The Effect of Gender and Age of the Leading Actor on Film Revenue

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Abstract

Throughout the years, film has been one of more highly consumed forms of media. In recent years, studies are starting to look into how the presence of different actors within the films have been thought to affect the film's gross revenue. This paper looks at how the gender and age of the leading actor affects a film's gross income for the Walt Disney Company. The purpose of this study is to observe if there is any impact on gross income, and if there is, to analyze what that impact is and how it affects the company. Three log-linear regression models help determine the relationship between these variables. Results show that gender of the leading actor does not have a statistical or economic impact on gross revenue while age does have both a statistical and economic impact.

Introduction

Film is a highly consumed part of the entertainment industry, where numerous companies are producing countless entertainment for an individual to see both on the big screen or at home. With so many actors and actresses in the space, it is easy to have a large variety of leads in films in both age and gender. Ranging from male to female and child to adult, there are countless options for a lead in any film.

Recently, though, there have been some questions on whether or not the biases found for gender within modern culture, where men are thought to be more successful than women in some cases, can have any effect on the income of films from around the globe. Studies have shown that there may not be a high return in the box office for films with more females in prominent roles and a slight bias towards males within the industry. Smith et. all found that in G rated films, female roles are typically found younger while male roles are typically older and that there is a 2.57 to 1 ratio of male leads to female leads, showing a bias towards male leads, leading to male led movies more likely to have higher box office returns (2010). In another study, Bielby and Bielby found that there was a large enough difference between male and female earnings when it comes to the realm of film media that there is an extremely noticeable gender wage gap and it affected film revenues in a slightly negative manner (1996).

However, other studies show some of the opposite, that there is no real difference between male and female roles when comparing revenues. Pranian found that there is no real effect on film revenue when looking at a film's male to female ratio, even though there may still be a bias towards men within the market (2022). Treme and Craig have found that there is no relationship between the age and gender of the starring role and box office revenue when looking into movies released between 2004 and 2010 (2013). Lindner et. all have found that films with a

higher female presence tend to earn less at the box office, but it is found that the effect does seem to come from the fact that these films tend to have a lower budget, thus not doing as well in the box office (2015). All three of these studies show that there is likely no effect at all or some other aspect that may cause this general effect.

While each of these papers look into what the effect is on the general population of films from a variety of production companies, I will take the time to look specifically into one of the largest companies there is within the entertainment industry: Walt Disney Studios. There are numerous other companies that could be looked into, but looking at specifically Disney will help see if there is a gender bias within most films since the company is known for being the most popular, profitable, and a reference for other companies in movie making (Carillo et. all). Knowing if their profitability comes from just the name of the company or who is in the main role or who the film is directed towards can help other companies try and reach similar profits that Disney has reached. But there is another demographic that should also be looked at. Not just gender, but does age of leading actors have any effect on the revenues for Disney? The ages of actors vary so much, especially for those in leading roles, so what if it does have an effect on these films? Is it possible that both really have no effect at all for the company?

So, this paper will be looking at what impact does age and gender of the leading role have on the Walt Disney Studios film gross income? Previous studies have shown that there may or may not be a definite effect of gender and age on revenues for a few companies, so I plan on showing if there is any effect at all for the Walt Disney Company from 1989-2016 for all films rated G, PG, and PG-13. Answering this question will allow us to see if biases between genders carry through and affect movies and if the leading actor's age makes or breaks a film's

profitability. Knowing these aspects can allow filmmakers to understand what they need to do in the casting process to aid their money-making endeavors.

To do this, I will be using three different linear regression models. All models will contain the main variables of gross income, leading actor gender, and leading actor age as well as include an interaction term between age and gender. The second and third models will include those as well as control variables for movie genre, rating, and release season for the first and an additional control for release year in the second.

I hypothesize that there will be no real effect between age and gross income but there will be an effect between gender and gross income where female leading roles tend to make less than male leading roles. The results of this study have found that is actually the opposite for the Walt Disney Company. A lead actor's age has a statistically significant impact on a film's gross income while gender has no statistically significant impact. This result tells us that while it doesn't quite matter what gender Disney's leading actor is, it is a generally good idea for Disney to cast someone who is an older age when appropriate for the film. These results are likely to do with the fact that older actors may be more popular than younger ones, but it is also possible that the general population prefers films with older leads without realizing it.

Data

The data used in this study is sourced from Kaggle.com from a data set titled "Disney Movies 1937-2016 Gross Income" by Rashik Rahman. This data set includes the variables of movie title, release date, genre, MPAA rating, total gross income, and inflation adjusted gross income in terms of 2016 dollars. There are three variables that were added to this data set: the

lead actor's age, lead actor's gender, and season and year in which the film was released. These variables were scrapped off of IMDB and found through additional research.

