DO AGE AND GENDER AFFECT MANAGERS' CAREER PROGRESSION? EVIDENCE FROM THE CAREERS OF MOVIE DIRECTORS.

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DO AGE AND GENDER AFFECT PROFESSIONAL SUCCESS? EVIDENCE FROM THE CAREERS OF MOVIE DIRECTORS.

ABSTRACT

This paper considers discrimination in the market for managerial positions by following the career paths of film directors. Film directors manage multi-million projects and are hired on a project by project basis.

We gather data on directors' film projects from the time they enter the profession. We also study their background prior to the first movie they direct. As shown here and in previous work, the economic success of previous film projects is the main determinant of hiring for a new film, thus our null hypothesis is that controlling for career paths, age gender and race should not matter in landing a new project.

However, we find that age matters and although directors start directing on average around age 40, there is evidence of age discrimination even for directors under 50. We also find more subtle evidence for gender bias, particularly in allocating budgets for future projects.

We also document that on average, only 12% of an entering cohort of new directors are women and they follow a different path than men in the entertainment industry.

It is significant that if there is evidence of discrimination in such an industry where career paths are public knowledge.

I. Introduction and related literature

This paper presents a very simple data exercise which should allow us to test for discrimination on the basis of gender or age in the market for film directors. Movie directors manage projects that cost tens or even hundreds of millions of dollars and they are responsible for completing projects on time and within budget. Since the break-up of the studio system more than sixty years ago, directors have usually been hired on a project-by-project basis.[1]. Our basic research design is very straightforward- we establish the criteria used to award projects to directors. Then, we conceptually compare two candidates with identical qualifications vying for their next assignment. If candidates of a particular gender or age are more likely to land a job everything else equal, we interpret this as discrimination. This type of analysis is hard to perform for high level jobs in other settings, because candidates come with different qualifications which cannot be easily summarized and compared. In the market for film directors, however, a previous record is clearly available and quantifiable, and we can make such comparisons. Also, unlike other high-level jobs, directors work on a project by project basis, making hiring decisions transparent. [2]

The discrimination literature, going back to Becker (1957) and Arrow (1973), distinguishes between taste- based discrimination, where there is an inherent bias against a specific group, and statistical

[1] People who are not familiar with the motion pictures industry may think that producers are in charge of film projects. However, this is not the case. The term (or credit in the movie), producer mean many things in the business. The most important credit is that of "Producer" and it is generally accorded to the person(s) who initiate a project, sell it to a studio, develop and shepherd it through the system until it is produced and released. The Executive Producer credit is usually reserved for a variety of people associated at one time or another with a project, in one form or another. For example, in the first set of Adam Sandler movies his then managers Brad Grey and Bernie Brillstein received Executive Producer credit, yet neither had anything to do with the development or production of the project beyond being Sandler's managers. Sometimes writers receive Executive Producer credit in addition to their writing credit because they may have originated the idea and have achieved a certain stature. Line Producers, the individuals who manage the production on a day to day basis, may seek Executive Producer credit as they gain stature, because it is perceived as better than a "Line Producer" credit.
In the independent film world Executive Producer is often a credit accorded to individuals who assisted in raising the financing for a film, or who are associated with a financial company or fund that finances a picture. See also the Wall Street Journal article entitled " A plague of Executive Producers" (12/2019) https://www.wsj.com/articles/a-plague-of-executive-producers-11577648316?mod=searchresults&page=1&pos=3
In other words, the term producers may refer to various roles, but generally they originate the project or finance it. For a further discussion of the roles of producers and directors see John et al. (2017).

[2] This is another instance of using the creative industries as a lab for human capital valuation (see Han and Ravid, 2020).

discrimination, where there is a belief that differences between groups are because of unobserved relevant characteristics. Bohren et al. (2019) argue that inaccurate statistical beliefs can sometimes look like taste-based discrimination. In our experiment, as we will show, we believe we are able to rule out statistical discrimination and probably also inaccurate beliefs-based discrimination, although Bohren et al. (2019) admit themselves that the distinction between taste based discrimination and inaccurate beliefs may be "blurred" (ibid. footnote 1 p.3)

There are numerous studies of possible discrimination in many contexts, many of them focus on race (for a seminal study see Bertrand and Mullainathan, 2004) and gender. Far fewer papers analyze age discrimination. An example of a gender discrimination study, which like this one, is conducted in a real life setting, is an interesting new paper by Egan et al. (2018) who document gender discrimination in the financial services industry.

Quite a few studies focus on women entrepreneurs who are similar to film directors, in the sense that the vast majority of entrepreneurs are men and that entrepreneurs need to attract funding to projects. Ewens and Townsend (2020) use the Angel List platform to show that women are less likely to attract investors, in all forms of interaction allowed by the platform, and are also less likely to be ultimately funded. However, this seems to be because most investors are male. Female investors are more likely to fund female led ventures. Hebert (2020) studies French entrepreneurs and has similar findings. Women are 18-27% less likely to raise capital from VCs on average, but the trend reverses for female dominated sectors where women are 3-5% more likely to raise capital. However, gender incongruent ventures that do get funded tend to outperform, suggesting that there is a discrimination based on stereotypes (See Bordalo et al. 2016) where females are expected to perform well in female dominated industries, and the bar for female entrepreneurs in male industries is set much higher. This is similar to our results regarding gender and similar to findings in Sherman and Tookes (2020) who show that women in the finance profession tend to work with women.

In a "lab in the field" test of lending officers in Turkey (Brock and de Haas, 2020) a similar pattern emerges, where women are required to have a guarantor more often- and this bias seems to be attenuated as officers get to be more experienced.

Gornall and Strebulaev (2019) run one of the few controlled "field experiments" in this area. They sent "pitches" from fictitious entrepreneurs to real venture capitalists and angels. The "pitches" were identical but randomly listed a name of a man or a woman, Asian or White. The (low) response rate to

these “cold calls” was somewhat higher for women and for Asian sounding names, although white men are by far the dominant group in venture capital and entrepreneurship. A very similar study which sought to address age discrimination is Neumark et al. (2019). The authors sent fictitious resumes for job openings, trying to adjust experience to what is expected at the relevant age. Callbacks declined monotonically by age, in particular for women.

Similarly, Lahey and Oxley (2020) perform lab in the field experiments which show that HR managers spend less time reviewing resumes by older workers (except that at some age the relationship flattens out) and seem to have biased opinions of older workers.

Our work differs, in that it follows real careers and managerial level positions, but the results complement and enhance other age and gender studies. Our design has several advantages compared to other studies on age discrimination. Neumark et al. (2019) argue that one of the challenges of age discrimination studies is that it may be hard to separate real discrimination from training costs for older workers, their nearness to retirement, (which makes it less worthwhile to invest in them) or assumptions regarding declining physical capabilities of older individuals that may be true (see Neumark et al., 2019). These concerns are alleviated to a large extent by the project by project nature of the film business and the availability of all previously relevant information. Some results in Hebert (2020) are related to our work, in showing that older entrepreneurs find it harder to obtain financing, however, our methodology allows for much more precise comparisons.

A final related literature includes numerous studies which analyze the influence (generally positive) of women directors on boards and the different career paths of men and women in various professions[3]. Some interesting studies suggest that women may be less competitive than men. The question of competitiveness is very relevant to some of our findings and will be discussed later. However, other work (Adams and Ragunathan, 2017, Adams et al. 2016) finds that women who enter very competitive professions may be different, in particular, less risk averse, than the average woman. Specifically, women in finance are similar to men in their chosen profession and different than the average woman. Other work focuses on wages of male and female CEOs, as well as on wages and productivity of lower ranked employees. Findings generally point to a wage gap between male and female CEOs.

[3] See also Bertand et al. 2019, Barber and Odean, 2001, Bayard et al. 2003, Bertrand and Hallock (2001), Bugeja et al. 2012, Sorenson and Dahl, 2016, Chen et al. 2016, Flabbi et al. 2014, Adams and Kirchmaiyer 2016, Tonoyan et al. 2017, Schwartz-Ziv, 2017, Lerchenmuller and Sorenson, 2018. Kynazeva et al. 2019, survey this literature.

In spite of the large literature, it is not easy to establish whether there are equal opportunities for men and women and for people of different ages in managerial positions. For this you need to follow people's careers and control for various factors that may affect their success[4][5]. Many of these factors may not be publicly observable. However, our study uses a unique data set to follow the career path of film directors project by project, so that in each point in time we can assess the precise economic value of the director in question. It is widely believed in the industry and supported by research (See John et al. 2017) that it is the success of previous films that determines the hiring of directors for future multi-million dollars projects[6]. Since the data used by decision makers in the industry is for the most part publicly available, and essentially, the researcher and the people in charge in the industry have the same information, it is difficult to expect that discrimination, should we find it, would be statistical. Decision makers can see if they wish the success metrics of every film by their candidates or any other man or woman in the profession. Thus if we find gender or age bias, it is probably taste based. Also, since everybody in our sample has self-selected into directing, then they are much less likely to self -select not to continue (although we do look into the circumstances of every director in the sample as discussed later).

