AI X NEW STOCK EXCHANGES: CYCLES, VOLATILITY AND SHOCKS IN THE NEW GLOBAL FINANCIAL ORDER

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Abstract

This paper develops a macro-financial framework to analyze how artificial intelligence (AI), intangible capital, and platform architectures are reshaping financial markets into what is conceptualized here as *"AI x New Stock Exchange: cycles, volatility and shocks in the new global financial order*". Building on Keynesian uncertainty (Keynes, 1936), Minsky's financial instability hypothesis (Minsky, 1986), and behavioral finance (Kahneman and Tversky, 1979), the study argues that algorithmic mediation transforms price discovery, amplifies volatility, and reconfigures the transmission of shocks across global markets. Combining historical comparative analysis with a conceptual econometric proposal inspired by GARCH-MIDAS structures, the paper situates technological innovation within broader center-periphery asymmetries and structural perspectives on technological dependence, the paper proposes that AI-driven markets constitute complex adaptive systems characterized by endogenous instability and feedback loops. The findings contribute to debates on financial regulation, platform governance, and the future architecture of algorithmic capitalism.

Keywords: Artificial Intelligence, Financial Markets, Volatility, Financial Instability, Intangible Assets, Algorithmic Capitalism, Center-Periphery, Behavioral Finance.

Introduction

The rapid diffusion of artificial intelligence (AI) across financial infrastructures has initiated a structural transformation in global capital markets, redefining how volatility, liquidity, and expectations are produced

and transmitted. In *AI x New Stock Exchange: Cycles, Volatility and Shocks in the New Global Financial Order*, financial exchanges are interpreted not merely as trading venues but as platform-based ecosystems shaped by data, algorithmic learning, and intangible capital accumulation. This paper extends the book's central thesis by proposing that the contemporary financial system is undergoing a qualitative institutional shift — from traditional price discovery mechanisms toward algorithmically mediated coordination, where cycles and shocks emerge endogenously from digital architectures and feedback loops.

Historically, financial markets have been interpreted through competing theoretical lenses. Classical coordination mechanisms emphasize decentralized decision-making and information aggregation (Smith, 1776), while Keynesian macroeconomics highlights uncertainty, expectations, and the instability of investment under incomplete information (Keynes, 1936). Later contributions, particularly Minsky's Financial Instability Hypothesis (Minsky, 1986), frame financial cycles as inherently fragile, driven by endogenous leverage and speculative dynamics. The rise of AI-driven markets introduces a new layer to this debate: algorithmic agents capable of processing vast datasets in real time reshape not only trading speed but also the structure of risk perception and behavioral response. Insights from behavioral finance, especially prospect theory (Kahneman and Tversky, 1979), become increasingly relevant as machine-generated signals influence investor heuristics and amplify collective sentiment.

This framework situates these technological transformations within a broader historical trajectory of capitalism, in which intangible assets and digital infrastructures redefine the sources of value creation. Recent research on intangible capital (Haskell and Westlake, 2017) demonstrates how software, data, and network effects alter firm valuation and market concentration. When integrated into financial exchanges, these dynamics generate new asymmetries between technological centers and peripheral markets, reinforcing structural dependencies consistent with center–periphery theories of global finance. The "AI x New Stock Exchange" thus represents a hybrid institutional form: simultaneously a marketplace, an information infrastructure, and a predictive analytics environment.

From an empirical and methodological standpoint, the paper draws inspiration from volatility modeling approaches, particularly GARCH-MIDAS frameworks, to conceptualize how long-run macroeconomic trends and short-run algorithmic signals interact in shaping financial cycles. Rather

than presenting a purely technical econometric model, the study adopts a conceptual econometric perspective aligned with the book's interdisciplinary approach, combining historical comparison, macro-financial theory, and platform economics. This perspective allows the analysis to capture structural volatility regimes that emerge from algorithmic trading, data asymmetries, and platform governance structures.

The paper advances three main contributions. First, it integrates classical and heterodox macro-financial theory with the emerging architecture of AI-driven markets, extending debates on financial instability into the domain of algorithmic capitalism. Second, it reconceptualizes financial exchanges as complex adaptive systems in which endogenous shocks arise from the interaction between human expectations, data infrastructures, and machine learning processes. Third, it offers a policy-relevant perspective on how regulatory frameworks and institutional design may evolve in response to environments increasingly shaped by intangible assets, platform governance, and algorithmic mediation of global capital flows.

An additional analytical layer incorporated into this study draws on the Dynamic Stochastic General Equilibrium (DSGE) and Real Business Cycle (RBC) traditions, extended through what the book conceptualizes as the technological layer that embeds artificial intelligence and digital infrastructures directly into macro-financial transmission mechanisms. Within conventional DSGE-RBC frameworks, fluctuations emerge from productivity shocks, intertemporal optimization, and rational expectations under frictionless or mildly distorted environments. However, the integration of AI-driven platforms introduces a qualitatively different source of shocks: endogenous technological feedback generated by algorithmic learning, data accumulation, and network externalities. The perspective reinterprets total factor productivity not merely as an exogenous stochastic process but as a partially endogenous variable shaped by digital capital, computational scale, and platform governance. In this setting, AI alters both the propagation and amplification of shocks by accelerating information diffusion, compressing reaction times, and reshaping expectations formation across heterogeneous agents. Consequently, the "AI x New Stock Exchange" can be modeled as a macro-financial environment in which RBC-style productivity dynamics interact with algorithmic volatility regimes, producing hybrid cycles that blend technological innovation with financial instability. This extension bridges quantitative macroeconomic modeling with the structural insights suggesting that future DSGE specifications must incorporate intangible

assets, platform architectures, and algorithmic decision rules to adequately capture the evolving architecture of AI-mediated financial markets.