In order to narrow down our results and remove unwanted films, there are a few limitations placed on the data set. All movies with no MPAA rating or movies that are rated R were dropped from the data set as these films do not fulfill the requirements for the research question. The population of interest is all Disney films from 1989-2016 that are rated G, PG, or PG-13. This was narrowed down so the discography we are looking at is just from the start of the "Disney Renaissance" and on for all films generally targeted towards children or young adults. This is not a random sample since this data is the entire population itself.

The outcome variable of interest is inflated adjusted gross income. This is the overall value of each film in the valuation of 2016 dollars, so we can accurately compare and contrast what the film's gross income is doing. The model itself will have a natural log version of this variable so the outcome can be measured in percentage change in gross income. The main limitation from this outcome variable is that this data is only accurate in terms of 2016 dollars, so it is a few years dated.

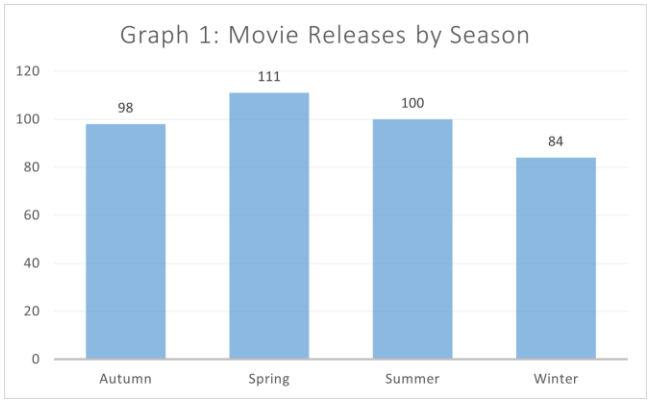
Table 1: Summary of Numerical Variables

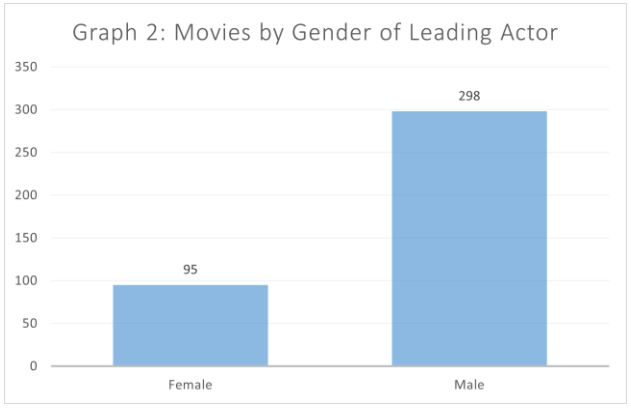
	Mean	Std. Dev.	Min	Max
Gorss Income (Inflation Adjusted for 2016)	$109,000,000	$125,000,000	$2,984	$936,662,225
Lead Actor's Age	35.78	14.56	10	81

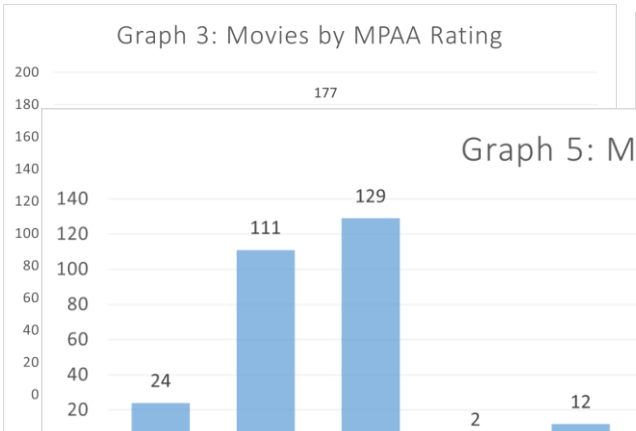
The key variables of interest are the gender and age of the leading actor or actress for the film. Gender is a dummy variable, where a 1 indicates that the lead is a female, and age is the given age of the actor or actress at the time of release for the film. The main limitation for these variables is that some films have multiple leading roles, but I have taken the lead role as the

