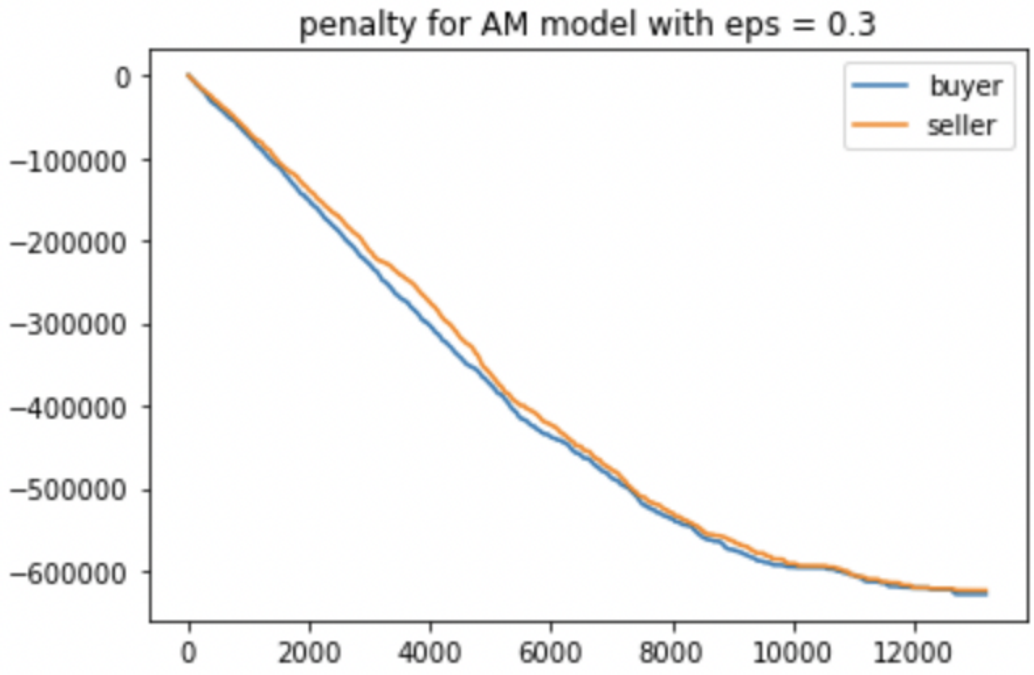

Figure 43: full penalty

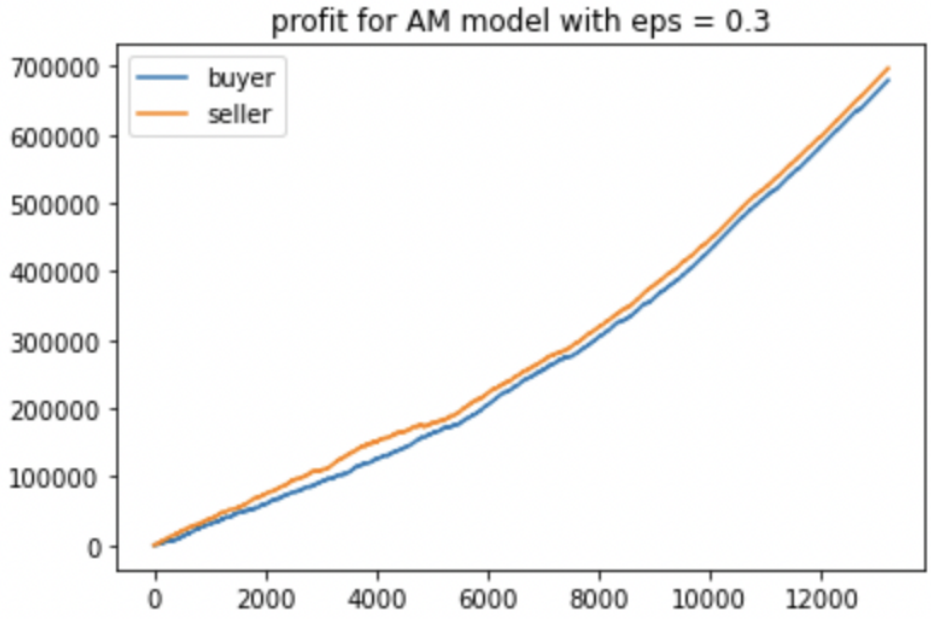

Figure 44: full profit

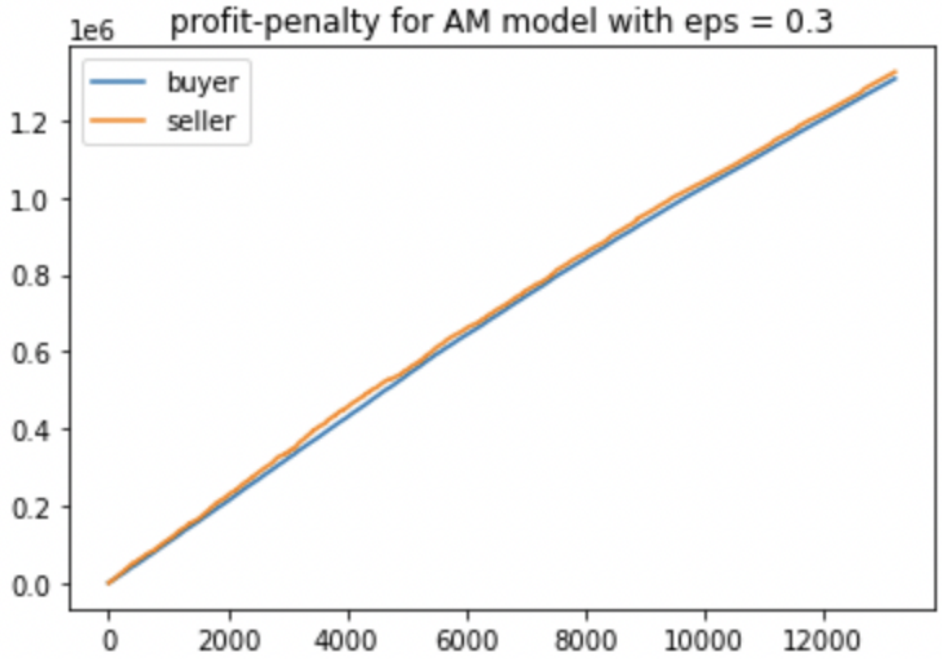

Figure 45: profit - penalty

If we consider only successful implementation situations, we can get other 3 pictures

