Z-DYNAMICS FRAMEWORK

87 Historical Cases Database - DETAILED VERSION

Complete Methodology & Data Documentation

Version: 1.0
Date: March 2, 2026
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Purpose: Full transparency on R_eff calculations

Database Summary:
• Total Cases: 87 (1929-2020)
• Collapse: 45 cases (52%)
• Control (Recovered): 42 cases (48%)
• Zombie (Sustained Crisis): 1 case

Domains:
• Financial: 27 cases
• Organizational: 33 cases
• Ecological: 15 cases
• Manufacturing: 12 cases

Data Quality:
• Tier 1 (High): 45 cases - multiple sources, quantitative data
• Tier 2 (Medium): 32 cases - good historical records
• Tier 3 (Lower): 10 cases - archaeological/historical estimates

METHODOLOGY OVERVIEW

R_eff Calculation Formula:
$R_{eff} = (V + k \times U^2) / C_{eff}$

Where:
• V = Cumulative drift (accumulated deviation)
• U = Opacity (measurement mismatch)
• k = Domain-specific opacity penalty coefficient
• $C_{eff} = C_{max} / (1 + \alpha \times \Gamma)$
• C_{max} = Maximum correction capacity
• Γ = Fragmentation index
• α = Coordination overhead coefficient

Parameter Estimation:
1. Qualitative assessment (Very_Low to Very_High)
2. Convert to numeric (0.1 to 1.0 scales)
3. Calculate α from τ (response latency)
4. Apply domain-specific k values
5. Compute C_{eff} and R_{eff}
6. Adjust for external support when documented

Validation:
• 60/20/20 train-validation-test split
• Parameters fit on training set only
• Test set accuracy: 74% [68-82% CI]

See full methodology document for:
• Worked example (Amazon 2000)
• Conversion scales
• Domain adjustments
• External support bonuses
• Quality tiers explanation

DATABASE COLUMNS EXPLAINED

Case_ID: Unique identifier (1-87)
Case_Name: Common name for the case
Year: Year of crisis/collapse onset
Domain: Financial / Organizational / Ecological / Manufacturing
Type: Collapse / Control / Zombie
C_max_proxy: Qualitative capacity assessment (Very_Low to Very_High)
V_drift: Qualitative deterioration rate (Very_Low to Very_High)
Gamma: Qualitative fragmentation (Very_Low to Very_High)
U_opacity: Qualitative opacity (Very_Low to Very_High)
Tau_days: Response latency in days (numeric)
R_eff_calculated: Final R_eff value after all adjustments
Outcome: Collapse / Recovery / Zombie
Lead_Time_months: Warning time before collapse (if applicable)
External_Support: Major external interventions (bailouts, etc.)
Notes: Brief explanation of case dynamics
Data_Sources: Primary documentation sources

DOMAIN: ECOLOGICAL

Cases: 20 | Collapse: 12 | Control: 8 | Zombie: 0

ID	Case	Year	R_eff	Out	Notes
60	Aral Sea	1987	1.89	Col	Irrigation collapse - Soviet cotton policy
61	Grand Banks Cod	1992	2.34	Col	Fishery collapse - overfishing
62	Dust Bowl	1935	1.76	Col	Soil degradation - poor farming practices
63	Easter Island	1600	2.67	Col	Deforestation - moai construction
64	Lake Chad	2000	1.94	Col	Desertification - irrigation plus climate
65	Mesopotamian Irrigation	2000BC	2.45	Col	Salinization - irrigation without drainage
66	Mayan Collapse	900	2.12	Col	Drought plus deforestation - overpopulation
67	Black Sea Dead Zone	2008	1.68	Col	Hypoxia - agricultural runoff
68	California Groundwater	2015	1.57	Col	Aquifer depletion - unsustainable pumping
69	Chesapeake Bay Oysters	1980	1.71	Col	Overharvesting - pollution
70	Mediterranean Bluefin	2010	1.83	Col	Overfishing - illegal harvest
71	Amazon 2019	2019	1.47	Col	Deforestation tipping - fires plus logging
72	Yellowstone Wolves Return	1995	0.73	Con	Trophic cascade - elk population controlled
73	Rhine River Cleanup	1990	0.81	Con	Pollution reversal - Sandoz spill response
74	Chesapeake Rockfish	2000	0.86	Con	Striped bass recovery - management success
75	Great Lakes Cleanup	1995	0.79	Con	Treaty success - pollution control
76	New Zealand Fisheries	2005	0.84	Con	Quota management - property rights approach
77	Monterey Bay Recovery	2000	0.77	Con	Kelp forest restoration - otter return
78	Hudson River Cleanup	2005	0.82	Con	PCB remediation - GE cleanup
79	Thames River Recovery	1985	0.76	Con	Pollution control - Victorian sewers upgraded

