Evaluating the Effect of Time for Implementing Black Hole on RZ CT Progression

I have a new strat called RZyoyoyo

How to do RZyoyoyo?

Buy variables at yo yo yo, Pub at yo yo yo, Black hole at t = yo yo yo

There u go, u have mastered it.

jk, the real stuff begins below.

1. Introduction and Summary

Implementing black hole at the correct time is very essential for pushing RZ tau at an efficient way. From what is found, it is more practical and more optimized if u **start using your black hole at/after 60% of the end of the publication**.

2. Methodology

A data set of t, z and z' had been obtained and undergo the manipulation of rho dot via. the formula provided in game, i.e., rho dot = (time interval) * t/((z/2^b) + 0.01). Then, cumulative rho up to an arbitrary time t was manipulated by **summing up all rho dot up to the time t**. Finally, by fixing rho dot after time t, which mimicked the effect of implementing black hole, cumulative rho was manipulated by **summing up all rho dot from t = 0 until the end of the publication**.

A publication data set had been simulated with the following settings: Given a publication that had **the same levels of c1, c2, w1 and w2 throughout**, the cumulative rho at the end of the publication had been manipulated with **black hole implemented at varying t towards the end of the publication**. Then, the result could be visualized and represented by **plotting a graph of cumulative rho at the end of the publication against the time for implementing the black hole**.

In short, one should interpret the graphs as the following:

(i) y-axis is the **maximum rho (in arbitrary unit) obtained at the end of the publication**

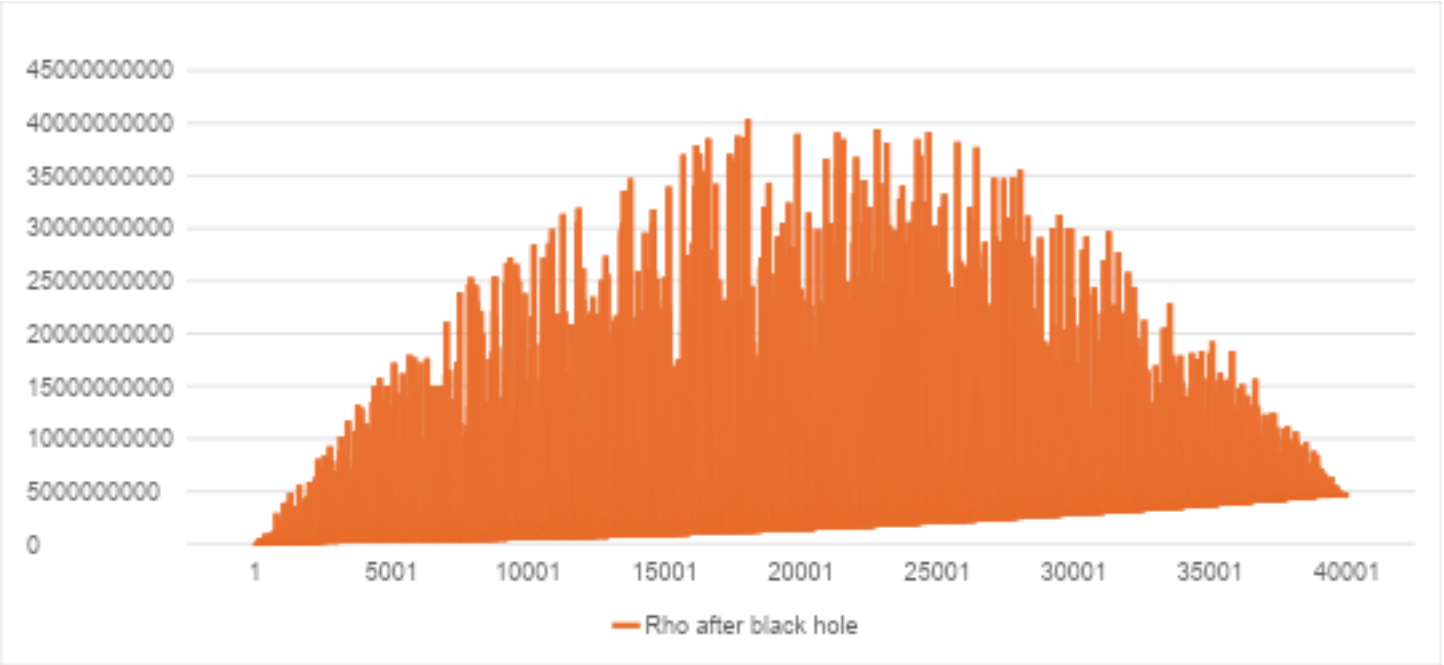
(ii) x-axis is the **time (in t) when black hole is being implemented**

It is worth noting that y-axis for both cumulative rho and cumulative delta are in **arbitrary units**, and they **deviate from the real result by a linear factor** (affected by c1, c2, w1 and w2).

