DSI Project 1

Goh Wen Xuan
Jervin Seow
Zackarias Chia

Problem Statement

We are tasked by the College Board to find out whether the SAT and ACT are biased towards a state's economic strength.

The objective of this project is to explore if there is a correlation between real GDP per capita and SAT/ACT scores and participation rates, and whether states with higher real GDP per capita produce higher scoring results.

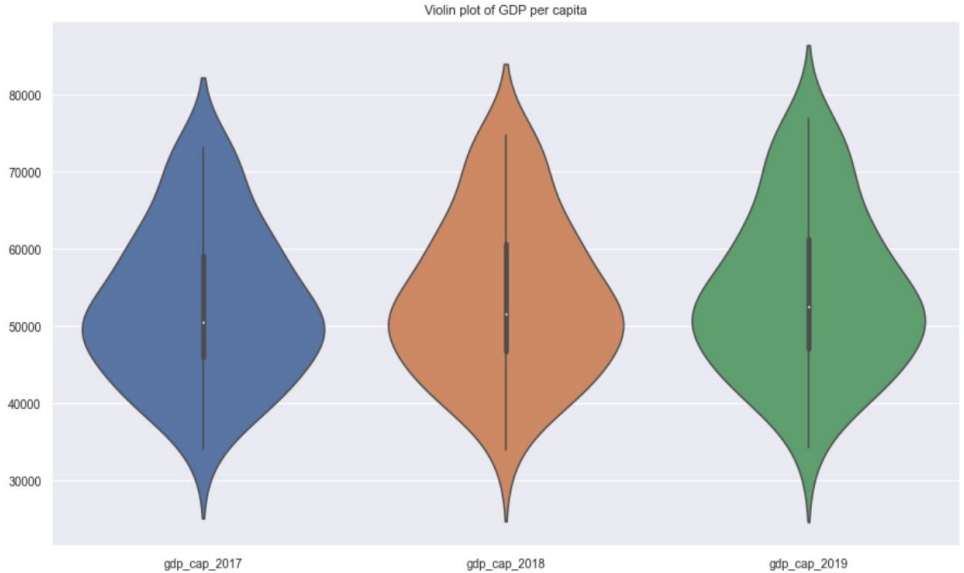
Methodology

Examining state data covering participation rates and SAT / ACT college scores, and whether these factors have a significant relationship when measured against real GDP per capita for the years 2017, 2018, and 2019.

- There are states that have mandated either ACT or SAT testing to encourage students to pursue higher education in an effort to reduce inequality. However, for states that do not mandate ACT or SAT testing, participation rate may be affected due to accessibility or cost issues.

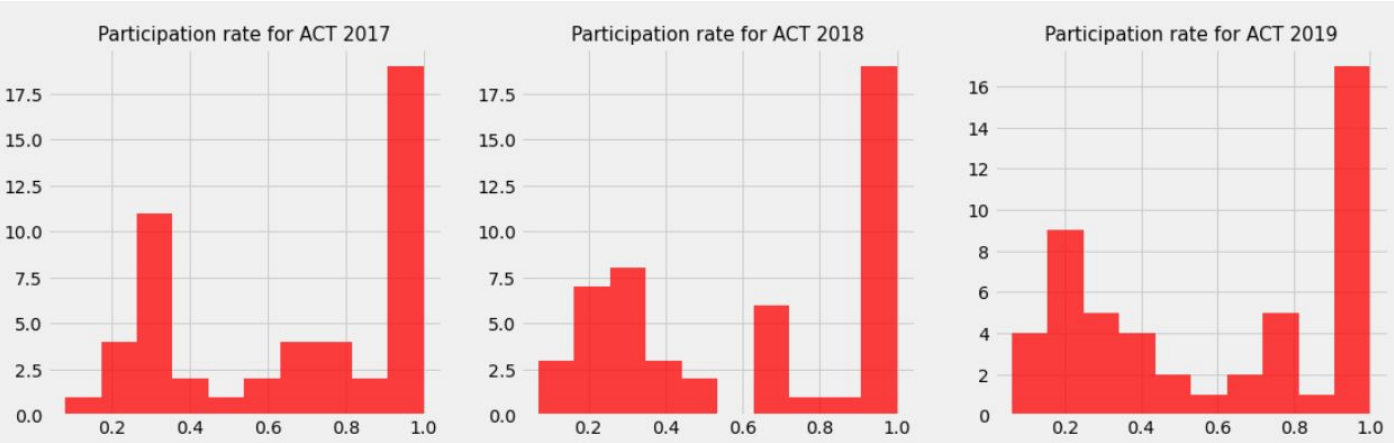
Summary of GDP per capita across 2017 to 2019

