



UNIVERSITY OF  
ILLINOIS CHICAGO

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# CREATING A FIRST-YEAR ON-TRACK INDEX FOR COLLEGE STUDENTS



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# INTRODUCTION

Earning a bachelor's degree is one of the clearest pathways to achieving socioeconomic mobility, contributing to a reduction in social inequality. Nationally, the 6-year college graduation rate for all full-time undergraduate students seeking a bachelor's degree at a four-year institution in 2019 was 60% at public institutions and 66% at private, non-profit institutions (McFarland et al., 2019). However, it is important to note that college access and success are not experienced equally among all groups: Black and Latinx students, as well as low-income students and students whose parents have not attended college themselves, are less likely to go to college, and once there, they are less likely to complete college compared to their peers (Massey et al., 2003; Musu-Gillette et al., 2017; Posselt et al., 2012; Skomsvold et al., 2011). For instance, across all racial/ethnic groups, 32% of adults have a bachelor's degree or higher; however, for Black adults the rate is 23%, and for Latinx adults the rate is 16% (U.S. Census Bureau, 2019). In recent years, there have been considerable efforts undertaken by higher education institutions, including the University of Illinois at Chicago (UIC), to increase

graduation rates and eliminate disparities in these rates among different student populations. The factors that impact college student success are many, including academic preparation, as well as a wide range of financial, behavioral, and contextual factors.

One initiative that has successfully addressed the behavioral and contextual factors involved in high school graduation is the Chicago Public Schools' (CPS) Freshman On-Track indicator, developed by the University of Chicago Consortium on School Research (Allensworth & Easton, 2005). The On-Track designation is based on two specific indicators: credits earned (i.e., a minimum of five, full-year course credits in the freshman year) and class failure (i.e., no more than one semester course failure in a core subject in the first year). To be on track, students must meet both requirements. Being on track is a highly accurate predictor of high school graduation. CPS has used this metric to improve graduation rates by focusing on ways (largely behavioral and contextual) to increase the number of students who meet the two indicators,

and by identifying students who could benefit from early intervention (Allensworth et al., 2018). As a result, CPS has increased its high school graduation rate by 20 percentage points in the past 14 years and seen parallel increases in On-Track rates. Further, the increases in On-Track rates are more pronounced in some subgroups of students; for example, the On-Track rate for Black males has increased from 43% to 71%. Overall, CPS' On-Track indicator has provided an accurate prediction of eventual graduation at the student level 80% of the time.

To consider the applicability of the Freshman On-Track indicator to college students, several issues must be considered:

- High school students can graduate with less than a 2.0 GPA. College students are required to have at least a 2.0 GPA upon graduation. This implies that the GPA requirements to be “on track” in college are more rigorous than those for high school.
- CPS students can graduate from a different CPS high school than their original school and still “count” towards the graduation rate. University graduation rates, however, are only inclusive of students who completed their degree at the institution at which they started. Some successful students, who are on track after their first year of college, may transfer to another university. Even if these students graduate from the other university, it does not count towards graduation rates at the original institution. This can make the false negative rate (i.e., predicted-to-graduate, but did not) artificially high.
- College is substantially more expensive than high school. Even public universities have tuition costs, whereas public high schools do not. While both have fees, and there are other costs, such as for books and supplies, these expenses tend to be much larger in college.

Financial costs are a primary barrier to college completion (Farruggia et al., 2016).

- High school is mandatory and college is not. With some exceptions, students are legally obligated to be in high school until the age of 18 years. This is not true for college; students can leave at any time. Likewise, students who are absent from college classes are not considered “truant.”
- There is less of a common curriculum in college. One of the two metrics for Freshman On-Track is related to core courses, which does not translate well to the college setting. For many universities and colleges, there are not core courses in the same way there are in high school, and courses that are required of all students may be few in number. Even for majors that would seem similar, there may be relatively few courses taken in common, and this lack of commonality is more pronounced across major disciplines, such as disciplines within the humanities versus STEM majors.
- The high school environment is more structured, and classes are typically smaller than college classes. This is particularly true at large, public universities.

Given these considerations, this study explored a number of institutional data points relevant to all UIC students, which are both similar and different in comparison to those data points used within CPS' Freshman On-Track indicator. UIC institutional data have similarities to CPS data, as the data include measures of performance (e.g., grades) and progress-to-degree (e.g., credits earned). However, financially-related variables, such as financial holds, were additionally explored, given the costs associated with attending college. Consistent with CPS' model, the data points considered were focused on a student's first year.

