



UNIVERSITY OF
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CREATING A FIRST-YEAR ON-TRACK INDEX FOR GRADUATING FROM COLLEGE IN FOUR YEARS



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Nicole Perez, Office of the Vice Chancellor for Student Affairs, UIC
Susan P. Farruggia, Office of the Vice Chancellor for Student Affairs, UIC
Lindsey Back, Office of the Vice Provost for Undergraduate Affairs and Academic Programs, UIC

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INTRODUCTION

The four-year college graduation rate of all full-time undergraduates seeking a bachelor's degree at a four-year institution is 41% (McFarland et al., 2019). Increasingly, universities are interested in using a 4-year graduation timeline as opposed to 6-year to decrease student's time to degree completion. At the University of Illinois at Chicago (UIC), the "Finish in Four" campaign outlines many benefits. For example, students who attempt 15 or more credits per semester are twice as likely to finish college in four years, and have higher retention rates, GPAs, and graduation rates. Beyond student success measures, finishing college in four years leads to less education-related expenses and a quicker transition to a career.

Farruggia, et al. (2020) developed a First-Year On-Track index that was inspired by Freshman On-Track (Allensworth & Easton, 2005). The First-Year On-Track index accurately predicts 6-year college graduation 75% of the time at the student level and, therefore, provides a clear and measureable way of identifying first-year students who are unlikely to graduate from college. See Farruggia et al. (2020)

for a full description of the index and how it was developed.

The First-Year On-Track index provides the motivation for the current study to create an index for a 4-year graduation timeline. In what follows, we use the same framework and indicators previously used in the First-Year On-Track index but to predict 4-year graduation (Farruggia et al., 2020). Importantly, we will explore different thresholds recognizing that the thresholds may be greater for 4-year graduation than they are for 6-year graduation. By exploring different thresholds, the current report will highlight what students need to accomplish in their first year of college to stay on track to receive a bachelor's degree in four years.

CURRENT STUDY

This study aimed to create a four-year on-track index for undergraduate college students using UIC institutional data. The index uses a 4-year time frame, as more universities are encouraging students to decrease their time to degree

completion. Given the high predictive ability of the First-Year On-Track index, there is significant potential to utilize an index that helps with increasing 4-year graduation rates.



METHOD

The study utilized institutional data from the 2012-2015 (N=12,653) full-time first-year student cohorts. Table 1 shows demographic characteristics for the students in this study.

TABLE 1
Student Demographics (2012-2015 Cohorts)

Demographic	n	%
Female	6,602	48%
Male	5,992	52%
Asian American	3,192	25%
Black	1,117	9%
Latinx	3,920	31%
White	3,609	29%
Other	815	6%
First-generation college	5,223	45%
Pell-Grant eligibility	7,123	56%
Total Students	12,653	100%

As with First-Year On-Track, the institutional data assessed for potential inclusion in the index falls into three categories, including: institutional credits (e.g., credits earned), academic performance (e.g., first-term GPA), and financial measures (e.g., financial holds). All data points that were in consideration for inclusion in the on-track index are from the first year in college. In addition, 4-year graduation, as well as student demographic variables, as indicated above, were utilized in this study.

Analytic Plan

There were three major steps to create the index, all of which were based on 2012-2014 cohort data. The finalized First-Year On-Track index was used as the foundation for the current 4-year analyses.

We prioritized keeping the same indicators from the 6-year model to uphold an index that is consistent across graduation timelines at UIC. First, when there were multiple potential versions of an indicator (e.g., credits), correlational or chi-square analyses were used to determine which had the strongest association with graduation (see below). Second, following the structure of the comprehensive model from the First-Year On-Track index, the indicators that were continuous needed to be dichotomized to be the most useful. To do this, indicators were mapped onto graduation rates. Then, threshold ranges were identified based on patterns of association, using a 35% graduation rate as the target to be on track, as that is the university's 4-year graduation rate for these cohorts. Third, once all of the potential indicators became dichotomous, they were entered into new logistic regression models to ensure that the model fit had not decreased meaningfully in comparison to when the indicators were continuous. In addition, those variables that were originally continuous were double-checked to ensure that the thresholds did not need to be adjusted once they were included in the model. It should be noted that only cases with complete data are included in the logistic regression analyses.

After the model was finalized, the 4-year graduation On-Track index was mapped onto graduation trends to ensure there was convergence between the proportion of students on track and graduation rates. In addition, as a means to validate the index, on-track rates for the 2015 cohort, along with graduation rates, were mapped to ensure the 4-year graduation On-Track index aligned for a cohort that was not used in its development.

