

# Mind the Gap: An Empirical Analysis of Pay Discrimination in Hollywood

## Abstract

This paper uses a rich panel data set including 178 female and male actors in 973 movies released between 1980 and 2019 to explore a potential gender pay gap in Hollywood's movie industry. Our analysis explicitly distinguishes between an explained and an unexplained gender pay gap. Only the latter can be referred to as "discrimination." Our study reveals a pay gap between female and male actors. Yet, gender-specific representation in leading roles and systematic differences in performance measures can explain this pay difference. While female actors' underrepresentation in leading roles reflects consumer tastes and discriminatory attitudes, no evidence can be found for direct pay discrimination in Hollywood's movie business.

**Keywords** Gender pay gap, Blinder-Oaxaca decomposition, Entertainment industry, Hollywood, Pay discrimination

**JEL classification** J31 | J71 | L82

*"To every woman who gave birth, to every taxpayer and citizen of this nation, we have fought for everybody else's equal rights. It's time to have wage equality once and for all. And equal rights for women in the United States of America."*

Patricia Arquette

OSCAR Ceremony 2015 (Luther *et al.*, 2017, p.168)

## Introduction

In 2015, Patricia Arquette used her speech at the annual Academy Award ceremony for the best-supporting actress to address a topic that had not been associated with Hollywood's movie business before: the systematically unequal pay of women and men. Later, many famous female actors<sup>1</sup> raised their voices to support Patricia Arquette's argument (e.g., Rogers, 2015; The Telegraph, 2015), creating a media buzz that led the state of California to pass a law against labor discrimination in the movie industry in 2016 (Evans 2016; Gershman 2016).<sup>2</sup>

Undoubtedly, a gender pay gap in Hollywood means more than just a difference in the remuneration of male and female actors: Hollywood movies shape culture and, thus, have a significant societal impact (De Pater *et al.*, 2014; Ezzedeen, 2015). Pay information of Hollywood actors is publicly available and can be accessed on several online databases, such as IMDb or Box Office Mojo. If "pay discrimination" existed in Hollywood's movie business, visitors of these databases would agree with the opinion expressed by Patricia Arquette without considering that other factors apart from gender may play a role in determining the individual actors' pay level.

However, do female actors earn significantly less than their male colleagues? And if so, what would be the practical relevance of a gender pay gap in such a small and exclusive labor market as Hollywood's movie star business?

Public press reports and anecdotal evidence, such as the Forbes List, perpetuate the impression by contrasting male and female actors' pay. Despite the media buzz following

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<sup>1</sup> Note that we henceforth use 'actor' for both female and male actors.

<sup>2</sup> This law was later removed because IMDb sued California stating that the law was unconstitutional.

Patricia Arquette's speech and the significance of Hollywood's movie business, no longitudinal study documents a systematic gender pay gap in this industry. So far, only De Pater *et al.* (2014) have analyzed the impact of gender and age on Hollywood actors' average earnings per film. While this study overlaps with our research approach, it relies on cross-sectional data, and thus, its implications are limited.

Therefore, a comprehensive empirical analysis would shed light on the discussion about the gender pay gap in the creative industry. Moreover, the factors that impact movie stars' salaries are likely to influence the pay of other top performers, such as athletes, executives, and academics (Chisholm, 2004). Hence, the repercussion chain of systematically unequal treatment of female and male actors would be significant. On these grounds, the present study seeks to identify and explain a possible gender pay gap in Hollywood's movie business.

From a research point of view, analyzing the pay of Hollywood's actors yields some advantages over pay data available for other industries: First, by using the salary information of Hollywood actors, we restrict the analysis to a relatively homogenous group of workers. Second, the actors' human capital endowments are publicly available, and their past performance (e.g., box office revenues or the number of movies they appeared in) can be measured precisely. Third, the efforts of individual actors performing in a particular movie are (more or less) equal, i.e., the time and energy that actors spend on acting in a film are roughly the same, eliminating the possible impact of differences in working hours and other productivity-related factors. Previous analyses of the gender pay gap have shown the difficulties of including adequate productivity measures that significantly explain gender differences in remuneration (e.g., Kunze, 2008; Sauermann, 2016). These data advantages are essential since they enable us to develop a model that includes many factors that potentially affect the magnitude of the gender pay gap.

