Investigating the influence of genre preferences on movie/series rating patterns over time

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Research motivation

The entertainment industry is highly dynamic. Consumer preferences keep changing, and new movies and series are produced regularly. These changes in preferences require the industry to respond accordingly. For example, showing an ankle in a movie might have been considered scandalous in the 1950s, but it is now just a minor detail. To make an impact in such an ever-evolving industry, movie directors need to get creative. These changes in the industry influence how movies and series are produced and how consumers react to them. One way to understand these patterns is by examining the genre of a product.

Genre preferences reflect what consumers have enjoyed watching in the past, and hence are likely to enjoy in the future. Therefore, genre can be used as a criterion for selecting productions, based on which consumers decide whether to watch a particular production or not. An understanding of genre preferences provides filmmakers with guidance on which genre to choose to increase the chances of success and to best convey their intended message. However, the nature of genres is constantly evolving, and it is important to comprehend how current consumers respond to the evolution of a genre over time. For instance, an action movie today might have rapid scene changes, multiple plot twists, and lengthy fight scenes, but on average, such movies may only receive moderate ratings at best. In contrast, action movies from two decades ago had a more gradual plot development and were less overwhelming, yet they received a higher average rating. When consumers rely on the genre productions of the past to make their choice, it may adversely impact their evaluation of a current production in the same genre.

In order to gain a better understanding of how modern consumers rate products and services, it is crucial to comprehend how they use their past preferences as a point of reference. Hence, this research paper aims to explore whether there exist any discernible patterns in genre preferences over time, and whether some genres tend to have a greater impact on average ratings than others.

Research question

In this paper we aim to answer the following research question:

How do consumers' production preferences of genre elements change over time, and how do they impact the average ratings of those same productions?

Relevance

The research results shed light on how consumers use dynamic genres to shape their satisfaction with a movie or TV series. The findings suggest that some genres are preferred in certain years over others. For example, war movies tend to receive higher ratings during world wars compared to times of peace. This may imply that consumers use these productions as references to rate them in context of the sign of the times. Managers may want to consider adjusting their productions to better suit the elements in those preferred years.

The study also found that recent fantasy movies tend to receive lower ratings from consumers, while those produced in the 70s are rated more favorably. Overall, the results may suggest that managers may face challenges in meeting previously set expectations and that these findings provide a reference frame for when those expectations are met.

Additionally, the results also provide insights into how genres are related to average ratings across another. Currently, every production has a similar pattern of ingredients. Most movies contain hints of drama and romance, regardless of whether it is in a distropian sci-fi survival movie or an horror action series. However, the results indicated that these common genres are not significantly related to the average ratings. In contrast some movies and series do contain unique elements do results in significant relationships. For example, biographies and animations. This may imply that consumers may not rely so heavily on past genres that are common because they gradually change with times without consumers noticing. (Think of it like a birthday party with your family when you are 12. Your aunt keeps telling you "How much you have grown!", but you don't notice any difference) In contrast, the uniqueness of biographies does sharply stand out. Therefore, managers may want to focus more strongly on the less common genre features compared to more common ones.

Research method

In this paper we investigate consumers' movie and series preferences using four of IMDb's data sets containing movie data. First, these

Data sets are loaded, cleaned, inspected, merged and cleaned. Next, the data is analyzed using a regression analysis. This method was chosen due to the continuous nature of the dependent variable and the categorical nature of the independent variables. The reason why a regression was chosen over the alternative of an ANOVA was due to the size and complexity of the analysis. There are 27 genres included as a dependent variable, and are measure over time. To include these features into an ANOVA is far more complex compared to a regression analysis.

This regression analysis regresses all movie and series genre's against the average rating's over a sliding period of 5 years. Additionally, the variables title, movieType and time are used as control variables to improve the interpret ability of the estimates. Additionally, because some of the assumptions were only robustly satisfied, the standard errors were clustered. The analysis resulted in a 20 window output, one for each year window.

A note of attention should be, that despite the richness of the data, the interpretation of the results remain descriptive at bests. This is because the average movie ratings are not reported over time but are merely a static measure of today's average. This implies that a single coefficient is read as "The genre X produced in the year Y is positively/negatively associated with the average movie rating of today."

