

Pace University

DigitalCommons@Pace

Honors College Theses

Pforzheimer Honors College

5-2022

The Effect of Female Representation on Revenue: A Study of Gender Within the Film Industry

Riley Pranian

Follow this and additional works at: https://digitalcommons.pace.edu/honorscollege_theses



Part of the Econometrics Commons

**The Effect of Female Representation on Revenue: A Study of Gender Within the Film
Industry**

Riley Pranian

Business Economics

Dr. Kier Hanratty

Department of Economics, Pace University

Presentation Date, May 3, 2022

Graduation Date, May 16, 2022

Abstract

The art of film has captivated the world for generations – a central component of the captivation is the actors showcased on-screen. But unfortunately, the film industry is male-dominated. Since 1970, the consumption of media by adults and adolescents has increased (Vogel, 2020). This study will determine the relationship between a cast's female-to-male ratio and a film's revenue. The initial hypothesis is that the more women present in the cast, the higher the revenue - this relationship is assumed through increased demand for movies and the need for role models among women. This study's foundation is the presence of a positive externality and econometrics. The addition of genre will play a role in the evaluation. After running three regression models, the conclusion is that a film's gender ratio does not affect its revenue. However, this research is essential to building a more equitable entertainment industry for the future of cinema.

Table of Contents

Abstract	2
Table of Contents	3
Main Body of Paper	4
Introduction	4
Literature Review	4
Data	11
Model	13
Main Results	15
Conclusion	16
Reference List	18

Introduction

Over a century ago, the first movies took their audiences to places unknown. Today, the film industry has evolved to represent different communities and realities — the representation of varying demographics in entertainment influences how one sees oneself and others. There is, however, an inequitable balance of representation within the film industry. For example, in 2016, women made up 51.1% of the United States population but spoke 27% of the lines within the year's top 10 movies (Published by Statista Research Department, 2021).

This study aims to identify a correlated relationship between female-cast ratios and the movies' revenues. Based on previous studies and current data, the initial hypothesis stands that a higher female-to-male cast ratio will equate to higher income. In addition, there will be an evaluation of female-cast balances and the genre of the film. This study is essential to economics and the film industry because it will determine the most optimal course of action for filmmakers and encourage more female representation within the entertainment industry. It is essential to quantify and identify representation's effects to apply its influence efficiently. The lack of female representation and the internalization of gender stereotypes negatively affect everyone (Essig, 2018). Therefore, the best way to solve a problem is to identify it.

Literature Review

Since the film industry's origins, its purposes and story-telling methods have changed. With humble beginnings, the film industry in 1907 consisted of two production companies - later combining to form the Motion Picture Patents Company. Over time, the length of projects grew, in addition to the project's budgets. Although there is no early data on budgets, these values increased exponentially between 1908 and 1920, from an average of \$10,000 to \$80,000—this

escalation of monies correlated with the expansion of the American film market (Sedgwick, 2007, p. 26).

In the 1920s, filmmakers began to use creative ways to patent and brand their films to create more popularity. Filmmakers did this by acquiring celebrities to star in their projects and using existing properties. Celebrities were rented and rotated through movie companies to decrease promotion costs and times (Sedgwick, 2007, p. 54). This method can be seen today in the modern film industry. For example, movies will use a new and relevant actor to boost anticipation for a release.

As the film market increased, so has the demand for leisurely activities. In 1970, the average person spent 1,226 hours per year watching television - in 2009, it was 1,774 hours per year. On an average day in 2008, a person spent 168 minutes watching television (Vogel, 2020, p. 10). As employees work more hours, earning more money - and eventually a higher income - they will favor leisure time over work. Therefore, the demand for leisurely activities, including movies, will increase. Additionally, the demand for leisurely activities increased due to technological advances. New equipment, a skilled labor force, and economic development increased the production of goods and services. Also, the time and amount of labor needed were decreasing.

