Superflow: Restoring Equilibrium in Isolated Crypto Spot Markets through Permissionless Synthetic Derivatives for Any DEX Asset

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Abstract

Over 20 million cryptocurrency tokens were launched in the past year—but this explosive growth comes at a structural cost. Throughout this paper, we will demonstrate that zero-entry-cost, the prevailing structure of contemporary digital asset markets has inherently favored insiders due to the isolated nature of spot market mechanisms. This isolation systematically generates arbitrage opportunities exploitable primarily by those possessing advanced or exclusive informational and technical access—broadly categorized as insiders. Such insiders, encompassing influential, project Founders("Devs"), wealthy Insiders("Whales"), Key Opinion Leaders ("KOLs"), technically sophisticated actors (including "MEV operators"), and project infrastructure providers ("DEXs" and "Launchpads"), benefit disproportionately through early participation, leveraging their privileged positions to extract maximal economic value. Consequently, non-insider market participants, especially ethical founders and retail investors, face structural disadvantages stemming from delayed market entry and restricted opportunities. This structural imbalance incentivizes ethically questionable behaviors among founders, promoting token launches designed primarily to amplify insider gains.

To address these systemic inefficiencies, we introduce a novel semi-automated market-making infrastructure, which we refer to as the **Superflow Omni-Solver***(1). This mechanism is built on top of **Symmio**'s decentralized OTC-derivatives protocol and serves as a foundational solution for enabling creation of synthetic perpetual futures and options for any token listed on decentralized exchanges (DEXs), **regardless of their market capitalization, supply distribution, or liquidity profile.**

The Omni-Solver is able to seed liquidity to those perpetual markets, by utilizing its own token inventory for delta-neutral, as well as traditional market making strategies, for example beta-neutral, or simple Long to Short balancing to hedge market exposure and facilitate multi-faceted trading from the moment of token launch, ultimately **allowing the Omni-Solver to mitigate the structural advantage traditionally held by insiders in isolated, spot-only crypto markets.**

This innovation significantly levels the playing field by empowering ethical participants to counteract insider dominance, similar to how *Uniswap* democratized token liquidity for spot assets, Superflow democratizes financial contracts introducing a "*Uniswap moment** (2)" for perpetuals, transforming even low-liquidity spot tokens into deeply tradable synthetic assets. In doing so, it establishes a new class of decentralized financial primitive—trustless, composable, and censorship-resistant—capable of resolving systemic inefficiencies in crypto market design. Ultimately, the Superflow Omni-Solver contributes to a more inclusive, liquid, and fair market structure by enabling robust price discovery and equitable access to key financial tools within decentralized finance.

(1) Market Making software is commonly referred to as a "Solver" within the newly emerging Intent-Based ecosystem.
(2) The "Uniswap moment" in crypto refers to a transformative shift where access to token trading became radically permissionless, decentralized, and frictionless, opening the floodgates for anyone to list, trade, or provide liquidity for tokens.

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1 Key Players in Cryptocurrency: A Game-Theoretical Discourse

Cryptocurrency markets are dynamically influenced by a diverse set of actors whose interactions and incentives can be effectively analyzed through the lens of game theory. Central to these interactions are four principal categories of participants: Retail Traders, Founders, Whales/Market Makers, and Infrastructure Providers.

1.1 Traders, Retail

Retail traders generally exhibit behaviors characterized by limited information and capital resources, positioning them as reactive rather than proactive market participants. Their strategic disadvantage lies in their delayed information access and inability to influence market movements significantly. Consequently, they often serve as liquidity providers or follow-on investors, indirectly benefiting insiders who exploit informational asymmetries.

1.2 Founders (Ethical Non-Ethical)

Founders significantly shape market dynamics through their choices regarding transparency, token distribution, and market engagement strategies. Ethical founders emphasize equitable token distribution and transparent operations, often facing market penalties due to delayed initial capitalization and diminished speculative appeal. Conversely, non-ethical founders exploit insider-driven incentives, leveraging early information dissemination and preferential token allocation strategies to maximize personal and insider financial returns.

1.3 Whales/Market Makers (Insiders Non-Insiders)

Whales represent powerful market entities capable of substantial asset movements and price manipulation. Insider whales benefit from privileged early access to market-critical information and strategic positioning, facilitating optimal arbitrage opportunities. Non-insider whales, while influential due to their significant capital, face comparative disadvantages in accessing exclusive insights but maintain considerable power through sheer scale and liquidity provision capabilities.

1.4 Ethical Non-Ethical Assistants (Infrastructure, KOLs, MEV-bots)

Infrastructure providers and technologically adept actors significantly impact market fairness and efficiency. Ethical assistants uphold market integrity through transparent operational practices and open dissemination of tools and information. In contrast, non-ethical assistants, including opportunistic KOLs and malicious MEV (Maximum Extractable Value) operators, strategically exploit their technological prowess and influence to capitalize on market inefficiencies and amplify informational asymmetries.

1.5 Structural Advantages of Isolated Spot Markets

The isolated nature of current cryptocurrency spot markets inherently favors insiders, especially non-ethical participants, by creating abundant arbitrage opportunities. With infinite, zero-cost listings of isolated spot assets, non-ethical founders and insider whales benefit substantially from early informational and technical advantages. Insiders leverage their priority access to initiate and manipulate asset prices, exploiting subsequent retail-driven momentum and liquidity. Ethical founders, bound by transparency and fair distribution constraints, are systematically disadvantaged, unable to capitalize swiftly on initial speculative fervor. Retail traders and non-insider whales, entering later, face significant structural impediments due to their reactive positions, often serving as exit liquidity for insiders. Non-ethical infrastructure providers and KOLs further amplify these asymmetries by facilitating rapid asset listings and disseminating selectively favorable information, enhancing the profitability of insiders while deepening structural inequities within the market. Ultimately, the current isolated spot market environment perpetuates systemic bias favoring non-ethical behavior, underscoring the necessity of innovative solutions like the Omni-Solver to rebalance market dynamics.

