Summer Class Profits

WWU Summer Class Decisions

- Summer class revenue is a straight $250 per student credit
- Individual class j generates a profit of $\$250S_j - C_j$ where C_j is the cost of putting on class j and S is the number of students in class j.
- Individual colleges have moved to to cancelling the class if $\$250S_j - C_j < 0$
- But what if $cor(S_j,S_k) \neq 0$?
- Possible: If course j is cancelled, then S_k falls and reduces university revenue more than the savings of cancelling the class.
- Example: Two four-credit, 8-person classes, one costs $9000 to teach one costs $7000. The first class is cancelled and as a result, 2 people drop out of class k.

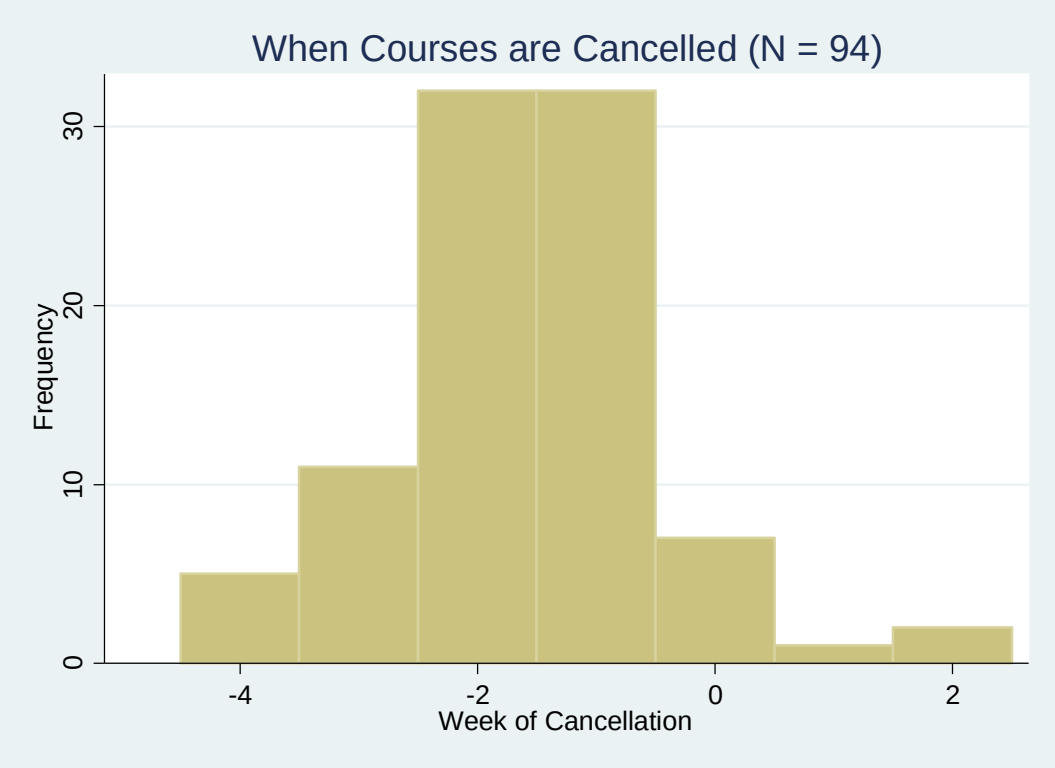
Research Question

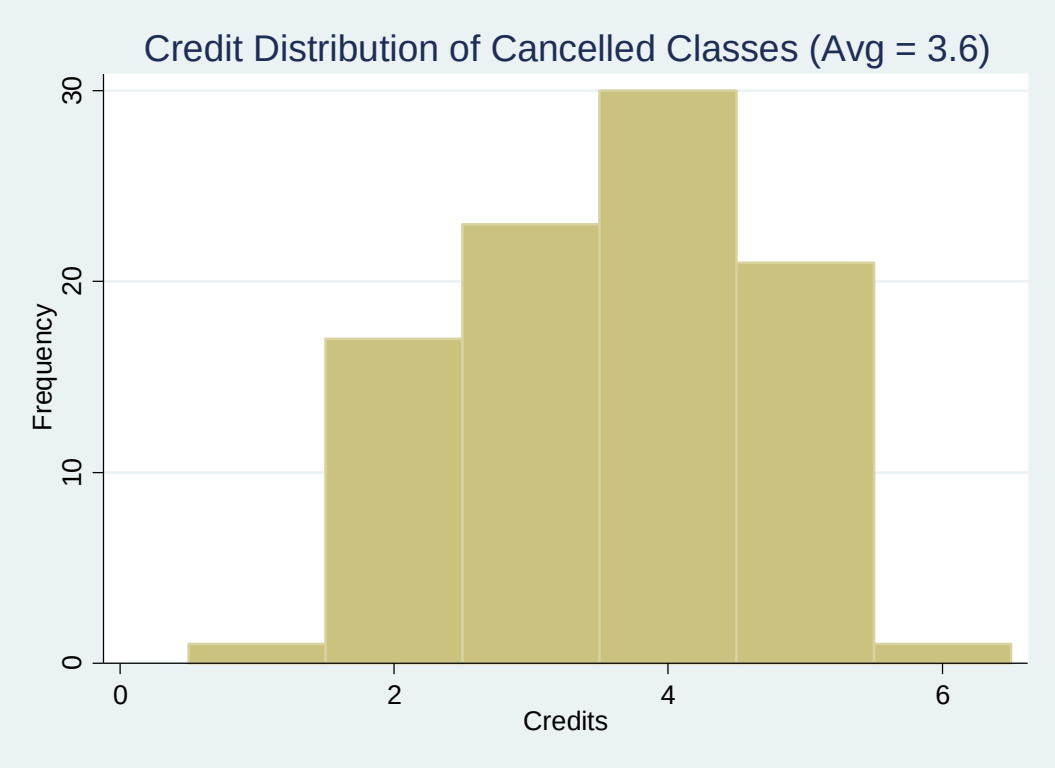
- Are summer classes complements or substitutes—if a class is cancelled, do students substitute into another one or do they drop more classes (i.e, what is the cor(S_j,S_k))?

