Industry/University Cooperative Research Centers

Highlights of Process/Outcome Data

FY 2013-2014

IUCRC Evaluator's Meeting

June 11, 2014

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Overview

Industry/University Cooperative Research Centers

- Response rate
- Industry Findings
- Faculty Findings
- Industry's Economic Impact Findings

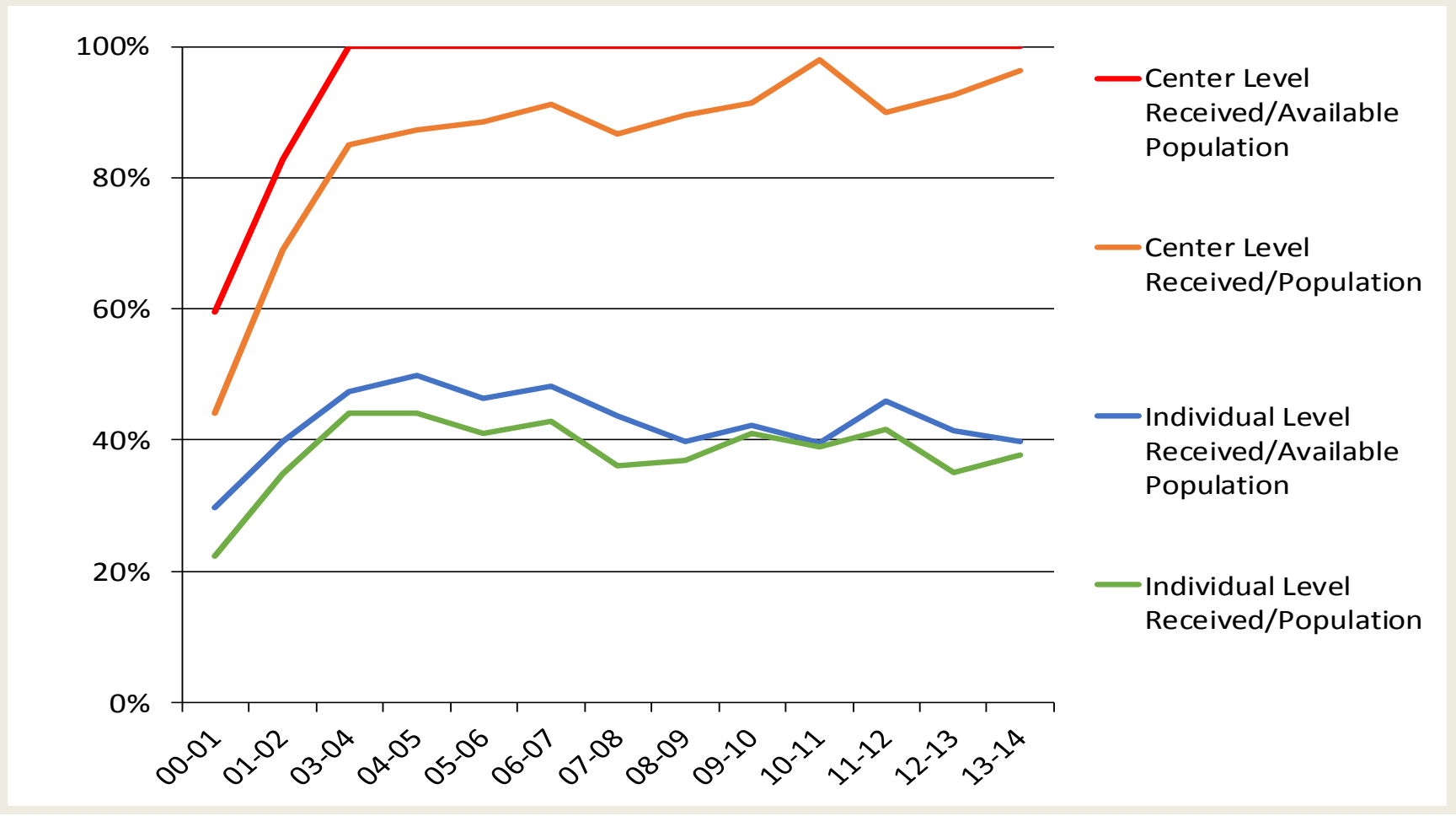
Process/Outcome
2013-2014 Response Rates

Industry/University Cooperative Research Centers

Category	Center Level		Individual Level	
	Industry	Faculty	Industry	Faculty
Response Frequency				
Continuing Population from CD report	66	66	1177	998
1st Year Reporting Population from CD report	+1	+0	+24	+0
Retired/Defunct Centers	7	7	73	92
Retired/Defunct Centers Reporting[a]	+0	+0	+0	+0
Phase III Centers Exempt	5	5	106	121
Phase III Centers Reporting[b]	+1	+2	+17	+25
Population [c]	56	56	1039	810
Centers Excused from Evaluation[d]	0	2	0	9
Centers that did not return data	2	12	54	142
Available Population[e]	54	42	985	659
Data Received	54	42	391	290
Received / Population	96.43%	75.00%	37.63%	35.80%
Received / Available Population	100%	100%	39.70%	44.01%

Industry Response Rate

Industry/University Cooperative Research Centers



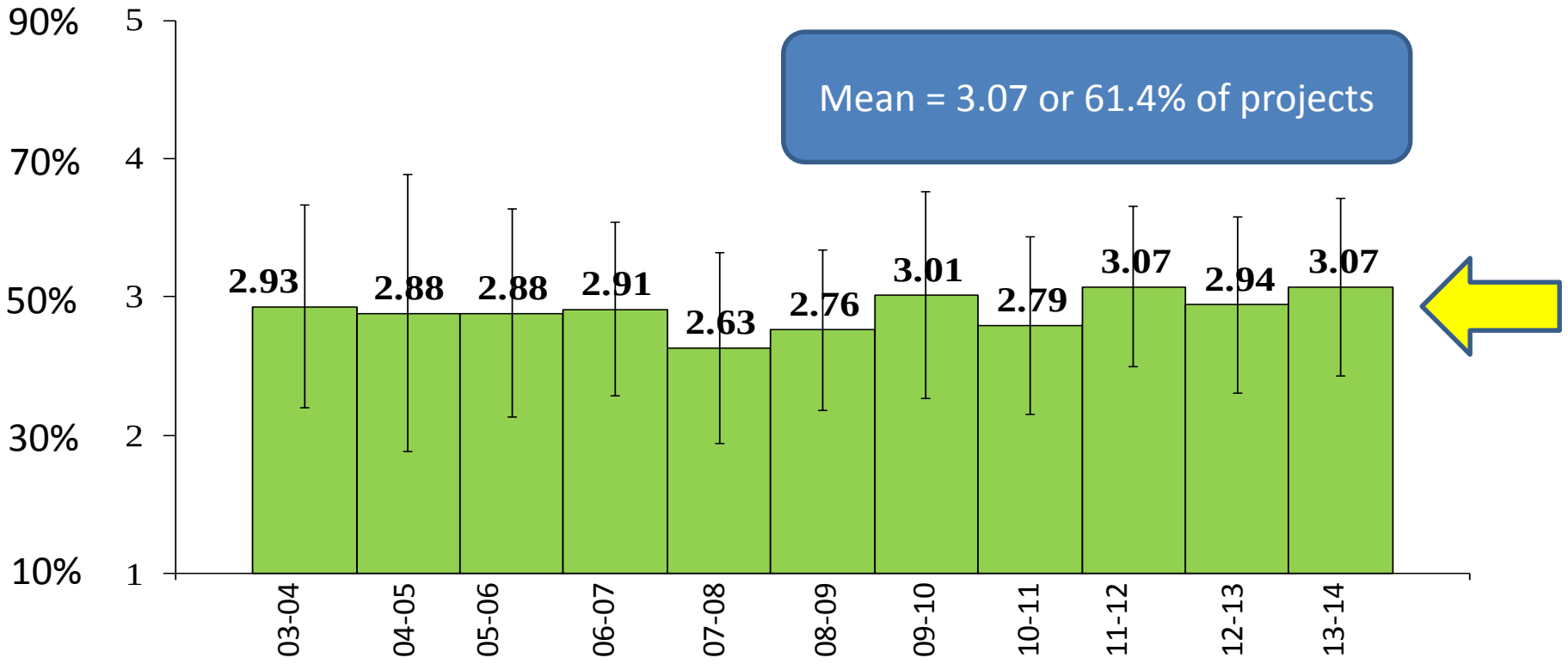
Industry/University Cooperative Research Centers

Industry Questionnaire

Select Results

Q1a: What percentage of the Center's currently funded research projects do you consider relevant to your organization's current or future R&D needs?*

Industry/University Cooperative Research Centers

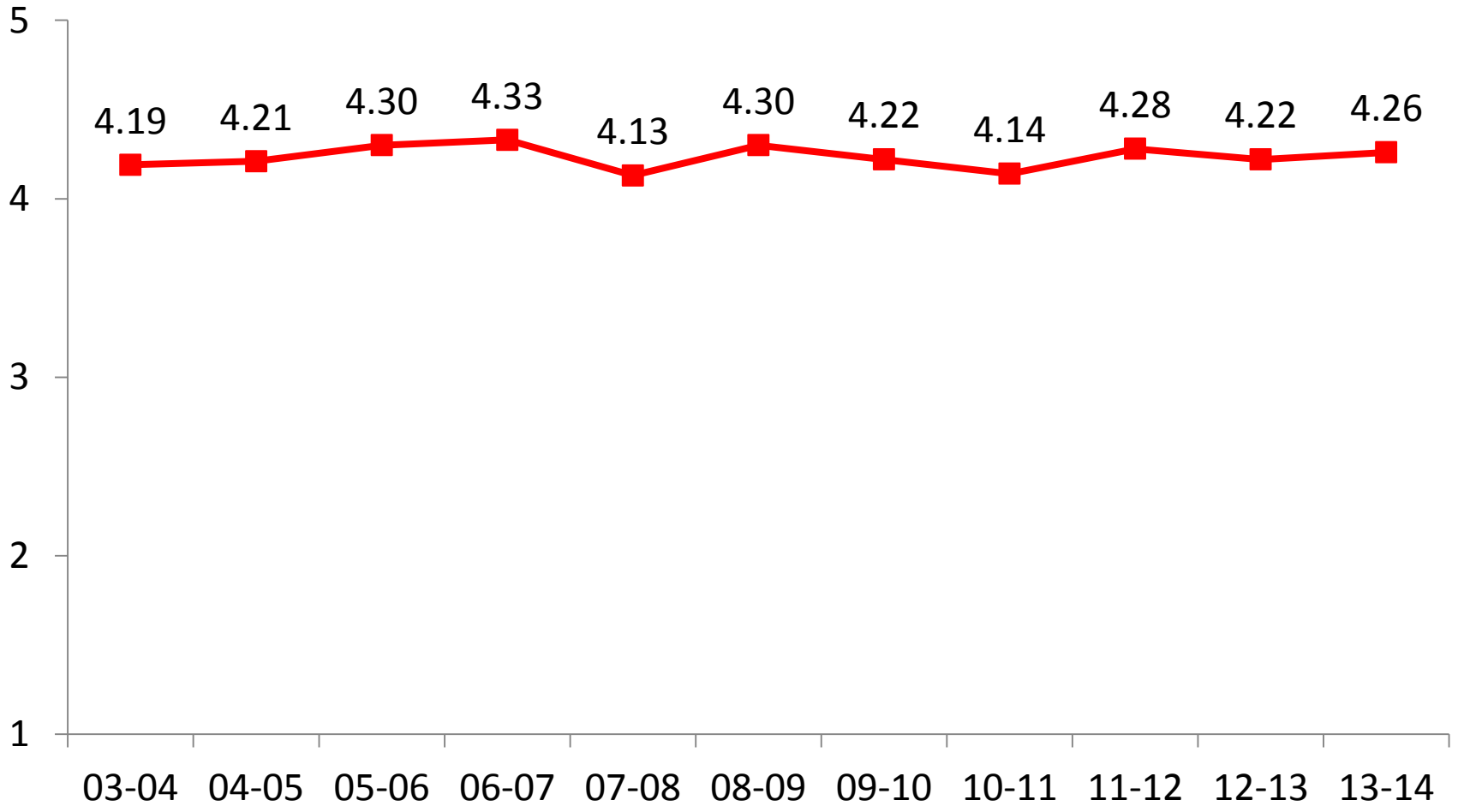


percentage values on y-axis represent midpoint of response range

*Previous version of this question asked % of projects in which you take an active interest

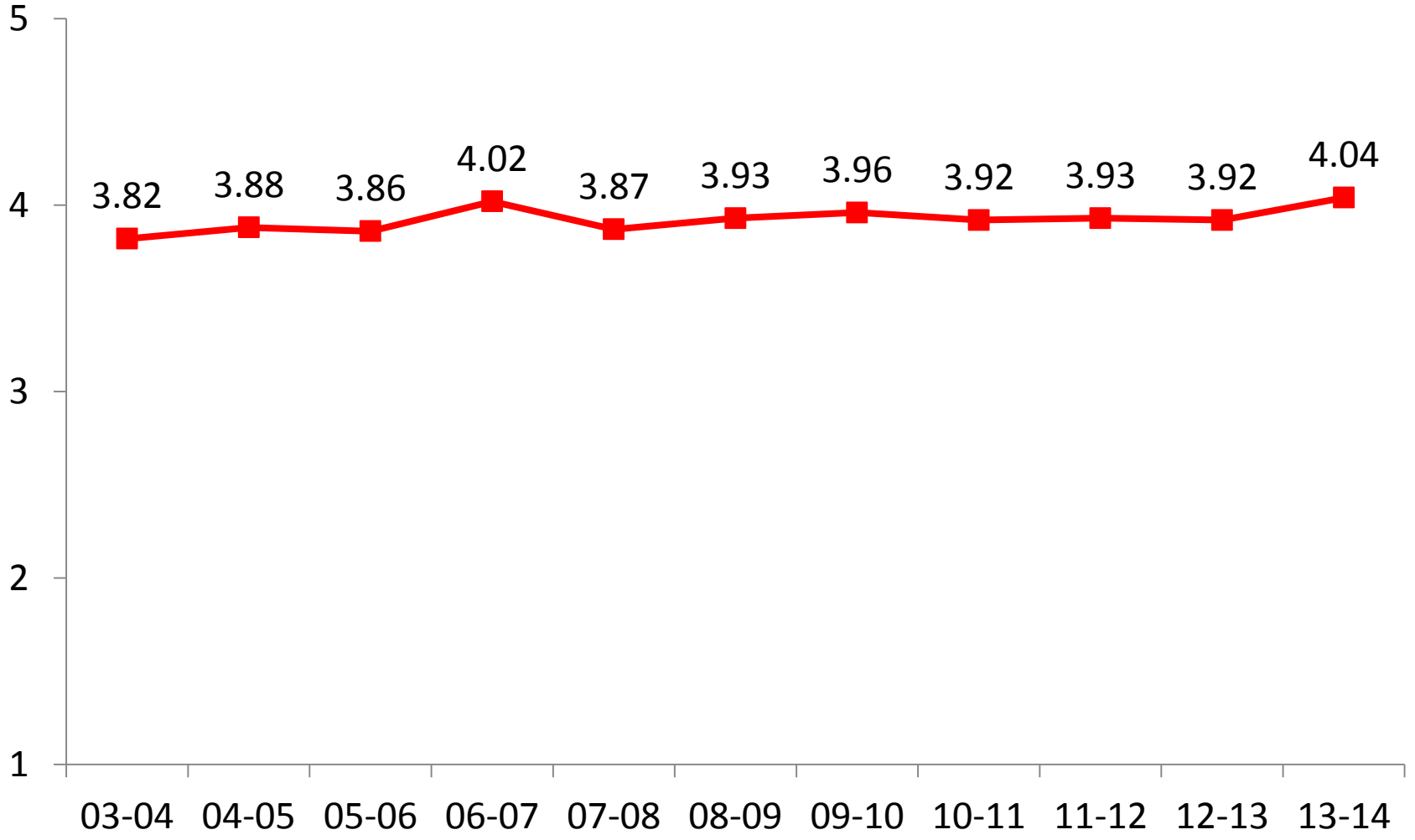
Q2a: During the past year, how satisfied were you with the capabilities of the researchers and quality of the research program?

Industry/University Cooperative Research Centers



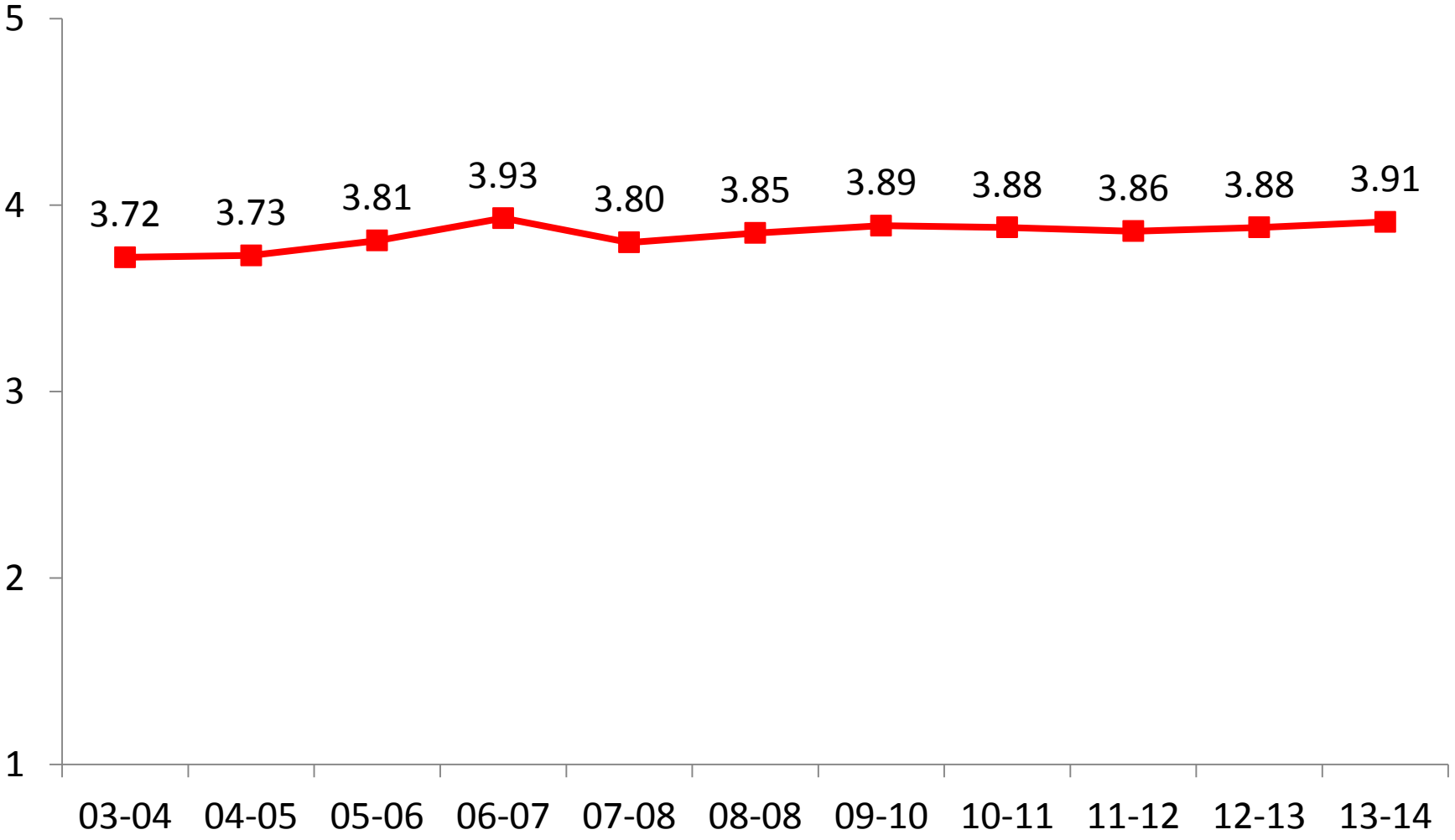
Q2b: During the past year, how satisfied were you with the Center's breadth of research topics covered?