1.6 Market Demand for Relaunch Rebrand

Given current market dynamics favoring early entrants, ethical founders increasingly adopt strategies of relaunching and rebranding their projects to rejuvenate interest and attract fresh investment. The low barrier and minimal cost associated with launching isolated spot assets significantly incentivize such strategic pivots. This approach, although typically beneficial to non-ethical founders who exploit these mechanisms repeatedly, has become a necessary tool even for ethical actors aiming to revitalize legitimate but stagnating projects. Relaunches and rebrands effectively reset investor perception, generate new speculative interest, and offer ethical founders a second opportunity to communicate their value proposition clearly, fostering renewed market participation and competitive viability.

A notable example of a successful rebranding is the transformation of the Fantom blockchain into Sonic. Following its rebrand in January 2025, Sonic experienced a significant surge in Total Value Locked (TVL), surpassing $1 billion and positioning itself as a major player in the decentralized finance (DeFi) space. This growth underscores the potential effectiveness of rebranding strategies in revitalizing blockchain projects.

1.7 Structural Market Stability and the Role of New Financial Tools

Historically, structural changes in financial markets have been catalyzed significantly by the advent of innovative financial tools and methodologies. The introduction of the Black-Scholes formula revolutionized options pricing in traditional financial markets, dramatically improving market liquidity, efficiency, and fairness. Similarly, contemporary cryptocurrency markets remain structurally static without innovative financial instruments.

Currently, there is significant incentive to become an insider, adopt non-ethical strategies, or engage in manipulative tactics such as KOL marketing and artificial scarcity. The spot-only environment substantially enhances the value of being first, amplifying insiders' capacity for maximum value extraction. Without advanced financial tools akin to Black-Scholes, digital asset markets will likely persist in favoring those who prioritize unethical strategies to gain early access advantages. The Omni-Solver represents an essential advancement, capable of disrupting these entrenched incentives and fostering fair, equitable, and dynamically stable market conditions.

2 Initial Mathematical Proofs Outline

2.1 Step 1: Define Market Participants and Information Sets

Participants:

- **Insiders (I)**: Possess advanced information at time t_0
- **Outsiders (O)**: Receive information at time $t_0 + N$

Information Set:

- Let $I(t)$ represent information available at time t
- Insiders have $I(t_0)$, while outsiders only have $I(t_0 + N)$

2.2 Step 2: Information Asymmetry Opportunity (Economic Model)

Consider a simplified asset price model, where the price at any time t is:

$$P(t) = P(t_0) + \alpha \cdot I(t) + \epsilon_t$$

Where:

- $P(t_0)$ is the initial price

- α measures the price impact of information
- ϵ_t is a random noise component, $\epsilon_t \sim \mathcal{N}(0, \sigma^2)$

Economical Gain for Insiders (G_a):

Insiders trade at t_0:

$$G_a = E[P(t) - P(t_0)|I(t_0)] = \alpha \cdot I(t_0)$$

Economical Gain for Outsiders (G_o):

Outsiders trade at $t_0 + N$:

$$G_o = E[P(t') - P(t)|I(t)], \quad t' > t > t_0$$

Since by definition, $I(t_0)$ is superior (earlier), we have:

$$G_a > G_o$$

Thus, insiders always have strictly greater expected gains due to information asymmetry.

2.3 Step 3: Game-Theoretical Nash Equilibrium

Model the game with two strategies:

- **Ethical (E)**: Transparent fair
- **Unethical (U)**: Exploitative, maximizing personal gain

Payoff matrices (π) for Founders (F):

Payoff matrices (π) for Founders (F):

Founder	Insider Behavior	Outsider Behavior
Ethical	Low payoff	Low payoff
Unethical	High payoff (early exploitation)	Low to medium payoff (if second hand insider information is available)

Rationality assumption (utility maximization):

$$U_F(U) > U_F(E)$$

Due to early access and information asymmetry.

Thus, Nash Equilibrium favors unethical behavior:

Ethical strategy is strictly dominated by unethical strategy for insiders, given isolated market structure:

$$U_F(U) \succ U_F(E)$$

2.4 Step 4: Structural Incentive for Unethical Behavior

Isolated spot markets allow infinite, zero-cost market creation ($C_{market} = 0$):

Let expected profit from market creation be G_a:

Insiders:

$$G_a = \alpha \cdot I(t_0) - C_{market} > 0$$

Outsiders:

$$G_o = \alpha \cdot I(t_0 + N) - C_{market} \quad (t > t_0)$$

Given $C_{market} = 0$ and $I(t_0) > I(t_0 + N)$, insiders consistently generate profit with no cost or risk:

$$G_a \gg G_o$$

2.5 Step 5: Impact of Financial Instrument ("Omni-Solver")

Introduce an Omni-Solver to price perpetual derivatives fairly:

Fair value price $F(t)$:

$$F(t) = P(t) + \beta \cdot V(t)$$

where:

- $V(t)$ is the fair-value premium derived from continuous open market participation
- β normalizes information asymmetry premium

Omni-Solver eliminates isolated information asymmetry opportunities ($G_a \approx G_o$):

$$E[F(t_0)|I(t_0)] \approx E[F(t)|I(t)], \quad t \geq t_0$$

This theoretically neutralizes insiders' asymmetric advantages, enforcing market fairness.

Subjection 1 Conclusion (Mathematical Justification)

Mathematically demonstrate that isolated spot markets structurally incentivize unethical insider behavior by formally showing:

1. **Information Asymmetry**: Earlier market participation yields greater economical gains ($G_a > G_o$)
2. **Game-Theoretic Dominance**: Unethical behavior is rationally dominant due to immediate financial incentives
3. **Zero-Entry Cost Markets**: Incentivize repeated unethical behavior through minimal barriers
4. **Fairness via Financial Innovation**: The introduction of a tool like Omni-Solver theoretically equalizes expected returns and removes asymmetric insider advantages.

3 Model: Structural Insider Advantage at Token Launch

3.1 Step 1: Setup the Timeline and Market Participants

Time Definitions

- t_0: Token launch (exact moment token becomes tradable)
- $t_0 + \delta$: Insider trading window ($\delta = 1$ to 10 minutes)
  - Only insiders or informed actors know exactly when, where, and which token will launch
- $t_0 + N$: General market awareness and public participation starts ($N \gg \delta$)

Market Participants

1. **Insiders (I)**
   - Know token identity
   - Know launch exact time (t_0)
   - Know initial demand (D)
2. **Outsiders (O)**
   - Uncertain token identity/time
   - Participate at $t_0 + N$

3.2 Step 2: Define Insider Advantage Formally

3.3 Advantage 1: Time (First-Mover Advantage)

Insiders can buy exactly at $t_0 + \delta$, while outsiders can only enter at $t_0 + N$.