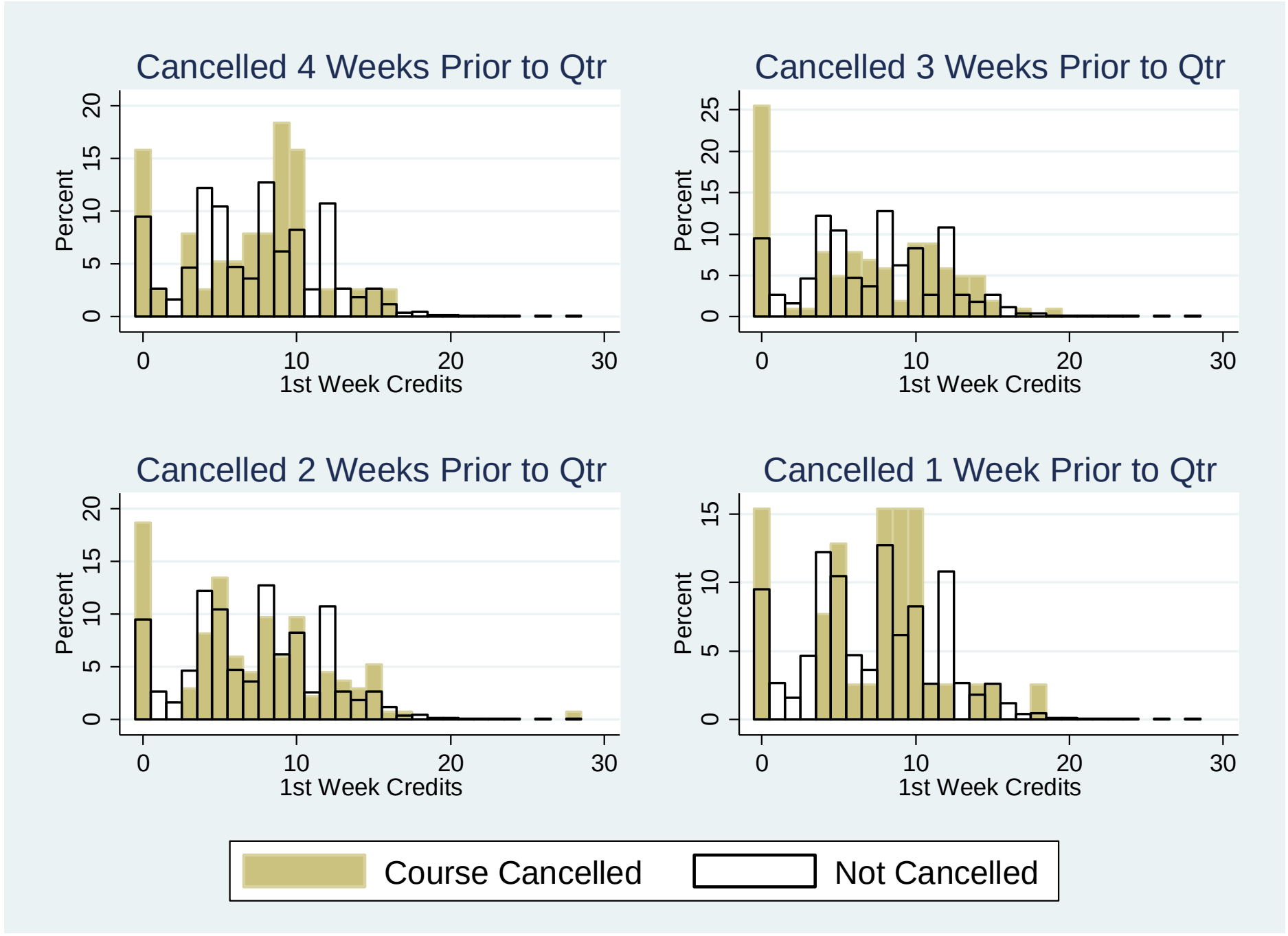
Data

- 16,504 different students who enrolled in WWU summer session during either 2012, 2013, 2014, 2015, or 2016. Observe all cancelled classes in 2014, 2015, and 2016.
- Average maximum summer head count 4500; paying enrollment about 4000, and FTE about 2100.
- Starting 6 weeks prior to start of summer quarter, weekly observations of which classes each student registers for, number of credits per class, and if/when that class was cancelled.
- Thinking classes being cancelled is exogenous with respect to student observables.

