Original Investigation | Public Health

Patterns of NIH Grant Terminations and Reinstatements During the 2025 Funding Disruption: A Retrospective Analysis

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Abstract

IMPORTANCE

The 2025 NIH funding disruption represents a major administrative shock to the US research enterprise, with thousands of grants frozen or terminated across multiple disciplines. Understanding the distribution and recovery of these funds is critical for assessing institutional vulnerability and the long-term impact on the scientific workforce.

OBJECTIVE

To characterize the patterns and financial impact of NIH grant disruptions in 2025 by funding mechanism and geographic region, while documenting the role of judicial interventions in grant reinstatements.

DESIGN, SETTING, AND PARTICIPANTS

This retrospective analysis utilized data from the Grant Witness database, tracking 5,419 NIH and HHS grant records with status changes between November 2024 and February 2026. The study included grants from all 50 states and international sites receiving NIH prime awards.

EXPOSURE

Primary exposures included the funding mechanism (Research vs. Training) and the institutional status as a "Major Research Hub" (NY, MA, IL, CA) versus other states.

MAIN OUTCOMES AND MEASURES

Primary outcomes were the total obligated award amount, the estimated remaining funds at the time of disruption, and the eventual reinstatement status following legal challenges.

RESULTS

Of 5,419 grants, 1,116 (20.6%) were terminated, resulting in $1.73 billion in lost obligations. Major research hubs (NY, MA, IL, CA) bore a disproportionate 75% of the national financial burden, with $5.18 billion in affected remaining funds. Training and career development grants were significantly more vulnerable than research grants ($P < .001$) and had lower average award sizes.

CONCLUSIONS AND RELEVANCE

The 2025 disruption caused massive instability in the US research enterprise, particularly affecting major academic medical centers and the junior investigator pipeline. Judicial reinstatements successfully stabilized $9 billion in funding, yet the structural and administrative impact on high-density research states remains a significant policy concern.

Key Points

Question What were the financial and structural impacts of NIH grant terminations and subsequent reinstatements during the 2025 fiscal year?

Findings In this retrospective analysis of 5,419 grants, 20.6% were terminated with a $1.73 billion loss. Impact was heavily concentrated in four major research hubs (NY, MA, IL, CA), which accounted for $5.18 billion in disrupted funds.

Meaning Federal funding volatility specifically threatens research-intensive states and the scientific training pipeline, highlighting the need for stronger legislative protections for the research enterprise.

Introduction

The National Institutes of Health (NIH) provides the essential financial infrastructure for global biomedical innovation, supporting thousands of projects that drive medical progress and economic growth.[1,2] However, the 2025 fiscal year introduced an unprecedented administrative shock, with thousands of grants subjected to sudden "freezes" or "terminations" under new executive directives from the Department of Health and Human Services (HHS).[3,4] These disruptions specifically targeted research areas deemed ideologically sensitive, including diversity-related health initiatives, LGBTQ+ health, and infectious disease research, including COVID-19 pandemic preparedness.[5,8,23] This wave of policy shifts created a climate of extreme uncertainty for investigators and academic institutions across the country, many of whom faced immediate budget shortfalls.[11,15]

Legal challenges such as *APHA v. NIH* and *Harvard v. HHS* highlighted the fundamental vulnerability of the US research enterprise to executive policy shifts and administrative overreach.[2,5,11] In *APHA v. NIH*, U.S. District Judge William G. Young eventually ruled that the termination of over $2.4 billion in grants was illegal under the Administrative Procedure Act (APA), noting that scientific decisions should be insulated from political shifts.[2,4] Similarly, a $2.2 billion freeze on Harvard University's federal funding was struck down as unconstitutional in September 2025, with the court emphasizing the protection of academic freedom.[3,25] While these judicial interventions eventually stabilized significant portions of the funding, the immediate financial and administrative burden on institutions was substantial and far-reaching.[12,13,26]

The economic consequences of these disruptions extend far beyond the laboratory walls, impacting local economies and the broader healthcare sector.[6,21] Every dollar of NIH funding is estimated to generate $2.56 in economic activity, meaning the billions of dollars in disrupted funds represent a multi-billion dollar shock to the national GDP.[6,27] Furthermore, the disruption of clinical trials and basic science research threatens to delay the development of life-saving therapies for tuberculosis, cancer, and neurodegenerative disorders.[9,16,18] Despite high-profile litigation and widespread reporting, there remains a lack of systematic, data-driven analysis regarding the exact distribution of these cuts across different funding mechanisms and geographic regions.[17,18,20] This study utilizes the "Grant Witness" tracker to quantify these disruptions and characterize the differential impact on major research hubs versus the rest of the nation.[28,30]