Assume:

- Initial price at launch: $P(t_0)$
- Price rises to $P(t_0 + N)$ due to insider demand

Profit for insiders (G_a):

$$G_a = Q_a \cdot [P(t_0 + N) - P(t_0 + \delta)]$$

where Q_a is insider's quantity bought at lower prices.

3.4 Advantage 2: Certainty of Information (Confidence)

Insiders accurately predict:

- Token legitimacy (which token is real)
- Amount of capital other insiders will deploy
- Expected initial price rise due to insider demand

Expected Utility Functions:

Insider expected utility:

$$E[U_a] = Q_a \cdot [P(t_0 + N) - P(t_0 + \delta)] \cdot (1 - \rho_a)$$

where ρ_a is insiders' perceived risk (very low).

Outsider expected utility:

$$E[U_o] = Q_o \cdot [P(t_0 + N') - P(t_0 + N)] \cdot (1 - \rho_o)$$

where:

- $Q_o \ll Q_a$: Outsiders typically buy smaller amounts initially (due to uncertainty)
- $\rho_o \gg \rho_a$: Outsiders perceive greater risk due to lack of insider certainty
- $N' > N$: Outsiders wait additional confirmation periods

3.5 Step 3: Empirical Example: Libra Launch Scenario

Hypothetical Example: Libra Token

1. Launch price at t_0 (exact insider launch): \$0.01
2. Insiders enter aggressively within 1-10 minutes
3. Price at $t_0 + 10$ mins rises to \$0.05 due to insider demand
4. Public enters at $t_0 + 1$ hour, price rises to \$0.10

Profit Calculations (heavily simplified)

Insiders' Gain:

- $Q_a = 10000000$ tokens at average price $\$0.02 Cost$:10000000 $\times \$0.02 = \$200000$
- Value at public entry: $10000000 \times \$0.10 = \$1000000$
- Profit $G_a = \$1000000 - \$200000 = \$800000$

Outsiders' Gain:

- $Q_o = 1000000$ tokens at price \$0.10 Cost: $1000000 \times \$0.10 = \$100000$
- Value shortly after: $1000000 \times \$0.08 = \$80000$
- Loss $G_o = \$80000 - \$100000 = -\$20000$

3.6 Step 4: Statistical Confidence Advantage

Confidence Factors

- Insiders: $CF_a = (1 - \rho_a) \approx 0.99$ (high confidence)
- Outsiders: $CF_o = (1 - \rho_o) \approx 0.5$ (low confidence)

Position Sizing

Insiders size aggressively:

$$Q_a = CF_a \cdot C_a \quad \text{(very large quantity)}$$

Outsiders size conservatively:

$$Q_o = CF_o \cdot C_o \quad \text{(much smaller)}$$

Therefore: $Q_a \gg Q_o$

3.7 Step 5: Generalization and Formalization of Advantage

Profit Functions

Insider profit function:

$$G_a(Q_a, t_0 + \delta) = Q_a \cdot [E(P(t_0 + N)) - P(t_0 + \delta)], \quad Q_a \gg 0$$

Outsider profit function:

$$G_o(Q_o, t_0 + N) = Q_o \cdot [E(P(t_0 + N')) - P(t_0 + N)], \quad Q_o \ll Q_a$$

Profitability Inequality

$$G_a(Q_a, t_0 + \delta) \gg G_o(Q_o, t_0 + N)$$

Subsection Conclusion

This mathematical approach demonstrates that isolated crypto token launches significantly favor insiders due to two fundamental structural advantages:

1. **Timing advantage**: Ability to trade immediately at t_0
2. **Confidence advantage**: Certainty of legitimacy, timing, and expected demand

These advantages systematically enable insiders to profit at the expense of outsiders, who typically bear the cost of entering later at higher prices or after price peaks.

This formal proof highlights the need for innovative financial instruments, like your proposed Omni-Solver, that neutralize these informational asymmetries by providing fair accessible derivatives for broader market participation.

4 Extended Model: Pre-Launch Advantage for Insiders

4.1 Step 0: Define Pre-Launch Time (t_{-n})

t_{-n}: The period before token launch (t_0), where insiders have exclusive knowledge of:

- Exact token details (identity, contract address, legitimacy)
- Exact timing of launch (precise t_0)
- Expected demand and anticipated token appreciation post-launch

Insiders use this period for strategic preparation.

4.2 Step 1: Insider Advantage during Pre-launch (t_{-n})

Insiders gain two distinct advantages in the pre-launch period:

4.3 Advantage A: Financial Preparation

Insiders allocate significant capital beforehand.

Define C_a as the amount of capital insiders prepare at t_{-n}:

$$C_a(t_{-n}) \gg 0$$

4.4 Advantage B: Psychological Advantage (Reduced Stress & Increased Rationality)

Insiders experience lower psychological stress due to certainty and preparation.

- Rationality factor ($R_a \approx 1$): Insiders behave near-optimally
- Thus, insiders' expected decision quality at launch is optimal:

$$E[D_a(t_0)] \approx \text{Optimal}$$

4.5 Step 2: Outsider Disadvantage (Surprise and FOMO)

Outsiders discover the token at time $t_0 + N$, and face:

No Pre-launch Preparation

Capital available is uncertain and limited at the moment of discovery:

$$C_o(t_0 + N) \ll C_a(t_{-n})$$

Psychological Distress (Surprise FOMO)

- Rationality factor ($R_o \ll 1$): Outsiders behave suboptimally due to stress, panic buying (FOMO), and irrational decision-making
- Thus, outsiders' expected decision quality is poor:

$$E[D_o(t_0 + N)] \ll \text{Optimal}$$

4.6 Step 3: Formalizing FOMO and Irrationality

Define a behavioral utility function that incorporates psychological stress:

Insider Behavioral Utility (U_a)

$$U_a = R_a \cdot (Q_a \cdot [P(t_0 + N) - P(t_0 + \delta)])$$

where:

- $R_a \approx 1$ (rational decision-making)
- Q_a is capital deployed (highly optimal)

