BOOMING ENROLLMENTS

Understanding the Surge

Tracy Camp

Colorado School of Mines

COLORADOSCHOOLOFMINES
engineering the way

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SEVERAL DISCUSSIONS/EFFORTS

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NCWIT

ACM Ed Board

ACM NDC

NSF CISE

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➔ Questions for Institutions

Questions for Students

CRA COMMITTEE: INSTITUTION

Rick Adrion (UMass)
Tracy Camp (Mines)
Susan Davidson (Penn)
Mary Hall (Utah)
Susanne Hambrusch (Purdue)
Ellen Walker (Hiram College)
Stu Zweben (Ohio State)

Betsy Bizot (CRA)
Lida Beninson/Jan Cuny (NSF)

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“OUR MASTERPIECE” (SURVEY)

- **goal:** measure, assess, and better understand enrollment trends and impact (on unit, on diversity, …)

- **focus:** *computer science* (CS) undergraduate degree programs

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THE PILOTS

Committee Members (2+)

Google CS Capacity Grantees

- Jeff Offut, George Mason
- Heather Pon-Barry, Mt. Holyoke
- John DeNero, UC Berkeley

Emily Grumbling (and others), CSTB

Anne Condon, UBC

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DOCTORAL UNITS

131 of 188 submitted useful data

121 U.S. institutions

10 Canadian institutions

~70% response rate

NON-DOCTORAL UNITS

93 of ~700 submitted useful data

93 U.S. institutions

0 Canadian institutions

~13% response rate

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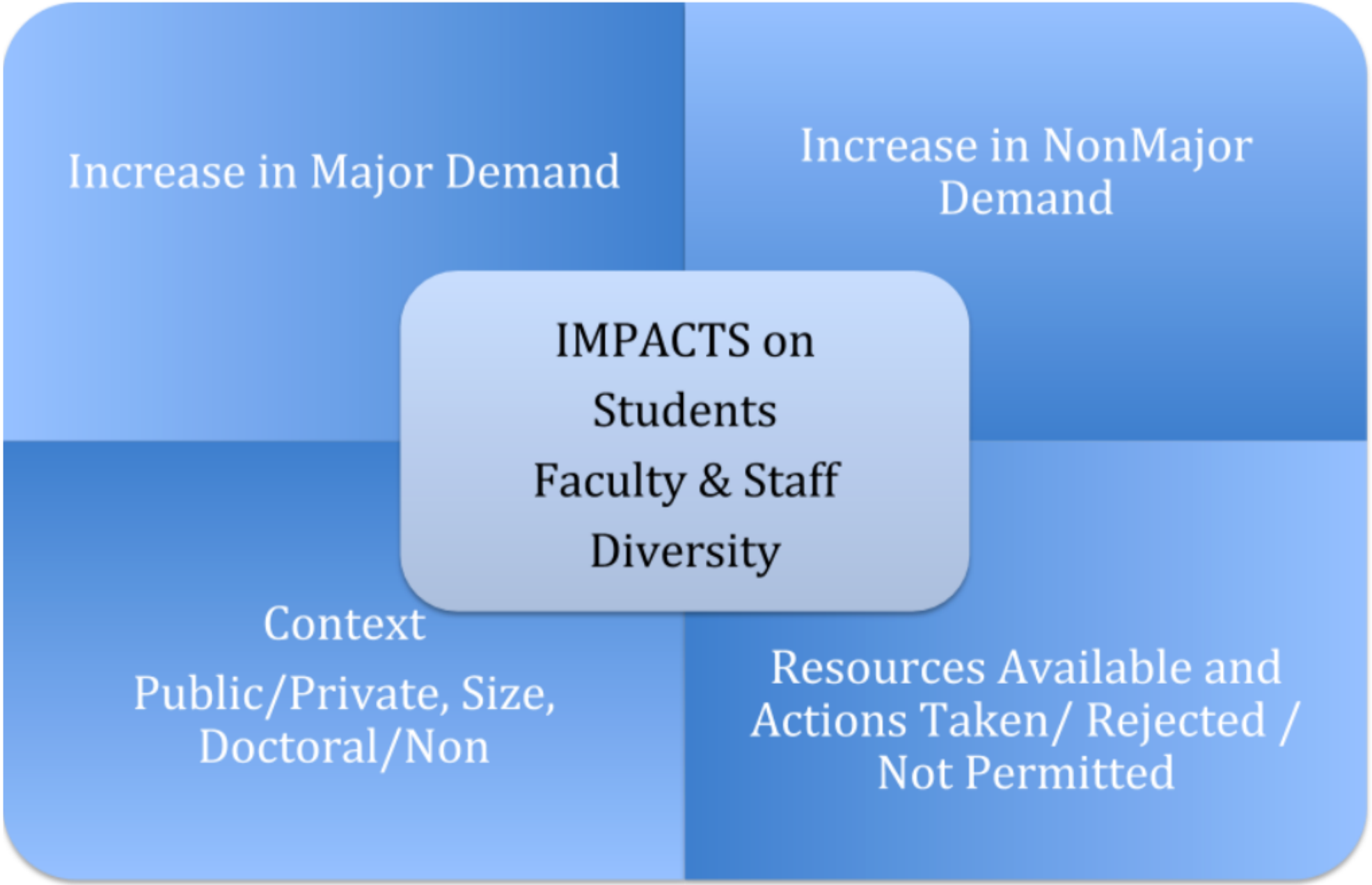
SURVEY ANALYSIS



Data Analysis
PRELIMINARY!!

Majors

Taulbee: 2010 to 2015

133% ↑ in CS majors*

16% ↑ in T/TT faculty

86% ↑ in teaching faculty

*estimated

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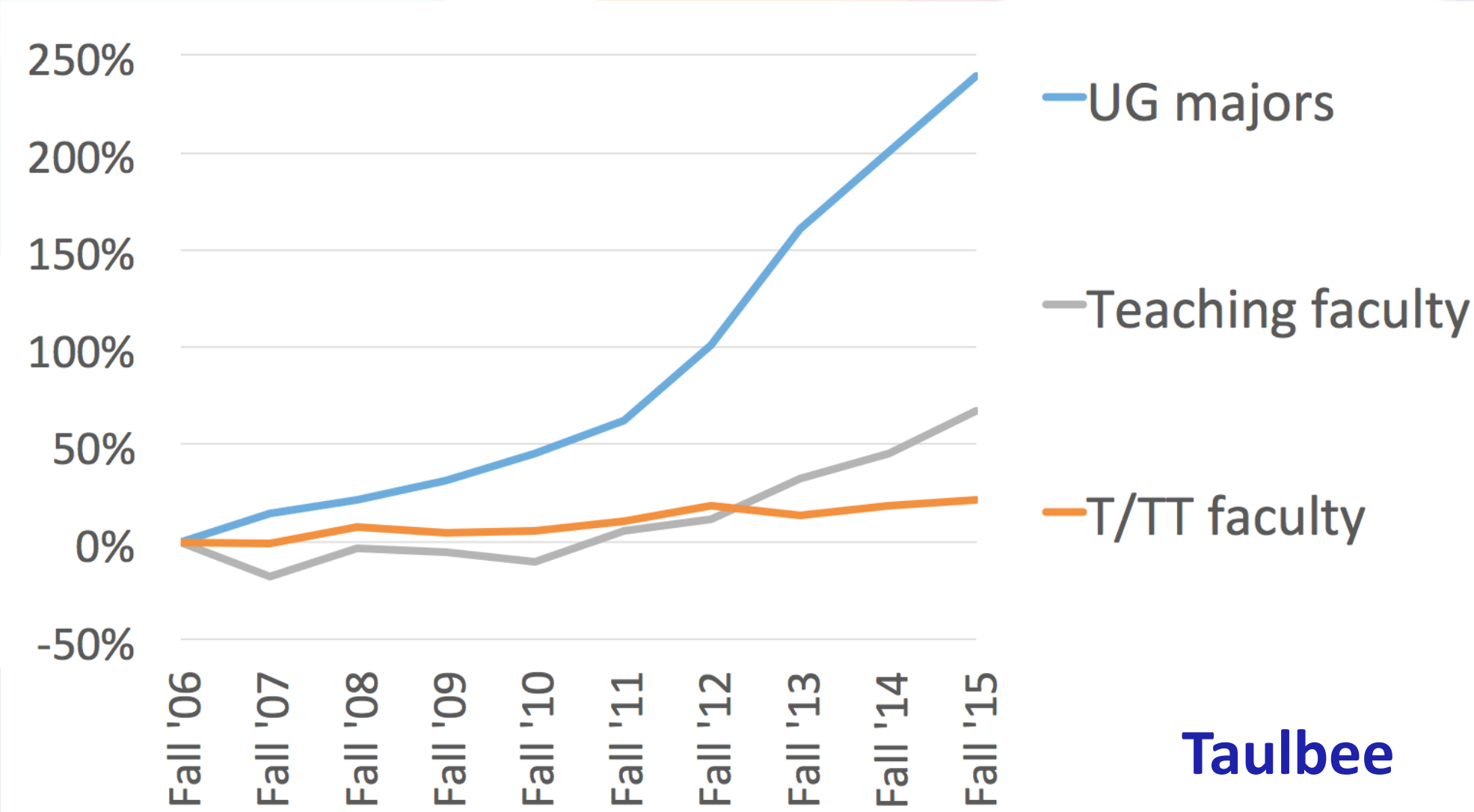
Cumulative Change in Majors and Full-time Instructional Faculty



Taulbee

Taulbee: 2010 to 2015

17% ↑ in CS Ph.D. Students

85% ↑ in CS M.S. Students

plus pressures from non-majors

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CRA Enrollment Survey

CRA ENROLLMENT SURVEY

A. Preliminary Questions

B. Unit Context

C. Declaration/Admission to CS Major

D. Computing Courses for Non-Majors

E. Changes in Demand

F. Impact of Demand Increases

G. Data on Enrollment Changes in CS Courses

H. Unit/Data Reports

I. Data Use Permission

J. Final Comments

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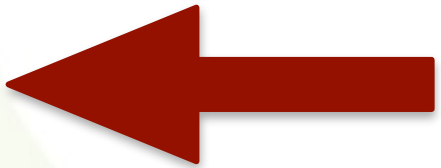
Course Enrollments

Intro Course (non-majors)

Intro Course (majors)