Although the top action, television is among a long list of activities, including the internet, books, spectator sports, and music (Vogel, 2020, p. 10). There is also a psychological pull to modern entertainment. Audiences feel adept - they can actively follow a storyline and feel involved in the movie's plot. Also, they feel they can relate to characters, leaving the consumers coming back for more (Vogel, 2020, p. 42).

Some various factors and influences go into a movie's revenue. Revenue is recognized practically immediately due to the cash flows from the box office (Vogel, 2020, p. 180).

Unfortunately, box office sales offer only a small percentage of revenues for movies - consumers rely on on-demand sales. In the context of the 2009 global recession, moviemakers anticipated ways to attract more profit while simultaneously lowering costs. Newer films began using 3-D technologies for an immersive film experience. This evolution attracted new audiences and an influx of money. Additionally, studios switched from physical film prints to digital files (Plunkett, 2010, p. 61).

The film industry is continuing to become more efficient and profitable while attracting more audience members and talent. Individuals within the film industry - actors, directors, technicians, etc. - gain celebrity status for their work. Additionally, the fine arts are continuously gaining more recognition in society for being an influential and contributing factor to all communities (Bioglio & Pensa, 2018).

Pieces of cinema define a time in one's life and open the eyes to new possibilities and identities. Adolescents and adults spend 8-12 hours a day consuming electronic content—this high level of consumption leads to the internalization of gender roles and ideologies (Essig, 2018, p. 1). In 2020, female-identifying individuals made up half of the United States population. Female actors had 47.8% of the lead roles and made up 41.3% of the overall casts in all 2020 films. Although underrepresented, the film industry made strides in gender equality among actors - women matched or exceeded their male actor counterparts (Wolf, 2021). Still, women were among some of the most underrepresented demographics in film. This lack of representation hinders their accessibility to role models. It also impedes young women and girls (Yang et al., 2020, para. 2), as children are still molding their ideas of the outside world, including gender

roles. Children establish these roles mentally through observing others around them and through media consumption (Essig, 2018, p. 6).

There are many interpretations and analyses that audience members can take away from a film. These takeaways can often be internalizing the gender stereotypes of women (Dutt, 2014, p. 7). Every day, members of society see what masculinity and femininity are supposed to look like through the media they consume. There are gender expectations that imbed themselves in day-to-day life (Essig, 2018, p. 1). Although society has changed over time, and also roles of various demographics, underlying gender roles remain the same (Essig, 2018, p. 9).

Female representation is an imperative element of modern entertainment. However, the portrayal of women in film varies – the stories told about women through film can either empower or oppress them (Dutt, 2014). Adolescents are impressionable and require positive role models who push them to break the glass ceiling of the patriarchy (Essig, 2018). By seeing a character with ambition, and drive, who is not defined by their level of femininity, young women can see past the traditional role of a caretaker. The internalization of gender stereotypes plays a heavy role in entertainment and society. However, entertainment sways the way communities view women and their abilities. In a study by Lee Whitney Essig, the author analyzed different media to identify their gender portrayals.

Firstly, as hypothesized, women were more likely to be portrayed in domestic roles and settings (H1a). Secondly, women were also more likely to be portrayed in parenting roles than their male counterparts (H1b), however, there appears to be some nuance in parenting, with men being more likely to be seen in availability and responsibility parenting roles. Thirdly, men were more likely to be portrayed in occupational roles

(H1c), including all the subcategories of occupational roles with the exception of assisting roles, which were almost exclusively portrayed by females (Essig, 2018, p. 23).

Stacy Smith conducted a study surrounding specifically gender oppression within the film industry. The study compared female actors to their male counterparts to measure gender misrepresentation within the observations. Female actors in films are often younger than male actors - therefore, women are more sexualized in their works. Women in film are more likely than men to wear revealing clothing, show nudity, be thin, and be conventionally attractive (Smith, S, 2010, pg. 4). Additionally, Smith explores the study's findings' effects on young women in society.