Outsider Behavioral Utility (U_o)

$$U_o = R_o \cdot (Q_o \cdot [P(t_0 + N') - P(t_0 + N)])$$

where:

- $R_o \ll 1$ (suboptimal decisions)
- Q_o is irrationally deployed capital due to FOMO

Given the psychological factor, we observe clearly:

$$U_a \gg U_o$$

4.7 Step 4: Real-world Example (Libra Launch Revisited)

Insiders

Pre-launch preparation (t_{-n}):

- Calm, informed, allocated \$1000000 ready to deploy instantly at launch
- Rationality factor $R_a = 0.99$

Outsiders

Discovery at $t_0 + N$ (e.g., 1 hour post-launch):

- Unprepared, stressed, FOMO-driven
- Panic-buying with only \$50000 accessible instantly, at inflated price
- Rationality factor $R_o = 0.4$

Utility Comparison

Insiders:

$$U_a = 0.99 \times (\$1000000 \times [0.10 - 0.02]) = \$792000$$

Outsiders:

$$U_o = 0.4 \times (\$50000 \times [0.08 - 0.10]) = -\$400$$

4.8 Step 5: Integrating into the Timeline (Extended)

Updated Comprehensive Timeline

1. t_{-n}: Insider exclusive preparation period (financial/psychological advantage)
2. t_0: Token launch (tradable publicly, insiders instantly participate)
3. $t_0 + \delta$: Insider exclusive trading window (1-10 min)
4. $t_0 + N$: Public awareness begins; outsiders react irrationally (FOMO)

Formal Comprehensive Insider Advantage

1. **Financial capital:**
$$C_a(t_{-n}) \gg C_o(t_0 + N)$$
2. **Rationality/optimality:**
$$R_a(t_{-n}) \gg R_o(t_0 + N)$$

Thus, insiders possess overwhelming structural advantages mathematically proven to facilitate unethical behavior.

Pre-launch Advantage Conclusion

Explicitly including pre-launch preparation mathematically emphasizes insiders' advantages in terms of:

1. **Capital availability**
2. **Mental preparation and rational decision-making**

This structural inequity intensifies the already-existing informational asymmetries, systematically disadvantaging outsiders and incentivizing unethical insider strategies.

Your proposed solution (Omni-Solver) could theoretically neutralize this pre-launch advantage by offering transparent derivatives and eliminating the necessity for insider-only knowledge and preparation.

5 Derivation of Insider Advantage and Market Equilibrium

5.1 Formal Definition of Isolated Spot Market

Consider an isolated spot market defined by a one-dimensional price curve $P(t)$. At token launch t_0, the price is defined as:

$$P(t_0 + n) = P(t_0) + \sum_{i=1}^{n} N(Q_i)$$

where:

- $P(t_0)$ is the initial price
- $N(Q_i)$ represents the price impact of the i^{th} buy action at time t_i

This formula demonstrates the direct additive impact of each subsequent purchase, reflecting the isolated and unidirectional nature of trading.

5.2 Insider Structural Advantage

Early insiders purchasing at t_0 incur a significantly lower cost basis compared to outsiders who buy at later times $t_0 + n$. The perpetual insider advantage A_a can thus be represented as:

$$A_a(t_m) = P(t_m) - P(t_0), \quad t_m > t_0 + n$$

Conversely, outsiders face a perpetual structural disadvantage D_o:

$$D_o(t_m) = P(t_m) - P(t_0 + n), \quad \text{where typically } D_o(t_m) < A_a(t_m)$$

This explicitly quantifies insiders' lasting advantage resulting directly from early entry.

5.3 Introducing Synthetic Assets to Restore Equilibrium

To mitigate insiders' structural advantage, introduce synthetic assets allowing outsiders to short-sell. These synthetic assets follow a price closely aligned to the underlying isolated spot market price $P_{spot}(t)$. Define the synthetic price as:

$$P_{synthetic}(t) \approx P_{spot}(t)$$

Introducing short-selling (negative liquidity $Q_{short} < 0$) broadens the price curve:

$$P_{equilibrium}(t) = P(t_0) + \sum_{i=1}^{n} N(Q_i) + \sum_{j=1}^{m} N(Q_{short,j}), \quad Q_{short,j} < 0$$

This formulation mathematically demonstrates how negative liquidity from synthetic assets offsets positive buy-side pressures, driving the market towards equilibrium.

5.4 Equilibrium Condition and Insider Advantage Mitigation

As short-selling through synthetic assets balances buying pressure:

$$\lim_{Q_{short} \to -Q_{buy}} A_a(t_m) \to 0$$

Thus, the synthetic assets systematically diminish insiders' advantage, eliminating perpetual asymmetry.

5.5 Information Asymmetry and Arbitrage

Define insiders (I) who possess information at t_0 and outsiders (O) who receive delayed information at $t_0 + N$. The asset price $P(t)$ is modeled as:

$$P(t) = P(t_0) + \alpha \cdot I(t) + \epsilon_t, \quad \epsilon_t \sim \mathcal{N}(0, \sigma^2)$$

Arbitrage gains are thus:

- Insiders' arbitrage gain: $G_a = E[P(t) - P(t_0)|I(t_0)] = \alpha \cdot I(t_0)$
- Outsiders' arbitrage gain: $G_o = E[P(t') - P(t)|I(t)], \quad t' > t > t_0$

Since $I(t_0) > I(t_0 + N)$, insiders always achieve higher arbitrage gains:

$$G_a > G_o$$

5.6 Game-Theoretical Nash Equilibrium

Using a game-theoretic approach with strategies Ethical (E) and Unethical (U), insiders find unethical strategies dominant due to early arbitrage opportunities:

$$U_F(U) \succ U_F(E)$$

This dominance fosters systematic incentives for unethical behaviors.

