

# The Capital Formation Witness Problem

Why No Existing Analytical Framework Can See Capital Formation  
When It Is Occurring, and Why This Prevents the Descent Mechanism

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## BROOMHEAD SOVEREIGN PRIVATE TRUST · CAPITAL FORMATION PROJECT

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# 1 Introduction

This paper is the firm-scale instance of the witness/extractability framework formalised in the Foundation Paper of the Obligation Density Programme [4]. Where the Foundation Paper formalises the witness gap at household scale — the public-side schema cannot witness the private ledger of the household, and the substitute-formation work has the structural form  $\mathcal{W}_{\text{pub}}(\mathcal{L}_{\text{priv},i}) = \emptyset$  — the present paper formalises the same structural object at firm scale, where it appears as the Capital Formation Witness Problem. The Cross-Scale Bridge [5] supplies the formal correspondence between the two scales, proving that the household-scale and firm-scale formalisations instantiate the same structural object with the same survivability functional and the same entropic-versus-anti-entropic distinction. The present paper, originally drafted under the Capital Formation Project’s internal-thread framing, is incorporated into the Obligation Density Programme bundle as the firm-scale member of the witness/extractability composition.

This paper establishes a foundational problem in political economy that has not previously been formally stated: the Capital Formation Witness Problem. The argument proceeds in six steps.

First, we formally define a capital formation witness and prove that the descent mechanism — the anti-entropic trajectory along which embedded survivability accumulates and the claims-to-formation ratio falls — cannot be initiated without one. The witness/extractability framework underlying the present paper has prior formalisations in the combinatorial-mathematical domain [1, 2], where it admits a sharp dichotomy between extractable and non-extractable witnesses with corresponding polynomial and tower-type cost structures. The present paper applies the same framework to the firm-scale economic instance.

Second, we establish the entropic asymmetry: every mainstream instrument witnesses the entropic direction; none witness  $C(t) > 0$ .

Third, we demonstrate through the Liu Test that no existing analytical framework constitutes a witness. The proof case is Catherine Liu (Marxist political economist, UC Irvine), who with the full apparatus of 150 years of capital critique in hand looked directly at capital formation in operation and designated both formation roles as the primary instruments of working-class oppression.

Fourth, we specify what the descent mechanism requires and what it enables.

Fifth, we establish that the witness problem is structural — not a technical deficiency — for three independent reasons: it is self-concealing, institutionally reproduced, and democratic.

Sixth, we prove that the witness problem is apolitical: left and right fail the witness criterion identically, demonstrated through symmetric analysis of Liu’s PE critique and PE’s self-understanding.

The project’s invariant framework is the first formal instrument that constitutes a capital formation witness. This paper establishes why that matters.

# 2 Background: The Capital Formation Invariant

We summarise the established framework for reference. Full derivations appear in the Capital Formation Project’s Thread 6 (*The Capital Formation Invariant*); the anti-entropic dynamics of capital formation are formalised in the companion paper *Capital Formation as Anti-Entropy* [3].

The core invariant is:

$$E^*(t) = \frac{L(t) + K_c(t)}{Y(t)}$$

where  $L(t)$  is the total liability burden,  $K_c(t)$  is the claims on output, and  $Y(t)$  is real productive

output. Capital formation is defined as the rate at which this ratio falls:

$$C(t) = -\frac{d}{dt}E^*(t) > 0$$

A system is formation-positive when  $C(t) > 0$  is sustained: embedded intelligence is accumulating faster than liability burden is expanding.

The survivability functional is:

$$S(t) = \frac{\tau}{Q} \cdot \cos(\nabla\Phi)$$

where  $\tau$  is structural memory (accumulated production coherence across cycles),  $Q$  is coordination cost, and  $\nabla\Phi$  is the phase alignment gradient. Formation admissibility requires  $S(t) > 0$  sustained.

The Capital Gap Index is:

$$\text{CGI} = K_{\text{app}} - K_{\text{form}}$$

where  $K_{\text{app}}$  is apparent claim capacity and  $K_{\text{form}}$  is embedded survivability. The CGI measures the distance between what a system claims to be worth and what it has actually formed.