Seeing skinny and sexy women may also have an effect on body image, especially among those viewers who compare themselves to idealized portrayals and perceive that their bodies do not live up to the quixotic standards. Or, heavy exposure to beautiful and thin females may teach and/or reinforce males' unrealistic expectations about how the opposite sex should look or act. (Smith, S, 2010, p. 1-2)

Audiences can interact with and witness the characters' stories - some, however, are more complex than others. Female-identifying characters and actors have developed from one-dimensional into multi-surface characters within film by having emotional complexity and compound storylines (Mulvey & Rogers, 2015). Therefore, it is crucial to have accurate and heterogenous female representation in media - this representation encourages women's empowerment.

There are ways to measure said representation within a film. For example, there is the Bechdel Test. The Bechdel Test contains three qualifications - if two or more female characters

are present, if those female characters meet, and if the subject of their conversation is not about a man (Mulvey & Rogers, 2015). Even if the piece of entertainment passes the Bechdel Test, it does not make it an immediate good representation of women. A movie that passes the Bechdel Test may hide the overall gender imbalance of the piece (Yang et al., 2020). The Bechdel Test also brings to light the male-dominant gaze within media (Mulvey & Rogers, 2015).

Additionally, genre plays a role in female representation. For example, genres not traditionally associated with women, such as Action and Crime, have higher budgets than other genres (Yang et al., 2020). Action movies have been the most dominant genre since the 1980s. Additionally, fighting in film is historically gender-specific. Out of a sample of 100 films, action and adventure featured the smallest percentage of women at 25.8% (Smith, S, 2010, p. 3).

The action film, according to Gallagher, 'has historically been a 'male' genre, dealing with stories of male heroism, produced by male filmmakers for principally male audiences.' Prior to the 1980s, the majority of female characters in action films were limited to roles accompanying, or oppositional to, the leading action hero; appearing as the sidekick, comic foil or "evil" other. When women were central to the plot it was rarely as the sole and independent protagonist of the film (Andris & Frederick, 2009, p. 6).

This genre, action, spotlights masculine figures and leaves female characters as damsels in distress. The main male protagonist is often muscular, making his body an element of the story (Brown, 2016). When a woman plays the heroine in an action film, her body, too, is visualized as her first weapon. A female protagonist in an action movie is usually sexualized (Brown, 2016).

In a 2020 study, Luoying Yang, Zhou Xo, and Jiebo Luo quantified female representation using female-cast ratios compared to the movie's Bechdel Test result. Then, by identifying which

pieces of film “pass” the Bechdel Test, the authors can evaluate whether this implication of female representation directly relates to a film’s financial success. Additionally, the study looks at other factors such as budget and the genders of the crew to pin which factors further encourage female representation throughout the creative process. The authors concluded that a higher female representation does not automatically equate to a movie’s success. Also, films with more female cast members often receive lower budgets and higher criticisms.

Throughout the past century, there have been parallels between politics and film. The film industry has served as a catalyst and a vocal amplifier for political and cultural change. Over time, women have achieved increased liberation. In the 1930s, women on-screen had abortions, had orgasms, took birth control, and spearheaded action-packed adventures - all typically taboo scenarios (Vine, 2019).

By the end of the '20s, one estimate is that over 80% of movie audiences were female.

And that statistic continues through the '30s and the '40s.” Films of the time showed women leaping out of trains and leading the charge into full-blown revolutions. Because *that* is what those majority-female audiences wanted to see, and what they would pay for (Vine, 2019, p. 4).

To that statement, traditionally underrepresented groups purchased the most tickets for the top five movies of 2015 (Women’s Media Center, 2016, p. 70). Additionally, a 2018 study conducted by the Creative Artists Agency also used the Bechdel Test to measure female representation. The study observed 350 movies spanning over the years 2014 through 2017, which budgets ranging from \$10,000 to over \$100 million. Out of the observations, only 60% passed the Bechdel Test. The movies that passed the Bechdel Test, regardless of budget, were more financially successful than those that did not pass (Dellatto, 2018). Lastly, there have been

various studies done previously that aim to determine a relationship between gender representation and revenue within the film industry.

