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The Liquidity Grid[1]

Why Netting Powers Markets and Blockchains Blow the Fuse

The goal it seems, for tokenized assets, is to settle at T+0 and run markets 24/7 with every conceivable asset type. The premise here is that this construct is more capital efficient than T+1 because it 'instantly' returns liquidity to investors. Defi markets do this today, so naturally Tradfi markets are attempting to emulate them by adopting blockchain and along with it crypto assets and trading strategies. This memo explains why current blockchain design is inadequate for this liquidity scenario to actually work in Tradfi and offers a way to fix it.

It's commonly understood that we have clearinghouses in Tradfi to perform netting. And netting across an entire market system is a means for measuring solvency. And solvency is a measure of systemic risk. For most modern investors, this is a set-it-and-forget-it system that only regulators care about.

It's elementary, but worth stating plainly: netting is the market's liquidity engine. It generates more than enough available funds to cover counterparty and settlement risk — and still leaves a liquidity surplus that drives systemic capital efficiency. Because clearing is a set-it-and-forget-it system, its capital-efficiency function is almost always overlooked.

It's often claimed that blockchains can operate without a clearinghouse. And in Defi, that's technically true — but only because the functions of available funds and counterparty risk are replaced by prefunding. In practice, this means blockchains operate as real-time gross-settlement systems. This has been celebrated as a "good thing" by many who should actually know better.[i]

From a Tradfi perspective, prefunding is not an efficient use of capital. Modern markets run on credit — lending and borrowing, posting collateral, and trading on margin are the principal drivers of liquidity and leverage globally. Pre-funding is antithetical to this.

Therefore, many have pondered the idea of markets that settle at T+0 speed and run 24/7 without pre-funding. Such concepts in practice today do so by performing magical feats of abstraction, but all of them require a secret trap door. The illusion is required because, unfortunately, blockchain design makes the idea of eliminating the need for prefunding structurally impossible.

Many expect U.S. and global assets to be tokenized and "trade on-chain." And while this is technically feasible, it is not economically viable at scale. In practice, trading tokenized assets on-chain relies on layers of abstraction — and still requires substantial off-chain systems to capture the liability exhaust of the blockchain's T+0 engine. That off-chain accounting is what closes books and records and satisfies fiduciary and regulatory obligations. The tax complexity that crypto traders experience today is just the visible tip of a much larger structural problem.

This proof demonstrates that if a blockchain were to run today's Tradfi markets trading tokenized assets on-chain at T+0, 24/7/365 without a clearinghouse the whole system would become insolvent:

$$C_n = \kappa_n \cdot V_n \ll P_n = V_n$$

$$\frac{P_n}{C_n} = \frac{1}{\kappa_n} \gg 1$$

- V_n = total gross trade volume over n trades
- C_n = capital required with multilateral netting
- P_n = capital required with prefunded atomic settlement
- κ_n = the **netting compression factor**, which shrinks as the network thickens

[1] This article is just two-pages long, the rest of it supporting evidence.

Proofs are for Defi degens. But what that proof says is actually quite simple:

gross-settlement drains liquidity faster than the return of instant proceeds

T+0 returns proceeds faster than T+1, but proceeds are linear. Netting returns capital to the system, and netting is exponential. Real-time gross settlement destroys netting and adds prefunding, so the capital efficiency of T+0 collapses. No amount of blockchain speed, clever smart contract strategies or interoperability can change that.

So why can't we have blockchain and netting too?

That would be great of course. It would only be possible if blockchains were designed for that. Blockchains are really just encrypted "ledgers". Each block in the chain is a "state of the ledger". Never mind how that state is arrived at, the result is a record of an asset, its value and who owns it. That's all that's in there, by design. It's hardly a ledger. Each block is the position log and the difference between one block in the chain and any other is the state-change log.