5.7 Structural Incentive for Unethical Behavior

Isolated markets allow zero-cost token creation $C_{market} = 0$, thus insiders generate profits with negligible risk:

$$G_a = \alpha \cdot I(t_0) - C_{market} \gg G_o = \alpha \cdot I(t_0 + N) - C_{market}, \quad t > t_0$$

5.8 Omni-Solver as Tool for Equilibrium Restoration

The Omni-Solver provides tools to create synthetic derivatives, enabling outsiders to participate effectively and neutralize insiders' asymmetric advantages:

$$F(t) = P(t) + \beta \cdot V(t), \quad \text{where } V(t) \text{ is fair-value premium}$$

The availability of synthetic assets ensures equitable arbitrage opportunities:

$$E[F(t_0)|I(t_0)] \approx E[F(t)|I(t)], \quad t \geq t_0$$

5.9 Comprehensive Equilibrium Model

The two-sided liquidity condition ensures fairness:

$$P_{equilibrium}(t) \approx E[P(t)], \quad \text{fair equilibrium price}$$

5.10 Equilibrium through Synthetic Assets Conclusion

This comprehensive derivation rigorously demonstrates:

- Structural insider advantage in isolated markets
- Effectiveness of synthetic assets, facilitated by the Omni-Solver, in restoring fairness
- The necessity of financial innovation to democratize and stabilize cryptocurrency markets

6 Extended Model: Advantage from Isolated Spot Markets and Synthetic Asset Solution

6.1 Step 1: Formalizing Isolated Spot Markets

An isolated spot market can be defined mathematically as a one-dimensional price curve, $P(t)$:

Let the token's price at launch (t_0) be $P(t_0)$.

Each subsequent buy action directly increases the price by the amount of impact, N, proportional to the demand volume Q.

The isolated price function is thus:

$$P(t_0 + n) = P(t_0) + \sum_{i=1}^{n} N(Q_i)$$

Where:

- $N(Q_i)$ is the price impact of buy transaction i at time t_i
- Note: 'n' here represents the *number of transactions*, distinct from the time delay 'N' used in other models.

Consequences of Isolation

Buy-first Advantage:

- Investors at t_0 buy at minimal price $P(t_0)$
- Investors at $t_0 + n$ must pay inflated price $P(t_0 + n)$

Sell Constraint Inelastic Supply:

- Selling is only possible after buying. Initial supply $S(P)$ is extremely inelastic, consisting only of early buyers potentially taking profit.
- This allows demand $D(P)$ shocks (like initial insider buying) to cause excessive price increases.

Formally, investors who buy at $t_0 + n$ have permanently higher cost bases:

$$P_{\text{basis,early}} = P(t_0)$$

$$P_{\text{basis,late}} = P(t_0 + n) > P(t_0)$$

Thus, insiders maintain a perpetual pricing advantage, leading to ongoing asymmetric profits.

6.2 Step 2: Illustrating Structural Insider Advantage

Mathematically, early insiders' perpetual advantage (A_a) at any future time $t_m > t_0 + n$ is:

$$A_a(t_m) = P(t_m) - P(t_0), \quad \text{always positive if market persists}$$

Latecomers' perpetual disadvantage (D_o):

$$D_o(t_m) = P(t_m) - P(t_0 + n), \quad \text{generally smaller or negative}$$

Because:

- $P(t_0 + n)$ is structurally inflated due to inelastic initial supply.
- Insiders continually extract profit by selling to latecomers at higher prices, potentially reaching an artificially high $P_{\text{max\_isolated}}$.

6.2.1 Step 3: Introducing Synthetic Assets Elastic Supply

To restore equilibrium, introduce synthetic assets (derivatives like futures, options) allowing market participants to effectively short the asset without prior ownership.

- Formally, this creates a synthetic supply curve $S_{\text{synthetic}}(P)$ that is available much earlier and is more elastic than the spot-only supply.
- Participants can now express negative price expectations by initiating short positions (Q_{short}) via derivatives.
- Define the synthetic asset price $P_{\text{synthetic}}(t)$ linked to the spot price $P_{\text{spot}}(t)$, potentially with a basis difference.

Consequences:

1. **Increased Supply Elasticity:** The total supply $S_{\text{total}}(P) = S_{\text{spot}}(P) + S_{\text{synthetic}}(P)$ becomes significantly more responsive to price changes, especially at inflated levels.
2. **Two-Sided Market:** Transforms the market from buy-dominated to two-sided, allowing for price discovery based on both positive and negative sentiment.
3. **Outsider Counter-Strategy:** Outsiders arriving at $t_0 + N$ can now potentially profit by shorting $P_{\text{synthetic}}$ if they perceive the price driven up by insiders as overvalued, providing a mechanism for $G_o > 0$ even if they missed the initial entry.

6.3 Step 4: Mathematical Equilibrium Restoration Insider Gain Capping

The equilibrium price $P_{\text{equilibrium}}$ is determined where total demand equals total supply: $D(P) = S_{\text{total}}(P)$.

Price Equation with Synthetics:

$$P_{\text{equilibrium}}(t) = P(t_0) + \sum_i N(Q_{\text{buy},i}) + \sum_j N(Q_{\text{short},j})$$

- The negative price impact $N(Q_{\text{short},j})$ from synthetic short-selling directly counteracts the positive impact from buying.
- This leads $P_{\text{equilibrium}}(t)$ to converge towards $E[P(t)]$ (fair value) more rapidly and reliably than $P_{\text{spot}}(t)$ in an isolated market.

Capping Insider Gains (G_a):

- In an isolated market, insiders could potentially drive the price to $P_{\text{max\_isolated}}$ before facing significant selling pressure.
- With synthetics, potential short-sellers anticipating a reversion provide selling pressure much earlier.
- This creates a lower effective price ceiling, $P_{\text{max\_synthetic}} < P_{\text{max\_isolated}}$.
- Insider gain $G_a = Q_a \cdot [E[P_{\text{sell}}] - P(t_0 + \delta)]$ is reduced because $E[P_{\text{sell}}] \leq P_{\text{max\_synthetic}}$.

Neutralizing Perpetual Advantage:

- As Q_{short} approaches $-Q_{\text{buy}}$ (balancing flows), the upward price distortion diminishes.
- $\lim(S_{\text{synthetic}} \to \infty \text{ at } P > E[P])[P_{\text{equilibrium}}(t) - E[P(t)]] \to 0$
- The perpetual insider advantage $A_a(t_m) = P_{\text{equilibrium}}(t_m) - P(t_0)$ is driven towards reflecting only the true change in expected value, not the structural advantage from early entry into an illiquid market.
- $\lim_{Q_{\text{short}} \to -Q_{\text{buy}}} A_a(t_m)$ based purely on timing $\to 0$

This restores balance by neutralizing insiders' exclusive price advantage derived from market isolation.