Industry/University Cooperative Research Centers



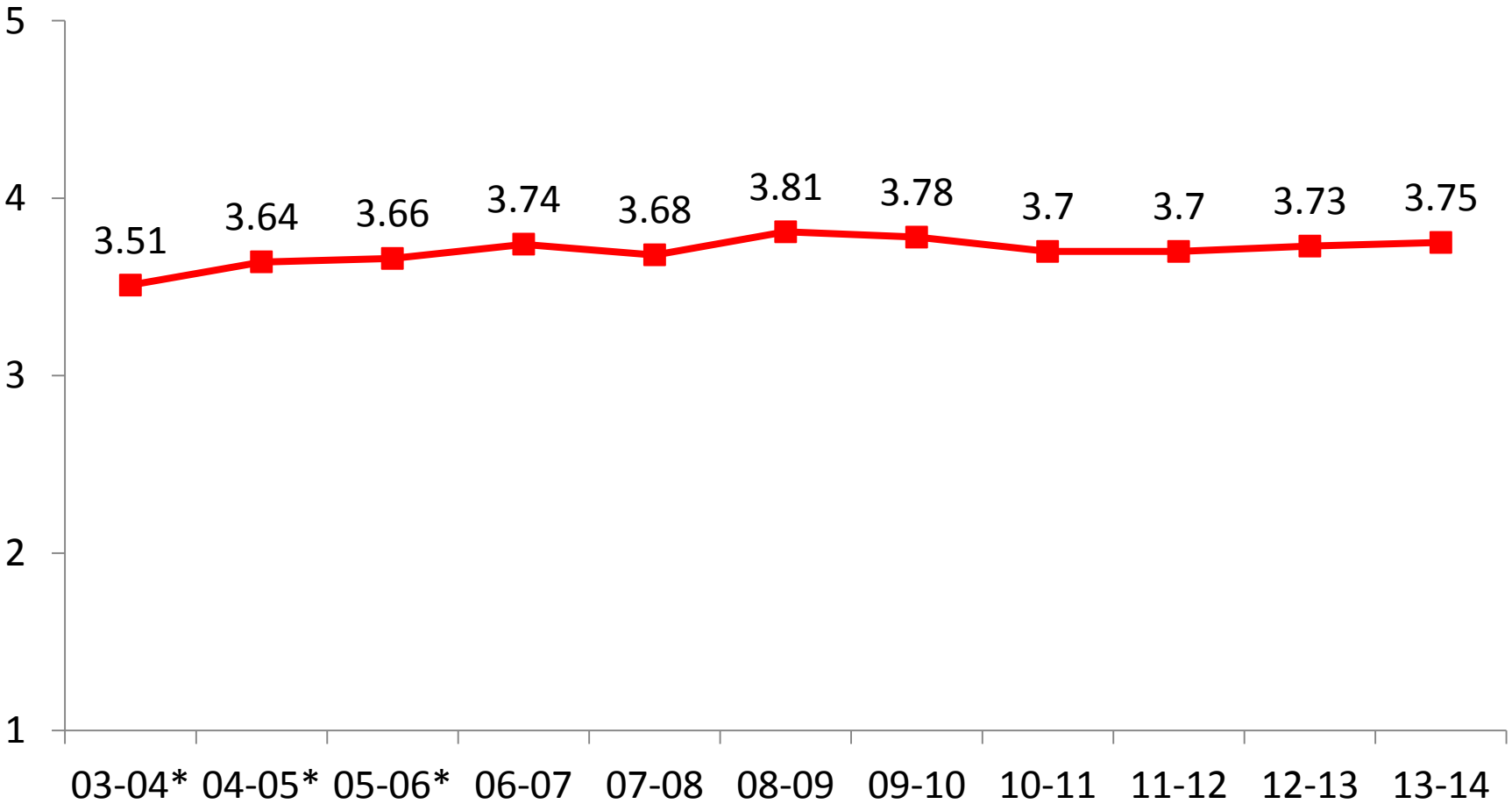
Q2c: During the past year, how satisfied were you with the Center's focus of the research?

Industry/University Cooperative Research Centers



Q2d: During the past year, how satisfied were you with relevance of the research to my organizations needs?

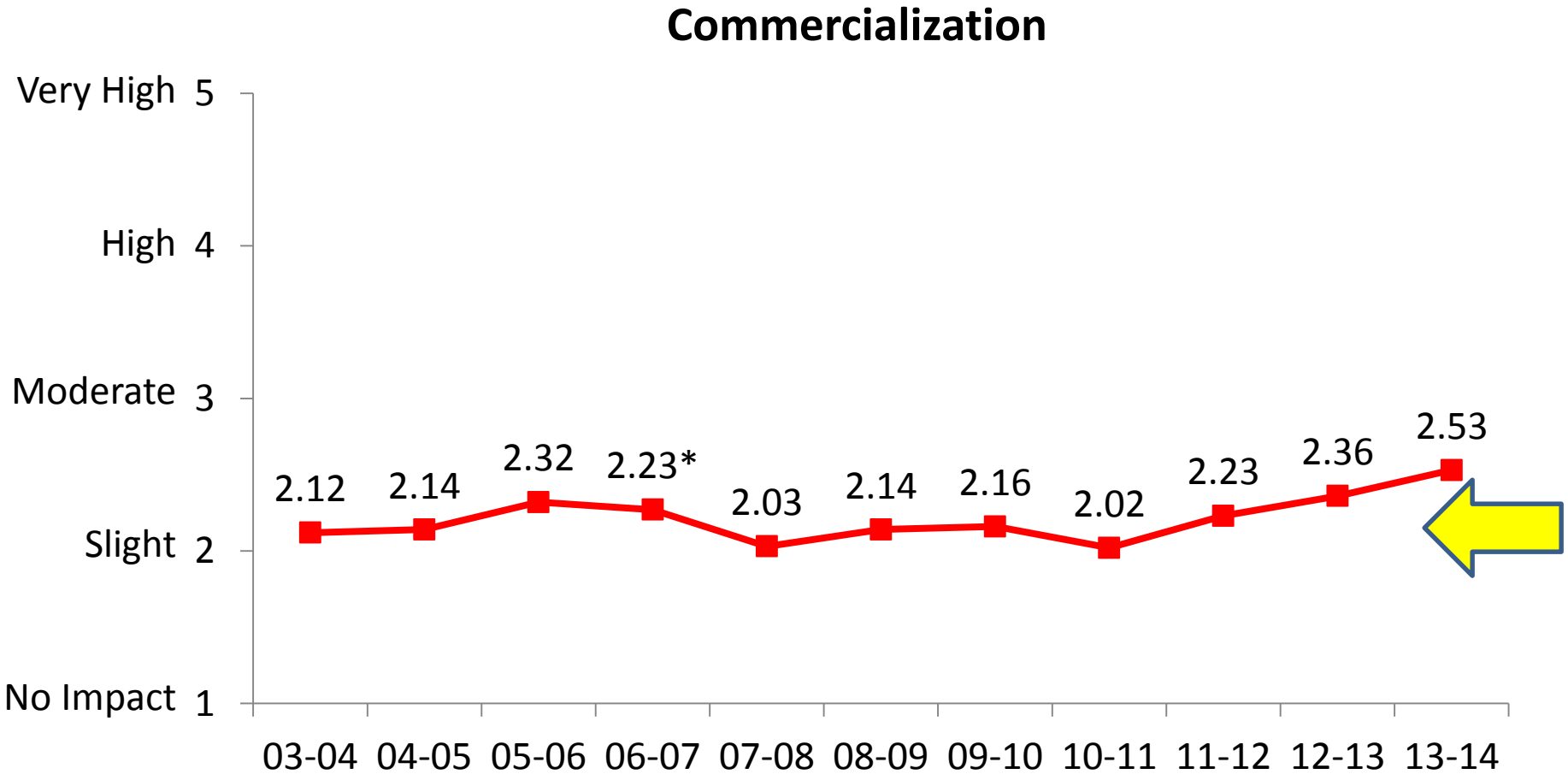
Industry/University Cooperative Research Centers



*Prior to 06 respondents were asked separately about relevance to short and long term needs. Means reported for those years are the average of the 2.

Q6a: During the past year, to what extent has participation in the Center contributed to the following benefits for your organization?

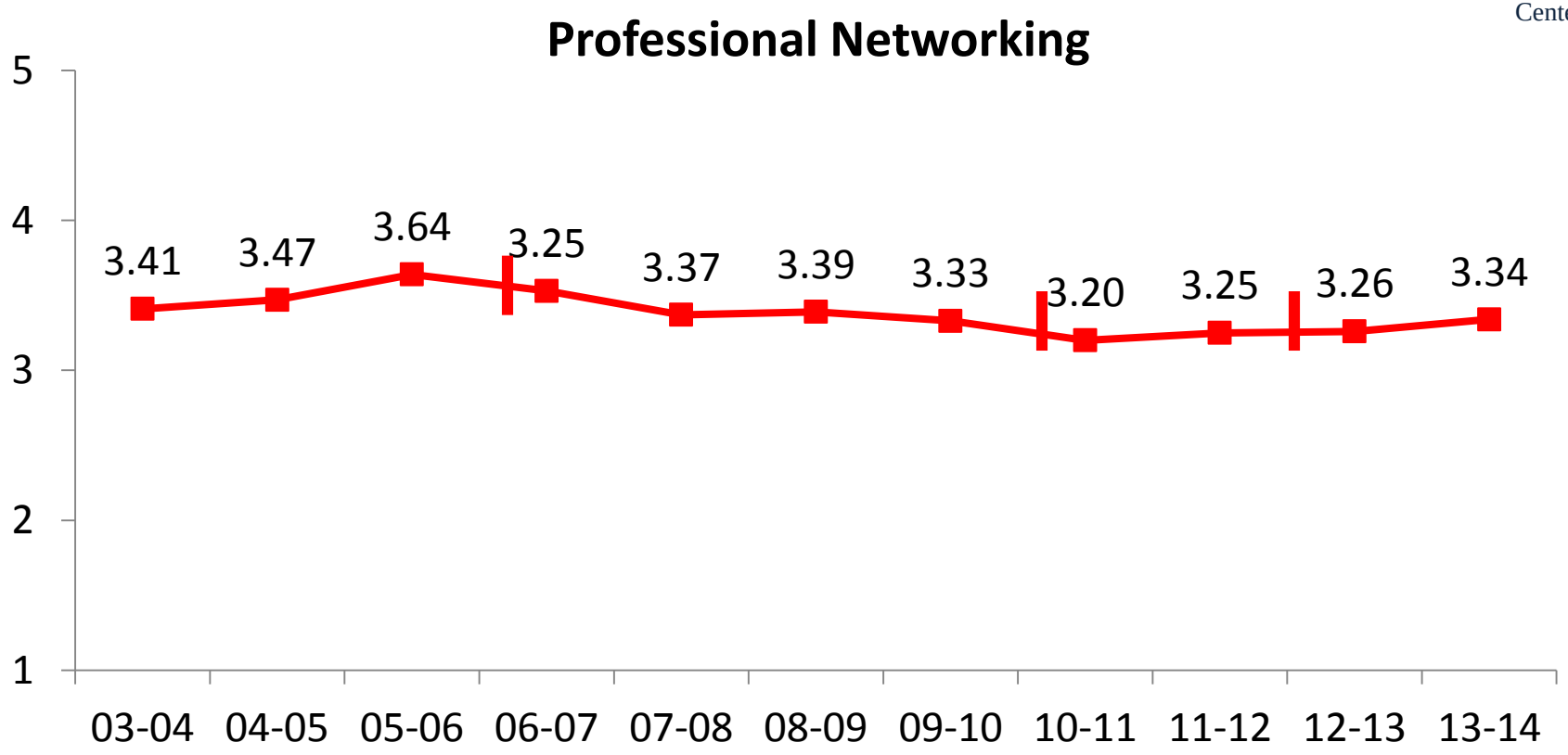
Industry/University Cooperative Research Centers



*Question modified to include new technical knowledge and intellectual property resources

Q4a: During the past year, to what extent has participation in the Center contributed to the following benefits for your organization?

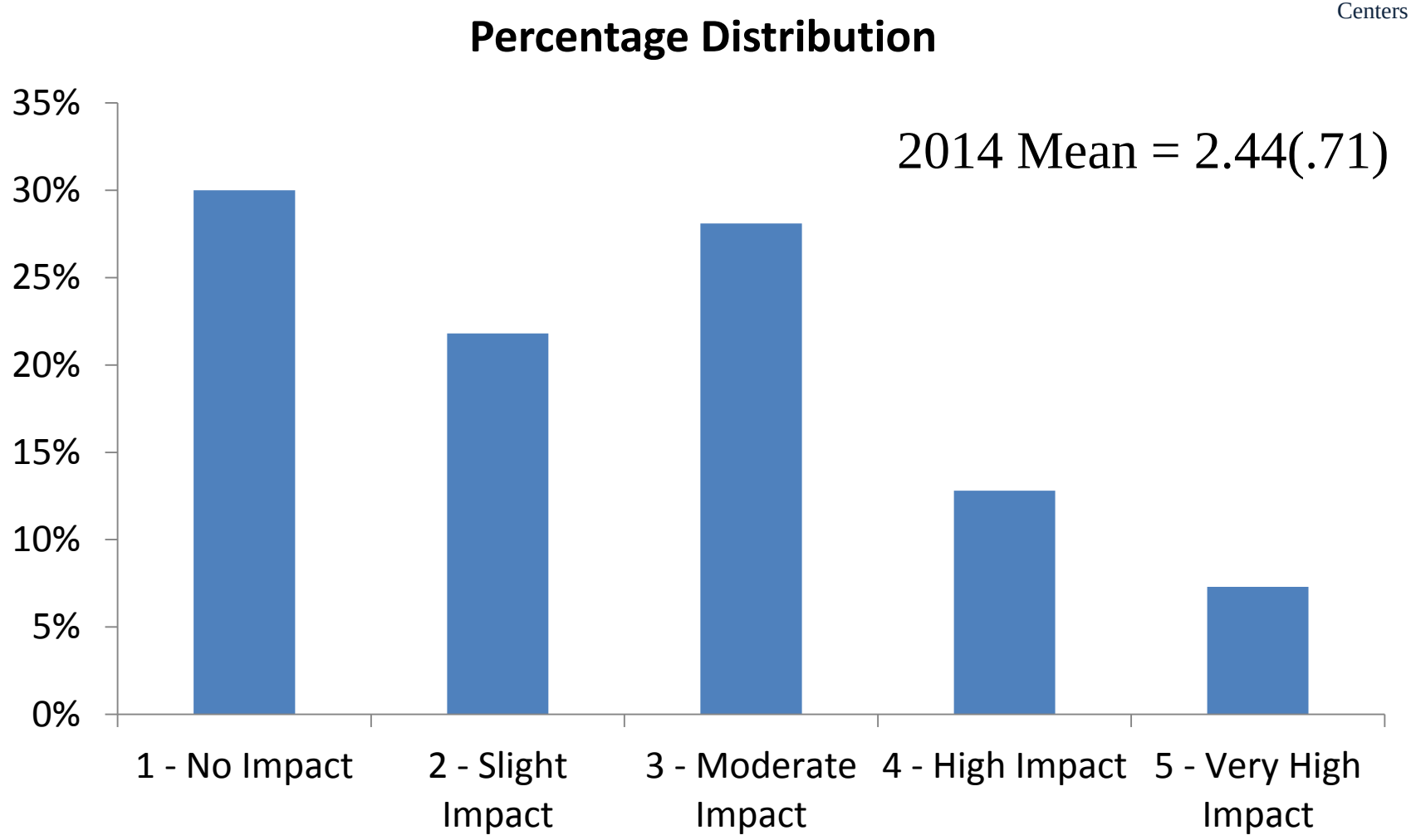
Industry/University Cooperative Research Centers



*Question changed from "Enhanced via improved ability to recruit students, increased cooperation with other industrial members and scientists outside my organization" (2007-2011) to "Enhanced via ability to network and build scientific capacity via cooperation with industry and university scientists …" (2012) to "Enhanced cooperation and networking with industry and university scientists …" (2013).

