*** Revised 11/19/2025 to include Aid Year 2025 Student Financial Aid data of the 4th UM campus. ***

MidAIR Forum, Nov 7, 2025, Johnson County Community College

Undergraduate Student Loan Indebtedness

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University of Missouri System

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Abstract:

This session will describe my preliminary investigation of loan indebtedness of undergraduate students from a Midwest system of research universities. I look specifically at cohorts of undergraduate students who were full-time, degree-seeking, first-time-college Missouri residents in Fall and received a first *bachelor's degree within eight years.*

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Outline:

Data: Fall Cohorts, FY2011 – FY2018 (FS2010 – FS2017)

- Full-time, degree-seeking, first-time-college, undergraduates, …
- … Unique students, only.
- Remove exclusive auditors.
- Keep MO residents, only.
- Keep U.S. citizens, only (i.e., remove NRA, PR, etc.).

- Keep only if received *first* Bachelor's degree within 8 years.

- Remove if received VA Educ Benefits ["G.I. Bill"] (at any time).
- Remove if received Athletic scholarship (at any time).
- Remove if received UM employee spouse/dependent tuition discount (at any time).

- **U/G Student Loan Total**, infl-adj, through the Aid Year the *first* Bachelor's degree was awarded.

OBJECTIVE: Investigate **U/G Student Loan** of the FTC U/G student cohorts w.r.t.:

- Whether attended Residential vs. Commuter campus.
- Whether "first" Bachelor's degree is a STEM or Health Sciences degree, or not.

QUESTIONS:

I. Did the *proportion* of FTC U/G students who received a loan change over time?

II. For those FTC U/G students who received a loan, did the *amounts* ($$) of these loans change over time?

I. Proportion of students who received a student loan

1. Chi-squared Test for Homogeneity
2. Logistic Regression

II. Amount ($$) of student loan

1. Simple Linear Regression
2. Multiple Regression

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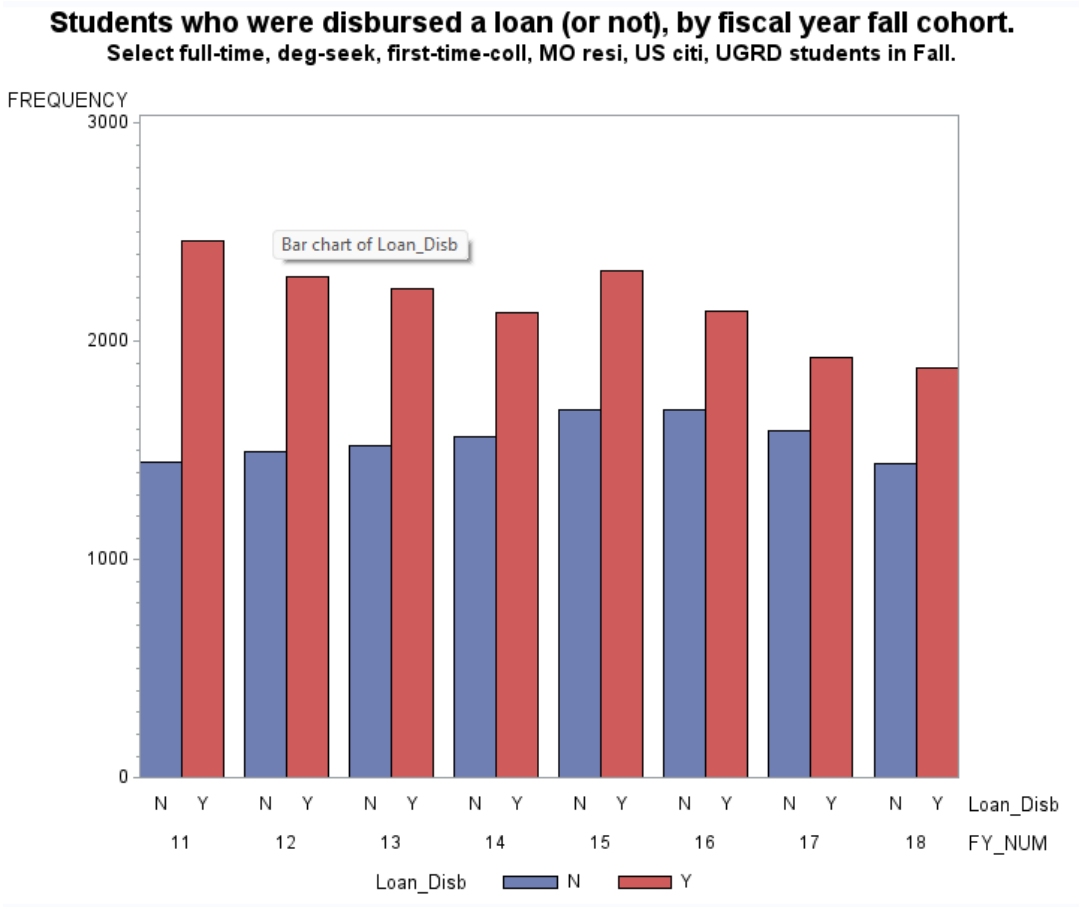
U/G Student Loan Indebtedness: Analyses

