

The Jevons Paradox of Capital Liquidity

High-Fidelity Asset Turnover and the Stagnancy Penalty in Agentic Environments

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Abstract

Traditional monetary theory utilizes M1 velocity as a proxy for capital efficiency, yet this metric remains an artifact of a legacy **"Batch-Processing"** model, restricted by the latencies of human-speed decision loops and T+N settlement cycles. As capital migrates into tokenized, agentic environments, execution friction approaches zero, triggering the **Jevons Paradox of Capital Liquidity (JPCL)**. This research demonstrates that frictionless movement does not reduce the demand for liquidity; instead, it creates an exponential requirement for asset turnover. We identify a structural divergence between legacy M1 velocity ($\approx 1.3x$) and agentic surface velocity ($\approx 610x$). By applying an **Average True Range (ATR)** harvesting model, we quantify the **Stagnancy Penalty**: a displacement in relative purchasing power exceeding 22% per annum, caused by the transition from **Duration-Based Yield** to **Throughput-Based Efficiency**.

1. Introduction: The End of Duration-Based Primacy

For the past centuries, capital efficiency has been defined by duration. The primary source of yield was the sacrifice of liquidity over time (e.g., T-bills, Term Deposits). In this "Batch-Processing" era, the velocity of money was inherently capped by structural frictions—legal settlement periods, banking hours, and discretionary oversight.

The emergence of the Agentic Age—defined by tokenized assets and Deterministic Execution Environments (DEE)—has effectively decoupled capital from these temporal constraints. As settlement becomes atomic, the fundamental source of value shifts from Time (Duration) to Motion (Throughput).

2. The Thesis

We contend that in a frictionless, agentic economy, **capital efficiency is a function of throughput, not duration**. Specifically, this research proves that the exponential increase in execution frequency—facilitated by the JPCL—transforms volatility from a "risk" into a primary "yield source." Consequently, the mathematically quantifiable delta between legacy velocity and agentic throughput creates a **Stagnancy Tax**: a terminal liability for any capital

held in discretionary, batch-processed systems. **In an agentic environment, inactivity is no longer a neutral state; it is a structural devaluation.**

2. The Jevons Paradox of Capital Liquidity (JPCL)

The JPCL posits that as the cost and latency of capital rebalancing decrease, the "demand" for rebalancing does not stabilize; it expands to fill the newly available execution capacity.

In the agentic substrate, a dollar is no longer a static store of value; it is a high-frequency packet of data. When transaction costs drop to sub-cent levels, the optimal rebalancing frequency shifts from monthly or daily to an "Atomic Pulse"—continuous, deterministic re-adjustment to market volatility.

3. Data Selection & Methodology

The integrity of the **Jevons Paradox of Capital Liquidity (JPCL)** rests on the delta between legacy "Batch" systems and agentic "Flow" systems. To quantify this, we utilize three distinct datasets representing the evolution of capital velocity.

3.1. The Digital M1 Proxy: Circle (USDC) Throughput

- **Source:** *Circle: State of the USDC Economy (Q1 2026 Report)* and on-chain telemetry from **Artemis/Dune Analytics**.
- **Rationale:** USDC serves as the most accurate "Digital M1" proxy due to its 1:1 USD backing, multi-chain settlement footprint, and audited transparency.
- **Parameters:** We utilized **Annualized On-Chain Volume** (V_{total}) divided by **Average Circulating Supply** (M).
- **Relevance:** Unlike CEX (Centralized Exchange) volume, which includes wash trading and internal bookkeeping, **On-Chain Throughput** represents actual settlement on deterministic rails—the primary environment for the Agentic Economy.

3.2. The "Institutional Pro" Benchmark: U.S. Treasury Market

- **Source:** *SIFMA (Securities Industry and Financial Markets Association) 2025-2026 Capital Markets Fact Book*.
- **Definition:** "Institutional Pro" refers specifically to the **Inter-Dealer Market** for U.S. Treasury Securities. This represents the absolute ceiling of legacy liquidity.
- **Data Point:** We utilized the **Annualized Turnover Ratio** of marketable Treasury debt. While the total debt outstanding in 2026 reached \approx \$30 Trillion, the Average Daily Volume (ADV) settled through primary dealers was \approx \$920 Billion.
- **Calculation:**

$$\tau = \frac{ADV \times 252 \text{ trading days}}{\text{Total Marketable Debt}} \approx 7.5x$$

- **Relevance:** This establishes that even at the highest levels of professional finance, capital only "turns over" roughly once every 33 trading days.

3.3. The Legacy Baseline: Federal Reserve M1 Velocity

- **Source:** *Federal Reserve Bank of St. Louis (FRED): Velocity of M1 Money Stock (M1V).*
- **Lookback Period:** A 5-year rolling average (2021–2026) was used to smooth post-pandemic volatility.
- **Parameters:** M1V is calculated as the ratio of quarterly nominal GDP to the quarterly average of the M1 money stock.
- **Finding:** The persistent 1.3x velocity confirms that in the broader economy, a dollar is "spent" or "settled" only slightly more than once per year.