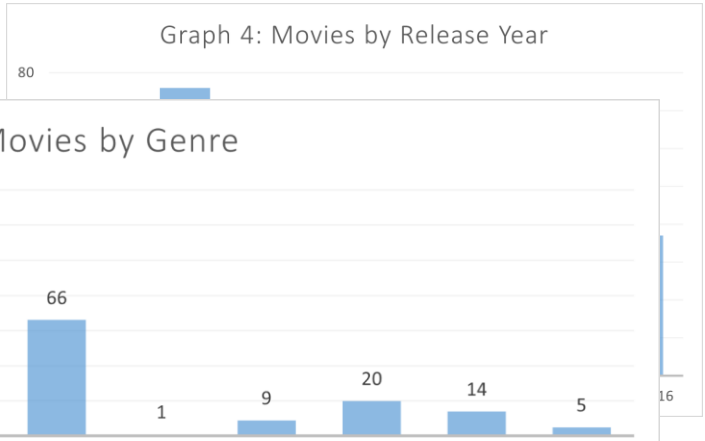
individual who is followed most in the story, has generally the most screen time, or taking the average of the leading roles and making it one. There is no random assignment for this variable and it is likely to have selection bias. Sometimes certain directors may want a specific individual for the film and not want to audition the role around and the audition process itself can be biased. Alas, these limitations to the data are not things we can quite control for at this time.

Other important variables within the data set that we are controlling for within this data set is the season the film was released, year the film was released, genre of the film, and rating of the film. The year released for the film is dictated on when the film was released in the United









States. For this analysis, the seasons are labeled as follows: Spring is March, April, and May, Summer is June, July, and August, Autumn is September, October, and November, and Winter is December, January, and February. All of these characteristics can have an effect on income for Disney and can alter how much the movie really makes as a whole. Controlling for these variables helps to prevent omitted variable bias.

Method

To answer my question, there are three models I will be using. My first model will be my base model, only looking at how age and gender affect the film's gross income along with an interaction term between the two. For all models, I will be taking the natural log of the inflation adjusted income to evaluate the change between films in percentage rather than dollar amounts. Model 2 and 3 are the main models of interest since it is looking into the effect of gender and age while controlling for multiple variables. Model 3 is the same as Model 2 where its only difference is that it will be controlling for year as well. The coefficients for the lead's age and gender in Model 3 will answer our question for us.

Model 1:

$$ln(gross\ revenue) = \beta_0 + \beta_1(leadage) + \beta_2(leadgender) + \beta_3(age * gender) + u$$

Model 2:

$$ln(gross\ revenue) = \beta_0 + \beta_1(leadage) + \beta_2(leadgender) + \beta_3(age * gender) + \beta_4(genre) + \beta_5(rating) + \beta_6(release\ season) + u$$

Model 3: $ln(gross\ revenue) = \beta_0 + \beta_1(leadage) + \beta_2(leadgender) + \beta_3(age * gender)$

$$+ \beta_4(genre) + \beta_5(rating) + \beta_6(release\ year) + \beta_7(release\ season) + u$$

Each of these additional control variables have a differing effect on a film's success so it is vital to include them in the model. Genre, rating, and release season are all categorical dummy variables for each of the different genres, ratings, and seasons of the year each film was released. Release year is a numerical variable that just labels each film with their respective release year in the United States.

These models are log-linear models as my outcome variable is a natural log of gross revenue and my main variables are the linear variable for age and the binary variable for gender. They are also interaction models to help dictate if there is a difference in income effect between male and female actors. With the outcome we are looking for being a percent change in income, we are able to analyze the effects of gender and age as a percentage impact. This will help dictate the economic effect that these variables have, thus aiding in answering the question at hand.

As for the Gauss Markov assumptions, the variables all vary and no two variables are dependent on one another. The model also does not need to worry about randomness since we are dealing with the population in this case. There may be some variable bias since we are not controlling for popularity of the actor or actress and the specific request to have the actor or actress star in the film.

There is no perfect way to measure popularity of a given individual or to know if the director or casting agency requested the individual for the movie, so we must omit these variables. Some possible proxy variables that could be used to measure popularity are the number of films they have been in as more popular people tend to be in more films, or even their salary for the film since higher paid actors are usually more popular. But each variable is limited

by what the actor in question wants to do with their career and life, so there is a form of selection bias with these possible proxy variables.

Results

Table 3: Regression Output

	(1)	(2)	(3)
VARIABLES	ln_gross	ln_gross	ln_gross
Lead Age	0.00721	0.0154***	0.0138**
	[0.00545]	[0.00526]	[0.00552]
Lead Gender	0.430	0.581	0.598
	[0.458]	[0.423]	[0.437]
Age*Gender	-0.00325	-0.00412	-0.00415
	[0.0137]	[0.0127]	[0.0129]
Controls (excluding year)	No	Yes	Yes
Year	No	No	Yes
Constant	17.52***	16.73***	16.90***
	[0.221]	[0.293]	[0.311]
Observations	393	393	393
R-squared	0.012	0.210	0.279

Model 1's results show us that age has a positive impact on gross income of 0.72% in each year increase in age for a male actor. Female actors, while age is held constant, have a positive impact of 43% on gross income while compared to men, but have a -0.33% impact on gross income impact on a film for each year they age when they are compared to the male impact on gross income for each year they age. But each of these results are not statistically significant and these impacts are close to 0% without controlling for outside variables.

