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On female leadership in the movie business: Evidence from over 130 years of filmmaking in Germany

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Abstract

This paper analyses gender differences in leadership in the German movie industry using a uniquely long-run dataset covering nearly 88,000 films and more than 27,000 directors from the late nineteenth century to 2023. Treating film directors as key leadership positions in a project-based creative labour market, we distinguish between career persistence and access to economically sustainable projects. Methodologically, we combine non-parametric survival functions and semi-parametric Cox proportional hazard models with film-level linear probability models including year fixed effects and detailed controls for experience, education, and production characteristics. This framework allows us to distinguish gender differences in exit behaviour from those in project allocation. We document a substantial historical underrepresentation of women, although participation has increased markedly since the 1960s. Survival estimates show no evidence that female directors exit the profession more rapidly than men once cohort and age-at-entry effects are accounted for. However, women are significantly less likely to direct commercial films—projects most closely associated with income generation. These gaps are large in unconditional models but largely explained by differences in accumulated experience. Conditional on commercial experience, women are no less likely than men to continue directing such projects. We further provide evidence suggesting that formal film education and public funding contribute to narrowing gender gaps, highlighting the role of institutions in shaping leadership opportunities.

JEL Codes: J16, L82, Z10

Keywords: leadership, gender, film directors, careers, public funding, film schools

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1 Introduction

Leadership positions in the cultural and creative industries are characterised by high creative autonomy, substantial economic responsibility, and strong winner-take-all dynamics. In the movie industry, the film director represents a central leadership role, combining creative authority, team coordination, and project management. Despite the prominence of directors in shaping both artistic and commercial outcomes, leadership positions in filmmaking have historically been dominated by men. While gender inequality in creative labour markets has received increasing attention, relatively little is known about the long-run dynamics of female leadership in film directing and the mechanisms that shape gender gaps over time.

Directors play a crucial role in movie production. The creative and financial responsibilities are concentrated in this position, and mismanagement in planning and guidance can have disastrous consequences for the film project (John et al., 2017). In the case of a film d'auteur, directors have almost complete control over the film, including the screenwriting. According to John et al. (2017), directors can be best viewed as project managers. So, when we look for leadership in the industry, we find it in the director role. The directors cover many leadership roles: 1) The creative vision: Directors interpret the script, guide actors' performance, and make decisions on visual style, pacing, and tone, 2) Decision making: Directors decide on casting, script revisions, shot composition and editing, and balance creative ambitions with practical constraints, 3) Team leadership: Directors lead teams including actors, cinematographers, designers and editors, and coordinate between different departments, 4) Project management: Directors manage the film's production schedule and budget, and 5) Public face: Directors represent the film in marketing, interviews and at festivals, and play a key role in the film's promotion and public reception.

When it comes to gender gaps in wages and earnings, the movie industry is not

different from other labour market sectors. In general, many studies find gender gaps in wages and earnings, partly attributable to the underrepresentation of women in top positions (Blau and Kahn, 2017; Bertrand, 2018). Even though there has been gradual progress, significant inequalities persist according to the Global Gender Gap Report (Pal et al., 2024), and the underrepresentation of women among directors is still evident today, as recently reflected in the public debate concerning the success of Greta Gerwig's blockbuster film 'Barbie'.

There is a substantial body of research documenting gender-based income disparities in the cultural and creative industries (CCIs). Heikkinen and Karhunen (1996) show, using data from Finland, that the average income of women artists across art forms is lower than that of their male colleagues. However, they find no significant evidence of gender bias in the allocation of public support for artists. Vecco et al. (2024) document gender pay gaps in the cultural and creative job markets in Canada, and Heo and Yoon (2018) present evidence of a glass ceiling for arts and culture professionals in Korea. Been et al. (2024) demonstrate that gender inequalities in earnings in the creative industries are extensive and omnipresent, being least pronounced in sub-sectors such as literature, music, and visual arts, and most severe in fields like film and photography. In music, Hennekam et al. (2019) find significant gender equity for women composers, while Vincent et al. (2022) identify gender biases in opera. Herron et al. (1998) provide evidence of glass ceilings in theatre employment and management, indicating that women in the theatre sector face barriers to advancing into management-level positions. Finally, Marchenko and Sonnabend (2022) offer strong empirical evidence for a gender gap in revenues among German visual artists.

In the movie industry, several studies have examined directors' career paths (e.g., John et al., 2017; Chan et al., 2018; Peng et al., 2019), but few have focused specifically on gender. Karniouchina et al. (2023) analyse a large sample of 2,386 movies released in the United States between 1994 and 2016. They find that only 4.95% of these movies were directed by women, and that female directors tend to receive lower budgets. Stupples et al. (2024) study Pacific filmmakers in key behind-the-camera

roles in films screened at the Pasifika Film Festival across three iterations (2015–2019), analysing a sample of 74 films. While there are still fewer women than men working as directors, scriptwriters, producers, and cinematographers, these inequalities appear to be declining: the share of female directors increased from 24% in 2016/17 to 45% in 2018/19. Furthermore, the authors find that more women work on short films and documentaries with smaller budgets. They suggest that future research should address gender diversity, intersectionality, and the nuances of gendered agency in different film-making contexts. Recently, Bittmann and Menger (2026) have shown that the effect of box-office success on both survival prospects and future earnings is much stronger for women directors.Using data on 4,508 films released in France between 1996 and 2018, the study analyses the careers of 2,442 directors and finds that "women in the French movie industry face greater pressure to excel, and their survival and earnings are more closely tied to the performance of their past projects compared to men" (p. 197).

Most prior studies on the career paths of film directors (John et al., 2017; Chan et al., 2018; Peng et al., 2019; Bittmann and Menger, 2026) have focused on box office revenues and therefore rely on relatively short sample periods. Our aim is to provide a more comprehensive picture of the evolution of the movie industry and female participation in leadership roles within it. Specifically, this paper addresses the gaps in the literature by studying gender differences in leadership careers in the German movie industry from its origins in the late nineteenth century to 2023. Germany provides a particularly suitable setting due to its long filmmaking tradition, major institutional changes over time, and the availability of comprehensive historical data. Using a newly assembled dataset covering nearly 88,000 films and more than 27,000 directors, we analyse gender gaps in directing across more than 130 years of industry development.

Our analysis is guided by three central research questions. First, do female directors differ from male directors in terms of career persistence, or are observed gender gaps primarily driven by differences in entry into the profession? Second, are women equally likely to access commercially viable leadership positions – that is, directing films that provide economic sustainability – or do gender gaps persist even conditional on remain-

ing active? Third, what role do institutions such as formal film education and public funding play in shaping gender differences in leadership outcomes?

To address these questions, we combine survival analysis with linear probability models. Survival models allow us to examine long-run career persistence and exit dynamics, while film-level probability models capture short-run transitions between projects and differences in project characteristics, including commercial orientation and public funding. By progressively conditioning on experience, education, and career characteristics, we distinguish between raw gender differences and differences that persist after accounting for accumulated career capital.

Our findings reveal a nuanced picture. While women have historically been underrepresented among film directors, female participation has increased substantially since the 1960s. Conditional on entry, women do not exit the profession more quickly than men. However, significant gender gaps remain in access to commercial films, indicating persistent barriers to economically sustainable leadership positions. These gaps largely disappear once women gain experience in commercial filmmaking, suggesting that unequal access, rather than differential performance or persistence, is the primary source of gender inequality. We further show that formal film education and public funding have played important roles in narrowing gender gaps over time.

The remainder of the paper is structured as follows. Section 2 describes the data and presents descriptive statistics. Section 3 outlines the empirical strategy. Section 4 presents the results and examines mechanisms related to education and public funding. Section 6 discusses the findings and concludes.

2 Data

Our data were collected from `filmportal.de`, an online database on German film established by the publicly funded *Deutsches Filminstitut – DIF* (German Film Institute). While the raw dataset comprises 155,336 observations spanning the years 1890 to 2023, our analytical sample is restricted to 87,092 entries for which directors' names are

known, representing 27,443 unique individuals. Note that most entries without director information relate to the period before the 'resurgence' of the German film industry after World War II and predominantly have an art or informational focus.

In some cases, a film is directed by more than one director, which can blur gender attribution if leadership is shared across genders. For this reason, we further restrict the sample to films with only one director, thereby eliminating potential ambiguity in attributing leadership to a specific individual. We end up with 78,314 observations, representing a reduction of approximately 10%. However, the majority of films with multiple directors fall in categories such as (short-)documentaries, and the share of works that meet our definition of a 'commercial' film, i.e., the category we are focused on (see the definition below), is only 23%.