Our study is based on information on 178 Hollywood actors who appeared in 973 different movies in the period 1980 thru 2019. Ours is the first Hollywood study relying on a rich panel

data set that includes various measures of the human capital of the different individual actors. Our theoretical contribution applies classic labor economics reasoning to explain pay determination in Hollywood's movie business. First, we introduce traditional labor economics approaches used to explain the gender pay gap and discuss them in the context of Hollywood's specific labor market. We then derive three hypotheses that we test using a random-effects model and the Blinder (1973)-Oaxaca (1973) decomposition approach. We distinguish between a fraction of the gender pay gap that can be explained and another fraction that cannot be explained. Only the latter can indicate pay discrimination (Blinder, 1973; Oaxaca, 1973). Hence, only the unexplained residual typically obtained by estimating two standard Mincer-type earnings functions is due to discriminatory pay practices. In a model that lacks adequate productivity measures, the unexplained residual might result from an omitted variable bias, leading to inadequate implications and false policy measures.

Our analysis reveals that female actors earn significantly lower salaries than male actors. However, nearly three-quarters of this pay difference can be explained by differences in productivity; the remaining unexplained gender pay gap does not achieve statistical significance. We find that female actors' (past) performance and their lower representation in leading roles explain most of the observed gender pay gap. While the concentration of female actors in supporting roles might be driven by consumer tastes and reflect discriminatory attitudes, it can also be caused by the individual actors' preferences for specific roles. Hence, we do not find any evidence of pay discrimination in our analysis using a rich panel data set and measuring individual productivity as the primary driver of pay differences. It has, therefore, a substantial signaling effect in the public discussion about a gender pay gap in Hollywood by providing systematic empirical findings to a debate that has thus far been dominated by anecdotal evidence and media buzz.

## Hollywood's Labor Market

Actors can be seen as free agents whose pay reflects their market value (De Pater *et al.*, 2014). Assuming equal time and energy spent on acting in a movie, we can construct precise productivity measures, a requirement for decomposition techniques to discover pay discrimination (Weichselbaumer and Winter-Ebmer, 2005; Amado *et al.*, 2018). Furthermore, we observe a relatively homogenous group of workers doing the same job in the exact location (Dean, 2008). Therefore, controlling performance is suitable since a large body of data from movie records provides detailed information on the respective actors. Thus, Hollywood's labor market offers a unique environment to study potential pay discrimination by gender.

We use different approaches from classic labor market theory to analyze Hollywood's movie business concerning a potential gender pay gap to derive testable hypotheses. These approaches are differences in human capital endowments, the family or motherhood gap, and vertical and horizontal segregation (see Figure 1 for a synthesis of our literature review). Apart from these approaches, we present the economic theory of discrimination as a valuable tool to explain the fraction of the gender pay gap that remains unexplained after having controlled for the relative impact of differences in human capital, the motherhood gap, and the relevance of horizontal as well as vertical segregation.

*[Figure 1 about here]*

First, according to human capital theory (Becker 1962, 1993), rational utility-maximizing individuals invest in the acquisition of skills until the (expected) marginal costs are equal to the (expected) marginal returns in the form of higher wages. This model has been translated by Mincer (1963) into a so-called "earnings function" that can be estimated contingent on the availability of adequate cross-section or panel data. The dependent variable – the observable variation of the natural logarithm of individuals' (hourly, monthly or annual) pay – is then explained by differences in these individuals' human capital endowments. The regression coefficients are then interpreted as the returns to, e.g., the number of years of schooling or labor

market experience. Until recently, women invested less in acquiring general and specific skills and earned lower salaries. Thus, *gender differences in human capital endowments* and their returns explain the observable pay differences between women and men and, thus, the gender pay gap (Polacheck, 1981; Le Grand, 1991; Barron *et al.*, 1993; Edin and Richardson, 2002; Bishu and Alkadry, 2016). In this perspective, graduating in a typically male (e.g., engineering) versus a typically female (e.g., nursing) discipline and other gender differences in formal training (Blundell *et al.*, 2021) are among the most critical determinants of a gender pay gap.