### **Academic Performance Data Points**

Grade point average (GPA) is a common indicator

of how well a student is doing across courses. Specifically, first-term GPA in college is a strong predictor of retention and graduation (Farruggia et al., 2015). Further, first-term GPA captures all incoming, fall-semester, first-year students, including those who are not retained to the second semester.

Another academic performance indicator at UIC is the requirement that all students must complete English 160, the first of two courses in the first-year writing sequence. While most students complete the course at UIC, some students test out of the course through placement testing, while others earn AP credit in high school. In whatever form students address the requirement, the requirement is common to all students.

### **Credits in the First Year**

The number of credits earned in the first year is part of CPS' On-Track indicator. Colleges have a similar system to ensure that the required number and type of courses are completed to be on track to earn a four-year degree. Research indicates that earning a minimum number of credit hours in the first year increases significantly the likelihood of degree completion (McCormick, 1999). A study by the National Center for Education Statistics (McCormick, 1999) found that 91% of college students who completed 30 credits in the first year completed a bachelor's degree, compared to 45% of those who had earned more than 10, but fewer than 20 credits. UIC student data also show the impact of first-year academic progress on student retention and graduation (Farruggia et al., 2019).

### **Financial Variables/Holds in the First Year**

As mentioned above, one important difference between high school and college is the financial costs that are encountered in college. A study of non-returning students found that first-year financial barriers were a key reason that students did not come back for their second year of college

(Farruggia et al., 2016). There are multiple types of financial indicators in institutional data, including unmet need and financial holds. Unmet need reflects the total cost of college (e.g., tuition, fees, housing, books) minus the amount of aid or expected support a student receives. Students who have substantial "unmet need" may be forced to reduce their enrollment status from full-time to part time, live off campus, or work more hours. These behaviors reduce the possibility that those students will successfully complete a four-year degree (Advisory Committee on Student Financial Assistance, 2001). Financial holds are placed on an account any time a student is delinquent in payment. They prevent a student from registering for a subsequent semester and can be issued at any time during the academic year.

Satisfactory Academic Progress (SAP) cancellations can also pose a significant barrier to student success, as they result in a loss of financial aid (Farruggia et al., 2019). SAP is a U.S. Department of Education requirement for financial aid recipients that allows them to maintain eligibility for future aid. SAP includes the following three components: 1) students must maintain a minimum cumulative GPA of 2.0, with monitoring beginning after 60 attempted credit hours; 2) students must have a 67% cumulative rate of progress throughout their time in college, defined as credit hours successfully earned/credit hours attempted; and 3) students cannot attempt more than 150% of the required credit hours in their degree program. Of these three rules, the one most relevant to first-year students is the 67% minimum completion rate. UIC first-year students' eligibility for future financial aid is cancelled if they fail to meet this SAP requirement at the end of the spring semester.

# CURRENT STUDY

This study aimed to create an on-track index (First-Year On-Track) for 6-year graduation for undergraduate college students using UIC institutional data. The index uses a 6-year time frame, as this is the standard set by the U.S.

Department of Education. Given the success of CPS in increasing high school graduation rates, there is significant potential for colleges to utilize a similar index to improve degree completion and help close the achievement gap.



# METHOD

The study utilized UIC institutional data from the 2007-2012 full-time, first-year student cohorts (N = 18,712). Table 1 shows demographic characteristics for the students in this study.

**TABLE 1**  
**Student Demographics (2007-2012 Cohorts)**

Demographic	n	%
Female	10,204	55%
Male	8,278	44%
Asian American	4,623	25%
Black	1,761	9%
Latinx	4,366	23%
White	6,850	37%
Other	1,108	6%
First-generation in college	7,202	39%
Pell-Grant eligibility	8,775	47%
Total Students	18,712	100%

The institutional data assessed for potential inclusion in the index falls into four categories, including: institutional credits (e.g., credits earned), academic performance (e.g., first-term GPA), SAP cancellation, 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. See Appendix A for a complete list of variables considered for inclusion in the on-track index. It should be noted that the list includes a wide range of potential variables, including some not previously identified in this report. In addition, 6-year graduation, as well as student demographic variables, as indicated above, were utilized in this report.

