CHESS.COM
MARKETING STRATEGY

Invest in Twitch! Twitch is powerful platform that is especially critical to chess.com. Partnering with chess twitch streams such as GrandMaster Hikaru is a great way to promote chess.com. Moreover, even if a deal with Mr.Hikaru is not viable, he is still indirectly promoting our website by playing solely on it!

Overall, investing in the twitch platform is highly reccomended.

Chess Championships: Hosting chess championships is the second best marketing strategy that we have. In fact, helping our competitors such as LiChess and Chess24 also help us out! This is largely due to our brand factor. Moreover, although there are no immediate effects on hosting championships, in the long run it is extremely beneficial!

Focus on iOS Users : Our data shows that we have a better application in the iOS space and should focus our efforts on this platform rather than Android. Moreover, we also have more downloads on iOS since we offer more unique features such as puzzles and more robots to play chess against. Instead of treating our iOS and Android users as equal, we should continue adding more and more features to our iOS space. A recommended next step would be to release an Apple Watch chess.com application. Our long term strategy should be to expand to Apple TV as well as the Mac App store.

2 Segments : It is important to know our customer base for future decisions. We largely have 2 segments of customer -- the early adopters and the late adopters. Moreover, the early adopters tend to lose interest over time, whereas the late adopters tend to increase their interest over time. We can use this information to be try new policies and promotions on the first segment, and if doesn't work out, we can always be sure that we will have another segment of late adopters to acquire using improved strategies from the ones used in the first segment!

Queen's Gambit and Chess Analysis

The Wharton School at the University of Pennsylvania

1 Introduction

Queen's Gambit – the incredibly famous Netflix series – has taken the world by storm. The series narrates the story of an orphan who goes to become a world chess champion. Besides being Netflix's most-watched limited series to date, it has sparked an unprecedented interest in chess. In this paper, we aim to understand, explain and infer the increase in chess.com mobile application downloads.

1.1 *Data Description*

The data for iOS and Android downloads of the app version of chess.com were taken from App Annie. Moreover, Netflix's viewing data of the Queen's Gambit is used unofficially. Covariate data is taken from a few outside sources that are elaborated below.

1.2 *Questions*

This paper will aim to answer the following questions :

- How does the heterogeneity of chess.com's mobile customer base look like?
- Is hosting online chess championships an effective marketing strategy for chess.com?
- Do chess championships, regardless of whether they are hosted by chess.com or its competitor, positively affect downloads of chess.com's iOS app?
- What are the immediate effects of the PogChamps 3 tournament?
- How vastly did chess.com benefit from Netflix's Queen's Gambit?
- Given that Queen's Gambit was a limited series with no known sequel, what steps can chess.com take to carry forward the upward momentum provided by it?
- Is advertising on Hikaru Nakamura's twitch platform a sound strategy for chess.com?

1.3 *Assumptions*

The models were operated under the following assumptions:

- The population of Android and iOS users in the United States is 20 million each.
- Users can only download the chess.com application. As it relates to the models, no-repeat downloading has taken place.
- For the purpose of this analysis, the dataset is acknowledged to be left-truncated and only data from August 30th, 2020 to February 28th, 2021 is used.
- The time period from February 7th, 2021 to February 28th, 2021is used as the holdout period for out-of-sample assessments of models. This represents close to 10 percent of the provided dataset.

1.4 *iOS vs Android*

After going through all seven of chess.com's monthly newsletters in the relevant time period to the chess community where the company announces new features and updates, it is clear that the iOS app is being operated much better than the Android one. For example, the "Beth Harmon" bot from Queen;s Gambit was first added to iOS during December, yet it still doesn't exist in the Android version. Furthermore, from the data provided it is clear that more users have downloaded the iOS version from the Android version. As such, the iOS dataset will be used for the analysis. The Android dataset will be considered towards the end of the analysis.

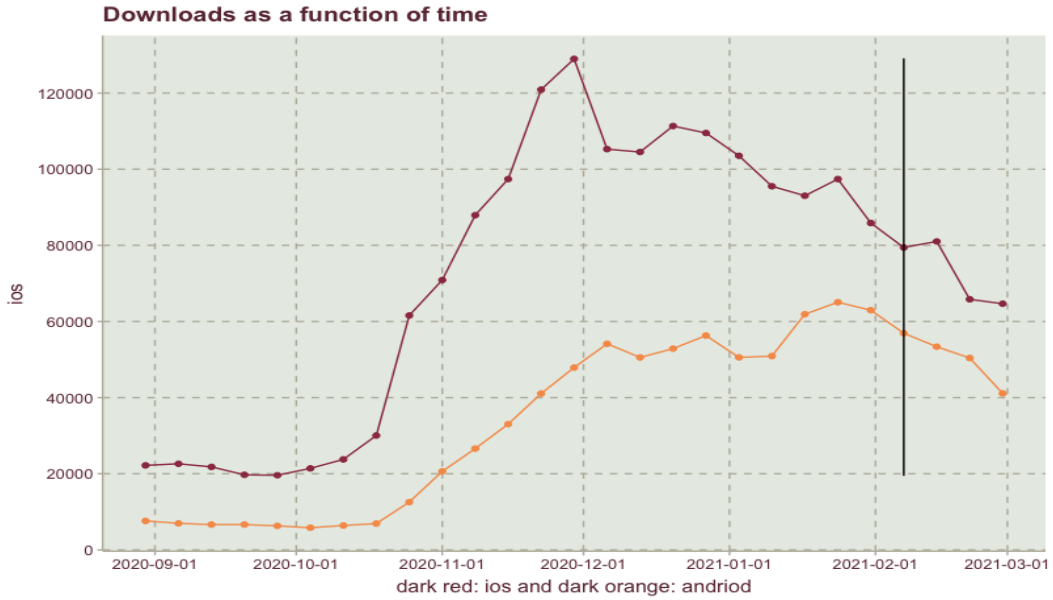

Figure 1: Downloads as a function of time

2 Method and Models

The data set clearly requires a continuous-time duration model. Below is a road map of how the model and story are going to be presented:

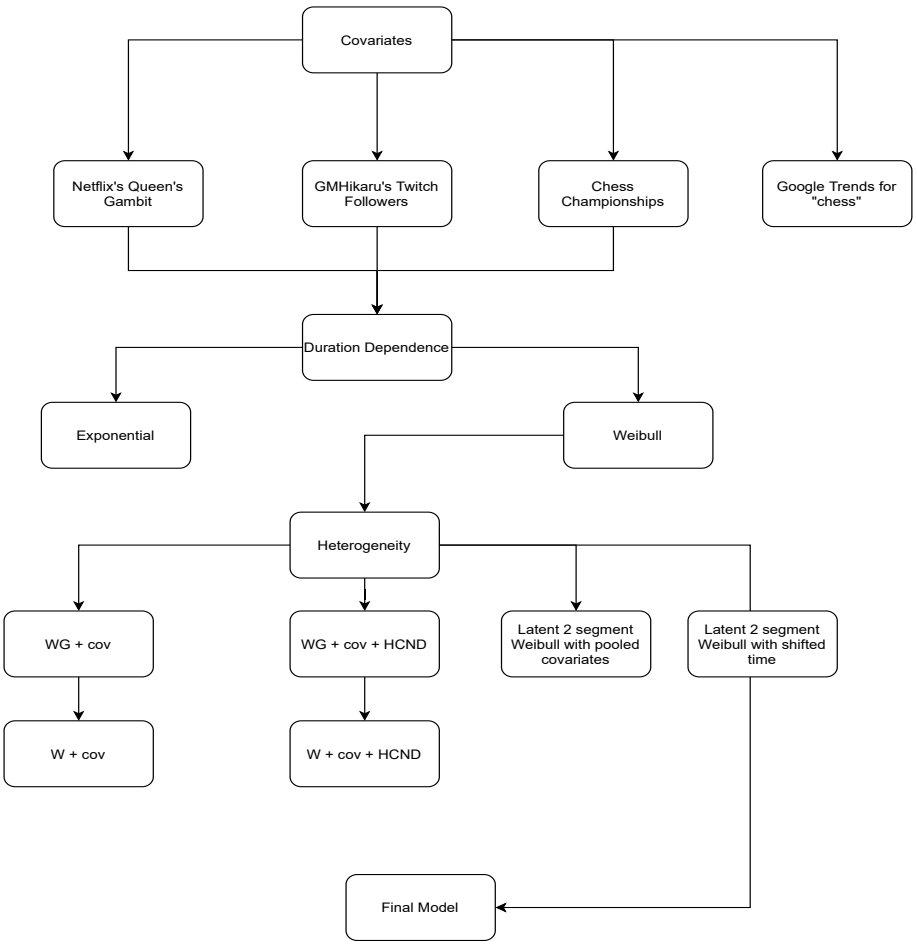

Figure 2: Flowchart of Final Model Process

2.1 *Covariates*

Note: Important acknowledgements of heteroscedasticity, multicollinearity and endogeneity are mentioned towards the end of the paper.

2.1.1 *Netflix Data*

It is crystal clear that Netflix's hit series The Queen's Gambit has played a very critical role in the rise of chess. Dubbed the "Netflix effect", multiple sources report that chess related aspects such as number of chess boards, number of games played etc have been on the rise following the release of this show. Moreover, a look at the raw data shows that there seem to be clear parallels between the number of weekly watches of the show and chess.com app downloads. As reported by the sources cited towards the end, approximately 62 million users have watched this show. As such, this is one of the main covariates that is being considered and the expectation is that this will have a positive, and possibly the largest, beta coefficient among the implemented covariates.

Queen's Gambit data was introduced in the models with a one week lag effect. It is the author's thinking that most people aren't going to pick up chess right after watching the first episode of the said show. It is far more likely that our customers will take some time to finish the 7 episode series. Moreover, chess.com's mobile application doesn't support fundamental features such as chess tutorials and video lessons of past games in the same capacity that it's website counterpart does. Therefore, it is reasonable to assume that most consumers will visit the website first, and after they have done so a couple times, will then download the application on their mobile phones.

2.1.2 *Hikaru Nakamura's Twitch Steam*

As noted by both the New York Times and in multiple blogs published on chess.com, international grandmaster and 5 time U.S champion Hikaru Nakamura's twitch channel has another powerful resource for those who wish to play chess. The main metric that was considered as a covariate was the number of followers gained in the relevant time period as obtained from twitchtracker.com. Two other data points that were considered were "hours streamed" and "concurrent views". The first metric was rejected on principle since it speaks more to the creator of the channel rather than the viewers. The second metric was also rejected on principle as it places more emphasis on repeat watching and those who tune in daily rather than individual watchers. There was no external effect such as lag or smoothing introduced for this covariate. A positive beta value is expected for this covariate.

2.1.3 *Chess Championships*

There were two major chess tournaments held during the relevant time period. The first one was the 2020 Speed Chess Championship held by Chess.com on their website. This tournament ran from November 1st, 2020 through December 12th, 2020 and had a grand prize of 250,000. Players included top world champions such as Hikaru Nakamura (youngest American grandmaster), Maxime Vachier Lagrave (seventh highest awarded played), Magnus Carlsen (current world champion), Levon Aronian(former world number 2) among others. The relevant weeks were marked with a 1 whereas the rest of the weeks were marked a 0.

The second major tournament was the first round of the Champions Chess Tour – the Skillings Open. These are a series of tournaments that play a major role in deciding the World Champion. This tournament took place from November 22nd, 2020 to November

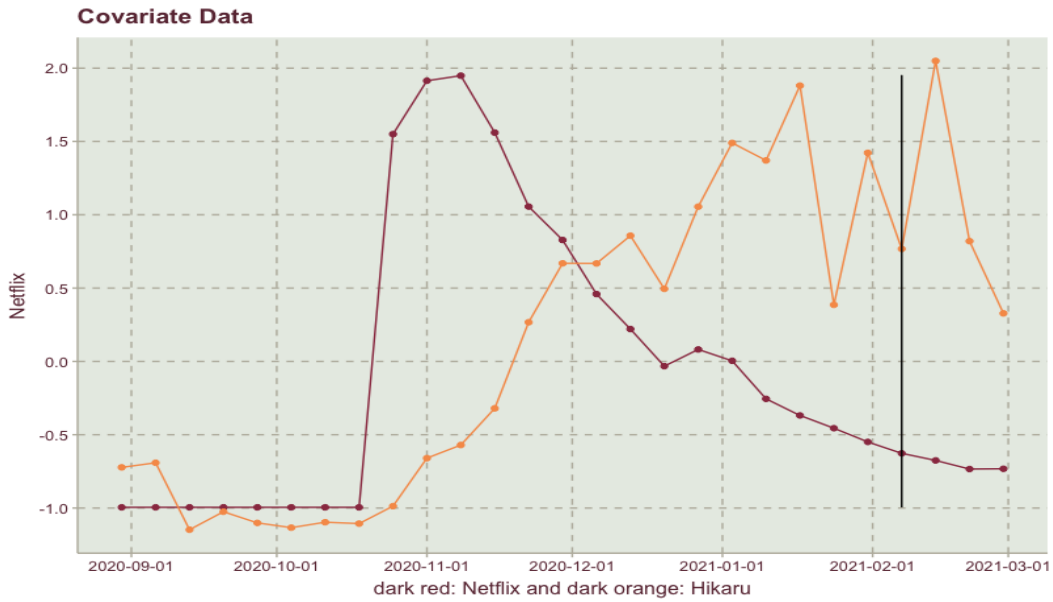

Figure 3: Netflix and GMHikaru's data

30th 2020. The same strategy described for the earlier tournament was used to bring this into the model. Participants included the players in the above paragraph as well as 12 other players, who together represented the majority of the top 10 current world chess players in the world.

Although the second mentioned tournament was held by chess.com's competitor lichess, below is an important reason as to why this is being considered in favor of chess.com's mobile application (but would not be if we were considering chess.com's website).

One of chess.com's strongest points is that this company is, in fact, named after the game itself. The company owns the domain chess.com, but more importantly, also owns the name "chess" on the app store. Most users when searching for chess apps on the app store are far more likely to search "chess" – referring to the game, not this company. However, due to their uniquely positioned brand name, the very first search is chess.com's mobile application. In contrast, chess.com's next 2 rivals, lichess and chess24, have their mobile applications also lichess and chess24. Note: There are a few other developers who have their app named chess, but these smaller developers are nowhere close to chess.com, lichess and chess24's popularity (chess.com's app is 13 currently in the entire games section).

2.1.4 *Google Trends Data*

Google trends data for the keyword "chess" was considered but ultimately not used. The primary reason for doing so was that there would be no key inferences about the customer base or chess.com that could be obtained from bringing this dataset into our model. For the previous covariates, if a positive beta value is found, actionable managerial statements can be inferred from the model. For example, if there is a high beta value associated with

Hikaru Nakamura's Twitch channel, a reasonable marketing strategy could be to form a partnership with Mr.Nakamura to advertise chess.com. Furthermore, it could emphasize that twitch remains a strong platform for chess.com to invest in. However, reasonably managerial actionable statements cannot be made for data from google trends. Therefore, this covariate was rejected based on the claim that it does not contribute to answering our managerial questions as proposed earlier.