Mid-Level Course 

Upper-Level Course

2005 2010 2015

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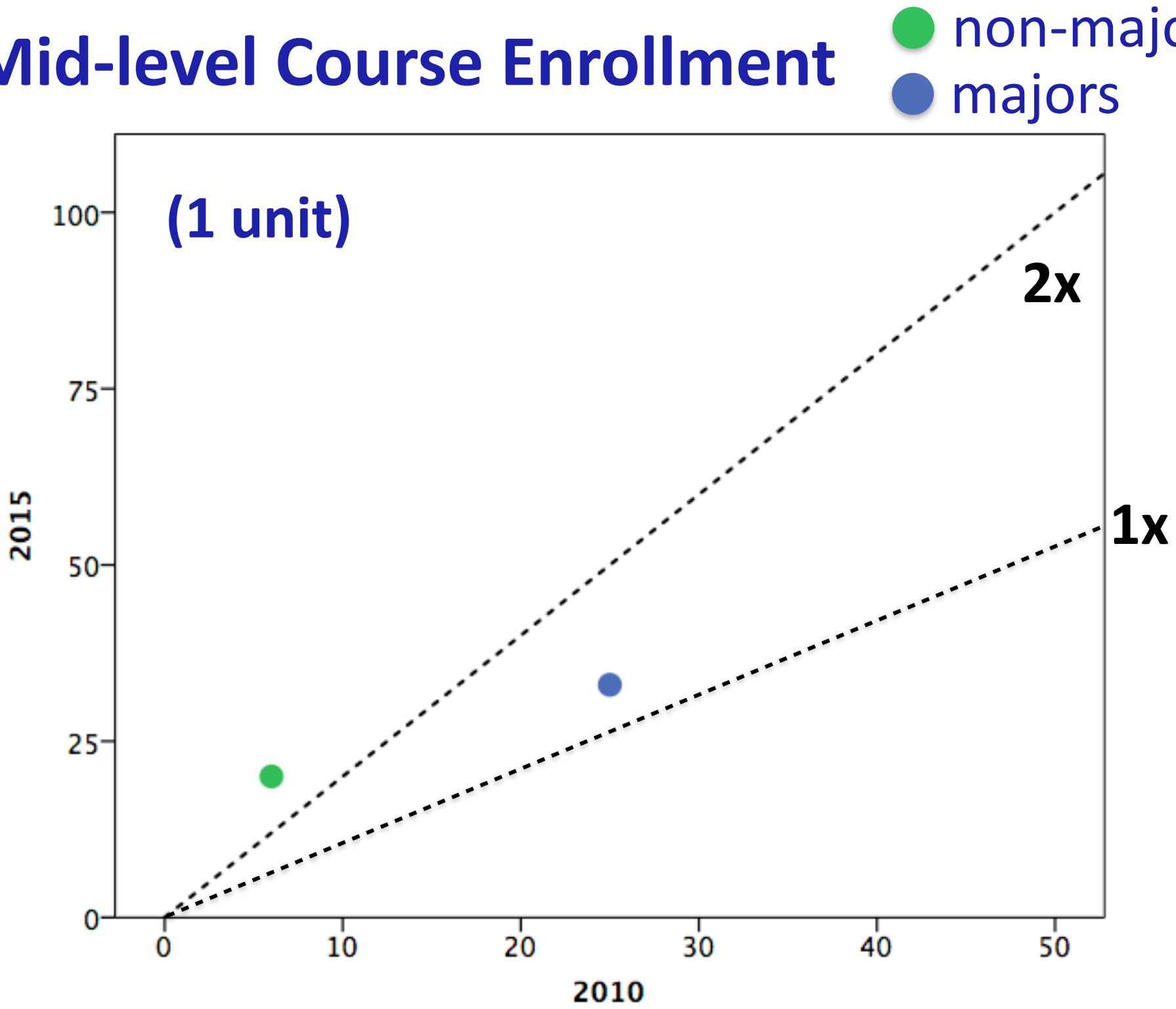
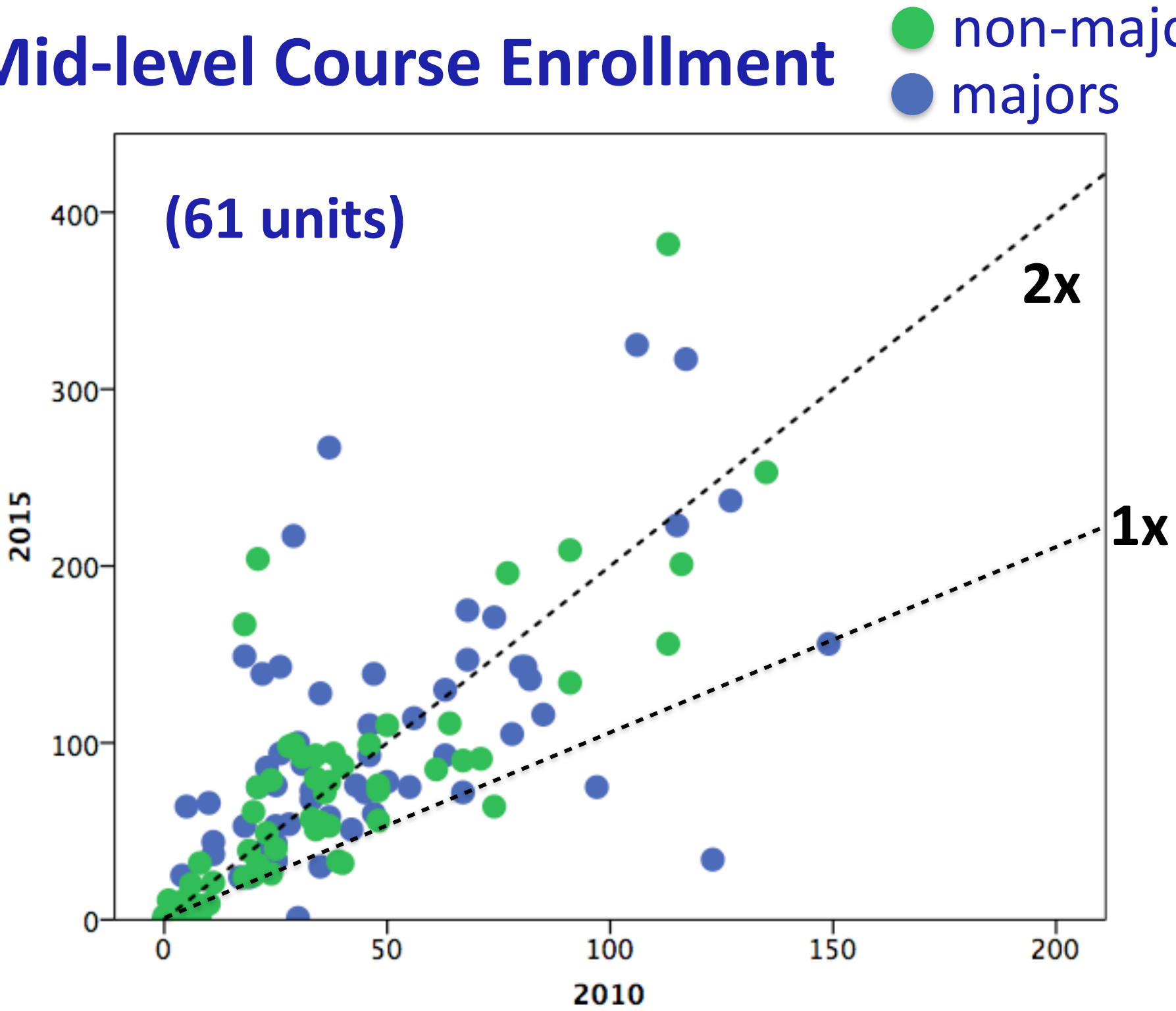
NON-Majors

