Empirical Realities of Scientific Misconduct in Publicly Funded Research

What can we learn from the ORI's investigations of U.S. cases in the biomedical and behavioral sciences?

By

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ABSTRACT

This paper presents the results of an exploratory statistical study of time-series and cross-section patterns in enquiries and findings of investigations of cases involving plagiaries, falsifications, and fabrications by researchers in the biomedical and behavioral sciences.

Our analysis is based upon datasets constructed from information provided by the published reports of the Office of Research Integrity (ORI) in the U.S. Public Health Service regarding its activities during 1994-2006.

A descriptive approach is adopted, in view the paucity of prior systematic empirical work, and the limitations of the micro-level data available at this time. While no causal hypotheses are tested, some possible interpretations and implications of the findings point to the importance of more widespread, independent data collection and analysis as a foundation for public regulations and private initiatives that aim to address and control the phenomenon of scientific misconduct.

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INTRODUCTION & ORGANIZATION

Purpose and Motivation

More comprehensive and systematic collection and analysis of quantitative information about the nature, incidence and circumstances of research misconduct is needed from independent social science researchers, for numerous reasons, including:

- **the central role of reliable scientific knowledge in political, social, economic and cultural affairs of modern societies**
- **growing public awareness and concern regarding selectively reported instances of "scientific misconduct"**
- **regulatory and educational initiatives to address this "problem," while acknowledging that its extent and causes in different contents are not well understood**
- **inherent difficulties conducting scientific investigations of behaviors that one is also seeking to regulate**

ORGANIZATION

Part 1. **Evolution of ORI Case Management, 1994-2006: Aggregate Trends and Case Disposition Rates**

Part 2. **Dynamics of the Distribution of Investigations and ORI Findings of Misconduct, by Type**

Part 3. **Patterns in the Conditional Probabilities of Findings of Misconduct in Closed Investigations**

Part 4. **Problems of Interpretation, Conjectures and Conclusions**

Part 1. **Analysis of Aggregate ORI Case Management Flows and Case Disposition Rates during 1994-2006**

Aggregate Flows in Allegations and Inquiries

Average Rates of Case Disposition for Inquiries and Investigations

Average Frequencies of Findings of Misconduct in Closed Investigations

Distributions of time-lags in “Misconduct Correction”

Statistical data for the study by Pozzi and David (2007) were extracted from the published Annual Reports of the U.S. Office of Research Integrity for the years 1994-2006

Caseload and Outcomes

The ORI caseload is divided into two elements: institutional inquiries and institutional investigations. ORI carried forward 59 cases from 2005, and ORI opened 29 new cases and closed 35 cases during 2005. At the end of CY 2006, ORI had 53 active formal cases divided between inquiries and investigations (Table 4).

Table 4: ORI Research Misconduct Caseload by Case Type, 2006

Case type	*Forwarded from 2005*	*Opened in 2006**	*Closed in 2006*	*Carried into 2007*
Institutional inquiry	20	10	7	23
Institutional investigation	39	19	28	30
TOTAL	59	29	35	53

*The number of cases opened has been adjusted to compensate for the movement of cases from the inquiry stage to the investigation stage, to avoid double-counting.

Office Of Research Integrity Annual Report 2006

ORI Annual Reports, then (1994)

OFFICE OF RESEARCH INTEGRITY

ANNUAL REPORT

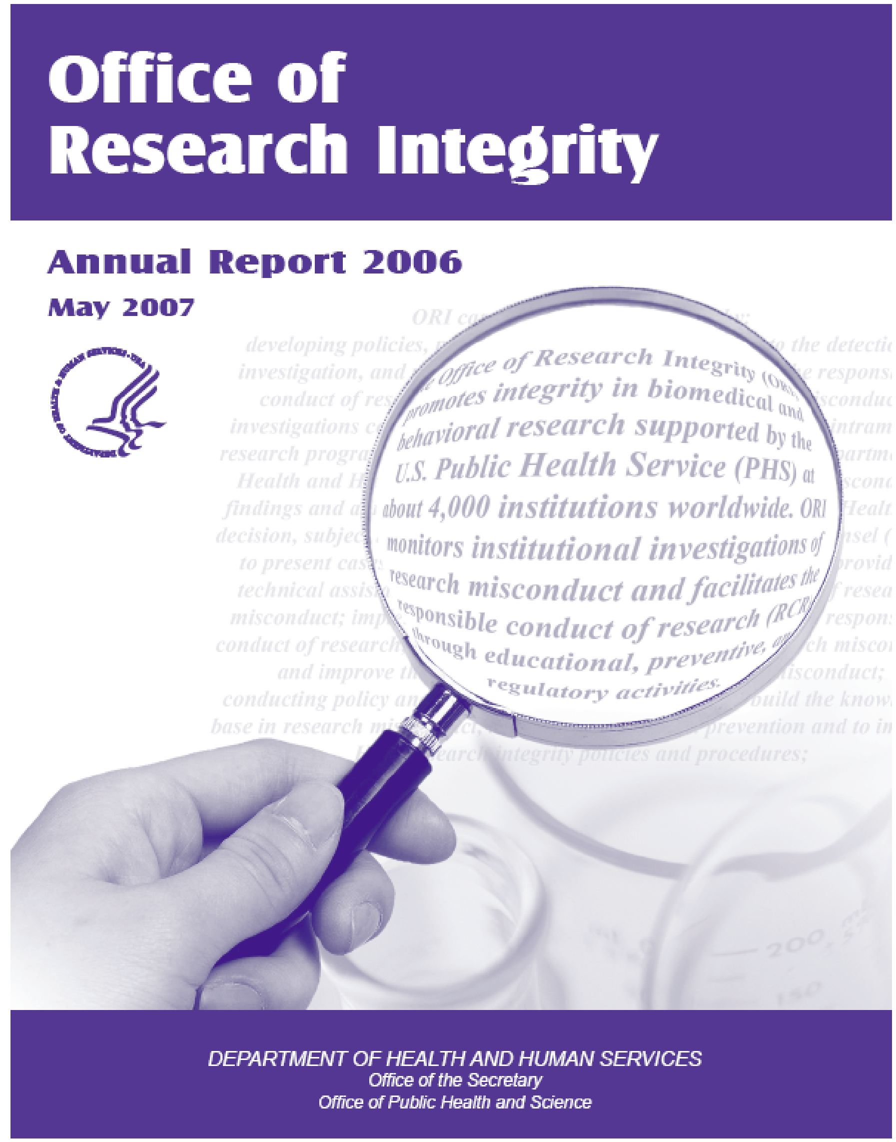
1994

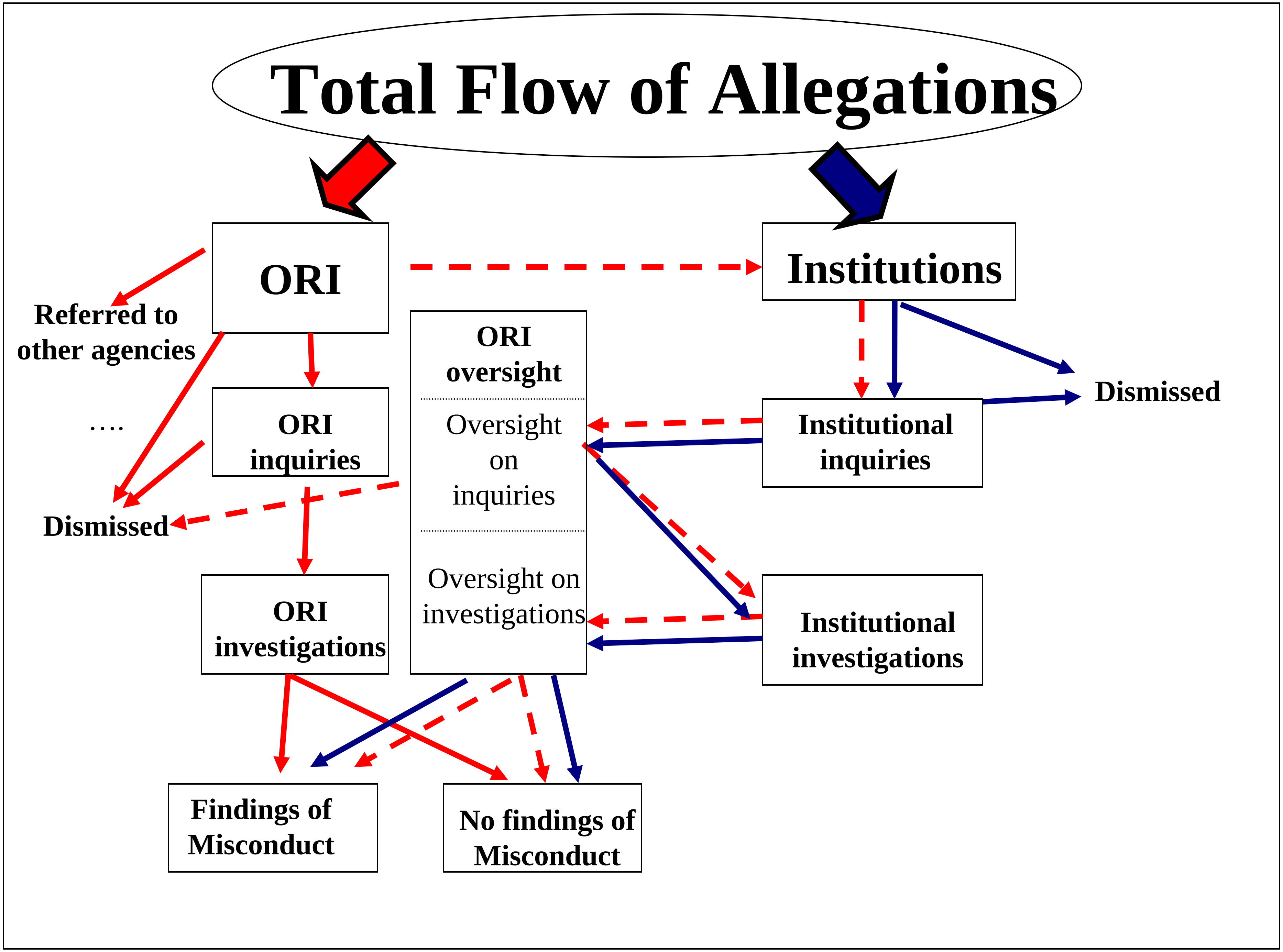
APRIL 1995

(HHS Emblem)

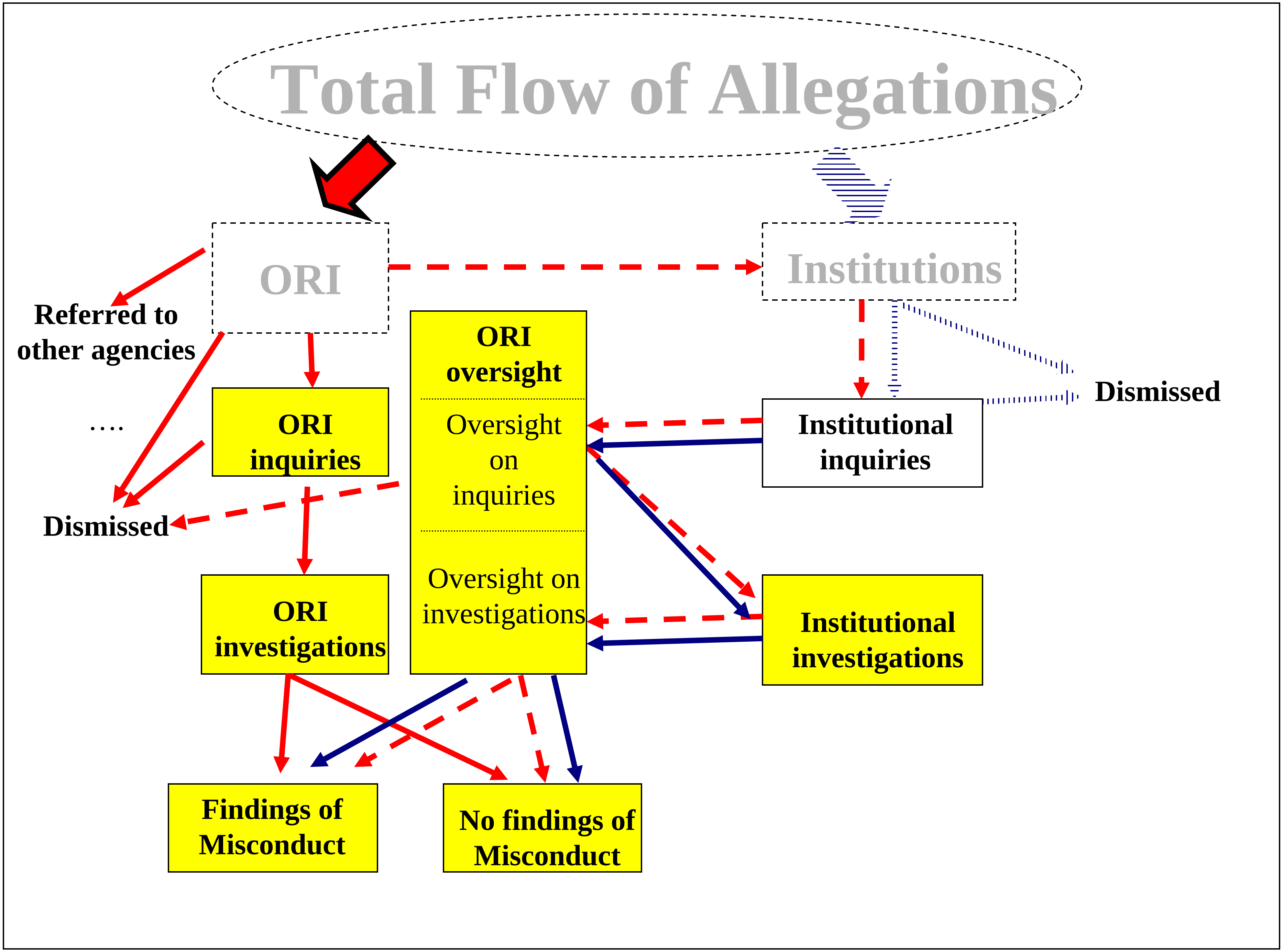
DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Office of the Assistant Secretary for Health

