MA678 Midterm Project

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1.Abstract

Nowadays, more and more people regard games as a way of leisure, and the profits of the game industry are huge. What I want to answer is what factors are the key to the success of a game. My project has been taking measurements as cost, required storage space and more, but it's unknown how they affect games' success or not. I built a multilevel model and a linear model to assess how these measurements correlate with games' success. The results found that there are indeed many factors that contribute to the success of a game. This project also brings me some inspiration on how to explore further in the future.

2.Introduction

2.1 Background

A PC game, also known as a computer game or personal computer game, is a type of video game played on a personal computer rather than a video game console or arcade machine. **Newzoo**(a leading global provider of games and esports analytics) reports that the PC gaming sector is the third-largest category across all platforms as of 2016, with the console sector second-largest, and mobile / smartphone gaming sector biggest. In 2018, the global PC games market was valued at about $27.7 billion.[1]

2.2 Question

PC game developers may be interested in what kind of games are worthy developed due to the huge interests of PC games market. There may be many decisive factors behind a successful game. PC games' genre can affect the audience, because some players prefer action games and some players show more interest in strategy game. In addition, the minimum graphics hardware requirements can affect popularity. A game that requires high graphics hardware may not be a popular game, because most people's graphics hardware cannot meet its requirements. Another question is how to evaluate a game. Can we say a game is more successful because there are more active players playing it? Here I chose two measurements to measure a game. One is reputation, which can reflect the quality, and one is topicality, which can reflect the popularity. In the dataset I found, metacritic rating gives a score of a PC game, presence gives a total number of social media articles. By using these two measurements, we can make a rough judgment on the success of a game.

2.3 Model

The initial data is very messy and contains a lot of useless data. After data cleaning, I kept 2607 observations and used these sub samples for analysis.

According to the question, I have two outcomes, they are metacritic rating and presence. Considering the outcome type, a linear regression model and a multilevel regression model are used. For the multilevel model, I chose to use *rstanarm* package rather than *lme4* package.

[1]Reference:Wikipedia. Here's the weblink:*PC game*.

3.Method

3.1 Data Source

I got the dataset from kaggle. Here's the weblink:*Dataset*. The dataset contains many details about PC games' features. Here are some data descriptions:

- Name: Original Title.
- Metacritic: Games metacritic rating.
- Indie: Whether or not the game was created by indie developers.
- Presence: Number of posts on social media sights.(e.g. Reddit.)
- OriginalCost: How much in USD the game cost at release.
- Storage: How much storage space is required to download the game.
- Memory: How much memory is required to support the game.
- Controller: Whether or not the game can be played with a controller.
- Achievements: How many achievements can be earned in game.

Before I start exploring, the initial dataset obtained from kaggle is very messy, therefore a in-depth data cleaning is needed to be done.

3.2 Model used

3.2.1 Metacritic Rating

Metacritic Rating is an important indicator used to evaluate the quality of a game. Therefore, I chose it as the outcome.

Model 1 The first model is a linear model. Here I set **Memory** in my regression as a factor, to see how much it can influence the outcome. According to the R output, coefficients of factor **Memory** are small, most of them even less than 1. Therefore, I considered factor **Memory** as a random effect.

Model 2 The second model is a multilevel model. Based on the results of model 1, I set **Memory** as random.

3.2.2 Presence

Presence is an important indicator used to evaluate the topicality of a game. Therefore, I chose it as the outcome.

Model 3 This model is a linear model. Here I set **Memory** in my regression as a factor as well. According to the R output, coefficients of factor **Memory** are large. Therefore, I considered factor **Memory** as a meaningful factor that can affect the outcome.

Model 4 This model is a multilevel model. Here I set **Memory** in my regression as a factor and treat a between-group variable as a random effect.

Model 5 Through model check, I realized model4 suffers from some flaws, so I added an extra model. Because of the polarization of data, I divided all the games into three small groups, one with presence between 0 and 10000, one with presence between 10000 and 900000, and one with presence greater than 900000, so that I can fit models for these three groups separately. Here I used multilevel model.

3.3 Model check

There are a lot of plots in this part, so I put them in the appendix.

3.3.1 Residuals

I checked residuals of these four models. First, I drew the overall residuals, and then I used the *plot_model* function in the *sjPlot* package to check linear relationship between each predictor and residuals.

3.3.2 Random effects

For these two multilevel models, I used the *ranef* function to show the model's random effects. In addition, I used the *plot_model* function in the *sjPlot* package to check the significance of them by these plots.

3.3.3 Predictive check

Then I did predictive check using the *pp_check* function.

3.3.4 R-squared value

At last, for these Stan-models, I checked R-Squared value using the *bayes_R2* function. And I drew histograms to observe the frequency of R square distribution.

4.Result

Metacritic Rating

Model1 and model2 are built to explore the quality of PC games, so I put them together to discuss.

First, I checked the results of model check. The overall residuals are distributed within an acceptable range. ACcording to the plot drew by *sjPlot* package, when the predictors' value is relatively large, the residual always increases a lot. In my opinion, this is caused by the large number of small predictors' value, which is a normal phenomenon. Random effects in model2 are reasonable. Most of the intervals contain 0, but some intervals do not. Combining the result of the R-squared value check, which is the value of model 1 is greater than the value of model 2, I concluded that model1 outperforms model2. I attribute this partly to the fact that memory is indeed a factor that affects game ratings, not just a random factor.

According to the output of model1,

- The coefficients for memory of 2GBRAM,4GBRAM, and 8GBRAM are all negative, which implies that games with large memory requirements may have lower ratings.
- The coefficient of *Achievement* and *OriginalCost* is extremely small, and their impact on game ratings can be almost ignored.
- The coefficient of *Controller* is -1.6, implies that a game that can be played with a controller tends to be 1.6 ratings lower than a game that can not.
- The coefficient of *Indie* is 0.7, implies that a game created by indie developers tends to have a 0.7 higher rating than a game created by multiple developers.
- The coefficient of *StorageGB* is 0.1, implies that with every 1 GB increase in storage, the rating would increase by 0.1. In other words, a game that takes up a lot of memory tends to have a higher rating. This result seems to be intuitive, because games that take up more memory are generally of higher quality.

Presence

Model3, model4 and model5 are built to explore the topicality of PC games, so I put them together to discuss.

Identically, I checked the results of model check of model3 and model4 first. Similarly, residuals and random effects are good. However, the predictive check plot is not good, which means the model doesn't fit very

well. After checking the data, I attributed this phenomenon to the polarization of the original data. A game is either very popular and highly topical, or only a few people discuss it. There are two obvious clusters gathered near 0 and 1000000, and also some games with presences between 0 and 1000000 exist. The number of these games is large, and cannot be ignored. The solution I came up with is to divide all the games into three groups, one with presence near 0, one with 1,000,000, and one with the other games whose presence has no obvious tendency, so that I can fit models for these three groups separately.

Based on the above reasons, I got model5 as my ultimate model analyzing presence. After model check, residuals and predictive check plot improve a lot compared with model4.

According to the output of model5,

- The coefficients of *OriginalCost* are all negative, implies that expensive games tend to be less discussed.
- For those games with a low presence, the *Controller* coefficient 21.4 means a positive impact on presence. Controller can be an interesting feature, enticing people to discuss. For those games with a high presence, controller has the opposite effect, for the reason the coefficients are negative.
- The coefficients of *Achievement* are all positive, implies that games with more achievements tend to be more discussed.
- For those games with a low presence, the *StorageGB* coefficient -13.9 means a negative impact on presence. For those games with a high presence, storage has the opposite effect, for the reason the coefficients are positive.
- For those games with a low presence, the *Indie* coefficient 420.2 means a positive impact on presence. Indie games could be a characteristic feature enticing people to discuss. For those games with a high presence, things are opposite. The coefficients are extremely big, which means it has a huge negative effect.
- The coefficient *Memory* varies greatly from low memory to high memory, and from low presence to high presence. It can be considered as a random factor here, and it does not have much influence on the presence.

5.Discussion

5.1 Implication

The predictors in the dataset do have an impact on PC games' quality and topicality. The details on how to influence, positive or negative are mentioned in the Result part.

5.2 Limitation

- The dataset lacks necessary features of the games to get better fitting model. For example, the age group of players. According to people's intuition, young players seldom comment online.
- There should be a certain method when grouping data for model5.

5.3 Future Directions

According to the limitations, the model can be improved in two directions:

- Accessing steam developer wiki through an API to get more information about PC games.
- Learning more about grouping data. Some methods about handling atypical data types are also needed.

6.Appendix

6.1 Data overview

At first, I checked the data structure after cleaning. This step helps me fit a suitable model. Then I proceeded a summary of the dataset to acquire a preliminary understanding of the data types.

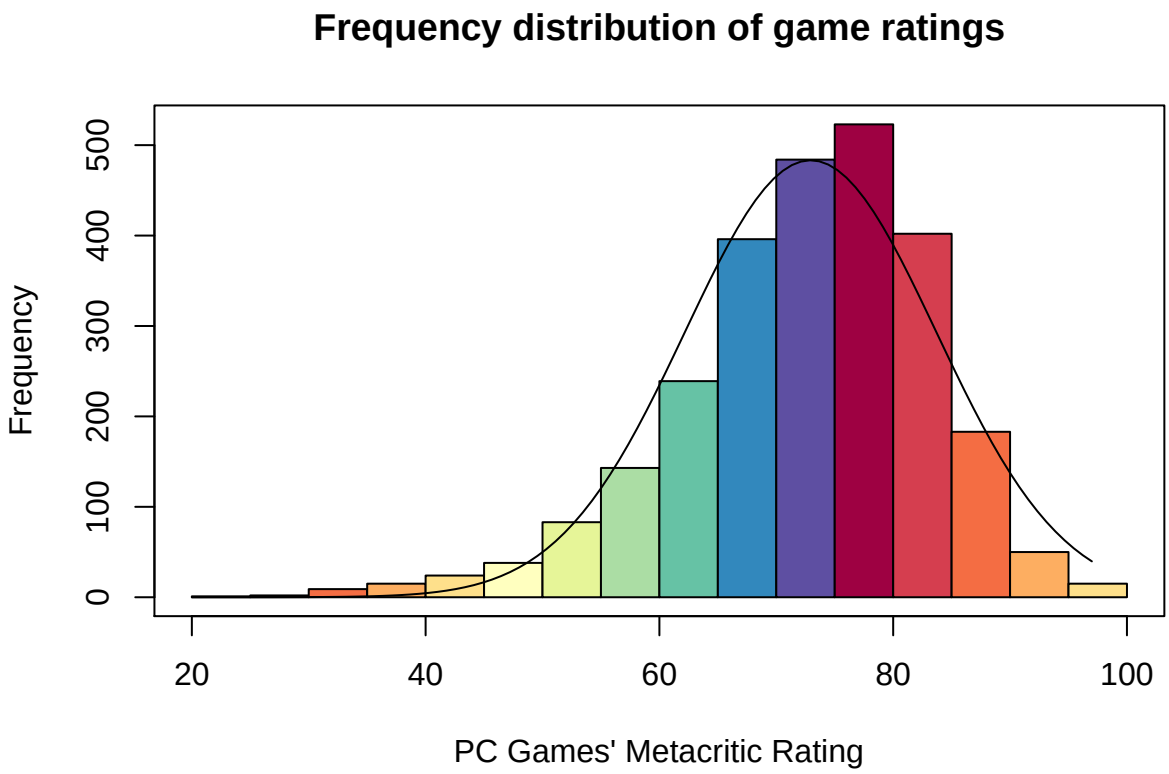
```
## 'data.frame':    2607 obs. of  9 variables:
##  $ Name        : chr  "Counter-Strike: Global Offensive" "Destiny 2" "Dota 2" "The Elder Scrolls Onl
##  $ Metacritic  : num  83 82 90 71 68 75 86 72 69 97 ...
##  $ Indie       : num  0 0 0 0 0 0 1 0 1 0 ...
##  $ Presence    : num  1009588 1007425 1009306 1000781 777456 ...
##  $ OriginalCost: num  0 0 0 20 40 ...
##  $ Controller  : num  1 1 1 1 1 1 1 1 0 1 ...
##  $ Achievements: num  179 61 0 0 308 82 253 406 57 369 ...
##  $ StorageGB   : num  15 105 15 85 50 61 20 25 20 72 ...
##  $ MemoryGB    : chr  "2 GB RAM" "6 GB RAM" "4 GB RAM" "3 GB RAM" ...
```

```
##      Name             Metacritic        Indie           Presence      
##  Length:2607        Min.   :20.00   Min.   :0.0000   Min.   :      0  
##  Class :character   1st Qu.:67.00   1st Qu.:0.0000   1st Qu.:  18494  
##  Mode  :character   Median :74.00   Median :1.0000   Median : 142903  
##                     Mean   :72.94   Mean   :0.5796   Mean   : 344490  
##                     3rd Qu.:80.00   3rd Qu.:1.0000   3rd Qu.: 694752  
##                     Max.   :97.00   Max.   :1.0000   Max.   :1009588  
##                                                                       
##   OriginalCost      Controller      Achievements      StorageGB       
##  Min.   :  0.00   Min.   :0.0000   Min.   :  0.00   Min.   :  0.00098  
##  1st Qu.:  6.99   1st Qu.:0.0000   1st Qu.: 12.50   1st Qu.:  0.68359  
##  Median : 12.99   Median :1.0000   Median : 41.00   Median :  2.00000  
##  Mean   : 15.37   Mean   :0.5738   Mean   : 62.23   Mean   :  7.27163  
##  3rd Qu.: 19.99   3rd Qu.:1.0000   3rd Qu.: 84.00   3rd Qu.:  8.00000  
##  Max.   :595.90   Max.   :1.0000   Max.   :800.00   Max.   :150.00000  
##                                                     NA's   :19         
##    MemoryGB        
##  Length:2607        
##  Class :character   
##  Mode  :character   
##                     
##                     
##                     
##
```

6.2 Exploration Data Analysis

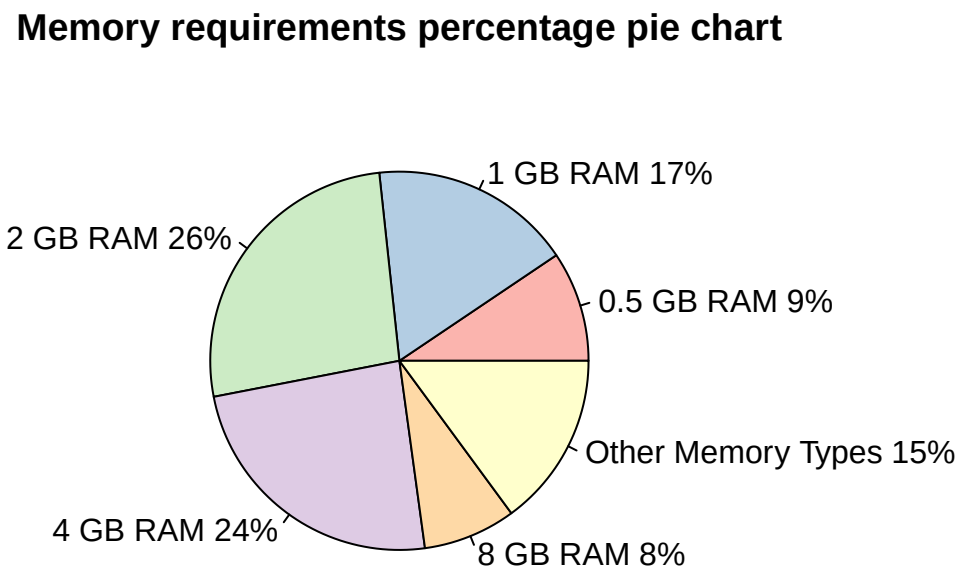
6.2.1 Metacritic Rating

Metacritic Rating is an important indicator used to evaluate the quality of a game. During this part, I drew a plot to display the distribution of overall ratings. In addition, a normal density curve is attached.



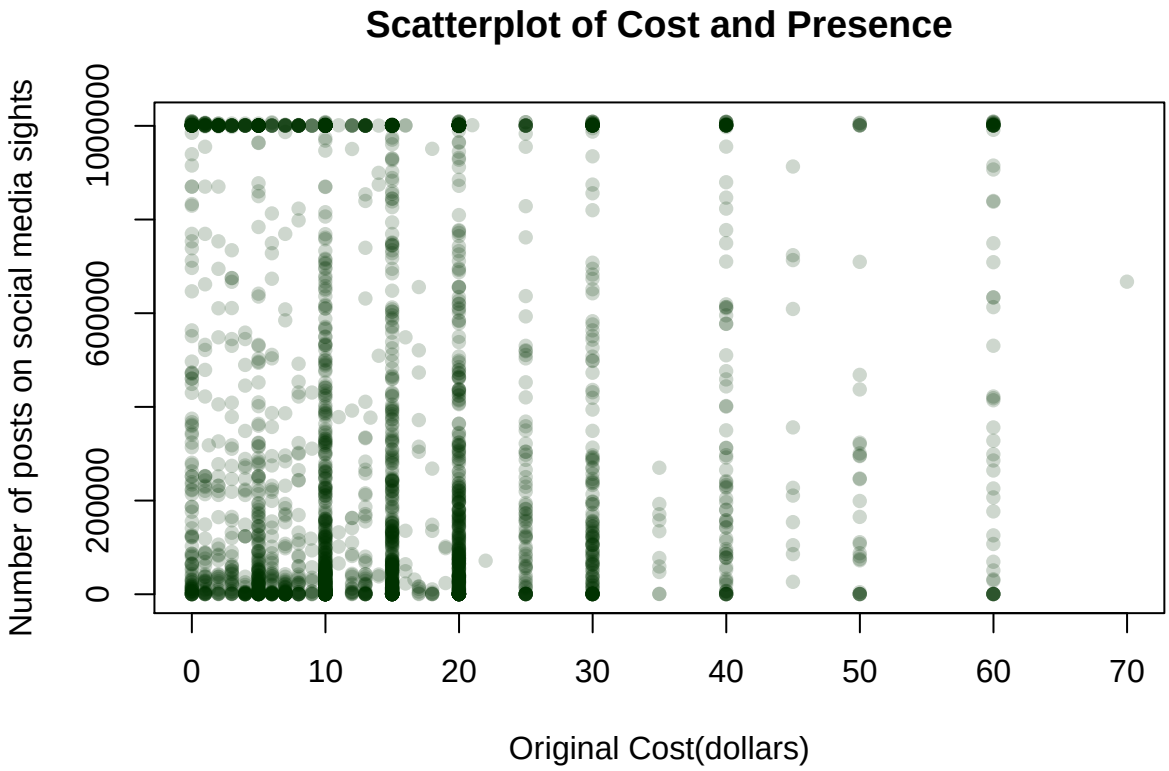
6.2.2 Memory Requirement

Random-access memory is a form of computer memory that can be read and changed in any order, typically used to store working data and machine code. Generally, a game will have a minimum memory requirement. For many large games, these requirements will generally be 4GB RAM, 8GB RAM, etc. In addition, some games require very little memory, but these games account for a small proportion of all games. In order to see the proportion of each memory requirement type clearly, here I drew a pie chart of memory requirements. Among them, I classified those types of memory requirements that appear very infrequently into one category, which is **Other Memory Types**.



6.2.3 Cost and Presence

In this dataset, **Presence** gives the number of posts on social media sights.(e.g. Reddit.) It is a measure of topicality. **OriginalCost** gives how much in USD the game cost at release. Based on our experience, games that cost less may be more topical, because it's more likely that more people will play a game that costs less. During this part, I drew a scatterplot to see if there is such a trend.



According to the scatterplot, we can see that in the cost range of 10 dollars to 30 dollars, points with low topicality are more dense, which means that our guess may be correct.

6.3 Stan mean_PPD Check

I used stan's built-in function mean_PPD diagnostic as a quick diagnostic.

```
## [1] 72.93633
```

```
## [1] 344489.7
```

```
## [1] 2072.631
```

```
## [1] 229548
```

```
## [1] 998365.4
```

6.4 Model Output

Model 1

```
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 1).
## Chain 1:
## Chain 1: Gradient evaluation took 0 seconds
## Chain 1: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 1: Adjust your expectations accordingly!
## Chain 1:
## Chain 1:
## Chain 1: Iteration:    1 / 2000 [  0%]  (Warmup)
```

```
## Chain 1: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 1: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 1: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 1: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 1: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 1: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 1: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 1: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 1: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 1: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 1: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 1:
## Chain 1:  Elapsed Time: 0.792 seconds (Warm-up)
## Chain 1:                1.152 seconds (Sampling)
## Chain 1:                1.944 seconds (Total)
## Chain 1:
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 2).
## Chain 2:
## Chain 2: Gradient evaluation took 0 seconds
## Chain 2: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 2: Adjust your expectations accordingly!
## Chain 2:
## Chain 2:
## Chain 2: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 2: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 2: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 2: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 2: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 2: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 2: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 2: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 2: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 2: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 2: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 2: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 2:
## Chain 2:  Elapsed Time: 0.505 seconds (Warm-up)
## Chain 2:                0.977 seconds (Sampling)
## Chain 2:                1.482 seconds (Total)
## Chain 2:
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 3).
## Chain 3:
## Chain 3: Gradient evaluation took 0 seconds
## Chain 3: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 3: Adjust your expectations accordingly!
## Chain 3:
## Chain 3:
## Chain 3: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 3: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 3: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 3: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 3: Iteration:  800 / 2000 [ 40%]  (Warmup)
```

```
## Chain 3: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 3: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 3: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 3: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 3: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 3: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 3: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 3:
## Chain 3:  Elapsed Time: 0.664 seconds (Warm-up)
## Chain 3:                0.765 seconds (Sampling)
## Chain 3:                1.429 seconds (Total)
## Chain 3:
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 4).
## Chain 4:
## Chain 4: Gradient evaluation took 0 seconds
## Chain 4: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 4: Adjust your expectations accordingly!
## Chain 4:
## Chain 4:
## Chain 4: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 4: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 4: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 4: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 4: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 4: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 4: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 4: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 4: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 4: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 4: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 4: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 4:
## Chain 4:  Elapsed Time: 0.848 seconds (Warm-up)
## Chain 4:                0.851 seconds (Sampling)
## Chain 4:                1.699 seconds (Total)
## Chain 4:
```

```
##
## Model Info:
##  function:     stan_glm
##  family:       gaussian [identity]
##  formula:      Metacritic ~ OriginalCost + Controller + Achievements + StorageGB +
##     Indie + factor(MemoryGB)
##  algorithm:    sampling
##  sample:       4000 (posterior sample size)
##  priors:       see help('prior_summary')
##  observations: 2572
##  predictors:   47
##
## Estimates:
##                                   mean   sd    10%   50%   90%
## (Intercept)                      60.5    6.9  51.8  60.5  69.4
## OriginalCost                      0.0    0.0   0.0   0.0   0.0
```

```
## Controller                             -1.3    0.5  -1.9  -1.3  -0.7
## Achievements                            0.0    0.0   0.0   0.0   0.0
## StorageGB                               0.1    0.0   0.1   0.1   0.1
## Indie                                   1.2    0.5   0.6   1.2   1.8
## factor(MemoryGB)0.0029296875 GB RAM    -2.2   12.2 -18.0  -2.0  13.2
## factor(MemoryGB)0.00390625 GB RAM      10.4    8.6  -0.5  10.4  21.6
## factor(MemoryGB)0.0078125 GB RAM       -5.1   12.2 -20.8  -4.9  10.7
## factor(MemoryGB)0.015625 GB RAM        25.8    8.1  15.3  25.7  36.4
## factor(MemoryGB)0.03125 GB RAM         16.9    9.2   5.1  17.2  28.6
## factor(MemoryGB)0.0390625 GB RAM       -3.6   12.5 -19.9  -3.5  12.1
## factor(MemoryGB)0.0625 GB RAM          11.4    7.1   2.3  11.4  20.8
## factor(MemoryGB)0.09375 GB RAM         30.4   10.2  17.5  30.5  43.4
## factor(MemoryGB)0.09765625 GB RAM      12.5    9.1   0.9  12.5  24.3
## factor(MemoryGB)0.125 GB RAM           14.8    7.0   5.8  14.8  23.9
## factor(MemoryGB)0.15234375 GB RAM      15.7   12.8  -1.3  16.0  31.9
## factor(MemoryGB)0.1875 GB RAM          13.5   12.8  -3.1  13.6  30.0
## factor(MemoryGB)0.1953125 GB RAM       14.7   10.0   1.8  14.6  27.7
## factor(MemoryGB)0.244140625 GB RAM      7.1   12.8  -9.5   7.1  23.8
## factor(MemoryGB)0.248046875 GB RAM     30.3   12.5  14.3  30.3  46.3
## factor(MemoryGB)0.25 GB RAM            12.6    6.9   3.7  12.6  21.4
## factor(MemoryGB)0.29296875 GB RAM       0.1   12.6 -15.8   0.0  16.5
## factor(MemoryGB)0.375 GB RAM           12.7   10.2  -0.4  12.7  25.8
## factor(MemoryGB)0.390625 GB RAM        16.6   12.3   1.6  16.7  32.3
## factor(MemoryGB)0.439453125 GB RAM     30.2   12.3  14.4  30.2  46.0
## factor(MemoryGB)0.48828125 GB RAM      10.0    7.8  -0.1  10.1  20.0
## factor(MemoryGB)0.5 GB RAM             10.7    6.9   1.8  10.7  19.5
## factor(MemoryGB)0.5078125 GB RAM       -2.5   12.4 -18.3  -2.7  13.5
## factor(MemoryGB)0.75 GB RAM            13.0    8.3   2.7  12.8  23.9
## factor(MemoryGB)0.78125 GB RAM         11.3   12.7  -5.0  11.2  27.8
## factor(MemoryGB)0.9765625 GB RAM       24.0   12.3   8.2  24.0  39.9
## factor(MemoryGB)1 GB RAM               10.7    6.9   1.9  10.7  19.5
## factor(MemoryGB)1.46484375 GB RAM      -1.6   10.2 -14.5  -1.7  11.3
## factor(MemoryGB)1.5 GB RAM              5.7   10.2  -7.7   5.9  18.8
## factor(MemoryGB)1.953125 GB RAM         9.7    9.1  -2.1   9.6  21.5
## factor(MemoryGB)10 GB RAM               3.1   12.7 -12.9   3.0  19.1
## factor(MemoryGB)12 GB RAM              -4.5   10.1 -17.4  -4.6   8.5
## factor(MemoryGB)16 GB RAM              14.4    8.6   3.3  14.5  25.5
## factor(MemoryGB)2 GB RAM                8.7    6.9  -0.1   8.7  17.5
## factor(MemoryGB)2.44140625 GB RAM      15.4   12.4  -0.6  15.8  31.3
## factor(MemoryGB)2000 GB RAM             6.9   12.6  -9.2   6.8  23.2
## factor(MemoryGB)3 GB RAM                9.7    7.0   0.8   9.7  18.7
## factor(MemoryGB)4 GB RAM                9.1    6.9   0.3   9.1  17.9
## factor(MemoryGB)5 GB RAM                1.9    9.2 -10.2   1.9  14.0
## factor(MemoryGB)6 GB RAM                8.4    7.0  -0.6   8.4  17.3
## factor(MemoryGB)8 GB RAM                9.1    6.9   0.3   9.1  18.0
## sigma                                  10.5    0.2  10.3  10.5  10.7
##
## Fit Diagnostics:
##            mean   sd   10%   50%   90%
## mean_PPD 72.9    0.3 72.5  72.9  73.3
##
## The mean_ppd is the sample average posterior predictive distribution of the outcome variable (for de
##
## MCMC diagnostics
```

```
##                                    mcse Rhat n_eff
## (Intercept)                        0.6  1.0   152
## OriginalCost                       0.0  1.0  2768
## Controller                         0.0  1.0  3047
## Achievements                       0.0  1.0  2729
## StorageGB                          0.0  1.0  2279
## Indie                              0.0  1.0  2781
## factor(MemoryGB)0.0029296875 GB RAM 0.6  1.0   429
## factor(MemoryGB)0.00390625 GB RAM   0.6  1.0   233
## factor(MemoryGB)0.0078125 GB RAM    0.6  1.0   494
## factor(MemoryGB)0.015625 GB RAM     0.6  1.0   211
## factor(MemoryGB)0.03125 GB RAM      0.6  1.0   251
## factor(MemoryGB)0.0390625 GB RAM    0.5  1.0   525
## factor(MemoryGB)0.0625 GB RAM       0.6  1.0   162
## factor(MemoryGB)0.09375 GB RAM      0.6  1.0   311
## factor(MemoryGB)0.09765625 GB RAM   0.6  1.0   255
## factor(MemoryGB)0.125 GB RAM        0.6  1.0   156
## factor(MemoryGB)0.15234375 GB RAM   0.6  1.0   408
## factor(MemoryGB)0.1875 GB RAM       0.6  1.0   478
## factor(MemoryGB)0.1953125 GB RAM    0.6  1.0   313
## factor(MemoryGB)0.244140625 GB RAM  0.6  1.0   456
## factor(MemoryGB)0.248046875 GB RAM  0.6  1.0   435
## factor(MemoryGB)0.25 GB RAM         0.6  1.0   156
## factor(MemoryGB)0.29296875 GB RAM   0.6  1.0   503
## factor(MemoryGB)0.375 GB RAM        0.6  1.0   337
## factor(MemoryGB)0.390625 GB RAM     0.5  1.0   527
## factor(MemoryGB)0.439453125 GB RAM  0.6  1.0   464
## factor(MemoryGB)0.48828125 GB RAM   0.6  1.0   196
## factor(MemoryGB)0.5 GB RAM          0.6  1.0   154
## factor(MemoryGB)0.5078125 GB RAM    0.6  1.0   490
## factor(MemoryGB)0.75 GB RAM         0.6  1.0   217
## factor(MemoryGB)0.78125 GB RAM      0.5  1.0   532
## factor(MemoryGB)0.9765625 GB RAM    0.5  1.0   555
## factor(MemoryGB)1 GB RAM            0.6  1.0   153
## factor(MemoryGB)1.46484375 GB RAM   0.5  1.0   344
## factor(MemoryGB)1.5 GB RAM          0.6  1.0   287
## factor(MemoryGB)1.953125 GB RAM     0.6  1.0   267
## factor(MemoryGB)10 GB RAM           0.5  1.0   593
## factor(MemoryGB)12 GB RAM           0.6  1.0   328
## factor(MemoryGB)16 GB RAM           0.6  1.0   206
## factor(MemoryGB)2 GB RAM            0.6  1.0   155
## factor(MemoryGB)2.44140625 GB RAM   0.5  1.0   535
## factor(MemoryGB)2000 GB RAM         0.5  1.0   535
## factor(MemoryGB)3 GB RAM            0.6  1.0   155
## factor(MemoryGB)4 GB RAM            0.6  1.0   155
## factor(MemoryGB)5 GB RAM            0.6  1.0   257
## factor(MemoryGB)6 GB RAM            0.6  1.0   158
## factor(MemoryGB)8 GB RAM            0.6  1.0   156
## sigma                              0.0  1.0  2623
## mean_PPD                           0.0  1.0  3147
## log-posterior                      0.1  1.0  1741
##
## For each parameter, mcse is Monte Carlo standard error, n_eff is a crude measure of effective sample
```

Model 2

```
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 1).
## Chain 1:
## Chain 1: Gradient evaluation took 0 seconds
## Chain 1: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 1: Adjust your expectations accordingly!
## Chain 1:
## Chain 1:
## Chain 1: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 1: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 1: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 1: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 1: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 1: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 1: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 1: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 1: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 1: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 1: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 1: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 1:
## Chain 1:  Elapsed Time: 10.37 seconds (Warm-up)
## Chain 1:                3.485 seconds (Sampling)
## Chain 1:                13.855 seconds (Total)
## Chain 1:
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 2).
## Chain 2:
## Chain 2: Gradient evaluation took 0 seconds
## Chain 2: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 2: Adjust your expectations accordingly!
## Chain 2:
## Chain 2:
## Chain 2: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 2: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 2: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 2: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 2: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 2: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 2: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 2: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 2: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 2: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 2: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 2: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 2:
## Chain 2:  Elapsed Time: 9.776 seconds (Warm-up)
## Chain 2:                3.384 seconds (Sampling)
## Chain 2:                13.16 seconds (Total)
## Chain 2:
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 3).
```

```
## Chain 3:
## Chain 3: Gradient evaluation took 0.001 seconds
## Chain 3: 1000 transitions using 10 leapfrog steps per transition would take 10 seconds.
## Chain 3: Adjust your expectations accordingly!
## Chain 3:
## Chain 3:
## Chain 3: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 3: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 3: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 3: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 3: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 3: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 3: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 3: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 3: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 3: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 3: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 3: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 3:
## Chain 3:  Elapsed Time: 13.532 seconds (Warm-up)
## Chain 3:                3.523 seconds (Sampling)
## Chain 3:                17.055 seconds (Total)
## Chain 3:
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 4).
## Chain 4:
## Chain 4: Gradient evaluation took 0 seconds
## Chain 4: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 4: Adjust your expectations accordingly!
## Chain 4:
## Chain 4:
## Chain 4: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 4: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 4: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 4: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 4: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 4: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 4: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 4: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 4: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 4: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 4: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 4: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 4:
## Chain 4:  Elapsed Time: 13.31 seconds (Warm-up)
## Chain 4:                3.481 seconds (Sampling)
## Chain 4:                16.791 seconds (Total)
## Chain 4:

##
## Model Info:
##  function:     stan_lmer
##  family:       gaussian [identity]
##  formula:      Metacritic ~ OriginalCost + Controller + Achievements + StorageGB +
```

```
##     Indie + (1 | MemoryGB)
##  algorithm:    sampling
##  sample:       4000 (posterior sample size)
##  priors:       see help('prior_summary')
##  observations: 2572
##  groups:       MemoryGB (42)
##
## Estimates:
##                                                mean   sd   10%   50%   90%
## (Intercept)                                   71.5    0.7 70.7  71.6  72.4
## OriginalCost                                   0.0    0.0  0.0   0.0   0.0
## Controller                                    -1.6    0.5 -2.2  -1.6  -1.0
## Achievements                                   0.0    0.0  0.0   0.0   0.0
## StorageGB                                      0.1    0.0  0.0   0.1   0.1
## Indie                                          0.8    0.5  0.1   0.7   1.4
## b[(Intercept) MemoryGB:0.001953125_GB_RAM]    -0.6    1.8 -2.8  -0.4   1.3
## b[(Intercept) MemoryGB:0.0029296875_GB_RAM]   -0.4    1.8 -2.5  -0.2   1.6
## b[(Intercept) MemoryGB:0.00390625_GB_RAM]      0.0    1.6 -1.9   0.0   1.8
## b[(Intercept) MemoryGB:0.0078125_GB_RAM]      -0.5    1.9 -2.7  -0.3   1.5
## b[(Intercept) MemoryGB:0.015625_GB_RAM]        2.1    2.4 -0.2   1.5   5.1
## b[(Intercept) MemoryGB:0.03125_GB_RAM]         0.5    1.7 -1.4   0.3   2.5
## b[(Intercept) MemoryGB:0.0390625_GB_RAM]      -0.4    1.9 -2.6  -0.3   1.6
## b[(Intercept) MemoryGB:0.0625_GB_RAM]          0.2    1.2 -1.2   0.2   1.8
## b[(Intercept) MemoryGB:0.09375_GB_RAM]         1.1    2.0 -0.9   0.7   3.5
## b[(Intercept) MemoryGB:0.09765625_GB_RAM]      0.1    1.7 -1.9   0.1   2.1
## b[(Intercept) MemoryGB:0.125_GB_RAM]           1.8    1.4  0.2   1.7   3.7
## b[(Intercept) MemoryGB:0.15234375_GB_RAM]      0.2    1.8 -1.9   0.1   2.3
## b[(Intercept) MemoryGB:0.1875_GB_RAM]          0.1    1.8 -1.9   0.1   2.1
## b[(Intercept) MemoryGB:0.1953125_GB_RAM]       0.2    1.7 -1.7   0.1   2.3
## b[(Intercept) MemoryGB:0.244140625_GB_RAM]    -0.1    1.7 -2.1  -0.1   1.7
## b[(Intercept) MemoryGB:0.248046875_GB_RAM]     0.5    1.9 -1.5   0.3   2.7
## b[(Intercept) MemoryGB:0.25_GB_RAM]            1.1    1.0 -0.1   1.0   2.4
## b[(Intercept) MemoryGB:0.29296875_GB_RAM]     -0.3    1.7 -2.4  -0.2   1.5
## b[(Intercept) MemoryGB:0.375_GB_RAM]           0.1    1.8 -1.9   0.1   2.1
## b[(Intercept) MemoryGB:0.390625_GB_RAM]        0.2    1.8 -1.9   0.1   2.2
## b[(Intercept) MemoryGB:0.439453125_GB_RAM]     0.6    1.9 -1.4   0.4   2.8
## b[(Intercept) MemoryGB:0.48828125_GB_RAM]     -0.1    1.5 -1.9  -0.1   1.7
## b[(Intercept) MemoryGB:0.5_GB_RAM]             0.0    0.8 -0.9   0.0   1.0
## b[(Intercept) MemoryGB:0.5078125_GB_RAM]      -0.4    1.9 -2.5  -0.2   1.6
## b[(Intercept) MemoryGB:0.75_GB_RAM]            0.3    1.6 -1.6   0.2   2.3
## b[(Intercept) MemoryGB:0.78125_GB_RAM]         0.0    1.8 -2.0   0.0   2.0
## b[(Intercept) MemoryGB:0.9765625_GB_RAM]       0.4    1.8 -1.5   0.3   2.6
## b[(Intercept) MemoryGB:1_GB_RAM]               0.1    0.7 -0.7   0.2   1.0
## b[(Intercept) MemoryGB:1.46484375_GB_RAM]     -0.7    1.9 -2.9  -0.4   1.2
## b[(Intercept) MemoryGB:1.5_GB_RAM]            -0.2    1.8 -2.3  -0.1   1.7
## b[(Intercept) MemoryGB:1.953125_GB_RAM]       -0.1    1.7 -2.0   0.0   1.9
## b[(Intercept) MemoryGB:10_GB_RAM]             -0.2    1.8 -2.3  -0.1   1.7
## b[(Intercept) MemoryGB:12_GB_RAM]             -0.8    1.9 -3.1  -0.5   1.1
## b[(Intercept) MemoryGB:16_GB_RAM]              0.4    1.7 -1.4   0.2   2.4
## b[(Intercept) MemoryGB:2_GB_RAM]              -1.4    0.7 -2.4  -1.4  -0.5
## b[(Intercept) MemoryGB:2.44140625_GB_RAM]      0.1    1.9 -2.0   0.1   2.3
## b[(Intercept) MemoryGB:2000_GB_RAM]           -0.1    1.8 -2.0  -0.1   1.8
## b[(Intercept) MemoryGB:3_GB_RAM]              -0.3    1.1 -1.7  -0.3   0.9
## b[(Intercept) MemoryGB:4_GB_RAM]              -1.0    0.7 -2.0  -0.9  -0.1
```

```
## b[(Intercept) MemoryGB:5_GB_RAM]            -0.6    1.8 -3.0  -0.4   1.3
## b[(Intercept) MemoryGB:6_GB_RAM]            -1.0    1.1 -2.5  -0.9   0.3
## b[(Intercept) MemoryGB:8_GB_RAM]            -0.7    0.9 -1.9  -0.6   0.4
## sigma                                       10.5    0.1 10.3  10.5  10.7
## Sigma[MemoryGB:(Intercept),(Intercept)]      3.4    4.2  0.5   2.2   7.4
##
## Fit Diagnostics:
##            mean   sd   10%   50%   90%
## mean_PPD 72.9    0.3 72.5  72.9  73.3
##
## The mean_ppd is the sample average posterior predictive distribution of the outcome variable (for de
##
## MCMC diagnostics
##                                             mcse Rhat n_eff
## (Intercept)                                 0.0  1.0  3166
## OriginalCost                                0.0  1.0  5947
## Controller                                  0.0  1.0  5931
## Achievements                                0.0  1.0  6953
## StorageGB                                   0.0  1.0  4193
## Indie                                       0.0  1.0  4026
## b[(Intercept) MemoryGB:0.001953125_GB_RAM]  0.0  1.0  4017
## b[(Intercept) MemoryGB:0.0029296875_GB_RAM] 0.0  1.0  5098
## b[(Intercept) MemoryGB:0.00390625_GB_RAM]   0.0  1.0  5365
## b[(Intercept) MemoryGB:0.0078125_GB_RAM]    0.0  1.0  4046
## b[(Intercept) MemoryGB:0.015625_GB_RAM]     0.1  1.0  1507
## b[(Intercept) MemoryGB:0.03125_GB_RAM]      0.0  1.0  4616
## b[(Intercept) MemoryGB:0.0390625_GB_RAM]    0.0  1.0  4523
## b[(Intercept) MemoryGB:0.0625_GB_RAM]       0.0  1.0  4597
## b[(Intercept) MemoryGB:0.09375_GB_RAM]      0.0  1.0  2135
## b[(Intercept) MemoryGB:0.09765625_GB_RAM]   0.0  1.0  6024
## b[(Intercept) MemoryGB:0.125_GB_RAM]        0.0  1.0  1667
## b[(Intercept) MemoryGB:0.15234375_GB_RAM]   0.0  1.0  4984
## b[(Intercept) MemoryGB:0.1875_GB_RAM]       0.0  1.0  6208
## b[(Intercept) MemoryGB:0.1953125_GB_RAM]    0.0  1.0  6237
## b[(Intercept) MemoryGB:0.244140625_GB_RAM]  0.0  1.0  6634
## b[(Intercept) MemoryGB:0.248046875_GB_RAM]  0.0  1.0  3903
## b[(Intercept) MemoryGB:0.25_GB_RAM]         0.0  1.0  2502
## b[(Intercept) MemoryGB:0.29296875_GB_RAM]   0.0  1.0  4554
## b[(Intercept) MemoryGB:0.375_GB_RAM]        0.0  1.0  6002
## b[(Intercept) MemoryGB:0.390625_GB_RAM]     0.0  1.0  5196
## b[(Intercept) MemoryGB:0.439453125_GB_RAM]  0.0  1.0  3698
## b[(Intercept) MemoryGB:0.48828125_GB_RAM]   0.0  1.0  6041
## b[(Intercept) MemoryGB:0.5_GB_RAM]          0.0  1.0  3630
## b[(Intercept) MemoryGB:0.5078125_GB_RAM]    0.0  1.0  5120
## b[(Intercept) MemoryGB:0.75_GB_RAM]         0.0  1.0  5742
## b[(Intercept) MemoryGB:0.78125_GB_RAM]      0.0  1.0  5915
## b[(Intercept) MemoryGB:0.9765625_GB_RAM]    0.0  1.0  4694
## b[(Intercept) MemoryGB:1_GB_RAM]            0.0  1.0  2686
## b[(Intercept) MemoryGB:1.46484375_GB_RAM]   0.0  1.0  3510
## b[(Intercept) MemoryGB:1.5_GB_RAM]          0.0  1.0  4771
## b[(Intercept) MemoryGB:1.953125_GB_RAM]     0.0  1.0  5546
## b[(Intercept) MemoryGB:10_GB_RAM]           0.0  1.0  5615
## b[(Intercept) MemoryGB:12_GB_RAM]           0.0  1.0  3302
## b[(Intercept) MemoryGB:16_GB_RAM]           0.0  1.0  4874
```

```
## b[(Intercept) MemoryGB:2_GB_RAM]            0.0  1.0  1959
## b[(Intercept) MemoryGB:2.44140625_GB_RAM]   0.0  1.0  5950
## b[(Intercept) MemoryGB:2000_GB_RAM]         0.0  1.0  5613
## b[(Intercept) MemoryGB:3_GB_RAM]            0.0  1.0  4574
## b[(Intercept) MemoryGB:4_GB_RAM]            0.0  1.0  2008
## b[(Intercept) MemoryGB:5_GB_RAM]            0.0  1.0  3703
## b[(Intercept) MemoryGB:6_GB_RAM]            0.0  1.0  2304
## b[(Intercept) MemoryGB:8_GB_RAM]            0.0  1.0  2218
## sigma                                       0.0  1.0  7589
## Sigma[MemoryGB:(Intercept),(Intercept)]     0.1  1.0  1086
## mean_PPD                                    0.0  1.0  3986
## log-posterior                               0.2  1.0   760
##
## For each parameter, mcse is Monte Carlo standard error, n_eff is a crude measure of effective sample
```