I. Numbers of students who received a student loan (or not). ***** Omitted from talk. *****



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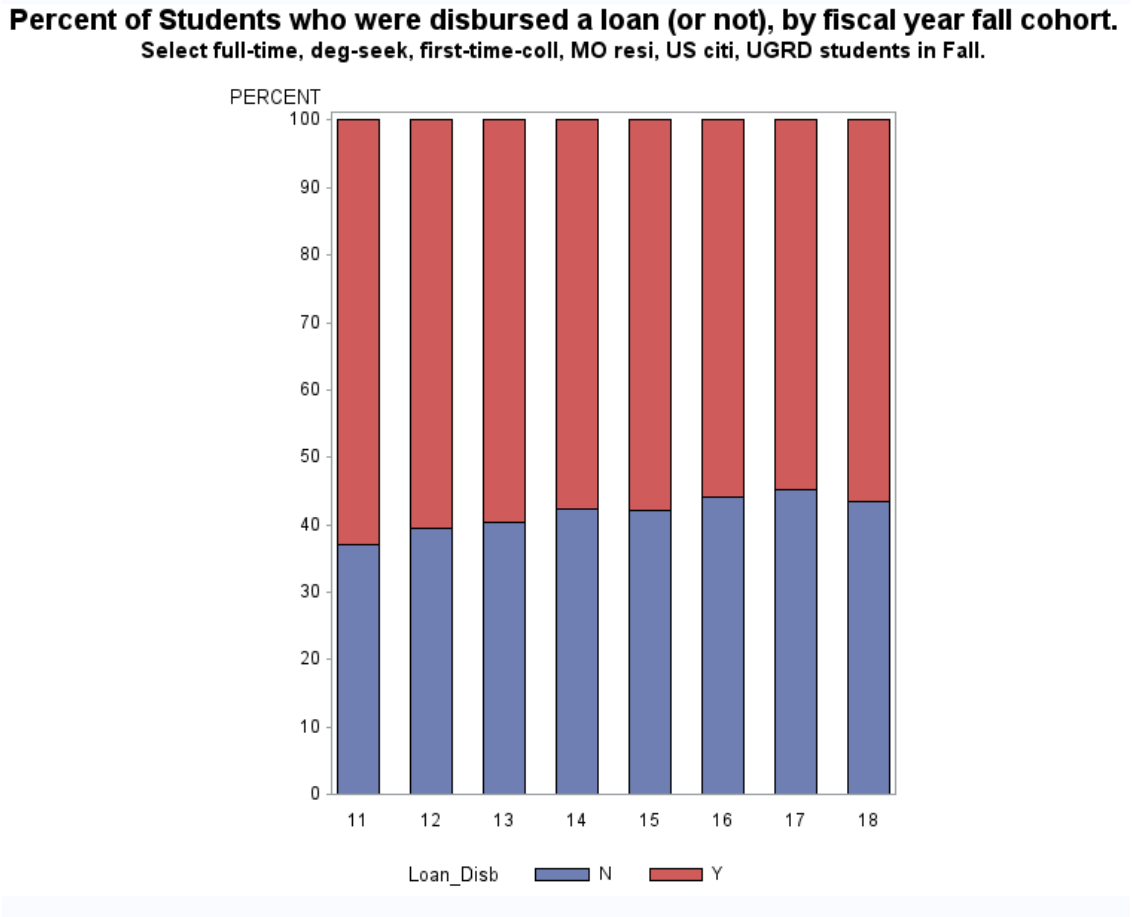