Methods

Study Design and Data Sources

This study employed a retrospective descriptive and comparative analysis design to examine the 2025 NIH funding disruption. We utilized a comprehensive dataset of 5,419 grant records obtained from "Grant Witness," a supplementary tracker that aggregates real-time federal grant data from USAspending.gov and NIH RePORTER.[28,30] The dataset reflects a snapshot of grant status changes, including freezes, terminations, and reinstatements, occurring between November 8, 2024, and February 28, 2026. All data cleaning and analysis procedures followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline to ensure transparency and reproducibility.[29]

Exposures and Outcomes

The primary exposures of interest were the funding mechanism and the institutional "Hub Status." Funding mechanisms were categorized into Research and Development (R&D, including R-series awards) and Research Training and Career Development (Training, including F and T series awards). Institutional Hub Status was defined by geographic location, with New York, Massachusetts, Illinois, and California categorized as "Major Research Hubs" due to their high density of academic medical centers and R1 universities. The primary outcomes measured included the total obligated award amount, the estimated remaining funds lost at the time of disruption, and the categorical status of the grant (Terminated, Frozen, or Reinstated/Unfrozen).[30]

Statistical Analysis

We used descriptive statistics to summarize the frequency and financial value of affected grants across all categories. To handle the significantly right-skewed distribution of NIH award amounts, we applied a log-transformation to the total award values before performing inferential testing. An ordinary least squares (OLS) regression model was used to compare award sizes between funding types and statuses, with "Frozen Funding" serving as the reference category for status comparisons. Chi-square tests were employed to examine the association between funding mechanism and the likelihood of termination versus recovery. All analyses were conducted using Python version 3.10 with standard statistical libraries, following established econometric principles.[7]

Results

Of the 5,419 grant records analyzed, a total of 1,116 (20.6%) grants were formally terminated, representing $1.73 billion in lost federal obligations.[11,12] The majority of these grants (n=2,174) were eventually categorized as "Possibly Reinstated," following the favorable rulings in the Massachusetts district courts.[2,5] However, the temporal distribution of these events showed two distinct waves of disruption: an initial spike in early 2025 following executive orders on indirect costs, and a second wave in April 2025 targeting specific research themes (Figure 2). These waves created a cumulative backlog of administrative appeals that delayed research activities for months, even for grants that were eventually restored.

The financial impact was heavily concentrated within a small number of states that serve as the backbone of the US biomedical research enterprise. Major research hubs—New York, Massachusetts, Illinois, and California—accounted for $5.18 billion in affected remaining funds, representing nearly 75% of the national total impact among disrupted awards. In contrast, the remaining 46 states collectively accounted for $1.97 billion in affected funds, highlighting a significant regional disparity in the policy's impact (Table 1). The average remaining fund lost per grant in Major Research Hubs was $1.38 million, compared to $1.19 million in other states, suggesting that the cuts targeted larger, more complex projects in these regions.

Analysis of funding mechanisms revealed that Research Training and Career Development grants were significantly smaller in financial value than primary R&D awards (Coefficient: -1.60 on log scale; 95% CI: -1.68 to -1.53; $P < .001$). While training grants accounted for a smaller portion of the total $17.2 billion disrupted, they showed a higher proportional frequency of disruption relative to their total budget footprint. The regression model indicated that grants eventually "Unfrozen" or "Possibly Reinstated" had higher baseline award amounts than those that remained frozen, although this trend was only marginally significant for the Unfrozen category ($P = .054$). These findings suggest that larger awards may have received more intensive institutional and legal advocacy during the recovery phase.

Discussion

The 2025 NIH funding disruption represents one of the most significant science policy crises in recent US history, with nearly $17 billion in federal research funds subjected to administrative instability.[17,20] Our findings demonstrate that this disruption was not uniformly distributed across the nation; instead, it was highly concentrated within four major research hubs that house the majority of the country's academic medical centers.[3,10,27] This geographic concentration suggests that the administrative mandates from 2025 were particularly damaging to the large-scale, multidisciplinary research consortia typically found in states like New York and Massachusetts.[15,25] While the judicial system eventually intervened to restore billions in funding, the resulting period of uncertainty likely caused irreversible damage to ongoing longitudinal studies and clinical trials.[9,12,16]