Model 3

```
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 1).
## Chain 1:
## Chain 1: Gradient evaluation took 0 seconds
## Chain 1: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 1: Adjust your expectations accordingly!
## Chain 1:
## Chain 1:
## Chain 1: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 1: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 1: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 1: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 1: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 1: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 1: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 1: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 1: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 1: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 1: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 1: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 1:
## Chain 1:  Elapsed Time: 0.843 seconds (Warm-up)
## Chain 1:                0.869 seconds (Sampling)
## Chain 1:                1.712 seconds (Total)
## Chain 1:
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 2).
## Chain 2:
## Chain 2: Gradient evaluation took 0 seconds
## Chain 2: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 2: Adjust your expectations accordingly!
## Chain 2:
## Chain 2:
## Chain 2: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 2: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 2: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 2: Iteration:  600 / 2000 [ 30%]  (Warmup)
```

```
## Chain 2: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 2: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 2: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 2: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 2: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 2: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 2: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 2: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 2:
## Chain 2:  Elapsed Time: 1.167 seconds (Warm-up)
## Chain 2:                1.025 seconds (Sampling)
## Chain 2:                2.192 seconds (Total)
## Chain 2:
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 3).
## Chain 3:
## Chain 3: Gradient evaluation took 0 seconds
## Chain 3: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 3: Adjust your expectations accordingly!
## Chain 3:
## Chain 3:
## Chain 3: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 3: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 3: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 3: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 3: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 3: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 3: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 3: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 3: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 3: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 3: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 3: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 3:
## Chain 3:  Elapsed Time: 0.67 seconds (Warm-up)
## Chain 3:                1.007 seconds (Sampling)
## Chain 3:                1.677 seconds (Total)
## Chain 3:
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 4).
## Chain 4:
## Chain 4: Gradient evaluation took 0 seconds
## Chain 4: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 4: Adjust your expectations accordingly!
## Chain 4:
## Chain 4:
## Chain 4: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 4: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 4: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 4: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 4: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 4: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 4: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 4: Iteration: 1200 / 2000 [ 60%]  (Sampling)
```

```
## Chain 4: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 4: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 4: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 4: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 4:
## Chain 4:  Elapsed Time: 0.726 seconds (Warm-up)
## Chain 4:                1.267 seconds (Sampling)
## Chain 4:                1.993 seconds (Total)
## Chain 4:
```

```
##
## Model Info:
##  function:     stan_glm
##  family:       gaussian [identity]
##  formula:      Presence ~ OriginalCost + Controller + Achievements + StorageGB +
##     Indie + factor(MemoryGB)
##  algorithm:    sampling
##  sample:       4000 (posterior sample size)
##  priors:       see help('prior_summary')
##  observations: 2572
##  predictors:   47
##
## Estimates:
##                                        mean       sd         10%        50%
## (Intercept)                           495679.3   250294.2   171306.1   507370.0
## OriginalCost                            -743.0      482.6    -1375.5     -739.6
## Controller                            -11145.2    16425.4   -32341.5   -11358.5
## Achievements                            1232.8      104.4     1099.8     1232.1
## StorageGB                               3932.7      748.9     3001.4     3912.2
## Indie                                 -57230.3    16974.0   -78870.8   -57398.9
## factor(MemoryGB)0.0029296875 GB RAM  -510291.0   444086.0 -1077559.0  -513858.7
## factor(MemoryGB)0.00390625 GB RAM    -451604.7   311915.7  -832614.7  -459811.9
## factor(MemoryGB)0.0078125 GB RAM     -512706.2   445102.3 -1070033.4  -521661.2
## factor(MemoryGB)0.015625 GB RAM      -316406.2   293194.8  -685953.5  -325318.1
## factor(MemoryGB)0.03125 GB RAM       -232723.2   330380.6  -655028.8  -237325.5
## factor(MemoryGB)0.0390625 GB RAM     -439388.9   448479.1 -1013976.3  -439547.0
## factor(MemoryGB)0.0625 GB RAM        -276433.5   258707.3  -594361.4  -286254.9
## factor(MemoryGB)0.09375 GB RAM        492693.0   361220.8    25022.2   487435.6
## factor(MemoryGB)0.09765625 GB RAM     -31927.7   325563.1  -443854.7   -37427.7
## factor(MemoryGB)0.125 GB RAM         -242125.6   257164.5  -561634.7  -248676.0
## factor(MemoryGB)0.15234375 GB RAM     243152.9   447448.7  -321908.2   235620.5
## factor(MemoryGB)0.1875 GB RAM         135144.3   451522.7  -440456.8   123416.4
## factor(MemoryGB)0.1953125 GB RAM     -103303.5   365119.0  -564425.0  -112979.0
## factor(MemoryGB)0.244140625 GB RAM   -420805.5   440708.2  -977591.4  -419403.8
## factor(MemoryGB)0.248046875 GB RAM   -202766.0   450696.2  -783298.3  -201540.9
## factor(MemoryGB)0.25 GB RAM          -204692.1   253214.6  -522009.7  -214954.4
## factor(MemoryGB)0.29296875 GB RAM    -440241.6   439888.6 -1005238.2  -449228.5
## factor(MemoryGB)0.375 GB RAM          421309.7   352024.3   -24241.1   417462.4
## factor(MemoryGB)0.390625 GB RAM       276798.7   442335.2  -286458.7   272859.5
## factor(MemoryGB)0.439453125 GB RAM    509099.8   446112.0   -52531.8   496530.9
## factor(MemoryGB)0.48828125 GB RAM    -417994.9   282173.9  -772646.8  -423491.5
## factor(MemoryGB)0.5 GB RAM           -223245.9   251474.6  -541969.2  -236013.1
## factor(MemoryGB)0.5078125 GB RAM     -322612.3   462282.8  -907402.0  -317631.1
## factor(MemoryGB)0.75 GB RAM          -244069.3   298980.6  -625615.0  -255175.2
```

```
## factor(MemoryGB)0.78125 GB RAM        511091.2   444310.1   -52244.4   504938.2
## factor(MemoryGB)0.9765625 GB RAM     -360539.4   446644.4  -936791.7  -358122.6
## factor(MemoryGB)1 GB RAM             -198116.8   251351.3  -512050.3  -209339.0
## factor(MemoryGB)1.46484375 GB RAM    -459179.6   368972.3  -924392.9  -462746.2
## factor(MemoryGB)1.5 GB RAM            375352.9   366034.7   -81001.5   368323.2
## factor(MemoryGB)1.953125 GB RAM      -465554.1   336019.0  -891599.2  -469955.6
## factor(MemoryGB)10 GB RAM             447850.1   459730.9  -136041.9   448915.4
## factor(MemoryGB)12 GB RAM            -565942.3   362147.8 -1019502.5  -576693.7
## factor(MemoryGB)16 GB RAM             -67116.1   315100.2  -467515.9   -73070.2
## factor(MemoryGB)2 GB RAM             -201881.6   250615.0  -516581.1  -216665.1
## factor(MemoryGB)2.44140625 GB RAM     501027.2   450431.7   -70738.9   503248.9
## factor(MemoryGB)2000 GB RAM           371342.1   450821.8  -201176.8   369071.7
## factor(MemoryGB)3 GB RAM             -210679.9   254758.7  -529295.4  -223482.1
## factor(MemoryGB)4 GB RAM             -212440.8   251248.1  -528215.2  -225706.9
## factor(MemoryGB)5 GB RAM             -167349.7   331504.3  -581619.5  -175167.2
## factor(MemoryGB)6 GB RAM             -178909.1   255579.9  -496561.8  -190856.6
## factor(MemoryGB)8 GB RAM             -200009.2   252805.8  -518039.4  -214464.9
## sigma                                 369761.2     5255.8   363044.6   369733.7
##                                       90%
## (Intercept)                          808917.1
## OriginalCost                           -122.1
## Controller                            10136.8
## Achievements                           1367.3
## StorageGB                              4904.5
## Indie                                -35651.0
## factor(MemoryGB)0.0029296875 GB RAM   55771.3
## factor(MemoryGB)0.00390625 GB RAM    -49008.6
## factor(MemoryGB)0.0078125 GB RAM      51173.7
## factor(MemoryGB)0.015625 GB RAM       60213.6
## factor(MemoryGB)0.03125 GB RAM       182456.7
## factor(MemoryGB)0.0390625 GB RAM     144732.7
## factor(MemoryGB)0.0625 GB RAM         52575.6
## factor(MemoryGB)0.09375 GB RAM       953553.9
## factor(MemoryGB)0.09765625 GB RAM    382069.7
## factor(MemoryGB)0.125 GB RAM          94667.8
## factor(MemoryGB)0.15234375 GB RAM    815757.0
## factor(MemoryGB)0.1875 GB RAM        709662.5
## factor(MemoryGB)0.1953125 GB RAM     368609.8
## factor(MemoryGB)0.244140625 GB RAM   140537.8
## factor(MemoryGB)0.248046875 GB RAM   365465.2
## factor(MemoryGB)0.25 GB RAM          122268.7
## factor(MemoryGB)0.29296875 GB RAM    120139.9
## factor(MemoryGB)0.375 GB RAM         881091.3
## factor(MemoryGB)0.390625 GB RAM      858130.2
## factor(MemoryGB)0.439453125 GB RAM  1093122.8
## factor(MemoryGB)0.48828125 GB RAM    -64155.0
## factor(MemoryGB)0.5 GB RAM           101008.2
## factor(MemoryGB)0.5078125 GB RAM     244054.9
## factor(MemoryGB)0.75 GB RAM          142799.8
## factor(MemoryGB)0.78125 GB RAM      1092345.5
## factor(MemoryGB)0.9765625 GB RAM     214486.4
## factor(MemoryGB)1 GB RAM             124103.7
## factor(MemoryGB)1.46484375 GB RAM     14413.1
## factor(MemoryGB)1.5 GB RAM           843317.0
```

```
## factor(MemoryGB)1.953125 GB RAM       -29081.2
## factor(MemoryGB)10 GB RAM            1039959.9
## factor(MemoryGB)12 GB RAM             -93815.4
## factor(MemoryGB)16 GB RAM             341917.7
## factor(MemoryGB)2 GB RAM              119660.0
## factor(MemoryGB)2.44140625 GB RAM    1072100.1
## factor(MemoryGB)2000 GB RAM           944408.8
## factor(MemoryGB)3 GB RAM              117383.4
## factor(MemoryGB)4 GB RAM              110124.1
## factor(MemoryGB)5 GB RAM              255549.8
## factor(MemoryGB)6 GB RAM              152266.3
## factor(MemoryGB)8 GB RAM              125804.9
## sigma                                 376478.6
##
## Fit Diagnostics:
##            mean     sd       10%      50%      90%
## mean_PPD 344953.4  10549.0 331320.0 344991.2 358662.2
##
## The mean_ppd is the sample average posterior predictive distribution of the outcome variable (for de
##
## MCMC diagnostics
##                                      mcse    Rhat    n_eff
## (Intercept)                          17155.4     1.0  213
## OriginalCost                             9.2     1.0 2731
## Controller                             334.6     1.0 2409
## Achievements                             2.0     1.0 2619
## StorageGB                               16.6     1.0 2044
## Indie                                  338.6     1.0 2513
## factor(MemoryGB)0.0029296875 GB RAM 19169.4     1.0  537
## factor(MemoryGB)0.00390625 GB RAM   18060.1     1.0  298
## factor(MemoryGB)0.0078125 GB RAM    18252.4     1.0  595
## factor(MemoryGB)0.015625 GB RAM     17674.7     1.0  275
## factor(MemoryGB)0.03125 GB RAM      17406.5     1.0  360
## factor(MemoryGB)0.0390625 GB RAM    19307.7     1.0  540
## factor(MemoryGB)0.0625 GB RAM       17115.4     1.0  228
## factor(MemoryGB)0.09375 GB RAM      17903.6     1.0  407
## factor(MemoryGB)0.09765625 GB RAM   17514.0     1.0  346
## factor(MemoryGB)0.125 GB RAM        17299.3     1.0  221
## factor(MemoryGB)0.15234375 GB RAM   18025.3     1.0  616
## factor(MemoryGB)0.1875 GB RAM       18037.3     1.0  627
## factor(MemoryGB)0.1953125 GB RAM    17378.8     1.0  441
## factor(MemoryGB)0.244140625 GB RAM  18586.1     1.0  562
## factor(MemoryGB)0.248046875 GB RAM  18155.2     1.0  616
## factor(MemoryGB)0.25 GB RAM         17175.2     1.0  217
## factor(MemoryGB)0.29296875 GB RAM   19117.8     1.0  529
## factor(MemoryGB)0.375 GB RAM        17790.3     1.0  392
## factor(MemoryGB)0.390625 GB RAM     16614.7     1.0  709
## factor(MemoryGB)0.439453125 GB RAM  18192.7     1.0  601
## factor(MemoryGB)0.48828125 GB RAM   17275.2     1.0  267
## factor(MemoryGB)0.5 GB RAM          17198.0     1.0  214
## factor(MemoryGB)0.5078125 GB RAM    19370.2     1.0  570
## factor(MemoryGB)0.75 GB RAM         17711.0     1.0  285
## factor(MemoryGB)0.78125 GB RAM      18491.2     1.0  577
## factor(MemoryGB)0.9765625 GB RAM    18096.7     1.0  609
```

```
## factor(MemoryGB)1 GB RAM            17264.8     1.0  212
## factor(MemoryGB)1.46484375 GB RAM   17921.5     1.0  424
## factor(MemoryGB)1.5 GB RAM          17902.7     1.0  418
## factor(MemoryGB)1.953125 GB RAM     18368.7     1.0  335
## factor(MemoryGB)10 GB RAM           18665.2     1.0  607
## factor(MemoryGB)12 GB RAM           17512.5     1.0  428
## factor(MemoryGB)16 GB RAM           17727.9     1.0  316
## factor(MemoryGB)2 GB RAM            17133.4     1.0  214
## factor(MemoryGB)2.44140625 GB RAM   18698.7     1.0  580
## factor(MemoryGB)2000 GB RAM         18193.0     1.0  614
## factor(MemoryGB)3 GB RAM            17040.9     1.0  223
## factor(MemoryGB)4 GB RAM            17210.5     1.0  213
## factor(MemoryGB)5 GB RAM            17414.4     1.0  362
## factor(MemoryGB)6 GB RAM            17246.6     1.0  220
## factor(MemoryGB)8 GB RAM            17279.5     1.0  214
## sigma                                  77.3     1.0 4618
## mean_PPD                              165.1     1.0 4080
## log-posterior                           0.1     1.0 1359
##
## For each parameter, mcse is Monte Carlo standard error, n_eff is a crude measure of effective sample
```