## Analytic Plan

There were four initial steps in creating the index, all of which were based on 2009-2011 cohort data.

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, once the optimal indicators were identified, logistic regression was used to determine which factors would be included in the initial, comprehensive model. Only those that were statistically significant when all variables were added into the model were retained. Third, after this comprehensive model was identified, 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 58% graduation rate as the target to be on track, as that is the university's 6-year graduation rate for these cohorts. Fourth, once all of the potential indicators became dichotomous, they were entered into new logistic regression models to 1) ensure that the model fit had not decreased meaningfully in comparison to when the indicators were continuous, and 2) reduce, if possible, the number of indicators in the model to have the simplest meaningful model. Also, 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.

After the model was finalized, the new First-Year 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 2007, 2008, and 2012 cohorts, along with graduation rates, were mapped to ensure the First-Year On-Track index aligned for cohorts that were not used in its development.

# RESULTS

## Basic Analysis of Associations of Variables with Graduation

For all variables that were under consideration for inclusion in the on-track index (see Appendix A), basic analyses exploring associations with graduation were conducted to determine which variables 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 for the same type of indicators (e.g., credits earned), each iteration was examined for its association with graduation, and the variable with the strongest association was kept in the initial logistic regression model. The following graphs visually reflect the associations with graduation for the continuous variables.

FIGURE 1  
6-Year Graduation and First-term GPA (2009-2011)

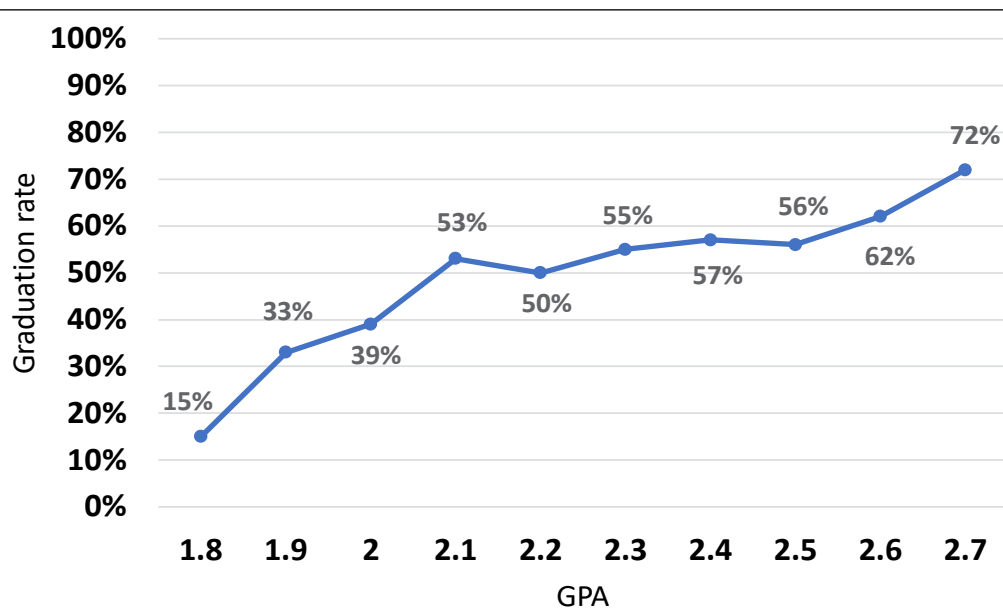
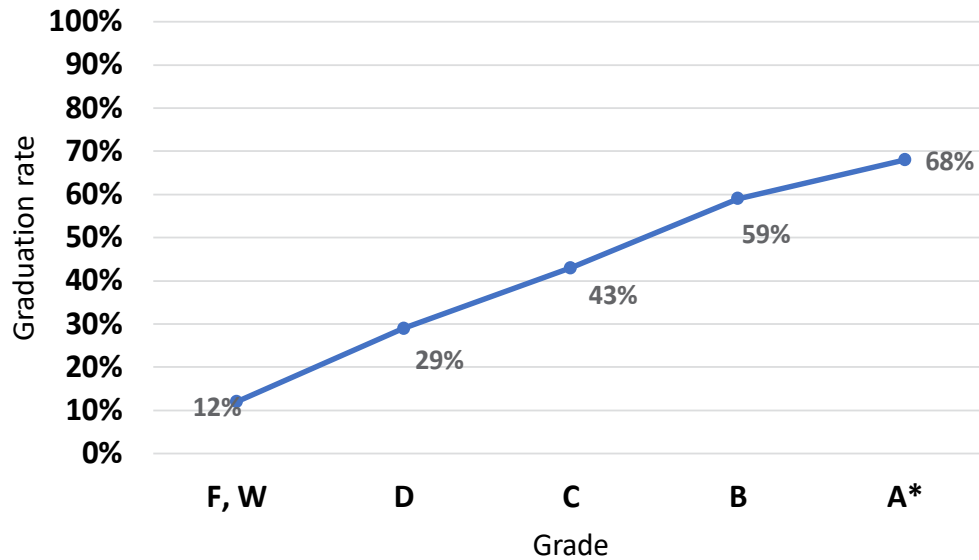