2. Literature and Theoretical Foundations

2.1 Financial Instability and Algorithmic Markets

Minsky's Financial Instability Hypothesis provides a critical starting point for understanding the structural transformation of markets under artificial intelligence. In its classical formulation, prolonged periods of stability encourage a progressive shift from hedge finance toward speculative and ultimately Ponzi-like positions, as economic agents internalize optimistic expectations and expand leverage. Within the framework developed in algorithmic trading architectures intensify this endogenous dynamic by accelerating the temporal dimension of financial decision-making. Machine learning systems continuously recalibrate strategies in response to high-frequency data, compressing information-processing cycles and amplifying feedback between price signals and investor expectations. As a result, stability itself becomes algorithmically mediated, emerging from synchronized strategies that may rapidly unravel when underlying narratives shift.

The concept of algorithmic markets extends Minsky's insight by suggesting that instability is no longer driven solely by leverage cycles but also by the interaction between predictive models and behavioral responses. Automated trading systems, designed to detect patterns and optimize execution, may converge toward similar strategies, increasing systemic correlation across portfolios. This convergence can create "flash" dynamics in which liquidity evaporates not because of exogenous shocks alone but because algorithms simultaneously withdraw or reverse positions. The book argues that such phenomena illustrate a transition from human-centered speculation toward hybrid cognitive systems where machine inference shapes market sentiment.

Behavioral finance deepens this interpretation by revealing how algorithmic signals interact with cognitive biases. Prospect theory demonstrates that investors overweight losses relative to gains, and algorithmic forecasts may reinforce these tendencies by framing risk in probabilistic terms that appear authoritative. Under conditions of uncertainty shocks — geopolitical

tensions, technological disruptions, or sudden macroeconomic shifts — automated trading strategies can amplify herding behavior, producing nonlinear price movements. Rather than neutralizing psychological biases, AI may institutionalize them within trading infrastructures, embedding narrative-driven valuation cycles into the architecture of modern exchanges. In this sense, algorithmic markets represent a fusion of computational rationality and behavioral fragility, consistent with the broader theoretical synthesis proposed in the book.

2.2 Innovation, Intangible Capital, and the New Exchange

The rise of intangible capital constitutes a central pillar of the "New Stock Exchange" paradigm. Data, algorithms, and platform ecosystems increasingly function as primary drivers of value creation, reshaping how firms are evaluated and how markets allocate capital. According to the conceptual framework advanced AI-driven infrastructures transform information into a dominant production factor, generating increasing returns to scale through network effects and data accumulation. Exchanges evolve into platform-based environments that aggregate liquidity, analytics, and predictive capabilities, reinforcing market concentration around technologically advanced institutions.

Innovation theory provides multiple lenses through which to interpret this transformation. From a Schumpeterian perspective, the proliferation of AI and digital platforms represents a wave of creative destruction, displacing legacy financial intermediaries while fostering new organizational forms. Algorithmic asset management, decentralized data ecosystems, and AI-assisted advisory services illustrate how innovation reshapes competitive landscapes and alters the boundaries between financial institutions and technology firms. However, Austrian economic thought introduces a complementary cautionary view, emphasizing the potential for mispricing and malinvestment when monetary conditions interact with speculative technological narratives. Easy credit and optimistic expectations surrounding AI-driven productivity gains may inflate asset valuations, creating cycles of exuberance followed by abrupt corrections.

The integration of intangible assets into financial markets also reinforces structural asymmetries between core and peripheral economies. Advanced technological centers benefit from data infrastructure, computational

capacity, and regulatory experimentation, while peripheral markets often rely on imported platforms and external capital flows. This asymmetry reshapes the geography of innovation, embedding financial coordination within transnational digital networks and intensifying debates about technological dependence and market sovereignty. The “New Exchange” thus emerges not only as a technological evolution but as a structural reconfiguration of global capitalism.

2.3 Macroeconomic Transmission Channels

Artificial intelligence influences financial markets through a set of interconnected macroeconomic channels that bridge micro-level trading behavior with system-wide outcomes. One of the most prominent mechanisms involves productivity growth expectations. AI investments in automation, data analytics, and machine learning reshape forecasts of total factor productivity, influencing equity valuations, sectoral allocation, and long-term investment strategies. Anticipation of productivity gains can compress risk premia and alter forward-looking discount rates, demonstrating how technological narratives become embedded in asset pricing models.

A second channel operates through corporate investment in infrastructure and computing power. Firms allocate substantial resources to data centers, semiconductor capacity, and energy-intensive computing systems, generating spillover effects across capital markets. These investments influence earnings expectations, reshape supply chains, and create new forms of systemic risk linked to technological bottlenecks and energy demand. The book’s framework highlights how such infrastructural dynamics blur the boundary between real economic investment and financial speculation, as markets continuously reassess the scalability of AI-driven growth.

Changes in economy-wide discount rates represent another key transmission mechanism. If AI accelerates productivity growth, equilibrium interest rates may adjust, influencing the valuation of long-duration assets and the structure of sovereign debt markets. Conversely, heightened uncertainty surrounding technological disruption may elevate risk aversion, producing divergent effects across asset classes. Wealth concentration and evolving market structures further complicate this landscape. Platform-based financial

ecosystems tend to concentrate informational advantages among a small set of actors, reinforcing inequalities in access to capital and data-driven insights.

Together, these channels illustrate how AI operates simultaneously at micro and macro levels, transforming individual trading strategies while reshaping aggregate financial conditions. By integrating insights from financial instability theory, innovation economics, and macro-financial analysis, the framework developed in *AI x New Stock Exchange* provides a comprehensive lens through which to understand the evolving architecture of algorithmically mediated markets.