Director gender is categorised based on first names using the `genderize.io` algorithm; 16.9% of all works are directed by women. Additional variables include the year of release, film type and length, production company, producer, prizes, and public funding, among others. Furthermore, for a subsample of 22,394 films, we have more detailed information on the director, including date of birth, education, and other positions held in the industry. For this subsample, the female share is 16.8%.

Table 1 presents the descriptive statistics. On average, men direct significantly more films than women (3.494 vs. 2.212). The gender difference in the number of positions held in the industry (such as actor and producer) is statistically significant, but small (4.644 vs. 4.482; t-test, p-value = 0.023). With regard to age, we find a mean difference of 3.201 years (p-value = 0.000), but this gap is substantially smaller at the time of debut (1.161 years, p-value = 0.008), suggesting that male filmmakers tend to have longer careers in the profession. A smaller proportion of women have graduated from a film school. On the other hand, a larger share of women hold a university degree, and they have directed slightly more films d'auteur than men.

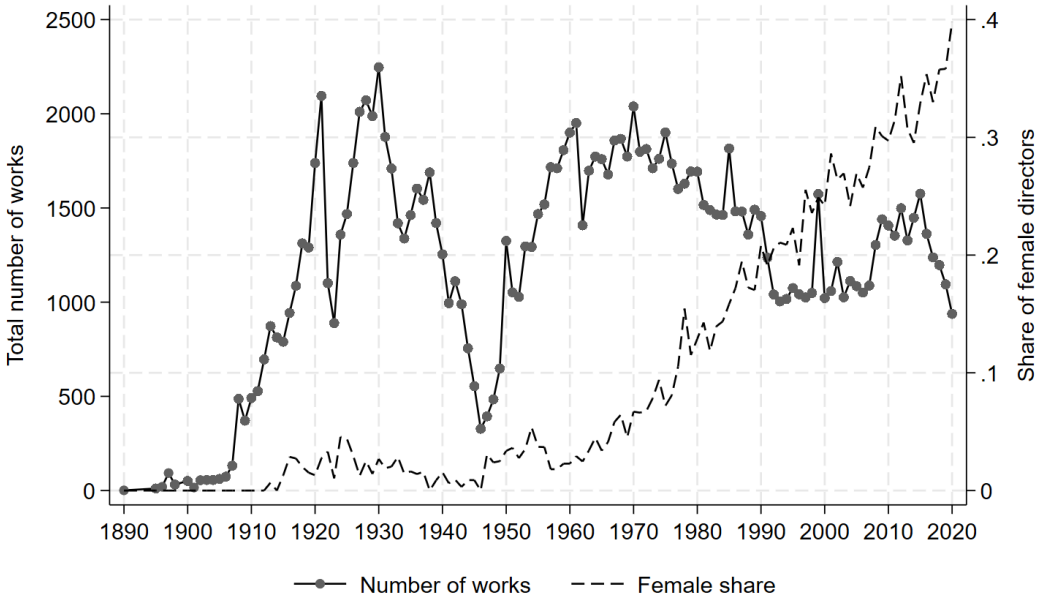
Figure 1 provides an overview of the dynamics of the German movie industry. It shows the strong impact of World War II (1939-1944) and the rapid increase of female participation in leadership starting in the 1960s.

Table 1: Descriptive statistics

	Men		**Women**	
	Mean	SD	Mean	SD
No. of movies[a]	**3.494**	8.875	**2.212**	11.504
Film d'auteur[a]	**0.325**	0.468	**0.361**	0.480
Age[a]	**42.715**	12.397	**39.514**	12.311
Age at debut[b]	**33.309**	10.015	**32.148**	8.571
No. of roles[b]	**4.644**	0.037	**4.482**	0.060
University degree[b]	**0.599**	0.490	**0.651**	0.017
Film school[b]	**0.237**	0.426	**0.183**	0.155

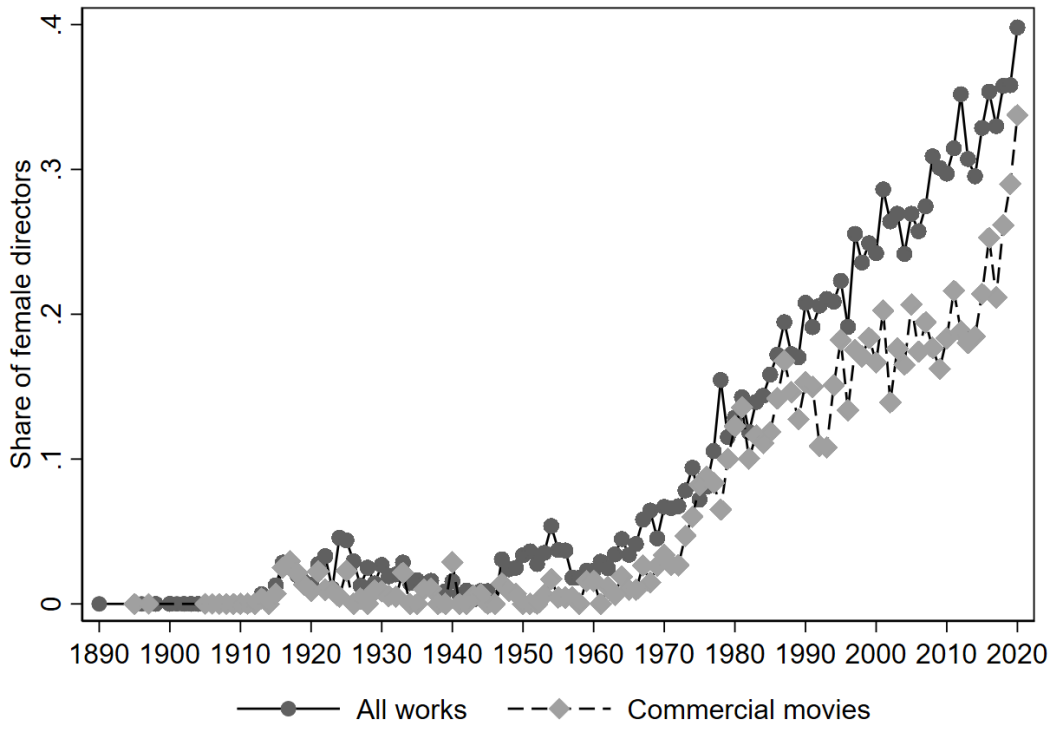
Notes: [a]N = 27,443 (female share: 0.168). [b]N =2,793 (female share: 0.169). Mean pair differences: bold $p < 0.05$.

Figure 1: The number of published films by year and the share of female directors



However, working as a director does not necessarily imply earning a living from it. It is therefore informative to distinguish between 'commercial' films – works that can generate income – and other types of films. The dataset includes various film types, and we differentiate between: a) commercial films (e.g., feature films, television productions, animated films), and b) non-commercial films (e.g., short documentaries, experimental films, educational films). Figure 2 illustrates the share of female directors for all films compared to commercial films.

Figure 2: Share of female directors – All kinds of films vs. 'commercial' films



While the share of female directors follows a similar trend for both categories from 1890 to 1940, the data show that during World War II and the post-war period (1940–1960), the share of female directors for all works was significantly higher than for commercial films. From 1960 onwards, the shares for all works and commercial films moved in parallel and increased to a similar degree until around 1990. Since then, the share of female directors in commercial films has been significantly lower than for all films, indicating that the likelihood of being able to make a living as a director has become increasingly difficult for women compared to men over the past three decades – except for

the most recent years, where the gap appears to be narrowing. Interestingly, the gender gap appears somewhat different on the intensive margin, that is, when we examine the mean number of films directed per individual. Figure A.1 in Appendix A shows substantial disparities in the average number of films directed by individuals in our sample to the disadvantage of women before 1970. After that, we only find a (moderate) difference between the releases of male and female directors for 'commercial' films only. Note that, since directors are assigned to the decade of their first publication, the downward slope of the graphs is mechanical.

Table 2 provides an overview of the variables used in the analysis and the corresponding samples. While the full sample allows us to examine long-run trends and career persistence, information on education and career characteristics is only available for a smaller director-level subsample.