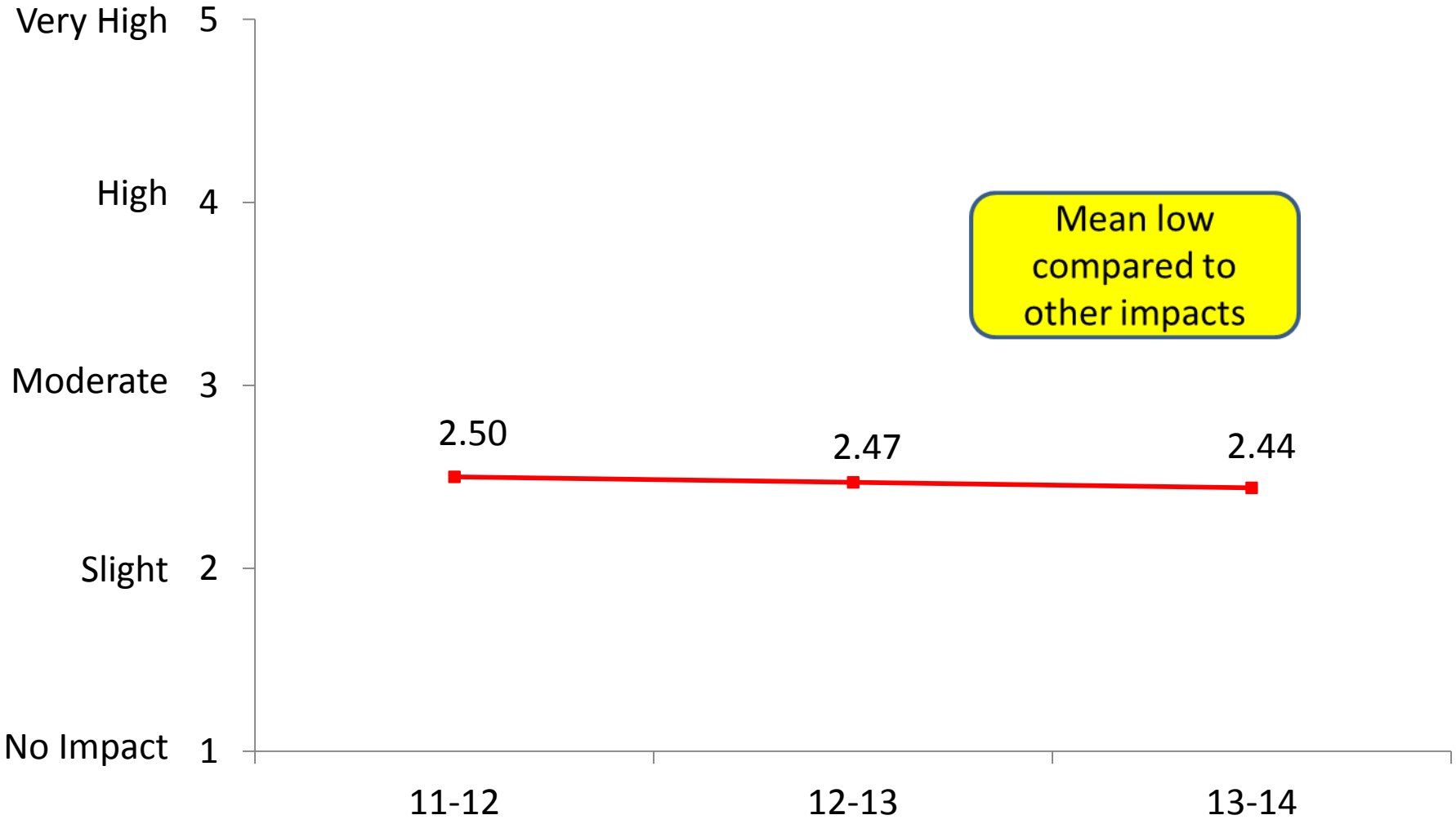
Q4b. Enhanced ability to identify and recruit well-qualified graduate students.

Industry/University Cooperative Research Centers



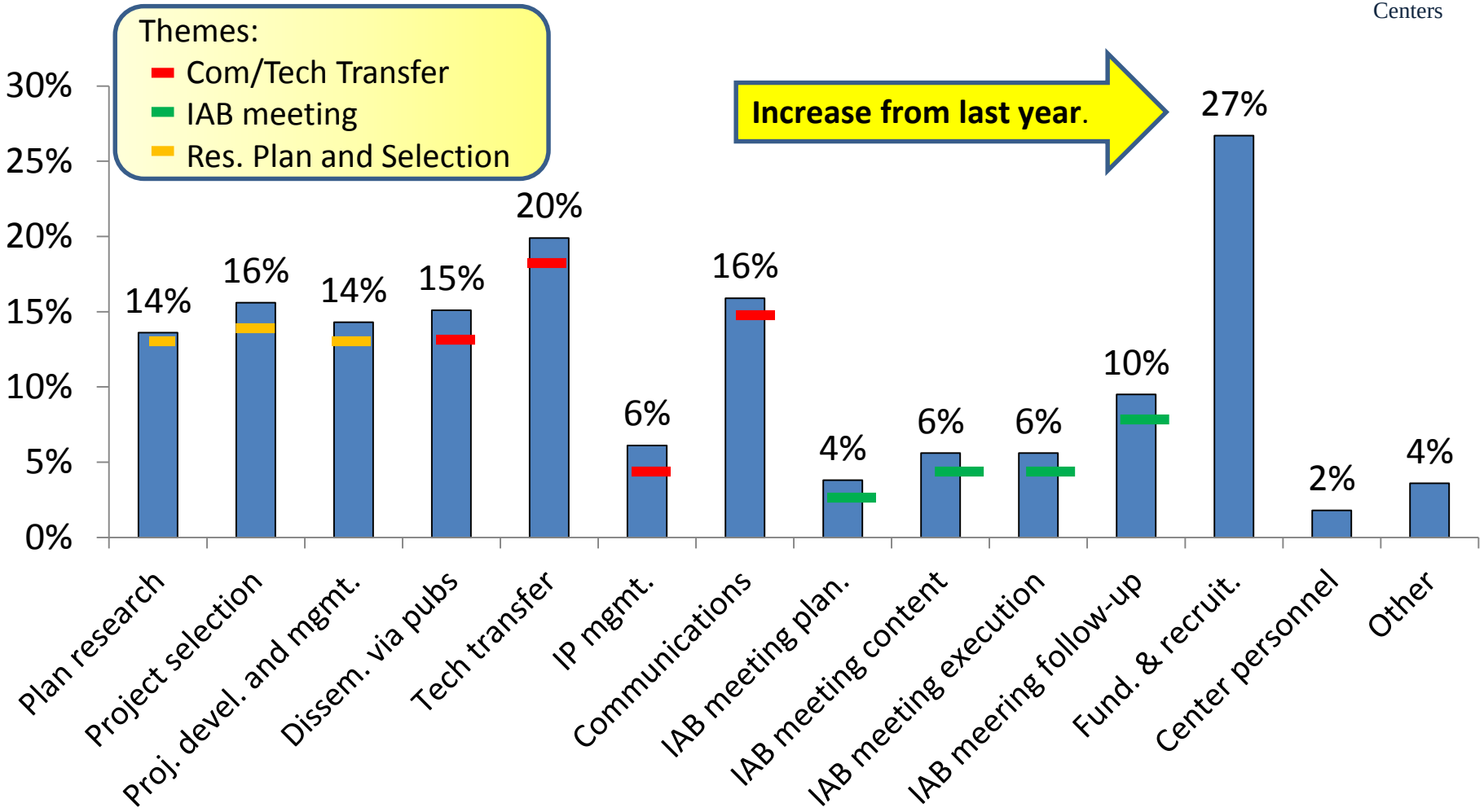
Q4b. Enhanced ability to identify and recruit well-qualified graduate students.

Industry/University Cooperative Research Centers



Q8. How can the Center improve it's administration and operations? Please mark areas that need improvement.

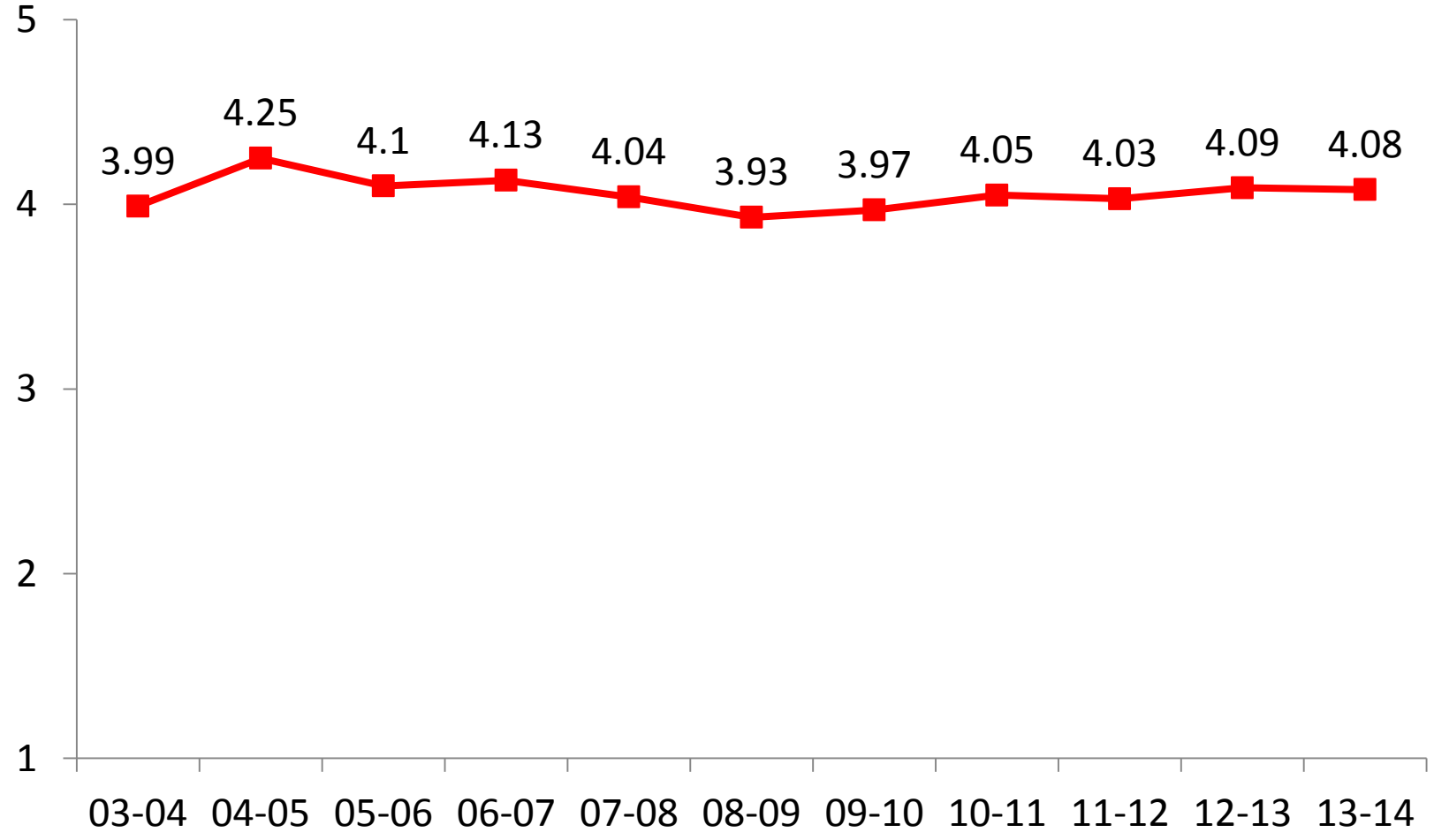
Industry/University Cooperative Research Centers



*Respondents were encouraged to check as many boxes as applied. Therefore, the percentage across all items may total to greater than 100%.

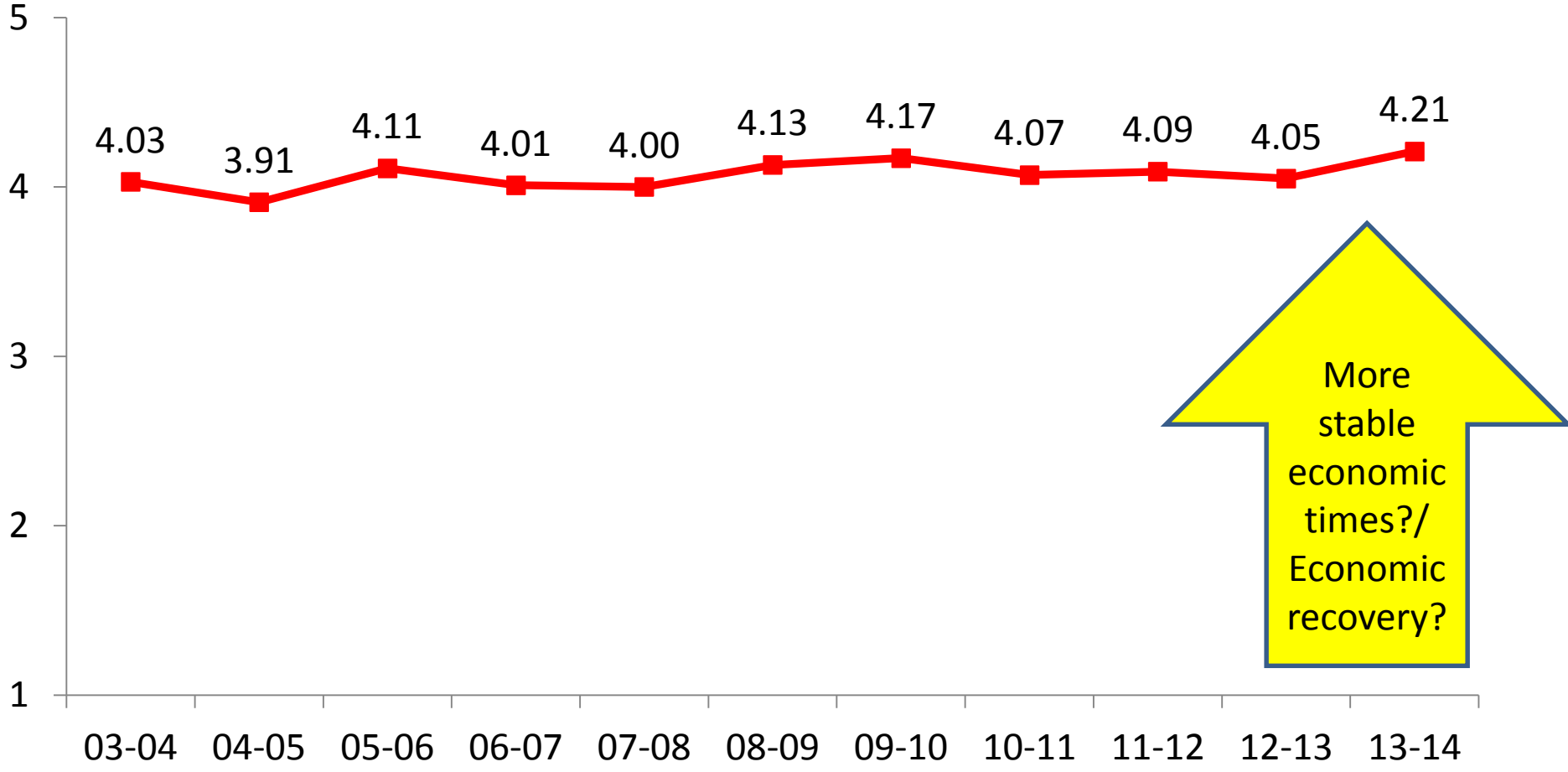
Q7: During the past year, how satisfied were you with center administrative operations?

Industry/University Cooperative Research Centers



Q9: Will your organization renew its membership?

Industry/University Cooperative Research Centers

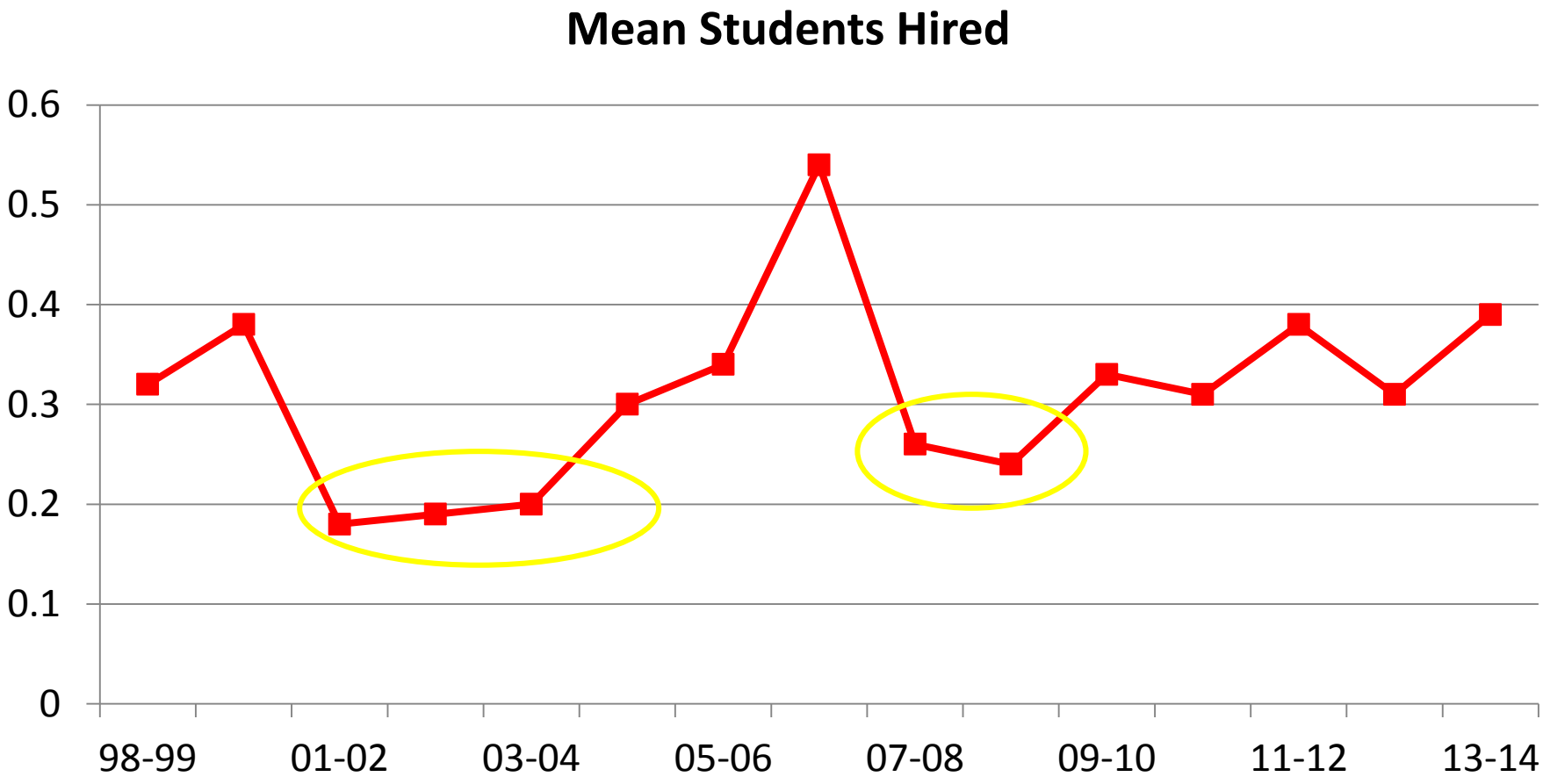


Industry/University
Cooperative Research
Centers

Students Hired

Q4c: During the past year, how many students trained in the Center projects were hired by respondent organization?

