

Preliminary and incomplete

‘Plus Ça Change’: Gender, Age, and the Careers of Hollywood Actors

Robert K. Fleck
John E. Walker Department of Economics
Clemson University
Clemson, SC 29634
phone: (864) 656-3964
e-mail: rfleck@clemson.edu

F. Andrew Hanssen
John E. Walker Department of Economics
Clemson University
Clemson, SC 29634
phone: (864) 656-5474
e-mail: fhansse@clemson.edu

June 12, 2012

Abstract: The relationship between gender, age, and employment (and the potential for changing it) has interested scholars – and inspired activists – since the advent of the women’s rights movement. In this paper, we examine the gender and age mix for an unusually visible profession: acting in motion pictures. Analysis of almost a century of data produces some striking results. For example, the average (and median) ages of both male and female actors have increased by about eight years over the last 90 years, suggesting the importance of technologies that permit youthful appearance to be maintained longer (e.g., fancy gyms, Botox). Yet for the most part, the dominant pattern is one of stability. Of the nearly half-million different roles played in more than 50,000 feature films between 1920 and 2011, two-thirds have gone to males, and the gender gap is now slightly larger than it was in industry’s early years. Furthermore, although the average ages of both male and female actors have increased over time, the average male actor has consistently remained about eight year older than the average female actor. The fact that these patterns have held steady in the face of major changes to the film industry, and in society as a whole, suggests a corresponding stability in consumer preferences that has implications for understanding gender-specific labor market returns to youth and appearance.

“Plus ça change, plus c’est la même chose”
-Jean-Baptiste Alphonse Karr

I. INTRODUCTION

Economists have long been interested in how labor force participation varies with age and gender, and how such relationships may have changed over time.¹ For example, the relationship between age and productivity – implicit in the Mincer equation – appears to have shifted in response to technological advances that prolong life, improve health, and decrease the importance of physical labor. And, of course, female labor force participation has increased substantially relative to that of men over the last hundred years (e.g., Goldin 2006). The study of such changes can be challenging, however, because few industries provide the individual-level data necessary to study changes over time in age and gender mix.

We develop such an analysis in this paper, exploring an industry with abundant data on the age and gender mix of its most prominent workers: motion pictures.² We employ two main data sets. The first is drawn from the Internet Movie Data Base (IMDB), which provides a wealth of information on virtually every film ever made. We focus our analysis on U.S.-produced, non-documentary, non-animated, non-pornographic feature-length films released between 1920 and 2011, and on actors who appeared in a minimum of three such films. The resulting data set encompasses nearly 40,000 actors who played nearly half a million roles (and roughly 80,000 leading roles) in more than 50,000 different films.³ We also explore a second data set, which allows us to focus on the most popular motion picture actors (an important addition since we lack information on film grosses or actor salaries to match with the IMDB

¹ Rising earnings profiles over the life cycle are well-documented, due perhaps to rising productivity (e.g., Ben-Porath 1967; Becker 1975; Mincer 1974). Rising earnings profiles can also result from the design of incentive-compatible contracts (e.g., Lazear 1979)

² The non-economic literature on women in films is enormous, and the fact that relatively few major film roles are played by older women receives great attention in the popular press as well as in the academic literature. For an extensive bibliography, see Center for the Study of Women in Television & Film (2012).

³ We define a leading role as first or second place on the rank of actors that IMDB provides for each film. Any unranked actors (e.g., for an uncredited or very small appearance) are excluded.

data): The “Top Ten Moneymaking Stars,” as voted annually in an exhibitor’s poll (see Section III for details). This latter data set provides us with ten actors per year from 1915 through 2011; approximately 240 different actors in total.

Empirical analysis of these data leads us to several conclusions. First, the majority of roles (leading and other) are filled by men – roughly two-thirds of all roles on average. Women account for a relatively larger proportion of leading roles than of supporting roles (40 percent versus 28 percent), but are a minority in either case. Second, despite the dramatic rise in female labor force participation in many professions traditionally dominated by men, the proportion of film roles played by women has actually *fallen* somewhat over time, from 40-to-45 percent of leading roles in the 1920s and 1930s to about 35 percent today. Third, over the entire period, male actors have been approximately eight years older than female actors (whether mean or median age is considered). Fourth, not only do women tend to be younger than men on average, they start their careers (i.e., enter our data base) and finish their careers (i.e., leave our data base) at substantially younger ages than do men. These patterns appear to be largely invariant to changes in the motion picture industry – even such major changes as the conversion from silent to sound films, which brought an abrupt end to an unusually large number of acting careers (as we will document).

We attribute the striking persistence of these patterns to a corresponding persistence in genre preferences among paying customers – roughly half of whom are women.⁴ In essence, the vast majority of popular films (and, similarly, plays by Shakespeare, which we examine in Section III) have plots that involve one (or both) of two basic themes: “romance” and “action” (broadly defined, as we will explain). Films that have predominantly romance-centered plots tend to employ roughly equal numbers of men and women (not surprisingly), while action (and,

⁴ On the gender composition of moviegoers, see Motion Picture Association of America (2012).

more generally, most films without much romance) employ more men than women. And this has long been the case. As we will show, each of these genres manifests itself in a gender mix that is quite stable over time; furthermore, the mix of genres (as it pertains to gender mix) has been relatively stable over time, as well. With the overall gender mix's two key components (i.e., the gender mix within genres and the mix of genres) remaining stable, the overall gender mix has remained stable, too, despite the many changes in society and in the nature of the motion picture industry.

All that said, we do identify one major change: The average (and median) ages of both male and female actors have increased substantially over time. In 1920, the average age of male actors was 38 years; in 2011, it was 45 years. In 1920, the average age of female actors was 31 years; in 2011, it was 38 years. The average male lead was 35 in 1920 and 42 in 2011; the average female lead was 26 in 1920 and 35 in 2011. But note that while the ages of actors have increased, the male-female age gap has changed very little.

In addition to providing detailed information on labor market participation by age and gender over time, our analysis has implications for the literature on labor market returns to physical attractiveness.⁵ First, the persistence of gender-age patterns is consistent with the recent literature indicating that an appearance-based premium in the labor market may have quite fundamental origins in human nature, as suggested in the sociobiology literature (e.g., Wilson 2000). Psychologists and biologists have long noted the advantages of human beauty; for example, Dion, Berscheid, and Walster (1972) conclude that, in the absence of other information, experimental subjects attribute good qualities to attractive people and bad qualities to

⁵ On the role of physical attractiveness in the labor market, see, e.g., Hamermesh and Biddle (1994), Averett and Korenman (1996), Mobius and Rosenblat (2006). Also see Becker's (1971) classic work on discrimination.

unattractive people.⁶ The idea that beauty signals quality is, of course, nothing new; Sappho, the Greek poet of 2600 years ago, posited the existence of a fundamental relationship between beauty and goodness (*Fragment 101*).⁷ Second, the increasing age of actors has been accompanied by technological advances (e.g., plastic surgery, Botox, modern gym equipment, a better understanding of the effects of exercise) that allow a youthful appearance to be maintained longer. Following the logic of Barzel and Yu (1984), we would expect movie stars to have especially strong incentives to invest in such technologies; thus, there is reason to temper any optimism that the increasing age distribution of actors signals a disappearance of the youth/attractiveness premium.

This paper's results also help establish the effect (or lack thereof) of institutional changes on labor market outcomes (e.g., Barzel 1989). Where institutions alter transaction costs, they may be expected to change how activities are organized and carried out within and between firms, with corresponding implications for labor market participants. For example, if a specific type of organizational structure or contract serves as a mechanism around an incentive problem, its prohibition may have a substantial effect on the allocation of real resources (e.g., Barzel 1982, 1989; Milgrom and Roberts 1992). The motion picture industry has experienced dramatic technological innovations (including the coming of sound, which cut short the careers of major stars), intrusive regulation (including a production code and the *Paramount* antitrust case, which helped precipitate the end of the studio system), and various changes in the competitive landscape. Very importantly, however, the industry has allowed relatively unrestricted entry and has had many would-be entrants. Thus, if it ever held as a general rule that high-wage actors (say a young female star or middle aged male star) could be replaced with lower-wage actors

⁶ See Langlois et al. (2000) for a meta-analytic review.

⁷ For relevant biological models, see Maynard Smith (1982) and Maynard Smith and Harper (2003).

(say an older females) without reducing revenue, profit-seeking behavior would be expected to lead to such replacements, thus driving down the wages for the (initially) high-wage actors and driving up the wages of the (initially) lower-wage actors.⁸ In this light, we argue that consumer preferences over types of genres and characters have kept the gender mix and male-female age gap quite stable over time.

II. An Economic Perspective on the Market for Actors

The starting point for our analysis is the basic logic of competition described briefly in the Introduction. The motion picture industry has been subject to many technological, organizational, and regulatory changes (from silent to sound films, from no code to censorship, from studio system to post-studio system, the introduction of television, the advent of home video, and so forth).⁹ For each change, the question to ask is whether it would be expected to have a substantially different effect on the demand for one group of actors relative to another – that is, for men versus women, or for younger actors versus older actors.¹⁰ Ultimately, this is an empirical question, and is the subject of our analysis.¹¹

⁸ Even though the industry was for many years dominated by a relatively small number of highly vertically integrated firms, independent producers were still a major source of films shown in theaters – including theaters owned by the large, vertically integrated firms (Hanssen 2010). Thus, entry into the critical stage of the process – competition over actors' labor as an input – appears to have been relatively unrestricted. Second, although the compensation of actors has taken – and still takes – various forms, this does not remove competition for talented actors. Of course, none of this is to say that actors are uniformly paid their marginal product, or that actors may shirk and fail to deliver what they are paid to deliver. Rather, the key point is that we expect opportunity cost to matter throughout the period we study – whether roles are assigned by a studio with actors under long term contracts or instead through film-by-film negotiations between producers and individual actors, opportunity cost will matter. On how the nature of contracting in the film industry has changed over time, also see Weinstein (1998).

⁹ See, e.g., Hanssen (2002) for a discussion of the transition from silent to sound motion pictures. See DeVany and Eckert (1991), Hanssen (2000, 2010), and Kenney and Klein (1983) for discussions of contractual procedures in the old Hollywood studio system. See Weinstein (1998) for an analysis of actor contracts and changes over time; see Chisholm (1997) for more on actor contracts.

