Question A

Directory Information (hd)	Student Financial Aid (sfa)
`STABBR`: State abbreviation (excluding DC, FM, MH, MP, PR, PW, VI, GU, AS)	`UNITID`: Unique institutional ID
`CONTROL`: Control (public/private	`SCUGFFN`: Full-time, first-time degree/certificate-seeking undergraduates
`ICLEVEL`: Institution level	`FGRNT_T`: Total federal grant aid received by full-time, first-time undergraduates
`UGOFFER`: Undergraduate offerings	

Question B

As shown in Figure 1, enrollment at public two-year colleges declined steadily from 2010 to 2015, with a temporary plateau between 2012 and 2013. The number of enrolled students fell from over 800,000 to below 680,000 during this period. One potential limitation of the data is that it may not capture students who pursue comparable credentials through four-year institutions offering associate degree or certificate programs. Additionally, the decline may reflect a shift in student preferences toward bachelor's degree-granting institutions, rather than a true decrease in overall demand for postsecondary education.

Question C

Question C(1): Enrollment. The claim is generally correct. As shown in Figure 2, the mean state-level average federal grant per student is around 1881, the std is around 373. The distribution is right-skewed with high outliers.Outliers include MS,FL and NM. However this number only include full-time, first-time degree/certificate seeking undergraduates. In the raw data, there are many other kinds of federal grants not counted here.

Question C(2): Simulated Grant Allocation. The distribution of average per-student federal grant aid across states in 2015 shows meaningful variation. Summary statistics are as follows:

- The mean per-student grant was approximately \$1,881.
- The standard deviation was \$374, indicating moderate spread.
- The distribution of federal grant per student is right-skewed, meaning a few states receive abnormally high amounts compared to others.

These statistics reveal that although most states cluster around the mean, there is a notable gap between the highest- and lowest-funded states. This suggests that the current allocation system results in significant disparities in federal grant aid on a per-student basis.

Question C(3): Comparison and Distributional Effects. Under the proposed formula—where federal grants are allocated at the school level as a nonlinear function $i.e.(1,750enrollment + 0.15enrollment^2)$ of enrollment, the distribution of average per-student federal grant aid across states becomes more compressed. As illustrated in Figures 3 and 4, the simulated allocation reduces the variability across states:

- The original allocation had a wider spread and more extreme values.
- The simulated distribution is tighter, with most states clustered around \$2,000.
- Outliers are fewer and less extreme in the simulated case, though some still persist due to large enrollments.

This suggests that the proposed formula would standardize per-student funding across states, likely improving equity in federal grant distribution. However, the formula also implicitly favors larger institutions, which may raise concerns about fairness for small colleges or sparsely populated states.