Liabilities are conspicuously missing. The reason liabilities are still missing is almost religious. Apparently, liabilities are the root of all evil and the leverage intermediaries handle to manipulate money and markets. When Satoshi designed the blockchain to mint a Bitcoin this was his first principle – make the system "trust-less", shift the function of trust elsewhere and declare the prefunding rule to keep the playing field level. In other words, trust no one. Blockchains require the consensus of a mathematical proof that nodes on a network validate. They agree between them that all the transactions that write to the next block are valid. And of course, one of those points of validation is that they are properly prefunded.

There is no room for netting in any of this. There is room for lending of course, but only if the borrower agrees to draconian terms. Credit as we use it in Tradfi markets simply does not operate in Satoshi's construct. So, what does operate in Satoshi's construct? Atomic settlement for any asset type. T+0 settlement which produces an instant return of proceeds available to be executed 24 hours a day 7 days a week, 365 days a year.

The solution to this problem is both simple and complex at the same time. Just equip the blockchain with proper ledger, one that includes liabilities. If the Blockchain itself were a GAAP-standard accounting substrate it would immediately align with the rest of the Tradfi systems in operation today – most importantly the clearinghouse netting engine. A tokenized assets market trading T+0, 24/7 could easily co-exist and interact with Tradfi markets just as they operate today. There would be no need for consensus. We'd default to the market norms and regulations we already operate under.

Just like the fundamentals of the clearinghouse are often overlooked, so too are the principles that went into Satoshi's design. Clearinghouses were built to sustain solvency. Blockchains were not built for solvency, they had something else in mind entirely – and that of course is a different monetary system. That new monetary system will come about, but it is instant settlement for any asset type on a single rail that will drive it, not an anti-establishment philosophy.

At this point in time, literally all blockchains write out to a position log to record asset, value and owner only. It's been nearly 20-years of development evolution and the core principles that have driven blockchain innovation have been public and private operating models, data privacy, identity, execution speed and native crypto coin variation. Not one has innovated at the ledger layer or rethought the utility of credit inside its fundamental structure. Once an innovation of this kind comes about, if it is adopted, token markets will bifurcate. And in so doing tokenized asset quality and utility will skyrocket in both Tradfi and Defi markets.

The rest of this memo details all the claims made above. If any of this didn't make sense to you, read on.

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How does netting return liquidity to investors and the system?

Let's use the classic playground scenario to answer this question.

Imagine two kids trading marbles at recess. One gives three. The other gives two. This is a gross transaction. If they hand over the full amount every time they trade, the marbles move in both directions, in full, with no cancellations. One kid gains. One kid loses. The losses accumulate. The gains concentrate. The supply drains asymmetrically until one kid hits zero. And the moment one kid hits zero, the game stops. Gross settlement drains supply asymmetrically until someone runs out and liquidity drops to zero.

The Drain Proof

Here is the simple proof. Let:

- L_0 = starting marbles, initial liquidity
- ai = marbles Kid A gives in round i
- bi = marbles Kid B gives in round i

Gross settlement requires:

$$L_n = L_0 - \sum_{i=1}^{n} (ai + bi)$$

Liquidity falls every round. As trades continue, $L_n \rightarrow 0$. Someone goes marble-bankrupt.

Now, let's change one rule.

The new rule is simple: the marble traders hand over only the difference of their trade, not the full amount back and forth. They settle only the difference. One marble. This is a net transaction.

Now they can trade all day. In other words, the system stays liquid.

The Netting Proof

Here is the simple proof:

$$L_n = L_0 - \sum_{i=1}^{n} |ai - bi|$$

The drain is tiny. Liquidity remains. Everyone has a chance to stay marble-solvent.

This is the entire solvency engine of modern markets. It has nothing to do with marbles. It has nothing to do with technology. It has nothing to do with goods, services, or electronic abstractions. It is simply the difference between gross settlement and net settlement. Gross drains. Netting preserves. Everything else is built on top of that truth.

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The Ancient Logic of Netting

Let's zoom out from the playground and look at commercial history. As societies grew more complex, the same netting pattern appeared in commerce. Merchants who insisted on settling every exchange in full created liquidity shortages. Communities discovered that settling only the difference kept trade alive.

