

Introduction

This project investigates how economic recessions impact educational activity. We determine this impact by looking at a school's enrollment statistics, financial aid provided to students, and allocation to research. Due to the limited availability of education data during past recessions, we chose to focus our study primarily on the 2008 recession.

Questions/Hypotheses

1. How do schools respond to an economic recession?
2. What schools respond similarly to recessions?
3. How do students respond to economic recessions?

We expected a decrease in educational activity during recessions. This would be seen by decreased enrollment, decreased financial aid, and decreased research spending across the board.

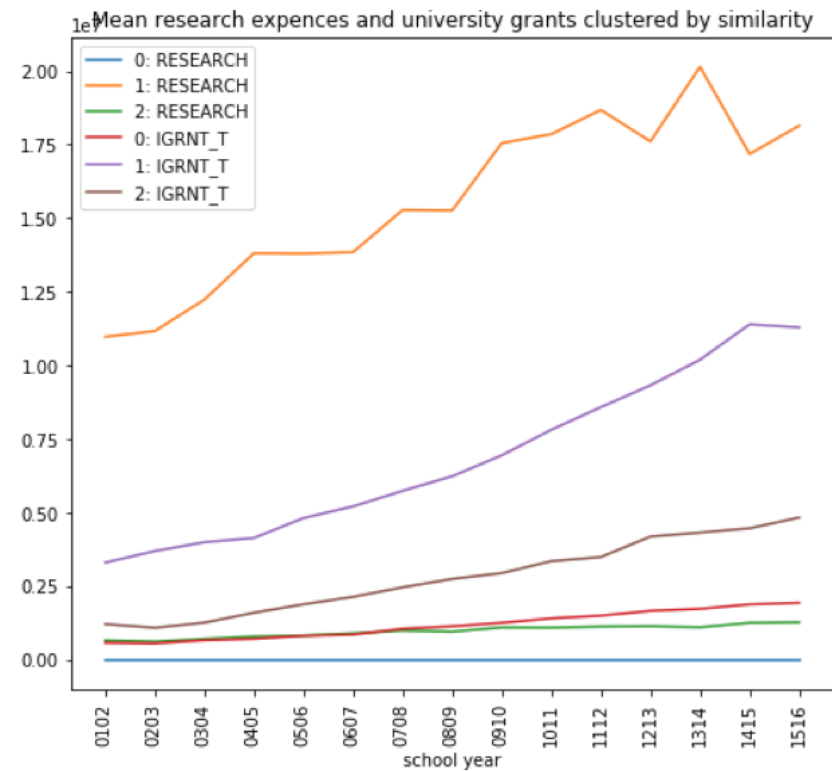
Our Data

1. National Center for Education Statistics
2. Yahoo! Finance
3. Google's Geocoder API
4. U.S News & World Report

The educational data required significant restructuring as many schools reported data inconsistently.

Cluster Analysis

Analysis Using GMM clustering of schools based on similarity of change in research spending and grants given during financial recession.