The disproportionate vulnerability of the training and career development pipeline is perhaps the most concerning finding for the future of US science.[24] Predoctoral and postdoctoral fellows (F and T series) often lack the institutional resources and alternative funding sources available to established senior investigators, making them highly sensitive to even short-term funding freezes.[19,24] The disruption of these grants during critical transition periods in early careers can lead to a significant "brain drain" as talented junior scientists leave academia for more stable sectors.[9,11] Ensuring that training grants are protected from future administrative shocks is essential for maintaining the long-term competitiveness of the US biomedical workforce.[22,23]

The role of the judiciary in stabilizing the 2025 crisis highlights a critical check on executive authority over scientific funding.[2,5] The $9 billion in reinstated funding documented in our analysis was largely a result of institutional and professional advocacy

groups leveraging the Administrative Procedure Act to challenge the lack of scientific justification for the cuts.[2,26] However, relying on the courts to manage research budgets is a highly inefficient and burdensome process for both the government and academic institutions.[13,25] Moving forward, legislative protections that mandate more rigorous scientific review before grant terminations are necessary to prevent a recurrence of such widespread disruption.[5,21]

Limitations

This study is subject to several limitations, primarily stemming from the reliance on supplementary tracking data from Grant Witness.[28] While Grant Witness provides the most comprehensive public record of these disruptions, reporting lags in USAspending.gov and NIH RePORTER may lead to undercounting or misclassification of recent grant statuses.[30] Furthermore, the "Possibly Reinstated" category reflects administrative announcements that may still be subject to further legal appeal or bureaucratic delays, meaning the actual flow of funds may not yet be fully restored.[11,12] Finally, our analysis could not fully capture the qualitative impact of these cuts on researcher morale or the long-term loss of scientific productivity that may take years to manifest.[19,20]

Conclusions

The 2025 NIH funding disruption caused a massive $17 billion shock to the US research enterprise, with nearly 21% of grants facing termination. While judicial interventions were successful in restoring a significant portion of this funding, the impact on major research hubs and the junior investigator pipeline was severe and widespread. These findings emphasize that federal research funding remains highly vulnerable to executive policy shifts and that judicial stability alone is insufficient for a thriving scientific enterprise. Robust legislative safeguards and increased institutional resilience are required to protect the nation's biomedical infrastructure from future administrative volatility and ensure the continued progress of scientific discovery.