Model 4

```
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 1).
## Chain 1:
## Chain 1: Gradient evaluation took 0.001 seconds
## Chain 1: 1000 transitions using 10 leapfrog steps per transition would take 10 seconds.
## Chain 1: Adjust your expectations accordingly!
## Chain 1:
## Chain 1:
## Chain 1: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 1: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 1: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 1: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 1: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 1: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 1: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 1: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 1: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 1: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 1: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 1: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 1:
## Chain 1:  Elapsed Time: 264.362 seconds (Warm-up)
## Chain 1:                431.104 seconds (Sampling)
## Chain 1:                695.466 seconds (Total)
## Chain 1:
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 2).
## Chain 2:
## Chain 2: Gradient evaluation took 0 seconds
## Chain 2: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 2: Adjust your expectations accordingly!
```

```
## Chain 2:
## Chain 2:
## Chain 2: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 2: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 2: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 2: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 2: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 2: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 2: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 2: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 2: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 2: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 2: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 2: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 2:
## Chain 2:  Elapsed Time: 204.84 seconds (Warm-up)
## Chain 2:                53.12 seconds (Sampling)
## Chain 2:                257.96 seconds (Total)
## Chain 2:
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 3).
## Chain 3:
## Chain 3: Gradient evaluation took 0.001 seconds
## Chain 3: 1000 transitions using 10 leapfrog steps per transition would take 10 seconds.
## Chain 3: Adjust your expectations accordingly!
## Chain 3:
## Chain 3:
## Chain 3: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 3: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 3: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 3: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 3: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 3: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 3: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 3: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 3: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 3: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 3: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 3: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 3:
## Chain 3:  Elapsed Time: 201.136 seconds (Warm-up)
## Chain 3:                105.034 seconds (Sampling)
## Chain 3:                306.17 seconds (Total)
## Chain 3:
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 4).
## Chain 4:
## Chain 4: Gradient evaluation took 0.001 seconds
## Chain 4: 1000 transitions using 10 leapfrog steps per transition would take 10 seconds.
## Chain 4: Adjust your expectations accordingly!
## Chain 4:
## Chain 4:
## Chain 4: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 4: Iteration:  200 / 2000 [ 10%]  (Warmup)
```

```
## Chain 4: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 4: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 4: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 4: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 4: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 4: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 4: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 4: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 4: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 4: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 4:
## Chain 4:  Elapsed Time: 183.659 seconds (Warm-up)
## Chain 4:                52.787 seconds (Sampling)
## Chain 4:                236.446 seconds (Total)
## Chain 4:
```

```
##
## Model Info:
##  function:     stan_lmer
##  family:       gaussian [identity]
##  formula:      Presence ~ OriginalCost + Controller + Achievements + StorageGB +
##     Indie + factor(MemoryGB) + (1 + StorageGB | MemoryGB)
##  algorithm:    sampling
##  sample:       4000 (posterior sample size)
##  priors:       see help('prior_summary')
##  observations: 2572
##  groups:       MemoryGB (42)
##
## Estimates:
##                                                mean           sd
## (Intercept)                                    472794.5       275700.2
## OriginalCost                                     -709.1          491.2
## Controller                                     -10095.7        16289.4
## Achievements                                     1233.5          105.6
## StorageGB                                        5440.4         1939.8
## Indie                                          -53042.9        17237.0
## factor(MemoryGB)0.0029296875 GB RAM           -493953.2       480479.4
## factor(MemoryGB)0.00390625 GB RAM             -424503.6       358312.4
## factor(MemoryGB)0.0078125 GB RAM              -513669.9       483837.0
## factor(MemoryGB)0.015625 GB RAM               -292021.9       341350.1
## factor(MemoryGB)0.03125 GB RAM                -219134.4       384913.6
## factor(MemoryGB)0.0390625 GB RAM              -423804.4       476136.9
## factor(MemoryGB)0.0625 GB RAM                 -255963.3       318750.1
## factor(MemoryGB)0.09375 GB RAM                 520582.1       413883.5
## factor(MemoryGB)0.09765625 GB RAM              -17027.8       371016.4
## factor(MemoryGB)0.125 GB RAM                  -222982.3       312939.6
## factor(MemoryGB)0.15234375 GB RAM              255056.0       472303.5
## factor(MemoryGB)0.1875 GB RAM                  145638.6       473911.8
## factor(MemoryGB)0.1953125 GB RAM               -74991.8       401409.7
## factor(MemoryGB)0.244140625 GB RAM            -408649.7       477770.4
## factor(MemoryGB)0.248046875 GB RAM            -179448.9       493907.4
## factor(MemoryGB)0.25 GB RAM                   -180875.0       322019.2
## factor(MemoryGB)0.29296875 GB RAM             -415292.5       478150.4
## factor(MemoryGB)0.375 GB RAM                   436964.4       423769.6
```

```
## factor(MemoryGB)0.390625 GB RAM                  292546.7      474081.6
## factor(MemoryGB)0.439453125 GB RAM               541952.0      484796.0
## factor(MemoryGB)0.48828125 GB RAM               -399475.1      338737.9
## factor(MemoryGB)0.5 GB RAM                      -207027.2      308642.7
## factor(MemoryGB)0.5078125 GB RAM                -296790.7      485863.3
## factor(MemoryGB)0.75 GB RAM                     -224560.0      365526.8
## factor(MemoryGB)0.78125 GB RAM                   548566.7      498265.9
## factor(MemoryGB)0.9765625 GB RAM                -353181.8      488802.1
## factor(MemoryGB)1 GB RAM                        -188634.2      314830.6
## factor(MemoryGB)1.46484375 GB RAM               -443191.3      410853.6
## factor(MemoryGB)1.5 GB RAM                       389583.8      403111.6
## factor(MemoryGB)1.953125 GB RAM                 -449624.3      384488.5
## factor(MemoryGB)10 GB RAM                        431264.4      482118.6
## factor(MemoryGB)12 GB RAM                       -561165.3      401393.0
## factor(MemoryGB)16 GB RAM                        -44501.7      357983.5
## factor(MemoryGB)2 GB RAM                        -163296.3      358308.4
## factor(MemoryGB)2.44140625 GB RAM                504797.6      484312.2
## factor(MemoryGB)2000 GB RAM                      383369.7      499822.4
## factor(MemoryGB)3 GB RAM                        -211745.9      309546.7
## factor(MemoryGB)4 GB RAM                        -165980.2      358629.1
## factor(MemoryGB)5 GB RAM                        -224035.2      396141.3
## factor(MemoryGB)6 GB RAM                        -188072.3      326029.1
## factor(MemoryGB)8 GB RAM                        -155483.6      334962.4
## b[(Intercept) MemoryGB:0.001953125_GB_RAM]         6414.0      108590.0
## b[StorageGB MemoryGB:0.001953125_GB_RAM]            -64.7        4036.9
## b[(Intercept) MemoryGB:0.0029296875_GB_RAM]      -1320.3      125429.0
## b[StorageGB MemoryGB:0.0029296875_GB_RAM]           -57.9        4157.2
## b[(Intercept) MemoryGB:0.00390625_GB_RAM]        -3307.3      141326.4
## b[StorageGB MemoryGB:0.00390625_GB_RAM]             -52.1        4118.5
## b[(Intercept) MemoryGB:0.0078125_GB_RAM]            593.6      128794.1
## b[StorageGB MemoryGB:0.0078125_GB_RAM]              -52.7        3996.7
## b[(Intercept) MemoryGB:0.015625_GB_RAM]             -731.5      119324.7
## b[StorageGB MemoryGB:0.015625_GB_RAM]                41.2        4140.0
## b[(Intercept) MemoryGB:0.03125_GB_RAM]              676.7      156118.8
## b[StorageGB MemoryGB:0.03125_GB_RAM]                -19.2        4063.9
## b[(Intercept) MemoryGB:0.0390625_GB_RAM]         -1507.1      133922.4
## b[StorageGB MemoryGB:0.0390625_GB_RAM]              -28.8        4192.9
## b[(Intercept) MemoryGB:0.0625_GB_RAM]               1263.9      138125.6
## b[StorageGB MemoryGB:0.0625_GB_RAM]                 -185.5        4191.5
## b[(Intercept) MemoryGB:0.09375_GB_RAM]              -912.1      152290.7
## b[StorageGB MemoryGB:0.09375_GB_RAM]                 -8.7        4154.0
## b[(Intercept) MemoryGB:0.09765625_GB_RAM]           1239.1      131326.7
## b[StorageGB MemoryGB:0.09765625_GB_RAM]             -6.7        4060.4
## b[(Intercept) MemoryGB:0.125_GB_RAM]             -1648.4      125575.3
## b[StorageGB MemoryGB:0.125_GB_RAM]                  -24.6        4020.5
## b[(Intercept) MemoryGB:0.15234375_GB_RAM]        -5475.4      137284.0
## b[StorageGB MemoryGB:0.15234375_GB_RAM]             14.6        4179.5
## b[(Intercept) MemoryGB:0.1875_GB_RAM]               2638.2      146104.7
## b[StorageGB MemoryGB:0.1875_GB_RAM]                 16.1        4131.9
## b[(Intercept) MemoryGB:0.1953125_GB_RAM]         -1143.1      120558.2
## b[StorageGB MemoryGB:0.1953125_GB_RAM]              -11.1        4064.0
## b[(Intercept) MemoryGB:0.244140625_GB_RAM]          314.5      140461.9
## b[StorageGB MemoryGB:0.244140625_GB_RAM]             60.3        4128.0
## b[(Intercept) MemoryGB:0.248046875_GB_RAM]       -1114.4      164287.0
```

```
## b[StorageGB MemoryGB:0.248046875_GB_RAM]            -37.6        4104.4
## b[(Intercept) MemoryGB:0.25_GB_RAM]               -5545.3      150338.2
## b[StorageGB MemoryGB:0.25_GB_RAM]                  -411.0        4116.9
## b[(Intercept) MemoryGB:0.29296875_GB_RAM]          -406.5      119315.9
## b[StorageGB MemoryGB:0.29296875_GB_RAM]             122.3        4101.4
## b[(Intercept) MemoryGB:0.375_GB_RAM]              -5655.8      155849.5
## b[StorageGB MemoryGB:0.375_GB_RAM]                   48.3        4055.8
## b[(Intercept) MemoryGB:0.390625_GB_RAM]            1519.6      141524.1
## b[StorageGB MemoryGB:0.390625_GB_RAM]               -33.3        3968.1
## b[(Intercept) MemoryGB:0.439453125_GB_RAM]        -4123.0      140833.9
## b[StorageGB MemoryGB:0.439453125_GB_RAM]            -30.1        4127.8
## b[(Intercept) MemoryGB:0.48828125_GB_RAM]         -4092.4      136228.2
## b[StorageGB MemoryGB:0.48828125_GB_RAM]              21.7        4153.1
## b[(Intercept) MemoryGB:0.5_GB_RAM]                 -990.0      127581.8
## b[StorageGB MemoryGB:0.5_GB_RAM]                   1074.2        3671.7
## b[(Intercept) MemoryGB:0.5078125_GB_RAM]             11.9      133950.4
## b[StorageGB MemoryGB:0.5078125_GB_RAM]              104.2        4194.1
## b[(Intercept) MemoryGB:0.75_GB_RAM]               -5048.3      154910.0
## b[StorageGB MemoryGB:0.75_GB_RAM]                  -138.8        4111.2
## b[(Intercept) MemoryGB:0.78125_GB_RAM]             -940.9      136759.8
## b[StorageGB MemoryGB:0.78125_GB_RAM]                -57.4        4083.9
## b[(Intercept) MemoryGB:0.9765625_GB_RAM]          -2021.4      159895.9
## b[StorageGB MemoryGB:0.9765625_GB_RAM]               82.8        4136.0
## b[(Intercept) MemoryGB:1_GB_RAM]                  -5311.5      145380.3
## b[StorageGB MemoryGB:1_GB_RAM]                     3666.6        3173.2
## b[(Intercept) MemoryGB:1.46484375_GB_RAM]          5448.7      162385.7
## b[StorageGB MemoryGB:1.46484375_GB_RAM]               4.1        4129.0
## b[(Intercept) MemoryGB:1.5_GB_RAM]                 2224.1      165816.8
## b[StorageGB MemoryGB:1.5_GB_RAM]                     -1.3        3965.0
## b[(Intercept) MemoryGB:1.953125_GB_RAM]           -1724.5      146971.4
## b[StorageGB MemoryGB:1.953125_GB_RAM]               -17.7        4088.1
## b[(Intercept) MemoryGB:10_GB_RAM]                  1158.5      102340.1
## b[StorageGB MemoryGB:10_GB_RAM]                      42.5        4349.5
## b[(Intercept) MemoryGB:12_GB_RAM]                   329.4      140467.6
## b[StorageGB MemoryGB:12_GB_RAM]                    -183.2        3928.0
## b[(Intercept) MemoryGB:16_GB_RAM]                  -984.5      143225.5
## b[StorageGB MemoryGB:16_GB_RAM]                      70.7        4265.0
## b[(Intercept) MemoryGB:2_GB_RAM]                 -20292.8      190894.8
## b[StorageGB MemoryGB:2_GB_RAM]                    -1434.5        2457.3
## b[(Intercept) MemoryGB:2.44140625_GB_RAM]           -24.9      149803.4
## b[StorageGB MemoryGB:2.44140625_GB_RAM]             -62.0        4429.0
## b[(Intercept) MemoryGB:2000_GB_RAM]                -672.6      161121.5
## b[StorageGB MemoryGB:2000_GB_RAM]                    18.0        4256.3
## b[(Intercept) MemoryGB:3_GB_RAM]                  -4461.5      103240.1
## b[StorageGB MemoryGB:3_GB_RAM]                     1071.7        2495.3
## b[(Intercept) MemoryGB:4_GB_RAM]                 -19484.3      185143.8
## b[StorageGB MemoryGB:4_GB_RAM]                    -2324.9        2139.8
## b[(Intercept) MemoryGB:5_GB_RAM]                   2243.3      143807.9
## b[StorageGB MemoryGB:5_GB_RAM]                      859.8        3707.7
## b[(Intercept) MemoryGB:6_GB_RAM]                  -8006.6      140438.0
## b[StorageGB MemoryGB:6_GB_RAM]                      -17.1        2132.1
## b[(Intercept) MemoryGB:8_GB_RAM]                 -12910.6      154967.3
## b[StorageGB MemoryGB:8_GB_RAM]                    -2046.2        2092.5
## sigma                                            369231.7        5275.0
```

```
## Sigma[MemoryGB:(Intercept),(Intercept)]      20365096321.1 170374546896.7
## Sigma[MemoryGB:StorageGB,(Intercept)]           22318244.5    495571649.6
## Sigma[MemoryGB:StorageGB,StorageGB]             17052593.3     23673545.9
##                                                        10%            50%
## (Intercept)                                          132742.8       482570.8
## OriginalCost                                          -1329.0         -714.8
## Controller                                           -31236.9       -10210.6
## Achievements                                          1098.2         1234.0
## StorageGB                                             3282.7         5240.7
## Indie                                                -75026.5       -52953.5
## factor(MemoryGB)0.0029296875 GB RAM                 -1090254.1      -494893.7
## factor(MemoryGB)0.00390625 GB RAM                    -838032.2      -436863.8
## factor(MemoryGB)0.0078125 GB RAM                    -1105107.5      -513934.1
## factor(MemoryGB)0.015625 GB RAM                      -687732.6      -298027.1
## factor(MemoryGB)0.03125 GB RAM                       -673862.2      -225806.4
## factor(MemoryGB)0.0390625 GB RAM                    -1001143.0      -426356.7
## factor(MemoryGB)0.0625 GB RAM                        -602946.9      -263986.7
## factor(MemoryGB)0.09375 GB RAM                         23306.7       519941.0
## factor(MemoryGB)0.09765625 GB RAM                    -450371.9       -23420.0
## factor(MemoryGB)0.125 GB RAM                         -572296.2      -232180.0
## factor(MemoryGB)0.15234375 GB RAM                    -319862.8       245588.2
## factor(MemoryGB)0.1875 GB RAM                        -424179.6       136701.9
## factor(MemoryGB)0.1953125 GB RAM                     -557171.0       -81419.8
## factor(MemoryGB)0.244140625 GB RAM                  -1007053.1      -413018.7
## factor(MemoryGB)0.248046875 GB RAM                   -785470.7      -183692.6
## factor(MemoryGB)0.25 GB RAM                          -525803.8      -194645.8
## factor(MemoryGB)0.29296875 GB RAM                   -1013537.8      -429802.7
## factor(MemoryGB)0.375 GB RAM                          -53053.5       429697.3
## factor(MemoryGB)0.390625 GB RAM                      -294194.0       278609.8
## factor(MemoryGB)0.439453125 GB RAM                    -43244.7       533586.9
## factor(MemoryGB)0.48828125 GB RAM                    -785038.8      -410763.4
## factor(MemoryGB)0.5 GB RAM                           -546822.6      -219109.5
## factor(MemoryGB)0.5078125 GB RAM                     -893527.0      -308932.8
## factor(MemoryGB)0.75 GB RAM                          -625379.0      -239146.7
## factor(MemoryGB)0.78125 GB RAM                        -77044.2       547500.1
## factor(MemoryGB)0.9765625 GB RAM                     -951006.4      -347996.5
## factor(MemoryGB)1 GB RAM                             -531305.5      -203576.3
## factor(MemoryGB)1.46484375 GB RAM                    -923769.1      -454038.1
## factor(MemoryGB)1.5 GB RAM                           -107951.6       393816.5
## factor(MemoryGB)1.953125 GB RAM                      -900964.0      -456367.1
## factor(MemoryGB)10 GB RAM                            -161492.3       427951.9
## factor(MemoryGB)12 GB RAM                           -1052188.5      -569290.4
## factor(MemoryGB)16 GB RAM                            -465271.7       -53819.1
## factor(MemoryGB)2 GB RAM                             -515551.6      -189172.3
## factor(MemoryGB)2.44140625 GB RAM                     -83435.1       505618.8
## factor(MemoryGB)2000 GB RAM                          -218661.8       386705.7
## factor(MemoryGB)3 GB RAM                             -562855.4      -221896.3
## factor(MemoryGB)4 GB RAM                             -516640.3      -191002.3
## factor(MemoryGB)5 GB RAM                             -691322.6      -231857.1
## factor(MemoryGB)6 GB RAM                             -542018.9      -204995.6
## factor(MemoryGB)8 GB RAM                             -509287.4      -174489.1
## b[(Intercept) MemoryGB:0.001953125_GB_RAM]            -12083.7           28.2
## b[StorageGB MemoryGB:0.001953125_GB_RAM]               -4377.6         -52.0
## b[(Intercept) MemoryGB:0.0029296875_GB_RAM]           -12845.6           -3.5
```

```
## b[StorageGB MemoryGB:0.0029296875_GB_RAM]          -4493.4          -26.2
## b[(Intercept) MemoryGB:0.00390625_GB_RAM]         -12669.2          -15.7
## b[StorageGB MemoryGB:0.00390625_GB_RAM]            -4553.0          -18.4
## b[(Intercept) MemoryGB:0.0078125_GB_RAM]          -11357.9            2.4
## b[StorageGB MemoryGB:0.0078125_GB_RAM]             -4327.6           -6.5
## b[(Intercept) MemoryGB:0.015625_GB_RAM]           -11968.1           75.6
## b[StorageGB MemoryGB:0.015625_GB_RAM]              -4441.1           -4.4
## b[(Intercept) MemoryGB:0.03125_GB_RAM]            -11419.9          -15.8
## b[StorageGB MemoryGB:0.03125_GB_RAM]               -4336.4            0.4
## b[(Intercept) MemoryGB:0.0390625_GB_RAM]          -12501.6           -8.0
## b[StorageGB MemoryGB:0.0390625_GB_RAM]             -4440.0           -8.5
## b[(Intercept) MemoryGB:0.0625_GB_RAM]             -11996.0           44.2
## b[StorageGB MemoryGB:0.0625_GB_RAM]                -4606.7          -56.7
## b[(Intercept) MemoryGB:0.09375_GB_RAM]            -12393.8          -17.7
## b[StorageGB MemoryGB:0.09375_GB_RAM]               -4507.0            0.0
## b[(Intercept) MemoryGB:0.09765625_GB_RAM]         -11362.4          -15.0
## b[StorageGB MemoryGB:0.09765625_GB_RAM]            -4333.1          -22.4
## b[(Intercept) MemoryGB:0.125_GB_RAM]              -11457.1           16.4
## b[StorageGB MemoryGB:0.125_GB_RAM]                 -4633.6           -3.8
## b[(Intercept) MemoryGB:0.15234375_GB_RAM]         -13803.3          -34.1
## b[StorageGB MemoryGB:0.15234375_GB_RAM]            -4378.5           -9.8
## b[(Intercept) MemoryGB:0.1875_GB_RAM]             -12243.7           42.8
## b[StorageGB MemoryGB:0.1875_GB_RAM]                -4435.2          -29.5
## b[(Intercept) MemoryGB:0.1953125_GB_RAM]          -12631.1           38.3
## b[StorageGB MemoryGB:0.1953125_GB_RAM]             -4241.5          -26.7
## b[(Intercept) MemoryGB:0.244140625_GB_RAM]        -11744.3          -14.8
## b[StorageGB MemoryGB:0.244140625_GB_RAM]           -4436.0           29.4
## b[(Intercept) MemoryGB:0.248046875_GB_RAM]        -12356.1           13.1
## b[StorageGB MemoryGB:0.248046875_GB_RAM]           -4532.1          -10.7
## b[(Intercept) MemoryGB:0.25_GB_RAM]               -13442.6           -9.7
## b[StorageGB MemoryGB:0.25_GB_RAM]                  -5070.3         -135.6
## b[(Intercept) MemoryGB:0.29296875_GB_RAM]         -11983.7            7.4
## b[StorageGB MemoryGB:0.29296875_GB_RAM]            -4321.0           28.3
## b[(Intercept) MemoryGB:0.375_GB_RAM]              -12256.4          -32.0
## b[StorageGB MemoryGB:0.375_GB_RAM]                 -4346.0           23.3
## b[(Intercept) MemoryGB:0.390625_GB_RAM]           -12274.5           25.7
## b[StorageGB MemoryGB:0.390625_GB_RAM]              -4517.4           -4.8
## b[(Intercept) MemoryGB:0.439453125_GB_RAM]        -12156.7          -20.6
## b[StorageGB MemoryGB:0.439453125_GB_RAM]           -4641.5            4.7
## b[(Intercept) MemoryGB:0.48828125_GB_RAM]         -12399.9           -2.0
## b[StorageGB MemoryGB:0.48828125_GB_RAM]            -4434.6           30.6
## b[(Intercept) MemoryGB:0.5_GB_RAM]                -12466.0          -21.8
## b[StorageGB MemoryGB:0.5_GB_RAM]                   -2851.8          563.1
## b[(Intercept) MemoryGB:0.5078125_GB_RAM]          -11965.0           -5.6
## b[StorageGB MemoryGB:0.5078125_GB_RAM]             -4292.3           43.2
## b[(Intercept) MemoryGB:0.75_GB_RAM]               -12298.3          -49.1
## b[StorageGB MemoryGB:0.75_GB_RAM]                  -4589.5          -50.0
## b[(Intercept) MemoryGB:0.78125_GB_RAM]            -11471.8           32.7
## b[StorageGB MemoryGB:0.78125_GB_RAM]               -4619.0          -25.0
## b[(Intercept) MemoryGB:0.9765625_GB_RAM]          -12035.6          -12.7
## b[StorageGB MemoryGB:0.9765625_GB_RAM]             -4200.9           45.6
## b[(Intercept) MemoryGB:1_GB_RAM]                  -13382.3           10.5
## b[StorageGB MemoryGB:1_GB_RAM]                        11.7         3291.2
## b[(Intercept) MemoryGB:1.46484375_GB_RAM]         -11516.1          -28.6
```

```
## b[StorageGB MemoryGB:1.46484375_GB_RAM]            -4482.7         -29.2
## b[(Intercept) MemoryGB:1.5_GB_RAM]                -11746.8           5.9
## b[StorageGB MemoryGB:1.5_GB_RAM]                   -4446.6         -13.8
## b[(Intercept) MemoryGB:1.953125_GB_RAM]           -11265.4         -33.3
## b[StorageGB MemoryGB:1.953125_GB_RAM]              -4390.3          -1.7
## b[(Intercept) MemoryGB:10_GB_RAM]                 -12292.7         -48.4
## b[StorageGB MemoryGB:10_GB_RAM]                    -4487.7          15.1
## b[(Intercept) MemoryGB:12_GB_RAM]                 -12440.8           7.4
## b[StorageGB MemoryGB:12_GB_RAM]                    -4731.7         -58.2
## b[(Intercept) MemoryGB:16_GB_RAM]                 -12680.9         -21.2
## b[StorageGB MemoryGB:16_GB_RAM]                    -4464.8          20.7
## b[(Intercept) MemoryGB:2_GB_RAM]                  -12121.2         -11.2
## b[StorageGB MemoryGB:2_GB_RAM]                     -4766.1       -1049.7
## b[(Intercept) MemoryGB:2.44140625_GB_RAM]         -12416.7           1.9
## b[StorageGB MemoryGB:2.44140625_GB_RAM]            -4412.8         -32.6
## b[(Intercept) MemoryGB:2000_GB_RAM]               -11763.5          18.1
## b[StorageGB MemoryGB:2000_GB_RAM]                  -4386.3         -17.1
## b[(Intercept) MemoryGB:3_GB_RAM]                  -11129.4         -49.0
## b[StorageGB MemoryGB:3_GB_RAM]                     -1705.7         821.0
## b[(Intercept) MemoryGB:4_GB_RAM]                  -13324.4         -51.5
## b[StorageGB MemoryGB:4_GB_RAM]                     -5210.2       -2053.2
## b[(Intercept) MemoryGB:5_GB_RAM]                  -11811.3           6.4
## b[StorageGB MemoryGB:5_GB_RAM]                     -3034.1         405.4
## b[(Intercept) MemoryGB:6_GB_RAM]                  -11255.6         -33.5
## b[StorageGB MemoryGB:6_GB_RAM]                     -2610.1          41.6
## b[(Intercept) MemoryGB:8_GB_RAM]                  -12244.1         -33.9
## b[StorageGB MemoryGB:8_GB_RAM]                     -4776.9       -1767.3
## sigma                                             362572.3      369145.5
## Sigma[MemoryGB:(Intercept),(Intercept)]           822363.1    26427598.8
## Sigma[MemoryGB:StorageGB,(Intercept)]          -28518135.2        8333.9
## Sigma[MemoryGB:StorageGB,StorageGB]              1145431.1     9634563.0
##                                                      90%
## (Intercept)                                       811036.2
## OriginalCost                                         -71.5
## Controller                                         10964.6
## Achievements                                        1367.9
## StorageGB                                           7876.2
## Indie                                             -31227.1
## factor(MemoryGB)0.0029296875 GB RAM                93483.0
## factor(MemoryGB)0.00390625 GB RAM                 -14407.2
## factor(MemoryGB)0.0078125 GB RAM                   68339.8
## factor(MemoryGB)0.015625 GB RAM                   101405.7
## factor(MemoryGB)0.03125 GB RAM                    228459.1
## factor(MemoryGB)0.0390625 GB RAM                  145305.7
## factor(MemoryGB)0.0625 GB RAM                     100482.9
## factor(MemoryGB)0.09375 GB RAM                   1009092.1
## factor(MemoryGB)0.09765625 GB RAM                 414753.5
## factor(MemoryGB)0.125 GB RAM                      127698.9
## factor(MemoryGB)0.15234375 GB RAM                 833199.6
## factor(MemoryGB)0.1875 GB RAM                     729402.4
## factor(MemoryGB)0.1953125 GB RAM                  403860.4
## factor(MemoryGB)0.244140625 GB RAM                196884.6
## factor(MemoryGB)0.248046875 GB RAM                410197.2
## factor(MemoryGB)0.25 GB RAM                       159151.8
```

```
## factor(MemoryGB)0.29296875 GB RAM                193690.5
## factor(MemoryGB)0.375 GB RAM                     925477.7
## factor(MemoryGB)0.390625 GB RAM                  869010.8
## factor(MemoryGB)0.439453125 GB RAM              1132994.2
## factor(MemoryGB)0.48828125 GB RAM                -17749.4
## factor(MemoryGB)0.5 GB RAM                       136176.2
## factor(MemoryGB)0.5078125 GB RAM                 315804.1
## factor(MemoryGB)0.75 GB RAM                      177551.2
## factor(MemoryGB)0.78125 GB RAM                  1147790.1
## factor(MemoryGB)0.9765625 GB RAM                 221263.1
## factor(MemoryGB)1 GB RAM                         149854.6
## factor(MemoryGB)1.46484375 GB RAM                 57166.6
## factor(MemoryGB)1.5 GB RAM                       859948.4
## factor(MemoryGB)1.953125 GB RAM                    -536.0
## factor(MemoryGB)10 GB RAM                       1031397.4
## factor(MemoryGB)12 GB RAM                        -77775.2
## factor(MemoryGB)16 GB RAM                        377469.4
## factor(MemoryGB)2 GB RAM                         168572.8
## factor(MemoryGB)2.44140625 GB RAM               1083193.4
## factor(MemoryGB)2000 GB RAM                      971357.5
## factor(MemoryGB)3 GB RAM                         129599.7
## factor(MemoryGB)4 GB RAM                         166591.9
## factor(MemoryGB)5 GB RAM                         249831.8
## factor(MemoryGB)6 GB RAM                         159456.8
## factor(MemoryGB)8 GB RAM                         177697.6
## b[(Intercept) MemoryGB:0.001953125_GB_RAM]        13067.5
## b[StorageGB MemoryGB:0.001953125_GB_RAM]           4422.6
## b[(Intercept) MemoryGB:0.0029296875_GB_RAM]       10497.8
## b[StorageGB MemoryGB:0.0029296875_GB_RAM]          4454.7
## b[(Intercept) MemoryGB:0.00390625_GB_RAM]         10721.4
## b[StorageGB MemoryGB:0.00390625_GB_RAM]            4366.7
## b[(Intercept) MemoryGB:0.0078125_GB_RAM]          12091.0
## b[StorageGB MemoryGB:0.0078125_GB_RAM]             4215.7
## b[(Intercept) MemoryGB:0.015625_GB_RAM]           12046.5
## b[StorageGB MemoryGB:0.015625_GB_RAM]              4526.0
## b[(Intercept) MemoryGB:0.03125_GB_RAM]            11752.1
## b[StorageGB MemoryGB:0.03125_GB_RAM]               4370.1
## b[(Intercept) MemoryGB:0.0390625_GB_RAM]          11509.6
## b[StorageGB MemoryGB:0.0390625_GB_RAM]             4236.4
## b[(Intercept) MemoryGB:0.0625_GB_RAM]             12059.2
## b[StorageGB MemoryGB:0.0625_GB_RAM]                4164.6
## b[(Intercept) MemoryGB:0.09375_GB_RAM]            11882.3
## b[StorageGB MemoryGB:0.09375_GB_RAM]               4345.4
## b[(Intercept) MemoryGB:0.09765625_GB_RAM]         12476.8
## b[StorageGB MemoryGB:0.09765625_GB_RAM]            4513.9
## b[(Intercept) MemoryGB:0.125_GB_RAM]              11940.2
## b[StorageGB MemoryGB:0.125_GB_RAM]                 4456.0
## b[(Intercept) MemoryGB:0.15234375_GB_RAM]         11251.4
## b[StorageGB MemoryGB:0.15234375_GB_RAM]            4247.0
## b[(Intercept) MemoryGB:0.1875_GB_RAM]             12817.2
## b[StorageGB MemoryGB:0.1875_GB_RAM]                4540.7
## b[(Intercept) MemoryGB:0.1953125_GB_RAM]          12884.4
## b[StorageGB MemoryGB:0.1953125_GB_RAM]             4426.2
## b[(Intercept) MemoryGB:0.244140625_GB_RAM]        11549.2
```

```
## b[StorageGB MemoryGB:0.244140625_GB_RAM]           4446.5
## b[(Intercept) MemoryGB:0.248046875_GB_RAM]        12533.4
## b[StorageGB MemoryGB:0.248046875_GB_RAM]           4371.2
## b[(Intercept) MemoryGB:0.25_GB_RAM]               10697.4
## b[StorageGB MemoryGB:0.25_GB_RAM]                  4104.3
## b[(Intercept) MemoryGB:0.29296875_GB_RAM]         11897.8
## b[StorageGB MemoryGB:0.29296875_GB_RAM]            4615.5
## b[(Intercept) MemoryGB:0.375_GB_RAM]              11824.4
## b[StorageGB MemoryGB:0.375_GB_RAM]                 4348.1
## b[(Intercept) MemoryGB:0.390625_GB_RAM]           11674.7
## b[StorageGB MemoryGB:0.390625_GB_RAM]              4396.8
## b[(Intercept) MemoryGB:0.439453125_GB_RAM]        12294.9
## b[StorageGB MemoryGB:0.439453125_GB_RAM]           4642.5
## b[(Intercept) MemoryGB:0.48828125_GB_RAM]         11795.8
## b[StorageGB MemoryGB:0.48828125_GB_RAM]            4651.1
## b[(Intercept) MemoryGB:0.5_GB_RAM]                11892.9
## b[StorageGB MemoryGB:0.5_GB_RAM]                   5724.8
## b[(Intercept) MemoryGB:0.5078125_GB_RAM]          12796.6
## b[StorageGB MemoryGB:0.5078125_GB_RAM]             4621.5
## b[(Intercept) MemoryGB:0.75_GB_RAM]               11545.3
## b[StorageGB MemoryGB:0.75_GB_RAM]                  4217.9
## b[(Intercept) MemoryGB:0.78125_GB_RAM]            12385.1
## b[StorageGB MemoryGB:0.78125_GB_RAM]               4370.8
## b[(Intercept) MemoryGB:0.9765625_GB_RAM]          11700.5
## b[StorageGB MemoryGB:0.9765625_GB_RAM]             4564.7
## b[(Intercept) MemoryGB:1_GB_RAM]                  13959.5
## b[StorageGB MemoryGB:1_GB_RAM]                     7789.9
## b[(Intercept) MemoryGB:1.46484375_GB_RAM]         12459.9
## b[StorageGB MemoryGB:1.46484375_GB_RAM]            4371.0
## b[(Intercept) MemoryGB:1.5_GB_RAM]                12711.1
## b[StorageGB MemoryGB:1.5_GB_RAM]                   4283.0
## b[(Intercept) MemoryGB:1.953125_GB_RAM]           12023.8
## b[StorageGB MemoryGB:1.953125_GB_RAM]              4270.7
## b[(Intercept) MemoryGB:10_GB_RAM]                 12241.2
## b[StorageGB MemoryGB:10_GB_RAM]                    4575.5
## b[(Intercept) MemoryGB:12_GB_RAM]                 13107.3
## b[StorageGB MemoryGB:12_GB_RAM]                    4109.5
## b[(Intercept) MemoryGB:16_GB_RAM]                 12098.4
## b[StorageGB MemoryGB:16_GB_RAM]                    4487.2
## b[(Intercept) MemoryGB:2_GB_RAM]                  10351.2
## b[StorageGB MemoryGB:2_GB_RAM]                     1215.9
## b[(Intercept) MemoryGB:2.44140625_GB_RAM]         12452.4
## b[StorageGB MemoryGB:2.44140625_GB_RAM]            4537.2
## b[(Intercept) MemoryGB:2000_GB_RAM]               11839.5
## b[StorageGB MemoryGB:2000_GB_RAM]                  4534.3
## b[(Intercept) MemoryGB:3_GB_RAM]                  11359.0
## b[StorageGB MemoryGB:3_GB_RAM]                     4276.3
## b[(Intercept) MemoryGB:4_GB_RAM]                   9608.6
## b[StorageGB MemoryGB:4_GB_RAM]                       45.7
## b[(Intercept) MemoryGB:5_GB_RAM]                  12281.1
## b[StorageGB MemoryGB:5_GB_RAM]                     5258.5
## b[(Intercept) MemoryGB:6_GB_RAM]                  10111.7
## b[StorageGB MemoryGB:6_GB_RAM]                     2539.5
## b[(Intercept) MemoryGB:8_GB_RAM]                  10871.2
```

```
## b[StorageGB MemoryGB:8_GB_RAM]                      148.0
## sigma                                             375919.1
## Sigma[MemoryGB:(Intercept),(Intercept)]       1118868250.0
## Sigma[MemoryGB:StorageGB,(Intercept)]           37836456.4
## Sigma[MemoryGB:StorageGB,StorageGB]             40562907.0
##
## Fit Diagnostics:
##            mean     sd       10%      50%      90%
## mean_PPD 344984.6  10065.6 332204.6 344913.0 357641.0
##
## The mean_ppd is the sample average posterior predictive distribution of the outcome variable (for de
##
## MCMC diagnostics
##                                              mcse          Rhat          n_eff
## (Intercept)                                15955.2           1.0  299
## OriginalCost                                   5.8           1.0 7270
## Controller                                   182.9           1.0 7929
## Achievements                                   1.2           1.0 7354
## StorageGB                                     44.5           1.0 1898
## Indie                                        217.4           1.0 6287
## factor(MemoryGB)0.0029296875 GB RAM        17549.4           1.0  750
## factor(MemoryGB)0.00390625 GB RAM          16044.2           1.0  499
## factor(MemoryGB)0.0078125 GB RAM           17587.0           1.0  757
## factor(MemoryGB)0.015625 GB RAM            17232.4           1.0  392
## factor(MemoryGB)0.03125 GB RAM             17057.2           1.0  509
## factor(MemoryGB)0.0390625 GB RAM           17052.4           1.0  780
## factor(MemoryGB)0.0625 GB RAM              16031.4           1.0  395
## factor(MemoryGB)0.09375 GB RAM             15759.5           1.0  690
## factor(MemoryGB)0.09765625 GB RAM          16210.1           1.0  524
## factor(MemoryGB)0.125 GB RAM               16880.2           1.0  344
## factor(MemoryGB)0.15234375 GB RAM          18287.3           1.0  667
## factor(MemoryGB)0.1875 GB RAM              16087.4           1.0  868
## factor(MemoryGB)0.1953125 GB RAM           17269.2           1.0  540
## factor(MemoryGB)0.244140625 GB RAM         16629.6           1.0  825
## factor(MemoryGB)0.248046875 GB RAM         17384.4           1.0  807
## factor(MemoryGB)0.25 GB RAM                18370.8           1.0  307
## factor(MemoryGB)0.29296875 GB RAM          16527.8           1.0  837
## factor(MemoryGB)0.375 GB RAM               18585.9           1.0  520
## factor(MemoryGB)0.390625 GB RAM            15664.7           1.0  916
## factor(MemoryGB)0.439453125 GB RAM         18403.9           1.0  694
## factor(MemoryGB)0.48828125 GB RAM          16818.0           1.0  406
## factor(MemoryGB)0.5 GB RAM                 15900.2           1.0  377
## factor(MemoryGB)0.5078125 GB RAM           15969.1           1.0  926
## factor(MemoryGB)0.75 GB RAM                17699.2           1.0  427
## factor(MemoryGB)0.78125 GB RAM             17469.1           1.0  814
## factor(MemoryGB)0.9765625 GB RAM           16393.9           1.0  889
## factor(MemoryGB)1 GB RAM                   19028.0           1.0  274
## factor(MemoryGB)1.46484375 GB RAM          14926.2           1.0  758
## factor(MemoryGB)1.5 GB RAM                 14667.3           1.0  755
## factor(MemoryGB)1.953125 GB RAM            16788.3           1.0  525
## factor(MemoryGB)10 GB RAM                  16553.1           1.0  848
## factor(MemoryGB)12 GB RAM                  16122.5           1.0  620
## factor(MemoryGB)16 GB RAM                  16545.2           1.0  468
## factor(MemoryGB)2 GB RAM                   29698.3           1.0  146
```

```
## factor(MemoryGB)2.44140625 GB RAM                17013.4          1.0  810
## factor(MemoryGB)2000 GB RAM                      17738.0          1.0  794
## factor(MemoryGB)3 GB RAM                         17973.2          1.0  297
## factor(MemoryGB)4 GB RAM                         27803.5          1.0  166
## factor(MemoryGB)5 GB RAM                         17348.5          1.0  521
## factor(MemoryGB)6 GB RAM                         19138.5          1.0  290
## factor(MemoryGB)8 GB RAM                         23947.7          1.0  196
## b[(Intercept) MemoryGB:0.001953125_GB_RAM]        5174.5          1.0  440
## b[StorageGB MemoryGB:0.001953125_GB_RAM]            60.8          1.0 4403
## b[(Intercept) MemoryGB:0.0029296875_GB_RAM]       2270.8          1.0 3051
## b[StorageGB MemoryGB:0.0029296875_GB_RAM]           62.3          1.0 4447
## b[(Intercept) MemoryGB:0.00390625_GB_RAM]         2419.1          1.0 3413
## b[StorageGB MemoryGB:0.00390625_GB_RAM]             58.0          1.0 5051
## b[(Intercept) MemoryGB:0.0078125_GB_RAM]          2475.9          1.0 2706
## b[StorageGB MemoryGB:0.0078125_GB_RAM]              59.9          1.0 4456
## b[(Intercept) MemoryGB:0.015625_GB_RAM]           2407.8          1.0 2456
## b[StorageGB MemoryGB:0.015625_GB_RAM]               56.7          1.0 5335
## b[(Intercept) MemoryGB:0.03125_GB_RAM]            3588.6          1.0 1893
## b[StorageGB MemoryGB:0.03125_GB_RAM]                58.5          1.0 4821
## b[(Intercept) MemoryGB:0.0390625_GB_RAM]          3247.3          1.0 1701
## b[StorageGB MemoryGB:0.0390625_GB_RAM]              57.9          1.0 5243
## b[(Intercept) MemoryGB:0.0625_GB_RAM]             2730.9          1.0 2558
## b[StorageGB MemoryGB:0.0625_GB_RAM]                 62.6          1.0 4481
## b[(Intercept) MemoryGB:0.09375_GB_RAM]            2388.1          1.0 4067
## b[StorageGB MemoryGB:0.09375_GB_RAM]                61.1          1.0 4616
## b[(Intercept) MemoryGB:0.09765625_GB_RAM]         2486.6          1.0 2789
## b[StorageGB MemoryGB:0.09765625_GB_RAM]             56.9          1.0 5101
## b[(Intercept) MemoryGB:0.125_GB_RAM]              2507.1          1.0 2509
## b[StorageGB MemoryGB:0.125_GB_RAM]                  60.3          1.0 4448
## b[(Intercept) MemoryGB:0.15234375_GB_RAM]         2332.3          1.0 3465
## b[StorageGB MemoryGB:0.15234375_GB_RAM]             59.9          1.0 4872
## b[(Intercept) MemoryGB:0.1875_GB_RAM]             4095.6          1.0 1273
## b[StorageGB MemoryGB:0.1875_GB_RAM]                 60.8          1.0 4626
## b[(Intercept) MemoryGB:0.1953125_GB_RAM]          2036.2          1.0 3505
## b[StorageGB MemoryGB:0.1953125_GB_RAM]              60.5          1.0 4512
## b[(Intercept) MemoryGB:0.244140625_GB_RAM]        2541.9          1.0 3054
## b[StorageGB MemoryGB:0.244140625_GB_RAM]            60.2          1.0 4702
## b[(Intercept) MemoryGB:0.248046875_GB_RAM]        3105.7          1.0 2798
## b[StorageGB MemoryGB:0.248046875_GB_RAM]            63.4          1.0 4192
## b[(Intercept) MemoryGB:0.25_GB_RAM]               4726.8          1.0 1012
## b[StorageGB MemoryGB:0.25_GB_RAM]                   64.9          1.0 4028
## b[(Intercept) MemoryGB:0.29296875_GB_RAM]         2492.5          1.0 2292
## b[StorageGB MemoryGB:0.29296875_GB_RAM]             63.2          1.0 4207
## b[(Intercept) MemoryGB:0.375_GB_RAM]              3562.0          1.0 1914
## b[StorageGB MemoryGB:0.375_GB_RAM]                  54.4          1.0 5569
## b[(Intercept) MemoryGB:0.390625_GB_RAM]           4033.5          1.0 1231
## b[StorageGB MemoryGB:0.390625_GB_RAM]               56.1          1.0 5009
## b[(Intercept) MemoryGB:0.439453125_GB_RAM]        2486.4          1.0 3208
## b[StorageGB MemoryGB:0.439453125_GB_RAM]            51.6          1.0 6395
## b[(Intercept) MemoryGB:0.48828125_GB_RAM]         2263.8          1.0 3621
## b[StorageGB MemoryGB:0.48828125_GB_RAM]             60.5          1.0 4706
## b[(Intercept) MemoryGB:0.5_GB_RAM]                3237.1          1.0 1553
## b[StorageGB MemoryGB:0.5_GB_RAM]                    54.9          1.0 4476
## b[(Intercept) MemoryGB:0.5078125_GB_RAM]          2550.9          1.0 2757
```

```
## b[StorageGB MemoryGB:0.5078125_GB_RAM]              66.2          1.0 4014
## b[(Intercept) MemoryGB:0.75_GB_RAM]               3005.4          1.0 2657
## b[StorageGB MemoryGB:0.75_GB_RAM]                   59.9          1.0 4707
## b[(Intercept) MemoryGB:0.78125_GB_RAM]            3251.2          1.0 1769
## b[StorageGB MemoryGB:0.78125_GB_RAM]                58.1          1.0 4935
## b[(Intercept) MemoryGB:0.9765625_GB_RAM]          4097.3          1.0 1523
## b[StorageGB MemoryGB:0.9765625_GB_RAM]              62.7          1.0 4350
## b[(Intercept) MemoryGB:1_GB_RAM]                  6664.7          1.0  476
## b[StorageGB MemoryGB:1_GB_RAM]                      71.7          1.0 1961
## b[(Intercept) MemoryGB:1.46484375_GB_RAM]         3783.3          1.0 1842
## b[StorageGB MemoryGB:1.46484375_GB_RAM]             62.5          1.0 4360
## b[(Intercept) MemoryGB:1.5_GB_RAM]                3002.3          1.0 3050
## b[StorageGB MemoryGB:1.5_GB_RAM]                    55.4          1.0 5123
## b[(Intercept) MemoryGB:1.953125_GB_RAM]           2566.1          1.0 3280
## b[StorageGB MemoryGB:1.953125_GB_RAM]               61.1          1.0 4472
## b[(Intercept) MemoryGB:10_GB_RAM]                 2056.8          1.0 2476
## b[StorageGB MemoryGB:10_GB_RAM]                     65.2          1.0 4454
## b[(Intercept) MemoryGB:12_GB_RAM]                 2346.0          1.0 3585
## b[StorageGB MemoryGB:12_GB_RAM]                     56.8          1.0 4776
## b[(Intercept) MemoryGB:16_GB_RAM]                 3407.1          1.0 1767
## b[StorageGB MemoryGB:16_GB_RAM]                     60.7          1.0 4941
## b[(Intercept) MemoryGB:2_GB_RAM]                 22522.2          1.0   72
## b[StorageGB MemoryGB:2_GB_RAM]                      51.1          1.0 2316
## b[(Intercept) MemoryGB:2.44140625_GB_RAM]         2264.2          1.0 4377
## b[StorageGB MemoryGB:2.44140625_GB_RAM]             64.2          1.0 4760
## b[(Intercept) MemoryGB:2000_GB_RAM]               2788.1          1.0 3340
## b[StorageGB MemoryGB:2000_GB_RAM]                   64.4          1.0 4365
## b[(Intercept) MemoryGB:3_GB_RAM]                  4405.7          1.0  549
## b[StorageGB MemoryGB:3_GB_RAM]                      43.7          1.0 3259
## b[(Intercept) MemoryGB:4_GB_RAM]                 20671.2          1.0   80
## b[StorageGB MemoryGB:4_GB_RAM]                      48.4          1.0 1951
## b[(Intercept) MemoryGB:5_GB_RAM]                  2489.4          1.0 3337
## b[StorageGB MemoryGB:5_GB_RAM]                      56.2          1.0 4356
## b[(Intercept) MemoryGB:6_GB_RAM]                  6346.6          1.0  490
## b[StorageGB MemoryGB:6_GB_RAM]                      42.2          1.0 2558
## b[(Intercept) MemoryGB:8_GB_RAM]                 16594.4          1.0   87
## b[StorageGB MemoryGB:8_GB_RAM]                      48.3          1.0 1875
## sigma                                               64.2          1.0 6758
## Sigma[MemoryGB:(Intercept),(Intercept)]     21463447427.6          1.0   63
## Sigma[MemoryGB:StorageGB,(Intercept)]          21325391.0          1.0  540
## Sigma[MemoryGB:StorageGB,StorageGB]              585532.5          1.0 1635
## mean_PPD                                            163.2          1.0 3803
## log-posterior                                         0.3          1.0 1107
##
## For each parameter, mcse is Monte Carlo standard error, n_eff is a crude measure of effective sample
```