¹⁰ On the ways in which technological change can affect the labor market, see, e.g., Barzel (1964). On the links between technological change, institutional change, and the rise of women's labor force participation, see Geddes and Lueck (2002), Goldin and Katz (2002), and Fleck and Hanssen (2009).

¹¹ Note that we focus on quantities (i.e., on the number of roles broken down by age and gender) rather than prices, because we have no reliable measures of actors' compensation.

Similar reasoning can be applied to broader changes in society. Perhaps most obviously, real world gender roles are much different now than they were in the first years covered by our data set. For example, women can vote in all states, can fly combat missions for the U.S. military, and, more generally, have moved into many professions previously dominated by men. Furthermore, age-related aspects of gender roles have also changed: It is now far more common than before for women to marry (or not) later in life, to give birth for the first time in their forties, and to exercise vigorously (which helps to maintain an attractive, youthful appearance). Thus, to the extent that films mirror society, we should such changes reflected in films.¹²

At the same time, despite the changes in society, there is good reason to expect relative stability in actors' career patterns. The reason is quite simple: While particular entertainment genres may be particularly fashionable at particular points in time (sometimes westerns, sometimes science fiction, sometimes musicals), the plots of most films involve themes that have been popular (with male and female audience members) longer than the motion pictures have existed. One of these we will refer to as "romance" – broadly interpreted to include selecting, attracting, and keeping (or not) romantic partners. Another is what we will refer to as "action" – broadly interpreted to include such things as adventure, combat, athletic contests, and, more generally, heroic feats. Although the categories of "romance" and "action" are not all-encompassing, these broadly defined genres are perennially important.¹³ The apparently timeless

¹² The discussion above is, of course, not intended to be comprehensive. For example, the United States has experienced a large increase in per capita income over the long run, there have been periods of recessions, including the great Depression, along with a major change with respect to who earns the income – perhaps most notably from the increase in female labor force participation. To the extent that such changes had effects on demand for films – specifically effects that were heterogeneous with respect to genres that employed male actors versus female actors, or younger actors versus older actors – we would expect to see changes in the gender and/or age mix in the employment patterns of actors. Similar effects could arise from other events. If, for example, "peace and security" is a good that acts as a substitute to one movie genre and as a complement to another movie genre, then wars, threats of war, or crime waves would increase demand for the genre that is a substitute for peace and security, while decreasing demand for the genre that is a complement to peace and security.

¹³ To illustrate this point, consider Shakespeare's plays. His comedies (e.g., *A Midsummer Night's Dream*, *Twelfth Night*, *The Taming of the Shrew*, *The Tempest*) typically have a substantial romantic component. His famous

appeal of these themes should come as no surprise, given the degree to which human “success” (reproductive or otherwise) depends on competition over mates and wealth, along with the ability to defend one’s family and property against (potentially violent) threats. With the traditional norm that romance involves characters of childbearing age, human biology suggests an age range for romantic leads that ends earlier for women than for men.¹⁴ And given the traditional division of labor within society, it is unsurprising that most action-oriented characters are male.¹⁵

III. Empirical Analysis

We will analyze nearly a century of data on actors’ roles in films. Before beginning our analysis, it is essential to make clear that we cannot match our data to measures of salaries earned or film grosses generated – existing actor-level and firm-level financial data are insufficient to allow a meaningful comparison over time. We therefore focus on what *can* be compared over time: the number and types (i.e., leading versus supporting) of roles played by actors with different characteristics (gender, age). To focus more specifically on successful actors, we also analyze data on the “Top Ten Moneymaking Stars” of each year (we will discuss this data source in the next subsection).

Data sources

tragedies have action and (some) romance: *Hamlet*, *MacBeth*, *King Lear*, and *Romeo and Juliet* all have bloody deaths as well as wooing and/or the demise of marriages. Moreover, his histories (e.g., *Julius Caesar*, *Richard III*, and *Henry V*) have famous murder and battle scenes, and sometimes include romantic comedy. Later in this paper, we will compare the gender mix of roles in Shakespeare’s plays to the gender mix in films.

¹⁴ Note that this norm is apparent in the fact that so many great (and not so great) novels feature relatively young protagonists (and stories that typically end in marriage, or death): *Pride and Prejudice*, *Anna Karenina*, *Madame Bovary*, *The Great Gatsby*, and so forth. Meryl Streep provides an interesting perspective on this point. In an account of her interview with Streep, Woods (2011) writes:

In 1989, she turned 40. “I remember turning to my husband and saying, ‘Well, what should we do now, because it’s over.’” The following year she received three offers to play witches in different movies. She saw the subtext pretty clearly: “Once women passed childbearing age they could only be seen as grotesque on some level.”

¹⁵ In Section III, we examine whether that appears to be changing.

Our principal data source is the Internet Movie Database (IMDB). The IMDB makes an effort to provide data on all films ever released and distributed in the U.S. (it lists films that date back to the 19th century).¹⁶ We will focus on feature films, as opposed to film shorts; features have generated the vast majority of attention and revenue over motion picture history.¹⁷ The feature film did not appear in the U.S. until the second decade of the 20th century (initially in the form of imports from Europe).¹⁸ Our analysis will begin with 1920 (by which time the feature film was well-established) and run through 2011. We will include in our data set only feature films produced in the United States.¹⁹ We will exclude documentaries, animation, and pornographic films (the former two have no “actors” in the traditional sense; the latter may not either). We will also exclude from the data set actors who appeared in fewer than three films over the course of their entire careers (in order to focus on professional film actors). An actor’s age at the time of filming is an important variable, but year of birth is unreported for a number of less well-known actors; we exclude these actors from our analysis.²⁰

¹⁶ We updated our data set in May 2012, so that the analysis in this paper represents all but the most recent additions and corrections to the IMDB.

¹⁷ Short films are relatively rare today, but the film industry developed producing short films, and musical, comedy, and other shorts were a standard part of a night at the movies in the 1930s and 1940s. The famous Warner Brothers (Bugs Bunny) and MGM (Tom and Jerry) cartoons are examples, as are the comedies of the Three Stooges. See, e.g., Balio (1985); Hanssen (2000).

¹⁸ See, e.g., Balio (1985) on the emergence of the feature film.

¹⁹ We define a feature film as any film that is 1) at least 40 minutes long and 2) not identified as a “short” in the genre listings. Twenty-two percent of films had no run time listed and seven percent had no genre listed, but only five percent had no run time or genre listed. We include that five percent in our analysis; however, excluding them has no material effect on our results. We also include films produced jointly by several countries, as long as the U.S. was one of the producing countries (for example, *Good Night, and Good Luck*, a film about Edward R. Murrow starring David Strathairn and George Clooney, was a joint Japanese, French, British and American production). Such multi-country productions account for about ten percent of the roles in our sample.

²⁰ In order to reduce the problem of miscoded data, we focus on actors listed as between the ages of 10 and 90 at the time a film is produced. More generally, we exclude observations that do not allow reasonable measurement of ages. Our exclusion of very young (age 10 and younger) and very old (age 90 and older) automatically drops the vast majority of the obvious problems – this is the main purpose of our age-based exclusions, and it affects only a small proportion of the observations. We have also identified some cases in which actors are listed in films that were produced long after the actors’ performance took place (as can happen when old footage is mixed with recent footage in the same film); again, we have excluded these observations from our analysis. In short, although the data set we employ is almost certainly imperfect, we have found no evidence of extensive measurement problems, and we have excluded the problematic observations that we have identified.

Figure 1 provides an overview of the data set (the corresponding numbers are presented in Appendix A). The top of Figure 1 shows the number of films released by year for our sample period (1920-2011). As can be seen, that number was higher during the silent film era of the 1920s than in the following decades (silent films were cheaper than sound films to make), until the 1980s when video and then digital technology reduced the cost of filmmaking enormously.²¹ Comparing the 1920s to the 1930s in the second graph in Figure 1, one can see that despite the reduction in number of films, the number of roles increased with the coming of sound in the late 1920s – plots became more complicated once actors could speak. The bottom two graphs plot actors and roles per actor over time. As can be seen, actors had the most roles per year during the Hollywood studio era, which lasted until the late 1940s and was characterized by long term contracts between actors and studios. The number of roles per actor per year stabilized at about 1.5 (three films every two years) in the early 1950s, and has remained at that level ever since.

Very importantly, the IMDB provides the order in which actors are listed in each film’s credits, allowing us to distinguish roles by importance. We create two categories: leading roles, defined as the first two actors listed in the credits, and all ranked roles.²²

Although the IMDB data allow us to determine whether or not an actor played a leading role in a film, they do not allow us to determine whether that leading role was in a major film or a minor film – the data do not include measures of each film’s success.²³ Therefore, we also assemble information from a unique data source: exhibitor poll results listing the ten leading “money making” actors of every year. From 1915 to the present, *Motion Picture Herald*, a trade

²¹ Not all these films were released theatrically, and if a film was not released theatrically, its actors do not enter our data set.

²² The IMDB does not rank uncredited actors, or actors in films that are not released in theaters. As noted earlier, we exclude unranked actors from our analysis.

²³ The IMDB provides some information on gross revenues earned by a film, but except for recent years, only for a very small number of very famous films. It also provides occasional data on actor salaries (e.g., \$50,000 per film), but the data are usually not linked to specific films, and are provided only for major stars.

weekly, and its successor the *International Motion Picture Almanac*, have surveyed thousands of exhibitors annually.²⁴ A version of the following question was/is asked: “Please list the ten players whose pictures drew the greatest number of patrons to your theater over the last twelve months.”²⁵ Votes are tallied, and the actors are ranked according to number of votes received (order of ranking by individual exhibitors is disregarded).²⁶ If one is willing to assume that exhibitor respondents answered honestly (and they had no reason not to), one can expect the actors most popular with audiences to get the most votes. And even casual perusal indicates that actors listed are mostly major stars.²⁷

A preliminary view of the gender-age mix: The (almost) century of data as a cross-section

We begin by using IMDB data to examine the gender and age mix of actors over the entire sample period. Averaging all data from 1920 through 2011, we find that males outnumber females by a large margin, accounting for 63 percent of all leading roles and 72 percent of all ranked roles. Note that although women are less well-represented than men in both categories, they are relatively better represented in lead roles (said differently, among women and men who have roles, women are more likely to play leading roles). The average age of males in leading roles is 38, and in ranked roles is 42. The average age of women in leading roles is 30 and in ranked roles is 32.²⁸

²⁴ The weekly publication was known as the *Exhibitor's Herald* from 1915-1928. After observing a rival publication, *Motion Picture World*, it was renamed the *Exhibitor's Herald World* (1928-1930) and then the *Motion Picture Herald*. The *Motion Picture Herald* was eventually closed, and the poll continued in an annual sister publication, the *International Motion Picture Almanac*.