In Hollywood's labor market, gender differences in educational attainment can potentially explain differences in pay. Actors graduating from a prominent drama school can receive higher remuneration due to their better formal qualifications. Moreover, accolades such as the Academy Awards signal superior skills to the labor market, allowing the person to command higher compensation. Simonton (2004) has shown a gender-specific pattern regarding the impact of such an accolade. His analysis of movies that won the Oscar for Best Picture between 1936-2000 shows that exceptional acting performances by women are less likely to be linked with outstanding films than exceptional acting performances by men. This phenomenon is called the "Best Actress Paradox."

Finally, age can be considered a substitute for an individual's experience and usually has an inverted U-shaped form concerning salaries. This relationship should also be found in Hollywood's labor market. However, De Pater *et al.* (2014) found a gender-specific pattern: female actors' pay decreases more as age increases than male actors' pay. To summarize, *differences in human capital endowments and labor market experience* will likely play a role in Hollywood's labor market. They have, therefore, the potential to explain the observable differences in female and male actors' fees.

Second, the so-called *family gap* is often considered an essential driver of the gender pay gap (Waldfogel, 1998; Grimshaw and Rubery, 2015; Cukrowska-Torzecka and Lovasz, 2016; Azmat and Ferrer, 2017; Cukrowska-Torzecka and Matysiak, 2020). The concept assumes

human capital depreciation due to a career interruption following childbirth (Becker, 1962, 1993). The younger the children, the more significant the detrimental pay effect for mothers; the same is actual for mothers taking a career break of more than two years (McIntosh *et al.*, 2012). While women are being paid less when returning to the labor market, married men have been found to receive a paid premium once they have children (Jacobsen and Rayack, 1996; Loh, 1996; Lundberg and Rose, 2000; Weeden *et al.*, 2016; Fuller and Cooke, 2018, Luhr, 2020). Particularly relevant for our study is that the fatherhood wage premium is the largest for top earners compared to low- or middle-income groups (Glauber, 2018).

In Hollywood's labor market, the depreciation of females' human capital due to motherhood likely occurs through media exposure. Female actors with children are often portrayed in the media as less attractive and, at the same time, bound to their mother's role. The public perception of male actors as fathers is associated with more favorable traits like, e.g., vitality and robustness. This might ultimately impact the market value of actors and, hence, their salaries. Treme and Craig (2013) found that media exposure of male and female actors is tied to the box office revenues of their movies. They further reveal gender-specific patterns disfavoring women. Thus, the *family gap* may influence female and male actors' pay in Hollywood and should be considered in the analysis.

Third, further research suggests that the gender pay gap is attributable to *occupational (vertical and horizontal) segregation*. Horizontal segregation depicts the phenomenon of typically male-dominated industries and female-dominated sectors. Male-dominated sectors are capital-intensive and well-paying, while female-dominated sectors, such as the healthcare industry, often imply lower salaries (e.g., MacPherson and Hirsch, 1995; Wrohlich, 2017; Meara *et al.*, 2020). Bishu and Alkadry (2016) confirm the role of horizontal segregation in explaining the gender pay gap. Moreover, they also find that women moving from traditionally female-dominated to male-dominated industries cannot close the pay gap.

Our data set includes female and male actors who have passed the "glass ceiling." Thus,

segregation occurs only in a narrow corridor that might be responsible for gender differences. Different movie genres might be considered proxies for either male or female-dominated sectors. Male-dominated genres such as action might pay more than female-dominated ones like, e.g., romantic comedies. Consistent with this argument, Fleck and Hansen (2016) found gender-specific assignments to the different genres in Hollywood.

In contrast, vertical segregation alludes to the different hierarchical ranks women and men occupy within an organization, with women typically holding lower-level positions (Wrohlich, 2017). A leading versus a supporting role in a movie stands for the different hierarchical ranks in an organization. Fleck and Hansen (2016) also reveal gender-specific patterns in assigning these roles. Thus, gender-specific segregation in specific movie genres and role types should impact individual salaries in Hollywood's labor market.