- Majority of states have GDP per capita that lie between $45,000 and $60,000
- Median across all 3 years is ~$50,000, which also has the highest frequency
- GDP per capita is rising gradually overall, but it seems like the spread is also increasing at the same rate.



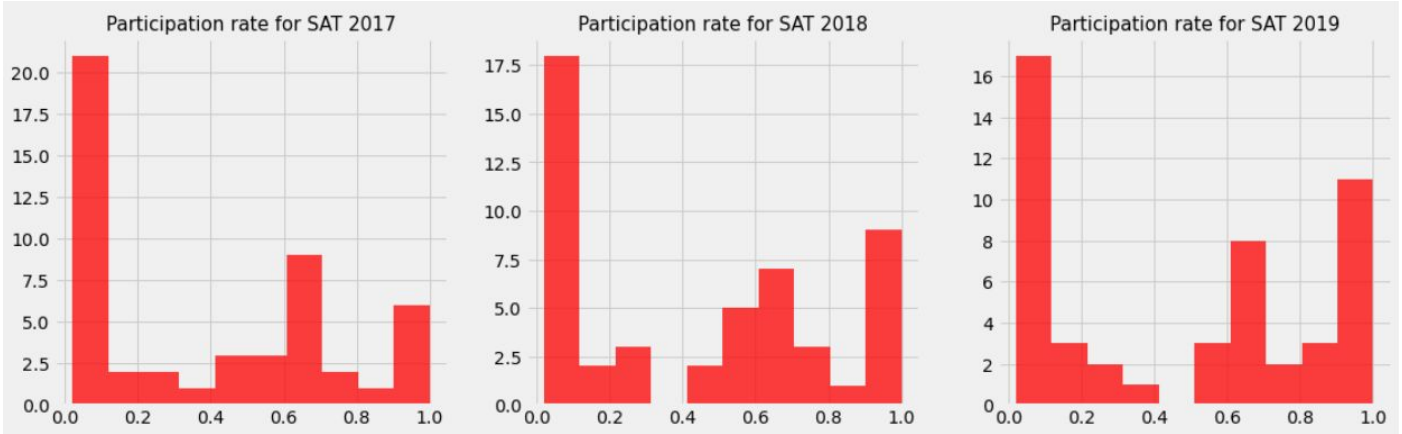
Distribution of Participation Rates for ACT

- There is a significant number of states that have really high participation rates.
- Mainly because ACTs are mandatory in the aforementioned states.



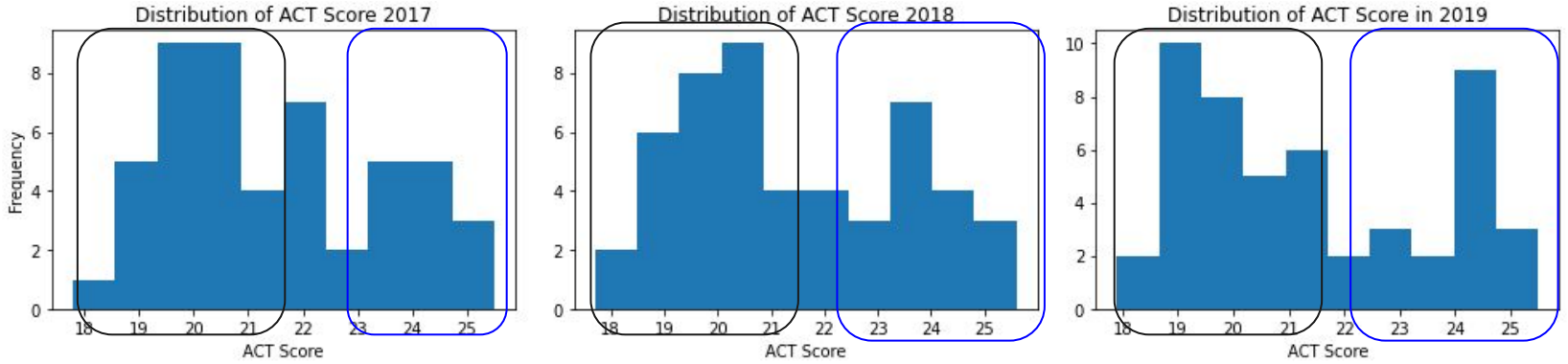
Distribution of Participation Rates for SAT