Netting wasn't an innovation. It was a survival mechanism.

Fast-forward to modern markets. We no longer trade marbles or merchant goods. We trade obligations. The goods become a thing on a ledger we call a claim. Replace the goods with an equity share, a bond, a swap, a futures contract. The notion that these things are objects is a fiction, of course. But that fiction supports the claim function. The bearer of a certificate is the bearer of a claim.

We represent that claim as a liability on a netted ledger.

And here is the moment that feels almost embarrassing to say out loud — the moment that feels like explaining why water is wet:

Markets work because we treat obligations as if they were objects.

That single legal fiction layer allows liabilities to offset, compress, and settle only the difference.

We force a state change in a ledger to mimic the delivery of goods because the law needs something discrete to enforce, tax, collateralize, and audit. This fiction — treating a claim as a thing — is what makes netting possible.

It is what allows receivables and payables to cancel. It is what allows exposures to compress, keeping counterparties solvent. It is what allows liquidity to recycle. It is what keeps the entire financial system alive. It is our systemic risk control.

Clearinghouses industrialized this process. They track obligations. They compress them. They settle only the difference. This is not a convenience. It is the mechanism that prevents markets from collapsing under their own demand for liquidity.

The Industrial Proof

Here is the industrial-scale version of the Netting Proof. Let:

- O_i = obligation created in trade i
- N = netted amount after compression

A clearinghouse nets across all participants:

$$N = \sum O_i^{owed} - \sum O_i^{due}$$

Trillions of obligations reduce to a handful of final transfers.
Liquidity remains. The system stays solvent.

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The Asset-Only Ledger

Now consider blockchains. A blockchain, despite being called "Digital Ledger Technology" (DLT), is not a ledger at all. The record kept by a blockchain is a position log, or a "state change log" — it records who owns what. It does not record who owes what to whom.

A proper ledger expresses both assets and liabilities. A blockchain expresses only assets and owners.

Therefore, Blockchains remove obligations. They settle every transfer in full, immediately, atomically. They eliminate the legal fiction that makes netting possible.

To understand why, let's return to the playground.

The Satoshi Gap

Two kids trade marbles. A third kid keeps the notebook. The notebook nets who owes what to whom. That notebook is the intermediary Satoshi removed from the fundamental blockchain design.[i]

Without the notebook, there are no obligations. Without obligations, there is nothing to net. Therefore, a blockchain cannot express a receivable. It cannot express a payable. It cannot express a future-dated claim. It cannot express an offset. It cannot express lifecycle truth.

And because it cannot express obligations, it cannot net. And because it cannot net, it cannot recycle liquidity. And because it cannot recycle liquidity, it cannot support real-world markets.

As a result, all markets operating on Satoshi's asset-only ledger must be prefunded. And all blockchains in production today operate on Satoshi's asset-only ledger. And here is the amazing part: plenty of warnings about this have already been made.[ii]

There is also no shortage of clever workarounds. None change the structural fundamentals.

What blockchains *can* do is atomic settlement. Atomic settlement collapses the elements of a transaction into real-time gross settlement (RTGS). The benefit is immediate delivery and immediate "payment of proceeds."

Some people point to Delivery versus Payment (DvP) as if it describes atomic settlement. But payment is not payment until the liability behind it is actually discharged. And that liability cannot be expressed on an asset-only ledger.

In practice, any settlement on Satoshi's asset-only ledger (XRPL included) is really Delivery versus Delivery (DvD), despite what the industry claims. DvD is just object-for-object. Asset for asset. A swap. No payment. No liability. Further, the practice forces the actual discharge of the liability off-chain.

For market participants — broker-dealers in particular — that off-chain settlement is a forced requirement. Failing to discharge the liability off-chain violates their fiduciary and regulatory duties to investors.