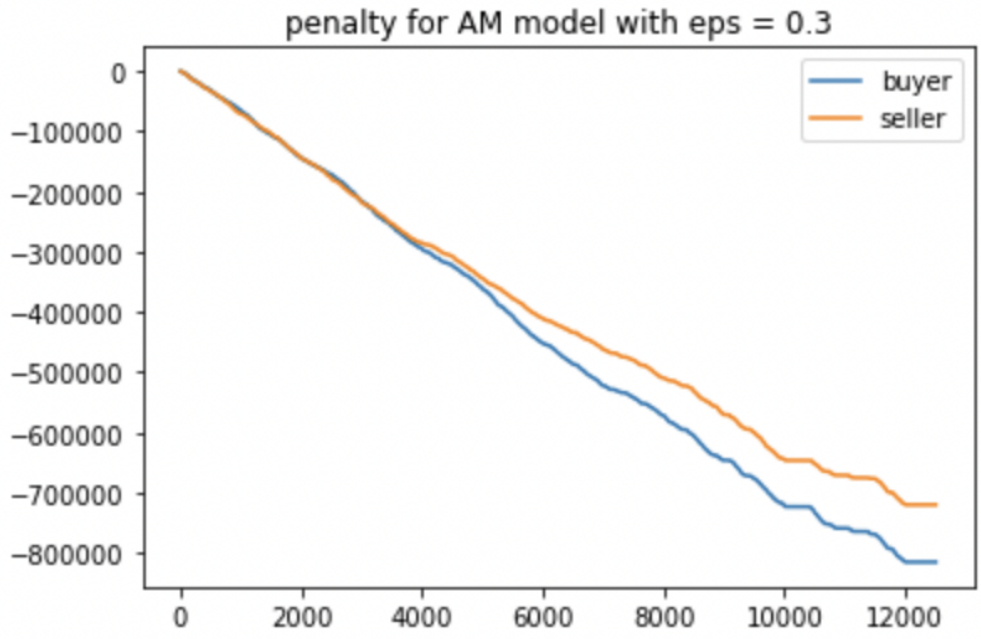

Figure 46: full penalty,implementation

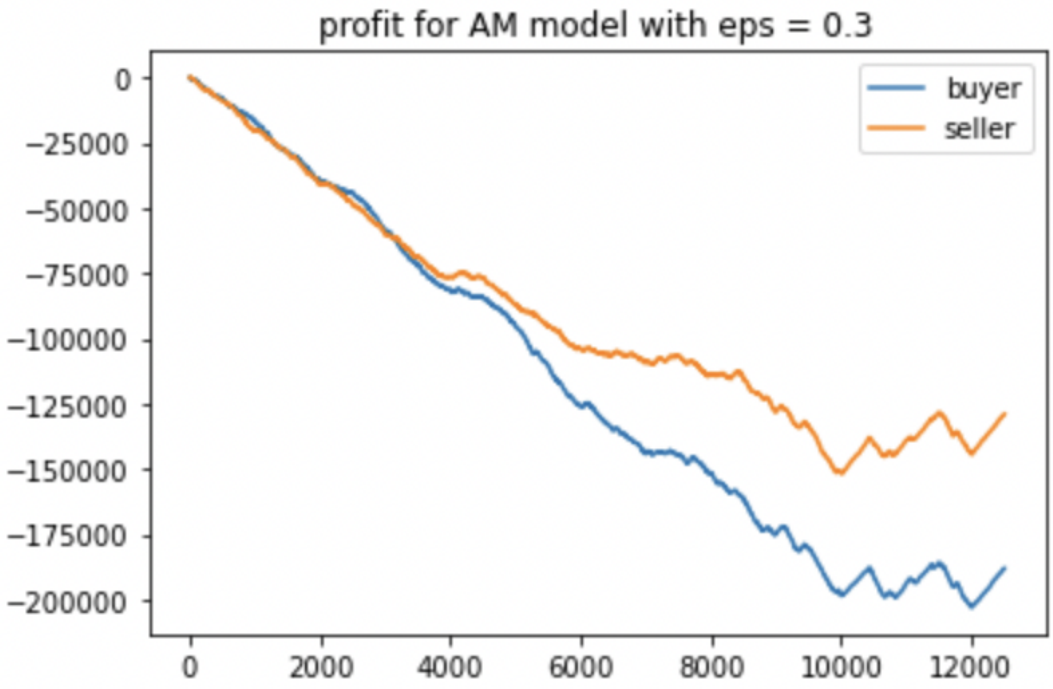

Figure 47: full profit,implementation