Figure 1 shows the positive relationship between first-term GPA in college and 6-year graduation, meaning the lower the first-term GPA, the less likely a student is to graduate. At a correlational level, the association is highly significant,  $r = .43$ ;  $p < .001$ .



FIGURE 2

6-Year Graduation and Writing Course Grade (2009-2011)



\*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 the grade in the first-year writing course and 6-year graduation. The positive association reflects an increase in graduation with an increase in course grade. The association between the two is highly significant,  $r = .28$ ;  $p < .001$ .

FIGURE 3

6-Year Graduation and Credits Earned in the First Year (2009-2011)

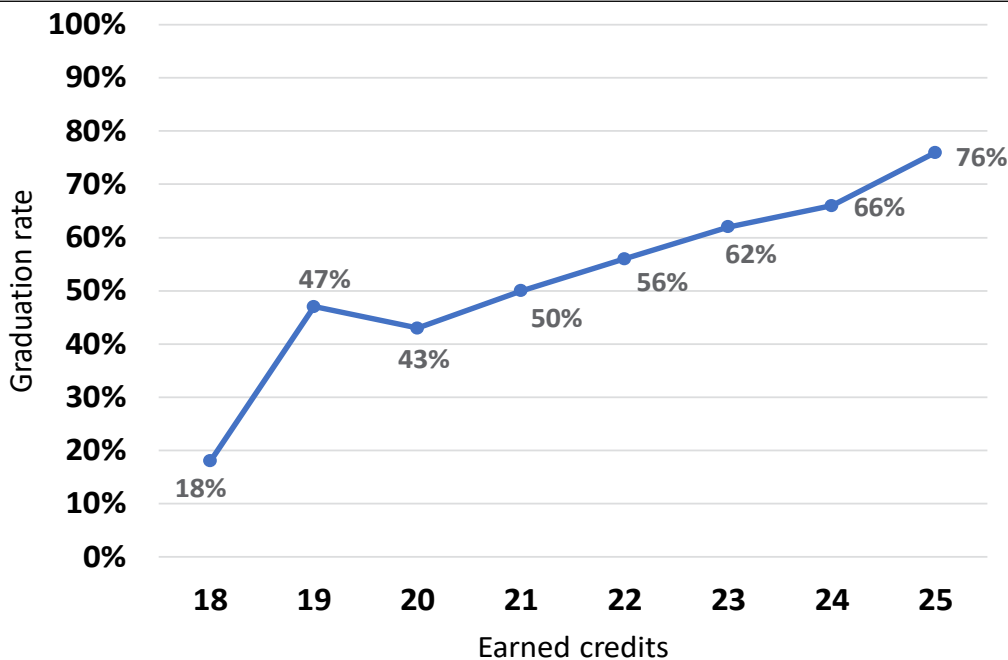
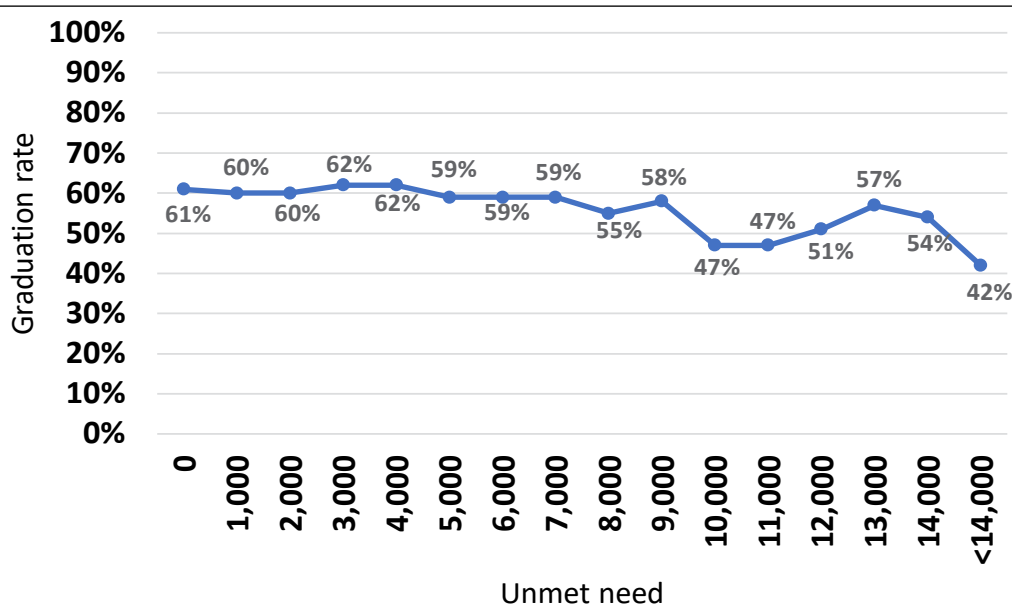


