

Institutional Effectiveness: Examining Effects on Student Success When Course Registration Occurs Prior to Course Start Date Vs. On or After Course Start Date

Authored by: Brittany Iverson

Contributors: Jake Morrison, Almat Yearly, and Scott Richter

Abstract: In this study, we investigate how the timing of when students register for a course affects student outcomes. These outcomes are retention and course completion. It is found that students who register prior to the start date of a course have a much higher chance of being retained at the university and of earning a C or better than those who register on or after the start date. Each day that registration is delayed following the start of the course diminishes those chances, with each day doing so more than the last. Registering one day after the start of a course diminishes likelihood of retention and passing by less than 1%, but by the 16th day has accrued to about 16.5% and 18%, respectively.

Background: 370,412 instances of undergraduate course registration are observed, spanning from Fall of 2017 through Summer of 2021. In this examination, the specific day of registration will be considered, but also more generally an indication of whether registration occurred prior to the first day of term, or on/after the first day of term.

Descriptive Statistics: This data includes the day which registration occurred relative to the start date of the term. This number ranges from -142 to 16, with 0 being the first day. 343,703, or 92.79%, of these instances occurred before the start of term.

First, retention is examined. Proportionally, those who registered prior to the first day of the term were retained more often than those who did not by roughly 4%.

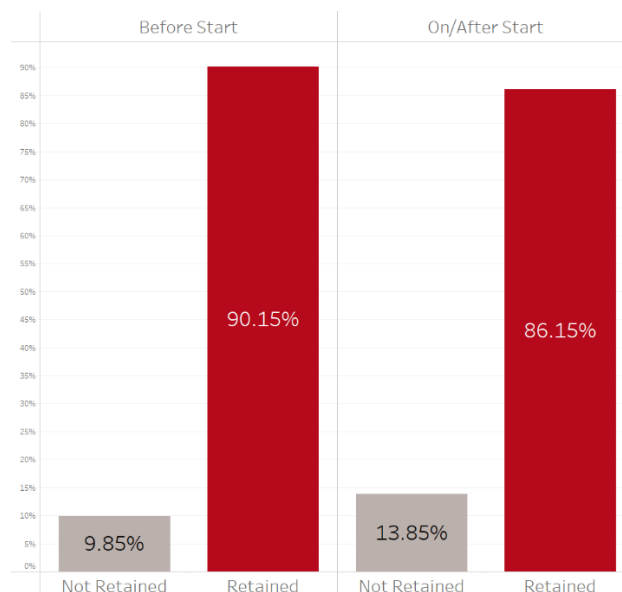


Figure 1: Retention by group

Next, focus is placed on whether the course was passed. Failed indicates that a student received less than a 2.0 in the course, and so a D or F. Passed then means that they received a C or better. Proportionally less students failed that registered before the start of the course than those who did not by about 8%.

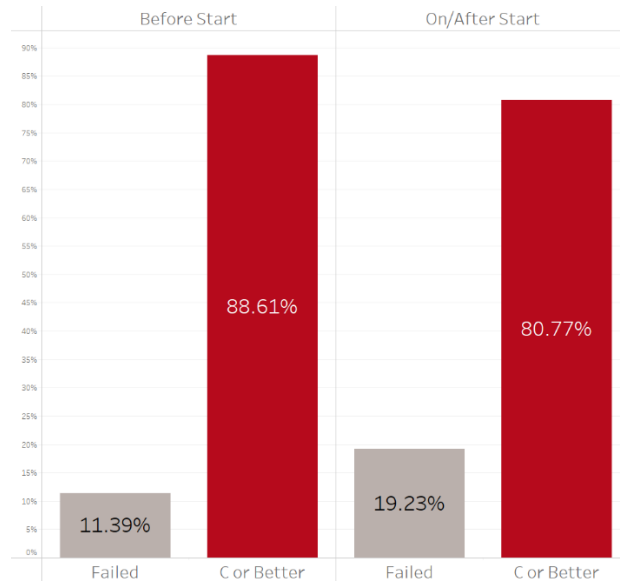


Figure 2: Failure by group

Based on these measures, students who register prior to the start date of a course tend to experience better outcomes than those who register on or after the first day of the course.

Inferential Methods: To further explore these relationships, logistic regressions using the probit method will be applied. Binary outcomes of student retention and failure will be modeled based on the specific day of registration and the generalized grouping of day of registration.