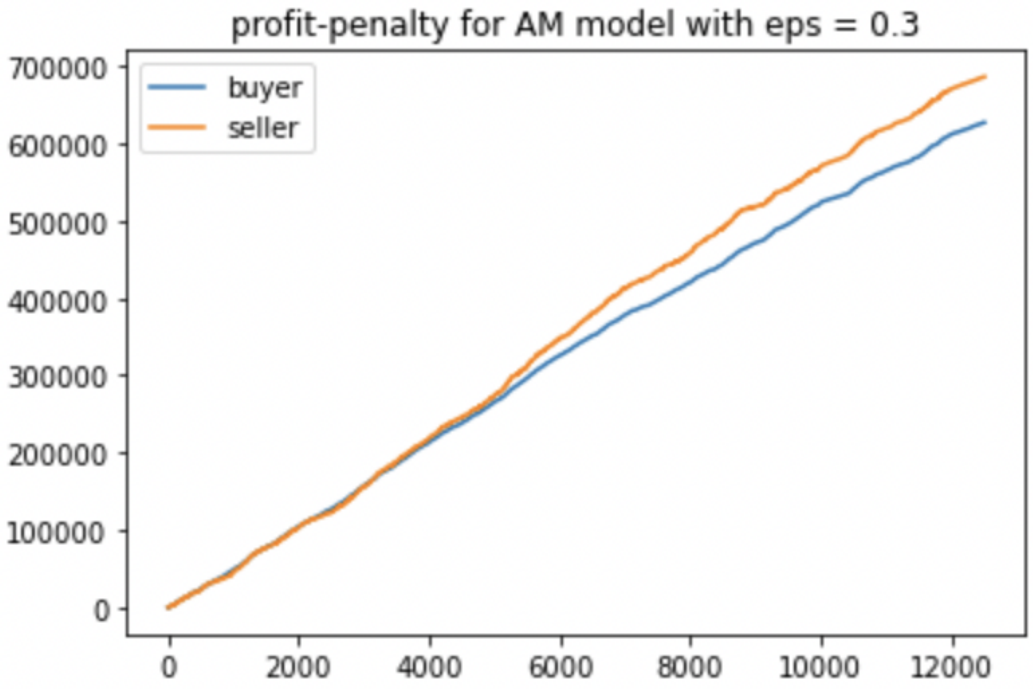

Figure 48: profit - penalty,implementation

2.3.3 AM94 with reward on $\epsilon = 0.2$

the turning point is around 0.23, so this result does not converge.