Industry/University Cooperative Research Centers



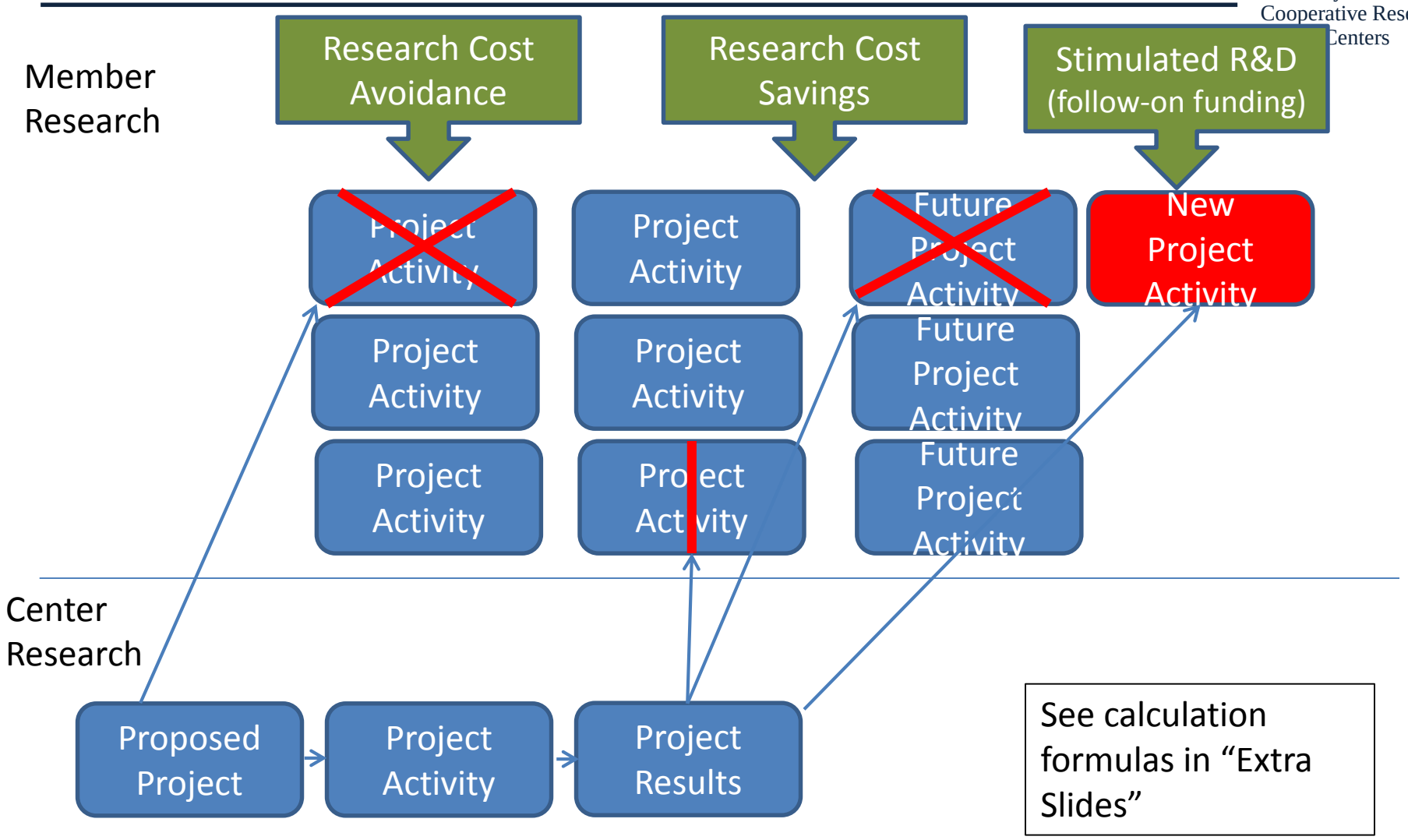
Note: 2002-2003 data based on subset of Centers

Industry/University
Cooperative Research
Centers

Research Economic Impact Metrics

Defining Research Efficiency Measures

Industry/University Cooperative Research Centers

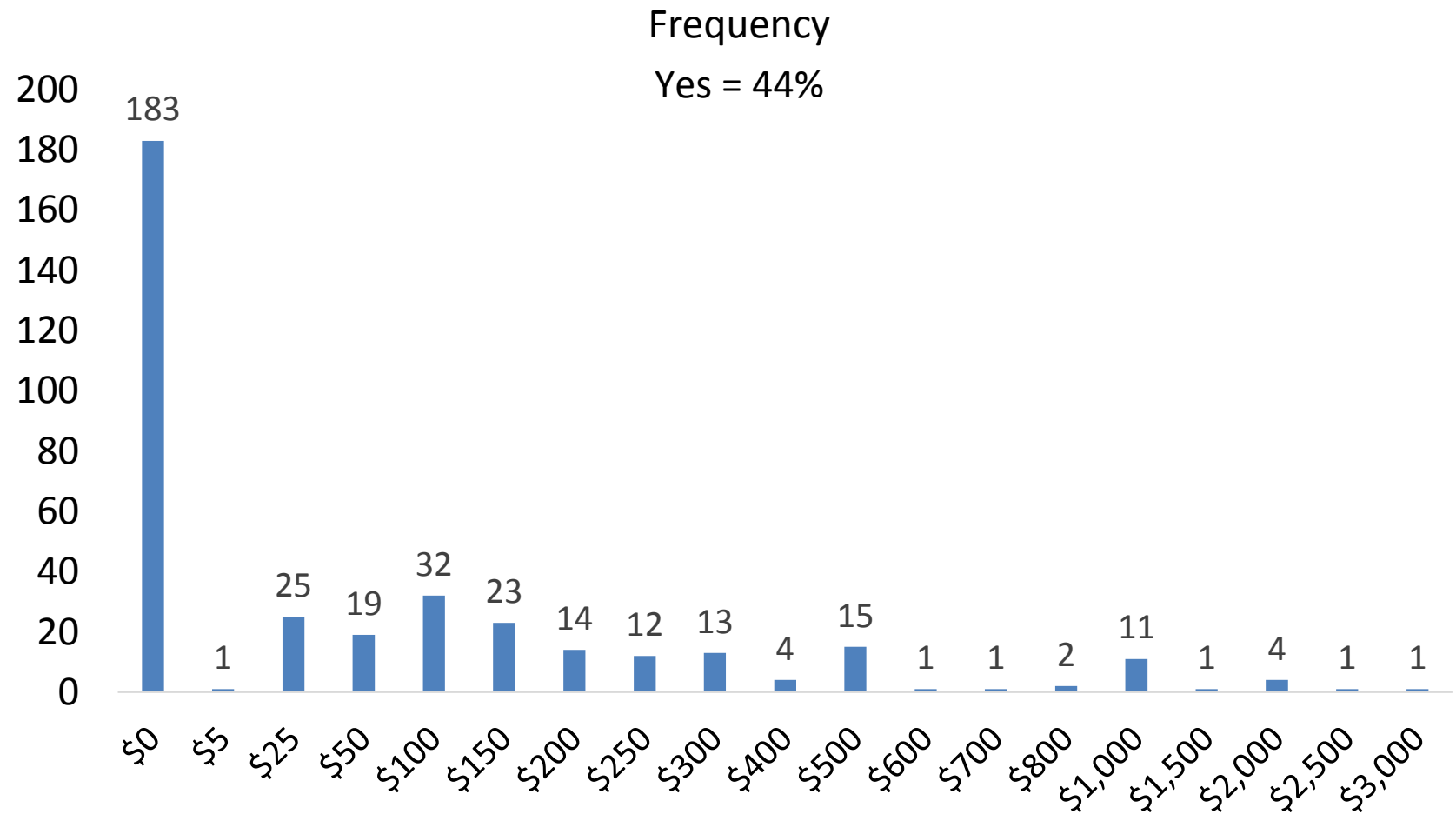


Industry/University
Cooperative Research
Centers

Findings

Dollar Value of Center-Stimulated Projects FY 2013-2014 (Total N = 363, N = 28 missing)

Industry/University Cooperative Research Centers



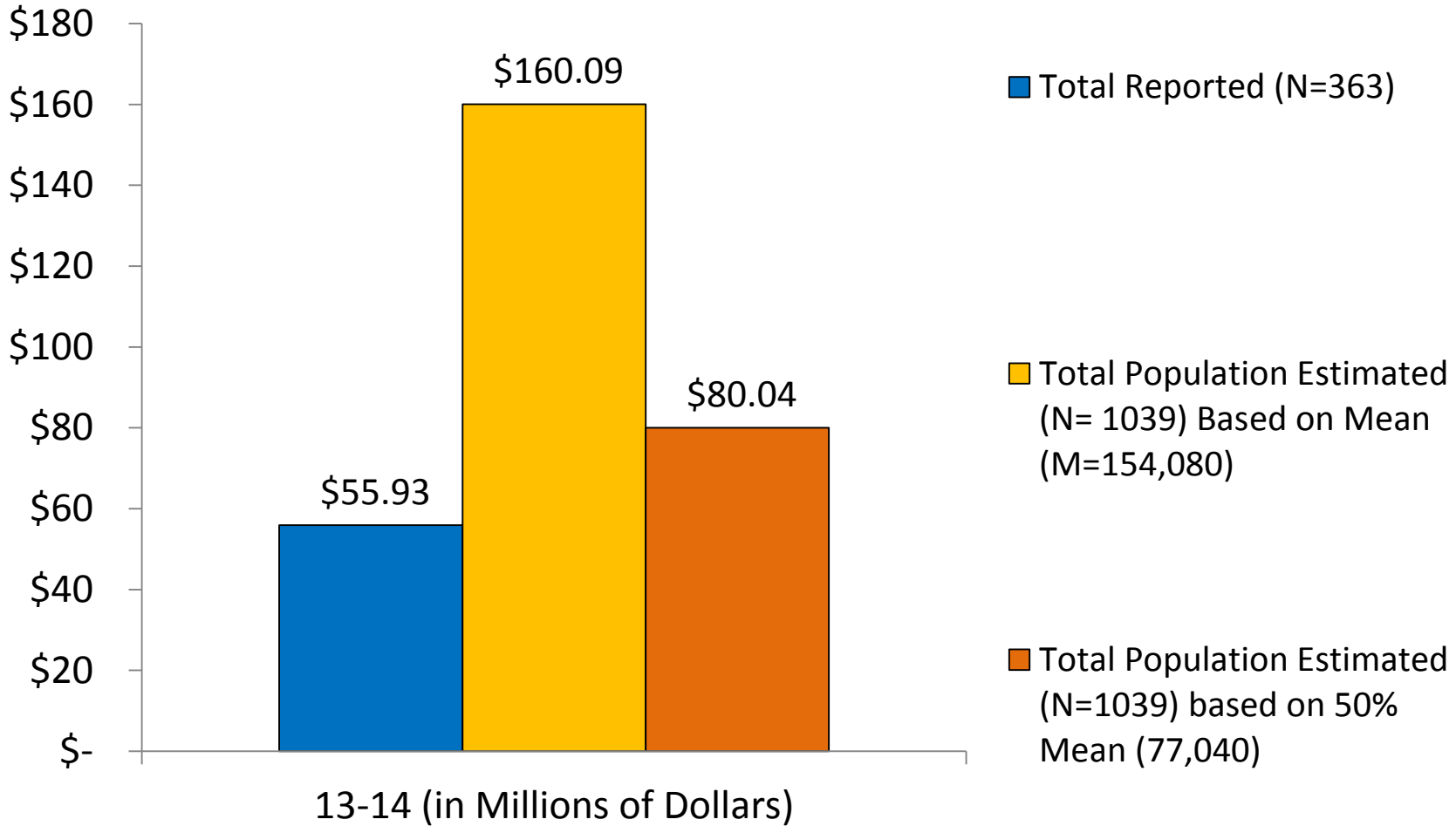
Estimating IUCRC-Wide Center-Stimulated Funding

Industry/University Cooperative Research Centers

- Program-wide center-stimulated funding for 13-14 is 32.05$ million
- There is a fundamental problem estimating both center and program-wide value of center stimulated projects
  - Response rate is running at ~40% of total population
- Our reported value is a VERY conservative estimate
  - Assumes none of the 50% non-responders invested in center stimulated projects
- Need to find a defensible approach to estimating
  - Non-responders
    - mean
    - 50% of mean

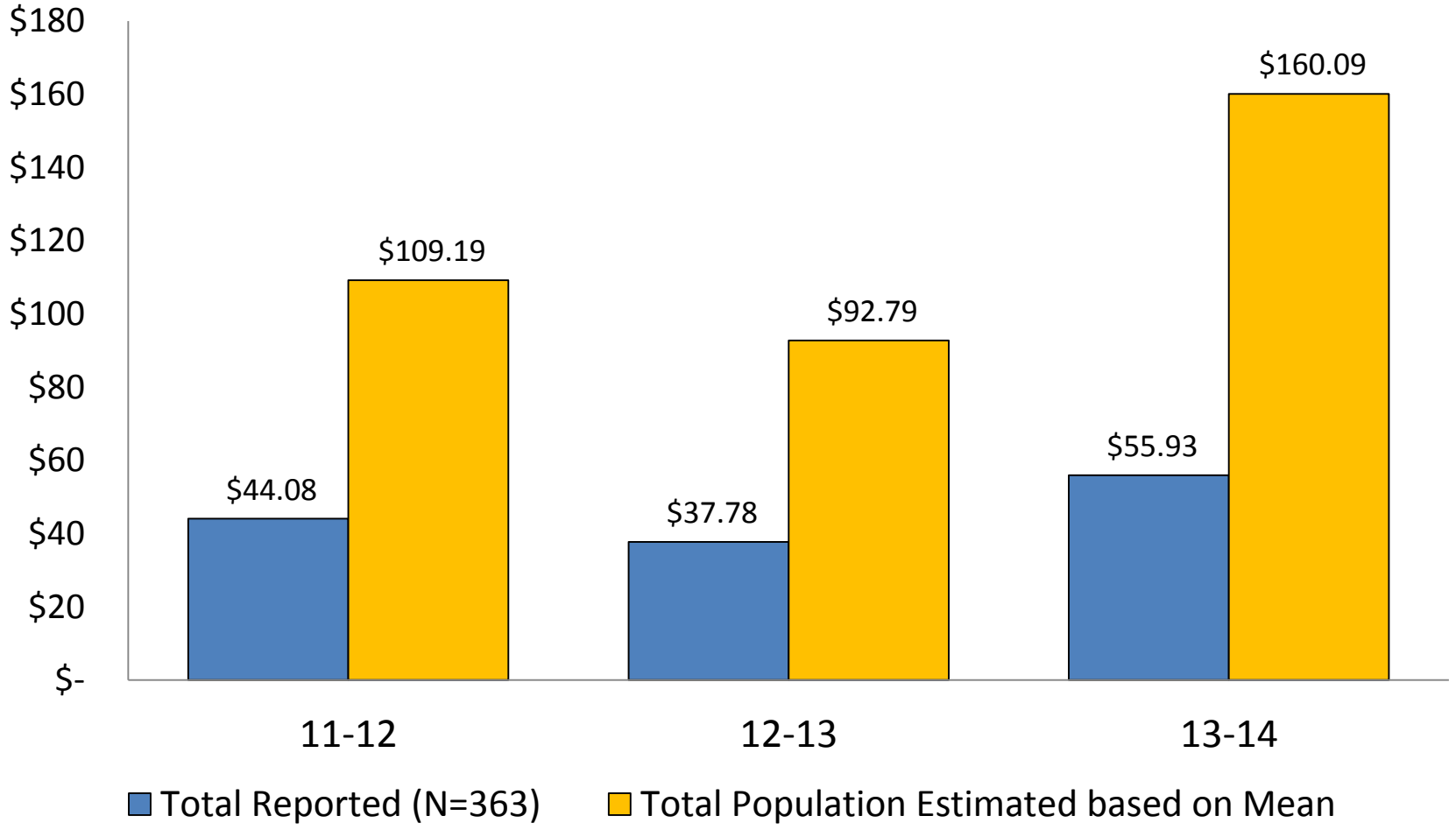
Estimating IUCRC-Wide Follow-on Funding in Millions

Industry/University Cooperative Research Centers



IUCRC-Wide Follow-on Funding in Millions over last three completed FYs

Industry/University Cooperative Research Centers



Research Cost Savings

Industry/University Cooperative Research Centers

B. Research & Development Benefits

	Yes		No	
	N	%	N	%
5a. During the past year, access to Center research findings and outputs has helped accelerate the pace and/or completion of some R&D projects already underway at the organization (N = 382)	239	61.9	147	38.1
5b. During the past year, access to Center research findings and outputs has helped the organization to decide against initiating a new project we otherwise would have conducted. (N = 384)	208	53.6	180	46.4
Yes to Either / No to Both	288	75.0	96	25.0

Research Cost Savings

Industry/University Cooperative Research Centers

***If yes**, taking into account personnel, facility and related costs how much would you estimate these accelerated AND/OR avoided project(s) would have cost your organization.*

Sample: N of respondents = 358; N of Centers= 54

	Member Level		
Member Level Scores	**Mean**	**Median**	**S.D.**
a. $ value of accelerated/avoided projects (thousands) per respondent org.	165.60	100.00	242.34