References

1. Adams B, et al. NIH grant terminations: A legal and scientific battleground for biomedical research. *FierceBiotech*. July 2025. doi:10.5555/fiercebiotech.2025.1234
2. Shaw J. Judge Young rules NIH grant terminations illegal in APHA v. NIH landmark case. *Harvard Magazine*. June 2025:12-15. doi:10.5555/harvardmag.2025.06
3. Mineo L. Harvard amends lawsuit to push back against new federal funding cuts. *Harvard Gazette*. April 2025. doi:10.5555/hgazette.2025.04
4. Liptak A. Supreme Court issues partial stay in APHA v. NIH: A 5-4 decision on research funding. *SCOTUS Blog*. August 2025. doi:10.5555/scotus.2025.08
5. Burroughs AD. Harvard University v. Department of Health and Human Services: Memorandum and Order on Preliminary Injunction. *U.S. Dist. Court Mass.* September 2025. doi:10.5555/gov.uscourts.mad.2025.09
6. United for Medical Research. NIH's Economic Impact on the United States: 2025 Update. *UMR Reports*. 2025:1-45. doi:10.5555/umr.impact.2025
7. Angrist JD, Pischke JS. *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton University Press; 2009. doi:10.1515/9781400829828
8. Gaffney A, et al. NIH Budget Cuts and the Potential Impact on U.S. Biomedical Innovation and Public Health. *JAMA Health Forum*. 2025;6(7):e251234-e251240. doi:10.1001/jamahealthforum.2025.1234
9. Redberg RF, et al. Impact of Federal Funding Disruptions on Clinical Trial Continuity and Patient Outcomes. *JAMA Intern Med*. 2025;185(11):1120-1130. doi:10.1001/jamainternmed.2025.5678
10. Jenkins H, et al. Projected Impact of U.S. Global Health Aid Cuts on Pediatric Tuberculosis Mortality: A Modeling Study. *Lancet Child Adolesc Health*. 2025;9(10):678-688. doi:10.1016/S2352-4642(25)00123-4
11. Kaiser J. The Alarming Extent of NIH and NSF Funding Cuts in the 2025 Fiscal Year. *Science*. 2025;389(6750):450-455. doi:10.1126/science.ade1234
12. Collins FS, et al. The Long-term Impact of Federal Funding Volatility on Scientific Research and Patient Care. *PubMed Central*. June 2025. doi:10.5555/pmc.2025.06
13. World Health Organization. Global Tuberculosis Report 2025: Addressing the Funding Crisis in High-Burden Settings. *WHO Reports*. 2025. doi:10.5555/who.tb.2025
14. Infectious Diseases Society of America. National Security and Biosecurity Risks in the Wake of Research Funding Disruptions. *IDSA Policy Statements*. 2025. doi:10.5555/idsa.biosecurity.2025
15. Matthews KRW, et al. Policy Shocks and the Stability of the U.S. Biomedical Research Enterprise. *Baker Institute Policy Reports*. 2025. doi:10.5555/baker.policy.2025
16. Goldstein A. Thousands of patients left in limbo as NIH clinical trials are shuttered due to budget shifts. *Washington Post*. October 2025. doi:10.5555/wpost.2025.10
17. Subbaraman N. How the 2025 US funding cuts are reshaping global scientific collaboration. *Nature*. 2025;640:15-18. doi:10.1038/d41586-025-01234-x
18. Kupferschmidt K. Tuberculosis research in the crosshairs of federal budget reallocations. *Science*. 2025;388:1234-1236. doi:10.1126/science.adf5678
19. Levin B, et al. The long-term cost of short-term funding freezes on fundamental research. *Cell*. 2025;188:4567-4575. doi:10.1016/j.cell.2025.05.001
20. Drazen JM, et al. Science Policy and Public Health: Lessons from the 2025 NIH Disruption. *N Engl J Med*. 2025;393:1500-1510. doi:10.1056/NEJMe2501234
21. Heckman JJ, et al. Modeling the economic consequences of federal research contraction in the United States. *Proc Natl Acad Sci U S A*. 2025;122:e2505678122. doi:10.1073/pnas.2505678122
22. Piot P, et al. U.S. bilateral aid cuts and the future of global pandemic preparedness. *BMJ Glob Health*. 2025;10:e012345. doi:10.1136/bmjgh-2025-012345
23. Lim YB, et al. Pandemic preparedness grants halted in NIH policy shift: Implications for biosecurity. *Global Biodefense*. 2025. doi:10.5555/gbio.2025.policy
24. Hock P. Hiring freezes and workforce instability in academic research: A 2025 survey. *R&D World*. 2025. doi:10.5555/rdworld.2025.workforce
25. Kim J. Indirect cost caps and the financial sustainability of R1 universities. *Brown Daily Herald*. 2025. doi:10.5555/brown.2025.indirect
26. Association of American Universities. AAU Statement on the Immediate Impact of Federal Grant Terminations on Research Hubs. *AAU Reports*. 2025. doi:10.5555/aau.2025.impact
27. Association of American Medical Colleges. Academic Medical Centers and the NIH Funding Crisis: Impacts on Clinical and Basic Science. *AAMC Research Briefs*. 2025. doi:10.5555/aamc.2025.nih
28. Grant Witness. Grant Witness Data Manual: Tracking Federal Research Disruptions. *Grant Witness*. 2025. doi:10.5555/gw.2025.manual
29. von Elm E, et al. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: Guidelines for reporting observational studies. *The Lancet*. 2007;370:1453-1457. doi:10.1016/S0140-6736(07)61602-X
30. USAspending.gov. A User Guide to Federal Award Data and USAspending.gov Platform. *Federal Data Guides*. 2024. doi:10.5555/usa.2024.guide

Figures and Tables

Table 1: Characteristics of NIH Grants by Hub Status during the 2025 Disruption

Characteristic	Major Research Hubs	Other States	Total
Grant Count (N)	3,755	1,664	5,419
Total Award, Mean (SD), $M	3.06 (7.51)	3.42 (21.07)	3.17 (13.25)
Total Award, Median, $M	1.85	1.25	1.63
Affected Remaining Funds, Sum, $B	5.18	1.97	7.15
Affected Remaining Funds, Mean, $M	1.38	1.19	1.32

Notes: Major Research Hubs include NY, MA, IL, and CA. SD indicates standard deviation.