…and now (2006)





Total Flow of Allegations
ORI
Institutions
Referred to other agencies
....
Dismissed
ORI inquiries
ORI oversight
Oversight on inquiries
Oversight on investigations
Institutional inquiries
Dismissed
ORI investigations
Institutional investigations
Findings of Misconduct
No findings of Misconduct



Total Flow of Allegations
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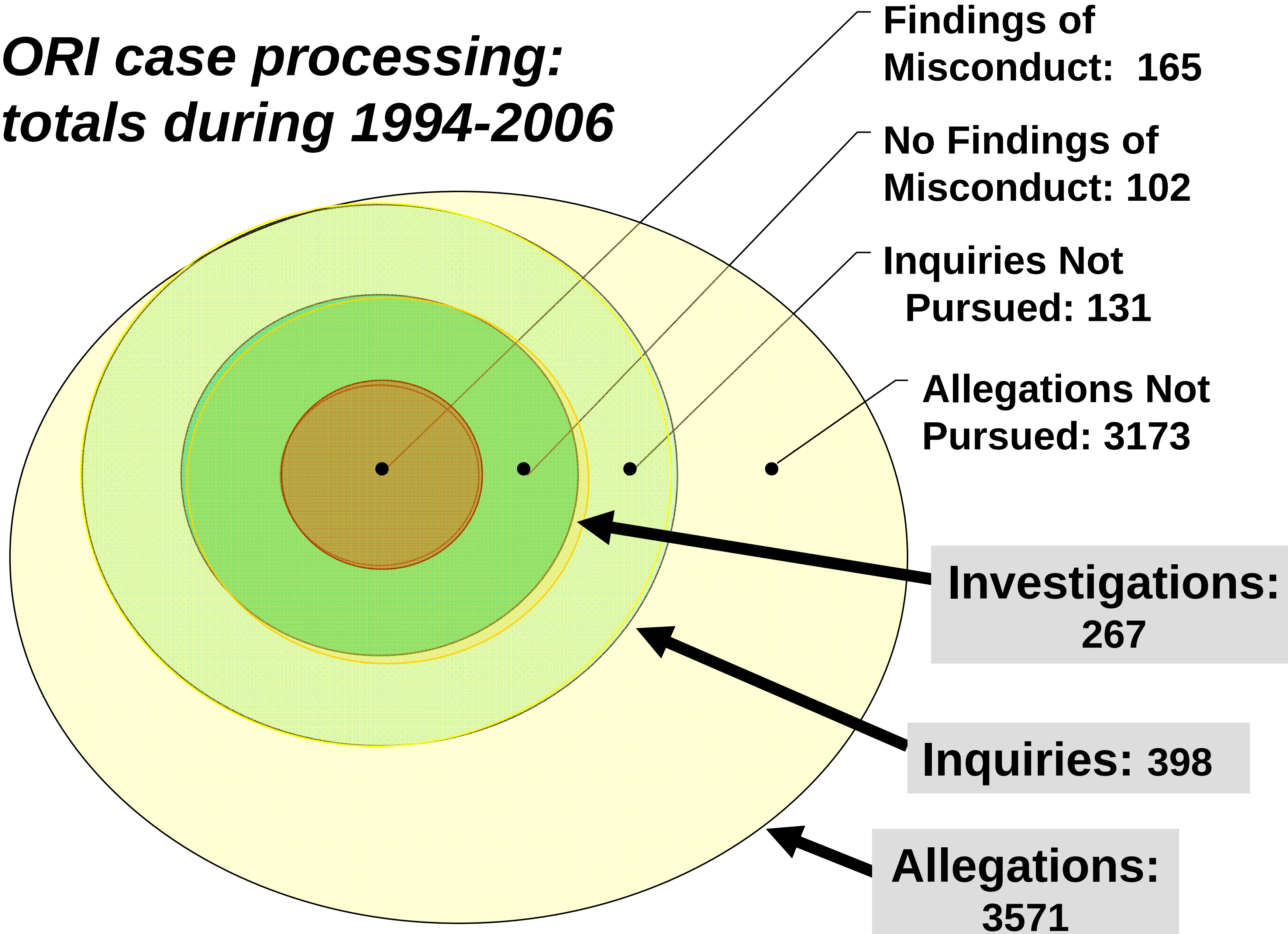
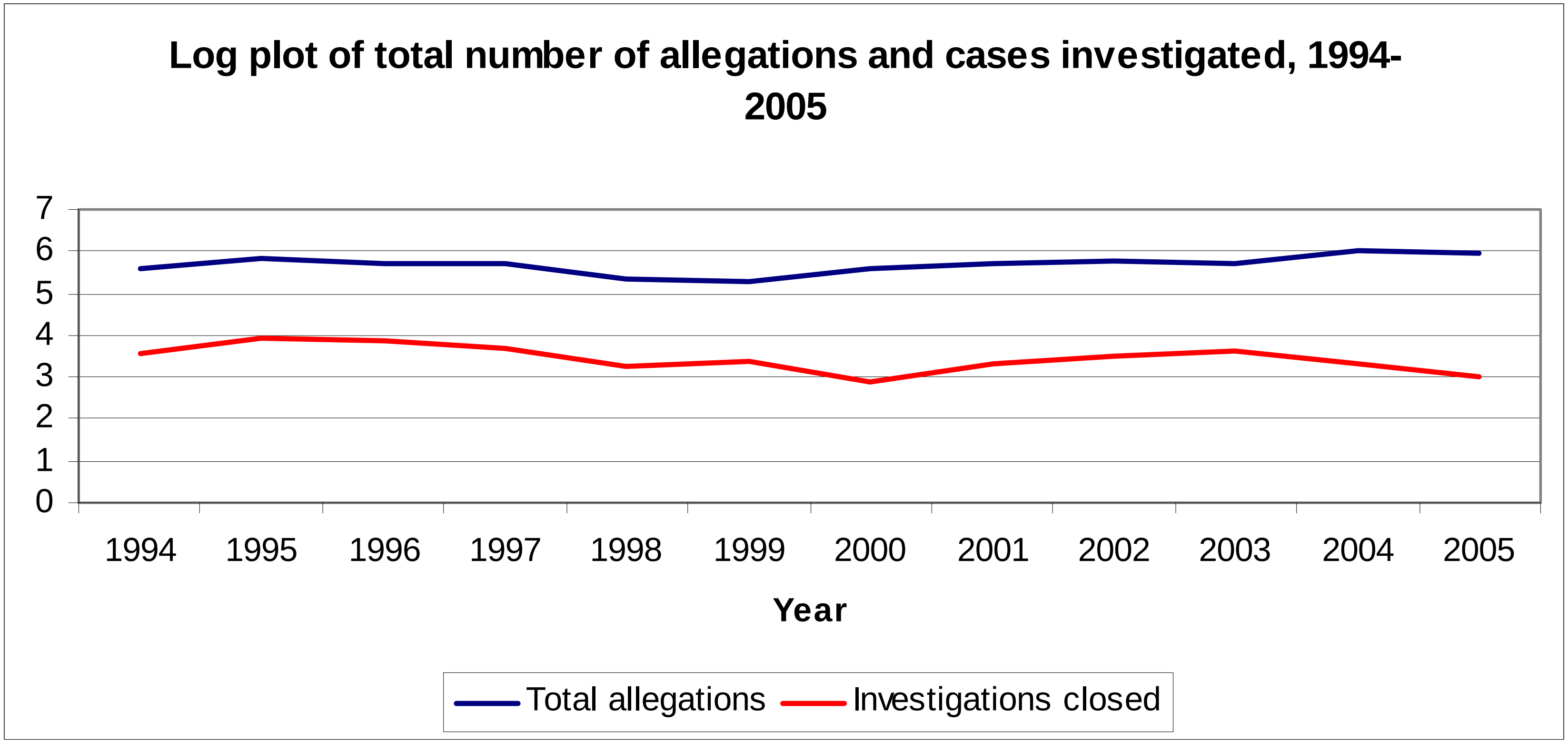
Institutional investigations
Dismissed
Findings of Misconduct
No findings of Misconduct

ORI case processing: totals during 1994-2006



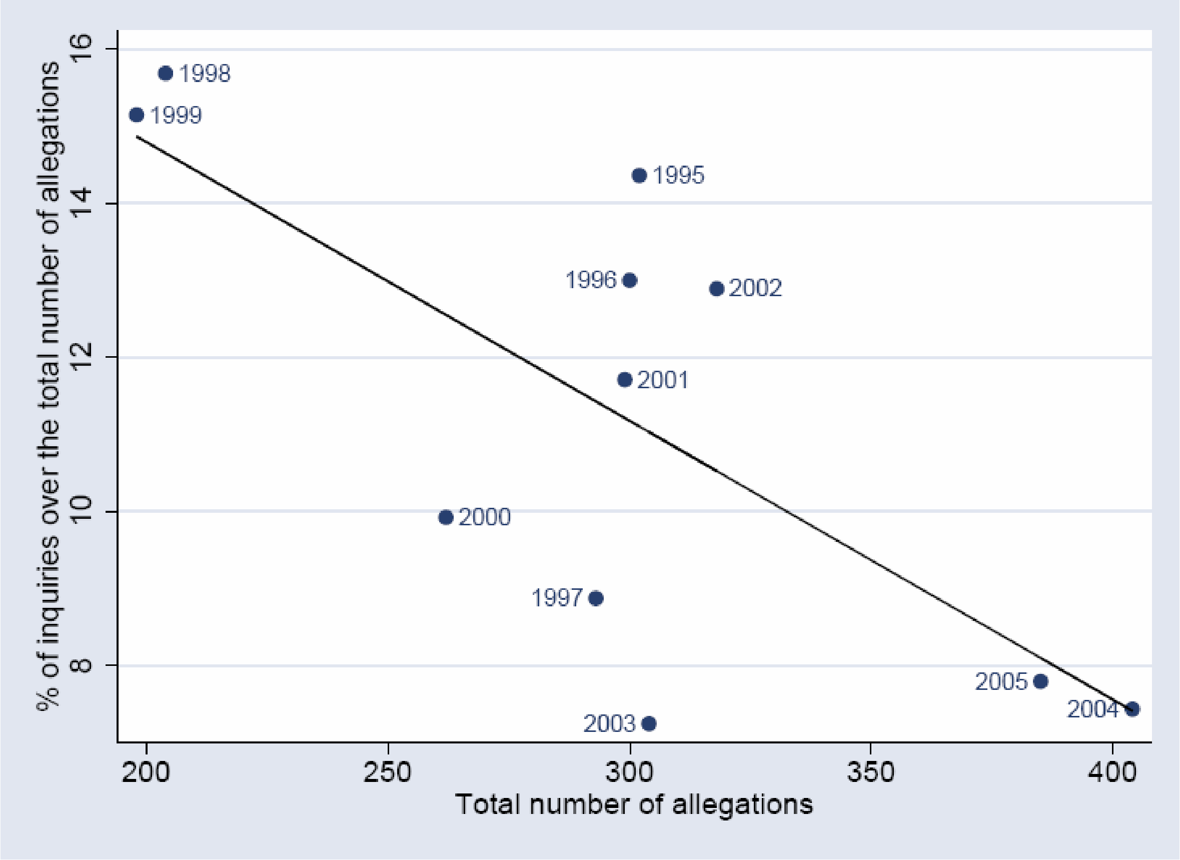
Source: Compiled from ORI Reports

Volumes of total allegations received annually by the ORI show variations around **a weak upward trend**, while those of "closed investigations" show slightly lagging variations around **a weak downward trend**



Source: Elaboration of ORI reports, 1994-2006.
Note: The series are plotted in logs to make them comparable.

ORI decisions to open an inquiries have declined as a proportion of the total number of allegations received, as the rate varies inversely with the volume of allegations; but there are substantial year-to-year variations.



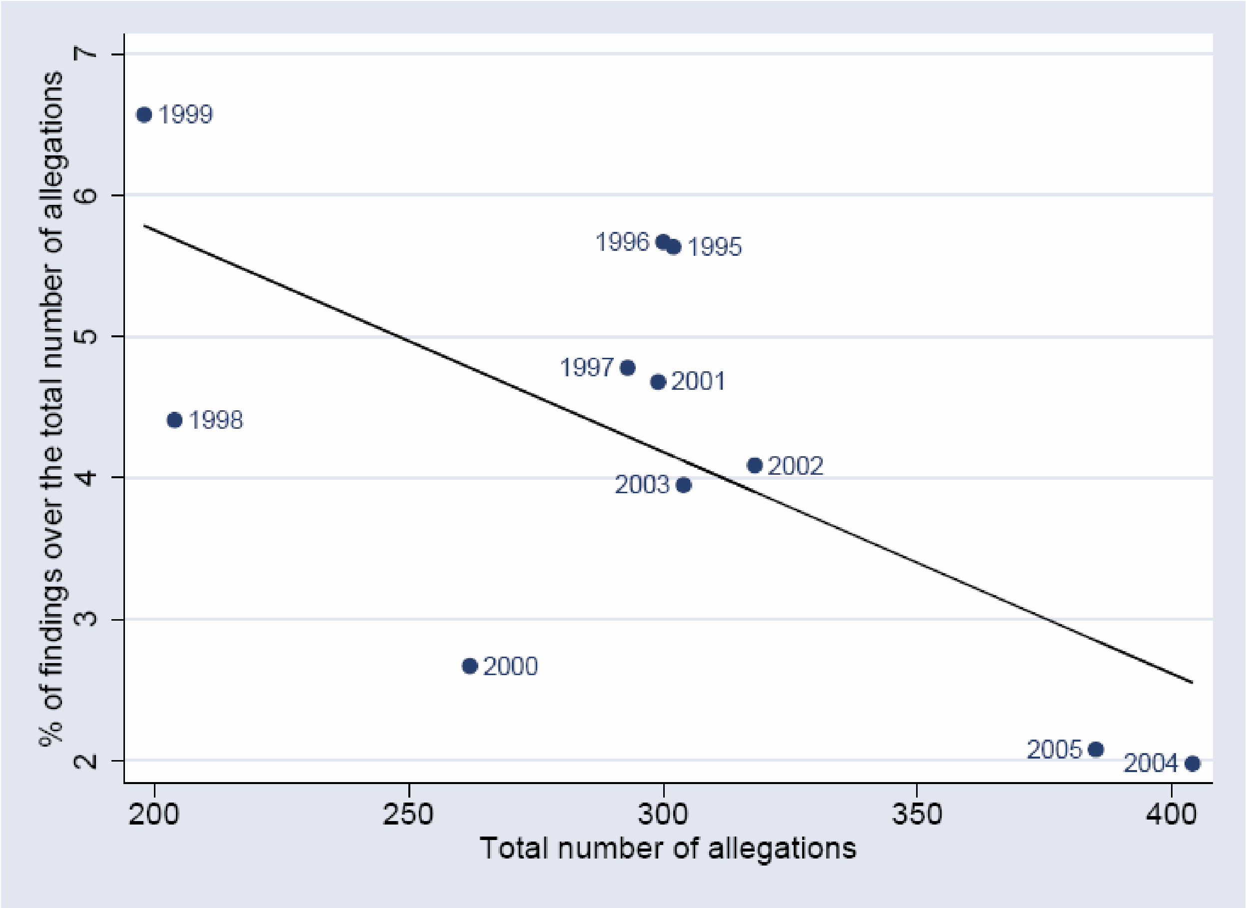
Source: Elaboration of ORI reports, 1994-2006.