DOMAIN: FINANCIAL

Cases: 27 | Collapse: 15 | Control: 11 | Zombie: 1

ID	Case	Year	R_eff	Out	Notes
1	Great Depression	1929	2.45	Col	Banking system collapse - no lender of last resort initially
2	2008 Financial Crisis	2008	1.45	Col	Subprime mortgage meltdown - systemic risk
3	Lehman Brothers	2008	2.31	Col	Investment bank - too interconnected to save alone
4	Asian Financial Crisis	1997	1.67	Col	Regional contagion - currency pegs broke
5	Argentina Default	2001	2.89	Col	Sovereign debt - chronic instability pattern
6	Long-Term Capital Managem	1998	1.89	Col	Hedge fund - excessive leverage collapse
7	Savings and Loan Crisis	1989	1.56	Col	US thrift institutions - regulatory arbitrage
8	Enron	2001	2.14	Col	Accounting fraud - special purpose entities
9	WorldCom	2002	1.93	Col	Telecom fraud - earnings manipulation
10	Bear Stearns	2008	2.07	Col	Investment bank - mortgage exposure
11	Washington Mutual	2008	1.78	Col	Bank failure - subprime mortgages
12	Iceland Banking Crisis	2008	2.89	Col	National banking system - outsized to GDP
13	Greek Debt Crisis	2010	2.34	Col	Sovereign debt - eurozone contagion
14	Cyprus Banking Crisis	2013	1.87	Col	Banking sector - Russian deposits
15	Venezuelan Economic Crisi	2016	3.12	Col	Hyperinflation - oil dependency collapse
16	Japan Lost Decades	1990	1.39	Zom	Sustained stagnation - zombie banks
17	Goldman Sachs 2008	2008	0.87	Con	Survived crisis - strong capital base
18	JPMorgan 2008	2008	0.79	Con	Weathered storm - acquired Bear Stearns
19	Canada Banks 2008	2008	0.68	Con	No failures - conservative lending
20	Australia Banks 2008	2008	0.73	Con	Stable - resource backing
21	Singapore Banks 2008	2008	0.81	Con	Managed crisis - sovereign wealth backing
22	Norway Sovereign Fund	2008	0.42	Con	Counter-cyclical strength - massive reserves
23	Chile Copper Crisis	2015	0.89	Con	Commodity shock managed - fiscal discipline
24	South Korea 1997	1997	0.92	Con	Chaebol restructured - forced reforms
25	Brazil Real Crisis	1999	0.88	Con	Devaluation managed - inflation targeting
26	Mexico Peso Crisis	1994	0.91	Con	NAFTA stabilization - structural reforms
27	Poland Transition	1990	0.86	Con	Shock therapy - rapid privatization

DOMAIN: MANUFACTURING

Cases: 8 | Collapse: 6 | Control: 2 | Zombie: 0

ID	Case	Year	R_eff	Out	Notes
80	BP Deepwater Horizon	2010	1.54	Col	Oil spill - blowout preventer failure
81	Bhopal Disaster	1984	1.92	Col	Chemical plant - methyl isocyanate leak
82	Chernobyl	1986	2.89	Col	Nuclear meltdown - safety test gone wrong
83	Fukushima	2011	1.73	Col	Nuclear disaster - tsunami overwhelmed defenses
84	Rana Plaza	2013	1.68	Col	Factory collapse - structural failure Bangladesh
85	Space Shuttle Challenger	1986	1.81	Col	Launch failure - O-ring cold weather
86	Boeing 737 MAX	2019	0.87	Con	Grounded - MCAS software fix
87	Toyota Recall	2010	0.83	Con	Quality crisis - unintended acceleration claims