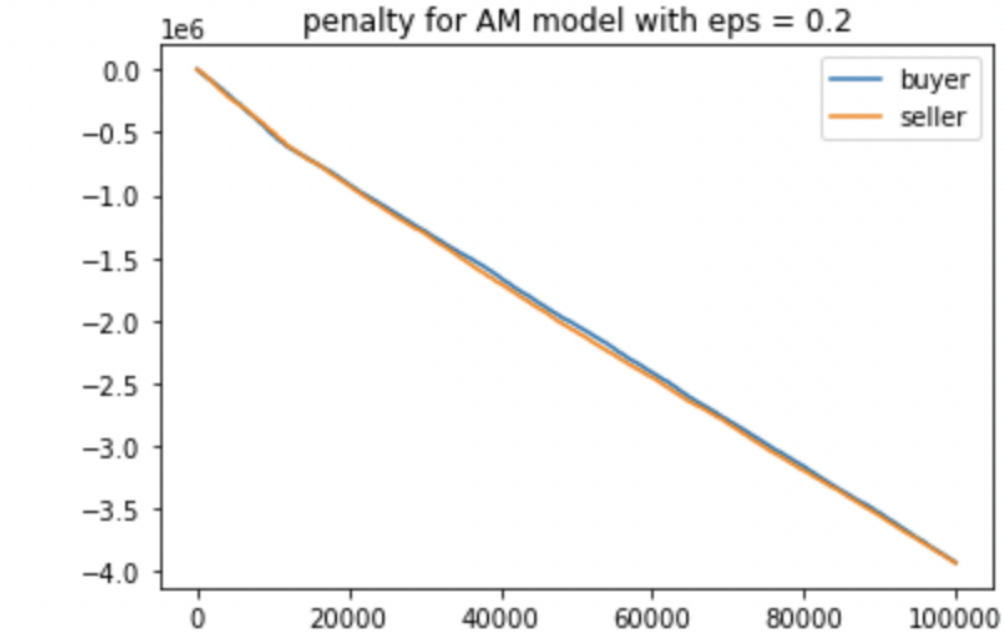

Figure 49: full penalty

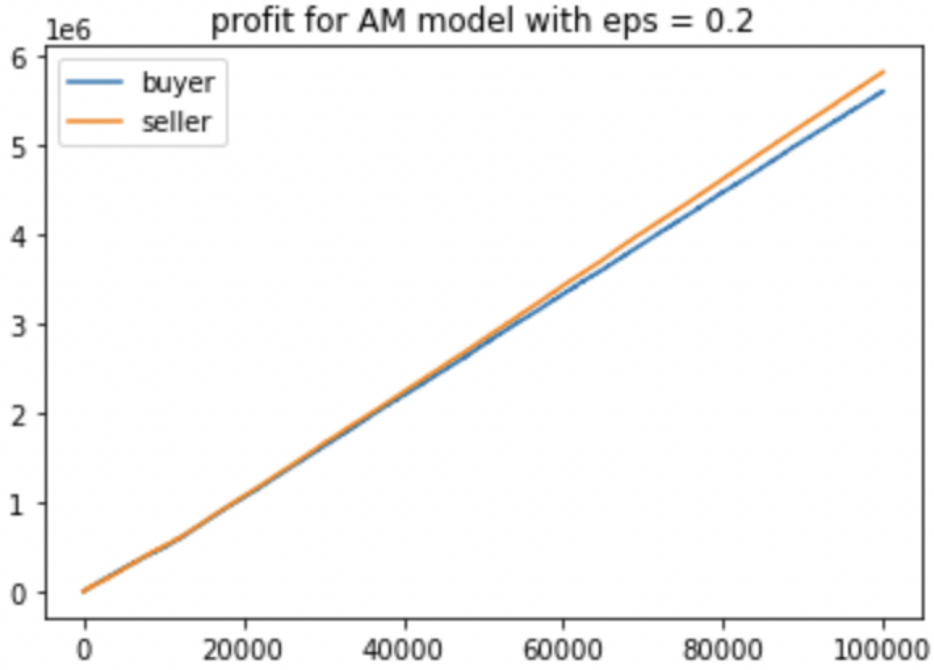

Figure 50: full profit

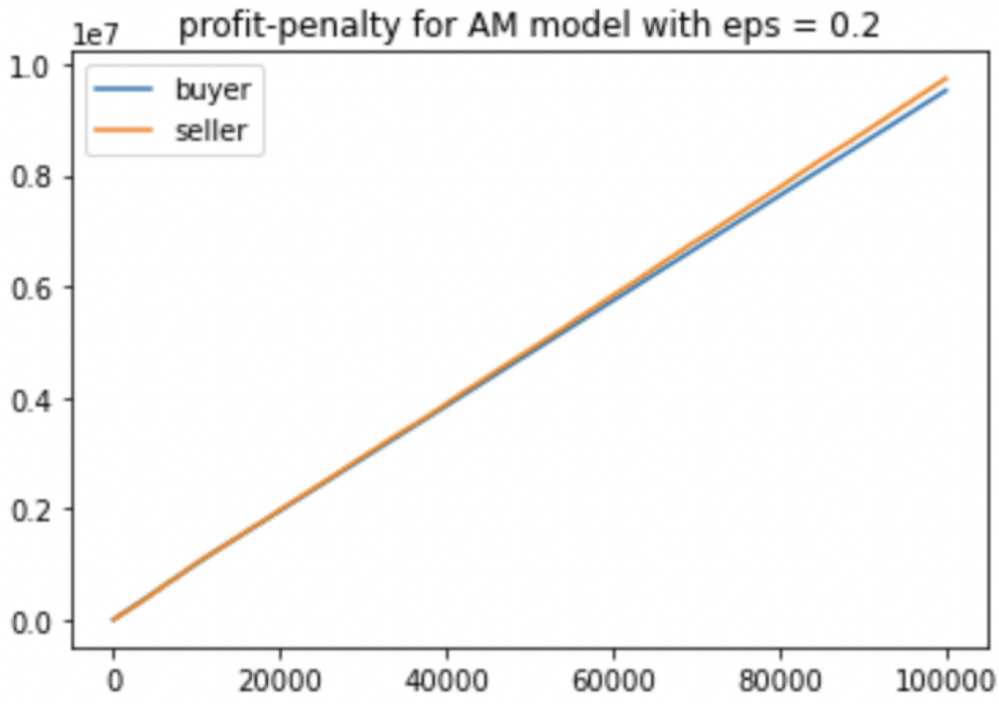

Figure 51: profit - penalty

If we consider only successful implementation situations, we can get other 3 pictures