6.4 Step 5: Illustrative Example

Without Synthetic Assets:

- Insiders buy at \$0.01. Inelastic supply allows price to inflate easily.
- Price driven to \$0.10 ($P_{\text{max\_isolated}}$ example) by follow-on buying.
- Outsiders buy high, insiders sell near the peak.
- Perpetual insider advantage: Cost basis \$0.01 vs outsiders at \$0.10.

With Synthetic Assets:

- As price rises above perceived fair value (e.g., \$0.05), outsiders/arbitrageurs short-sell synthetics at $P_{\text{synthetic}} \approx \$0.10$.
- This selling pressure prevents the price from staying excessively high ($P_{\text{max\_synthetic}} < \$0.10$).
- Equilibrium price may settle closer to \$0.05. Insiders' gains are capped, and outsiders have opportunities to profit from shorting.

Thus, synthetic derivatives mathematically dampen manipulation by enabling elastic, two-sided liquidity.

6.5 Step 6: Generalized Conclusion (Mathematically Demonstrated)

In isolated spot markets:

- Structural insider advantage arises from price isolation and inelastic initial supply.

Synthetic assets mathematically restore equilibrium by:

- Introducing elastic (synthetic) supply via short-selling.
- Facilitating balanced two-sided trading.
- Capping artificial price peaks and reducing insider gains.
- Driving prices toward a fair equilibrium, neutralizing timing-based advantages.

The introduction of derivative-based synthetic assets transforms isolated spot markets into more balanced, fair, and efficient trading environments.

7 Proof of Derivative-Induced Market Balancing

7.1 Intro to proof

This document presents a formal economic argument demonstrating that the introduction of accessible financial derivatives (specifically perpetual futures and options facilitated by an agent like the Omni-Solver) into otherwise isolated, low-liquidity spot markets for newly launched crypto assets unilaterally improves market efficiency and mitigates structurally derived advantages held by insiders. We prove that derivatives introduce necessary two-sided liquidity and price discovery mechanisms, fundamentally altering supply/demand dynamics, capping potential insider gains, and creating counter-opportunities for informed outsiders, thereby forcing convergence towards a more efficient equilibrium compared to the isolated spot market baseline.

8 Model Setup: The Isolated Market Deficiencies

We begin by formally defining the characteristics of the baseline scenario: an isolated spot market immediately following a token launch at time t_0.

8.1 Market Structure Price Dynamics

- **Participants:** Insiders (I) with information set $I(t_0)$ and capital C_a; Outsiders (O) with delayed information $I(t_0 + N)$ and capital C_o.
- **Trading Mechanism:** A simple Automated Market Maker (AMM) or order book with negligible initial sell-side depth.
- **Price Function:** The spot price $P_{\text{spot}}(t)$ evolves primarily based on net buy pressure. Following Formula 4, for n buy transactions Q_i:

  $$P_{\text{spot}}(t_0 + n) = P_{\text{spot}}(t_0) + \sum_{i=1}^{n} N(Q_i)$$

  where $N(Q_i) > 0$ is the price impact, inversely related to available liquidity (which is initially near zero on the sell side).

8.2 Inherent Structural Inefficiencies

1. **Inelastic Initial Supply (S_{spot}):** At t_0 and shortly after, the only potential sellers are the insiders themselves or the initial liquidity providers. Supply is extremely inelastic ($\partial S_{\text{spot}}/\partial P \approx 0$ for $P > P(t_0)$).

2. **One-Sided Price Discovery:** Due to inelastic supply, the price is almost entirely determined by buy-side demand $D(P)$. There is no effective mechanism for participants with negative sentiment or valuation below the current price to influence $P_{\text{spot}}(t)$ downwards.

3. **Exploitable Information Asymmetry:** Insiders, knowing the launch time and potential demand ($I(t_0)$), can execute buys at $P(t_0 + \delta)$ before outsiders enter at $P(t_0 + N)$.

4. **Structural Gain for Insiders (G_a):** Insiders benefit from both timing and the market structure. Their expected gain is maximized by acquiring tokens at low prices and selling into the subsequent demand (from outsiders) in an environment where sell-side pressure is minimal:

$$G_a = E[Q_a \cdot (P_{\text{sell}} - P(t_0 + \delta))|I(t_0)]$$

   where P_{sell} can reach artificially high levels ($P_{\text{max\_isolated}}$) due to the inelastic supply and potential FOMO-driven demand from outsiders.

5. **Outsider Disadvantage (G_o):** Outsiders entering at $t_0 + N$ face an inflated price $P(t_0 + N) > P(t_0)$. In the isolated market, their only strategy is to buy and hope for further appreciation. They have no mechanism to directly profit if they believe the price is overvalued (G_o is often negative initially).

This setup establishes the baseline inefficient market where structural factors, independent of the specific token's fundamental value, create a predictable advantage for insiders.

9 Mechanism Introduction: The Omni-Solver Agent Derivative Market Creation

We now introduce a mechanism, embodied by the "Omni-Solver" agent, designed to counteract the inefficiencies of the isolated market by facilitating the creation and accessibility of derivative instruments.

9.1 The Omni-Solver Agent (Ω)

- **Role:** A specialized, automated agent acting as a counterparty or market facilitator for derivatives.
- **Resources:** Holds or has access to a significant inventory of the underlying spot token ($Q_{\text{spot},\Omega}$), acquired via loans from the token team or through its own treasury.
- **Protocol:** Utilizes an OTC derivatives protocol (e.g., Symmio) that allows it to programmatically offer derivative contracts (perpetuals, options) to market participants.
- **Objective:** While potentially profit-motivated itself, its core function within this model is to provide the *infrastructure* for two-sided derivative trading, effectively acting as an automated OTC desk.

9.2 Derivative Instruments Enabled

1. **Perpetual Futures (Perps):** Contracts allowing participants to gain long or short exposure to the token's price without an expiry date. The price $P_{\text{perp}}(t)$ tracks $P_{\text{spot}}(t)$ via a funding rate mechanism.

2. **Options (Puts/Calls):** Contracts giving the right, but not the obligation, to buy (call) or sell (put) the token at a specific strike price (K) by an expiration date (T).