²⁵ The quotation is from the December 28, 1935 *Motion Picture Herald*, page 13.

²⁶ The publication notes that some exhibitors attempt to rank in order, but most do not.

²⁷ For example, the 2011 Top Ten were (in order): Brad Pitt, George Clooney, Johnny Depp, Leonardo DiCaprio, Matt Damon, Sandra Bullock, Bradley Cooper, Robert Downey, Jr., Meryl Streep, and Ben Stiller.

²⁸ Among men and among women, the mean age differs little from the median age. We will explore the age distribution in more detail below.

In short, it appears that women are both fewer and younger than men on average. But is this phenomenon persistent over time? And what explains it? We will now examine the gender and age mix in more detail.

Changes over time in the gender mix

Figure 2 shows the gender mix (percent male and percent female) by year for the entire sample period, with leading roles above and all ranked roles below. Beginning with leading roles, there are three main things to observe. First, males actors have always accounted for a majority of the roles (consistent with the basic cross-sectional results). Second, there has been nontrivial variation in the proportion of leading roles going to men and women over time. Third, that variation does not show a steady decline of the gender gap, but, if anything, a decrease in the proportion of roles going to women. In other words, the long run trend here is nothing like the closing (and, indeed, the eventual reversal) of the gender gap in college graduation rates, and the increase in female labor force participation.²⁹ And the persistent gender gap is not merely apparent in leading roles, as the bottom of Figure 2 demonstrates.

Changes over time in the age distribution

Figure 3 presents mean and median ages of actors in leading roles over time, for males and females separately. Both males and females have seen mean and median ages increase over the sample period, but the increase has been steadier and more substantial for females. The male median age rose from 38 to 40 between 1920 and 2011; the female median rose from 28 to 34. Figure 4 plots age percentiles. The biggest change over time has been in the upper range. Notice, for example, that leading male actors between the 90th and 95th percentiles are now 60 to 66 years old, while they were roughly 50 to 55 years old during the 1920s and 1930s. For

²⁹ Interestingly, the gender gap in college graduation rates was small in the first decades of the 20th century, followed by an increase – with men substantially outnumbering women by the mid-century – and the eventual reversal, with women outnumbering men once again today (Goldin, Katz, and Kuziemko 2006).

females, the change was (again) even more dramatic: 50 to 59 years today versus 35 to 39 in the 1920s and 1930s. Nonetheless, the high percentile males remain substantially older than the high percentile women. All ranked actors are several years older than leading actors on average, but the male-female differences are similar (results not shown).

The gender gap for the young versus for the old

Although there are clearly more leading (and other) roles played by males than by females in aggregate, the fact that the number of women's roles declines more rapidly with age leads to an additional question: Is there a young age range for which women occupy the majority of roles? Anecdotal accounts suggest the possibility: Although glamorous Lana Turner was not really discovered in a soda fountain, she was playing lead roles within two years of being cast in her first motion picture; equally glamorous (according to many viewers) Clark Gable had to wait seven years to play a lead, and was cast almost entirely in uncredited roles his first six years.

Figure 5 shows the gender mix by age, from 19 through 60. As can be seen in the top panel of the figure, older lead actors are predominantly male, while younger lead actors are predominantly female. The age that divides majority female leading roles from majority male leading roles is 29 (for all ranked roles, the age is 27).

Accordingly, one can place a different spin on the complaint that there are relatively few leading roles for older women. As the bottom panel in Figure 5 shows clearly, the flipside of the dearth of roles for older women is a dearth of roles for younger men. Indeed, the size of the male-female gap at younger ages is striking: Two-thirds of all leading roles for actors between the ages of 16 and 30 – and there are a substantial number of them – were played by females (and three quarters of leading roles for actors between 16 and 25). It is important to note,

however, that the gender gap (more women than men) at younger ages is much smaller in magnitude – and is much briefer in duration – than the gender gap (more men than women) at older ages.

The gender and age mix of the Top Ten actors

We now turn to the “Top Ten” data set (described above), in order to examine whether our findings for a very broad set of actors apply when we restrict analysis to the major stars. The Top Ten data have the advantage of identifying the truly important actors (and by extension, films); however, the Top Ten data have the obvious limitation of providing a relatively small sample and (as a result) relatively large year-to-year fluctuations. Nevertheless, the findings for the top ten actors are basically consistent with those for our IMDB data set.

Gender mix among the Top Ten is shown in Figure 6. As can be seen, the first two decades of our sample are characterized (perhaps surprisingly) by a relatively even gender mix – indeed, female actors comprise majorities of the Top Ten for several years. And this was not a brief episode – it lasted from the 1920s through the 1930s. However, that near-parity has never returned, and the chart evinces no long-run trend suggestive of an imminent closing of the gender gap.

Turning to the age mix, Figure 7 shows that the average age of both male and female Top Ten actors has risen over since the earlier years of the sample period, consistent with the findings using IMDB data. Nonetheless, with very rare exceptions (such as 2009 and 2011 with early 60s Meryl Streep and late 40s Sandra Bullock, or 1969 with 62 year old Katherine Hepburn), the top male actors remain substantially older on average than the top female actors.

Given that there appear to be more roles available to male actors than to females at any age beyond 30, as documented in Figures 4 and 5 above (and the difference gets larger as actors

get older, although roles get fewer), one might expect males to have longer careers than females. The Top Ten data indicate as much. Table 1 breaks male and female actors into groups according to the number of times they have appeared on the Top Ten list.³⁰ Males outnumber women 1.73 to 1 for the whole sample. The corresponding ratio for actors who have appeared only once on the top ten list is close to 1. By contrast, for actors who appeared 6-to-10 times, the ratio is more than 4 to 1. And for actors who have appeared on the list more than ten times, the male/female ratio is a staggering 14 to 1.³¹

Thus, it appears that the top male stars remain at the top substantially longer than the top female stars. This is consistent with the greater ages of male leading actors and greater numbers of leading roles for males in the upper age percentiles, as documented using the IMDB data set.

From silent to sound: Is there evidence of structural change?

Although the motion picture industry has experienced many technological and institutional changes (as noted in Sections I and II), there is one of particular interest to us here: the transition to sound. Some have argued that the transition to sound altered fundamentally the nature of film acting (e.g., Crafton 1999; Hanssen 2002); it may have thereby destroyed actors' careers.³² Yet none of the charts we have presented suggest that either gender mix or the distribution of ages differed substantially between the silent and sound era, or during the transition between the two (1927-1930).

Did the coming of sound indeed alter in an abrupt fashion the roster of stars? To answer this question, we investigate whether the period of transition to sound motion pictures exhibits

³⁰ A number of actors included in Table 1 are in mid-career, and may be included on the Top Ten list in future years. For example, 14 of the 75 actors in the "one appearance" group appeared on the list in the last ten years. Eight are men; four are women. It is not clear that this biases our results in any particular fashion.

³¹ The sole female is Mary Pickford, the silent era great, who appeared 12 times. Doris Day, Julia Roberts, Barbra Streisand, and Betty Grable each appeared on the list ten times. The all time leader is John Wayne, who appeared on the list 25 times (Clint Eastwood is second with 21 appearances).

³² For example, see Griffith and Mayer (1957, 247-51) for a discussion of the effect of the coming of sound on the roster of stars; in particular, see the sub-section entitled "Kaput."

more than the usual number of actors dropping off the Top Ten list. Figure 8 suggests that this is so – none of the Top Ten actors for the transition years 1927 through 1929 (sound motion pictures comprised roughly three percent of all features released in 1926, and 98 percent of all features released in 1930) was still on the list five years later (actors listed in the years immediately preceding the transition, 1924-1926, saw low rates of repeat, too). For no other period through 1950 is this so. Furthermore, the abrupt disappearance of so many actors was not because the top actors at the time were unusually elderly (and thus ripe for removal from the top) – as both Figure 7 and regression results (in which we control for actor age) indicate. In short, not even a major and abrupt change in the coterie of stars brought a major shift in the gender or age mix.

Genre and the gender of characters: Changes over time

As we have shown, the gender gap is large and highly persistent – but might there be reason to expect changes in the near future? Scholars and journalists who want to see more “strong” female characters have pointed to a few prominent examples (such as *The Hunger Games*); furthermore, the Top Ten actors of 2009 and 2011 included two women who are (for top female actors) unusually old: Meryl Streep and Sandra Bullock. Indeed, Meryl Streep is held in high regard not just for her acting skills, but for paving the way for other older actresses (e.g., Woods 2011). Do such things signal a fundamental shift? To address this question, we turn to film genres.

The IMDB classifies each film by genre or genres – the majority of films are placed in multiple categories (such as “action/adventure/comedy/crime/romance”). We employ the IMDB genre designations to create the following indicator variables: action/adventure in any combination, action/adventure without romance, comedy in any combination, comedy without

romance, drama in any combination, drama without romance, romance in any combination, and romance without any other genre. We then calculated how roles are divided between men and women for each of these genre categories.

The results (for leading and all ranked actors) are shown in Table 2. The first row shows the overall male-female mix. For which genres is the representation of female actors greater than or less than the overall average?

The table indicates that female actors are most highly represented in romance – indeed, “romance only” is the sole category in which women outnumber men (though it accounts for only a tiny number of roles). By contrast, action/adventure films have a greater than average proportion of male roles – and the difference gets larger when combinations with romance (e.g., “action/adventure/romance”) are excluded. Women are found in drama and comedy roughly in proportion to their overall representation.