Name of Variable	Contents of Variable	Used as .. in Analysis
Average Rating	The average rating on IMBd per title of a given movie or series.	Dependent Variable
Genre Types	Genre Types is a cluster for all 26 genre dummies that contain the value 1 if the movie or series contains that genre and otherwise 0.	Independent Variable
titleType	This variable indicates whether a title is a movie or a series.	Fixed Effect
Title	The title is the given title of any unique movie or series	Fixed Effect
5 Year Window	The 5 year window (or ' slide_window_5' indicates between what 5 year window a movie or series belongs to. For example a movie from 2003 belonging to 2000-2004	Split Variable

Descriptives

The data set contains of 70087 films, of which 60246 are movies and 9841 are series. These films have on average a rating of 6.3, with 10 being the highest and 1 being the lowest. After removing the votes to all being above 100, the average number of votes on a film became 7146. When looking at the years, the most amount of films were released on IMDb in 2019, with 2586 films. Also when comparing the 5 year range of films released,2015 to 2019 had the most films released, with 11353 films. LAst, when looking at the run time of the films, on average a film is 101 minutes long.

Outcome Variable: Average Movie Rating

The average IMDb rating is used as the outcome variable for the analysis. However, this average rating is influenced by the number of votes that compile this average. This can be the case because each rating, including the extreme ones, receives more weight when calculating the average, simply because there are only a few ratings. So, the average ratings may be more extreme, causing to skew the overall results. Therefore, movies/series receiving a number of votes below the cut-off of a hundred will not be included in the regression analysis.

Please note the average movie rating is a static measure that does not change the dynamics of the rating. For example, we can only see today's average rating but not that of 2 hours, 2 days, or even 2 years ago.

Explanatory Variable: Genres

Genres are used as the explanatory variable in the analysis. However, because they are nested within the original data set they are first un-nested and then pivoted wider. As a result data with 27 dummies was constructed that could be assessed separately in the analysis.

Fixed Effects

Given that the measurement of genre preferences over time is a construct that is viable to many unobservables, fixed effects were added to the regression analysis to partially capture these unobservables. More specifically the type of title (movie vs. series) and title were added. To give an example, it could be that for movies people prefer something with a little more drama than they would for a series or vice-versa.