The results from Model 2 show us that, while controlling for a film's genre, MPAA rating, and release season, age has a 1.54% positive impact on gross income for each year increase in age for a male actor. For female leading actors, while age is held constant, there is a positive 58.1% increase in gross income when compared to male actors. Similarly to Model 1, women have a -0.41% impact on gross income on a film for each year they age when they are

compared to the male impact on gross income for each year they age. But unlike the previous model, only the percent change for age is statistically significant at the 99% level, thus telling us that age does in fact have an impact on film revenue for the Walt Disney Company while gender does not.

Results from Model 2 hold through when adding the control for the year the film was released in Model 3. Age has a 1.38% positive impact on gross income for each year increase in age for a male actor, and female actors, while age is constant, have a positive impact of 59.8% on gross income. And almost exactly the same as Model 2, Model 3 shows that women have a -0.42% impact on gross income on a film for each year they age when they are compared to the male impact on gross income for each year they age. For this model, it still carries that gender is not statistically significant, showing there is no real impact on film revenue between genders. Age, on the other hand, is statistically significant at the 95% level, showing that there is an impact on film revenue for each year older a leading actor is.

For this study, we will just be omitting the popularity variable and giving it a positive bias as an increase in popularity for an actor is likely to cause a film to have a higher gross income. Therefore the findings of the paper are likely to be lower than what is showing in the model. From an economic point of view, the findings are quite significant. While a 1.38% increase in gross income for each year older in the leading actor does not seem like a lot, that percentage adds up quickly. If we were to take our average gross income of $109,000,000 and have the leading actor be 27 years old, that is a 37.26% increase in gross income which equates to a $40,613,200 dollars addition to our average gross income. This is a major impact and can really change if a movie has made profit or not.

Conclusion

Looking back at the main question for this study, does age and gender of the leading role of a Walt Disney Studios film affect the gross income, the results from my models allow me to conclude that while gender has no real statistical or economic effect on gross income, the age of the lead actor has a statistically significant impact and economic impact. This directly contrasts with my hypothesis that gender had an effect while age had almost none. A possible reason that this may be true is with the fact that older actors tend to have been in more films, leading to them being more popular in the entertainment sphere, causing the movie they are starring in to have a higher gross income so gender is not as important for the film to make money.

While there is some discourse about this topic, it is seen here that the leading actor's gender really has no effect on gross income for Walt Disney while their age does. This study adds to that knowledge by looking specifically at the films from the start of the "Disney Renaissance" through 2016. Statistically and economically, the impact is absolutely different from zero and is positive for the company.

To improve this model further, adding movie length in minutes, film budget, and popularity of the given actor or actress could help show a more accurate relationship between age and gender of the lead and gross income. While movie length and budget would be an easy addition, finding a statistical way to measure popularity of a given actor or actress would be quite difficult. It is also likely that there is a relationship between gross income and releasing films on or around holidays, so controlling for that as well may be a beneficial aspect to further this model.

This research question could also be looked at on a deeper level, analyzing the differences between companies within the industry to see if this trend carries through. This could

help show some of the bias in entertainment as well who really is the most profitable out of some of the largest entertainment production companies out there.

Works Cited

Carillo, C., Crumley, J., Thieringer, K., & Harrison, J. S. (2012). The Walt Disney Company: A Corporate Strategy Analysis.

Bielby, D. D., & Bielby, W. T. (1996). Women and Men in Film: Gender Inequality among Writers in a Culture Industry. Gender and Society, 10(3), 248–270.

Lindner, A. M., Lindquist, M., & Arnold, J. (2015). Million dollar maybe? The effect of female presence in movies on box office returns. *Sociological Inquiry*, *85*(3), 407-428.

Pranian, R. (2022). The Effect of Female Representation on Revenue: A Study of Gender Within the Film Industry.

Smith, S. L., Pieper, K. M., Granados, A., & Choueiti, M. (2010). Assessing gender-related portrayals in top-grossing G-rated films. *Sex roles*, *62*(11), 774-786.

Treme, J., & Craig, L. A. (2013). Celebrity star power: Do age and gender effects influence box office performance?. *Applied Economics Letters*, *20*(5), 440-445.