

The Foreseeability Boundary Windings, Loading, and the Physics Hidden Inside Economics

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Abstract

The Vacuum.Net theory describes every persistent structure as a closed winding of a single strand, carrying a frozen address and a dynamic tension, and passing through four states: loading, holding, discharge, rest. This essay applies that description to the system humanity calls the economy and shows that what is conventionally partitioned into financial, economic and social theory is one ladder of windings ordered by closing time — physics that its inhabitants do not recognise as physics because they stand inside it. A double-blind empirical campaign on 150 years of macro-financial history fixes the ladder's first empirical content: two loading sensors survive every test set for them — credit loading, which reads systemic crises one year ahead, and market loading, which reads five-day equity discharges at daily resolution — while six proposed sensors, including the geomagnetic layer of the space-weather literature, are removed by the same rule. From the survivals and the removals together, three laws become visible: loading reads discharge and never price; predictive information flows only from deep to shallow, while tension flows back; and each layer warns on the horizon of its own closing time. These laws combine into a foreseeability criterion that determines, in advance, which winding levels of the universe admit prediction with presently recorded history — and locates the boundary just above the institutional winding. Below that boundary, prediction is engineering; above it, physics without testable repetition. The economic and social sciences are thereby identified as the map of the windings inside humanity's foreseeability boundary.

1. The ladder humanity stands inside

The universe, in the Vacuum.Net reading, is a single continuous strand and nothing else. Whatever persists is a configuration of the strand that returns to itself: a closed winding. Each closure has two categorically distinct parts. The closed part is its address — topology, frozen at the moment of closure, never changing afterwards. The open part is its tension — dynamic, treatable, the only layer in which anything happens. A loaded winding passes through four states: it loads, it holds, it discharges, and it rests.

Windings nest, and they order themselves by closing time. Some close in microseconds, some in days, some in decades, some on scales no observer outlives. A human being experiences directly only a narrow band of this ladder — the windings whose closing times bracket a human life — and has, over centuries, converted that experienced band into specialised vocabularies: market sentiment, credit cycles, business cycles, institutional regimes, generational change. Finance, economics and sociology are the names given to adjacent rungs of one physical ladder by observers who stand on it. The claim of this essay is not metaphorical. Ordered by closing time, the financial system is a stack of windings in the exact technical sense:

Winding	Closing time	Discharge
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Market microstructure	minutes–hours	flash crash
Equity market	days–weeks	multi-day crash
Money and liquidity	months	funding squeeze, bank run
Credit stock	years	systemic financial crisis
Real estate	15–20 years	housing bust
Institutional / monetary regime	decades	regime break, currency collapse
Demographic / technological	generations	structural transition

A loan is a loop opened at creation and closed at repayment; the outstanding credit stock is stored tension. An equity position closes in days. A monetary regime is a winding whose address — the unit of account, the peg, the rule — is meant to stay frozen for decades. The deep windings load the shallow ones: tension accumulated in the slow layers is ultimately released through the fast ones, which is why the fast layers exhibit the violence and the slow layers the memory.

The theory makes one further structural demand, inherited from its two-layer law. A measurement is a comparison against a reference, and a reference functions only if it is quasi-frozen on the time scale of what it measures. A winding that closes in years is, on the scale of days, effectively an address: frozen enough to serve as a reference. The reverse is impossible: a winding that closes in days is, on the scale of years, pure tension — it cannot serve as anyone's yardstick. From this single observation the direction of prediction follows before any data are consulted: predictive information can flow only from deep to shallow. Tension may flow the other way — a crash burdens the credit system — but foresight cannot.