To further build on this claim, a few models were run with this covariate being introduced alongside the other three that were mentioned. The result in almost all cases was that the model rejected this covariate by placing the beta of googletrends to 0.

2.2 *Duration Dependence*

Note: Only the incremental plots are shown here. The cumulative plots can be found in the appendix.
The Weibull distribution was used at the individual level as it allows for duration dependence. While we cannot yet comment on the exact nature of the duration dependence, the author believes that overall we should see positive duration dependence. Below is a comparison of the exponential + covariates and the weibull + covariates models.

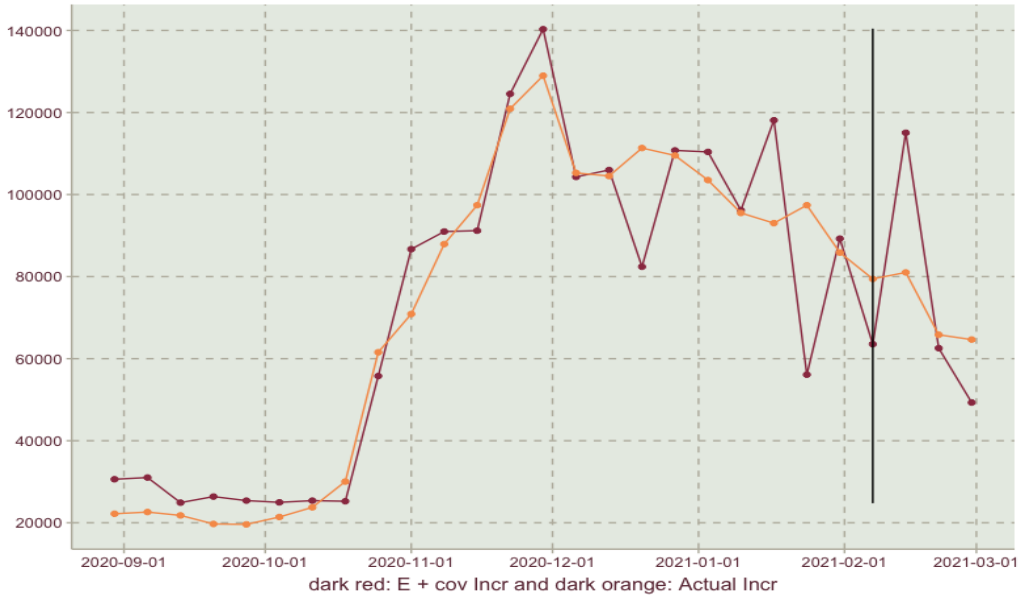

Figure 4: E + cov Incr

2.3 *Heterogeneity*

2.3.1 *Weibull Gamma + covariates*

The first model we run as a benchmark is the plain Weibull Gamma with no bells and whistles. In this model, we assume everyone has their own lambda that is distributed according to a gamma distribution.

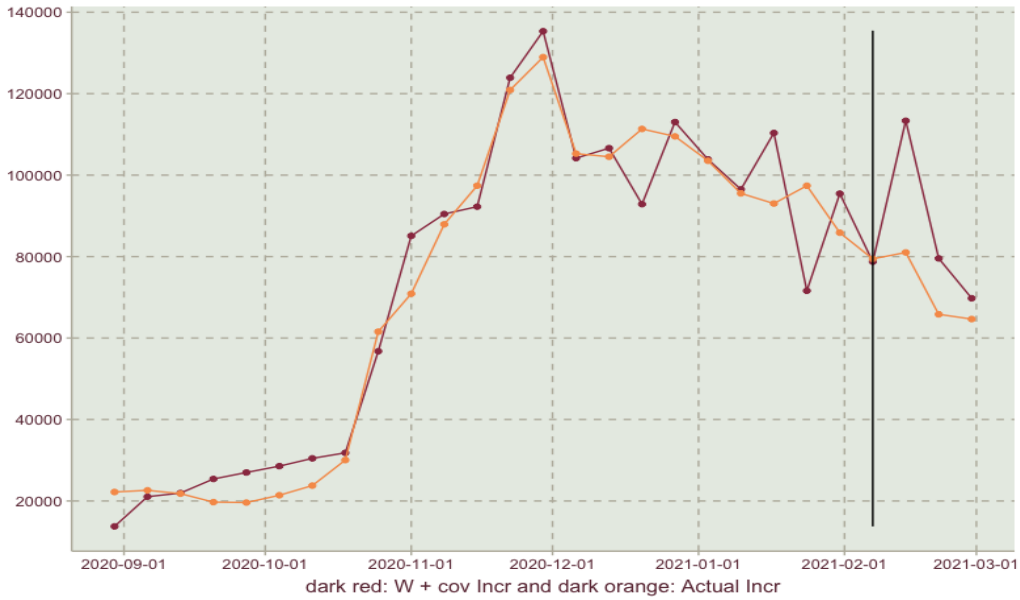

Figure 5: W + cov Incr

Comparing this to the Weibull + covariates model (Figure 6), we see that there is no major difference. As such, we find that a gamma distribution is not appropriate for this dataset.

2.3.2 *Weibull Gamma with HCND + covariates*

Consider the following narrative:

Frank – Frank is currently in his 30s and is married with 2 kids. His family and friends are all into baseball and basketball. In fact, he almost never misses any major games in either sport. He has never tried to play chess, nor does anyone he knows plays chess. While he heard about a show called Queen's Gambit on Netflix, he doesn't own a netflix subscription since ESPN does the job for him.

The narrative of Frank illustrates one of many stories that can be categorized in the hard-core-never-downloaders section. These are the people who probably do not own a netflix subscription, and even if they do, they do not play chess and never had any interest at all. The release of Queen's Gambit or covid or any of the covariates mentioned do not affect their life in any way. From this story's perspective, we run the WG + HCND + cov model.

In this case, the r value is very high, indicating that the gamma distribution is rejected just like before. Therefore, we also run the W + HCND + cov model, which gives us the

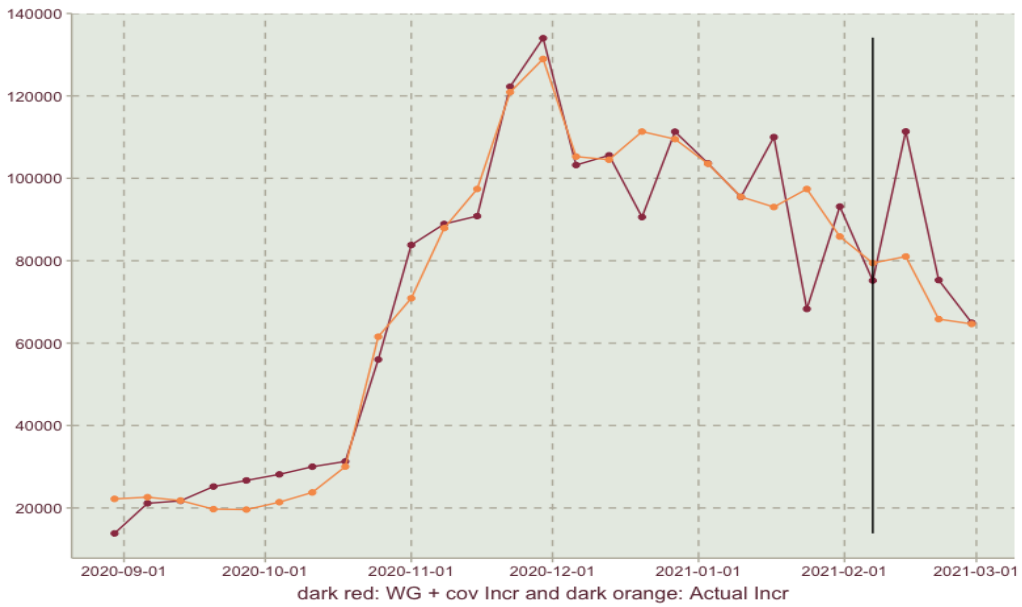

Figure 6: WG + cov Incr

same model. Moreover, the spike is rejected.