Table 2: Outcomes, controls, and analytical samples

	Full sample 87,092 films 27,443 directors	**Director-level subsample** 22,394 films 2,793 directors
Panel A. Outcome variables		
Exit from directing (survival analysis)	Yes	Yes
Produces another film	Yes	Yes
Film is commercial	Yes	Yes
Produces more than one commercial film	Yes	Yes
Film receives public funding	Yes	Yes
Panel B. Control variables		
Director gender	Yes	Yes
Year of release	Yes	Yes
Film category and length	Yes	Yes
Production company fixed effects	Yes	Yes
Country of production	Yes	Yes
Number of prior films	Yes	Yes
Prior commercial film experience	Yes	Yes
Age of director	No	Yes
Age at debut	No	Yes
Film school education	No	Yes
University degree	No	Yes
Number of other industry roles	No	Yes

3 Empirical Approach

Our empirical strategy is guided by the distinction between career persistence and access to economically viable leadership opportunities. In project-based creative industries such as filmmaking, gender inequality may arise either because women exit the profession more quickly, because they face barriers in accessing commercially sustainable projects, or both. Survival analyses allow us to examine long-run career persistence, while film-level probability models capture differences in personal and project characteristics. By combining these approaches and progressively conditioning on experience and institutional factors, we assess whether observed gender gaps reflect differential attrition, unequal access to opportunities, or differences in accumulated career capital.

3.1 Survival analysis

In this framework, the event of interest is exit from the profession, defined as 'not producing another film'. A director is considered to have exited in year *t* if he or she is observed directing a film in year *t*, but is absent in year *t+1* and does not reappear in any subsequent year. Directors who return after a temporary absence are therefore not classified as exits. Career duration is measured in years, starting from the director's first observed film. Let *T* denote the random variable representing career duration. The survival function is defined as

$$S(t) = P(T > t) \,, \tag{1}$$

that is, the probability that a director remains active beyond year *t*. The hazard rate, which captures the instantaneous risk of exit at time *t*, is defined as

$$h(t) = \frac{d}{dt} \left[-\log S(t) \right] . \tag{2}$$

The dataset contains right-censored observations, as some directors remain active at the end of the observation period. Since this censoring arises from the observation win-

dow rather than from individual behaviour, standard survival analysis methods remain valid (Wooldridge, 2010). To avoid left-censoring, the analysis is restricted to directors whose careers commenced after the start of the observation period.

3.2 Semi-parametric Cox proportional hazard model

To examine how gender and other characteristics affect career persistence, we estimate semi-parametric Cox proportional hazard models. The Cox model specifies the hazard rate for individual *i* at time *t* as

$$h_i(t) = h_0(t) \exp\left(\boldsymbol{\beta}' \mathbf{z}_i\right) \ , \tag{3}$$

where $h_0(t)$ is an unspecified baseline hazard function and $\mathbf{z}_i$ is a vector of covariates including gender, cohort indicators, and age at first film. The key advantage of the Cox model is that it does not require specifying the functional form of the baseline hazard, while still allowing for a parametric interpretation of covariate effects. The estimated coefficients are interpreted as proportional effects on the hazard of exit. A hazard ratio below one indicates greater career persistence, while a value above one indicates a higher exit risk. The proportional hazards assumption implies that covariate effects are constant over time.

3.3 Linear probability models with fixed effects

While survival analysis captures long-run career persistence, it does not provide insight into short-run career transitions or project characteristics. To address this, we estimate linear probability models (LPMs) with year fixed effects to analyse three binary outcomes: (i) whether a director produces another film after a given project; (ii) whether the film is a commercial production; and (iii) whether the film receives public funding. The analysis is restricted to the post-1960 period to avoid distortions related to the Nazi era, World War II, and the immediate post-war years. However, we also provide estimates based on the full sample in Appendix B. Standard errors are clustered at the

director level. The estimated model takes the form:

$$Y_{i,j,t} = \beta_0 + \beta_1 \,\mathrm{Female}_j + \boldsymbol{\beta}_2' \mathbf{X}_i + \boldsymbol{\beta}_3' \mathbf{Z}_{j,t} + \theta_t + \varepsilon_{i,j,t} \ , \tag{4}$$

where $Y_{i,j,t}$ is the outcome of interest for film *i* by director *j* in year *t*, $\mathbf{X}_i$ a vector of film-level controls (including production company, country, and movie category), $\mathbf{Z}_{j,t}$ is a vector of director-level controls (including prior experience, age, education, and other occupations in the industry), and θ_t year and other fixed effects. By comparing models with increasingly rich controls, we distinguish between raw gender differences and differences that remain after accounting for experience and institutional context. This approach allows us to identify whether gender gaps reflect unequal treatment, differential access to opportunities, or differences in accumulated career capital. Leveraging both survival analysis and film-level probability models thus allows us to disentangle long-run career persistence from short-run project transitions.

4 Results

This section presents the main empirical results.

4.1 Survival curves and hazard ratios

Figures 3 and 4 show the survival functions for men and women for the full sample period and for careers starting after 1960, respectively (given the disruptions after WWII as presented in Figure 1). The high values on the x-axis reflect a small number of directors, such as Leni Riefenstahl and Werner Herzog, who remained active over exceptionally long careers. Both figures indicate that women are slightly more likely than men to remain in the profession, although the difference is modest.

While the Kaplan–Meier curves provide a descriptive comparison of career survival by gender, they do not account for other factors that may influence exit rates, such as entry cohort or age at debut. To formally assess the effect of gender on career persis-

Figure 3: Kaplan-Meier survival curves, 1890-2023

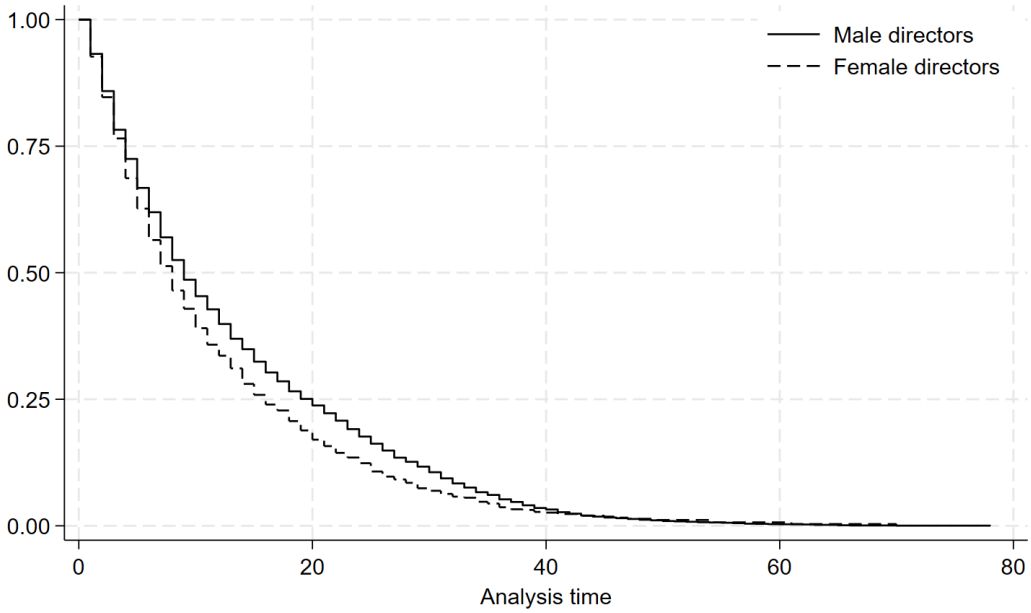
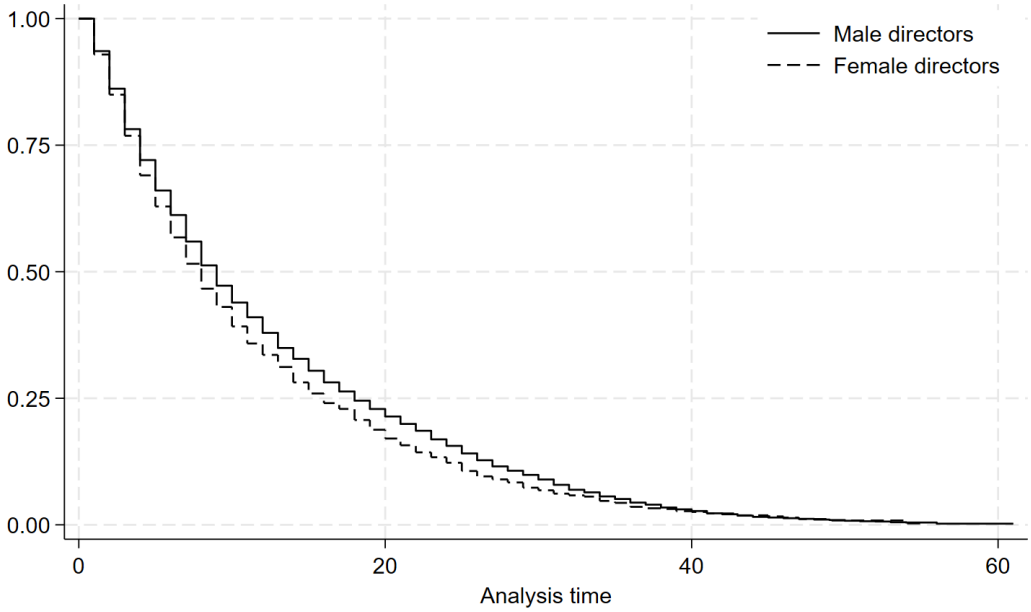