Summarizing the theoretical arguments for a gender pay gap outlined above and taking Hollywood's specific labor market into account, our first and second hypotheses read as follows:

**H1:** *Female actors are paid significantly lower salaries than their male counterparts.*

**H2:** *The gender pay gap is explained by human capital endowments, family background, and representation in specific genres and movie roles.*

Given the media buzz around gender pay discrimination and female actors' accusations, we conjecture that a fraction of the gender pay gap cannot be explained by the abovementioned approaches and may be based on discriminatory attitudes and behavior. According to Becker (1971), many individuals have a "taste for discrimination", leading to different labor market outcomes. At the same time, Arrow (1971) and Phelps (1972) developed the theory of statistical discrimination to explain (employers' and/or consumers') discriminatory attitudes. Non-economic theories of discrimination add to the theories mentioned above by including psychological factors causing discriminatory preferences (e.g., Bertrand *et al.*, 2005). Hence, based on the notion of the prevalence of discrimination, we derive (and subsequently test) our

third hypothesis:

**H<sub>3</sub>:** *The pay gap between female and male actors cannot be fully explained and is thus, gender-biased.*

## Data and Model

### *Data Set and Descriptive Statistics*

Our data sample consists of 178 actors who appeared in 973 movies between 1980 and 2019. We concentrate our analysis on the North American movie market, that is, on films first released in North America. Data were obtained from the online databases IMDb and Box Office Mojo. Both platforms are widely acknowledged and highly regarded sources of Hollywood data and have already been used in several prior cinema studies (Treme and Craig, 2013; De Pater *et al.*, 2014; Ezzedeen, 2015).

Our data set includes an actor's fee for their appearance in a particular movie. In addition, we have included whether the respective actor was entitled to a variable bonus share depending on the movie's gross box office receipts. Further, the data set contains information on the individual movie's characteristics, including release date and genre. The movie genre was assigned according to Box Office Mojo's genre categorization. Furthermore, our data includes whether the actor had a leading role and whether the movie was a sequel or prequel in a series of films.

The data set also includes whether the respective actor had been awarded an Academy Award, i.e., the Oscar for the previous leading or supporting role. The data set further includes human capital variables of the respective actor, i.e., gender, age, college, high school, or drama school degree. We also included information on the actor's marital status (married and divorced) and the number of children. Moreover, the total number of movies the actor had appeared in, the aggregated gross box office receipts in North America, and the respective movie's production budget are included in the data set. Summary and descriptive statistics for all

variables used in our empirical analysis can be found in Table 1.

*[Table 1 about here]*

Of the 973 observations, 622 are from actors and 351 from actresses. The mean salary for appearing in a movie is 10,100,00 USD for actors and 5,741,199 USD for actresses suggesting that the male mean fee is almost twice as large as the average female fee. The minimum salary is 38 USD (male) and 1,600 USD (female), while the maximum is 75,000,000 USD (male) and 35,000,000 USD (female).<sup>3</sup> The release date of the oldest movie in the data is 21 March 1980, while the latest release date is 12 September 2019.

Starting with the variables reflecting the individuals' human capital, the mean age of male actors is 39.2 years and that of female actors 34.5 years. The youngest actor in the data set is seven years old, female, and the most senior actor is 81 and female.<sup>4</sup> Figure 2 shows the approximately normal distribution of female and male actors' observations over the different age groups.

*[Figure 2 about here]*

Most male and female actors have graduated from high school; only 2.4% (4.6%) of the male (female) actors are high-school dropouts. 55.5% of the male actors have graduated, while the respective share is 47.9% for female actors. Additionally, 42.0% of the male actors have attended drama school. This respective value for female actors is 39.3%. Among the male actors, 8.0% have been awarded one Oscar for the leading role. This value is significantly higher among female actors with 15.4%. Two awards went to 1.4% of the male and 4.3% of female actors. Looking at the Oscar awards for the supporting role, 8.0% of the male and 10.5% of the female actors have been successful.