2.3.3 *2 Segment Weibull with pooled covariates*

Consider the following narratives:

Aronian – Aronian was first taught chess by his grandfather when he was very young, maybe around 8. He played on and off with his grandfather and mother till he was in middle school. From then onwards, he got into video games and spent almost every weekend playing fortnite with his friends. Watching the Queen's Gambit reignited his love for chess. Now, instead of playing fortnite, he takes that time to finish Queen's Gambit. He also has the Nezhmetdinov (one of the early legends of the game) saga of chessgames from youtube Agadmator (biggest chess youtuber) lined up. He has just finished watching the movie "Searching for Bobby Fischer" and continues to find chess related TV shows, movies and youtubers.

Darius – When he heard about the rise of chess during covid, Darius decided to give the Queen's Gambit a chance. Although he liked the first episode, he got distracted by the release of the new episode from the Falcon and the Winter Soldier in the middle. He has been meaning to start learning chess; however, every time he sits down he ends up playing the latest Uncharted game on his PS5.

Aronian is an example of a narrative for whom we expect a positive duration dependence index. He has found his love for chess, and is actively taking steps to learn about the game from different sources. While he has not downloaded chess.com's mobile application yet, as time passses on we expect Aronian's probability of downloading the app to

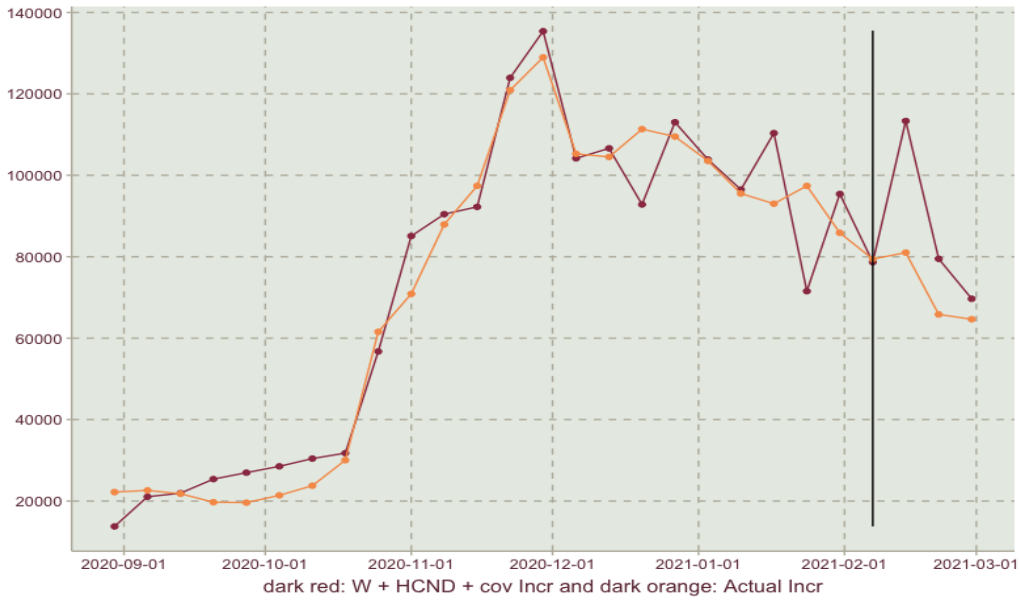

Figure 7: W + HCND + cov Incr

increase. On the other hand, Darius is someone who is slowly losing interest in chess. The Queen's Gambit provided a very small temporary excitement about the game, but it was quickly lost among his other interests. As time passes on and Darius doesn't download the app, due to his slowly losing interest we expect him to have a negative duration dependence.

A very important note about the above described behavior is as follows:
As reported by Marketwatch and evident from Netflix's official filing, Netflix recently changed its metric on "viewership" from customers who have watched 70 percent or more of an episode to those who have watched 2 minutes or more. This is an important detail since this means that Darius, and others like him, who only watched the first few minutes of the Queen's Gambit are included in the viewership data.

2.3.4 *2 Segment Weibull with time shifted + covariates*

Consider the following narratives:

Early Adopters: Erin – Erin is the type of person who wants to be the first taker on new and exciting stuff. She pre-ordered the first Apple Watch and also got her hands on the Tesla Model S before it became a major hit. As such, when Queen's Gambit released, she started watching the show within an hour of its official launch.

Late Adopters: Ryan – Ryan is a very careful person who doesn't want to be the first to try new things. He waits for the official review, listens to what his friends and family have to say, and only then decides to carry out a task. In sharp contrast to Erin, Ryan waited until the Apple Watch Series 5 to buy his first apple watch, because this is when

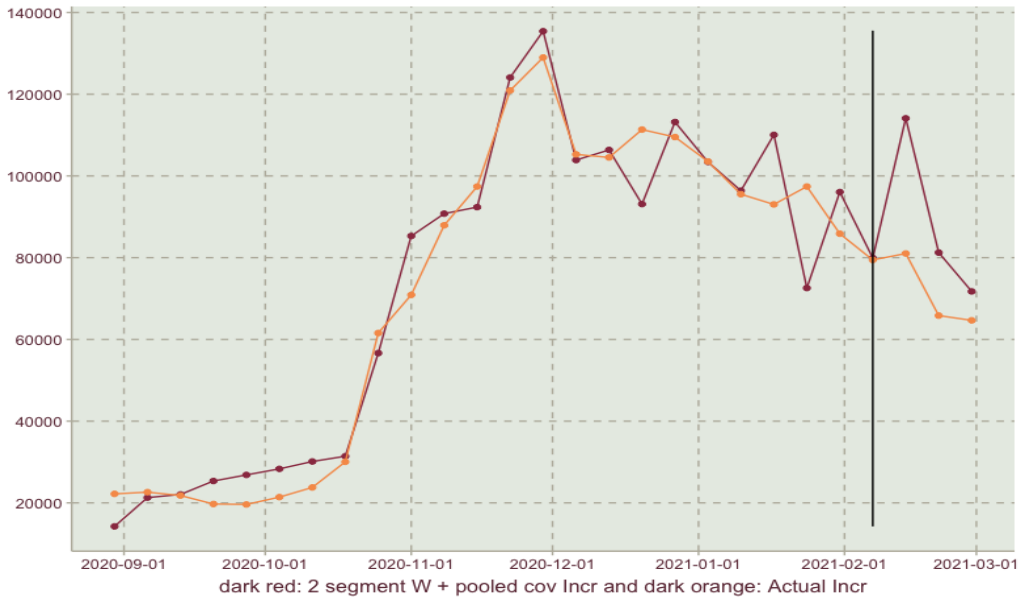

Figure 8: 2 Segment W + pooled cov Incr

most reviews recommended buying the said watch. He had no interest in buying the first apple watch; what if it had major bugs? Ryan would rather let the world try it out, and then if it all looks good, only then will he consider buying. As such, when the Queen's Gambit released, Ryan did not even think about watching it until most of the reviews had come out. Only after most of his friend circle had finished watching the show, did he do so under their recommendation. He was about 2 months late, but Ryan doesn't mind that!

