Priced Out? Does Financial Aid Affect Student Success?

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Project Background

- Expansion of our previous research on multi-institutional success in college.
- Continued refinement of our institutional model of probability of six-year graduation.
- Development of a system to account for the inputs and outputs associated with student finance at the University.

The Rising Cost of College

- **For AY 2008-09:**
  - 6.4% increase in average published in-state tuition and fees for students at public four-year colleges.
  - 5.9% increase in average published tuition and fees at private four-year colleges.
  - 4.7% increase in average published tuition and fees at two-year colleges.

Source: College Board (2008). *Trends in College Pricing.*

The New Philosophy of Financing Higher Education

- Early focus of student aid was to remedy income inequalities through grants.
- End of the 20th century "federal student aid drifted from a grant based system to a loan-based system" (College Board, 2000).
- Recent trends suggest that state aid is increasingly shifting from a need-based system to merit-based system (Heller, 2004)

Research Questions

- **Does financial aid affect the likelihood of student success?**
- **Does the different types of financial aid available to students differentially impact the likelihood for success?**

What does it mean to be successful in college?

- Most studies of student graduation utilize a strict dichotomy to identify success: graduate or not.
- Additionally, our interpretation of success has been largely constrained to the institution of entry.

Redefining Student Success

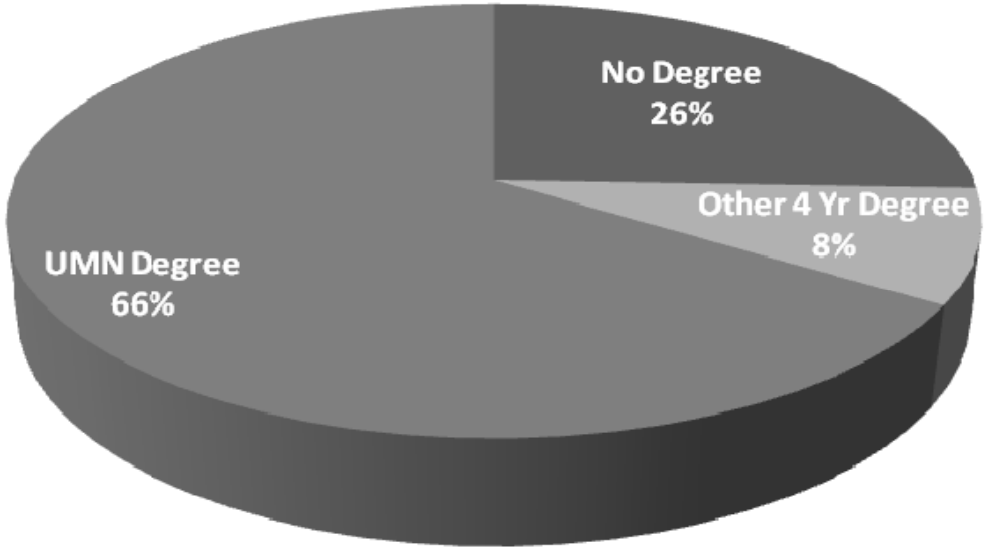
- Student success should include graduation outcomes beyond University of Minnesota.
- Expand the dependent variable to include a separate category to identify students who obtain other four-year degrees.
- Results in a three category dependent variable where students are:
  - successful here
  - successful somewhere
  - not yet successful.

National Student Clearinghouse

- Streamlines the student record verification process for organizations such as: colleges, lenders, and employers.
- Maintains a comprehensive registry of records providing accurate verification of student enrollment, degree, and loan data.
- More than 3,300 colleges, enrolling 92% of US college students, and hundreds of high school districts nationwide participate.

- Source: http://www.studentclearinghouse.org/about/aboutus.htm

NSC Corrected Student Success Rates



Six year graduation rates for first-time, full-time freshman, Fall 2001 cohort

The University of Minnesota at a Glance

- **Established:** 1851
- **President:** Robert H. Bruininks
- **Students:** 40,572 undergraduates, 25,527 graduate, professional, and other students.
- **Faculty:** 4,088 full-time faculty
- **Alumni:** 400,000
- **Research:** $619.2 million in sponsored research.
- **Campuses:** Flagship and four coordinate campuses: Crookston, Duluth, Morris, and Rochester.