We ask two questions. The first question is mainly descriptive. Do women and men follow the same path in the directing profession? The second, and more important question is whether directors, with a statistically identical record but who differ by gender or age, are equally likely to land a directing job. We also try to test whether or not gender and age are factors in determining the budget provided for film projects. In principle, we can do the same experiment with a dummy for race, but in our sample the number of African-American directors is too small for meaningful statistical analysis (which is a statement in itself).

This is not a natural or a randomized experiment- these are people's real careers, however, the ability to pinpoint the relevant achievements for far and to follow a career from the point where one enters the profession provides unique advantages.

[4] See Bertrand and Schoar (2003) for the first study of the value of CEOs and later work by Bennedsen et al. (2010,2020), Graham et al. (2012) and Fee et al.(2013)

[5] This paper is also related to a huge literature on career paths and promotions, going back to Stiglitz and Weiss (1983) or Waldman (1984) and including such papers as Von Wachter and Bender (2006) and many others.

[6] Industry professionals like to say that "you are as successful as you last film". However, evidence is more consistent with using the entire career path as a measure of success (see John et al. 2017).

Our main finding is that age matters and although directors direct their first film on average around age 40, there is evidence of age discrimination even for directors under 50. We also find more subtle evidence for gender discrimination, particularly in allocating budgets for future projects.

However, we also document that on average, only 12% of an entering cohort of new directors are women and they follow a different path than men in the entertainment industry.

We suggest that if discrimination seems to occur in a profession where all relevant information is publicly available, it is likely to be present in hiring and promotions for other professions where much less data is available to outsiders.

II. Background Surveys and Hypotheses

There are frequent complaints in Hollywood about discrimination against and mistreatment of women. The recent Harvey Weinstein scandal is one of the most visible cases, but the industry also claims to be moving towards greater gender equality in recent years.

The women and Hollywood Initiative which "educates, advocates, and agitates for gender diversity and inclusion in Hollywood and the global film industry" laments the fact that of the top 100 films of 2019 only 12% were directed by women (in our data, as we will see later, this is interestingly identical to the percentage of women entering the profession).[7] However, Danielle Lessovitz , a director whose first feature film was nominated for awards at the prestigious 2019 Cannes film festival said that after the me-too movement "It seems like there's greater openness for female perspectives and more acknowledgement of the default gender bias and the subsequent power imbalance".

https://womenandhollywood.com/cannes-2019-women-directors-meet-danielle-lessovitz-port-authority/

[7] several surveys point to a male-female pay gap among the most highly visible and highly paid individuals in the media and entertainment industries. For example, Forbes' list of 15 highest paid actors in 2017 includes 14 men. Only the 15th listed actor was a woman (Emma Stone). Ms. Stone earned less than Ryan Gosling, her co-star in the very successful musical comedy La La Land, although she won an Oscar for her performance and he did not. (https://www.cbsnews.com/news/forbes-highest-paid-actors-2017-mark-wahlberg-emma-stone/)An analysis of the pay of top stars at the BBC revealed that only 1/3 of the top 96 earners and none of the top 7 were women (https://www.theguardian.com/media/2017/jul/19/evans-lineker-bbc-top-earners-only-two-women-among-best-paid-stars).

There are also complaints about ageism in the movie industry. The famous actor and activist Jane Fonda said that ageism in Hollywood "is alive and well" following her experience in the recent film the "Book Club". In spite of a brilliant history of high quality acting screenwriting and directing of all participants in the project, " the film's creators resorted to making it independently after they said executives told them they would only produce the movie if the characters were younger" .
https://www.telegraph.co.uk/news/2018/05/16/ageism-hollywood-alive-jane-fonda-reveals-bosses-wanted-younger/

Lloyd Robinson, a well-known talent agent argues that "ageism isn't something restricted to screenwriters in the entertainment industry. It applies to directors and actors too". He attributes this to "younger buyers" who prefer to do business with people their own age.
https://creativescreenwriting.com/heres-what-we-found-out-about-ageism-in-hollywood/.

Smith et al. (2017) report that Only 148 (11.8%) of the 1,256 speaking characters in 25 Best Picture-nominated movies were 60 years of age or older. This is 6.7% below the percentage of seniors in the U.S. population, according to the U.S. Census.

In a private conversation, a 65 years old successful indie director told us that he had been told "not to bother" with an agent in LA since nobody would hire a person his age to direct a major movie.

There are numerous other claims of ageism and other forms of discrimination in the industry, including racism which we cannot address in our study due to data limitations.

However, since directors are hired on a project by project basis, we can see how their career progresses and try to assess whether discrimination affects their success. [8]

Our null hypothesis is very simple- Since we control for the previous career path of each director, from their first film and before that then if there is no discrimination, non-career related variables and in particular age and gender, should not affect the selection of a director for a movie.

This can be specialized a bit along the lines in Hebert (2020) or Bohren et al. (2019). Statistical discrimination is practically ruled out by design since information about qualifications and the previous career of each director is publicly available. If we find evidence that gender age or race affect the career paths of film directors, it will support taste-based discrimination.

[8] In this study we cannot address pay issues since directors' salaries are not publicly disclosed. We should note, however, that directors' salaries are most often not a significant item on the expense list (see a later discussion of available salary data), so that it is difficult to believe that someone will not be hired because of their wages.

III. Data

We construct a comprehensive dataset of all US directors who started their careers between 1995 and 2015, documenting all the films they made through 2018, henceforth the 95-15 sample. We gather as much information as possible about the directors and their films. For each director in the dataset, we collect their demographic information: date of birth and gender (unlike large scale studies, we are able to find photos of the vast majority of directors in our sample, thus making it easier to identify gender), as well as information about the movies they made. We also collect information about the directors' careers before, during and if relevant after their directing career. For this we use mostly the web site IMDB (Internet movie data base) but we supplement the information with data from Linkedin Wikipedia and other sources.

For each movie we use, we collect the following information: date of release, domestic gross, genre and distributor, as well as the quality of these films, as measured by expert reviews and user reviews where available on IMDB[9]. While expert reviews are reasonably straightforward, aggregating user reviews is not as easy. IMDB exercises some (not very transparent) quality control and publishes a weighted average of user reviews. Therefore, we include these ratings in our main tables. Also, since IMDB includes most of the relevant information about movies and directors, it makes sense to expect that decision makers should look there for reviews as well. Nevertheless, we also collect user and professional review information from Rotten Tomatoes, a competing website, which had the slight advantage of covering about 3% more movies in our sample. In robustness checks we show that the results are similar. For about half the sample, incorporating directors who entered the profession between 1998 and 2005, in addition to the data above, we also purchase much more detailed financial information about every film in this sample, including budgets and world-wide grosses from all sources including for example streaming. This data is obtained from Gracenote[10], a data vendor specializing in movies and entertainment industry. Data from Gracenote is only available for movies released on or before year of 2017. Hence, in this smaller sample, we are examining the directors debuting between 1998 and 2005 and their movie career until 2017. However, a director who made another film in 2018

[9] See literature on the value of user vs. professional reviews starting with Holbrook (1990) and more recently, explicitly discussing internet reviews, see Basuroy et al. (2020).
[10] Gracenote was later acquired by Nielson .

or 2019 is not classified as having left the profession of course. The detailed financial information allows us to assess properly the metrics that industry insiders, who hire directors and finance films, use for evaluation[11].

IV. Sample Construction and Methodology

We start with the IMDB (text based) website which lists over 400,000 directors. We consider all feature length films (as opposed to shorts or TV films) released in the US each year which made at least $10,000 in the box office (this sum is somewhat arbitrary but is approximately the take for one screen in a small theater for one week- one week is also the cutoff for academy award consideration, for example). This methodology biases the sample somewhat against really awful films (high budget, but total failures) so that we include only the bad films that at least had some audience. There are typically 300-400 such movies released every year. We then search IMDB to identify the directors of each film, and then search again to identify first time directors among the directors in the sample (directors who had not directed a previous film). This allows us to construct the basic list of first-time directors. Once we identify a first-time director, we follow him/her on IMDB and identify all feature films s/he directed either until the end of the sample, or until they drop out and do not make another film[12].

For each director, we go back to his/her IMDB listing and find out his/her age when they make their first movie. This also enables us also to document the age when they make each subsequent film which is useful for identifying possible age bias. Most directors do list ages, but some do not. For those, we go back to Wikipedia as well as to other sources, for example, college graduation announcements and population records (only publicly available information was used). We lose some directors where we could not find any listing for age. For each director we also go back and look at everything they had done prior to making their first movie. We document the first year they were first listed on IMDB in any capacity (typically making a major motion picture is not a first step in the entertainment industry). We list the number of credits before, during and if applicable after their directing career (the latter is only for people who drop out of the directing sample). We classify the non-directing career into a “major”

[11] We started with 1118 directors directing their first film between 1995 and 2015. 417 directors started their career between 1998 and 2005. After eliminating directors whose age is not available, we end up with 348 directors and after eliminating directors for whom we don't have movie financial data, we ended up with 309 directors.