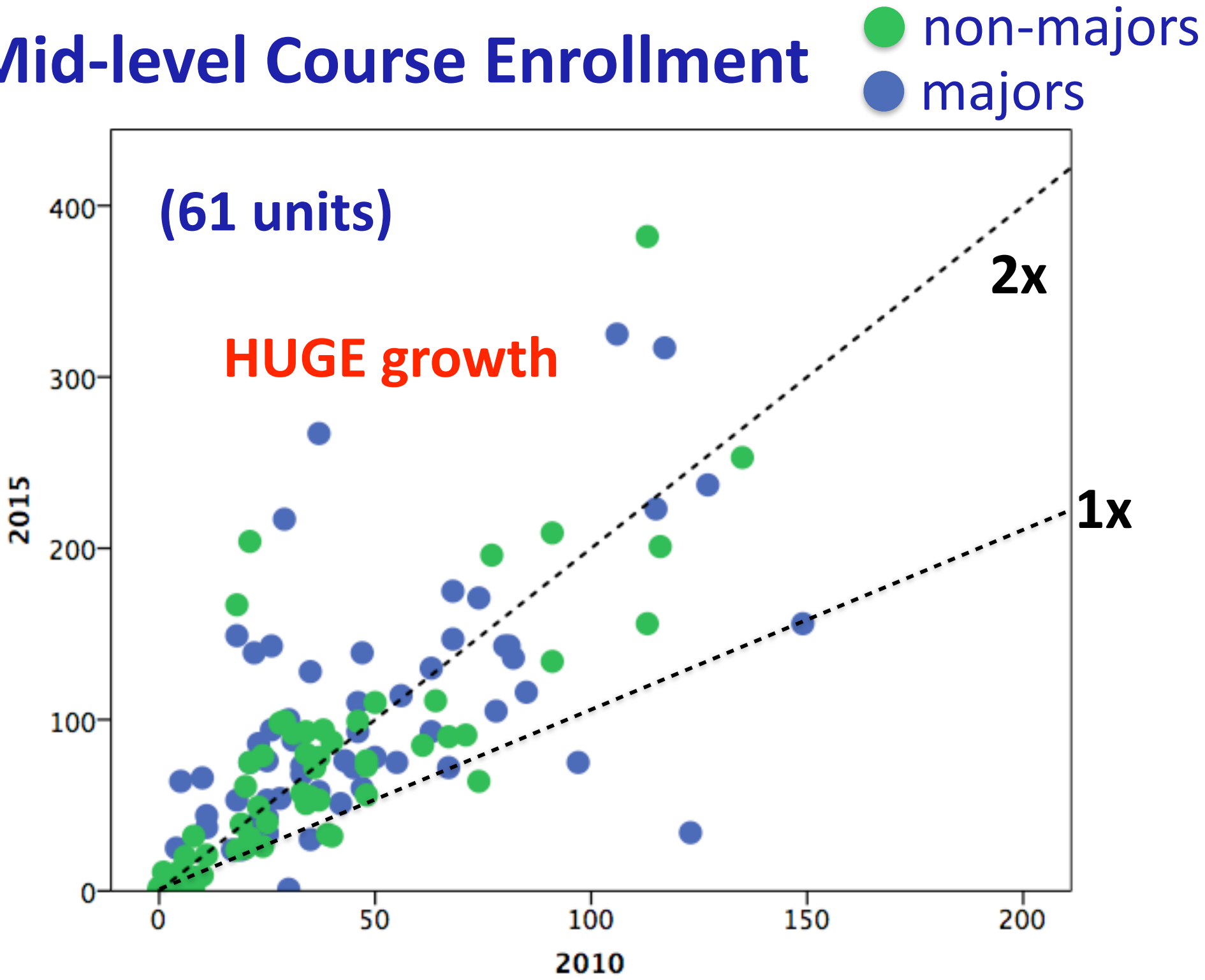
Mid-level Course Enrollment



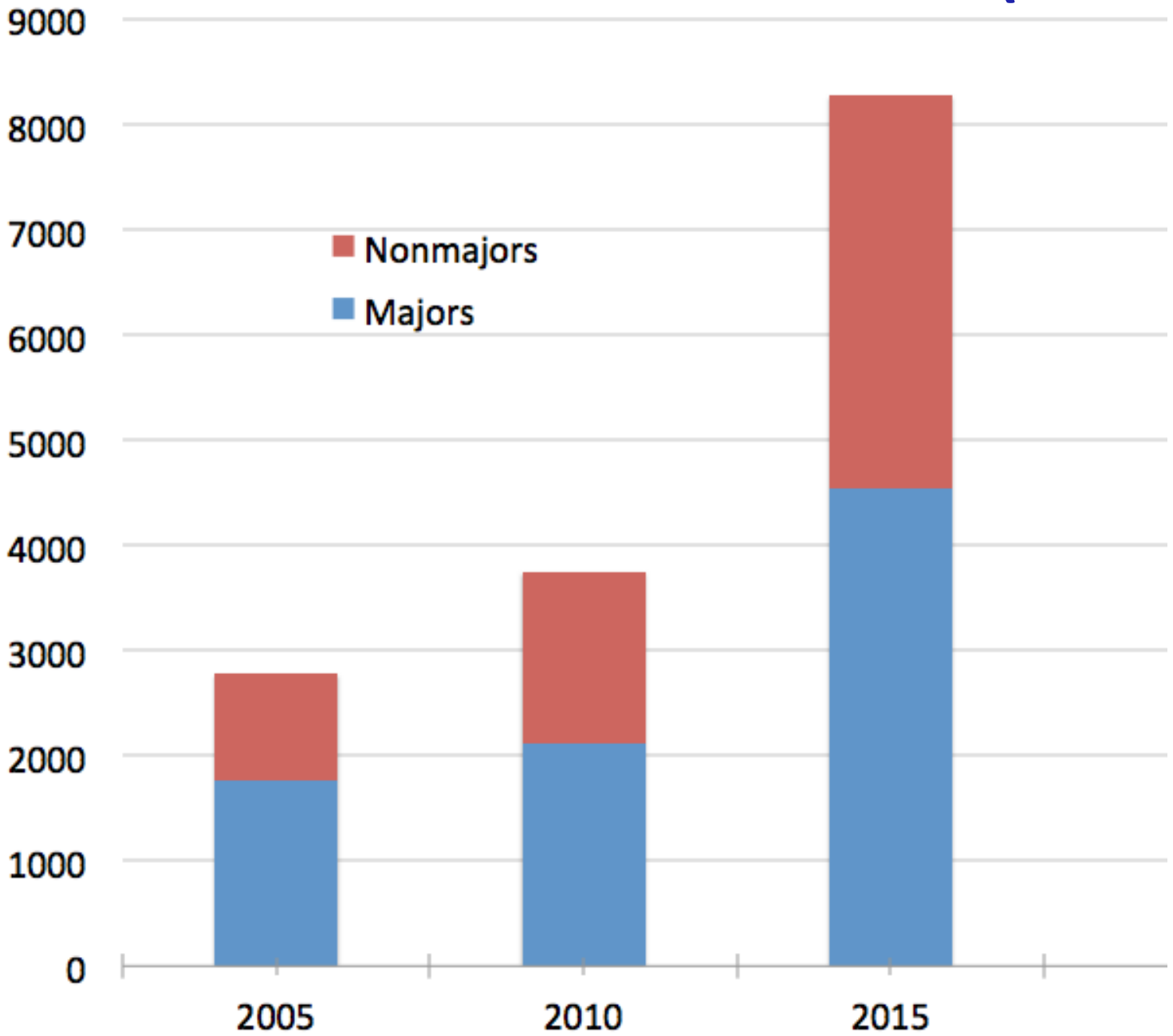
Mid-level Course Enrollment



Mid-level Course Enrollment



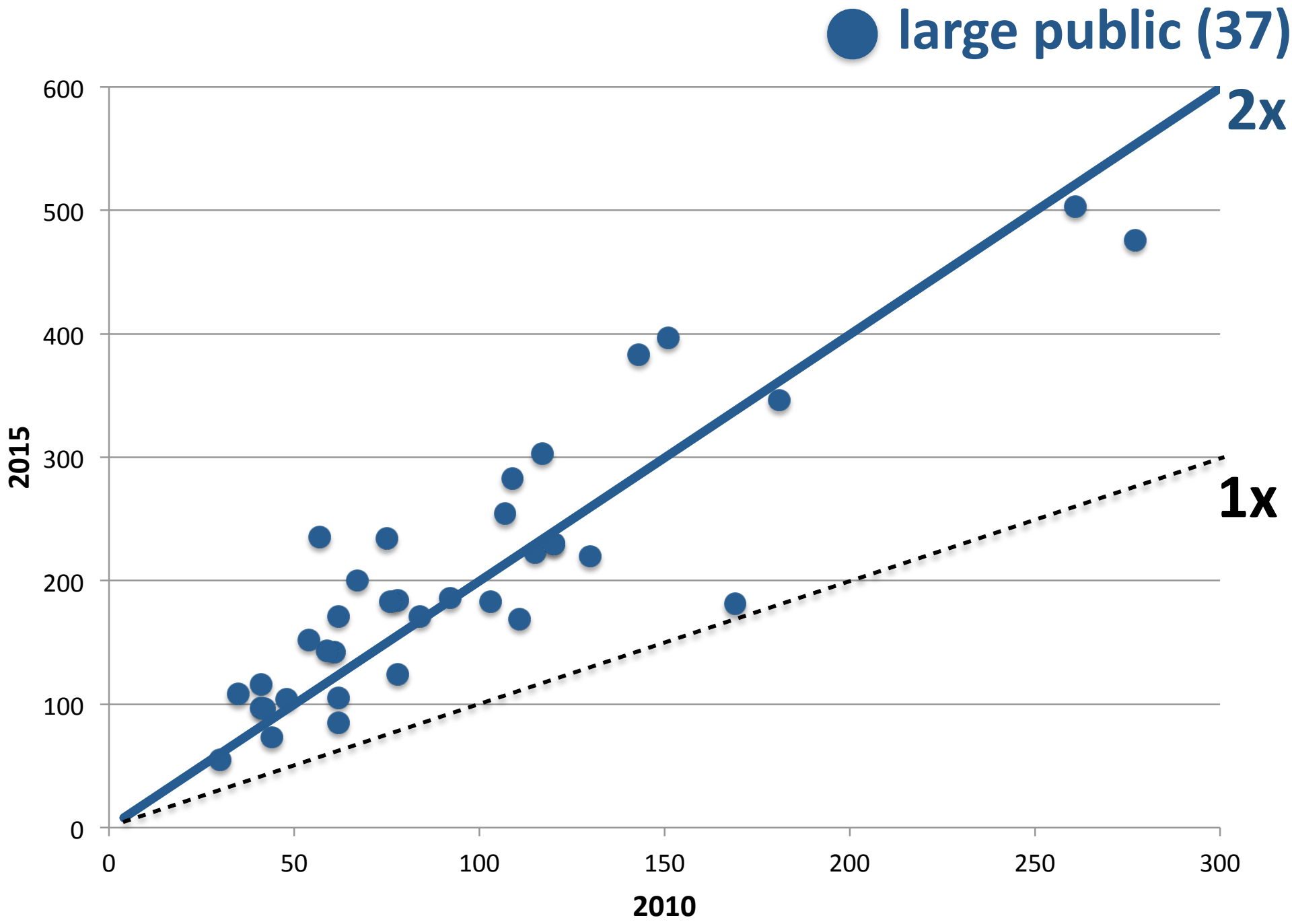
Students in 'Typical' Mid-Level Courses (in 44 units)