Source: http://www1.umn.edu/twincities/about.php

Sample

- Fall 2002 cohort of all first-time, full-time freshman (n=5,188).
- Utilized data from three sources:
  - Student data obtained from tenth day census data stored in the University's data warehouse.
  - Financial data obtained from detailed PeopleSoft student financial transactions data.
  - Outcome data obtained from institutional records and the NSC.
- After removing missing cases, 99% of observations were usable (n=5,116)

Method

- Adopted a multivariate approach to modeling success.
- Graduation outcomes are represented by an unordered multi-categorical variable: MN Degree, Other Degree, No Degree.
- Neither OLS nor Binary Logit is appropriate.

Multinomial Logit Models

- MNLM represents simultaneous estimation of parameters for all possible binary outcomes.
- Each pair of outcomes are compared separately.
- Coefficients represent the change in the likelihood of an alternative relative to a reference category.

Independent Variables

- **Academic Background:** ACT Score, First Generation College, First Choice College, AP Credits, and Remedial Course.
- **First Semester Performance:** Course Completion Ratio, C Count, D Count, and W Count
- **Demographic Characteristics:** Female, Asian, Underrepresented Minority, and Athlete

Independent Variables (cont.)

- **Geographic Origin:** Out-of-state, Reciprocity

- **Social Integration:** On-campus Housing, Living Learning Community (LLC), Federal Work Study, and On-campus employment.