In fact, in 2015, movies led by female actors averaged 15.8% more in gross earnings than movies led by men. Also, movies that contained a more racially diverse cast achieved the highest box office profits (Women's Media Center, 2016, p. 70). Due to the increase in demand for leisurely activities and the long-term demand for women on film, the initial hypothesis remains that the more women there are within a film's cast, the more revenue the movie will make.

Data

The data within this study is from a data scrape performed by Stefano Leone. "IMDb extensive dataset," found on Kaggle, originated as 85,555 observations or movies, spanning release years of 1894 to 2020. The origin of the data, IMDb, is an accessible, online database containing information about film, television, actors, and other entertainment industry statistics. All movies included in the dataset have at least 100 votes on IMDb - meaning the movie was received mainly by a public audience. Observations made internationally or had missing values were eliminated from the dataset, which cut the observations down to 3,283.

The independent variable of the study is the gender ratio. The gender ratio for each movie was calculated from the initial data scrape and merged into the larger dataset.

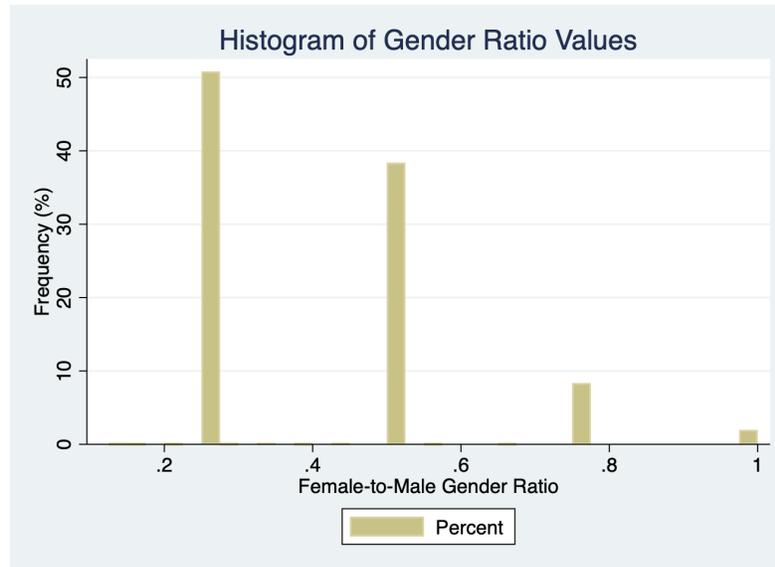


Figure 1. Histogram of Gender Ratio Values

The primary dependent variable of the study is revenue - these values were logged within the regression, changing the results to a percentage change versus a dollar change. Other dependent variables include the average vote, budget, duration, and the total number of the film's cast members. There are also nine dummy variables within the full model. These binary variables represent genre within the dataset, with "1" being the presence of said genre and "0" being the absence of said genre. The dummy variables are adventure, animation, biography, comedy, crime, drama, family, fantasy, etc. The reference genre, or the most popular genre, is action.

Variable	Obs	Mean	Std. dev.	Min	Max
ln_gross_re	3,823	15.76616	2.801329	3.401197	20.65783
gender_ratio	3,823	.4029251	.1807692	.125	1
ln_budget	3,823	4.757598	1.123029	0	5.883322
duration	3,823	104.847	17.10885	60	238
totalcastn	3,823	4.010725	.2347161	2	10
adventure	3,820	.0400524	.1961077	0	1
animation	3,823	.0418519	.2002769	0	1
biograph	3,823	.0397594	.1954189	0	1
comedy	3,822	.3608059	.4802971	0	1
crime	3,823	.0685326	.2526906	0	1
drama	3,823	.1995815	.3997381	0	1
family	3,823	.0013079	.0361456	0	1
fantasy	3,823	.0062778	.0789938	0	1
other	3,823	.0622548	.2416493	0	1

Table 1. Summarization Table of Variables.