[12] Very few directors may take long breaks (because they could not find a job in the field or for other reasons). However, in practice, in that case they will need to start almost from scratch. The only ones we lose that way are people who say, made a film in 2014 and will make the next one in 2024, and we try to correct this bias below.

role, a "minor" role, and other credits. The major role is the role with the highest number of credits on IMDB, if they exceed 2. The minor role is for the next in line that is at least 20 percent of the number of major-role credits and that exceed 2. For example, if the future director had 10 writing credits and 4 acting credits, prior to directing her first film, then her major role is writing, and her minor role is acting[13]. Most directors had been actors or writers, with a distribution around other roles such as DP (Director of Photography) or Producer. Thus, in much of the analysis we use the categories writers, actors, other professions, or none, the latter category reserved for people who had had no prior experience we could identify and started in the business as directors. This happens for example, if you direct a film out of film school (or even before that- Steven Spielberg directed his first feature at age 17) or you had a very different profession and made a career change. We do not think this way of classifying experience introduces a significant bias since if say, a finance professor changes profession and directs films, then they can be considered with no relevant experience when they shoot their first movie.

We compare the careers of male and female directors and we also analyze the age of directors as movies are made. This analysis provides us with a set of descriptive statistics about the careers of male and female directors who started making movies during the 20-year period from 1995-2015 (Tables 1&2&3). Most of the analysis is based on Logit regressions where the probability of making another film is regressed on career variables which have been shown to determine re-hiring (see also John et al. 2017) and on variables which should be irrelevant, and indicate discrimination, namely gender and age.

As shown in John et al. 2017, the main variable which determines hiring is the average return on previous movies and to some extent reviews. These types of variables also have the advantage of being non- age related, in other words, the assumption seems to be that you would continue to produce at your average level of returns and reviews. However, since all proxies for quality of a director are not perfect, we also include experience, i.e the number of movies directed prior to the current one. One could argue that one "expects" more movies from older directors (see Neumark et al. 2019) and to allay these concerns we also run productivity (average number of films per year- generally less than one) in our robustness tests, with similar results. As discussed, the user and professional reviews provide another quality proxy.

[13] As it turns out, empirically minor roles are not that important in the analysis.

V. Descriptive statistics

In the first part of this section we review the data base which includes all directors who started their career in 1995-2005.

Table 1 and 2 describe the larger sample. Table 1 while very simple, documents a very important and startling fact- very few women enter the profession. The average percentage of females first time directors over the 20 years is 12% of the cohort, but unlike other professions, there are no trends, i.e. the number of new women directors is not increasing over time[14]. For example, while 2014 was one of the best years for women who constitute 17% of the entering class of directors, in 2015 only 7% of first-time directors were women. This percentage is also strikingly similar to the percentage of women in the C-suite (See Knyazeva et al. 2019) and a bit lower than the percentage of female entrepreneurs (See Hebert, 2020). In a way, women CEOs are much more similar to film directors than board members where there has been an increase in recent years as well as laws designed to secure diversity in the board room (See Knyazeva et al. 2019).

Table 1 suggests that one of the main reasons for the dearth of women directors is that very few women enter the profession in the first place. For example, the fact that only 12% of new directors on average are women may be part of the reason why only 12% of the directors of top 100 movies in 2019 are women (Women and Hollywood Initiative). This may also indicate than once a woman enters the profession, there is less clear evidence of discrimination. We will look at this idea later in our tests. Table 1 also ties to interesting new research by Buser and Yuan (2019) which suggests that women may be less competitive and are likely to be deterred by initial failures, following earlier work by Niederle and Vesterlund (2007) and other studies suggesting that women are significantly less likely to enter competitive environments despite having the appropriate skills (Gneezy et al 2003). Goldin (2020) in her Feldstein lecture suggests that part of the difference in wages between men and women is accounted for by the premium paid for jobs that require essentially a total commitment with less control. During principal photography, when every day can cost a million dollars, directors are expected to cope with all contingencies no matter when and how they happen so as to make sure that everything is run on schedule and on budget.

[14] For example, Sherman and Tookes (2020) find that women comprise about 15% of the faculty in the top 100 business schools, but this percentage is edging up a bit towards the end of their sample, in 2017.

Table 1B characterizes the career path of the directors in our sample. The pattern here is much more pronounced than in the more partial picture in John et al. (2017). 68% of men and more than 75% of women make only one film. This number is a bit biased because people at the end of the period may still make another movie. However, since we have a forward look until 2018 and the average director makes a film every 2-3 years, the bias is not as severe. A full 90% of the women and 83% of the men make two films or less. Only less than 4% of men and 1.5% of women make 6 or more films.

This is a brutal career and failures are not tolerated lightly. However, it seems that women drop out at a higher rate. This empirical fact can be related to the effects discussed in Buser and Yuan (2019) or Niederle and Vesterlund (2007) and Gneezy et al (2003).

Table 2 shows summary statistics for the sample for which we have detailed financial information.

Panel A compares films made by women and men. Men make films with larger budgets and have a higher return. User reviews are similar, but women have somewhat higher ratings by professional reviewers (see Basuroy et al. 2003, 2020, for the importance of professional reviewers). There is no statistical difference (t-test) however, between films made by men or women directors.

A striking fact is that films that are co-directed by women and men have a higher return and higher ratings by both professionals and users. Since the number of such films is small, we should be cautious in interpreting this finding, but this is consistent with work such as Schwartz Ziv (2017) which suggests that a collaboration between men and women can lead to better outcomes.

Table 2 panel B describes the career paths prior to becoming directors for the people in our 1998-2005 panel. More than 40% of the male directors had been actors or writers, whereas for women this percentage is less than 30%. It can be that the pathway from writing and acting to directing, which is the most common for men, is not as open for women. The second part of the panel shows the secondary roles prior to our sample participants' directing careers. Most people did not have a significant secondary role (defined as at least 2 credits and ≥ 20% of the number of credits for the main role). We will test to see whether the different initial paths are important to the future careers of the directors.

Table 2 panel C is striking, as it characterizes the men and women entering the profession and may account for the different rates of participation. Prior to directing, men had more diverse careers (1.32 vs. 1.06 different skills), and consistent with that, they have a higher number of other credits while directing. Men become directors 18 years after their first credit appears in IMDB but women enter the profession only 10 years after their first credit. This seems to suggest that less experienced women get

more of an opportunity to direct, or perhaps, that the small subset of women who become directors are more daring and talented than the men. This suggestion is consistent with work such as Adams and Ragunathan, (2017) and Adams et l. (2016) or Hebert (2020). Nevertheless, women on average start their directing career at a later age[15]. This different path is also consistent with work by Kim and Moser (2020) which shows that women in science, and in particular mothers, follow a different productivity trajectory than men. The relatively late age of first-time directors is consistent with work by Azoulay et al. (2020) which shows that entrepreneurs generally start in their 40s and peak even later (contrary to popular belief..) . Film directors also need to be entrepreneurial and similarly need the experience that leads them to succeed.

Table 2 panel D shows the number of films made by directors in the 1998-2005 sample. As we can see, this sub-sample is somewhat "better" than the sample in table 1- only 49% of the men and 52% of the women made one movie and 71% of the men and 77% of the women made either one or two movies. The reason is that there is no data on some of the least successful films. However, the patterns are similar- most directors made only 1 or 2 films, and women drop out faster than men.

Panel E describes the percentage of women and men in our sub-sample. The number of new female directors is on average 10%, similar to the larger sample.

This very simple descriptive analysis already shows that industry studies that try to draw conclusions from the number of women directing films, may be misleading, ignoring the very different paths that men and women take in becoming directors, as well as the small number of women entering the profession in the first place. In a way, this is similar to the "life cycle" of women employment described in Goldin and Mitchell (2017).

Table 2 Panel F shows the distribution of return by age of directors. It seems if anything that return increases by age and so do reviews (this is consistent with Azoulay et al. (2020)). We will revisit this later.

Table 3 panel A shows the summary statistics of our regression variables – on average sample films' budget is about 40 million (constant 1998 dollars). 10% of our directors are women and on average they had had made about 2 films before the current film. Obviously, these averages are skewed because most people drop out after the first film or two. Panel B is the correlation matrix- there are relatively

high correlations between the various types of reviews and between reviews and returns (See Basuroy et al. 2003 and Basuroy et al. 2020) All variable definitions are in appendix A.

VI. Empirical Analysis

Table 4 contains our base model and it shows the determinants of making another film. The dependent variable in all models is a dummy that takes the value of 1 if the director makes his/her next film and zero if they drop out of the sample. This is a logit regression with standard errors clustered by director.

This table corroborates John et al. (2017) who use a differently constructed sample, with different definitions of a "film" and of a "first time director". Remarkably, even though there is no overlap and the two samples include non-intersecting sets of directors, the findings are similar. Hiring in the film industry is based on prior performance. It is measured in our regressions by the average return on the director's prior movies as well as by another proxy, the number of movies made so far (tenure). The latter is also a measure of success- since staying in the business is a function of prior achievements[16]. Finally, the probability of hiring depends the "quality" of a director's previous work, as reflected in the average reviews of the director's various films. All these variables are significant and positive. Hiring is based mainly on prior success.