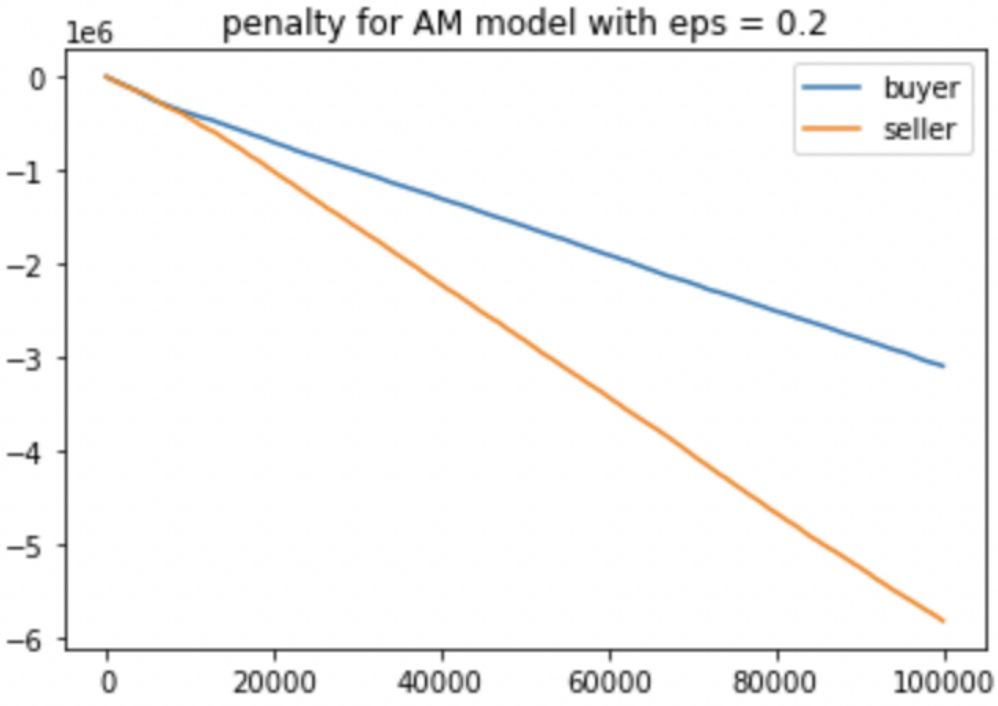

Figure 52: full penalty,implementation

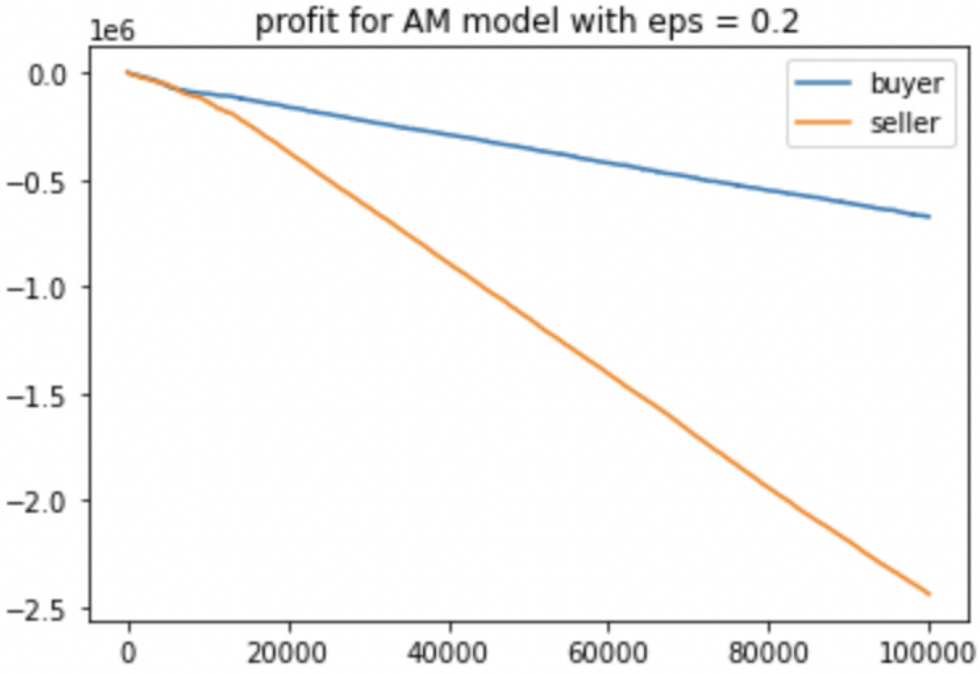