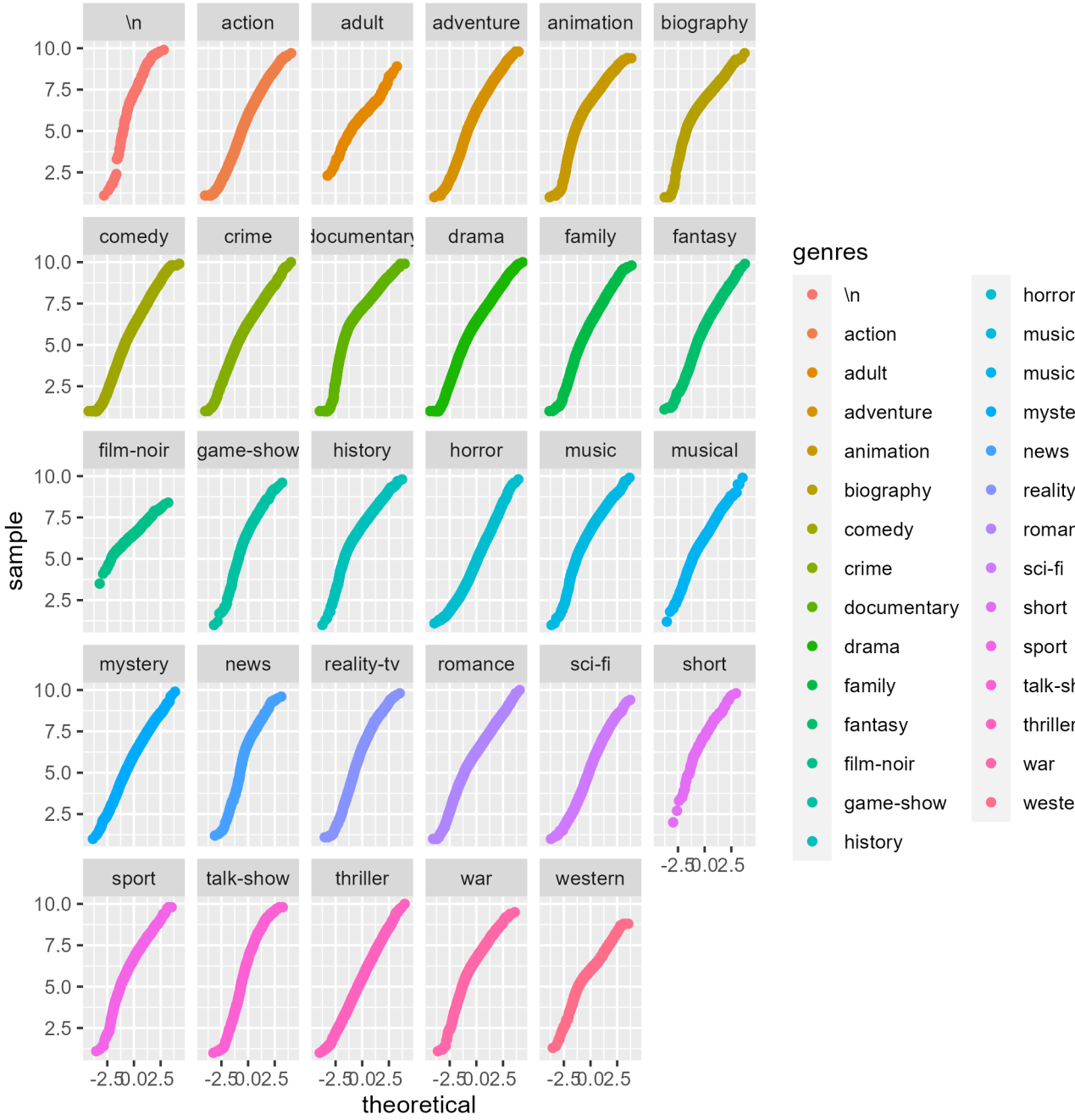
A point of concern, however, is that these average ratings are not measured over time but are a fixed sum up to and including the data of analysis. This means that if series fall out of favor and their rating drops this remains unobservant. Given that the continuation of a series is determined by its success (a second season is not produced if the first one was a flop) the following assumption can be made: if a genre is not preferred throughout the continuance of a series, the rating is low in the starting year and thus unlikely to be significant. Additionally, since IMDb was not around in 1925, average ratings for movies and series originating from that time may be strongly biased because a niche selection of the population may be watching these movies in the first place. Therefore, regardless of the additions of these fixed effects the results of the analysis are correlational at best.

Capturing preferences over time

Last, to see how preferences change over time we build on the assumption that if a movie or series is a success they gain many positive ratings in the beginning and less so over time. As a result, there is a peak during (the first season) release allowing us to only use the startYear as a means to calculate behavior over time. Yet, the individual years are unlikely to have a remarkable effect on the genre preference trends. This is because the effects are so nuanced that they are unlikely to be detected. Therefore, a five-year window was created that captures all genre preferences for that period of time. This window was constructed by grouping all productions in an interval of five years.