Model 2 adds several pre-career variables- we split the directors by their previous careers into writers, actors, other entertainment related positions (such as editor, director of photography and others). The last category includes those who had had no previous observable experience. The table shows that having been a writer is the only variable that contributes to future hiring as a director. This may be consistent with the view of a director as the manager of the project who controls the vision of the film, and some writer-directors who are more common in smaller productions[17].

We also find a negative sign on the average non-directorial activity during the career- this essentially reflects the opportunity cost of the director, and a higher number suggests a higher opportunity cost and a lower "commitment" to the profession. We also see here and in most regressions that prior experience as a writer seems to enhance the marketability of directors.

[16] There is a legitimate question as to whether older directors may be expected to have directed more films. We address this mostly by including other proxies, average return and average reviews, and by running productivity analysis in our robustness checkes. However, John et al. (2017 also show that the number of films over a career classifies directors into quality bins, and in unreported analysis we repeat this in our sample with similar outcomes.
[17] We include both "main" and "secondary" career so a future director may start as both a writer and a director, or a writer and a producer before becoming a director.

In regression (3) We include control variables common in this literature (see Ravid, 1999). We also add a Herfindahl index which measures the versatility of the director which in this set of regression is mostly insignificant.

We also add variables for age and gender for the first time. We expect that variables that represent anything but the quality and financial success of prior work (which are highly significant, as we show in the previous table and in John et al. ,2017) should not matter, but they do.

We see that the female dummy is insignificant but age is negative and significant in these runs and in every regression in the table except (6) where we added a square term and we see that the negative sign probably reflects a non-linear function (see figure 4) but still age is a deterrent to landing a job, everything else equal.

Regressions (4) (5) (7) and (8) explore different interaction terms. Regression (4) is the only one where gender is significant.[18] it seems that women need a higher user rating to be hired, that is, user reviews seem to be more discounted in a decision to hire a woman director. Age interacted with performance variables is negative as well (regressions 5 and 7), suggesting that older directors need to show better average performance in order to succeed. However, as discussed, the relationship seems to be non-linear as in model 6 which implies that for a small range age may help, but overall it is detrimental to a director's career. We explore this graphically below. Regression (8) shows that the relationship between age and versatility is complex.

In table 5 we run the same regressions for the probability of making a second film. An initial successful film is the most difficult hurdle in a director's career and crossing this hurdle is critical in order to continue.

The sample here is obviously smaller and the significance levels are lower, but the overall picture is decidedly similar. Performance, as much as can be gleaned from a first effort, matters- average return is mostly significant as well as reviews. Age is negative, but insignificant (but then most of the people in this sub-sample are at the very beginning of their career), but age interacted with average return still matters. We believe this supports our view- since first time directors are the youngest in the sample, age is still not a factor, but if you start at an older age, then you are expected to do better (keep in mind

[18] We tried interacting the female dummy with other performance metrics, but the results were not significant and thus left unreported.

that although you may be older and more experienced in other fields, you are still a novice director). Overall, females do not seem to be treated differently.

The main runs are when we cut off films made after 2015. In other words, we do not count someone who made his last film in or after 2015 but did not direct any feature later as a "failure". We ran robustness checks with films made after 2012, 2013 and 2014 and the results are similar.

Figures 1-4 explore the interactions graphically, keeping all other variables at their means, and they lead to some interesting conclusions. Figure 1 shows that whereas for male directors as user ratings go up, the probability of hiring goes up as well (keeping all the other variables at their means), for women better reviews do not do much – the slope is even slightly (insignificantly) negative. This explains the negative interaction term in the table.

The next three figures depict the age bias we seem to find in the data. Figure 2 shows that at younger ages, as the record (average return) improves, the probability of being hired increases, all but at a decreasing rate, but for older directors, success is essentially discounted and the curve of the probability of being hired vs. previous success is flat. Figure 3 plots the success vs. the number of films made, revealing a similar picture. Figure 4 is perhaps most interesting. It plots hiring vs. age-keeping everything else at its mean. Hiring peaks at around age 35-40 which is the average age of making a first film. If you are younger, this is not good, but as soon as you get older, your age is a hindrance. The probability of hiring drops by about a half, everything else equal, as a director ages from 40 to 55.

Finally, Table 2 panel F shows that older directors seem to perform better than younger directors, so that at least on the face of it, there is no statistical reason for discrimination (of course, there are selection issues in that table, so the evidence is just suggestive).

One possibility to interpret our findings is that people simply decide to retire at some point. We should keep in mind that directors are not movie stars. First time directors receive five or six figure-pay per film. and they make films on average every two or three years, in other words, they do not do much better and possibly worse on average than finance professors[19]. Also, people in our sample select to be

[19] From https://work.chron.com/much-money-film-director-make-7811.html: "Film directors working in professional productions under the Directors Guild of America guidelines earn salaries based on the type of production and the number of weeks on the job. Films, classified as low or high budget, shorts or documentaries, earn different pay. High-budget films have budgets more than $11 million. Directors working a week on a high-budget film earned a minimum of $19,143 in 2018, while a week on a short or documentary paid $13,672. When the film takes more than the week, directors on high-budget productions earned $4,786 daily pay. Short and documentary film directors took home $3,418 for a day of work in 2018. The Bureau of Labor Statistics (BLS)

directors typically after a career in the business that had involved interacting with other directors. Nevertheless, we went manually through the data looking up every director who dropped out of the directing sample to see if they retired (stopped working) or not. The vast majority of the people who stopped directing went back to related professions, but some completely changed fields, from teaching Buddhist meditation to financial planning. However, in the entire sample only 8 directors disappeared from our view (which means they either died without this being posted where we could see or indeed retired).

In other words, notable examples such as Clint Eastwood, Woody Allen Martin Scorcese and earlier Alfred Hitchcock of directors working later in life suggest that retiring at age 55 is not what a director who starts at age 39 would like to do and our work seems to provide evidence suggestive of age discrimination for a majority of the other, less well-known directors.

VII. Additional Tests

Table 6 shows the budget of the next film as a function of the career path. The age coefficient is still negative and significant. A gender bias seems to show as well- in other words, a woman needs to be more successful in order to land a higher budget. As we saw in the descriptive statistics, women direct films with significantly lower budgets on average and the industry indeed laments this[20] . Perhaps these are the instances where the bias against women exists, or again, it may be the result of the very different career path women take. The latter interpretation is less likely since we do control for the previous career path.

In table 7 we address endogeneity concerns- it may be that the average return is a function of other unobserved variables. Thus, we run a first stage regression on years in the entertainment business prior to directing a first theatrical movie as an instrument. The instrument is very significant, and the second stage shows results that are very similar to the results in previous tables.

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reported in May 2016 that directors working in the motion picture and video industries earned an annual mean wage of $111,320. Naturally, well known directors can make millions + percentages of the gross of films. Also, similar to actors, pay will go up and down depending on the success of previous projects.

[20] Telefilm Canada (an agency that is financing of film and TV in Canada) was working towards gender parity in the industry by 2020 by funding films with women in key roles (director, producer, writer). In 2018/2019 close to 60% of Telefilm funding went to films with women in key roles and parity has already been achieved in the producer role. However, in private conversations we found out that most of the progress has been in low budget films rather than in major studio productions and indeed the agency is calling for partnerships to ameliorate this situation https://telefilm.ca/en/news-releases/telefilm-canada-releases-update-on-gender-parity-initiatives

So far we have been able to show some gender bias and a much more significant age bias. In a final robustness check in table 8 we re-run our main specifications for directors under the age of 50- in other words, we exclude films made by directors over age 50. The coefficient on age is still negative. It is very difficult to argue that people who start their career on average at age 39 will retire for exogenous reasons at age 49. Similarly, it is hard to argue that there are other, unobserved reasons (such as cultural connection to the current generation) that separate someone who is 40 from someone who is 49, although that type of argument in itself can be masking discrimination.

We perform several additional tests. One may be concerned that what matters is productivity rather than the number of films (tenure)- similar to arguments in Neumark et al. (2019) which suggest that older workers are expected to have done more. We tested this idea in unreported results by running a "productivity" variable (films per year) with or without the tenure variables. The productivity variable is significant, but when run with tenure, tenure remains significant. Age is still negative and significant in all runs, and the sample is smaller, since obviously we had to run this on films beyond the directorial debut.

To further address gender and age issues along the career path, in table 9 we consider very experienced directors, ones who have made at least 3 or at least 4 movies.

The findings are interesting- whereas we still seem to show an age bias, the female dummy becomes positive and significant. It seems that once women directors make it through the first difficult stages of the profession, first entering the field and then crossing a barrier that is set higher for them, they are treated as well or better than their male counterparts.

Since the proxies for the quality of the director are imprecise, we re-ran the entire analysis using reviews from Rotten Tomatoes instead of IMDB professional and user reviews. As discussed, we believe that IMDB reviews are a somewhat better measure, on the other hand, we can add a few observations for which there were no IMDB reviews. Table 10 is similar to Table 4 and we see that the results are nearly identical- if anything the age variable is even more significant. In unreported results we replicated most other tables with qualitatively similar outcomes.