I.1. Chi-squared Test for Homogeneity

The FREQ Procedure

Table of Loan_Disb by FY_NUM

Loan_Disb / FY_NUM Frequency Percent Row Pct Col Pct	11	12	13	14	15	16	17	18	Total
N	1447 4.85 11.64 37.04	1498 5.02 12.05 39.44	1520 5.10 12.23 40.37	1563 5.24 12.58 42.27	1686 5.65 13.57 42.07	1686 5.65 13.57 44.10	1589 5.33 12.79 45.22	1439 4.82 11.58 43.37	12428 41.66
Y	2460 8.25 14.14 62.96	2300 7.71 13.22 60.56	2245 7.53 12.90 59.63	2135 7.16 12.27 57.73	2322 7.78 13.34 57.93	2137 7.16 12.28 55.90	1925 6.45 11.06 54.78	1879 6.30 10.80 56.63	17403 58.34
Total	3907 13.10	3798 12.73	3765 12.62	3698 12.40	4008 13.44	3823 12.82	3514 11.78	3318 11.12	29831 100.00

Statistics for Table of Loan_Disb by FY_NUM

Statistic	DF	Value	Prob
Chi-Square	7	77.1397	<.0001
Likelihood Ratio Chi-Square	7	77.4165	<.0001
Mantel-Haenszel Chi-Square	1	65.7665	<.0001
Phi Coefficient		0.0509	
Contingency Coefficient		0.0508	
Cramer's V		0.0509	

Sample Size = 29831

I.2.a. Logistic Regression – Simple Model

$$p = pr(\boldsymbol{iLoan\_Disb = 1}) = \frac{exp[(\beta_0 + \beta_1 * \boldsymbol{FY\_NUM})]}{1+exp[(\beta_0 + \beta_1 * \boldsymbol{FY\_NUM})]} = \frac{1}{1+exp[-(\quad)]}$$ and

$$q = 1 - p$$

I.2.a. Logistic Regression – Simple Model

RESULTS – SEE HANDOUT

I.2.b. Logistic Regression – Multivariate Model

	A	B	C	D	E	F	G	H	I	J	K	L
1												
2												
3	Count of EMPLID			FY_NUM								
4	Loan_Disb	Resid_Cmp	STEM_Hlth_Deg	11	12	13	14	15	16	17	18	Grand Total
5	N	N	N	112	109	116	111	110	127	134	122	941
6			Y	77	70	91	88	111	109	111	118	775
7		N Total		189	179	207	199	221	236	245	240	1,716
8		Y	N	660	625	634	638	671	629	604	526	4,987
9			Y	598	694	679	726	794	821	740	673	5,725
10		Y Total		1,258	1,319	1,313	1,364	1,465	1,450	1,344	1,199	10,712
11	N Total			1,447	1,498	1,520	1,563	1,686	1,686	1,589	1,439	12,428
12	Y	N	N	259	234	209	163	187	198	201	209	1,660
13			Y	130	140	162	150	157	152	156	178	1,225
14		N Total		389	374	371	313	344	350	357	387	2,885
15		Y	N	970	902	880	814	899	773	663	608	6,509
16			Y	1,101	1,024	994	1,008	1,079	1,014	905	884	8,009
17		Y Total		2,071	1,926	1,874	1,822	1,978	1,787	1,568	1,492	14,518
18	Y Total			2,460	2,300	2,245	2,135	2,322	2,137	1,925	1,879	17,403
19	Grand Total			3,907	3,798	3,765	3,698	4,008	3,823	3,514	3,318	29,831
20												

I.2.b. Logistic Regression – Multivariate Model with 2-way interactions

$$p = pr(\boldsymbol{iLoan\_Disb = 1}) = \frac{exp[(\quad)]}{1+exp[(\quad)]} = \frac{1}{1+exp[-(\quad)]}\text{,} \quad \text{where}$$

$$(\beta_0 + \beta_1 * \boldsymbol{FY\_NUM} + \beta_2 * \boldsymbol{iResid\_Cmp} + \beta_3 * \boldsymbol{iSTEM\_Hlth\_Deg} + \text{"}2 - ways\text{"})$$

I.2.b. Logistic Regression – Multivariate Model with 2-way interactions (continued)

