Snowed In: The Effects of Inclement Weather Closures on AP Exam Performance

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INTRODUCTION

Current research suggests that inclement weather closures (snow days, Hurricanes, etc.) have no effect on student achievement. Though limited, these studies have used state standardized tests or the SAT, which are not subject-specific and are able to be moved in the case of weather-related closures. This research also fails to examine the role that socioeconomic status plays in these effects.

To improve upon this, I have investigated the effects of inclement weather closures on student achievement using the AP exam across Massachusetts and Georgia. The AP exam is a measurement of achievement that is more susceptible to disruptions due to its subject-specific nature. I then incorporate the percent of economically disadvantaged students per district to examine effects in low-income areas.

Hypothesis: I believed that student achievement *is* impacted by inclement weather days, especially in low-income areas, resulting in lower AP pass rates.

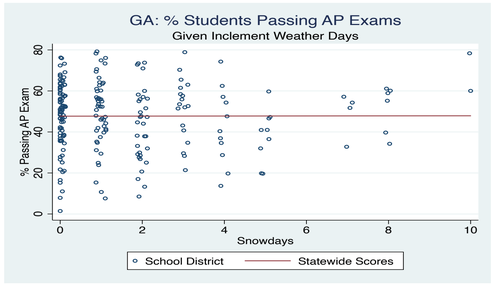
METHODS

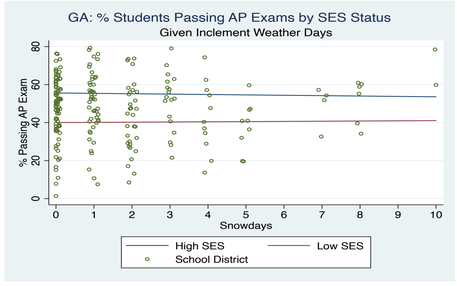
- Contacted 275 districts in Massachusetts and 154 in Georgia to report inclement weather closures from 2014-2019.
  - Final: 44 Georgia and 147 Massachusetts
- Combined with panel data on the percentage of students passing and the percentage of economically disadvantaged students per district
- Ran a fixed effects OLS regression model with the independent variable of interest being inclement weather days:

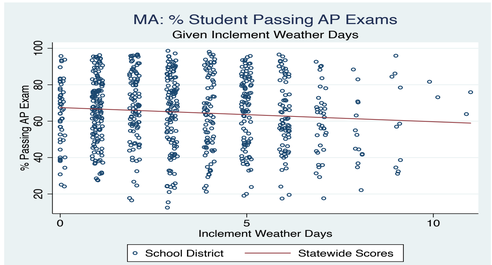
$$\%Scoring3\text{-}5District,Year = \beta 1SnowDaysDistrict,Year + \alpha District + \lambda Year + uDistrict,Year$$

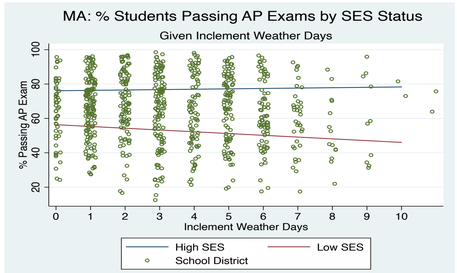
- Supplemented quantitative analysis with interviews with superintendents and teachers from within these districts
  - Final: 9 Georgia and 7 Massachusetts

RESULTS









- *Georgia*: no significant effects of inclement weather closures on AP exam scores at any level
- *Massachusetts*: decrease state-wide (-0.362 percentage points) for every inclement weather closure.
  - Decrease more significant in areas with high percentages of economically disadvantaged students (-1.252 percentage points)
- Interviews produced varied narratives about the impacts of inclement weather closures and potential solutions
  - Teachers with heavier content-based courses, specifically STEM APs, described the greatest hardships. There was also a general consensus to make-up these closures during the school year.

Statewide	Georgia	Massachusetts
Inclement Weather Days	-0.3376098	-0.3620808*
	(0.319821)	(0.1163948)
Observations	220	735
R^2 (adjusted)	0.6981	0.8969
NOTE: Table reports regression coefficients with standard errors clustered by district-years in parentheses. Data are at the district level for years 2014/15-2018/19. * indicates statistically significant at the 0.05 critical value.		

High Percentage of Economically Disadvantaged Students	Georgia	Massachusetts
Inclement Weather Days	-0.201112	0.2212941
	(0.6777614)	(0.3690703)
High Level of Economic Disadvantage	-15.56705	-19.74813
	(2.470941)	(2.041731)
Interaction Term	0.302363	-1.25179*
	(0.9401981)	(0.5073228)
Observations	220	735
R^2 (adjusted)	0.2047	0.3824
NOTE: Table reports regression coefficients with standard errors clustered by district-years in parentheses. Data are at the district level for years 2014/15-2018/19. * indicates statistically significant at the 0.05 critical value.		

CONCLUSION

- Partially confirmed hypothesis
- Statistically significant negative relationship between inclement weather closures and school district performance on the AP exam, especially in low-income districts, in Massachusetts but not Georgia.
  - By extension, it can be concluded that overall education and student achievement are hurt by closures in these areas
- Factors influencing these disproportionate results
  - Frequency of closures, make-up and closure policies, transportation, and internet access
  - Georgia schools make-up missed days during the school year, Massachusetts schools add them on to the end
  - Massachusetts schools average two more closures than Georgia districts.

FUTURE RESEARCH

It is recommended that future studies investigate two routes:

1. The impact on STEM versus non STEM courses to see if there are inter-disciplinary differences.
2. Account for early releases or delayed starts in interpreting "disruptions" to the school day.

REFERENCES

ACKNOWLEDGEMENTS

Thank you to the BU Political Science department for this opportunity to write about my passions. Special thanks to my advisor Katherine Einstein for your continued support and guidance throughout this process.