Figure 3 shows the highly significant association between credits earned in the first year and 6-year graduation ( $r = .51$ ;  $p < .001$ ). Greater numbers of credits earned are associated with higher graduation rates.

**FIGURE 4**  
**6-Year Graduation and Unmet Need (2009-2011)**



The significant association between unmet need and 6-year graduation ( $r = -.07$ ;  $p < .01$ ) can be seen in Figure 4. Greater amounts of unmet need at the start of the first year in college are associated with lower 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**  
**6-Year Graduation and Unresolved Financial Holds in the First-Term of College (Cohorts 2009-2011)**

	Not Graduated	Graduated	Total
No Financial Hold or Financial Hold was Resolved	3,608 (40%)	5,395 (60%)	9,003
Unresolved Financial Hold	340 (85%)	60 (15%)	400
Total	3,948 (42%)	5,455 (58%)	9,403

The association between first-term, unresolved financial holds and 6-year graduation was significant,  $\chi^2 = 8253.35$ ;  $p < .001$ . Table 2 demonstrates that unresolved financial holds in the first term are strongly associated with not graduating: only 15% of those with an unresolved hold graduate within six years, whereas 60% of those without an unresolved financial hold graduate within six years.

TABLE 3

**6-Year Graduation and SAP Cancellation after the First Year in College (Cohorts 2009-2011)**

	Not Graduated	Graduated	Total
No SAP Cancellation	3,460 (39%)	5,354 (61%)	8,814
SAP Cancellation	452 (91%)	46 (9%)	498
Total	3,912 (42%)	5,400 (58%)	9,312

The association between a SAP cancellation and 6-year graduation was significant,  $X^2 = 7426.53$ ;  $p < .001$ . Table 3 demonstrates that a SAP cancellation after the first year is strongly associated with not graduating: only 9% of those with a SAP cancellation graduate in six years, whereas 61% of those without a SAP cancellation graduate in six years.

**Comprehensive Model with Five Factors**

The next step was to develop a comprehensive model that accurately predicted who would and would not graduate. A series of models were tested using logistic regression to determine which variables to include in the comprehensive model. The six variables that were initially included in this model were those shown above as examples: credits earned during the first year, first-term GPA,

SAP cancellation, unmet financial need, writing class grade, and unresolved first-term financial hold. When considered separately, the correlation of unmet need and 6-year graduation was significant; however, it was not significant within the comprehensive model with all six factors. Unmet need, therefore, was removed from the model, leaving five predictors within the comprehensive model (see Table 4).

TABLE 4

## Logistic Regression Model for the Five Predictors

Variable	B	Exp ( $\beta$ )
Constant	-4.06	0.02***
GPA During the First Term	0.47	1.59***
Credits Earned During the First Year	0.12	1.13***
ENGL 160 Grade During First Year	0.33	1.39***
Financial Hold Not Resolved in First Term	-1.17	0.31***
SAP Cancellation after the First Year	-0.62	0.53***

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

Table 5 shows the accuracy of the above logistic regression model in predicting which students would graduate in six years. Overall, the model is 75% accurate, similar to the CPS Freshman On-Track indicator accuracy rate of 80%.