Figure 53: full profit,implementation

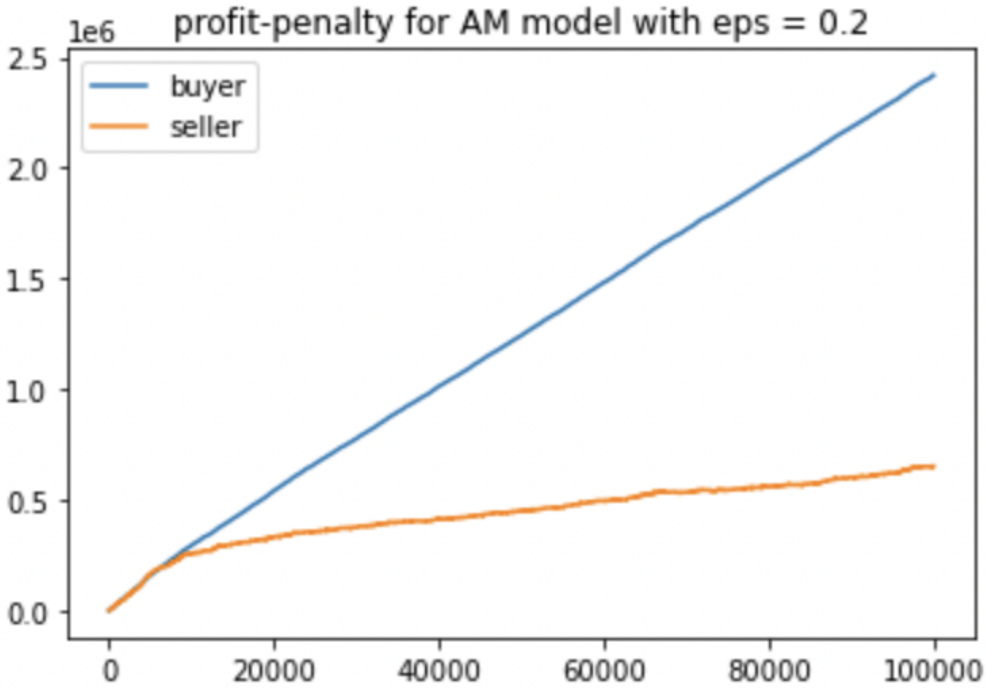

Figure 54: profit - penalty,implementation

2.4 SR model

SR models have no ϵ.