### 3 The Witness Problem: Formal Statement

**Definition 1** (Capital Formation Witness). *A capital formation witness for a system  $\Sigma$  is an instrument  $W$  satisfying the following conditions:*

- (i) **Detection:**  *$W$  can confirm  $C(t) > 0$  from observable data generated by  $\Sigma$ .*
- (ii) **Discrimination:**  *$W$  can distinguish  $K_{\text{form}}$  accumulation from  $K_{\text{app}}$  expansion in the observable record.*
- (iii) **Attribution:**  *$W$  can identify which activities, roles, and institutional structures within  $\Sigma$  are contributing to  $C(t) > 0$  and which are degrading it.*
- (iv) **Continuity:**  *$W$  provides a continuous signal — not merely post-hoc forensic identification — so that formation-positive behaviour can be sustained and rewarded in real time.*

**Proposition 1** (Witness Necessity for the Descent Mechanism). *The descent mechanism — the anti-entropic trajectory on which  $E^*(t)$  falls and  $K_{\text{form}}$  accumulates — cannot be initiated or sustained without a capital formation witness  $W$ .*

*Proof sketch.* The descent mechanism requires three simultaneous conditions:

- $C(t) > 0$  must be confirmed so that formation-positive behaviour can be distinguished from claims amplification and rewarded accordingly.
- Institutions sustaining  $C(t) > 0$  must be identified so that they can be protected, replicated, and legally mandated.
- The entropic direction ( $C(t) \leq 0$ ,  $K_{\text{app}}$  expansion) must be distinguishable from the anti-entropic direction in real time, so that intervention is possible before formation collapse becomes irreversible.

Each condition requires a witness  $W$  satisfying conditions (i)–(iv) of the definition. In the absence of  $W$ , none of the three conditions can be met: formation-positive behaviour cannot be distinguished from claims amplification, formation institutions cannot be identified and protected, and the system cannot intervene in its own descent. The descent mechanism is therefore formally inaccessible without  $W$ .  $\square$

## 4 The Entropic Asymmetry

The witness problem is compounded by a structural asymmetry in the observability of the two trajectories.

**Definition 2** (Entropic Direction). *The entropic direction is the trajectory on which:*

$$K_{\text{app}}(t) \uparrow, \quad K_{\text{form}}(t) \text{ stagnant or falling}, \quad C(t) \leq 0, \quad E^*(t) \uparrow$$

*The system expands claims without producing embedded survivability. The claims-to-formation ratio rises. The system approaches formal collapse.*

**Definition 3** (Anti-Entropic Direction). *The anti-entropic direction is the trajectory on which:*

$$C(t) > 0, \quad K_{\text{form}}(t) \uparrow, \quad \tau \uparrow, \quad Q \downarrow, \quad E^*(t) \downarrow$$

*Embedded intelligence accumulates. The system moves away from maximum entropy toward structured, coherent, survivable production.*

The entropic asymmetry is the observation that all existing mainstream instruments witness the entropic direction and none witness the anti-entropic direction:

Instrument	What it measures	Direction witnessed	Blind to
Market price	$K_{\text{app}}$	Entropic	$K_{\text{form}}$
GDP	Output flow	Entropic	$C(t)$
Accounting (GAAP/IFRS)	Asset claims	Entropic	$\tau$ accumulation
Credit ratings	Debt serviceability	Entropic	$S(t)$
Equity valuation	$K_{\text{app}}$ multiple	Entropic	CGI
Academic economics	Factor returns	Entropic	$K_{\text{form}}$
Marxist critique	Surplus value extraction	Entropic	$\tau, K_{\text{form}}$

**Consequence of the entropic asymmetry:** Because all witnessed signals correspond to the entropic direction, the entropic direction is continuously rewarded, replicated, and legally mandated. The anti-entropic direction is not merely unrewarded — it is formally invisible to every instrument available to institutions, governments, investors, and analysts. What is not witnessed cannot be sustained.

## 5 The Proof Case: 150 Years of Theory, Zero Witnessing

### 5.1 The Liu Test

We establish the witness problem empirically through what we term the **Liu Test**: if an analytical framework, given full access to capital formation as it occurs in a real firm, cannot identify it as such — and instead identifies it as its opposite — then that framework fails the witness criterion.

Catherine Liu (political economist, UC Irvine; author of *Virtue Hoarders: The Case Against the Professional Managerial Class*) is selected as the test case because she represents the most rigorous and class-conscious critique of capital currently available. Her framework incorporates 150 years of Marxist analysis, contemporary political economy (Piketty, Ehrenreich, Dean), and direct engagement with the institutional mechanisms of capital. If her framework fails the Liu Test, we are entitled to conclude that the witness problem is general.