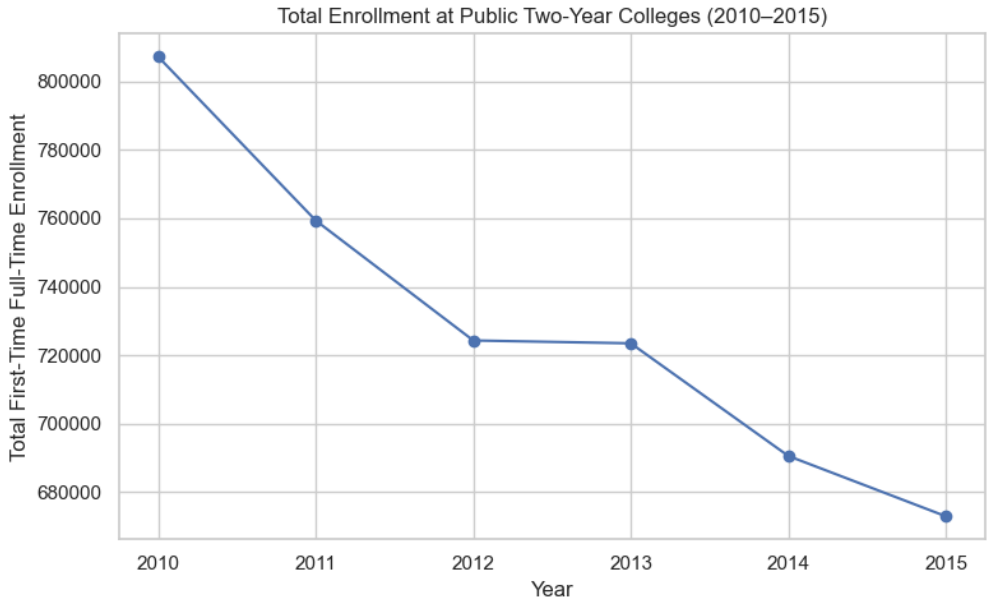

Figure 1: Total Enrollment at Public 2 Year College

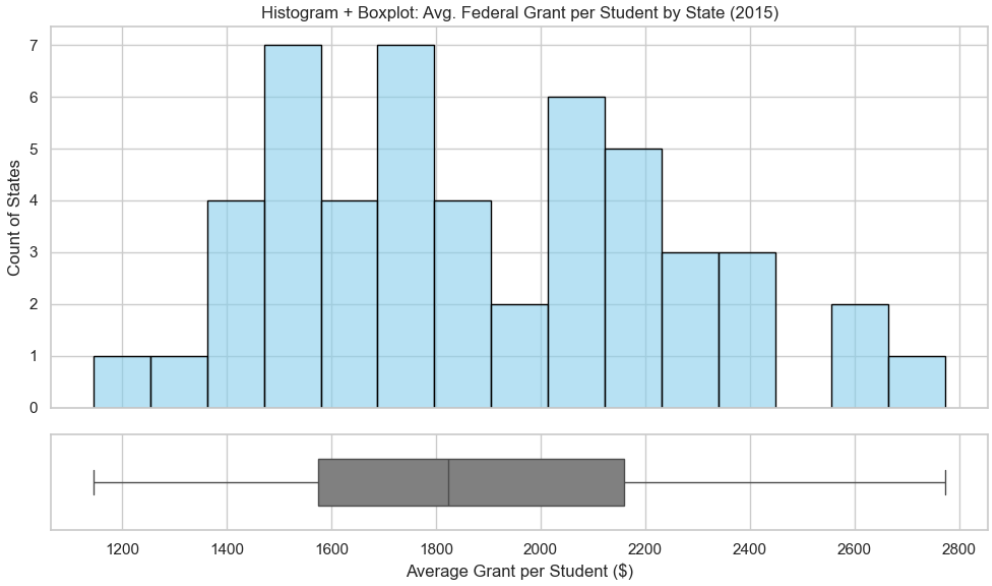

Figure 2: Avg. Federal Grant per Student by State

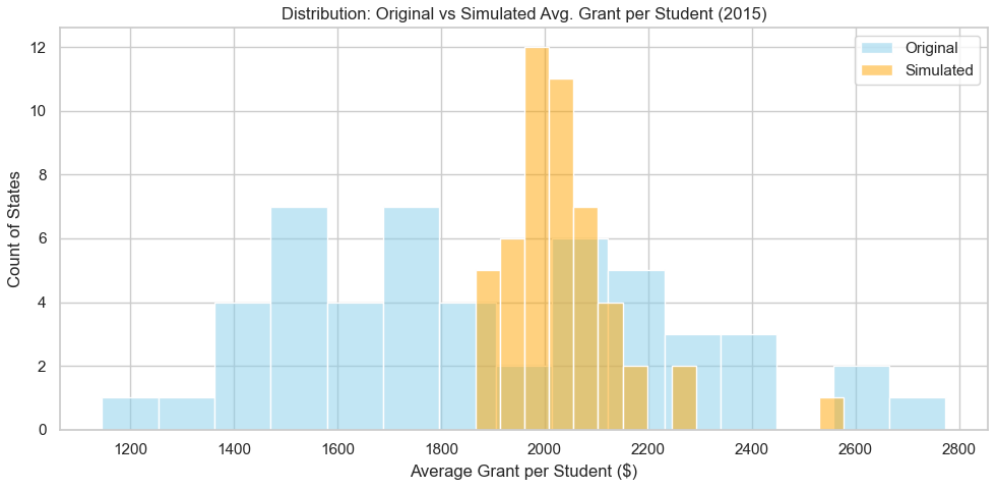

Figure 3: Distribution: Original vs Simulated Avg. Grant per Student (2015)

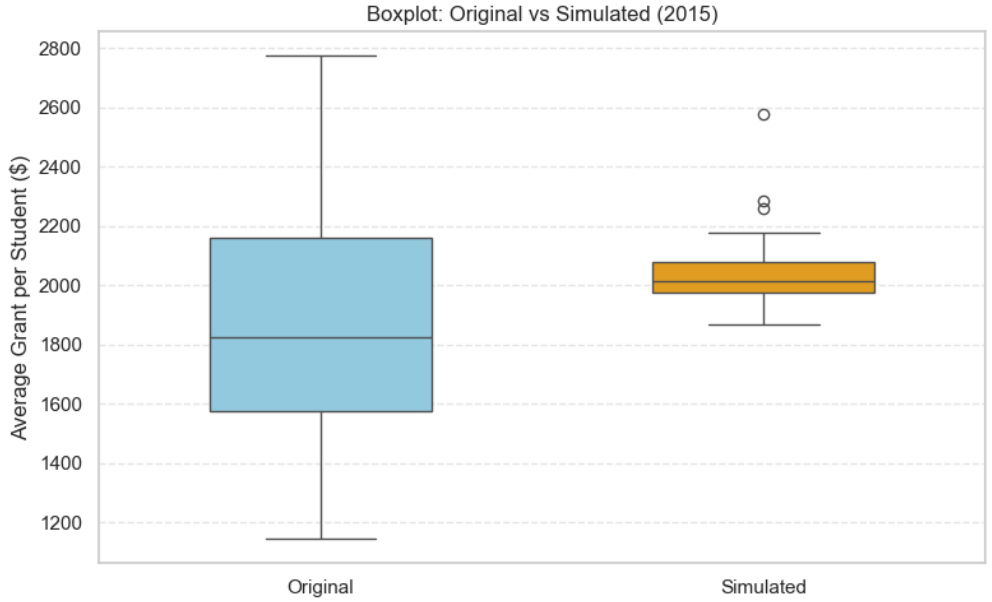

Figure 4: Boxplot: Original vs Simulated (2015)