# Corroborating/Controverting Conventional Wisdom: an Analysis of the Impact of the Tony Awards on the Success of Broadway Productions

**Abstract**

Broadway, as an industry, has been greatly underserved in terms of data analysis, in spite of it being a data-rich field (Miller, 2016). Thus, there is a need to be filled in the industry. To that end, this research project is a descriptive analysis that aims to elucidate the relationship between Tony Award outcomes and the success of individual Broadway productions. I hypothesize that receiving nominations and winning awards both positively impact financial performance in the weeks following the announcement of nominations and in the weeks following the award ceremony. I also hypothesize that the awards are less relevant than they were in 1980. Findings suggest that receiving nominations and/or wins positively impacts a production's longevity with wins being more influential than nominations. Furthermore, various regression model outputs suggest that nominations and wins may not be as relevant to a production's success as they used to be.

**Introduction**

**An Overview Broadway History**

The term "Broadway" refers to an industry comprising 41 theaters in New York City, all of which are venues for performances of different plays and musicals (New York Theatre Guide, 2023). For a performance space to be considered a Broadway theater, it must seat at least 500 people, and with the exception of the Vivian Beaumont Theater, it must be located in Manhattan between 41st and 54th Street and 6th and 9th Avenue. All other venues in the area that do not meet these criteria would be considered off-Broadway (New York Theatre Guide, 2023).

One could fill several books discussing the history and cultural significance of Broadway as a concept, a location, and an industry. However, for the sake of brevity, this historical account will start with Broadway's so-called "Golden Age." Theatre historians widely agree that this era took place from the early 40s until the early 60s (Jenkins, 2007; Vandevender, 2017). Historians also agree that the inciting incident of this era was Richard Rodgers and Oscar Hammerstein's 1943 musical *Oklahoma!* (Guest, 1993; Jenkins, 2007; O'Leary, 2014; Vandevender, 2017). Unlike the plotless revues of previous decades, *Oklahoma!* and other musicals of its ilk actually had a plot, as well as thematic content often relevant to social issues of the time (Jenkins, 2007; Vandevender, 2017). Part of what makes this era the "Golden Age" is that it was the period of time in which Broadway was a major part of the American zeitgeist (Vandevender, 2017). Songs from musicals at this time were covered by famous artists like Frank Sinatra and Ella Fitzgerald, and show tunes and radio hits were practically the same thing (Gans, 1998; Hughes, 2023)

From the mid 1960s onward, Broadway generally does not have the same widespread cultural impact it did in the Golden Age (Vandevender, 2017). In the past three decades, the industry has seen the advent of Disney musicals, jukebox musicals, and an increase in revivals of Golden Age musicals that are considered enduring classics (Evans, 2020; Vandevender, 2017; Wollman, 2002). For those who do not know, a jukebox musical is one that features a famous musician's songs that have been repurposed for use in a musical (Evans, 2020). All three of these trends are indicative of something more general: the commercialization of Broadway (Jenkins, 2007; Wollman, 2002). Currently, more than half of Broadway audiences consist of tourists, and many productions are made with that audience in mind (Jenkins, 2007; Wollman, 2002). The goal is to create productions that are "risk-free" by recycling old, nostalgic material (Wollman, 2002). A brand new musical or play not based on popular pre-existing source material is an incredibly risky commercial venture and is rarely cost effective (Wollman, 2002).

**The Tony Awards**

The American Theatre Wing's Tony Awards, named after actor/producer/director Antoinette Perry, are an awards ceremony made to "celebrate excellence in the theatre" (Tony Awards, 2023b). They are arguably the most anticipated event of the year for the Broadway community, and consumers generally view nominations and wins (or a lack thereof) as a sign of a production's quality (Boyle & Chiou, 2009). For those seeking something to compare them to, the Tonys are effectively the theatrical equivalent to the Oscars. Tony nominations are announced every year in early May, and the ceremony takes place roughly a month later in June (Tony Awards, 2023b). A production is only eligible to be nominated for awards for the season in which it opened on Broadway (Tony Awards, 2023b). For example, a play that opened in January 2010 is considered part of the 2009-2010 season, and is only eligible to be nominated for the 2010 Tony Awards. Additionally, off-Broadway productions and touring productions are not eligible to receive nominations (Tony Awards, 2023a).

The following are examples of Tony Award categories: "best lead actress in a musical," "best featured actor in a play," "best lighting design of a musical," "best revival of a play," "best orchestrations," "best musical," etc. (The Broadway League, 2023b). Note that in 1980 (the first year with usable data) there were 19 Tony Award categories, and in 2023 there were 26 categories (Tony Awards, 2023c). As a rule, people tend to be more invested in certain categories, and previous research on the Tony Awards has made a point of distinguishing between the importance of different categories (Boyle & Chiou, 2009). One tends to be extremely invested in finding out who will win "best leading actress in a musical," but one has little-to-no stake in who wins "best set design." Note that the Tony Awards have been held every year since 1947, with the exception of the 2020 awards, which were canceled due to Covid-19 (Hall, 2022; Tony Awards, 2023b).

**The Broadway League**

The Broadway League is the industry's national trade association (The Broadway League, 2023a). It was founded in 1930 by theater operators hoping to promote their interests and collaborate with other theatrical unions and guilds (The Broadway League, 2023a). Currently, the League has over 700 members (The Broadway League, 2023b). Today the League performs a variety of functions, including but not limited to, overseeing relations between the industry and the government, supporting charities that help members of the Broadway community, creating industry-wide marketing campaigns, and collecting and storing data on the industry (The Broadway League, 2023a).

This data is why the League is of interest to this research. The Internet Broadway Database, or IBDB, was created by the Broadway League in 2001, and houses data on Broadway shows dating as far back as the late 19th century (The Broadway League, 2023b). This data includes Tony nominations and wins dating back to 1947, weekly grosses for every production since 1980, and weekly attendance for every production since 1980 (The Broadway League, 2023b). The League's data is publicly available on the Internet Broadway Database and has been used in previous research papers (Boyle & Chiou, 2009; Miller, 2016; Simonoff & Ma, 2003), as well as in non-academic contexts (Bressler, 2020). All data used in this research come from the IBDB.

**The Current State of Broadway Research**

The majority of the sources for the historical overview of Broadway are primary scholarly literature, and these sources are representative of research on the industry in general. Most Broadway-related research is firmly rooted in the humanities and completely ignores actual data analysis (Miller, 2016). Rather than working with large quantities of data to better understand trends in the industry, scholars have a strong tendency to "focus on successful exceptions at the expense of normal mediocrities" (Miller, 2016). By cherry picking a small number of shows for research, we limit our ability to fully understand Broadway, and we fail to actually prove or disprove the truth of conventional wisdom (Miller, 2016).

This is not to say that the research being done is of no value, nor is it to say that the information in the literature is patently false. Both claims would be absurd. It is instead to say that we are missing the complete picture. There are a large number of exceptions to every single trend that the literature attempts to depict (McNamara, 2001). Even this literature review describes industry trends in rather broad strokes. The intellectual value of using large amounts of

quantitative and qualitative data to figuratively fill in blank spaces and add more detail to the picture is immeasurable (Miller, 2016).

The Broadway related research that is data-driven has made the following conclusions: production type (play or musical), Tony Award wins, critic reviews, and whether or not a production is a revival can impact a production's longevity (Reddy et al., 1998; Simonoff & Ma, 2003), and winning a tony award generally increases a production's revenue in the weeks that follow the ceremony (Boyle & Chiou, 2009). While these studies are great examples of actual data analysis, they only use data from a very limited time frame with randomly selected productions (Boyle & Chiou, 2009; Reddy et al., 1998; Simonoff & Ma, 2003). Therefore, they still suffer from issues of generalizability.

Conversely, a study that used roughly 100 years-worth of Broadway League data had several interesting findings that actually describe long term trends in the industry (Miller, 2016). For example, Miller (2016) found that the overall percentage of revivals has increased over the past several decades, thus corroborating one of the statements made earlier about revivals being more prevalent (Vandevender, 2017). However, due to the volume of data being used, Miller (2016) is also able to identify the fact that the changes in the percentage of revivals do not represent a single trend; they represent a cyclical process that likely stems from a complex web of factors, including things like financial pressures and changing taste (Miller, 2016). Additionally, Miller (2016) is able to use data on female representation in Broadway productions over the last century to provide greater depth to the analysis of Stacy Wolf, author of *Changed for Good: A Feminist History of the Broadway Musical* (Wolf, 2011). Evidently, the performing arts are greatly underserved in terms of data analysis, and the Broadway League's data provides countless opportunities to better understand the complex system that is Broadway. This research contributes to this data-driven conversation through its analysis of the Tony Awards' impact on the financial success of Broadway productions.