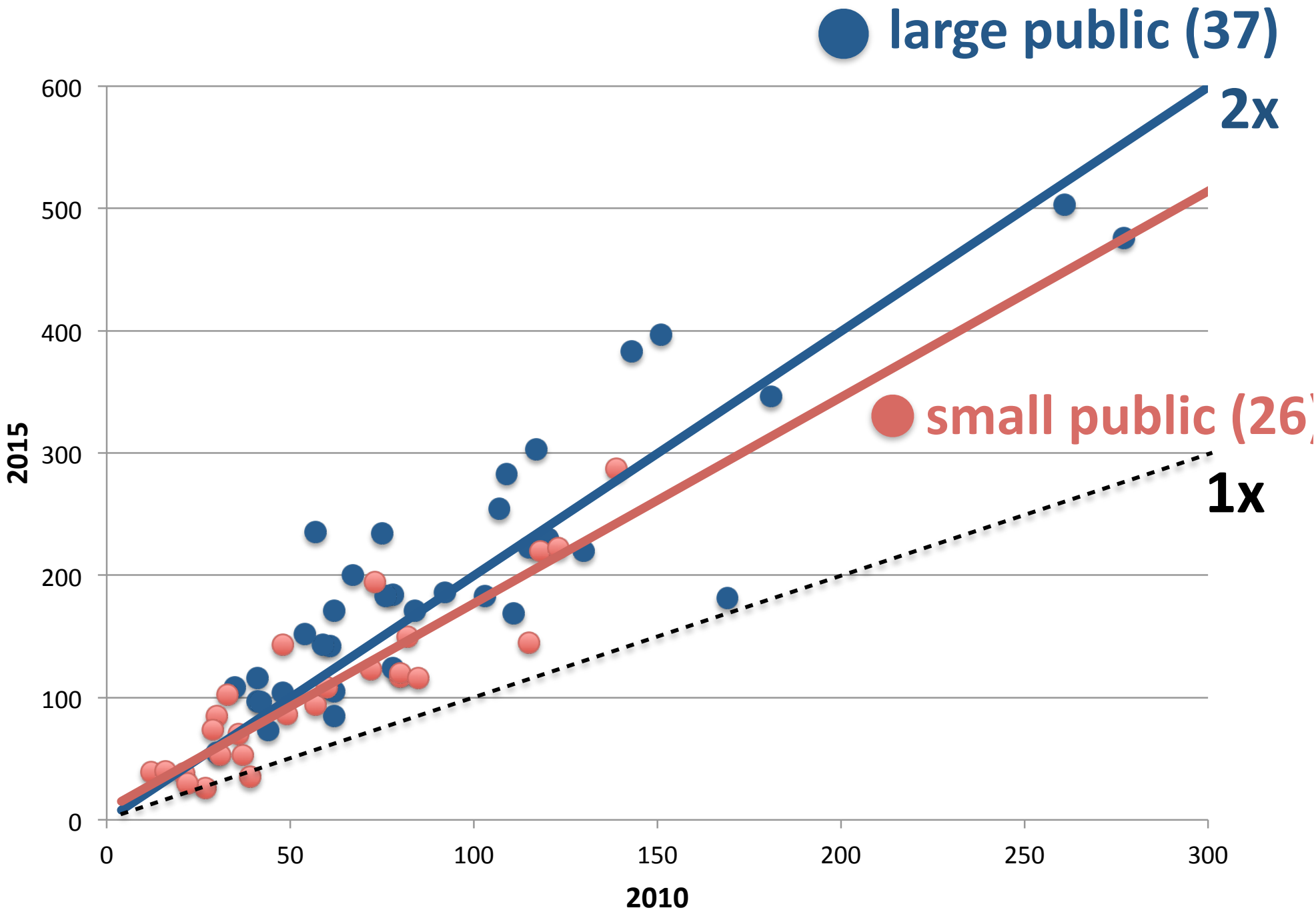
Public/Private

Large/Small

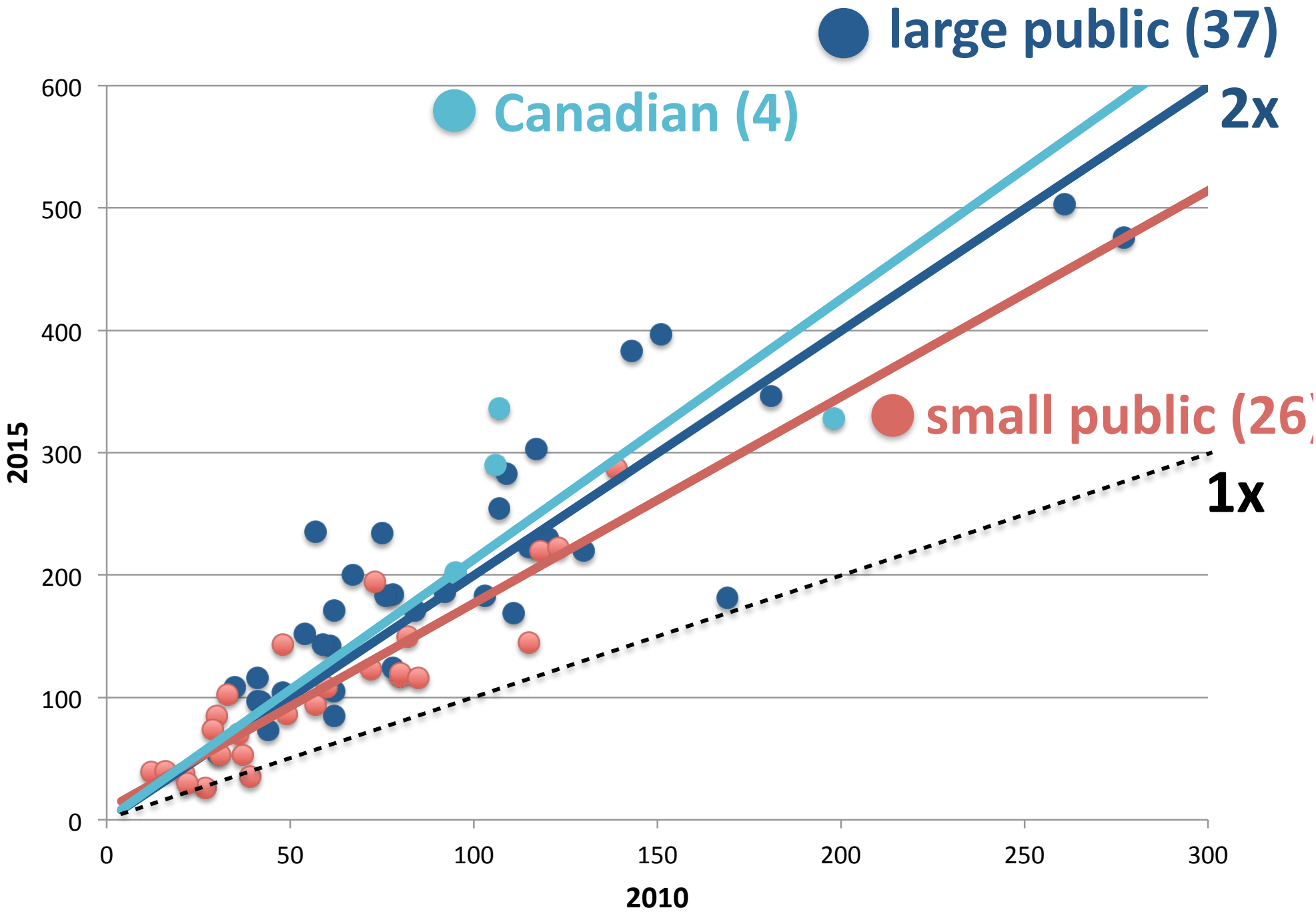
Mid-level Course Enrollment



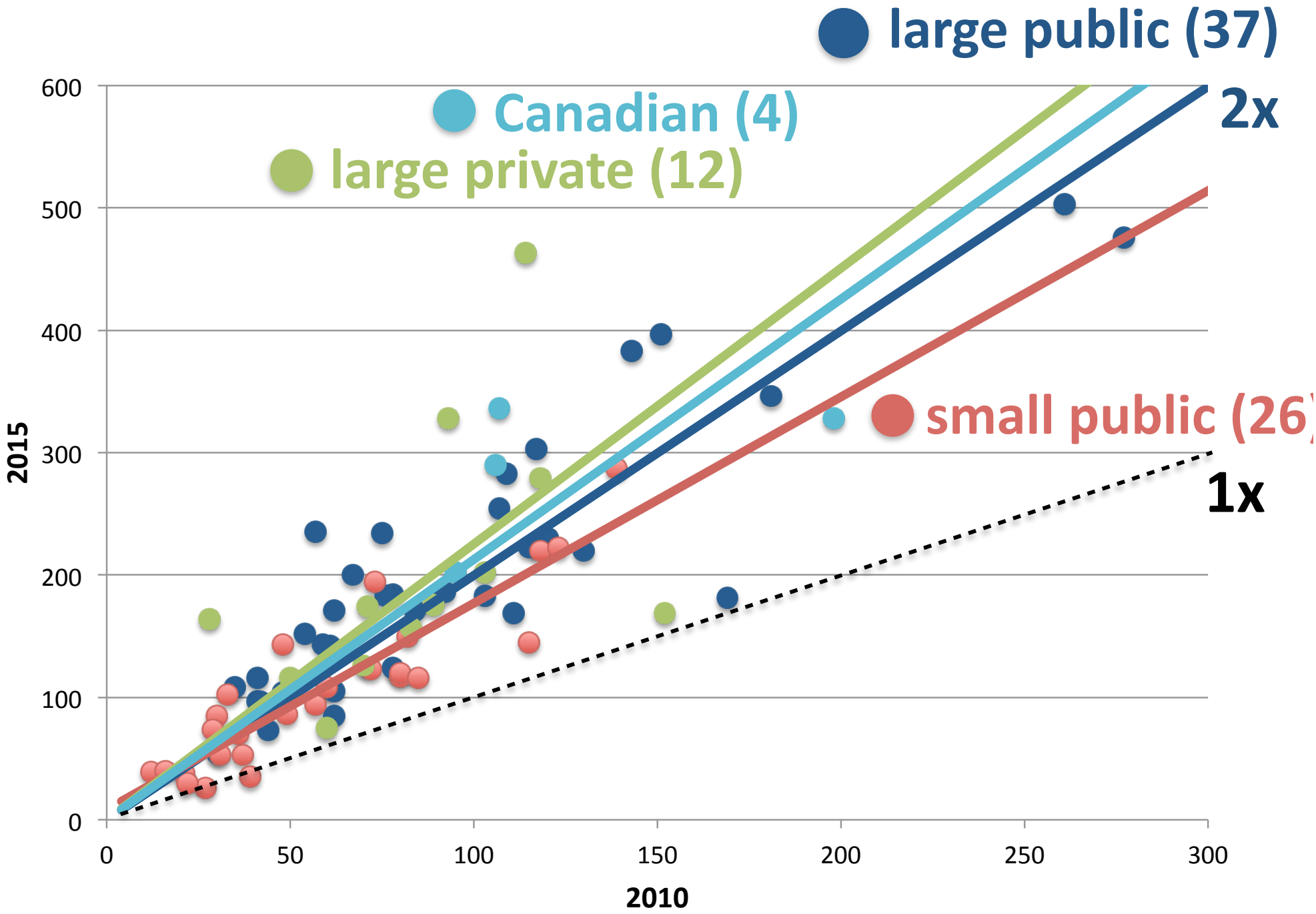
Mid-level Course Enrollment



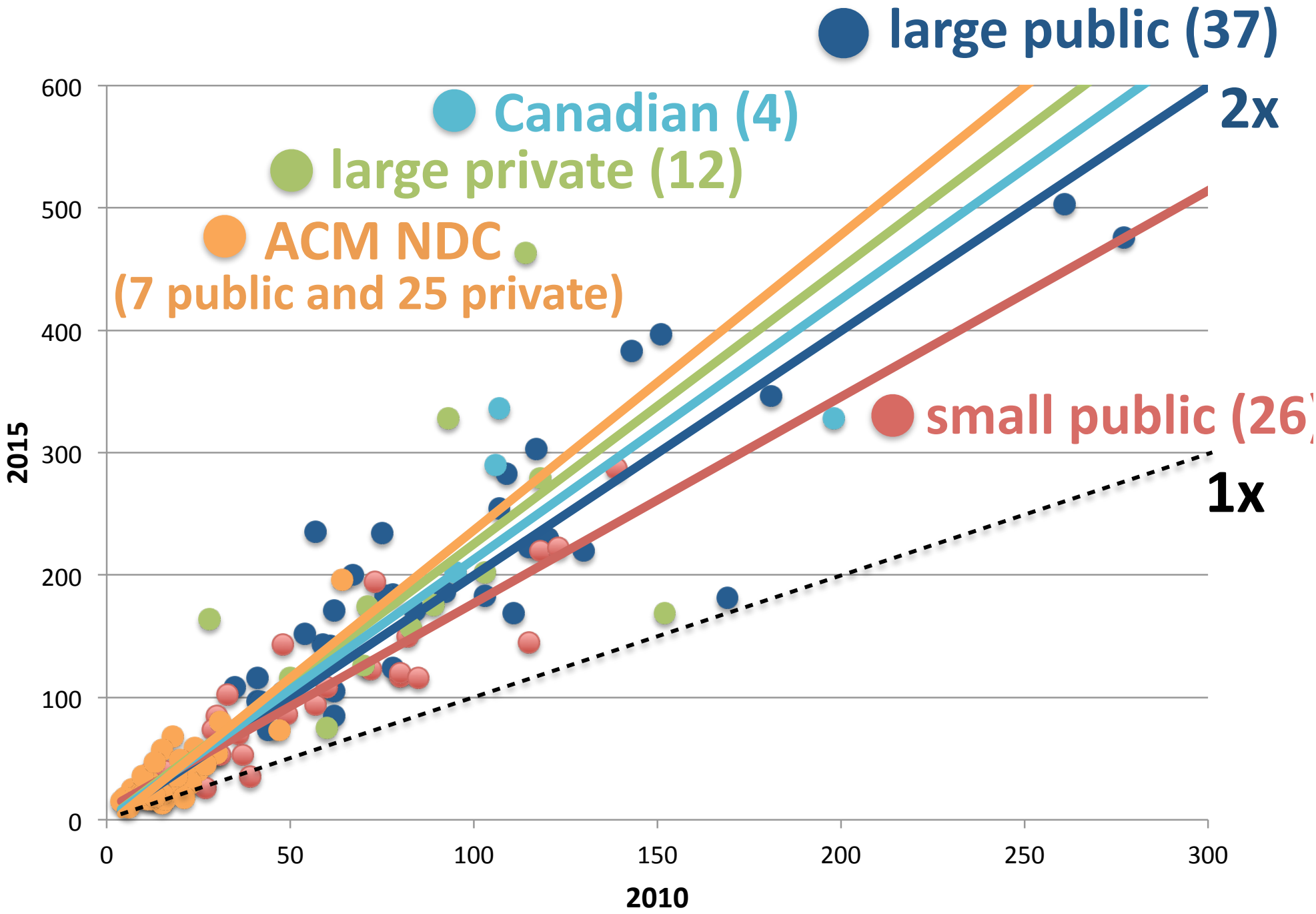
Mid-level Course Enrollment



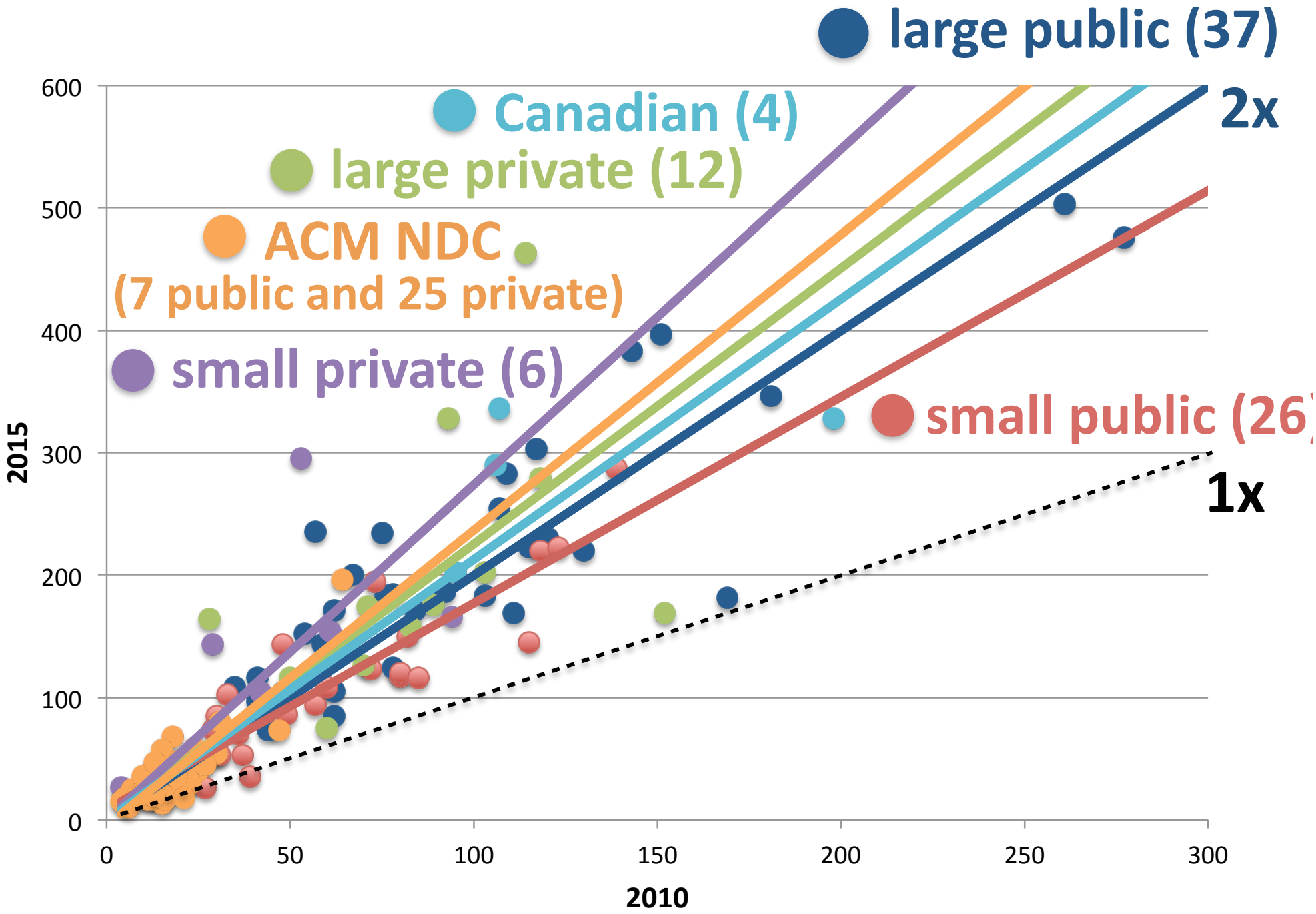
Mid-level Course Enrollment