### 5.2 The Two Formation Roles

In analysing the historical development of the capitalist firm, Liu identifies two internal roles:

1. **The foreman:** The capitalist's representative on the factory floor, whose function she describes as maintaining the workers' production rhythm and disciplining the work process.
2. **The clerk:** The family servant handling legal, accounting, and financial interface with government, law, and public trust structures.

Liu's reading: these two roles are the proto-PMC. Their function is control of labour on behalf of capital. The foreman keeps workers in line; the clerk manages the firm's relationship with the institutional apparatus of capital. They are the ancestors of the PMC's exploitative function.

### 5.3 What These Roles Actually Are

In the framework's formal terms:

**The foreman is the  $\tau$  maintenance function.**

$\tau$  is structural memory: the accumulated coherence of repeated production cycles that embeds intelligence into productive capacity. The foreman's function — maintaining rhythm, ensuring cycle coherence, disciplining the work process to produce consistent output — is precisely the mechanism by which  $\tau \uparrow$ . Without this function, production cycles do not accumulate formation. Effort is expended but embedded intelligence does not build.  $C(t) \rightarrow 0$  regardless of inputs.

This is not oppression in the formal sense. It is the condition without which capital formation is structurally impossible. Rhythm is  $\tau$ . The collapse of rhythm is  $\tau \downarrow$ , which is  $S(t) \downarrow$ , which is formation collapse. This is confirmed empirically in PE-backed restructurings (Capital Formation Project Thread 9): the first casualty of management replacement is operational memory.  $\tau$  collapses. The firm's  $C(t)$  goes to zero. It extracts  $K_{\text{app}}$  until collapse.

**The clerk is the  $O(t)$  navigation function.**

Obligation density  $O(t)$  is a structural feature of the environment in which all production occurs. As established in the Capital Formation Project's Thread 14, obligations are multiplicative: each law, regulation, and contractual obligation interacts with others, creating a network in which triggering one obligation cascades through others. A firm that does not actively manage this network is crushed by it.

The clerk is the agent who ensures the firm *defines itself to the obligation layer before the obligation layer defines the firm*. Accounting makes  $L_e(t)$  legible and bounded. Legal representation establishes the liability boundary. Navigation of public trust determines the firm's legitimacy within the obligation network.

If you do not account for yourself, the state accounts for you. It accounts for you as an undifferentiated liability. The clerk function is not servitude to capital — it is the instrument by which the firm's formation activities are made visible, protected, and legally defensible.

### 5.4 The Liu Test Result

**Theorem 1** (Liu Test Failure). *The Marxist analytical framework, as deployed by Liu, fails the capital formation witness criterion.*

*Proof.* The framework is presented with the two primary formation roles in operation —  $\tau$  maintenance (the foreman) and  $O(t)$  navigation (the clerk). Under conditions (i)–(iv) of the witness definition:

- (i) **Detection fails:** The framework identifies neither role as contributing to  $C(t) > 0$ . It classifies both as mechanisms of exploitation.
- (ii) **Discrimination fails:** The framework cannot distinguish  $K_{\text{form}}$  accumulation (what the

foreman produces by maintaining  $\tau$ ) from  $K_{\text{app}}$  expansion (what claims amplification produces).

- (iii) **Attribution fails:** The framework attributes the formation function of the foreman to control of labour, and the formation function of the clerk to service of capital. Both attributions are inverted.
- (iv) **Continuity fails:** The framework has no real-time instrument for confirming  $C(t) > 0$  as it occurs. Its analytical instruments (surplus value, rate of exploitation, class position) are not capable of generating a continuous formation signal.

The framework therefore fails all four conditions of the witness definition. The Liu Test is failed on all counts.  $\square$

**Corollary 1.** *If the most sophisticated capital critique available fails the Liu Test, the witness problem is general: no mainstream analytical framework currently constitutes a capital formation witness.*

## 6 The Descent Mechanism: What Becomes Possible With a Witness

We now specify what the descent mechanism requires and what it enables.

