

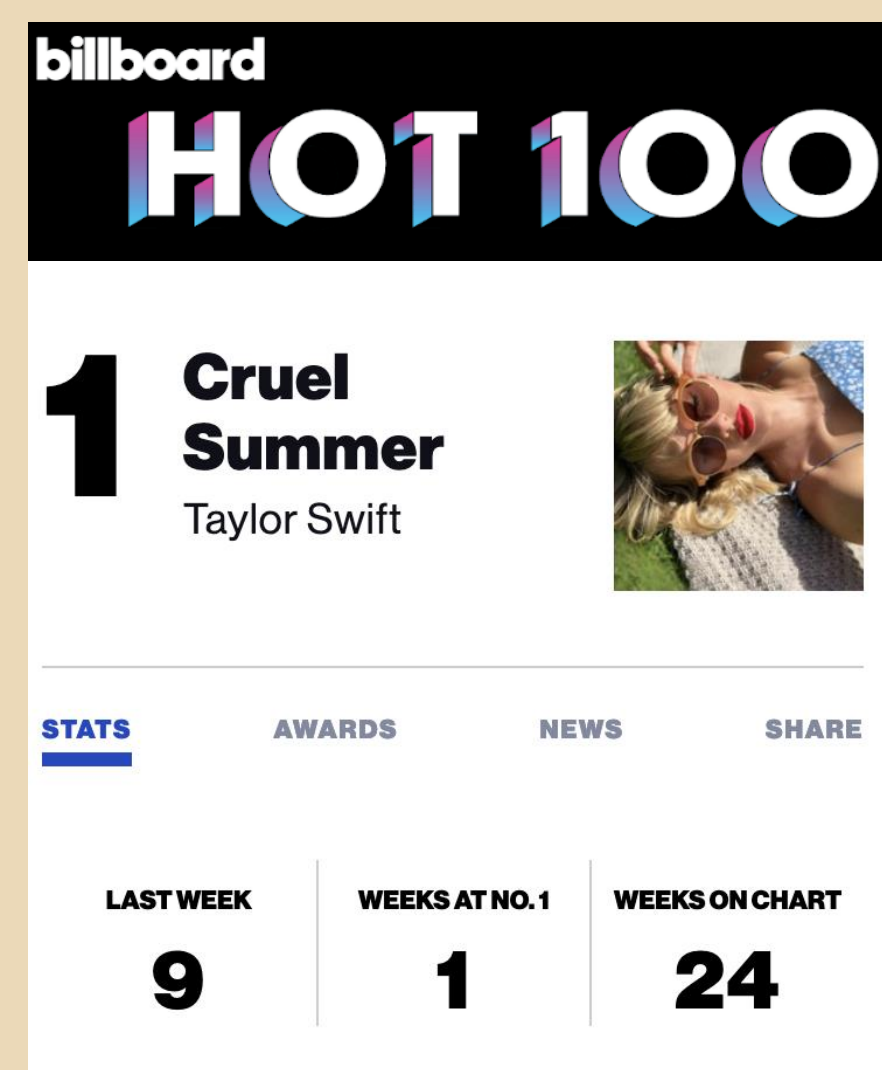
I don't know about you, but I'm feeling an analysis on Taylor Swift time to charting

Anh Nguyen

Wake Forest University,
Winston-Salem,
North Carolina

INTRODUCTION

- Time from release to charting on the Billboard Hot 100 as an indicator of popularity. The chart counts sales and stream.
- Taylor Swift is one of the most popular and pop-culture-defining artist in 2023 and 2024.



- How long on average does it take for a song to reach the Billboard Hot 100?
- How does charting time changes across eras?

METHODS

- Billboard is updated every Sunday → interval censoring, no right censoring unless we stop the Billboard chart (which can happen one day).
- DATA:** Eras, divided albums into 6 groups; Taylor Swift song release date; Charted on Billboard Hot 100 date.
- METHODS:**
 - Kaplain-Meier Curve: empirical survival probability curve.
 - 95% log confidence interval.
 - Use log-rank test for difference across eras
 - Use different ways to grouping eras to see if the results change drastically.