Model 5

```
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 1).
## Chain 1:
## Chain 1: Gradient evaluation took 0 seconds
## Chain 1: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 1: Adjust your expectations accordingly!
```

```
## Chain 1:
## Chain 1:
## Chain 1: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 1: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 1: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 1: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 1: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 1: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 1: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 1: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 1: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 1: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 1: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 1: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 1:
## Chain 1:  Elapsed Time: 16.305 seconds (Warm-up)
## Chain 1:                5.717 seconds (Sampling)
## Chain 1:                22.022 seconds (Total)
## Chain 1:
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 2).
## Chain 2:
## Chain 2: Gradient evaluation took 0 seconds
## Chain 2: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 2: Adjust your expectations accordingly!
## Chain 2:
## Chain 2:
## Chain 2: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 2: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 2: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 2: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 2: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 2: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 2: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 2: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 2: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 2: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 2: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 2: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 2:
## Chain 2:  Elapsed Time: 15.539 seconds (Warm-up)
## Chain 2:                5.684 seconds (Sampling)
## Chain 2:                21.223 seconds (Total)
## Chain 2:
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 3).
## Chain 3:
## Chain 3: Gradient evaluation took 0 seconds
## Chain 3: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 3: Adjust your expectations accordingly!
## Chain 3:
## Chain 3:
## Chain 3: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 3: Iteration:  200 / 2000 [ 10%]  (Warmup)
```

```
## Chain 3: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 3: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 3: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 3: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 3: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 3: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 3: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 3: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 3: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 3: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 3:
## Chain 3:  Elapsed Time: 16.923 seconds (Warm-up)
## Chain 3:                11.152 seconds (Sampling)
## Chain 3:                28.075 seconds (Total)
## Chain 3:
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 4).
## Chain 4:
## Chain 4: Gradient evaluation took 0 seconds
## Chain 4: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 4: Adjust your expectations accordingly!
## Chain 4:
## Chain 4:
## Chain 4: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 4: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 4: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 4: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 4: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 4: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 4: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 4: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 4: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 4: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 4: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 4: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 4:
## Chain 4:  Elapsed Time: 13.111 seconds (Warm-up)
## Chain 4:                5.76 seconds (Sampling)
## Chain 4:                18.871 seconds (Total)
## Chain 4:
```

```
##
## Model Info:
##  function:     stan_lmer
##  family:       gaussian [identity]
##  formula:      Presence ~ OriginalCost + Controller + Achievements + StorageGB +
##     Indie + factor(MemoryGB) + (1 + StorageGB | MemoryGB)
##  algorithm:    sampling
##  sample:       4000 (posterior sample size)
##  priors:       see help('prior_summary')
##  observations: 558
##  groups:       MemoryGB (23)
##
## Estimates:
```

```
##                                                  mean     sd       10%      50%
## (Intercept)                                     589.9   2509.2  -2643.2    669.7
## OriginalCost                                    -18.3     12.7    -34.3    -18.1
## Controller                                       98.8    242.0   -212.5     98.2
## Achievements                                     12.7      3.1      8.8     12.6
## StorageGB                                        -8.4     28.8    -39.2    -10.0
## Indie                                           479.3    269.4    132.9    478.9
## factor(MemoryGB)0.00390625 GB RAM              4062.4   3090.7     97.0   3980.6
## factor(MemoryGB)0.015625 GB RAM                -118.7   3021.6  -3947.2   -178.7
## factor(MemoryGB)0.0390625 GB RAM               -870.2   3515.2  -5415.0   -971.5
## factor(MemoryGB)0.0625 GB RAM                  3538.0   2650.7    192.5   3475.7
## factor(MemoryGB)0.125 GB RAM                   1001.7   2578.5  -2297.6    945.0
## factor(MemoryGB)0.244140625 GB RAM              605.8   3465.7  -3892.5    653.2
## factor(MemoryGB)0.25 GB RAM                    1326.0   2566.2  -1942.2   1224.3
## factor(MemoryGB)0.29296875 GB RAM              -778.7   3512.5  -5265.5   -750.4
## factor(MemoryGB)0.48828125 GB RAM               683.7   2807.8  -2934.0    665.2
## factor(MemoryGB)0.5 GB RAM                     1232.1   2545.9  -1984.6   1152.9
## factor(MemoryGB)0.75 GB RAM                     487.5   3049.7  -3250.9    446.2
## factor(MemoryGB)1 GB RAM                       1429.8   2531.1  -1790.6   1364.5
## factor(MemoryGB)1.46484375 GB RAM               587.4   3017.0  -3176.5    504.7
## factor(MemoryGB)1.953125 GB RAM                1158.1   2893.2  -2561.7   1098.5
## factor(MemoryGB)12 GB RAM                        44.7   3548.2  -4401.9     49.4
## factor(MemoryGB)16 GB RAM                      -494.2   3534.2  -4983.3   -569.2
## factor(MemoryGB)2 GB RAM                       1184.2   2522.1  -2073.5   1116.1
## factor(MemoryGB)3 GB RAM                        630.0   2642.1  -2709.9    590.1
## factor(MemoryGB)4 GB RAM                        548.5   2537.3  -2734.5    480.8
## factor(MemoryGB)5 GB RAM                       -521.6   3677.9  -5228.8   -491.1
## factor(MemoryGB)6 GB RAM                       1146.5   2660.0  -2211.7   1059.6
## factor(MemoryGB)8 GB RAM                          2.5   2589.5  -3297.4    -64.7
## b[(Intercept) MemoryGB:0.0029296875_GB_RAM]       1.9    231.1    -85.7      0.0
## b[StorageGB MemoryGB:0.0029296875_GB_RAM]        -0.7     55.0    -39.9      0.0
## b[(Intercept) MemoryGB:0.00390625_GB_RAM]        -5.9    214.1    -97.6      0.0
## b[StorageGB MemoryGB:0.00390625_GB_RAM]           1.6     52.4    -35.5      0.3
## b[(Intercept) MemoryGB:0.015625_GB_RAM]           2.0    200.3    -91.3      0.0
## b[StorageGB MemoryGB:0.015625_GB_RAM]            -0.7     52.4    -38.4      0.1
## b[(Intercept) MemoryGB:0.0390625_GB_RAM]          2.3    209.6    -85.3      0.3
## b[StorageGB MemoryGB:0.0390625_GB_RAM]           -0.7     49.9    -37.1      0.0
## b[(Intercept) MemoryGB:0.0625_GB_RAM]            -2.9    213.5    -91.5     -0.1
## b[StorageGB MemoryGB:0.0625_GB_RAM]               0.2     45.8    -37.4      0.1
## b[(Intercept) MemoryGB:0.125_GB_RAM]             -7.7    233.3    -98.2      0.0
## b[StorageGB MemoryGB:0.125_GB_RAM]                0.6     53.9    -39.2      0.2
## b[(Intercept) MemoryGB:0.244140625_GB_RAM]       -5.2    236.9    -93.4      0.0
## b[StorageGB MemoryGB:0.244140625_GB_RAM]         -1.4     49.0    -38.3     -0.2
## b[(Intercept) MemoryGB:0.25_GB_RAM]              -2.4    221.1    -92.2      0.0
## b[StorageGB MemoryGB:0.25_GB_RAM]                 5.3     50.7    -31.5      0.6
## b[(Intercept) MemoryGB:0.29296875_GB_RAM]         1.2    196.0    -88.3      0.0
## b[StorageGB MemoryGB:0.29296875_GB_RAM]           0.0     50.1    -38.8      0.0
## b[(Intercept) MemoryGB:0.48828125_GB_RAM]        -1.1    230.9    -90.2     -0.3
## b[StorageGB MemoryGB:0.48828125_GB_RAM]          -0.1     50.9    -38.8      0.0
## b[(Intercept) MemoryGB:0.5_GB_RAM]                2.5    239.7    -99.1     -0.1
## b[StorageGB MemoryGB:0.5_GB_RAM]                 19.3     61.1    -18.4      3.1
## b[(Intercept) MemoryGB:0.75_GB_RAM]               0.0    243.5    -88.5      0.0
## b[StorageGB MemoryGB:0.75_GB_RAM]                -1.2     52.9    -40.2     -0.1
## b[(Intercept) MemoryGB:1_GB_RAM]                 -2.1    207.3    -87.6      0.1
```

```
## b[StorageGB MemoryGB:1_GB_RAM]                  -2.4     35.8    -38.4     -0.2
## b[(Intercept) MemoryGB:1.46484375_GB_RAM]        5.7    241.1    -81.9      0.3
## b[StorageGB MemoryGB:1.46484375_GB_RAM]         -1.2     50.5    -39.9     -0.1
## b[(Intercept) MemoryGB:1.953125_GB_RAM]         -1.5    217.3    -89.9      0.0
## b[StorageGB MemoryGB:1.953125_GB_RAM]            5.2     53.1    -32.1      0.4
## b[(Intercept) MemoryGB:12_GB_RAM]                4.2    234.0    -82.6      0.0
## b[StorageGB MemoryGB:12_GB_RAM]                  1.6     47.6    -38.4      0.2
## b[(Intercept) MemoryGB:16_GB_RAM]                5.0    229.2    -91.3     -0.1
## b[StorageGB MemoryGB:16_GB_RAM]                  1.0     52.1    -37.1      0.0
## b[(Intercept) MemoryGB:2_GB_RAM]                 0.8    179.4    -84.3      0.1
## b[StorageGB MemoryGB:2_GB_RAM]                  -7.6     31.5    -41.6     -2.2
## b[(Intercept) MemoryGB:3_GB_RAM]                -4.2    238.0    -90.2      0.0
## b[StorageGB MemoryGB:3_GB_RAM]                   0.9     43.0    -35.1      0.1
## b[(Intercept) MemoryGB:4_GB_RAM]                -5.3    196.4    -85.0     -0.2
## b[StorageGB MemoryGB:4_GB_RAM]                  -0.5     27.1    -25.5      0.1
## b[(Intercept) MemoryGB:5_GB_RAM]                -0.7    246.5    -80.9      0.0
## b[StorageGB MemoryGB:5_GB_RAM]                   2.4     52.2    -35.3      0.4
## b[(Intercept) MemoryGB:6_GB_RAM]                -2.8    224.9   -101.1     -0.1
## b[StorageGB MemoryGB:6_GB_RAM]                 -18.2     37.7    -63.9     -6.8
## b[(Intercept) MemoryGB:8_GB_RAM]                 0.7    195.8    -79.9     -0.1
## b[StorageGB MemoryGB:8_GB_RAM]                   0.5     28.0    -26.0      0.7
## sigma                                         2405.8     75.9   2308.6   2404.0
## Sigma[MemoryGB:(Intercept),(Intercept)]      51797.5 290133.2     16.7   1318.2
## Sigma[MemoryGB:StorageGB,(Intercept)]          126.0  16014.5  -2583.8     -0.1
## Sigma[MemoryGB:StorageGB,StorageGB]           2657.9   8627.0     11.5    468.6
##                                                90%
## (Intercept)                                   3824.1
## OriginalCost                                    -2.3
## Controller                                     401.6
## Achievements                                    16.6
## StorageGB                                       21.2
## Indie                                          824.4
## factor(MemoryGB)0.00390625 GB RAM             8035.6
## factor(MemoryGB)0.015625 GB RAM               3799.8
## factor(MemoryGB)0.0390625 GB RAM              3698.4
## factor(MemoryGB)0.0625 GB RAM                 6881.0
## factor(MemoryGB)0.125 GB RAM                  4259.6
## factor(MemoryGB)0.244140625 GB RAM            4965.1
## factor(MemoryGB)0.25 GB RAM                   4625.4
## factor(MemoryGB)0.29296875 GB RAM             3689.0
## factor(MemoryGB)0.48828125 GB RAM             4214.4
## factor(MemoryGB)0.5 GB RAM                    4454.8
## factor(MemoryGB)0.75 GB RAM                   4386.7
## factor(MemoryGB)1 GB RAM                      4662.0
## factor(MemoryGB)1.46484375 GB RAM             4480.8
## factor(MemoryGB)1.953125 GB RAM               4865.6
## factor(MemoryGB)12 GB RAM                     4581.4
## factor(MemoryGB)16 GB RAM                     4056.1
## factor(MemoryGB)2 GB RAM                      4442.7
## factor(MemoryGB)3 GB RAM                      4012.0
## factor(MemoryGB)4 GB RAM                      3811.8
## factor(MemoryGB)5 GB RAM                      4168.0
## factor(MemoryGB)6 GB RAM                      4554.2
## factor(MemoryGB)8 GB RAM                      3334.0
```

```
## b[(Intercept) MemoryGB:0.0029296875_GB_RAM]     92.4
## b[StorageGB MemoryGB:0.0029296875_GB_RAM]       38.5
## b[(Intercept) MemoryGB:0.00390625_GB_RAM]       87.1
## b[StorageGB MemoryGB:0.00390625_GB_RAM]         40.1
## b[(Intercept) MemoryGB:0.015625_GB_RAM]         88.8
## b[StorageGB MemoryGB:0.015625_GB_RAM]           36.6
## b[(Intercept) MemoryGB:0.0390625_GB_RAM]        90.2
## b[StorageGB MemoryGB:0.0390625_GB_RAM]          37.5
## b[(Intercept) MemoryGB:0.0625_GB_RAM]           84.2
## b[StorageGB MemoryGB:0.0625_GB_RAM]             35.8
## b[(Intercept) MemoryGB:0.125_GB_RAM]            89.5
## b[StorageGB MemoryGB:0.125_GB_RAM]              38.3
## b[(Intercept) MemoryGB:0.244140625_GB_RAM]      88.8
## b[StorageGB MemoryGB:0.244140625_GB_RAM]        35.1
## b[(Intercept) MemoryGB:0.25_GB_RAM]             91.0
## b[StorageGB MemoryGB:0.25_GB_RAM]               44.2
## b[(Intercept) MemoryGB:0.29296875_GB_RAM]       89.4
## b[StorageGB MemoryGB:0.29296875_GB_RAM]         38.9
## b[(Intercept) MemoryGB:0.48828125_GB_RAM]       88.2
## b[StorageGB MemoryGB:0.48828125_GB_RAM]         37.2
## b[(Intercept) MemoryGB:0.5_GB_RAM]              93.0
## b[StorageGB MemoryGB:0.5_GB_RAM]                68.2
## b[(Intercept) MemoryGB:0.75_GB_RAM]             78.9
## b[StorageGB MemoryGB:0.75_GB_RAM]               38.9
## b[(Intercept) MemoryGB:1_GB_RAM]                82.6
## b[StorageGB MemoryGB:1_GB_RAM]                  31.4
## b[(Intercept) MemoryGB:1.46484375_GB_RAM]      101.9
## b[StorageGB MemoryGB:1.46484375_GB_RAM]         35.5
## b[(Intercept) MemoryGB:1.953125_GB_RAM]         87.0
## b[StorageGB MemoryGB:1.953125_GB_RAM]           45.5
## b[(Intercept) MemoryGB:12_GB_RAM]               84.4
## b[StorageGB MemoryGB:12_GB_RAM]                 40.9
## b[(Intercept) MemoryGB:16_GB_RAM]               90.3
## b[StorageGB MemoryGB:16_GB_RAM]                 38.5
## b[(Intercept) MemoryGB:2_GB_RAM]                81.3
## b[StorageGB MemoryGB:2_GB_RAM]                  20.9
## b[(Intercept) MemoryGB:3_GB_RAM]                88.4
## b[StorageGB MemoryGB:3_GB_RAM]                  37.8
## b[(Intercept) MemoryGB:4_GB_RAM]                74.2
## b[StorageGB MemoryGB:4_GB_RAM]                  27.0
## b[(Intercept) MemoryGB:5_GB_RAM]                98.1
## b[StorageGB MemoryGB:5_GB_RAM]                  38.5
## b[(Intercept) MemoryGB:6_GB_RAM]                78.7
## b[StorageGB MemoryGB:6_GB_RAM]                  10.7
## b[(Intercept) MemoryGB:8_GB_RAM]                81.8
## b[StorageGB MemoryGB:8_GB_RAM]                  28.0
## sigma                                         2505.4
## Sigma[MemoryGB:(Intercept),(Intercept)]      58732.9
## Sigma[MemoryGB:StorageGB,(Intercept)]         2330.1
## Sigma[MemoryGB:StorageGB,StorageGB]           5584.9
##
## Fit Diagnostics:
##            mean   sd     10%    50%    90%
## mean_PPD 2063.4  143.3 1880.9 2062.5 2244.0
```

```
##
## The mean_ppd is the sample average posterior predictive distribution of the outcome variable (for de
##
## MCMC diagnostics
##                                              mcse   Rhat   n_eff
## (Intercept)                                 192.5    1.0  170
## OriginalCost                                  0.2    1.0 5061
## Controller                                    3.7    1.0 4350
## Achievements                                  0.0    1.0 5090
## StorageGB                                     0.9    1.0  958
## Indie                                         4.8    1.0 3184
## factor(MemoryGB)0.00390625 GB RAM           178.5    1.0  300
## factor(MemoryGB)0.015625 GB RAM             179.8    1.0  282
## factor(MemoryGB)0.0390625 GB RAM            200.7    1.0  307
## factor(MemoryGB)0.0625 GB RAM               182.6    1.0  211
## factor(MemoryGB)0.125 GB RAM                188.1    1.0  188
## factor(MemoryGB)0.244140625 GB RAM          182.7    1.0  360
## factor(MemoryGB)0.25 GB RAM                 195.6    1.0  172
## factor(MemoryGB)0.29296875 GB RAM           198.6    1.0  313
## factor(MemoryGB)0.48828125 GB RAM           199.3    1.0  199
## factor(MemoryGB)0.5 GB RAM                  197.2    1.0  167
## factor(MemoryGB)0.75 GB RAM                 207.1    1.0  217
## factor(MemoryGB)1 GB RAM                    192.9    1.0  172
## factor(MemoryGB)1.46484375 GB RAM           195.1    1.0  239
## factor(MemoryGB)1.953125 GB RAM             184.9    1.0  245
## factor(MemoryGB)12 GB RAM                   189.3    1.0  351
## factor(MemoryGB)16 GB RAM                   199.9    1.0  312
## factor(MemoryGB)2 GB RAM                    194.7    1.0  168
## factor(MemoryGB)3 GB RAM                    199.8    1.0  175
## factor(MemoryGB)4 GB RAM                    195.3    1.0  169
## factor(MemoryGB)5 GB RAM                    185.3    1.0  394
## factor(MemoryGB)6 GB RAM                    202.3    1.0  173
## factor(MemoryGB)8 GB RAM                    193.3    1.0  179
## b[(Intercept) MemoryGB:0.0029296875_GB_RAM]   5.4    1.0 1816
## b[StorageGB MemoryGB:0.0029296875_GB_RAM]     1.1    1.0 2631
## b[(Intercept) MemoryGB:0.00390625_GB_RAM]     3.4    1.0 3987
## b[StorageGB MemoryGB:0.00390625_GB_RAM]       1.0    1.0 2771
## b[(Intercept) MemoryGB:0.015625_GB_RAM]       3.8    1.0 2784
## b[StorageGB MemoryGB:0.015625_GB_RAM]         0.9    1.0 3597
## b[(Intercept) MemoryGB:0.0390625_GB_RAM]      3.3    1.0 4157
## b[StorageGB MemoryGB:0.0390625_GB_RAM]        0.8    1.0 3614
## b[(Intercept) MemoryGB:0.0625_GB_RAM]         3.9    1.0 3047
## b[StorageGB MemoryGB:0.0625_GB_RAM]           0.8    1.0 3165
## b[(Intercept) MemoryGB:0.125_GB_RAM]          4.0    1.0 3332
## b[StorageGB MemoryGB:0.125_GB_RAM]            1.0    1.0 2905
## b[(Intercept) MemoryGB:0.244140625_GB_RAM]    3.7    1.0 4171
## b[StorageGB MemoryGB:0.244140625_GB_RAM]      0.9    1.0 2666
## b[(Intercept) MemoryGB:0.25_GB_RAM]           3.9    1.0 3171
## b[StorageGB MemoryGB:0.25_GB_RAM]             1.1    1.0 2151
## b[(Intercept) MemoryGB:0.29296875_GB_RAM]     3.0    1.0 4222
## b[StorageGB MemoryGB:0.29296875_GB_RAM]       0.8    1.0 3743
## b[(Intercept) MemoryGB:0.48828125_GB_RAM]     4.4    1.0 2817
## b[StorageGB MemoryGB:0.48828125_GB_RAM]       0.9    1.0 3358
## b[(Intercept) MemoryGB:0.5_GB_RAM]            5.4    1.0 2006
```

```
## b[StorageGB MemoryGB:0.5_GB_RAM]               1.6    1.0 1401
## b[(Intercept) MemoryGB:0.75_GB_RAM]            4.3    1.0 3179
## b[StorageGB MemoryGB:0.75_GB_RAM]              0.9    1.0 3383
## b[(Intercept) MemoryGB:1_GB_RAM]               4.0    1.0 2655
## b[StorageGB MemoryGB:1_GB_RAM]                 0.8    1.0 2205
## b[(Intercept) MemoryGB:1.46484375_GB_RAM]      4.0    1.0 3684
## b[StorageGB MemoryGB:1.46484375_GB_RAM]        0.9    1.0 3140
## b[(Intercept) MemoryGB:1.953125_GB_RAM]        4.6    1.0 2248
## b[StorageGB MemoryGB:1.953125_GB_RAM]          0.9    1.0 3295
## b[(Intercept) MemoryGB:12_GB_RAM]              4.4    1.0 2854
## b[StorageGB MemoryGB:12_GB_RAM]                0.9    1.0 2699
## b[(Intercept) MemoryGB:16_GB_RAM]              4.5    1.0 2565
## b[StorageGB MemoryGB:16_GB_RAM]                1.0    1.0 3001
## b[(Intercept) MemoryGB:2_GB_RAM]               3.9    1.0 2086
## b[StorageGB MemoryGB:2_GB_RAM]                 0.9    1.0 1141
## b[(Intercept) MemoryGB:3_GB_RAM]               4.5    1.0 2784
## b[StorageGB MemoryGB:3_GB_RAM]                 0.7    1.0 3962
## b[(Intercept) MemoryGB:4_GB_RAM]               3.9    1.0 2493
## b[StorageGB MemoryGB:4_GB_RAM]                 0.9    1.0  993
## b[(Intercept) MemoryGB:5_GB_RAM]               4.1    1.0 3535
## b[StorageGB MemoryGB:5_GB_RAM]                 1.1    1.0 2099
## b[(Intercept) MemoryGB:6_GB_RAM]               4.0    1.0 3092
## b[StorageGB MemoryGB:6_GB_RAM]                 1.1    1.0 1087
## b[(Intercept) MemoryGB:8_GB_RAM]               3.5    1.0 3065
## b[StorageGB MemoryGB:8_GB_RAM]                 0.8    1.0 1102
## sigma                                          1.0    1.0 5452
## Sigma[MemoryGB:(Intercept),(Intercept)]     8162.1    1.0 1264
## Sigma[MemoryGB:StorageGB,(Intercept)]        418.7    1.0 1463
## Sigma[MemoryGB:StorageGB,StorageGB]          273.7    1.0  993
## mean_PPD                                       1.9    1.0 5524
## log-posterior                                  0.2    1.0 1419
##
## For each parameter, mcse is Monte Carlo standard error, n_eff is a crude measure of effective sample
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 1).
## Chain 1:
## Chain 1: Gradient evaluation took 0 seconds
## Chain 1: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 1: Adjust your expectations accordingly!
## Chain 1:
## Chain 1:
## Chain 1: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 1: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 1: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 1: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 1: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 1: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 1: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 1: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 1: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 1: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 1: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 1: Iteration: 2000 / 2000 [100%]  (Sampling)
```

```
## Chain 1:
## Chain 1:  Elapsed Time: 65.717 seconds (Warm-up)
## Chain 1:                26.899 seconds (Sampling)
## Chain 1:                92.616 seconds (Total)
## Chain 1:
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 2).
## Chain 2:
## Chain 2: Gradient evaluation took 0 seconds
## Chain 2: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 2: Adjust your expectations accordingly!
## Chain 2:
## Chain 2:
## Chain 2: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 2: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 2: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 2: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 2: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 2: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 2: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 2: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 2: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 2: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 2: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 2: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 2:
## Chain 2:  Elapsed Time: 64.089 seconds (Warm-up)
## Chain 2:                26.593 seconds (Sampling)
## Chain 2:                90.682 seconds (Total)
## Chain 2:
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 3).
## Chain 3:
## Chain 3: Gradient evaluation took 0 seconds
## Chain 3: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 3: Adjust your expectations accordingly!
## Chain 3:
## Chain 3:
## Chain 3: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 3: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 3: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 3: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 3: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 3: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 3: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 3: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 3: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 3: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 3: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 3: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 3:
## Chain 3:  Elapsed Time: 78.749 seconds (Warm-up)
## Chain 3:                26.222 seconds (Sampling)
## Chain 3:                104.971 seconds (Total)
```

```
## Chain 3:
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 4).
## Chain 4:
## Chain 4: Gradient evaluation took 0 seconds
## Chain 4: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 4: Adjust your expectations accordingly!
## Chain 4:
## Chain 4:
## Chain 4: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 4: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 4: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 4: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 4: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 4: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 4: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 4: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 4: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 4: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 4: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 4: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 4:
## Chain 4:  Elapsed Time: 64.145 seconds (Warm-up)
## Chain 4:                26.616 seconds (Sampling)
## Chain 4:                90.761 seconds (Total)
## Chain 4:
```

```
##
## Model Info:
##  function:     stan_lmer
##  family:       gaussian [identity]
##  formula:      Presence ~ OriginalCost + Controller + Achievements + StorageGB +
##     Indie + factor(MemoryGB) + (1 + StorageGB | MemoryGB)
##  algorithm:    sampling
##  sample:       4000 (posterior sample size)
##  priors:       see help('prior_summary')
##  observations: 1462
##  groups:       MemoryGB (28)
##
## Estimates:
##                                                mean         sd
## (Intercept)                                  125281.3     204190.8
## OriginalCost                                   -498.3        624.9
## Controller                                    -8910.3      12639.1
## Achievements                                    536.1         89.8
## StorageGB                                      2587.8       1152.2
## Indie                                        -34384.1      13301.7
## factor(MemoryGB)0.00390625 GB RAM            -58640.4     253104.7
## factor(MemoryGB)0.0078125 GB RAM             -19055.1     296380.9
## factor(MemoryGB)0.015625 GB RAM              141717.3     231293.5
## factor(MemoryGB)0.03125 GB RAM               131554.0     240862.7
## factor(MemoryGB)0.0625 GB RAM                 64044.9     212175.3
## factor(MemoryGB)0.09765625 GB RAM            150800.4     254898.0
## factor(MemoryGB)0.125 GB RAM                 123038.5     207975.2
```

```
## factor(MemoryGB)0.15234375 GB RAM              634172.1     298380.7
## factor(MemoryGB)0.1875 GB RAM                  515466.6     299400.4
## factor(MemoryGB)0.1953125 GB RAM               250812.5     256238.8
## factor(MemoryGB)0.248046875 GB RAM             172559.3     296768.9
## factor(MemoryGB)0.25 GB RAM                    102005.5     206628.2
## factor(MemoryGB)0.48828125 GB RAM              -11072.0     230735.9
## factor(MemoryGB)0.5 GB RAM                      63376.2     204754.1
## factor(MemoryGB)0.5078125 GB RAM                70631.5     306728.5
## factor(MemoryGB)0.75 GB RAM                    294086.9     240896.9
## factor(MemoryGB)0.9765625 GB RAM                66762.4     299718.1
## factor(MemoryGB)1 GB RAM                        97684.1     205186.3
## factor(MemoryGB)1.5 GB RAM                     737612.5     293990.8
## factor(MemoryGB)12 GB RAM                     -150425.0     302391.7
## factor(MemoryGB)16 GB RAM                      313848.4     257256.3
## factor(MemoryGB)2 GB RAM                        79087.7     204980.6
## factor(MemoryGB)3 GB RAM                        85554.8     207795.1
## factor(MemoryGB)4 GB RAM                        83583.8     204830.7
## factor(MemoryGB)5 GB RAM                       285226.1     300220.8
## factor(MemoryGB)6 GB RAM                        89745.1     208393.1
## factor(MemoryGB)8 GB RAM                       101662.4     206322.6
## b[(Intercept) MemoryGB:0.001953125_GB_RAM]       -205.0      12902.4
## b[StorageGB MemoryGB:0.001953125_GB_RAM]           20.4       1868.0
## b[(Intercept) MemoryGB:0.00390625_GB_RAM]         -20.0      11949.6
## b[StorageGB MemoryGB:0.00390625_GB_RAM]            -1.5       1772.3
## b[(Intercept) MemoryGB:0.0078125_GB_RAM]         -506.8      12489.1
## b[StorageGB MemoryGB:0.0078125_GB_RAM]           -25.0       1835.6
## b[(Intercept) MemoryGB:0.015625_GB_RAM]          183.0      11175.7
## b[StorageGB MemoryGB:0.015625_GB_RAM]             11.1       1835.8
## b[(Intercept) MemoryGB:0.03125_GB_RAM]             1.5      11656.8
## b[StorageGB MemoryGB:0.03125_GB_RAM]             -13.1       1825.0
## b[(Intercept) MemoryGB:0.0625_GB_RAM]            226.2      13755.8
## b[StorageGB MemoryGB:0.0625_GB_RAM]              -68.5       1740.7
## b[(Intercept) MemoryGB:0.09765625_GB_RAM]        -121.1      12206.5
## b[StorageGB MemoryGB:0.09765625_GB_RAM]            22.9       1847.8
## b[(Intercept) MemoryGB:0.125_GB_RAM]             -35.3      11356.2
## b[StorageGB MemoryGB:0.125_GB_RAM]               -14.4       1780.4
## b[(Intercept) MemoryGB:0.15234375_GB_RAM]        -107.1      10941.7
## b[StorageGB MemoryGB:0.15234375_GB_RAM]            6.2       2028.6
## b[(Intercept) MemoryGB:0.1875_GB_RAM]            223.1      14929.2
## b[StorageGB MemoryGB:0.1875_GB_RAM]              -14.5       1851.3
## b[(Intercept) MemoryGB:0.1953125_GB_RAM]         -68.3      12858.3
## b[StorageGB MemoryGB:0.1953125_GB_RAM]            36.4       1820.7
## b[(Intercept) MemoryGB:0.248046875_GB_RAM]       -37.8      12359.0
## b[StorageGB MemoryGB:0.248046875_GB_RAM]         -26.2       1895.0
## b[(Intercept) MemoryGB:0.25_GB_RAM]              -35.6      11181.9
## b[StorageGB MemoryGB:0.25_GB_RAM]                -38.0       1789.9
## b[(Intercept) MemoryGB:0.48828125_GB_RAM]        129.8      11802.6
## b[StorageGB MemoryGB:0.48828125_GB_RAM]          -27.7       1868.9
## b[(Intercept) MemoryGB:0.5_GB_RAM]               -80.6      13386.9
## b[StorageGB MemoryGB:0.5_GB_RAM]                  57.6       1620.2
## b[(Intercept) MemoryGB:0.5078125_GB_RAM]          88.1      14688.3
## b[StorageGB MemoryGB:0.5078125_GB_RAM]           -18.1       1854.5
## b[(Intercept) MemoryGB:0.75_GB_RAM]               29.0      12186.6
## b[StorageGB MemoryGB:0.75_GB_RAM]               -223.9       1906.0
```

```
## b[(Intercept) MemoryGB:0.9765625_GB_RAM]           74.6      11802.4
## b[StorageGB MemoryGB:0.9765625_GB_RAM]            -30.2       1945.4
## b[(Intercept) MemoryGB:1_GB_RAM]                  127.6      13100.3
## b[StorageGB MemoryGB:1_GB_RAM]                    500.0       1444.3
## b[(Intercept) MemoryGB:1.5_GB_RAM]                 33.6      11145.3
## b[StorageGB MemoryGB:1.5_GB_RAM]                    5.7       1705.5
## b[(Intercept) MemoryGB:12_GB_RAM]                 155.1      13473.7
## b[StorageGB MemoryGB:12_GB_RAM]                   -17.6       1780.6
## b[(Intercept) MemoryGB:16_GB_RAM]                 -11.7      10449.3
## b[StorageGB MemoryGB:16_GB_RAM]                    45.7       1800.8
## b[(Intercept) MemoryGB:2_GB_RAM]                 -171.9      12337.2
## b[StorageGB MemoryGB:2_GB_RAM]                    303.6       1250.1
## b[(Intercept) MemoryGB:3_GB_RAM]                 -550.0      11571.1
## b[StorageGB MemoryGB:3_GB_RAM]                     78.9       1485.4
## b[(Intercept) MemoryGB:4_GB_RAM]                 -167.8      10881.1
## b[StorageGB MemoryGB:4_GB_RAM]                   -588.2       1203.5
## b[(Intercept) MemoryGB:5_GB_RAM]                  111.5      11756.1
## b[StorageGB MemoryGB:5_GB_RAM]                    -10.5       1836.0
## b[(Intercept) MemoryGB:6_GB_RAM]                  -47.8      10171.1
## b[StorageGB MemoryGB:6_GB_RAM]                    -25.1       1180.8
## b[(Intercept) MemoryGB:8_GB_RAM]                  141.8      11449.8
## b[StorageGB MemoryGB:8_GB_RAM]                   -332.2       1126.8
## sigma                                          218253.7       4182.3
## Sigma[MemoryGB:(Intercept),(Intercept)]     160169157.3 1050112781.7
## Sigma[MemoryGB:StorageGB,(Intercept)]          112319.3   20603641.7
## Sigma[MemoryGB:StorageGB,StorageGB]           3288687.7    8130748.7
##                                                10%          50%
## (Intercept)                                  -131433.7     123603.6
## OriginalCost                                   -1292.4       -492.7
## Controller                                    -25336.9      -8738.0
## Achievements                                     422.5        536.1
## StorageGB                                       1323.0       2517.9
## Indie                                         -51359.6     -34467.6
## factor(MemoryGB)0.00390625 GB RAM            -387773.4     -55300.4
## factor(MemoryGB)0.0078125 GB RAM             -405140.3     -16658.7
## factor(MemoryGB)0.015625 GB RAM              -154733.5     140666.5
## factor(MemoryGB)0.03125 GB RAM               -175037.5     134496.3
## factor(MemoryGB)0.0625 GB RAM                -211284.6      65099.2
## factor(MemoryGB)0.09765625 GB RAM            -175250.3     150130.6
## factor(MemoryGB)0.125 GB RAM                 -146075.2     128481.2
## factor(MemoryGB)0.15234375 GB RAM             249593.9     638881.0
## factor(MemoryGB)0.1875 GB RAM                 136071.8     515127.0
## factor(MemoryGB)0.1953125 GB RAM              -76751.9     247585.6
## factor(MemoryGB)0.248046875 GB RAM           -216501.4     178387.9
## factor(MemoryGB)0.25 GB RAM                  -170346.8     103119.4
## factor(MemoryGB)0.48828125 GB RAM            -308046.6      -9072.2
## factor(MemoryGB)0.5 GB RAM                   -206694.2      66338.8
## factor(MemoryGB)0.5078125 GB RAM             -315183.7      69835.2
## factor(MemoryGB)0.75 GB RAM                   -10394.7     293343.3
## factor(MemoryGB)0.9765625 GB RAM             -315235.5      68086.5
## factor(MemoryGB)1 GB RAM                     -174546.9     101862.5
## factor(MemoryGB)1.5 GB RAM                    369817.1     738915.7
## factor(MemoryGB)12 GB RAM                    -532361.9    -151198.1
## factor(MemoryGB)16 GB RAM                     -12018.8     321812.3
```

```
## factor(MemoryGB)2 GB RAM                        -189144.0      82341.2
## factor(MemoryGB)3 GB RAM                        -189648.4      88174.7
## factor(MemoryGB)4 GB RAM                        -186688.9      85415.4
## factor(MemoryGB)5 GB RAM                        -103063.5     287152.2
## factor(MemoryGB)6 GB RAM                        -184782.8      92428.2
## factor(MemoryGB)8 GB RAM                        -170798.9     104051.9
## b[(Intercept) MemoryGB:0.001953125_GB_RAM]        -4354.8         -5.9
## b[StorageGB MemoryGB:0.001953125_GB_RAM]          -1583.1         -0.8
## b[(Intercept) MemoryGB:0.00390625_GB_RAM]         -4399.2          1.7
## b[StorageGB MemoryGB:0.00390625_GB_RAM]           -1606.1         -3.1
## b[(Intercept) MemoryGB:0.0078125_GB_RAM]          -4352.7         -2.5
## b[StorageGB MemoryGB:0.0078125_GB_RAM]            -1635.9          5.9
## b[(Intercept) MemoryGB:0.015625_GB_RAM]           -4278.7         -6.1
## b[StorageGB MemoryGB:0.015625_GB_RAM]             -1658.1         -2.1
## b[(Intercept) MemoryGB:0.03125_GB_RAM]            -4168.0         -5.0
## b[StorageGB MemoryGB:0.03125_GB_RAM]              -1637.4         -2.2
## b[(Intercept) MemoryGB:0.0625_GB_RAM]             -3747.9         -4.4
## b[StorageGB MemoryGB:0.0625_GB_RAM]               -1708.4         -2.0
## b[(Intercept) MemoryGB:0.09765625_GB_RAM]         -4005.5         -0.3
## b[StorageGB MemoryGB:0.09765625_GB_RAM]           -1525.1         -2.6
## b[(Intercept) MemoryGB:0.125_GB_RAM]              -3872.7          1.2
## b[StorageGB MemoryGB:0.125_GB_RAM]                -1608.7         -6.6
## b[(Intercept) MemoryGB:0.15234375_GB_RAM]         -4170.4          1.2
## b[StorageGB MemoryGB:0.15234375_GB_RAM]           -1668.1         -2.0
## b[(Intercept) MemoryGB:0.1875_GB_RAM]             -4212.2          0.6
## b[StorageGB MemoryGB:0.1875_GB_RAM]               -1647.1         -4.6
## b[(Intercept) MemoryGB:0.1953125_GB_RAM]          -4223.9          0.3
## b[StorageGB MemoryGB:0.1953125_GB_RAM]            -1523.8          0.3
## b[(Intercept) MemoryGB:0.248046875_GB_RAM]        -4003.9          0.7
## b[StorageGB MemoryGB:0.248046875_GB_RAM]          -1656.6         -6.1
## b[(Intercept) MemoryGB:0.25_GB_RAM]               -3773.6         -2.7
## b[StorageGB MemoryGB:0.25_GB_RAM]                 -1602.5         -3.2
## b[(Intercept) MemoryGB:0.48828125_GB_RAM]         -4309.9         -8.4
## b[StorageGB MemoryGB:0.48828125_GB_RAM]           -1599.9         -0.1
## b[(Intercept) MemoryGB:0.5_GB_RAM]                -4562.7         -4.7
## b[StorageGB MemoryGB:0.5_GB_RAM]                  -1434.9          8.9
## b[(Intercept) MemoryGB:0.5078125_GB_RAM]          -4505.2         -6.2
## b[StorageGB MemoryGB:0.5078125_GB_RAM]            -1620.1         -2.3
## b[(Intercept) MemoryGB:0.75_GB_RAM]               -4260.3         -1.6
## b[StorageGB MemoryGB:0.75_GB_RAM]                 -1936.4        -27.5
## b[(Intercept) MemoryGB:0.9765625_GB_RAM]          -4041.8         -1.4
## b[StorageGB MemoryGB:0.9765625_GB_RAM]            -1551.8         -1.8
## b[(Intercept) MemoryGB:1_GB_RAM]                  -3943.2         -1.1
## b[StorageGB MemoryGB:1_GB_RAM]                     -773.4        171.9
## b[(Intercept) MemoryGB:1.5_GB_RAM]                -4388.1         -2.4
## b[StorageGB MemoryGB:1.5_GB_RAM]                  -1604.4          3.6
## b[(Intercept) MemoryGB:12_GB_RAM]                 -4129.7          2.0
## b[StorageGB MemoryGB:12_GB_RAM]                   -1552.0          2.9
## b[(Intercept) MemoryGB:16_GB_RAM]                 -4099.3          0.1
## b[StorageGB MemoryGB:16_GB_RAM]                   -1529.4         11.8
## b[(Intercept) MemoryGB:2_GB_RAM]                  -4201.5         -0.1
## b[StorageGB MemoryGB:2_GB_RAM]                     -828.7        113.5
## b[(Intercept) MemoryGB:3_GB_RAM]                  -4040.2          0.1
## b[StorageGB MemoryGB:3_GB_RAM]                    -1377.6          5.1
```

```
## b[(Intercept) MemoryGB:4_GB_RAM]                -4113.9         2.9
## b[StorageGB MemoryGB:4_GB_RAM]                  -2057.1      -278.9
## b[(Intercept) MemoryGB:5_GB_RAM]                -4157.0        -1.4
## b[StorageGB MemoryGB:5_GB_RAM]                  -1563.5        -3.5
## b[(Intercept) MemoryGB:6_GB_RAM]                -3978.9         3.2
## b[StorageGB MemoryGB:6_GB_RAM]                  -1253.2        -1.8
## b[(Intercept) MemoryGB:8_GB_RAM]                -3884.8        -4.8
## b[StorageGB MemoryGB:8_GB_RAM]                  -1591.3      -124.4
## sigma                                          212866.4    218130.8
## Sigma[MemoryGB:(Intercept),(Intercept)]         29836.1   2515771.2
## Sigma[MemoryGB:StorageGB,(Intercept)]        -4870446.1         3.5
## Sigma[MemoryGB:StorageGB,StorageGB]             26204.2    884766.8
##                                                90%
## (Intercept)                                   394093.1
## OriginalCost                                     290.9
## Controller                                      7205.1
## Achievements                                     649.9
## StorageGB                                       3863.7
## Indie                                         -16971.3
## factor(MemoryGB)0.00390625 GB RAM              262224.1
## factor(MemoryGB)0.0078125 GB RAM               360849.8
## factor(MemoryGB)0.015625 GB RAM                435345.6
## factor(MemoryGB)0.03125 GB RAM                 438215.3
## factor(MemoryGB)0.0625 GB RAM                  334802.5
## factor(MemoryGB)0.09765625 GB RAM              479016.3
## factor(MemoryGB)0.125 GB RAM                   384454.7
## factor(MemoryGB)0.15234375 GB RAM             1017915.0
## factor(MemoryGB)0.1875 GB RAM                  904257.5
## factor(MemoryGB)0.1953125 GB RAM               577182.7
## factor(MemoryGB)0.248046875 GB RAM             548684.4
## factor(MemoryGB)0.25 GB RAM                    361860.8
## factor(MemoryGB)0.48828125 GB RAM              282684.7
## factor(MemoryGB)0.5 GB RAM                     322466.1
## factor(MemoryGB)0.5078125 GB RAM               462114.4
## factor(MemoryGB)0.75 GB RAM                    599349.1
## factor(MemoryGB)0.9765625 GB RAM               447351.6
## factor(MemoryGB)1 GB RAM                       355777.0
## factor(MemoryGB)1.5 GB RAM                    1110559.0
## factor(MemoryGB)12 GB RAM                      230089.1
## factor(MemoryGB)16 GB RAM                      636380.9
## factor(MemoryGB)2 GB RAM                       339113.8
## factor(MemoryGB)3 GB RAM                       348881.0
## factor(MemoryGB)4 GB RAM                       344444.2
## factor(MemoryGB)5 GB RAM                       666481.9
## factor(MemoryGB)6 GB RAM                       354394.1
## factor(MemoryGB)8 GB RAM                       364916.1
## b[(Intercept) MemoryGB:0.001953125_GB_RAM]       4024.7
## b[StorageGB MemoryGB:0.001953125_GB_RAM]         1689.4
## b[(Intercept) MemoryGB:0.00390625_GB_RAM]        4000.1
## b[StorageGB MemoryGB:0.00390625_GB_RAM]          1600.7
## b[(Intercept) MemoryGB:0.0078125_GB_RAM]         3651.0
## b[StorageGB MemoryGB:0.0078125_GB_RAM]           1548.2
## b[(Intercept) MemoryGB:0.015625_GB_RAM]          4317.6
## b[StorageGB MemoryGB:0.015625_GB_RAM]            1620.9
```

```
## b[(Intercept) MemoryGB:0.03125_GB_RAM]           4339.3
## b[StorageGB MemoryGB:0.03125_GB_RAM]             1595.7
## b[(Intercept) MemoryGB:0.0625_GB_RAM]            4400.9
## b[StorageGB MemoryGB:0.0625_GB_RAM]              1487.0
## b[(Intercept) MemoryGB:0.09765625_GB_RAM]        4061.4
## b[StorageGB MemoryGB:0.09765625_GB_RAM]          1626.9
## b[(Intercept) MemoryGB:0.125_GB_RAM]             4112.3
## b[StorageGB MemoryGB:0.125_GB_RAM]               1505.2
## b[(Intercept) MemoryGB:0.15234375_GB_RAM]        4351.6
## b[StorageGB MemoryGB:0.15234375_GB_RAM]          1659.4
## b[(Intercept) MemoryGB:0.1875_GB_RAM]            4278.9
## b[StorageGB MemoryGB:0.1875_GB_RAM]              1609.9
## b[(Intercept) MemoryGB:0.1953125_GB_RAM]         3909.9
## b[StorageGB MemoryGB:0.1953125_GB_RAM]           1672.2
## b[(Intercept) MemoryGB:0.248046875_GB_RAM]       4417.5
## b[StorageGB MemoryGB:0.248046875_GB_RAM]         1639.3
## b[(Intercept) MemoryGB:0.25_GB_RAM]              3967.3
## b[StorageGB MemoryGB:0.25_GB_RAM]                1546.9
## b[(Intercept) MemoryGB:0.48828125_GB_RAM]        4084.0
## b[StorageGB MemoryGB:0.48828125_GB_RAM]          1483.6
## b[(Intercept) MemoryGB:0.5_GB_RAM]               3840.0
## b[StorageGB MemoryGB:0.5_GB_RAM]                 1660.6
## b[(Intercept) MemoryGB:0.5078125_GB_RAM]         4122.5
## b[StorageGB MemoryGB:0.5078125_GB_RAM]           1636.9
## b[(Intercept) MemoryGB:0.75_GB_RAM]              3791.3
## b[StorageGB MemoryGB:0.75_GB_RAM]                1363.7
## b[(Intercept) MemoryGB:0.9765625_GB_RAM]         4433.7
## b[StorageGB MemoryGB:0.9765625_GB_RAM]           1534.9
## b[(Intercept) MemoryGB:1_GB_RAM]                 4209.4
## b[StorageGB MemoryGB:1_GB_RAM]                   2289.6
## b[(Intercept) MemoryGB:1.5_GB_RAM]               4063.5
## b[StorageGB MemoryGB:1.5_GB_RAM]                 1592.5
## b[(Intercept) MemoryGB:12_GB_RAM]                4614.8
## b[StorageGB MemoryGB:12_GB_RAM]                  1557.1
## b[(Intercept) MemoryGB:16_GB_RAM]                4439.4
## b[StorageGB MemoryGB:16_GB_RAM]                  1575.2
## b[(Intercept) MemoryGB:2_GB_RAM]                 3874.1
## b[StorageGB MemoryGB:2_GB_RAM]                   1776.2
## b[(Intercept) MemoryGB:3_GB_RAM]                 3901.8
## b[StorageGB MemoryGB:3_GB_RAM]                   1559.8
## b[(Intercept) MemoryGB:4_GB_RAM]                 3844.0
## b[StorageGB MemoryGB:4_GB_RAM]                    437.2
## b[(Intercept) MemoryGB:5_GB_RAM]                 4193.0
## b[StorageGB MemoryGB:5_GB_RAM]                   1546.9
## b[(Intercept) MemoryGB:6_GB_RAM]                 3888.2
## b[StorageGB MemoryGB:6_GB_RAM]                   1198.3
## b[(Intercept) MemoryGB:8_GB_RAM]                 3656.3
## b[StorageGB MemoryGB:8_GB_RAM]                    644.8
## sigma                                          223703.2
## Sigma[MemoryGB:(Intercept),(Intercept)]     141474940.2
## Sigma[MemoryGB:StorageGB,(Intercept)]         4521852.1
## Sigma[MemoryGB:StorageGB,StorageGB]           7604642.2
##
## Fit Diagnostics:
```

```
##             mean     sd       10%      50%      90%
## mean_PPD 229307.4   8092.4 219068.3 229229.4 239746.9
##
## The mean_ppd is the sample average posterior predictive distribution of the outcome variable (for de
##
## MCMC diagnostics
##                                                mcse       Rhat       n_eff
## (Intercept)                                 12292.1        1.0  276
## OriginalCost                                    7.6        1.0 6843
## Controller                                    134.4        1.0 8843
## Achievements                                    1.0        1.0 8089
## StorageGB                                      33.4        1.0 1188
## Indie                                         156.6        1.0 7215
## factor(MemoryGB)0.00390625 GB RAM           12774.6        1.0  393
## factor(MemoryGB)0.0078125 GB RAM            12397.5        1.0  572
## factor(MemoryGB)0.015625 GB RAM             12002.1        1.0  371
## factor(MemoryGB)0.03125 GB RAM              12307.9        1.0  383
## factor(MemoryGB)0.0625 GB RAM               12572.3        1.0  285
## factor(MemoryGB)0.09765625 GB RAM           12597.9        1.0  409
## factor(MemoryGB)0.125 GB RAM                12360.1        1.0  283
## factor(MemoryGB)0.15234375 GB RAM           13139.9        1.0  516
## factor(MemoryGB)0.1875 GB RAM               12601.4        1.0  565
## factor(MemoryGB)0.1953125 GB RAM            12295.8        1.0  434
## factor(MemoryGB)0.248046875 GB RAM          12830.9        1.0  535
## factor(MemoryGB)0.25 GB RAM                 12213.9        1.0  286
## factor(MemoryGB)0.48828125 GB RAM           12121.9        1.0  362
## factor(MemoryGB)0.5 GB RAM                  12285.6        1.0  278
## factor(MemoryGB)0.5078125 GB RAM            12584.5        1.0  594
## factor(MemoryGB)0.75 GB RAM                 11995.4        1.0  403
## factor(MemoryGB)0.9765625 GB RAM            12334.3        1.0  590
## factor(MemoryGB)1 GB RAM                    12300.2        1.0  278
## factor(MemoryGB)1.5 GB RAM                  12823.8        1.0  526
## factor(MemoryGB)12 GB RAM                   12142.6        1.0  620
## factor(MemoryGB)16 GB RAM                   12754.0        1.0  407
## factor(MemoryGB)2 GB RAM                    12371.4        1.0  275
## factor(MemoryGB)3 GB RAM                    12361.7        1.0  283
## factor(MemoryGB)4 GB RAM                    12285.4        1.0  278
## factor(MemoryGB)5 GB RAM                    12603.0        1.0  567
## factor(MemoryGB)6 GB RAM                    12391.0        1.0  283
## factor(MemoryGB)8 GB RAM                    12380.7        1.0  278
## b[(Intercept) MemoryGB:0.001953125_GB_RAM]    227.4        1.0 3218
## b[StorageGB MemoryGB:0.001953125_GB_RAM]       29.1        1.0 4122
## b[(Intercept) MemoryGB:0.00390625_GB_RAM]     189.5        1.0 3978
## b[StorageGB MemoryGB:0.00390625_GB_RAM]        26.0        1.0 4648
## b[(Intercept) MemoryGB:0.0078125_GB_RAM]      183.2        1.0 4646
## b[StorageGB MemoryGB:0.0078125_GB_RAM]         26.5        1.0 4809
## b[(Intercept) MemoryGB:0.015625_GB_RAM]       210.6        1.0 2815
## b[StorageGB MemoryGB:0.015625_GB_RAM]          26.4        1.0 4853
## b[(Intercept) MemoryGB:0.03125_GB_RAM]        152.5        1.0 5841
## b[StorageGB MemoryGB:0.03125_GB_RAM]           26.5        1.0 4729
## b[(Intercept) MemoryGB:0.0625_GB_RAM]         177.2        1.0 6025
## b[StorageGB MemoryGB:0.0625_GB_RAM]            26.3        1.0 4379
## b[(Intercept) MemoryGB:0.09765625_GB_RAM]     169.4        1.0 5194
## b[StorageGB MemoryGB:0.09765625_GB_RAM]        24.9        1.0 5515
```

```
## b[(Intercept) MemoryGB:0.125_GB_RAM]            178.2        1.0 4060
## b[StorageGB MemoryGB:0.125_GB_RAM]               29.5        1.0 3646
## b[(Intercept) MemoryGB:0.15234375_GB_RAM]       161.2        1.0 4607
## b[StorageGB MemoryGB:0.15234375_GB_RAM]          31.2        1.0 4236
## b[(Intercept) MemoryGB:0.1875_GB_RAM]           244.5        1.0 3729
## b[StorageGB MemoryGB:0.1875_GB_RAM]              28.9        1.0 4096
## b[(Intercept) MemoryGB:0.1953125_GB_RAM]        201.0        1.0 4094
## b[StorageGB MemoryGB:0.1953125_GB_RAM]           27.3        1.0 4435
## b[(Intercept) MemoryGB:0.248046875_GB_RAM]      196.2        1.0 3968
## b[StorageGB MemoryGB:0.248046875_GB_RAM]         26.7        1.0 5028
## b[(Intercept) MemoryGB:0.25_GB_RAM]             185.7        1.0 3626
## b[StorageGB MemoryGB:0.25_GB_RAM]                27.4        1.0 4263
## b[(Intercept) MemoryGB:0.48828125_GB_RAM]       188.3        1.0 3927
## b[StorageGB MemoryGB:0.48828125_GB_RAM]          29.3        1.0 4074
## b[(Intercept) MemoryGB:0.5_GB_RAM]              207.2        1.0 4173
## b[StorageGB MemoryGB:0.5_GB_RAM]                 23.3        1.0 4829
## b[(Intercept) MemoryGB:0.5078125_GB_RAM]        211.9        1.0 4806
## b[StorageGB MemoryGB:0.5078125_GB_RAM]           27.4        1.0 4575
## b[(Intercept) MemoryGB:0.75_GB_RAM]             193.0        1.0 3985
## b[StorageGB MemoryGB:0.75_GB_RAM]                29.3        1.0 4243
## b[(Intercept) MemoryGB:0.9765625_GB_RAM]        166.2        1.0 5043
## b[StorageGB MemoryGB:0.9765625_GB_RAM]           29.7        1.0 4281
## b[(Intercept) MemoryGB:1_GB_RAM]                281.4        1.0 2167
## b[StorageGB MemoryGB:1_GB_RAM]                   25.4        1.0 3222
## b[(Intercept) MemoryGB:1.5_GB_RAM]              153.1        1.0 5303
## b[StorageGB MemoryGB:1.5_GB_RAM]                 26.1        1.0 4260
## b[(Intercept) MemoryGB:12_GB_RAM]               182.1        1.0 5473
## b[StorageGB MemoryGB:12_GB_RAM]                  29.2        1.0 3712
## b[(Intercept) MemoryGB:16_GB_RAM]               156.0        1.0 4488
## b[StorageGB MemoryGB:16_GB_RAM]                  28.1        1.0 4120
## b[(Intercept) MemoryGB:2_GB_RAM]                310.0        1.0 1584
## b[StorageGB MemoryGB:2_GB_RAM]                   30.6        1.0 1669
## b[(Intercept) MemoryGB:3_GB_RAM]                189.7        1.0 3720
## b[StorageGB MemoryGB:3_GB_RAM]                   26.0        1.0 3269
## b[(Intercept) MemoryGB:4_GB_RAM]                212.9        1.0 2612
## b[StorageGB MemoryGB:4_GB_RAM]                   36.7        1.0 1077
## b[(Intercept) MemoryGB:5_GB_RAM]                174.1        1.0 4562
## b[StorageGB MemoryGB:5_GB_RAM]                   27.6        1.0 4441
## b[(Intercept) MemoryGB:6_GB_RAM]                180.0        1.0 3191
## b[StorageGB MemoryGB:6_GB_RAM]                   27.6        1.0 1835
## b[(Intercept) MemoryGB:8_GB_RAM]                195.4        1.0 3435
## b[StorageGB MemoryGB:8_GB_RAM]                   34.5        1.0 1066
## sigma                                            49.2        1.0 7212
## Sigma[MemoryGB:(Intercept),(Intercept)]    25934838.0        1.0 1639
## Sigma[MemoryGB:StorageGB,(Intercept)]        463631.8        1.0 1975
## Sigma[MemoryGB:StorageGB,StorageGB]          236940.8        1.0 1178
## mean_PPD                                        115.5        1.0 4909
## log-posterior                                     0.2        1.0 1060
##
## For each parameter, mcse is Monte Carlo standard error, n_eff is a crude measure of effective sample
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 1).
## Chain 1:
```

```
## Chain 1: Gradient evaluation took 0 seconds
## Chain 1: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 1: Adjust your expectations accordingly!
## Chain 1:
## Chain 1:
## Chain 1: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 1: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 1: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 1: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 1: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 1: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 1: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 1: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 1: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 1: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 1: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 1: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 1:
## Chain 1:  Elapsed Time: 161.765 seconds (Warm-up)
## Chain 1:                6.077 seconds (Sampling)
## Chain 1:                167.842 seconds (Total)
## Chain 1:
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 2).
## Chain 2:
## Chain 2: Gradient evaluation took 0 seconds
## Chain 2: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 2: Adjust your expectations accordingly!
## Chain 2:
## Chain 2:
## Chain 2: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 2: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 2: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 2: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 2: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 2: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 2: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 2: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 2: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 2: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 2: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 2: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 2:
## Chain 2:  Elapsed Time: 124.12 seconds (Warm-up)
## Chain 2:                5.621 seconds (Sampling)
## Chain 2:                129.741 seconds (Total)
## Chain 2:
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 3).
## Chain 3:
## Chain 3: Gradient evaluation took 0 seconds
## Chain 3: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 3: Adjust your expectations accordingly!
## Chain 3:
```

```
## Chain 3:
## Chain 3: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 3: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 3: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 3: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 3: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 3: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 3: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 3: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 3: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 3: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 3: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 3: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 3:
## Chain 3:  Elapsed Time: 197.1 seconds (Warm-up)
## Chain 3:                5.645 seconds (Sampling)
## Chain 3:                202.745 seconds (Total)
## Chain 3:
##
## SAMPLING FOR MODEL 'continuous' NOW (CHAIN 4).
## Chain 4:
## Chain 4: Gradient evaluation took 0 seconds
## Chain 4: 1000 transitions using 10 leapfrog steps per transition would take 0 seconds.
## Chain 4: Adjust your expectations accordingly!
## Chain 4:
## Chain 4:
## Chain 4: Iteration:    1 / 2000 [  0%]  (Warmup)
## Chain 4: Iteration:  200 / 2000 [ 10%]  (Warmup)
## Chain 4: Iteration:  400 / 2000 [ 20%]  (Warmup)
## Chain 4: Iteration:  600 / 2000 [ 30%]  (Warmup)
## Chain 4: Iteration:  800 / 2000 [ 40%]  (Warmup)
## Chain 4: Iteration: 1000 / 2000 [ 50%]  (Warmup)
## Chain 4: Iteration: 1001 / 2000 [ 50%]  (Sampling)
## Chain 4: Iteration: 1200 / 2000 [ 60%]  (Sampling)
## Chain 4: Iteration: 1400 / 2000 [ 70%]  (Sampling)
## Chain 4: Iteration: 1600 / 2000 [ 80%]  (Sampling)
## Chain 4: Iteration: 1800 / 2000 [ 90%]  (Sampling)
## Chain 4: Iteration: 2000 / 2000 [100%]  (Sampling)
## Chain 4:
## Chain 4:  Elapsed Time: 157.615 seconds (Warm-up)
## Chain 4:                44.276 seconds (Sampling)
## Chain 4:                201.891 seconds (Total)
## Chain 4:
##
## Model Info:
##  function:     stan_lmer
##  family:       gaussian [identity]
##  formula:      Presence ~ OriginalCost + Controller + Achievements + StorageGB +
##     Indie + factor(MemoryGB) + (1 + StorageGB | MemoryGB)
##  algorithm:    sampling
##  sample:       4000 (posterior sample size)
##  priors:       see help('prior_summary')
##  observations: 552
```

```
##  groups:       MemoryGB (23)
##
## Estimates:
##                                                mean       sd         10%
## (Intercept)                                 998772.8  13243.9   981937.0
## OriginalCost                                   -15.1     23.0      -45.0
## Controller                                   -2398.3   1419.0    -4212.8
## Achievements                                     7.3      6.2       -0.6
## StorageGB                                       26.7    101.2      -75.1
## Indie                                         -997.2   1443.1    -2812.9
## factor(MemoryGB)0.0625 GB RAM                 1938.4  15343.6   -17793.4
## factor(MemoryGB)0.09375 GB RAM                4192.9  16630.9   -17238.5
## factor(MemoryGB)0.09765625 GB RAM             2315.6  19505.6   -22616.5
## factor(MemoryGB)0.125 GB RAM                  2944.2  14307.4   -15683.3
## factor(MemoryGB)0.25 GB RAM                  -1402.1  13591.9   -18957.8
## factor(MemoryGB)0.375 GB RAM                  1688.5  16671.8   -19675.5
## factor(MemoryGB)0.390625 GB RAM               3162.5  19519.4   -23183.6
## factor(MemoryGB)0.439453125 GB RAM            8227.6  19243.4   -16640.0
## factor(MemoryGB)0.5 GB RAM                    1081.3  13409.0   -16154.3
## factor(MemoryGB)0.78125 GB RAM                3657.1  19244.9   -21395.8
## factor(MemoryGB)1 GB RAM                      1850.9  13315.6   -15396.5
## factor(MemoryGB)1.5 GB RAM                    4340.0  19791.4   -21003.6
## factor(MemoryGB)10 GB RAM                     5475.0  19792.7   -19675.3
## factor(MemoryGB)16 GB RAM                     5837.2  19461.5   -18661.7
## factor(MemoryGB)2 GB RAM                      -696.9  13302.8   -17905.4
## factor(MemoryGB)2.44140625 GB RAM             2845.7  19279.3   -21659.8
## factor(MemoryGB)2000 GB RAM                   -234.0  19516.7   -25722.5
## factor(MemoryGB)3 GB RAM                     -7679.8  13845.3   -25473.8
## factor(MemoryGB)4 GB RAM                      3516.2  13338.5   -13918.3
## factor(MemoryGB)5 GB RAM                     -9005.5  22922.7   -37800.5
## factor(MemoryGB)6 GB RAM                      4760.1  13912.1   -13405.1
## factor(MemoryGB)8 GB RAM                      -407.5  13461.5   -17843.4
## b[(Intercept) MemoryGB:0.001953125_GB_RAM]      -8.7   1167.8     -408.2
## b[StorageGB MemoryGB:0.001953125_GB_RAM]         4.1    160.5     -159.9
## b[(Intercept) MemoryGB:0.0625_GB_RAM]           -4.9   1193.5     -391.8
## b[StorageGB MemoryGB:0.0625_GB_RAM]              0.4    165.4     -156.0
## b[(Intercept) MemoryGB:0.09375_GB_RAM]          13.3   1457.6     -424.4
## b[StorageGB MemoryGB:0.09375_GB_RAM]            -0.6    173.0     -168.6
## b[(Intercept) MemoryGB:0.09765625_GB_RAM]       62.4   1457.9     -413.1
## b[StorageGB MemoryGB:0.09765625_GB_RAM]          8.6    175.2     -149.4
## b[(Intercept) MemoryGB:0.125_GB_RAM]           -37.3   1429.7     -403.7
## b[StorageGB MemoryGB:0.125_GB_RAM]               2.6    174.0     -160.9
## b[(Intercept) MemoryGB:0.25_GB_RAM]            -24.5   1209.1     -431.5
## b[StorageGB MemoryGB:0.25_GB_RAM]                4.7    161.8     -155.8
## b[(Intercept) MemoryGB:0.375_GB_RAM]           -29.0   1239.3     -472.1
## b[StorageGB MemoryGB:0.375_GB_RAM]              -2.5    176.4     -175.6
## b[(Intercept) MemoryGB:0.390625_GB_RAM]         39.1   1309.2     -417.8
## b[StorageGB MemoryGB:0.390625_GB_RAM]            2.4    176.9     -164.9
## b[(Intercept) MemoryGB:0.439453125_GB_RAM]       5.8   1413.5     -445.1
## b[StorageGB MemoryGB:0.439453125_GB_RAM]        -2.9    170.9     -173.7
## b[(Intercept) MemoryGB:0.5_GB_RAM]             -60.2   1287.0     -454.1
## b[StorageGB MemoryGB:0.5_GB_RAM]                11.8    156.6     -146.1
## b[(Intercept) MemoryGB:0.78125_GB_RAM]          27.5   1512.9     -414.9
## b[StorageGB MemoryGB:0.78125_GB_RAM]             3.6    185.8     -164.5
```

```
## b[(Intercept) MemoryGB:1_GB_RAM]                -29.3     1201.3     -397.9
## b[StorageGB MemoryGB:1_GB_RAM]                   22.7      120.9      -94.3
## b[(Intercept) MemoryGB:1.5_GB_RAM]              -70.6     1498.9     -449.3
## b[StorageGB MemoryGB:1.5_GB_RAM]                 -0.7      179.4     -163.5
## b[(Intercept) MemoryGB:10_GB_RAM]               -21.2     1319.6     -423.2
## b[StorageGB MemoryGB:10_GB_RAM]                  0.6      171.6     -167.8
## b[(Intercept) MemoryGB:16_GB_RAM]               -32.6     1371.0     -433.3
## b[StorageGB MemoryGB:16_GB_RAM]                  -1.8      178.5     -165.9
## b[(Intercept) MemoryGB:2_GB_RAM]                -18.4     1221.4     -393.2
## b[StorageGB MemoryGB:2_GB_RAM]                  -22.8      123.7     -161.0
## b[(Intercept) MemoryGB:2.44140625_GB_RAM]        -9.5     1365.8     -409.0
## b[StorageGB MemoryGB:2.44140625_GB_RAM]          -9.1      163.7     -177.9
## b[(Intercept) MemoryGB:2000_GB_RAM]             -32.3     1099.9     -428.8
## b[StorageGB MemoryGB:2000_GB_RAM]                0.1      173.2     -165.1
## b[(Intercept) MemoryGB:3_GB_RAM]                 -0.9     1283.2     -429.1
## b[StorageGB MemoryGB:3_GB_RAM]                   93.6      132.7      -28.8
## b[(Intercept) MemoryGB:4_GB_RAM]                -13.3     1119.7     -431.1
## b[StorageGB MemoryGB:4_GB_RAM]                 -102.5      117.4     -238.0
## b[(Intercept) MemoryGB:5_GB_RAM]                 23.4     1269.1     -403.3
## b[StorageGB MemoryGB:5_GB_RAM]                   -1.7      172.1     -172.4
## b[(Intercept) MemoryGB:6_GB_RAM]                -29.2     1192.4     -392.6
## b[StorageGB MemoryGB:6_GB_RAM]                  -11.4      108.5     -128.5
## b[(Intercept) MemoryGB:8_GB_RAM]                -29.0     1111.6     -406.0
## b[StorageGB MemoryGB:8_GB_RAM]                   -0.1      101.9     -102.8
## sigma                                         14232.0      435.7    13671.9
## Sigma[MemoryGB:(Intercept),(Intercept)]     1793524.7 12158021.2      720.2
## Sigma[MemoryGB:StorageGB,(Intercept)]          -319.1   258982.0   -44077.7
## Sigma[MemoryGB:StorageGB,StorageGB]           30125.1    62892.5      772.5
##                                                50%        90%
## (Intercept)                                  998563.6  1015828.0
## OriginalCost                                    -15.4       14.3
## Controller                                    -2387.5     -595.5
## Achievements                                      7.3       15.3
## StorageGB                                        18.6      132.9
## Indie                                         -1009.6      831.0
## factor(MemoryGB)0.0625 GB RAM                  2086.1    22041.5
## factor(MemoryGB)0.09375 GB RAM                 4392.5    25427.7
## factor(MemoryGB)0.09765625 GB RAM              2426.2    27552.0
## factor(MemoryGB)0.125 GB RAM                   3153.5    21331.0
## factor(MemoryGB)0.25 GB RAM                   -1078.0    16056.5
## factor(MemoryGB)0.375 GB RAM                   2128.1    22646.1
## factor(MemoryGB)0.390625 GB RAM                3542.2    28080.1
## factor(MemoryGB)0.439453125 GB RAM             8481.8    32291.5
## factor(MemoryGB)0.5 GB RAM                     1457.5    18069.6
## factor(MemoryGB)0.78125 GB RAM                 4149.7    27437.8
## factor(MemoryGB)1 GB RAM                       2112.8    18663.0
## factor(MemoryGB)1.5 GB RAM                     4612.4    29480.7
## factor(MemoryGB)10 GB RAM                      5766.6    30150.6
## factor(MemoryGB)16 GB RAM                      5838.9    30664.9
## factor(MemoryGB)2 GB RAM                       -541.2    16099.9
## factor(MemoryGB)2.44140625 GB RAM              2802.6    26772.2
## factor(MemoryGB)2000 GB RAM                     489.0    24249.7
## factor(MemoryGB)3 GB RAM                      -7393.5    10123.2
## factor(MemoryGB)4 GB RAM                       3733.7    20397.5
```