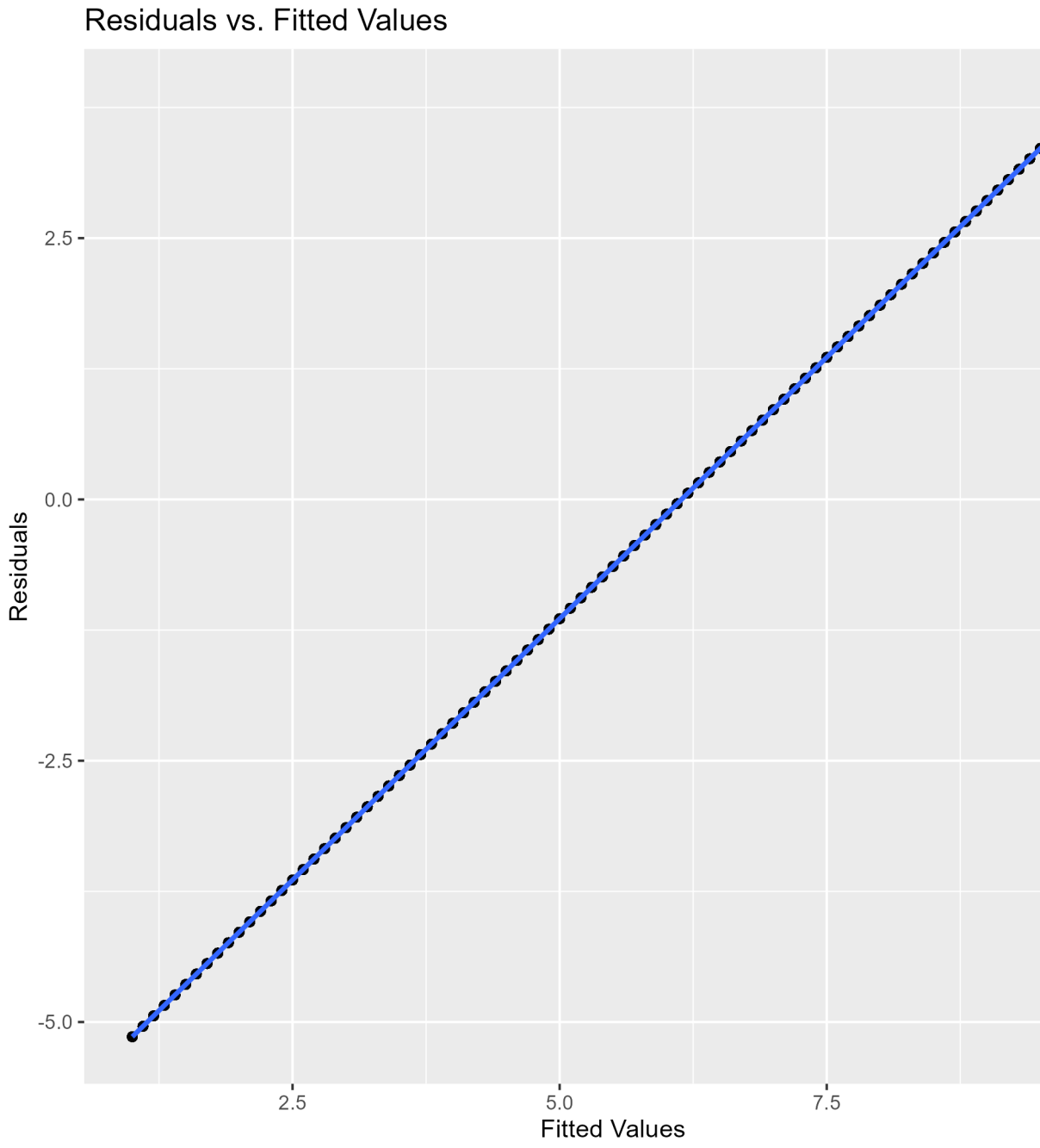
Assumption

All assumptions associated with regression were checked via a visual inspection. Only normality appeared to be satisfied.