Note: The black line represents the fitted values from the OLS regression whose equation line is

% of inquiries= 22.04 - .0362**Total number of allegations*, R^2=.4601.

The values for year 1995 actually resulted from averaging years 1994 and 1995 to smooth any start-up variations in the operations of the ORI.

ORI findings of misconduct (all types) as a proportion of allegations received also tend to vary inversely with the volume of allegations, but the relative year-to-year variations in the proportion are smaller



Source: Elaboration of ORI reports, 1994-2006.

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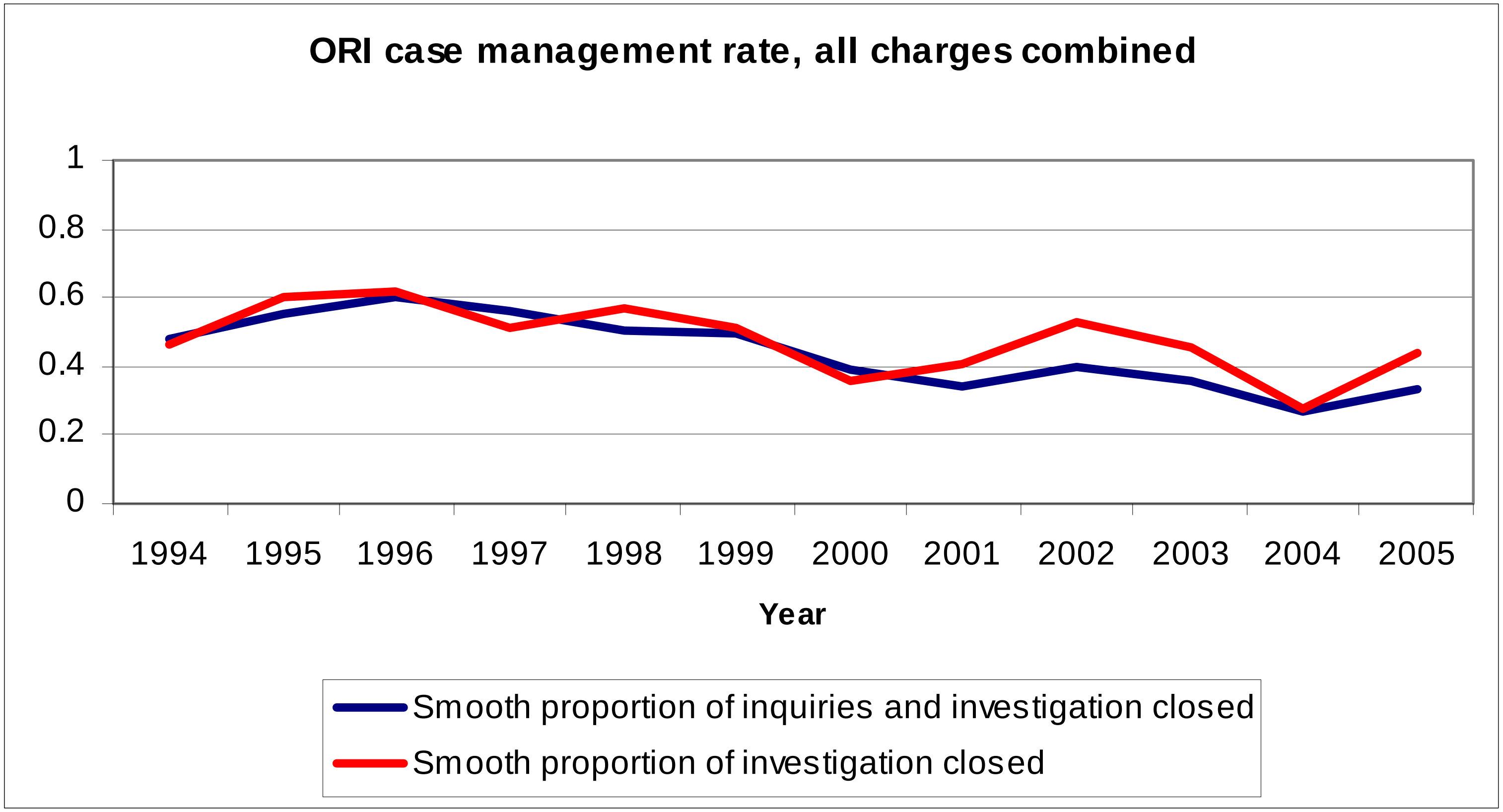
% of inquiries= 22.04 - .0362**Total number of allegations*, R^2=.4601.

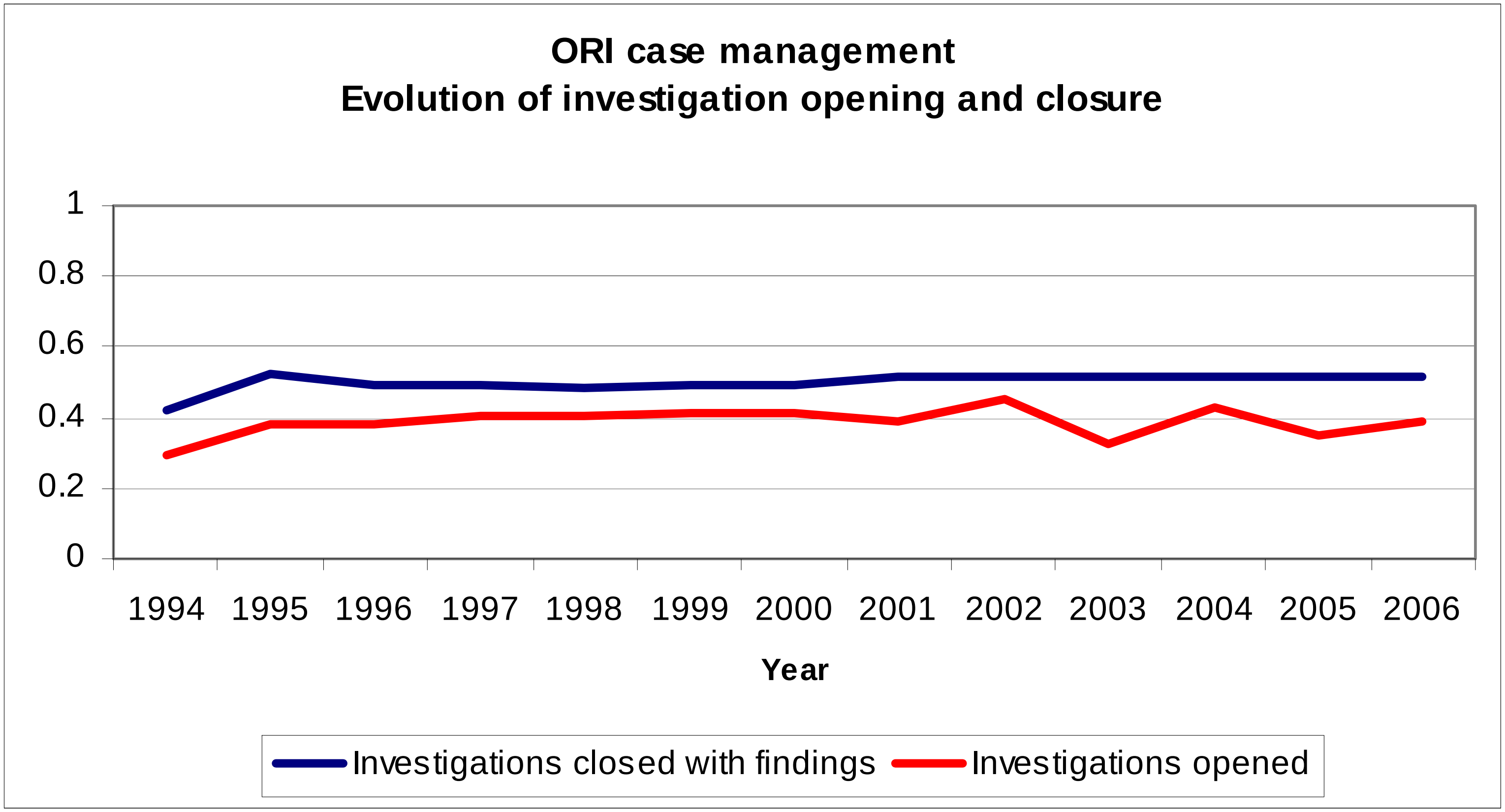
The values for year 1995 actually resulted from averaging years 1994 and 1995 to smooth any initial conditions problem.

Closure rates for ORI all enquiries and investigations, and for investigations alone are approximately the same (both averaged over successive pairs of years), with the relative volume of closed inquires declining somewhat



Source: Elaboration of ORI reports, 1994-2006.
Note: Smooth proportion of inquiries and investigations closed = total number of inquiries and investigations closed in a year over the sum of inquiries and investigations opened in the year and those carried to the next year.
Smooth proportion of investigations closed = total number of investigations closed in a year over the sum of investigations opened in the year and those carried to the next year.
Both series are smoothed by a two years moving average.

The *cumulative* ratios of newly opened investigations to total open investigations, and the similar measure for investigations closed with findings of misconduct exhibit great stability in ORI case management

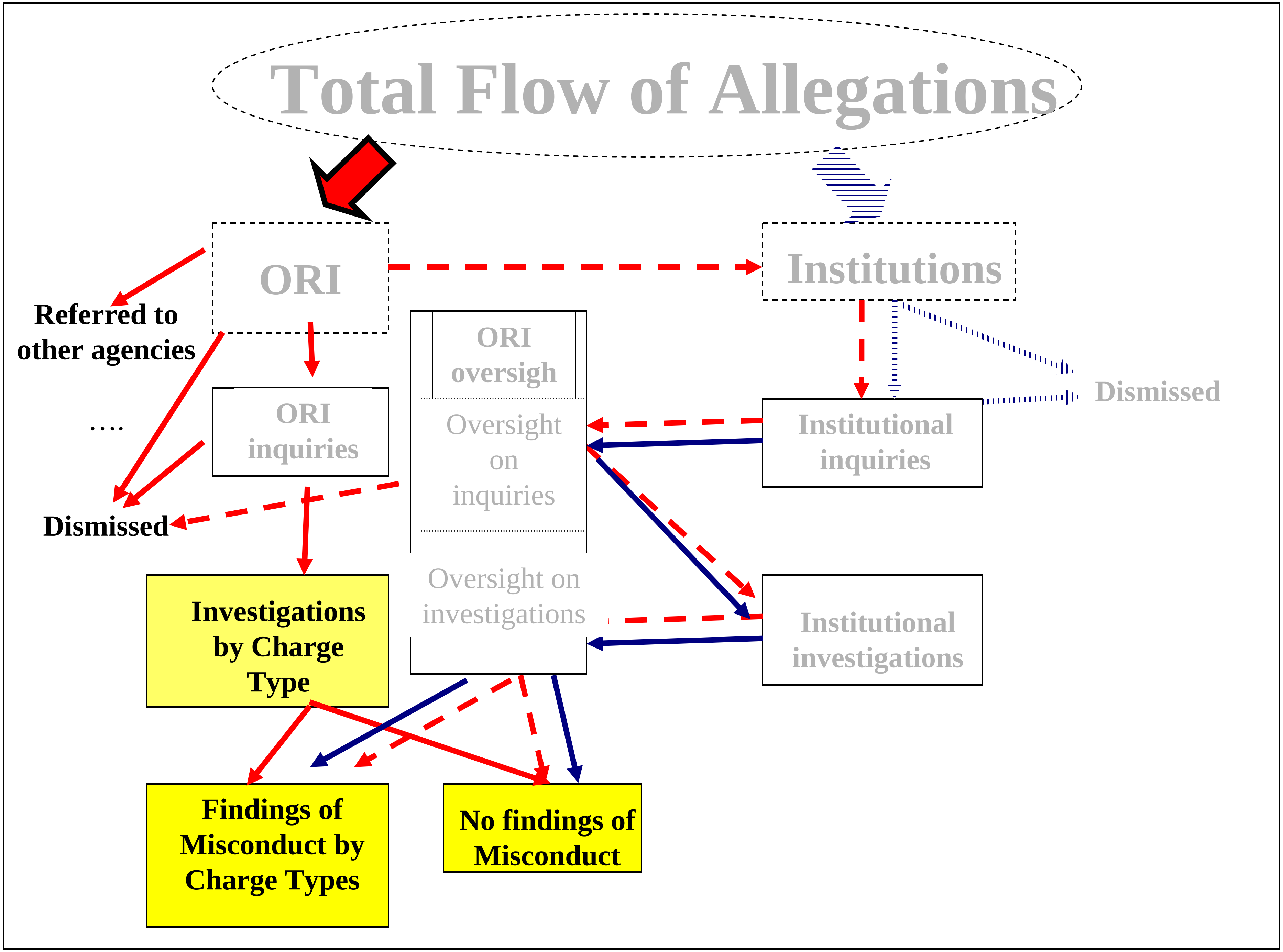


Source: Elaboration of ORI reports, 1994-2006.

