

Hypotheses and Motivation for Testing

With the recent release of the latest James Bond movie *Quantum of Solace* and its relatively lower ratings and box office take than its predecessor (*Casino Royale*), we wished to look at data from the 22 official James Bond movies to see if there was any correlation between such factors as each movie's budget, its box office take, its critical ratings, and the particular actor portraying James Bond. In particular, we wanted to see if there was any effect from the various "reboots" of the series, such as when a new actor plays James Bond, or in a radical shift in the themes of the various movies (such as the end of the Cold War, or the reboot for *Casino Royale*).

1. The first main hypothesis compares the budgets of the James Bond movies with their success as measured by ratings from Rotten Tomatoes and box office numbers, adjusted for inflation. To test this, we are testing two sub-hypotheses, one comparing budget with ratings, and the other comparing budget with box office numbers. We are using box office and budget numbers from Wikipedia, all adjusted for inflation using 2008 figures. The ratings come from the "T-Meter Critics" section of Rotten Tomatoes (as opposed to "RT Community").

H_0 : A Bond movie's budget has no effect on its success as measured by Rotten Tomatoes rating and box office take.

H_1 : A Bond movie's budget does have an effect on its success.

2. We used the same numbers from Wikipedia and Rotten Tomatoes as the previous hypothesis to compare the actors playing James Bond. We tested the actor's effect on ratings as well as the actor's effect on the box office numbers.

H_0 : The actor playing James Bond has no effect on his movies' average success as measured by averaged Rotten Tomatoes ratings and averaged box office take, adjusted for inflation.

H_1 : The actor playing James Bond does have an effect on the movie's success.

Summary Statistics

A Pearson's correlation test for adjusted box office earnings and ratings resulted in a correlation coefficient of 0.4433; the same test for adjusted budget and ratings resulted in a coefficient of -0.315. A third correlation test for adjusted budget and adjusted box office gave a coefficient of -0.059.

A one-way ANOVA of actor and ratings gave a p-value of 0.031, and a two-way ANOVA of actor, adjusted budget, and ratings gave a p-value of 0.019, both significant at the 0.05 level. A two-way ANOVA of director, adjusted budget, and adjusted ratings resulted in a p-value of 0.013, also significant. However, a two-way ANOVA of actor, director, and adjusted box office earnings resulted in a p-value of 0.312, and a one-way ANOVA of actor and adjusted box office earnings gave a p-value of 0.129; both of these were not significant.

Discussion

Our goal of this project was to examine the James Bond movie franchise to see if a reproducible method of predicting future movies' successes could be uncovered. The data set included the following variables: movie budget adjusted for inflation; box office profits adjusted for inflation; its critical ratings as noted by rottentomatoes.com; the actor portraying James Bond; and the director of the film. We expected to see correlative effects between the budget and rating, and between the actor portraying Bond and the movie rating in conjunction with the budget. Unfortunately, we were not able to uncover any reproducible method of predicting a future movie's success, but we were able to gain some insight on what does and does not contribute to individual movies' successes within movie franchises.

A Pearson's correlation test was conducted to see whether or not there was a correlation between box office intake

adjusted for inflation and movie ratings. Since movie ratings often come out prior to a film's release, it was expected that movie goers would be influenced by these ratings and hence choose to either see or not see the movie, contributing to the box office intake. A 0.4433229 correlation coefficient was observed as a result of the test, which does not serve as extremely *weak* evidence for a correlation between two variables, but does not serve as extremely *strong* evidence for a correlation between two variables either.

Next, a one-way ANOVA was conducted to analyze the variance between movie ratings and the actor portraying James Bond in each film. Given the esteemed nature of the choosing of the James Bond actor, perhaps an ANOVA would reveal whether or not movie critics' ratings were influenced by the acting skills of a particular actor. The Actor Pr(>F) value returned from the test was 0.03108, which warranted a single * significance rating. This means that at the 0.05 level, the actor portraying James Bond does have an influence on the movie's ratings.