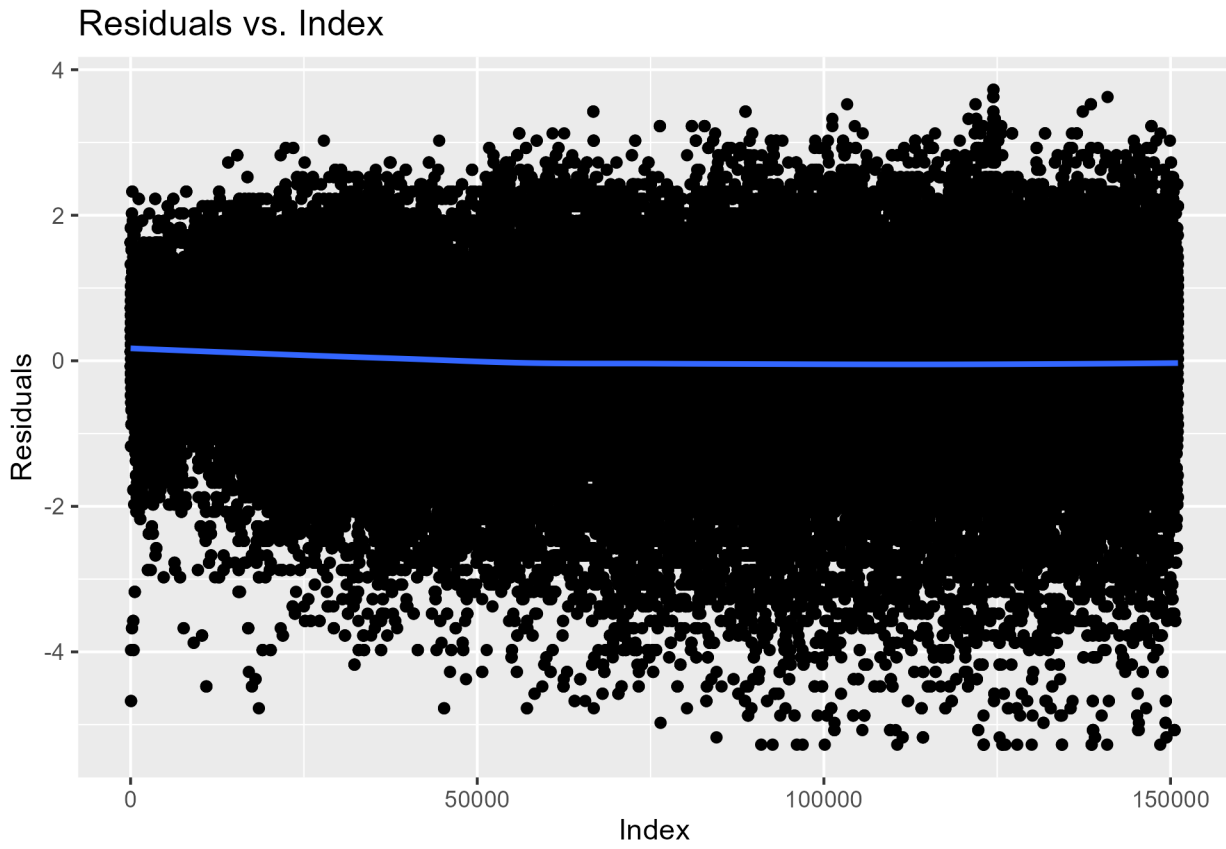


Normality

Homoscedasticity and independence appeared to be moderate at best.