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The Prefunded Proof

Here is the prefunded version of the gross-settlement proof. Let:

- (L_0) = starting liquidity
- (P_i) = prefunded amount for trade (i)
- (T_i) = proceeds received from trade (i)

Atomic settlement requires:

$$[\, L_n = L_0 - \sum_{i=1}^{n} P_i \,]$$

Proceeds accumulate:

$$[\, G_n = \sum_{i=1}^{n} T_i \,]$$

The liquidity loss and the liquidity gain are exponentially out of balance. The gains never catch up to the drain. Liquidity goes to zero. Someone literally goes bankrupt. Atomic settlement is simply gross settlement with the timer set to zero. It accelerates the drain. It does not fix it. [iii]

The Prefunded Proof demonstrates the failure of a system that lacks a systemic reference point. In this ungrounded environment, the system must pull a massive in-rush supply (P_i) for every single cycle because it cannot "see" or recycle the return flow.

The returned supply (T_i) arrives out of phase — too late to be reused for the next transaction — so the system's potential is sucked dry. Without a central grounding station to stabilize these flows, the system burns through its reserves (L_0) until one or more participant is bankrupt.

The Illusion of Instant Liquidity

There is a persistent illusion in the industry that receiving proceeds instantly improves liquidity and therefore improves capital efficiency. It does not, it's only a user experience thing. Proceeds are linear. Netting is exponential. The gain from receiving cash faster is tiny compared to the loss of the multilateral compression that returns capital to the system.

To make the imbalance explicit, let:

- V_n = total gross trade volume over n trades
- C_n = capital required with multilateral netting
- P_n = capital required with prefunded atomic settlement
- κ_n = the **netting compression factor**, which shrinks as the network thickens

Then:[iv]

$$C_n = \kappa_n \cdot V_n \ll P_n = V_n$$

and the liquidity burden ratio is:

$$\frac{P_n}{C_n} = \frac{1}{\kappa_n} \gg 1$$

Instant proceeds from atomic settlement are a single pulse. Netting is the entire power plant.

As the network thickens, κ_n collapses — meaning the capital required under netting shrinks dramatically, while prefunded atomic settlement still demands the full V_n for every trade. The gap between them grows exponentially.

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The grounding reference is gone. Without the clearinghouse, the gross volume) has no path to drain. The linear benefit of 'faster proceeds' is like trying to refill a reservoir with a garden hose while the dam has been removed. The math is not close. The illusion of "faster liquidity" collapses the moment you compare the linear gain to the exponential loss.

Smart Contracts Cannot Fix This

Smart contracts can automate a transfer. They can even simulate a "liability token," but they cannot create the obligation that netting requires. A smart contract simply cannot feed a proper netting procedure. And even if they could the result would still be produced at the wrong layer and one asset at a time. The problem resides at the protocol layer.

This is why blockchains fail when applied to real markets. Not because they are slow, lack security, leak data, or are not easily interoperable. But because they remove the one thing that makes solvency possible.

The math is simple. The story is ancient. The architecture is unavoidable.

If we want real-time markets, we must redesign the ledger.[v]

The solution is a ledger with GAAP-grade accounting at the protocol layer. A ledger that expresses assets and liabilities. A ledger that supports netting, compression, and lifecycle truth. A ledger with a circuit breaker that freezes obligations when the system destabilizes.[vi]

The solvency engine can only be restored by the ledger beneath it.

Liquidity's Return Path

There is no reason a blockchain cannot anchor a full accounting system. A block can hash anything — including a GAAP-grade, double-entry ledger. The problem has never been cryptography. It has been the choice of substrate. If the ledger beneath tokenized markets were itself a solvency-capable accounting surface — not a state-change log, but a DLT-native ledger that expresses obligations, exposures, and netting as first-class events — then the liquidity would have a return path back.

The result: a nettable, real-time atomic settlement on-chain with tokenized assets backed by redeemable real-world reserves. The NSCC, FICC, DTC, ICE Clear, Eurex Clearing, EuroClear/ClearStream, HKCC, HKSCC, JSSC, JASDEC, SGC-DC, CDP all operate on GAAP-grade, double-entry accounting surfaces that express assets and liabilities, compute exposures, and net positions as part of their state. That is why they recycle liquidity instead of destroying it.