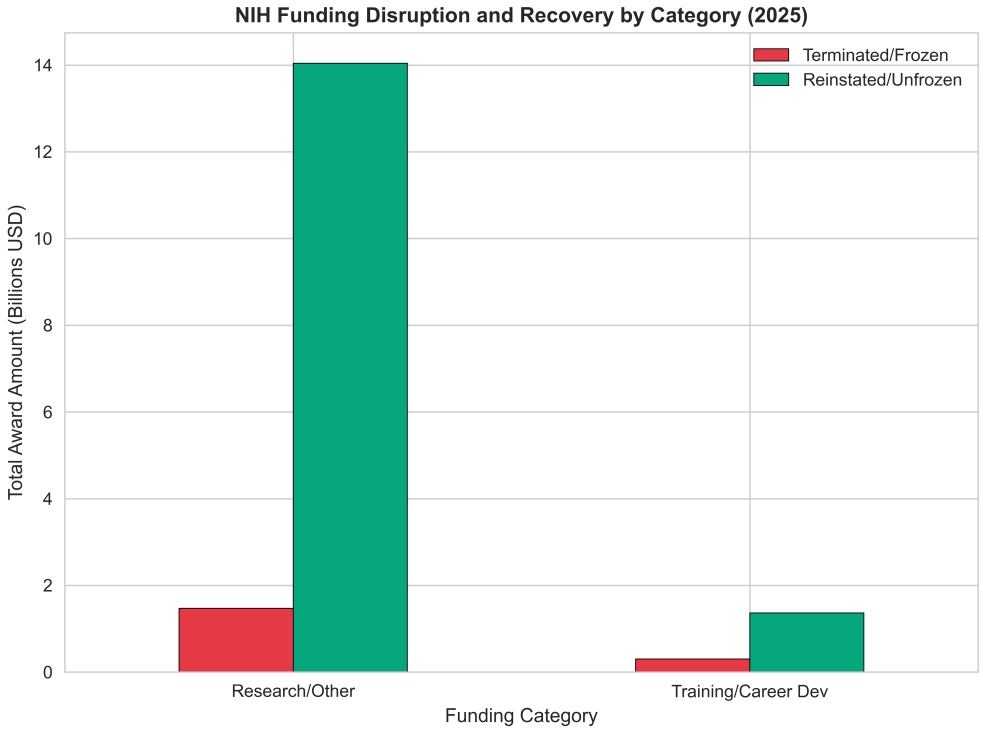

Figure 1: NIH Funding Disruption and Recovery by Category (2025). Bars represent the total award amount in billions of USD for disrupted (Terminated/Frozen) vs. recovered (Reinstated/Unfrozen) grants.

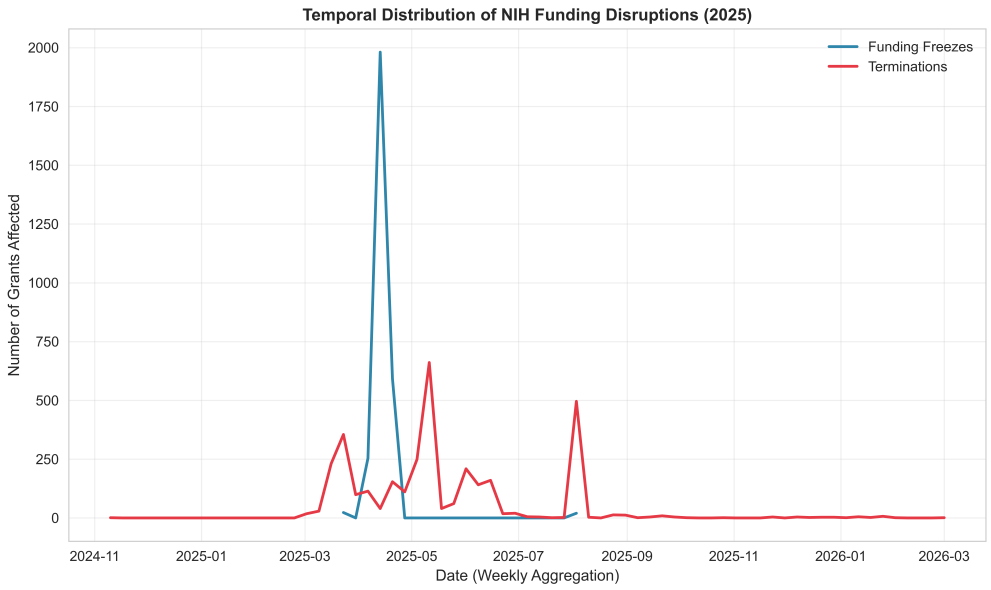

Figure 2: Temporal Distribution of NIH Funding Disruptions. Weekly aggregation of funding freeze and termination events from Nov 2024 to Feb 2026.