Information on cancelled classes






Cancelled 4 Weeks Prior to Qtr
Percent
0
5
10
15
20
0
10
20
30
1st Week Credits
Cancelled 3 Weeks Prior to Qtr
Percent
0
5
10
15
20
25
0
10
20
30
1st Week Credits
Cancelled 2 Weeks Prior to Qtr
Percent
0
5
10
15
20
0
10
20
30
1st Week Credits
Cancelled 1 Week Prior to Qtr
Percent
0
5
10
15
0
10
20
30
1st Week Credits
Course Cancelled
Not Cancelled

One Possible Approach

Example using course cancellations that occurred 1 week prior to summer qtr. beginning

		Actual Credits Enrolled During 1st Week of Summer									
		0	1	2	3	4	5	6	7	8	9
Credits Week Prior to Cancel	0	8%	0%	0%	0%	2%	0%	0%	0%	0%	0%
	1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	3	2%	0%	0%	2%	1%	0%	0%	0%	0%	0%
	4	3%	0%	0%	1%	2%	0%	0%	0%	0%	0%
	5	1%	0%	0%	0%	0%	7%	2%	0%	0%	0%
	6	1%	0%	0%	0%	0%	0%	3%	0%	1%	0%
	7	2%	0%	0%	1%	1%	2%	0%	2%	0%	0%
	8	0%	0%	0%	0%	3%	2%	0%	1%	4%	0%
	9	1%	0%	0%	0%	1%	1%	0%	0%	1%	3%

Credit difference = 2% * (0 – 7) + all the rest…

Change in 1st Week Credits, Diff. in Diff.

		Cancelled Difference	Not Cancelled Difference	Diff. in Diff.
Summer Quarter Week	-4	-2.25	-0.7	-1.55
	-3	-2.13	-0.67	-1.46
	-2	-2.13	-0.63	-1.5
	-1	-1.69	-0.54	-1.15
	0	-0.25	-0.4	0.15
	1	0	-0.21	0.21
	2	0	-0.08	0.08
		weighted average =		**-1.12**

		Cancelled Difference	Not Cancelled Difference	Diff. in Diff.
Summer Quarter Week	-4	-2.53	-0.7	-1.83
	-3	-2.13	-0.67	-1.46
	-2	-2.13	-0.63	-1.5
	-1	-1.92	-0.54	-1.38
	0	-0.76	-0.4	-0.36
	1	0	-0.21	0.21
	2	0	-0.08	0.08
		weighted average =		**-1.29**

Change in 1st Week Credits by Credits Cancelled, Diff. in Diff.

Cancelled Class = 3 Credits				
		Cancelled Difference	Not Cancelled Difference	Diff. in Diff.
Week Cancelled	-4	0.00	-0.70	0.70
	-3	-2.17	-0.67	-1.50
	-2	-1.63	-0.63	-1.00
	-1	-1.74	-0.54	-1.20
	0	0.00	-0.40	0.40
	1	0.00	-0.21	0.21
	2	0.00	-0.08	0.08
		weighted average =		**-1.16**

Cancelled Class = 4 Credits				
		Cancelled Difference	Not Cancelled Difference	Diff. in Diff.
Week Cancelled	-4	-2.70	-0.70	-2.00
	-3	0.00	-0.67	0.67
	-2	-3.73	-0.63	-3.10
	-1	-1.91	-0.54	-1.37
	0	-0.71	-0.40	-0.31
	1	0.00	-0.21	0.21
	2	0.00	-0.08	0.08
		weighted average =		**-1.52**

Cancelled Class = 5 Credits				
		Cancelled Difference	Not Cancelled Difference	Diff. in Diff.
Week Cancelled	-4	0.00	-0.70	0.70
	-3	-2.21	-0.67	-1.54
	-2	-2.23	-0.63	-1.60
	-1	-2.23	-0.54	-1.69
	0	-1.00	-0.40	-0.60
	1	0.00	-0.21	0.21
	2	0.00	-0.08	0.08
		weighted average =		**-1.41**

Summary

- Cancelling a 3.6 credit class reduces enrolled credits by 1.3—or said another way, students replace 3.6 credits with 2.3.
- The marginal cost of class cancellation is thus 1.3×\$250 = \$325 per student.
- The marginal benefit of class cancellation is the cost of the instructor.
- There will be very few situations where the local rule of cancelling a class because $\$250S_j - C_j < 0$ actually results in the university reducing profits.