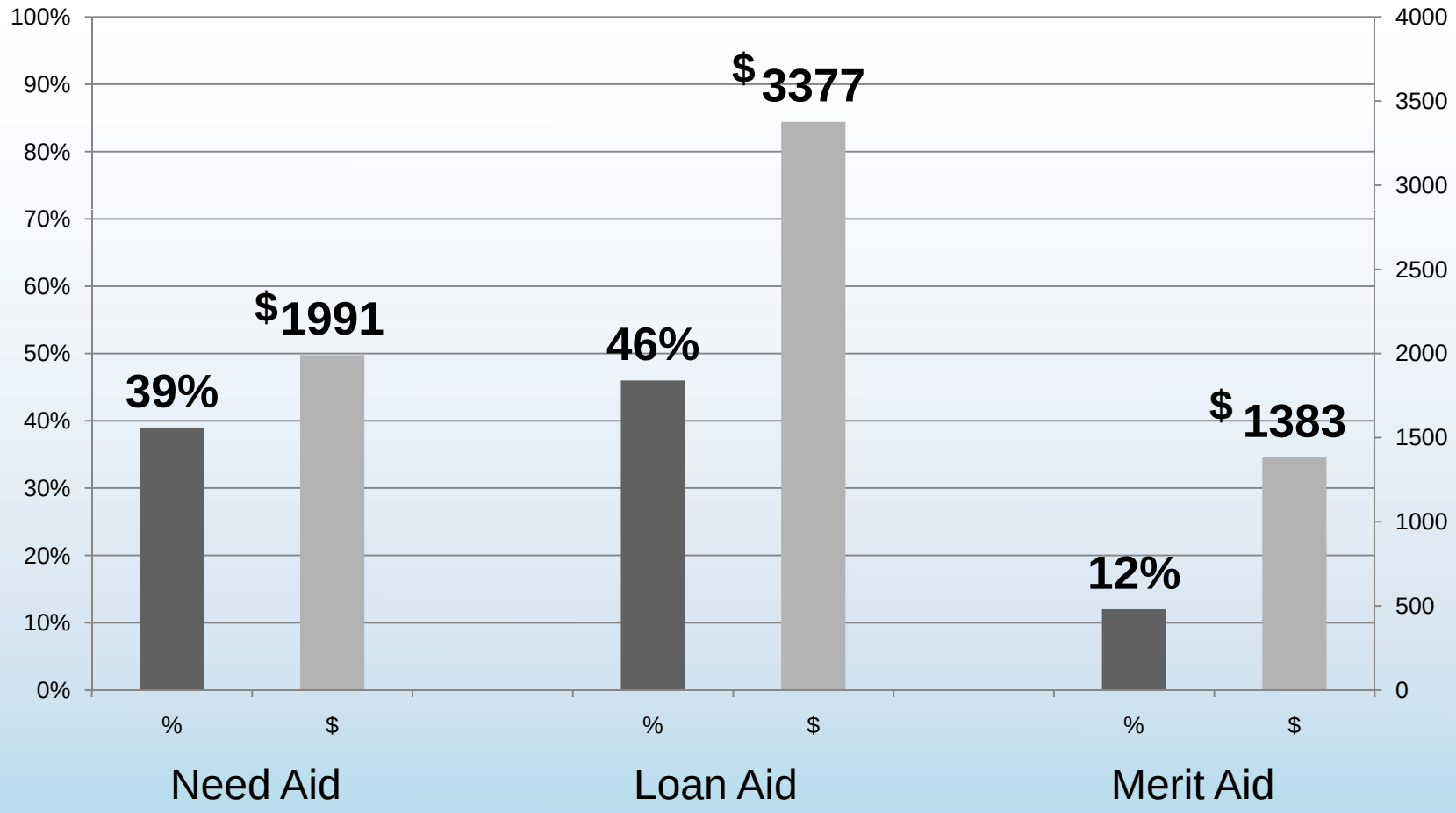
Better Financial Aid Information

- Past reliance on Pell eligibility produced an incomplete financial picture of students.
- Financial aid data in our study was disaggregated from detailed PeopleSoft financial records data.
- By identifying and categorizing all the payments and expenditures associated with a student's financial account, we are more confident that we have the most complete information possible.

Financial Aid Variables

- **Unmet Need:** (amount) calculated by financial system based on both FAFSA data and internal award and budget information.
- **Need Aid:** (dummy) identifies if the student received any grants or scholarships based on need (Pell, MN State, or institutional)
- **Loan Aid:** (dummy) identifies if a loan from any source was applied to a student's account.
- **Merit Aid:** (dummy) identifies scholarship dollars allocated by admission office.

Financial Aid Picture at UMN, Fall 2002



Some Recognizable Limitations

- Single institution/ limited time period hinders generalizability.
- Only include a limited set of variables.
- NSC does not have a complete listing of degrees (slippage).
- More complicated patterns of enrollment are not examined.

Results

- MNLM results reflect the ceteris paribus change in the log-odds of an outcome *relative to* another outcome.
- Three outcomes produce six potential comparisons:

1 | 2	2 | 1	3 | 1
1 | 3	2 | 3	3 | 2

- Redundancy makes each specific comparison unnecessary.

Reading the Results

- **Selected three relevant graduation outcome comparisons**

  UMN|Dropout Other|Dropout Other|UMN

- **Patterns to look for:**
  - Variables that affect success similarly across institutions (comparisons 1 and 2 move the same).
  - Variables that affect institutional goals (comparisons 1 and 3 in different directions)

Results: Academic Background

	UMN|Dropout		Other|Dropout		Other|UMN	
	Coef.	Sig.	Coef	Sig.	Coef.	Sig.
Composite ACT Score	-0.011		**-0.027**	⇩	-0.016	
First Generation Student	**-0.340**	⬇	**-0.310**	⇩	0.031	
First Choice College	0.130		-0.005		-0.136	
Advance Placement Credits	**0.035**	⬆	0.004		**-0.030**	⬇
Remedial Course	**-1.000**	⬇	**-0.941**	⬇	0.059	

■ P < 0.01 ■ P < 0.05 □ P < 0.10

Results: First Semester Performance

	UMN|Dropout		Other|Dropout		Other|UMN	
	Coef.	Sig.	Coef	Sig.	Coef.	Sig.
Course Completion Ratio	**0.037**	↑	**0.023**	↑	**-0.014**	↓
C Count	**-0.381**		**-0.249**	↓	**0.132**	⇧
D Count	**-0.647**	↓	-0.110		**0.536**	↑
W Count	**-0.928**	↓	**-0.517**	↓	**0.411**	⇧