RESULTS

Basic Analysis of Associations of Variables with Graduation

For all variables that were used in the First-Year On-Track index, basic analyses were conducted to look at associations with 4-year graduation to determine the new thresholds to include in the next step of logistic regression. For continuous variables, bi-variate correlation was used, and chi-square

was used for dichotomous variables. When there were multiple options of the same type of indicators (e.g., credits earned), each iteration was examined for its association with 4-year graduation, and the variable with the strongest association was kept in the initial logistic regression model. The following graphs visually reflect the associations with 4-year graduation for the continuous variables.

FIGURE 1
4-Year Graduation and First-term GPA (2012-2014)

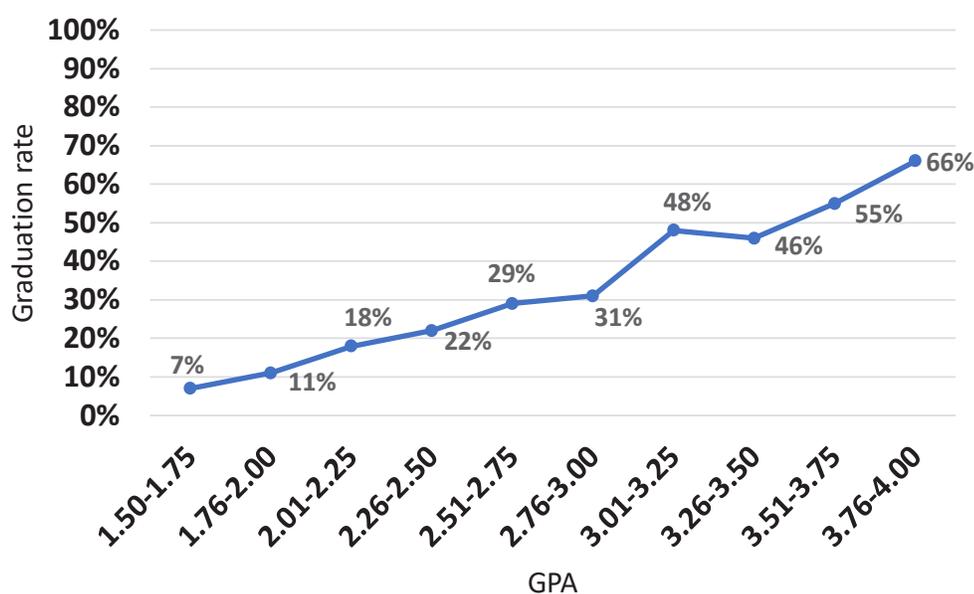
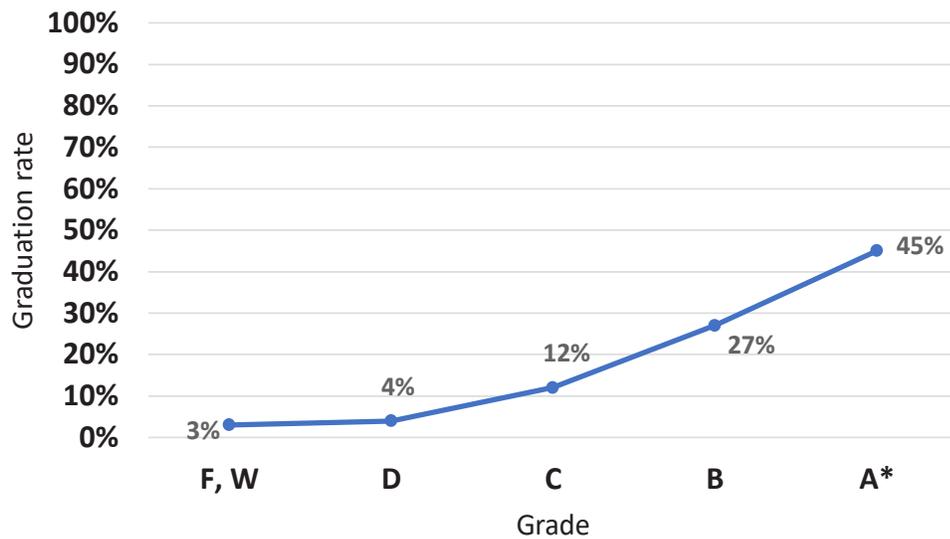


Figure 1 shows the positive relationship between first-term GPA in college and 4-year graduation, meaning the lower first-term GPA, the less likely to graduate. At a correlational level, the association is significant, $r = .39$; $p < .001$.

FIGURE 2

4-Year Graduation and Writing Course Grade (2012-2014)



*The "A" grade includes "PS," reflecting students who transferred AP credits from high school or tested out of the course.