Figure 9 shows the IMDB genre mix by five year intervals.³³ Recall our argument that one possible cause of large changes with respect to the age and/or gender mix of actors – if such changes were to occur – would be a shift in the demand for a given genre (relative to other genres) that is atypical with respect to the gender and/or age of actors. Has this happened in recent years? The answer is no. As can be seen in Figure 9 by comparing the early decades to the most recent decades, there is no marked rise in the genres that feature relatively large numbers of women.

Of course, changes in genre mix are not the only route to closing the gender gap – even if the genre mix remained unchanged, the gap would be narrowed if the proportion of females roles

³³ To make it easier to read Figure 9, we combined action and adventure; crime, mystery, and film noir; and fantasy, horror, and science fiction, as well as creating an “other” category that consists of animation, biography, history, music and sport. We excluded “adult” films and a few minor categories: talk shows, reality TV, game shows, and news.

in male-dominated genres increased. Is this happening? Again, the data suggest no. Table 3 compares the genre and gender mix for 1920s and 1930s (when women were relatively well-represented – see Figures 2 and 6) to the most recent two decades, 1990 through 2009. Although overall female representation is higher in the earlier period, the genre mixes are very similar (and similar to the overall mix shown in Table 2): Women are overrepresented (relative to men) in romance, underrepresented in action/adventure, and appear in comedies and dramas in more-or-less representative proportions. Thus, the action heroines of recent years lack sufficient numbers to close to gender gap.

To verify that Table 3's grouping of the end of the 20th century with the beginning of the 21st century does not mask more recent changes, we repeated the analysis using shorter windows of time – comparing the 1990-2000 period with the 2001-2011 period (results not shown). This revealed little change over time. Overall, women lost a little ground relative to men: The male-female ratio for all films increasing slightly (from 1.97 to 2.01), with women's modest gains in action/adventure films offset by modest losses in comedies.

In short, although we cannot predict the future, the recent past is relatively clear. The gender mix that we see persisting over the long run could change if (i) the mix of film genres changed in a gender-relevant way (e.g., more romance and less action would, holding the gender-genre relationship constant, increase the share of roles played by women) or (ii) the genres that disproportionately employ men (e.g., action) increasingly employed women. But long-run trends in the data suggest that such changes have not occurred.

A note on the very long run (back to Shakespeare)

Although it is beyond this paper's scope (and would be exceedingly difficult) to analyze in any comprehensive manner the pre-film gender and age mix of stage actors, we can use

William Shakespeare's plays as a proxy. It is fortunate for us that several key aspects of Shakespeare's plays have been (or can easily be) quantified. As a starting point, it is essential to recall that in Shakespeare's time the female characters were typically played by men or boys – which shows that opportunities for female actors (of which there were none) have increased in the last four centuries. However, what we wish to investigate is the stability of popular themes of entertainment.

Shakespeare's famous plays – like most of today's popular movies – typically include romance and/or action. If the gender mix of these genres in Shakespeare's plays is like that of modern films, we would expect Shakespeare to have created more male than female characters. Indeed, this is the case. Among the full set of characters in all Shakespeare's plays, approximately 19 percent are female.³⁴ Similarly, among the 20 characters with the most lines (using lines as a proxy for importance), 20 percent (i.e., 4) are female.³⁵

When looking at the change in share of characters that are female – from one-fifth in Shakespeare's plays to the one-third in modern movies – should one view this as an indication of increased demand for female characters? It depends on perspective. The modern number is higher, of course, but the comparison is consistent with long run stability in gender mix driven by genre mix. From Shakespeare's time until the present day, action stories (such as adventure and war themes) have featured predominantly male roles, while romance stories have had a more even gender mix.

Moreover, even if one assumes that audience demand drives the mix of genres and types of characters found in popular plays and movies, the increase in the number of female characters need not indicate a shift in demand for women characters – from an audience's perspective,

³⁴ Our calculation is based on the lists of male and female characters available from Name Nerds (2012).

³⁵ Our source of data on lines per character is Johnson (2012).

watching a man or boy in women's clothing is not the same as watching a woman. More specifically, with female characters played by men and boys, the theaters of Elizabethan England could not compete for audiences by having attractive female actors, whereas film directors today clearly can. Suppose that Shakespeare could have done what modern directors often do when selecting the cast for a major film production of a Shakespeare play – employ famous actresses widely viewed as beautiful – Elizabeth Taylor as Katherine (in *The Taming of the Shrew*), Kate Winslet as Ophelia (in *Hamlet*), and Michelle Pfeiffer as Titania (in *A Midsummer Night's Dream*), just to name a few examples.³⁶ Our conjecture is that if Shakespeare could have employed such actresses, he would have written more roles for women.

IV. Conclusion

Over the course of the last century, many professions traditionally dominated by men have seen a substantial rise in the relative number of participating women. This is not what we see among motion picture actors – indeed, the long run trend has been in the opposite direction, with the gender gap larger now than it was in the early years of the motion picture industry. The lack of roles for older women is currently receiving substantial attention, in the popular press as well as in the academic literature, and commentators have pointed optimistically to the success of several actors, most prominently Meryl Streep. Our results suggest that the rise of many Meryl Streeps is not very likely – trends in the mix of genres, along with the mix of genders within genres, over recent years do not indicate any imminent closing gender gap.

³⁶ See Wikipedia (2012) for a quite comprehensive listing of film adaptations of Shakespeare, and who played the main roles. Although “beauty” is difficult to quantify (and, arguably, “in the eye of the beholder”), it is clearly reasonable to say that the actresses listed above (and many others who have played the romantic-interest female characters in film adaptations of Shakespeare) are widely seen as beautiful. They have, for example, been listed on “most beautiful” lists (e.g., *People Magazine*, *Los Angeles Times Magazine*).

Why not? If the mix of characters in popular films principally reflects audience preferences over various types of themes (romance, action, etc.), then we should expect to see substantial inter-temporal consistency in the gender mix of actors. Moreover, the themes and characters found in Shakespeare's plays suggest that audience preferences over the gender mix of characters in popular performances may have changed little even in the very long run.

From a policy perspective, if the gender and age mix of actors is driven by consumer demand, the nature of the industry (i.e., unrestricted entry and exit) would make it difficult (or very costly) to effect a substantial change through regulation or institutional redesign – because the opportunity to capture rents by returning to the initial types of films would not go unexploited (e.g., Barzel 1989). It is plausible, of course, that the increased real-world participation of women in traditionally male-dominated activities that fit well into action-related movies (e.g., military combat, law enforcement, space travel, politics) will eventually lead to gender parity in film roles. That said, the data do not yet indicate any major shift in gender mix. Hence, we should expect that gender parity in film roles will come (if it does) in a manner that lags behind the progress of women in the general population.

References

- Averett, Susan, and Sanders Korenman. 1996. "The Economic Reality of the Beauty Myth." *Journal of Human Resources* 31:304-330.
- Balio, Tino S. 1985. "Struggles for Control, 1908-1930." In Tino S. Balio, ed., *The American Film Industry*. Madison, WI: University of Wisconsin Press.
- Barzel, Yoram. 1964. "The Production Function and Technical Change in the Steam-Power Industry." *Journal of Political Economy* 72:133-150.
- Barzel, Yoram. 1982. "Measurement Cost and the Organization of Markets." *Journal of Law and Economics* 25:27-48.
- Barzel, Yoram. 1989. *Economic Analysis of Property Rights*. Cambridge: Cambridge University Press.
- Barzel, Yoram, and Ben T. Yu. 1984. "The Effect of the Utilization Rate on the Division of Labor." *Economic Inquiry* 22:18-27.
- Becker, Gary S. 1971. *The Economics of Discrimination*, Second Edition. Chicago: University of Chicago Press.
- Becker, Gary S. 1975. *Human Capital*. Chicago: University of Chicago Press.
- Ben-Porath, Yoram. 1967. "The Production of Human Capital and the Life Cycle of Earnings." *Journal of Political Economy* 75:352-65.
- Center for the Study of Women in Television & Film. 2012. "Resources." (<http://womenintvfilm.sdsu.edu/resources.html>, accessed May 2012).
- Chisholm, Darlene, C. 1997. "Profit-Sharing Versus Fixed-Payment Contracts: Evidence from the Motion Pictures Industry." *Journal of Law, Economics, and Organization* 13:169-201.
- Crafton, Donald. 1999. *The Talkies: American Cinema's Transition to Sound, 1926-1931*. Berkeley: University of California Press.
- De Vany, Arthur, and Ross D. Eckert. 1991. "Motion Picture Antitrust: The Paramount Cases Revisited." *Research in Law and Economics* 14:51-112.
- Dion, Karen, Ellen Berscheid, and Elaine Walster. 1972. "What is Beautiful is Good." *Journal of Personality and Social Psychology* 24:285-290.