Note: Investigations closed with findings= Cumulative fraction of investigations closed with findings over the total of investigations opened and carried to the next year.

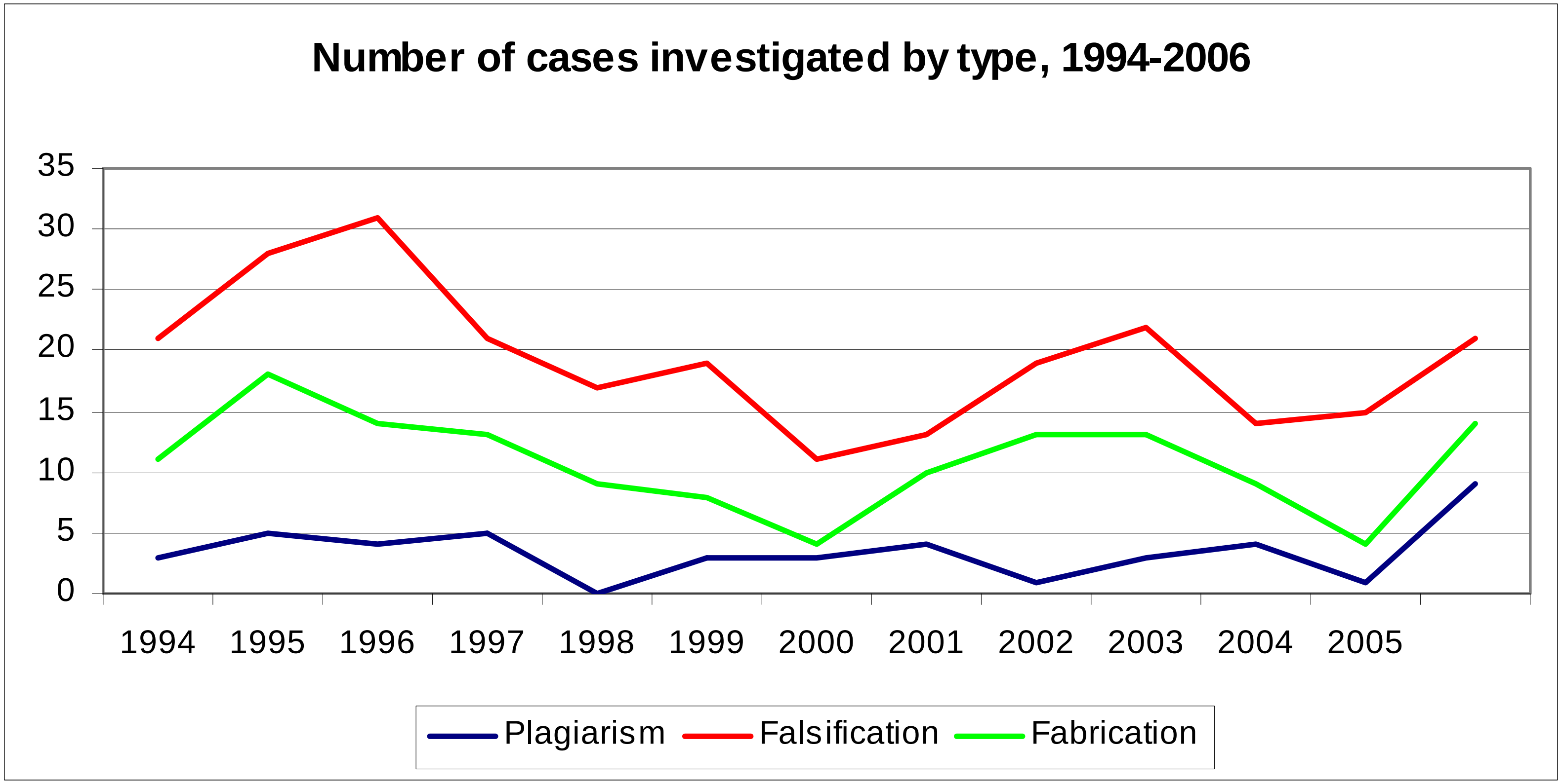
Investigations opened= Cumulative fraction of new investigations opened over the total of investigations opened and carried to the next year.

Part 2. Dynamics of the Distribution of ORI Investigations and Findings of Misconduct, by Type, 1994-2006



Total Flow of Allegations
ORI
Institutions
Referred to other agencies
....
Dismissed
ORI inquiries
ORI oversigh
Oversight on inquiries
Oversight on investigations
Institutional inquiries
Institutional investigations
Dismissed
Investigations by Charge Type
Findings of Misconduct by Charge Types
No findings of Misconduct

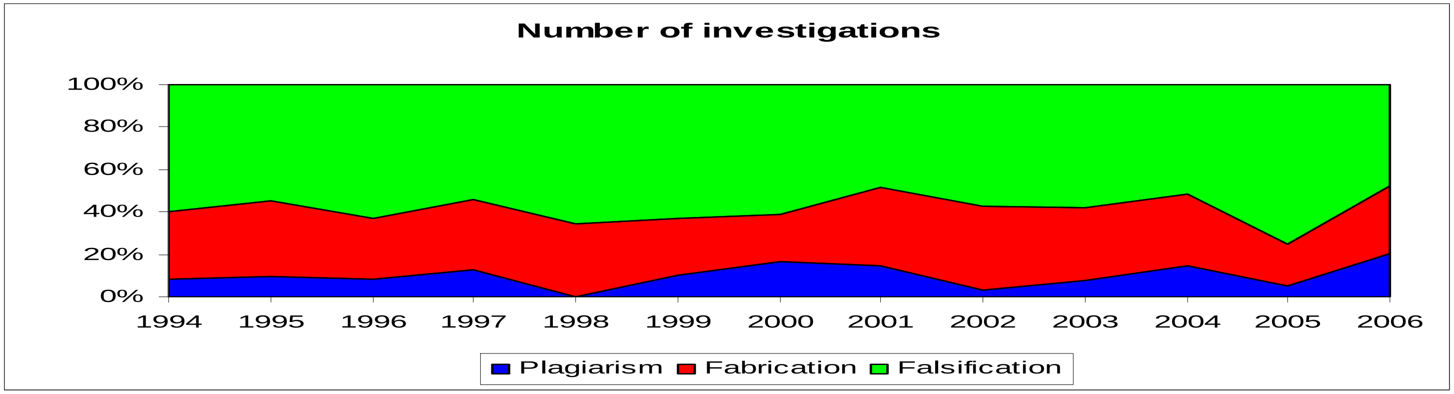
Annual volumes of ORI closed investigations of falsifications and fabrications have declined since the 1990's, while those involving plagiarism remain few and show no trend

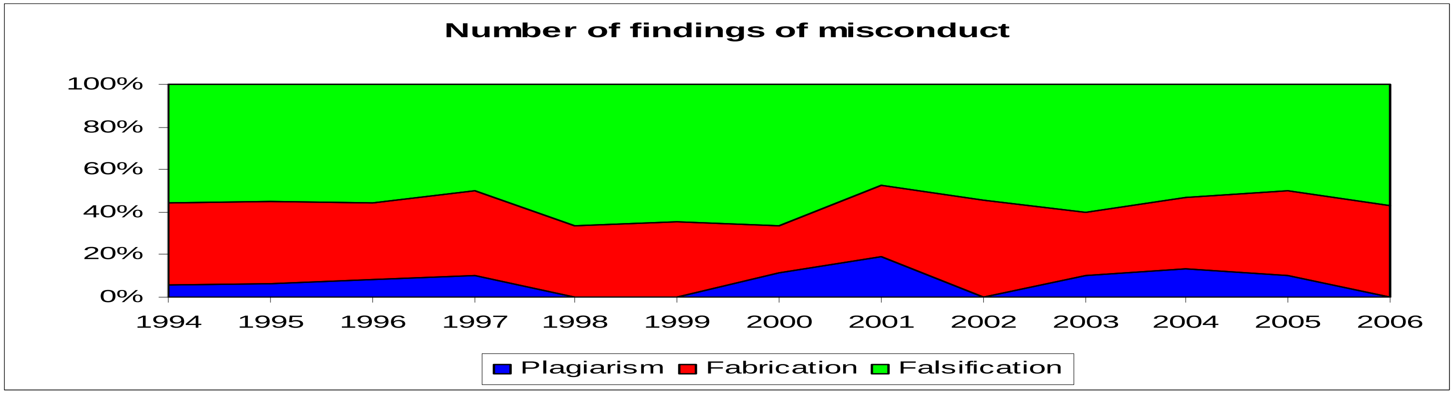


Source: Elaboration of ORI reports, 1994-2006.
Note: Number of cases investigated= number of investigations closed during the year.

The annual distributions of the three types of misconduct charges investigated by the ORI, and the corresponding distributions of misconduct findings have remained quite stable and involved relatively few plagiarism cases

Distribution of number of investigations and number of findings, by type of charge





Source: Elaboration of ORI reports, 1994-2006.

Trends in the mean lag in corrections of the public record of research -- a partial view from ORI misconduct findings

Is the publicly supported research system being overwhelmed by instances of scientific misconduct that go undetected and uncorrected?

One symptom of such a condition would be the tendency for the distribution of the time-lags between acts of misconduct and their detection, and public correction.

More systematic data about this should be collected, based on published notices and/or retractions by scientific research journals.

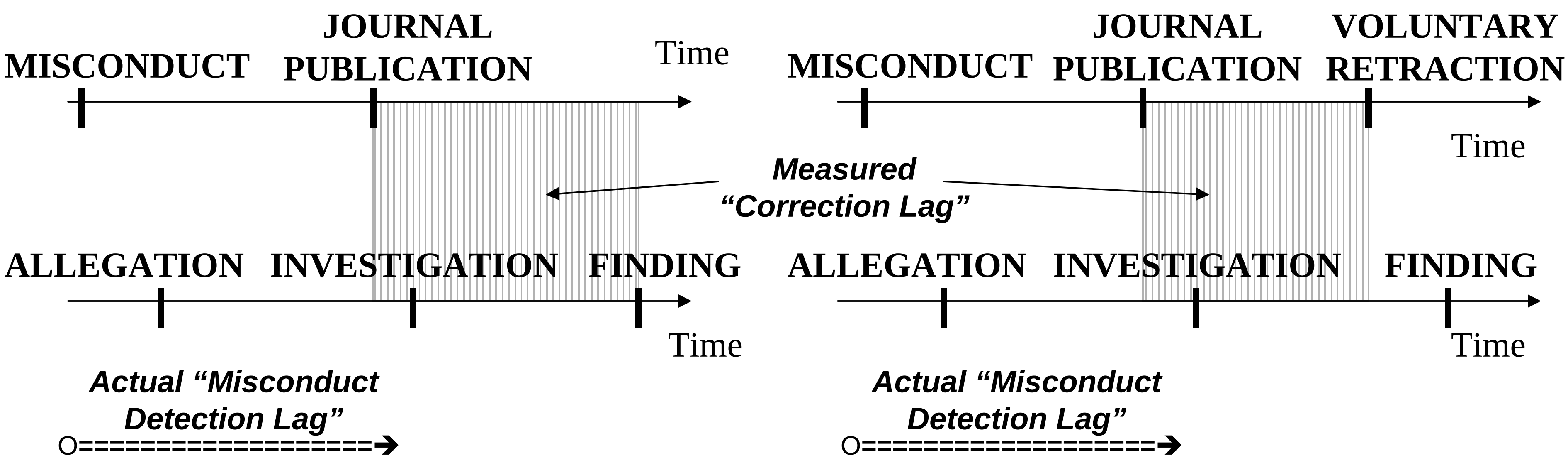
But an analysis of the evolution of the distribution of the "correction lags" -- measured from ORI cases where misconduct was found -- can provide an approximate indicator of recent *trends* in the typical lags for biomedical and behavioral research publications.