**Research Question**

This project attempts to answer the following research question: To what extent has the Tony Awards' impact on the longevity and financial success of Broadway productions changed over time?

**Hypotheses**

1. Winning Tony Awards improves a production's financial performance in the 5 weeks following the ceremony. After those 5 weeks have passed, the effect will begin to diminish.
2. Failing to receive nominations or failing to win after being nominated has the opposite effect on a production's financial performance in the 5 weeks following the ceremony.
3. The Tony Awards are less impactful now than they were in 1980. Therefore, while the award outcomes still matter, productions are more likely to succeed without winning awards than they used to be, and productions that win awards do not benefit to the extent that they used to.

To understand the reasoning behind Hypothesis 3 one should note the following: in 1972, the musical *Pippin* opened on Broadway (Laird, 2014; The Broadway League, 2023b). *Pippin* is notable for being the first Broadway production to ever use a television ad to market itself, and doing so significantly increased attendance (Laird, 2014). This marketing decision permanently

changed the way productions were advertised (Laird, 2014), and I posit that it served as a harbinger of the general commercialization of the industry (Wollman, 2002). Therefore, Hypothesis 3 revolves around the idea that between 1972 and 2023, the Tony Awards have started becoming less relevant as the industry slowly becomes more commercial.

## Methods

### Data

All data come from the IBDB (The Broadway League, 2023b). The data include the following variables (Table 1):

| Variable | Definition | Type | Other Information |
|---|---|---|---|
| Nominations | Number of Tony Awards a production was nominated for in a given year | Independent, discrete numeric | For the weekly data, if the date for a given row is before that year's nominations announcement, then the number of nominations for that row is listed as 0, since the production has not yet been nominated. |
| Wins | Number of Tony Awards a production won in a given year | Independent, discrete numeric | For the weekly data, if the date for a given row is before that year's awards ceremony, then the number of wins for that row is listed as 0, since the production has not yet won anything. |
| Year | The year the production was eligible for Tony nominations | Ordinal | used to split the data and analyze each year separately |
| Type | Type of show the production was (play, musical, special) | Categorical | important for filtering data |
| Production | Name of the production | Categorical | |
| Weekly gross | Amount of money a production grossed in a given week | Dependent, continuous numeric | |
| Date | The date of a week in a production's run | Ordinal | Important for classifying each point of financial and attendance data within a specific week, month, and year |
| Capacity | Percentage of sears that were filled in a given week for a given production | Dependent, continuous numeric | Most of the analysis uses capacity as a proxy for weekly gross, as there is no need to account for inflation, and the range of potential values is consistent across all productions (0 - 100%). |
| Weeks open | For any given week, the number of weeks since a production played its first performance | Independent, discrete numeric | This variable was created during analysis and was not initially present in the IBDB data |

**Table 1:** A table defining and explaining the purpose of every variable used for the project

Gathering this data required web scraping directly from the IBDB, primarily with the Python packages Beautiful Soup (Richardson, 2007) and Selenium (Muthukadan, 2018). If one wants a detailed explanation of the web scraping process, the link to this project's Github repository is available upon request. Bressler (2020) clarifies that data on production and financial information (i.e. the data for this research) are publicly available, while operational information (i.e. seating decks, social media/website traffic, etc.) is not publicly available due to its proprietary nature. Most of the data in my research are not about specific individuals, and the data that are do not contain particularly sensitive information; the fact that someone received a Tony nomination is not sensitive or private information. All data used in this project are available in csv format on this project's GitHub repository.

**Data Exclusion Criteria**

While the IBDB has weekly gross and capacity data for some productions that opened in the 1970s, the data are too sparse to be useful in analysis, and do not cover the relevant windows of time (i.e., the weeks leading up to and after the nominations announcement and the ceremony) (The Broadway League, 2023b). Therefore, the analysis excludes financial data that predate 1980. Similarly, this analysis excludes any data on Tony nominations and wins that predate 1980. While the IBDB has Tony Award data as far back as 1947 (The Broadway League, 2023b), these data are of no use to this research without the corresponding gross/capacity data needed for analysis.

Additionally, many productions that do fall between 1980 and 2023 still need to be filtered out. There are some productions that flop so badly that they close after only a few weeks (or even days), sometimes months before Tony nominations are announced. For example, in 1988, the musical *Carrie* played its first preview on April 28; it officially opened on May 12, and played its final performance on May 15 (The Broadway League, 2023b). Outlier productions like *Carrie* are therefore not of interest to this research because they closed before the Tony Awards could impact them positively or negatively. In the same vein, most productions of type "special" are excluded from the data. Special productions include things like *Bea Arthur On Broadway*, or *Mandy Patinkin in Concert*. While these productions are eligible for Tony Awards, most are limited engagements that will close after a certain number of weeks, regardless of Tony Award outcomes, and many of them close before nominations are even announced.

All data related to the 2021 Tony Awards were also excluded as that year's awards were unusual for a couple of reasons: the ceremony took place in September, instead of early June, and the awards had an unusually low number of nominees (The Broadway League, 2023b). For example, there was only one nominee for the category of "Best Leading Actor in a Musical" (The Broadway League, 2023b), something that would never happen under normal circumstances. This research also ignored data from what would have been the 2019 - 2020 season, as there were no Tony Awards in 2020 due to Covid-19 (Hall, 2022).

**Analysis Methods**
**Summary Statistics and Time Series**

Initial analysis included the collection of several summary statistics to provide context for the data (Table 2). There are also two time series (Figure 2) to illustrate the effect Tony Award nominations/wins, or a lack thereof, can have on the financial success of individual productions. This portion of the analysis was based on general principles for creating and analyzing time series in the social sciences (Shin, 2017).

**Multiple Linear Regression**

Analysis also included a multiple linear regression model that used Tony nominations and Tony wins as predictors for production longevity (i.e., the number of weeks a production is able to stay open). This model is somewhat similar to the survival analysis done by Simonoff & Ma (2003). However, unlike Simonoff and Ma, I did not create a proportional hazards model and did not make use of *New York Times* or *Daily News* Reviews. I also did not distinguish between plays and musicals, or revivals and original productions in my model. Note that while Simonoff & Ma's (2003) model only used 3 years of Broadway League data to study production longevity, mine uses over 40 years of data. This model is based on the following equation:

$$weeks \ = \ \beta_0 \ + \ \beta_1 nominations \ + \ \beta_2 wins$$

To determine how the relationship between award outcomes and production longevity has changed over time, the same model described above was created for every individual season of data (Figure 4).Note that data for each season only included productions that were eligible for that season's Tony Awards; if a production ran for several years, it was still only included in the dataframe for the season in which it was eligible for nominations. For example, *Phantom of the Opera* opened in 1988 and closed in 2023 (The Broadway League, 2023b), but it was only included in the 1987 - 1988 dataframe because that is when it was eligible for nominations.

**Moderated Multiple Regression**

Studying the relationship between award outcomes and weekly attendance (which is a proxy for financial success) for each year required the use of an interrupted time series. Interrupted time series are used to study changes that occur (or do not occur) after predetermined breakpoints in the data (Steinbach et al., 2015). In the case of this project, there are two breakpoints: the date of nomination announcements, and the date of the award ceremony. The idea is that weekly attendance rates will change based on the outcomes of both the nominations announcement and the ceremony. However, an interrupted time series assumes that the effect that occurs at the breakpoint is uniform across all data points (Steinbach et al., 2015). Therefore, this method alone does not capture the interaction between the two breakpoints and the number of accolades a production receives. In other words, for this project, the effect at the breakpoint is likely to be different for a production that receives 1 nomination and a production that receives 11 nominations. Moreover, this effect is likely to decay as time passes; this decay cannot be captured without looking at the interaction between nominations/wins received and the passage of time.