- Seemingly mirror image when compared to ACT, significant number of states that have little to no participation.
- However, a number of states seemed to have switched their mandatory exam from ACT to SAT, causing the slight change in distribution over the 3 years.



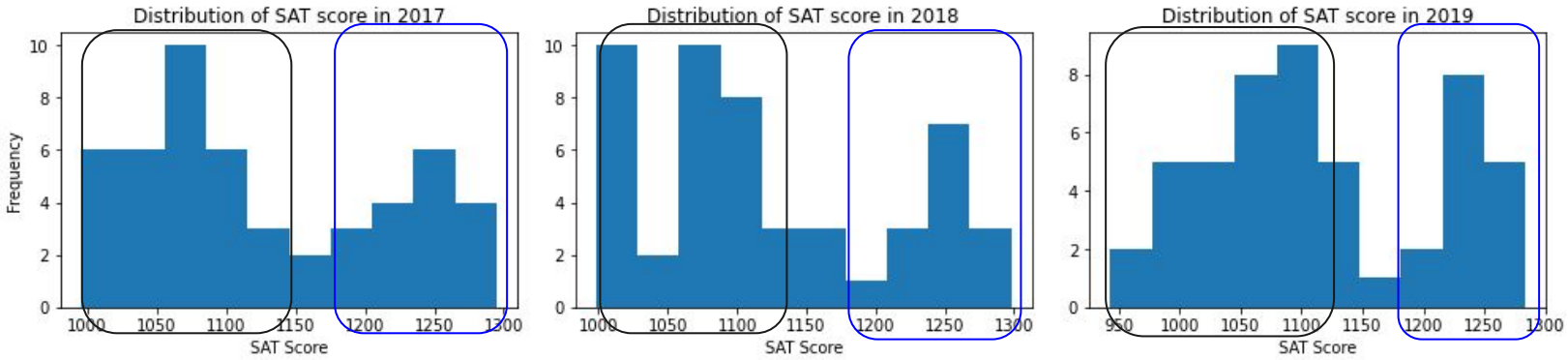
Distribution of ACT and SAT Score

- The ACT and SAT scores from 2017 to 2019 shows that they are not normally distributed.
    - Distribution is split into two groups - high and low