3.4. Distinction: Settlement Velocity vs. Agentic Execution Velocity

A common critique of the JPCL thesis is the observation that legacy clearing systems already process high-volume turnover. If the Federal Reserve's Fedwire® Funds Service settles over **\$1.1 Quadrillion annually**—a turnover of $\approx 61x$ relative to the M1 base—one might argue that "high velocity" is already a feature of the legacy system. However, this conflates **Settlement** (the plumbing of commerce) with **Execution** (the active harvesting of capital efficiency).

The Cost-Friction Barrier

The JPCL is triggered only when the marginal cost of execution approaches zero. In the legacy environment, friction is "Lumpy" and expensive:

- **Fedwire:** As of the **2026 Federal Reserve Fee Schedule**, the base interbank transfer fee is **\$0.97** per transaction. However, for a corporate treasurer, the retail markup typically results in fees of **\$15.00 to \$35.00 per wire**.
- **Nacha (ACH):** While transaction costs are lower (cents per item), the **Nacha 2026 Operating Rules** (including Phase 2 of the Fraud Monitoring requirements effective June 2026) maintain significant "Settlement Windows." Even with **Same Day ACH** expanded to a 4:45 p.m. ET submission deadline, capital remains "trapped" in multi-hour or multi-day settlement loops.

Metric	Legacy (Fedwire/ACH)	Agentic (USDC on L2/DEE)
Execution Cost	\$15.00 – \$30.00 (User-level)	<\$0.01 (Atomic)
Frequency	Discretionary (Batch)	Non-Discretionary (Pulse)
Settlement	T+1 or T+0 (Intra-day)	Atomic (T-Immediate)

The Paradox of Modernization

Critics often point to the **Federal Reserve's ISO 2022 migration (Mandated November 2026)** as a legacy "fix" for inefficiency. The paradox, however, is that as legacy rails move toward 24/7/365 instant settlement (via FedNow and modern Fedwire messaging), they do not diminish the JPCL; **they weaponize it.**

As the "pipes" of legacy finance become more efficient, the **opportunity cost of letting capital sit idle** becomes visible in real-time. If a treasurer *can* move money instantly but chooses to wait until the next day, they are actively paying the **Stagnancy Tax**. Thus, the legacy layer's own acceleration acts as a catalyst, forcing institutions to adopt the very agentic, throughput-based logic they previously dismissed.

4. Volatility Sampling & ATR Parameters

To ground the **Yield from Motion** thesis, we conducted an empirical analysis of Treasury micro-volatility to identify the **Atomic Pulse** of low-risk assets.

- **Asset Analyzed:** iShares Short Treasury Bond ETF (SHV).
- **Lookback Period:** 30-Day High-Fidelity Window (March 24, 2026 – April 23, 2026).
- **Frequency:** Daily OHLC (Open, High, Low, Close) data.
- **Assumptions:**
 1. **Atomic Settlement:** We assume the ability to enter/exit positions within the same trading day (T+0), a technical reality in tokenized environments.
 2. **Linear Scalability:** We assume that volatility harvesting potential scales with turnover (τ), provided the engine operates within the liquidity depth of the instrument.

The "Stagnancy" Formula Structure

We defined the **Liquidity Decay Rate (L_δ)** as the opportunity cost incurred by the delta in execution frequency.

$$L_\delta = \left(\sum_{i=1}^n ATR_i \right) \times \left(\frac{\tau_{agentic} - \tau_{legacy}}{365} \right)$$

5. Methodological Relevance & Disclosures

5.1. Temporal Rationale: The "Atomic Pulse" Lookback

The 30-day ATR lookback for Short-Term Treasuries (SHV) is an intentional departure from traditional multi-year volatility averages. In the Agentic Age, 10-year historical volatility is a trailing indicator that fails to capture the high-fidelity shifts of the current environment. By isolating the most recent 30-day window (March–April 2026), this study captures the "Current Pulse"—the specific volatility inherent in 2026 geopolitical shifts, modern high-frequency liquidity cycles, and inflation adjustments.

5.2. The Market Repricing Hypothesis

This research operates under a **Forward-Looking Repricing Assumption**. We hypothesize that as JPCL-driven harvesting reaches a critical mass (defined as >5% of the total circulating stablecoin supply), the "Risk-Free Rate" will undergo a structural bifurcation. The

yield floor will no longer be determined solely by central bank duration mandates, but by the **Deterministic Equilibrium**—the baseline yield generated by the motion of capital through these frictionless rails.

5.3. Empirical Validation: The Conservative Benchmark

To validate the mathematical framework, we observed preliminary data from live **Deterministic Execution Environments (DEEs)**. In an April 2026 lookback study, a delta-neutral, conservative sandbox—operating on **1–4 hour rebalancing cycles**—achieved an average annualized turnover of **18.4x**.