VIII. Conclusions

In this simple exercise we provide an analysis of directors' careers. We reaffirm earlier findings in a larger and more precise analysis showing that the main determinants of hiring in the movie industry, are previous financial success and to some extent previous critical acclaim.

We find evidence for age bias which seems to be taste or stereotype based rather than statistical, and more complex evidence regarding women. It seems that very few women enter the directing profession in the first place, which may correlate with the path they take and their career decisions. Once they enter, there are subtle barriers, but experienced female directors seem to be as successful or more so than men.

We present a strong case showing that age discrimination starts almost immediately as a director enters the profession, and that people do not just retire but seem to be unable to find another directing job.

We believe that this analysis can provide insights also into women's career paths towards managing large projects and enterprises in fields where data such as we have does not exist. Also, our findings about age discrimination are suggestive because even though movie directors start this career path at a relatively late age, they seem to be almost immediately subject to an age bias.

Perhaps the most worrisome conclusion from our analysis is that if discrimination is allowed to occur for a profession which is in the limelight and where all relevant information is publicly available, it is very likely to be present in other professions which are more opaque where much less data is available to outsiders.

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Table 1 Panel A The number of female and male first-time directors by year of first movie, 1995-2015 Sample.

Debut year	N. of Male	N. of Female	Grand Total	% Female of the Grand Total
1995	38	2	40	5%
1996	45	7	52	13%
1997	49	3	52	6%
1998	50	14	64	22%
1999	60	6	66	9%
2000	58	10	68	15%
2001	52	4	56	7%
2002	58	7	65	11%
2003	43	6	49	12%
2004	54	1	55	2%
2005	53	6	59	10%
2006	52	11	63	17%
2007	60	12	72	17%
2008	61	9	70	13%
2009	51	8	59	14%
2010	35	2	37	5%
2011	26	5	31	16%
2012	43	2	45	4%
2013	33	5	38	13%
2014	40	8	48	17%
2015	27	2	29	7%
Total	988	130	1118	12%

Table 1 Panel B - Directors by the number of movies made during their entire career (1995-2015 cohort until 2015)

Total Number of Movies made btw 1995-2015	N. of Male Directors Making this number of films	Percentage of Male Directors Making this # of Films Among all Male Directors	N. of Female Directors Making this number of films	Percentage of Female Directors Making this # of Films Among All Female Directors
1	674	68.2%	98	75.4%
2	157	15.9%	19	14.6%
3	56	5.7%	7	5.4%
4	37	3.7%	3	2.3%
5	28	2.8%	1	0.8%
6	17	1.7%	2	1.5%
7	8	0.8%		
8	4	0.4%		
9	3	0.3%		
10	2	0.2%		
11	1	0.1%		
15	1	0.1%		
Grand Total	988	1	130	1

Table 2 panel A - Summary statistics by movie for the 1998-2005 sample. All variables are defined in appendix A.

	Return	Meta score	User ratings	Domestic Gross (millions)	Budget (millions)	Max screen count
male	3.12	50.99	6.30	36.28	44.70	1798.49
female	2.61	52.46	6.28	25.09	28.03	1339.43
Female-male joint	6.02	62.40	6.71	139.03	97.82	3131.50

Table 2 Panel B Number of directors by pre-directing major role and gender. Major role is the role with the highest number of credits in IMDB. Others are all roles but actor or writer.

	Male		Female		
	N.	%	N	%	N
Actor	59	21%	5	16%	64
Writer	48	17%	3	10%	51
Others	86	31%	11	35%	97
None	85	31%	12	39%	97
Total	278		31		309

Number of directors by pre-directing secondary role and gender. Secondary role is a role with the second highest number of credits in IMDB, if they are at least 20% of the number of credits for the major role.

	Male		Female		
	N.	%	N	%	N
Actor	13	5%	0	0%	64
Write	18	6%	1	3%	51
Others	42	15%	5	16%	97
None	205	74%	25	81%	97
Total	278		31		309

Table 2 Panel C Characteristics of first-time directors by gender. Variables are defined in Appendix A.

	Average pre-debut Scope	Average years before debut	Average of Other Engagements	Age when directing first movie
Male	1.32	18.33	1.49	38.32
Female	1.06	10.61	1.60	40.33
Total	1.30	17.56	1.50	38.53

Table 2 panel D Number of films by director 1998-2005 sample

Number of movies made	Male		Female	
	N	%	N	%
1	137	0.49	16	0.52
2	62	0.22	8	0.26
3	28	0.10	3	0.10
4	22	0.08	2	0.06
5	14	0.05	2	0.06
6	9	0.03		0
7	2	0.01		0
8	2	0.01		0
9	1	0.00		0
11	1	0.00		0
Total	278	1	31	1

Table 2 panel E Percent of female directors by debut year

Debut year	Male	Female	% of female	Total
1998	28	5	0.15	33
1999	43	5	0.10	48
2000	44	8	0.15	52
2001	41	3	0.07	44
2002	40	4	0.09	44
2003	24	2	0.08	26
2004	25	1	0.04	26
2005	33	3	0.08	36
Total	278	31	0.10	309

Table 2 Panel F – Films by the Age of the Director. Variables are defined in Appendix A.

	1st quartile	2nd quartile	3rd quartile	4th quartile	P value -ANOVA test to compare means
	<37	37-41	41-47	>47	
Return	2.76	3.38	3.35	3.42	0.07
Meta score	51.63	53.05	49.86	54.70	0.12
User ratings	6.36	6.42	6.25	6.43	0.93

Table 3 Summary statistics for regression variables (director-film pairs). Variables are defined in Appendix A.

	N.	Mean	Std. Dev.	Min	Max
Next	645	0.62	0.49	0.00	1.00
Female	645	0.1	0.29	0.00	1.00
Tenure	645	2.23	1.58	1.00	11.00
Average return	645	3.25	3.16	0.00	25.64
Average budget	645	42.11	40.56	0.12	214.29
Average user rating	645	6.41	0.84	3.30	8.40
Average meta score	645	52.28	15.17	5.00	90.33
Age	645	41.72	7.63	22.00	70.00
Scope of pre-debut career	645	1.31	1.25	0.00	6.00
Years before debut	645	10.48	8.26	0	41
Other engagement	645	1.50	1.47	0.00	13.00
Coop	645	0.09	0.28	0.00	1.00

Table 3 Panel B- Correlation matrix. Variables are defined in Appendix A.

		1	2	3	4	5	6	7	8	9	10
Next	1	1									
Female	2	-0.041	1								
Tenure	3	0.256***	-0.076+	1							
Average return	4	0.281***	-0.021	0.132**	1						
Average user rating	5	0.322***	0.006	0.099*	0.393***	1					
Average meta score	6	0.310***	0.070+	0.106**	0.419***	0.762***	1				
Age	7	-0.058	0.083*	0.356***	0.059	0.024	0.074+	1			
Scope of pre-debut career	8	0.010	-0.062	-0.038	0.004	0.010	0.068+	0.300***	1		
Years before debut	9	0.015	-0.023	0.006	0.005	-0.021	0.034	0.030	-0.051	1	
Other engagements	10	-0.124**	-0.052	-0.053	-0.049	-0.061	0.012	-0.013	0.297***	-0.072+	1
Coop	11	-0.090	0.079*	-0.152***	0.026	0.087*	0.037	-0.133**	0.008	-0.022	0.109**

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Table 4 - The determinants of the probability of making another movie. The dependent variable is a dummy taking the value of 1 if the director makes another movie and zero if they drop out of the sample. All variables are defined in Appendix A.

Dependent Variables	Probability of making another movie							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female		-0.108	-0.107	4.094*	-0.031	-0.048	0.008	-0.051
		(0.350)	(0.340)	(1.976)	(0.353)	(0.365)	(0.347)	(0.342)
Tenure	0.367***	0.493***	0.383***	0.375***	0.390***	0.370***	2.380***	0.389***
	(0.074)	(0.085)	(0.098)	(0.098)	(0.092)	(0.101)	(0.540)	(0.099)
Average return	0.160*	0.143*	0.157*	0.157*	0.805*	0.156*	0.151*	0.150*
	(0.067)	(0.063)	(0.075)	(0.075)	(0.330)	(0.066)	(0.075)	(0.074)
Average user rating	0.463**	0.379*	0.397*	0.469*	0.381*	0.442*	0.450*	0.405*
	(0.174)	(0.184)	(0.192)	(0.198)	(0.193)	(0.197)	(0.195)	(0.192)
Average meta score	0.016+	0.022*	0.027**	0.026**	0.028**	0.027**	0.026**	0.026**
	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
age		-0.079***	-0.081***	-0.080***	-0.045*	0.437***	-0.009	-0.191**
		(0.016)	(0.018)	(0.018)	(0.021)	(0.117)	(0.027)	(0.060)
Other engagements		-0.173*	-0.157*	-0.162*	-0.134+	-0.174*	-0.158*	-0.164*
		(0.075)	(0.078)	(0.079)	(0.073)	(0.076)	(0.077)	(0.079)
Actor		0.239	0.042	0.034	0.024	0.158	0.089	0.083
		(0.344)	(0.345)	(0.348)	(0.330)	(0.358)	(0.345)	(0.350)
Writer		0.685**	0.579*	0.562*	0.619*	0.675*	0.690**	0.644*
		(0.260)	(0.251)	(0.253)	(0.246)	(0.276)	(0.261)	(0.260)
Others		0.469	0.519+	0.534+	0.557*	0.689*	0.575+	0.592*
		(0.301)	(0.292)	(0.294)	(0.282)	(0.311)	(0.298)	(0.299)
None		0.182	0.198	0.168	0.259	0.346	0.244	0.262
		(0.391)	(0.396)	(0.396)	(0.398)	(0.402)	(0.397)	(0.399)
R_percent			0.747	0.774+	0.725	0.726	0.654	0.702
			(0.473)	(0.467)	(0.491)	(0.487)	(0.479)	(0.478)
G_percent			-0.128	-0.094	-0.284	-0.240	-0.196	-0.153
			(0.559)	(0.558)	(0.582)	(0.559)	(0.563)	(0.559)
PG13_percent			1.036*	1.004*	1.055*	1.077*	0.980+	1.006*
			(0.507)	(0.498)	(0.527)	(0.523)	(0.511)	(0.512)

