DSC 531 Regression Project

Danny Chau, Agnes Nyagami, Eric Rash,

Will Toman, Carly Watkins, Cherishma Reddy Velimineti

The Procedure

For our model, we decided to stick with the spec sheet provided to us in class. We also did not transform the data in any way. First, we ran the model for every parameter in the data set using stepwise selection with various combinations of select/stop/choose criteria as well as interactions/hierarchy enforcement on and off. Then we ran the same glmselect procedures again but removing the class variables for room and board due to the missing values. Every model was scored on AIC and SBC and then judged accordingly.

The Selection

The final model we decided on used stepwise selection and AIC as all the select/stop/choose criteria with no interactions/hierarchy. We chose this model because it had the 2nd lowest AIC score and 3rd lowest SBC score. However, we believe this is the best model because it was the same one that SAS kept giving us despite all the different parameters we tried for scoring. Out of all the models, this one was generated 5 times. The parameters for the model are shown below.

Parameter Estimates				
Parameter	DF	Estimate	Standard Error	t Value
Intercept	1	0.351973	0.067582	5.21
control Private for-profit	1	0.024368	0.038721	0.63
control Private not-for-profit	1	0.041642	0.020895	1.99
control Public	0	0	.	.
hloffer Bachelor^s degree	1	0.007569	0.058075	0.13
hloffer Doctor^s degree	1	0.034198	0.059693	0.57
hloffer Master^s degree	1	-0.002667	0.059287	-0.04
hloffer Post-master^s certificate	1	0.033889	0.060520	0.56
hloffer Postbaccalaureate certificate	0	0	.	.
instcat Degree-granting, not primarily baccalaureate or above	1	-0.034859	0.018557	-1.88
instcat Degree-granting, primarily baccalaureate or above	0	0	.	.
c21enprf Exclusively undergraduate four-year	1	0.008082	0.022531	0.36
c21enprf Exclusively undergraduate two-year	1	-0.204466	0.053687	-3.81
c21enprf High undergraduate	1	-0.018137	0.008498	-2.13
c21enprf Majority graduate	1	-0.006712	0.019084	-0.35
c21enprf Majority undergraduate	1	-0.042300	0.011423	-3.70
c21enprf Not applicable, not in Carnegie universe (not accredited or nondegree-granting)	1	-0.094528	0.059056	-1.60
c21enprf Very high undergraduate	0	0	.	.
cohort	1	0.000026314	0.000003177	8.28
GrantRate	1	0.115478	0.028417	4.06
GrantAvg	1	0.000001776	0.000000824	2.16
PellRate	1	-0.388176	0.029032	-13.37
LoanRate	1	-0.093466	0.022061	-4.24
InDistrictT	1	-0.085238	0.051277	-1.66
InDistrictFDiff	1	-0.000589	0.000297	-1.99
InStateT	1	0.000002583	0.000000622	4.16
InStateF	1	0.000008028	0.000002661	3.02
OutStateT	1	-0.037170	0.020806	-1.79
OutStateTDiff	1	0.000003260	0.000001016	3.21
boardamt	1	0.000003576	0.000002236	1.60
AvgSalary	1	0.000001751	0.000000216	8.10
StuFacRatio	1	-0.000028977	0.000019992	-1.45

Parameter Estimate Interpretation

- **Intercept:** As the data was not transformed, centered, or standardized in anyway, the intercept value of 0.351973 is meaningless as it is impossible for a university or college to have all 0 as the parameters.
- **Control:** For the control class variable, the model by default is for public universities so there is no change in graduation rate. If the record was for a private for-profit school, then the graduation rate would increase by 0.024368 on average compared to the default. If the record was for a private not-for-profit school, then the graduation rate would increase by 0.041642 on average compared to the default.

- **HLOffer:** For the hloffer class variable, the model by default shows the rate for schools that have a postbaccalaureate certificate as the highest level offered, so there is no change for graduation rate. If the hloffer for a school was a Bachelor's degree, then the graduation rate would increase by 0.007569 on average compared to the default. For schools that have an hloffer of a master's degree, the graduation rate would decrease by 0.002667 on average compared to the default. For schools that have an hloffer of a post-master's certificate, the graduation rate would increase by 0.033889 on average compared to the default. Finally, for schools that have an hloffer of a doctoral degree, the graduation rate would increase by 0.034198 on average compared to the default.
- **Instcat:** For the instcat class variable, the model by default shows "Degree-granting, primarily baccalaureate or above" so there is no change in graduation rate. However, if a university instead was a "Degree-granting, not primarily baccalaureate or above" school, the graduation rate on average would decrease by 0.034859 compared to the default.
- **c21enprf:** For the c21enprf class variable, the model by default shows "Very high undergraduate" schools, meaning there is no change in the rate. For schools that are labeled as "Exclusively undergraduate four-year", the average graduation rate would increase by 0.008082 compared to the default. For schools that are labeled as "Exclusively undergraduate two-year", the graduation rate would decrease by 0.204466 compared to the default. For schools that are labeled as "High undergraduate", the graduation rate would decrease by 0.018137 compared to the default. "Majority graduate" schools have a decrease in graduation rate of 0.006712 on average compared to the default. "Majority Undergraduate" schools on average have a decrease of 0.042300 in graduation rate compared to the default. Finally, schools labeled as "Not applicable, not in Carnegie universe (not accredited or nondegree-granting)" on average have a decrease of 0.094528 in graduation rate compared to the default.
- **Cohort:** As the cohort size increases by 1 (1 extra student), the graduation rate increases by 0.000026314 on average
- **GrantRate:** As the GrantRate increases by 1 (1% increase in % of students with grants), the graduation rate increases by 0.115478 on average
- **GrantAvg:** As the GrantAvg increases by 1 ($1 increase in average grant per student), the graduation rate increases by 0.000001776 on average
- **PellRate:** As the PellRate increases by 1 (1% increase in % of students with pell grants), the graduation rate decreases by 0.388176 on average
- **LoanRate:** As the LoanRate increases by 1 (1% increase in % of students with loans), the graduation rate decreases by 0.093466 on average
- **InDistrictT:** As InDistrictT increases by 1 ($1 increase in indistrict tuition), the graduation rate decreases by 0.085238 on average
- **InDistrictFDiff:** As InDistrictFDiff increases by 1 ($1 increase in difference between indistrict and outdistrict fees), the graduation rate decreases by 0.000589 on average
- **InStateT:** As InStateT increases by 1 ($1 increase in in state tuition), the graduation rate increases by 0.000002583 on average
- **InStateF:** As InStateF increases by 1 ($1 increase in in state fees), the graduation rate increases by 0.000008028 on average

- **OutStateT:** As OutStateT increases by 1 ($1 increase in out state tuition), the graduation rate decreases by 0.037170 on average
- **OutStateTDiff:** As OutStateTDiff increases by 1 ($1 increase in the difference between outstate tuition and instate tuition), the graduation rate increases by 0.000003260 on average
- **Boardamt:** As Boardamt increases by 1 ($1 increase in board costs), the graduation rate increases by 0.000003576 on average
- **AvgSalary:** As AvgSalary increases by 1 ($1 increase in average faculty salary), the graduation rate increases by 0.000001751 on average.
- **StuFacRatio:** As StuFacRatio increases by 1 (1 unit increase in student to faculty ratio), the graduation rate decreases by 0.000028977 on average.