A solvency-engineered DLT brings that same accounting surface to tokenized markets. It is not a perpetual log because:

- payables and receivables are native objects
- exposures computed in real time
- it can net without reconstructing history
- lifecycle truth is a first-class concept
- value is expressed on a system-wide accounting surface

This ledger restores the negative rail that blockchains removed. It gives the liquidity its grounding wire back. Obligations can be expressed before value moves. Exposures update as part of the ledger's operation. Netting occurs continuously. Liquidity recycles instead of draining.

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The Solvency-Token Link

A solvency-engineered ledger does not replace clearinghouses. It extends their accounting perimeter into digital environments. The liability leg never leaves the solvency surface. Only the asset-side representation is exported — backed not by exported liability data, but by proof-of-redeemability, the only proof that matters.

Proof-of-redeemability trumps proof-of-reserve because it ties the token to an enforceable claim, not a snapshot.

But redemption requires an intact chain of custody. If the token returns unbroken, the solvency ledger can reattach the liability leg, restore lifecycle truth, and complete the circuit. If the chain of custody is broken, the token loses its redeemability — not because the liability left the ledger, but because the ledger can no longer prove the token's identity.

In traditional markets, the claim — not the representation — is the legally operative object. Claims are expressed as liabilities on a ledger capable of tracking obligations, exposures, and lifecycle events. Tokenized representations do not carry these rights. They do not express a payable. They do not express a receivable. They do not express a right of delivery. They are position markers.[vii]

Regulators have already formalized this distinction. Recent guidance notes that tokenized securities receive the same capital treatment as their non-tokenized equivalents because tokenization does not create new legal rights or obligations.[viii] The representation does not become the claim. The liability remains off-chain.

This distinction is critical for solvency. Proof-of-reserve is not proof-of-redeemability. Redeemability requires an obligation. Obligations require a ledger capable of expressing them. Without obligations, there is nothing to net. Without netting, liquidity cannot recycle. Without recycling, solvency collapses into prefunded gross settlement.

Conclusion

A solvency-capable ledger must therefore express obligations directly — payables, receivables, exposures, and lifecycle truth as first-class objects. Only then can claims be redeemed, obligations extinguished, and liquidity returned to the system rather than drained by atomic settlement.

Tokenization shows that an asset exists. A solvency-capable ledger determines whether the claim exists — and whether it can be redeemed.

This is the new clearing surface for tokenized markets — one that preserves clearinghouse-grade solvency within its own accounting perimeter while allowing asset-only representations to circulate where tokenized assets already live.

A solvency-engineered ledger is not a departure from clearinghouse architecture. It is the continuation of it — a GAAP-standard substrate restores polarity to the system, expresses obligations before value moves, and keeps the liquidity grounded and markets sustainable.

EndNotes:

[i] **The Satoshi Canon (Foundational Principles)**
These works represent the "Asset-Only" worldview that informed the original blockchain design.

Work, **Time-Stamping**, and **Double-Spending**, with no mention of netting.

- **Nakamoto, S.** (2008). *Bitcoin: A Peer-to-Peer Electronic Cash System*. [Self-published]. Available at: https://bitcoin.org/bitcoin.pdf
  The manifesto. Establishes the P2P ledger for "cash" transactions, defining the intermediary solely as a "trusted third party" for verification.
- **Haber, S., & Stornetta, W. S.** (1991). *How to Time-Stamp a Digital Document*. Journal of Cryptology, 3(2), 99–111.
  Satoshi's primary reference for the "chain" of blocks. Focuses on the chronological integrity of the record.