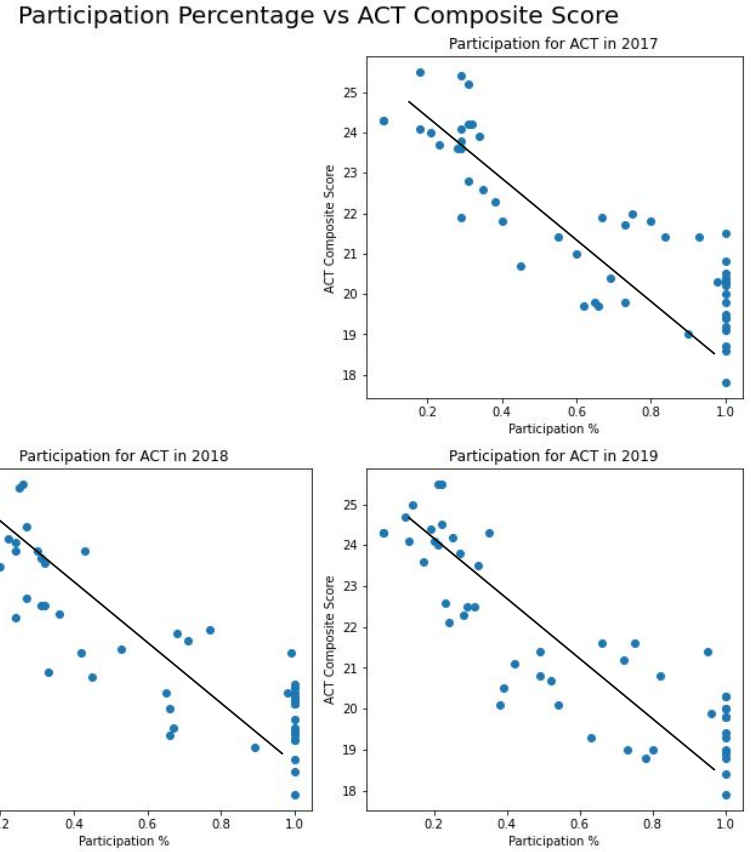
Distribution of ACT and SAT Score

- The ACT and SAT scores from 2017 to 2019 shows that they are not normally distributed
    - Distribution is split into two groups - high and low



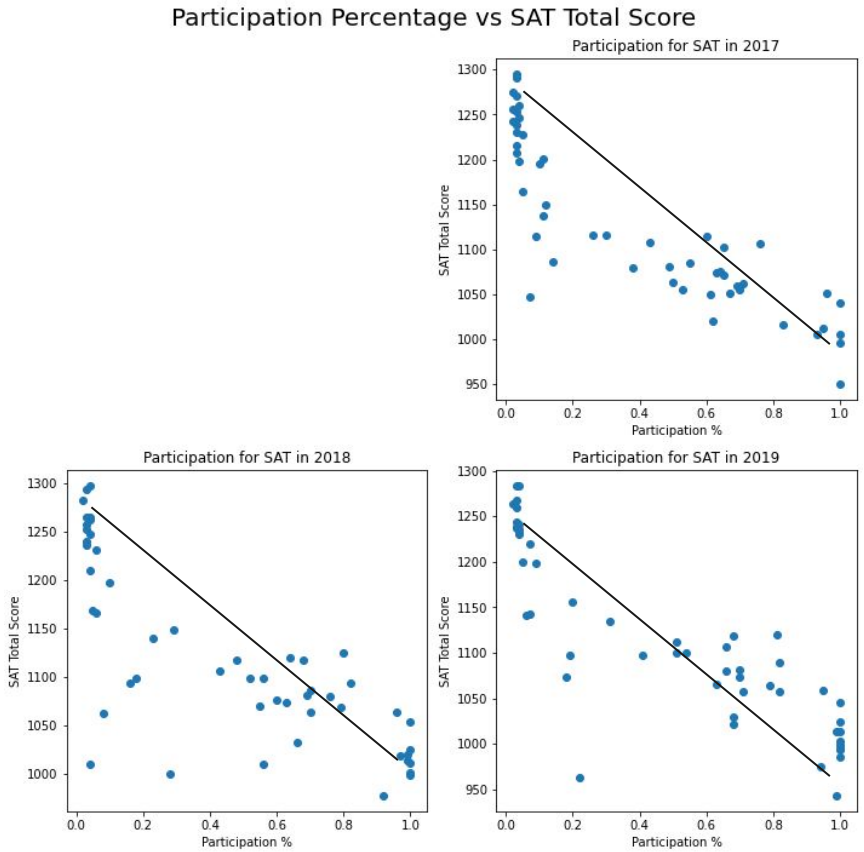
As participation rate increases, average score decreases for both ACT and SAT

Year	Correlation Coefficient	P-Value
2017	-0.855	0.00
2018	-0.861	0.00
2019	-0.865	0.00



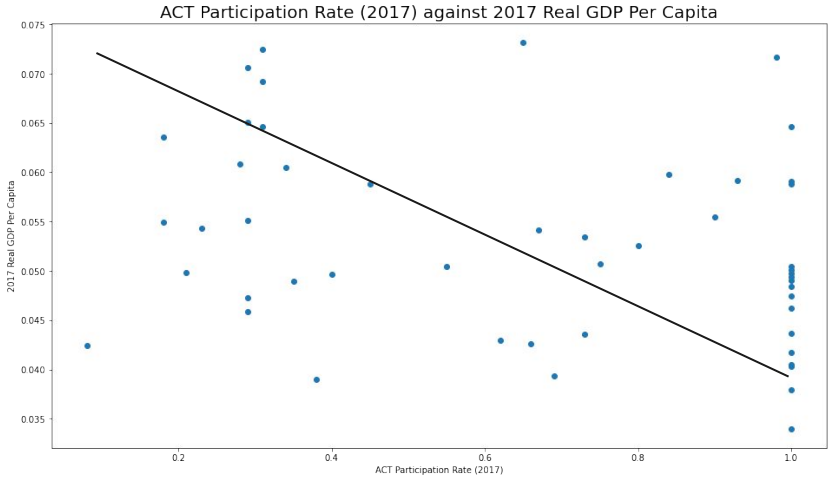
As participation rate increases, average score decreases for both ACT and SAT