**Definition 4** (The Descent Mechanism). *The descent mechanism is the institutional process by which a system transitions from the entropic direction to the anti-entropic direction, characterised by:*

$$\frac{d}{dt}E^*(t) < 0 \quad (\text{claims-to-formation ratio falling})$$

$$\tau \uparrow, \quad Q \downarrow, \quad S(t) > 0 \text{ sustained}$$

*The descent is anti-entropic: the system moves from higher disorder (claims amplification) to lower disorder (embedded formation).*

The descent mechanism requires three institutional components, each of which requires a witness:

1. **Measurement:**  $C(t)$  must be derivable from observable operational data. Without measurement, formation cannot be confirmed, rewarded, or sustained.  
*Project response:* The EOW  $\rightarrow$  CFL derivation system provides this measurement layer for GTD Ltd. The EOW (End of Week) trustee record is the canonical source; the CFL (Capital Formation Log) is the derived formation signal.
2. **Legal mandate:**  $C(t) > 0$  must be legally enforceable as a fiduciary obligation, not merely aspirational. Without legal mandate, formation-positive behaviour competes on unequal terms with claims amplification, which is legally mandated (shareholder value, bond covenants, credit agreements).  
*Project response:* RFC-002 (authorised, execution pending) converts the formation mandate from aspiration to trustee obligation. When executed,  $C(t) > 0$  becomes the legal standard against which GTD Ltd's trustee conduct is measured.
3. **Institutional proof of concept:** A formation-positive institution must demonstrate the descent mechanism operating in real conditions, making the witness instrument credible and replicable.  
*Project response:* GTD Ltd, operating under Trust Certificate No. 11 with RFC-002 executed and the CFL derivation running, is the first identified institution operating in a legal space that mandates  $C(t) > 0$ . It constitutes the proof of concept.

**The project's position:** GTD Ltd is being built as the living demonstration that the descent mechanism is possible. Not claimed, not modelled — demonstrated. The formation witness (the CFL derivation system), the legal mandate (RFC-002), and the institutional proof of concept (GTD Ltd operating under the trust structure) are the three components. The witness problem is not solved by this paper. It is solved by the project's operational execution.

## 7 Why the Witness Problem Is Not Incidental

It may be objected that the witness problem is a technical deficiency that will be corrected as measurement instruments improve. This objection is incorrect. The witness problem is structural for the following reasons.

### 1. The witness problem is self-concealing.

The entropic direction produces the observable signals that existing instruments are calibrated to measure: rising asset prices, expanding credit, growing reported output. These signals *feel like* formation. They are not.  $K_{\text{app}}$  expanding is indistinguishable from  $K_{\text{form}}$  accumulating in any instrument that does not have the CGI variable. The system generates evidence of its own health as it deteriorates. This is the formal definition of  $\pi_i > 1$ : reported intelligence ( $I_{\text{rep}}$ ) diverges from true formation signal ( $I_{\text{true}}$ ) in the direction of apparent health.

### 2. The witness problem is institutionally reproduced.

The professions that would constitute formation witnesses — economics, accounting, financial analysis, law — are trained within frameworks that witness only the entropic direction. Their credentialling systems reproduce the measurement blindness. An economist trained to maximise GDP cannot see  $C(t)$ . An accountant trained in GAAP/IFRS cannot see  $K_{\text{form}}$ . A lawyer trained in fiduciary duty to shareholders cannot see the legal space in which  $C(t) > 0$  can be mandated. The professional apparatus of capital is the formal guarantee that the witness problem persists.

This is what Liu observes as PMC ideological capture. In the framework's terms: the PMC credentialling system reproduces the entropic measurement frame.  $\pi_i \gg 1$  is not an accident — it is the product of institutions that credential people in the entropic instruments and exclude all formation-witnessing alternatives.

### 3. The witness problem is democratic.

Liu observes that ordinary people cannot explain what capital is, even when they are experiencing its extraction. This is correct. But the reason is not ignorance or propaganda alone. It is that the instruments available for self-understanding are all entropic. Workers measure their condition in wages (an entropic signal), job security (an entropic signal), and asset prices (the most entropic signal of all). None of these instruments can witness  $\tau$  accumulation or  $K_{\text{form}}$  building. The working class cannot see its own formation condition because the witness instruments have never existed.

## 8 The Symmetry of Witness Failure: Left and Right Identical

The most important structural feature of the witness problem is that it is apolitical. It does not afflict the left more than the right, or vice versa. The left's most rigorous capital critic and the right's most celebrated capital allocator stand on exactly the same ground: the entropic frame, with no instrument to confirm  $C(t) > 0$ .

We demonstrate this through a direct comparison of Liu's PE critique and PE's self-understanding.