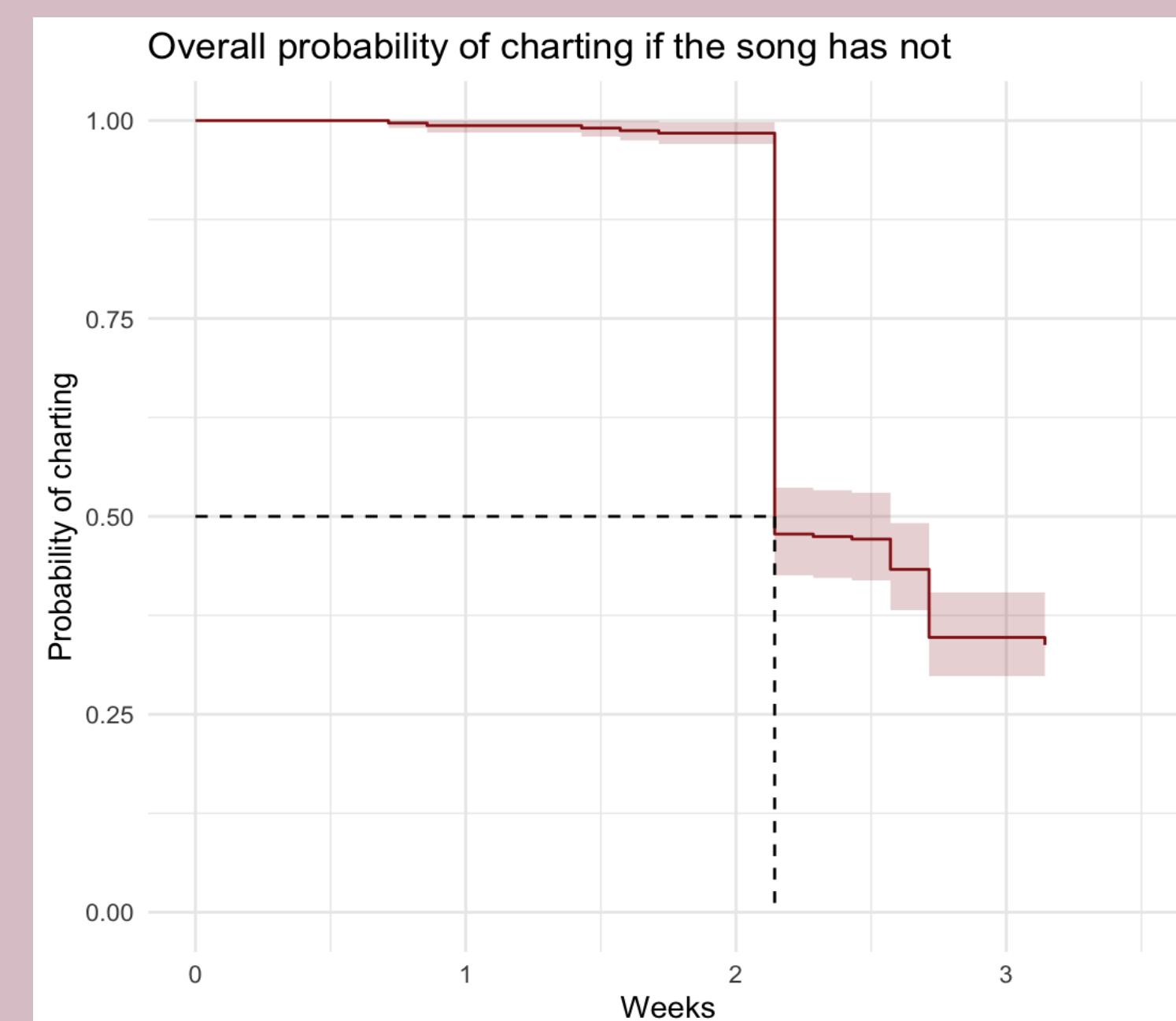