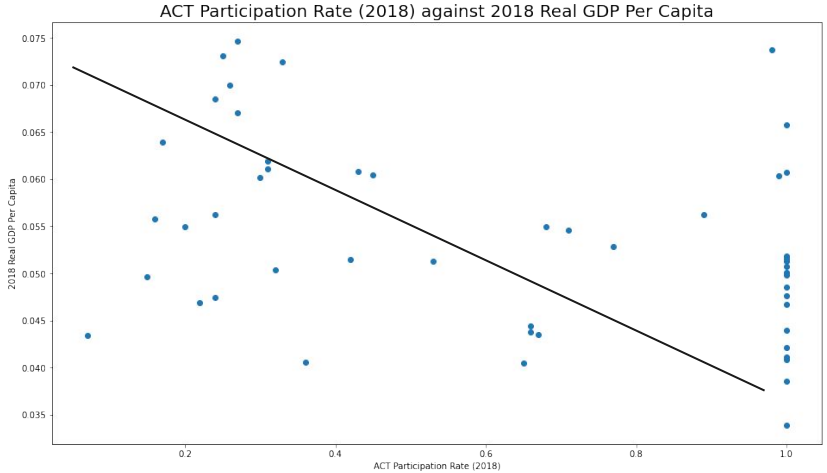
Year	Correlation Coefficient	P-Value
2017	-0.859	0.00
2018	-0.778	0.00
2019	-0.858	0.00

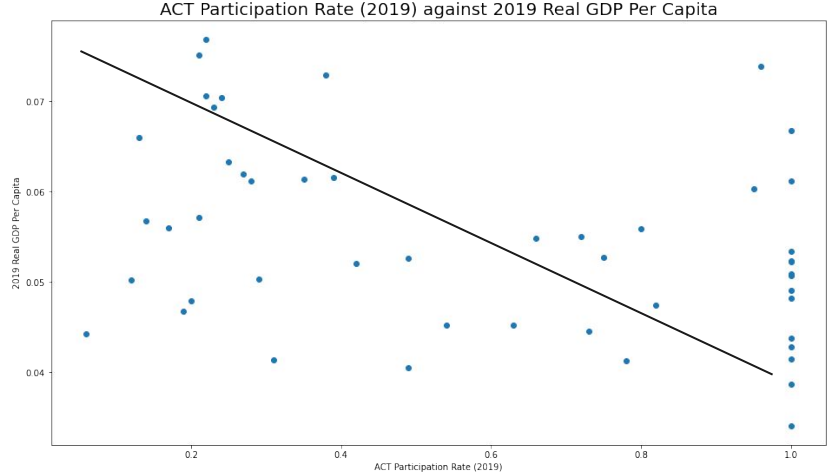


As GDP Per Capita increases, Participation Rate decreases slightly (ACT)

Year	Correlation Coefficient	P-Value
2017	-0.290	0.041
2018	-0.373	0.008
2019	-0.363	0.009