3. Result

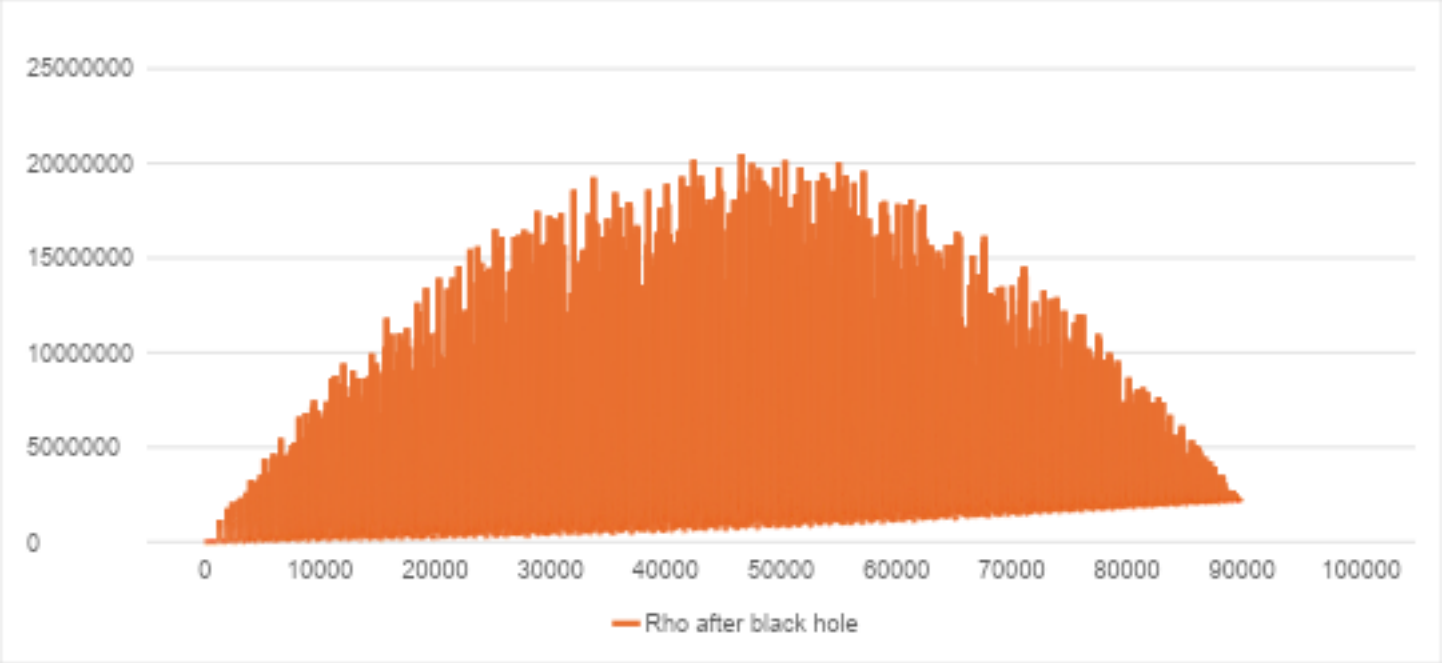
4 different data sets were tested with the simulation of **b = 1.5** and the results were obtained, they were

(i) a publication at **t = 40, 000** with **time interval 1**, maximum cumulative rho can be resulted at t = 40, 000 if black hole is implemented at **t = 18, 047** (**45.1%**; See Graph 1 below)