Continuing with the variables reflecting a possible family gap, 39.1% of the male actors are

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<sup>3</sup> Brad Pitt officially got 38 USD for acting in the movie 'Less than Zero' in 1987, Tom Cruise got for 'Mission Impossible II' and 'Mission Impossible III' a salary of 75,000,000 USD, respectively.

<sup>4</sup> Drew Barrymore was seven years old when he played in the movie 'E.T. - The Extra-Terrestrial.' Mary Wickes was 81 years old when she played 'Sister Act.'

single, while this is true for 40.5% of the female actors. Slightly more than 60% (48%) of all male (female) actors are in their first marriage. More than 78% of all male actors have never been divorced; the respective share is 57% for female actors. Regarding children, the dominant number is three among male actors (24.3%) and two among females (26.2%).

Considering the variables that may reflect segregation, men and women appear equally often in a prequel or sequel movie in a series of films (15.1% vs. 14.8%). Male (female) actors have played a leading role in 92.6% (84.3%) of the observations. Moreover, most male appearances are in action movies (34.3%), while most female appearances are in comedies (34.5%).

Regarding performance controls, 6.8% of the male appearances are associated with a variable bonus payment, while this share is far lower among the women with 2.3% only. Male actors have previously appeared in 21 movies, women in only 18. The average production budget of movies with male appearances is 70,900,000 USD, exceeding the value of the movies with female appearances (52,500,000 USD). The mean domestic box office receipts of the last movie with male actors are 99,900,000 USD, while for women, the respective figure is lower at 54,400,000 USD.

Table 2 displays the correlation matrix. Apart from the expected high correlation between age and the number of previous movies, the coefficients show that multicollinearity is not a serious concern.

*[Table 2 about here]*

### *Model and Analysis*

Our analysis consists of two steps: First, we estimate a random-effects generalized least squares regression model, a Mincer-type earnings function with the actor's fee as the dependent variable.

Second, we decompose the model estimated in step one using the decomposition method

developed by Blinder (1973) and Oaxaca (1973) to distinguish the explained from the unexplained pay gap between female and male actors. Only the unexplained part of that gap can be considered the result of discrimination. Recent studies explaining the gender pay gap using this approach are, e.g., Combet and Oesch (2019), Calcagno and Montgomery (2021), and Paul *et al.* (2022).

### *Step 1: The Mincer Earnings Function in the Context of Hollywood's Labor Market*

According to the Mincer-type earnings function, the fees earned by Hollywood actors are determined by the individual's human capital, their family situation, the genre(s) they appear in, and the box office performance of the films. Thus, the model to be estimated is of the following general form:

$$\ln(\text{pay}_{it}) = \beta_0 + \beta_1 \text{female}_{it} + \beta_2 \text{human capital vector}_{it} + \beta_3 \text{family gap vector}_{it} + \beta_4 \text{segregation vector}_{it} + \beta_5 \text{performance controls}_{it-1} + u_{it} \quad (1)$$

where the *human capital vector* includes an individual's age in the linear and squared form to account for potential non-linear effects and variables reflecting the respective actor's educational attainment and Oscar awards, both for the supporting and the leading role, the *family gap vector* includes information on the individuals' marital status, i.e., if they are married or/and divorced, and the number of their children. The *segregation vector* includes the different genre categories, dummy variables for movies that are either sequels or prequels, and whether the actor had appeared in the leading role. Finally, *performance controls* indicate whether the actor was entitled to a profit share in the respective movie, how many movies they had already appeared in in the past, the production budget of the respective movie, and the gross accumulated box office receipts of the actor's last movie project in the North American market.  $u_{it}$  is the error term.

The dependent variable in our estimations is the natural logarithm of the actor's fee. Since our data comes from a long observation period covering almost 30 years, actors' fees, box office receipts, and production budgets were adjusted for inflation before estimating the regression

model.

Female is our main covariate of interest. By adding age (as well as its squared term), we investigate whether age (in line with the human capital theory) reflects experience or if an "age penalty" exists in Hollywood. This penalty should apply equally to both female and male actors. We also control education by including dummy variables reflecting graduation from high school, college, and drama school. We conjecture that general and specific training increases an actor's abilities. Furthermore, we include a dummy variable reflecting whether an actor has ever been awarded an Oscar for the leading or supporting role. These latter variables reflect the talent and an actor's popularity and should impact one's market value and salary.