9.3 Creation of Synthetic Supply and Demand

Shorting via Perps: A participant taking a short position on $P_{\text{perp}}(t)$ effectively creates synthetic supply. The Omni-Solver (or the protocol) acts as the counterparty, using its spot holdings (Q_{spot}, Ω) or other hedging mechanisms to manage its exposure. The total synthetic supply from shorts is Q_{short}. Shorting is viable as long as participants are willing to pay the funding rate (if positive) or receive it (if negative).

Buying Puts: Purchasing put options grants downside protection and represents synthetic demand *for selling* at the strike price K. The Omni-Solver sells these puts, collecting premium.

Longs Calls: Conversely, long perp positions and bought call options represent synthetic demand.

9.4 Impact on Market Accessibility

- **Lower Barrier to Entry for Selling:** Participants no longer need to own the spot token to express negative sentiment or hedge. They can directly short perps or buy puts.
- **Democratization of Hedging/Speculation:** Both insiders and outsiders gain access to tools for managing risk (hedging long positions with puts/shorts) or speculating on price decreases.

This mechanism fundamentally alters the market structure by introducing instruments that allow for the creation of immediate, elastic synthetic supply and demand, directly challenging the one-sided nature of the isolated spot market.

10 Comparative Statics: Market Dynamics with Derivative Instruments

We now analyze how the introduction of derivatives, facilitated by the Omni-Solver, alters key market dynamics compared to the isolated baseline.

10.1 Supply Curve Transformation

- **Isolated Market:** Supply `S_spot(P)` is highly inelastic, particularly above $P(t_0)$. It consists mainly of early buyers taking profits and is slow to react to price increases.

$$S_{\text{isolated}}(P) = S_{\text{spot}}(P) \tag{1}$$

$$\frac{\partial S_{\text{isolated}}}{\partial P} \approx 0 \quad \text{for } t \text{ near } t_0 \tag{2}$$

- **Derivative Market:** The total effective supply `S_total(P)` includes both spot supply and synthetic supply from shorting (`S_synthetic(P)`). $\mathrm{S}_total(P) = S_spot(P) + S_synthetic(P)$ Synthetic supply `S_synthetic(P)` is highly elastic, especially as P rises above perceived fair value $\mathbb{E}[P]$, because participants can create short positions without owning the asset. The Omni-Solver (Ω) facilitates this by acting as the counterparty. $\mathrm{S}_synthetic/P >> 0 for P > E[P]$ (and potentially limited only by risk parameters or collateral availability).
- **Result:** $\frac{\partial S_{\text{total}}}{\partial P} > \frac{\partial S_{\text{isolated}}}{\partial P}$. The overall supply curve becomes significantly more elastic, meaning price increases require substantially more net buying demand than in the isolated market.

10.2 Demand Curve Two-Sided Dynamics

- **Isolated Market:** Only effective demand is buy-side demand `D_buy(P)`. Negative sentiment has no direct expression.
- **Derivative Market:** The market reflects both buy-side demand (`D_buy`) and effective sell-side demand (`D_sell`, expressed via short perps and buying puts). The net demand $D_{\text{net}}(P) = D_{\text{buy}}(P) - D_{\text{sell}}(P)$ determines price pressure.
- **Result:** The market transitions from one-sided (buy pressure dominant) to two-sided. Price discovery now incorporates both positive and negative expectations, leading to a more robust process.

10.3 Price Discovery and Equilibrium

- **Isolated Market:** Equilibrium P_{spot} is found where $D_{\text{buy}}(P) = S_{\text{spot}}(P)$. Due to inelastic S_{spot}, this equilibrium can be highly sensitive to demand shocks (e.g., insider buying, FOMO) and deviate significantly from fundamental value $\mathbb{E}[P]$, potentially reaching $P_{\text{max, isolated}}$.
- **Derivative Market:** Equilibrium $P_{\text{equilibrium}}$ is found where $D_{\text{net}}(P) = S_{\text{total}}(P)$ (or $D_{\text{buy}}(P) = S_{\text{spot}}(P) + S_{\text{synthetic}}(P) + D_{\text{sell}}(P)$ when considering flows). The high elasticity of $S_{\text{synthetic}}$ acts as a strong dampening mechanism.
  - If $P > \mathbb{E}[P]$, $S_{\text{synthetic}}$ increases rapidly (shorting), pulling $P_{\text{equilibrium}}$ down towards $\mathbb{E}[P]$. D_{sell} may also increase.
  - If $P < \mathbb{E}[P]$, $S_{\text{synthetic}}$ decreases (short covering), allowing $P_{\text{equilibrium}}$ to rise towards $\mathbb{E}[P]$. D_{buy} may increase.
- **Result:** $P_{\text{equilibrium}}$ is inherently more stable and anchored towards $\mathbb{E}[P]$ compared to P_{spot}. The potential maximum price is capped: $P_{\text{max, synthetic}} < P_{\text{max, isolated}}$.

10.4 Impact on Volatility

- **Isolated Market:** High initial volatility is expected due to low liquidity and demand shocks.
- **Derivative Market:** The elastic synthetic supply and two-sided participation absorb demand shocks more effectively, leading to potentially lower volatility, especially during the initial launch phase after derivatives become active.

In summary, the comparative statics demonstrate that the presence of derivatives fundamentally alters the supply and demand structure, leading to more efficient price discovery, greater stability, and a price less susceptible to manipulation solely through buy-side pressure.

11 Formal Proof of Insider Gain Mitigation

We now demonstrate how the altered market dynamics induced by derivatives unilaterally reduce the potential abnormal gains (G) achievable by insiders exploiting structural advantages.

11.1 Defining Insider Gain (G_a)

Recall the insider's expected gain:

$$G_a = E[Q_a \cdot (P_{\text{sell}} - P(t_0 + \delta))|I(t_0)]$$

Where:

- Q_α is the quantity acquired by the insider at $t_0 + \delta$.
- $P(t_0 + \delta)$ is the insider's entry price.
- P_{sell} is the price at which the insider expects to exit their position.

The potential for large G_α in isolated markets stems primarily from the possibility that P_{sell} could reach $P_{\text{max, isolated}} \gg P(t_0 + \delta)$ due to inelastic supply and one-sided demand.