■ P < 0.01 ▩ P < 0.05 □ P < 0.10

Results: Demographic Characteristics

	UMN|Dropout		Other|Dropout		Other|UMN	
	Coef.	Sig.	Coef	Sig.	Coef.	Sig.
Female	**0.219**	↑	**0.596**	↑	**0.377**	↑
Asian	-0.071		**-0.557**	↓	**-0.487**	⇩
Underrepresented Minority	**-0.425**	↓	**-0.429**	↓	-0.004	
Athlete	**0.660**	↑	0.156		**-0.504**	⇩

■ P < 0.01 ■ P < 0.05 □ P < 0.10

Results: Geographical Origin

	UMN|Dropout			Other|Dropout			Other|UMN	
	Coef.	Sig.		Coef	Sig.		Coef.	Sig.
Out of State	-0.144			**0.504**	⇧		**0.648**	↑
Reciprocity State	0.104			**0.705**	↑		**0.601**	↑

■ P < 0.01 ▒ P < 0.05 □ P < 0.10

Results: Social Integration

	UMN|Dropout		Other|Dropout		Other|UMN	
	Coef.	Sig.	Coef	Sig.	Coef.	Sig.
Living on Campus	**0.373**	■	**0.271**	□	-0.102	
Living Learning Community	**0.381**	■	0.160		-0.221	
Work On-Campus (Federal)	-0.052		0.008		0.060	
Work On-Campus (Other)	-0.041		-0.021		0.020	

■ P < 0.01 ▩ P < 0.05 □ P < 0.10

Results: Financial Aid

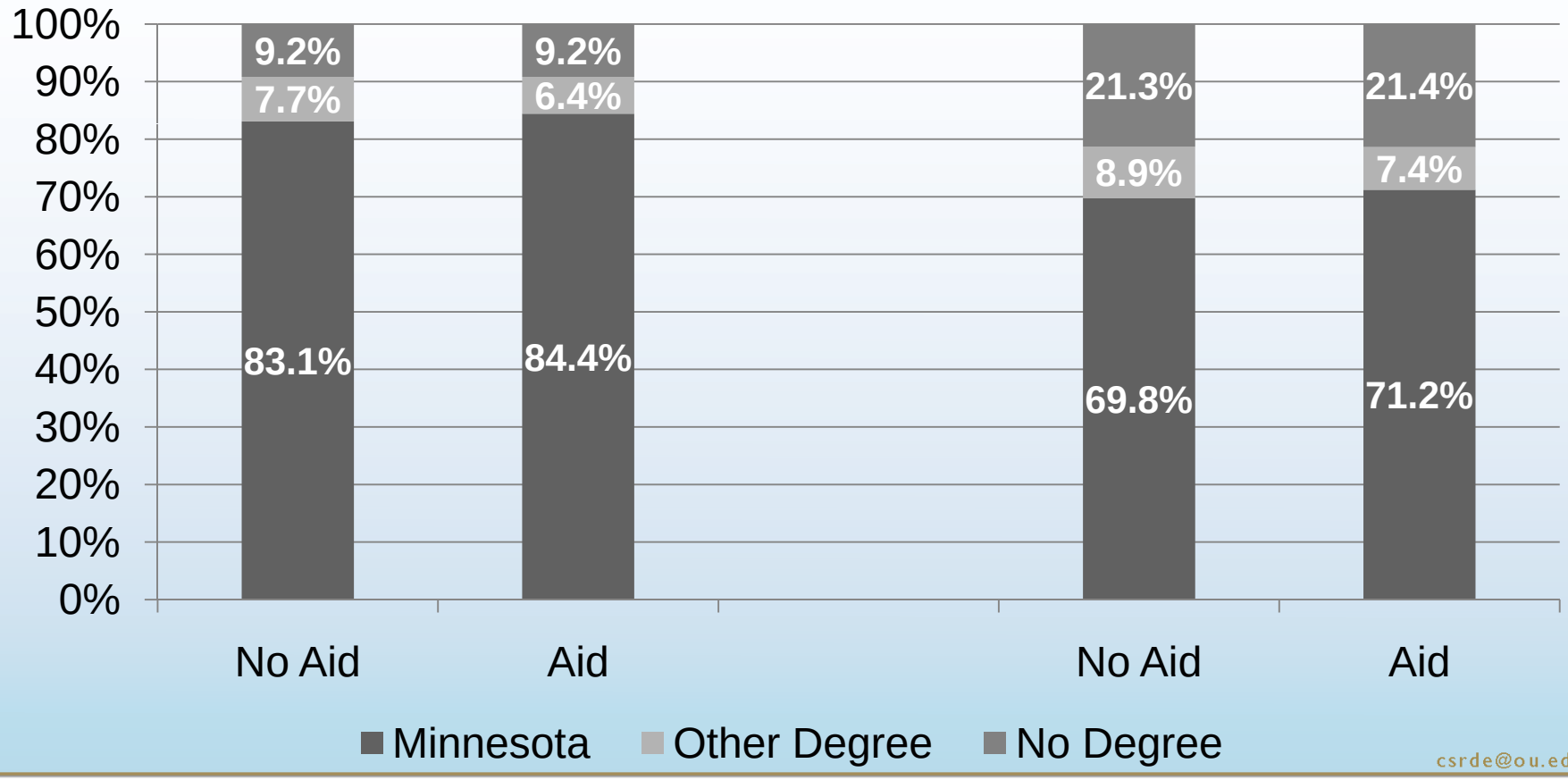
	UMN|Dropout		Other|Dropout		Other|UMN	
	Coef.	Sig.	Coef	Sig.	Coef.	Sig.
Unmet Need ($1000)	-0.002		0.002		**0.004**	↑
Need Aid Award	0.018		-0.188		**-0.206**	↓
Loan Award	**-0.294**	↓	0.016		**0.310**	↑
Merit Aid Award	**0.858**	↑	-0.169		**-0.689**	↓