The above two narratives are to illustrate the difference between "early adopters" and "late adopters" of the Queen's Gambit and the chess hype. To accommodate these stories, a 2 segment Weibull model with one of the segments starting at week 14 were run. The reason week 14 was chosen is because this was around the peek of daily viewers according to the Netflix data. By this time, the majority of people would have watched the show, and it is reasonable to conclude that around here is when the late adopters started showing up.

2.3.5 *Final Model*

Overall, taking into account our 5 factors – in sample fit, out of sample fit, story, parsimony and robustness – the 2 segment Weibull with time shifted was chosen to be the final model.

Surprisingly, as per this model, the Twitch covariate has a higher beta than the Netflix one. The least effective covariate was the chess championship one. Moreover, the two segments composed of 92 percent and 8 percent, where the first group had a negative duration dependence and the second had a positive duration dependence. Furthermore, the lambda of the first group was also higher than that of the second group.

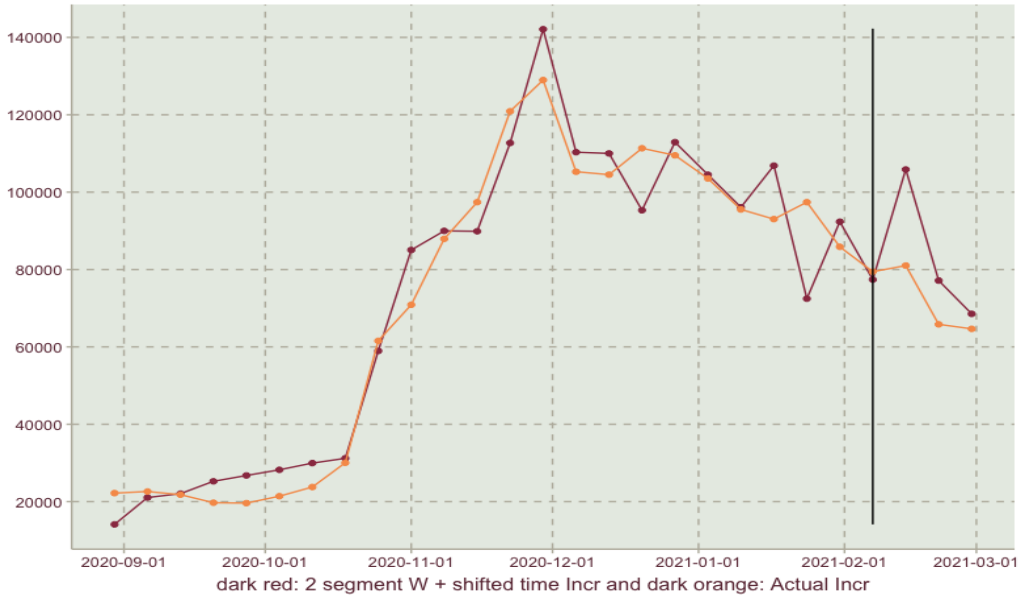

Figure 9: 2 Segment W + Shifted Time Incr

Model	Parameters	LL	BIC	In-MAPE	Out-MAPE
W + cov	5	-10613315	21226713	0.13	0.17
W + HCND + cov	6	-10613315	21226713	0.13	0.17
2 Seg W + pooled cov	8	-10612489	21225113	0.12	0.18
2 Seg W + shifted time	8	-10612241	21224616	0.09	0.11

Possible explanation for why beta of twitch is higher than that of beta of netflix : After watching several of grandmaster Hikaru's twitch channel, it is observed that GM Hikaru only uses chess.com to play his games throughout his stream. Not only does he play the standard games on chess.com, but he also shows his viwerers other features of chess.com such as puzzles, robots etc. On the other hand, while the Netflix show indirectly promotes the game chess, GM Hikaru indirectly promotes chess.com by playing his game on the said website. Therefore, it can be seen why beta of twitch is higher than beta of netflix.

Below are the parameters of the final model (shown in the next page):

3 Application to Android Data

We now try our final model on the Android dataset. Unfortunately, this doesn't fit the Android data as well as it fit the iOS data. Upon further investigation, the largest disconnect seems be come from the impact of the twitch covariate. However, the author doesn't think this is a reasonably story as to why this might be the case. Moreover, since none of the analysis used the fact that the dataset was from iOS, in principle and from a story standpoint, the relative behavior of our customer base ought to the same. This leads the

Parameter	Value
Beta of Netflix	0.22
Beta of Twitch	0.24
Beta of Chess Championships	0.11
Lambda of segment 1	0.011
C of segment 1	1.3
Lambda of segment 2	3.24
C of segment 2	0.02
pi	0.92

author to believe that there might be something from the other end that is causing this difference. A few reasonable explanations include :

As mentioned earlier, chess.com seems to prioritize their iOS app over their Android app. This pattern can be detected from their monthly newsletters that provide updates and new features on their various platforms. Examples include most new features coming to iOS first, and only showing up very late on the Android version. The iOS version also seems to have a few extra features such as special chess robots etc.

Android chess seem to have more competition. This is because in order to publish an iOS app, a developer needs to have an Apple device, must be part of the Apple developer's program and must pay an yearly fee of about 100 dollars. Moreover, Apple is more strict when it comes to duplicate apps, as well as apps that violate their strict privacy code. On the other hand, none of these red tape restrictions apply to Android phones. Hence, it makes sense as to why the App store is relatively less competitive in nature.

It is critical to note that the above two reasons come with their own limitations and flaws and are in no aspect the only explanations for the difference noted above. The above two reasons are also not backed by any analysis as part of the study but are spoken from a domain knowledge and personal experience point of view.

The in-sample MAPE is about 15 percent and out-sample is about 17 percent. Note that due to the nature of the fit, it is best to not to make solid inferences for solely Android based on this model.

4 Managerial Inferences

Twitch is a power platform for chess advertising and chess.com should look to partner with GM Hikaru to promote chess.com on his twitch channel. Moreover, major chess championships, regardless of which company hosts them, is a big plus for chess.com due to their brand name and better mobile application. iOS users, in general, seem to be more predictable and in larger numbers than Android users. Although chess.com currently focuses more on their iphone app than their android app, they should continue prioritizing their ios version. Netflix's Queen's Gambit has provided chess with a great upward momentum; however, its effect is slowing down and those early adopters have a negative duration depen-