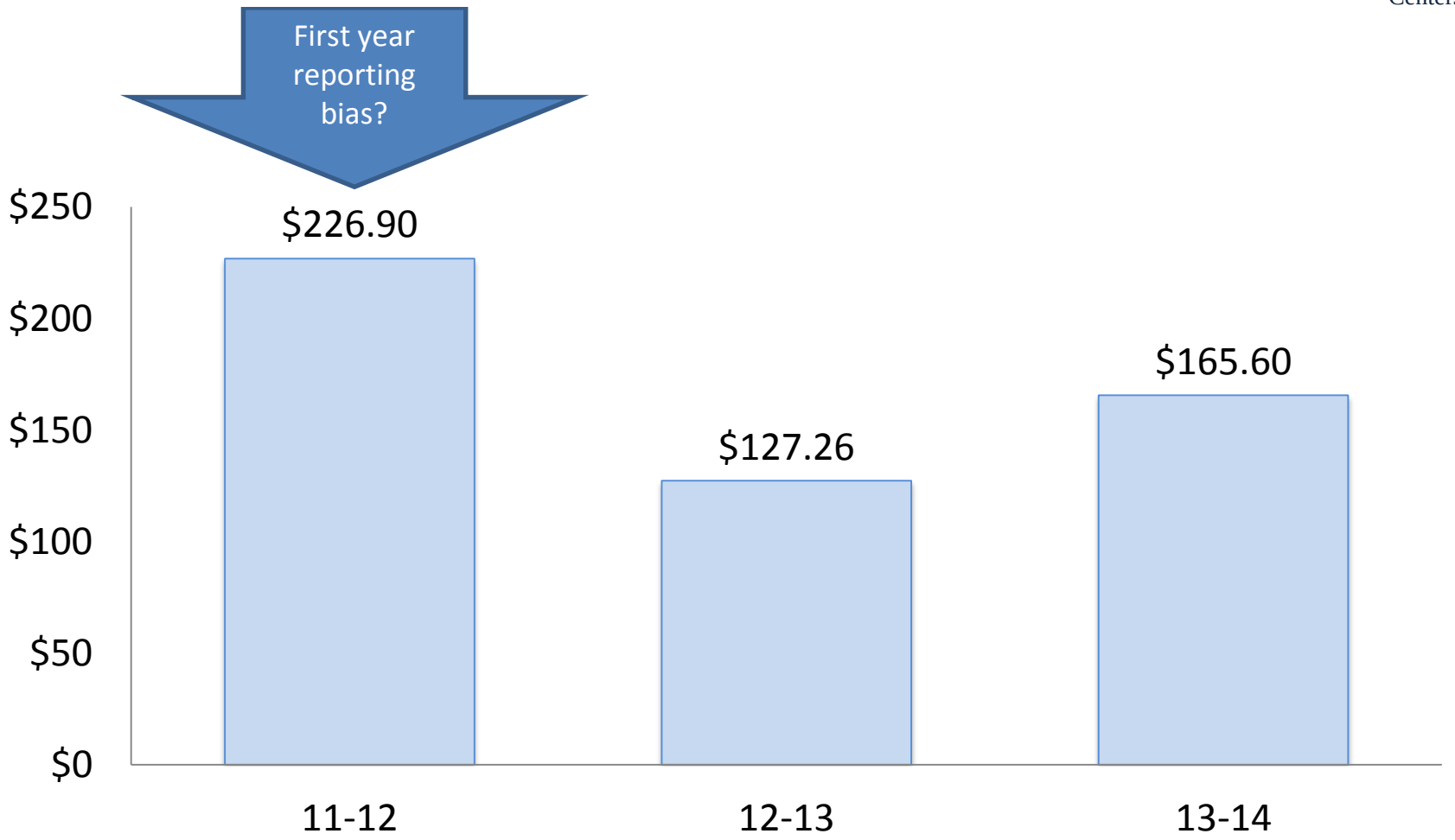
	Center Level		
Center Level Scores	**Mean**	**Median**	**S.D.**
b. $ value of accelerated/avoided projects (thousands) per center	1,162.45	700.00	1,355.59

Program Level Scores	Program Level
c. Total $ value of accelerated/avoided projects supported by respondent orgs.	$59,285,000

** It is worth noting that since only 37.63% of all members completed the questionnaire; this is a very conservative estimate of the value of accelerated/avoided projects supported by members.*

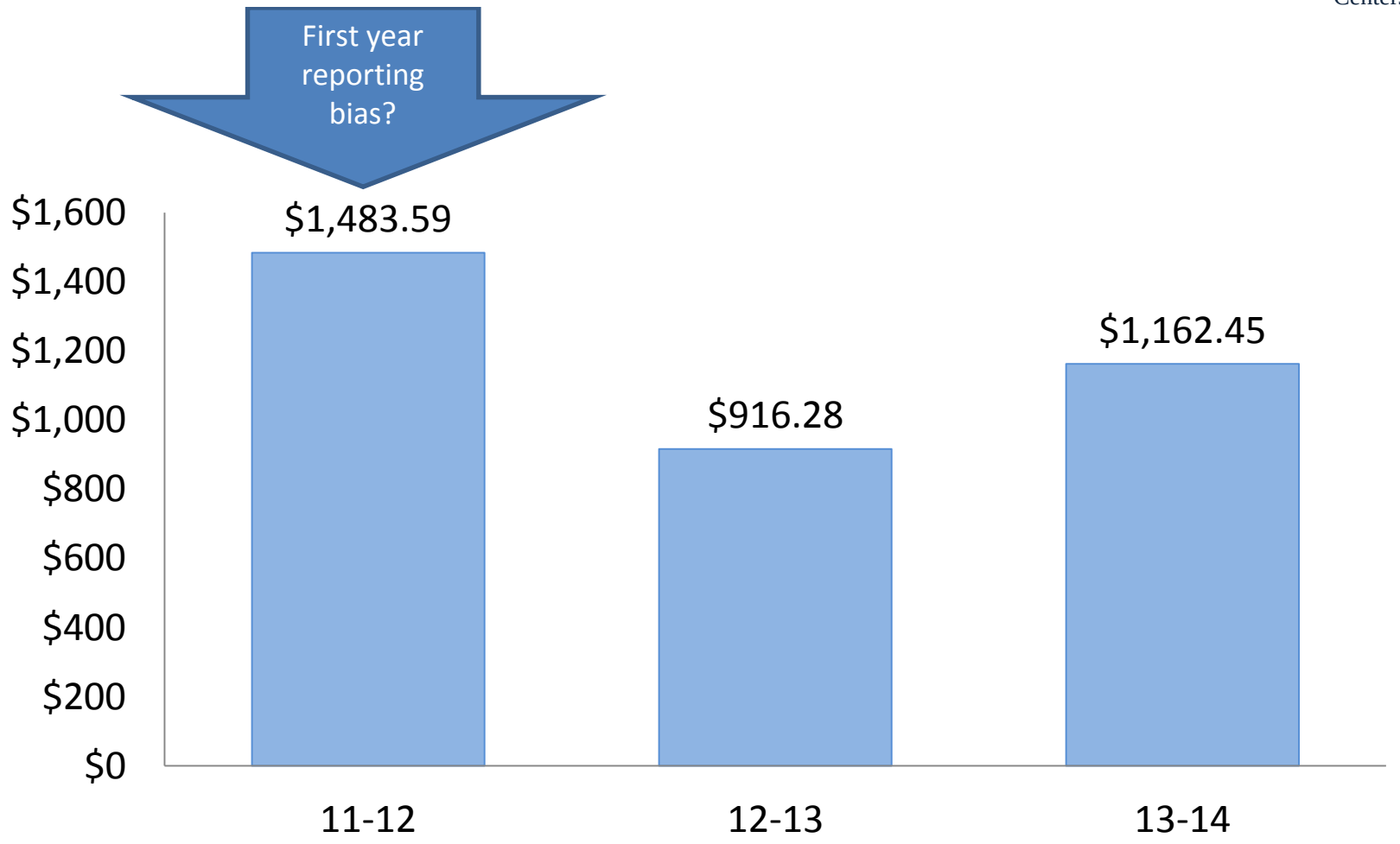
Research Cost Savings: Individual Member Level Average (in thousands)

Industry/University Cooperative Research Centers



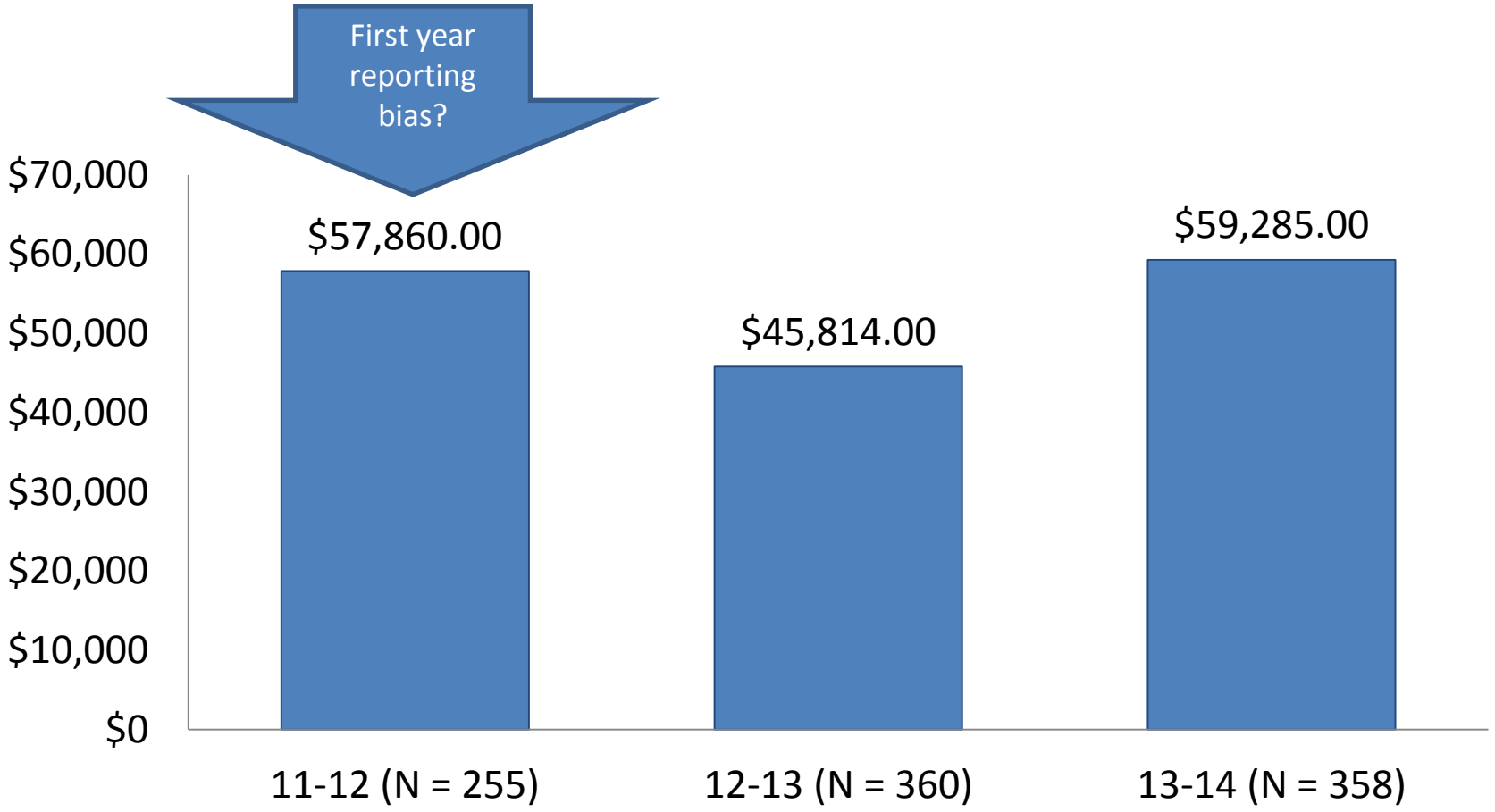
Research Cost Savings
Center Level Average (in thousands)

Industry/University Cooperative Research Centers



Research Cost Savings: Program Level Total

Industry/University Cooperative Research Centers



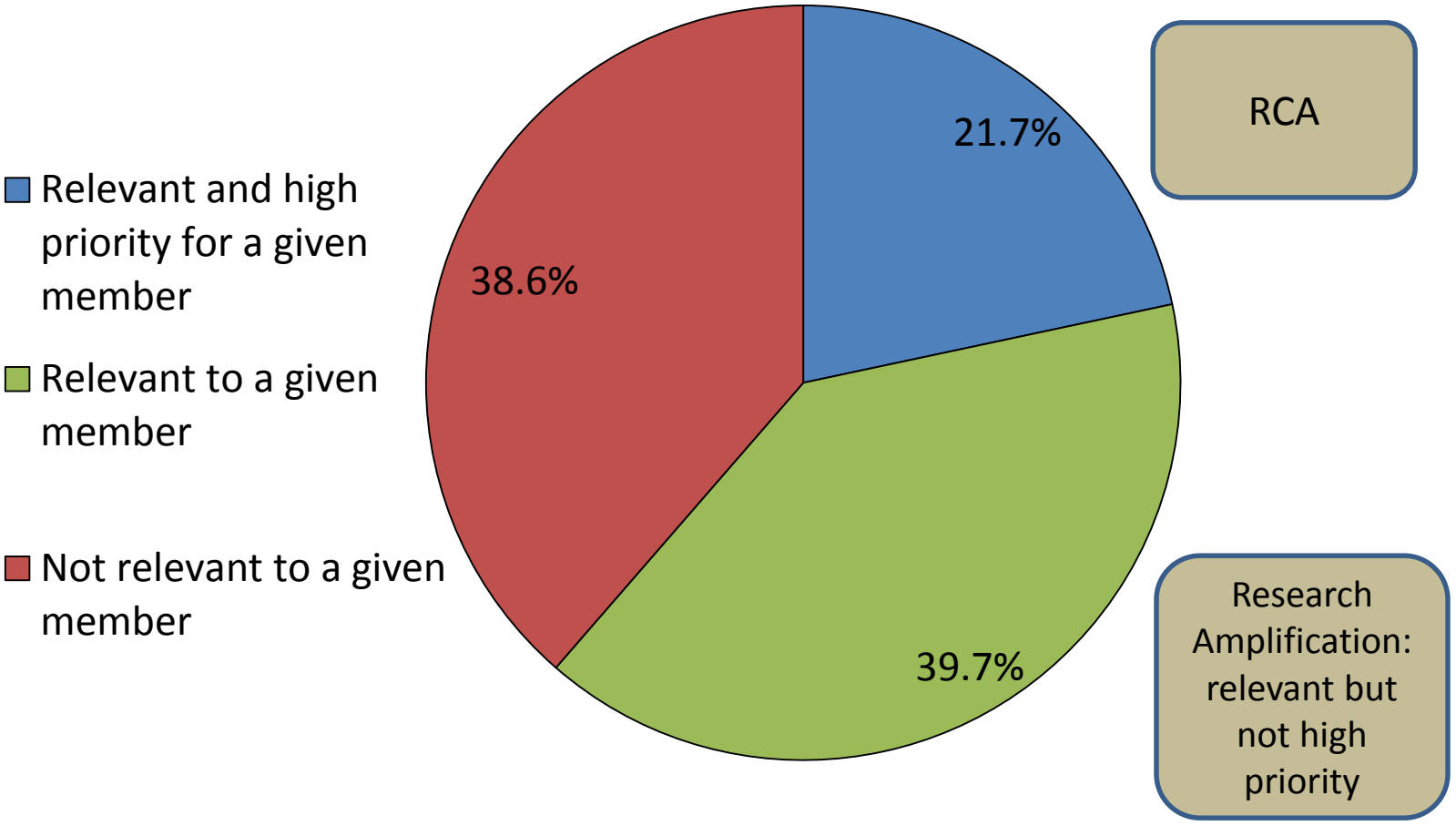
Research Cost Avoidance

Industry/University Cooperative Research Centers

- Definition: *Research cost avoidance is savings a firm obtains by having "necessary" research projects performed by a center rather than performing them internally.*
- Example: If a firm reports that a particular "necessary" project would cost $100,000 to carry out internally (counterfactual estimate) but that project was actually carried out by a center to which they pay a $50,000 membership fee that firm has avoided $50,000 of R&D costs.

Member Evaluation of the Center Project FY 2013-2014

Industry/University Cooperative Research Centers



RCA Findings

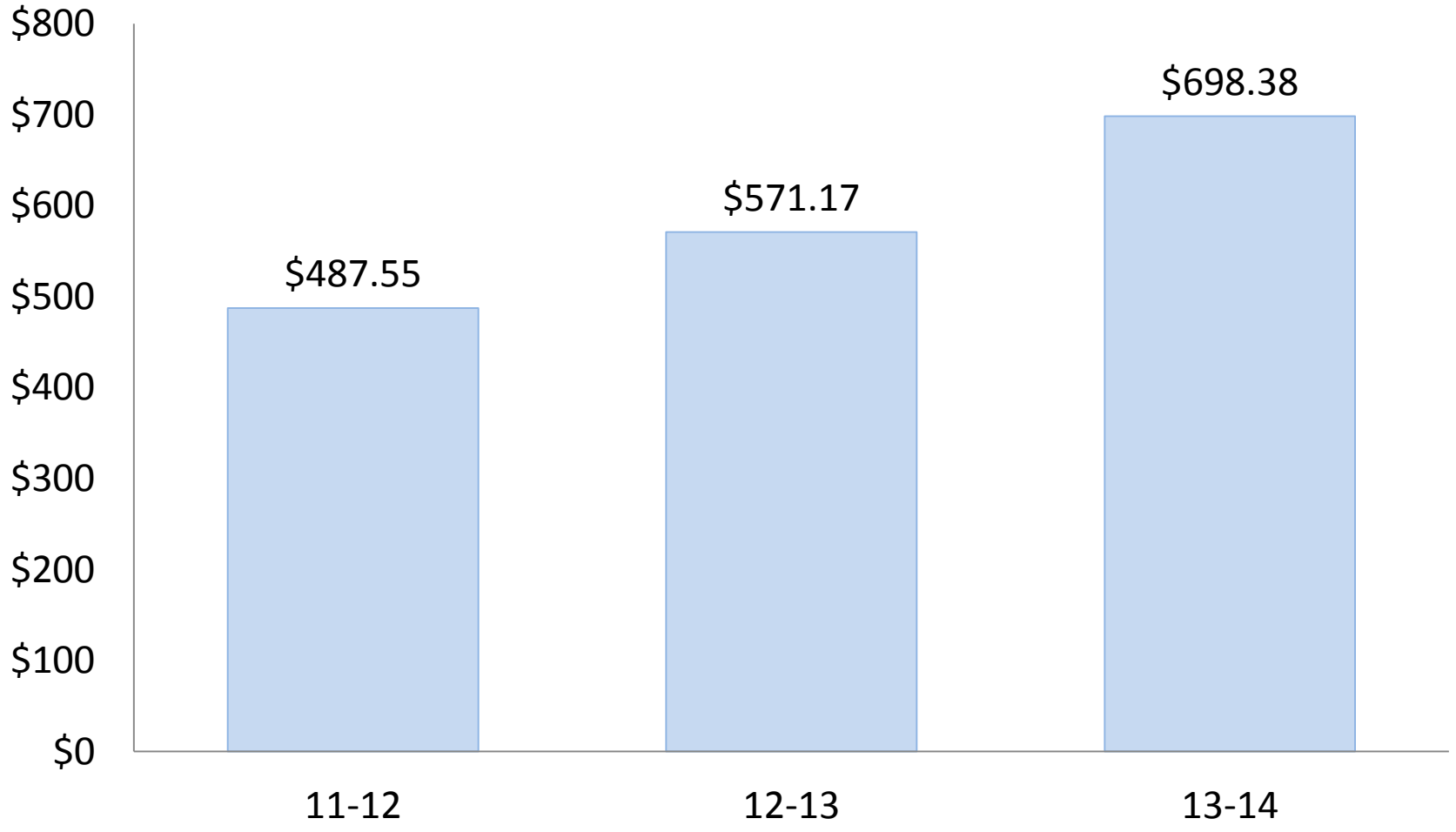
Industry/University Cooperative Research Centers

Average Research Cost Avoidance (RCA)			
Member Level Scores	**Mean**	**Median**	**S.D.**
a. Average dollar value (in thousands) of avoided projects per respondent organization Av.RCA member = (N of projects * N of months * Average salary per month) – Primary Fee *Sample: N of respondents = 340, N of centers = 51*	698.38	318.54	130.06*
Center Level Scores	**Mean**	**Median**	**S.D.**
b. Average dollar value (in thousands) of avoided projects per respondent organization *Sample: N of respondents = 340, N of centers = 51*	5,815.88	2,857.34	9,870.14
Program Level Scores		**Sum**	
c. Total dollar value of avoided projects by respondent organizations RCA program = Av. RCA member * N of members *Sample: N of respondents = 340 N of centers = 51*		$237,449,200	

*55 members (16%) have negative RCA that results in large standard deviation.