Being married, divorced, and having several children reflects an individual actor's family background. The literature on the gender pay gap suggests that women with children often suffer from a pay penalty (e.g., Fuchs, 1989; Korenman and Neumark, 1992; Waldfogel, 1997; Waldfogel, 1998; Molina and Montuenga, 2009, Grimshaw and Rubery, 2015; Fuller, 2018; Frodermann *et al.*, 2020, Hook and Paek, 2020). Hence, we include these variables to capture the potential effects of family background on one's salary.

We further include dummy variables for the different movie genres and distinguish between comedy, horror, drama, action, and thriller. In our analysis, the genre reflects horizontal segregation as it shows the representation of male and female actors in certain branches, which might impact the actors' pay. We also include a dummy variable reflecting whether the respective movie is a sequel or a prequel in a series of films. This measure also refers to horizontal segregation. Appearing in this type of movie is likely to increase actors' pay because it is essential that they "stay on board" for future films. Additionally, we include a dummy for the leading role, which we expect to drive an individual's pay.

Finally, we assume that the success of the actor's last project determines the individual's market value and, thus, one's pay. Therefore, we add the lagged number of movies the actor has appeared in as a control variable and the natural logarithm of the total domestic gross box office.

A movie's production budget may be linked to an actor's pay because higher budgets can lead to higher salaries and vice versa. We thus include the production budget of the respective movie as a control variable after correcting the budget by the respective actor's fee, which is usually included in the budget. We also control if an actor was entitled to a variable bonus depending on the movie's box office receipts.

The results of the random-effects regression are displayed in Table 3.

*[Table 3 about here]*

Overall, our model explains 42.8% of the observable variation in actors' remuneration per film. While being female is negatively associated with actors' pay, the respective coefficient fails to reach conventional levels of statistical significance, suggesting no (direct) discrimination by directors and/or producers. However, the coefficients of age and age<sup>2</sup> are statistically significant, showing a typical curvilinear inverted u-shape with a turning point at 47 years, beyond which fees decline again. This applies to both female and male actors' fees. Awarding an Oscar for the leading role is linked to a salary increase of about 25 percent. None of the coefficients of the family status variables are statistically significant, suggesting that they are irrelevant to an actor's pay.

According to our point estimates, appearing in the leading role is associated with a roughly 120 percent pay premium. Among the different movie genres, only drama is significantly and negatively linked to an actor's salary (with "horror" being the reference genre).

Finally, all the performance variables included in the estimation turned out to be statistically significant. Since remuneration and production budget are both in logs, the coefficient can be interpreted as an elasticity, suggesting that an increase in the budget by one percent leads to an increase in actors' pay by about 0.5 percent. Similarly, a one percent increase in the last movie's accumulated gross box office receipts in North America increases an actor's salary by 0.1 percent. Furthermore, each movie an actor has played in in the past increases that individual's fee by about 4.5 percent.

### *Step 2: Identifying the Gender Pay Gap*

In the economics literature, pay discrimination has traditionally been identified using counterfactual decomposition techniques, e.g., asking what women would have earned if they had the productivity-related characteristics of men. Thus, only the differences in pay that differences in productivity-related traits cannot explain are interpreted as discrimination. Blinder's (1973) and Oaxaca's (1973) pioneering work in this domain decomposes these differences at the mean for the whole distribution. This allows identification of how much of the mean outcome difference is due to differences at the group-specific means of the regressors  $X_\ell$  (the "endowment or quantity effect"), and how much of the mean outcome difference is not explained (the unexplained part). The latter residual is usually referred to as discrimination. It may, however, also capture all the potential effects of differences in unobserved variables. The Blinder-Oaxaca (1973) decomposition has been widely applied in the economics literature in various contexts. In a recent study, Combet and Oesch (2019) used the Blinder-Oaxaca decomposition to analyze the wage gap between Swiss graduates and young adults to assess the effect on children. In another study, Calcagno and Montgomery (2021) applied the Blinder-Oaxaca decomposition to investigate the gender wage gap among members of Congress. Although Congress pushes laws and regulations for equal pay, Calcagno and Montgomery (2021) identified a gender wage gap among the members of Congress similar to the one prevailing in the private sector. Also, using the Blinder-Oaxaca decomposition, Paul *et al.* (2022) showed that the interaction between race and gender explains gender wage differentials because black women suffer from exceptionally high wage penalties.