RESULTS – SEE HANDOUT

I. Proportion of FTC U/G students disbursed loan $$

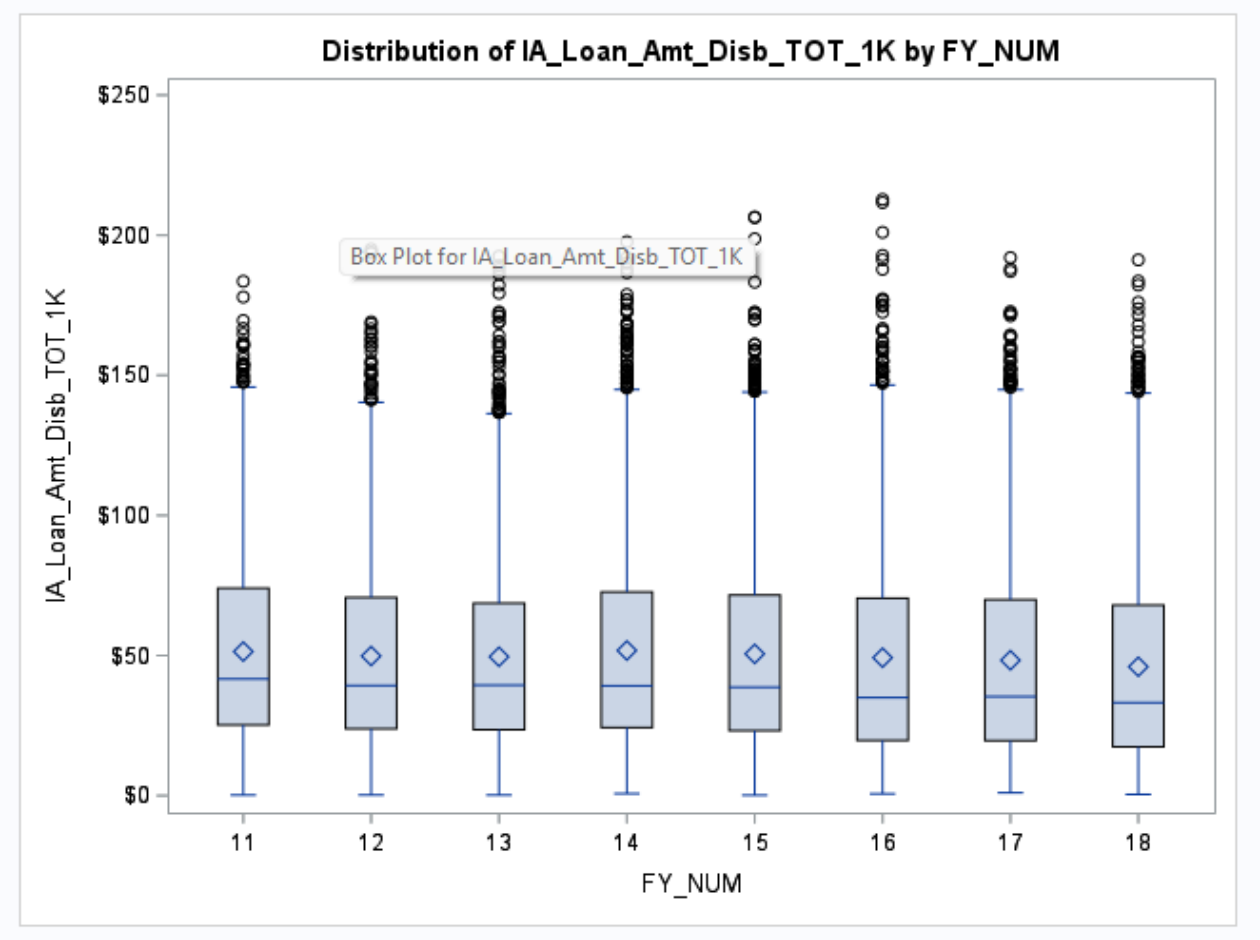
1. Chi-squared Test for Homogeneity
2. Logistic Regression