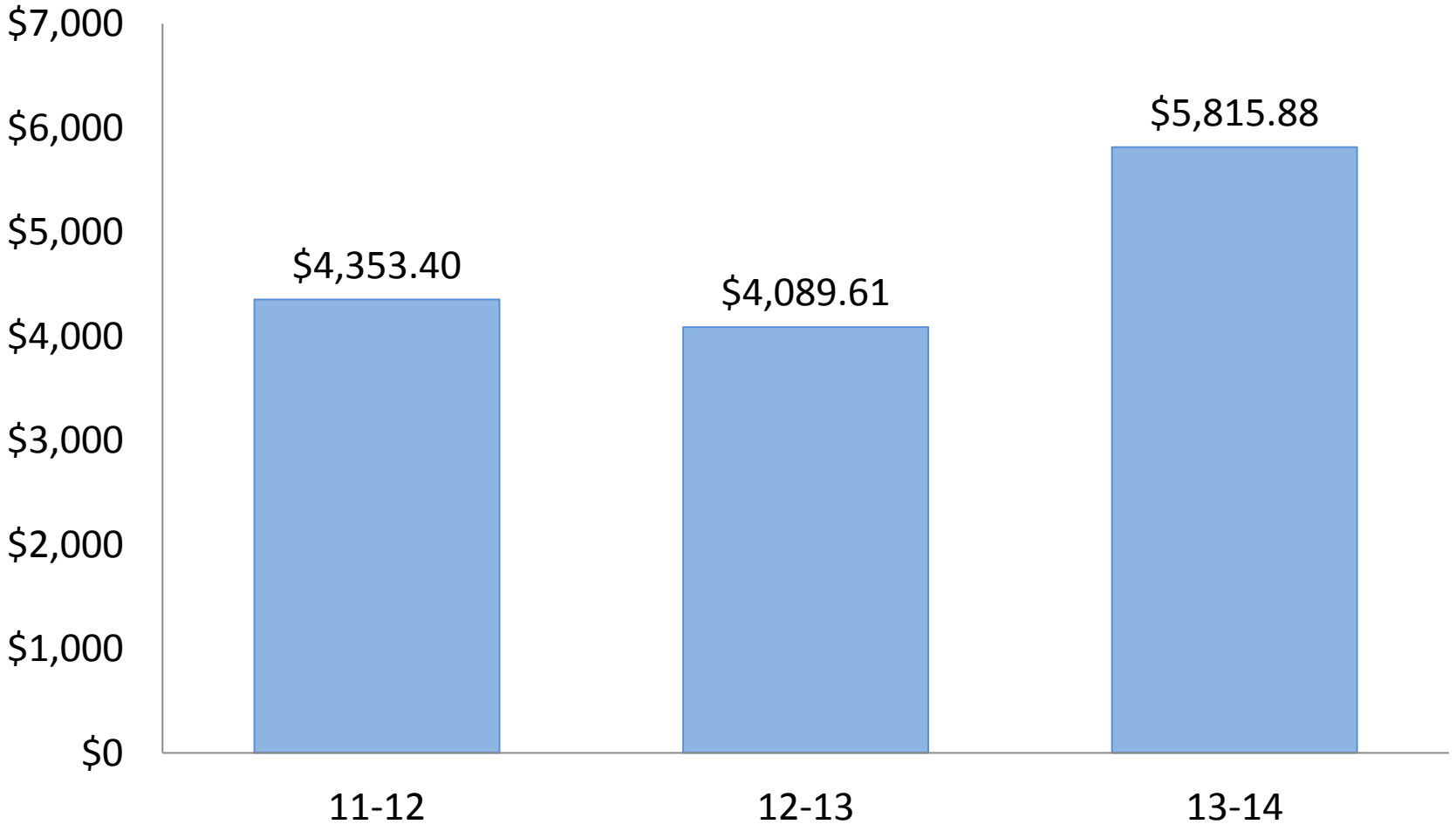
RCA: Individual Member Level Average (in thousands)

Industry/University Cooperative Research Centers



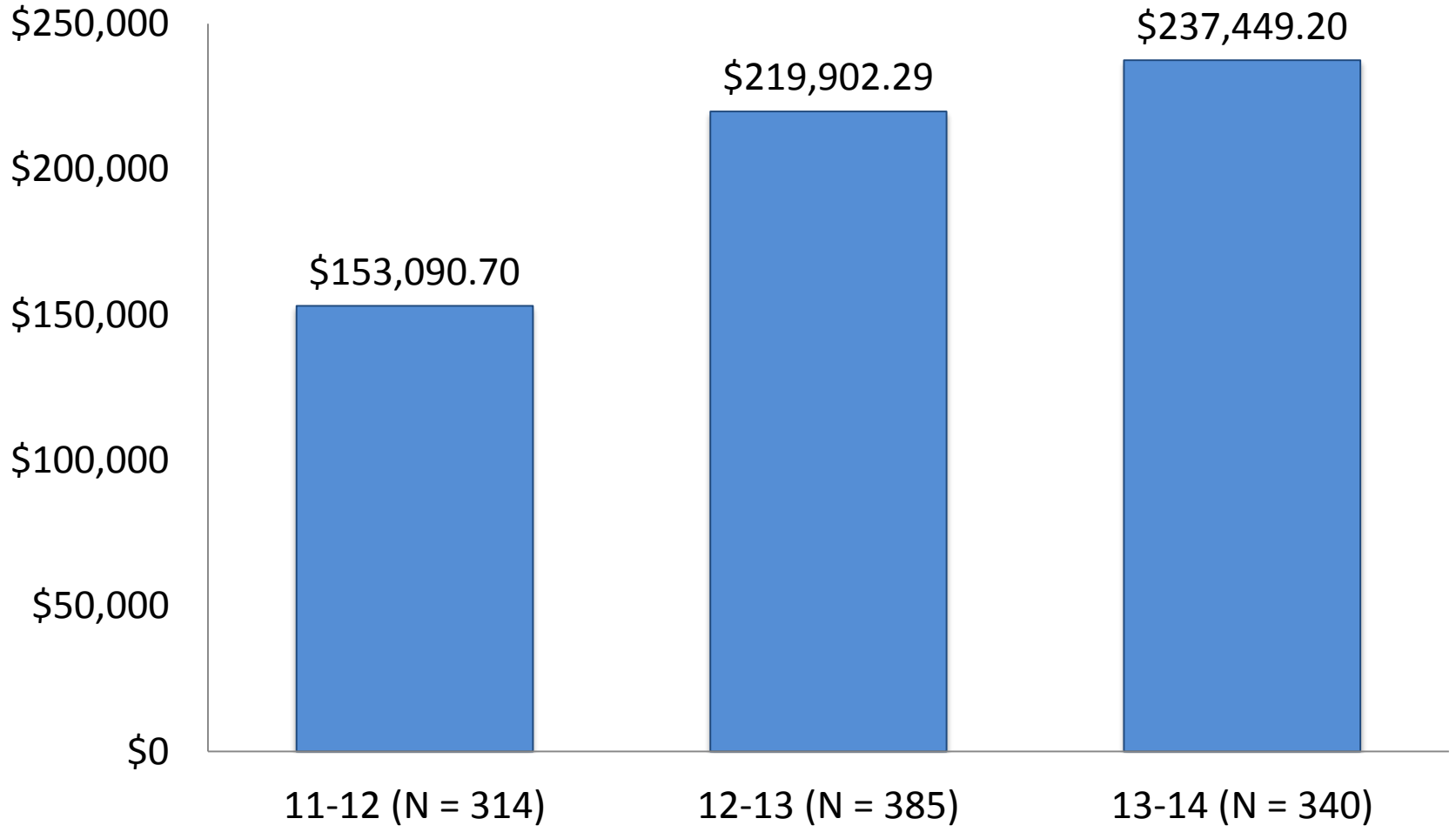
RCA: Center Level Average (in thousands)

Industry/University Cooperative Research Centers



RCA: Program Level Total (in thousands)

Industry/University Cooperative Research Centers



Summary of R&D Efficiency Impacts

Industry/University Cooperative Research Centers

	Member Level Mean	Center Level Mean	Program Total	
Research Cost Avoidance	$698.380	$5,815,880	$237,449,200	↑
Research Cost Savings	$165,600	$1,162,450	$59,285,000	↓
Stimulated Research Projects	$154,080	$1,055,280	$55,930,000	↑

Notes:

- **Since Research Cost Avoidance and Research Cost Savings are "savings" and Stimulated Research Projects involves "costs" indices should not be added**
- **Since these data only involve feedback from about 40% of members they almost certainly underestimate impacts at both the Center and Program level**

Industry Summary

Industry/University Cooperative Research Centers

- Stability across variables is the dominant pattern with few instances of more positive outcomes.
- Ratings in most domains are relatively flat: research program, impacts, and satisfaction
- Follow up Issues/Concerns
  - Student hires: impact on recruiting relatively low
  - Areas needing improvement
    - Communication/technology transfer
    - Recruiting/fund raising
    - IAB meetings' organization
    - Research planning and selection
- Despite some issues and concerns, members' satisfaction remains consistently high

Industry/University
Cooperative Research
Centers

Faculty Questionnaire

Select Results

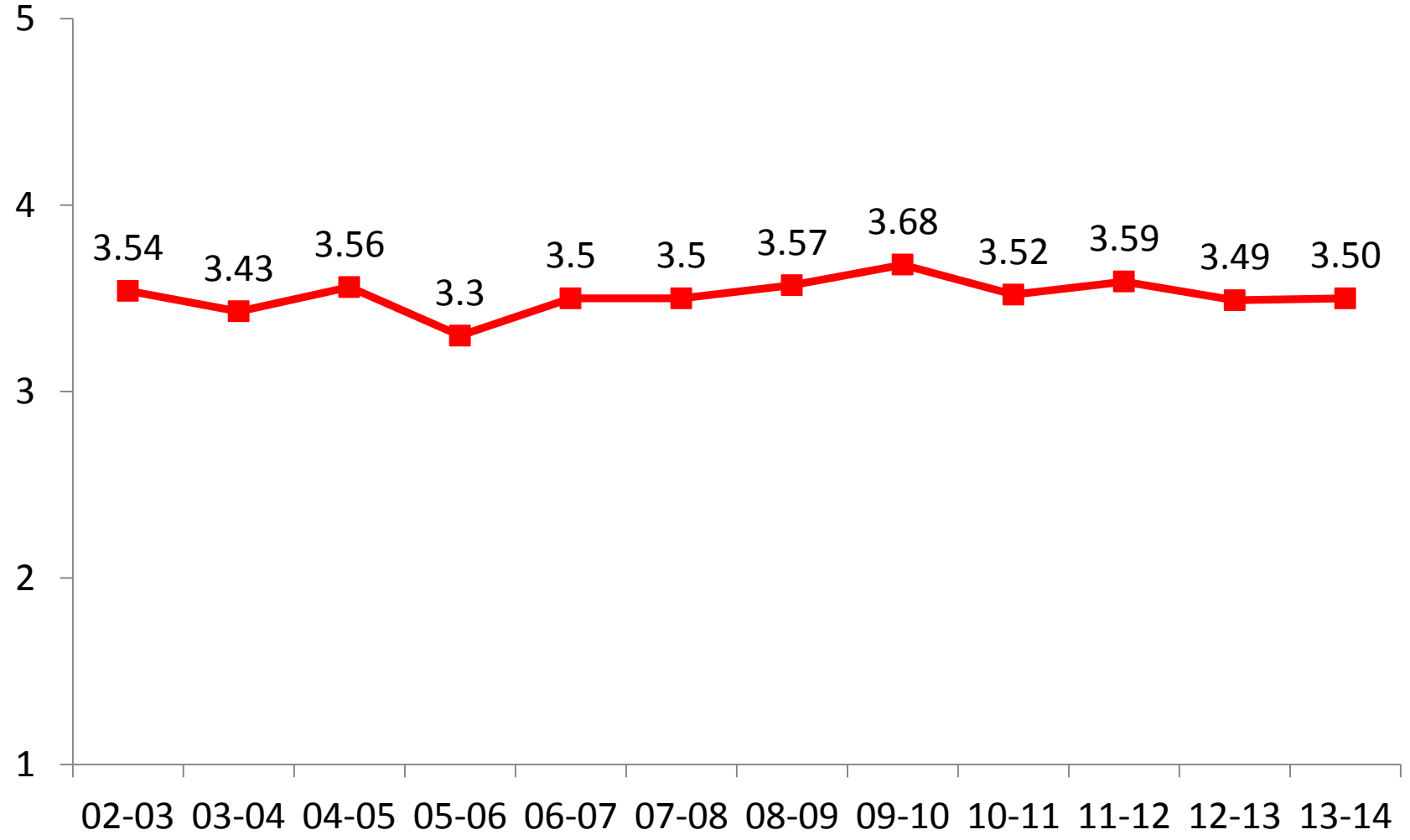
Faculty Long and Short Forms

Industry/University Cooperative Research Centers

	Long Form	Short Form
# of items	13	6
# of questions in common	6	6
# of unique questions	7	0
# of centers using form	22	19
Sample size	125	165

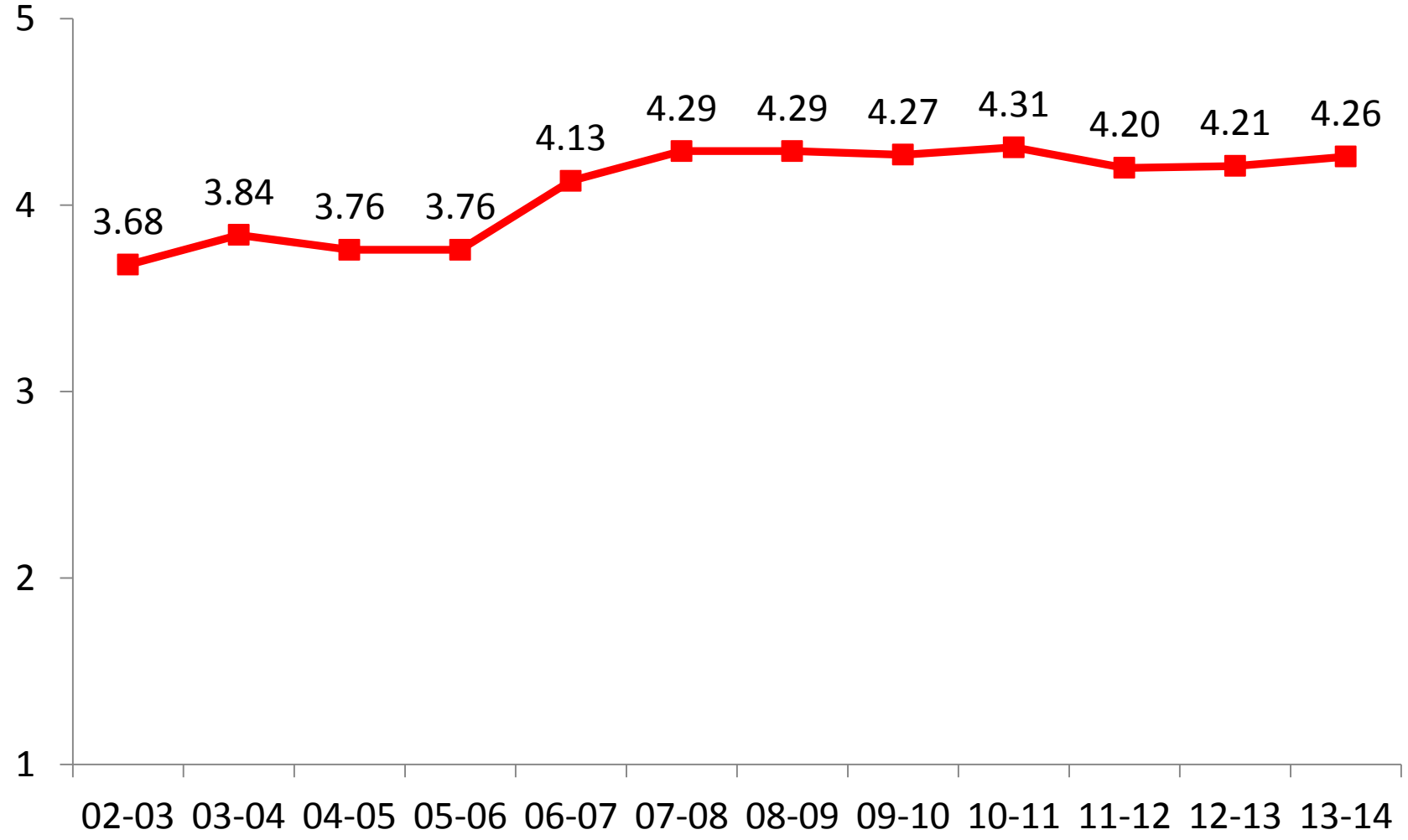
Q1: Compared to the research projects you typically conduct, would you describe your Center-funded research as more basic or applied?