Therefore, while there are elements of an interrupted time series in this analysis due to the notion of there being breakpoints in the data, the analysis is more accurately described as moderated multiple regression. This method allows for the presence of interaction effects between different independent variables (Aguinis & Gottfredson, 2010). The moderated multiple regression model for each year is based on the following equation:

$$capacity \ = \ \beta_0 \ + \ \beta_1 noms \ + \ \beta_2 wins \ + \ \beta_3 weeks\ open \ + \ weeks\ open(\beta_4 noms \ + \ \beta_5 wins)$$

Note that unlike the previous model, each point of data here represents one week in a production's run. Prior to the nominations announcement, every production has 0 nominations and 0 wins, so the only variable affecting capacity during that time is "weeks open." The model uses the number of weeks since opening instead of date to account for the fact that almost none of the productions open on the same date. Once nominations are announced, the model hits its first "breakpoint." While it is not a breakpoint in a technical sense, this paper will refer to it as a breakpoint because when nominations are announced, nominated productions receive a fixed

increase (presumably) in weekly capacity from that point on. This effect is multiplied by the number of nominations received. The same applies to the number of wins received. The interaction between weeks open and nominations/wins captures the notion that the effect of receiving accolades in theory starts to diminish over time.

## Results

### Summary Statistics

Prior to applying the exclusion criteria to the web scraped data, the data consisted of 1,552 productions. Of those, 552 were musicals, 890 were plays, and 110 were special productions. After applying the exclusion criteria, the total number of productions was 837, with an average of roughly 20 new productions per year. Of those 837 productions, 358 were musicals, 447 were plays, and 32 were specials. These 32 remaining specials were not included in analysis of production longevity, but they were included in analysis of weekly capacity. This decision is based on the following logic: while the longevity of a limited engagement cannot be affected by Tony Award outcomes, the weekly capacity of a limited engagement can if the production was open during Tony Award season, which these 32 productions were.
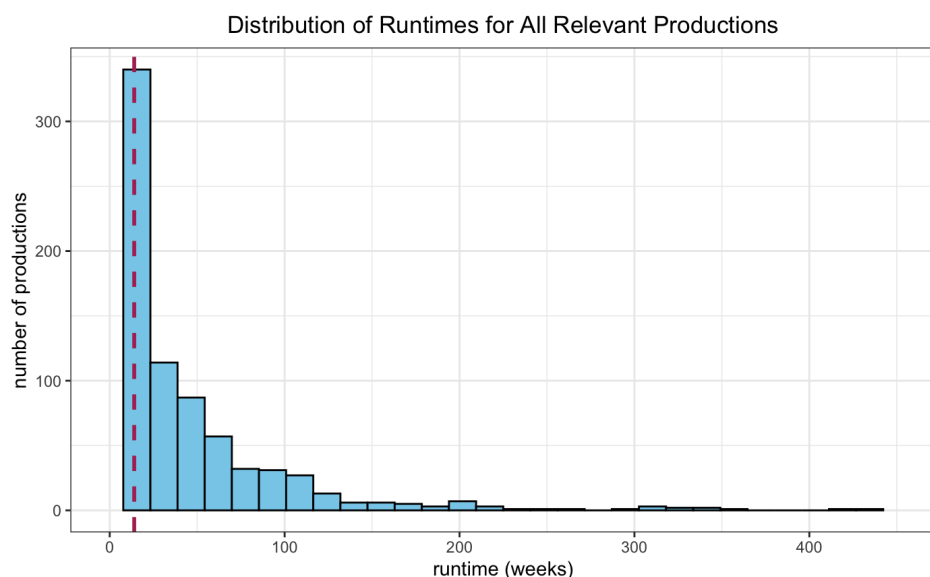


**Figure 1:** A distribution of runtime in weeks (i.e., longevity) for every production relevant to analysis. Note that outlier productions like *Phantom*, *Cats*, *Chicago*, etc. are not depicted in this visualization. The dashed red line represents the median runtime (14 weeks).

Between 1980 and 2023 the average runtime for a production was 36.59 weeks. However, this number is skewed by outlier productions like *Phantom of the Opera*, which ran for 1,755 weeks and the 1997 revival of *Chicago*, which has been running for 1,327 weeks. The median runtime is only 14 weeks, meaning roughly half of the productions run for 14 weeks or fewer (Figure 1).

| Month | Average Capacity |
|-----------|-----------|
| January | 79.92% |
| February | 77.84% |
| March | 79.97% |
| April | 79.25% |
| May | 77.85% |
| June | 80.30% |
| July | 83.12% |
| August | 84.63% |
| September | 78.81% |
| October | 81.69% |
| November | 77.77% |
| December | 77.77% |

Additional summary statistics include the average monthly capacity for each month across all 42 years of data (Table 2).This was done to determine if there were any intra-annual trends in capacity to be aware of when conducting statistical analysis. With the exception of a 3-4% increase in attendance during July and August, there are no noticeable yearly trends. Average capacity tends to sit around 77-80% for the remainder of the year.

**Table 2:** Average percentage of seats filled each month
for every Broadway production featured in the data since 1979.

**Time Series of Individual Productions**

In 2007, *Spring Awakening* had a noticeable increase in weekly grosses after it received 11 nominations, and grosses continued to steadily increase after it won 8 of those nominations (Figure 2A). Conversely, *The Pirate Queen* started grossing noticeably less money after receiving only 1 nomination, and it closed about a week after winning 0 awards at the Tonys (Figure 2B).