Once the aforementioned finding was uncovered, performing additional two-way ANOVAs, such as ratings in relation to budget adjusted for inflation and actor portraying James Bond, became of interest even though the results would not directly relate to any of our stated hypotheses. The combination of actors and budget as related to movie ratings could reveal a relationship that would shed light on a future movie's success, or it may simply reveal that some actors require more money to play the part of Bond, hence inflating the budget and having some or no effect on ratings. The two-way ANOVA revealed a Pr(>F) of 0.01931 with a single * significance rating for movie ratings and actors portraying James Bond. Again, we see that at the 0.05 level, the actor portraying James Bond does have an influence on the movie's ratings. A two-way ANOVA on ratings in relation to actor portraying James Bond and movie director was also conducted with a similar result: Pr(>F) of 0.04361 with a single * significance rating indicating that at the 0.05 level the actor portraying James Bond does have an influence on the movie's ratings. Further, a two-way ANOVA on box office intake adjusted for inflation and actor portraying James Bond in relation to the director revealed no significance rating with Pr(>F) of 0.3120. It was thought, anecdotally, that perhaps the box office intake could be at least partly explained by the cohesive artistic vision between a well matched actor and director in James Bond movies, but the data did not support this conclusion.

In an attempt to observe a correlative relationship between box office intake adjusted for inflation and actor portraying James Bond, a one-way ANOVA was conducted. It was thought that perhaps the box office intake could at least be partly explained by the movie goer's preference towards the chosen actor to portray James Bond. Unfortunately, the conclusion of the one-way ANOVA did not support this conclusion: Pr(>F) of 0.1289 and no *, **, or *** significance rating. This result reveals that box office intake is not influenced by which actor portrays James Bond. However, there was something significant to be observed from plotting box office intake adjusted for inflation and number of the movie in the series (that is, the franchise count). (See Figures 1 and 2)

In the plot of the franchise count versus the box office intake there seems to be a trend that when an actor's films begin to tank at the box office an easy way to boost the box office for the next film would be to switch actors. In the plot, with one exception, every time a new Bond is hired the box office numbers take a jump. The exception, George Lazenby, could be accounted for in that he was the first replacement and was replacing the iconic original Sean Connery and people weren't responsive to that, but once the trend for replacement was set, replacement was the way to refresh the box office take once they were becoming stale.

If a movie has a higher budget for production, there is more money to higher better writers, special effects gurus, directors, actors, etc., and so the more money that goes into a movie, the more confidence the investing parties have in its success and hence the opportunity to turn a profit. In order to assess whether or not there was a correlation between the budget of a film (adjusted for inflation of course) and the movie rating, Pearson's correlation test was conducted and the results was -0.315. Unfortunately, the result of this correlation test will not be very comforting for movie investors: movie budget and movie ratings do not have a strong correlation.

Potential Sources of Bias

There was at least one potential source of bias in our data and results relating to the movie ratings from rottentomatoes.com. Despite our group's best efforts, the only complete set of movie ratings we were able to find

were from sources who rated the movie long after it was released. These ratings, as a result, may suffer from what we have identified as the "nostalgia" factor: critics may have fonder memories of a film and rate it much higher long after it has been released. In terms of our project, we know that from looking at the inflation adjusted box office earnings of *Licence to Kill* that the movie did pretty poorly, but the Rotten Tomatoes rating of the movie was still relatively high with 73 when other more box office successful movies, such as *A View to a Kill*, rated relatively low (38 in this case).

Final Thoughts

Our group was in the fairly unique position of being able to sample the entire population of James Bond movies. Our data set was small and all the entries were crucial to our research topic. Given that we examined the entire population, we feel that even though we were unable to uncover a reproducible "formula" for a franchised movie's success that the research conducted here still did lead to a valuable conclusion: there really isn't a reproducible formula for a franchised movie success. It is not simply the case that a movie with a large budget will do well, or even that a box office intake is representative of a movie's success (in terms of critic's ratings).

Statistically, we did find that there was at least one factor which contributed to a Bond movies success: the actor portraying Bond. By conducting a one-way ANOVA between the actor portraying James Bond and movie ratings, we observed that at the 0.05 level, the actor portraying James Bond does have an influence on the movie's ratings. We observed a single * significance rating later on between actor portraying James Bond and movie ratings when we performed a two-way ANOVA with: ratings in relation to budget adjusted for inflation; and actor portraying James Bond and ratings in relation to actor portraying James Bond and movie director. This information, combined with the spikes in movie ratings as the franchise changes James Bond actors, indicates that the actor playing James Bond somehow contributes to the success (in terms of ratings) of a movie in this franchise.

Note for Lada:

1. Feel free to use the data in future versions of the course.
2. Feel free to post the final report to the class webpage.