In addition to registration time, other factors, which are student class, gender, ethnicity, Pell grant status, transfer status, and first-generation status, will be included to create a more realistic and accurate model.

First, retention is examined.

Generally, registering on or after the first day of a course is predicted to decrease the likelihood that a student will be retained by 19.79% (see [appendix 1](#)). This relationship is unlikely to be due to random chance and so is statistically significant, as indicated by the very small $Pr(>|z|)$, or p-value.

When the specific day of registration relative to the start date is used, an additional exponential variable of the number of days is included to examine the building effects as time goes on. According to this model (see [appendix 2](#)), each day that registration is delayed decreases a student's likelihood of retention slightly more than the last with strong statistical significance (see [appendix 3](#)). After one day, the likelihood decreases by a little less than 1%, but by the 16th day the odds have accumulated and decreased by about 16.5%.

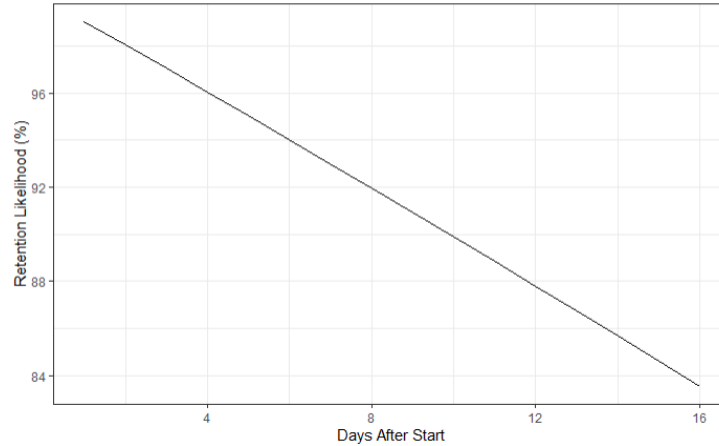


Figure 3: Likelihood of retention over time after start

Based on these two models, it is shown that later registration hurts a student in terms of their retention.

Next, focus is turned towards course failure, or a student receiving less than a 2.0 in a course.

Generally, registering after or on the first day of a term increases the likelihood that a student will fail a course by 33.83% with strong statistical significance (see [appendix 4](#)).

Returning to analysis of the specific day of registration, the exponential variable is included. This model predicts that each additional day registration is delayed further increases the likelihood of failure (see [appendix 5](#)). Registering one day after the start of term is predicted to increase this chance by about 1%, but by the 16th day this likelihood has accumulated to about 18% (see [appendix 6](#)).

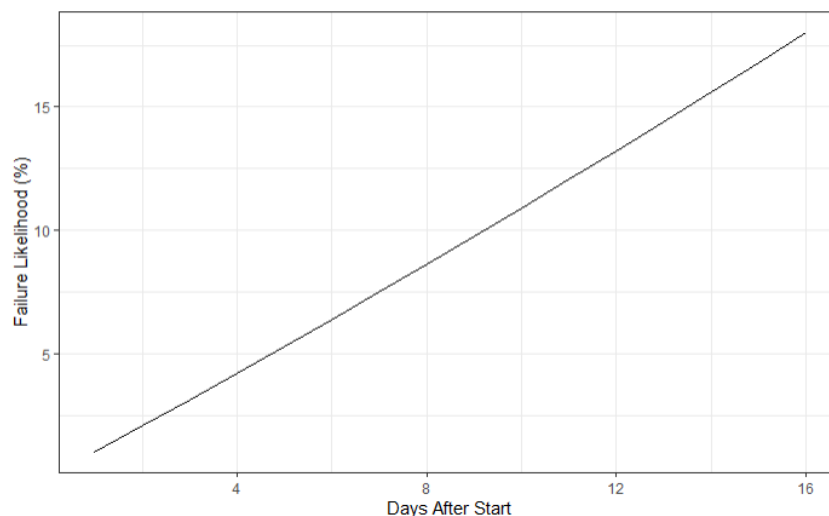


Figure 4: Likelihood of failure over time after start

Based on these two models, it is demonstrated that later registration hurts a student as they are more likely to fail the course.

Conclusions: According to both the descriptive and inferential analyses, registering prior to the start date of a course provides students with a higher chance of success. Within this, the effects are amplified as the start date becomes further and further in the past. Earlier registration boosts the likelihood that a student will be retained and decreases the likelihood that they will fail the course.