Figure 4: Kaplan-Meier survival curves, after 1960



tence while controlling for these covariates, we next estimate Cox proportional hazard models. Table 3 presents the results from these models, showing the estimated effect of gender on the risk of exiting the directing profession. Specifically, the table reports hazard ratios (exp(β)) for the *female* indicator variable. Column (1) uses the full sample, while columns (2)-(5) restrict the sample to directors who started their careers in the 1960s or later.

Unconditional estimates for the full sample and after 1960 (columns (1) and (2), respectively) show hazard ratios of 1.159 and 1.111 for female directors, indicating that they face a risk of exiting the profession up to 15.9% higher than that of male directors. In column (3), after controlling for cohort indicators, the hazard ratio becomes statistically insignificant, implying that the gender difference in exit risk is explained by differences across cohorts. In columns (4) and (5), using the additional data sample that allows controlling for age at first movie, the hazard ratio for *female* is 1.196 in column (4) and becomes insignificant when adding cohort indicators (column (5)). Table A.1 in Appendix B shows that these results remain robust when the sample is restricted to 'regular work spans' of no more than 40 years, mitigating the potential bias introduced by exceptionally long careers (as discussed above). In summary, our findings indicate that although female directors initially appear to have a higher risk of exiting the profession, this difference is largely accounted for by cohort effects and career characteristics. Once these factors are accounted for, no significant gender difference in career survival remains.

Taken together, both the non-parametric Kaplan-Meier curves and the multivariate Cox regressions point to the same substantive conclusion: gender gaps in career survival among directors are negligible once relevant covariates are taken into account. This suggests that gender inequality in the film industry as demonstrated in Section 2 is driven more by barriers to entry and access to opportunities than by differential rates of attrition.

While survival analysis provides valuable insights into long-run career persistence, it does not capture short-run transitions or project-specific characteristics. To address

these aspects, we complement our analysis with film-level linear probability models, which allow us to examine the probability of directors continuing their careers after each film and to assess gender gaps in project allocation.

Table 3: Survival in the movie business and gender.

	Basic data			*Additional data*	
	(1)	(2)	(3)	(4)	(5)
female	1.159***	1.111***	0.969	1.196**	1.000
	(0.033)	(0.032)	(0.028)	(0.080)	(0.064)
Cohort indicators[a]	No	No	Yes	No	Yes
Age-at-first-movie indicators	No	No	No	Yes	Yes
N	8,431	6,514	6,514	1,497	1,497

Notes: Table presents hazard ratios (exp(β)). Except for column (1), where we use the full sample, the sample is restricted to directors who started their careers in the 1960s or later (i.e., release of the first movie). Standard errors clustered at the director level in parentheses. * p < .10; ** p < .05; *** p < .01. [a]: cohorts are 1960-1969, 1970-1979, 1980-1989, 1990-1999, 2000+.

4.2 Gender gaps in the probability of women staying in business and producing commercial movies

Building on the previous survival analysis, which examined exit from the directing profession at the individual (person) level and was necessarily limited to directors with more than one film, Table 4 presents results from linear probability models estimated at the film level. Here, the binary outcome variable indicates whether a director continues filmmaking after a given movie, thus capturing the probability of producing another film. This procedure allows us to add more observations and to use film-specific information, such as the category and production company. We restrict the sample again to the period beginning with 1960 to exclude the WWII disruptions. Table A.2 in Appendix B shows similar results for the whole sample.

Across all model specifications, the coefficient for *female* is negative, indicating that female directors are generally less likely than their male counterparts to make another film. This is consistent with the observation that the share of female directors with

only one observation in our sample is much higher than for men (0.260 vs. 0.131, *p*-value < 0.000). In the simplest specification (column (1)), the gender gap is statistically significant and sizeable: female directors are 3.4 percentage points less likely to direct another film compared to men (or 5% relative to the sample mean). This gap remains statistically significant, though reduced in magnitude, after controlling for film category and country (column (2)). However, once company fixed effects are included (column (3)), the gender gap is no longer statistically significant. In the more detailed models (columns (4) and (5)), which include additional controls at the director level, such as the number of prior works, age, education, and other industry roles, the gender coefficient becomes small and remains statistically insignificant.

In sum, while there is an apparent gender gap in the likelihood of continuing a directing career after a given film, this gap is largely explained by differences in film, company, and director characteristics. Once these factors are accounted for, there is no significant difference between male and female directors in their probability of making another film. In other words: Once women have overcome industry-specific barriers such as working with the 'right' production company, gender differences in staying in the business vanish.

To investigate the cohort effects identified in the previous section in more detail, Figure 5 illustrates how the gap evolves decade-wise: we see a stepwise closing of the gap up to a point (in the 1990s), after which the point estimator loses statistical significance.

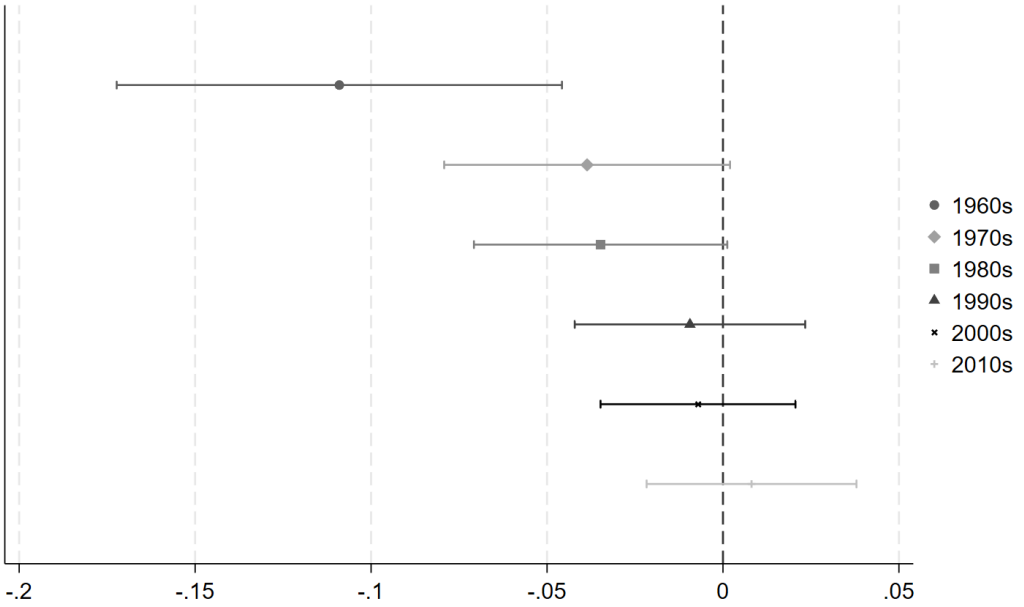
However, there are huge differences between films (ranging from short documentaries and experimental films to full-length films produced for the cinema and TV). To make a living from staying in the business, we expect it is important to produce movies from which money can be earned. Therefore, we have carried out a similar exercise with the probability that the focused movie is a 'commercial' movie being the dependent variable. Here, we define 'commercial' movies as those works for which money can be earned, i.e., narrative and animated films as well as documentaries with a length of at least 60 minutes produced for TV.