Industry/University Cooperative Research Centers



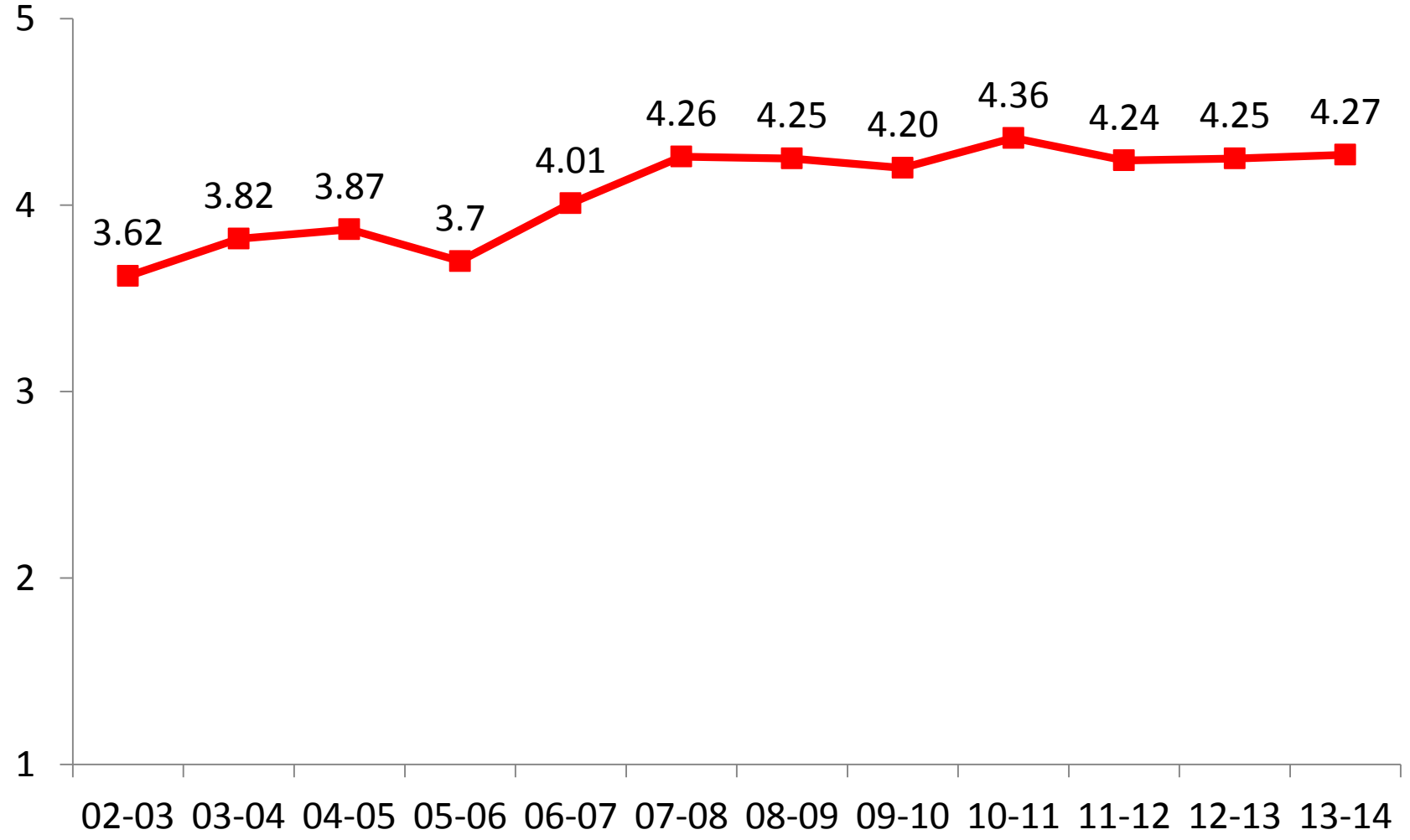
Q2a: During the past year, how satisfied were you with the quality of center-supported research program?

Industry/University Cooperative Research Centers



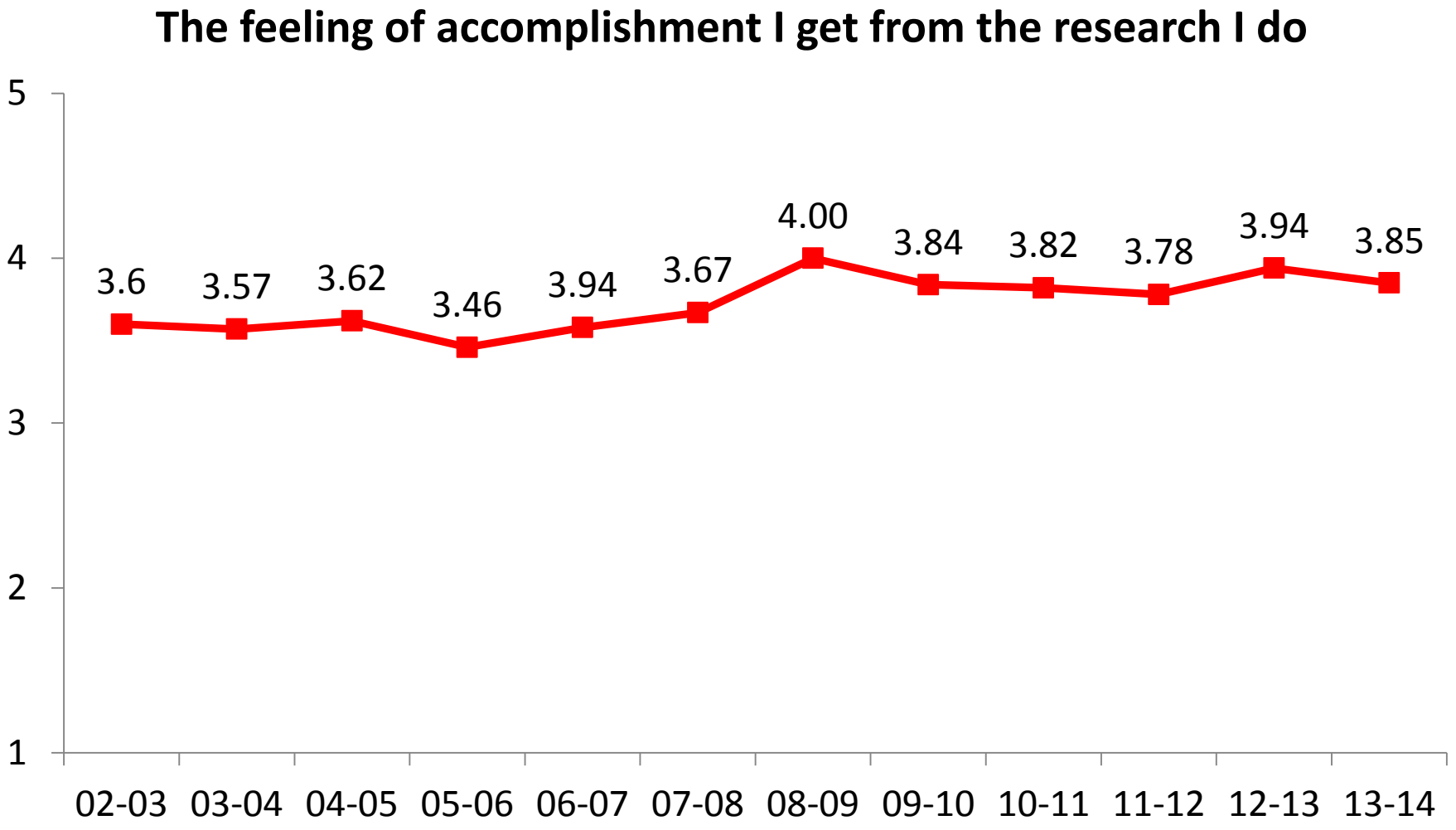
Q2b: During the past year, how satisfied were you with the relevance of the Center's research program to my professional goals?

Industry/University Cooperative Research Centers



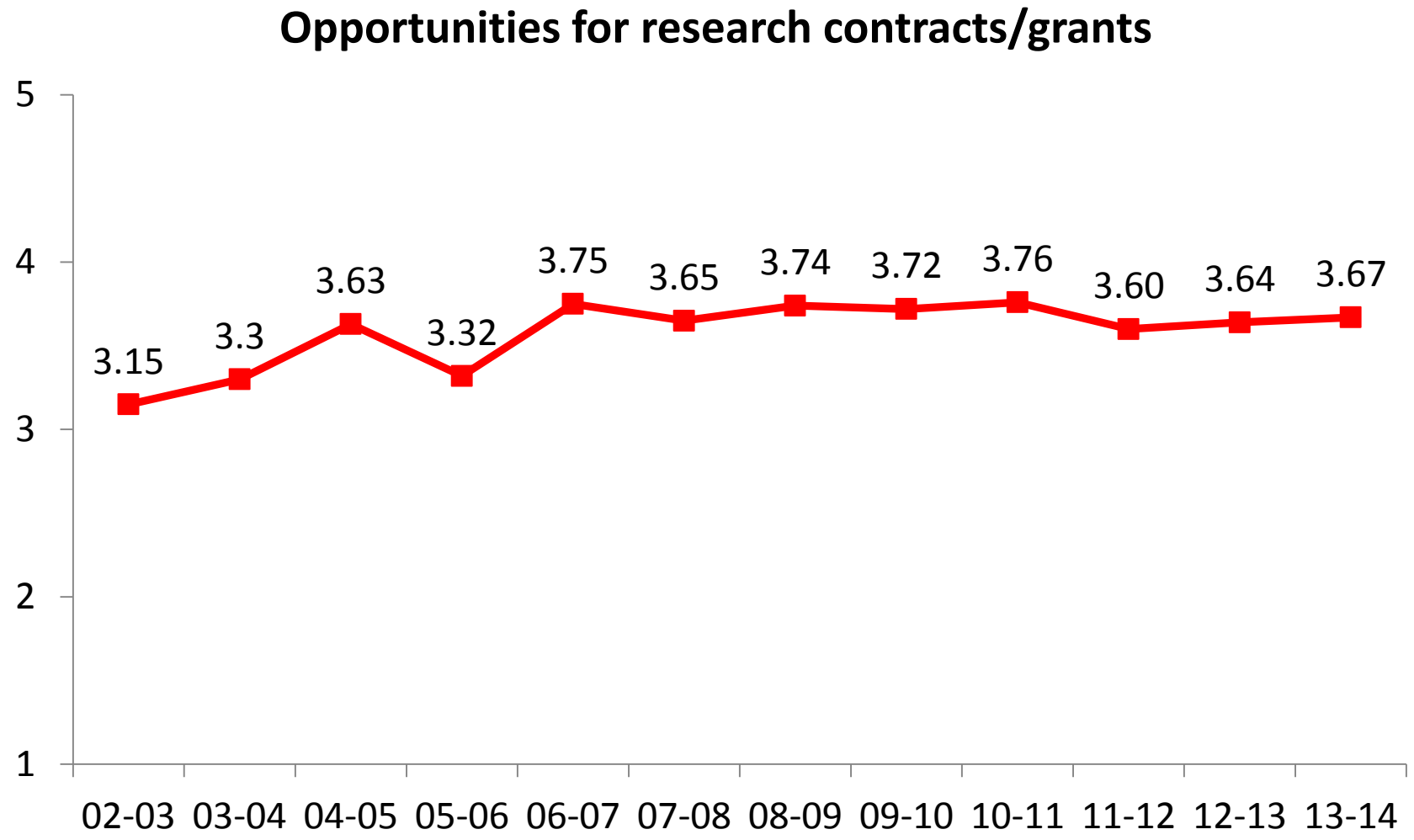
Q4a: During the past year, what impact has participation in the Center had for YOU in the following areas?

Industry/University Cooperative Research Centers



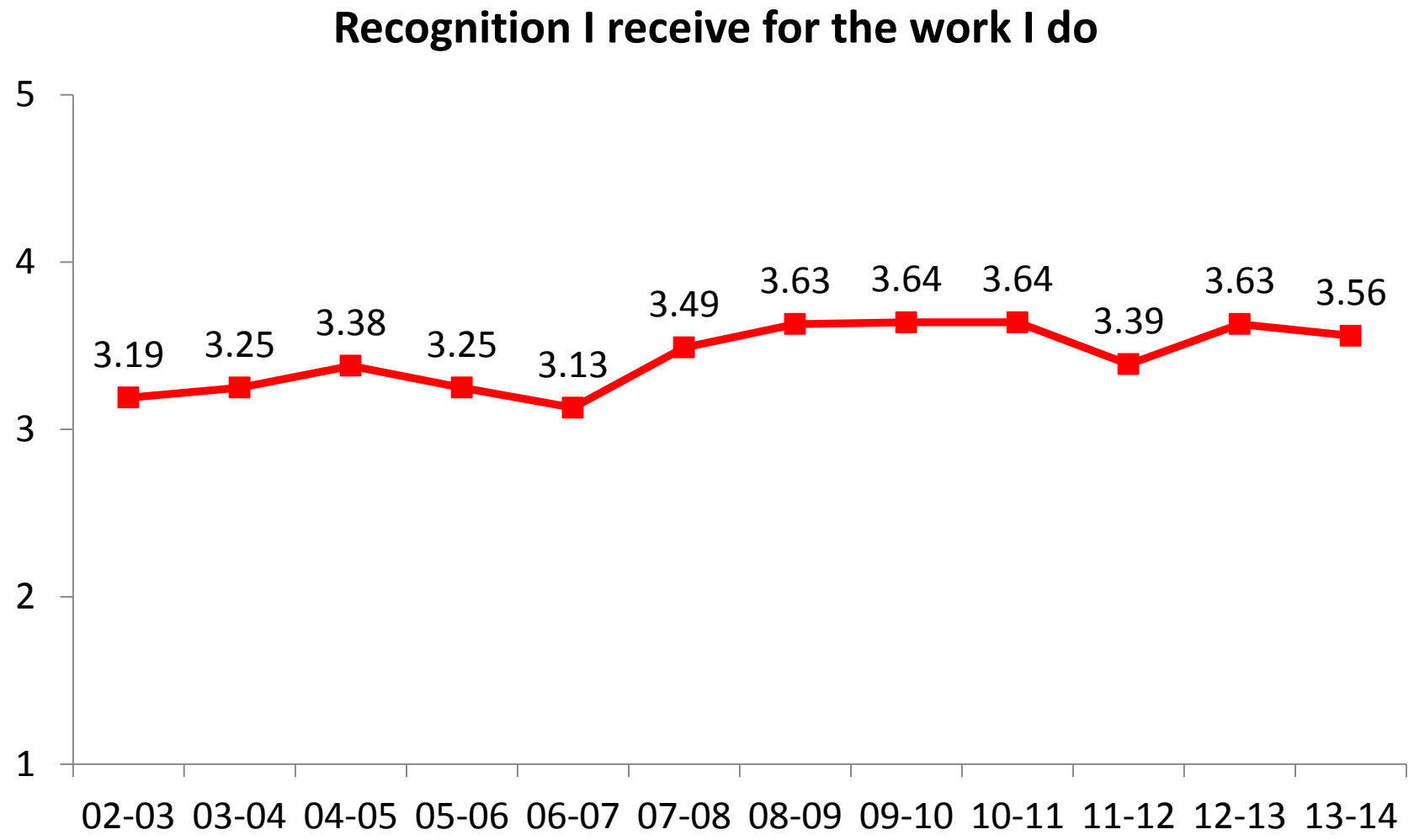
Q4b: During the past year, what impact has participation in the Center had for YOU in the following areas?

Industry/University Cooperative Research Centers



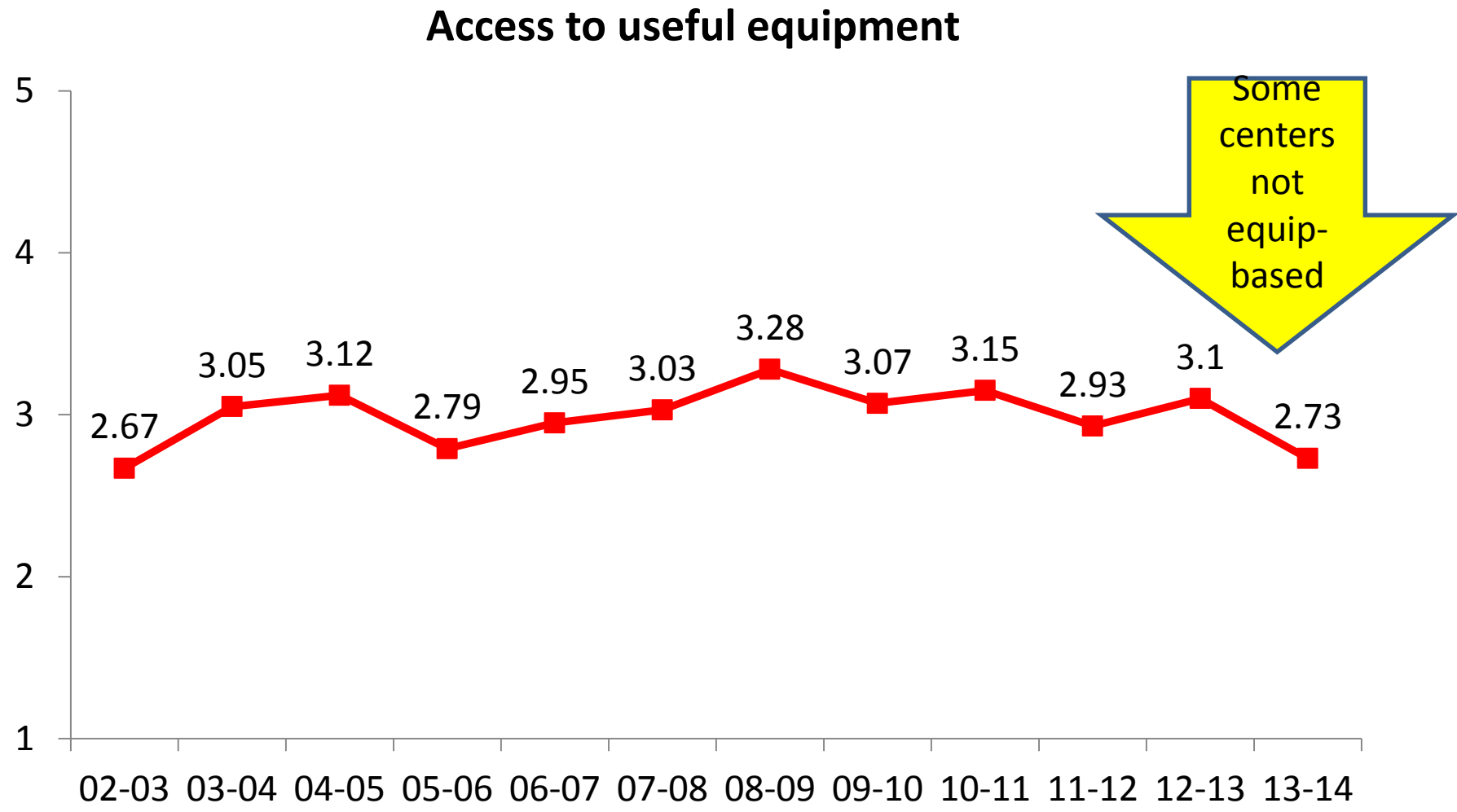
Q4c: During the past year, what impact has participation in the Center had for YOU in the following areas?