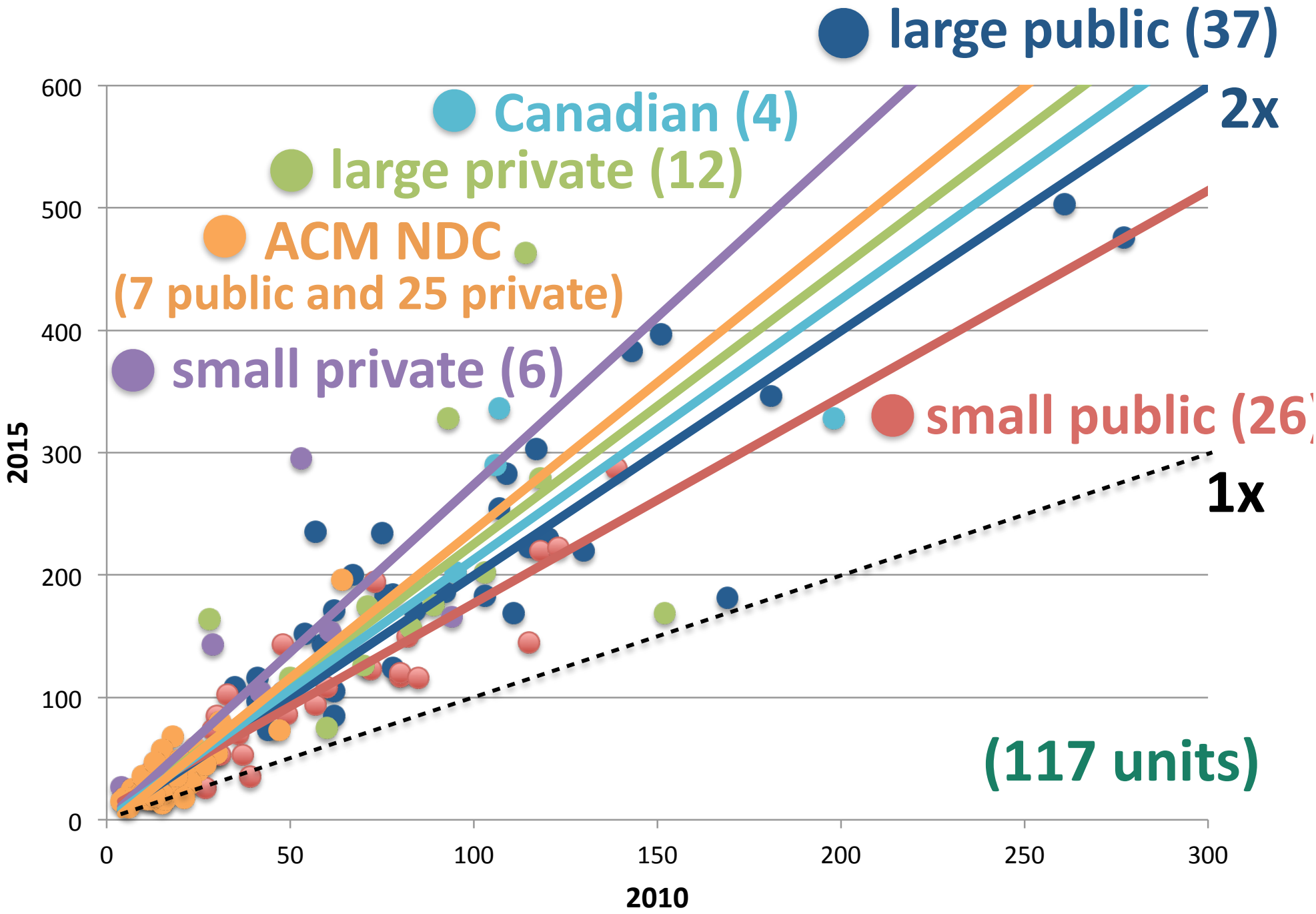
Mid-level Course Enrollment



Mid-level Course Enrollment



Mid-level Course Enrollment



Impact

CRA ENROLLMENT SURVEY

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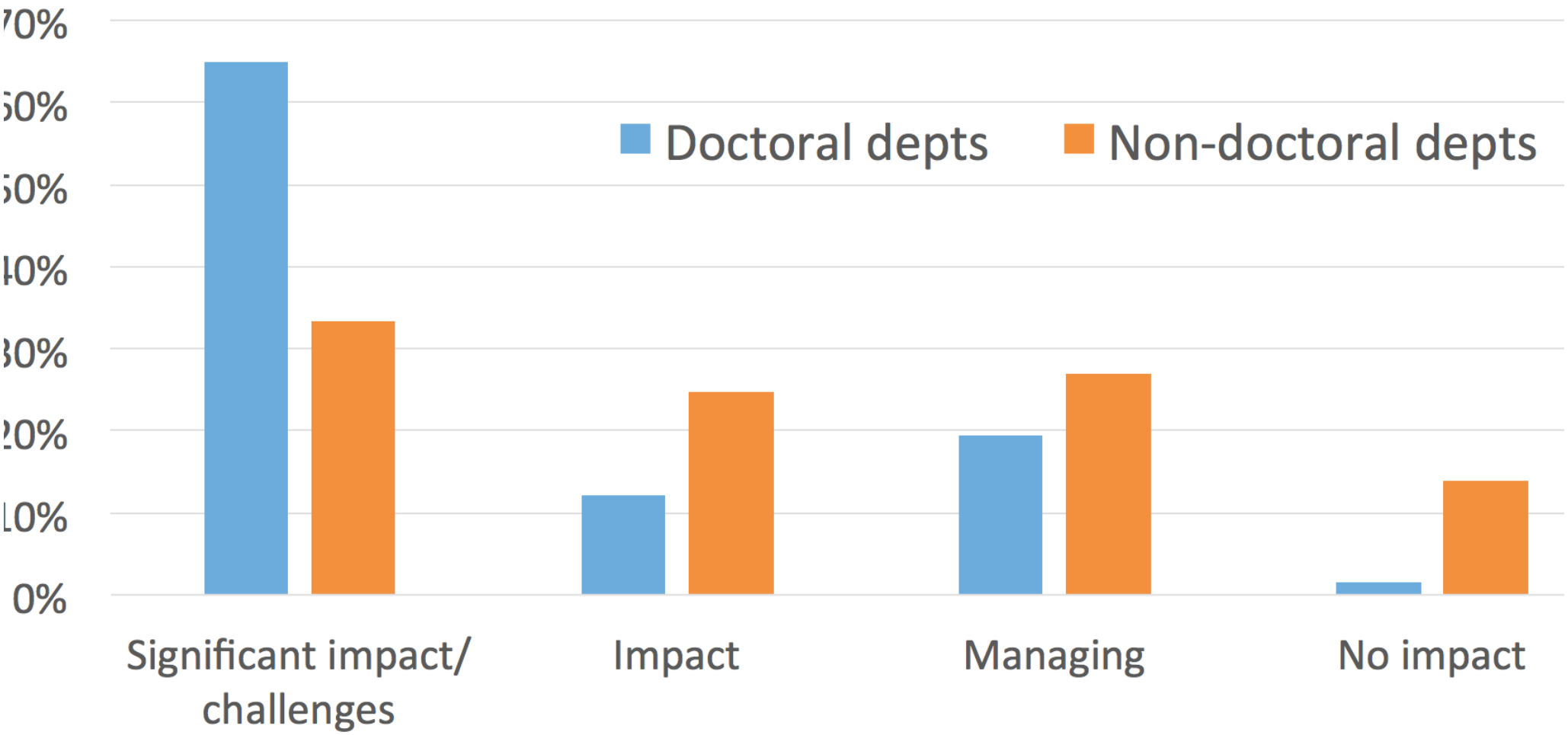
To what extent are increasing UG enrollments impacting your unit?