2.4.1 SR model

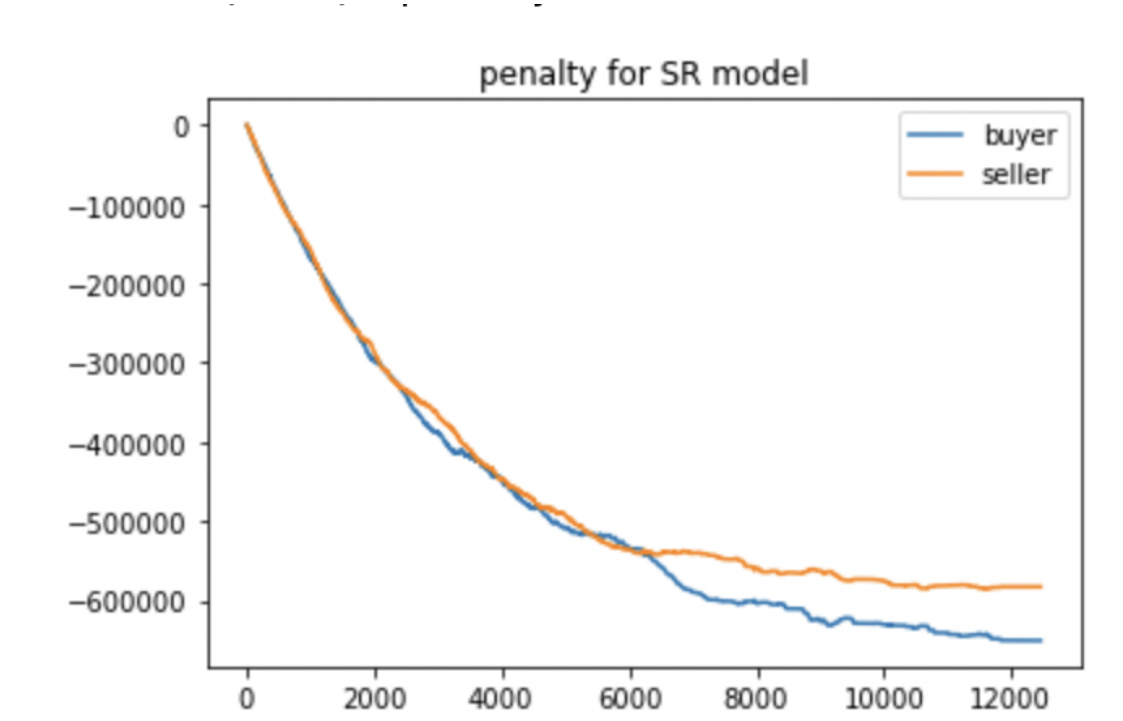

Figure 55: full penalty

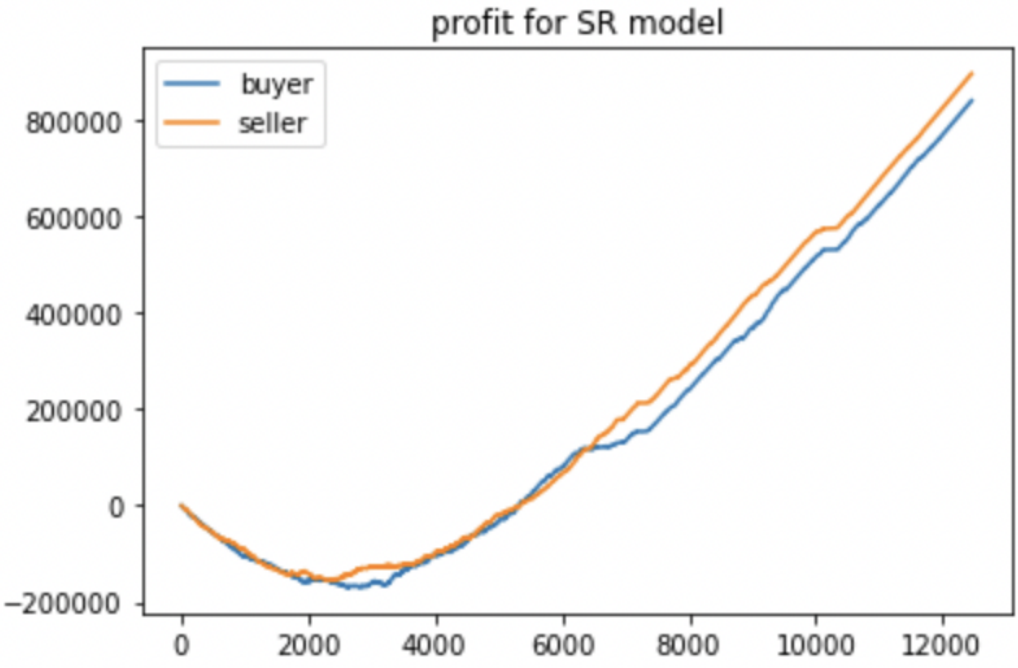

Figure 56: full profit

Figure 57: profit - penalty

3 Relearning Study of AM Models with Different ϵ

If we relax the ϵ of the AM model, players need to undergo relearning to achieve a converged state. Starting from the converged state, different ϵ values lead to varying outcomes in terms of re-convergence. As shown in the figure below.