- Fleck, Robert K., and F. Andrew Hanssen. 2009. "Rulers Ruled by Women: An Economic Analysis of the Rise and Fall of Women's Rights in Ancient Sparta." *Economics of Governance* 10:221-245.
- Geddes, Rick, and Dean Lueck. 2002. "The Gains from Self-Ownership and the Expansion of Women's Rights." *American Economic Review* 92:1079–1092.
- Goldin, Claudia. 2006. "The Quiet Revolution that Transformed Women's Employment, Education, and Family." *American Economic Review Papers and Proceedings* 96:1-21.
- Goldin, Claudia, and Lawrence F. Katz. 2002. "The Power of the Pill: Oral Contraceptives and Women's Career and Marriage Decisions." *Journal of Political Economy* 110:730-770.
- Goldin, Claudia, Lawrence F. Katz, and Ilyana Kuziemko. 2006. "The Homecoming of American College Women: The Reversal of the College Gender Gap." *Journal of Economic Perspectives* 20:133–156.
- Griffith, Richard, and Arthur Mayer. 1957. *The Movies*. New York: Simon and Schuster.
- Hamermesh, Daniel S., and Jeff E. Biddle. 1994. "Beauty and the Labor Market." *American Economic Review* 84:1174-1194.
- Hanssen, F. Andrew. 2000. "The Block-Booking of Films Re-Examined." *Journal of Law and Economics* 43:395-426.
- Hanssen, F. Andrew. 2002. "Revenue-Sharing in Movie Exhibition and the Arrival of Sound." *Economic Inquiry* 40:380-402.
- Hanssen, F. Andrew. 2010. "Vertical Integration during the Hollywood Studio Era." *Journal of Law and Economics* 53:519-543.
- Johnson, Eric M. 2012. "Shakespeare Characters, Sorted Alphabetically." In *Open Source Shakespeare*. (<http://www.opensourceshakespeare.org/views/plays/characters/chardisplay.php>, accessed May 2012).
- Kenney, Roy W., and Benjamin Klein. 1983. "The Economics of Block Booking." *Journal of Law and Economics* 26:497-540.
- Langlois, Judith H., Lisa Kalakanis, Adam J. Rubenstein, Andrea Larson, Monica Hallam, and Monica Smoot. 2000. "Maxims or Myths of Beauty? A Meta-Analytic and Theoretical Review." *Psychological Bulletin* 126:390-423.
- Lazear, Edward P. 1979. "Why Is There Mandatory Retirement?" *Journal of Political Economy* 87:1261-84.
- Maynard Smith, John. 1982. *Evolution and the Theory of Games*. Cambridge, UK: Cambridge University Press.

Maynard Smith, John, and David Harper. 2003. *Animal Signals*. Oxford: Oxford University Press.

Milgrom, Paul, and John Roberts. 1992. *Economics, Organization, and Management*. Englewood Cliffs, NJ: Prentice Hall.

Mincer, Jacob. 1974. *Schooling, Experience and Earnings*. New York: Columbia University Press.

Mobius, Markus M., and Tanya S. Rosenblat. 2006. "Why Beauty Matters." *American Economic Review* 96:222-235.

Motion Picture Association of America. 2012. "Theatrical Market Statistics, 2011." (<http://www.mpa.org/resources/5bec4ac9-a95e-443b-987b-bff6fb5455a9.pdf>, accessed May 2012).

Name Nerds. 2012. "Male Characters in Shakespeare's Plays" and "Female Characters in Shakespeare's Plays." (<http://www.namenerds.com/uucn/shakes.html>, accessed May 2012).

Weinstein, Mark. 1998. "Profit-Sharing Contracts in Hollywood: Evolution and Analysis." *Journal of Legal Studies* 27:67-112.

Wikipedia. 2012. "List of William Shakespeare Screen Adaptations." (http://en.wikipedia.org/wiki/List_of_William_Shakespeare_screen_adaptations, accessed May 2012).

Wilson, Edward O. 2000. *Sociobiology: The New Synthesis, Twenty-Fifth Anniversary Edition*. Cambridge, MA: The Belknap Press of Harvard University Press.

Woods, Vicki. 2011. "Meryl Streep: Force of Nature." *Vogue*. December 12.

TABLE 1: Number of Appearance on Top Ten List (By actor)

Number of appearances	#		ratio
	men	# women	
1	42	33	1.27
2-5	58	45	1.29
6-10	38	9	4.22
>10	14	1	14
Total sample	152	88	1.73

**TABLE 2: Gender Mix by Genre
(number of roles)**

Lead Actors	Male	Female	Male-female ratio
All films	48963	29767	1.64
action/adventure all	9885	3968	2.49
action/adventure w.o. romance	8010	2843	2.82
comedy all	14054	8661	1.62
comedy w.o. romance	10543	5790	1.82
drama all	22803	15290	1.49
drama w.o. romance	18575	11748	1.58
romance all	8147	6510	1.25
romance only	145	160	0.91

All Ranked Roles	Male	Female	Male –female ratio
All films	325859	129891	2.51
action/adventure all	71467	18593	3.84
action/adventure w.o. romance	56812	14563	3.90
comedy all	104493	49079	2.13
comedy w.o. romance	75361	33279	2.26
drama all	155163	66371	2.34
drama w.o. romance	121608	49999	2.43
romance all	63974	29940	2.14
romance only	749	433	1.73

**TABLE 3: Gender Mix by Genre: 1920-39 versus 1990-2009
(number of roles)**

<u>1920-1939</u>			Male-female
Lead Actors	Male	Female	ratio
All films	12634	9688	1.30
action/adventure all	1804	1120	1.61
action/adventure w.o. romance	984	590	1.67
comedy all	3148	2477	1.27
comedy w.o. romance	2206	1638	1.35
drama all	5466	4694	1.16
drama w.o. romance	4027	3397	1.19
romance all	2867	2455	1.17
romance only	85	92	0.92
<u>1990-2009</u>			Male-female
Lead Actors	Male	Female	ratio
All films	13370	6693	2.00
action/adventure all	3245	970	3.35
action/adventure w.o. romance	3050	865	3.53
comedy all	4688	2450	1.91
comedy w.o. romance	3507	1518	2.31
drama all	6412	3339	1.92
drama w.o. romance	5218	2430	2.15
romance all	1995	1524	1.31
romance only	29	29	1.00

FIGURE 1: Overview of IMDB Data

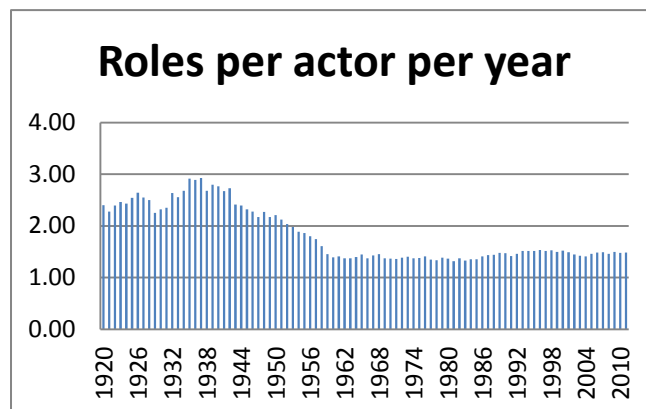
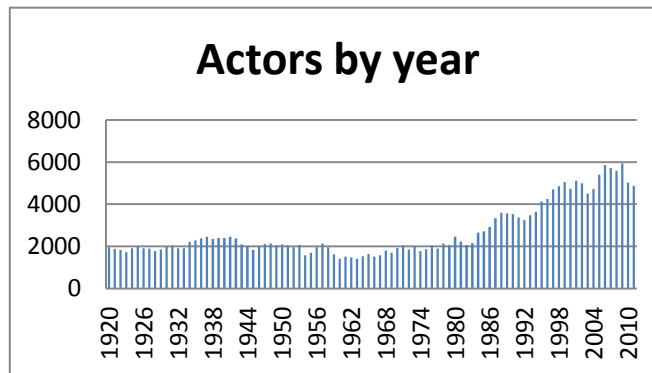
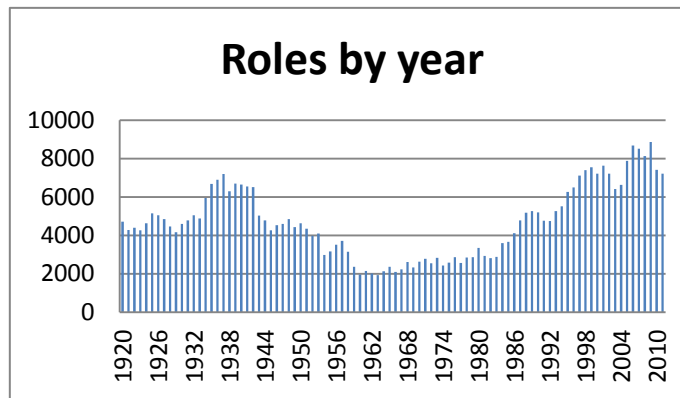
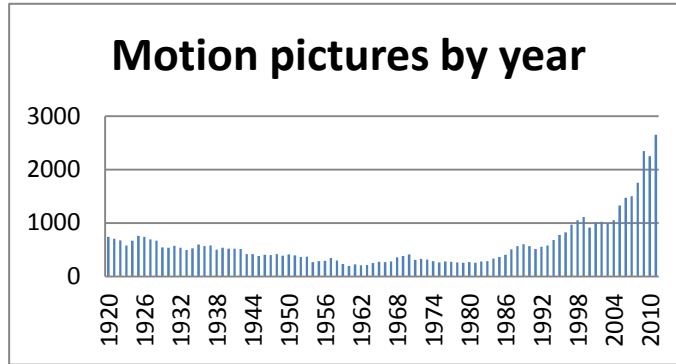