TOP 5 Issues

Top 5 Issues

#1 - Classroom Space (77%)

#2 - Sufficient Faculty (69%)

#3 - Sufficient TAs (67%)

#4 - Faculty Workload (61%)

#5 - Office/Lab Space (55%)

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TOP 5 Actions

Top 5 Actions

#1 - Increase class size (87%)

#2 - Increase # of sections (84%)

#3 - Increase use of UG TAs (77%)

#4 - Increase adjuncts/visitors (69%)

#5 - Have grad students teach (68%)

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Top 5+1 Actions

#1 - Increase class size (87%)

#2 - Increase # of sections (84%)

#3 - Increase use of UG TAs (77%)

#4 - Increase adjuncts/visitors (69%)

#5 - Have grad students teach (68%)

#6 - Increase teaching faculty (65%)

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Bottom 5 Actions

Bottom 5 Actions

#1 - Increase buyout costs
or reduce buyouts (8.6%)

#2 - Spin off service courses (8.9%)

#3 - Raise bar for doing well in course (11%)

#4 - Increase teaching load (20%)

#5 - Increase online courses (21%)

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Diversity

What % of units explicitly *chose* actions to assist with diversity goals?

15%

These units have a *consistently* higher % of females enrolled per Taulbee 2015 and across all four courses in our survey.

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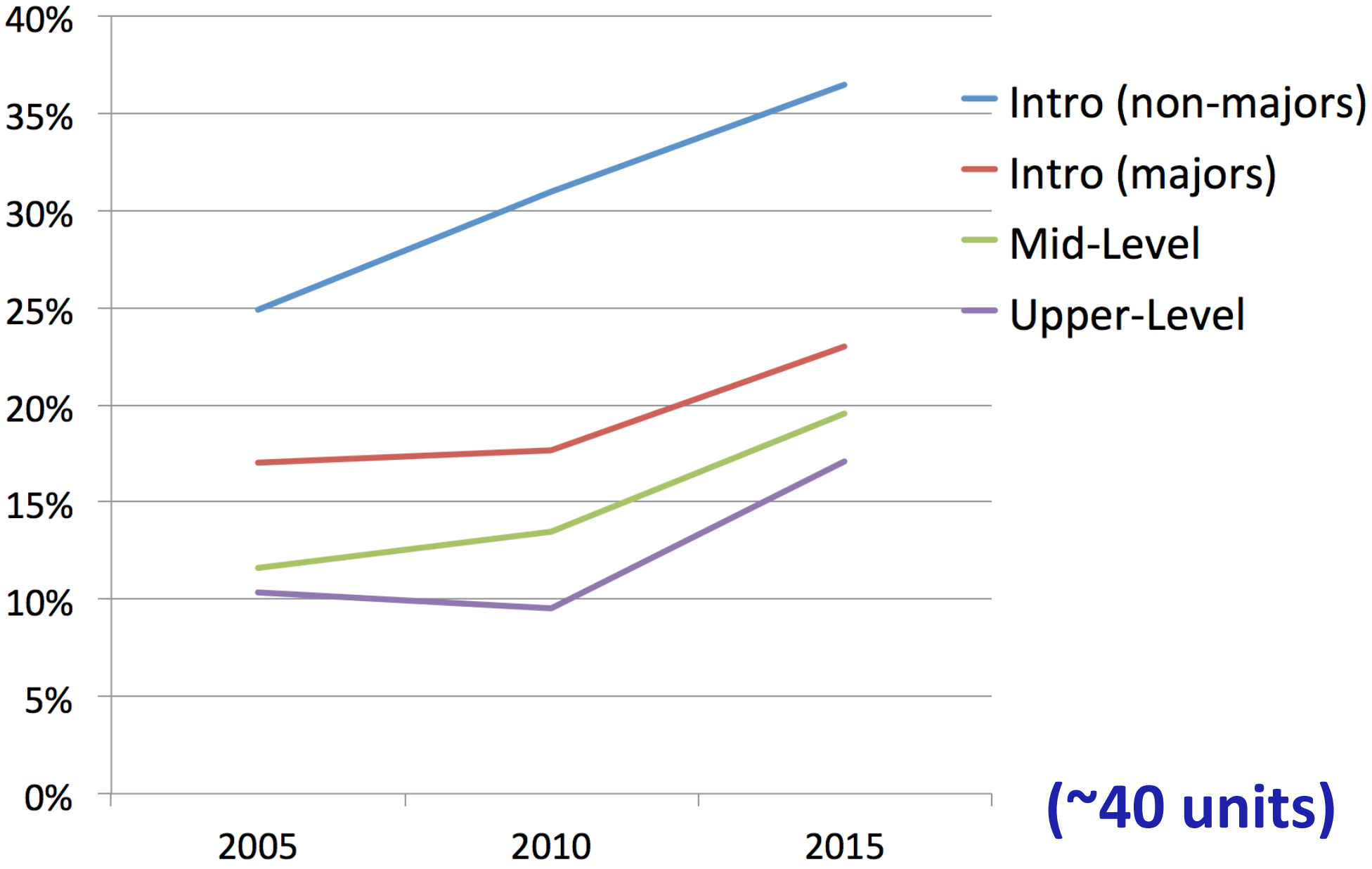
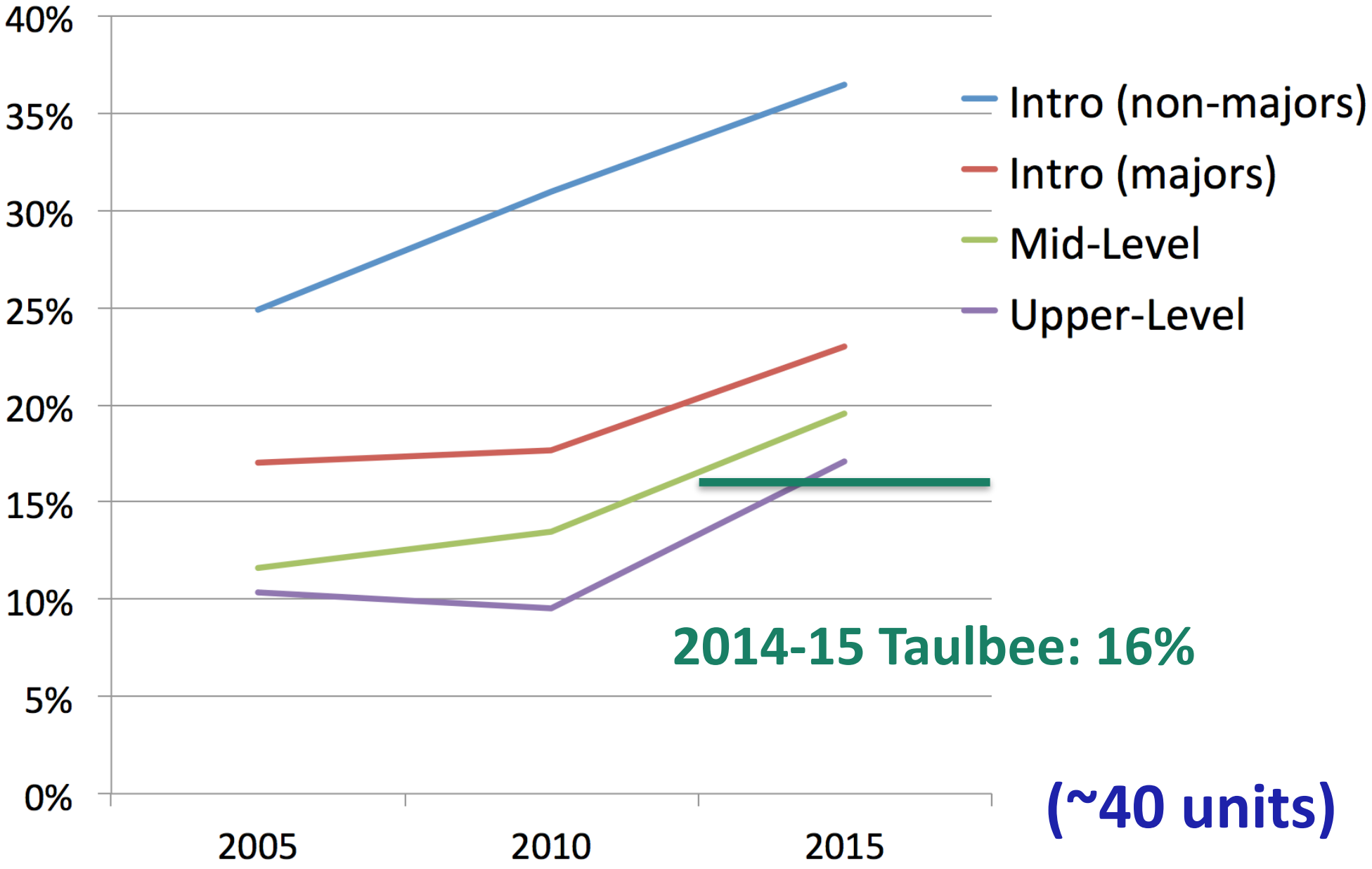
% female in courses surveyed (2005-2015)



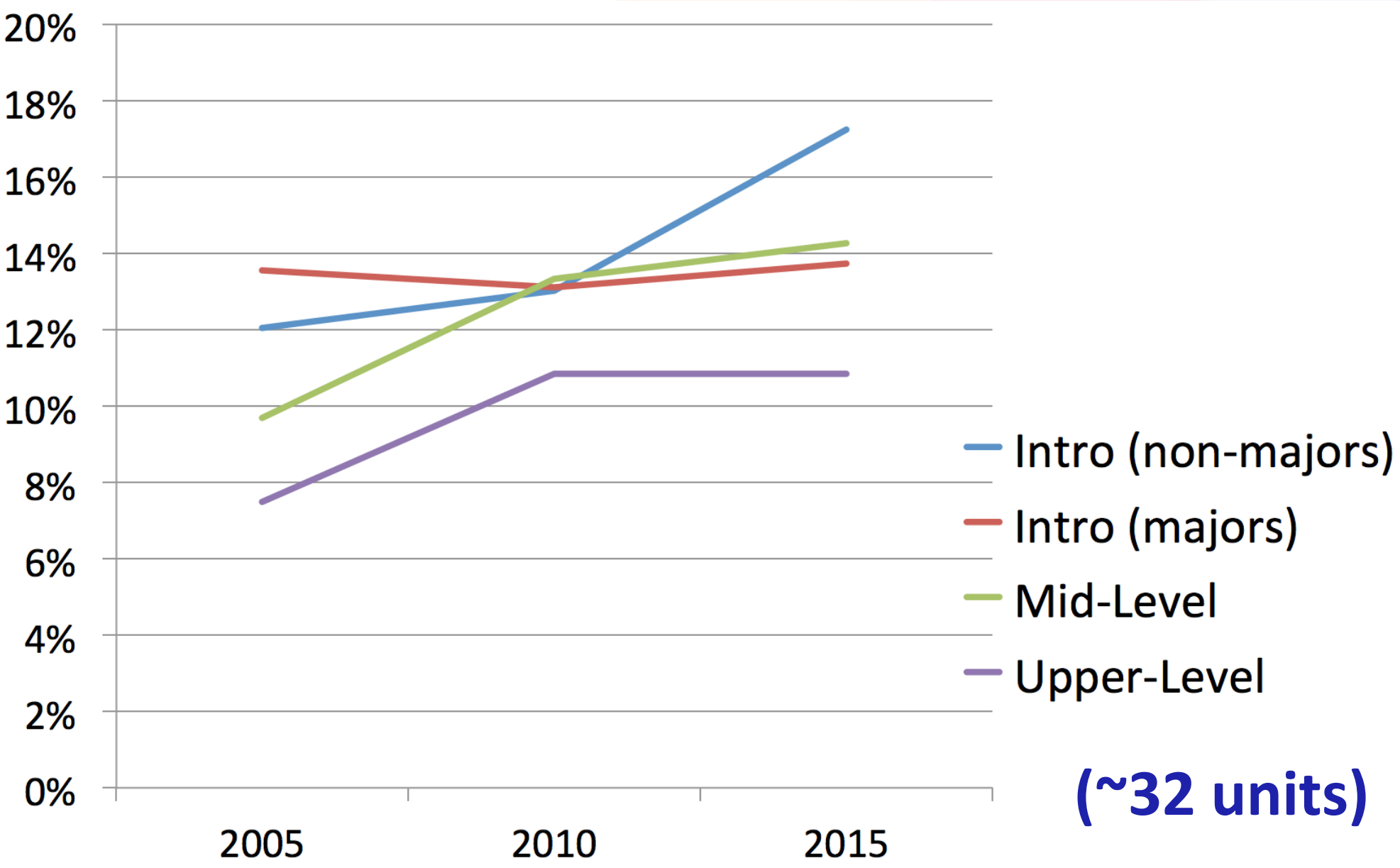
(~40 units)