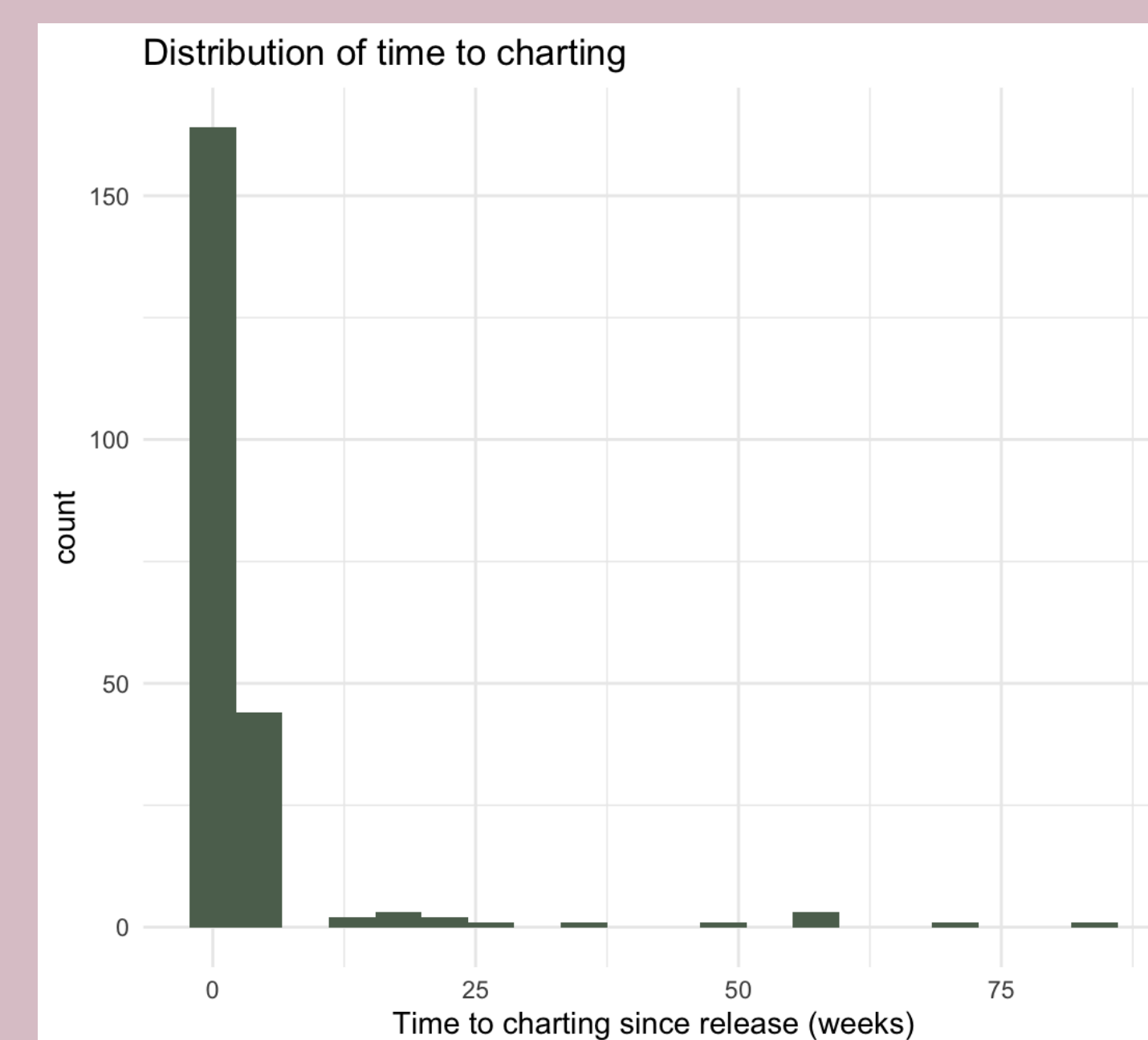