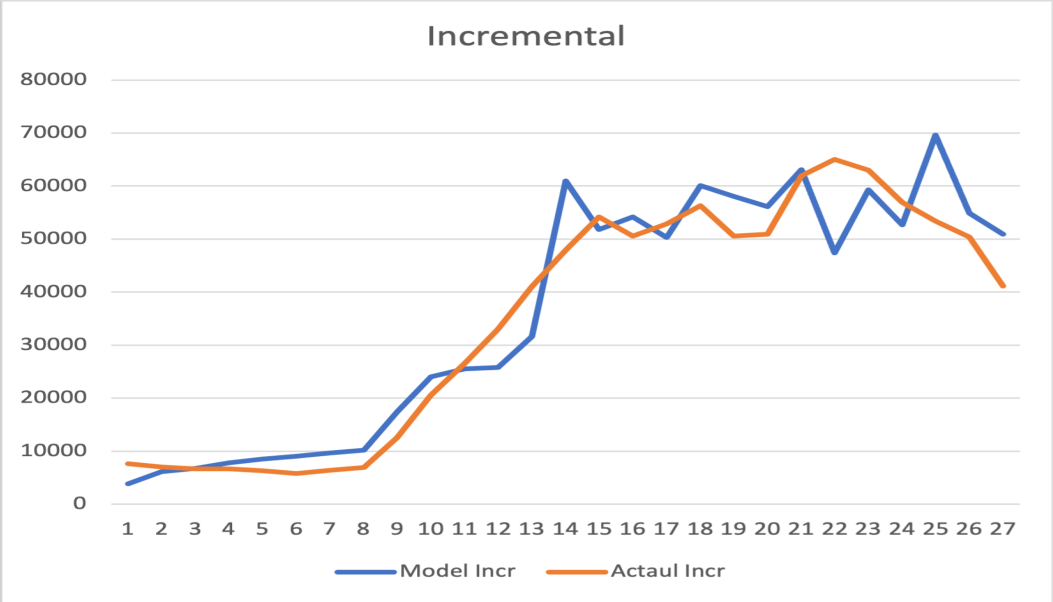

Figure 10: Android Incr

dence. Given this, chess.com could have come up with new policies such as more beginner lessons, more outreach, perhaps even considering a referral model with incentives to capitalize on the small window that they had with these customers. Adding on, since there is evidence to say that chess champions are a good marketing strategy, another recommendation is to host online chess tournaments at all levels, especially the beginner levels. Finally, since chess.com's customers can be divided into 2 segments, this means that chess.com can try our new policies and tactics with the first group and see what works and doesn't work and still be sure that they will have another batch of customers that they can acquire : the late adopters. With the current hype in chess, it is likely that we will see more TV shows and movies based on chess, and chess.com should be ready as the abovementioned pattern of early adopters and late adopters is likely to repeat itself. Finally, although chess championships such as pogchamps do not carry immediate benefits (shown below), they seem to be a good marketing strategy, and can be made even more powerful if they are held on twitch.

Note: More inferences are listed in the attached info graphic.

5 Practical Managerial Example : Pogchamps 3

During the holdout period, there was another major chess tournament held by chess.com – Pogchamps 3 chess tournament. To test the immediate effectiveness of this marketing strategy in attracting chess downloads, we will run our final model and factor in this championship with the same strategy used to bring in other championships.

The model sets beta of pogchamps to be 0, indicating that there are no immediate benefits of hosting online chess tournaments. Note that, as we can see earlier, chess championships are likely to be a relatively long term play. Finally, it is important to note that the

above conclusions have been reached with a small sample size, and more extensive research would need to be done in order to reach concrete statements.

6 Limitations of this Study

Answers to the questions were limited in scope as only a few tournaments were considered. Moreover, these answers are model-specific and only carry as much weight as we place on the final model.
The models were run multiple times – and about a 3 percent difference in metric such inMAPE etc were noticed. In cases like these, the best metric was reported.
It is important to acknowledge Heteroscedasticity, Endogeneity and Multicollinearity.
Most of the data used in this study is not official, and a more solid conclusion can be reached with official data from Netflix, Twitch instead of third party sources.

7 Future Research

In the future, it would be helpful to use the count-counterpart of the time based models to back out count data. Although we operated under the assumption that people only download this app once, this is likely not true and count based data can help break down the specifics of such activity. More granular level data would be beneficial as this could also allow researchers to be able to make statements on the duration of an individual's time to download, and time to delete the application. A link between chess.com's website and mobile application using login id of users can also establish cross platform patterns that can aid in marketing. Given more granular data, conditional expectation on the life of a user can also be made which can help in finding our best customers and catering to them in order to maximize their value.

8 Appendix

Acknowledgements

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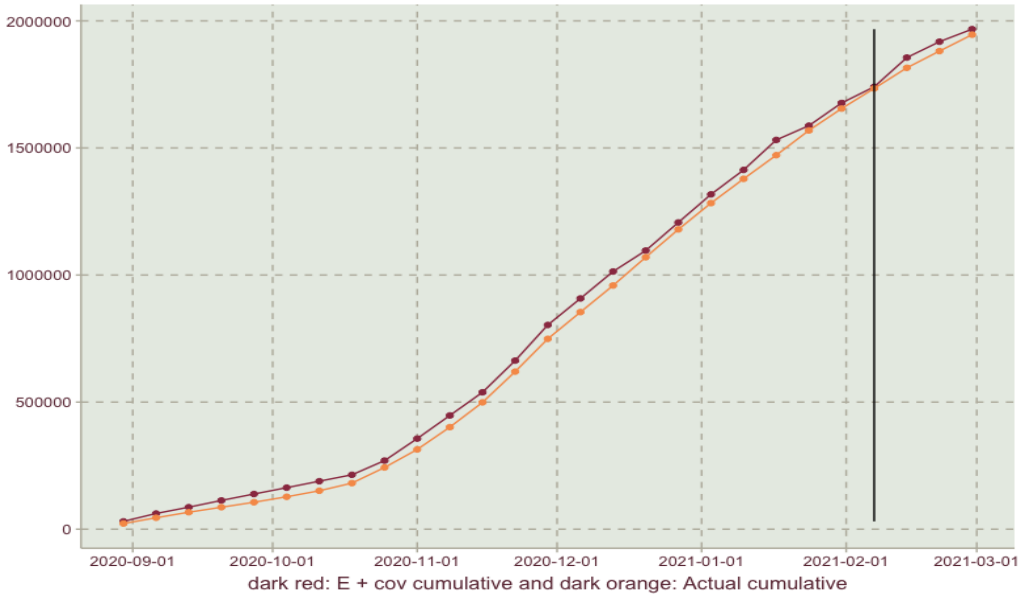

Figure 11: E + cov Cumulative [More charts after acknowledgements]