II. Individual Student Total Loan $$ disbursed

1. Simple Linear Regression
2. Multiple Regression

II. Individual Student Total Loan $$ disbursed

***** Now reflects Aid Year 2025 SFA data of 4th campus. *****



II. Individual Student Total Loan $$ disbursed

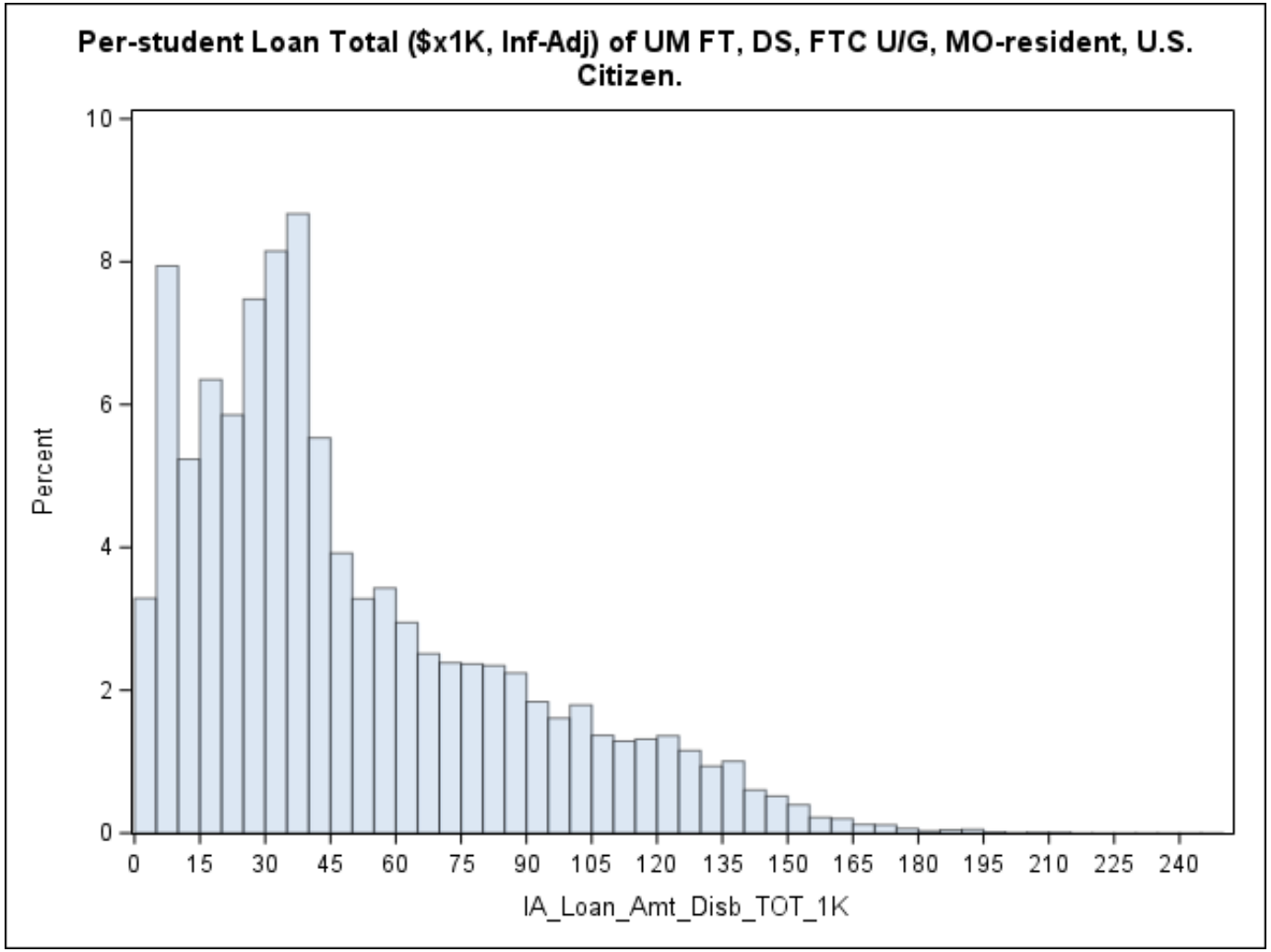
***** Now reflects Aid Year 2025 SFA data of 4th campus. *****