**A**
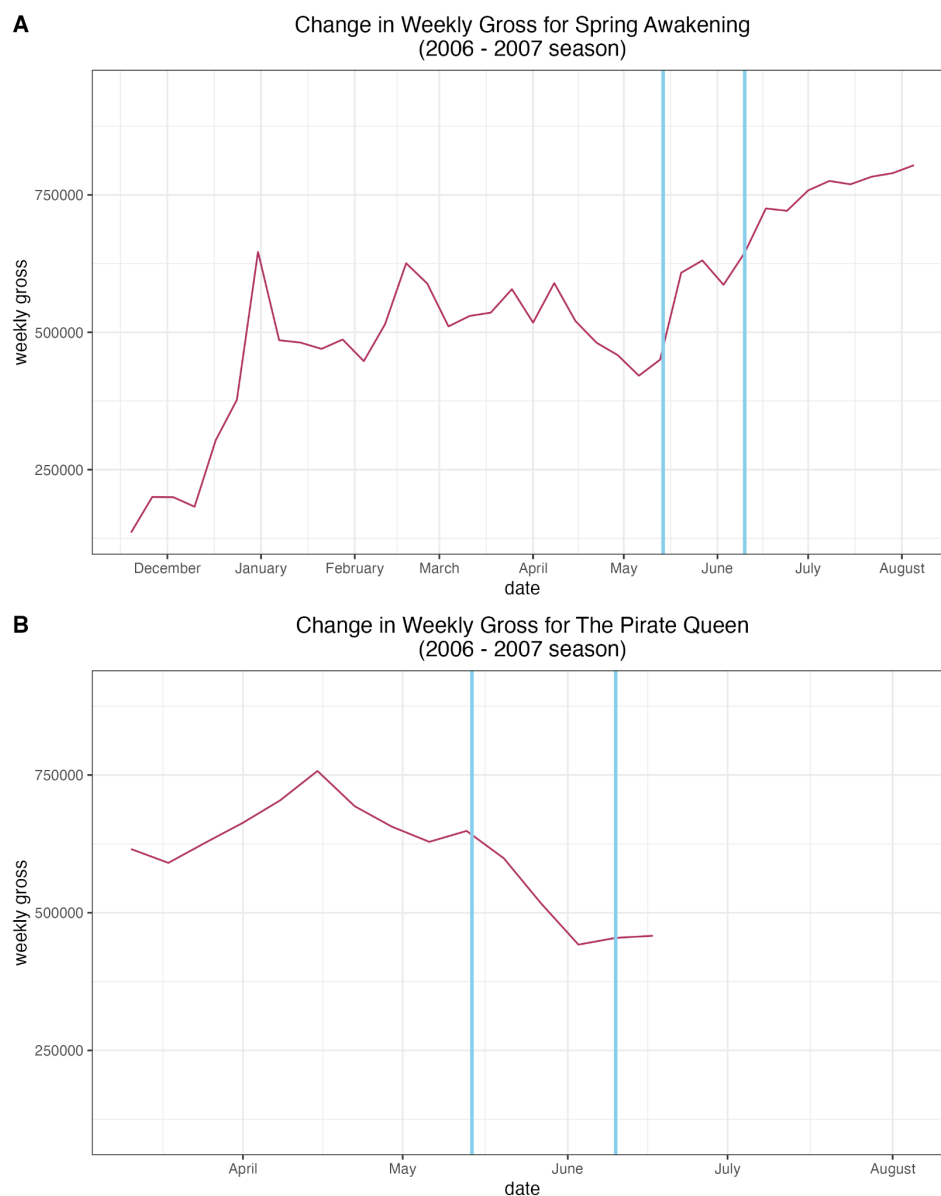


**Figure 2:** Time series analyses of how a production's weekly gross changes between its first performance and two months after the Tony Awards. For each figure, the first blue line represents the date Tony Award nominations were announced for that season (May 15, 2007), and the second blue line represents the date of the Tony Awards ceremony (June 10, 2007). Both productions were musicals that opened in the 2006 - 2007 season. *Spring Awakening* was nominated for 11 awards and won 8. *The Pirate Queen* was nominated for 1 award and won 0. The week when the red line stops abruptly for *The Pirate Queen* is the week the production closed.
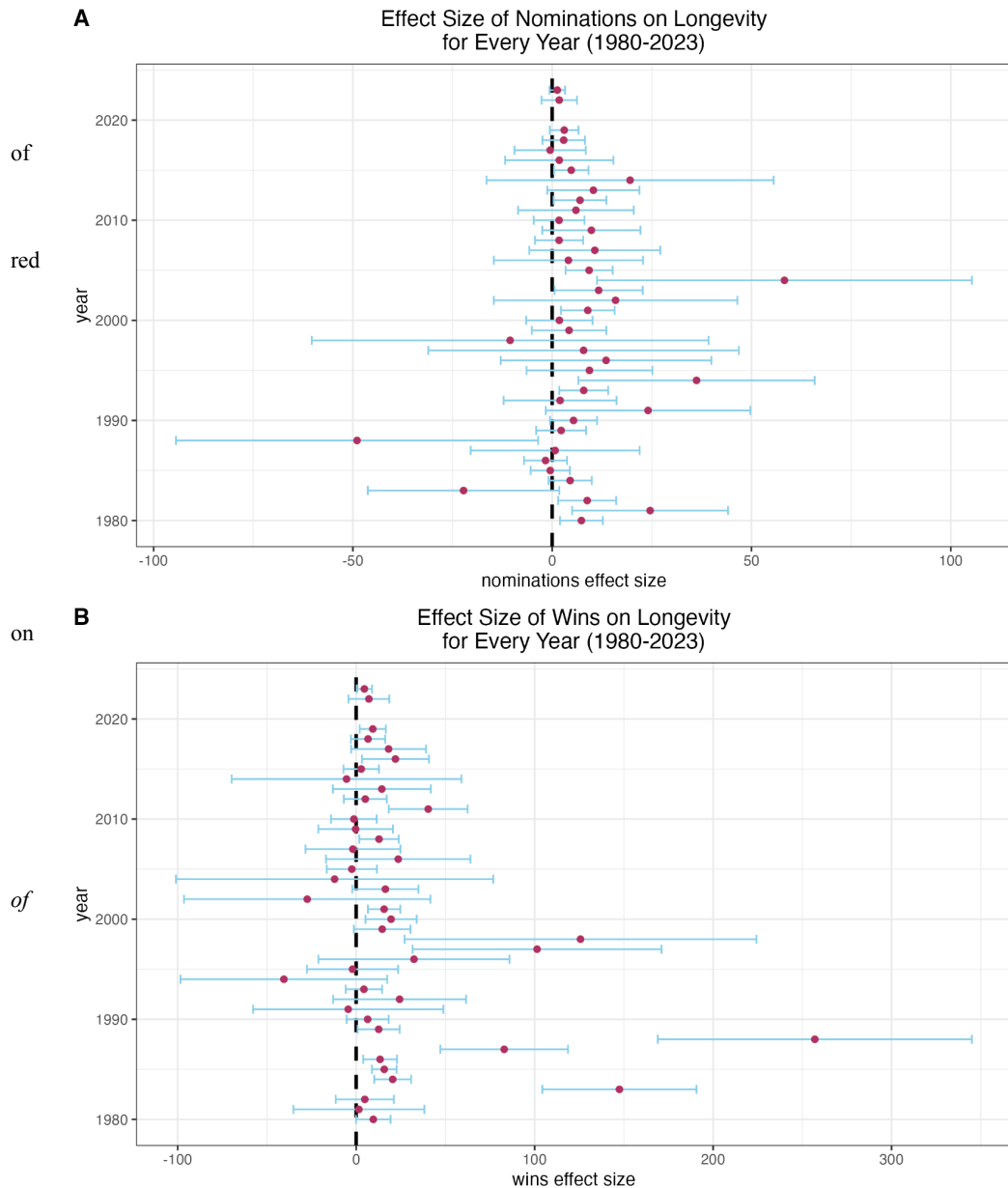
## Multiple Linear Regression
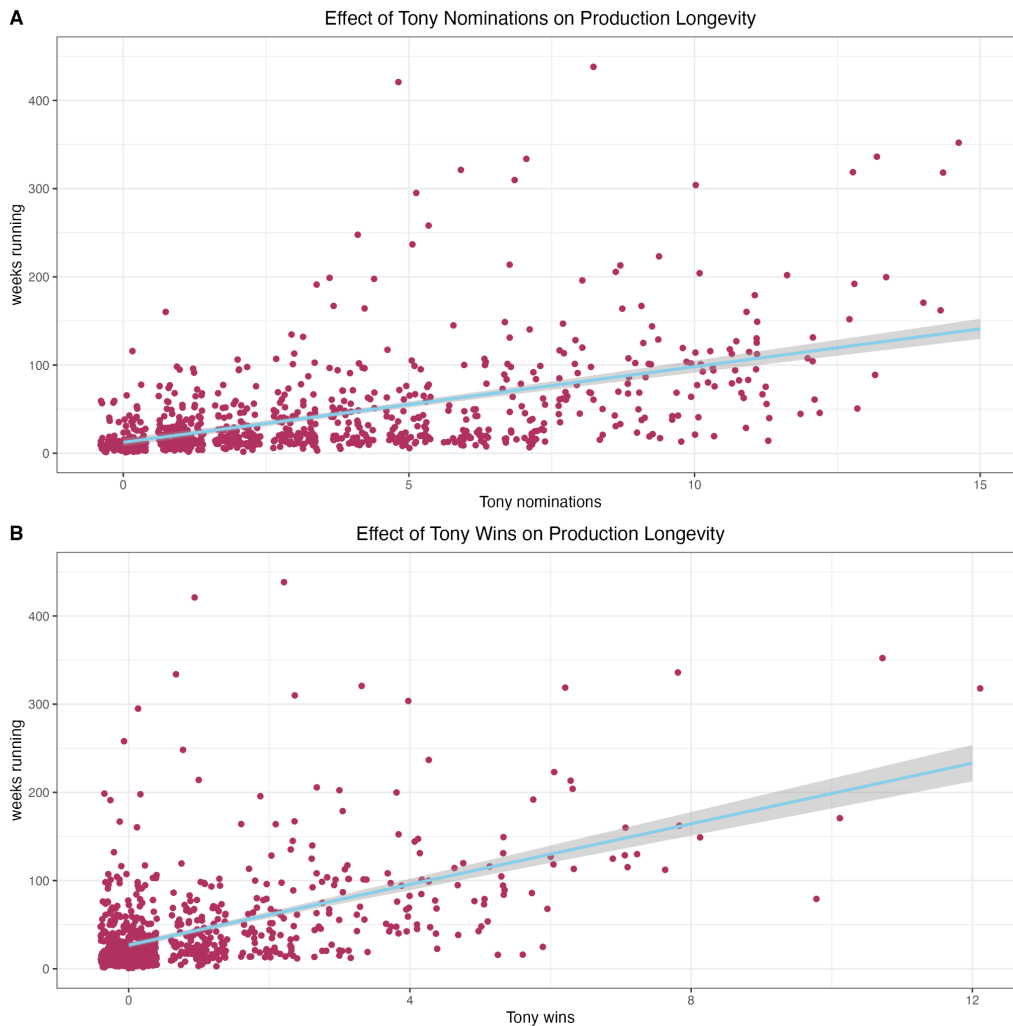


**Figure 3:** A depicts the relationship between Tony nominations and the number of weeks a production stays open. B depicts the relationship between Tony wins and the number of weeks a production stays open. Each dot is one production. The overwhelming majority of productions receive fewer than 5 nominations and fewer than 2 wins. In both cases, the line of best fit indicates a positive relationship between the predictors and the response variable. However, the relationship between wins and weeks running is stronger. Note that in both A and B there are productions that fall above the y-axis limit. Also note that the regression lines in A and B are distinct from the output of the multiple linear regression model.