Table 4: Probability of staying in the business (producing another film)

	Basic data				*Additional data*
	(1)	(2)	(3)	(4)	(5)
female	-0.034***	-0.020**	-0.010	0.001	0.012
	(0.010)	(0.009)	(0.008)	(0.008)	(0.011)
no. of prior works				0.003***	0.003***
				(0.001)	(0.000)
german					0.004
					(0.010)
age					0.006***
					(0.002)
age^2					-0.000***
					(0.000)
no. other occup.					0.015***
					(0.002)
univ. degree					0.034***
					(0.009)
year dummies	*yes*	*yes*	*yes*	*yes*	*yes*
category dummies	*no*	*yes*	*yes*	*yes*	*yes*
country dummies	*no*	*yes*	*yes*	*yes*	*yes*
company dummies	*no*	*no*	*yes*	*yes*	*yes*
N	55,247	55,247	55,121	55,121	11,703
R^2	0.139	0.197	0.298	0.310	0.406
Mean of DV			0.679		0.871

Notes: Data restricted to the years after 1960. Binary dependent variable: director *j* continues filmmaking after movie *i* (0/1). Robust standard clustered on the director level, * p<0.1, ** p<0.05, *** p<0.01. Film length quintile indicator included as an additional control in columns (2)–(5).

Figure 5: Gender gap in the likelihood of making another movie over the decades



Notes: Parameter estimates for the *female* indicator with category, country, and year FE only. DV: *j* directs another movie after *i* (0/1). 95% CI.

Our estimates presented in Table 5 show that the unconditional gender gap of 14.3 ppts (or 40% relative to the sample mean, column (1)) shrinks to 3.3 ppts when we condition on film characteristics and prior experience (column (4)), but still amounts to 9.1% relative to the sample mean. These findings suggest significant barriers for women in the industry.

When we include all the additional information we have about the individuals for the smaller sample of more prolific directors, the estimated coefficient of the gender indicator loses significance (column (5)). In this case, experience gets significant, with the number of prior works, number of other occupations, age, and a university degree being positively associated with the probability of producing a 'commercial' film. This result is supported by Table 6, which shows the likelihood of a director producing more than one 'commercial' film. Throughout the specifications, we find no statistically significant association between being a woman and the probability of producing another 'commercial' film. In other words: if women succeed in entering commercial filmmaking, they remain in business to the same degree as men. Again, Table A.3 in Appendix B shows similar results for the whole sample. Decade-wise (unconditional) estimates of

Table 5: Probability that film *i* is a 'commercial' movie

	Basic data				*Additional data*
	(1)	(2)	(3)	(4)	(5)
female	-0.143***	-0.062***	-0.043***	-0.033***	-0.011
	(0.012)	(0.008)	(0.006)	(0.005)	(0.012)
no. of prior works				-0.001***	0.001
				(0.000)	(0.001)
experience[a]				0.215***	0.179***
				(0.008)	(0.015)
german					-0.004
					(0.013)
age					0.016***
					(0.003)
age^2					-0.000***
					(0.000)
no. other occup.					-0.025***
					(0.003)
univ. degree					-0.026**
					(0.013)
year dummies	*yes*	*yes*	*yes*	*yes*	*yes*
category dummies	*no*	*yes*	*yes*	*yes*	*yes*
country dummies	*no*	*yes*	*yes*	*yes*	*yes*
company dummies	*no*	*no*	*yes*	*yes*	*yes*
N	54,454	54,454	54,311	54,311	11,546
R^2	0.025	0.484	0.659	0.682	0.682
Mean of DV			0.361		0.530

Notes: Data restricted to the years after 1960. Binary dependent variable: film *i* (0/1) is a 'commercial movie'. Robust standard clustered on the director level, * p<0.1, ** p<0.05, *** p<0.01. Film length quintile indicator included as an additional control in columns (2)–(5). [a] : director *j* has directed a 'commercial movie' before *i*.

the gender gap, similar to Figure 5, show a sharp decrease in the 1960s to 1980s but no clear trend after that (Figure 6).

Table 6: Probability of making more than one 'commercial' movie.

	Basic data			*Additional data*
	(1)	(2)	(3)	(4)
female	0.019	0.015	0.015	0.040
	(0.014)	(0.013)	(0.016)	(0.039)
german				-0.132***
				(0.051)
univ. degree				0.036
				(0.039)
year dummies	*yes*	*yes*	*yes*	*yes*
category dummies	*no*	*yes*	*yes*	*yes*
country dummies	*no*	*yes*	*yes*	*yes*
company dummies	*no*	*no*	*yes*	*yes*
age-at-debut dummies	*no*	*no*	*no*	*yes*
N	5,997	5,996	5,302	753
R^2	0.073	0.110	0.205	0.471
Mean of DV	0.371		0.357	0.659

Data from 1960 to 2020. DV: director *j* directed more than one 'commercial' movie (0/1). Robust standard clustered on the category-year level, * p<0.1, ** p<0.05, *** p<0.01.

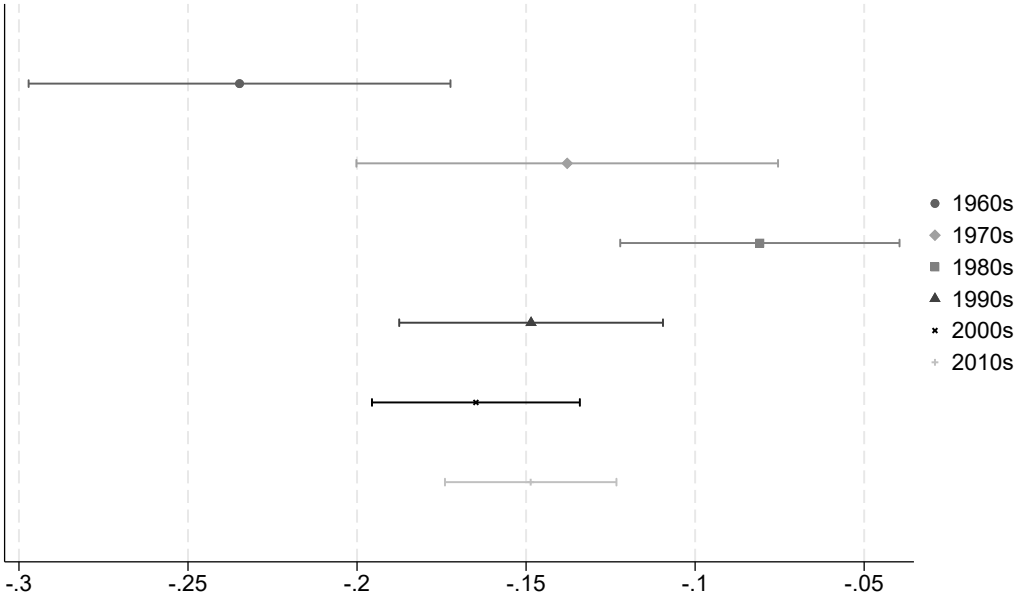
5 Mechanism for closing the gender gap

In the previous section, we documented a gender gap – particularly for 'commercial' films – that greatly diminishes once female directors manage to 'get a foot in the door'. In this section, we will look at mechanisms that could have been effective in closing the gender gap, namely 1) the establishment of formal film schools and 2) the public funding for filmmaking.

5.1 Film schools

How can we explain the rapid increase in female participation in leadership starting in the 1960s, as illustrated in Figure 1? Besides general trends in female labour market

Figure 6: Gender gap in the likelihood of making another 'commercial' film over the decades



Notes: Parameter estimates for the *female* indicator with year FE only. DV: *j* directs another 'commercial' film after *i* (0/1). 95% CI.

participation, the increase may also result from the founding of film schools, which have helped to establish formal education as a way to enter the profession. Attending a film school can serve as a strong labour market signal, reducing information asymmetries between job seekers and employers. In creative industries such as filmmaking, employers often face uncertainty about the true abilities and commitment of aspiring directors, particularly for candidates from underrepresented groups. In such contexts, statistical discrimination may arise—employers may rely on group-based stereotypes rather than individual merit when making hiring decisions.

A formal film school qualification provides credible, standardised evidence of skills, training, and professional intent. This signal can help employers distinguish qualified candidates from the broader pool, thereby reducing reliance on gender-based assumptions. For women, who may otherwise face greater scepticism regarding their suitability or commitment to directing roles, a film school degree can thus mitigate statistical discrimination and improve their chances of entry into the profession. In this way, film education not only imparts relevant skills but also serves as an equalising credential,

increasing women's access to opportunities in the film industry..

