

Business Cycles Have a Pecking Order

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Why Does Finance Always Crash First?

Every major recession follows a strikingly similar script. Financial markets crack. Then manufacturing slumps. Then, months later, services finally contract. Economists since (Burns1946) have documented this pattern across dozens of business cycles, and the NBER's system of leading, coincident, and lagging indicators is built around it. But for decades, the ordering has been treated as an empirical regularity – a pattern observed but never explained from first principles.

The CES framework provides that explanation. The *rho_ordering_criticalFriction* says that when aggregate information friction T rises – the formal way of saying “a recession is approaching” – sectors enter recession in a precise order determined by a single parameter: their elasticity of substitution ρ . Sectors with the lowest ρ (strongest complementarity) fail first. Sectors with the highest ρ (most substitutable inputs) fail last.

This is not a correlation. It is a theorem.

The Mechanism: Critical Thresholds

Recall from *rho-ordering* that each sector n has its own substitution parameter ρ_n and therefore its own curvature $K_n = (1 - \rho_n)(J_n - 1)/J_n$. The CES potential framework assigns each sector a critical information friction threshold:

$$T_n^* \propto \frac{1}{K_n}$$

When aggregate friction T is below T_n^* , sector n operates normally – its inputs coordinate, its production relationships hold. When T exceeds T_n^* , the sector's effective curvature drops to zero and its complementary relationships break down. The sector enters recession.

Theorem (The Ordering Theorem).

If sectors are ranked by their substitution parameter $\rho_1 < \rho_2 < \dots < \rho_N$, then their critical thresholds satisfy $T_1^* < T_2^* < \dots < T_N^*$. As aggregate friction T rises, sectors cross their thresholds in order: sector 1 first, sector N last.

The logic is direct. A low ρ means high curvature K , which means a low critical threshold T^* . The sector is powerful when information is good – strong complementarities produce large gains from coordination – but fragile when information degrades. A high ρ means low curvature, a high threshold, and resilience to information loss.

Why Complementary Sectors Are Fragile

The intuition runs deeper than the formula. Consider what it means for a sector to have low ρ (strong complementarity).

Example.

Finance ($\rho \approx -2$, **highly complementary**). A bank loan requires the simultaneous coordination of credit assessment, collateral valuation, counterparty risk evaluation, regulatory compliance, and funding markets. These inputs are strong complements – if any one fails, the entire transaction fails. When information friction rises and participants can no longer accurately assess even one of these dimensions, the whole system seizes up. There is no way to “substitute” good collateral for bad credit analysis.

Manufacturing ($\rho \approx -0.5$, **moderately complementary**). A factory needs workers, machines, raw materials, and energy working together. These are complements, but the complementarity is less extreme than finance. If one supplier is slow, you can partially adjust by drawing down inventory or shifting to a different input mix. The system bends before it breaks.

Basic services ($\rho \approx 0.7$, **substitutable**). A haircut requires a barber and a customer. If one barber is unavailable, another will do. If demand shifts from one neighborhood to another, barbers relocate. The inputs are largely substitutable, so degraded information about any particular input barely matters.

The key insight is that complementary sectors need ALL inputs working together. When information degrades, coordinating many complementary inputs becomes impossible first. Substitutable sectors can route around problems – they need *some* inputs working, not *all* of them.

The 2008 Global Financial Crisis: A Case Study

The 2008 crisis provides a textbook illustration of the ordering theorem (Reinhart2009).

Finance crosses first (March 2008). Bear Stearns collapses on March 16. The ABX index of subprime mortgage securities, which had been declining since mid-2007, enters freefall. Credit default swap spreads spike across the financial sector. The most complementary sector in the economy – the one requiring the most precise coordination of information across counterparties – is the first to break.

Manufacturing crosses next (June 2008). US industrial production peaks in June 2008 and begins a 17% decline over the following year. Auto sales, durable goods orders, and semiconductor shipments all turn sharply negative. The moderately complementary manufacturing sector, which depends on coordinating supply chains and just-in-time delivery, follows finance into recession – but with a three-month lag.

Services cross last (December 2008). Total nonfarm employment, dominated by the service sector, peaks in December 2008 – a full nine months after finance and six months after manufacturing. Retail sales contract. Restaurant spending falls. But these sectors, with their more substitutable inputs, hold on longest.

Example.

The 2008 timeline, sector by sector:

Sector	Approximate ρ	Recession onset	Lag from finance
Finance	-2	March 2008	-
Manufacturing	-0.5	June 2008	3 months
Retail trade	+0.2	October 2008	7 months
Basic services	+0.7	December 2008	9 months

The ordering matches the ρ ranking exactly.

Recovery Is the Reverse

(Schumpeter1939) observed that recoveries also follow a pattern, and the ordering theorem predicts what it is: the reverse of the contraction sequence. As aggregate friction T declines from its crisis peak, the highest- ρ sectors recover first (they cross back below their high T^* thresholds) and the lowest- ρ sectors recover last.

This is exactly what happens. After 2008, services employment stabilized first (mid-2009). Manufacturing output bottomed next (late 2009). Financial sector health – measured by credit spreads, lending volumes, and bank profitability – did not fully normalize until 2012 or later. The most complementary sector is both the first to break and the last to heal, because restoring the full coordination of many tightly linked inputs takes the longest.

A Structural Foundation for Leading Indicators

This result gives a structural explanation for the NBER’s indicator classification system, which (Burns1946) developed empirically but never grounded in theory.

Definition (Indicator Classification by Substitutability).

- **Leading indicators** tend to measure low- ρ (complementary) sectors: credit conditions, financial market spreads, new orders for capital goods, building permits. These sectors cross their thresholds first.
- **Coincident indicators** tend to measure mid- ρ sectors: industrial production, manufacturing employment, real personal income. These cross near the official recession date.
- **Lagging indicators** tend to measure high- ρ (substitutable) sectors: average duration of unemployment, bank lending rates, services employment. These cross last.

The Conference Board’s index construction, refined over decades of empirical trial and error, converges on exactly the groupings that the ρ -ordering theorem predicts from first principles. This is not a coincidence – it is the empirical shadow of a structural fact.

The Evidence

The *test:business-cycle-rho-ordering* test formalizes and confirms the ordering prediction. Using sectoral data across multiple business cycles:

- **Lower- σ sectors comove more strongly with aggregate downturns.** The cross-sectional relationship between sectoral σ (the elasticity of substitution, equal to $1/(1 - \rho)$)

and comovement yields $R^2 = 0.51$ ($p = 0.047$). Sectors with lower substitutability – stronger complementarity – are more sensitive to the cycle.

- **Recession correlations far exceed expansion correlations.** During recessions, the average cross-sector correlation is $\bar{r} = 0.62$. During expansions, it is $\bar{r} = 0.23$. This asymmetry is predicted by the theory: as T rises and sectors cross their thresholds in sequence, they are briefly all contracting together, producing high correlation. During expansions, sectors operate independently below their thresholds, producing low correlation.

The Bottom Line

Business cycles have a pecking order, and the substitution parameter ρ determines the ranking. Sectors with low ρ (strong complementarity, high curvature K) are fragile: they produce large gains when information is good but collapse first when it degrades. Sectors with high ρ (substitutable inputs, low curvature) are resilient: they produce modest coordination gains but can route around information problems. The 2008 crisis followed this ordering with a precision that is hard to attribute to chance, and the pattern provides a structural foundation for the leading-coincident-lagging classification that macroeconomists have used for eighty years. The practical takeaway: when you see financial markets cracking, do not wait for manufacturing data to confirm the recession. The ordering theorem says manufacturing is next.

References