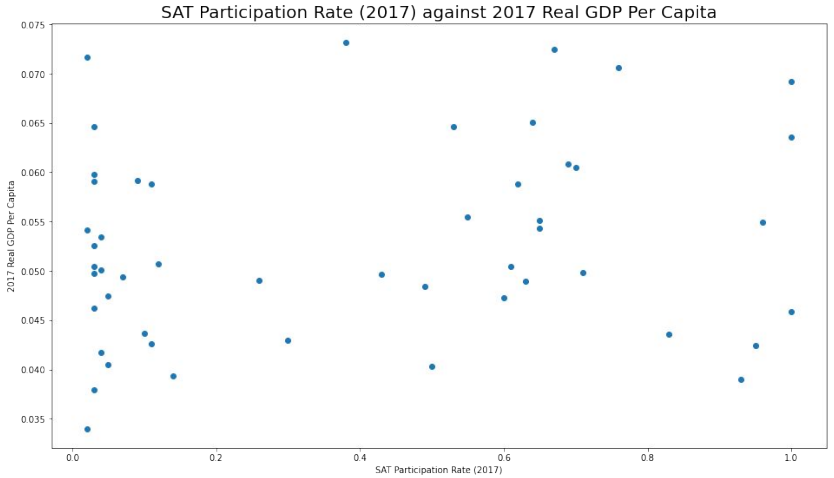


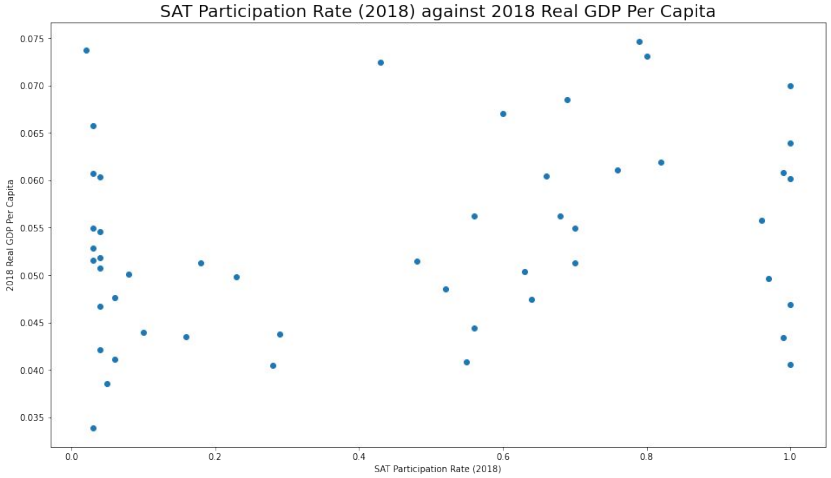


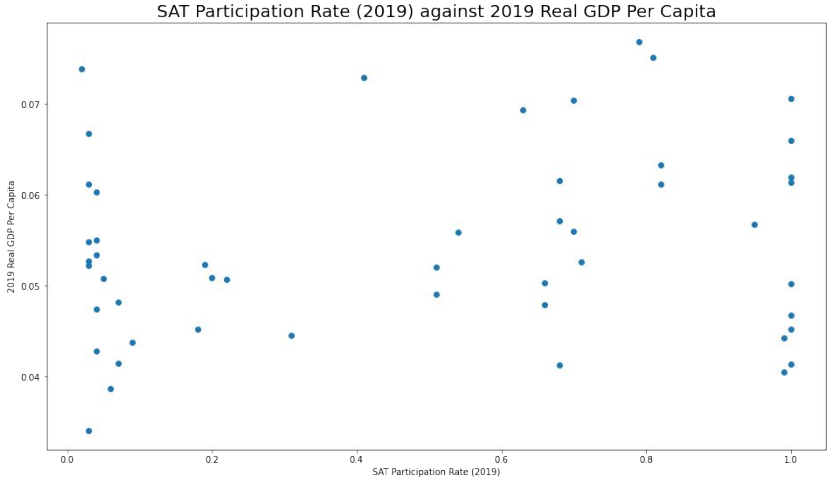


No significant relationship between real GDP Per Capita vs Participation Rate (SAT)

Year	Correlation Coefficient	P-Value
2017	0.204	0.155
2018	0.280	0.049
2019	0.202	0.159