Measuring the “Misconduct Correction Lags” from ORI Cases

Averaging the gap between the date of a journal publication and the date of the misconduct finding (or a prior retraction) yields the mean “correction lag,” **and from that an efficient lower-bound estimate of the mean Detection Lag can be obtained by allowing for the mean duration of ORI investigations**

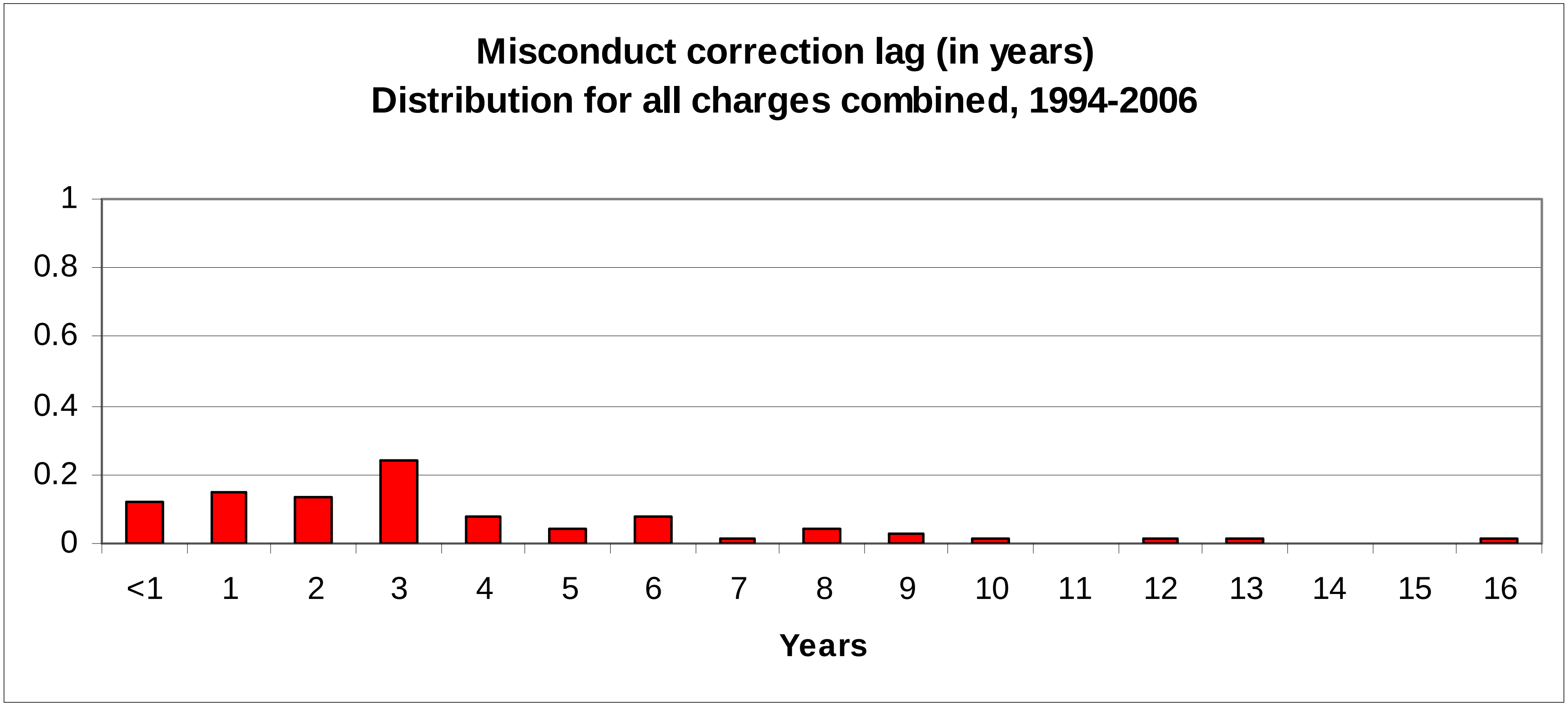
Case 1: No retraction issued

Case 2: Retraction issued



Note: The “detection lag” (between a true allegation the prior act of misconduct) can be shorter or longer than the lag between journal publication and the opening of an investigation. But the measured “correction lag” overstates the lag between post-publication allegation and investigation, as it includes the period of the investigation, which can be taken as roughly 1 year on average. Biases in the estimated levels of these average lags are unlikely to distort their trends, given time-stationary case flow management.

The distribution of measured “correction lags” in cases where ORI found misconduct (all types combined) is left-skewed with a mode at 3 years, based pooled observations for 1994-2006



Distribution statistics for the measured "correction lags" (in cases where ORI found misconduct) reveal the emergence of post-1990's stability around a constant mode, lower mean and smaller rel-variance

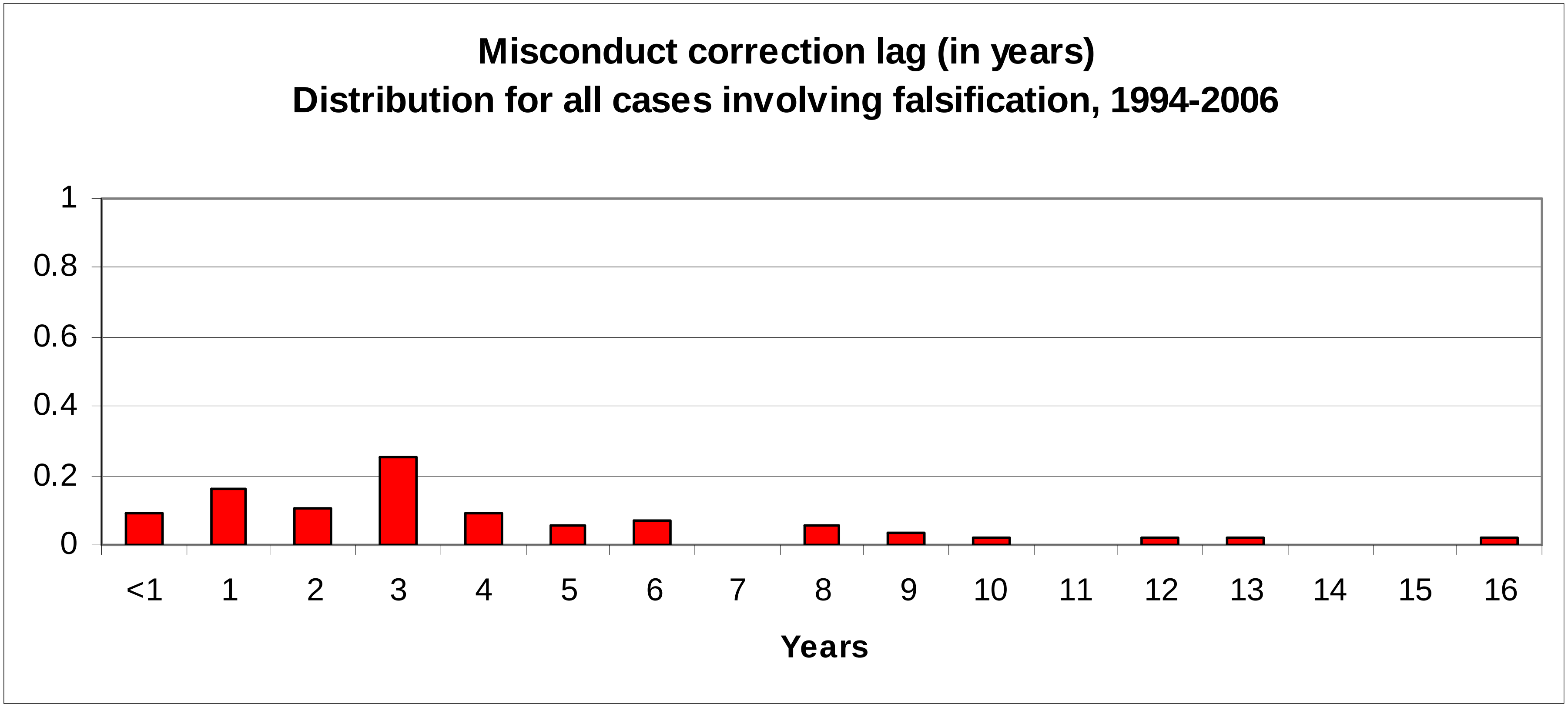
		Evolution of the average "Misconduct correction lag" (in years), for all charges combined					
	1994	**1994-1996**	**1994-1998**	**1994-2000**	**1994-2002**	**1994-2004**	**1994-2006**
Mean	5.60	4.82	4.04	3.75	3.35	3.33	3.65
Median	3.00	4.00	3.00	3.00	3.00	3.00	3.00
Std. Dev.	6.11	4.35	4.01	3.68	3.24	3.06	3.32
Range	1--16	0--16	0--16	0--16	0--16	0--16	0--16
Std. Dev./Mean	1.12	0.90	0.99	0.98	0.97	0.92	0.92

Source: Elaboration on ORI reports, 1994-2006.

Note: The "corrections lag" is calculated only for those observations that involve publication of a paper related to the research under investigation. The date of publication of the paper is used as an estimate of the time at which misconduct took place (as the misconduct act had already been committed prior to journal submission and, a fortiori, prior to the publication). To obtain an approximation of the detection lag, we first find the mean correction lag by taking the "correction dates" as the minima of either the dates on which the investigation was closed (most cases are closed within the year they are opened), or of an antecedent voluntary retraction by the respondent; then subtracting the journal publication date gives the lag. Reducing the mean estimates of the correction lags by the typical one-year investigation duration yields an "efficient under-estimator" of the mean detection lag.

In this sample, the correction date coincides with the end of the investigation in 40 cases out of 65, and we use the date of retraction statements in the other 25 cases.

The distribution of measured "correction lags" in cases where ORI found falsification resembles that for all types of misconduct pooled, over the period 1994-2006



The distribution statistics for the measured “correction lags” in cases where ORI found falsification broadly resemble those for all types of misconduct pooled in successively longer sub-periods of 1994-2006

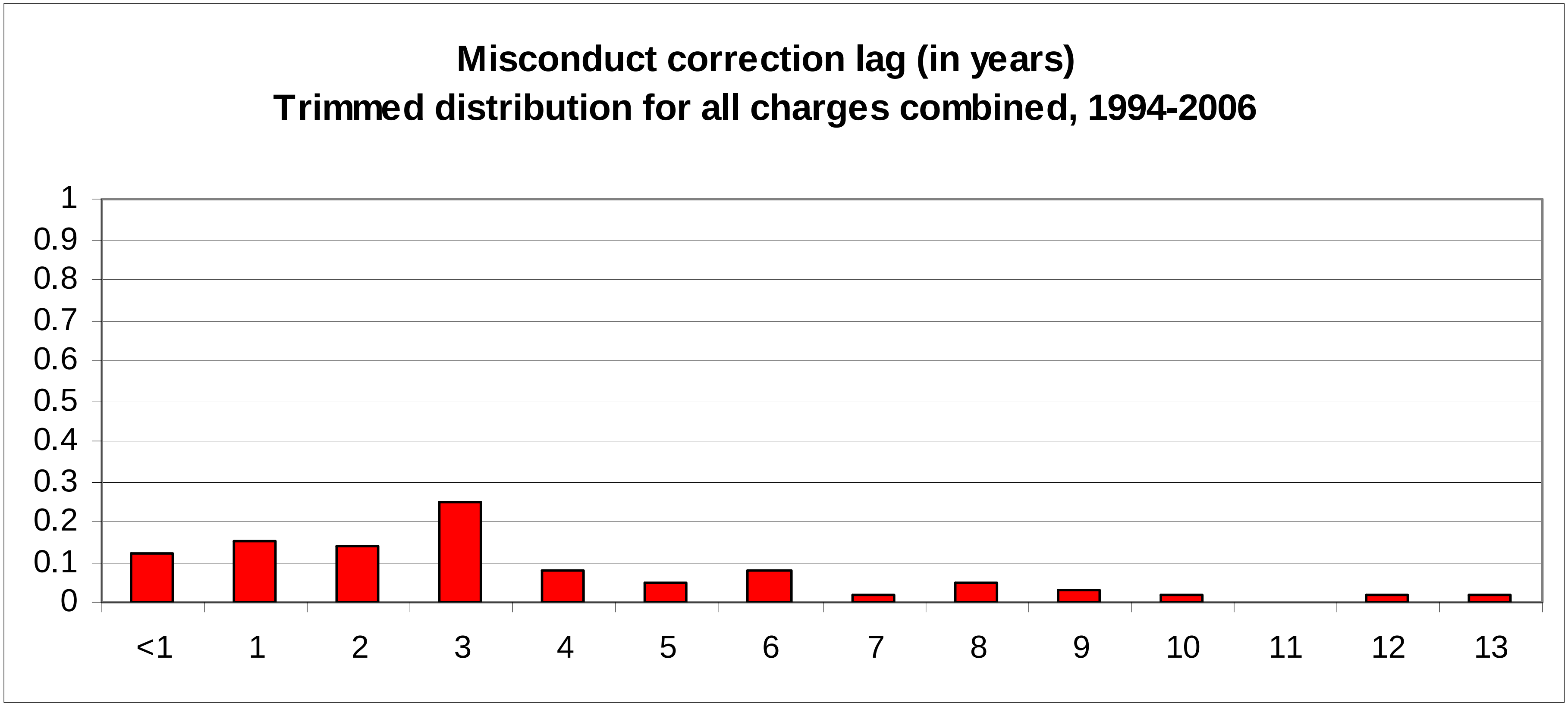
		Evolution of the average "Misconduct correction lag" (in years), for all cases involving falsification					
	1994	**1994-1996**	**1994-1998**	**1994-2000**	**1994-2002**	**1994-2004**	**1994-2006**
Mean	5.60	5.00	4.26	4.10	3.52	3.54	3.91
Median	3.00	4.00	3.00	3.71	3.23	3.29	3.69
Std. Dev.	6.11	4.42	4.05	3.71	3.29	3.33	3.74
Range	1--16	0--16	0--16	0--16	0--16	0--16	0--16
Std. Dev./Mean	1.09	0.88	0.95	0.90	0.93	0.94	0.96

Source: Elaboration of data from ORI reports, 1994-2006.

Note: The “corrections lag” is calculated only for those observations that involve publication of a paper related to the research under investigation. The date of publication of the paper is used as an estimate of the time at which misconduct took place (as the misconduct act had already been committed prior to journal submission and, a fortiori, prior to the publication). To obtain an approximation of the detection lag, we first find the mean correction lag by taking the “correction dates” as the minima of either the dates on which the investigation was closed (most cases are closed within the year they are opened), or of an antecedent voluntary retraction by the respondent; then subtracting the journal publication date gives the lag. Reducing the mean estimates of the correction lags by the typical one-year investigation duration yields an “efficient under-estimator” of the mean detection lag.

In this sample, the correction date coincides with the end of the investigation in 40 cases out of 65, and we use the date of retraction statements in the other 25 cases.