% female in courses surveyed (2005-2015)



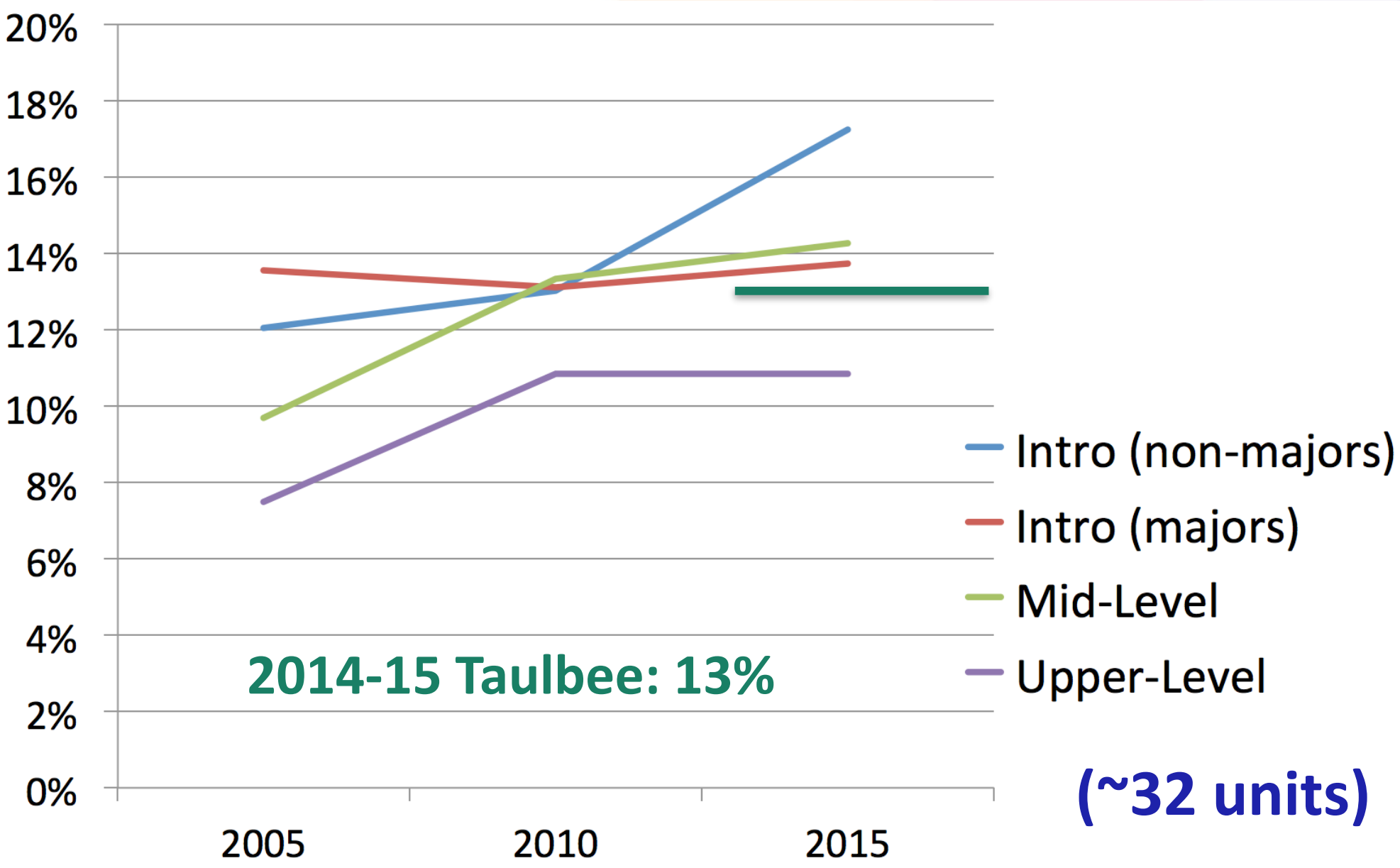
(~40 units)

% URM in courses surveyed (2005-2015)



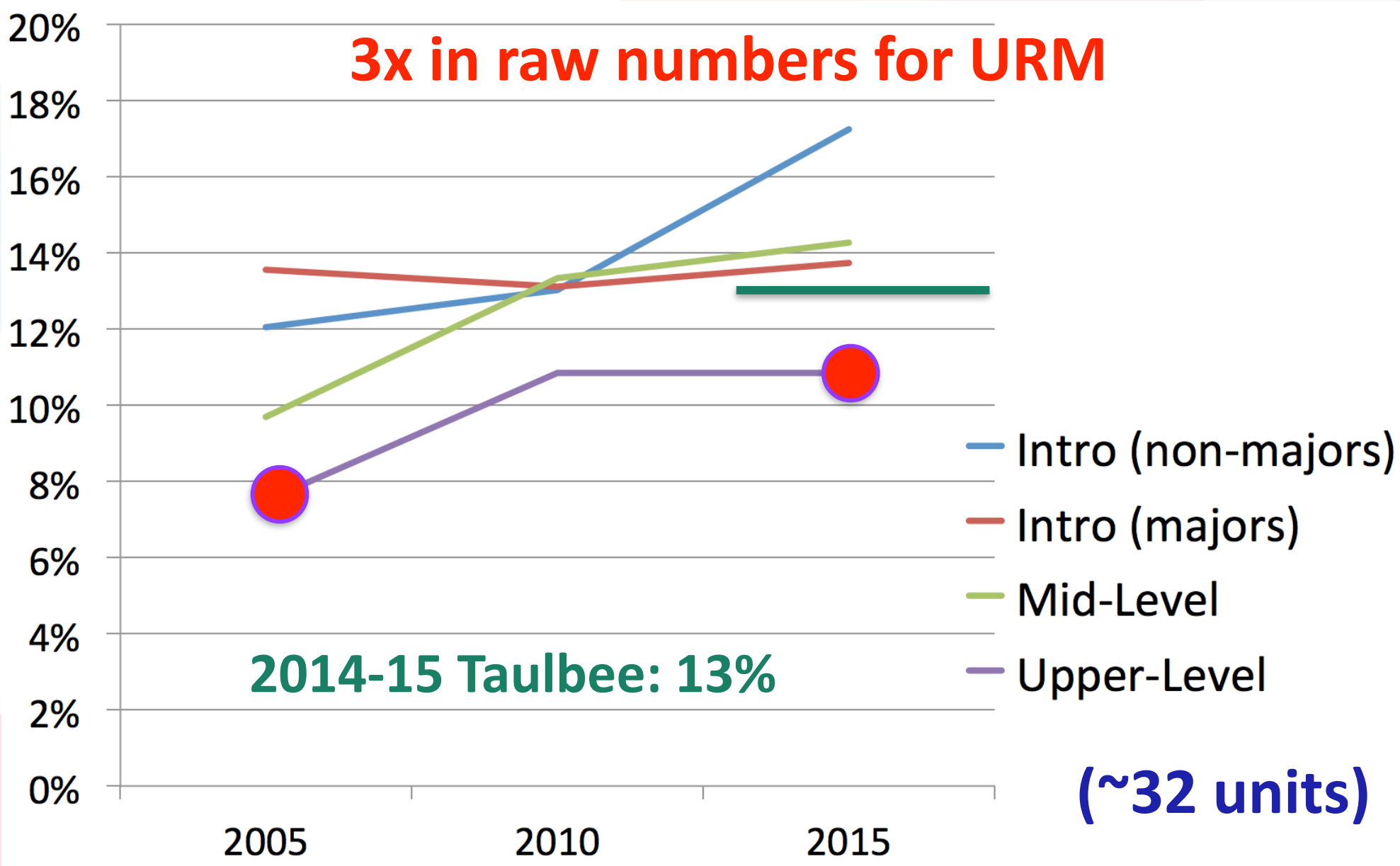
(~32 units)

% URM in courses surveyed (2005-2015)



(~32 units)

% URM in courses surveyed (2005-2015)