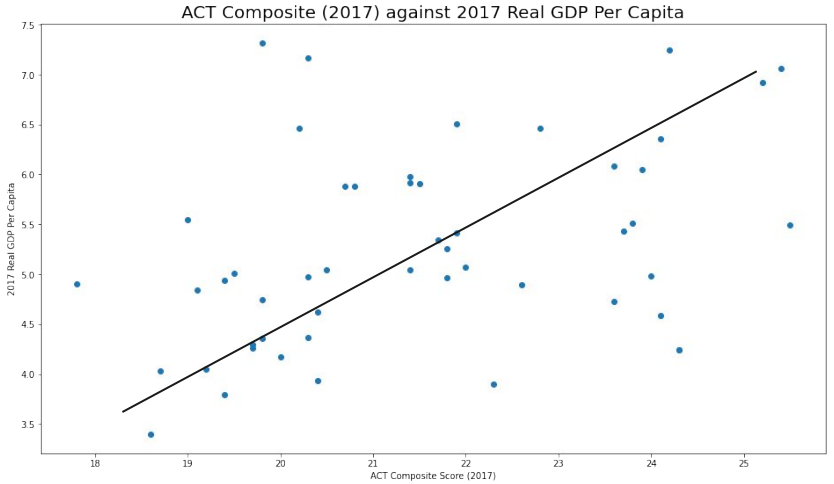


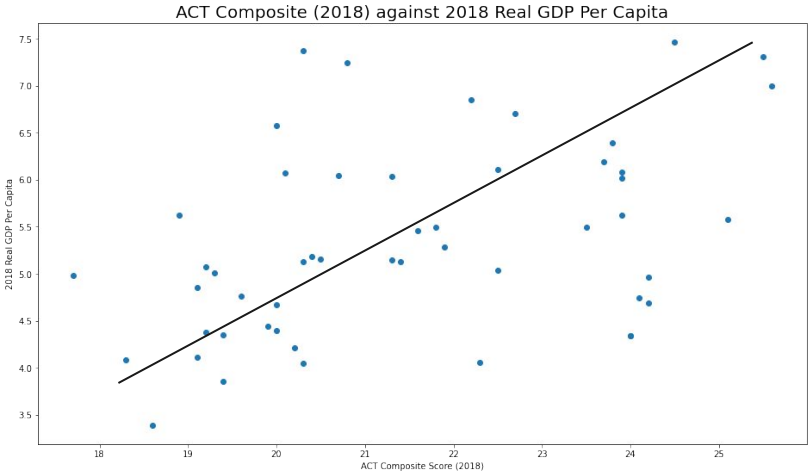


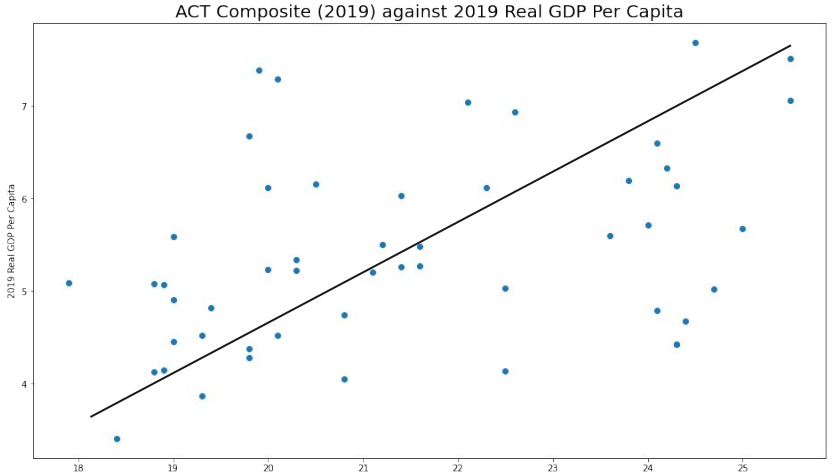


As real GDP per capita increases, average scores moderately increases (ACT)

Year	Correlation Coefficient	P-Value
2017	0.429	0.002
2018	0.480	0.00
2019	0.444	0.001