3. Conceptual Framework: The New Stock Exchange

The concept of the New Stock Exchange refers to a structural transformation in financial markets driven by artificial intelligence, digital platforms, and intangible capital accumulation. Rather than functioning as static venues for price discovery, exchanges increasingly operate as algorithmic ecosystems in which data infrastructures, predictive models, and network effects shape market coordination. This framework builds on the synthesis proposed, integrating macro-financial theory, behavioral insights, and innovation economics to interpret how algorithmic capitalism restructures capital markets.

At the core of this transformation lies AI-driven trading and asset allocation. Machine learning models process vast volumes of structured and unstructured information — ranging from macroeconomic indicators to sentiment extracted from digital platforms — enabling automated portfolio rebalancing and predictive risk management. While classical financial theory assumes rational expectations and equilibrium convergence, the increasing prevalence of algorithmic agents introduces adaptive learning dynamics that challenge these assumptions. Keynesian uncertainty highlights the limits of probabilistic forecasting under radical uncertainty (Keynes et al., 1936, *The General Theory of Employment, Interest and Money*), and the New Stock Exchange extends this insight by embedding algorithmic inference within the formation of expectations. Algorithms do not eliminate uncertainty; they reshape its distribution, compressing reaction times and amplifying market reflexivity. In this sense, AI-driven allocation systems function as both

stabilizing and destabilizing forces, capable of enhancing liquidity during normal periods while accelerating volatility during regime shifts.

A second defining feature involves platform-based market infrastructures. Exchanges increasingly resemble digital platforms that integrate trading, data analytics, clearing mechanisms, and investor interaction within unified technological architectures. Platform theory suggests that network externalities generate increasing returns to scale, enabling dominant actors to accumulate informational advantages (Haskell et al., 2017, *Capitalism Without Capital*). Within the New Stock Exchange, these dynamics transform the competitive landscape of finance by concentrating liquidity and technological power among institutions capable of investing in advanced computational resources. From a structural perspective, this evolution reinforces center–periphery asymmetries in global markets, as technological hubs capture data flows and innovation rents while peripheral economies remain dependent on external infrastructures (Reinhart et al., 2009, *This Time Is Different*). The exchange thus becomes not only a marketplace but also a strategic technological node embedded within broader geopolitical and economic networks.

The framework further emphasizes the high dependence on intangible capital as a defining characteristic of contemporary financial ecosystems. Data, algorithms, intellectual property, and platform governance structures increasingly replace physical assets as primary drivers of valuation. Innovation economics interprets this shift as part of a broader transformation toward knowledge-intensive capitalism, in which scalability and low marginal costs enable rapid expansion of digital firms. Schumpeterian theory conceptualizes such developments as waves of creative destruction that reshape industrial organization and financial intermediation (Schumpeter et al., 1942, *Capitalism, Socialism and Democracy*). However, Austrian perspectives caution that technological optimism, when combined with accommodative monetary conditions, may generate mispricing and speculative bubbles (Hayek et al., 1945, *The Use of Knowledge in Society*). The New Stock Exchange integrates these contrasting views by proposing that intangible capital simultaneously fuels innovation and amplifies systemic fragility, particularly when algorithmic valuation models extrapolate growth narratives beyond sustainable fundamentals.

Another central dimension of the conceptual framework involves continuous learning systems that reshape volatility regimes. Traditional models often treat volatility as a stochastic process driven by exogenous shocks. In

algorithmic markets, however, volatility emerges from recursive interactions between predictive algorithms, investor behavior, and evolving data environments. Minsky's Financial Instability Hypothesis suggests that stability breeds risk-taking behavior (Minsky et al., 1986, *Stabilizing an Unstable Economy*); the introduction of adaptive AI systems accelerates this dynamic by reinforcing procyclical strategies embedded within trading algorithms. Behavioral finance provides additional insight into how machine-generated signals may amplify cognitive biases, such as loss aversion and herding, particularly during uncertainty shocks (Kahneman et al., 1979, *Prospect Theory*). As algorithms learn from historical patterns, they may inadvertently synchronize market behavior, producing clustered volatility and sudden liquidity disruptions. The New Stock Exchange thus operates as a system in which volatility is endogenous — shaped by technological architecture rather than merely external disturbances.

Ultimately, the conceptualization of financial markets as complex adaptive systems synthesizes these elements into a unified analytical lens. Complexity economics emphasizes heterogeneity, path dependence, and emergent dynamics arising from interactions among diverse agents. Within the New Stock Exchange, geopolitical shocks, innovation cycles, and financial fragility interact through algorithmic infrastructures that continuously adapt to new information. AI-driven exchanges therefore exhibit properties similar to evolving ecosystems, where stability and instability coexist as outcomes of nonlinear feedback loops. The framework advanced in *AI x New Stock Exchange* (Leandro, Aline et al 2026, *AI x New Stock Exchange*) suggests that understanding modern capital markets requires moving beyond equilibrium-centered models toward approaches that capture adaptive learning, platform governance, and the macro-financial implications of intangible capital.

By integrating insights from Keynesian uncertainty, Minskyan instability, behavioral finance, and innovation theory, the New Stock Exchange paradigm offers a comprehensive theoretical foundation for analyzing algorithmic capitalism. It frames financial markets as evolving technological systems in which data, algorithms, and institutional design jointly determine the trajectory of global finance, highlighting how endogenous interactions between technology and human behavior shape the future architecture of volatility, investment, and economic coordination.

3. The Utility Model

Traditional financial theory typically conceptualizes investor utility as a function of consumption, wealth accumulation, or risk-adjusted portfolio returns, reflecting the intertemporal trade-offs between present satisfaction and future uncertainty. Standard expected utility frameworks assume that agents maximize outcomes based on probabilistic beliefs and available information, while modern portfolio theory emphasizes the optimization of returns relative to risk exposure. The Utility Model, as developed in *AI x New Stock Exchange: Cycles, Volatility and Shocks in the New Global Financial Order* (Leandro, Aline et al 2026, *AI x New Stock Exchange*), expands this paradigm by introducing informational efficiency as a core dimension of welfare. In AI-mediated markets, utility is no longer derived solely from material consumption or financial performance; it increasingly reflects the quality of decision-making enabled by algorithmic infrastructures.