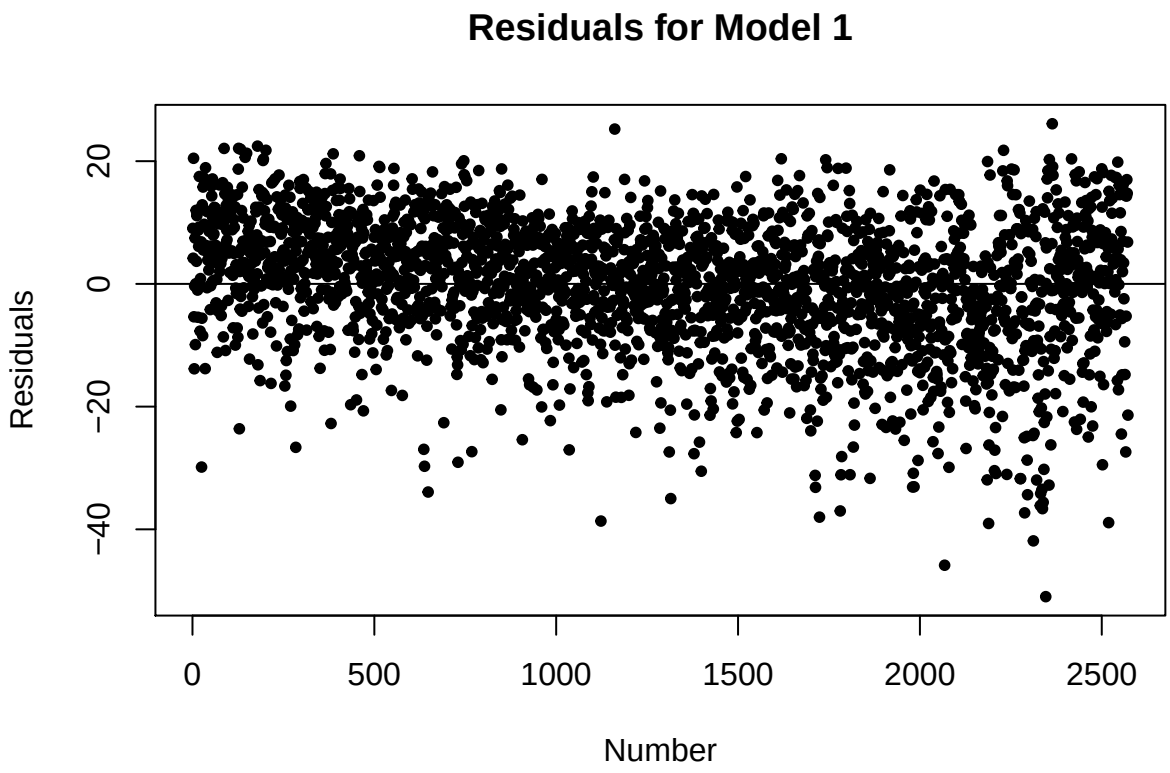
```
## factor(MemoryGB)5 GB RAM                          -9080.6    19709.9
## factor(MemoryGB)6 GB RAM                           4911.7    22504.9
## factor(MemoryGB)8 GB RAM                           -204.4    16506.5
## b[(Intercept) MemoryGB:0.001953125_GB_RAM]           -0.4      410.0
## b[StorageGB MemoryGB:0.001953125_GB_RAM]              0.1      168.4
## b[(Intercept) MemoryGB:0.0625_GB_RAM]                 0.1      424.2
## b[StorageGB MemoryGB:0.0625_GB_RAM]                   0.0      165.6
## b[(Intercept) MemoryGB:0.09375_GB_RAM]               -0.7      425.0
## b[StorageGB MemoryGB:0.09375_GB_RAM]                 -0.1      173.9
## b[(Intercept) MemoryGB:0.09765625_GB_RAM]            -1.7      427.5
## b[StorageGB MemoryGB:0.09765625_GB_RAM]               2.3      182.0
## b[(Intercept) MemoryGB:0.125_GB_RAM]                 -0.3      403.8
## b[StorageGB MemoryGB:0.125_GB_RAM]                    0.6      162.9
## b[(Intercept) MemoryGB:0.25_GB_RAM]                   0.3      408.5
## b[StorageGB MemoryGB:0.25_GB_RAM]                     0.5      166.9
## b[(Intercept) MemoryGB:0.375_GB_RAM]                 -0.8      382.6
## b[StorageGB MemoryGB:0.375_GB_RAM]                   -0.1      164.4
## b[(Intercept) MemoryGB:0.390625_GB_RAM]              -0.6      435.7
## b[StorageGB MemoryGB:0.390625_GB_RAM]                -0.5      166.5
## b[(Intercept) MemoryGB:0.439453125_GB_RAM]            0.2      426.6
## b[StorageGB MemoryGB:0.439453125_GB_RAM]             -1.0      168.2
## b[(Intercept) MemoryGB:0.5_GB_RAM]                   -0.7      383.0
## b[StorageGB MemoryGB:0.5_GB_RAM]                      3.6      173.3
## b[(Intercept) MemoryGB:0.78125_GB_RAM]               -0.4      403.9
## b[StorageGB MemoryGB:0.78125_GB_RAM]                  0.0      179.3
## b[(Intercept) MemoryGB:1_GB_RAM]                      0.7      362.9
## b[StorageGB MemoryGB:1_GB_RAM]                        9.5      158.3
## b[(Intercept) MemoryGB:1.5_GB_RAM]                    0.0      395.7
## b[StorageGB MemoryGB:1.5_GB_RAM]                      0.2      173.0
## b[(Intercept) MemoryGB:10_GB_RAM]                    -1.4      461.5
## b[StorageGB MemoryGB:10_GB_RAM]                       0.0      164.0
## b[(Intercept) MemoryGB:16_GB_RAM]                    -1.4      396.8
## b[StorageGB MemoryGB:16_GB_RAM]                      -0.1      167.8
## b[(Intercept) MemoryGB:2_GB_RAM]                      0.2      393.0
## b[StorageGB MemoryGB:2_GB_RAM]                       -7.6      103.1
## b[(Intercept) MemoryGB:2.44140625_GB_RAM]            -0.1      376.0
## b[StorageGB MemoryGB:2.44140625_GB_RAM]              -2.6      161.0
## b[(Intercept) MemoryGB:2000_GB_RAM]                  -0.6      390.8
## b[StorageGB MemoryGB:2000_GB_RAM]                    -0.5      168.6
## b[(Intercept) MemoryGB:3_GB_RAM]                     -0.8      459.9
## b[StorageGB MemoryGB:3_GB_RAM]                       67.9      260.9
## b[(Intercept) MemoryGB:4_GB_RAM]                     -0.1      395.1
## b[StorageGB MemoryGB:4_GB_RAM]                      -83.1        8.5
## b[(Intercept) MemoryGB:5_GB_RAM]                     -1.6      419.4
## b[StorageGB MemoryGB:5_GB_RAM]                       -0.3      168.3
## b[(Intercept) MemoryGB:6_GB_RAM]                     -1.2      357.3
## b[StorageGB MemoryGB:6_GB_RAM]                       -2.7       99.9
## b[(Intercept) MemoryGB:8_GB_RAM]                     -1.9      339.4
## b[StorageGB MemoryGB:8_GB_RAM]                        3.2      106.0
## sigma                                             14225.3    14794.9
## Sigma[MemoryGB:(Intercept),(Intercept)]           32569.9  1155788.9
## Sigma[MemoryGB:StorageGB,(Intercept)]               -27.6    41719.1
## Sigma[MemoryGB:StorageGB,StorageGB]               12002.4    66743.5
##
```

```
## Fit Diagnostics:
##            mean     sd       10%      50%      90%
## mean_PPD 998327.0    867.9 997190.2 998339.0 999447.7
##
## The mean_ppd is the sample average posterior predictive distribution of the outcome variable (for de
##
## MCMC diagnostics
##                                                mcse     Rhat     n_eff
## (Intercept)                                    676.8      1.0  383
## OriginalCost                                     0.4      1.0 4006
## Controller                                      20.4      1.0 4841
## Achievements                                     0.1      1.0 4234
## StorageGB                                        4.4      1.0  533
## Indie                                           21.8      1.0 4389
## factor(MemoryGB)0.0625 GB RAM                  693.6      1.0  489
## factor(MemoryGB)0.09375 GB RAM                 707.2      1.0  553
## factor(MemoryGB)0.09765625 GB RAM              710.1      1.0  755
## factor(MemoryGB)0.125 GB RAM                   676.5      1.0  447
## factor(MemoryGB)0.25 GB RAM                    687.6      1.0  391
## factor(MemoryGB)0.375 GB RAM                   702.3      1.0  563
## factor(MemoryGB)0.390625 GB RAM                736.6      1.0  702
## factor(MemoryGB)0.439453125 GB RAM             722.2      1.0  710
## factor(MemoryGB)0.5 GB RAM                     678.1      1.0  391
## factor(MemoryGB)0.78125 GB RAM                 723.3      1.0  708
## factor(MemoryGB)1 GB RAM                       683.9      1.0  379
## factor(MemoryGB)1.5 GB RAM                     718.8      1.0  758
## factor(MemoryGB)10 GB RAM                      713.3      1.0  770
## factor(MemoryGB)16 GB RAM                      728.1      1.0  715
## factor(MemoryGB)2 GB RAM                       674.8      1.0  389
## factor(MemoryGB)2.44140625 GB RAM              705.2      1.0  747
## factor(MemoryGB)2000 GB RAM                    723.1      1.0  728
## factor(MemoryGB)3 GB RAM                       681.0      1.0  413
## factor(MemoryGB)4 GB RAM                       678.7      1.0  386
## factor(MemoryGB)5 GB RAM                       823.7      1.0  775
## factor(MemoryGB)6 GB RAM                       685.7      1.0  412
## factor(MemoryGB)8 GB RAM                       674.6      1.0  398
## b[(Intercept) MemoryGB:0.001953125_GB_RAM]      20.6      1.0 3202
## b[StorageGB MemoryGB:0.001953125_GB_RAM]         2.8      1.0 3346
## b[(Intercept) MemoryGB:0.0625_GB_RAM]           26.7      1.0 1994
## b[StorageGB MemoryGB:0.0625_GB_RAM]              3.1      1.0 2887
## b[(Intercept) MemoryGB:0.09375_GB_RAM]          34.3      1.0 1806
## b[StorageGB MemoryGB:0.09375_GB_RAM]             3.1      1.0 3167
## b[(Intercept) MemoryGB:0.09765625_GB_RAM]       33.1      1.0 1939
## b[StorageGB MemoryGB:0.09765625_GB_RAM]          3.2      1.0 2977
## b[(Intercept) MemoryGB:0.125_GB_RAM]            31.7      1.0 2035
## b[StorageGB MemoryGB:0.125_GB_RAM]               3.2      1.0 2880
## b[(Intercept) MemoryGB:0.25_GB_RAM]             24.6      1.0 2408
## b[StorageGB MemoryGB:0.25_GB_RAM]                2.9      1.0 3182
## b[(Intercept) MemoryGB:0.375_GB_RAM]            30.7      1.0 1628
## b[StorageGB MemoryGB:0.375_GB_RAM]               3.6      1.0 2386
## b[(Intercept) MemoryGB:0.390625_GB_RAM]         26.6      1.0 2416
## b[StorageGB MemoryGB:0.390625_GB_RAM]            3.2      1.0 3123
## b[(Intercept) MemoryGB:0.439453125_GB_RAM]      35.7      1.0 1572
## b[StorageGB MemoryGB:0.439453125_GB_RAM]         3.1      1.0 2979
```