Analysis Variable: IA_Loan_Amt_Disb_TOT_1K

*** Where Loan_Disb = 'Y'. ***

FY_NUM	N	Mean	Std Dev	Minimum	Lower Quartile	Median	Upper Quartile	Maximum
11	2460	51.41241	35.53369	0.19740	25.22684	41.63709	74.05305	183.54729
12	2300	49.81559	36.03678	0.22137	23.86399	39.28778	70.67870	195.00859
13	2245	49.55786	36.08819	0.19596	23.49366	39.42323	68.65158	192.47317
14	2135	51.78518	38.56025	0.73088	24.28866	39.19140	72.63860	197.63860
15	2322	50.58407	37.78934	0.14580	23.15172	38.67396	71.57298	206.46872
16	2137	49.22771	39.75465	0.66000	19.69292	34.97456	70.46540	212.76039
17	1925	48.29527	38.63890	1.00000	19.60556	35.35242	69.92299	191.98015
18	1879	45.99653	37.93185	0.45440	17.38182	33.17976	68.03541	191.19628

U/G Student Loan Indebtedness: Analyses



II.1. Simple Linear Regression

$$Exp(\boldsymbol{IA\_Loan\_Amt\_Disb\_1K}) = \beta_0 + \beta_1 * \boldsymbol{FY\_NUM}$$

U/G Student Loan Indebtedness: Analyses

The REG Procedure
Model: MODEL1
Dependent Variable: IA_Loan_Amt_Disb_TOT_1K

Number of Observations Read	17403
Number of Observations Used	17403

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	26417	26417	18.78	<.0001
Error	17401	24472825	1406.40335		
Corrected Total	17402	24499242			

Root MSE	37.50204	R-Square	0.0011
Dependent Mean	49.69953	Adj R-Sq	0.0010
Coeff Var	75.45754		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	57.46065	1.81317	31.69	<.0001
FY_NUM	1	-0.54178	0.12501	-4.33	<.0001

II.2. Multiple Regression (with 2-way interactions)

$$Exp(IA\_Loan\_Amt\_Disb\_1K) = \beta_0 + \beta_1 * FY\_NUM + \beta_2 * iResid\_Cmp + \beta_3 * iSTEM\_Hlth\_Deg + \beta_{12} * FY\_NUM * iResid\_Cmp + \beta_{13} * FY\_NUM * iSTEM\_Hlth\_Deg + \beta_{23} * iResid\_Cmp * iSTEM\_Hlth\_Deg$$

U/G Student Loan Indebtedness: Analyses

The GLM Procedure

Dependent Variable: IA_Loan_Amt_Disb_TOT_1K

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	293402.47	48900.41	35.14	<.0001
Error	17396	24205839.59	1391.46		
Corrected Total	17402	24499242.06			

R-Square	Coeff Var	Root MSE	IA_Loan_Amt_Disb_TOT_1K Mean
0.011976	75.05560	37.30228	49.69953

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	60.62280879	4.59176726	13.20	<.0001
FY_NUM	-1.35596297	0.31372985	-4.32	<.0001
iResid_Cmp	-7.20967443	4.82291227	-1.49	0.1350
FY_NUM*iResid_Cmp	1.28576977	0.32933137	3.90	<.0001
iSTEM_Hlth_Deg	6.17825071	3.91386313	1.58	0.1145
FY_NUM*iSTEM_Hlth_De	-0.35019580	0.25129177	-1.39	0.1635
iResid_Cm*iSTEM_Hlth	-3.07968168	1.54120959	-2.00	0.0457

PRELIMINARY OBSERVATIONS:

I. Did the *proportion* of FTC U/G students who received a loan change over time? ***Maybe* YES and DECREASING over time. And *maybe* is affected by type of campus and type of degree.**

II. For those FTC U/G students who received a loan, did the **mean** *amount* ($$) of these loans change over time? ***Maybe* YES and DECREASING over time. And *maybe* is affected by type of campus and type of degree.**

NEXT STEPS:

1. Need ~~Aid Year 2025 SFA data~~ VA Educational Benefits data for the fourth campus ~~(for the FY2018 FTC U/G Cohort)~~.

2. Include incoming SCH (and other predictor variables?) into the multivariate models.

3. Transform Loan amounts (Box-Cox transformation?) to address the normality requirement for simple linear regression and multiple regression analyses.

4. Finally, once the above are done and the analyses are rerun, then, if statistical significance obtains, address the question of whether any of this should be used for *making predictions*.

5. Check "sensitivity": Try 9-year windows (rather than 8-year windows).

Q&A

END

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