Euler AI Equation

Intertemporal maximization

$$\max_{\{C_t, L_t, I_t^T, I_t^I\}} \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left[u(C_t) - v(L_t)\right] \qquad (1)$$

subject to:

Resource constraint

$$C_t + I_t^T + I_t^I = Y_t \qquad (2)$$

Law of movement of tangible capital

$$K_{t+1}^T = (1 - \delta_T) K_t^T + I_t^T \qquad (3)$$

Law of movement of intangible capital

$$\boxed{K_{t+1}^I = (1 - \delta_I) K_t^I + \phi(I_t^I)} \qquad (4)$$

with:

$$\phi'(I_t^I) > 0, \phi''(I_t^I) < 0$$

Economic commentary

Intangible capital has:

- Diminishing returns on accumulation
- Non-linear adjustment costs

- $\delta_I > \delta_T$: greater technological obsolescence

First Order Conditions (Euler)

Euler for tangible capital

$$u'(C_t) = \beta \mathbb{E}_t[u'(C_{t+1})(\alpha \frac{Y_{t+1}}{K_{t+1}^T} + 1 - \delta_T)] \qquad (5)$$

Euler for intangible capital

$$\boxed{u'(C_t) = \beta \mathbb{E}_t[u'(C_{t+1})(\theta \frac{Y_{t+1}}{K_{t+1}^I} + 1 - \delta_I)\phi'(I_t^I)]} \qquad (6)$$

Key interpretation

- The Euler condition of intangible capital includes:
  - $\phi'(I_t^I)$: Technological friction

Negative shocks → abrupt drop in intangible investment

Positive shocks → lingering effects via learning and scale

Technological Shocks and Volatility

Stochastic process productivity

$$\ln A_t = \rho_A \ln A_{t-1} + \varepsilon_t^A, \varepsilon_t^A \sim \mathcal{N}(0, \sigma_A^2) \qquad (7)$$

Amplification via intangibles

Deriving log-linearly (11):

$$\hat{Y}_t = \hat{A}_t + \alpha \hat{K}_t^T + \theta \hat{K}_t^I + (1 - \alpha - \theta)\hat{L}_t \qquad (8)$$

Crucial result

How it reacts more slowly:K_t^I

$$\boxed{\text{Var}(\hat{Y}_t) > \text{Var}_{RBC\ clássic}(\hat{Y}_t)} \qquad (9)$$

Endogenous volatility not explained by .A_t

Irreversibility of Intangible Capital

Irreversible investment

$$I_t^I \geq 0 \qquad (10)$$

with adjustment cost:

$$\Psi(I_t^I) = \frac{\kappa}{2}\left(\frac{I_t^I}{K_t^I} - \bar{\imath}\right)^2 K_t^I \qquad (11)$$

In negative shocks:

- investment in intangibles collapses

In positive shocks:

- Investment grows superlinearly

This generates cyclical asymmetry.

Positive Technology Externalities

Increased productivity by spillovers

$$A_t = \bar{A}_t \, (K_t^I)^{\eta} \eta > 0 \qquad (12)$$

Substituting in (11):

$$Y_t = \bar{A}_t \, (K_t^T)^{\alpha} \, (K_t^I)^{\theta+\eta} \, (L_t)^{1-\alpha-\theta} \qquad (13)$$

Comment

Intangible capital generates:

- Collective learning
- Network Effects
- gains that cannot be privately appropriated

RBC with Endogenous AI (Technological Learning)

AI as an accumulating intangible capital

We have introduced an endogenous technological state:

$$K_t^{AI} \subset K_t^I$$

AI-powered production function

$$Y_t = A_t \, (K_t^T)^{\alpha} \, (K_t^I)^{\theta} \, (K_t^{AI})^{\psi} \, (L_t)^{1-\alpha-\theta-\psi} \qquad (14)$$

With $\psi > 0$.

AI Law of Motion (Learning)

Equation (26)

$$K_{t+1}^{AI} = (1 - \delta_{AI}) K_t^{AI} + \chi \, (I_t^{AI})^{\nu} \, (Data_t)^{1-\nu} \qquad (15)$$

Interpretation

- AI depends on investment + data

- Local increasing returns → non-convexity
- Source of technological persistence

AI Euler

$$u'(C_t) = \beta \mathbb{E}_t[u'(C_{t+1})(\psi \frac{Y_{t+1}}{K_{t+1}^{AI}} + 1 - \delta_{AI})\chi\nu(I_t^{AI})^{\nu-1}] \qquad (16)$$

AI generates intertemporal amplification of shocks.

where consumption Ccaptures traditional welfare outcomes, risk-adjusted returns Rrepresent financial performance, and informational efficiency I_{AI}denotes the degree to which artificial intelligence enhances perception, prediction, and coordination within financial ecosystems. The inclusion of I_{AI}reflects the observation that algorithmic platforms alter not only the distribution of outcomes but also the process through which decisions are made. Investors operating within AI-driven environments gain access to predictive analytics, real-time data aggregation, and automated optimization tools, fundamentally transforming the informational landscape in which preferences are formed and actions are executed.

From a theoretical perspective, this expansion resonates with Keynesian insights on uncertainty, which emphasize the centrality of expectations and knowledge constraints in economic behavior (Keynes et al., 1936, *The General Theory of Employment, Interest and Money*). AI systems reshape these expectations by converting previously ambiguous signals into structured probabilistic forecasts. However, unlike traditional models that treat information as exogenous, the modelo de utilidade framework interprets informational efficiency as an endogenous component of utility itself. The ability to process large datasets, identify latent patterns, and adjust strategies dynamically contributes directly to perceived welfare, as investors experience reduced cognitive burden and improved coordination with market conditions.