FIGURE 2: Male-Female Split, 1920-2011

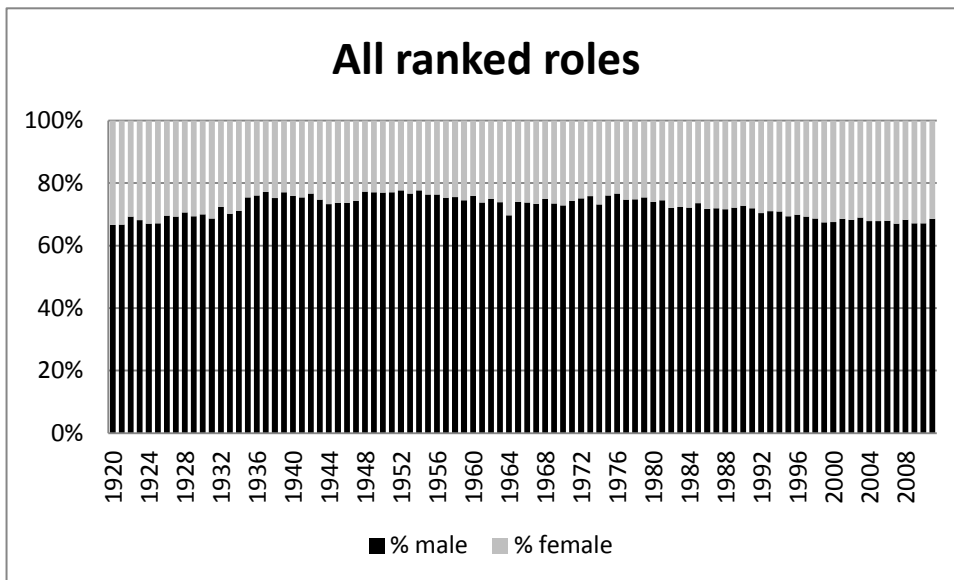
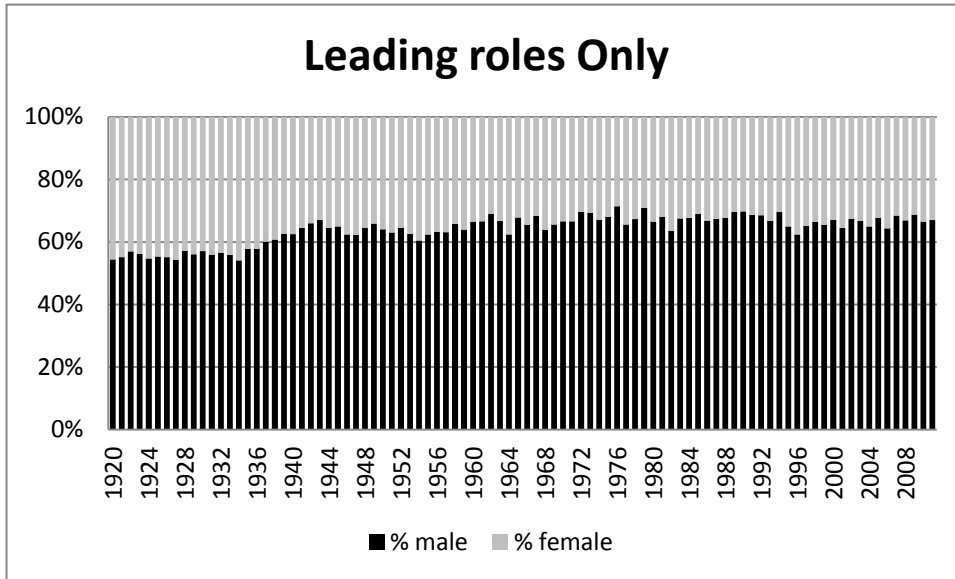


FIGURE 3: Mean and Median Ages, 1920-2011

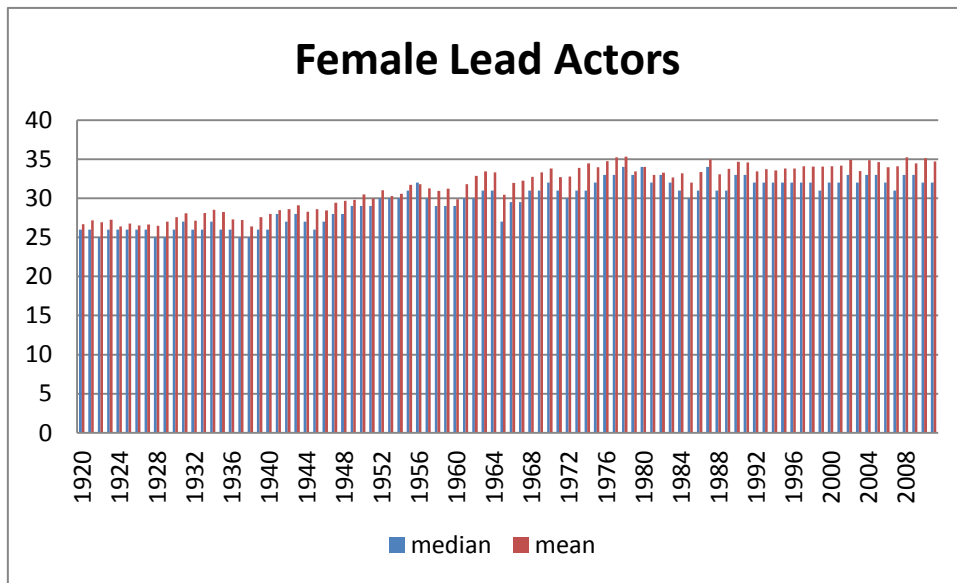
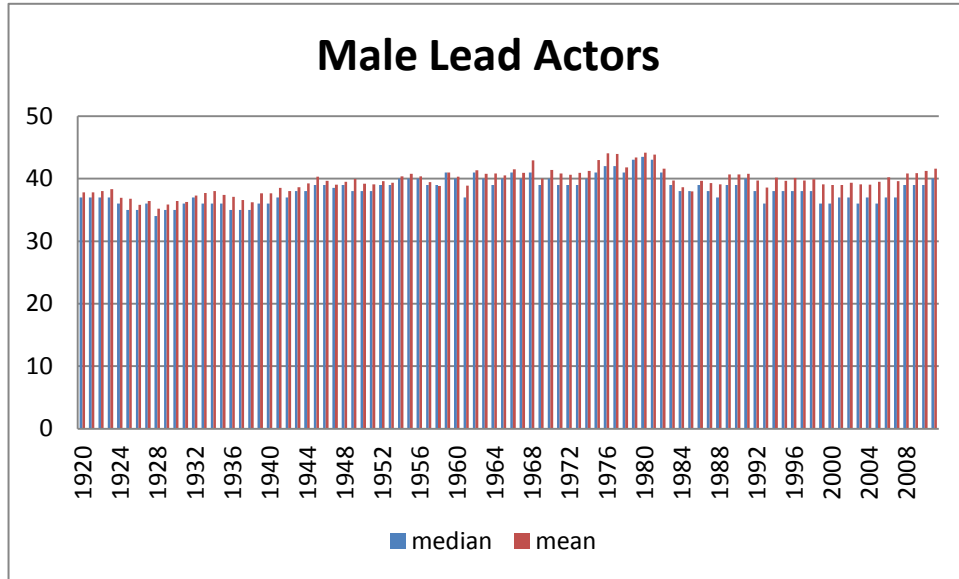


FIGURE 4: Male and Female Age Percentiles, 1920-2011

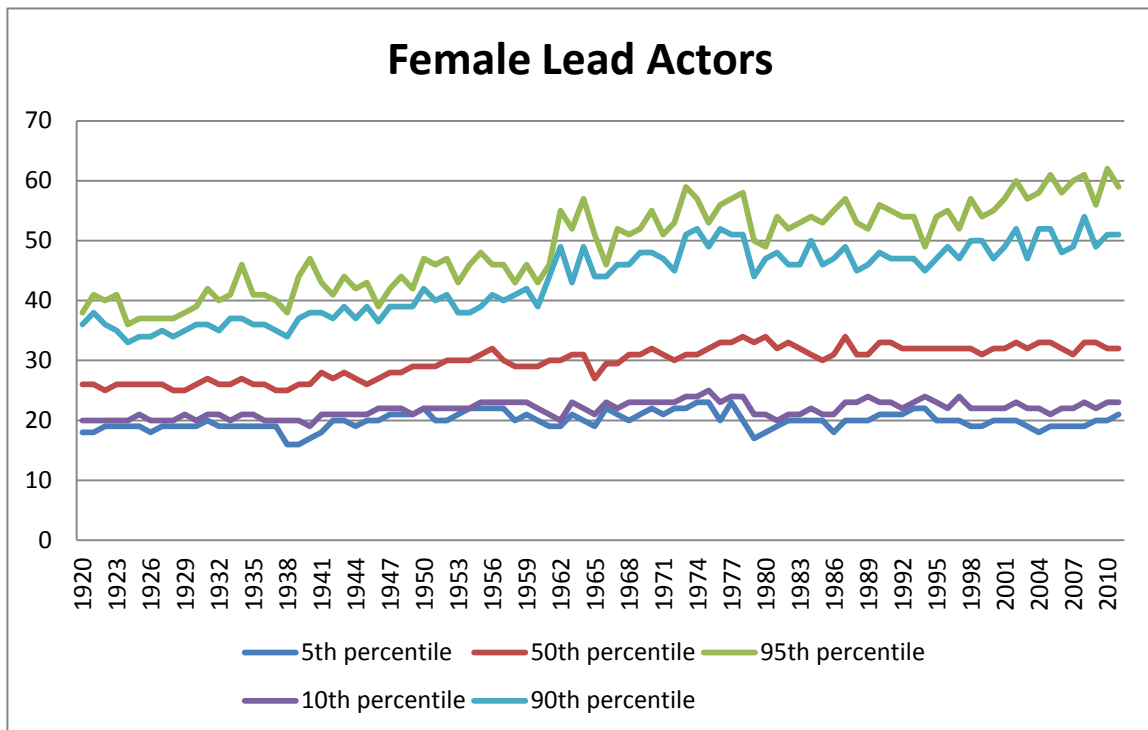
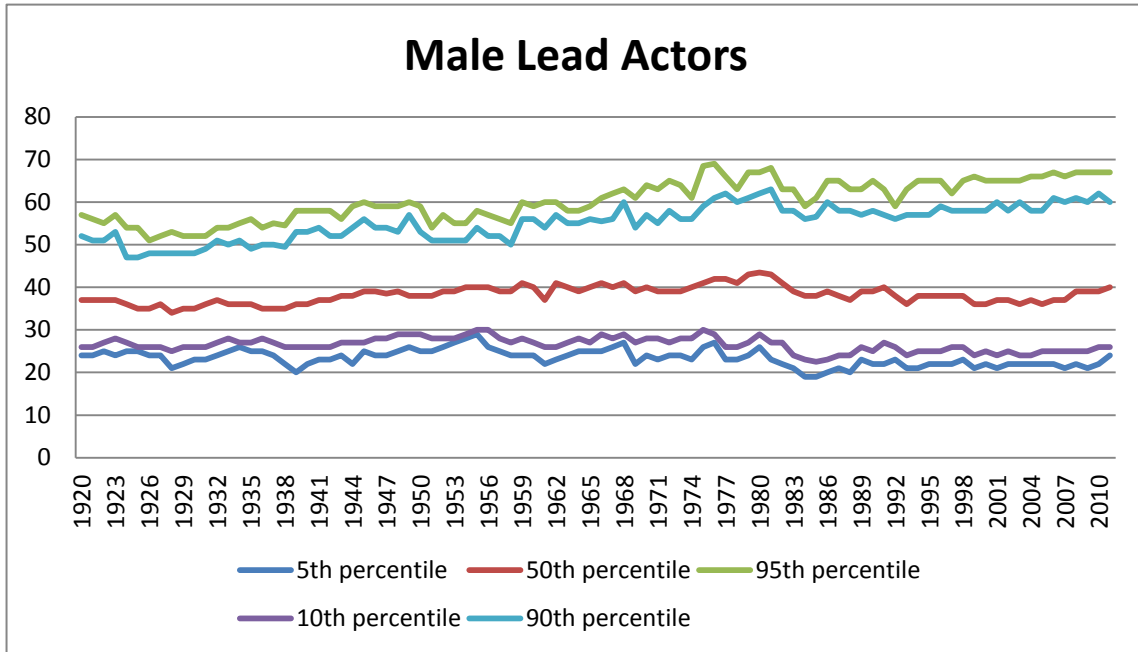