Industry/University Cooperative Research Centers



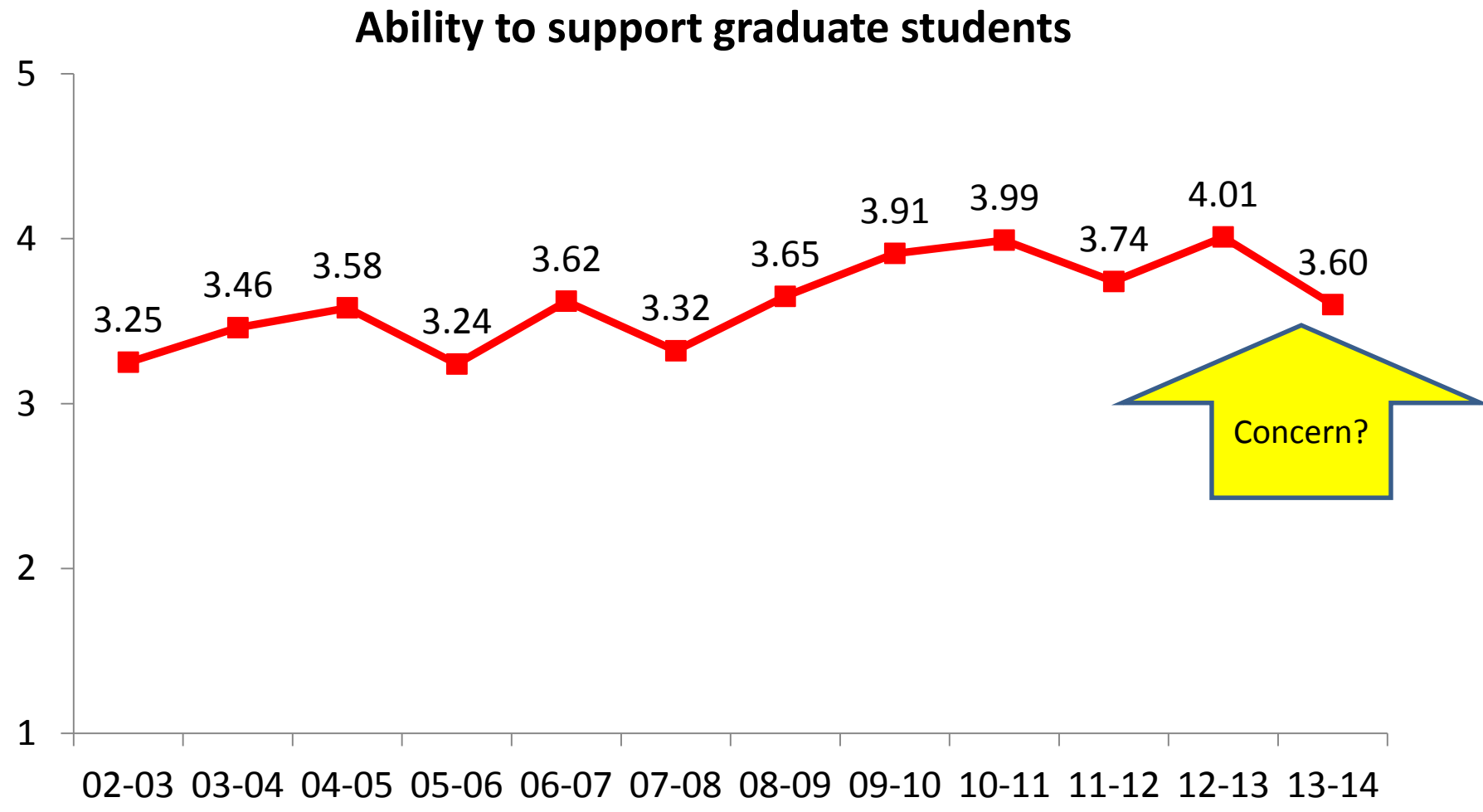
Q4d: During the past year, what impact has participation in the Center had for YOU in the following areas?

Industry/University Cooperative Research Centers



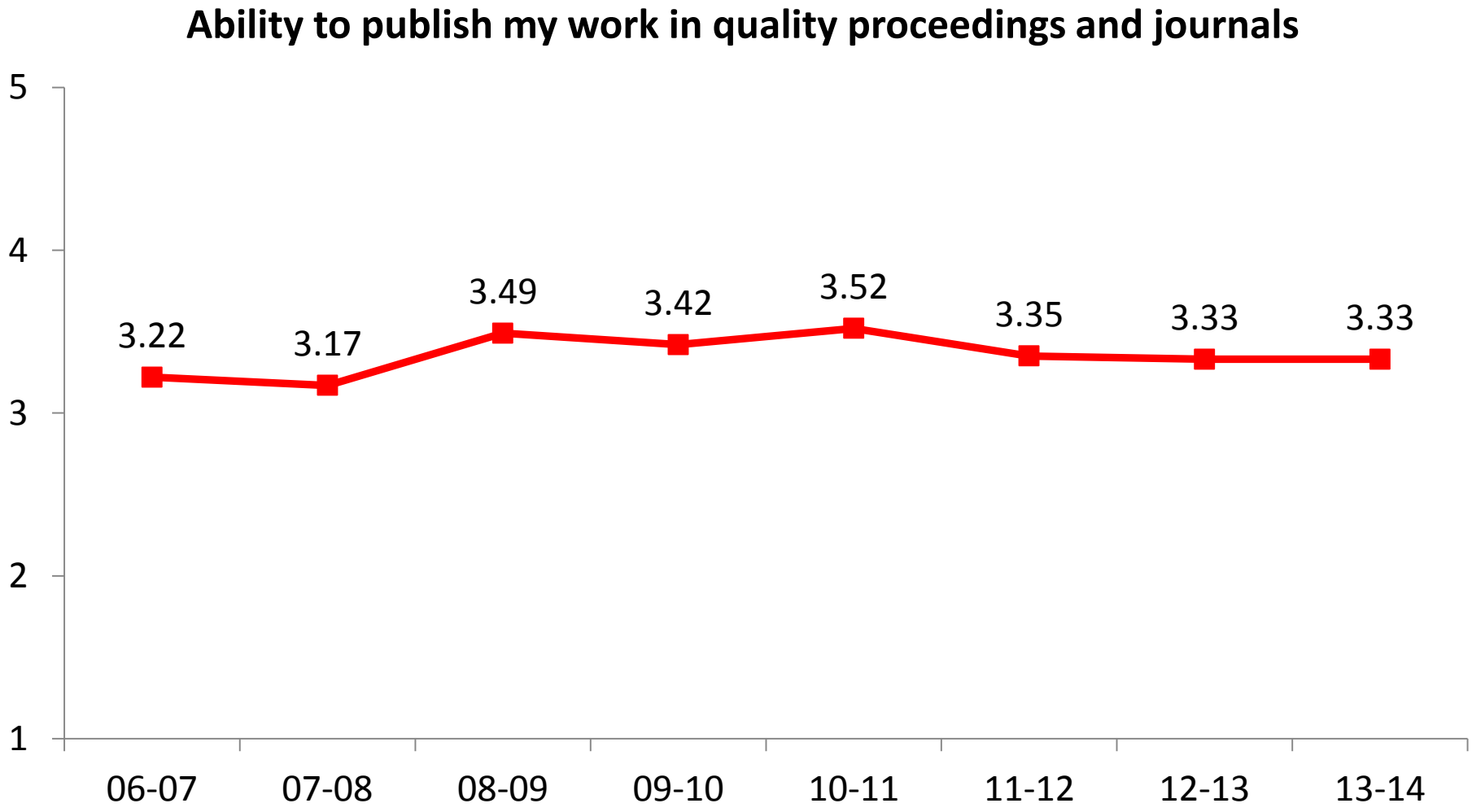
Q4e: During the past year, what impact has participation in the Center had for YOU in the following areas?

Industry/University Cooperative Research Centers



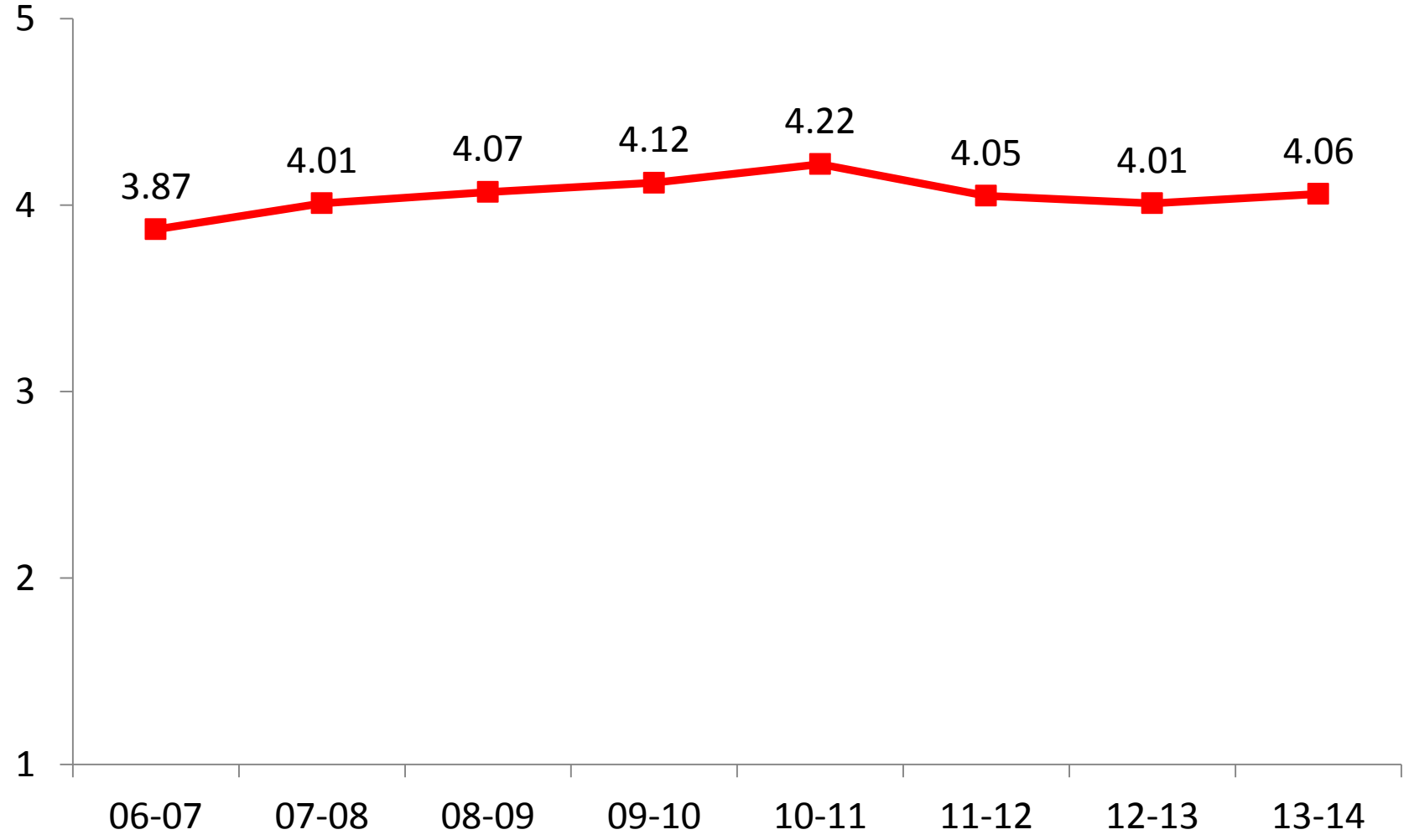
Q4f: During the past year, what impact has participation in the Center had for YOU in the following areas?

Industry/University Cooperative Research Centers



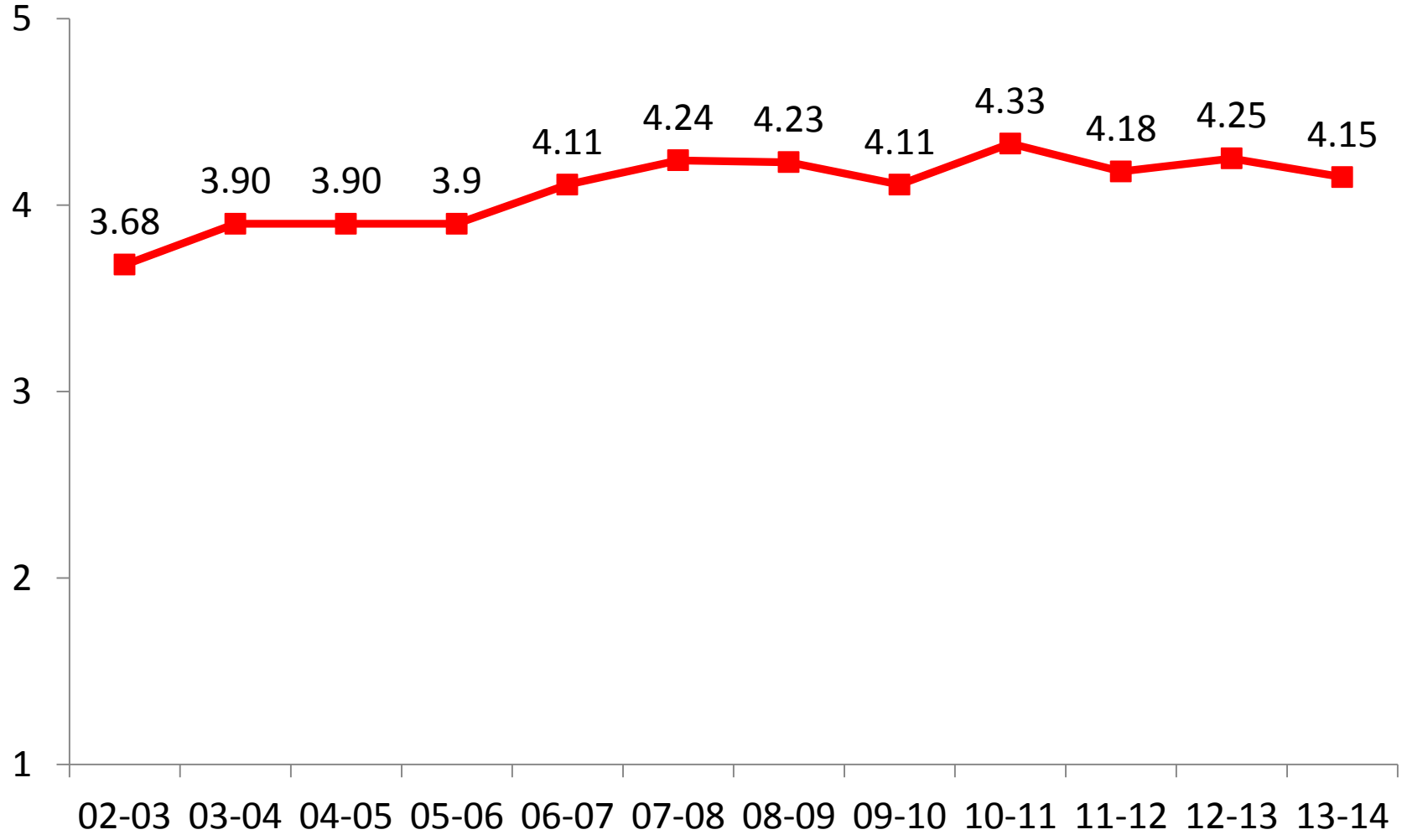
Q5: Which option best expresses your current intentions? - Next year I will submit my best research ideas in a center funded proposal.

Industry/University Cooperative Research Centers



Q6: During the past year, how satisfied were you with center administrative operations?

Industry/University Cooperative Research Centers



Faculty Summary

Industry/University Cooperative Research Centers

- Most indicators are relatively stable
  - Keep using benchmarks: variability between centers is key issue.

How Should These Process/Outcome Results be Used?

Industry/University Cooperative Research Centers

- Trends are probably much more interpretable at local center level
  - Director leaves; research direction changes; move from one-on-one to consortial center
- Benchmark center against previous year and national norms
  - By comparing means, medians, and standard deviations, evaluators can see how their centers compare to national "norms"
  - Insert national data into industry software tools for this year/last year comparisons with your center
  - Move current center means to previous year in e-mail software package
- Caution:
  - Deteriorating response rate undermines the validity and usefulness of feedback
    - Need to reinvent our methods
    - Cautiously considered interpretation

Extra Slides

Calculation of Economic Impacts ($)

Industry/University Cooperative Research Centers

- Research amplification (Q1a & Q1b)
  - *Percent Rel. x N of Center Proj. x Scien. Months x $/Scien. Month (Gray & Steenhuis, 2003)*
- Cost Avoidance (Q1a & 1b)
  - *N of Proj. Avoid x Scien. Months x $/Scien. Months (Gray & Steenhuis, 2003)*
- R&D Cost Savings
- Accelerated R&D savings or Avoided R&D (5c):
  - *$ saved by accelerated projects or $ avoided by not starting projects*
- Stimulated R&D (5f):
  - *$ invested in new or re-directed internal R&D*

Research Cost Avoidance

Industry/University Cooperative Research Centers

- Calculation:
  - $RCA = \sum C_f - C_c.$

    Firm cost (C_f) is calculated as follows: $C_f = N_{projects} \times N_{sm} \times C_{sm.}$

  - $N_{projects}$ = number of center projects a firm considers "high enough priority they would have conducted them internally or by contract" (Q1b)
  - N_{sm} = how many scientist months those projects would take to complete. (Q1c1)
  - C_{sm} = the cost of a scientist month (archival)
    - (Salary ($88.5k) + Fringe (35%) + indirect (50%)) / 12 = $14,939
  - C_c = average cost of center membership