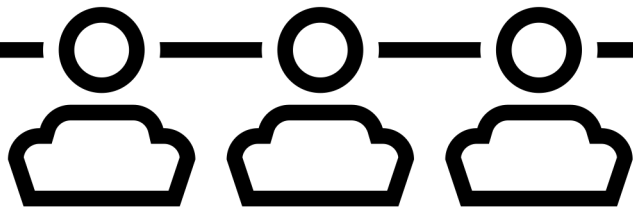# DATA OVERVIEW

Do female or male led movies perform better at the box office?

Dependent Variable
Overall Box Office Earnings

Independent Variables
*Movie Budget , *Gender of Lead Actor, *Box Office Opening Weekend Earnings , *Number of Oscars Won, Age, Runtime, Critical Review Scores, Audience Review Scores

Other Parameters
Movies released post 2008 which marked the end of the HD DVD Promotion Group, so studios predominately relied on box office sales for revenue

All monetary values were adjusted for inflation

On average, films chosen were high grossing films
(Lowest Grossing = 46 M, Highest Grossing = 4,099 M)

We selected our 50 movies at random and the ending dataset contained 25 female led movies and 25 male led movies.

21ST CENTURY BOX OFFICE TRENDS:
A GENDER PERSPECTIVE

- Studies analyzing high-grossing movies in the 21st century consistently found that films with female leads and co-leads often outperform their male-led counterparts.

- This trend is particularly pronounced in romantic comedies and dramas.

- An examination of the top 100 grossing films revealed that those directed by women generally yielded higher box office returns than films directed by men.

- Interestingly, films with a higher percentage of female cast members often saw enhanced box office performance, especially if they were on a modest budget.

- Conversely, another study indicated that films led or directed by men garnered higher box office returns. However, for lower-budget films, gender dynamics appeared to have a diminished effect on earnings.

Key Takeaway: While movies with female leads and co-leads typically excel at the box office, the influence of gender diminishes for films with more conservative budgets.

DESCRIPTIVE STATISTICS

Box Office:
Max: $4,099 M
Min: $46 M
Avg: $710.8 M

Box Office Opening Weekend:
Max: $267 M
Min: $0.14 M
Avg: $76 M

Oscars:
Max: 3
Min: 0
Mode: 0

Budget:
Max: $389
Min: $4 M
Avg: $121.81 M

Average Female...
Overall Box Office Earnings: $617.76 M
Opening Weekend Box Office: $82.35 M
Budget: $111.60 M

Average Male...
Overall Box Office Earnings: $804.53 M
Opening Weekend Box Office: $69.42 M
Budget: $131.84 M

EXPECTED SIGNS

(+) Movie Budget

a higher budget is generally associated with higher production values, marketing efforts, and star power

(+) Gender of Lead Actor

based on our research we anticipated that female lead actors would have higher grossing box office films

(+) Box Office Opening Weekend Earnings

this variable represents the initial hype and interest generated by the movie which would likely result in high box office earnings

(+) Number of Oscars Won

this variable reflects critical acclaim and recognition which can increase the appeal of the movie to audiences

Pearson Correlation Coefficient Matrix

```
. correlate boxofficeadjusted budgetadjusted boxofficeopeningweekendadjusted gender oscars
(obs=50)

             | boxoff.. bud~sted boxoff..   gender   oscars
-------------+------------------------------------------------
 boxofficea~d|  1.0000
 budgetadju~d|  0.7813   1.0000
 bo~dadjusted|  0.7006   0.7411   1.0000
      gender |  0.1610   0.1532   0.4859   1.0000
      oscars | -0.1222  -0.0568  -0.0945   0.0921   1.0000
```

Breusch-Pagan Test: Since the Prob > chi2 value is less than 0.05, we can reject the null hypothesis and conclude there is heteroskedasticity present in the dataset

```
Breusch–Pagan/Cook–Weisberg test for heteroskedasticity
Assumption: Normal error terms
Variable: Fitted values of boxofficeadjusted

H0: Constant variance

    chi2(1) =  46.24
Prob > chi2 = 0.0000
```
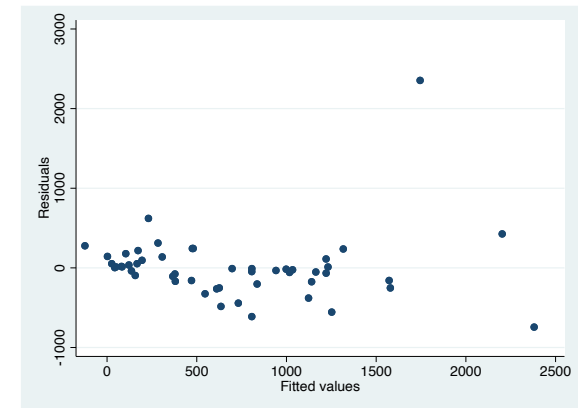
The residual values show signs of heteroskedasticity