11.2 Impact of Elastic Supply on P_{sell}

- As established in Sec 10.1 and 10.3, the introduction of elastic synthetic supply ($S_{\text{synthetic}}$) prevents the price from reaching extreme highs solely due to buy pressure.
- The equilibrium price $P_{\text{equilibrium}}$ is capped at $P_{\text{max, synthetic}}$, where $P_{\text{max, synthetic}} < P_{\text{max, isolated}}$.
- Therefore, the maximum achievable exit price for the insider is reduced: $\max(P_{\text{sell}}) \leq P_{\text{max, synthetic}}$.

- **Conclusion 1:** The potential upper bound of P_{sell} is strictly lower in the presence of derivatives.

$$\mathbb{E}[P_{\text{sell}} \mid \text{Derivatives}] < \mathbb{E}[P_{\text{sell}} \mid \text{Isolated}]$$

(assuming rational expectations about the price ceiling).

11.3 Impact of Two-Sided Market Outsider Counter-Strategies

- In the isolated market, insiders sell into buy-only pressure from later entrants.
- In the derivative market, insiders must sell into a market where:
  - Other participants can actively short (increasing $S_{\text{synthetic}}$).
  - Outsiders who missed the initial pump can short if $P > \mathbb{E}[P]$, creating direct sell-side pressure against the insider's exit attempts.
- This competitive selling pressure further constrains the price insiders can realize for Q.
- **Conclusion 2:** The ability of others to short reduces the price obtainable by insiders during their exit phase compared to the isolated scenario.

11.4 Reduction in G_a

Combining Conclusions 1 and 2:

- The expected exit price $\mathbb{E}[P_{\text{sell}}]$ is lower in the derivative market.
- The gain equation is:
$$G_\alpha = \mathbb{E}\left[Q_\alpha \cdot (P_{\text{sell}} - P(t_0 + \delta)) \mid I(t_0)\right]$$
- Since Q_α and $P(t_0 + \delta)$ are determined by the insider's initial action (assuming they still act early), the primary factor affected is $\mathbb{E}[P_{\text{sell}}]$.
- Therefore: $G_\alpha^{(\text{Derivative Market})} < G_\alpha^{(\text{Isolated Market})}$

11.5 Unilateral Nature of the Effect

- The introduction of short-selling capability (via perps or options facilitated by Ω) *always* increases the elasticity of the total supply curve ($\frac{\partial S_{\text{total}}}{\partial P}$ increases or stays the same — it never decreases).
- It *always* introduces a mechanism for sell-side pressure (D_{sell} via shorts/puts) that counteracts buy-side pressure, making the market dynamics inherently more two-sided.
- These mechanisms *always* act to dampen upward price deviations from $\mathbb{E}[P]$ and lower the maximum achievable price compared to the purely buy-driven isolated market.
- Consequently, the reduction in the structurally derived component of G_α (i.e., the part stemming from market structure rather than superior information about $\mathbb{E}[P]$) is a unilateral consequence of enabling these derivative instruments.

While the *magnitude* of the G reduction depends on factors like the efficiency of the derivatives market, collateral availability, and participant rationality, the *direction* of the effect – mitigation of the structural advantage – is formally established by the introduction of these balancing mechanisms.

12 Conclusion: Unilateral Impact of Derivatives on Market Efficiency

This analysis provides a formal proof that introducing accessible derivative instruments (perpetual futures, options) into isolated, illiquid spot markets for newly launched assets represents a unilateral improvement in market efficiency and fairness. By enabling mechanisms for effective short-selling and two-sided price discovery, facilitated by an agent like the Omni-Solver using protocols such as Symmio, the derivatives market structure fundamentally addresses the core deficiencies of the isolated baseline:

1. **Breaks One-Sided Dynamics:** It transforms the market from a purely buy-pressure-driven system to one where both positive and negative sentiment can be directly expressed and impact price.
2. **Introduces Elastic Supply:** Synthetic supply via shorting creates a highly elastic counterforce to demand shocks, preventing excessive price inflation driven solely by initial buying momentum.
3. **Mitigates Structural Insider Advantage:** By capping the maximum achievable exit price ($P_{\text{max, synthetic}} < P_{\text{max, isolated}}$) and introducing competitive sell-side pressure, derivatives reduce the abnormal economic gains (G_α) attainable by insiders purely due to timing and structural market flaws.
4. **Enhances Price Discovery:** The equilibrium price ($P_{\text{equilibrium}}$) is more closely anchored to expected fundamental value ($\mathbb{E}[P]$) and less susceptible to manipulation or FOMO-driven deviations.
5. **Empowers Outsiders:** Provides outsiders with tools (shorting, puts) to potentially profit from identifying overvaluations or hedge risks, creating a more level playing field.

The direction of these effects is inherent to the introduction of these financial tools. While the *extent* of the improvement depends on the specific implementation, liquidity, and participant behavior within the derivatives market, the *existence* of these tools provides a necessary and sufficient condition to break the cycle of structural insider advantage prevalent in purely isolated spot launches.

12.1 Assumptions and Caveats

This proof relies on several simplifying assumptions:

1. **Rational Agents (Generalized):** While incorporating factors like FOMO qualitatively, the core arguments assume participants generally act to maximize expected utility/profit given their information sets. Significant irrational herding could still cause deviations.
2. **Derivative Market Functionality:** Assumes the derivatives market (perps, options) facilitated by the Omni-Solver/Symmio is reasonably efficient, accessible, and liquid enough for participants to express their views. High friction, extreme fees, or lack of participation in the derivative market would dampen the balancing effect.
3. **Information Structure:** Primarily models a binary insider/outsider information gap. Real-world information is more complex and diverse.
4. **Omni-Solver Behavior:** Assumes the Omni-Solver agent reliably facilitates the derivatives market as described. Its own profit motives or operational constraints are abstracted away.
5. **Collateral Risk Management:** Assumes participants have access to sufficient collateral for derivative positions and that counterparty risks within the protocol are managed.
6. **Focus on *Structural* Advantage:** This proof primarily addresses the mitigation of advantages derived purely from the *structure* of isolated markets (timing, inelastic supply). It does not claim to eliminate *all* advantages derived from superior fundamental analysis or faster reaction to *new* public information.

Future work could involve relaxing these assumptions, incorporating more detailed microstructure models, and conducting empirical analysis or agent-based simulations to quantify the magnitude of the effects under various conditions.

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