The main concern of the data is the lack of control variables. One control variable missing is the accessibility of female-identifying actors within the workforce. For example, one year, there may be more female actors than males or vice versa. This matter of accessibility would affect the ability of filmmakers to cast women over men.

Model

This study presents two economic theories - positive externalities and econometrics. Professor Todd R. Yarbrough says a positive externality: "...implies that others benefit from the market even when they do not involve themselves with it... the market does not see this benefit, as it flows outside of the market" (Yarbrough, 2020). For example, female representation in the film pushes for gender equality in the workforce. As a result, representation leads to more opportunities for women and further optimizes the utility of others they interact with (Yarbrough, 2020). Due to this external benefit, the market will under-consume movies with heavier female-cast ratios. The film industry will do so because the positive externalities do not directly affect the market. Therefore, the film industry does not claim these benefits.

The study uses econometrics or statistical methods to describe economic behavior through the three regression models. In addition, an ordinary least squares regression further identifies the relationship between the independent and dependent variables. The first model, the baseline model, includes the independent variable, gender ratio, and the primary dependent variable revenue.

$$revenue = \beta_0 + \beta_1(\text{gender ratio})$$

Figure 2. The Baseline Model.

The second model, the main model, contains the independent variable, the primary dependent variable, and the other dependent variables - average vote, budget, duration, and the total number of the cast.

$$revenue = \beta_0 + \beta_1(\text{gender ratio}) + \beta_2(\text{average vote}) + \beta_3(\text{budget}) + \beta_4(\text{duration}) + \beta_5(\text{total number in cast})$$

Figure 3. The Main Model.

Finally, the third model, the full model, includes the independent variable, all of the dependent variables, and the nine dummy variables to represent the genre.

$$revenue = \beta_0 + \beta_1(\text{gender ratio}) + \beta_2(\text{average vote}) + \beta_3(\text{budget}) + \beta_4(\text{duration}) + \beta_5(\text{total number in cast}) + D_1(\text{adventure}) + D_2(\text{animation}) + D_3(\text{biography}) + D_4(\text{comedy}) + D_5(\text{crime}) + D_6(\text{drama}) + D_7(\text{family}) + D_8(\text{fantasy}) + D_9(\text{other})$$

Figure 4. The Full Model.

Main Results

When looking at the robust standard errors of the model, unbiased standard errors showcase bias within the variables' relationships and statistical significance. Additionally, the regression that includes the robust standard errors is more conservative. The usage of robust standard errors is appropriate when the uniformity of variance is not present. The independent variable's standard error increases from 22.3% to 23.3%. Additionally, there is a decrease in the t-value from 0.72 to 0.69. Lastly, there is an increase in the probability statistic from 0.472 to 0.491. These changes between the two regressions conclude that another bias exists within the variance present.

Linear regression					Number of obs	=	3,819
					F(14, 3804)	=	109.86
					Prob > F	=	0.0000
					R-squared	=	0.2725
					Root MSE	=	2.3909