VIF: No signs of multicollinearity

```
   Variable |       VIF      1/VIF
------------+----------------------
bo~dadjusted|      3.33    0.300441
budgetadju~d|      2.55    0.392124
     gender |      1.54    0.647959
     oscars |      1.04    0.959638
------------+----------------------
   Mean VIF |      2.12
```

REGRESSION RESULTS

FINAL REGRESSION

```
. regress boxofficeadjusted budgetadjusted boxofficeopeningweekendadjusted gender oscars, vce(robust)

Linear regression                               Number of obs   =         50
                                                F(4, 45)        =      19.49
                                                Prob > F        =     0.0000
                                                R-squared       =     0.6511
                                                Root MSE        =     444.98
```

boxofficeadjusted	Coefficient	Robust std. err.	t	P>|t|	[95% conf. interval]	
budgetadjusted	4.109244	2.156155	3.89	0.000	-.2334754	8.451964
boxofficeopeningweekendadjusted	3.220652	1.876446	2.04	0.048	-.5587043	7.000007
gender	-110.042	107.8538	-1.02	0.313	-327.2707	107.1866
oscars	-58.18326	74.33982	-0.78	0.438	-207.9113	91.54482
_cons	32.87413	82.6977	0.40	0.693	-133.6876	199.4359

KEY TAKE AWAYS

1. The **budget** and **box office opening weekend sales** have positive coefficients (expected signs), and the p-values are statistically significant.

   Surprisingly, the **gender** of a lead actor has a negative effect on box office sales if the actor is a female, as indicated by its negative coefficient. Although unexpected, it was still included in the regression due to its perceived importance.

   Additionally, **the number of Oscars** the lead actor has does not appear to be a significant variable of box office sales, as it has a negative coefficient (unexpected sign) and a non-significant p-value.

KEY TAKE AWAYS

2. The **adjusted R-square value** of 0.65 indicates that the model explains 65% of the variance in box office sales. This means that the model has moderate explanatory power.

3. The **Root Mean Squared Error (RMSE)** of 444.98 indicates that the model's predictions deviate from the actual box office sales by an average of $444.98 million. This value may seem high, but it is important to consider the scale of the dependent variable (Lowest Grossing = 46 M, Highest Grossing = 4099 M).

Overall, this is a sufficient model that provides insight into the factors that may influence box office sales. However, there may be other variables that could improve the model's accuracy

LIMITATIONS

OVTest

```
Ramsey RESET test for omitted variables
Omitted: Powers of fitted values of boxofficeadjusted

H0: Model has no omitted variables

F(3, 42) =    8.67
Prob > F = 0.0001
```

Since the p-value is less than .05, we reject Ho and conclude that there are omitted variables

Potential Omitted Variables

Genre Type
Original or Adapted Screenplay
Number of Movies in Theaters at time of Release
Reputation of Director/Crew
Sequel or in a Franchise

FORECASTING
2023
BOX OFFICE
SALES

The Little Mermaid
$861,280,000

Barbie
$655,820,000

Oppenheimer
$765,860,000

Dune: Part Two
$856,270,000

CONCLUDING THOUGHTS

Although our research found female lead or co-lead movies performed better at the box office — which can be attributed to diversity, innovation, the ability to appeal to wider audiences — our selected data showed male films to be higher grossing.

--

The primarily represented genres were Drama (26), Action (14), Adventure(14), Science Fiction (12), Fantasy (11), Comedy (8), and Thriller(8), with all other genres having less than 5 entries. Movies that fall into the action/adventure, comedy, and drama genres tend to be the highest grossing so a genre bias may have been present.

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Our forecasts are likely an overestimate because our data captures a highly profitable period for the cinema box office. Currently and post-pandemic, box office revenues have significantly decreased, and streaming and digital distribution are being favored.

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