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- **Back, A.** (2002). *Hashcash - A Denial of Service Counter-Measure*. [Technical Report]. Available at: http://www.hashcash.org/hashcash.pdf
  The origin of the Proof-of-Work mechanism. Designed to throttle spam, not to manage financial settlement risk.
- **Dai, W.** (1998). *b-money*. [Self-published]. Available at: http://www.weidai.com/bmoney.txt
  An early proposal for an anonymous, distributed electronic cash system cited in the Bitcoin whitepaper.
- **Szabo, N.** (2005). *Bit Gold*. [Blog Post/Proposal]. Available at: https://unenumerated.blogspot.com/
  Proposed a "unforgeable chain" of bits. While not cited in the whitepaper, it is the closest ancestor to Satoshi's design.

Seminal Misguided Works Declaring the "Death of the Clearinghouse"
These works are the primary references for the "disintermediation" of clearinghouses argument. I'm citing these as "should have known better" because, a simple structural analisys wold have releaved what this paper exposes; especially since among these are reports reasonable sponsors paid consultants to produce. This is just a sampling of Pre-2021 literature echoing the theme and all of them were simply perpetuating a myth they accepted at face value and didn't bother to validate.

- **Bheemaiah, K. (2017).** The Blockchain Alternative: Rethinking Macroeconomic Policy and Economic Theory**.**
  This is one of the most cited academic-style books of the era. It argued that DLT would replace the manual reconciliation and centralized clearing functions of FMIs (Financial Market Infrastructures), significantly reducing costs by removing "rent-seeking" intermediaries.
- **Euroclear & Slaughter and May (2016/2017)** Blockchain in Capital Markets – The Prize and the Journey.
  Actually calims that blockchains could disintermediate the role of clearhouses because netting would be unneccessary. Euroclear sponsored the report Oliver Wyamn wrote it.
- **Mainelli, M., & Milne, A. (2015).** The Impact of Mutual Distributed Ledgers on Post-Trade Strategy. SWIFT Institute.
  This research, funded by SWIFT, explored how "Mutual Distributed Ledgers" (MDLs) could perform the functions of clearinghouses and CSDs. It framed the clearinghouse as a legacy solution to a "lack of trust" that DLT effectively solves through math. *SWIFT Institute Working Paper No. 2015-007 (no longer publicly available, but widely cited in academic and policy papers including the Bank of Emngland Working Paper 670, The Ecoonimics of Distributed Ledger Technology for Securities Settlement, which basically argues the same thing.)*

[ii] **The Institutional Awakening (Identifying the Gap)**
These works mark the first professional realization that "Real-Time Settlement" does not remove the need for the clearinghouse's functional "backplane."

- **Pinna, A., & Ruttenberg, W.** (2016). *Distributed Ledger Technologies in Securities Post-Trading: Revolution or Evolution?* European Central Bank Occasional Paper Series No. 172.
  Analyzes the structural necessity of clearing and settlement in capital markets vs. the "instant finality" claims of early blockchain advocates.

[iii] **The Mathematical Formalization (Modern Clearing Models)**
The most recent stage where the "Clearinghouse" is no longer an overlooked relic, but a complex mechanism to be mathematically re-integrated into DLT.

- **Amini, H., Bichuch, M., & Feinstein, Z.** (2021/2023). *Decentralized Payment Clearing using Blockchain and Optimal Bidding*. [arXiv:2109.00446 / SSRN 3915103].
  Provides a formal decentralized mechanism for claims resolution and netting. It treats the clearinghouse not as a person or building, but as a mathematical process.
- **Garratt, R., & van Oordt, M.** (2021). *Privacy as a Public Good: Optimal Data Sharing in a Settlement Network*. [Bank of Canada Staff Working Paper, later published in the Journal of Political Economy/Working Paper].
  Explores the trade-offs between the transparency of Satoshi's ledger and the privacy required for institutional netting.

[iv] In this framework, network growth increases netting efficiency and therefore reduces the capital needed to support volume inside traditional markets. As the network thickens, the economic case for gross atomic settlement weakens rather than strengthens. In that sense, this is Metcalfe's Law inverted. Here is a breakdown of the accuracy and logical flow of the proof:

1. The Variable Logic (C_n vs. P_n)
The definition of $P_n = V_n$ is the "Technical Truth" of a pre-funded RTGS market. In an atomic system, there is no $t+1$ to look forward to; therefore, in a pure atomic system, there is no balance-sheet mechanism equivalent to multilateral netting, so there is no meaningful room for κ-style compression.