■ P < 0.01 ■ P < 0.05 □ P < 0.10

How Does Financial Aid Affect Success Probabilities

- Due to nonlinearity, “no single approach to interpretation can fully describe the relationship between a variable and an outcome probability” (Long, 1997).
- While the log-odds provide a ceteris paribus interpretation of the impact of variables, they remain difficult to interpret.
- It is often helpful to fix all other variables at some level and plot the change in predicted probabilities of the outcomes as a single variable changes.

Predicted Probabilities: Need Aid



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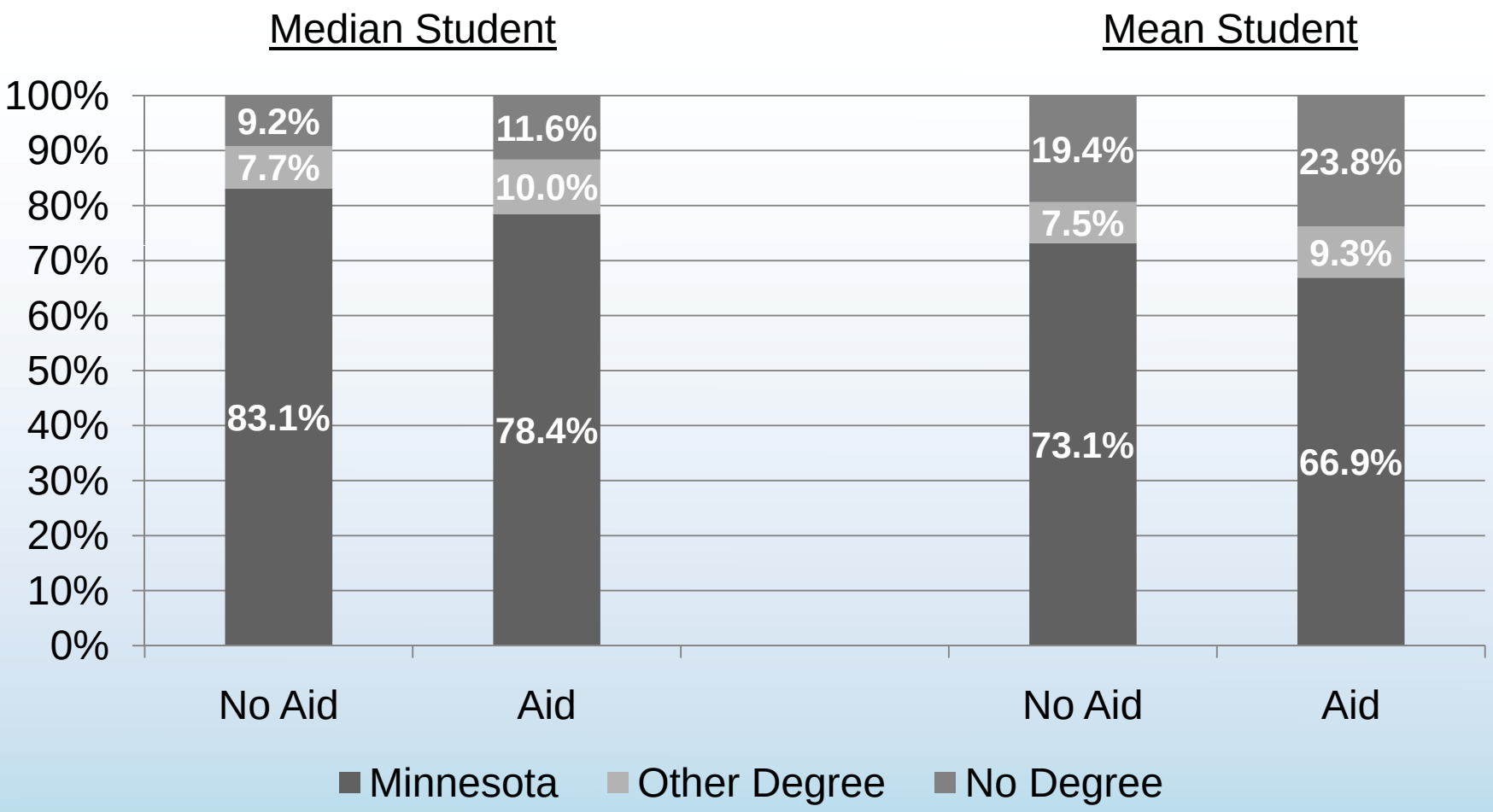
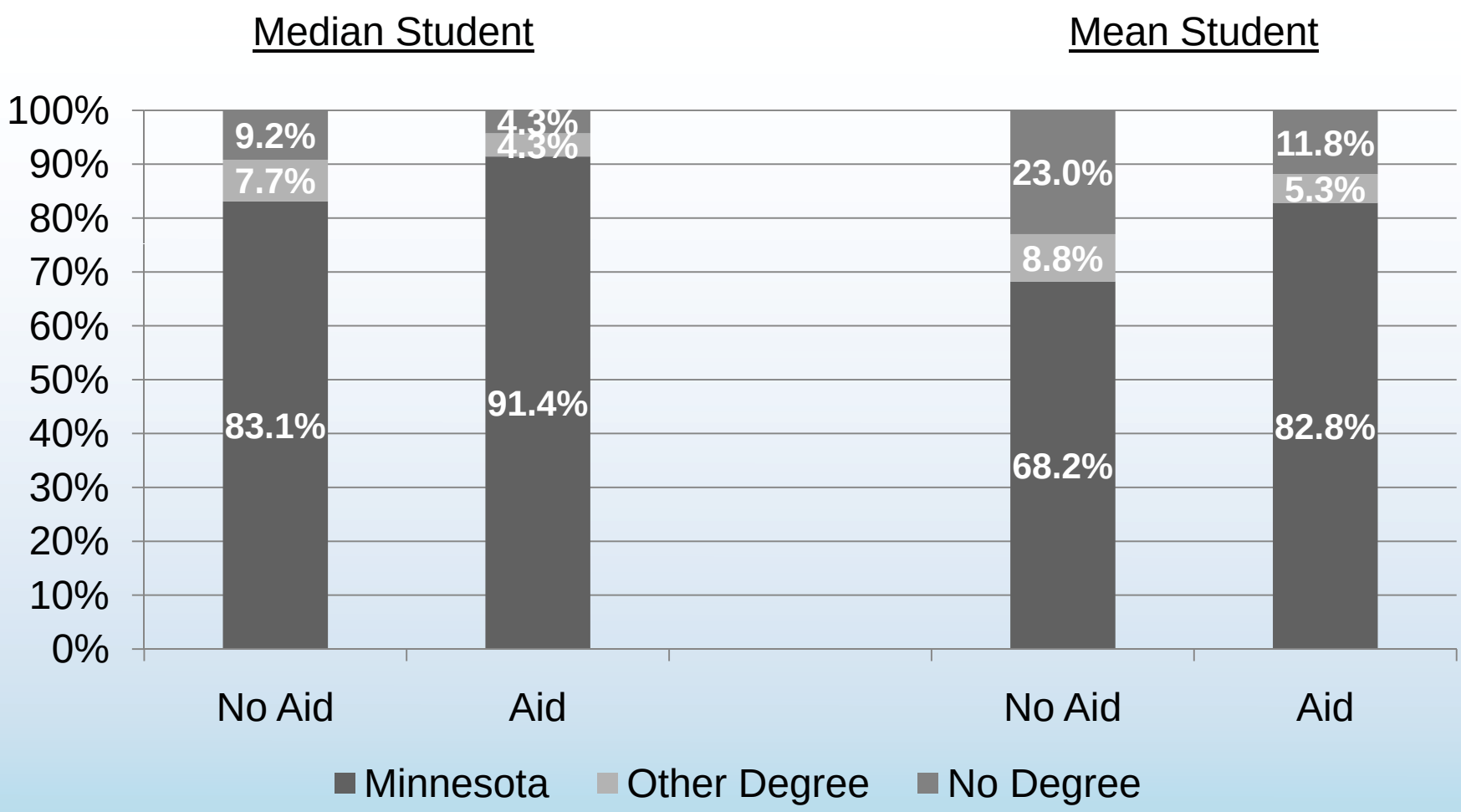
Predicted Probabilities: Loan Aid