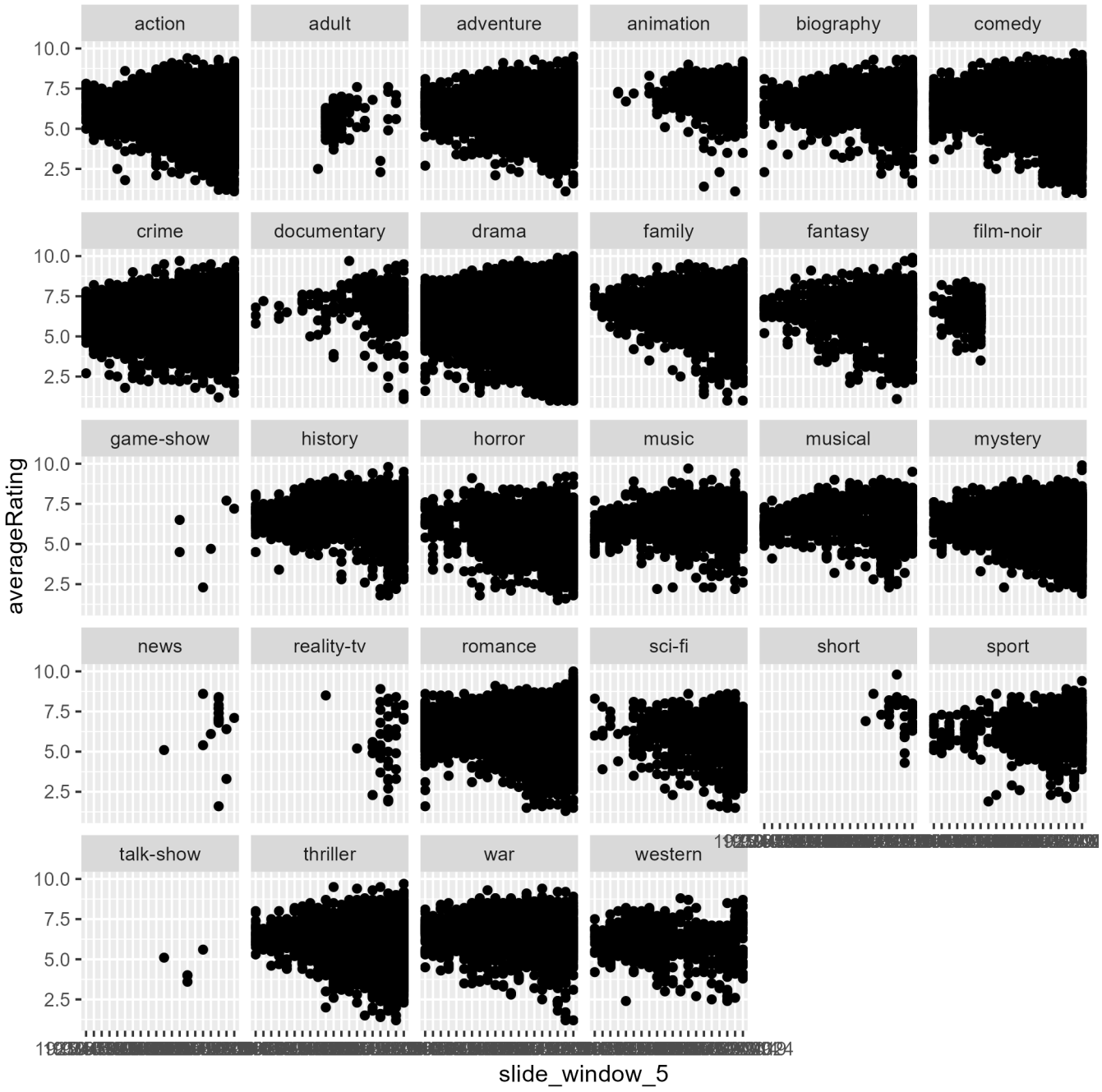


Homoskedacity



Independence

Linearity Linearity appeared to be violated the most with a widening trend for all genres as the years evolved.