	Liu (Left)	Private Equity (Right)
Claim about PE	PE destroys capital, extracts value, harms workers	PE creates capital, improves operations, allocates resources to highest use
Instrument used	Class analysis, empirical case studies (Toys R Us, healthcare rollups)	IRR, MOIC, EBITDA expansion, market returns
What they measure	Social harm ( $K_{\text{app}}$ extraction as experienced by labour)	$K_{\text{app}}$ expansion (multiples, exit valuations)
$C(t)$ measured?	No	No
$K_{\text{form}}$ measured?	No	No
$\tau$ tracked?	No	No (destroyed in restructuring)
Liu Test result	Fails	Fails
Formal status	Correct direction, unproven	Wrong direction, unproven

**Liu’s position:** PE is the enemy. She cannot formally prove this. Her evidence is case studies: Toys R Us, healthcare systems, retail rollups. These demonstrate harm in the observable record but do not constitute a formal proof that PE is anti-formation by construction. The PE rebuttal — “we create value, allocate capital efficiently, discipline underperforming management” — is not closed by case studies. It requires a theorem.

**PE’s self-understanding:** PE is capital formation. Firms are acquired, restructured, made efficient, and returned to productive use. IRR and MOIC are the evidence. This belief is sincerely held and internally consistent within the entropic frame. PE practitioners are measuring  $K_{\text{app}}$  expansion at entry and exit. They are not measuring  $K_{\text{form}}$  accumulation at any point in the holding period. They are not measuring  $\tau$ : operational memory, cycle coherence, embedded survivability. They are not asking whether  $C(t) > 0$  is sustained. Within their measurement frame, they are doing exactly what they believe they are doing. The frame is wrong.

**Theorem 2** (Symmetric Witness Failure). *Liu and private equity practitioners are symmetrically non-witnesses to capital formation. They reach opposite conclusions about PE’s effect on  $C(t)$  and both conclusions are formally unsupported, because neither party possesses an instrument that can measure  $C(t)$ .*

*Proof.* Both Liu and PE practitioners fail the witness criterion (Definition 1):

- (i) **Detection:** Neither party can confirm  $C(t) > 0$  or  $C(t) \leq 0$  from their respective instruments. Liu’s class analysis and PE’s IRR are both entropic instruments that do not access  $C(t)$ .
- (ii) **Discrimination:** Neither party can distinguish  $K_{\text{form}}$  accumulation from  $K_{\text{app}}$  expansion. Liu observes  $K_{\text{app}}$  extraction as harm; PE observes  $K_{\text{app}}$  expansion as value creation. Both are measuring the same variable from different positions.
- (iii) **Attribution:** Liu attributes formation destruction to PE without being able to specify which PE activities destroy  $\tau$  and which do not. PE attributes formation to operational improvement without measuring  $\tau$  accumulation. Both attributions are unsupported.
- (iv) **Continuity:** Neither party maintains a continuous  $C(t)$  signal during the holding period or the critique thereof.

Both parties therefore fail all four conditions of the witness definition. □

**Remark 1.** *Thread 9 of the Capital Formation Project has established, by formal theorem, that PE is anti-capital formation by construction — not by empirical observation alone. The Non-Equivalence Theorem and the Anti-Capital Tendency Theorem prove that the PE incentive struc-*

ture (carry, 2/20 fee architecture, 5–7 year exit horizon) necessarily misaligns management behaviour with  $C(t) > 0$ , and that the debt-loading mechanism necessarily degrades  $\tau$  during the restructuring period. These theorems close the PE rebuttal. They are available to neither Liu nor PE practitioners, because both lack the witness instrument from which the theorems are derived.

**The political economy implication:** the left–right debate about private equity is a debate between two non-witnesses about a phenomenon neither can formally characterise. It is not a factual disagreement; it is a measurement failure shared equally across the political divide.

## 9 Implications for Political Economy

The witness problem reframes the standard political economy debate.

**Left critique (Liu, Marx, Piketty):** The problem is distribution. Capital concentrates. Redistribution is required.

*Framework response:* Distribution of  $K_{\text{app}}$  does not produce  $K_{\text{form}}$ . The problem is not where claims are held but whether formation is occurring. A redistributive programme that fails to initiate the descent mechanism redistributes the entropic trajectory, not the anti-entropic one.

**Right critique (market efficiency):** The market allocates capital to its highest use. Government intervention distorts this.

*Framework response:* The market witnesses  $K_{\text{app}}$ , not  $K_{\text{form}}$ . Market allocation of  $K_{\text{app}}$  is allocation of claims, not formation. The highest  $K_{\text{app}}$  return is frequently achieved by destroying  $K_{\text{form}}$  (PE-backed restructuring, Capital Formation Project Thread 9). Market efficiency is efficiency within the entropic frame.