- **Relevance:** This is 2.4x the "Institutional Pro" benchmark (7.5x), achieved without the use of sub-second execution or high-frequency speculative strategies.
- **Efficiency:** The agent achieved a turnover-adjusted **ATR Efficiency of 187%**. This suggests that automated, non-discretionary rebalancing not only captures the "Atomic Pulse" of volatility but compounds it by resolving cross-asset price discrepancies that remain invisible to discretionary legacy treasuries.

5.4. Fiscal and Regulatory Disclosures

The outcomes and mathematical models presented in this study are focused purely on the high-level shift in capital efficiency and throughput logic. This study **does not account for**:

1. **Taxation:** Jurisdictional tax treatments on high-frequency trades or tokenized yields may significantly impact net returns.
2. **Government Policy:** Regulatory shifts regarding stablecoin reserves or DEE compliance could alter the execution environment.
3. **Gas/Network Fees:** While assumed to be negligible in an agentic substrate, extreme network congestion may degrade the H_{atr} outcome.

Consequently, while the **math of the Displacement** remains constant, the practical net yield may vary based on the specific regulatory and fiscal footprint of the executor.

6. Mathematical Framework: The Stagnancy Tax

To quantify the cost of remaining in legacy "idle" systems, we propose the Stagnancy Tax (Σ). This is defined as the delta between the **Harvestable ATR (H_{atr})** available in a high-velocity environment and the yield generated by a static legacy instrument.

1. The Harvestable ATR Formula

The potential efficiency gain from "Motion" is calculated by normalizing the daily volatility of an asset by the turnover velocity (τ):

$$H_{atr} = \left(\sum_{i=1}^n ATR_{daily} \right) \times \frac{\tau}{365}$$

2. The Displacement Delta (Δ)

Using our 2026 benchmarks for Short-Term Treasuries (SHV) with a daily ATR of 0.0377%, we compare three tiers of capital usage:

Tier	Environment	Turnover (τ)	H_{atr} (Annualized)
Legacy Retail	M1 Cash	1.3x	0.049%
Institutional Pro	US Treasury Market	7.5x	0.282%
Agentic Frontier	Digital M1 (USDC)	610x	22.99%

The Stagnancy Tax (Σ):

$$\Sigma = H_{atr(\text{agentic})} - H_{atr(\text{legacy})}$$

$$\Sigma \approx 23.0\% - 0.28\% = 22.72\%$$

7. Discussion: Repricing the Inertia (Forward Outlook)

This section moves beyond the hard data to explore the inevitable market consequences of the JPCL.

- 1. Relative Devaluation:** The 22.7% efficiency gap is not "alpha"; it is a new baseline. Capital that fails to harvest this motion-based yield is effectively devaluing against the most efficient form of the dollar.
- 2. Repricing of Risk-Free Rates:** As agentic entities begin to front-run legacy yields, the "Risk-Free Rate" will likely bifurcate between the "Duration Rate" (Fed-set) and the "Throughput Rate" (Market-harvested).
- 3. The Inaction Exodus:** We project a violent shift of liquidity as institutional treasurers recognize that sitting in "safe" legacy T-bills is a guaranteed loss of relative purchasing power.

8: Conclusion & Strategic Implications

The Jevons Paradox of Capital Liquidity proves that in a frictionless economy, **"Slow is Same as Broken."** The transition to the Agentic Age is not merely a software upgrade; it is a fundamental shift in the physics of money.

- 1. The Inaction Exodus:** As the **22.7% Stagnancy Tax** becomes a mathematical certainty, we anticipate a violent exodus of liquidity from duration-based assets.
- 2. Repricing of Safety:** "Risk-free" will no longer mean "Government Backed + Static." It will mean "Atomic + High Throughput."

3. **The Feedback Loop:** By modernizing to ISO 20022 and instant rails, the legacy system is removing the final physical barriers to its own obsolescence. By making it *possible* to move capital at 610x velocity, the legacy system makes it *mandatory* to do so to maintain capital neutrality.

Citations & References

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[Footnotes/Disclosures]

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Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

During the preparation of this work the author(s) used Gemini (Google DeepMind) in order to collaborate on the presented topic. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the published article.

1. Declaration of Interest Statement

The authors declare a potential financial interest as this research serves as the theoretical foundation for the Nutcracker Engine, a flagship product of Aleph Strategy. The lead researcher is the founder of Aleph Strategy. However, the comparative analysis and mapping framework provided in this study were developed through independent research conducted within the Aleph Strategy R&D Lab to establish a deterministic baseline for agentic financial infrastructure. No external commercial entities influenced the data collection or the final structural conclusions of this paper.

2. Funder Statement

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3. Ethics Approval Statement

This study consists of theoretical modeling, architectural analysis, and the synthesis of publicly available technical data. It did not involve any human participants, animal subjects, or private patient data. Consequently, formal ethics committee approval was not required for this research.

4. Use of Data

The findings in this study are derived from the synthesis of publicly available technical specifications, whitepapers, and market data of existing financial and agentic infrastructure. No proprietary or third-party datasets requiring separate repository hosting were utilized.

Keywords

Jevons Paradox, JPCL, Capital Velocity, Tokenization, Stagnancy Tax, Agentic Economy, Deterministic Execution, Yield from Motion.