The distribution of measured "correction lags" in cases where ORI found misconduct (all types combined) – after deletion of one case (with 16 year lag, involving falsification) reported in 1994, leaves the mode at 3 years, but reduces the left-skew and the variance



Eliminating the 1994 “outlier” observation (one 16-year lag) reveals the essential time-stationarity of the distribution of the “correction lag” for all types of misconduct cases over the period 1994-2006

		Evolution of the average "Trimmed misconduct correction lag" (in years), for all charges combined					
	1994	**1994-1996**	**1994-1998**	**1994-2000**	**1994-2002**	**1994-2004**	**1994-2006**
Mean	3.00	4.13	3.56	3.40	3.14	3.12	3.46
Median	2.50	3.50	3.00	3.00	3.00	3.00	3.00
Std. Dev.	2.16	3.36	3.25	3.07	2.74	2.60	2.96
Range	1--6	0--12	0--12	0--12	0--12	0--12	0--13
Std. Dev./Mean	0.72	0.82	0.91	0.90	0.87	0.84	0.86

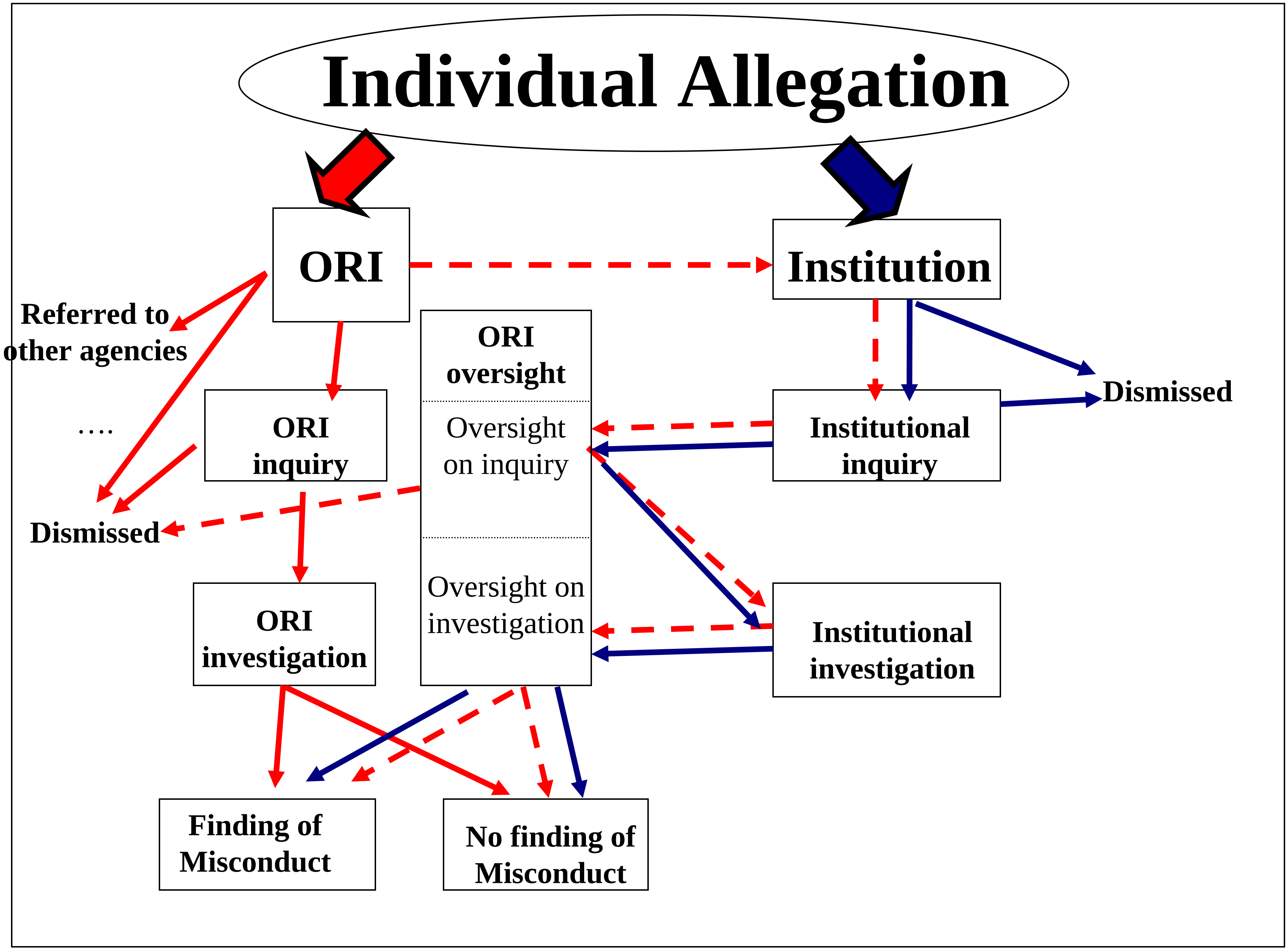
Source: Elaboration on ORI reports, 1994-2006.

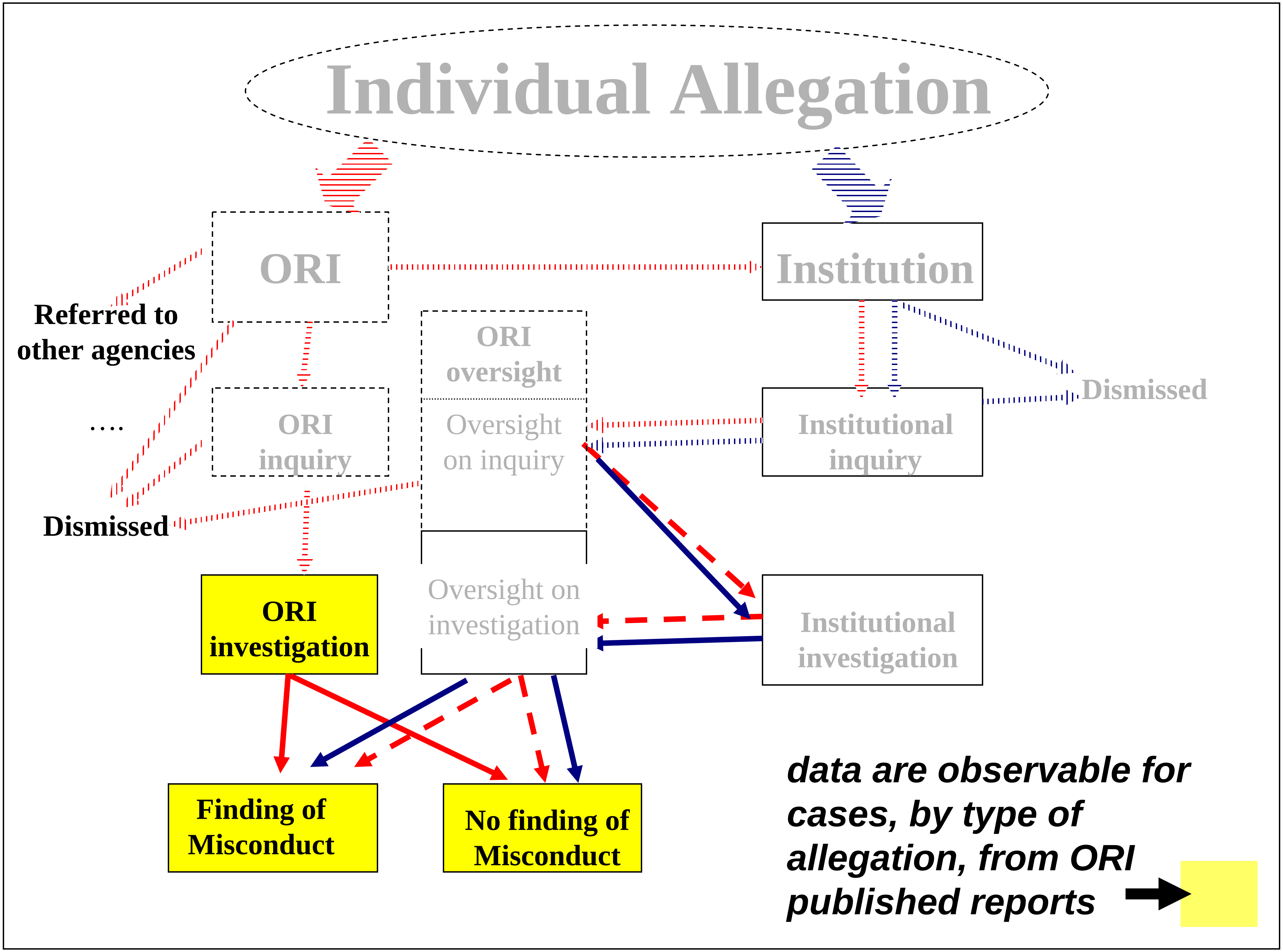
Note: The “corrections lag” is calculated only for those observations that involve publication of a paper related to the research under investigation. The date of publication of the paper is used as an estimate of the time at which misconduct took place (as the misconduct act had already been committed prior to journal submission and, a fortiori, prior to the publication). To obtain an approximation of the detection lag, we first find the mean correction lag by taking the “correction dates” as the minima of either the dates on which the investigation was closed (most cases are closed within the year they are opened), or of an antecedent voluntary retraction by the respondent; then subtracting the journal publication date gives the lag. Reducing the mean estimates of the correction lags by the typical one-year investigation duration yields an “efficient under-estimator” of the mean detection lag.

In this sample, the correction date coincides with the end of the investigation in 40 cases out of 65, and we use the date of retraction statements in the other 25 cases.

Part 3. Analysis of Effects on Conditional Probabilities of Findings of Misconduct in Closed ORI Investigations, 1994-2006

Remark: The previously demonstrated stability of ORI case management processes over time, as well as that of the distribution of cases investigated, justifies pooling all the available data for the “closed investigations” from the entire period 1994-2006, in order to perform the statistical analysis reported in this Part with of the largest possible number of observations on individual cases and their characteristics.


Individual Allegation
ORI
Institution
Referred to other agencies
....
ORI inquiry
ORI oversight
Oversight on inquiry
Oversight on investigation
Institutional inquiry
Dismissed
Dismissed
ORI investigation
Institutional investigation
Finding of Misconduct
No finding of Misconduct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ORI investigation
Oversight on investigation
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Finding of Misconduct
No finding of Misconduct
data are observable for cases, by type of allegation, from ORI published reports

Frequencies and rank ordering of grantor institutes by frequency of closed investigations, shows no significant differences between sub-periods of 1994-2006

List of grantors, ranked by frequency of ORI "closed investigations", 1994-2006.

Institute	1994-2006 Investigations closed	1994-2006 Rank by frequency	1994-1997 Investigations closed	1998-2006 Investigations closed
Main grantors				
National Cancer Institute (NCI)	39	1.5	6	33
National Heart, Lung,and Blood Institute (NHLBI)	39	1.5	2	37
National Institute of Mental Health (NIMH)	21	3	4	17
National Institute of Allergy and Infectious Diseases (NIAID)	17	4.5	0	17
National Institute of Diabetes and Digestive and Kidney Diseases (NIKKDK)	17	4.5	2	15
Other grantors				
National Institute of Neurological Disorders and Stroke (NINDS)	15	6	2	13
National Institute of Child Health and Human Development (NICHD)	13	7	1	12
National Institute of General Medical Sciences (NIGMS)	10	8	2	8
National Institute of Aging (NIA)	9	9	1	8
National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS)	8	10.5	2	6
National Institute on Drug Abuse (NIDA)	8	10.5	1	7
National Center for Research Resources (NCRR)	7	12	0	7
National Institute of Environmental Health Sciences (NIEHS)	5	13	1	4
National Eye Institute (NEI)	4	14.5	0	4
National Institute of Dental and Craniofacial Research(NIDCR)	4	14.5	0	4
National Institute on Deafness and Other Communication Disorders (NIDCD)	3	16	1	2
National Center for Human Genome Research (NCHGR)	2	17.5	1	1
National Institute on Alcohol Abuse and Alcoholism (NIAAA)	2	17.5	0	2
Centers for Disease Control and Prevention (CDCP)	1	21.5	1	0
National Institute of Nursing Research (NINR)	1	21.5	0	1
National Institute for Occupational Safety and Health (NIOSH)	1	21.5	0	1
Substance Abuse and Mental Health Services Administration (SAMHSA)	1	21.5	0	1
Small Business Innovation Research (SBIR)	1	21.5	0	1

Source:Micro-level dataset derived from elaboration of ORI reports, 1994-2006.

Note: Investigations related to funds granted by two(three) institutes are counted twice(three times), once for each institute. Kolmogorov-Smirnov test for the equality of the cumulative distribution of closed inquiries in the two subsamples 1994-1997 and 1998-2006 gives a D=.2308, with P-value=.811. A test for the independence of the rankings in institutions by frequencies in the two sub-samples gives a Kendall Score (allowing for ties) of 40, with a P-value=.009. Both the Kolmogorov-Smirnov and the Kendall test were performed for the subset of institutes with a positive number of closed investigations in both periods.

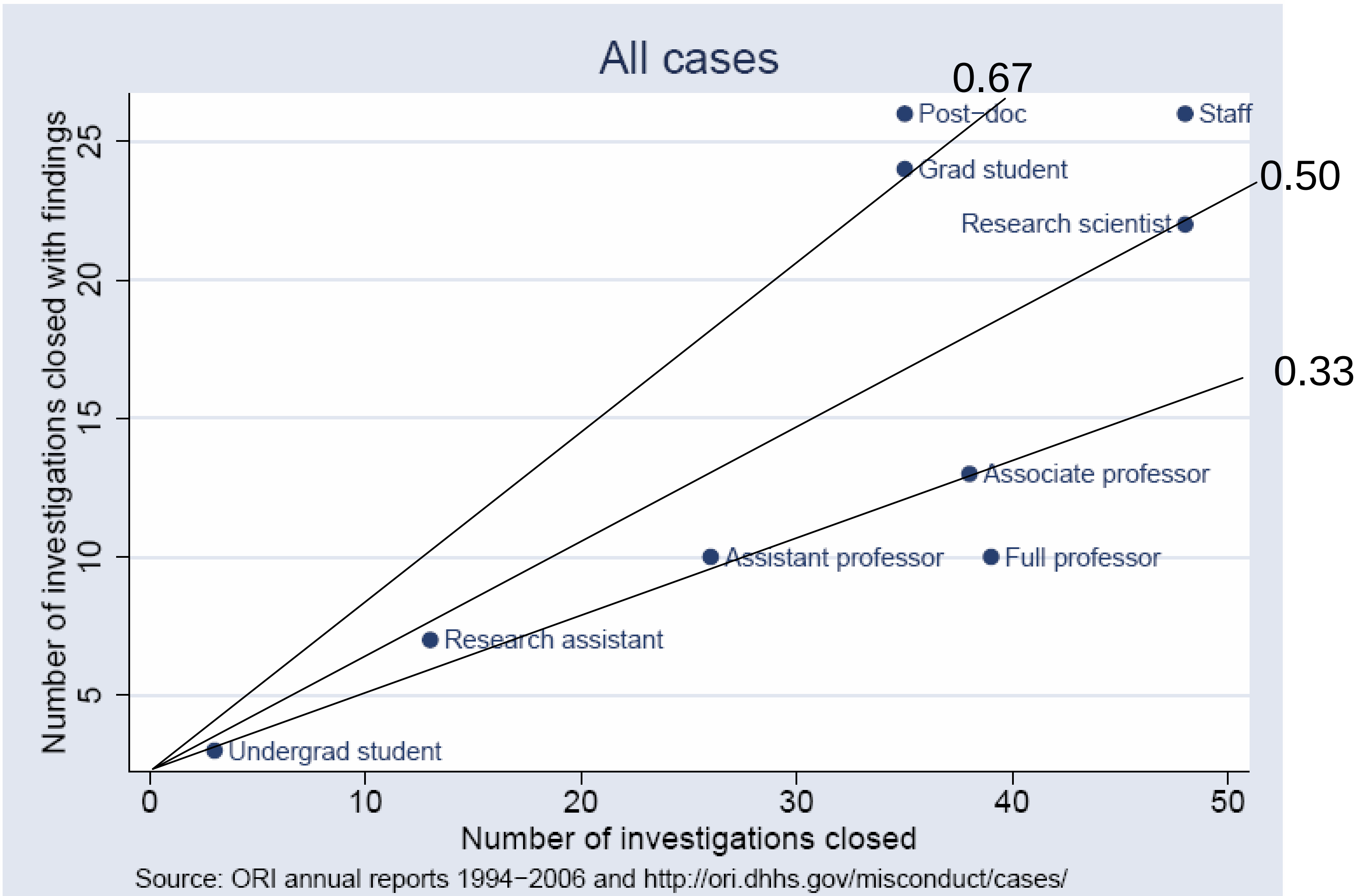
For purposes of this analysis the individual respondents in the ORI’s closed investigations were grouped into major categories defined according to their academic and non-academic employment “positions”

Positions held by individual subjects of ORI ”closed Investigations”, 1994-2006.