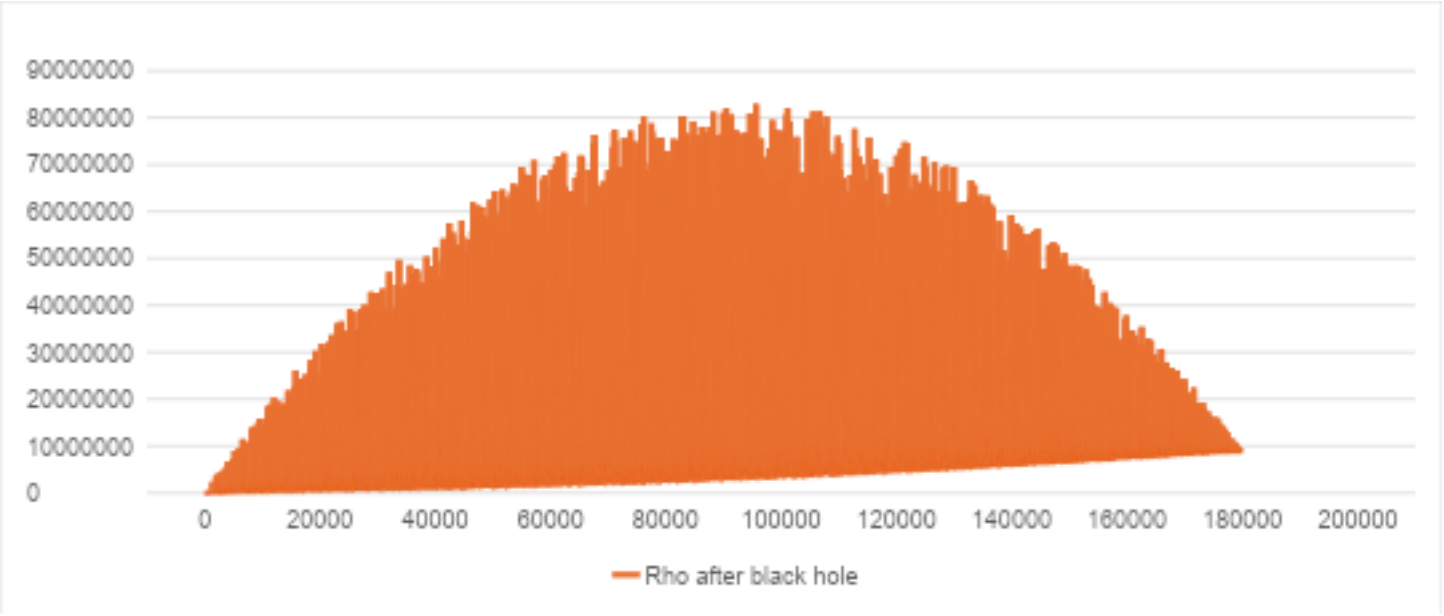
Graph 1: a publication of t = 40, 000, with cumulative rho plotted against time of implementing black hole in linear scale

(ii) a publication at **t = 900** (i.e., a publication with **1 hour in real time**) with **time interval 0.01**, maximum cumulative rho can be resulted at t = 900 if black hole is implemented at **t = 466.56** (**51.8%**; See Graph 2 below)



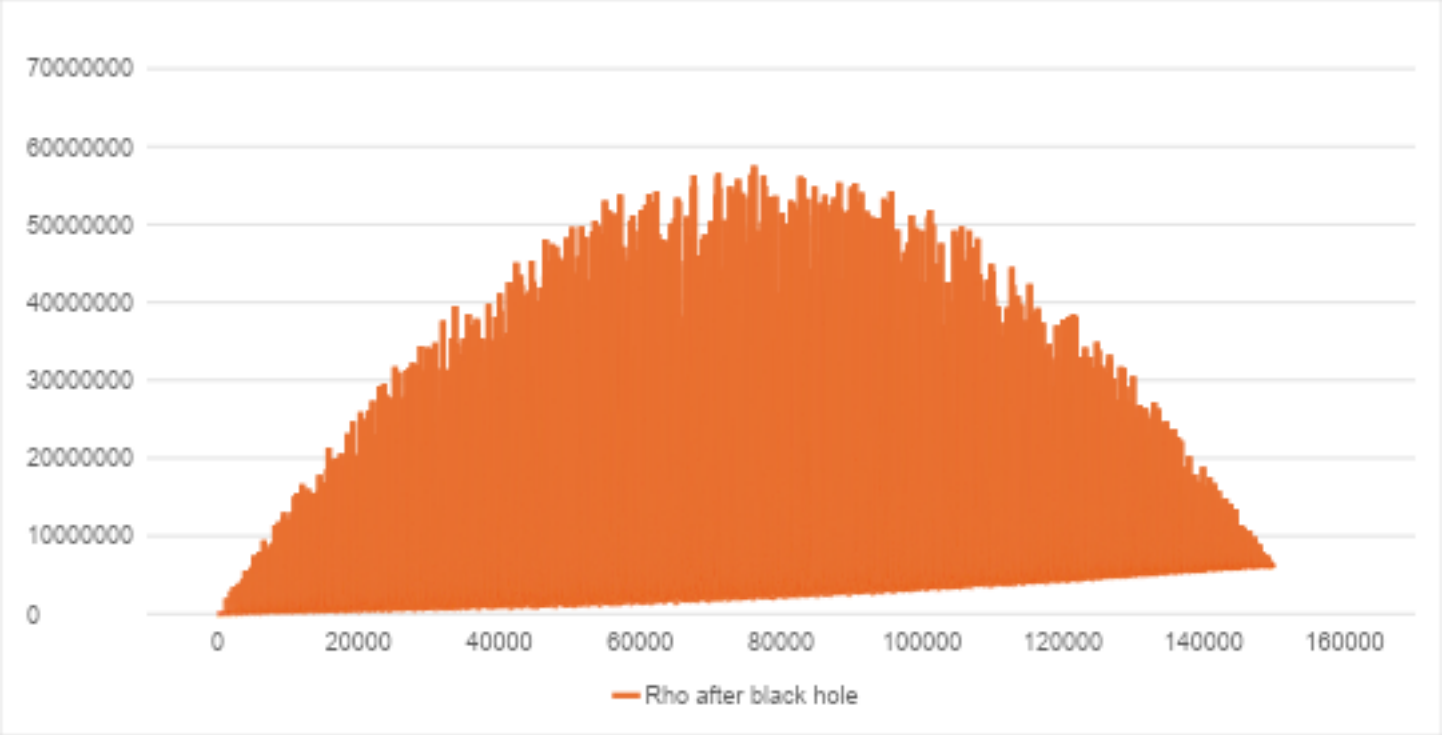
Graph 2: a publication of t = 900, with cumulative rho plotted against time of implementing black hole in linear scale