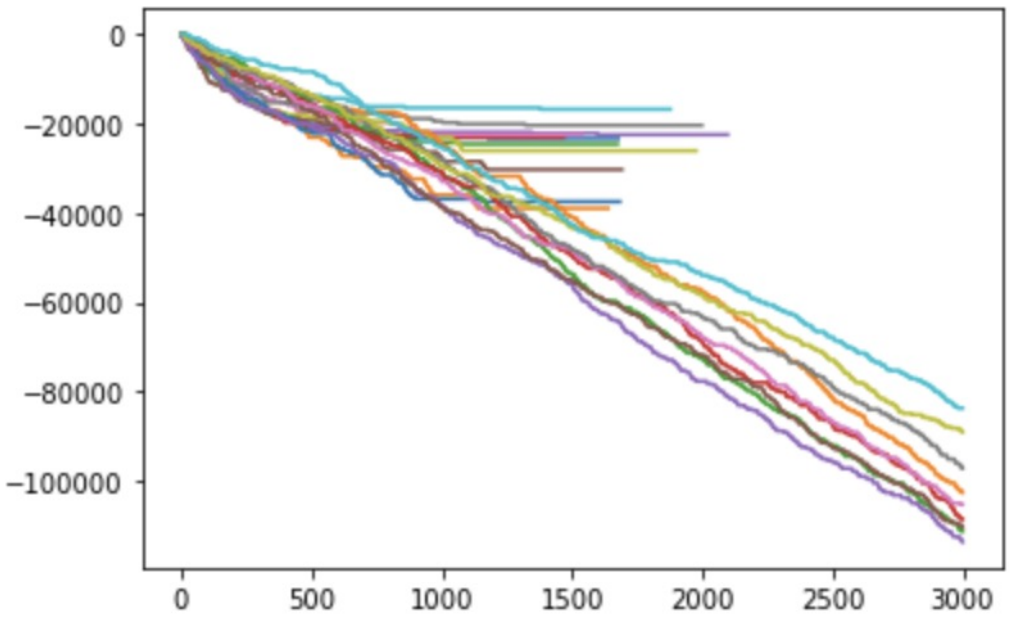

Figure 58: relearning study for AM with different ϵ

In the picture different lines stand for different ϵ, the lower the lines the smaller the ϵ

the conclusion that can be drawn is that relearning states that do not converge, regardless of their lack of convergence, still do not converge, as long as they are below the turning point.

If we retrain the SR model and transition from a converged state to a non-converged state, each time we can return to the converged state, as shown in the figure.

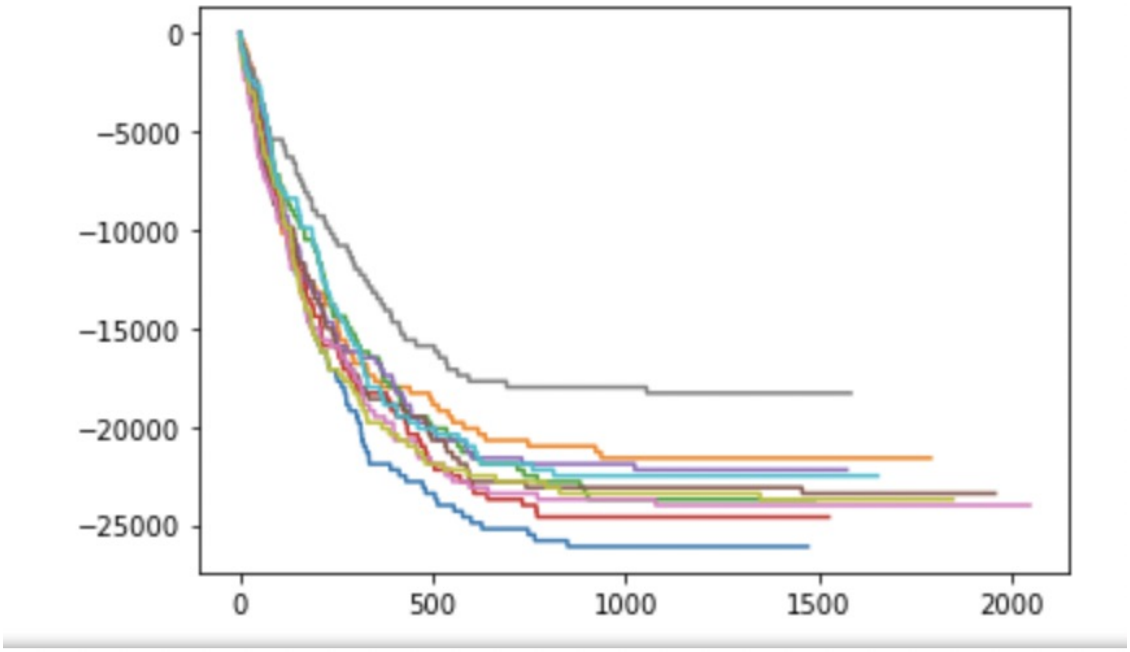

Figure 59: relearning study for SR

In the picture we choose different state, we can see that all state will go to convergence state

4 Future work

0) Attempt to identify a parameter set applicable to all states, rather than restricting it solely to states (2,2) and states (2,1). Execute the parameter loop across all scenarios and then contrast the outcomes with those of states (2,2) and states (2,1).

1) Conduct an ϵ cycle, experimenting with a broader range of ϵ values across all models. The goal is to pinpoint the precise turning point for each model.