**TABLE 5**

**Predicted and Actual 6-Year Graduation Rates for 2009-2011 Cohorts**

Occurred	Predicted		Percentage Correct
	Would Not Graduate	Would Graduate	
Did Not Graduate	2,210	1,663	57%
Graduated Within 6 Years	665	4,734	88%
Overall Percentage	-	-	75%

**Creating Thresholds for Continuous Variables**

With the five-factor model created, “on-track” thresholds needed to be established for continuous data (e.g., GPA). This is necessary so practitioners know at which specific point a student is considered on track or off track for a particular variable. For instance, what is the first-term GPA requirement for a student to be on track? The process of creating thresholds was initially done by identifying breakpoints in the data, as well as by identifying points at which the graduation rate for a variable’s values fell below the actual graduation rate of 58%, on average, for the

included cohorts. “Breakpoints” reflect shifts in the data that are non-linear. For example, for first-term GPA, Figure 1 shows two breakpoints at 2.1 and 2.5. There is a plateau in the data between these two points, likely indicating that the threshold would fall within this range. This also aligns with the point at which the graduation rate for the GPA values consistently fell below the actual graduation rate for the three cohorts (58%). As seen in Figure 1, the graduation rate for the first-term GPA values was consistently below 58% with a GPA of 2.6 or lower. These step of identifying breakpoints and GPA-graduation points indicated that the first-term





GPA threshold would be within the 2.1 to 2.6 range. A similar process to identify the variable range was conducted for writing class grade and credits earned in the 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 2.1 through 2.6 were tested in the four-variable model. Thresholds were finalized based on the

model fit to maximize the accuracy of predicting 6-year graduation. For first-term GPA, the best threshold was 2.4. For the remaining continuous variables, the final thresholds were a “C” grade in the writing class, and at least 22 credits earned during the student’s first year.

### **Reducing the Number of Variables in the On-Track Index**

After the model that included the thresholds was developed, a final check to the model was made

to explore whether the number of variables in the model could be further reduced. The CPS Freshman OnTrack indicator only consists of two factors, making the practical work of addressing those factors highly targeted. At this stage, the First-Year On-Track index still consisted of five factors. From the perspective of simplification and practical application, reducing the number of factors in the index, while still maintaining a high level of accuracy in its predictiveness of graduation, was seen as a goal worth pursuing. Each variable was individually removed to determine whether the model would be similarly predictive without the inclusion of the

variable. During this process, it was determined that the removal of SAP cancellation did not change the model fit in a meaningful way; the percentage correctly predicted was 74%, reflecting only a one-percentage-point change. As a result, the final model included only four predictors that together established the on-track index for 6-year college graduation at UIC: a first-term GPA at 2.4 or above; having no unresolved financial hold in the first-term; earning at least 22 credits in the first year; and earning at least a C in the first-year writing course. Tables 6 and 7 show the statistics for the final model.

**TABLE 6**  
**Logistic Regression Model for the Final Four Predictors Using Thresholds**

Variable	B	Exp( $\beta$ )
Constant	-2.10	0.12***
GPA During the First Term +/- 2.40	0.94	2.56***
Credits Earned During the First Year +/- 22	1.59	4.92***
ENGL 160 Grade During First Year +/- C	0.81	2.24***
Financial Hold Not Resolved in First Term	-1.36	0.12***

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

**TABLE 7**  
**Predicted and Actual 6-Year Graduation Rates for 2009-2011 Cohorts**

Occurred	Predicted		Percentage Correct
	Would Not Graduate	Would Graduate	
Did Not Graduate	2,305	1,568	60%
Graduated Within 6 Years	841	4,558	84%
Overall Percentage	-	-	74%