(iii) a publication at **t = 1, 800** (i.e., a publication with **2 hours in real time**) with **time interval 0.01**, maximum cumulative rho can be resulted at t = 1, 800 if black hole is implemented at **t = 957.5** (**53.2%**; See Graph 3 below)



Graph 3: a publication of t = 1, 800, with cumulative rho plotted against time of implementing black hole in linear scale

(iv) a publication at **t = 1, 500** (i.e., a publication with **100 minutes in real time**) with **time interval 0.01**, maximum cumulative rho can be resulted at t = 1, 500 if black hole is implemented at **t = 762.69** (**50.8%**; See Graph 4 below)



Graph 4: a publication of t = 1, 500, with cumulative rho plotted against time of implementing black hole in linear scale

All 4 data sets showed similar results that **maximum cumulative rho was obtained at the end of the publication if black hole is implemented at last 1/3 of the publication**.

4. Conclusion and Discussion

4.1 Conclusion

The above investigations illustrate the fact that **implementing black hole at different times does affect the cumulative rho obtained at the end of the publication**, thus affecting the time required for publication and efficiency of gaining tau for growth. Simulation across different data sets also demonstrates the **consistency of**

implementing black hole at 60% of the publication for optimization, and the hypothesis that **the duration of publication seems to be independent to the time of implementing the black hole** (only the relative duration does).

4.2 Replication of Result/Hypothesis

To verify the findings, I have used my own game progress for testing. In total I have tested 3 rounds of publication with **double chase strategy***, and their results are as follows:

(i) Publication from e644 to e649 rho, using black hole at **t = 388.84 (32.4%)**, publication duration **80 minutes**
(ii) Publication from e649 to e654 rho, using black hole at **t = 732.81 (69.8%)**, publication duration **70 minutes**
(iii) Publication from e654 to e659 rho, using black hole at **t = 679.74 (70.8%)**, publication duration **64 minutes**

*Double chase strategy suggests that a player should **auto buy c2, w2 and b**, while **buying c1 and w1 when the cost of them is less than 10% of c2 and w2** respectively.

Although the hypothesis was only tested a few times, the above result seemed not to be **in line with the hypothesis on the smaller t side**. Yet, the above experiments were still **not sufficient to show that the optimization point were reached due to the factor of the effect of c1, c2, w1 and w2**, more experiments are to be carried out to show **the publication duration will be longer when the black hole is implemented too late**. And I will continue to test for the hypothesis or using the actual RZ simulation as a reference.

4.3 Evaluating the Effect of b, c1, c2, w1 and w2

The above simulations took on a major assumption of a publication that had **the same levels of b, c1, c2, w1 and w2 throughout**, which allowed the manipulation of cumulative rho/delta in a **single independent variable setting** and hence validated the fair comparison among independent variables. However, such assumption was **practically impossible** during the actual situation. As the effect of variables on the cumulative rho is **complex** and **highly dependent on the activeness of player**, it was also theoretically challenging to simulate the exact effects on all available data I had in my excel. To evaluate the general/rough effects of b, c1, c2, w1 and w2, I will explore them **in the view of the equation of rho dot and delta dot in game** and in turn **evaluate the effect of such on the graphs**, hence provide a more refined hypothesis.