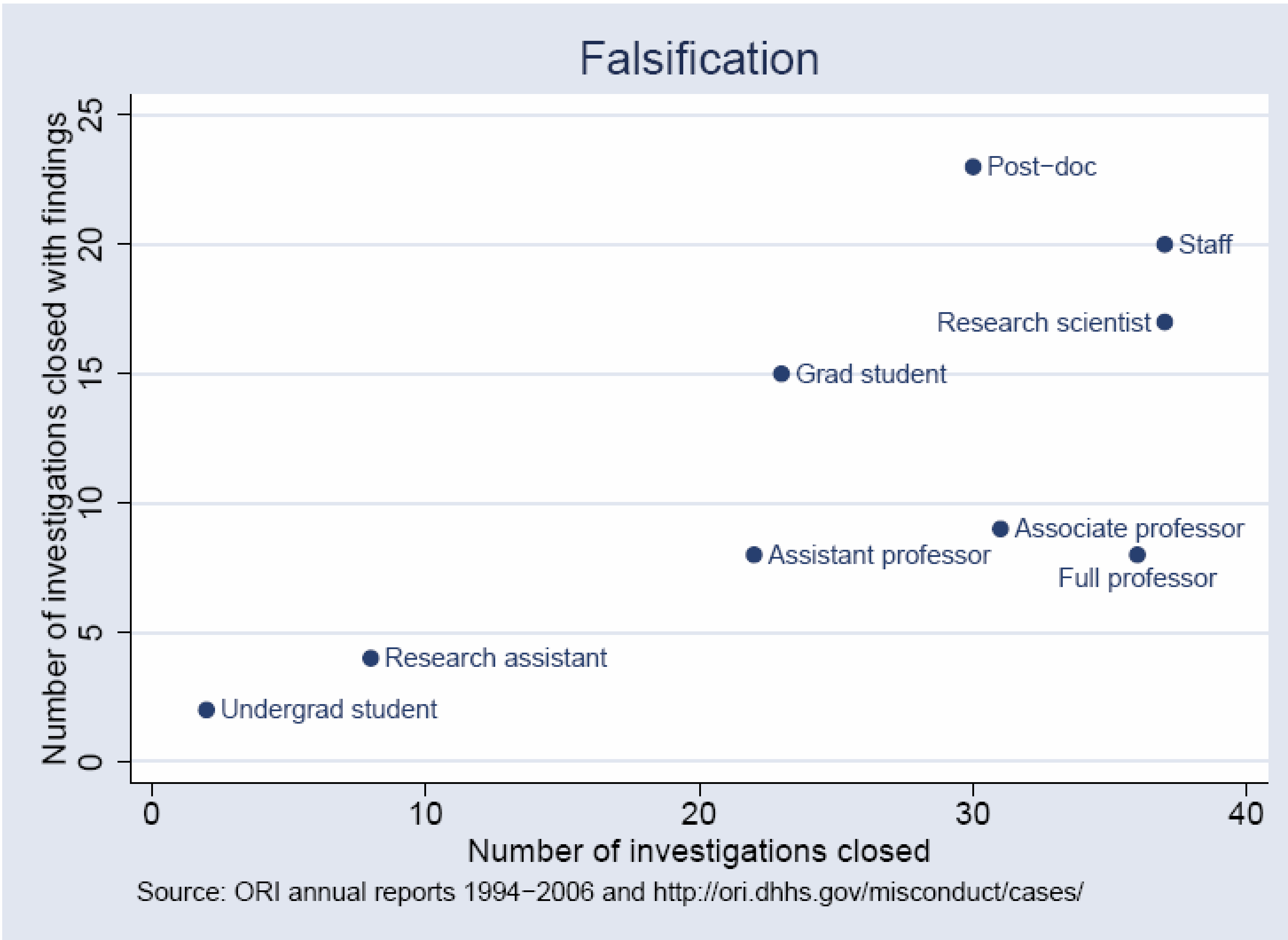
Category	Position	Obs.	Category	Position	Obs.
Academic			*Non academic*		
Full professor		**34**	**Research scientist**		**42**
	Full professor	33		Program coordinator	6
	Faculty member	1		Project coordinator	1
				Project director	4
Associate professor		**34**		Clinic coordinator	4
				Principal investigator	3
Assistant professor		**24**		Executive manager	1
				Research associate	11
Instructor		1		Research fellow	5
				Research scientist	5
Post-doc		**32**		Scientist	2
	Post-doc	29			
	Visiting fellow	3	**Staff**		**45**
				Laboratory technician	6
Graduate student		**31**		Research technician	6
				Technician	5
Research assistant		**12**		Data manager	4
	Research assistant	9		Study counselor	2
	Assistant researcher	3		Counselor	1
				Interviewer	4
Undergraduate student		**3**		Staff	9
				Contractual employee	3
				Employee	4
				Assistant member	1

Source: ORI reports 1994-2006. The Categories in boldface are aggregates, formed for the purpose of the analysis of “position effect” on the conditional probability of finding of misconduct.
Note: The “faculty member” entry that has been absorbed into the “Full professor” category pertains to a 1997 case involving allegations of falsification and fabrication; the ORI report discussion of the case suggests that the respondent was a senior faculty member. Although the position “Instructor” is listed separately here, for the statistical analysis this case was aggregated into the category “Staff”.

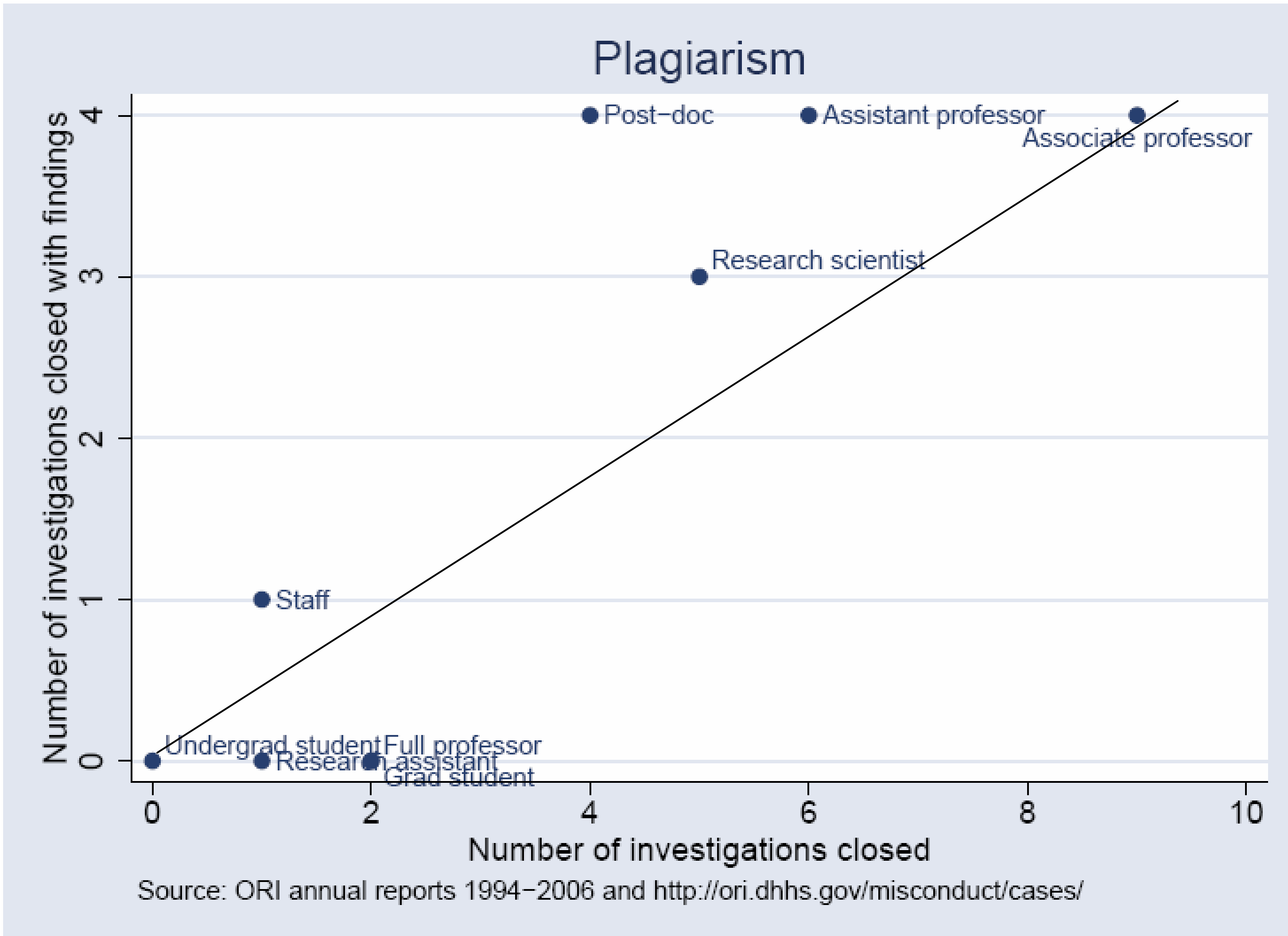
Mean relative frequencies of misconduct findings in closed observations are indicated by the indicated slope of rays from the origin of the graph, and reveal marked differences among two sets of “respondent-positions”



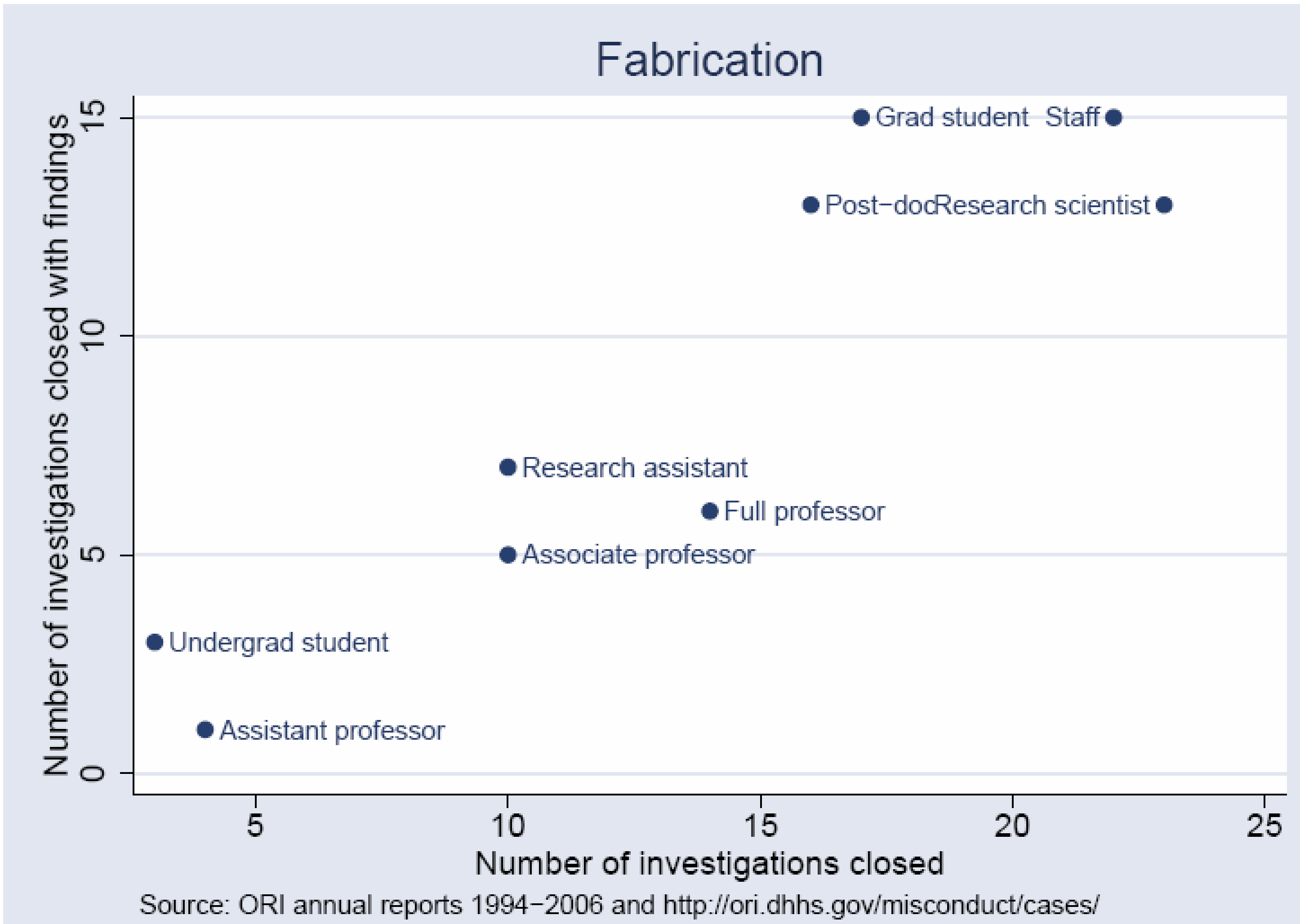
The pattern in the relative frequencies of misconduct findings among cases of falsification resembles that for all misconduct cases combined