Predicted Probabilities: Merit Aid



Implications

- Multi-institutional enrollment trends require a rethinking of student success.
- Success as a strict dichotomy results in measurement error in our dependent variable producing imprecise parameter estimates.
- Data from the National Student Clearinghouse goes a long way to help minimize this problem.
- The results of this study reaffirms work done by others which suggests that financial aid types differentially impact student outcomes.

The Differential Affects of Financial Aid

- **Need awards** appear *equalizing* not affecting the likelihood of graduating from either the U or another institution, relative dropping out.
- **Student loans** appear to be working at cross purposes of institutional retention goals as first semester borrowing *decreases* success at UMN.
- **Merit Aid**, while controversial, appears to support the institution's retention goals.

Institutional Responses

- **Expanding Student Success:** Developing a P-20 tracking system to better reflect a student's educational career path.
- **Financial Aid:** Institution has developed and expanded new aid programs to help offset student need.
- **Financial Literacy:** Introduced financial literacy classes to educate students and parents about the implications of borrowing for college.

Future Research

- **Consider Aid Packaging:** Expand the research from independent effects of aid type to consider possible interactive effects.
- **Explore Aid Dynamics:** Consider how aid after the first semester, particular changes in aid status, might impact success probabilities.

Acknowledgments

- Jones-White, D., Radcliffe, P.M, Huesman, R. L. Jr., Kellogg, J. P. (2008). Redefining student success: Assessing different multinomial regression techniques for the study of student retention and graduation across institutions of higher education. *Paper presented at the Association for Institutional Research Annual Forum.* Seattle, WA. May 24th-28th.

Additional Resources:

- **Multinomial Logit**
- Porter S. (2003). Understanding Retention Outcomes Journal of College Student Retention, 5(1), 53-70.
- Herzog, S. (2005). Measuring determinants of student return vs. dropout/stopout vs. transfer. Research in Higher Education. Vol. 46, No. 8. Pp. 883-928.
- Stratton, L. S., O'Toole, D.M., & Wetzel, J.N. (2008). A multinomial logit model of college stopout and dropout behavior. Economics of Education Review. 27: 319-331.