Table 4 displays the results of the Blinder-Oaxaca (1973) decomposition technique based on our Mincer earnings function (Table 3). It shows the decomposition results, the mean pay predictions for male and female actors, and the differences.

*[Table 4 about here]*

The mean of the logarithm of pay is 15.682 for men and 15.034 for women, yielding a pay

gap of 0.648. Hence, this result confirms Hypothesis  $H_1$  (*Female actors are paid significantly lower fees than their male counterparts.*).

The explained gap's first part would reflect the mean increase in women's wages if they had the same endowments as men. The value of 0.473 suggests that differences in endowments account for nearly three-quarters (72.9%) of the average gender pay gap. Table 4 indicates that the explained part of the gender pay gap is mainly due to differences in age (as a proxy for experience), the performance characteristics of the movies, and the individuals' representation in leading roles. The award of an Oscar for the leading role reduces the gender pay gap, indicating a female advantage. Table 4 further reveals that no family background and education variables explain the pay gap between female and male actors. Likewise, neither the representation in specific movie genres nor prequel and sequel movies explains the gender pay gap. Thus, we can only partially accept  $H_2$  (*The gender pay gap is explained by human capital endowments, family background, and the representation in specific genres and movie roles.*).

Lastly, the unexplained gap is 0.176 only, accounting for 27.1% of the observable gender pay gap. Moreover, this unexplained part of the gender pay gap is statistically insignificant. Therefore, we can finally reject our hypothesis  $H_3$ : *The pay gap between female and male actors cannot be explained and is, thus, due to discrimination.* Instead, the results of the Blinder-Oaxaca (1973) decomposition suggest that the gap is primarily due to differences in individual experience (measured by the number of previous movies) and the characteristics of these movies (budget and box office returns). If pay discrimination existed in Hollywood, the unexplained pay gap would be statistically significant, which is not the case.

To check the robustness of our results, we estimated the same model using a quantile approach with the standard quantiles (.10, .25, .59, .75, .90), confirming the findings reported above. We also calculated the threefold version of the Blinder-Oaxaca (1973) decomposition technique, avoiding the Index Number Problem, which is typically an issue when using the twofold version (Jann, 2008). Our results remain consistent.

## Discussion and Implications

Ravid (1999) states that an actor's earnings reflect market value. Therefore, it is not surprising that a potential gender pay gap in Hollywood's movie business has recently attracted a lot of (media) attention (e.g., Rogers, 2015, Evans 2016). Several female actors complained of being paid systematically less than their male counterparts. Since Hollywood's movie business is subject to considerable public attention, a pay gap – presumably due to discrimination – would have significant societal consequences.

Our study confirms a statistically significant difference in the mean salaries of female and male actors, of which nearly three quarters (72.9%) can be explained. Our results suggest that female actors are paid less due to their under-representation in leading roles, their lower number of appearances, and the poorer box office performance of the movies they have appeared in, but not because they are directly discriminated against. Since Goldberg *et al.* (2004) have shown that gender has a significant effect on the compensation level of employees and that the salaries of men are higher than those of women even in the same occupation, the question arises why women are not offered more leading roles and appear in fewer movies over their careers?

Hiring decisions for Hollywood movies are made by gatekeepers, consisting of casting directors, producers and directors, agents, and lawyers, who are ultimately responsible for setting the context and targets of work, including scheduling, pay, and conditions (Blair, 2001). Actresses and actors rely on the support of these gatekeepers when being offered a role and negotiating their compensation for a specific movie project (Vogel, 2020). Many Hollywood gatekeepers are male (Erigha, 2020), and prior research has shown that men demonstrate a pro-male bias even in gender-mixed occupations (Erlandsson, 2019). Consequently, the movie industry's current economic and social setting can explain why the significant difference in the mean salaries of female and male actors still exists.