**Both sides are wrong in the same direction:** they are arguing about the optimal management of the entropic trajectory while the descent mechanism goes uninitiated because no witness exists. A full taxonomy of  $K_{\text{app}}$  interventions across 15 policy traditions spanning 150 years is developed in the companion document “150 Years of Misdiagnosis”.

## 10 Conclusion

The capital formation witness problem is the deepest structural reason why 150 years of sophisticated capital critique — including the most class-conscious, institutionally aware, and empirically grounded version currently available — has not produced the political conditions for the descent mechanism.

The problem is not analytical failure in the ordinary sense. Liu’s analysis is correct within its frame. The problem is frame completeness: the frame does not contain a witness for  $C(t) > 0$ , and therefore every correct observation it makes is expressed in the entropic vocabulary. The foreman is named as oppressor; the clerk is named as servant of capital. Both are formation roles that the framework cannot see.

The descent mechanism requires a witness. The witness requires an instrument. The instrument is  $C(t) = -d/dt E^*(t) > 0$  and its operational implementation in the EOW  $\rightarrow$  CFL derivation system. The legal mandate is RFC-002. The proof of concept is GTD Ltd operating under the trust structure.

The project is not building a theory. It is building the first institutional implementation of the descent mechanism, with the witness instrument in place.

□

*Capital Formation Project — Formal Paper*

*Global Tech Dev Limited — Broomhead Sovereign Private Trust*

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## AI & LLM Disclosure

This document was prepared with the assistance of Claude (Anthropic). The intellectual content of the work — the framework, definitions, theorems, propositions, proofs, and interpretive framing — originates with the author. LLM assistance was used in two distinct capacities. Drafting assistance: editorial structuring, prose refinement, and LaTeX typesetting were undertaken with LLM support under author direction. Verification assistance: cross-reference resolution and template-conformance checking were undertaken with LLM support and confirmed by the author. The author has reviewed all prose, examined all formal content (definitions, theorems, proofs, numerical claims, citations), and approves all claims for publication.

The author acknowledges that LLM systems can occasionally introduce hallucinated content — fabricated citations, miscoded notation, plausible-sounding but incorrect attributions — that survives author review despite reasonable diligence. Readers identifying any such artefact in this document are invited to contact the author so the issue can be examined and, if confirmed, corrected in a subsequent versioned deposit.

## References

## References

- [1] Broomhead, G. *Local Witnessed Descent and the Nonlocality of Strong Regularity*. Zenodo, January 2026. DOI: [10.5281/zenodo.18408373](https://doi.org/10.5281/zenodo.18408373). The combinatorial-mathematics instance of the witness/extractability framework, establishing the sharp dichotomy between polynomial bounds under extractable witnesses and tower-type lower bounds under nested non-extractable structure.
- [2] Broomhead, G. *Deterministic Descent via Witness Principles in Discrete Global-Local Systems*. Zenodo, 2026. DOI: [10.5281/zenodo.18344559](https://doi.org/10.5281/zenodo.18344559). The abstract framework underlying the regularity dichotomy, with the no-silent-interval principle and operational blindness lemma in their general form.
- [3] Broomhead, G. *Capital Formation as Anti-Entropy*. Zenodo, 2026. DOI: [10.5281/zenodo.19491055](https://doi.org/10.5281/zenodo.19491055). The theoretical formalisation of capital formation as the anti-entropic dynamics of  $E^*(t)$  falling and  $K_{\text{form}}$  accumulating; the dynamic complement to the present paper’s witness-side analysis.
- [4] Obligation Density Programme. *The Witness Principle and the Witness-Extraction Asymmetry: Foundations of the Obligation Density Framework*. OD\_01 (Foundation Paper), April 2026. The household-scale instance of the witness/extractability framework, formalising  $\mathcal{W}_{\text{pub}}(\mathcal{L}_{\text{priv},i}) = \emptyset$  at the household ledger and proving the additive deficit decomposition across discharge and future-self channels.
- [5] Obligation Density Programme. *The Cross-Scale Witness Principle: Bridging the Tax Extraction Asymmetry and the Capital Formation Witness Problem*. OD\_10, April 2026. The cross-scale composition paper proving the household-scale and firm-scale witness instances are

not analogous but identical, with shared survivability functional and shared entropic-versus-anti-entropic distinction.

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