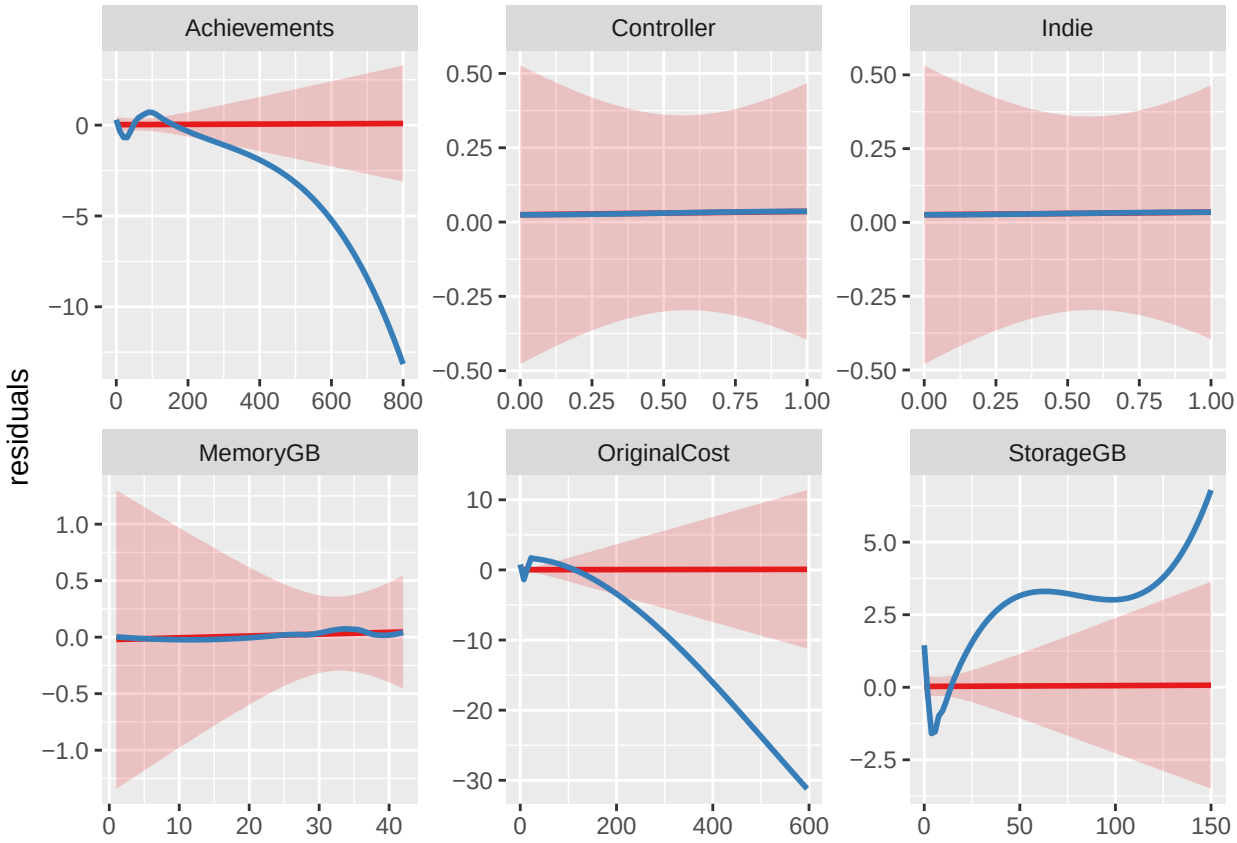
```
## b[(Intercept) MemoryGB:0.5_GB_RAM]             30.3      1.0 1807
## b[StorageGB MemoryGB:0.5_GB_RAM]                2.6      1.0 3676
## b[(Intercept) MemoryGB:0.78125_GB_RAM]         36.5      1.0 1717
## b[StorageGB MemoryGB:0.78125_GB_RAM]            3.8      1.0 2401
## b[(Intercept) MemoryGB:1_GB_RAM]               36.2      1.0 1101
## b[StorageGB MemoryGB:1_GB_RAM]                  3.6      1.0 1112
## b[(Intercept) MemoryGB:1.5_GB_RAM]             37.9      1.0 1566
## b[StorageGB MemoryGB:1.5_GB_RAM]                3.3      1.0 3035
## b[(Intercept) MemoryGB:10_GB_RAM]              31.9      1.0 1708
## b[StorageGB MemoryGB:10_GB_RAM]                 3.1      1.0 3121
## b[(Intercept) MemoryGB:16_GB_RAM]              38.1      1.0 1298
## b[StorageGB MemoryGB:16_GB_RAM]                 3.3      1.0 2887
## b[(Intercept) MemoryGB:2_GB_RAM]               34.9      1.0 1223
## b[StorageGB MemoryGB:2_GB_RAM]                  3.9      1.0 1028
## b[(Intercept) MemoryGB:2.44140625_GB_RAM]      29.0      1.0 2215
## b[StorageGB MemoryGB:2.44140625_GB_RAM]         2.8      1.0 3460
## b[(Intercept) MemoryGB:2000_GB_RAM]            20.5      1.0 2877
## b[StorageGB MemoryGB:2000_GB_RAM]               3.4      1.0 2620
## b[(Intercept) MemoryGB:3_GB_RAM]               38.2      1.0 1130
## b[StorageGB MemoryGB:3_GB_RAM]                  3.7      1.0 1265
## b[(Intercept) MemoryGB:4_GB_RAM]               31.0      1.0 1306
## b[StorageGB MemoryGB:4_GB_RAM]                  4.7      1.0  611
## b[(Intercept) MemoryGB:5_GB_RAM]               27.1      1.0 2196
## b[StorageGB MemoryGB:5_GB_RAM]                  4.5      1.0 1468
## b[(Intercept) MemoryGB:6_GB_RAM]               22.3      1.0 2860
## b[StorageGB MemoryGB:6_GB_RAM]                  4.0      1.0  732
## b[(Intercept) MemoryGB:8_GB_RAM]               29.2      1.0 1448
## b[StorageGB MemoryGB:8_GB_RAM]                  4.1      1.0  617
## sigma                                           6.9      1.0 3996
## Sigma[MemoryGB:(Intercept),(Intercept)]    460295.6      1.0  698
## Sigma[MemoryGB:StorageGB,(Intercept)]        9648.9      1.0  720
## Sigma[MemoryGB:StorageGB,StorageGB]          2644.2      1.0  566
## mean_PPD                                       12.9      1.0 4537
## log-posterior                                   0.2      1.0 1378
##
## For each parameter, mcse is Monte Carlo standard error, n_eff is a crude measure of effective sample
```

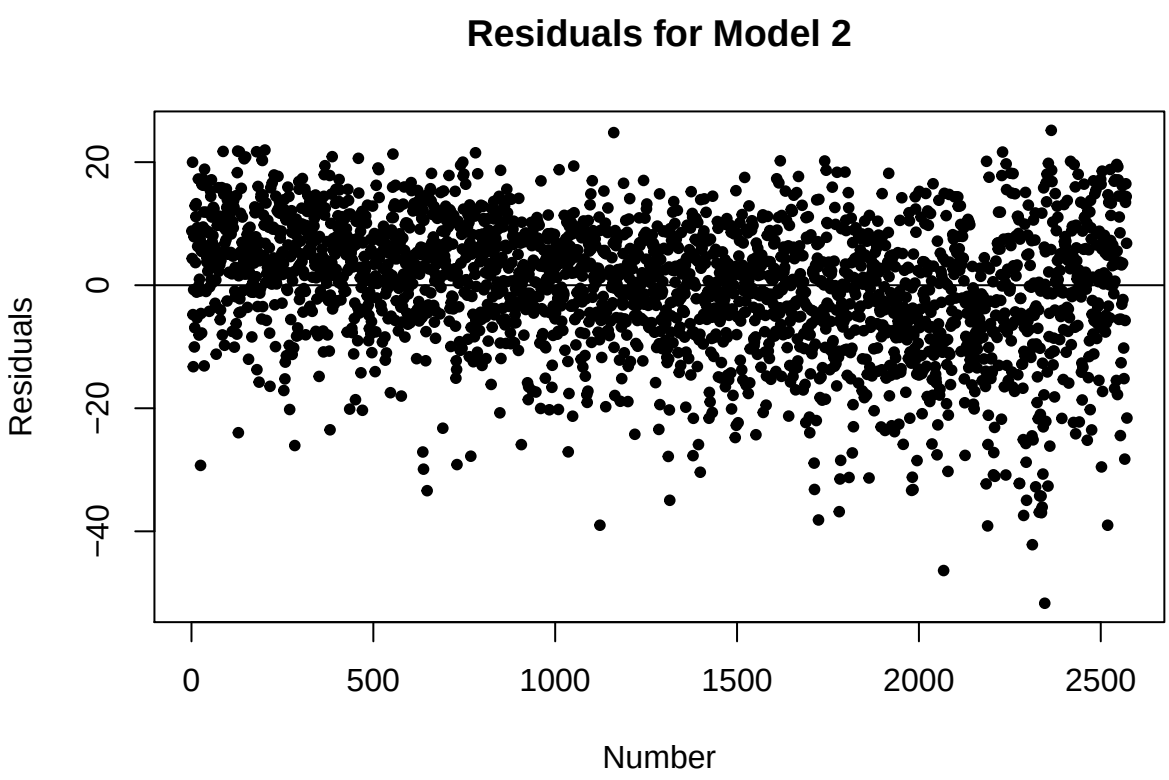
6.5 Model Check

6.5.1 Residuals

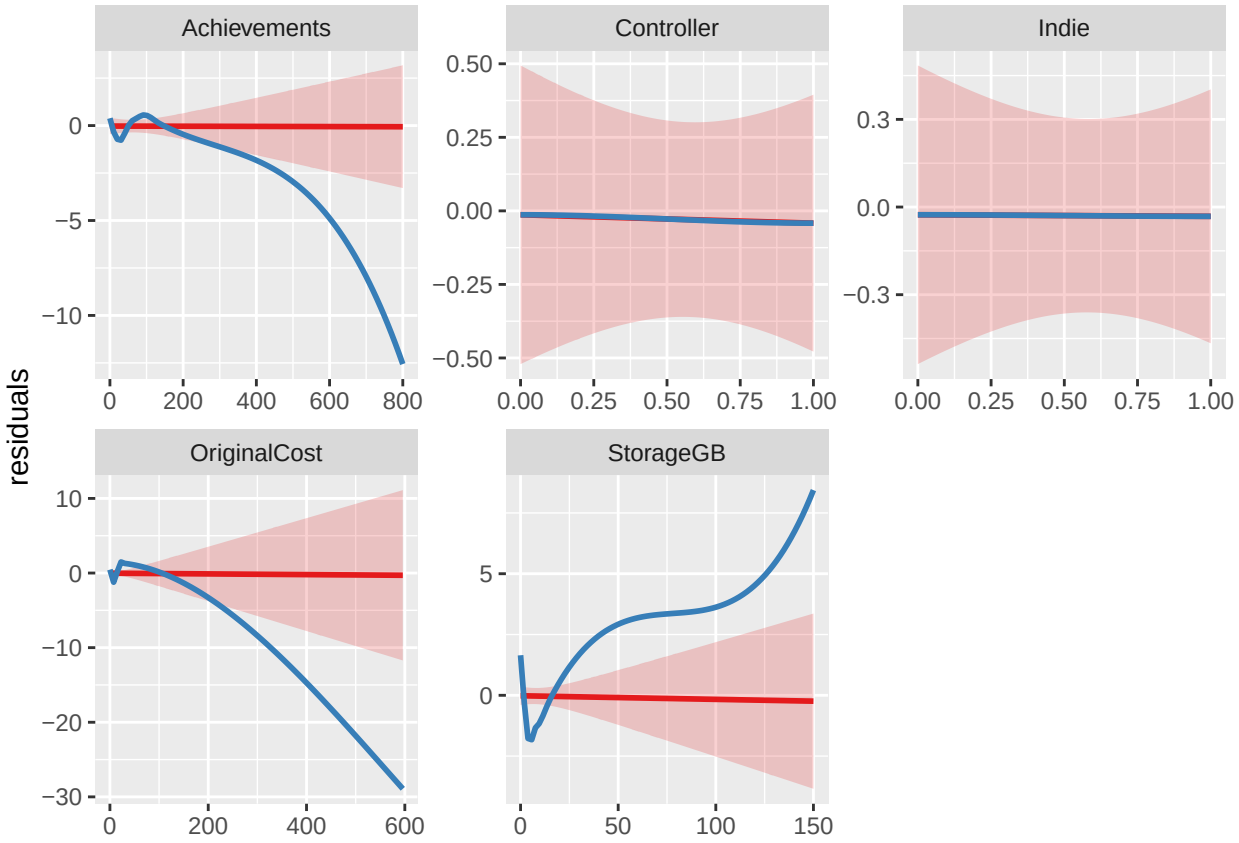


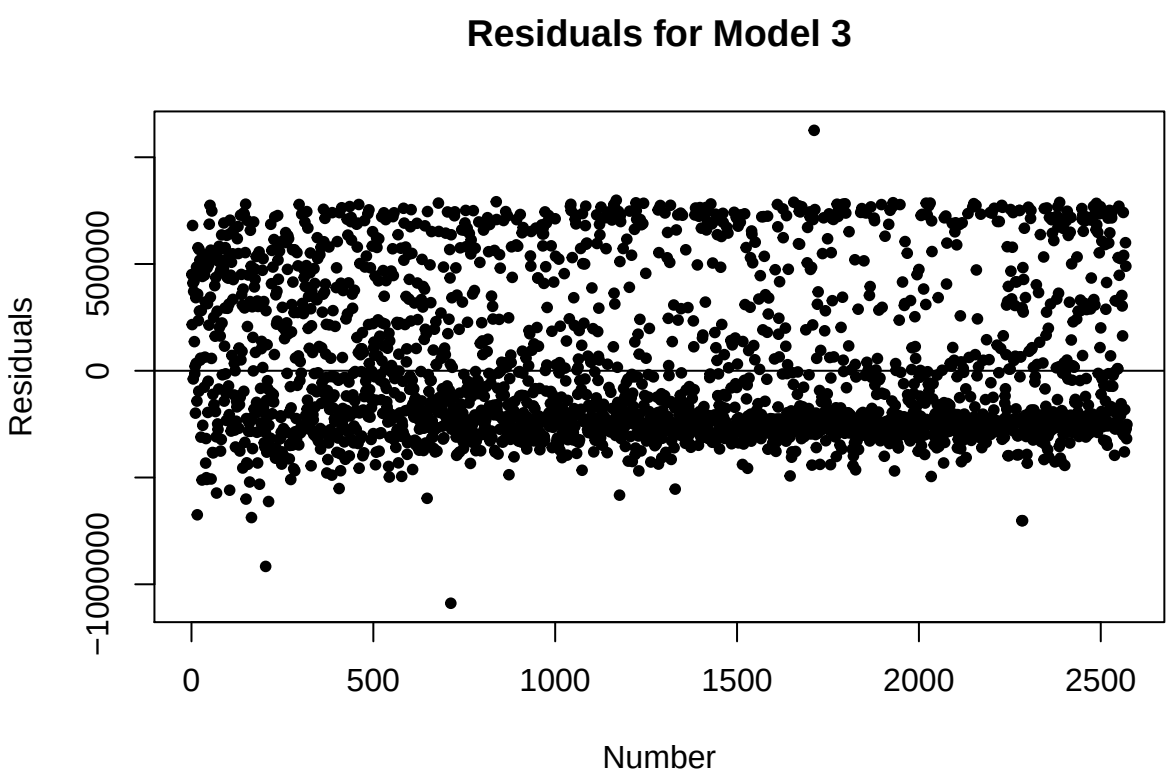

```
## `geom_smooth()` using formula 'y ~ x'
## `geom_smooth()` using formula 'y ~ x'
```


residuals
Achievements
Controller
Indie
MemoryGB
OriginalCost
StorageGB
0
−5
−10
0.50
0.25
0.00
−0.25
−0.50
0
200
400
600
800
0.00
0.25
0.50
0.75
1.00
1.0
0.5
0.0
−0.5
−1.0
10
20
30
40
10
0
−10
−20
−30
0
200
400
600
5.0
2.5
0.0
−2.5
0
50
100
150

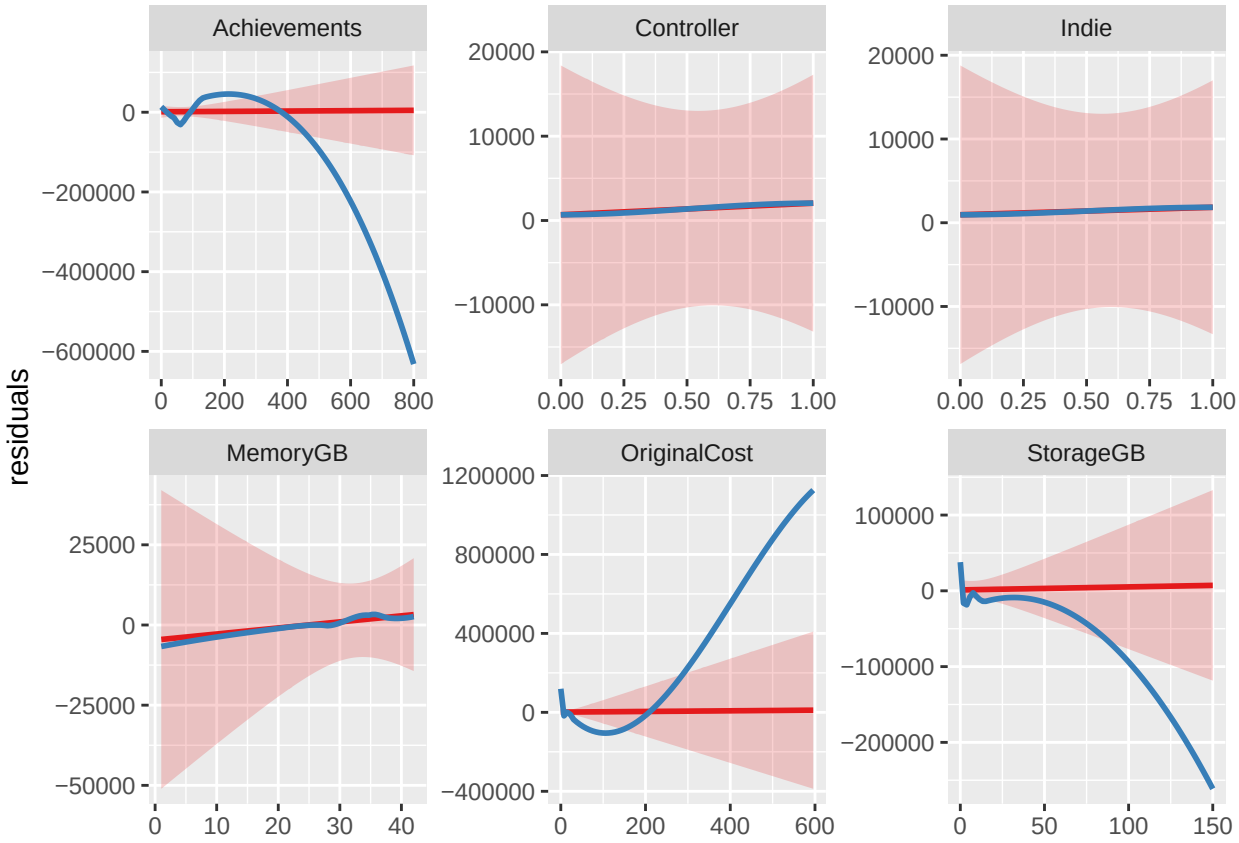


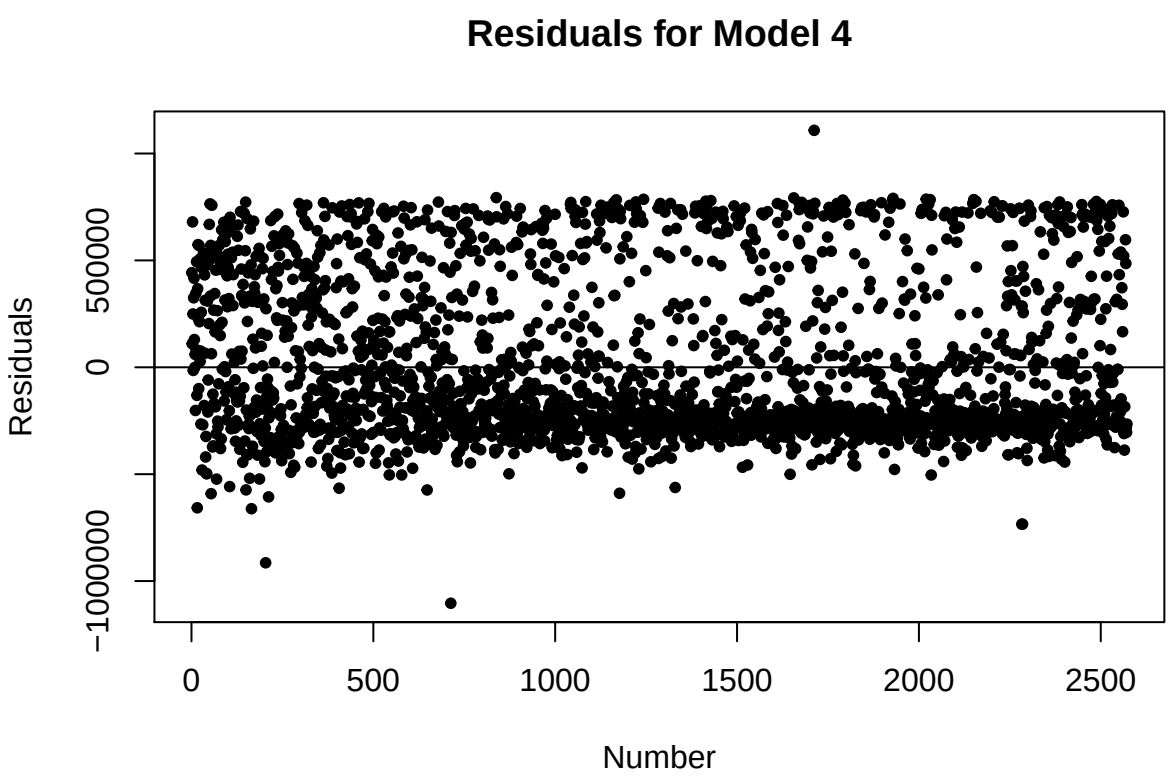

```
## `geom_smooth()` using formula 'y ~ x'
## `geom_smooth()` using formula 'y ~ x'
```


residuals
Achievements
Controller
Indie
OriginalCost
StorageGB
0
−5
−10
0
200
400
600
800
0.50
0.25
0.00
−0.25
−0.50
0.00
0.25
0.50
0.75
1.00
0.3
0.0
−0.3
10
−20
−30
150

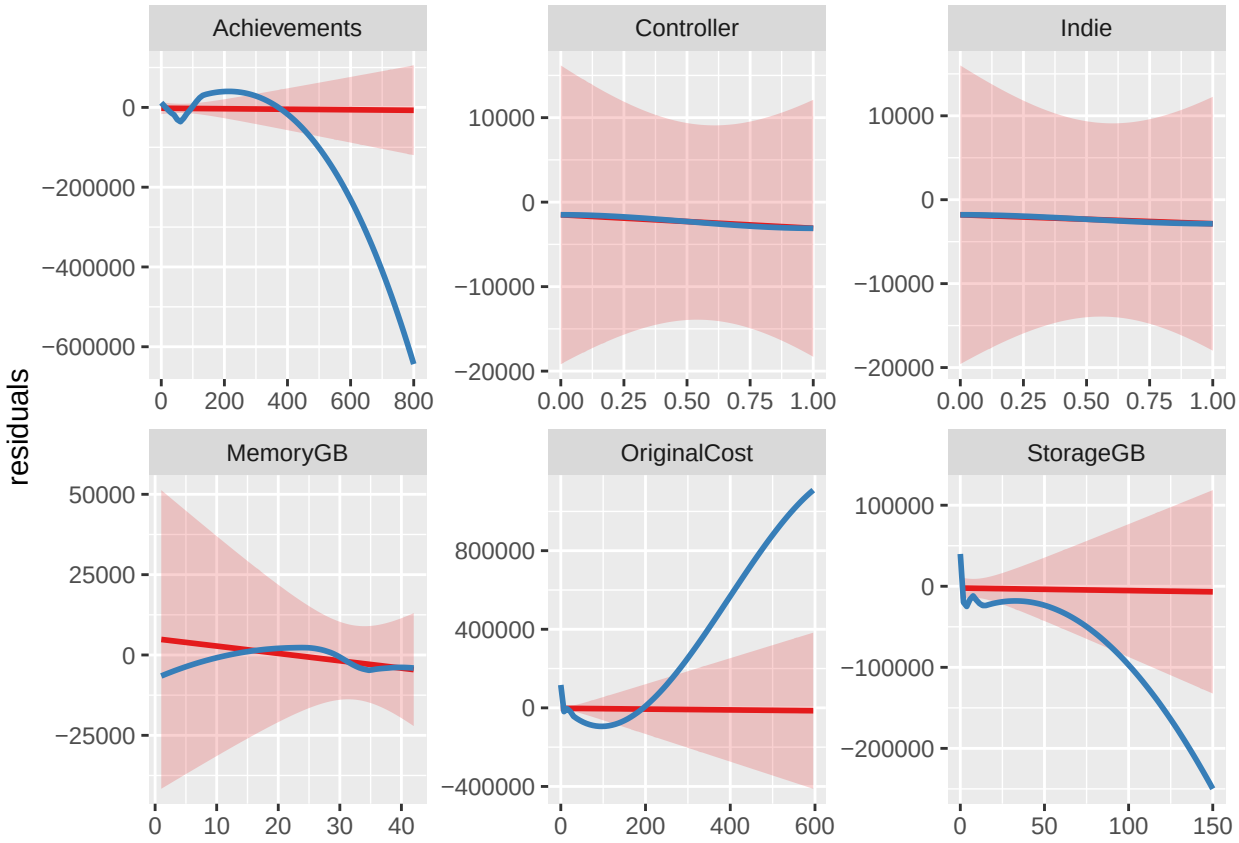


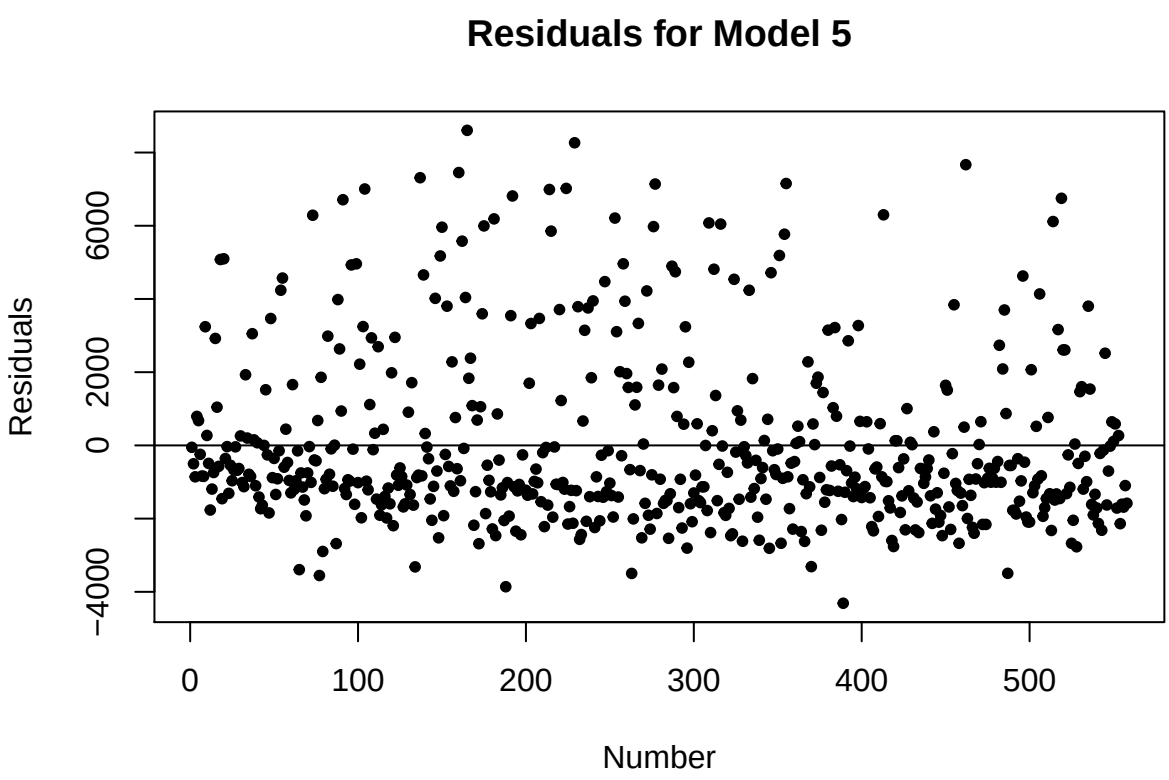

```
## `geom_smooth()` using formula 'y ~ x'
## `geom_smooth()` using formula 'y ~ x'
```


residuals
Achievements
Controller
Indie
MemoryGB
OriginalCost
StorageGB
0
−200000
−400000
−600000
0
200
400
600
800
20000
10000
0
−10000
0.00
0.25
0.50
0.75
1.00
25000
0
−25000
−50000
0
10
20
30
40
1200000
800000
400000
0
−400000
0
200
400
600
100000
0
−100000
−200000
0
50
100
150

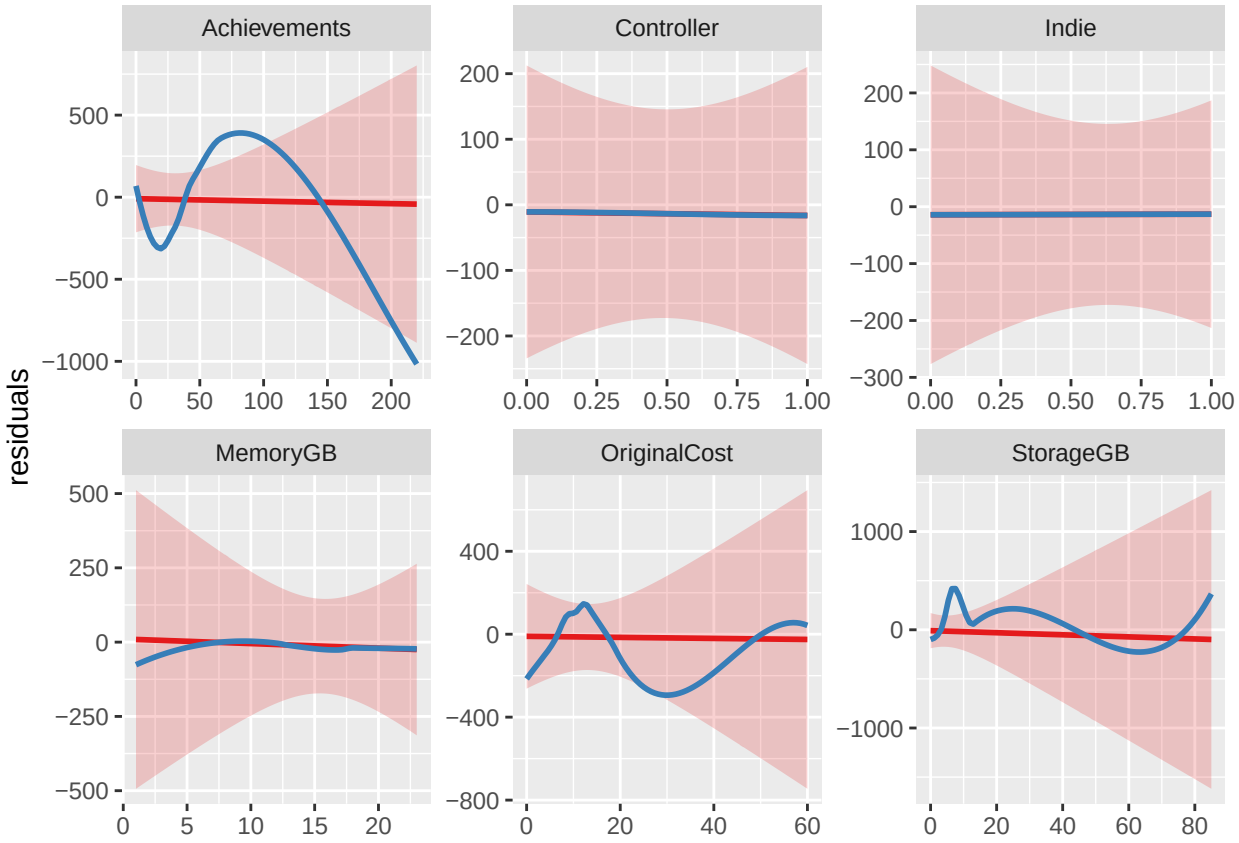


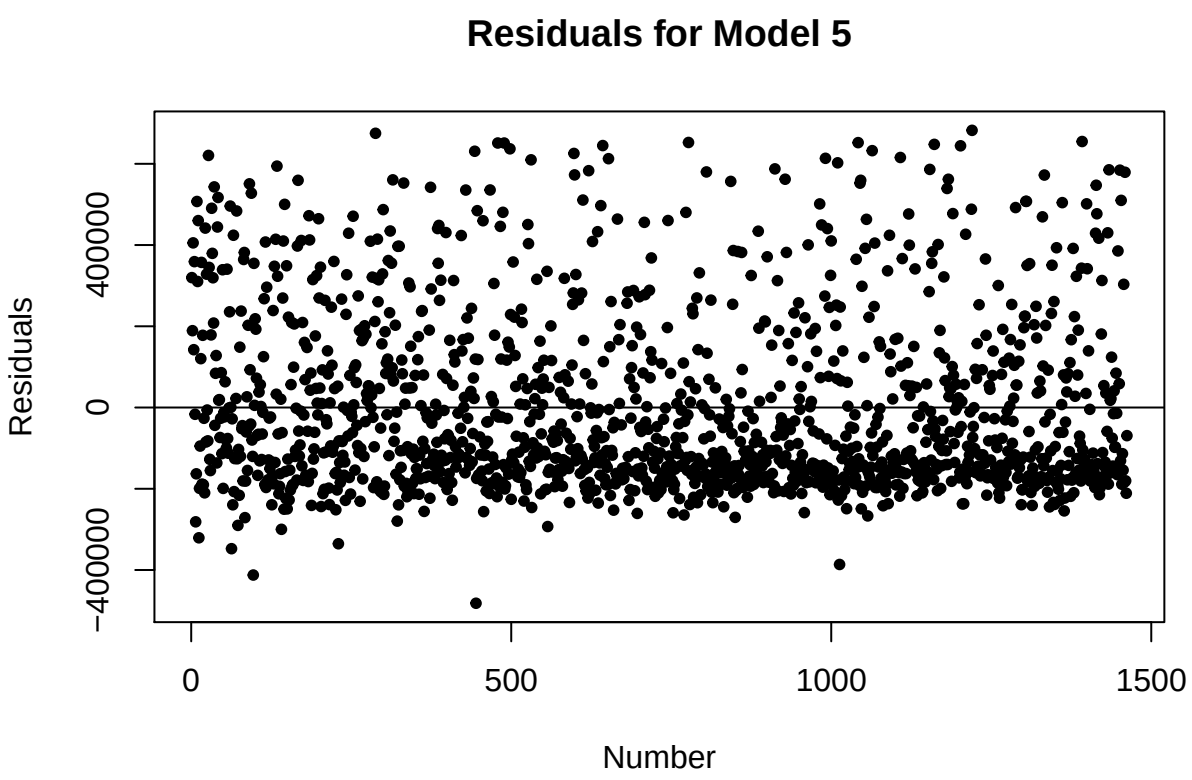

```
## `geom_smooth()` using formula 'y ~ x'
## `geom_smooth()` using formula 'y ~ x'
```


residuals
Achievements
Controller
Indie
MemoryGB
OriginalCost
StorageGB
0
−200000
−400000
−600000
0
200
400
600
800
10000
0
−10000
−20000
0.00
0.25
0.50
0.75
1.00
50000
25000
0
−25000
0
10
20
30
40
800000
400000
0
−400000
0
200
400
600
100000
0
−100000
−200000
0
50
100
150