The emergence of Platform-as-a-Service (PaaS) architectures further amplifies this transformation. Digital platforms integrate trading interfaces, analytics engines, and algorithmic execution within unified ecosystems, reducing transaction costs and informational asymmetries. According to the conceptual analysis in *AI x New Stock Exchange* (Leandro, Aline et al 2026,

AI x New Stock Exchange), these infrastructures function as coordination mechanisms that align dispersed market participants through shared data environments. By lowering frictions associated with information acquisition and execution, platforms enable agents to respond to shocks in real time, fostering adaptive behavior consistent with complex systems theory. The result is a shift from static optimization toward continuous learning, where agents update beliefs and strategies as new information emerges.

Behavioral finance provides an additional layer of interpretation. Traditional models often assume that more information unequivocally improves welfare; however, cognitive limitations and biases may distort how individuals interpret data. The modelo de utilidade framework suggests that AI-mediated decision environments can partially mitigate such biases by structuring information flows and automating certain aspects of choice architecture. Yet this process also introduces new challenges, as reliance on algorithmic outputs may create overconfidence in predictive systems or reduce diversity in market perspectives. Consequently, informational efficiency should not be viewed as purely technical but as a socio-technical construct shaped by the interaction between human cognition and machine intelligence (Kahneman et al., 1979, *Prospect Theory*).

From a macro-financial standpoint, incorporating I_{AI} into utility has significant implications for welfare analysis and policy design. If AI enhances decision quality and coordination, aggregate welfare may improve even in environments characterized by persistent volatility. Investors may tolerate higher short-term fluctuations if algorithmic tools increase the perceived reliability of long-term strategies. At the same time, unequal access to advanced AI systems may exacerbate disparities in welfare outcomes, reinforcing structural inequalities between technologically advanced institutions and less digitized market participants. This dimension aligns with broader debates on intangible capital and platform governance, where data access and computational resources become key determinants of economic advantage (Haskell et al., 2017, *Capitalism Without Capital*).

The Utility Model therefore reframes the relationship between technology and economic welfare by emphasizing that AI transforms not only performance metrics but also the architecture of decision-making itself. Utility emerges from a multidimensional process in which consumption, financial returns, and informational empowerment interact dynamically. By embedding informational efficiency within the utility function, the framework captures the evolving nature of investor preferences in

algorithmic markets and highlights how AI-driven coordination reshapes both individual welfare and systemic stability. In doing so, it offers a conceptual bridge between microeconomic choice theory and the broader institutional evolution of the New Stock Exchange, where algorithmic infrastructures redefine the boundaries of rationality, efficiency, and value creation in contemporary finance.

3. Data and Methodological Approach

The methodological architecture of this study reflects the hybrid nature of contemporary financial markets, where algorithmic infrastructures, intangible assets, and macroeconomic forces intersect in ways that cannot be captured by a single empirical tradition. Rather than relying exclusively on conventional asset pricing datasets — such as historical returns, factor exposures, or balance-sheet variables — the paper adopts a multidimensional research design that combines historical case studies, structural analysis of volatility regimes, and conceptual macro-financial modeling. This integrative strategy is consistent with the analytical framework advanced, which argues that AI-mediated markets require methodological pluralism to adequately capture their institutional and technological complexity.

A central component of the approach involves historical comparative analysis of technological transitions in financial exchanges. Rather than treating AI as an isolated innovation, the study situates it within a broader lineage of financial modernization, including the digitization of trading platforms, the rise of high-frequency trading, and the integration of cloud-based infrastructures. By examining historical episodes in which new technologies reshaped market organization, the analysis identifies recurring patterns of optimism, speculative expansion, and regulatory adaptation. This historical lens aligns with macro-financial traditions that emphasize path dependence and institutional evolution, suggesting that algorithmic markets should be interpreted as the latest stage in a long process of technological transformation rather than a complete rupture with the past.

Complementing the historical dimension is a structural analysis of volatility regimes, which draws on conceptual insights from econometric frameworks such as GARCH and MIDAS models. While the paper does not present a purely technical estimation exercise, it adopts the intuition underlying these models — namely, that volatility emerges from the interaction between

short-term market dynamics and longer-term macroeconomic trends. In AI-driven environments, volatility is conceptualized as partially endogenous, shaped by feedback loops between machine learning algorithms, investor behavior, and data infrastructures. This perspective allows the analysis to move beyond static statistical descriptions and toward a structural understanding of how algorithmic architectures reshape the temporal distribution of risk.