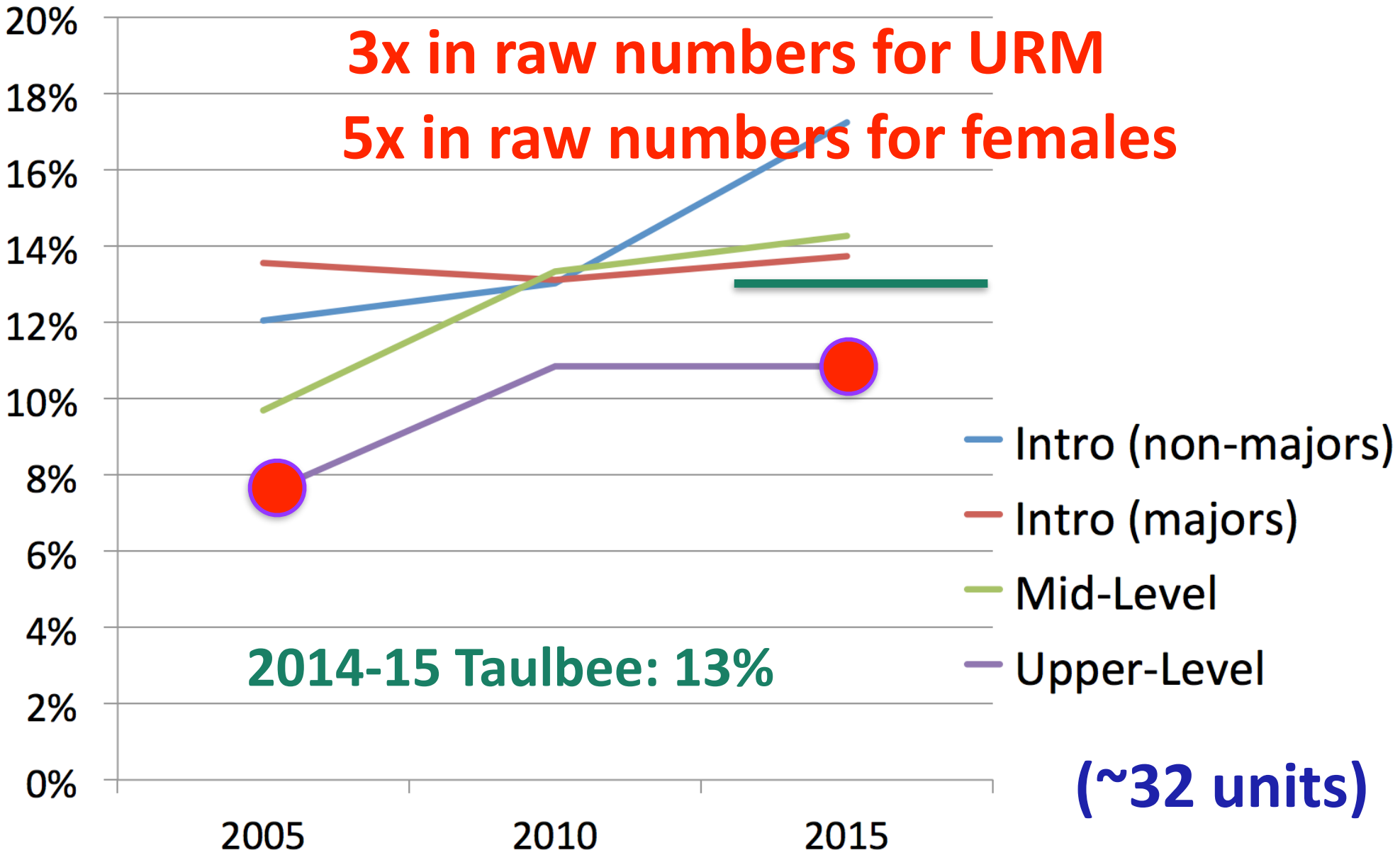


% URM in courses surveyed (2005-2015)

2.5x in raw numbers for all

3x in raw numbers for URM

5x in raw numbers for females



(~32 units)

Questions for Institutions

➔ Questions for Students

CRA COMMITTEE: STUDENT

Duncan Buell (South Carolina)
Tracy Camp (Mines)
Ed Lazowska (UW)
Leen-Kiat Soh (Nebraska)
Jodi Tims (Baldwin Wallace)

Jane Stout (CRA)
Lida Beninson/Jan Cuny (NSF)

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CERP

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Evaluation

Center for Evaluating the Research Pipeline

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CERP

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Evaluation

Fall 2015 Student Survey

N = 9721 took survey

N = 2563 students in intro to CS course

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Why did you enroll in an intro CS course?
for students who are NOT CS major/minor

	Non-major/ minor (N=405)		
It was required for my major/minor	64%		
Curiosity/interest in computers	54%		
A teacher/mentor encouraged me	13%		
My parents encouraged me	6%		

Why did you enroll in an intro CS course?
for students who are NOT CS major/minor

	Non-major/ minor (N=405)	White/Asian Students (N=324)	URM Students (N=81)
It was required for my major/minor	64%	62%	74%
Curiosity/interest in computers	54%	56%	43%
A teacher/mentor encouraged me	13%	**15%**	**3%**
My parents encouraged me	6%	7%	1%

significantly different, p <= 0.05

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Evaluation

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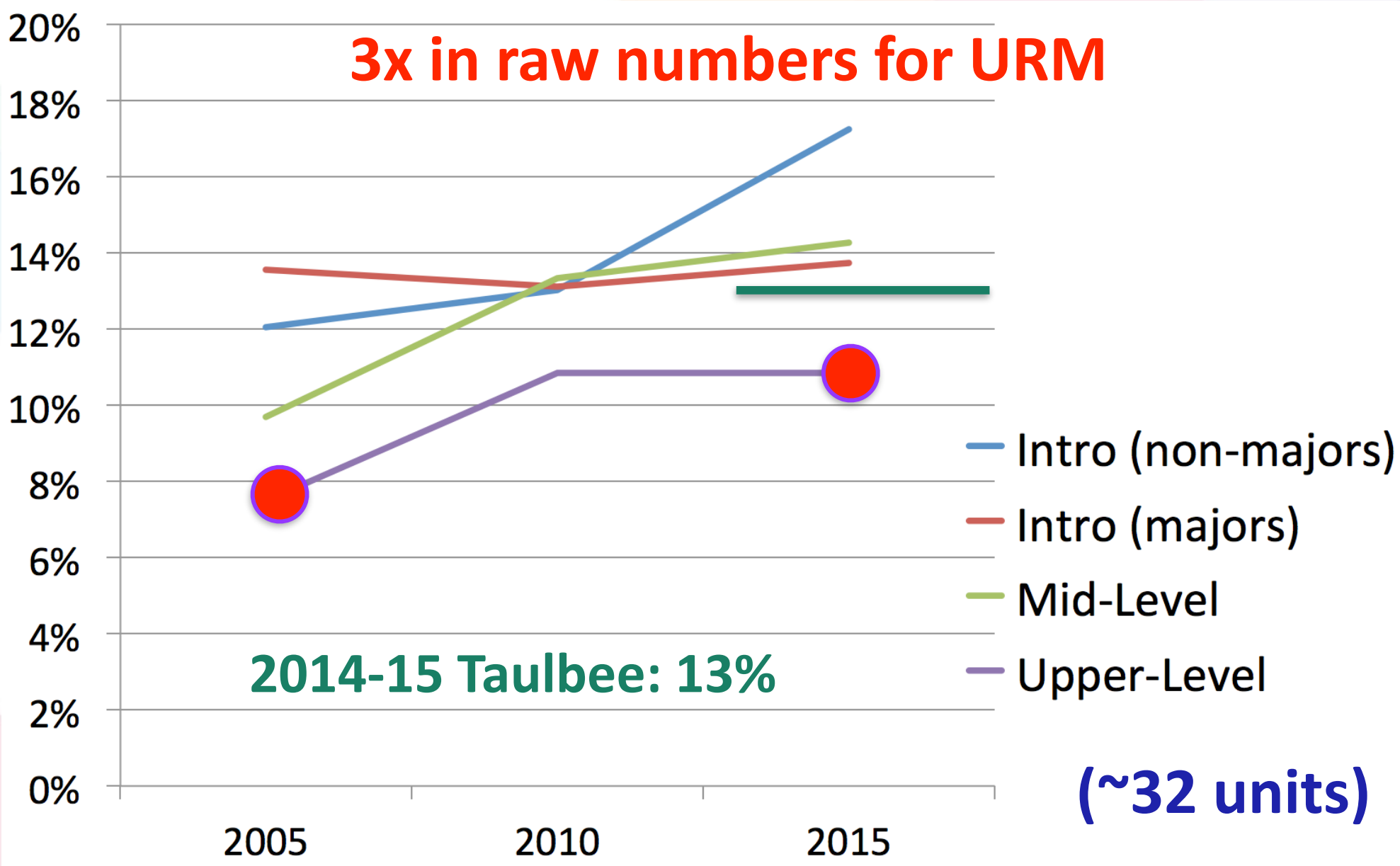
% URM in courses surveyed (2005-2015)



Data Analysis
PRELIMINARY!!

Questions for Institutions

Questions for Students

Are we in a boom or are we in a new era?

What should we call this enrollment surge?

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CSinAll Era? CSinAll Boom?

Centrality of Computing

CompUbiquity

Mobile Big Data ????

Please email me (Tracy Camp) OR Betsy Bizot OR leave suggestion at CRA table.

Vote in post-Snowbird survey!

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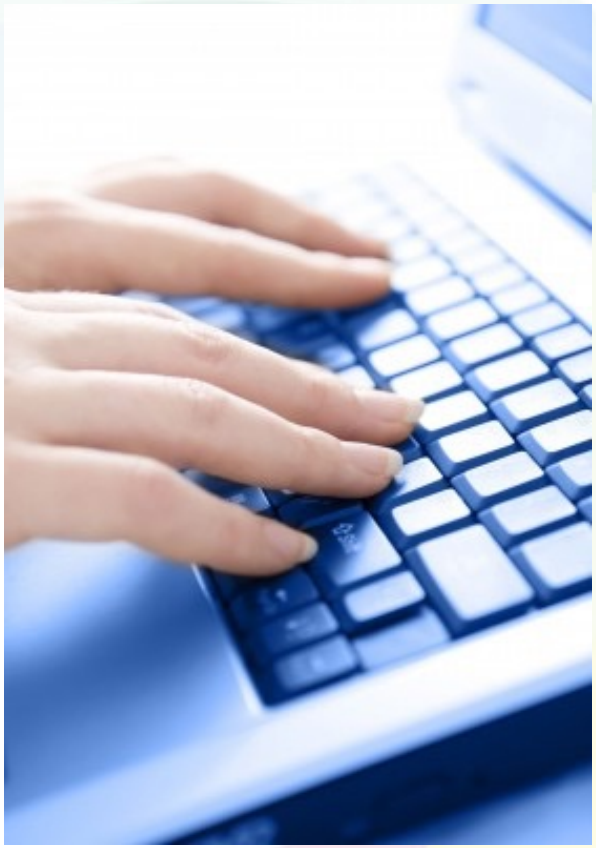
Plans

CRA COMMITTEE



Goal: finish report by early Fall 2016

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NATIONAL ACADEMIES

Committee on Growth of
CS Undergraduate Enrollments

http://sites.nationalacademies.org/CSTB/CurrentProjects/CSTB_171607

Chairs:

Jared Leigh Cohon (CMU)

Susanne Hambrusch (Purdue)

Staff:

Emily Grumbling, CSTB

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COMMITTEE MEMBERS

M. Brian Blake (Drexel)
Tracy Camp (Mines)
David Culler (UC Berkeley)
Susan Davidson (Penn)
Brian Fitzgerald (BHEF - **workforce**)
Ann Quiroz Gates (Texas-El Paso)
Charles Isbell (GATech)
Clas Jacobson (United Tech Corp - **workforce**)
Michael McPherson (Spencer Foundation - **economics**)
Eric Roberts (Stanford)
Valerie Taylor (Texas A&M)
Jodi Tims (Baldwin Wallace)
Sarah Turner (UVA - **economics**)

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NA COMMITTEE REPORT

Four working groups:

- Workforce and Degree Trends
- Institutional Strategies
- Diversity
- Non-CS majors

Workshop: August 15, 2016

Goal: finish report by end of year

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2016 SNOWBIRD

Booming Enrollments: Understanding the Surge

Impact on Department Practices (Ballroom 3)

Susanne Hambrusch (Purdue)

Stu Zweben (Ohio State)

Student Profiles/Motivations (Ballroom 2)

Tracy Camp (Mines)

Mary Hall (Utah)

Programs for High Achieving Students (Ballroom 1)

Nancy Amato (Texas A&M)

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