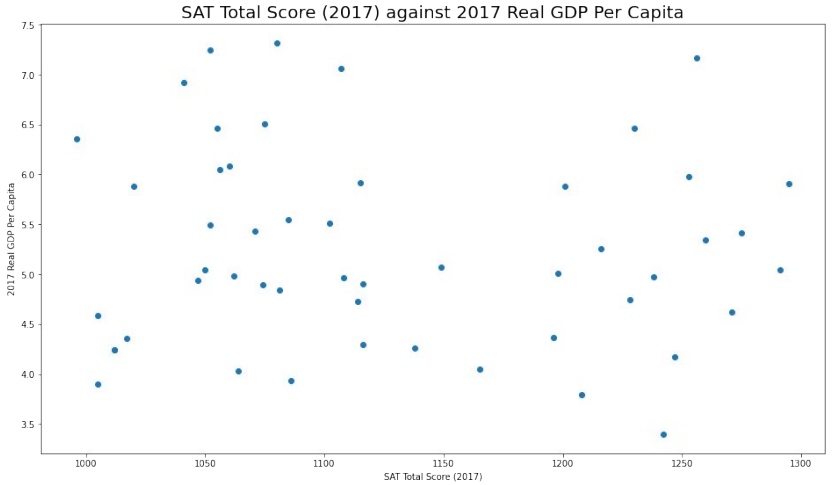


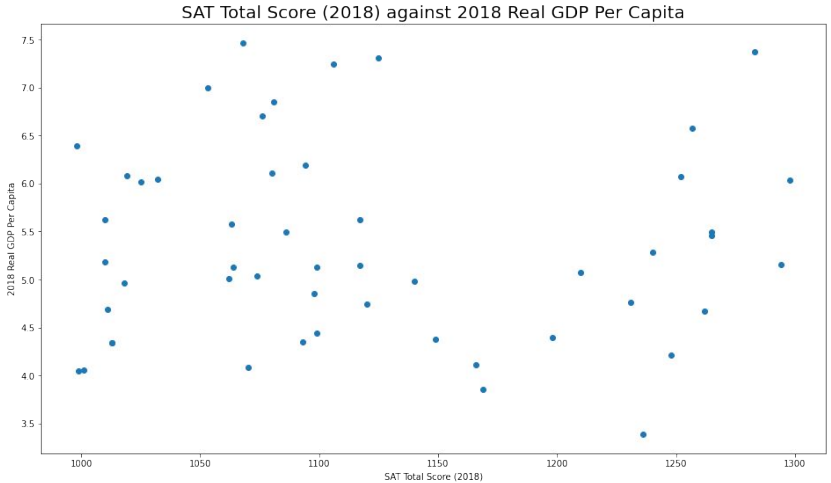


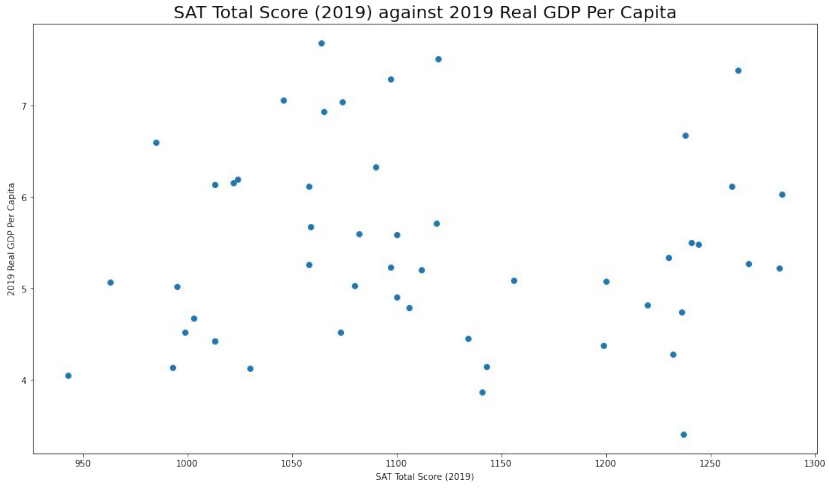


No significant relationship between real GDP Per Capita vs Scores (SAT)

Year	Correlation Coefficient	P-Value
2017	-0.09	0.53
2018	-0.03	0.82
2019	-0.004	0.98







Conclusion and Recommendations

Conclusion	Recommendation
As participation rate increases, average scores decreases for both ACT and SAT.	To determine if policy intervention is needed to make ACT/SAT would make the tests more representative of a student's intellectual strength to reduce bias in testing (e.g. investigating factors that affect students decision making on whether to take ACT or SAT and whether either test should be made mandatory)
When real GDP per capita increases, ACT participation rate decreases. However, this relationship does not apply to SAT.	To investigate further into the reasons why participation rate in ACT falls as state's economic wealth increases. (e.g. profile of students who take ACT)
When real GDP per capita increases, ACT average scores increases but SAT average scores do not.	To research further into reasons for this relationship and whether policy intervention is needed (e.g. to lower admission scores for the ACT for students who are from less wealthier states)