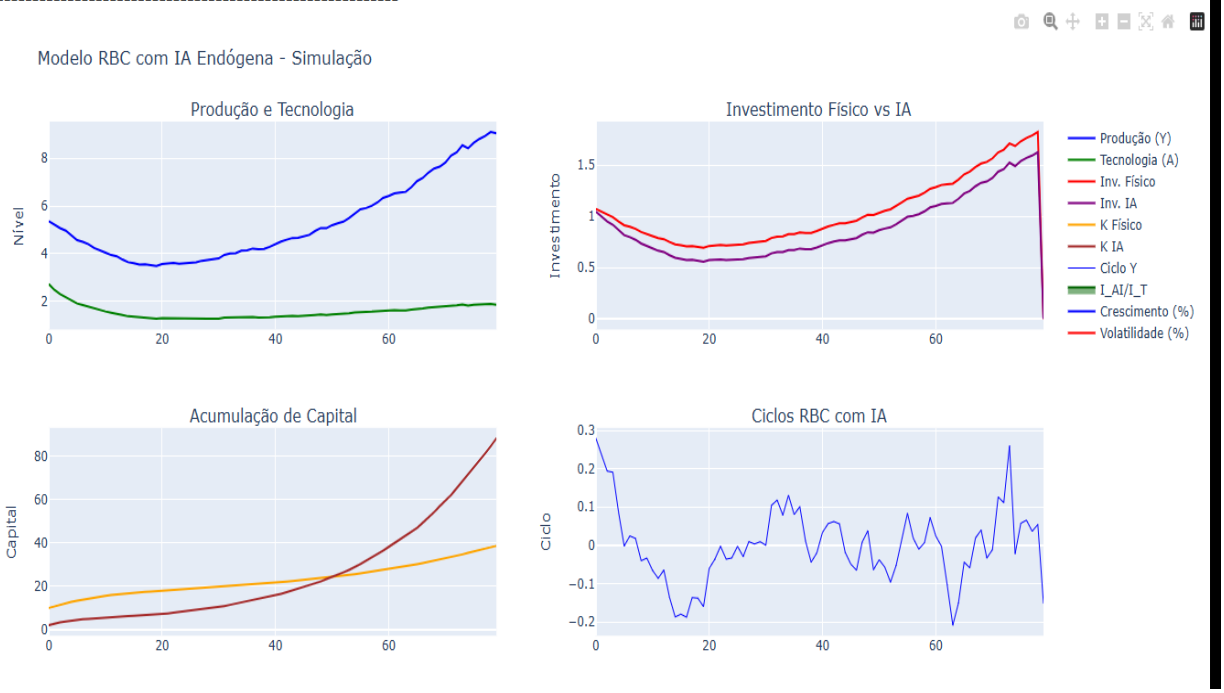
The methodological framework also incorporates an examination of algorithmic trading architectures as institutional objects of analysis. Platform-based exchanges, automated execution systems, and data-driven analytics tools are treated not merely as technological features but as organizational structures that influence market outcomes. Drawing on institutional economics and platform theory, the study evaluates how governance mechanisms, access to data, and computational asymmetries shape liquidity provision and market stability. Such qualitative institutional analysis is particularly relevant in AI-mediated markets, where the opacity of algorithms and proprietary infrastructures complicates traditional empirical measurement.

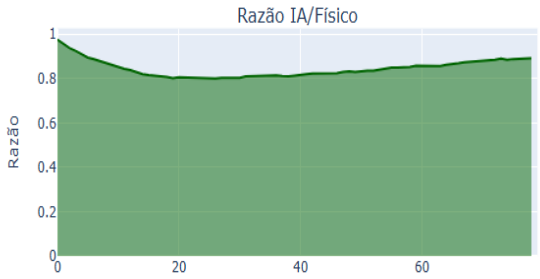
Integrating these elements, the paper adopts a macro-financial modeling perspective that bridges micro-level trading behavior with system-wide outcomes. Insights from DSGE and RBC traditions are extended through the modelo de utilidade framework to interpret AI as a driver of productivity expectations, discount rate dynamics, and structural volatility. This macro-financial lens enables the identification of recurring patterns in cycles and shocks, highlighting how technological innovation interacts with geopolitical events, monetary conditions, and investor sentiment. By combining qualitative and conceptual quantitative approaches, the methodology captures both the institutional depth and analytical rigor required to analyze algorithmic capitalism.

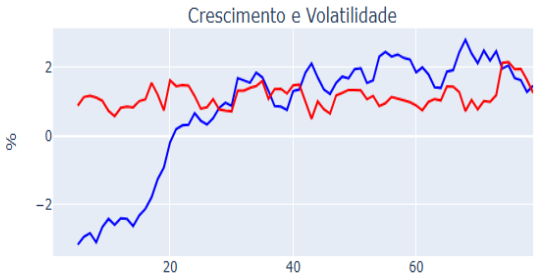
Ultimately, the hybrid methodological strategy reflects a recognition that AI-driven financial markets are complex adaptive systems whose dynamics cannot be fully understood through isolated datasets or purely theoretical abstractions. By integrating historical case studies, structural volatility analysis, and macro-financial modeling, the paper provides a comprehensive framework for identifying the mechanisms through which technological innovation reshapes financial cycles, amplifies systemic fragility, and redefines the architecture of global exchanges.

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Modelo RBC-IA simulado com sucesso!
   Períodos: 80
   Crescimento médio Y: 0.69%
   Volatilidade Y: 2.06%
   I_AI/I_T: 0.85

============================================================
2. GERANDO GRÁFICOS DO MODELO RBC-IA
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✅ Gráficos RBC-IA gerados!

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3. SIMULANDO DADOS DE MERCADO - CRIPTO & TECH
============================================================
📊 Dados de mercado simulados:
   Período: 2018-01-01 a 2020-09-26
   Retornos médios diários:
     BTC: 126.7% | Vol: 59.9% | Sharpe: 2.11
     ETH: 101.7% | Vol: 64.2% | Sharpe: 1.59
     NASDAQ: 8.7% | Vol: 32.6% | Sharpe: 0.27
     S&P500: 27.4% | Vol: 15.6% | Sharpe: 1.75
     Gold: 4.5% | Vol: 15.4% | Sharpe: 0.29

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4. ESTIMANDO MODELOS GARCH PARA VOLATILIDADE
============================================================
📈 Parâmetros GARCH simulados:
   BTC: α=0.100, β=0.850, Persistência=0.950, Meia-vida=13.5 dias
   ETH: α=0.120, β=0.820, Persistência=0.940, Meia-vida=11.2 dias
   NASDAQ: α=0.080, β=0.900, Persistência=0.980, Meia-vida=34.3 dias
   S&P500: α=0.070, β=0.910, Persistência=0.980, Meia-vida=34.3 dias
   Gold: α=0.050, β=0.930, Persistência=0.980, Meia-vida=34.3 dias
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The New Stock Exchange at the Crossroads of Theories of proposal cannot be understood only by the logic of market efficiency (RBC) nor only by the logic of predatory accumulation (Harvey). It is a symptomatic hybrid of contemporary capitalism.