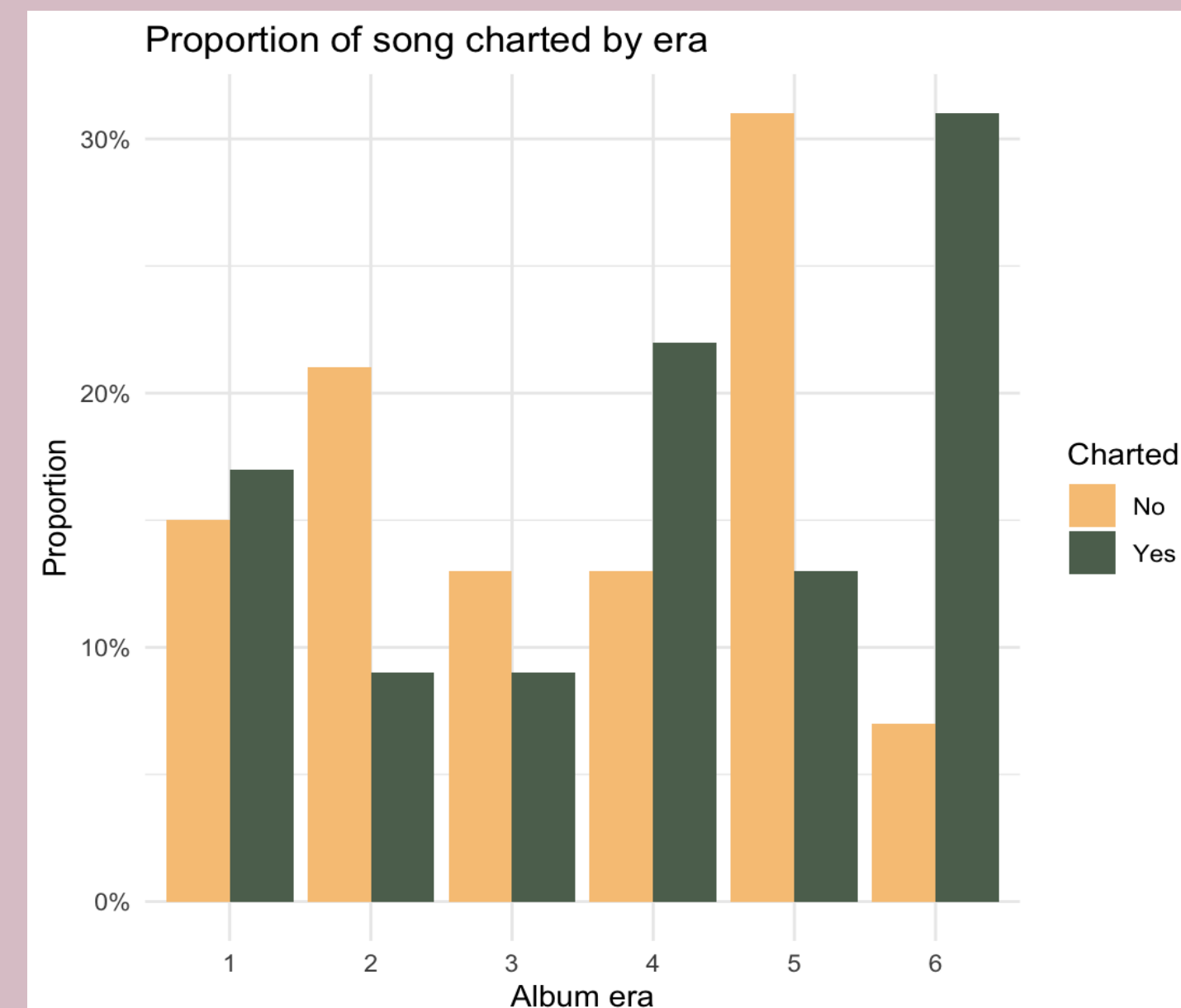