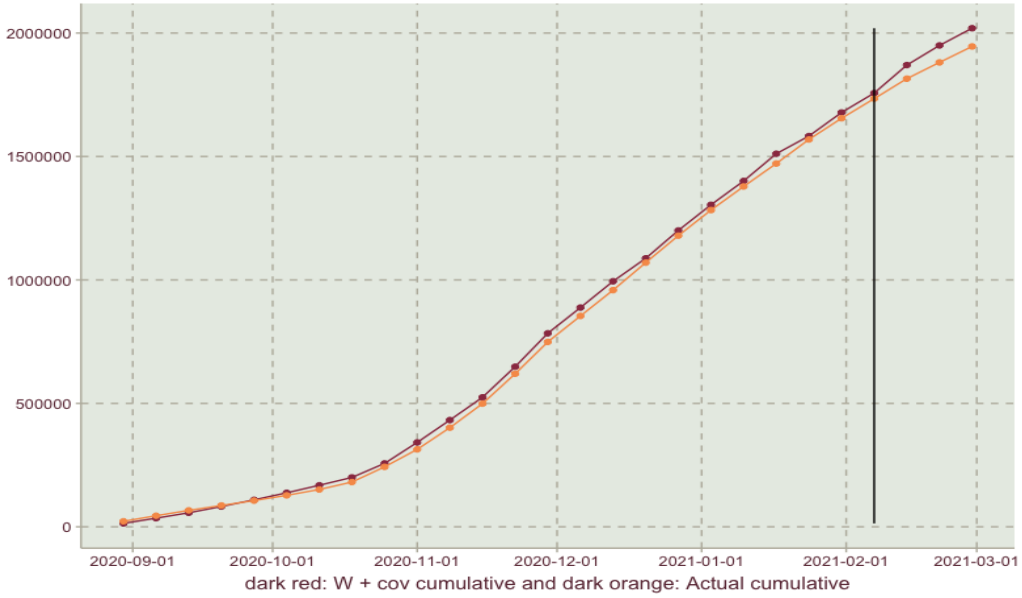

Figure 12: W + cov Cumulative

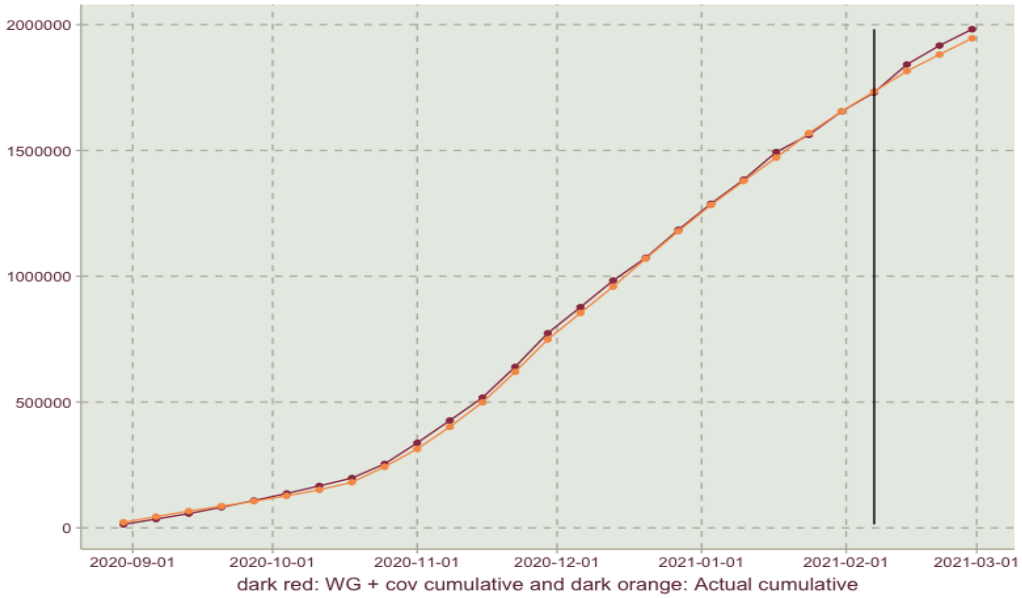

Figure 13: WG + cov Cumulative

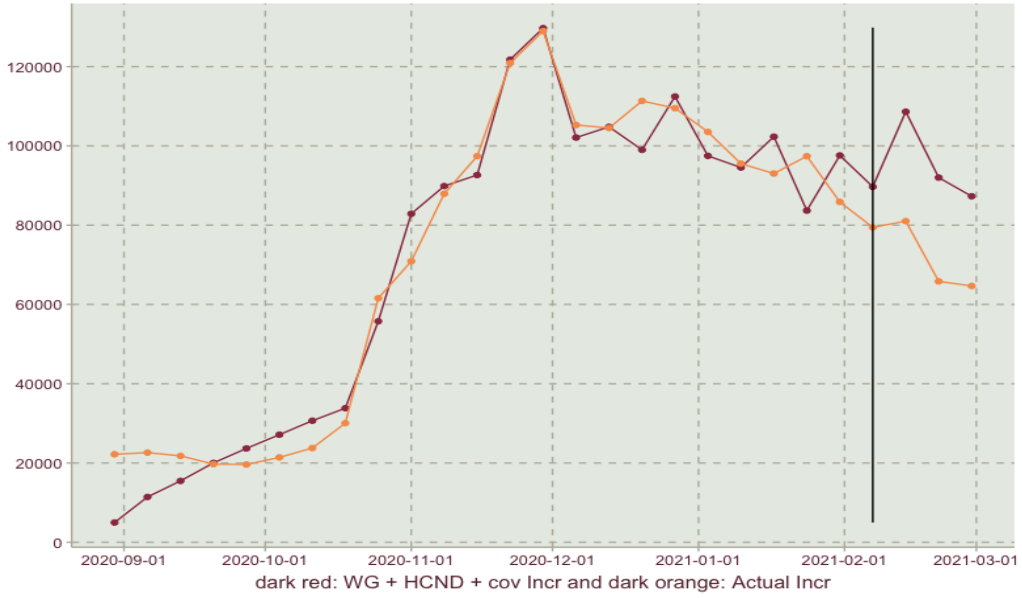

Figure 14: WG + HCND + cov Incr

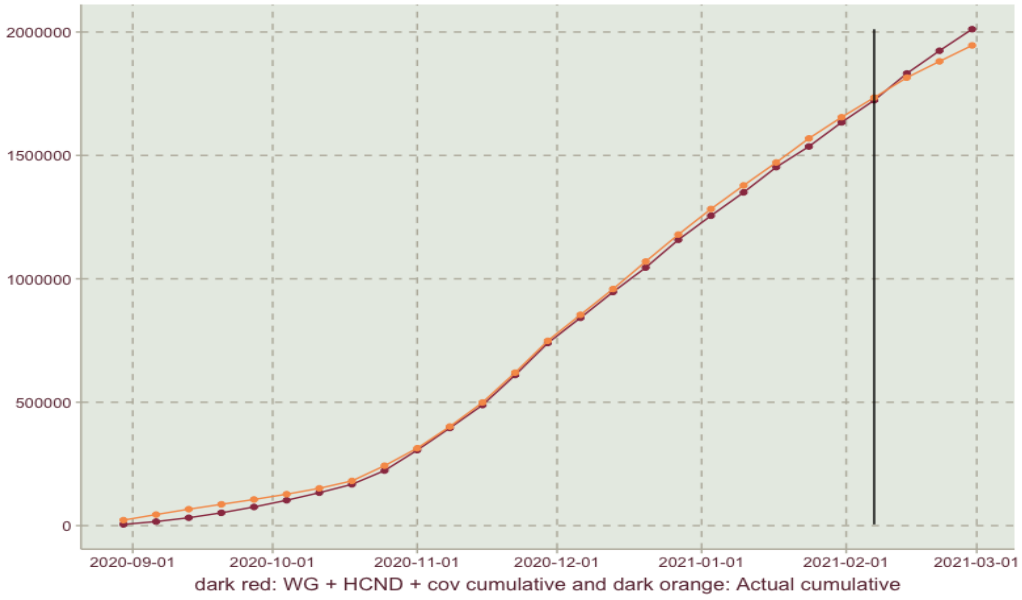

Figure 15: WG + HCND + cov Cumulative