ln_gross_i~e	Coefficient	Robust std. err.	t	P> t	[95% conf. interval]		
gender_ratio	.1601216	.2325385	0.69	0.491	-.2957906	.6160338	
avg_vote	.5822706	.0471889	12.34	0.000	.4897525	.6747886	
ln_budget	.3291211	.038557	8.54	0.000	.2535268	.4047155	
duration	.0454215	.0028375	16.01	0.000	.0398584	.0509846	
totalcastn	-.7685362	.1522051	-5.05	0.000	-1.066948	-.4701248	
adventure	-.0867714	.1893853	-0.46	0.647	-.4580778	.2845351	
animation	1.774646	.1466156	12.10	0.000	1.487193	2.062099	
biograph	-1.54909	.1698019	-9.12	0.000	-1.882002	-1.216179	
comedy	-.7331814	.110035	-6.66	0.000	-.9489147	-.5174481	
crime	-1.808314	.1720796	-10.51	0.000	-2.145691	-1.470937	
drama	-2.143191	.1242038	-17.26	0.000	-2.386704	-1.899679	
family	-.5331395	1.264134	-0.42	0.673	-3.011586	1.945307	
fantasy	.18987	.3469455	0.55	0.584	-.4903472	.8700872	
other	-.7159287	.212131	-3.37	0.001	-1.13183	-.3000273	
_cons	9.704284	.7424521	13.07	0.000	8.248642	11.15993	

Table 2. The Robust Standard Errors Regression

Per the full model results, with every one percentage point increase in gender ratio, the revenue increases by 4.86%. This result supports the initial hypothesis that the higher the gender ratio, the higher the revenue. However, this data point lacks statistical significance. When

looking at the main model, the results state that with every one percentage point increase in gender ratio, the revenue decreases by 6.69%, with a significance level of 5%. The switch of the coefficient's sign is due to omitted variable bias. Omitted variable bias occurs when a model overestimates or underestimates a relationship due to the absence of a variable. The association is more significant within this study without the omitted variable; therefore, the relationship is overestimated. Additionally, there are more dummy variables than there are control variables. The model obtains bias by not including the genre dummy variables.

```

regression table
-----
                baseline m-1    main model    full model
-----
gender_ratio    -1.087***      -0.669**     0.0486
                (0.250)              (0.235)      (0.228)

ln budget              0.381***     0.330***
                (0.0380)          (0.0357)

duration              0.0476***     0.0590***
                (0.00250)          (0.00251)

totalcastn          -0.735***     -0.702***
                (0.181)              (0.169)

adventure              -0.0528
                (0.219)

animation              2.400***
                (0.220)

biograph             -1.207***
                (0.223)

comedy                -0.645***
                (0.119)

crime                 -1.604***
                (0.179)

drama                 -1.950***
                (0.132)

family                -0.281
                (1.101)

fantasy                0.293
                (0.510)

other                 -0.771***
                (0.189)

cons                  16.20***      12.18***      11.54***
                (0.110)          (0.810)      (0.768)
-----
N                    3823           3823           3819
adj. R-sq            0.005           0.126           0.233
AIC                   18709.4         18214.7         17699.6
BIC                   18721.9         18245.9         17787.1
-----
Standard errors in parentheses
Source: movies.dta
* p<0.05, ** p<0.01, *** p<0.001

```

Table 3. The Main Regression Table.

Conclusion

This study aimed to identify a positive relationship between gender ratio and revenue within a film. A lack of female representation has been an ongoing debate and issue across many

entertainment sectors. This study added the genre element to locate further where female-identifying actors were being represented.

The study concludes that gender ratio has no impact on a movie's revenue - this conclusion rejects the initial hypothesis. These findings support the previous research done by Luoying Yang, Zhou Xo, and Jiebo Luo. However, the film industry is seeing a historic increase in female representation. In 2019, the percentage of female leads rose to 43% - the highest percentage in over a decade. Additionally, 17% of movies portrayed a woman of color in a lead or leading role (Annenberg Inclusion Initiative, 2020, p. 26).

Following this study, there is potential to expand to a behavioral economic approach - sample individuals would view different media portraying female actors. Possible questions include if they would go to the box office and pay money to see entertainment like that. There is also potential for focus groups. Further questions have: why are women a minority within the film industry, why are there more male leads if there is no relationship with revenue, and what are the effects of gender-swapping movie roles? A potential answer to the first question is that there is an imbalance in the biological sex of creators behind-the-scenes of most films (Smith, 2010, p. 15).