2. The discipline

These claims were put to data under one uniform protocol. Every candidate sensor is a loading variable of some winding; every target is a discharge of a shallower or equal winding. Model parameters — coefficients, thresholds, weights — are estimated on a calibration period and then frozen; nothing is ever re-estimated. Each frozen model is evaluated on two disjoint blind windows, not one, because in the course of this campaign a single favourable window twice flattered a hypothesis that the second window then destroyed. A candidate survives only if it improves prediction in both windows; a candidate that helps in one era and harms in the other is removed. The removal rule is constitutive: no literature pedigree and no mechanistic elegance confers protection. In a research organisation the blind test is not a gatekeeper to be appeased but a tool that makes the instrument better; when a candidate falls, a sharper theory becomes visible in its outline.

The data are public and long. The Jordà-Schularick-Taylor Macrohistory panel supplies annual credit, income, interest rates, house prices, equity returns and dated systemic crises for eighteen advanced economies from 1870 to 2020. The Shiller series supplies monthly United States prices and rates from 1871. A daily S&P 500 series from 1927 supplies the fast scale; the definitive daily planetary Ap record from 1957 and the SILSO sunspot series from 1749 supply the space-environment side. Discrimination is measured by AUC, probability quality by the Brier score, uncertainty by bootstrap intervals on the blind windows.

3. What survived

Two sensors passed every test set for them — one per proven rung.

Credit loading, the slow winding. The three-year growth of the credit-to-GDP ratio, entered alone into a logistic model calibrated on all country-years to 1960 and frozen —

$\text{logit } P(\text{crisis in year } t+1) = -3.206 + 0.029 \cdot L(t)$, L in percentage points —

reads systemic crises one year ahead in both blind windows (AUC 0.751 in 1961–1990, 0.698 in 1991–2020), beats the BIS-style credit-threshold benchmark that underlies the Basel III countercyclical buffer in both windows, decisively so in probability quality (Brier 0.020 and 0.026 against 0.178 and 0.142), and survived a third, independent split imposed later in the campaign (0.755 and 0.733). Behind an elevated signal the crisis frequency runs at roughly four times base rate. The result confirms and freezes the credit-boom finding of Schularick and Taylor into a deployable formula. Every attempted enrichment of this layer died in the blind windows and left the single variable standing.

Market loading, the fast winding. Sixty-day realised volatility and the drawdown below the trailing one-year high — volatility clustering and trend persistence, the two internal loading quantities any market feed supplies — fitted once on 1957–1990 and frozen:

$\text{logit } P(\text{discharge within 5 trading days}) = -3.744 + 2.024 \cdot \sigma_{60} + 5.783 \cdot DD_{252}$,

where a discharge is a five-day return below the calibration 5th percentile. Blind, the sensor does not merely hold; it strengthens: AUC 0.679 in its own calibration, 0.711 in 1991–2007, 0.726 in 2008–2019. On the strongest decile of signal days the discharge frequency within five days is 15.7% and 22.3% in the two blind windows against 4–6% elsewhere — a factor of three to four, at daily resolution, from two quantities and one frozen equation.

4. What was removed, and what the removals drew

Six candidates entered the same protocol and died, and their outlines are as informative as the survivals.

The interest-rate term spread, added to credit loading, improves the window 1991–2020 and damages the window 1961–1990; what one era gives, the other takes back. An annual sunspot layer collapses in the earlier window the moment the full series is used ($\Delta\text{AUC} -0.344$, interval entirely negative), exposing its earlier promise as an artefact of a truncated window. An annual layer built from the true geomagnetic A_p record harms significantly where it does not sit idle. The six-day geomagnetic storm window — $A_p > 29$ with decaying weights, the strongest prior claim of the space-weather-and-markets literature — shows no effect on 8,360 calibration days and two blind windows: the calibration sign points the wrong way, no blind difference approaches significance, and the discharge AUC falls below 0.5. The relationship does not replicate, and the geomagnetic layer is withdrawn from the financial instrument. A cascade interaction — equity crash conditioned on high credit loading — reproduces the theoretically expected pattern spectacularly in one blind window (crisis frequency 29.4% after loaded crashes against 1.0% base) and inverts completely in the other, for a reason the data themselves expose: on an annual grid, the crash and the crisis of 2008 fall in the same cell, and a yearly lag structure cannot see a sequence that unfolds within months. Finally, a real-estate loading variable pointed at next-year systemic crises harms in both windows — a sensor aimed at the wrong target, as the next section makes precise.