Step 1:
Gather data

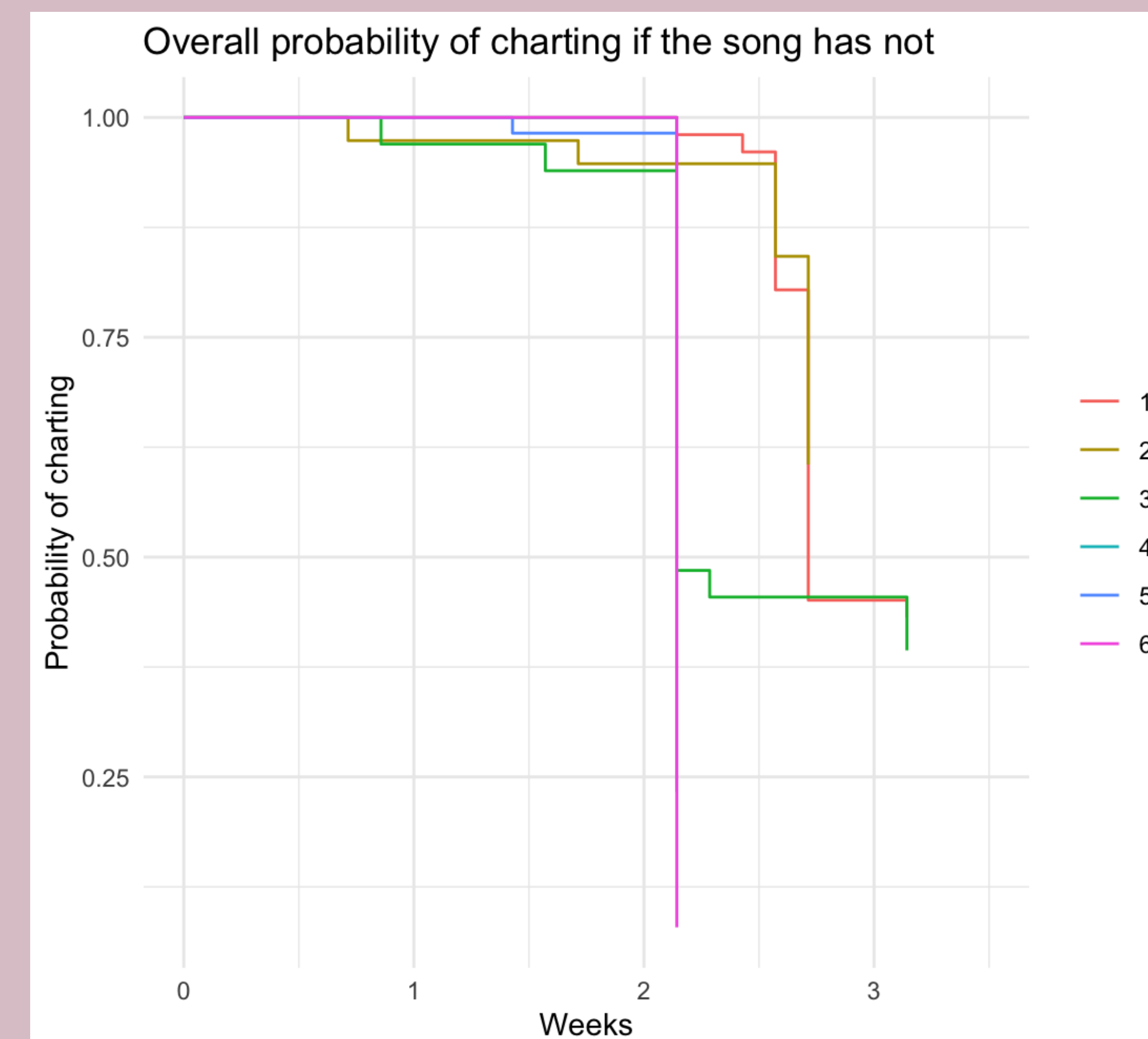
Step 2:
Exploratory
data
analysis

Step 3:
Fit Kaplan-
Meier curve

RESULTS



Time from release	Probability of charting after (95% CI)	
1 week	99.4%	(98.5%, 100%)
2.14 week	47.8%	(42.6%, 53.6%)
3.13 week	33.8%	(28.9%, 39.4%)



Log rank test:
 $\chi^2 = 61.5$ on 5 degrees of freedom
 $p\text{-value} = 6 \times 10^{-12}$

Eras	Probability of charting after 2.14 weeks (95% CI)
Era 1	98.0% (94.3%, 100%)
Era 2	94.7% (87.9%, 100%)
Era 3	48.5% (34.1%, 68.9%)
Era 4	23.3% (14.7%, 36.9%)
Era 5	50% (38.5%, 65.0%)
Era 6	8.0% (3.7%, 17.0%)

CONCLUSION

- For Taylor Swift, more than 70% of her songs charted on the Billboard Hot 100.
- The longest that a song take to chart is 84.6 weeks.
- Charting rate is different for each eras: The eras with more charted songs are eras 1, 4 and 6. The eras with more songs that did not charted are eras 2, 3, and 4.
- It takes a Taylor Swift song on average (median) 2.14 weeks (~ 15 days) to reach the Billboard Hot 100 chart.
- However, if we consider each era, the time to charting very different from each other. The more recent the era the shorter it takes on average for a song to reach the Billboard Hot 100.
- Using log rank test, we found the different in the probability to charting after a time point is statistically significant.
- Using a different grouping of eras, we still see that the more recent songs will reach the chart quicker.
- However, we might want to consider the fact that a song is well promoted as a single or not, and the favorability of a song among the fans and the general public. Furthermore, eras is a time dependent covariates that might need other methods.

REFERENCES

Thompson W (2024). *taylor: Lyrics and Song Data for Taylor Swift's Discography*. R package version 3.1.0, <https://github.com/wjakethompson/taylor>, <https://taylor.wjakethompson.com>.

UT Data, UT-Austin School of Journalism and Media, data and coding classes (2024). *rwd-billboard-data: Billboards chart data*. Github repository. <https://github.com/utdata/rwd-billboard-data>

THANKS

Thanks to Dr. Sarah Lotspeich (Wake Forest University), Ashley Mullan (Vanderbilt University), and the Wake Forest Statistics Department.