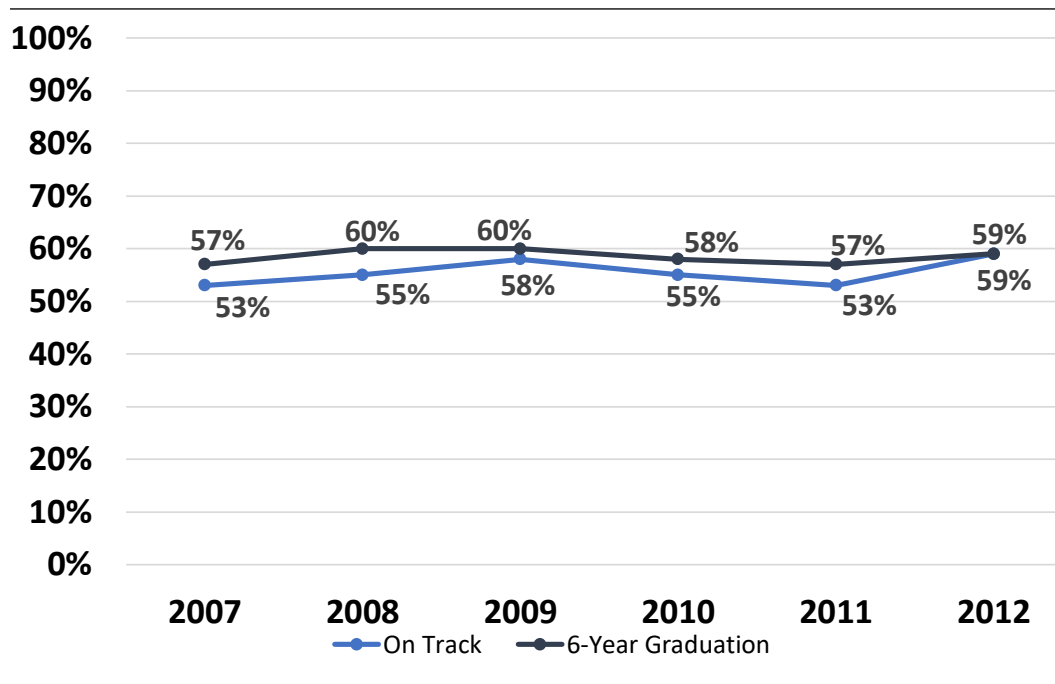
### Mapping to Graduation Trends

The final step after the first-year on-track index was developed was to see whether the on-track index mapped onto 6-year graduation, as predicted. Figure 5 shows that there is convergence between

on-track and graduation for the 2009-2011 cohorts that were used to develop the index. In addition, the 2007, 2008, and 2012 cohorts validate the index, as they show a similar pattern between on-track and 6-year graduation.

FIGURE 5

On-Track and 6-Year Graduation Rates for 2007-2012 Cohorts



## CONCLUSIONS & NEXT STEPS

Developing this index has provided an important benchmark for students entering UIC, as the index has implications for efforts in higher education to increase graduation rates. One of the biggest challenges for a large university is to know which students need assistance. The on-track index provides a clear and measurable way of identifying students who are unlikely to graduate from college, so that the university can provide services early on to help them get back on track. Many of these students may not have otherwise appeared to be at risk. For instance, a student with a 2.1 GPA would not be academically dismissed or even placed on probation, but would still be off track in terms of graduation. Prior to the on-track index, that student likely would not have been flagged for services.

In addition, UIC can utilize the index to identify students who are on a path to becoming off track and support them before they do.

To build on the results of this study, UIC will next explore why and how students “recover” from being off track and why they go off track. Analyses will include exploring student experiences in college, student contextual factors (e.g., financial concerns), and noncognitive assets (e.g., sense of belonging). In addition, whether on-track indices can be developed for 4-year graduation and first-to-second-year retention will be explored.

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# APPENDIX A

The following data points were tested for inclusion in the on-track index. Items listed in parentheses reflect the iterations of the variable that were tested.

- Institutional Credits
  - Hours attempted, which includes credit and non-credit bearing courses
  - Hours Passed, which includes credit and non-credit bearing courses
  - Credits attempted, which includes credit-bearing courses only
  - Credits earned, which includes credit-bearing courses only
- GPA
  - First-term GPA
  - First-year GPA
- First-year writing course grade, the first course in the required writing sequence
- Academic dismissal
  - After the first term
  - After the first year
- Number of course failures
- Financial hold
  - No hold
  - Hold in the first term (hold; hold resolved in that term; hold not resolved in that term, but later resolved; and hold never resolved)
  - Hold in the first year (hold; hold resolved in the term it was issued; hold not resolved in that term it was issued, but later resolved; and hold never resolved)
- SAP cancellation after the first year in college
- Unmet need at the start of the first year in college
- Amount of loans during the first year in college
- Amount of financial aid accessed during the first year in college