Drawn together, the removals are not a list of accidents. They trace three laws.

First law — loading reads discharge, never tension. Across every test, no variable of any layer improved return forecasts; the same variables, pointed at discharges, succeeded or failed on their merits. Where the price stands tomorrow is not readable; when accumulated loading releases is. The instrument that follows is a storm warner, not a price oracle, as a structural property rather than a modest disclaimer.

Second law — predictive information flows one way. Derived in §1 from the frozen-reference requirement and untouched by any test: the deep winding can serve as the shallow winding's yardstick, never the reverse. Tension flows back upward — the crash loads the credit system — but foresight flows only down.

Third law — the horizon law. A loading layer warns on the horizon of its own closing time. The credit winding, closing in years, warns at one year; the market winding, closing in days, warns at one week. The law also explains two removals from the inside: an annual grid cannot resolve a within-year cascade (the resolution corollary: the measurement grid must be finer than the discharge process), and a real-estate loading variable must be scored against real-estate discharges on a multi-year horizon, not against next-year banking crises. A sensor is not refuted by failing a target that was never on its own rung.

5. The foreseeability boundary

The three laws combine into a criterion that can be stated in advance of any regression. A winding level is foreseeable if and only if three conditions hold: its discharges are dated, repeated events in available records; a loading variable exists at its own depth or deeper, with a quasi-frozen reference; and the measurement grid is finer than the discharge process. Apply the criterion down the ladder and the map draws itself. Market microstructure is foreseeable in principle, given tick data. The equity and credit rungs are foreseeable and now proven. The money-and-liquidity rung is foreseeable and immediately testable: the historical panel carries loan-to-deposit ratios and non-core funding shares, the classic loading variables of funding fragility. The real-estate rung is foreseeable against its own discharges on its own horizon. The institutional rung is foreseeable at the margin: recorded history contains just enough regime breaks — peg abandonments, currency collapses — to fill two blind windows, and the horizon law predicts in advance that any valid institutional sensor must warn on the scale of years, a prediction that gives the next construction its pass-fail criterion before it is built.

Above that rung the criterion fails, and it fails for a reason the theory computes rather than laments: foreseeability ends where the closing time of a winding, multiplied by the number of discharges a double-blind protocol requires, exceeds the length of recorded history. Demographic, technological and civilisational windings discharge too rarely inside the record. They remain physics — the same strand, the same four states — but physics without testable repetition, at least until the record lengthens.

This boundary is the essay's central object, because it explains the disciplinary map of the human sciences. Humanity experiences the windings inside its own foreseeability boundary and has named them economics, finance and sociology; it experiences the rungs at the boundary as history, and the rungs above it as fate. The partition into disciplines is an artefact of where the observer stands on the ladder and how long his records are. Seen from the theory, there is one ladder, one pair of layers, four states, and a boundary that moves outward as records lengthen and grids refine. The economic and social sciences are the physics of the windings a species can see from inside — sharpened here, for the first two rungs, into frozen equations that read the lightning a year and a week ahead.

6. The open programme

The programme that follows is enumerable and requires no new theory. Score the two frozen sensors across the world's equity indices rather than one. Operationalise the money-and-liquidity rung from the funding-fragility variables already in the historical panel, under the identical protocol. Re-aim the real-estate sensor at its own discharges on its own horizon. Build the institutional sensor against the recorded regime breaks, with the horizon law's prediction as its pre-registered pass-fail line. Connect the live feeds — quarterly credit against the 1960 calibration, daily volatility and drawdown against the 1990 calibration — and let the instrument display what it is: a nested weather report, one umbrella per winding, each warning on the horizon of its own closing time, and no price forecast at any horizon.

Annotated references

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