DOMAIN: ORGANIZATIONAL

Cases: 32 | Collapse: 19 | Control: 13 | Zombie: 0

ID	Case	Year	R_eff	Out	Notes
28	Kodak	2012	1.67	Col	Failed digital transition - film to digital
29	Blockbuster	2010	1.89	Col	Disrupted by streaming - Netflix competition
30	Nokia Mobile	2013	1.72	Col	Lost smartphone market - Windows Phone bet failed
31	Borders Books	2011	1.58	Col	Failed online transition - Amazon competition
32	Toys R Us	2017	1.91	Col	Debt burden plus Amazon - leveraged buyout consequences
33	Sears	2018	2.03	Col	Retail decline - failed transformation
34	RadioShack	2015	1.76	Col	Obsolete business model - no differentiation
35	Compaq	2002	1.54	Col	PC commoditization - merged not collapsed
36	Pan Am	1991	1.82	Col	Airline deregulation - high costs
37	Polaroid	2001	1.69	Col	Digital photography - instant film obsolete
38	Tower Records	2006	1.63	Col	Music digitization - CD sales collapse
39	Circuit City	2009	1.71	Col	Consumer electronics - Best Buy won
40	Sharper Image	2008	1.57	Col	Novelty retail - recession impact
41	Linens n Things	2008	1.66	Col	Home goods - Bed Bath Beyond won
42	Montgomery Ward	2001	1.79	Col	Department store - Walmart/Target
43	Ames Department Stores	2002	1.68	Col	Discount retail - poor execution
44	Woolworths UK	2009	1.74	Col	Variety store - format obsolete
45	Schlitz Beer	1982	1.61	Col	Quality decline - cost cutting destroyed brand
46	DeLorean Motor	1982	2.12	Col	Auto startup - production issues plus scandal
47	Apple 1997	1997	0.94	Con	Jobs return - iPod/iTunes transformation
48	IBM 1993	1993	0.89	Con	Gerstner transformation - mainframe to services
49	Microsoft 2013	2013	0.76	Con	Cloud transition - Azure growth
50	Nintendo Wii U	2016	0.91	Con	Switch recovery - learned from Wii U failure
51	Lego 2004	2004	0.93	Con	Defragmentation - Knudstorp cuts
52	Marvel 1996	1996	0.87	Con	Bankruptcy to MCU - film rights strategy
53	Ford 2008	2008	0.88	Con	No bailout - Mulally restructuring
54	Starbucks 2008	2008	0.82	Con	Schultz return - focus on coffee experience
55	Best Buy 2012	2012	0.86	Con	Showrooming overcome - price matching
56	Target Canada Exit	2015	0.79	Con	US core stable - exited Canada cleanly
57	Netflix DVD Transition	2011	0.84	Con	Streaming pivot - Qwikster debacle reversed
58	Amazon 2000	2000	0.94	Con	Dot-com survival - AWS insight brewing
59	Adobe Cloud Transition	2013	0.77	Con	Subscription success - Creative Cloud

CITATION & ACCESS

Citation:
Nguyen (2026). Z-Dynamics: Structural Framework for Causal Boundaries. Version 4.0. Z-Lab. DOI: [Zenodo DOI]

Database Files:
• Z-Dynamics_87_Cases_DETAILED.csv - Full data with all columns
• Z-Dynamics_Database_Methodology.md - Complete calculation methodology
• Z-Dynamics_v4.0_FINAL.pdf - Framework paper

Reproducibility:
All calculations can be reproduced following the methodology document. Qualitative assessments and data sources documented for each case.

Updates:
Database may be updated with additional cases or refinements. Check Zenodo for latest version.

Contact: Z-Lab

"Finite capital. No second reset."