The output of the multiple linear regression model produces the following equation:

$$weeks\ =\ 4.831(nominations)\ +\ 25.581(wins)\ +\ 12.157$$

This equation predicts that for every nomination a production receives, it will stay open for an additional 4.8 weeks (95% CI = 1.63 - 8.03; p-value = 0.003), and for every win it receives, it will stay open for an additional 25.6 weeks (95% CI = 19.49 - 31.68; p-value = $6.8*10^{-16}$). Productions that receive 0 nominations and 0 wins are predicted to stay open for roughly 12.2 weeks (95% CI = 0.74 - 23.57; p-value = 0.037). These relationships are depicted in Figure 3. The model did not meet assumptions of homoscedasticity (Appendix A, Figure A1 and A2). The model does not suffer from issues of multicollinearity between the two predictor variables; the variance inflation factor (VIF) between the two variables is 2.066. The model's adjusted R-squared value is 0.215.

**A**

Effect Size of Nominations on Longevity
for Every Year (1980-2023)



of

red

**B**

on

Effect Size of Wins on Longevity
for Every Year (1980-2023)

*of*



**Figure 4:** A depicts the effect size of nominations on longevity for each the 42 models. B depicts the effect size of wins on longevity. Each dot represents the effect size for a given year. The blue lines represent the confidence intervals for each effect size. The dashed black line represents an effect size of 0. Note that A and B have different ranges of values the x-axis. The years with extremely wide confidence intervals are years that featured an outlier production. For example, 1988 included *Phantom the Opera.*

   Over the past 4 decades, receiving Tony nominations and/or Tony wins has an overall positive effect on a production's longevity (nominations: n = 36 years; wins: n = 32 years) (Figures 4 and 5). Across every model, the mean R-squared value was 0.437 and the median R-squared value was 0.446. The highest was 0.772, and the lowest was effectively 0.
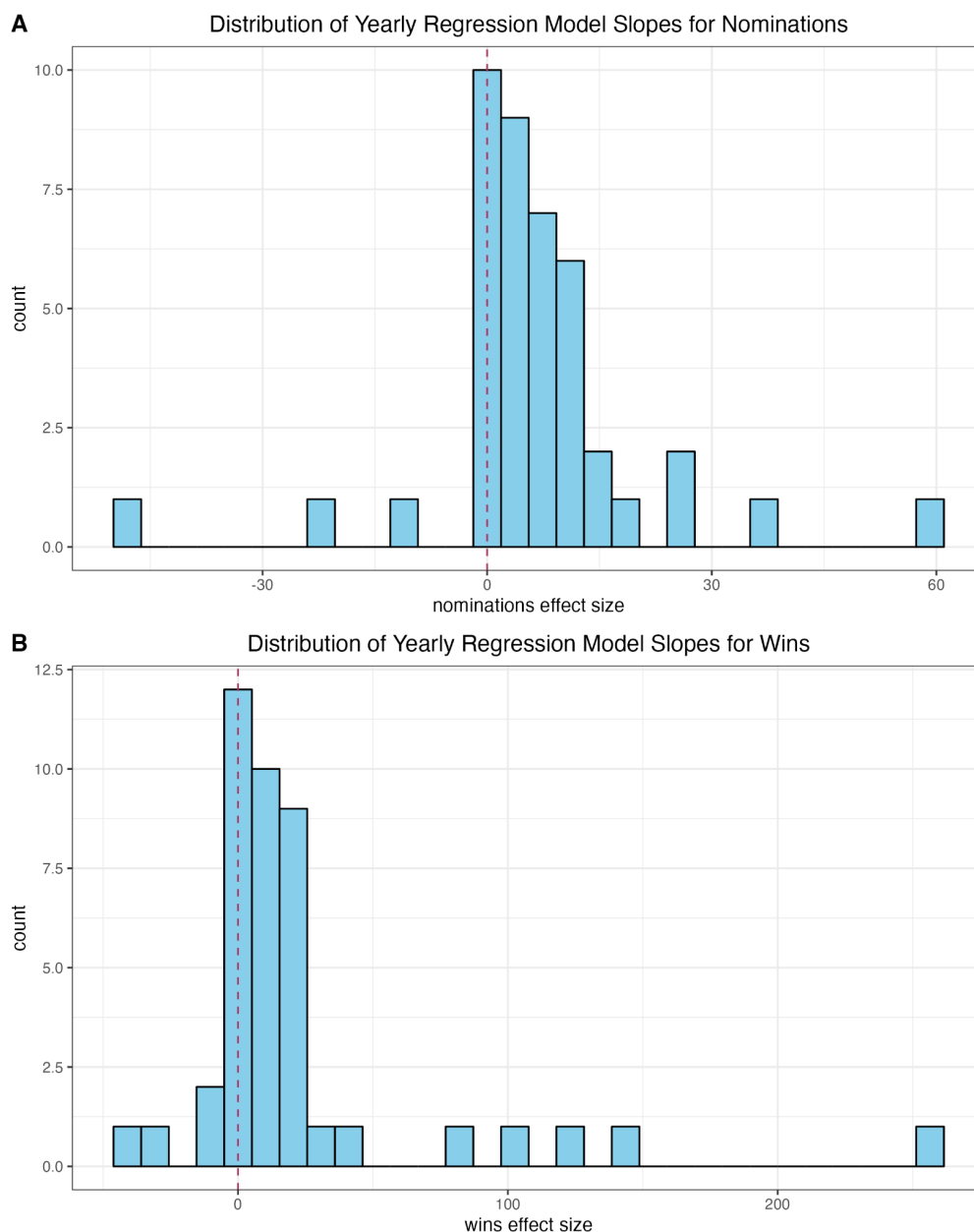
**Figure 5:** The distribution of the effect sizes of the 42 multiple linear regression models. A depicts nomination effect sizes. B depicts win effect sizes. The majority of the effects are positive (noms: 36 effects; wins: 32 effects), and a large number are near 0. Note that A and B have different ranges of values on the x-axis.

## Moderated Multiple Regression

The output of the moderated multiple regression model for all years (1980 - 2023) produces the following equation:

$$c = 75.585 + 0.726n + 0.826w - 0.024t + t(0.004n - 0.003w)$$

where $c$ is weekly capacity (0% - 100%), $n$ is nominations, $w$ is wins, and $t$ is weeks since opening. Similar to the first model described, this is one model for all of the data. It is not split up by year. This equation predicts that at week 0, all productions will fill 75.56% (95% CI = 75.32 - 75.85; p-value = 2*10^-16) of their capacity. After nominations are announced, the production will see a 0.73% (95% CI = 0.66 - 0.79; p-value = 2*10^-16) increase in capacity for