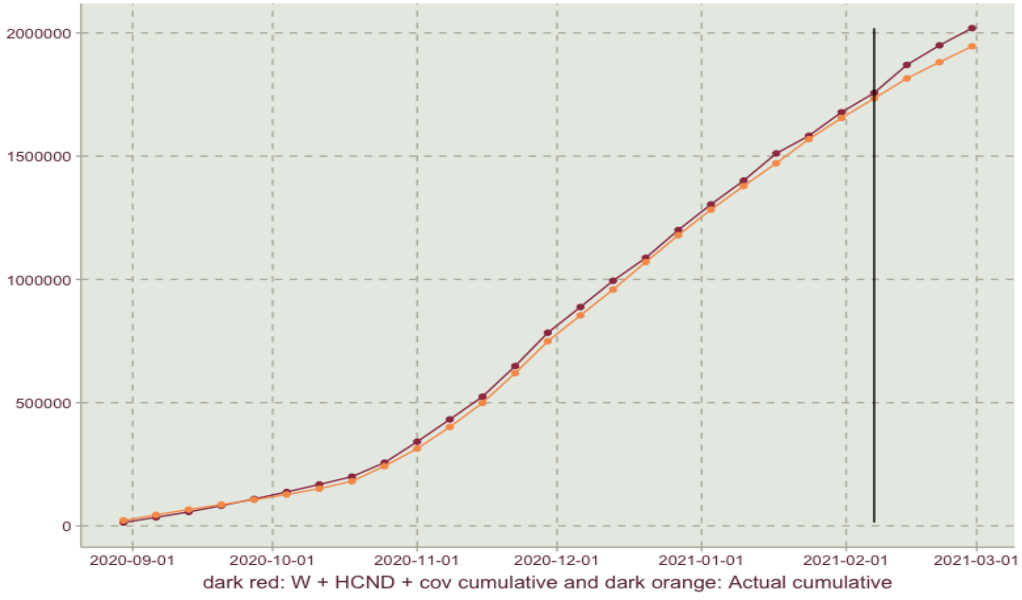

Figure 16: W + HCND + cov Cumulative

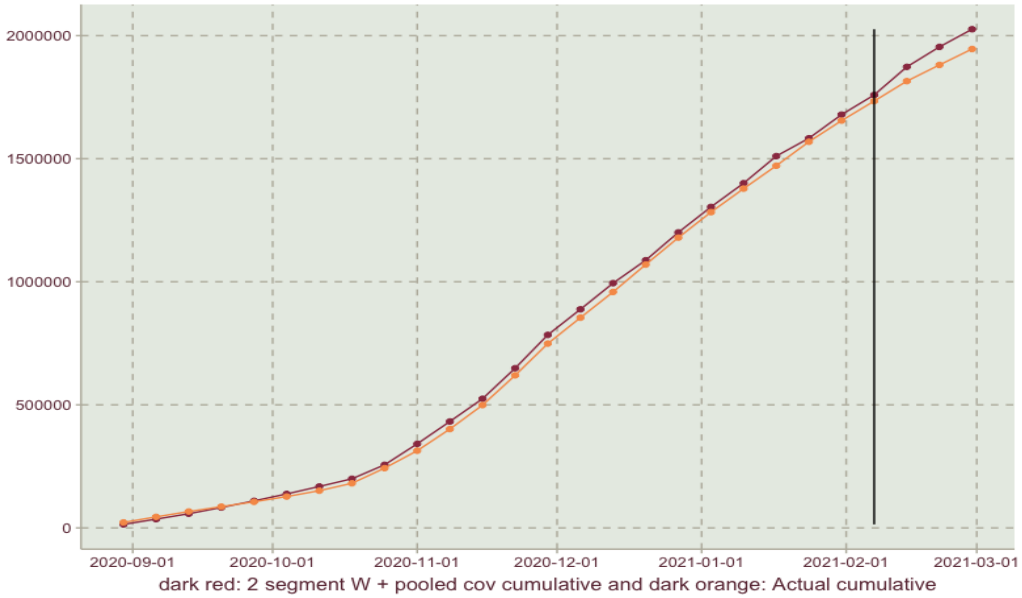

Figure 17: 2 Segment + pooled cov Cumulative

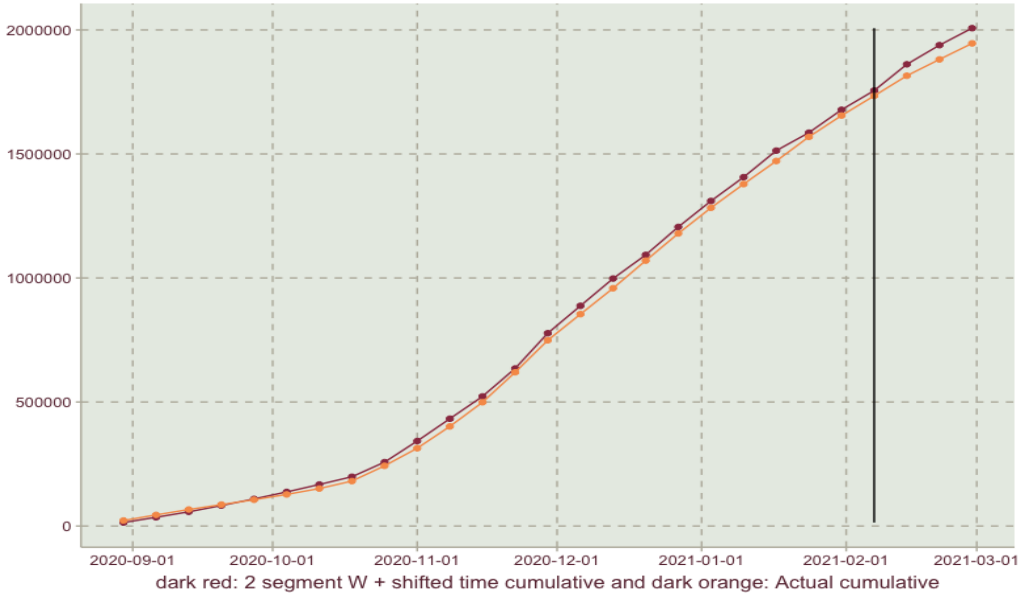

Figure 18: 2 segment + shifted time Cumulative

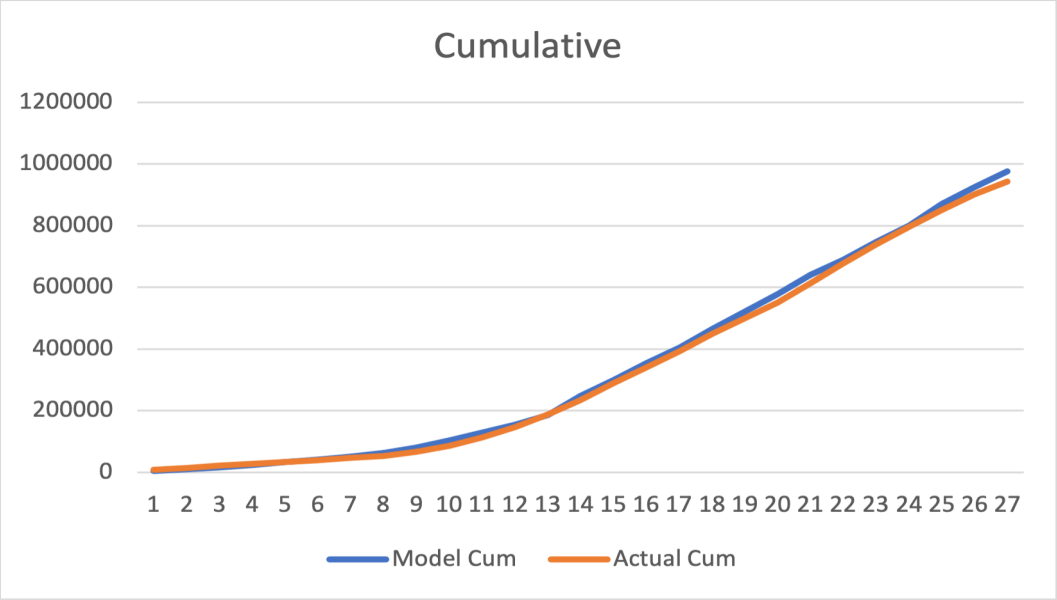

Figure 19: Android Cumulative