To investigate the formal education in our setting, we use data on graduates from two well-established film schools in Germany: The *Deutsche Film- und Fernsehakademie* (German Film and Television Academy Berlin, DFFB) and the *Hochschule für Fernsehen und Film München* (University of Television and Film Munich, HFF), both publicly funded and founded in 1966. From the 1970s onward, the DFFB was increasingly associated with politically engaged documentary filmmaking, leading to a shift toward experimental works and narrative cinema. In the 1990s, the curriculum was extended to include screenwriting and production alongside directing and cinematography[1] The HFF, like the DFFB, is one of Germany's most reputable film schools with about 350 students enrolled.

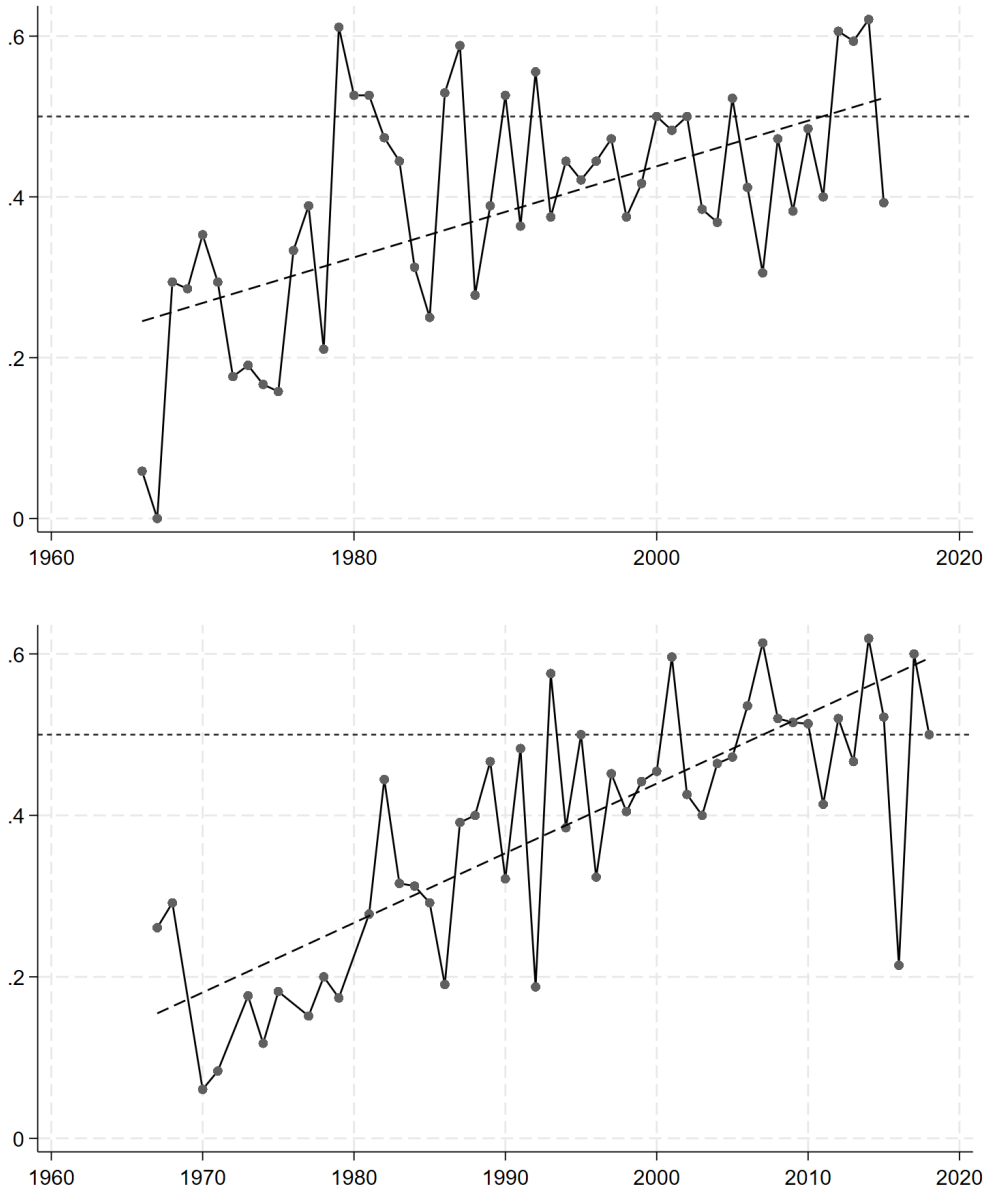
Figure 7 supports our hypothesis that formal education may have helped to increase female participation in leadership positions: It shows a clear upward trend in the share of female graduates, which sometimes exceeds 50%. For the DFFB (upper panel), we also see a jump in the share of female graduates in the late 1970s, and thereafter it has fluctuated around 40-50%. For the HFF (lower panel), we also observe an increasing trend from below 20% in the mid-1960s to above 50% in recent years (with some outliers), indicating that film schools have been effective in closing the gender gap. This is consistent with our finding that women in our sample are more likely to hold a university degree (see Table 1).

5.2 Public funding

Public funding constitutes a central institutional feature of the German movie industry. Unlike purely market-based film industries, Germany has long relied on federal and regional funding schemes to promote cultural production, artistic diversity, and domestic filmmaking. Such funding may affect gender inequality in at least two respects. First, if funding decisions are gender-neutral or explicitly designed to promote diversity, public support may mitigate market-based discrimination and unequal access to capital. Sec-

[1]Information taken from `www.dffb.de`.

Figure 7: Share of female graduates from DFFB and HFF over time

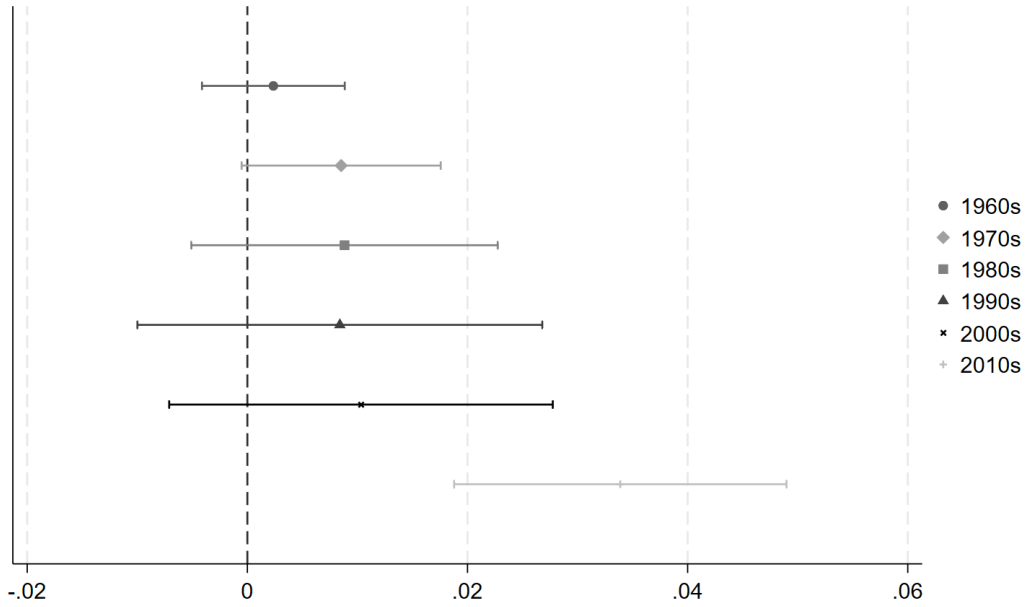


Notes: The upper panel shows the female share of graduates from the *Deutsche Film- und Fernsehakademie Berlin* (DFFB, German Film and Television Academy Berlin); the lower panel shows the female share among *Hochschule für Fernsehen und Film München* (University of Television and Film Munich, HFF) graduates. Both film schools were founded in 1966. Dashed lines represent fitted values.

ond, public funding may reduce financial risk, thereby lowering barriers to entry for underrepresented groups in leadership positions.

To assess whether public funding plays an equalizing role, we estimate linear probability models in which the dependent variable equals 1 if a film receives public support. In the baseline specification including only year fixed effects, we find no significant gender gap. When controlling for film characteristics and prior experience, however, we observe an economically and statistically significant advantage for female directors (columns (2) to (4)). Depending on the specification, the estimated coefficients range from 1.2 to 1.4 percentage points (9.2% to 13.1% relative to the sample mean; see Table 7), suggesting that films directed by women are slightly more likely to receive public funding. Figure 8 suggests that the association is strongest in the most recent years.

Figure 8: Public funding dynamics



Notes: Parameter estimates for the *female* indicator based on specification (3) of Table 7. Binary dependent variable: film has received public funding i (0/1). 95% CI.