There can be a deeper evaluation of genre, which genre holds the most revenue, and if that branch of entertainment has a relationship with gender ratio and potential revenue. Additionally, the study was strictly binary - many identities lie between "women" and "men," and intersectional identities have a deep effect on one's representation. This type of evaluation could be used to show and expose misrepresentation across many different minorities - all of whom deserve to be seen. Further research can encourage a more inclusive society and entertainment industry for years to come.

References

- Annenberg Inclusion Initiative. (2020). *Inequality in 1,300 popular films: Examining portrayals of gender, race/ethnicity, LGBTQ & disability from 2007 to 2019*. University of Southern California, Annenberg School for Communication and Journalism.
<https://annenberg.usc.edu/news/research-and-impact/report-finds-popular-films-show-paltry-progress-toward-inclusion>
- Andris, S., & Frederick, U. (2009). *Women willing to fight: The fighting woman in film*. Cambridge Scholars Publishing.
- Bioglio, L., & Pensa, R. G. (2018). *Identification of key films and personalities in the history of cinema from a western perspective*. *Applied Network Science*, 3(1).
<https://doi.org/10.1007/s41109-018-0105-0>
- Brown, J. A. (2016). *Dangerous curves: Action heroines, gender, fetishism, and popular culture*. University Press of Mississippi.
- Dellatto, M. (2018, December 12). *Movies starring women make more money, study says*. New York Post.
<https://nypost.com/2018/12/11/movies-starring-women-make-more-money-study-says/>
- Dutt, R. (2014). *Behind the curtain: Women's representations in contemporary hollywood*. MEDIA@LSE MSc Dissertation Series.

- Essig, L. W. (2014, May 4). *A content-analytic meta-analysis of gender stereotyping in screen media*. BYU ScholarsArchive.
<https://scholarsarchive.byu.edu/cgi/viewcontent.cgi?article=8328&context=etd>.
- Mulvey, L., & Rogers, A. B. (2015). *Feminisms: Diversity, difference and multiplicity in contemporary film cultures*. Amsterdam University Press.
- Plunkett, J. W. (2010). *Plunkett's entertainment & media industry almanac 2011: Entertainment & media industry market research, statistics, trends & leading companies*. Plunkett Research.
- Sedgwick, J. (2007). *An economic history of film*. Routledge.
- Smith, S. (2010). *Gender oppression in cinematic content? A look at females on-screen & behind-the-camera in top-grossing 2007 films*. University of Southern California, Annenberg School for Communication and Journalism.
- Vine, L. L. (2019). *Introducing ladies first: 13 decades Of women saving hollywood from itself*. Refinery 29.
<https://www.refinery29.com/en-us/2019/12/8901028/ladies-first-women-in-hollywood-history>
- Vogel, H. L. (2020). *Entertainment industry economics: A guide for financial analysis*. Cambridge University Press.

Wolf, J. (2021, April 22). *2021 hollywood Diversity Report: Audiences showed up for diverse films in theaters, online*. UCLA. Retrieved March 17, 2022, from

<https://newsroom.ucla.edu/releases/2021-hollywood-diversity-report>

Women's Media Center. (2017). *The Status of Women in the U.S. Media 2017*. Geena Davis Institute on Gender in Media.

<https://seejane.org/research-informs-empowers/other-research-resources/>

Yang, L., Xu, Z., & Luo, J. (2020). Measuring female representation and impact in films over time. *ACM/IMS Transactions on Data Science*, *1*(4), 1–14.

<https://doi.org/10.1145/3411213>

Yarbrough, T. R. (2020). Don't Be Afraid of Failure. *Microeconomics* (pp. 15–17). Kendall Hunt Publishing Company.

Yarbrough, T. R. (2020). Down the Rabbit Hole. *Microeconomics* (pp. 17-19). Kendall Hunt Publishing Company.