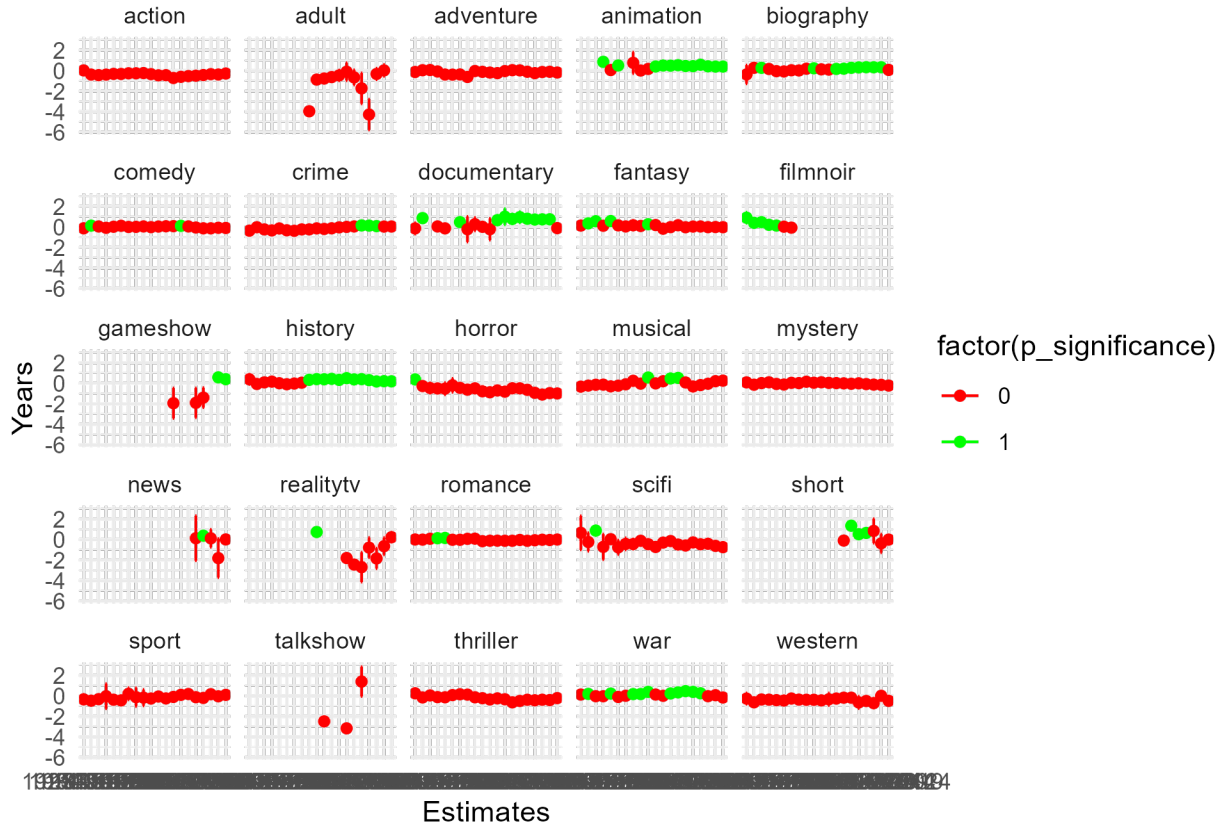


Regardless of these results the decision was made to continue with the analysis. This is because the R package `fixest` allows for modification in the mixed model analysis that helps overcome these limitations. For example, the package allows for clustering of different groups of residuals. While this does not entirely mitigate the assumption concerns it does help with them.

Results and Discussion

The results indicated that there are different genre preferences over time. Out of all twenty-five genres, only eighteen appeared to significantly influence the average ratings on IMDb. These genres were animation, biography, film-noir, fantasy, documentary, crime, comedy, game-show, history, horror, musical, shorts, sci-fi,

romance, reality-tv, news, and war.



The genre history fell in favor in around the year 1960 and continued to significantly ($p_{1960\text{-}1964}$<.01) relate to the average rating until this day ($p_{2020\text{-}2024}$ <.001). While the genre film-noir stoped to significantly relate to the average ratings around the year 1950 ($p_{1950\text{-}1954}$=.06 , $p_{1955\text{-}1959}$ =.49). The genres crime ($p_{2000\text{-}2004}$ <.01,$p_{2005\text{-}2009}$ <.01), romance ($p_{1940\text{-}1944}$ =.03, $p_{1945\text{-}1949}$ <.01), horror ($p_{1925\text{-}1929}$ =.04), game-show ($p_{2000\text{-}2004}$ <.01), reality-tv ($p_{1970\text{-}1974}$ <.01), sci-fi ($p_{1935\text{-}1939}$ <.01), and shorts ($p_{1995\text{-}1999}$ <.01, $p_{2005\text{-}2009}$ <.01) had a single period bursts where they significantly related to the average ratings. Last, the genres animation (p~1940-1944 <.01, $p_{1950\text{-}1954}$ <.01, $p_{1975\text{-}1979}$ <.01 -up until 2024), biography ($p_{1935\text{-}1939}$ <.01, $p_{1985\text{-}1989}$ <.01 -Up until 2024), comedy ($p_{1930\text{-}1934}$ =.02, $p_{1950\text{-}1954}$ =.04, $p_{1990\text{-}1994}$ =.01), documentary ($p_{1930\text{-}1934}$ <.01, p~1945-1949 <.01, p~1980-1984 <.01 - up to and including p~2015-2019 <.01), fantasy ($p_{1930\text{-}1934}$ <.01, $p_{1935\text{-}1939}$ <.01, $p_{1945\text{-}1949}$ <.01, $p_{1970\text{-}1974}$ =.03), musical ($p_{1960\text{-}1964}$ =.09, $p_{1985\text{-}1989}$ =.03, $p_{1990\text{-}1994}$ =.02, $p_{2020\text{-}2024}$<.01), and war ($p_{1930\text{-}1934}$ =.02, $p_{1945\text{-}1949}$ <.01, $p_{1960\text{-}1964}$ =.04 up to and including $p_{1970\text{-}1974}$ <.01, $p_{1985\text{-}1989}$ <.01 up to and including $p_{2005\text{-}2009}$ <.01) were significantly related to the average ratings in bursts with unrelated periods in between.