FIGURE 5: Gender Mix by Age, 1920-2011

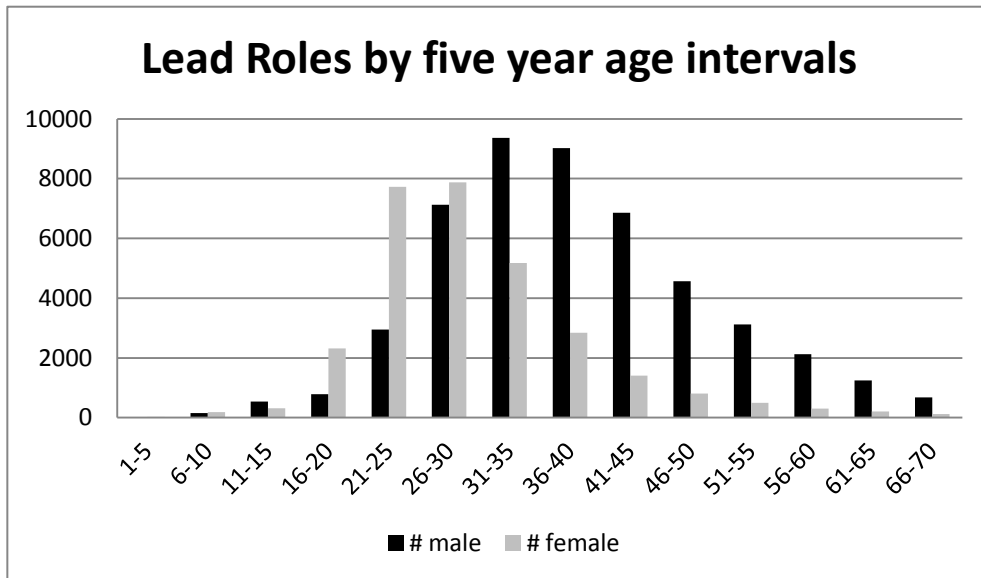
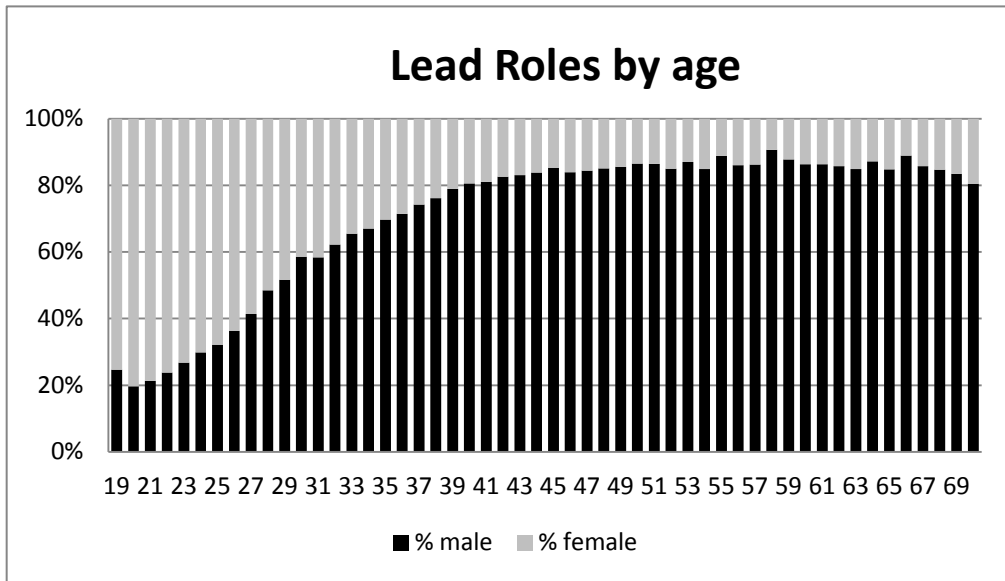


FIGURE 6: Gender mix of Top Ten Actors, 1920-2011

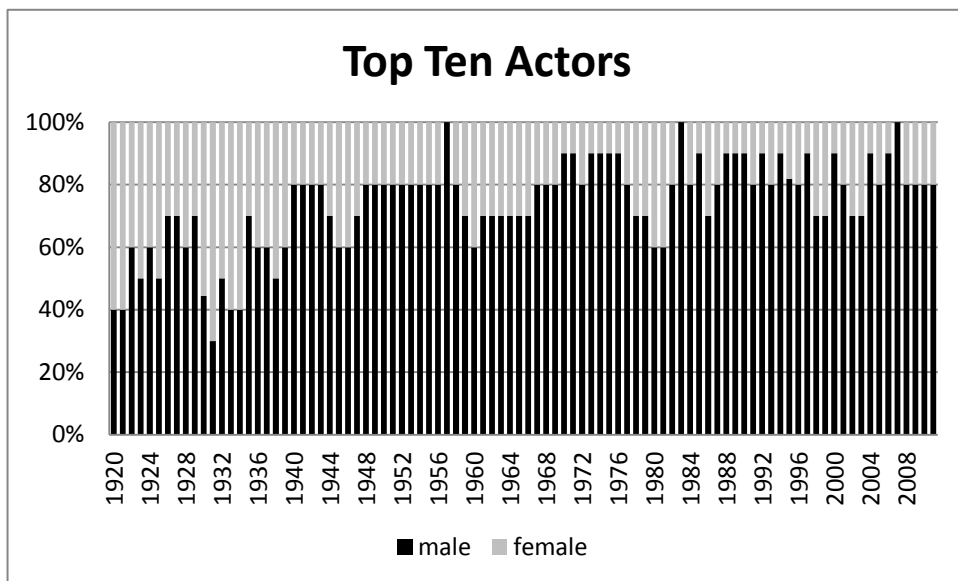


FIGURE 7: Age of Top Ten Actors by Gender

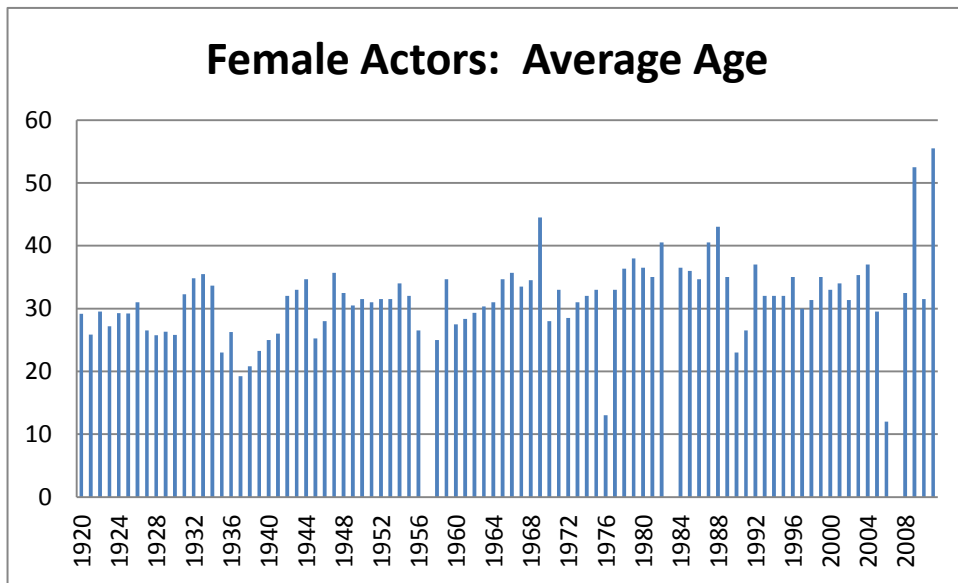
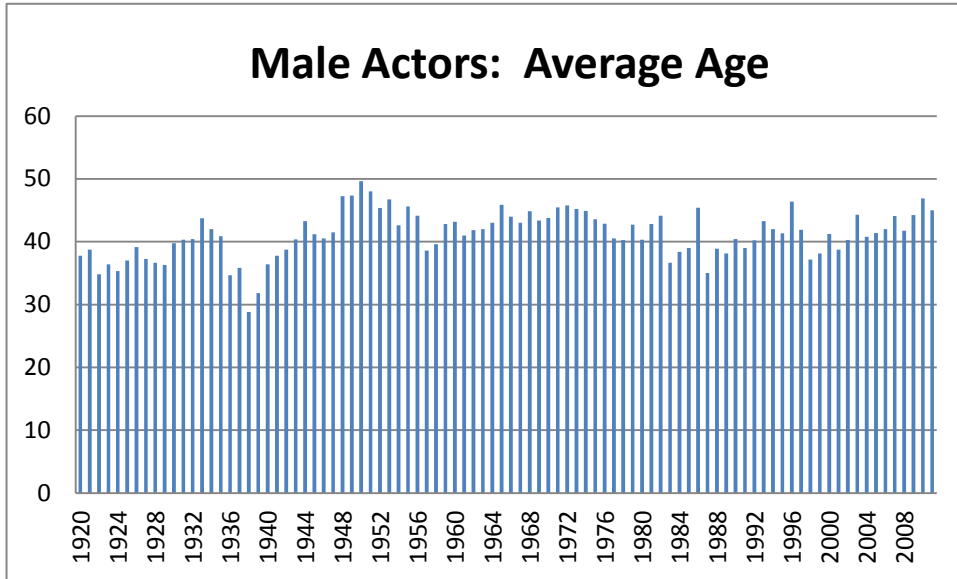