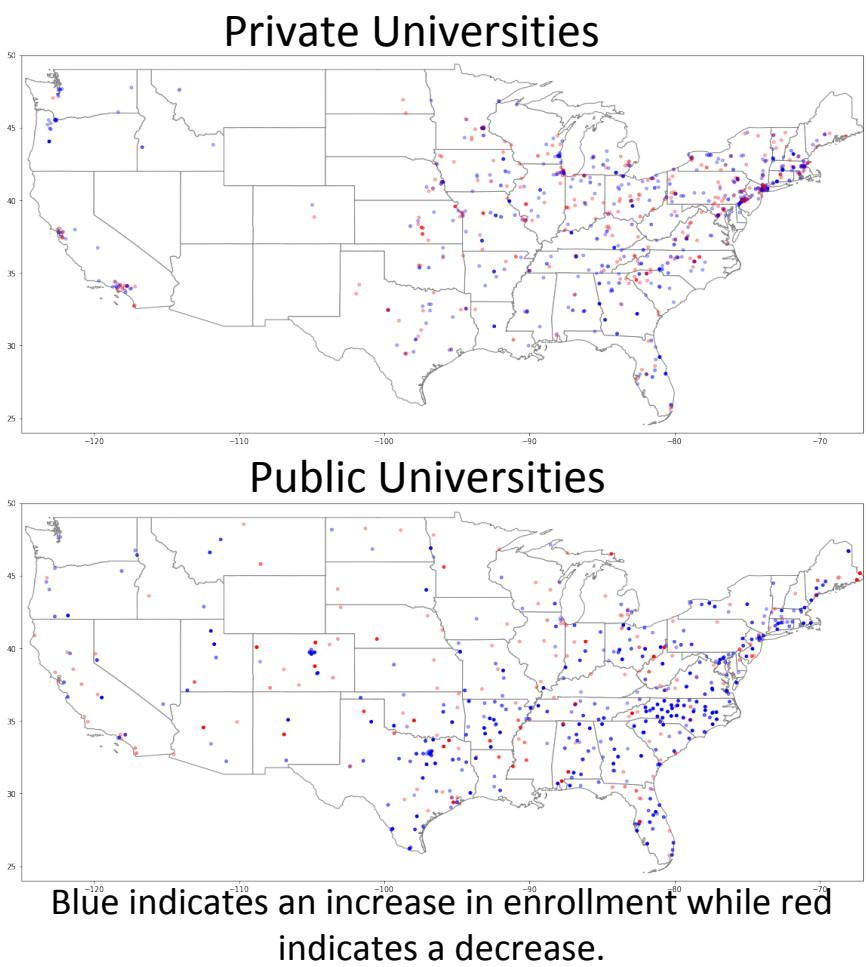


Observations Cluster 1 was made up primarily of highly ranked universities. For this cluster research spending is lower than expected for school year 08/09. However, during 09/10 it increases drastically.

This increase in educational activity during the recession was found to be due to the 2009 stimulus package issued by the Obama administration.

Geo-Location Analysis

Analysis Geographic plots of school, showing change in enrolment during 2008 between public and private schools.



Observations We see an overall increase in enrollment in public universities while many private universities see a decrease in admissions. A possible explanation is a movement of students from expensive private universities to more affordable public universities.

Predictive Models

Analysis Effort to determine whether a school will see an increase or decrease in enrollment, using Logistic Regression (LR) and Artificial Neural Network (ANN) for Binary Classification.

LR Model

Optimization terminated successfully.
Current function value: 0.571777
Iterations: 8

Logit Regression Results

Dep. Variable:	dummy_enrollment	No. Observations:	1106
Model:	Logit	DF Residuals:	1092
Method:	MLE	DF Model:	13
Date:	Fri, 27 Apr 2018	Pseudo R-squ.:	0.08084
Time:	17:33:31	Log-likelihood:	-432.39
converged:	True	LL-Null:	-688.00
		LLR p-value:	1.071e-17

coef	std err	z	P> z	[0.025 0.975]	
Rank	-0.0032	0.002	-1.359	0.174	-0.008 0.001
0809_GN	0.0014	0.002	0.578	0.563	-0.003 0.006
0809_ASSETS	0.0009	0.001	0.775	0.438	-0.001 0.003
0809_EXPENSES	0.0453	0.011	4.034	0.000	0.023 0.067
0809_REVENUE	9.7426e-06	0.001	0.011	0.992	-0.002 0.002
0809_RESEARCH	0.0006	0.001	0.702	0.482	-0.001 0.002
0809_AWARD	0.0218	0.005	3.929	0.000	0.009 0.033
0809_LOAN_T	-0.0001	9.64e-05	-1.160	0.246	-0.000 7.71e-05
0809_FGRNT_T	0.0023	0.002	1.458	0.145	-0.001 0.005
0809_SGRNT_T	0.0015	0.001	1.611	0.107	-0.000 0.003
0809_IGRNT_T	-0.0005	0.000	-1.645	0.100	-0.001 9.63e-05
for-profit	0.9271	0.435	1.460	0.144	-0.317 2.171
not-for-profit	0.6935	0.425	1.634	0.102	-0.139 1.525
public	1.4124	0.444	3.178	0.001	0.541 2.283

	precision	recall	f1-score	support
0.0	0.62	0.11	0.19	163
1.0	0.67	0.96	0.79	312
avg / total	0.66	0.67	0.59	475

ANN Model

	precision	recall	f1-score	support
0	0.53	0.22	0.31	144
1	0.73	0.92	0.81	330
avg / total	0.67	0.70	0.66	474

Observations The LR model showed that the variables of highest significance in determining how a school's enrollment will change during recessionary periods were change in number of students receiving financial aid, change in school expenses, and whether the school was public. The ANN further improved the classification model.

Conclusion

How do schools respond to an economic recession?

- Difficult to determine given that the 2009 stimulus package provided funds for expansion in the educational sector
- Future studies should take into account the past recessions where such stimulus packages were not initiated.

What schools respond similarly to recessions?

- Top ranked universities – in terms of change in research spending and grants
- Schools of same type
- Schools in same state

How do students respond to economic recessions?

- Increase in grants to students
- More students taking loans
- Possible movement from private to public schools