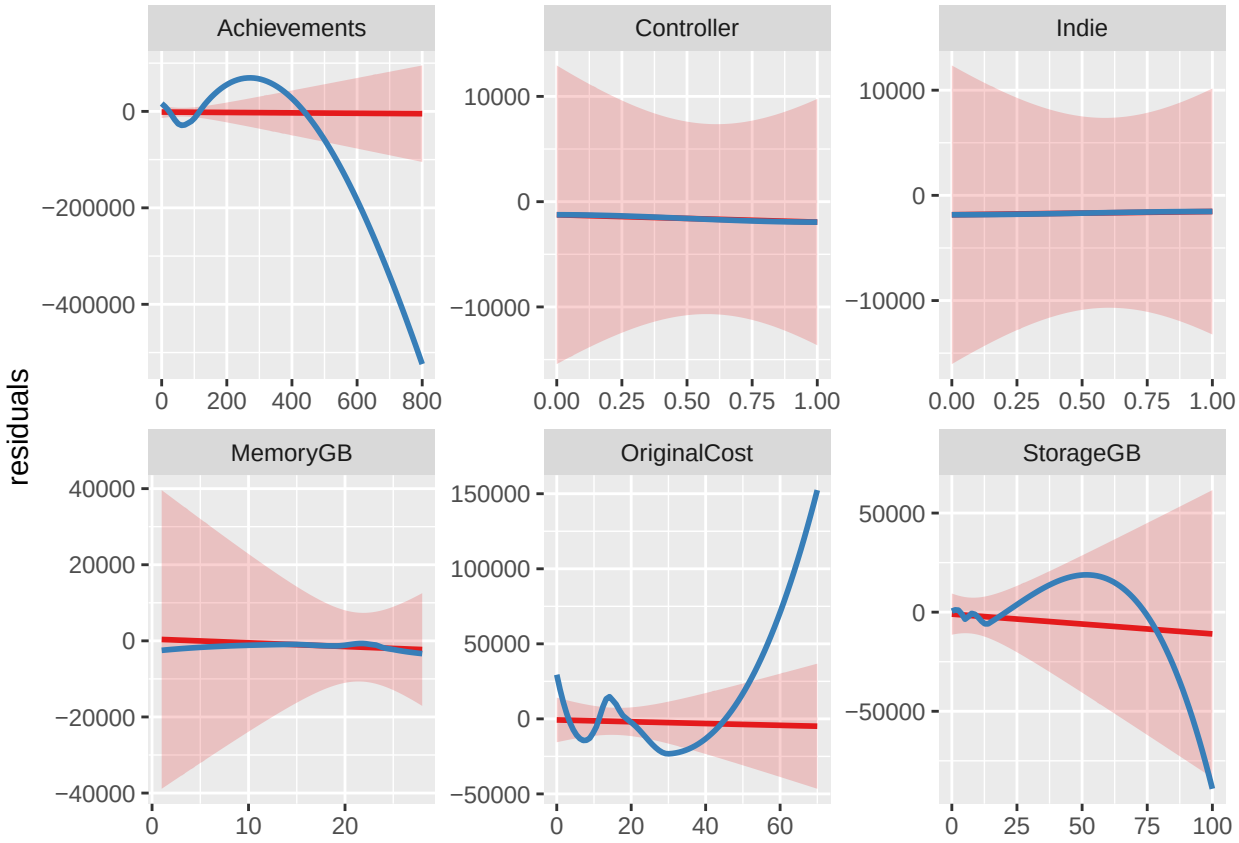


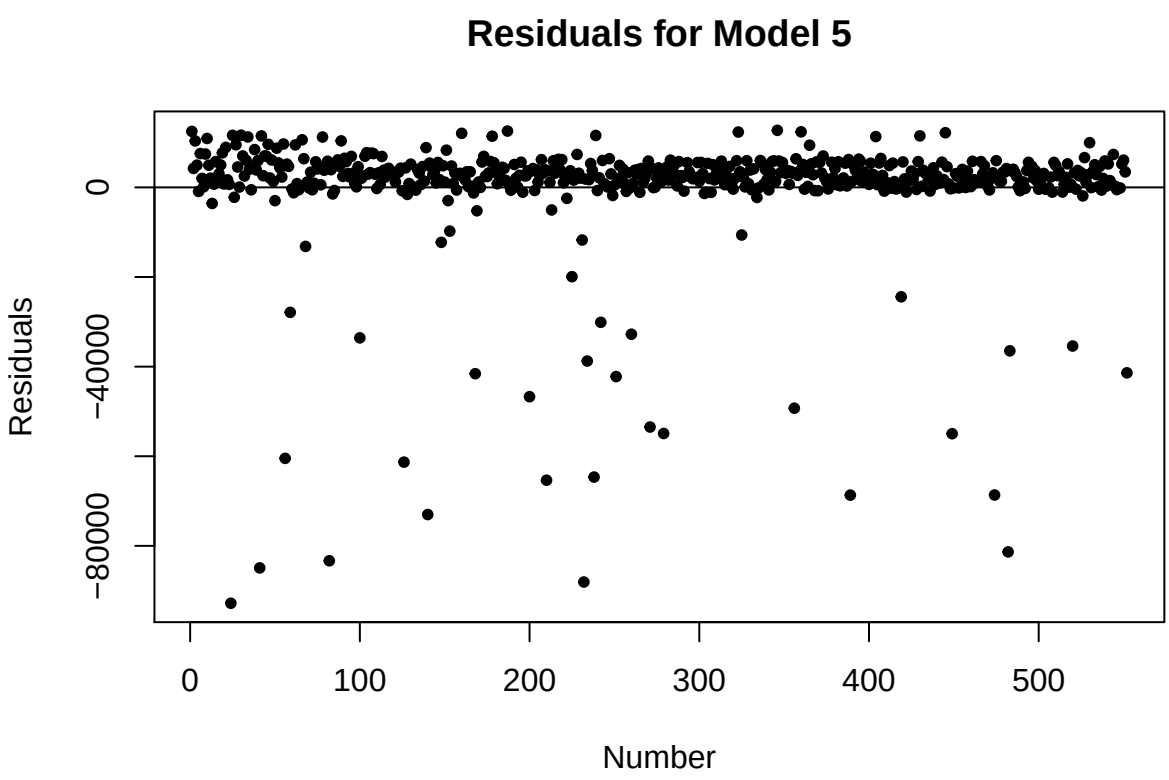

```
## `geom_smooth()` using formula 'y ~ x'
## `geom_smooth()` using formula 'y ~ x'
```


residuals
Achievements
Controller
Indie
MemoryGB
OriginalCost
StorageGB

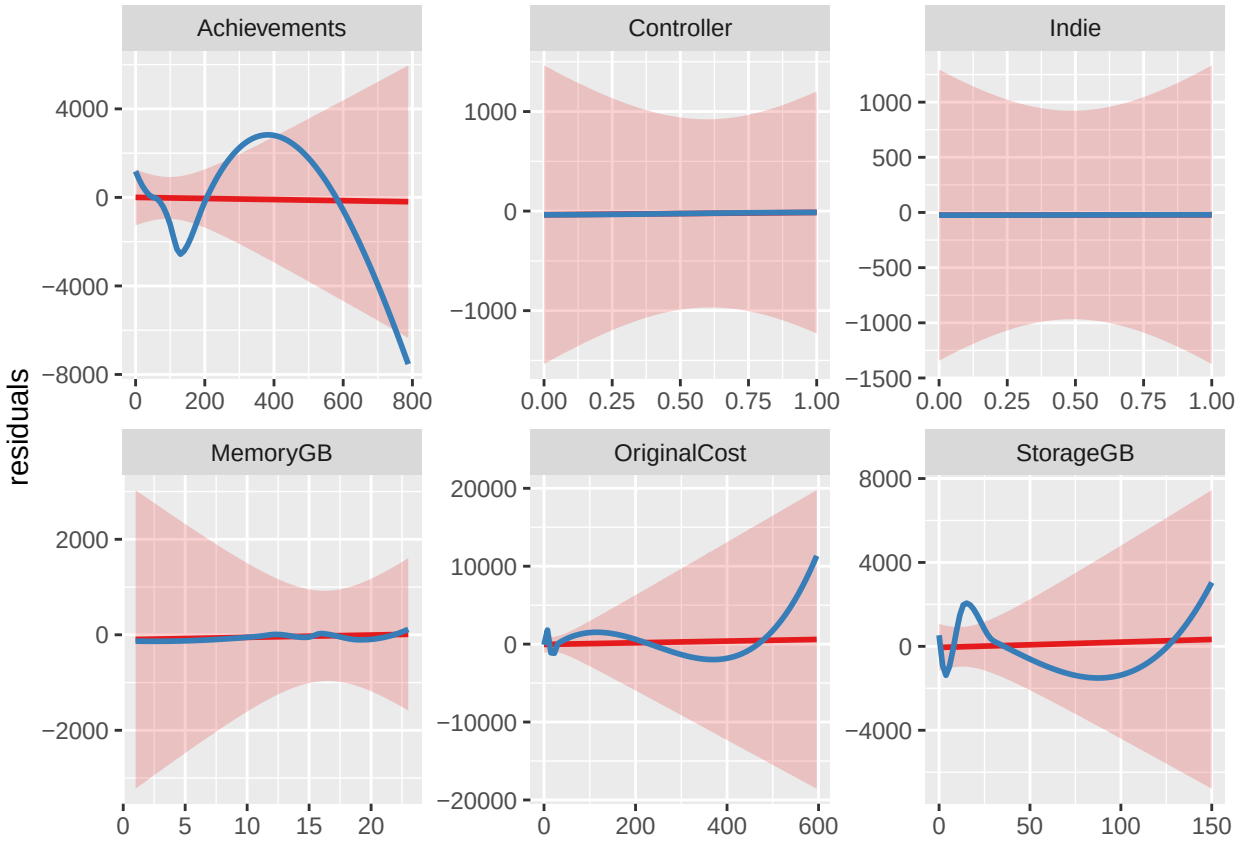



```
## `geom_smooth()` using formula 'y ~ x'
## `geom_smooth()` using formula 'y ~ x'
```


residuals
Achievements
Controller
Indie
MemoryGB
OriginalCost
StorageGB
0
−200000
−400000
0
200
400
600
800
10000
0
−10000
0.00
0.25
0.50
0.75
1.00
40000
20000
−20000
−40000
10
20
150000
100000
50000
−50000
40
60
−50000
25
50
75
100



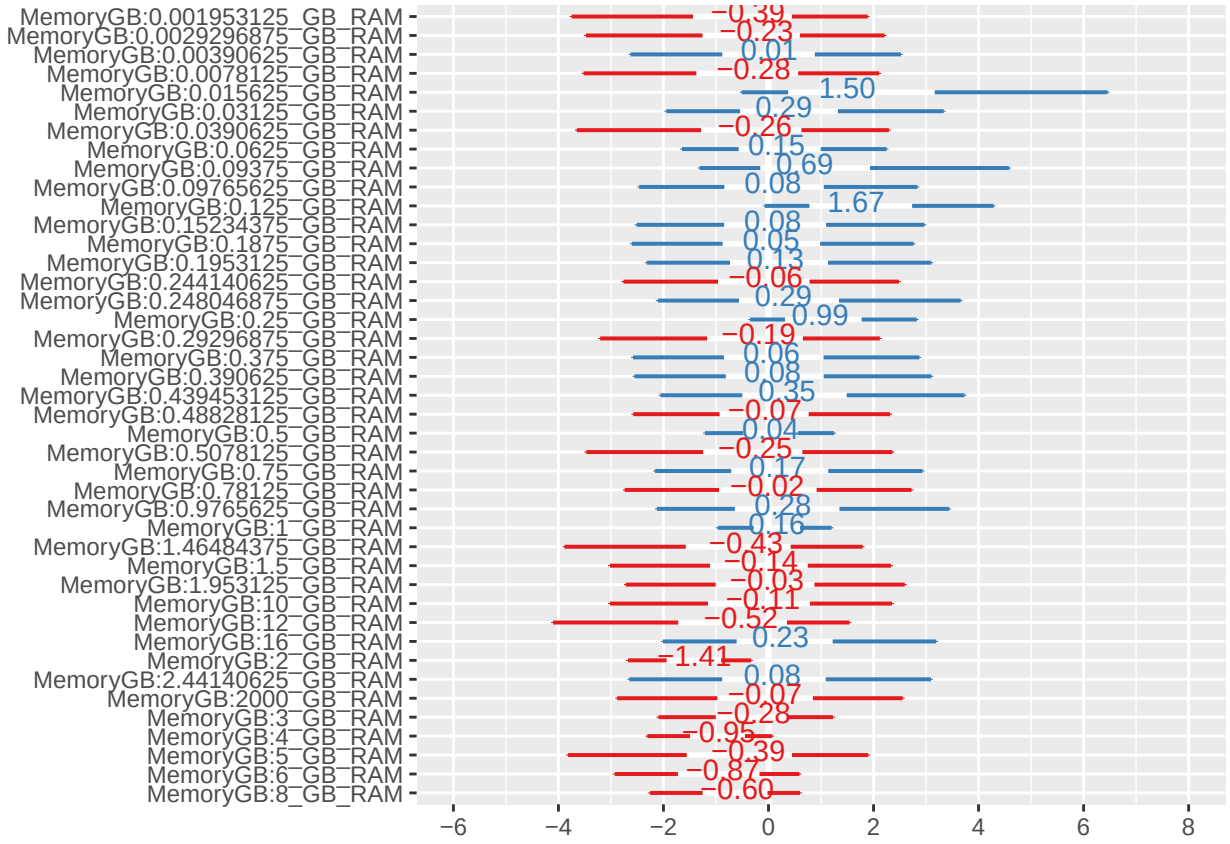

```
## `geom_smooth()` using formula 'y ~ x'
## `geom_smooth()` using formula 'y ~ x'
```



6.5.2 Random Effects

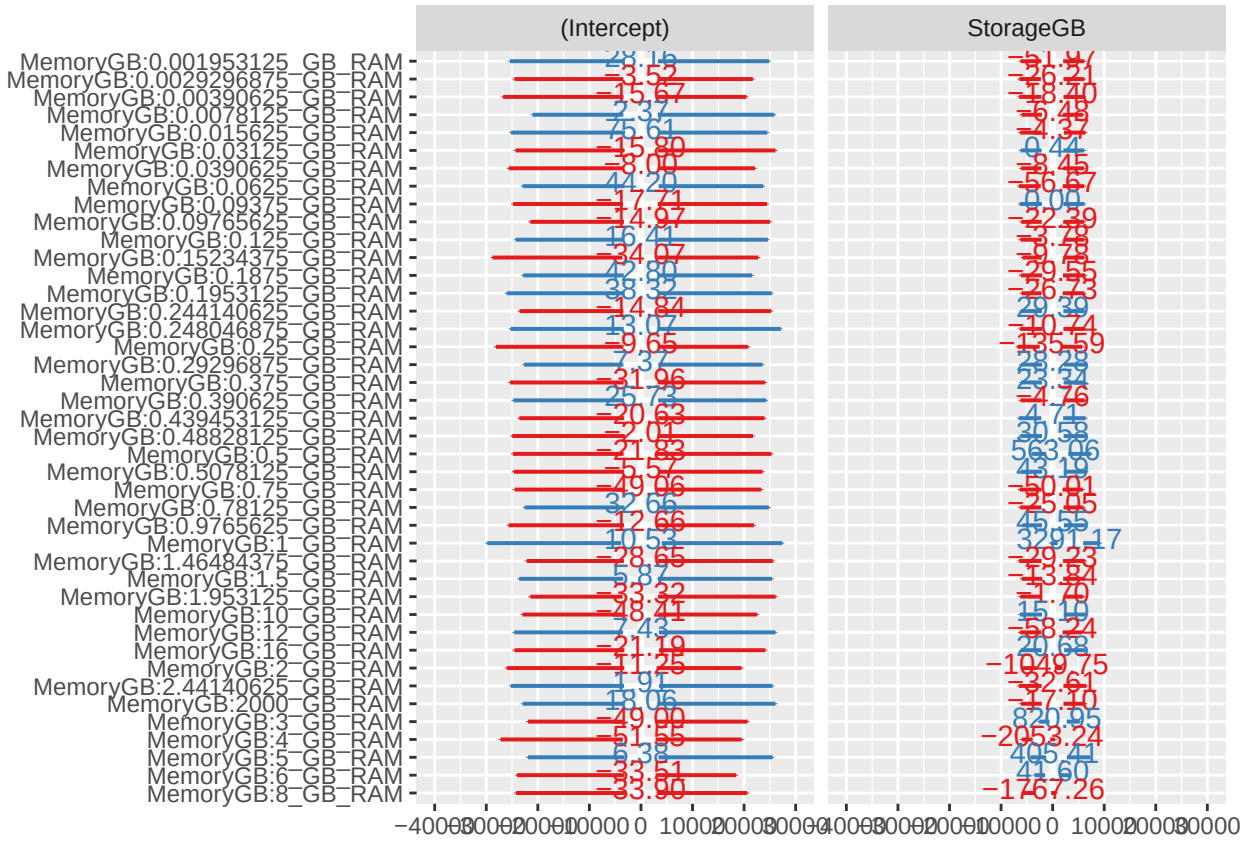
```
## $MemoryGB
##                       (Intercept)
## 0.001953125 GB RAM  -0.38983408
## 0.0029296875 GB RAM -0.22866912
## 0.00390625 GB RAM    0.01432255
## 0.0078125 GB RAM    -0.28350627
## 0.015625 GB RAM      1.49844206
## 0.03125 GB RAM       0.29245726
## 0.0390625 GB RAM    -0.25776638
## 0.0625 GB RAM        0.15282942
## 0.09375 GB RAM       0.69074608
## 0.09765625 GB RAM    0.08391218
## 0.125 GB RAM         1.66843095
## 0.15234375 GB RAM    0.08195725
## 0.1875 GB RAM        0.05222955
## 0.1953125 GB RAM     0.13235023
## 0.244140625 GB RAM  -0.05630151
## 0.248046875 GB RAM   0.28594915
## 0.25 GB RAM          0.98843592
## 0.29296875 GB RAM   -0.18713773
## 0.375 GB RAM         0.05950885
## 0.390625 GB RAM      0.08104896
## 0.439453125 GB RAM   0.35498326
## 0.48828125 GB RAM   -0.06659367
```

```
## 0.5 GB RAM            0.04147376
## 0.5078125 GB RAM     -0.24922961
## 0.75 GB RAM           0.17359742
## 0.78125 GB RAM       -0.02039063
## 0.9765625 GB RAM      0.27767640
## 1 GB RAM              0.15987416
## 1.46484375 GB RAM    -0.42834002
## 1.5 GB RAM           -0.14339100
## 1.953125 GB RAM      -0.02858855
## 10 GB RAM            -0.10519105
## 12 GB RAM            -0.52207430
## 16 GB RAM             0.23279628
## 2 GB RAM             -1.41011200
## 2.44140625 GB RAM     0.07634590
## 2000 GB RAM          -0.06609623
## 3 GB RAM             -0.28237062
## 4 GB RAM             -0.94635405
## 5 GB RAM             -0.38599792
## 6 GB RAM             -0.87022567
## 8 GB RAM             -0.59651672
##
## with conditional variances for "MemoryGB"
```



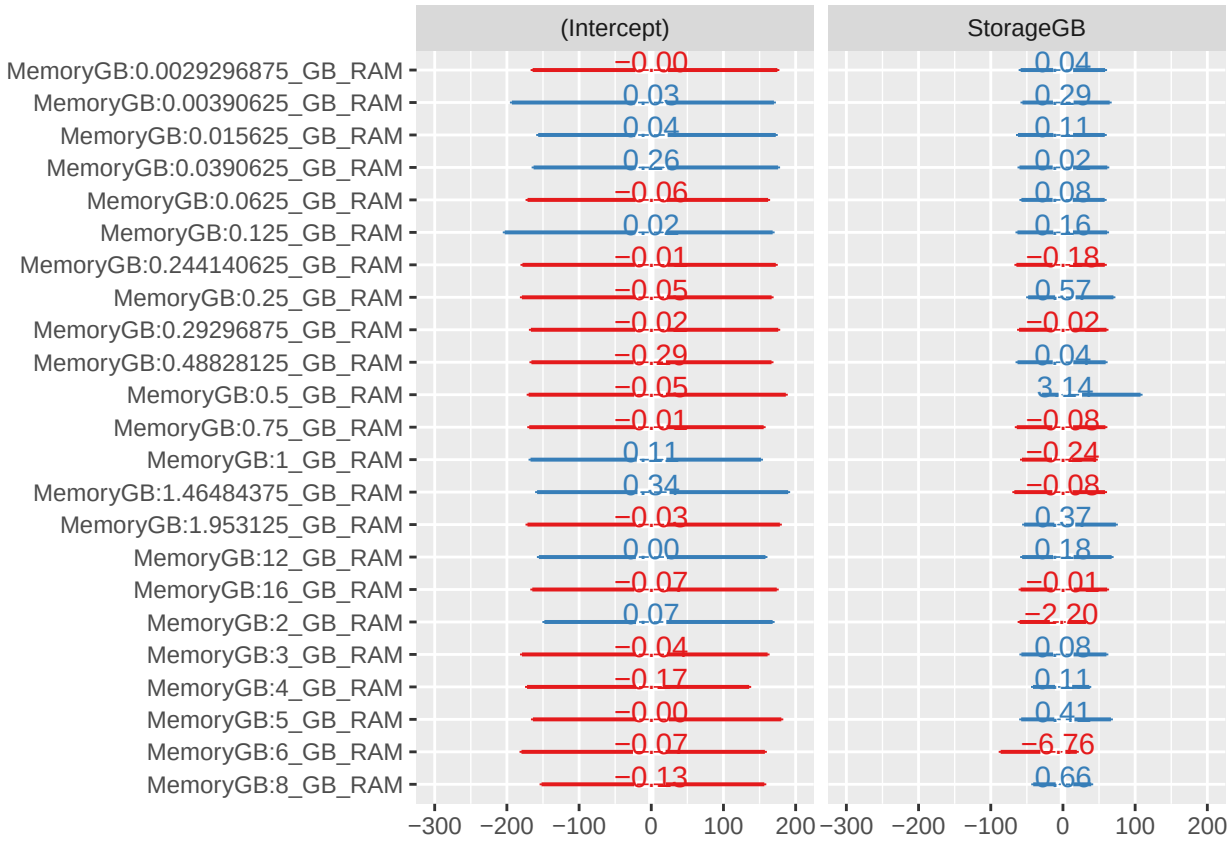

```
## $MemoryGB
##                       (Intercept)       StorageGB
## 0.001953125 GB RAM     28.162438   -51.969471445
```

```
## 0.0029296875 GB RAM   -3.520479   -26.206368493
## 0.00390625 GB RAM    -15.668888   -18.396635220
## 0.0078125 GB RAM       2.369765    -6.479128518
## 0.015625 GB RAM       75.608890    -4.372973461
## 0.03125 GB RAM       -15.798841     0.438225345
## 0.0390625 GB RAM      -7.996389    -8.451752007
## 0.0625 GB RAM         44.196130   -56.669776649
## 0.09375 GB RAM       -17.714031     0.004358361
## 0.09765625 GB RAM    -14.968550   -22.388216793
## 0.125 GB RAM          16.414076    -3.783390811
## 0.15234375 GB RAM    -34.069066    -9.779763279
## 0.1875 GB RAM         42.796542   -29.547216527
## 0.1953125 GB RAM      38.319943   -26.734712070
## 0.244140625 GB RAM   -14.840486    29.389516357
## 0.248046875 GB RAM    13.068264   -10.738811133
## 0.25 GB RAM           -9.654470  -135.587874068
## 0.29296875 GB RAM      7.370825    28.280943674
## 0.375 GB RAM         -31.962706    23.337759568
## 0.390625 GB RAM       25.732583    -4.763055524
## 0.439453125 GB RAM   -20.627827     4.713118679
## 0.48828125 GB RAM     -2.012374    30.581992906
## 0.5 GB RAM           -21.830509   563.058798844
## 0.5078125 GB RAM      -5.568963    43.185785076
## 0.75 GB RAM          -49.062068   -50.007971288
## 0.78125 GB RAM        32.656501   -25.048329350
## 0.9765625 GB RAM     -12.656734    45.550314429
## 1 GB RAM              10.532950  3291.166807309
## 1.46484375 GB RAM    -28.648408   -29.229556160
## 1.5 GB RAM             5.871732   -13.837047943
## 1.953125 GB RAM      -33.323921    -1.699271891
## 10 GB RAM            -48.408640    15.097918803
## 12 GB RAM              7.431892   -58.240886314
## 16 GB RAM            -21.188189    20.679565150
## 2 GB RAM             -11.248075 -1049.745083294
## 2.44140625 GB RAM      1.911460   -32.605276139
## 2000 GB RAM           18.056078   -17.104788052
## 3 GB RAM             -48.995820   820.950508789
## 4 GB RAM             -51.545998 -2053.236447403
## 5 GB RAM               6.376585   405.413202515
## 6 GB RAM             -33.512265    41.595132010
## 8 GB RAM             -33.895151 -1767.256403027
##
## with conditional variances for "MemoryGB"
```



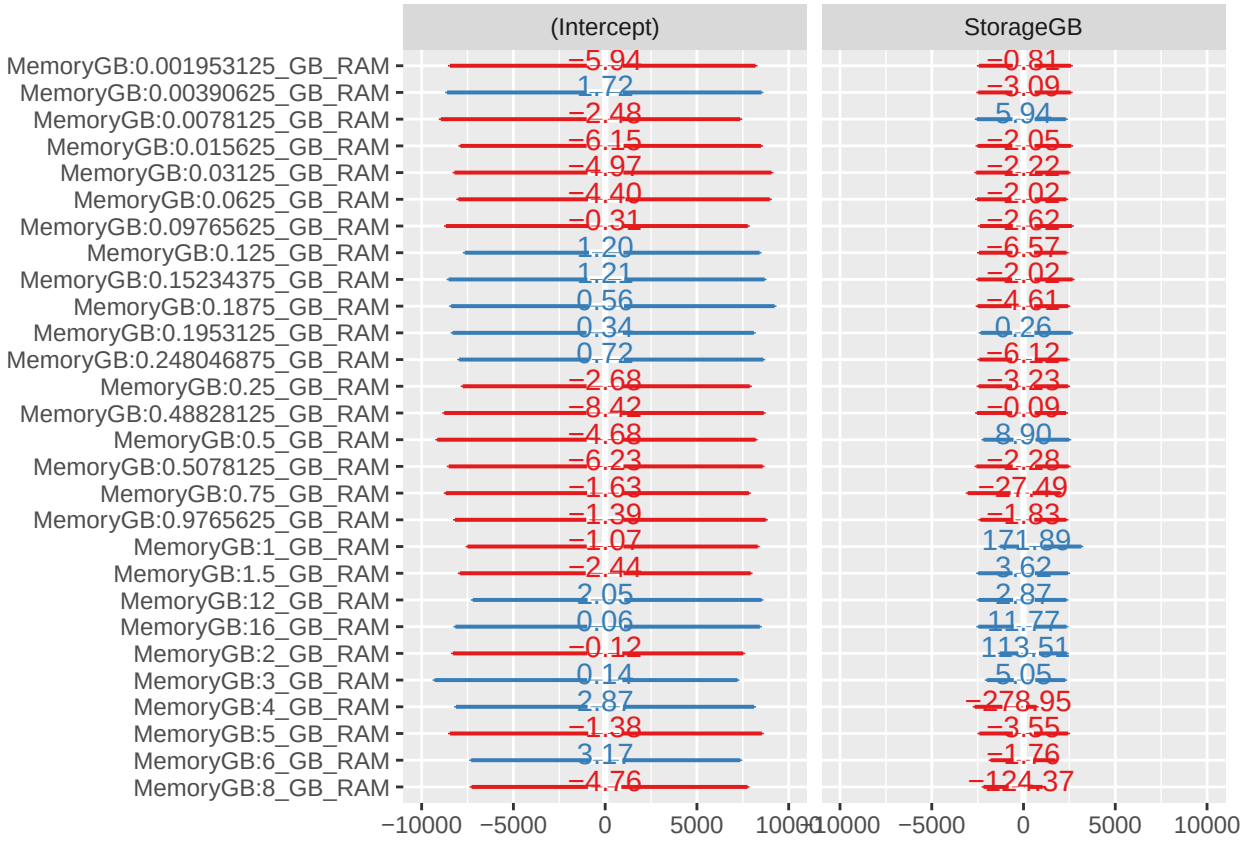

```
## $MemoryGB
##                         (Intercept)   StorageGB
## 0.0029296875 GB RAM -0.002459716  0.04238985
## 0.00390625 GB RAM    0.028388531  0.28506689
## 0.015625 GB RAM      0.038779977  0.10575669
## 0.0390625 GB RAM     0.259730958  0.01837012
## 0.0625 GB RAM       -0.056535946  0.07727260
## 0.125 GB RAM         0.022879706  0.16397792
## 0.244140625 GB RAM  -0.009468684 -0.18439630
## 0.25 GB RAM         -0.046071353  0.56833986
## 0.29296875 GB RAM   -0.017938872 -0.02066779
## 0.48828125 GB RAM   -0.292749689  0.03599551
## 0.5 GB RAM          -0.053538900  3.13756203
## 0.75 GB RAM         -0.008952454 -0.07617782
## 1 GB RAM             0.114083448 -0.23628224
## 1.46484375 GB RAM    0.342930848 -0.07840456
## 1.953125 GB RAM     -0.026083076  0.36991517
## 12 GB RAM            0.003944153  0.17529749
## 16 GB RAM           -0.066751946 -0.01496115
## 2 GB RAM             0.072657191 -2.19581774
## 3 GB RAM            -0.036026784  0.07786901
## 4 GB RAM            -0.170898911  0.10667648
## 5 GB RAM            -0.002464469  0.41010362
## 6 GB RAM            -0.069327127 -6.76163243
## 8 GB RAM            -0.130999536  0.66164628
##
```

```
## with conditional variances for "MemoryGB"
```



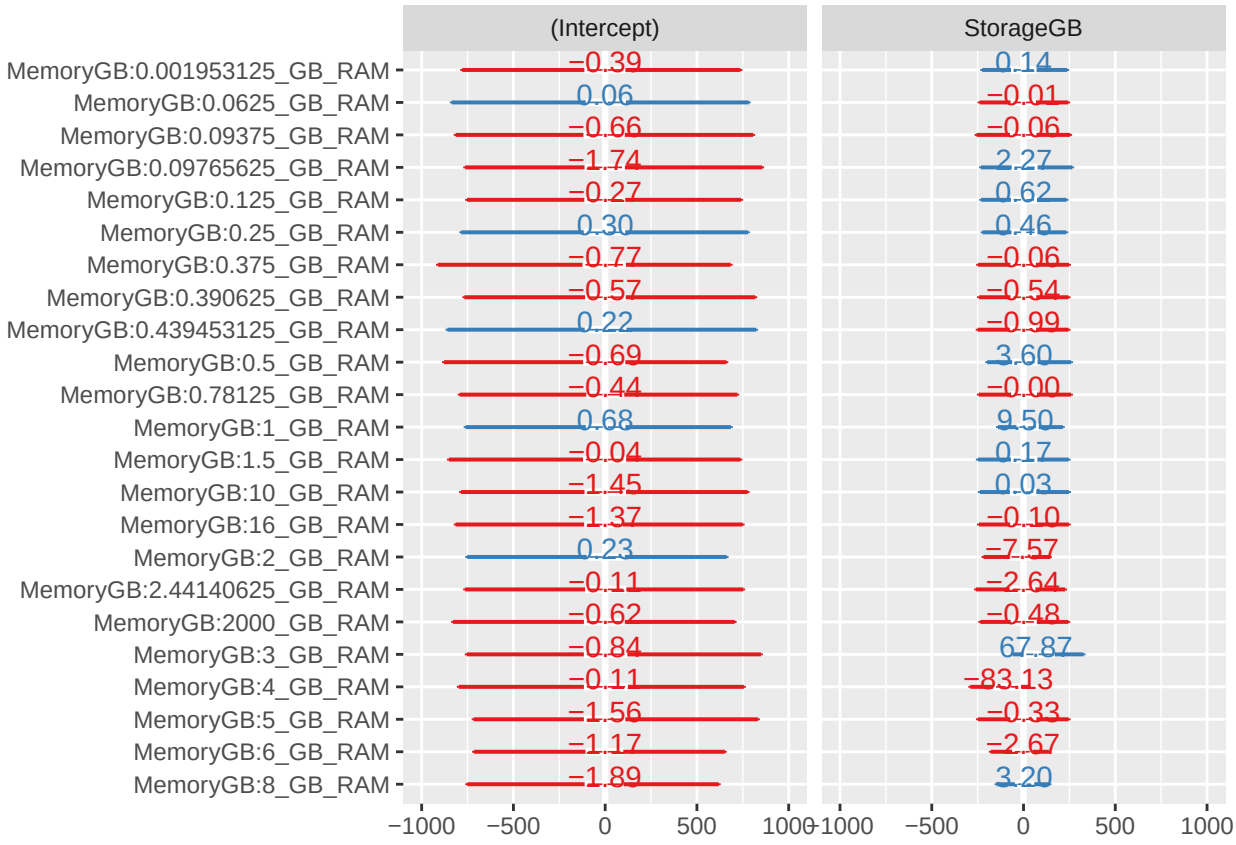

```
## $MemoryGB
##                       (Intercept)     StorageGB
## 0.001953125 GB RAM -5.94340207   -0.81041176
## 0.00390625 GB RAM   1.72006721   -3.08729838
## 0.0078125 GB RAM   -2.48240366    5.93751958
## 0.015625 GB RAM    -6.14532623   -2.05448785
## 0.03125 GB RAM     -4.97134448   -2.22088383
## 0.0625 GB RAM      -4.40133080   -2.01596758
## 0.09765625 GB RAM  -0.30521886   -2.61606989
## 0.125 GB RAM        1.20051196   -6.57393953
## 0.15234375 GB RAM   1.21365916   -2.02094466
## 0.1875 GB RAM       0.56366379   -4.60848836
## 0.1953125 GB RAM    0.33621934    0.25661755
## 0.248046875 GB RAM  0.72458026   -6.11501721
## 0.25 GB RAM        -2.68093050   -3.22611191
## 0.48828125 GB RAM  -8.42122250   -0.09176519
## 0.5 GB RAM         -4.68388763    8.90431167
## 0.5078125 GB RAM   -6.23379974   -2.27527979
## 0.75 GB RAM        -1.63394127  -27.49360758
## 0.9765625 GB RAM   -1.38894073   -1.82999416
## 1 GB RAM           -1.07365707  171.89070689
## 1.5 GB RAM         -2.43886769    3.61534050
## 12 GB RAM           2.04810647    2.87354992
## 16 GB RAM           0.05737108   11.76939701
```

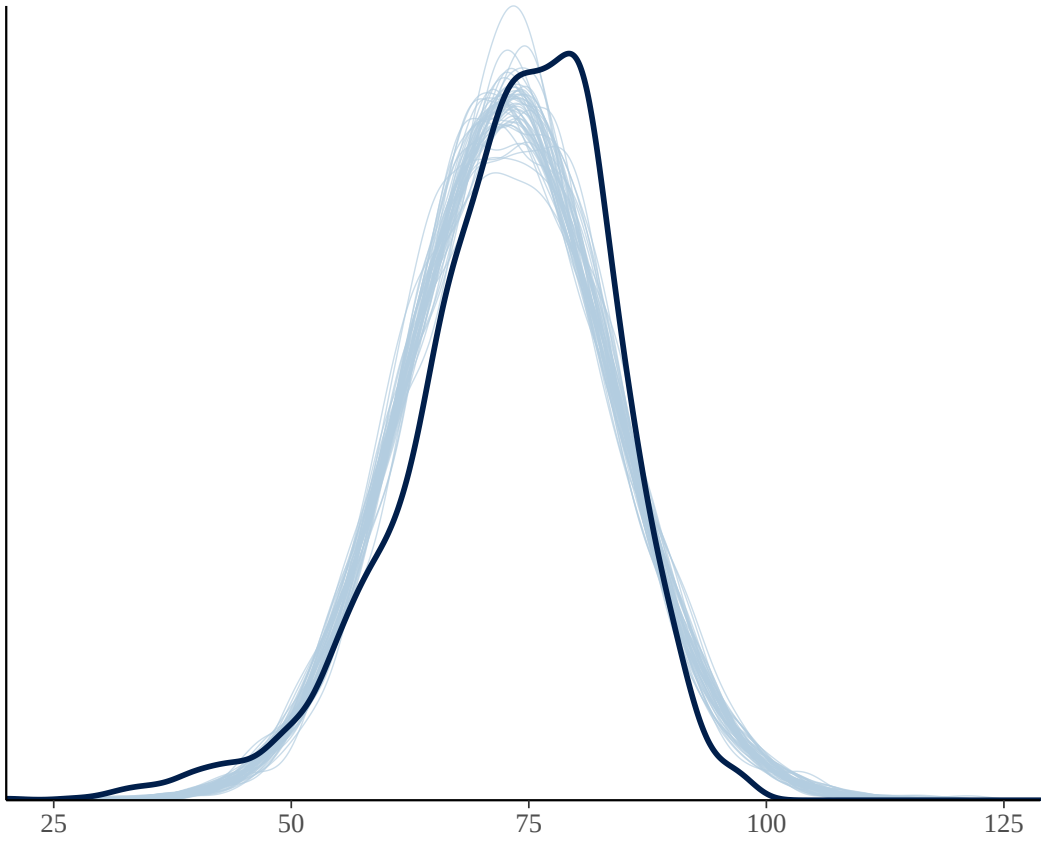
```
## 2 GB RAM            -0.11569358  113.51021430
## 3 GB RAM             0.13819127    5.05331226
## 4 GB RAM             2.87008936 -278.94745899
## 5 GB RAM            -1.37879935   -3.54660806
## 6 GB RAM             3.16779372   -1.75553588
## 8 GB RAM            -4.75504727 -124.37155505
##
## with conditional variances for "MemoryGB"
```



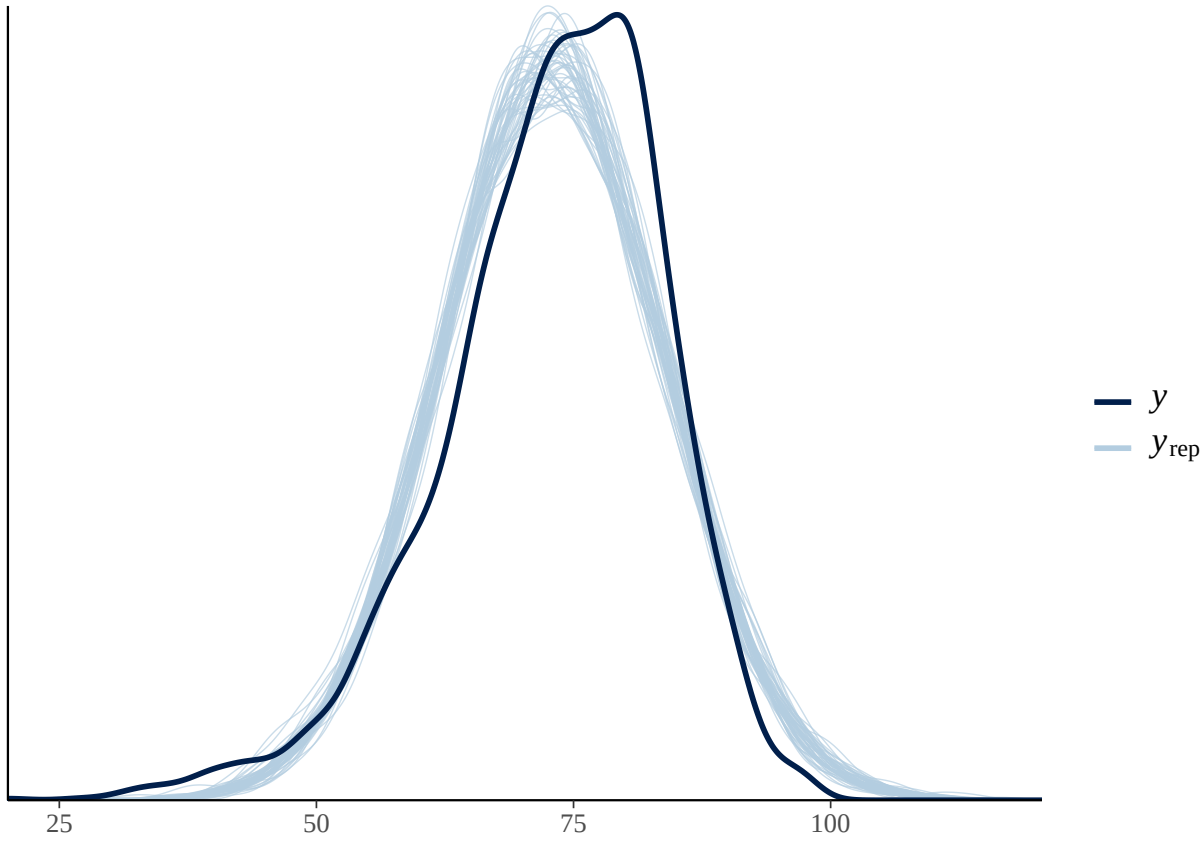

```
## $MemoryGB
##                       (Intercept)     StorageGB
## 0.001953125 GB RAM -0.38585923   0.137115707
## 0.0625 GB RAM       0.06235256  -0.009691402
## 0.09375 GB RAM     -0.65610133  -0.064688279
## 0.09765625 GB RAM  -1.73739838   2.274744133
## 0.125 GB RAM       -0.26732546   0.620464099
## 0.25 GB RAM         0.29701181   0.457121280
## 0.375 GB RAM       -0.77364701  -0.064433689
## 0.390625 GB RAM    -0.57055388  -0.540904090
## 0.439453125 GB RAM  0.21748665  -0.989174973
## 0.5 GB RAM         -0.69073406   3.602809297
## 0.78125 GB RAM     -0.44153598  -0.004212816
## 1 GB RAM            0.67999928   9.497461228
## 1.5 GB RAM         -0.04253329   0.172848572
## 10 GB RAM          -1.44937069   0.027717092
## 16 GB RAM          -1.37495141  -0.099581480
```