each nomination received. After the ceremony, productions will see a 0.83% (95% CI = 0.72 - 0.93; p-value = $2*10^{-16}$) increase in capacity for win received. Capacity will decrease by 0.02% (95% CI = -0.3 - -0.02; p-value = $2*10^{-16}$) for every week that the production is open. The effect of receiving a nomination will increase by 0.004% (95% CI = 0.004 - 0.004, p-value = $2*10^{-16}$) for each week that passes, and the effect of receiving a win will diminish by 0.003% (95% CI = -0.003 - -0.002; p-value = $2*10^{-16}$) for each week that passes. The model had an adjusted R-squared value of 0.12. This model did not meet assumptions of homoscedasticity or normally distributed residuals (Appendix B, Figure A3 and A4). One should also note that the predictors (nominations and wins) are not quite independent, which could be contributing to issues of heteroscedasticity. While the VIF between nominations and wins was low, it is still the case that a production can never win a number of awards larger than the number of nominations it received.
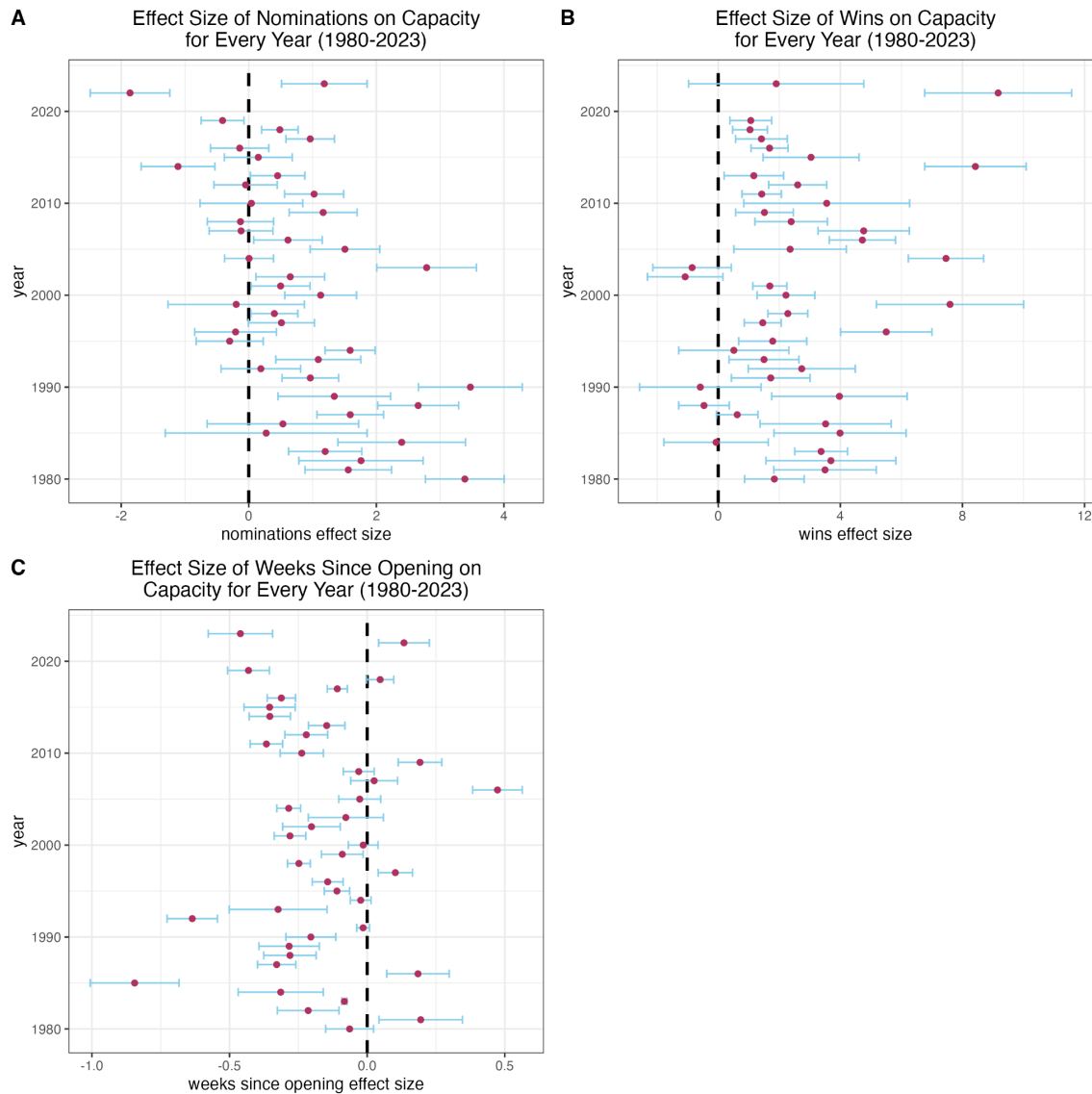


**Figure 6:** A depicts the effect size of nominations on weekly capacity for each of the 42 models. B depicts the effect of size of wins in relation to weekly capacity. C depicts the effect size of weeks since opening on weekly capacity. Each red dot represents the effect size for a given year. The blue lines represent the confidence intervals for each effect size. The dashed black line represents an effect size of 0. Note that A, B, and C have different ranges of values on the x-axis.

Between 1980 and 2023, nominations and wins both tend to have a positive effect on weekly capacity; of the two, the effect of wins tends to be stronger (Figure 6). The number of weeks since opening almost always has a negative effect on weekly capacity (Figure 6). The effects for the moderated multiple regression model tended to be very close to 0 (Figures 6 and 7). Note that for these 42 models, more than half of the R-squared values were below 0.5. Specifically, the mean R-squared value was 0.224 and the median was 0.199.
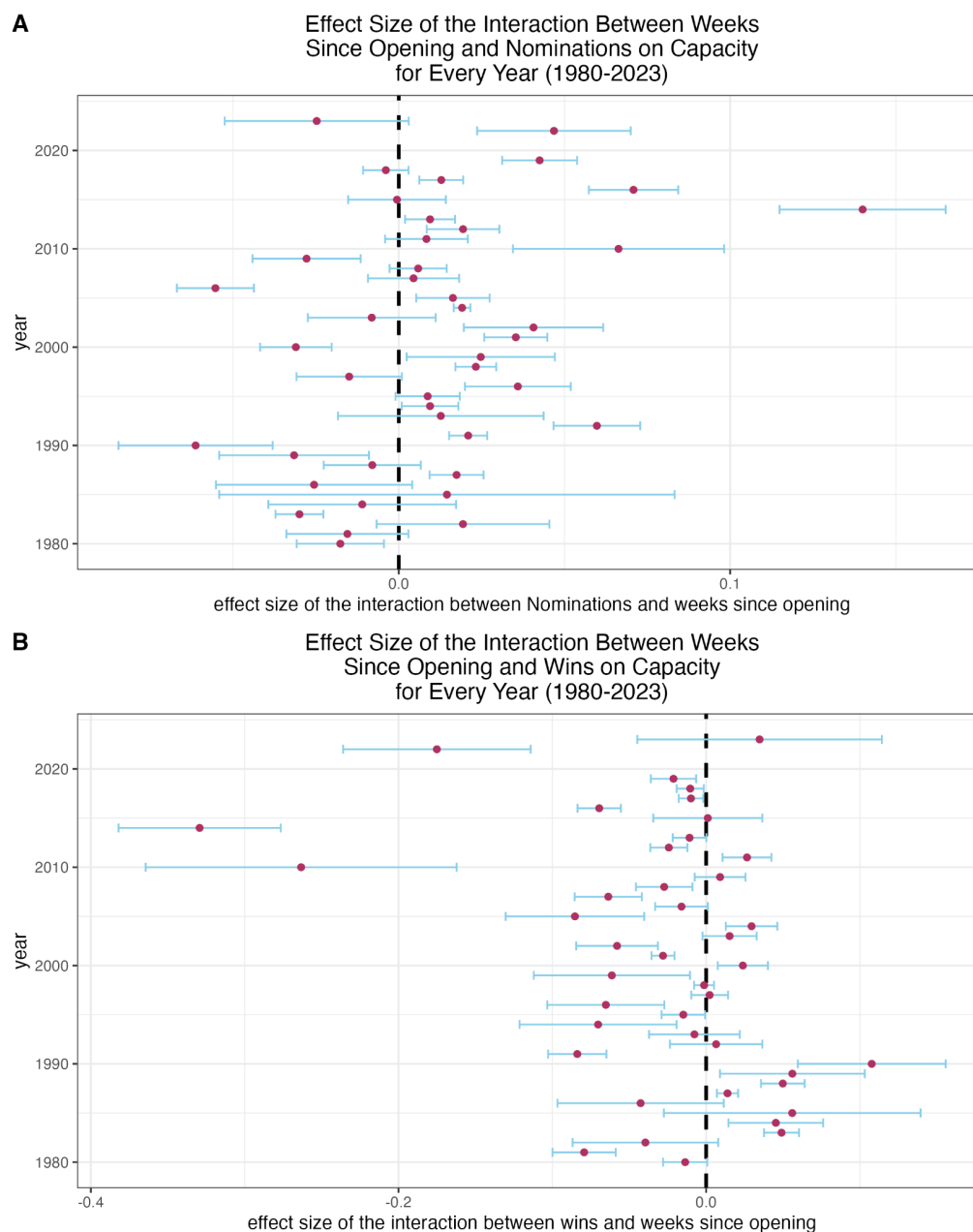


**Figure 7:** A depicts the effect size of the interaction between nominations and weeks since opening on capacity for each of the 42 models. B depicts the same thing but with wins instead of nominations. Each red dot represents the effect size for a given year. The blue lines represent the confidence intervals for each effect size. The dashed black line represents an effect size of 0. The effect sizes of these interactions were not as consistently positive or negative as the effects of previous variables. Note that A and B have different ranges of values on the x-axis.