Rating Herfindahl			-0.786	-0.834	-0.671	-0.827	-0.611	-6.276*
			(0.512)	(0.517)	(0.515)	(0.553)	(0.542)	(3.000)
Female*Average user rating				-0.655*				
				(0.313)				
Age*Average return					-0.014*			
					(0.006)			
Age*Age						-0.006***		
						(0.001)		
Age* Tenure							-0.043***	
							(0.011)	
Age* Rating Herfindahl								0.124+
								(0.065)
Observations	676	645	645	645	645	645	645	645
log likelihood	-381.8	-344.8	-337	-335.6	-332.5	-326.9	-330.7	-335.2

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Table 5: Probability of making the 2nd movie with age and gender. The dependent variable is a dummy taking the value of 1 if the director makes another movie and zero if they drop out of the sample. All variables are defined in Appendix A.

Dependent Variables	Probabilities of making the 2nd movie					
	(1)	(2)	(3)	(4)	(5)	(6)
Female		-0.089	0.004	5.172*	0.031	-0.046
		(0.454)	(0.470)	(2.582)	(0.489)	(0.484)
Average return	0.226+	0.173+	0.191	0.189	0.810*	0.195*
	(0.118)	(0.100)	(0.120)	(0.119)	(0.370)	(0.097)
Average user rating	0.212	0.038	0.049	0.146	0.015	0.063
	(0.187)	(0.217)	(0.220)	(0.226)	(0.222)	(0.227)
Average meta score	0.022*	0.033**	0.037**	0.037**	0.039**	0.037**
	(0.010)	(0.012)	(0.012)	(0.013)	(0.013)	(0.012)
age		-0.033	-0.034	-0.034	-0.007	0.397*
		(0.021)	(0.022)	(0.023)	(0.023)	(0.196)
Other engagements		-0.338**	-0.325**	-0.327**	-0.289**	-0.332**
		(0.115)	(0.119)	(0.120)	(0.107)	(0.116)
Actor		0.029	-0.076	-0.086	-0.122	-0.021
		(0.531)	(0.530)	(0.535)	(0.510)	(0.544)
Writer		1.170**	1.152**	1.161**	1.180**	1.054**
		(0.399)	(0.384)	(0.390)	(0.378)	(0.392)
Others		0.471	0.545	0.568	0.541	0.549
		(0.488)	(0.484)	(0.487)	(0.473)	(0.496)
None		0.364	0.407	0.434	0.433	0.452
		(0.587)	(0.588)	(0.590)	(0.594)	(0.596)
R_percent			0.565	0.626	0.529	0.602
			(0.501)	(0.496)	(0.516)	(0.509)
G_percent			-0.337	-0.262	-0.575	-0.390
			(0.655)	(0.657)	(0.651)	(0.634)
PG13_percent			0.721	0.751	0.730	0.780
			(0.545)	(0.539)	(0.567)	(0.563)
Rating Herfindahl				-0.808*		
				(0.402)		
Female*Average user rating					-0.014*	
					(0.007)	
Age*Average return						-0.005*
						(0.003)
Observations	315	288	288	288	288	288
log likelihood	-190.2	-160.5	-157.3	-155.9	-154	-154.2

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Figure 1: Plotting the interaction between gender and average user review (Table 5 Model 4)

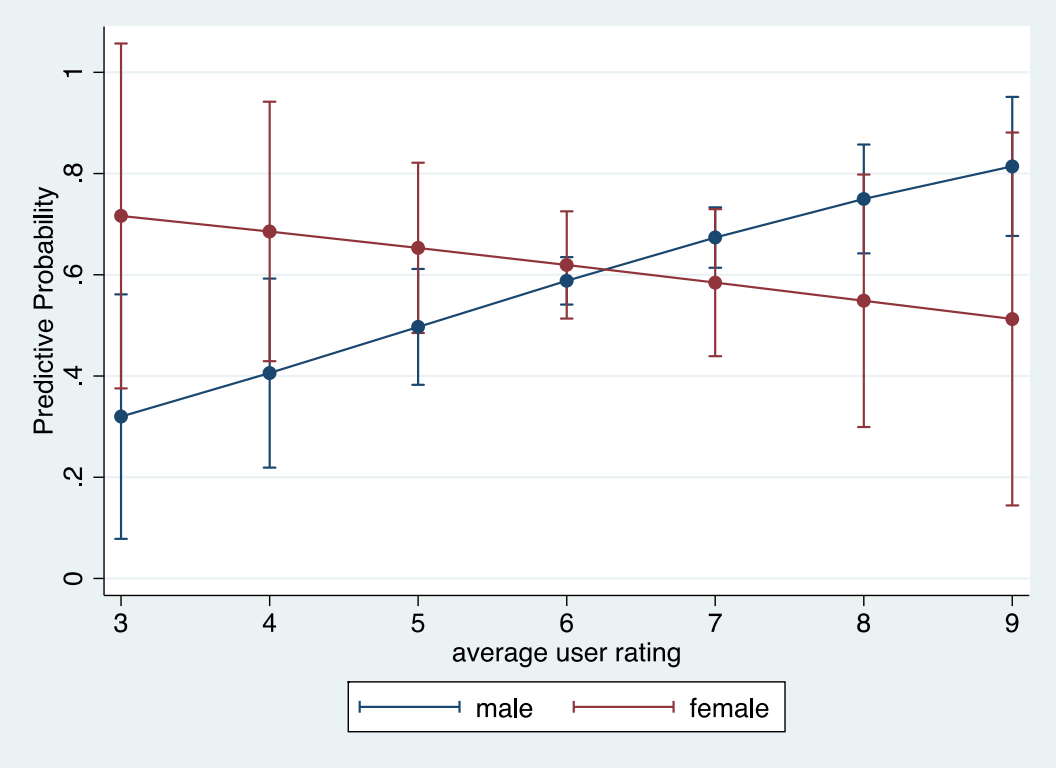


Figure 2: Plotting the interaction between age and average return (age is at the mean, 2 SDs above the mean and 2 SDs below mean) (Table 5 Model 5)

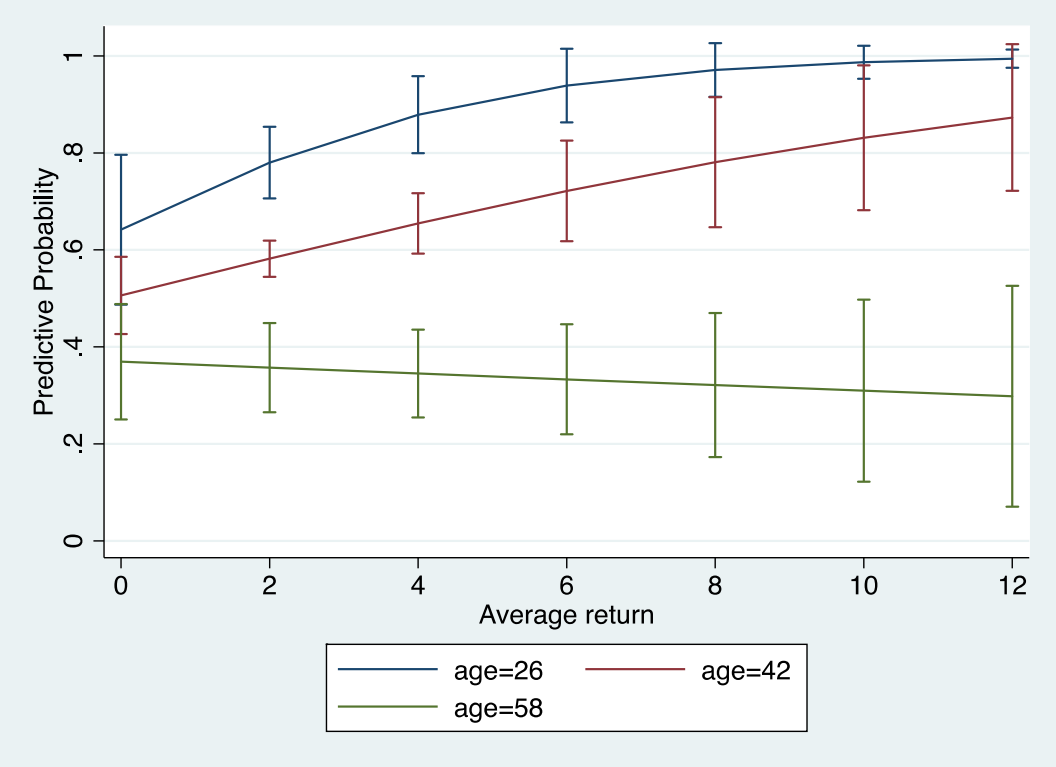


Figure 3: Plotting the curvilinear effect of age (Table 5 Model 6)