Because the effects with each day grow, it is important to consider at which day after the start that registration may become detrimental to a student. Other factors must be considered in each specific case, but these analyses provide a glimpse into the possibilities.

It is also important to consider the data. The majority registers prior to the start of a course, and so much more data exists for this group.

Appendix

1. Retention as a function of registering before/after or on the start day of term

	Estimate	Std. Error	Z Value	Pr(> z)
Intercept	1.271135	0.031642	40.173	2×10^{-16} ***
On/After Start	-0.220563	0.010358	-21.294	2×10^{-16} ***
Exceptional Freshman	3.147261	10.541628	0.299	0.765279
Freshman	-0.109532	0.015523	-7.056	1.71×10^{-12} ***
Graduate	-0.487130	0.638749	-0.763	0.445683
Junior	0.348122	0.015151	22.976	2×10^{-16} ***
Class N/A	0.044797	0.465062	0.096	0.923262
Post Baccalaureate	3.099233	19.163373	0.162	0.871521
Sophomore	0.162384	0.015703	10.341	2×10^{-16} ***
Senior	-0.427259	0.014083	-30.339	2×10^{-16} ***
Male	0.047606	0.005858	8.127	4.40×10^{-16} ***
Gender N/A	3.076450	13.654609	0.225	0.821742
Gender Null	-0.414893	0.440465	-0.942	0.346222
Asian	0.124388	0.032451	3.833	0.000127 ***
Black/African American	0.031865	0.032342	0.985	0.324493
Hispanic/Latino	0.086905	0.029423	2.954	0.003141 **
Hawaiian/Pacific Islander	-0.134580	0.050236	-2.679	0.007386 **
Two or More Races	0.097491	0.030445	3.202	0.001364 **
Race Unknown	0.050305	0.030589	1.645	0.100067
White	0.098236	0.028780	3.413	0.000642 ***
Transfer	0.061982	0.017572	3.527	0.000420 ***
Pell Grant	0.056536	0.006167	9.167	2×10^{-16} ***
First Gen.	-0.041693	0.006274	-6.646	3.01×10^{-11} ***

2. Retention as a function of registration day relative to start date

	Estimate	Std. Error	Z Value	Pr(> z)
Intercept	0.8587	0.03273	26.235	2×10^{-16} ***
Number of Days	-0.009886	2.535×10^{-4}	-38.990	2×10^{-16} ***
Number of Days₂	-3.003×10^{-5}	1.986×10^{-6}	-15.117	2×10^{-16} ***
Exceptional Freshman	3.431	0.1057	0.324	0.745581

Freshman	0.02099	0.01582	-1.327	0.184572
Graduate	0.4200	0.6316	-0.665	0.505987
Junior	0.4073	0.01546	26.343	2×10 ⁻¹⁶ ***
Class N/A	0.2165	0.4748	0.456	0.648399
Post Baccalaureate	3.239	0.1856	0.175	0.861452
Sophomore	0.2209	0.01603	13.777	2×10 ⁻¹⁶ ***
Senior	-0.3957	0.01435	-27.572	2×10 ⁻¹⁶ ***
Male	0.0600	0.00594	10.096	2×10 ⁻¹⁶ ***
Gender N/A	3.152	0.1339	0.235	0.813942
Gender Null	-0.2763	0.4505	-0.613	0.539605
Asian	0.1238	0.03283	3.772	0.000162 ***
Black/African American	0.04024	0.03272	1.230	0.218757
Hispanic/Latino	0.08113	0.02975	2.727	0.006395 **
Hawaiian/ Pacific Islander	-0.1488	0.05091	-2.923	0.003471 **
Two or More Races	0.08258	0.03080	2.682	0.007328 **
Race Unknown	0.0697	0.03094	2.253	0.024239 *
White	0.07787	0.02910	2.676	0.007459 **
Transfer	0.07403	0.01784	4.149	3.35×10 ⁻⁵ ***
Pell Grant	0.06172	0.006253	9.872	2×10 ⁻¹⁶ ***
First Gen.	-0.0417	0.006355	-6.568	5.11×10 ⁻¹¹ ***

3. First 16 days retention predictions

Days After	Retention Likelihood (%)	Change
1	99.017	--
2	98.028	-0.989
3	97.033	-0.995
4	96.032	-1.001
5	95.025	-1.007
6	94.012	-1.013
7	92.993	-1.019
8	91.968	-1.025
9	90.937	-1.031
10	89.900	-1.037
11	88.857	-1.043
12	87.808	-1.049