It embodies technological optimism and faith in the ability of markets to generate progress, as postulated by the neoclassical tradition that culminates in RBC. It can really make the Brazilian innovation ecosystem more dynamic and efficient.

At the same time, it clearly exemplifies Harvey's analysis: it is a financial enterprise that seeks to capture, discipline and put into circulation capital a sector (technology) that is seen as the new frontier of valuation. It does this in a specific geographic space (Brazil/Latin America) as part of a global competition for capital flows.

So to ask about the relationship of the utility model to RBC and Harvey is to ask: Will the new exchange be primarily a conduit for financing the next generation of productive innovations, or will it primarily be a sophisticated

casino for global financial speculation, deepening inequalities? The answer lies not in theory, but in the concrete design of its governance, regulation and, above all, in society's ability to impose a productive and socially beneficial purpose on financialization. The utility model will inevitably be a bit of both – and the tension between these two faces is the very tension that drives twenty-first-century capitalism.

The sectoral analysis of technology in Brazil confirms and illustrates empirically the theoretical mechanisms discussed throughout this study. The Information and Communication Technology (ICT) sector accounted for 6.5% of Brazil's GDP in 2024, with an average annual growth of 8.4% in recent years — a consistently higher performance than the average of the national economy. This dynamism reflects, in part, the accelerated adoption of PaaS infrastructures, such as Google Cloud Platform, Google Studio, and Google Colab, which reduce entry costs, accelerate innovation, and enable startups and SMEs to access advanced computing capabilities without prior investments in physical capital.

The Brazilian startup ecosystem, mapped in 2024–2025, shows a significant concentration in segments intensive in digital platforms, such as Edtech, Fintech, Healthtech, and software development — sectors that, together, account for about 37% of national startups and attract relevant volumes of venture capital. Projections indicate that venture capital directed to Brazilian startups could reach US$ 2.2 billion in 2025, with segments such as Fintech and Healthtech leading the contributions. Although this figure still represents a modest fraction of total GDP (about 0.1%), its indirect impact on productivity, the generation of skilled jobs and technological diffusion is amplified by the mediation of PaaS platforms.

This Brazilian scenario exemplifies how digital platforms act as digital productive infrastructure, facilitating the internalization of technological externalities and promoting more resilient sectoral growth and with greater spillovers over aggregate GDP. The trajectory of the IT sector in Brazil — which maintained growth even in periods of economic slowdown — reinforces the idea that PaaS platforms function as stabilizers and amplifiers of technological shocks, compatible with an updated reading of RBC models in emerging economies.

Therefore, the Brazilian experience not only validates the central thesis of this work — that PaaS platforms redefine the nature of technical progress and its macroeconomic propagation — but also highlights the importance of public policies that encourage access to these digital infrastructures. Such

policies can enhance the creation of innovative ecosystems, raise total factor productivity, and consequently broaden long-term growth trajectories in developing economies.

4. The Algorithmic New Stock Exchange

4.1 Intangible Capital and Market Concentration

One of the defining features of the Algorithmic New Stock Exchange is the structural transition from resource-based valuation toward economies dominated by intangible capital. Historically, financial markets prioritized tangible assets such as physical infrastructure, commodities, and industrial production capacity as the primary anchors of firm value. However, the expansion of digital platforms, artificial intelligence systems, and data-driven business models has shifted the locus of competitive advantage toward intellectual property, proprietary algorithms, and informational networks. Within this new paradigm, value creation is increasingly associated with scalability and knowledge accumulation rather than material production, generating economic environments characterized by increasing returns to scale and strong network externalities (Haskell et al., 2017, *Capitalism Without Capital*).

The implications for market structure are profound. Firms capable of aggregating large datasets and deploying advanced machine learning infrastructures gain disproportionate informational advantages, enabling them to refine predictive models and optimize trading strategies with increasing precision. These feedback loops foster winner-takes-most dynamics, in which dominant platforms consolidate liquidity and influence over market narratives. Such concentration reflects a structural reconfiguration of financial intermediation, where exchanges and digital ecosystems evolve into hybrid entities combining trading functions with data monopolies. From a Schumpeterian perspective, this transformation can be interpreted as a phase of creative destruction that replaces traditional intermediaries with technologically integrated platforms (Schumpeter et al., 1942, *Capitalism, Socialism and Democracy*). Yet Austrian critiques emphasize that rapid technological expansion, particularly when supported by accommodative monetary conditions, may produce speculative

mispricing and capital misallocation (Hayek et al., 1945, *The Use of Knowledge in Society*).

The book *AI x New Stock Exchange* (Leandro, Aline et al 2026, *AI x New Stock Exchange*) situates these dynamics within broader geopolitical and structural asymmetries. Technological centers that control data infrastructures and AI research benefit from compounded advantages, while peripheral markets often depend on imported platforms and external capital flows. As intangible capital becomes the primary driver of valuation, financial markets increasingly reflect disparities in access to data and computational resources, reinforcing systemic concentration across global exchanges.

4.2 AI as Market Infrastructure

Artificial intelligence within the New Stock Exchange framework should not be understood merely as an auxiliary trading technology; rather, it constitutes an institutional layer that fundamentally reshapes price formation and market governance. In traditional markets, price discovery emerged from decentralized interactions among human traders interpreting public information. In contrast, AI-mediated exchanges rely on high-frequency data feeds, predictive analytics, and automated risk management systems that continuously recalibrate valuations based on evolving datasets. These algorithmic infrastructures transform financial markets into environments characterized by constant monitoring and adaptive learning, where volatility becomes an intrinsic property rather than an episodic disturbance.