Figure 2 shows the relationship between grade in the first-year writing course and 4-year graduation. The positive association reflects an increase in graduation with an increase in course grade. The association between the two is significant, $r = .26$; $p < .001$.



FIGURE 3

4-Year Graduation and Credits Earned in the First Year (2012-2014)

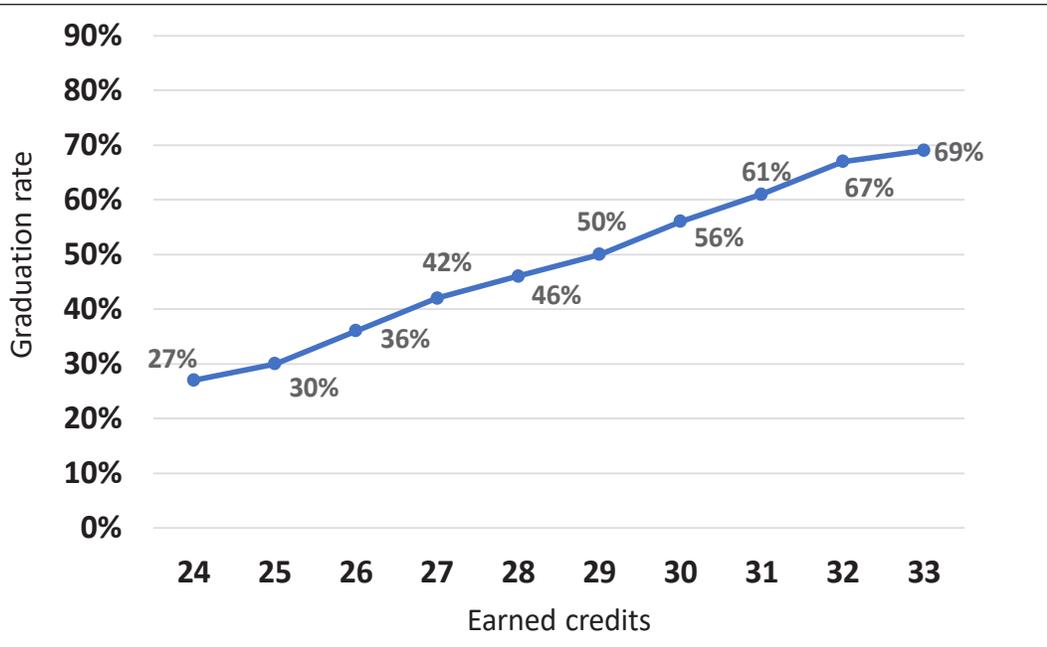


Figure 3 shows the highly significant association between credits earned in the first year and 4-year graduation ($r = .47$; $p < .001$). Greater numbers of credits earned are associated with higher graduation rates.

As noted, some of the variables that were considered for inclusion in the model were dichotomous. To consider the inclusion in the model of these variables, chi-square tests were conducted. Tables for key dichotomous variables are presented.

TABLE 2

4-Year Graduation and Unresolved Financial Holds in the First-Term of College (Cohorts 2012-2014)

	Not Graduated	Graduated	Total
No Financial Hold Resolved or Financial Hold was Resolved	5,482 (63%)	3,163 (37%)	8,645
Unresolved Financial Hold	499 (93%)	39 (7%)	538
Total	5,981 (65%)	3,202 (35%)	9,183

The association between first-term unresolved financial hold and 4-year graduation was significant, $X^2 = 7155.11$; $p < .001$. Table 2 demonstrates that unresolved financial holds in the first term are strongly associated with not graduating: only 7% of those with an unresolved hold graduate within six years, whereas 37% of those without an unresolved financial hold graduate within six years.

Creating Thresholds for Continuous Variables

While the same four-factor model established in the First-Year On-Track index was used, thresholds needed to be re-established for continuous data. This is necessary so practitioners know at which specific point a student is considered on track or off track to graduate within 4 years for a particular variable. For instance, what is the first-term GPA requirement for a student to be on track? We established thresholds for continuous data (e.g., GPA) by identifying breakpoints and points in the indicators at which graduation rate fell below the observed rate. For example, for first-term GPA, we looked at: 2.6, 2.7, 2.75, 2.8, 2.85, 2.9, 2.95, and 3.0, identifying the best threshold as 2.75. For the remaining continuous variables, the final thresholds were a 'C' grade in English 160 (consistent with the

First-Year On-Track index) and at least 28 credits earned during the student's first year.