13	86.753	-1.055
14	85.692	-1.061
15	84.625	-1.067
16	83.552	-1.073

4. Failure as a function of registering before/on or after start day of term

	Estimate	Std. Error	Z Value	Pr(> z)
Intercept	-1.331762	0.029750	-44.765	2×10^{-16} ***
On/After Start	0.291383	0.009500	30.672	2×10^{-16} ***
Exceptional Freshman	0.307486	0.264405	0.299	0.244855
Freshman	0.390861	0.014659	26.663	2×10^{-16} ***
Graduate	-2.843629	16.187676	-0.176	0.860556
Junior	0.024865	0.014080	1.766	0.077411 .
Class N/A	0.172413	0.459880	0.375	0.707729
Post Baccalaureate	-2.832292	12.131389	-0.233	0.815398
Sophomore	0.293988	0.014446	20.350	2×10^{-16} ***
Senior	-0.176985	0.014051	-12.596	2×10^{-16} ***
Male	0.170933	0.005521	30.963	2×10^{-16} ***
Gender N/A	-2.839088	8.612826	-0.330	0.741676
Gender Null	0.468760	0.438655	1.069	0.285237
Asian	-0.096448	0.030148	-3.199	0.001378 **
Black/African American	0.155141	0.029469	5.264	1.41×10^{-7} ***
Hispanic/Latino	-0.011255	0.027327	-0.412	0.680424
Hawaiian/Pacific Islander	0.216377	0.044691	4.842	1.29×10^{-6} **
Two or More Races	-0.096043	0.028312	-3.392	0.000693 ***
Race Unknown	-0.012774	0.028557	-0.447	0.654658
White	-0.182995	0.026836	-6.819	9.16×10^{-12} ***
Transfer	-0.130983	0.013847	-9.459	2×10^{-16} ***
Pell Grant	0.113722	0.005849	19.444	2×10^{-16} ***
First Gen.	0.063086	0.005938	10.625	2×10^{-16} ***

5. Failure as a function of registration day relative to start day

	Estimate	Std. Error	Z Value	Pr(> z)
Intercept	-1.020	0.03053	-33.406	2×10^{-16} ***
Number of Days	0.01022	2.414×10^{-4}	42.342	2×10^{-16} ***
Number of Days₂	6.141×10^{-5}	1.844×10^{-6}	33.305	2×10^{-16} ***
Exceptional Freshman	0.1257	0.2630	0.478	0.63277
Freshman	0.3555	0.0475	24.109	2×10^{-16} ***
Graduate	-2.923	1.615	-0.181	0.85637
Junior	-0.006263	0.001415	-0.443	0.65806
Class N/A	0.1030	0.4658	0.221	0.82498
Post Baccalaureate	-2.834	0.1207	-0.235	0.81432
Sophomore	0.2614	0.01452	18.007	2×10^{-16} ***
Senior	-0.2044	0.01412	-14.478	2×10^{-16} ***
Male	0.1642	0.005539	29.648	2×10^{-16} ***
Gender N/A	-2.898	8.542	-0.339	0.73442
Gender Null	0.3798	0.448	0.854	0.39315
Asian	-0.09149	0.03024	-3.026	0.00248 **
Black/African American	0.1586	0.02955	5.368	7.95×10^{-8} ***
Hispanic/Latino	-0.003932	0.02741	-0.143	0.88594
Hawaiian/Pacific Islander	0.2275	0.04479	5.078	3.82×10^{-7} ***
Two or More Races	-0.08474	0.02840	-2.984	0.00285 **
Race Unknown	-0.01382	0.02864	-0.482	0.62951
White	-0.1710	0.02692	-6.354	2.10×10^{-10} ***
Transfer	-0.1474	0.01392	-10.594	2×10^{-16} ***
Pell Grant	0.1113	0.005865	18.977	2×10^{-16} ***
First Gen.	0.06410	0.005954	10.767	2×10^{-16} ***

6. First 16 days failure predictions

Days After	Failure Likelihood (%)	Change
1	1.036	--
2	2.084	1.048
3	3.144	1.060
4	4.216	1.072
5	5.300	1.084

6	6.396	1.096
7	7.504	1.108
8	8.624	1.120
9	9.756	1.132
10	10.900	1.144
11	12.056	1.156
12	13.224	1.168
13	14.404	1.180
14	15.596	1.192
15	16.800	1.204
16	18.016	1.216