We interpret this to mean that public funding functions primarily as an equalising mechanism rather than as a strongly redistributive instrument. While it does not fully eliminate gender gaps in access to commercially viable projects (see Table 5), it reduces potential financial constraints and may facilitate the accumulation of experience that is crucial for long-term career sustainability. In this sense, public funding may oper-

Table 7: Probability of receiving public funding and gender.

	Basic data				*Additional data*
	(1)	(2)	(3)	(4)	(5)
female	-0.001	0.017***	0.012***	0.014***	0.013
	(0.008)	(0.006)	(0.004)	(0.004)	(0.011)
no. of prior works				0.000	-0.000
				(0.000)	(0.001)
experience[a]				0.027***	0.010
				(0.005)	(0.012)
german					0.002
					(0.011)
age					0.002
					(0.003)
age^2					-0.000
					(0.000)
no. other occup.					-0.007***
					(0.003)
univ. degree					0.005
					(0.010)
year dummies	*yes*	*yes*	*yes*	*yes*	*yes*
category dummies	*no*	*yes*	*yes*	*yes*	*yes*
country dummies	*no*	*yes*	*yes*	*yes*	*yes*
company dummies	*no*	*no*	*yes*	*yes*	*yes*
N	55,247	55,247	55,121	55,121	11,703
R^2	0.122	0.267	0.444	0.445	0.562
Mean of DV	0.130	0.130	0.131	0.131	0.259

Notes: Data restricted to the years after 1960. Binary dependent variable: film has received public funding i (0/1). Robust standard clustered on the director level, * p<0.1, ** p<0.05, *** p<0.01. Film length quintile indicator included as an additional control in columns (2)–(5). ^{a} : director j has directed a 'commercial movie' before i.

ate indirectly by improving women's access to initial leadership opportunities, thereby affecting subsequent project allocation.

These findings align with broader evidence in cultural economics suggesting that public support can reduce structural inequalities in creative labour markets without fully overriding market dynamics. In project-based industries characterized by high uncertainty and network-based allocation, even small differences in early access to funding may generate cumulative advantages over time. Our results, therefore, highlight the role of institutional design in shaping leadership opportunities and suggest that public funding mechanisms can partially offset market-driven gender disparities, particularly in later stages of industry development.

6 Conclusions

This paper has analysed gender differences in leadership within the German movie industry over more than 130 years, focusing on film directors as the key leadership position. Drawing on a uniquely long historical dataset, we combined survival analysis with linear probability models to examine gender gaps in career persistence, access to commercially viable projects, and mechanisms underlying changes in female participation over time. This provides a long-run perspective on gender inequality in a creative labour market that is typically studied over shorter time horizons.

Our results point to three main findings. First, while women have historically been underrepresented among film directors, female participation has increased substantially since the 1960s. Conditional on entry, women do not exit directing at higher rates than men. Survival estimates indicate that female directors are at least as likely as their male counterparts to remain active in the profession once cohort and age-at-entry effects are taken into account. This suggests that gender inequality in directing is not primarily driven by differential attrition. Second, substantial gender gaps persist in economically sustainable leadership positions. Female directors are significantly less likely to direct commercial films – those most closely associated with income generation and career viability. Although these gaps are largely explained by differences in prior experience and career characteristics, the unconditional estimates reveal persistent barriers to accessing commercial projects. Importantly, once women have accumulated experience in commercial filmmaking, they are no less likely than men to continue producing such films. This points to unequal access, rather than performance or persistence, as the key source of gender disparities. Third, we identify two institutional mechanisms that appear to have contributed to narrowing gender gaps over time. The expansion of formal film education has coincided with rising female participation in directing, suggesting that standardised credentials may reduce informational frictions and facilitate entry into leadership roles. In addition, public funding plays an equalizing role: female-directed films are not disadvantaged in funding allocation and, in recent decades, have been more likely to receive public support. These findings highlight the importance of

non-market institutions in shaping leadership opportunities in creative industries.

This paper contributes to the literature on gender inequality in cultural and creative industries in several ways. First, it extends existing research on film directors' careers by adopting a long-run historical perspective, covering the full evolution of the German movie industry from its origins to the present. While prior studies typically focus on short sample periods and box office outcomes (e.g., John et al., 2017; Chan et al., 2018; Peng et al., 2019), our approach allows us to analyse structural changes in gender gaps across different institutional regimes. Second, we contribute to the broader literature on gender inequality in creative labour markets by distinguishing between entry, survival, and access to commercially viable work. Our findings show that gender gaps persist not because women exit the profession more rapidly, but because they face barriers in accessing projects that enable economic sustainability. This distinction helps reconcile mixed evidence in prior studies on gender gaps in creative careers. Third, the paper provides new evidence on the role of institutions – specifically formal education and public funding – in mitigating gender inequality in leadership positions. By linking individual career outcomes to changes in educational infrastructure and funding regimes, we shed light on mechanisms through which policy interventions may affect gender gaps in high-risk, project-based labour markets.

Several limitations should be acknowledged. First, the absence of box office and income data prevents us from directly assessing earnings differentials and economic returns to directing. While our classification of commercial films serves as a proxy, future research would benefit from linking career trajectories to actual financial outcomes. Second, although we addressed the issue of multiple directors by focusing on films directed by one person, collaborative authorship may still obscure individual leadership contributions. Third, while our long historical perspective is a key strength, institutional and cultural factors specific to Germany may limit the generalisability of the results to other national film industries.

Overall, the results suggest that while progress toward gender equality in film directing has been substantial, access to commercially sustainable leadership positions

remains uneven. Policies that support early access to high-budget projects, together with continued investment in formal education and public funding, may therefore be crucial for reducing persistent gender gaps in leadership within the movie industry.

References

Been, W., Wijngaarden, Y., and Loots, E. (2024). Welcome to the inner circle? earnings and inequality in the creative industries. *Cultural Trends*, 33(3):255–272.

Bertrand, M. (2018). Coase lecture–the glass ceiling. *Economica*, 85(338):205–231.

Bittmann, S. and Menger, P.-M. (2026). The gendered returns of film success, women and men directors in French cinema. *Journal of Cultural Economics*, 50:195–223.

Blau, F. D. and Kahn, L. M. (2017). The gender wage gap: Extent, trends, and explanations. *Journal of Economic Literature*, 55(3):789–865.

Chan, J. H., Ko, A. C., Au, A. K., and Yeung, M. C. (2018). A relational perspective on pure project performance: Network centrality and cinematic achievements in the Hong Kong film industry. *Management Research Review*, 41(6):753–772.

Heikkinen, M. and Karhunen, P. (1996). Does public support make a difference, and for whom? the impact of gender on the income level and public support of artists in different art forms. *Journal of Cultural Economics*, 20(4):341–358.

Hennekam, S., Bennett, D., Macarthur, S., Hope, C., and Goh, T. (2019). An international perspective on managing a career as a woman composer. *International Journal of Arts Management*, pages 4–13.

Heo, S. and Yoon, S. (2018). Evidence of a glass ceiling for arts and culture professionals in Korea. *Applied Economics Letters*, 25(16):1170–1174.

Herron, D. G., Hubbard, T. S., Kirner, A. E., Newcomb, L., Reiser-Memmer, M., Robertson, M. E., Smith, M. W., Tulliow, L. A., and Young, J. S. (1998). The effect of gender on the career advancement of arts managers. *The Journal of Arts Management, Law, and Society*, 28(1):27–40.

John, K., Ravid, S. A., and Sunder, J. (2017). Managerial ability and success: Evidence from the career paths of film directors. *Journal of Corporate Finance*, 44:425–439.

Karniouchina, E. V., Carson, S. J., Theokary, C., Rice, L., and Reilly, S. (2023). Women and minority film directors in Hollywood: Performance implications of product development and distribution biases. *Journal of Marketing Research*, 60(1):25–51.

Marchenko, M. and Sonnabend, H. (2022). Artists' labour market and gender: Evidence from German visual artists. *Kyklos*, 75(3):456–471.

Pal, K. K., Piaget, K., Zahidi, S., and Baller, S. (2024). Global gender gap report. World Economic Forum. `https://www.weforum.org/reports/global-gender-gap-report-2024` . Accessed: 2026-02-13.

Peng, F., Kang, L., Anwar, S., and Li, X. (2019). Star power and box office revenues: evidence from China. *Journal of Cultural Economics*, 43(2):247–278.