Once the ranges of these variables were determined, a series of logistic regression models were run, with various iterations of possible thresholds. For instance, first-term GPA thresholds of 2.5 through 3.0 were tested in the four-variable model. Thresholds were finalized based on the model fit to maximize the accuracy of predicting 4-year graduation. The final model included 4 predictors that together established the on-track index for 4-year college graduation at UIC: a first-term GPA at 2.75 or above; having no financial holds; earning 28 credits in the first year; and earning at least a C in the first-year writing course. Tables 3 and 4 show the statistics for the final model.

TABLE 3

Logistic Regression Model for the Four Predictors Using Thresholds

Variable	B	Exp (β)
Constant	-3.13	.04***
GPA During the First Term +/- 2.75	.96	2.61***
Credits Earned During the First Year +/- 28	1.52	4.56***
ENGL 160 Grade During First Year +/- C	1.20	3.33***
Financial Hold Not Resolved in First Term	-1.03	.36***

* $p < .05$, ** $p < .01$, *** $p < .001$



Table 4 shows the accuracy of the above logistic regression model in predicting which students would graduate in four years. Overall, the model is 73% accurate, similar to the First-Year On-Track index accuracy rate of 75%.

TABLE 4
 Predicted and Actual 4-Year Graduation Rates for 2012-2014 Cohorts

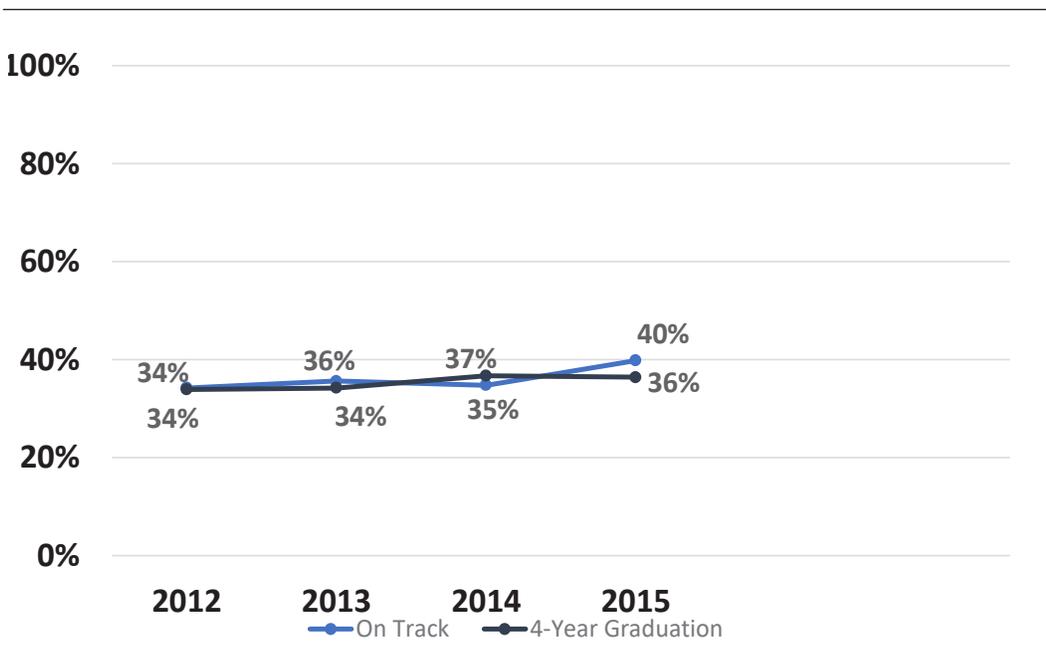
Occurred	Predicted		Percentage Correct
	Would Not Graduate	Would Graduate	
Did Not Graduate	4,503	1,202	79%
Graduated Within 6 Years	1,119	1,997	63%
Overall Percentage	-	-	73%

Mapping to Graduation Trends

The final step after the four-year graduation on-track index is developed was to check to see if the on-track index mapped onto four-year graduation, as predicted. Figure 4 shows that there is convergence between the proportion of students

who are on track and graduation rates for the 2012-2014 cohorts that were used to develop the index. In addition, the 2015 cohort validated the index as it also indicated a similar pattern between on-track and four-year graduation.

FIGURE 4
 On-Track and 4-Year Graduation Rates for 2012-2015 Cohorts





CONCLUSIONS & NEXT STEPS

This research can provide a framework for students, advisors, and university staff to improve 4-year graduation rates across UIC. The 4-year on-track index provides a concise framework to identify which students are on or off track to graduate within four years. The 4-year on-track index also clearly delineates how students have to increase their first year earned credits and GPA

to finish in four years, as compared to six years. Once students are identified as being off track, interventions and resources could be targeted to get students back on track and decrease time to degree completion. To build on these results, UIC will next focus on why and how students recover from being off track to graduate within four years.

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