A reason why genres such as animation, biography, and history are so often correlated with the average rating over time is because these genres hold very unique elements. For example, take romance. In romance, the plays and sequence of events are often set and fail to vary. A watcher often knows what is going to happen next and what it may look like. Controversially, the genres of animation, biography, and history contain more unique and unpredictable elements. For example, not every animated movie is Frozen or the Incredibles, the history of Egypt is not the same as that of Amelia Earhart or even Germany, and the story of Elton John is different from that of Justin Timberlake.

For genres like war and film-noir the correlation could be a sign of the times, and can be strongly guided by biases in the rating population. For example, when the genre war was indicated to be significantly related to average ratings it was the time the Second World War and the Cold War were in full motion. Therefore people who have an interest in this topic may like to watch propaganda movies from that time. As a result,

the average ratings are higher because a niche of interested people is watching. Similar to film-noir, people who are interested in this type of movie or series are watching these and rating them. Therefore, there may be a strong instance of viewer bias present.

On the contrary, the genres action, adult, adventure, mystery, sport, thriller, and western are all insignificant and do not appear to be correlated to the average ratings on IMDb. A reason for this may be that these elements have become expected or core components of movies and series and therefore do not stand out. As a result, they may not correlate with the average rating as much as elements of a biography may do. It is not every day a movie or series is released that is based on true events.

Conclusion

This research illustrates that genre preferences may be related to the average IMDb ratings and vary over time. While further research is necessary to fine-tune these claims the current research does provide insight into how raters' watch patterns appear to alter. For example, it shows that the common ingredients like romance and action may not stand out as much as biography and history might. The results of this analysis can be, at best, interpreted as correlational given the vast amount of assumptions and potential hidden dangers of sampling biases (e.g., film-noir and war genres). While this has been partially mitigated by loosening some of the underlying assumptions and adding fixed effects, the fact remains that these appear as trend observations. Therefore, the results do not necessarily conclude that some genres lead to higher average ratings. However, the results do indicate that there may be preferences over time that may lead to higher average ratings.

Extensions

Yet, the investigation into these genres is only a starting point. Much more can be learned and investigated. Here are three ways in which the current research into how genres relate to average IMDb rating may be extended:

First, researchers may want to make use of dynamic review data that is not an accumulation of a point in time. Currently, the sole measure of the average reviews resulted in two major assumptions in the analysis. The first assumption refers to series and franchise continuation. E.g., if the first film or series was not successful there is no follow-up. And the second assumption refers to the fact that the year window is based on the startYear of the movie and series. By looking at dynamic data researchers can also observe if genres fall out of favor in specific conditions. For example, as the series continues do people tire of the interpretation of the genre, or is the genre in general less popular?

Second, researchers may benefit by including data from multiple sources. Currently, the analysis is limited to IMDb data but there are also other sources such as Rotten Tomatoes for example. By combining these data sets the interpretation of the results becomes less biased by the data platform. For example, it may be that people of higher age groups typically review on IMDb, and younger groups adopt commentators. By broadening the data sources the generalization of the results increases.

Last, researchers may benefit by including additional control variables such as GDP and reported population happiness scales. Given that the movie and series market is an indulgent market it may be that genres did not fall out of favor but that people could not afford to watch movies and series. Or it may be that other matters were stirring in the population which made them more happy or sad. These factors influence consumption patterns and thus ratings. By broadening the scope of the analysis results become more reliable.