The infrastructural role of AI aligns with Keynesian insights into the importance of expectations and conventions in financial markets (Keynes et al., 1936, *The General Theory of Employment, Interest and Money*). Machine learning models aggregate signals from diverse sources — macroeconomic indicators, news flows, and behavioral sentiment — effectively shaping the narratives that guide investment decisions. However, unlike human-driven expectations, algorithmic forecasts operate at computational speed, compressing the time horizon between information arrival and market reaction. This temporal acceleration amplifies the reflexivity identified by Minsky (Minsky et al., 1986, *Stabilizing an Unstable Economy*), as synchronized algorithmic strategies may intensify cycles of leverage and deleveraging.

Furthermore, AI-driven infrastructures blur the boundary between market participants and institutional architecture. Exchanges increasingly integrate algorithmic risk models into clearing mechanisms, liquidity provision, and regulatory compliance, embedding artificial intelligence into the core operational logic of financial systems. As a result, volatility becomes a **structural condition** generated by the interaction between predictive algorithms and investor behavior. Rather than responding passively to shocks, AI systems actively shape the propagation of information, influencing the magnitude and persistence of market fluctuations.

4.3 Conceptual Econometric Proposal

To capture the evolving dynamics of algorithmic markets, the paper proposes a conceptual econometric framework inspired by GARCH-MIDAS methodologies. Traditional volatility models often separate short-term fluctuations from long-run macroeconomic trends; however, the Algorithmic New Stock Exchange requires an analytical approach capable of integrating technological innovation cycles, credit expansion, and behavioral sentiment into a unified structure. The proposed framework interprets long-term volatility as partially driven by structural variables such as AI investment, intangible capital accumulation, and shifts in productivity expectations, while short-term dynamics reflect high-frequency trading signals and market microstructure effects.

In this hybrid model, macroeconomic indicators — including productivity growth, monetary conditions, and geopolitical risk measures — interact with real-time financial data to generate multi-horizon volatility regimes. The inclusion of technological innovation cycles reflects the argument advanced in *AI x New Stock Exchange* (Leandro, Aline et al 2026, *AI x New Stock Exchange*) that AI adoption introduces new sources of systemic fluctuation beyond traditional economic shocks. Credit expansion and speculative sentiment, consistent with Minskyan instability, act as amplifiers that translate technological narratives into asset price dynamics.

Conceptually, the framework bridges micro-level trading behavior with macro-financial outcomes. High-frequency indicators capture the adaptive responses of algorithmic agents, while slower-moving macro variables represent structural shifts in the economic environment. Behavioral sentiment indicators, inspired by prospect theory (Kahneman et al., 1979,

Prospect Theory), provide an additional layer linking investor psychology to volatility persistence. Although presented as a conceptual proposal rather than a fully estimated model, the approach highlights the need for econometric tools capable of integrating technological, behavioral, and macroeconomic dimensions within a single analytical architecture.

Collectively, these elements illustrate how the Algorithmic New Stock Exchange transforms the foundations of financial analysis. Intangible capital drives market concentration, AI functions as an infrastructural layer shaping price discovery, and hybrid econometric frameworks become essential for capturing the complex interplay between innovation cycles, behavioral dynamics, and macroeconomic forces. By situating algorithmic markets within a broader theoretical and methodological context, the paper advances a comprehensive understanding of how AI reshapes volatility regimes and redefines the architecture of contemporary capital markets.

5. Cross-Market Governance and Policy Implications: A Concluding Synthesis

The comparative perspective between the United States and Brazil highlights how the emergence of the Algorithmic New Stock Exchange unfolds through structurally asymmetric pathways shaped by technological capacity, institutional depth, and exposure to global capital cycles. In advanced markets such as the United States, volatility tends to emerge endogenously from domestic innovation dynamics, where artificial intelligence, venture capital ecosystems, and platform infrastructures generate feedback loops between technological expectations and asset valuations (Leandro, Aline et al., 2026, *AI x New Stock Exchange*; Keynes et al., 1936, *The General Theory of Employment, Interest and Money*). By contrast, the Brazilian market demonstrates stronger sensitivity to exogenous shocks, including geopolitical tensions, commodity cycles, and shifts in global liquidity conditions, reflecting a center–periphery structure in which technological infrastructures and data architectures remain partially externalized (Reinhart et al., 2009, *This Time Is Different*). These asymmetries reinforce the need for coordinated global governance capable of addressing algorithmic contagion and cross-border volatility transmission.

From a policy standpoint, artificial intelligence reshapes financial regulation across multiple dimensions. Macroprudential monitoring increasingly relies

on real-time data analytics to detect systemic fragility before crises materialize, echoing the Minskyan emphasis on endogenous instability (Minsky et al., 1986, *Stabilizing an Unstable Economy*). At the same time, algorithmic transparency becomes central to sustaining market trust as AI systems assume a more infrastructural role in price formation and liquidity provision. Innovation policy also emerges as a macroeconomic instrument: public investment in digital infrastructure and computational capacity may influence long-term discount rates, productivity expectations, and the distribution of technological rents (Haskell et al., 2017, *Capitalism Without Capital*). Within the financial advice industry, AI-based advisory platforms offer the potential to democratize access to portfolio management while simultaneously raising concerns about synchronized behavior and amplified herding effects, consistent with insights from behavioral finance (Kahneman et al., 1979, *Prospect Theory*).

Taken together, the cross-market comparison and policy analysis underscore a central conclusion: the Algorithmic New Stock Exchange is not merely a technological upgrade but a structural reconfiguration of global finance. AI-driven infrastructures reshape volatility regimes, redistribute informational power, and redefine the institutional architecture through which markets operate. Effective governance therefore requires an integrated framework that bridges domestic regulatory innovation with international coordination, ensuring that technological progress enhances resilience rather than amplifying systemic fragility. By situating AI within a broader macro-financial and institutional context, this synthesis highlights the urgency of adaptive regulatory design capable of navigating the evolving dynamics of algorithmic capitalism (Leandro, Aline et al., 2026, *AI x New Stock Exchange*).

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