Our results have far-reaching, mostly political implications. Based on our results, we

answer the question asked particularly by the media, "Is Patricia Arquette wrong?" (Carroll, 2015; Newman, 2015) with a straightforward "Yes." However, while we do not find evidence of direct gender pay discrimination, we cannot rule out that female actors' under-representation in leading roles and the poorer box office performance of their movies reflect some sort of customer discrimination (Treme and Craig, 2013, Ezzedeen, 2015).

Our study, therefore, suggests that more female actors in leading roles would reduce the gender pay gap. Storyboard writers and producers in Hollywood should therefore design film projects accordingly. Moreover, since experience in the number of previous appearances contributes positively to actors' fees, female actors must stay in business to accumulate similar levels of human capital as male actors. Thus, more roles should be made available for already experienced female actors. Accordingly, an important implication for practice is that the labor market and, most notably, the labor allocation process for professional actors should be adjusted (Dean, 2005).

Movie production studios could institutionalize 'self-regulating' behavior by establishing rules and practices that prevent or impede the prevailing discriminatory culture and hiring policy. The film industry has already attempted to implement such a 'self-regulating' rule by introducing a public (anonymized) catalog recording payments and benefits (Van Syckle, 2018). This practice can shed light on hiring practices within the industry and enable the community of movie practitioners to exchange their knowledge and contribute to current equality and discrimination issues.

## Concluding Remarks

In this paper, we estimated a Mincer-type earnings function using a dataset of 178 actors appearing in 973 movies between 1980 and 2019 and a wide range of human capital and family background variables, performance measures, and movie characteristics. Applying the Blinder-Oaxaca (1973) method to decompose the pay gap into an explained and an unexplained part,

we shed light on the gender pay gap. Our main findings are threefold: (i) female actors receive significantly lower fees than male actors, (ii) several productivity-related characteristics of the individuals as well as the movie-specific characteristics explain most of this gap, and (iii) we fail to find evidence for gender pay discrimination. This is comprehensible as the production budget significantly determines a movie's (technical and visual) quality and gross revenues. Accordingly, the compensation of actors and actresses starring in blockbuster movies will likely be higher than those in independent or art house productions (Ravid, 1999).

Perhaps surprisingly, no longitudinal study on remuneration practices in Hollywood's movie business has analyzed the pay gap between male and female actors. The only comparable study is De Pater *et al.* (2014), who analyzed cross-section data and failed to find evidence of a gender pay gap. Yet, they revealed a gender pay bias in combination with age because fees decrease with age faster among women than among men. We cannot confirm this result using a panel data set including actors over a long period. We do not find evidence of direct pay discrimination based on gender in our data.

Another possible explanation for our findings is the scope of Hollywood's labor market. Our dataset includes an elite group of actors with high social prestige and publicity, that is, actors – female and male – who have successfully passed the "glass ceiling", above which men and women do not differ concerning wages and salaries. Signing a superstar like Meryl Streep is equally expensive for a producer than signing Tom Cruise. Thus, pay discrimination can be an issue below that level of prominence and public exposure, i.e., below the glass ceiling that more men than women have climbed in Hollywood.

Admittedly, our analysis has certain limitations. First, our sample includes 36% female observations only. This low female share might reflect particular gender discrimination because access to Hollywood's elite is gender-biased. Second, some of our control variables may already reflect discriminatory hiring practices. A typical example is the movie genre's impact on the actors' fees, suggesting consumer discrimination. Additionally, selecting actors to be awarded

an Oscar has lately been blamed for being subject to discrimination (Levitt *et al.*, 2020). Despite these limitations, our study offers new insights into a world that has attracted substantial media and public attention.

It would be interesting to extend this analysis to comparable labor markets characterized by superstars, such as musicians and athletes, to see whether our findings can be confirmed or rejected. Another interesting approach is to analyze the ex-post effects of "Hollywood PR buzz" on the gender pay gap. Does a famous female actor's fee increase, remain unaffected, or even decrease following an interview about the possible reasons for the noticeable gender pay gap in a popular newspaper?

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