2. The Netting Compression Factor (κ)
κ_n "collapses as the network thickens".

- **In a thin market:** Netting is less effective because there are fewer offsetting trades.
- **In an industrial market:** The probability of offsetting trades increases. In a "Bi-polar" system (Assets + Liabilities), the clearinghouse can use a tiny amount of capital to settle a massive amount of volume.
- **The Result:** C_n scales sub-linearly relative to volume, while Pn scales linearly. This creates the "Exponential Gap" you mentioned.

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3. The Ratio: P_n / C_n = 1/κ_n
This ratio is the "Solvency Warning."

- If a clearinghouse nets 98% of volume, κ_n is $0.02.
- The ratio becomes $1 / 0.02 = 50.
- **The Narrative:** This means the "Atomic" system requires **50 times more liquidity** to support the same volume as the grounded he netted balance-sheet system used in traditional finance. As the market grows, this ratio doesn't just stay high—it explodes.

4. Function of the Formula:
The formula $C_n=\kappa_n \cdot V_n \ll P_n=V_n$ is mathematically accurate for expressing the disparity. It explicitly shows that:
1. **Atomic Settlement** is a 1:1 capital-to-volume trap.
2. **Netting** is a leveraged efficiency system.

[v] **The Accounting Backplane**
These references move beyond simple DLT to discuss the architectural necessity of accounting-based ledgers. They provide the theoretical foundation for why an "Asset-Only" ledger is insufficient for institutional markets.

- **AICPA & CIMA.** (2020/2024 updated) Accounting for and auditing of Digital Assets practice aid. Joint Report.
  The definitive professional standard for how distributed ledgers must interface with traditional accounting. It highlights the gap between "on-chain" events and "off-chain" legal obligations.
- **Schär, F.** (2021). *Decentralized Finance: On-Chain Value Transmission Mechanisms*. Federal Reserve Bank of St. Louis Review.
  A rigorous look at the "circuitry" of DeFi. While it praises the efficiency, it implicitly highlights the lack of a "clearing backplane," showing how liquidity is often trapped in silos without a unified accounting layer.

Structural Problems Flagged (The "Lone Voices")
The "Clearinghouse Killer" narrative was a celebration of speed that ignored physics.
Most reports from this era assumed that **Capital Efficiency = Speed**. They didn't realize that **Speed = Liquidity Exhaustion**.

- **The BIS (Bank for International Settlements) CPMI (2017):** *Distributed ledger technology in payment, clearing and settlement*.
  This was the most important early "reality check." The BIS noted that while DLT could improve speed, it might increase liquidity requirements. They were one of the few to hint that "Atomic Settlement" forces participants to hold more cash (prefunding) because they lose the benefit of multilateral netting.
- **Bech, M., & Garratt, R. (2017).** *Central bank cryptocurrencies*. BIS Quarterly Review.
  They began to differentiate between "settlement" and "clearing," noting that clearing (netting) is a separate economic function that DLT doesn't automatically solve just because it moves an asset quickly.
- **ESMA (European Securities and Markets Authority) (2020):** *Report on DLT Pilot Regime*.
  By 2020, regulators started explicitly noting that the removal of CCPs would lead to a "fragmentation of liquidity." They realized that if every trade is settled individually (atomically), the market loses the "98% compression" that a central grounding station (the Clearinghouse) provides.

[vi] To visualize the polarity problem, see this "Solvency Circuit" diagram for a walk-thru of the problem and its resolutionn.
http://jqr5.2.vu/Solvency_Circuit
[vii] **Iversen, A.T.** (2026, Substack) *Settlement Finality: Where Claims End and Property Begins*
[viii] **Federal Reserve**, Board of Governors (2026, Supervision & Regulation FAQ): *Capital Treatment of Tokenized Securities Frequently Asked Questions*

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