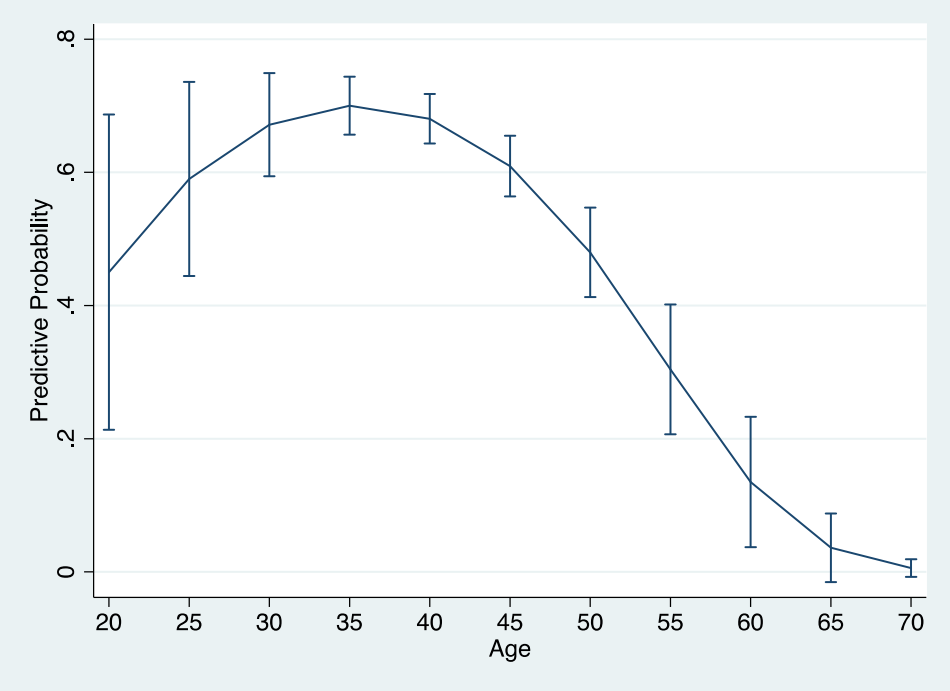


Figure 4- The probability of being hired as a function of tenure for different ages (Model 7)

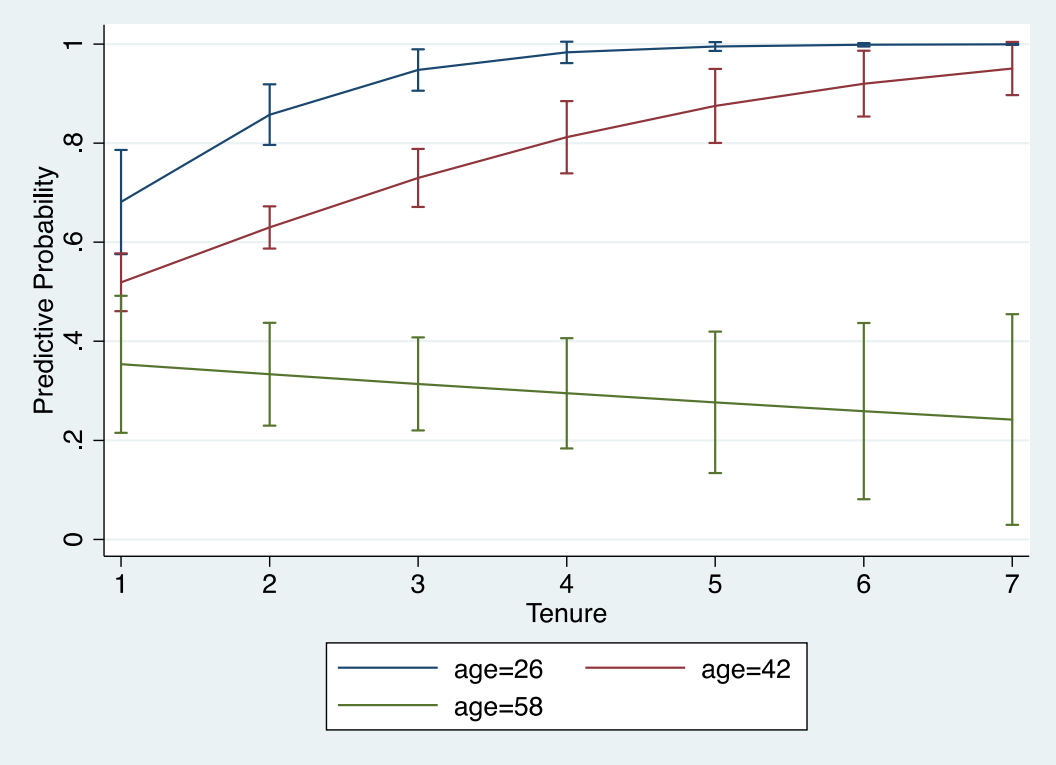
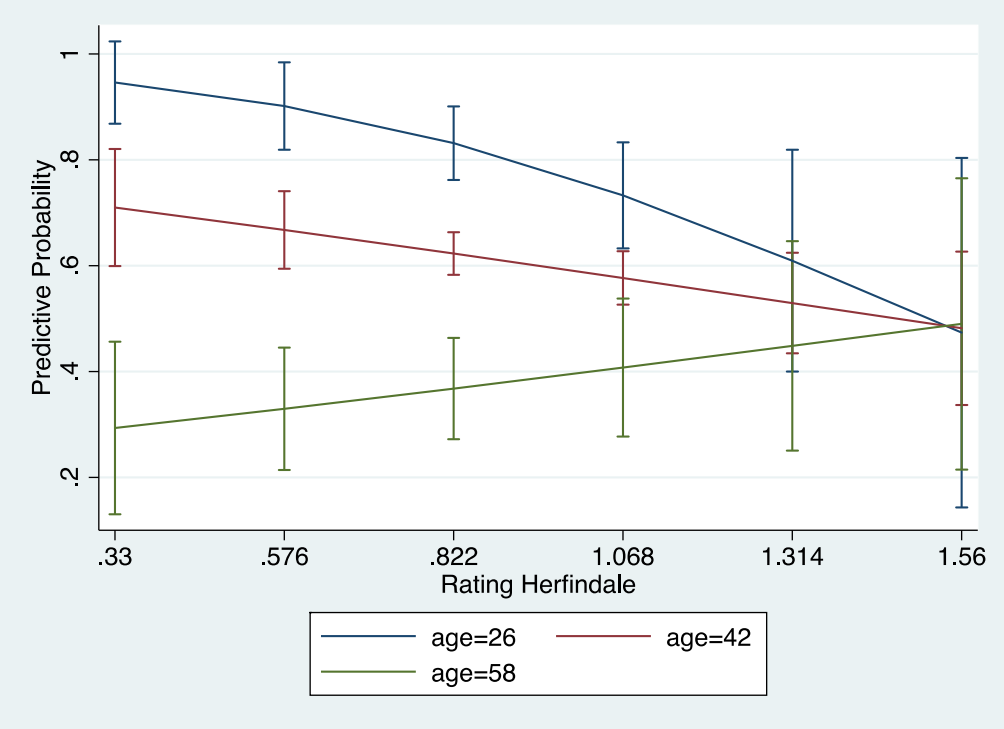


Figure 5- The probability of being hired as a function of rating Herfindahl for different ages (Model 8)



Additional tests:

Table 6: The determinants of the budget provided. The dependent variable is the budget for the film directed in constant 1998 dollars. All variables are defined in Appendix A.