Stupples, P., Zonjić, M., Malifa, E., Kale, A., and Motu, A. (2024). Whose lens? gender behind the camera in Pacific filmmaking. *Cultural Trends*, 33(1):111–127.

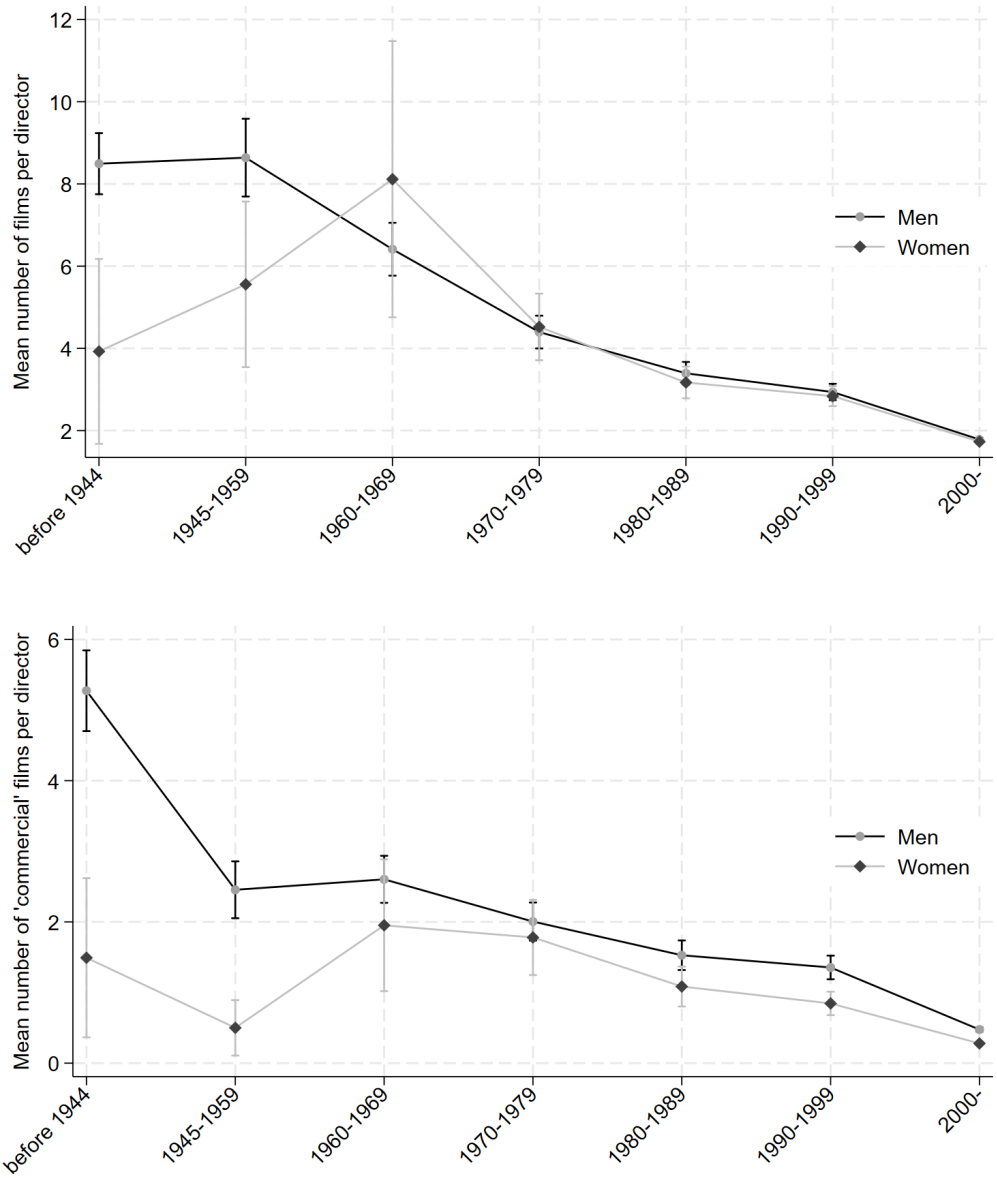
Vecco, M., Campbell, M., and Zanola, R. (2024). Gender pay gap in the early-stage careers of Canadian creative workers. *International Journal of Arts Management*, 26(3):4–16.

Vincent, C., Coles, A., and Vincent, J. B. (2022). Opera-ting on inequality: gender representation in creative roles at The Royal Opera. *Cultural Trends*, 31(3):205–221.

Wooldridge, J. M. (2010). *Econometric Analysis of Cross Section and Panel Data*. MIT Press, Cambridge, MA, 2nd edition.

A Additional Figures

Figure A.1: Mean number of ('commercial') films per director over the decades



Notes: The upper panel shows the mean number of films per director for different decades; the lower panel restricts to 'commercial' films. Directors are assigned to the decade when their first work was published.

B Additional Tables

Table A.1: Survival in the movie business and gender – Sample restricted to directors active for $\leqslant 40$ years.

	Basic data			*Additional data*	
	(1)	(2)	(3)	(4)	(5)
female	1.149***	1.110***	0.993	1.210**	1.036
	(0.032)	(0.032)	(0.029)	(0.082)	(0.069)
Cohort indicators[a]	No	No	Yes	No	Yes
Age-at-first-movie indicators	No	No	No	Yes	Yes
N	8,257	6,423	6,423	1,447	1,447

Notes: Table presents hazard ratios (exp(β)). Except for column (1), the sample is restricted to directors who started their careers in the 1960s or later (i.e., release of the first movie). Standard errors clustered at the director level in parentheses. * p < .10; ** p < .05; *** p < .01. [a]: cohorts are 1960-1969, 1970-1979, 1980-1989, 1990-1999, 2000+.

Table A.2: Probability of staying in the business (producing another film) – Full sample (1890-2023)

	Basic data				*Additional data*
	(1)	(2)	(3)	(4)	(5)
female	-0.038***	-0.025***	-0.016**	-0.005	0.009
	(0.010)	(0.009)	(0.008)	(0.008)	(0.011)
no. of prior works				0.003***	0.002***
				(0.001)	(0.000)
german					0.002
					(0.008)
age					0.005**
					(0.002)
age^2					-0.000***
					(0.000)
no. other occup.					0.015***
					(0.002)
univ. degree					0.032***
					(0.007)
year dummies	*yes*	*yes*	*yes*	*yes*	*yes*
category dummies	*no*	*yes*	*yes*	*yes*	*yes*
country dummies	*no*	*yes*	*yes*	*yes*	*yes*
company dummies	*no*	*no*	*yes*	*yes*	*yes*
N	77,763	77,763	77,763	77,763	15,789
R^2	0.153	0.201	0.308	0.320	0.405
Mean of DV			0.735		0.900

Notes: Full sample (1890 to 2023). Binary dependent variable: director *j* continues filmmaking after movie *i* (0/1). Robust standard clustered on the director level, * p<0.1, ** p<0.05, *** p<0.01. Film length quintile indicator included as an additional control in columns (2)–(5).

Table A.3: Probability that film *i* is a 'commercial' movie – Full sample (1890-2023)

	Basic data				*Additional data*
	(1)	(2)	(3)	(4)	(5)
female	-0.149***	-0.066***	-0.044***	-0.032***	-0.018
	(0.012)	(0.009)	(0.006)	(0.005)	(0.014)
no. of prior works				-0.001***	0.000
				(0.000)	(0.000)
experience^a				0.222***	0.171***
				(0.007)	(0.014)
german					-0.012
					(0.011)
age					0.015***
					(0.003)
age^2					-0.000***
					(0.000)
no. other occup.					-0.022***
					(0.003)
univ. degree					-0.027**
					(0.011)
year dummies	*yes*	*yes*	*yes*	*yes*	*yes*
category dummies	*no*	*yes*	*yes*	*yes*	*yes*
country dummies	*no*	*yes*	*yes*	*yes*	*yes*
company dummies	*no*	*no*	*yes*	*yes*	*yes*
N	76,753	76,753	76,753	76,753	15,608
R^2	0.120	0.519	0.698	0.720	0.713
Mean of DV			0.406		0.593

Notes: Full sample (1890 to 2023). Binary dependent variable: film i (0/1) is a 'commercial movie'. Robust standard clustered on the director level, * p<0.1, ** p<0.05, *** p<0.01. Film length quintile indicator included as an additional control in columns (2)–(5). ^{a} : director j has directed a 'commercial movie' before i.

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