Figures and Plots

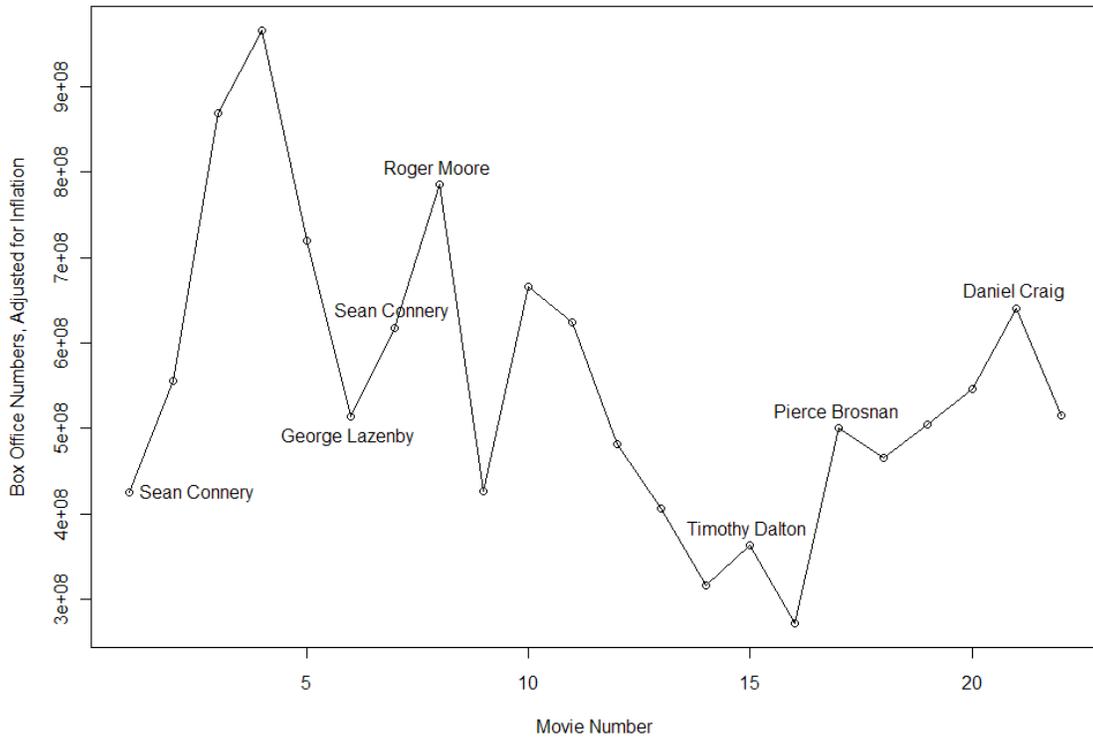


Figure 1

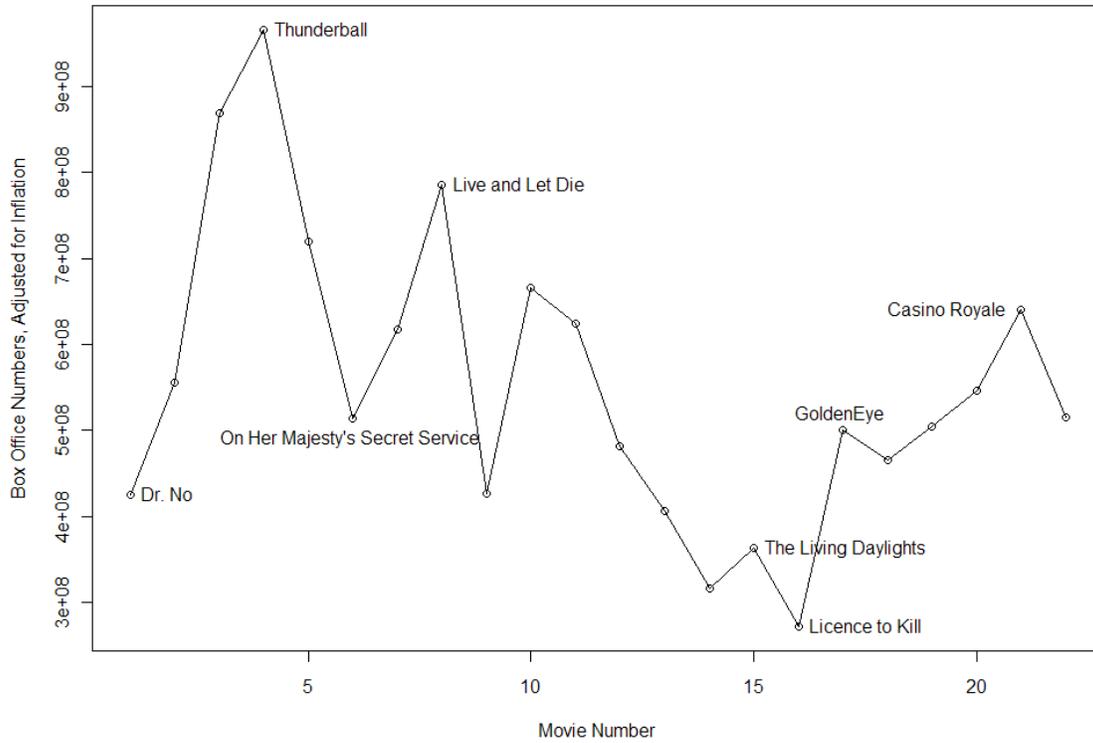


Figure 2