Dependent variables	Budget	
	(1)	(2)
Female	-4.262	10.742
	(11.252)	(13.782)
Tenure	7.278**	7.288**
	(2.205)	(2.192)
Average return	0.899	1.154
	(1.203)	(1.295)
Average user rating	-0.240	-0.270
	(0.383)	(0.384)
Average meta score	19.515*	20.168*
	(7.761)	(7.845)
Age	-1.222*	-1.150*
	(0.552)	(0.562)
Actor	19.388	19.152
	(13.055)	(12.969)
Writer	11.496	10.591
	(9.508)	(9.492)
Other	22.519*	22.764*
	(10.305)	(10.241)
None	13.872	12.927
	(14.327)	(14.316)
R rating	28.362**	28.894**
	(9.374)	(9.629)
G rating	80.432***	81.723***
	(11.526)	(11.747)
PG13 rating	63.282***	64.165***
	(10.853)	(11.118)
Female x Average return		-4.187*
		(1.901)
Observations	336	336
R-squared	0.282	0.286

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Table 7- A Robustness check: the instrument is the number of years a director had spent in the entertainment industry before directing her/his first movie. In the second stage, the dependent variable is a dummy taking the value of 1 if the director makes another movie and zero if they drop out of the sample. All variables are defined in Appendix A

Dependent Variables	Probability of making another movie	
	(1)	(2)
	2nd stage	1st stage
Average return	0.253**	
	(0.095)	
Gender	0.030	-0.393
	(0.180)	(0.430)
Tenure	0.194*	0.282*
	(0.089)	(0.130)
Age	-0.042***	0.004
	(0.011)	(0.023)
Other engagement	-0.119*	-0.003
	(0.053)	(0.099)
R percent	0.125	1.118*
	(0.207)	(0.520)
G percent	-0.390	2.381***
	(0.278)	(0.616)
PG13 percent	0.092	1.012*
	(0.201)	(0.497)
Rating_Herfindahl	-0.410	0.466
	(0.295)	(0.688)
Actor	0.319	-1.425**
	(0.238)	(0.514)
Writer	0.413**	-0.491
	(0.140)	(0.400)
None	0.191	-0.847
	(0.216)	(0.618)
Others	0.264	0.222
	(0.184)	(0.357)
Years before debut		0.001**
		(0.000)
Observations	687	687
log likelihood	-2098	-2098

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Table 8 : The determinants of directing another film for directors under the age of 50. The dependent variable is a dummy taking the value of 1 if the director makes another movie and zero if they drop out of the sample. All variables are defined in Appendix A

Dependent variables	Probability of making another Movie
Female	-0.294
	(0.433)
Tenure	0.494***
	(0.098)
Average return	0.199*
	(0.081)
Average user rating	0.460*
	(0.206)
Average meta score	0.018+
	(0.010)
Age	-0.048*
	(0.023)
Scope of pre-debut career	0.222*
	(0.092)
Years before debut	0.000
	(0.000)
Other engagements	-0.212**
	(0.079)
Coop	-0.523
	(0.340)
N	546
Log likelihood	-283.7

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Table 9 – Success for experienced directors. The dependent variable is a dummy taking the value of 1 if the director makes another movie and zero if they drop out of the sample. All variables are defined in Appendix A

	Probabilities of making the 4th movie and beyond	Probability of making the 5th movie and beyond
Female	1.347+	3.516*
	(0.792)	(1.401)
Tenure	0.415*	0.753**
	(0.172)	(0.270)
Average return	0.037	-0.201
	(0.149)	(0.222)
Average user rating	1.902**	1.803+
	(0.734)	(0.960)
Average meta score	-0.026	0.023
	(0.028)	(0.064)
age	-0.214***	-0.273***
	(0.048)	(0.071)
Other engagements	0.355+	0.441+
	(0.194)	(0.245)
Actor	0.092	1.659
	(0.691)	(1.181)
Writer	0.624	2.439**
	(0.614)	(0.941)
Others	0.793	1.553+
	(0.618)	(0.848)
None	0.742	3.085**
	(0.848)	(1.143)
R_percent	-0.594	-1.829
	(1.921)	(5.377)
G_percent	-1.205	-0.019
	(2.137)	(4.640)
PG13_percent	-0.693	-1.670
	(1.741)	(4.743)
Rating Herfindahl	-1.114	1.709
	(1.126)	(2.814)
Observations	201	115
log likelihood	-75.17	-35.37

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Table 10 - Robustness checks with Rotten Tomatoes- the dependent variable is a dummy taking the value of 1 if the director makes another movie and zero if they drop out of the sample. All variables are defined in Appendix A

Dependent Variable	Probability of making another movie							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female		-0.243	-0.254	4.318+	-0.207	-0.181	-0.159	-0.205
		(0.328)	(0.317)	(2.246)	(0.325)	(0.337)	(0.325)	(0.319)
Tenure	0.392***	0.510***	0.412***	0.406***	0.415***	0.404***	2.285***	0.420***
	(0.073)	(0.083)	(0.096)	(0.096)	(0.092)	(0.098)	(0.545)	(0.098)
Average return	0.151*	0.136*	0.149*	0.148*	0.651*	0.154**	0.144*	0.142*
	(0.062)	(0.057)	(0.067)	(0.067)	(0.298)	(0.059)	(0.068)	(0.066)
Critics average	0.318***	0.395***	0.463***	0.473***	0.475***	0.448***	0.453***	0.450***
	(0.093)	(0.105)	(0.112)	(0.113)	(0.113)	(0.111)	(0.109)	(0.110)
Audience average	0.761**	0.571*	0.506+	0.647*	0.457	0.622*	0.627*	0.560+
	(0.254)	(0.291)	(0.297)	(0.297)	(0.299)	(0.306)	(0.299)	(0.298)
age		-0.078***	-0.080***	-0.077***	-0.052**	0.350**	-0.014	-0.183**
		(0.015)	(0.016)	(0.016)	(0.020)	(0.108)	(0.026)	(0.059)
Other engagements		-0.193*	-0.182*	-0.185*	-0.165*	-0.199**	-0.183*	-0.186*
		(0.076)	(0.080)	(0.079)	(0.076)	(0.077)	(0.078)	(0.080)
Actor		0.097	-0.088	-0.127	-0.093	0.036	-0.049	-0.063
		(0.347)	(0.348)	(0.353)	(0.342)	(0.356)	(0.344)	(0.349)
Writer		0.594*	0.506*	0.488+	0.523*	0.635*	0.612*	0.565*
		(0.259)	(0.249)	(0.254)	(0.244)	(0.271)	(0.259)	(0.257)
Others		0.325	0.372	0.370	0.415	0.551+	0.417	0.425
		(0.308)	(0.297)	(0.299)	(0.292)	(0.311)	(0.299)	(0.299)
None		0.120	0.102	0.050	0.155	0.280	0.143	0.150
		(0.386)	(0.388)	(0.390)	(0.388)	(0.392)	(0.387)	(0.389)
R_percent			0.570	0.611	0.530	0.543	0.494	0.548
			(0.446)	(0.445)	(0.456)	(0.457)	(0.449)	(0.449)
G_percent			-0.250	-0.216	-0.383	-0.367	-0.300	-0.252
			(0.526)	(0.529)	(0.544)	(0.526)	(0.527)	(0.525)
PG13_percent			0.692	0.683	0.692	0.685	0.626	0.670
			(0.479)	(0.473)	(0.489)	(0.493)	(0.482)	(0.484)
Rating Herfindahl			-0.722	-0.751	-0.636	-0.760	-0.560	-5.811+
			(0.518)	(0.523)	(0.520)	(0.551)	(0.546)	(2.967)
Female*Audience average				-1.290*				
				(0.650)				
Age*Average return					-0.011+			

					(0.006)			
Age*Age						-0.005***		
						(0.001)		
Age*Tenure							-0.040***	
							(0.011)	
Age* Rating Herfindahl								0.115+
								(0.064)
Observations	705	662	662	662	662	662	662	662
log likelihood	-399.6	-353.9	-348.3	-346.8	-345.4	-339.7	-342.6	-346.7

Appendix A Table A1- Variable Definitions

Age	Age of the director when making the current movie
Female	A dummy variable that takes the value of 1 if the director is female.
Coop	A dummy variable for films co-directed by a man and a woman.
Revenue	Domestic gross revenue + International box office + TV revenues+ home entertainment gross revenue (adjusted for inflation – 1998 dollars)
Domestic Gross	North American Revenues
Budget	Production Cost +print and ad (adjusted for inflation – 1998 dollars)
Return	Revenue/Budget
Tenure	Number of movies made prior to the current movie
Max Screen Count	The largest number of screens during the run of the movie.
R,PG, PG-13 Percent	Percentage of films in this MPAA rating category.
Average Meta-score	Metacritic score from IMDB
User Rating	User reviews score from IMDB
Critics Average	Average critics' score from Rotten Tomatoes.
Audience Average	Average user reviews score from Rotten Tomatoes.
Avg Return	Average return of all prior films by the director excluding the current film.
Average Critic Rating	Average of critical reviews for all prior films by the director excluding the current film
Average User Ratings	Average user ratings for all previous films by the director.
Years Before Debut	The number of years from the first listing on IMDB and until the director directs her/his first movie.
Major Role	The major role is the role the director is credited with prior to their directing career with the highest number of credits on IMDB, if they exceed 2.
Minor Role	The minor role is for the next role that is at least 20 percent of the number of major-role credits, if they exceed 2.
Scope of pre-Debut	Number of pre-debut skills
Other Engagements	The average number of other credits on IMDB per year (besides directing a feature film) for a director while pursuing a directing career.