FIGURE 8: Number of Actors Repeating in Top Ten Five Years Later, by year

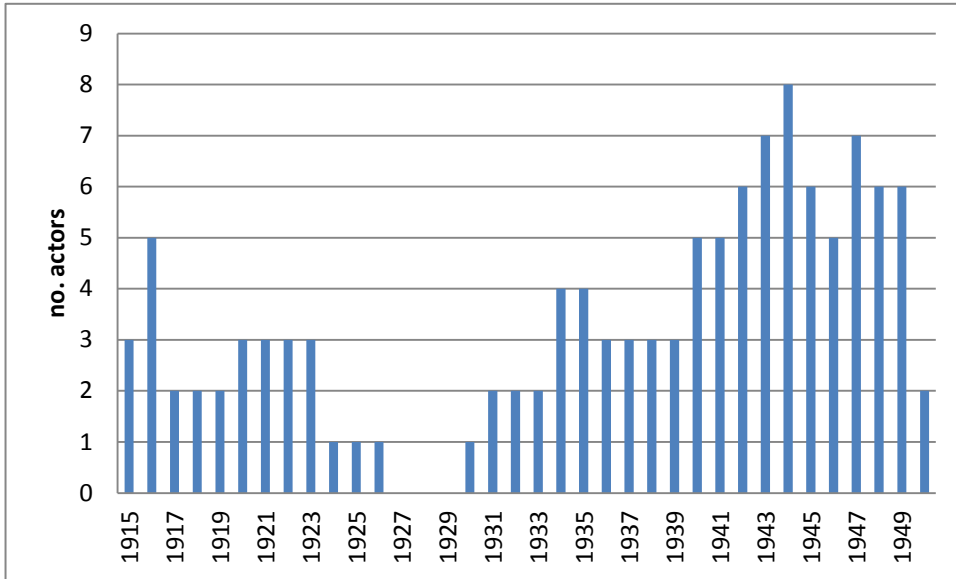
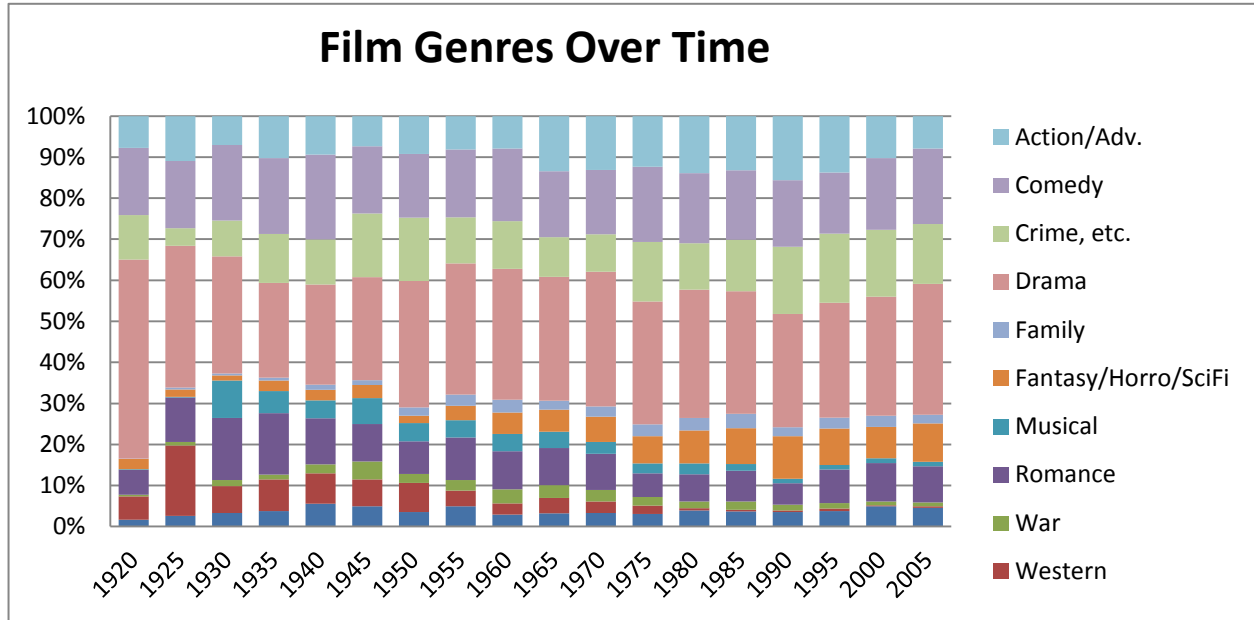


FIGURE 9: IMDB Genre Categories, by Year



APPENDIX A: Data Description

	All ranked actors				Lead actors only		
	movies	roles	actors	roles/actor	roles	actors	roles/actor
1920	739	4722	1966	2.40	1318	676	1.95
1921	705	4278	1880	2.28	1220	639	1.91
1922	674	4393	1835	2.39	1181	587	2.01
1923	581	4261	1730	2.46	1040	502	2.07
1924	671	4635	1906	2.43	1194	540	2.21
1925	759	5147	2022	2.55	1363	585	2.33
1926	740	5054	1912	2.64	1348	579	2.33
1927	695	4849	1903	2.55	1273	605	2.10
1928	670	4463	1784	2.50	1223	576	2.12
1929	543	4162	1847	2.25	989	536	1.85
1930	539	4597	1983	2.32	989	499	1.98
1931	575	4786	2038	2.35	1047	514	2.04
1932	537	5049	1917	2.63	993	473	2.10
1933	495	4883	1913	2.55	925	445	2.08
1934	526	5956	2223	2.68	974	487	2.00
1935	595	6679	2293	2.91	1114	526	2.12
1936	566	6892	2384	2.89	1068	539	1.98
1937	577	7198	2459	2.93	1099	531	2.07
1938	502	6304	2352	2.68	955	477	2.00
1939	538	6693	2395	2.79	1009	513	1.97
1940	520	6648	2402	2.77	977	487	2.01
1941	519	6554	2453	2.67	1003	485	2.07
1942	514	6508	2388	2.73	995	475	2.09
1943	419	5040	2091	2.41	813	426	1.91
1944	417	4783	1998	2.39	805	403	2.00
1945	381	4264	1838	2.32	733	384	1.91
1946	408	4526	1990	2.27	771	420	1.84
1947	398	4591	2113	2.17	751	403	1.86
1948	417	4846	2137	2.27	776	420	1.85
1949	390	4432	2043	2.17	731	418	1.75
1950	409	4628	2098	2.21	775	428	1.81
1951	393	4357	2053	2.12	736	419	1.76
1952	364	3976	1954	2.03	683	388	1.76
1953	367	4099	2071	1.98	674	370	1.82
1954	266	2978	1578	1.89	503	286	1.76
1955	286	3168	1701	1.86	538	297	1.81
1956	292	3520	1959	1.80	549	342	1.61
1957	344	3716	2134	1.74	634	396	1.60
1958	299	3146	1958	1.61	538	365	1.47

1959	234	2361	1627	1.45	408	283	1.44
1960	198	1969	1413	1.39	346	255	1.36
1961	226	2146	1522	1.41	371	276	1.34
1962	211	2026	1478	1.37	338	254	1.33
1963	214	1939	1413	1.37	315	226	1.39
1964	250	2132	1528	1.40	343	246	1.39
1965	272	2375	1644	1.44	357	258	1.38
1966	268	2095	1525	1.37	336	251	1.34
1967	279	2240	1572	1.42	341	250	1.36
1968	360	2617	1804	1.45	401	271	1.48
1969	381	2330	1699	1.37	375	267	1.40
1970	414	2639	1928	1.37	398	300	1.33
1971	313	2789	2050	1.36	401	306	1.31
1972	329	2559	1850	1.38	409	316	1.29
1973	318	2840	2022	1.40	450	346	1.30
1974	289	2433	1772	1.37	408	317	1.29
1975	263	2577	1866	1.38	353	268	1.32
1976	280	2875	2037	1.41	371	276	1.34
1977	273	2569	1903	1.35	354	271	1.31
1978	260	2855	2138	1.34	373	290	1.29
1979	257	2862	2070	1.38	351	279	1.26
1980	267	3358	2455	1.37	379	300	1.26
1981	257	2932	2231	1.31	360	280	1.29
1982	279	2824	2060	1.37	367	281	1.31
1983	288	2876	2161	1.33	379	307	1.23
1984	334	3599	2657	1.35	458	352	1.30
1985	363	3667	2715	1.35	464	355	1.31
1986	405	4122	2925	1.41	519	398	1.30
1987	509	4777	3336	1.43	648	484	1.34
1988	570	5186	3597	1.44	747	566	1.32
1989	601	5266	3565	1.48	781	554	1.41
1990	566	5195	3537	1.47	698	515	1.36
1991	514	4766	3372	1.41	644	488	1.32
1992	555	4748	3250	1.46	675	494	1.37
1993	578	5260	3480	1.51	701	492	1.42
1994	680	5520	3644	1.51	770	578	1.33
1995	779	6257	4124	1.52	880	662	1.33
1996	822	6505	4250	1.53	909	656	1.39
1997	966	7118	4703	1.51	1020	760	1.34
1998	1,050	7392	4850	1.52	1116	854	1.31
1999	1,110	7546	5053	1.49	1138	854	1.33
2000	915	7214	4736	1.52	1039	788	1.32
2001	1,011	7631	5119	1.49	1127	853	1.32

2002	1,023	7216	4995	1.44	1092	838	1.30
2003	994	6413	4511	1.42	927	716	1.29
2004	1,050	6635	4714	1.41	916	706	1.30
2005	1,327	7879	5402	1.46	1129	882	1.28
2006	1,469	8686	5861	1.48	1312	997	1.32
2007	1,499	8506	5718	1.49	1252	968	1.29
2008	1,753	8127	5577	1.46	1265	980	1.29
2009	2,346	8865	5926	1.50	1453	1098	1.32
2010	2,252	7421	5027	1.48	1288	969	1.33
2011	2,648	7219	4874	1.48	1351	978	1.38
Total	55,299	432,735			71,910		