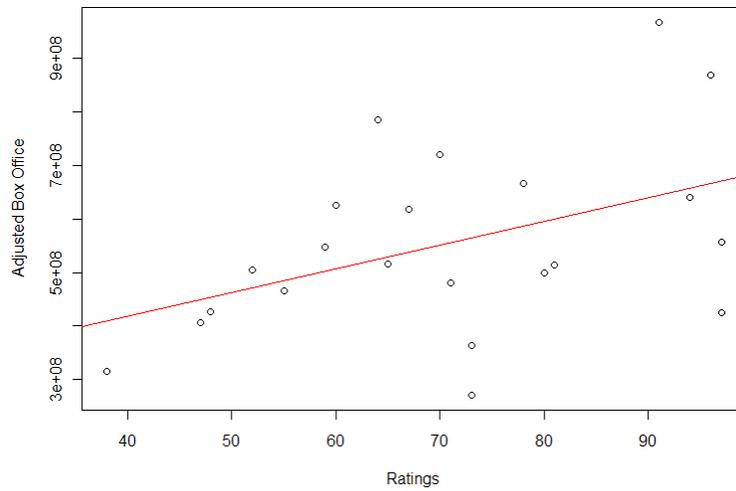


Figure 3

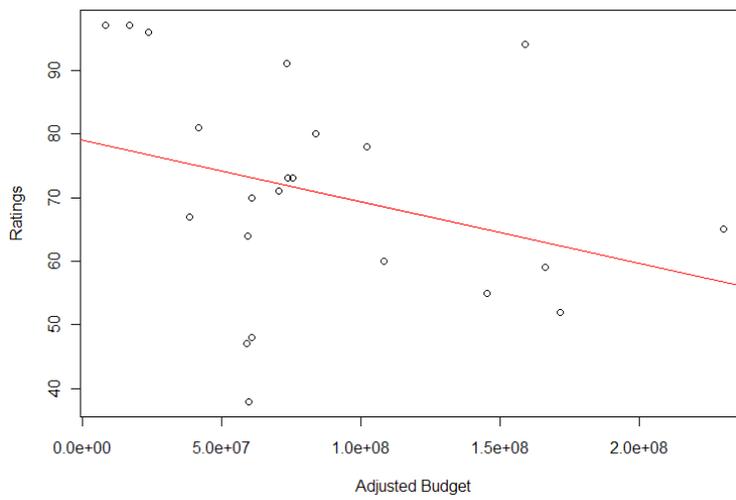


Figure 4

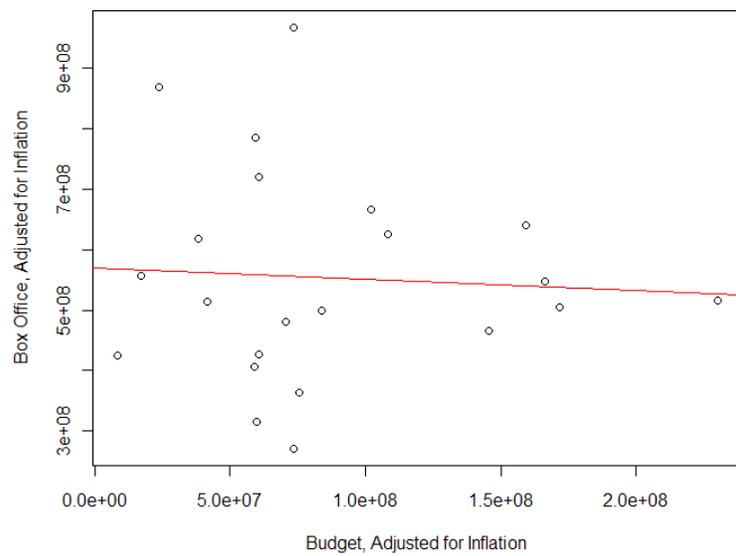


Figure 5