(i) **The cost of purchasing c1, c2, w1 and w2 has no effect on the graphs**, as the graphs plot the cumulative rho/delta but not the rho/delta a player have at a specific t.
(ii) **The effect of c1, c2 and w1 will shift the graphs of cumulative rho upward and rightward** at a non-linear scale, as rho dot directly depends on c1, c2 and w1.
(iii) **The effect of w1 and w2 will shift the graphs of cumulative delta upward and rightward** at a non-linear scale, as delta dot directly depends on w1 and w2.
(iv) **The effect of b will shift the graph of cumulative rho and delta upward at an exponential scale**, as it

directly influences rho dot and delta dot in an exponential manner

(v) **The effect of shortened time buying the variables will shift the graphs of cumulative rho and delta leftward** at a non-linear scale, as it allows an earlier spike for cumulative rho and delta in a repeatable manner.

Overall, purchasing c1, c2, w1 and w2 has an effect of **shifting graphs upward and slightly rightward**, indicating the **implement of black hole is possible to be pushed back slightly for optimization**. However, the above suggested effects were **not exact** and were **not strictly experimented**, which hope to be understood more clearly after the actual RZ simulation is available to the public.

4.4 Evaluating Publication Time

Since the time for implementing black hole **rely on the publication duration**, it is important to obtain the information about the publication duration of the publication undergoing. However, due to the regression properties of the hypothesis, it is **practically impossible** to obtain such information and perfectly set the time for implementing black hole.

Based on the available data in Discord regarding the publication time, it is concluded that **the publication duration is increasing slightly with rho/tau** in the interval of e600 rho and e1, 000 rho. Therefore, it is possible to **estimate the publication duration of the current publication by using the publication duration of the previous ones**. However, this estimation is only valid if one **performs both publications consistently**, this includes the **activeness,** and the **strategy used** in both publications.

4.5 Evaluating the Actual Time for Implementing Black Hole

Implementing the black hole at the right time is essential for rho/tau growth since it fixes z' as well. However, the continuity of the publication duration does not have the same nature of the discreteness of the solution for z = 0, which may **lead to suboptimal z' if the hypothesis is strictly followed**.

In response of this, there are also data from Discord about z = 0 with particularly higher z' as a list. One can consider **selectively setting t with z = 0 and high z' as the time of implementing black hole** instead of the theoretical values obtained from the hypothesis. From the graphs above, it can be observed that **selecting a time for implementing black hole that slightly deviates from the hypothesised time minimally affect the cumulative rho/delta** obtained at the end of the publication. Yet, this discussion **has not been strictly tested** and errors could persist. Do note that the 3 experiments I used to test with my own game save has selectively used t with z = 0 and high z' instead of hypothesised time.

4.6 Evaluating the Effect of w3

w3 is a variable available at e1, 000 rho of RZ, which is not available for me to test on due to my own progress. The effect of w3 **will be evaluated at a later stage**, or after the RZ simulation is available to the public.

4.7 Proposing a Possible New Route for Completion of RZ

Base on the discussion and all available data we have at this moment, it may be reasonable to **propose a new route of publication** for completion of RZ CT between e600 rho and e1, 000 rho, the general routing will be as follow:

(i) **Take a note on the duration** of your previous publication. **Calculate the hypothesised time** for implementing black hole (i.e., 60% of your publication time, or slightly later).
(ii) **Set the time for implementing black hole that is z = 0 and has a high z'**, and is sufficiently close to the hypothesised time calculated from previous step.
(iii) Start playing the publication with **double chase strategy**.
(iv) When the black hole is implemented, **continue the double chase strategy until the end of publication**.

5. Acknowledgement

Lastly, I would like to give a huge thanks to the following people/group of people for assisting the verification of hypothesis and further findings on RZ CT:

(i) **Prop** - For designing the RZ CT, providing data for processing and verifying the hypothesis, and refining on the accuracy of the hypothesis.
(ii) **Hotab** - For designing the simulation for RZ CT and suggesting the concept of deviating from theoretical time and selecting t with high z'.
(iii) **invalid.user_** - For suggesting the point of assessing the effect of b on cumulative rho and delta, and bringing up several points in discussion section to investigate with.
(iv) **Axiss, lll333, Black Seal, Mathis S., Megamin, Maimai** - For willing to test my hypothesis with their save and bringing up several points on my hypothesis. (ofc, thanks Maimai for enlightening of RZyoyoyo lol)
(v) **All other people** - For providing experimental data and providing support whenever I need them.