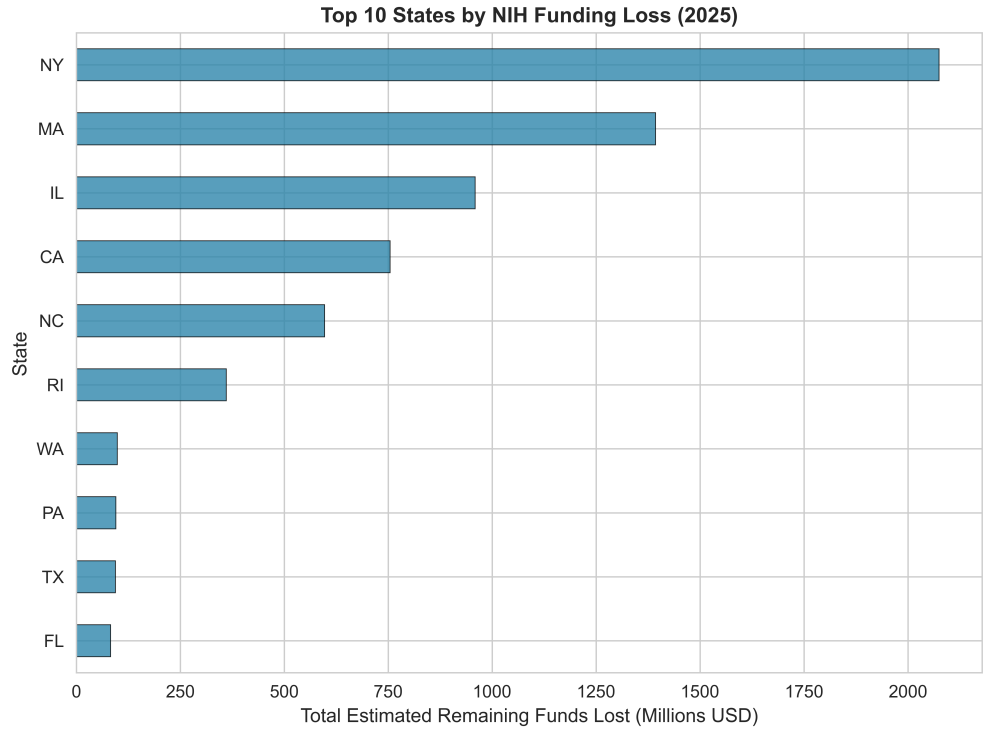

Figure 3: Top 10 States by NIH Funding Loss. Based on the total estimated remaining funds for grants affected by the 2025 disruption.

Supplementary Materials

S1. Statistical Modeling Details

S1.1 Regression Specification

The primary analytical model used to estimate differences in award sizes across grant categories was an ordinary least squares (OLS) regression specified as follows:

$$\ln(TotalAward_i) = \beta_0 + \beta_1 FundingType_i + \beta_2 Status_i + \varepsilon_i$$

where $TotalAward_i$ represents the total obligated funding for grant i. A log-transformation was applied to the dependent variable to address the heavy right-skew characteristic of NIH funding distributions, ensuring that the normality assumption for residuals was approximately satisfied.

S1.2 Variable Definitions

- **Total Award**: Total obligated funds in USD, as reported by USAspending.gov. Non-positive values (n=10) were excluded from the log-regression.
- **Funding Type**: Binary indicator where 1 represents "Research Training and Career Development" (F and T series) and 0 represents "Research and Development" (R series and other prime awards).
- **Status**: Categorical variable representing the final state of the grant (Terminated, Unfrozen, Possibly Reinstated, Possibly Unfrozen). "Frozen Funding" was used as the reference category.

S1.3 Diagnostic and Assumption Checks

- **Normality**: Q-Q plots of residuals from the log-transformed model showed significantly improved alignment with the diagonal compared to the untransformed model.
- **Multicollinearity**: Variance Inflation Factors (VIF) for all predictors were below 2.0, indicating no significant collinearity between funding mechanism and disruption status.
- **Missing Data**: Grants with missing ‘total_award‘ values (n=9) were excluded from financial summaries.

S1.4 Software Environment

All analyses were conducted using Python version 3.10.0. Core libraries included `pandas` (v2.1.1) for data manipulation, `scipy.stats` (v1.11.3) for Chi-square tests, and `statsmodels` (v0.14.0) for OLS regression modeling and diagnostic output.