The Crisis Sequence: What Fails First?

Jon Smirl

2026-03-01

The Surprise That Shouldn't Have Been

In late 2007, something strange happened in financial markets. Portfolios that were supposed to be well-diversified — mortgage-backed securities spread across dozens of US states — suddenly moved in lockstep. Asset correlations spiked toward 1. Diversification, the oldest trick in the investor's playbook, simply stopped working.

Months later, in early 2008, the real economy started to crack. Industrial production fell. Factories closed. The complementary relationships between workers, machines, and supply chains — the basic engine of production — began breaking down.

Then, in September 2008, trust itself collapsed. Lehman Brothers failed. Banks refused to lend to each other. The interbank market froze. Strategic cooperation, the glue holding the financial system together, disintegrated.

Here is the puzzle: was this ordering — diversification first, production second, cooperation last — just bad luck? Or was it inevitable?

The answer, formalized as *crisis_sequence_ordering*, is that the ordering is mathematically determined. It follows from a single formula, and it would hold in any crisis driven by rising information friction, not just 2008.

Three Benefits, Three Degradation Rates

To understand why things fail in order, we need to recall three benefits that the curvature parameter K provides (see *ces-potential* for background). When inputs are complements ($K > 0$), combining them produces three distinct advantages:

> **Definition (The Three Curvature Benefits).**
>
> 1. **Correlation robustness**: The ability to extract value from differences between inputs, even when they are partially correlated. The bonus is proportional to K^2.
> 2. **Superadditivity**: The production bonus from combining heterogeneous inputs — the whole exceeds the sum of parts. The bonus is proportional to K.
> 3. **Strategic independence**: The stability of cooperative equilibria — the penalty any agent faces for deviating from balanced contribution. The penalty is proportional to K, but with a larger coefficient than superadditivity.

Under perfect information, all three operate at full strength. But information is never perfect, and the *effective-curvature* theorem tells us what happens as information friction T rises:

$$K_{\text{eff}} = K \cdot \left(1 - \frac{T}{T^*}\right)^+$$

Effective curvature declines linearly toward zero as T approaches the critical value T^*. The key is how each benefit depends on K_{eff}.

Why Diversification Dies First

Here is the core mathematical fact. As K_{eff} shrinks, the three benefits do not shrink at the same rate:

- **Correlation robustness** $\propto K_{\text{eff}}^2$ — quadratic
- **Superadditivity** $\propto K_{\text{eff}}$ — linear
- **Strategic independence** $\propto K_{\text{eff}}$ — linear, but with a higher threshold

The quadratic dependence of correlation robustness is the entire story. Suppose information friction rises enough to cut effective curvature in half. What happens to each benefit?

Example.

Let K_{eff} fall to $0.5K$ (a 50% reduction in effective curvature).

Benefit	Dependence	Remaining fraction
Correlation robustness	K_{eff}^2	$(0.5)^2 = 25\%$
Superadditivity	K_{eff}	50%
Strategic independence	K_{eff} (higher base)	$> 50\%$

Diversification has lost 75% of its value. Production has lost 50%. Cooperation is still more than half intact.

This is not a special case. For any reduction in K_{eff}, the quadratic term always falls faster than the linear terms. Diversification is the most information-sensitive benefit of complementary production. It requires the most precise knowledge about what makes each input different. When that knowledge degrades, diversification is the first casualty.

The Intuition Behind Each Stage

Why does the math work out this way? There is a clean economic intuition for each stage.

Stage 1: Diversification requires knowing what's different. To diversify effectively, you need to identify the *idiosyncratic* component of each asset or input — the part that moves independently. This requires distinguishing signal from noise across many dimensions simultaneously. When information friction rises, this high-dimensional discrimination is the first thing to go. You can still tell that two assets are both "pretty good," but you can no longer tell *how* they differ. Without that distinction, diversification is just a collection of correlated bets.

Stage 2: Complementary production requires knowing what to combine. Production complementarities are more robust because they depend on a simpler fact: that having *both* a worker and a machine is better than having two workers or two machines. You don't need to know the precise

quality of each input — you just need to know what category it falls into. This categorical knowledge survives longer than the fine-grained distributional knowledge that diversification demands.