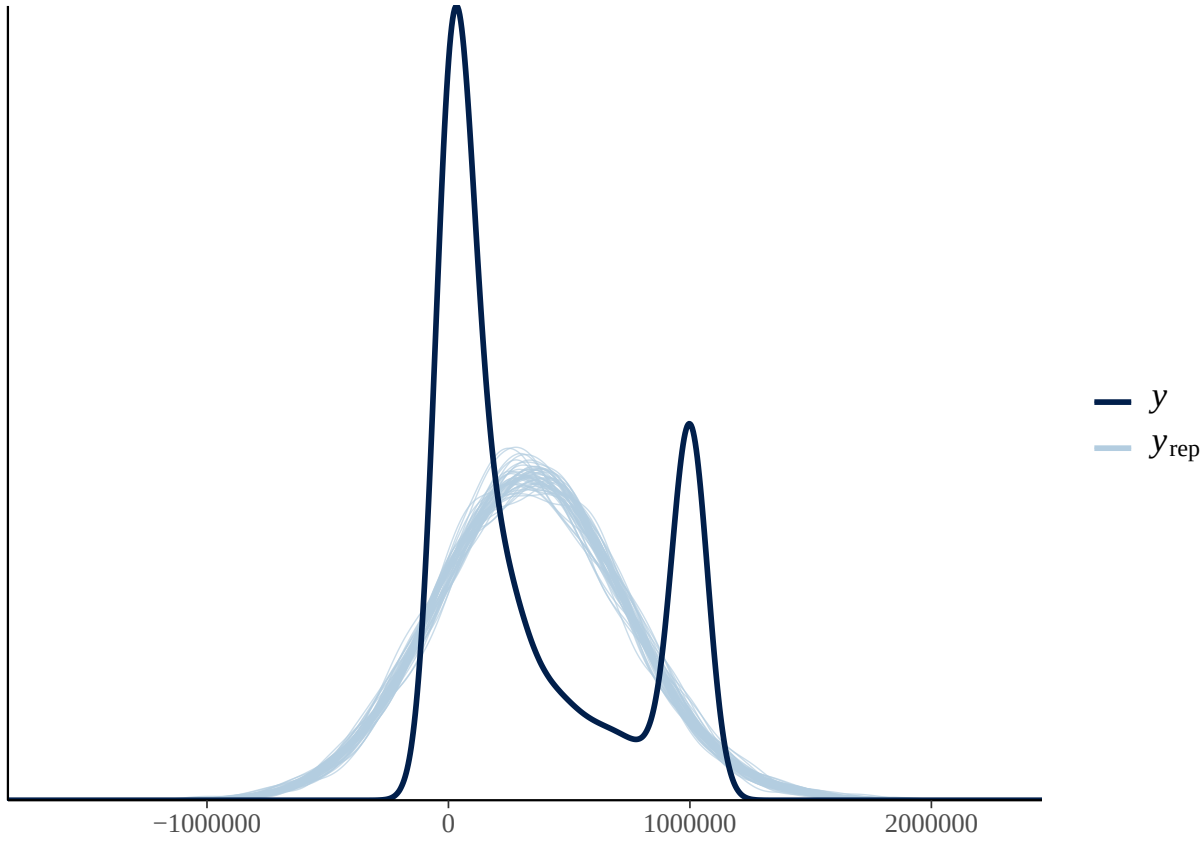
```
## 2 GB RAM             0.23344002  -7.570815661
## 2.44140625 GB RAM  -0.11006172  -2.642510498
## 2000 GB RAM        -0.62093972  -0.480482809
## 3 GB RAM           -0.83929011  67.865626778
## 4 GB RAM           -0.10543327 -83.126399690
## 5 GB RAM           -1.56455902  -0.330748338
## 6 GB RAM           -1.17367441  -2.671795074
## 8 GB RAM           -1.88539609   3.196250490
##
## with conditional variances for "MemoryGB"
```

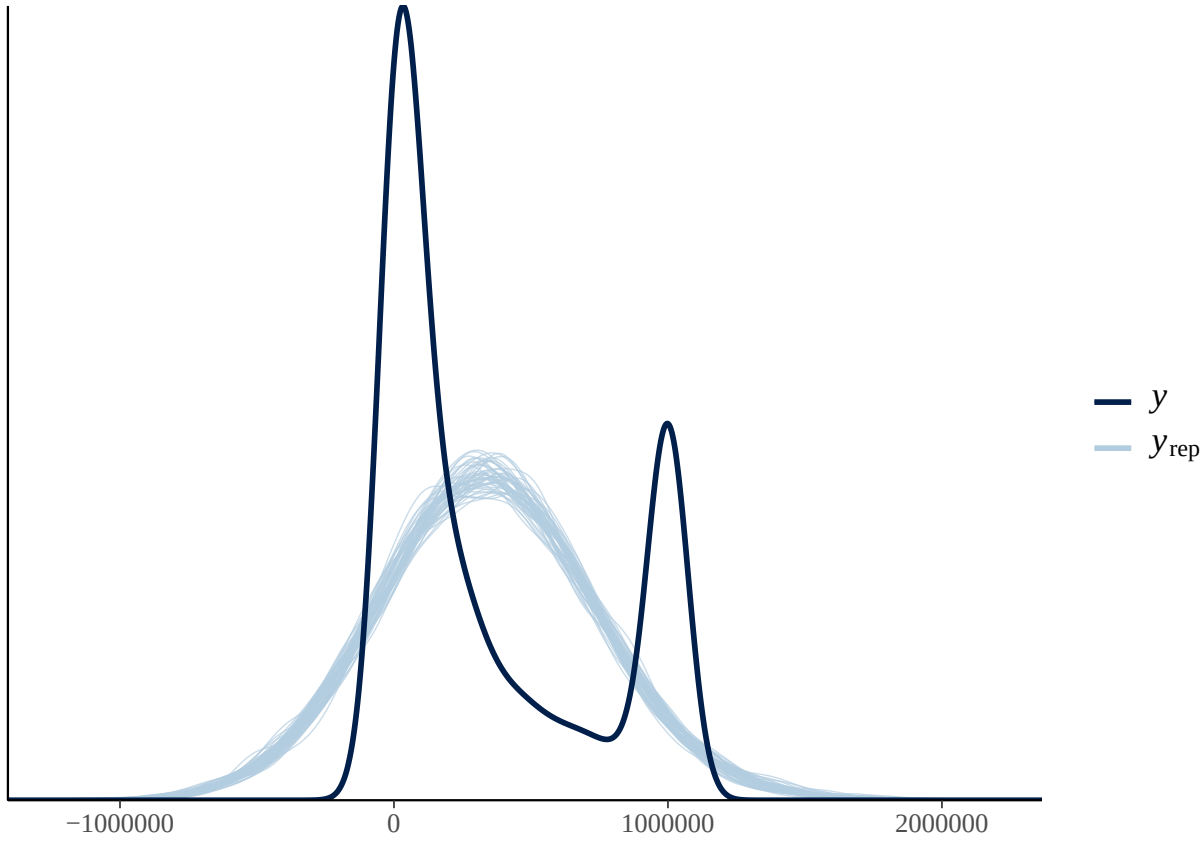


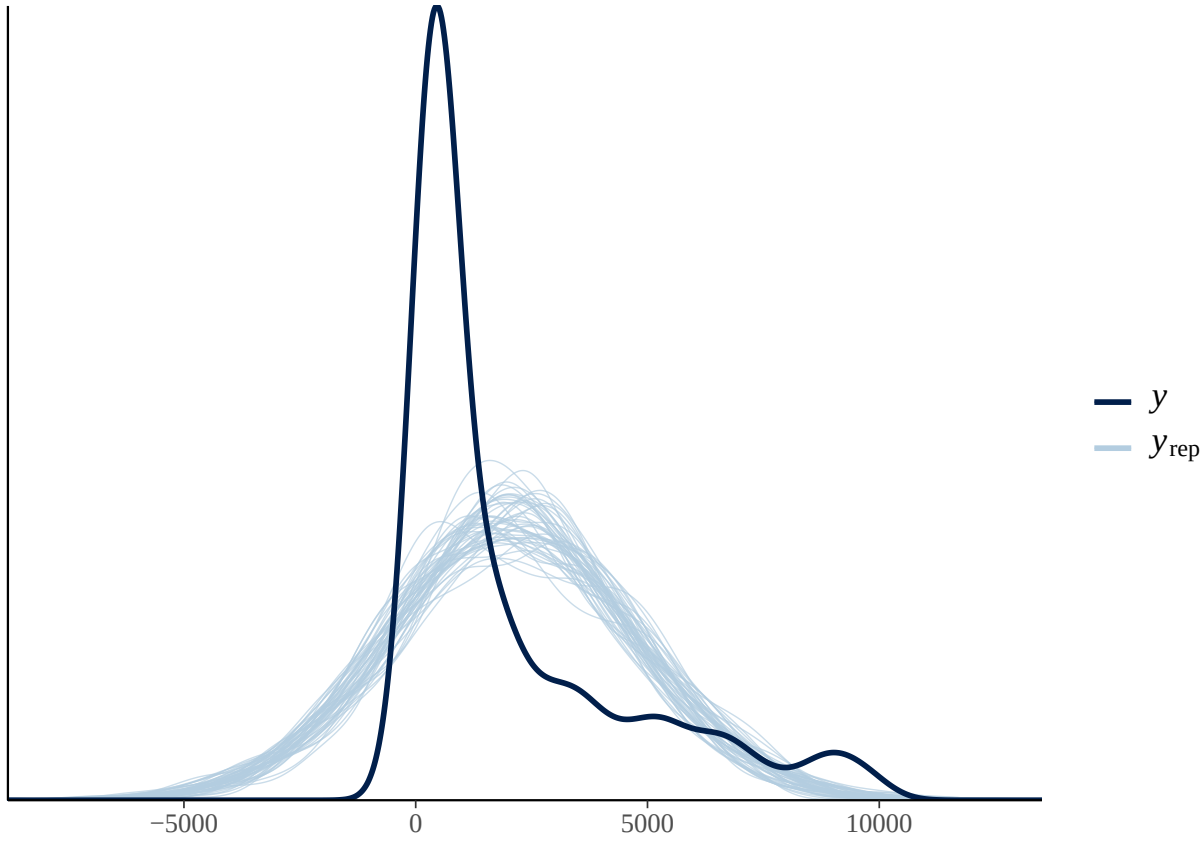


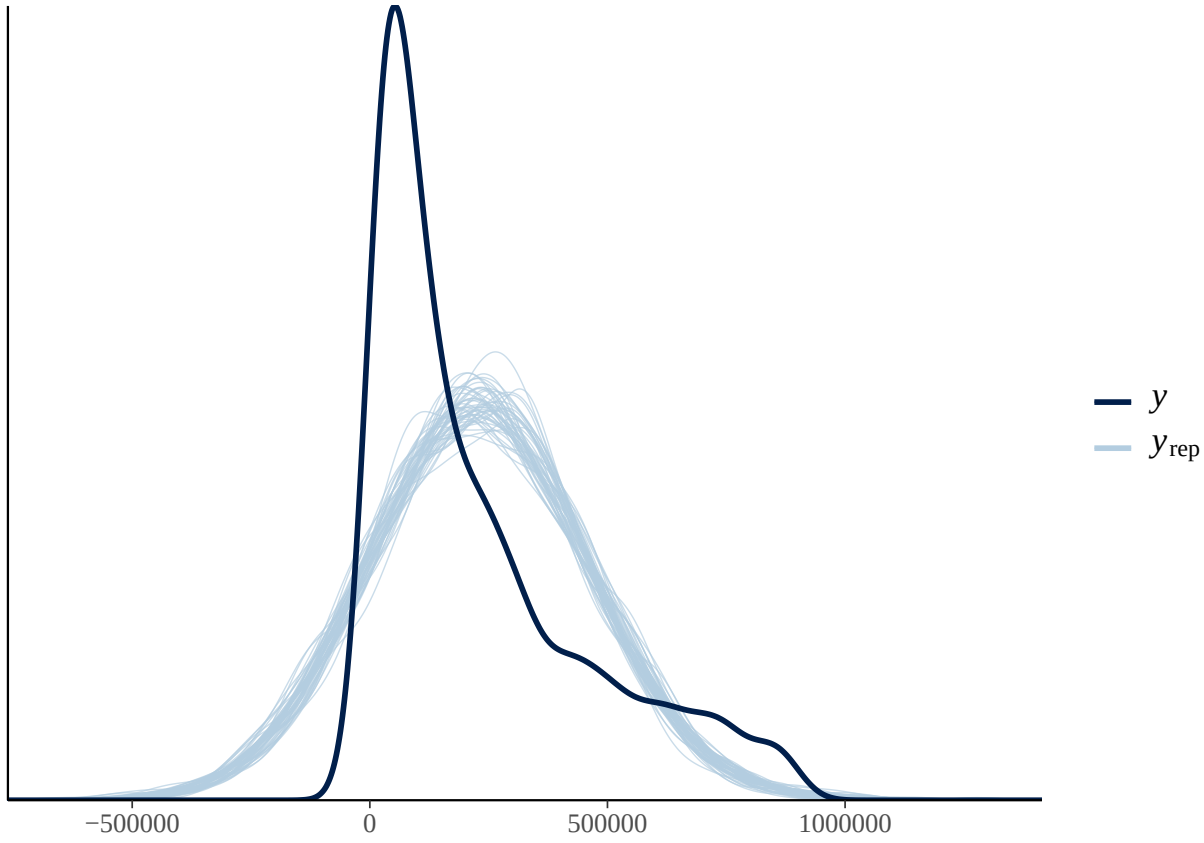
6.5.3 Predictive Check

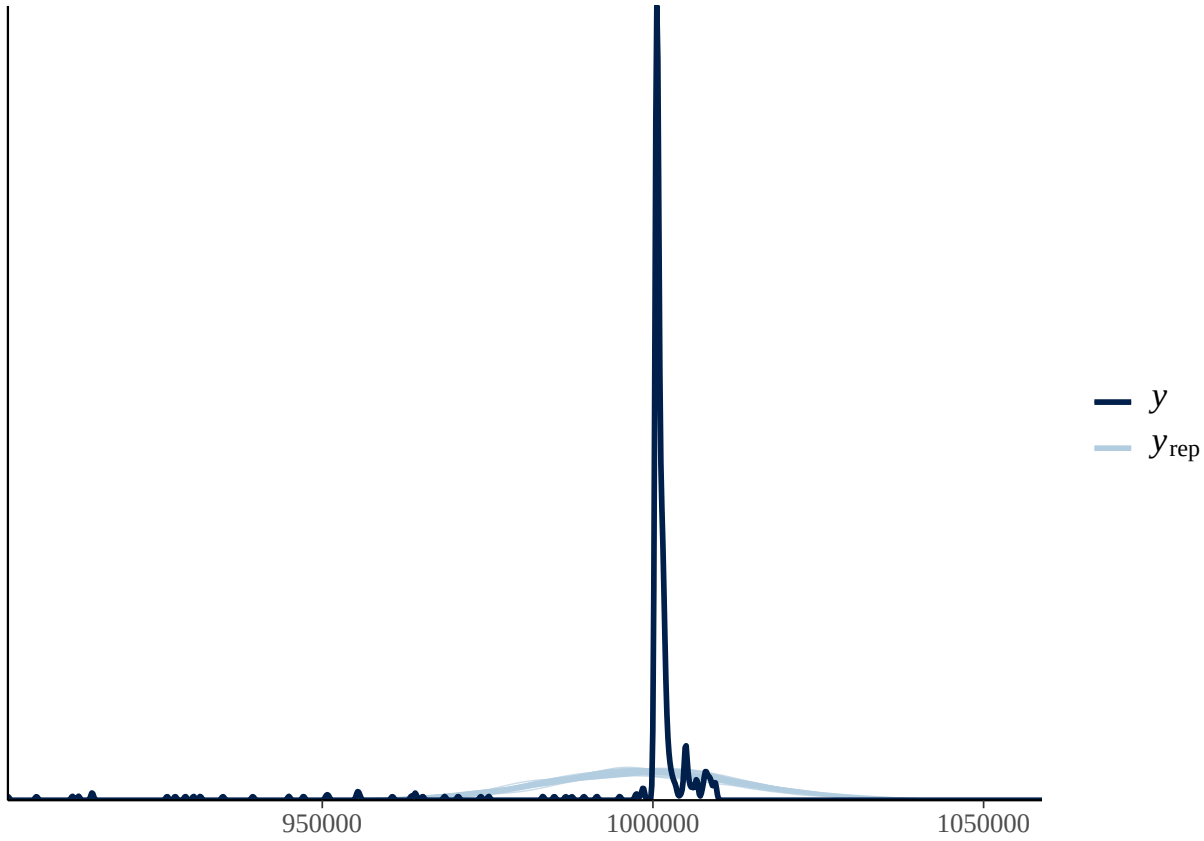

25
50
75
100
y
y rep


−1000000
0
1000000
2000000
y
y rep


y
y rep
−1000000
0
1000000
2000000

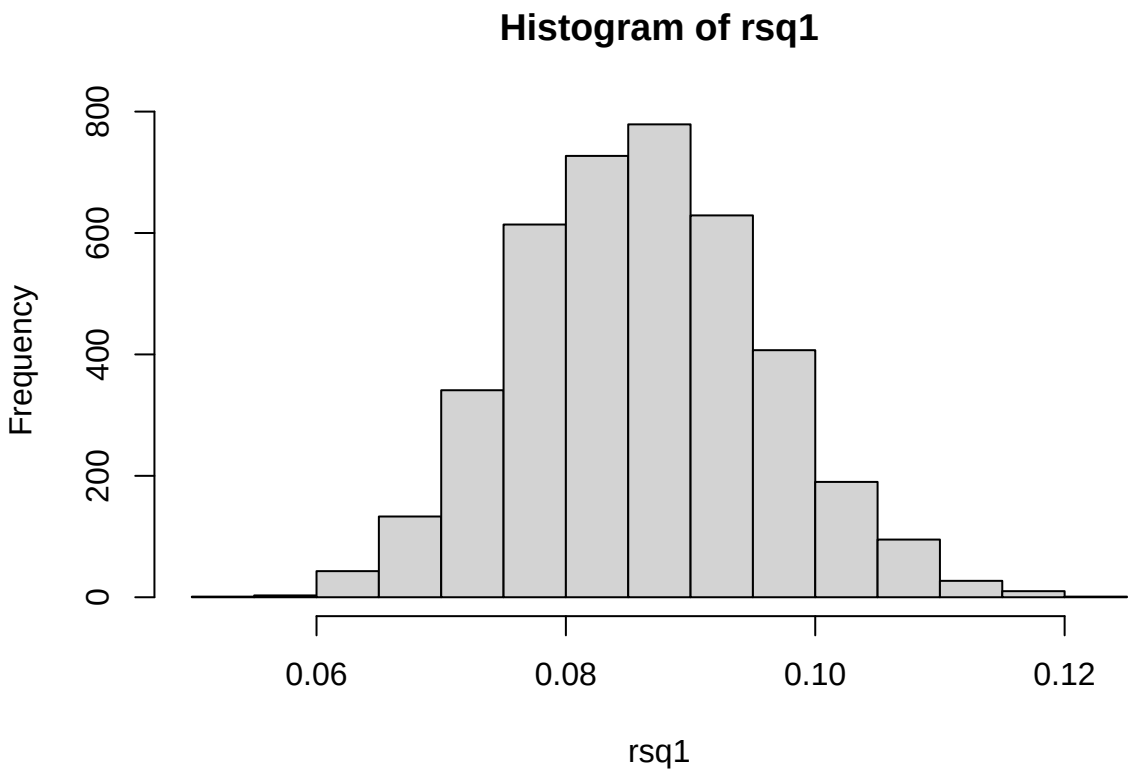

−5000
0
5000
10000
y
y rep


−500000
0
500000
1000000
y
y rep

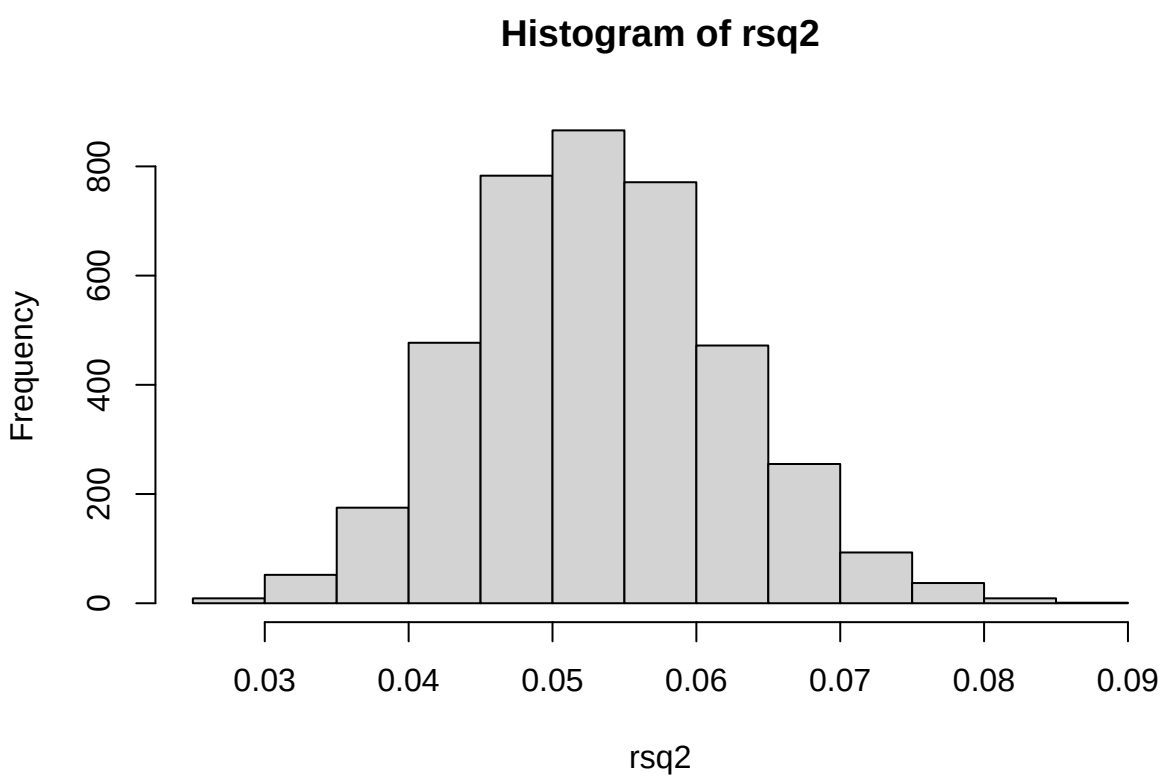


6.5.4 R-squared value

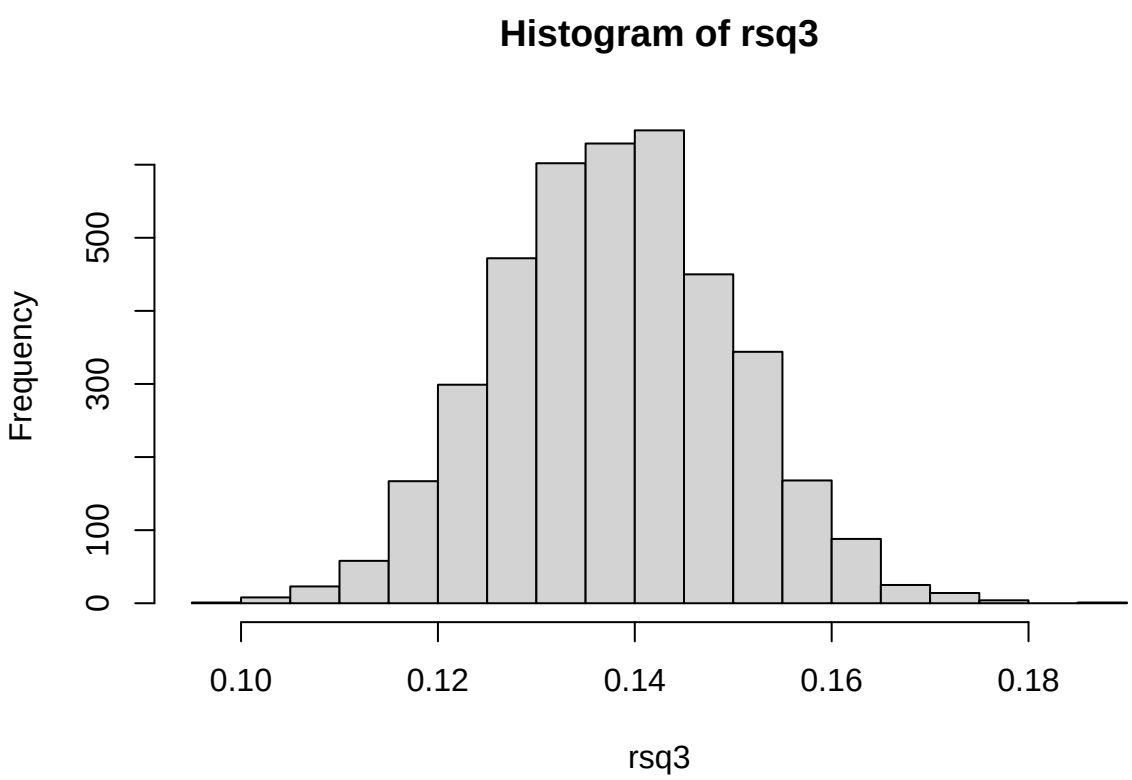
```
## [1] 0.08590745
```


Histogram of rsq1
Frequency
0
200
400
600
800
0.06
0.08
0.10
0.12
rsq1

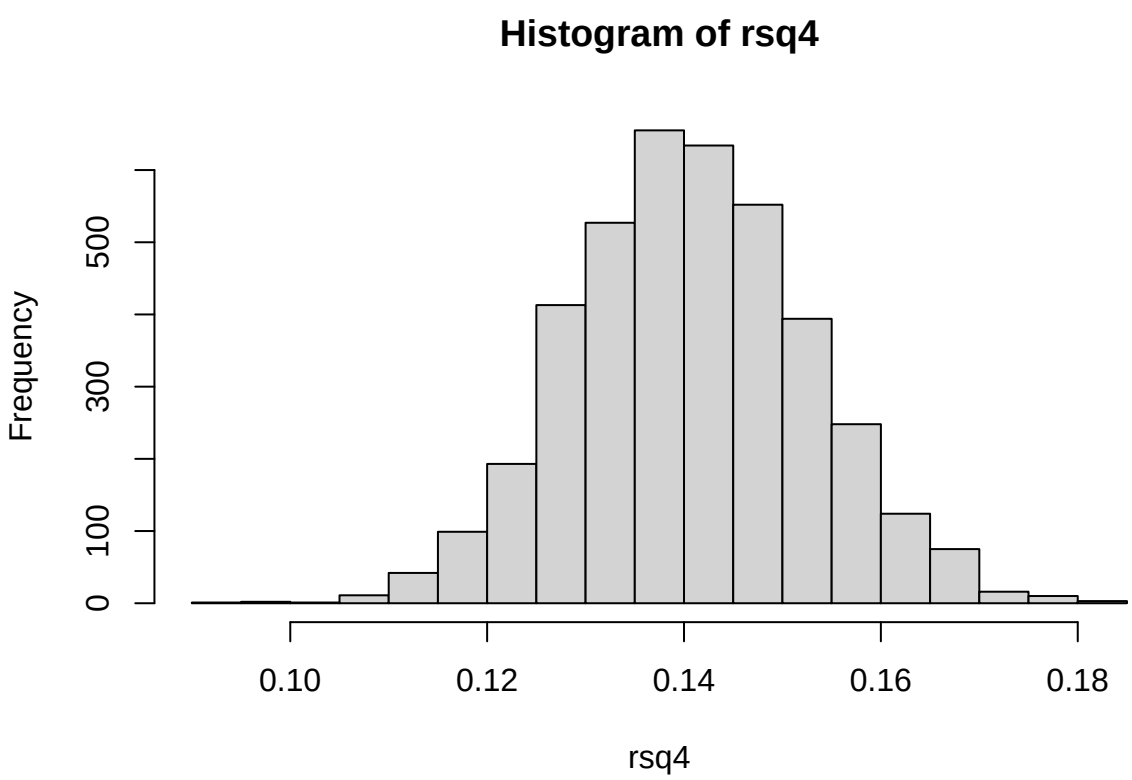
```
## [1] 0.05289533
```


Histogram of rsq2
Frequency
0
200
400
600
800
0.03
0.04
0.05
0.06
0.07
0.08
0.09
rsq2

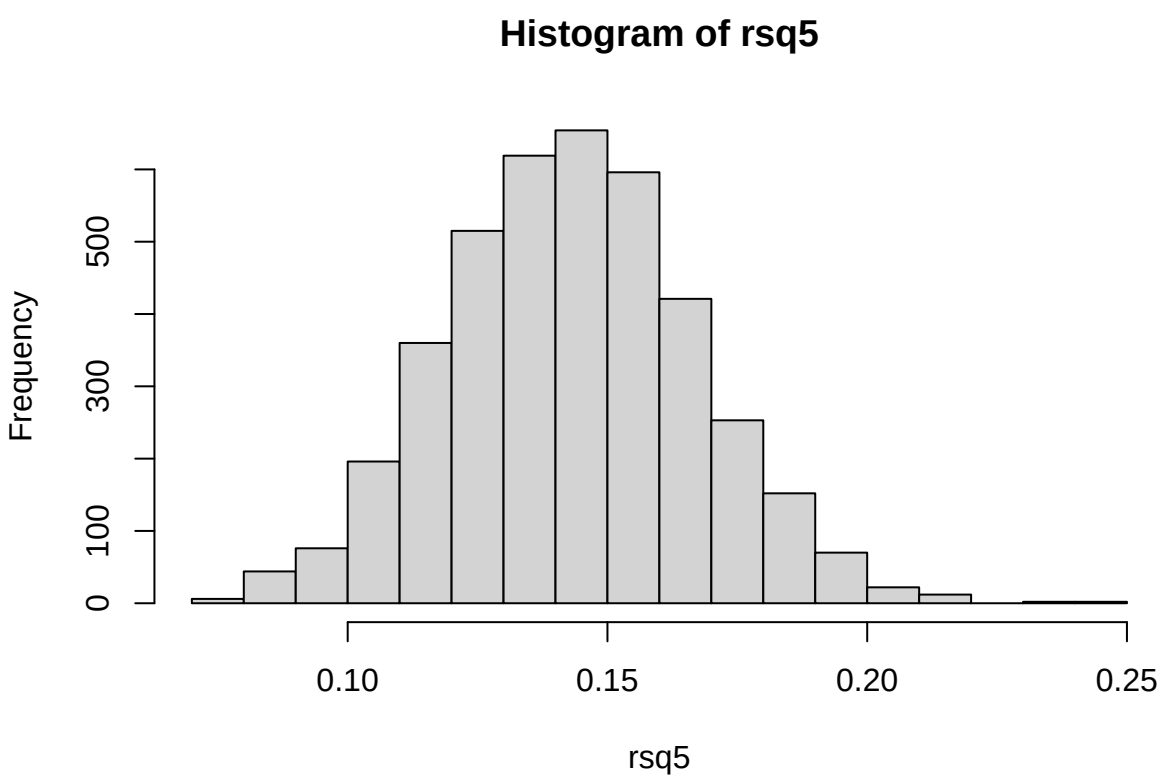
```
## [1] 0.1380143
```


Histogram of rsq3
Frequency
0
100
300
500
0.10
0.12
0.14
0.16
0.18
rsq3

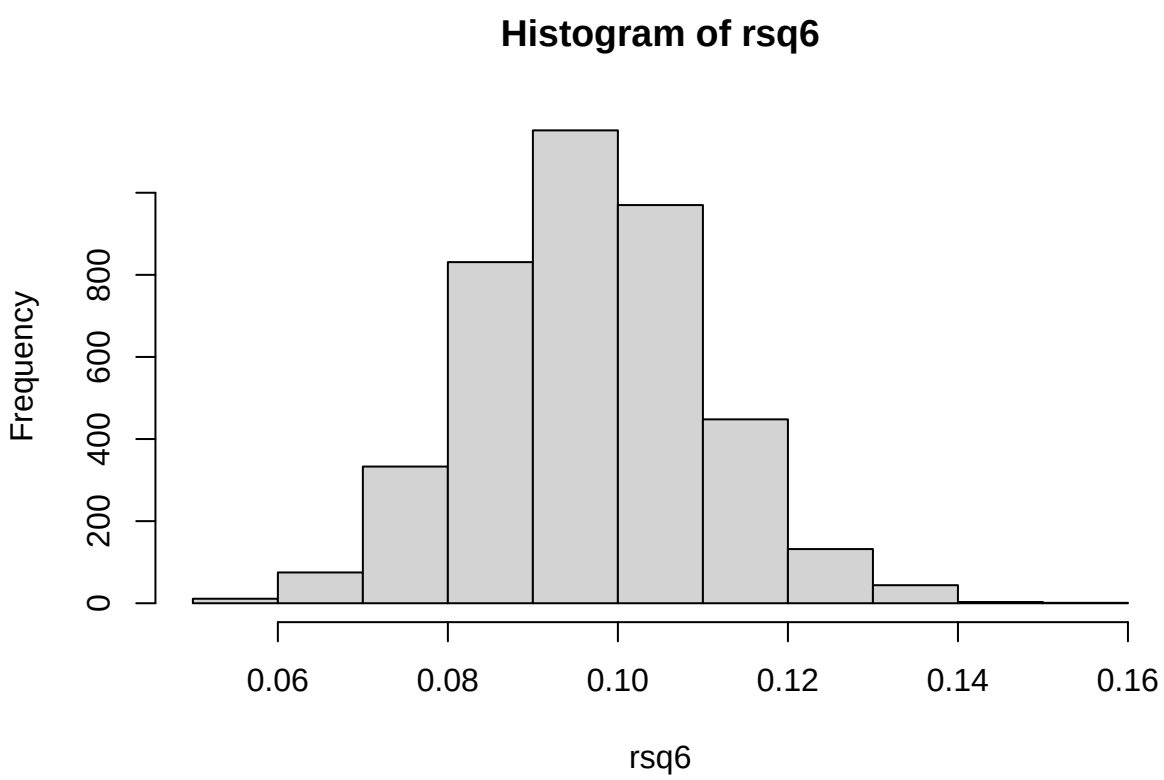
```
## [1] 0.1404329
```


Histogram of rsq4
Frequency
0
100
300
500
0.10
0.12
0.14
0.16
0.18
rsq4

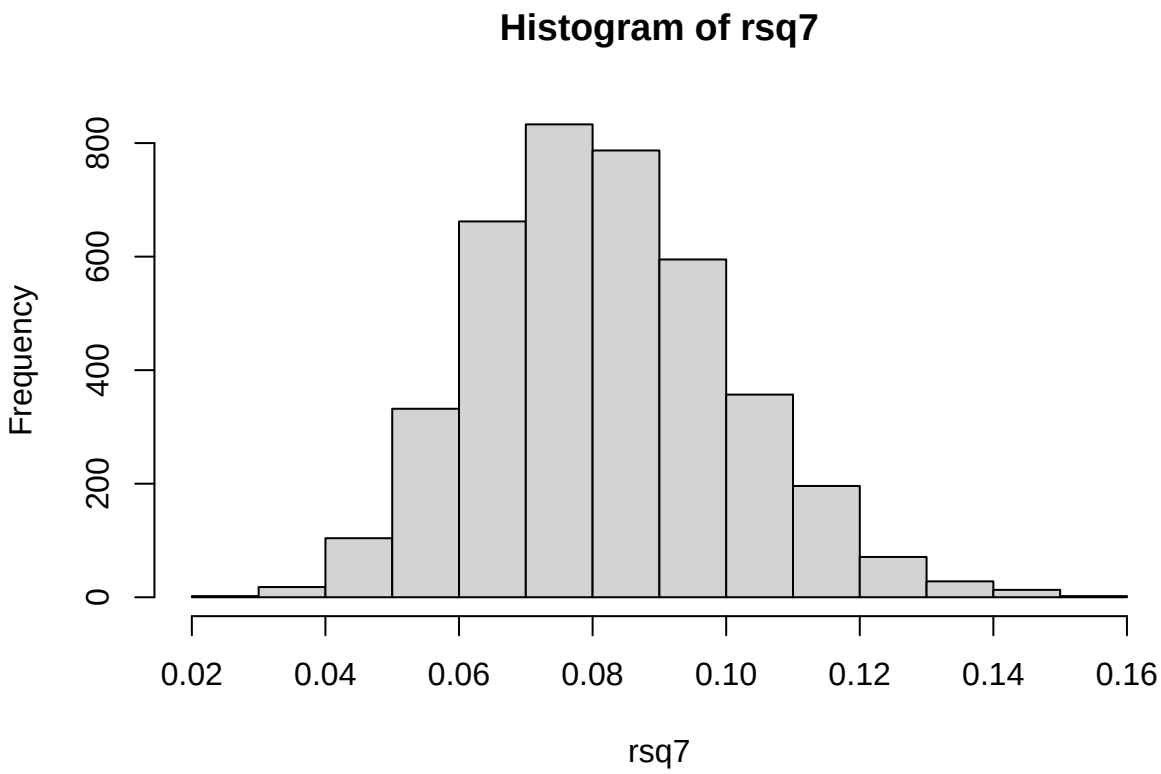
```
## [1] 0.1427867
```


Histogram of rsq5
Frequency
0
100
300
500
0.10
0.15
0.20
0.25
rsq5

```
## [1] 0.09664238
```


Histogram of rsq6
Frequency
0
200
400
600
800
0.06
0.08
0.10
0.12
0.14
0.16
rsq6

```
## [1] 0.08055329
```



7.Bibliography

Data source: kaggle from Internet. Weblink: https://www.kaggle.com/jesneuman/pc-games.

R package: ggplot2, tidyr, plyr, dplyr, RColorBrewer, ggmap, knitr, stringr, RColorBrewer, performance, rstanarm, bayesplot, sjPlot.