**Discussion**

On the whole, this research corroborates previous findings, which indicate that Tony Award nominations and wins have a positive effect on a production's success (Boyle & Chiou, 2009; Simonoff & Ma, 2003). Importantly, however, this project uses an unprecedentedly large amount of data, thus making it possible to answer the following research question: To what extent has the Tony Awards' impact on the longevity and financial success of Broadway productions changed over time? The results indicate that while Tony nominations and wins are still relevant to a production's success, they are not as impactful as they used to be. Specifically, prior to 2000, there were several years in which winning a Tony Award was highly correlated with staying open much longer (Figure 4). As we move closer to 2023, we can see the effect get slightly closer to 0, although it is still usually predicted to be a positive effect (Figure 4). This conclusion lines up with Hypothesis 3, which predicted this exact outcome. One should note that while many of the models created for each year have low adjusted R-squared values, one can still draw tentative conclusions from them. One should also keep in mind that this analysis is meant to be descriptive in nature. The concern is not so much predicting future events, as it is accurately describing past events in the industry, so the predictive accuracy of the model is not necessarily the be-all and end-all.

Additionally, the time series depicting weekly grosses for *Spring Awakening* and the *Pirate Queen* (Figure 2) help to answer the research question by demonstrating the impact the Tony Awards had on specific productions. That said, while these results illustrate an interesting point about the effect Tony Award outcomes can have on longevity and financial success, one should keep in mind that this figure is largely anecdotal. Therefore, one does not want to draw any strong conclusions from Figure 2, as one ought to avoid the tendency that Broadway scholars have to "focus on successful exceptions at the expense of normal mediocrities" (Miller, 2016).

Additionally, the data support the hypotheses that receiving nominations and wins positively impacts a production's weekly success (Hypothesis 1 and Hypothesis 2). However, these hypotheses also assert that the benefit a given production receives from nominations/wins will start to diminish over time (specifically, after 5 weeks). The moderated multiple regression models were meant to capture this interaction between accolades and the passage of time, something achieved with different methods and on a much smaller scale by Boyle and Chiou (2009). However, the results (Figure 7) show how the effects of these interactions were not consistently positive or negative across years. Additionally, the effects tended to be very small (< 0.1%). Moreover, the adjusted R-squared values for the moderated multiple regression models are so consistently low that one should hesitate to make any conclusions from these model outputs, as many of the models do not accurately represent all of the data. Thus, it would be difficult and unwise to use the results of the moderated multiple regression models to draw conclusions about the extent to which the effect of receiving nominations/wins diminishes over time.

A minor point of interest not directly related to the research questions is that roughly half of the productions that have opened on Broadway between 1980 and 2023 ran for 14 weeks or fewer (Figure 1). This number includes flops and limited engagements that closed prior to nomination announcements. The majority of research on Broadway tends to focus on successful productions that run for a long time (Miller, 2016), but the results (Figure 1) suggest that such productions should not always be the focal point of research. It is undeniable that the most culturally impactful productions tend to be the ones that run for a long period of time (Block, 1993; Snelson & Block, 2004; The Broadway League, 2023b), but to only focus on those

productions obfuscates a great breadth of potentially valuable information. The results imply that much of the previous literature has done just that. Moreover, with the exception of a small bump in attendance during the summer, Broadway productions do not have any intra-annual trends related to weekly capacity (Table 2). This bump in business during the summer corroborates the widely held belief that ticket sales improve for many productions during this part of the year due to tourism (Passy, 2018). That being said, one cannot make any definitive conclusions about the extent to which the increase in attendance is a product of tourism, since we do not have data on that.

**Limitations**

This research is limited by the fact that, unlike in other research (Boyle & Chiou, 2009), it did not distinguish between major award categories and minor award categories. In other words, this project works under the assumption that every award category is of roughly the same importance, when in reality, a category like "Best Leading Actress in a Musical" is more likely to generate public interest than a category like "Best Lighting Design in a Play" (Boyle & Chiou, 2009). This research does not make this distinction for purely logistical reasons; it would have been too time consuming to write code to distinguish between these two kinds of categories during the web scraping process. This research also does not distinguish between plays and musicals or revivals and original productions. Previous research has made this distinction (Simonoff & Ma, 2003).

**Next Steps**

I have data on whether a production was a play or musical, and I can scrape data on whether a production was a revival. Therefore, these factors will likely be included in future analysis, as it is conceivable that Tony outcomes could affect these kinds of productions differently. These factors would have been included in this analysis if not for time constraints.

More generally, next steps include continuing to not only do data-driven research on the industry, but data-driven research that makes use of a plethora of data from a wide variety of sources. This project used over 40 years of data, but it merely scratches the surface of what is possible. Broadway as an industry is rich in data, but poor in terms of data analysis (Miller, 2016). While this project narrowed its focus to studying the impact of the Tony Awards on Broadway productions for an unprecedentedly large time scale, one could also do the same for *New York Times* reviews of Broadway productions, or various kinds of marketing campaigns for Broadway productions. The options are limitless.
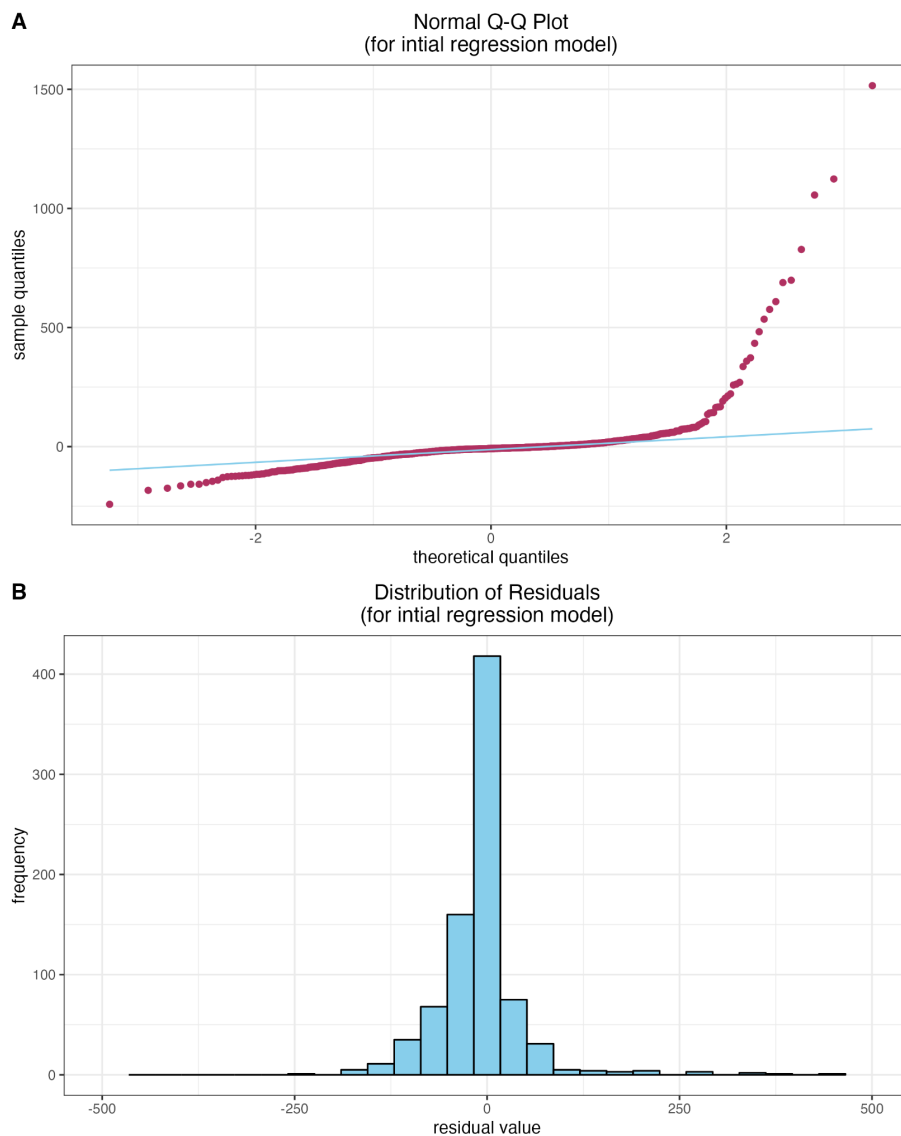
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# Appendices
## Appendix A: checking assumptions of multiple linear regression