Stage 3: Strategic cooperation depends on bilateral trust. Cooperation is the last to fail because it rests on the simplest information of all: can I trust my counterparty? This is a binary judgment about a single partner, not a portfolio-wide assessment of correlations. Even in severe crises, bilateral agreements between known partners hold up longer than multilateral portfolio diversification. The interbank market froze in September 2008 — a full year after diversification collapsed — and even then, many bilateral credit lines survived.

The 2008 Timeline

The theory predicts a specific ordering. The data from 2008 confirm it with remarkable precision:

> **Example.**
>
> **December 2007**: The BAA-AAA corporate bond spread begins widening sharply. This spread measures the market's ability to discriminate credit quality — when it widens, it signals that investors can no longer tell good credits from bad (Gorton2012). Diversification across credit qualities is failing. **Correlation robustness is gone.**
>
> **February 2008**: US industrial production begins its decline, falling 17% peak-to-trough over the next year. Factories that depended on just-in-time supply chains, skilled labor, and specialized components — all complements — start shutting down. The complementary production machine is breaking. **Superadditivity is eroding.**
>
> **September 2008**: The TED spread (the gap between interbank lending rates and Treasury bills) spikes from 100 basis points to over 450. Banks refuse to lend to each other overnight. Lehman Brothers collapses. The strategic equilibrium of the financial system — the mutual understanding that banks will honor their obligations — shatters (Reinhart2009). **Strategic independence has collapsed.**

Three stages, nine months apart, in exactly the predicted order.

This Is Not Just About Finance

The crisis sequence applies wherever information friction rises. Consider a few other domains:

Supply chains. When a pandemic disrupts global logistics, the first casualty is diversified sourcing — firms can no longer assess alternative suppliers (correlation robustness fails). Then production slows because complementary components are missing (superadditivity erodes). Finally, long-term supplier relationships break down as firms scramble for any available input (strategic independence collapses).

Labor markets. When an industry undergoes rapid technological change, employers first lose the ability to evaluate which combinations of skills are most productive (diversification of hiring fails). Then team productivity falls because mismatched workers are assigned to complementary roles (superadditivity drops). Eventually, employment relationships themselves become unstable as neither side can assess the other's value (cooperation erodes).

International trade. When geopolitical tensions rise, the first effect is that trade diversification breaks down — countries can no longer rely on a broad base of trading partners (Akerlof1970). Then the gains from specialization and comparative advantage shrink (production complementarities

weaken). Finally, trade agreements and institutional commitments unravel (strategic frameworks collapse).

The pattern is always the same. The most information-intensive benefit fails first. The simplest fails last.

What the Sequence Tells Policymakers

If the ordering is predictable, then so is the appropriate policy response. When you see diversification failing — asset correlations spiking, portfolio risk models breaking down — you know what comes next. The right time to intervene is *before* Stage 2, not after Stage 3.

The 2008 policy response was largely reactive: massive intervention after strategic cooperation had already collapsed. The crisis sequence suggests that earlier intervention — specifically, measures to reduce information friction T when diversification first starts to fail — could prevent the cascade from reaching Stages 2 and 3. Stress tests, mandatory disclosure, and transparency requirements are all tools for lowering T. The framework says: deploy them early, when the BAA spread widens, not late, when the TED spread spikes.

The *test:akerlof-banking-gfc-severity* provides cross-country evidence for this prediction. Across 147 countries, the interaction between substitutability and pre-crisis information friction predicts crisis severity ($p = 0.016$). Countries that entered the crisis with lower information friction experienced a milder version of the sequence — or avoided the later stages entirely.

The Bottom Line

Crises are not random. When information friction rises, the benefits of complementary production degrade in a fixed mathematical order: diversification first (K^2), production second (K), cooperation last (K with a buffer). This ordering is a theorem, not an empirical regularity — it holds for any system governed by CES aggregation with information friction. The 2008 financial crisis followed the script almost perfectly, and the same logic applies to supply chains, labor markets, and international trade. The practical implication is equally clear: intervene early, when diversification starts failing, because by the time cooperation collapses, the damage is already done.

References