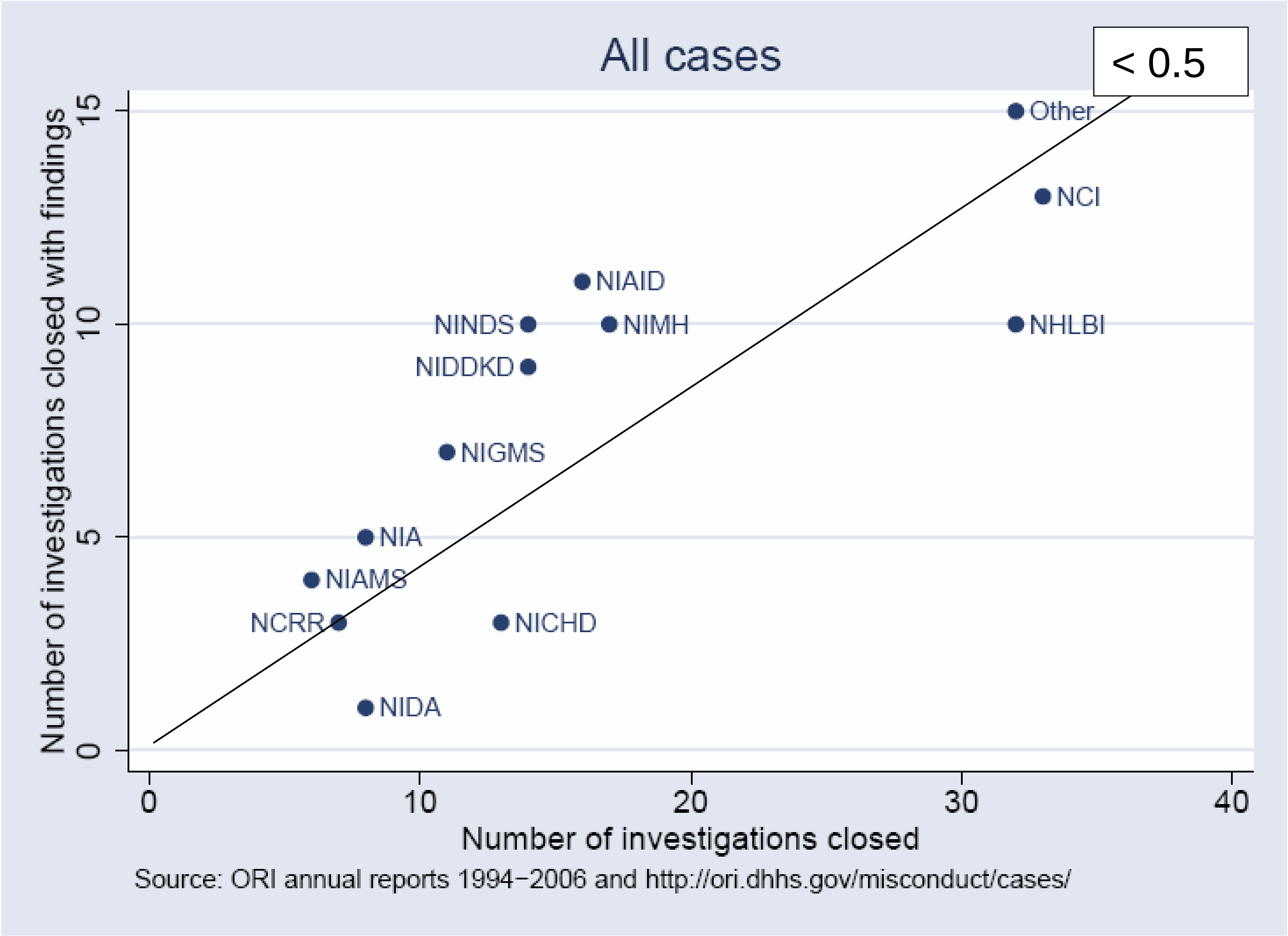
A still more striking separation between the mean relative frequencies of findings of misconduct appears among the different respondent-position groups in cases involving plagiarism



But the separation the mean frequencies of findings of misconduct is less pronounced among the various respondent-position groups in cases involving plagiarism



Grouping all ORI cases investigations of misconduct by the identities of the grantor institutes reveals some differences in the relative frequency of misconduct findings between two groups of National Institutes



Probit regression analysis of the marginal effects of respondent's "position" reveals statistically higher probabilities of misconduct findings for post-docs, grad students and staff, each compared with full professors in falsification cases, and for grad students vs full professors in fabrication cases

Probit analysis of marginal effect of "Position" other than "Full professor" on the conditional probability of a misconduct finding, comparing three types of charges, 1994-2006.

	Falsification		Fabrication		Plagiarism	
Variable	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
Post-doc	.4427	.002	.1138	.720	(a)	(a)
Graduate student	.3902	.006	.4663	.049	(a)	(a)
Staff	.2878	.021	.2268	.415	(a)	(a)
Research scientist	.2197	.102	.1549	.586	.9851	(b)
Assistant professor	.1725	.237	(a)	(a)	.9961	.000
Associate professor	.0156	.908	(a)	(a)	.9945	.000
Research assistant	(a)	(a)	.2496	.381	(a)	(a)
Journal publication involved	.1937	.011	.3133	.180	.000	1
Observations	169		45		15	

Source: Probit regression analysis of micro-level dataset derived from elaboration of ORI reports, 1994-2006.

Note: *Full professor* is the omitted dummy variable for "Position".

The dummy variable for *Journal publication involved* takes the value =1 when the ORI case discussion refers to a journal article that built upon the alleged infraction and was published prior to the ORI's finding of misconduct; otherwise the "*Journal*" dummy takes value =0, which includes case of infractions in working papers, grant proposals, and journal submissions.

(a) Regressor omitted from the estimating equation to avoid perfect collinearity

(b) P-value could not be computed, due to insufficient degrees of freedom (too few observations).

Levels of predicted conditional probabilities of misconduct findings, showing effects of respondent position and involvement of prior journal publications, for all closed ORI investigations, 1994-2006

Predicted probabilities of a misconduct finding, conditional on the respondent's "Position" for each specified class of allegation investigated by ORI, 1994-2006.

	No journal publication involved			Journal publication involved		
	Falsification	**Fabrication**	**Plagiarism**	**Falsification**	**Fabrication**	**Plagiarism**
Post-doc	.5004	.4085	(a)	.5482	.7915	(a)
Graduate student	.4411	.8907	(a)	.6551	.9885	(a)
Staff	.3393	.5455	(a)	.5528	.8764	(a)
Research scientist	.2766	.4565	.5	.4820	.8248	.5
Assistant professor	.2374	(a)	.6666	.4335	(a)	.6667
Associate professor	.1295	(a)	.6666	.2805	(a)	.6667
Full professor	.1240	.2879	6.02E-10	.2658	.6857	6.01E-10
Research assistant	(a)	.6	(a)	(a)	.9026	(a)
Observations	169	45	15	169	45	15

Source: Probit regression analysis of micro-level dataset derived from elaboration of ORI reports, 1994-2006.

Note: *Full professor* is the omitted dummy variable for "Position".

The dummy variable for *Journal publication involved* takes the value =1 when the ORI case discussion refers to a journal article that built upon the alleged infraction and was published prior to the ORI's finding of misconduct; otherwise the "*Journal*" dummy takes value =0, which includes case of infractions in working papers, grant proposals, and journal submissions.

(a) Regressor omitted from the estimating equation to avoid perfect collinearity

Because our sample of microdata only contains investigations, all the probabilities reported have to be considered conditional on the case being investigated.

Estimates of the differentially lower probabilities of findings of falsification for full professors compared with post-docs, grad students and staff are bigger and significant when controls are introduced for grantor institutes, multiple charges and involvement of prior journal publications

Probit analysis for the marginal effect of positions other than "Full professor" and institutes other than NHLBI on the probability of finding of misconduct. **Falsification charges, 1998-2006.**

Variable	Coeff.	P-value
Post-doc	.5385	.004
Graduate student	.5336	.007
Staff	.3304	.055
Research scientist	.1285	.541
Assistant professor	.2332	.220
Associate professor	.1015	.569
Journal publication involved	.2875	.004
NIAID	.1570	.523
NIMH	.0528	.839
NIDDKD	.0109	.968
NCI	-.0886	.621
Other	-.9601	.000
Two grantors	-.2052	.289
Three grantors	.95	(b)

Source: Probit regression analysis of micro-level dataset derived from elaboration of ORI reports, 1998-2006.

Note: *Full professor* is the omitted dummy variable for "Position". *NHLBI* is the omitted dummy variable for "Institute"

The dummy variable for *Journal publication involved* takes the value =1 when the ORI case discussion refers to a journal article that built upon the alleged infraction and was published prior to the ORI's finding of misconduct; otherwise the "*Journal*" dummy takes value =0, which includes case of infractions in working papers, grant proposals, and journal submissions.

(a) Regressor omitted from the estimating equation to avoid perfect collinearity

(b) P-value could not be computed, due to insufficient degrees of freedom (too few observations).

Levels of predicted conditional probabilities of a falsification finding, showing effects of respondent position involvement of prior journal publications and selected grantor institutes, for closed ORI investigations of falsification cases during 1998-2006

Predicted probabilities of a Finding of Misconduct in investigations of Falsification, conditional on respondent's Position and selected grantor Institute, 1998-2006.

Institute	Position	No journal publication involved	Journal publication involved
	Post-doc	.3487	.6888
	Graduate student	.3432	.6834
	Staff	.3393	.5455
NHLBI	Research scientist	.1724	.4746
	Assistant professor	.1121	.3690
	Associate professor	.0587	.2467
	Full professor	.0308	.1617
	Post-doc	.5234	.8264
	Graduate student	.5174	.8224
	Staff	.3095	.6494
NIAID	Research scientist	.1477	.4343
	Assistant professor	.2212	.5450
	Associate professor	.1317	.4062
	Full professor	.0776	.2946
	Post-doc	.2443	.5748
	Graduate student	.2396	.5688
	Staff	.1059	.3566
NCI	Research scientist	.0361	.1796
	Assistant professor	.0643	.2616
	Associate professor	.0308	.1614
	Full professor	.0149	.0983

Source: Elaboration on ORI reports, 1998-2006. **Note:**The three Institutes for which predicted probabilities are displayed were selected as representative of the range of variation in effects among the major grantors. Corresponding probability estimates for all the institutes specified in the marginal effects model [your Table 5] are available on request. Because our micro-dataset only contains observations on the outcomes of closed investigations, the probabilities reported here are conditions on the cases having been selected for investigation. The dummy variable for *Journal publication involved* takes the value = 1 when the ORI case discussion refers to a journal article that built upon the alleged infraction and was published prior to the ORI's finding of misconduct; otherwise the "*Journal*" dummy takes the value = 0, which includes case of infractions in working papers, grant proposals, and journal submissions.

Remark: **More detailed studies and statistical analysis of circumstances in cases of research misconduct by postdocs and graduate student research assistants are needed. The forthcoming ORI staff report focused on this topic is a welcome initiative.**

Misconduct by Graduate Students and Postdocs: Where Was the Mentor?

ORI staff is analyzing 50 research misconduct cases involving postdocs and research associates to determine the type of relationship the respondents had with their mentor/advisor. The case files are being examined to determine whether mentors/advisors supervised or delegated that responsibility to others, the Principle Investigator (PI)/advisor examined original data, the respondent was under any stress to meet a deadline, or the laboratory had difficult interpersonal behaviors. The study is expected to be completed in 2007.

Part 4. Problems of Interpretation, Conjectures and Conclusions

Note: This Part will be elaborated in the conference presentation

A priori theorizing has obvious limits in interpreting the data where one only can observe *detected* cases of misconduct

Modern economists --starting with Gary Becker (1968) have developed formal "rationale actor" models of crime and punishment, in which the expected benefits of undetected deviant acts are weighed against the expected losses incurred when such behavior is detected.

Recently, the issue of scientific misconduct has been attracting similar and increasingly sophisticated game-theoretic analysis, e.g.:

The Simple Economics of Scientific Misconduct[*]

Nicola Lacetera
Case Western Reserve University[†]

Lorenzo Zirulia
University of Bologna[‡]
CESPRI, Bocconi University

July 2, 2007

But, as always, the predicted "equilibrium behavior" in these models depends strongly on what is assumed about the players' knowledge and motives, including, the case of researchers, the level of effective effort they devote to examining each others' working papers and publications, and mutual expectations about the likelihood of detection.

A priori theorizing has obvious limits in interpreting the data where one only can observe *detected* cases of misconduct - 2

As simple illustration of theorizing in rational actor models, suppose:

- **the career rewards of recognized priority in an radical research result are greater than those for an incremental result;**
- **a researcher with a strong reputation (a "star") has more to lose than others, were they to engage in acts of misconduct that were detected –** this depends on assumptions about the individual's expected remaining "career life" and time-discount rate;
- **a "research "star" has less to lose than those with less peer-esteem if the current research project fails to obtain a radical result**

Then one could argue that:

- **since "stars" would correctly expect that their claims of a radical result would be accepted on trust, they would undertake riskier projects and the incidence of "*star misconduct*" would be comparatively under-stated by the statistics of detected cases;**

OR ALTERNATIVELY

- **since "stars'" projects were expected to aim at radical results, they would correctly expect to receive closer scrutiny and worry about the greater penalties of detection than of failure, so that the incidence of *non-star misconduct* would be comparatively understated.**