**A**



Normal Q-Q Plot
(for intial regression model)

**B**



Distribution of Residuals
(for intial regression model)

**Figure A1:** Normal Q-Q plot (A) and histogram of residuals (B) for the first multiple linear regression model (i.e., the one that uses data from every year). Most of the residuals in the Q-Q plot tend to follow a linear trend, with the exception of the several points that trail off at the ends. These represent outlier productions like *Phantom*, *Chicago*, *Wicked*, etc. In the histogram the residuals appear to be normally distributed around 0.

Based on the information depicted in Figure A1, the residuals are approximately normally distributed. Barring a handful of outlier productions, the residuals follow a linear trend. However, Figure A2 indicates that the model does not meet assumptions of homoscedasticity (i.e. equal variance) because the residuals are not equal across the horizontal line. In other words, there are several residuals that fall far above zero, but none that fall nearly as far below zero.

Residuals vs Fitted
(for intial regression model)
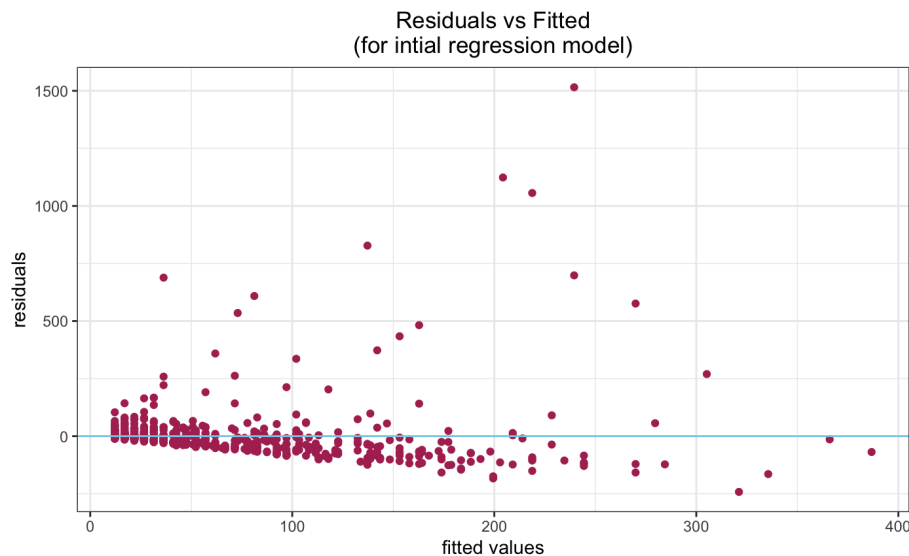


**Figure A2:** depiction of residuals vs fitted values for the first regression model. This visual is used to test whether the model meets assumptions of homoscedasticity. It does not.

## Appendix B: checking assumptions of moderated multiple regression

Based on the information depicted in Figure A4, the residuals are not normally distributed around 0. Therefore, the model does not meet the assumption of normal distribution. Additionally, Figure A3 indicates that the model does not meet assumptions of homoscedasticity (i.e. equal variance) because the residuals are not equal across the horizontal line. In other words, there are many residuals that fall far below zero, but none that fall nearly as far above zero.

Residuals vs Fitted
(for moderated multiple regression)
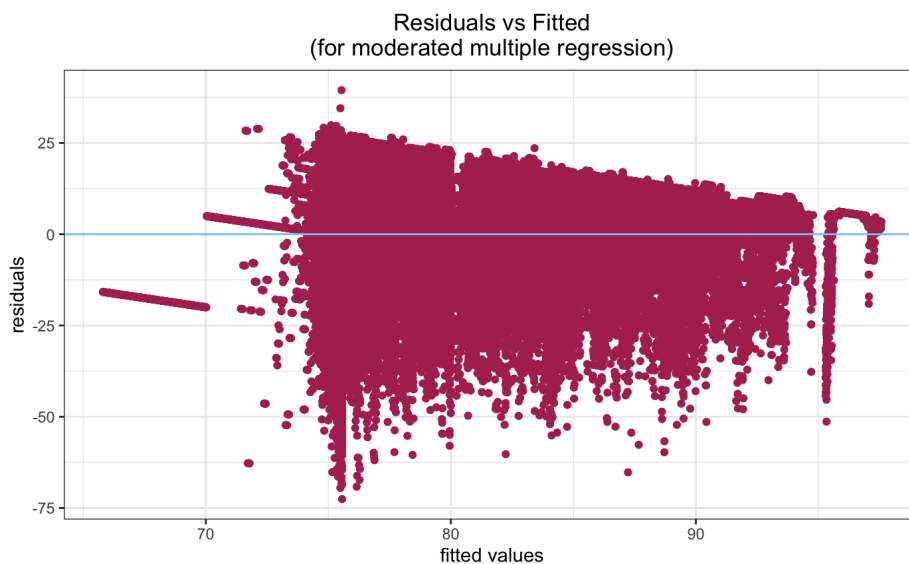


**Figure A3:** depiction of residuals vs fitted values for the first moderated multiple regression model (i.e., the one that uses data from every year). This visual is used to test whether the model meets assumptions of homoscedasticity. It does not.

**A**
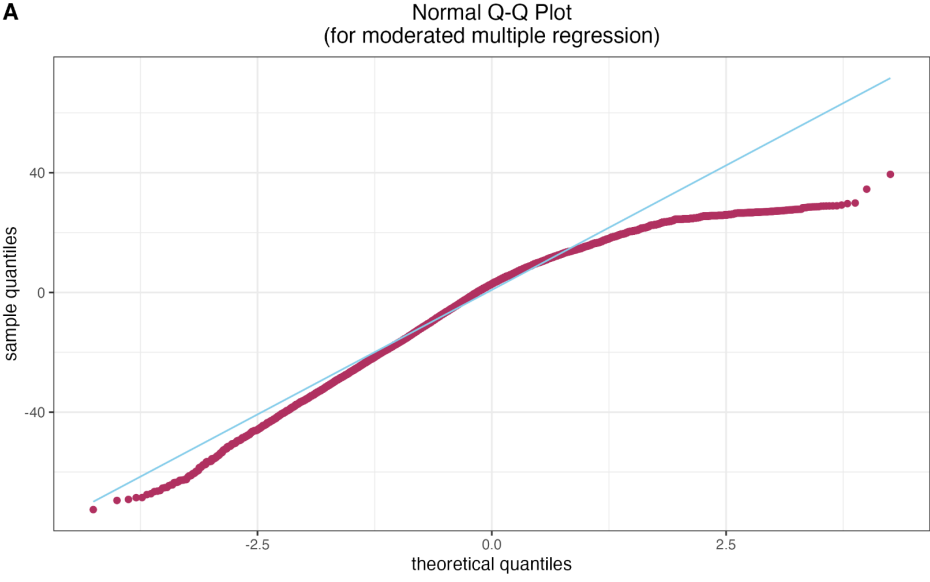


**Figure A4:** Normal Q-Q plot (A) and histogram of residuals (B) for the first moderated multiple regression model. Most of the residuals in the Q-Q plot tend to follow a linear trend, but many points trail off at the ends. These represent outlier productions like *Phantom*, *Chicago*, *Wicked*, etc. In the histogram the residuals are not normally distributed around 0.

**B**