



Adaptive Financial Ecosystems under Polycrisis: Toward a Theory of Financial Resilience for Economic Transformation

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Abstract

The increasing convergence of climate change, geopolitical instability, technological disruption, pandemics, and financial volatility has created a polycrisis environment that fundamentally challenges conventional understandings of financial resilience. Existing studies predominantly conceptualize financial resilience as the capacity to preserve stability or recover from isolated shocks, providing limited explanation of how financial systems continuously adapt and contribute to long-term economic transformation under persistent systemic uncertainty. This conceptual paper addresses this theoretical gap by developing the Theory of Adaptive Financial Resilience (TAFR), which integrates insights from resilience theory, complexity science, financial ecosystem research, systemic risk literature, and sustainability transition studies into a unified conceptual framework. The proposed framework positions the Adaptive Financial Ecosystem as the primary unit of analysis and conceptualizes financial resilience as an emergent capability generated through institutional agility, organizational learning, financial innovation, network reconfiguration, and collaborative governance. By reframing financial resilience as an adaptive and transformative ecosystem capability, this study extends existing theory beyond stability-oriented perspectives and provides a coherent foundation for explaining how financial systems can sustain economic transformation under polycrisis. The framework also offers a platform for future empirical validation and further theoretical development in adaptive finance and systemic resilience research.

Keywords

adaptive financial ecosystem; adaptive financial resilience;
economic transformation; financial resilience; polycrisis;
systemic resilience

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1. Introduction

The global economy has entered an era characterized not by isolated crises but by the simultaneous interaction of multiple, interconnected disruptions that reinforce one another across economic, financial, environmental, technological, and geopolitical domains. This phenomenon, increasingly described as polycrisis, reflects a condition in which individual crises become mutually entangled, generating cascading effects that amplify uncertainty and systemic vulnerability beyond the capacity of conventional policy responses (Helleiner, 2024; Lawrence *et al.*, 2024; Sogaard Jørgensen *et al.*, 2024). Unlike traditional financial shocks that can often be analyzed independently, polycrisis represents a dynamic configuration of interacting disturbances whose combined impacts are nonlinear, persistent, and difficult to predict (Ullah *et al.*, 2025). Consequently, the resilience of financial systems can no longer be understood solely through the lens of stability against isolated disturbances but must be reconsidered within the broader context of interconnected and evolving systemic risks.

Recent global events illustrate the increasing complexity of financial vulnerabilities. The COVID-19 pandemic exposed weaknesses in global supply chains and financial intermediation, while accelerating digital transformation across financial markets. Simultaneously, geopolitical conflicts, climate-related disasters, inflationary pressures, energy insecurity, and rapid technological disruption have interacted to reshape the risk landscape confronting governments, financial institutions, investors, and regulators. Climate change, in particular, has emerged as a major source of systemic financial risk, influencing asset valuation, investment decisions, and macro-financial stability (Bolton & Kacperczyk, 2021, 2023; Giglio *et al.*, 2021). Likewise, the expansion of digital finance and financial technology has increased financial efficiency but has also introduced new forms of operational, cyber, and systemic risks that challenge conventional regulatory frameworks (Thakor, 2020; Vives, 2019). These overlapping developments suggest that financial systems increasingly operate within highly interconnected environments where disturbances propagate through complex adaptive networks rather than linear transmission mechanisms.

The growing complexity of financial systems has motivated extensive research on systemic risk, financial contagion, and network stability. Financial networks have long been recognized as channels through which localized shocks spread across interconnected institutions, potentially threatening overall financial stability (Allen & Gale, 2000; Haldane & May, 2011). Complexity theory further argues that increasing interconnectedness can simultaneously enhance efficiency and magnify fragility, making financial systems vulnerable to cascading failures that are difficult to anticipate (Acemoglu *et al.*, 2015; Battiston *et al.*, 2012). Advances in network-based approaches have significantly improved understanding of contagion dynamics, systemic importance, and macro-financial vulnerabilities (Battiston *et al.*, 2012; Elliott *et al.*, 2014). Nevertheless, these studies primarily emphasize mechanisms for preserving financial stability, managing contagion, or reducing systemic risk, while providing comparatively limited attention to how financial systems continuously adapt and transform under prolonged conditions of interacting crises.

Parallel to developments in financial economics, resilience theory has evolved substantially within ecological and social-ecological research. Early conceptualizations defined resilience as the capacity of systems to absorb disturbances while maintaining essential functions (Holling, 1973). Subsequent scholarship broadened this perspective by emphasizing adaptation, learning, self-organization, and transformability as critical dimensions of resilience in complex adaptive systems (Folke, 2006; Walker *et al.*, 2004). These developments shifted resilience from a static notion of resistance toward a dynamic process through which systems reorganize in response to changing environmental conditions. Despite these advances, the application of resilience theory within financial research remains relatively fragmented. Existing studies frequently conceptualize financial resilience in terms of banking stability, liquidity management, capital adequacy, or crisis recovery, without fully

integrating adaptive processes that characterize complex financial ecosystems operating under polycrisis conditions.

Furthermore, literature on finance and economic transformation has increasingly recognized that financial systems perform functions extending beyond capital allocation. Financial institutions increasingly influence sustainability transitions, technological innovation, climate adaptation, and long-term structural transformation (Kanger & Schot, 2019; Loorbach, 2010; Markard *et al.*, 2012). Climate finance, sustainable investment, and responsible finance illustrate the expanding role of financial systems in supporting societal transformation toward sustainable development (Campiglio *et al.*, 2018; Pástor *et al.*, 2021; Pedersen *et al.*, 2021). However, these streams of research generally examine transformation from sectoral or policy perspectives rather than conceptualizing financial ecosystems themselves as adaptive systems capable of generating resilience under persistent polycrisis. As a result, important theoretical connections among financial resilience, adaptive ecosystems, and economic transformation remain insufficiently developed.

These observations reveal three interrelated conceptual gaps. First, existing financial resilience literature remains predominantly grounded in the objective of maintaining stability rather than explaining adaptive transformation within continuously evolving crisis environments. Second, research on systemic financial risk and financial ecosystems has largely concentrated on contagion, network structure, and regulatory stability while paying less attention to adaptive capabilities such as learning, institutional agility, innovation, and network reconfiguration. Third, the emerging literature on polycrisis has yet to be systematically integrated into financial resilience theory, leaving limited understanding of how interacting crises reshape the adaptive capacities of financial systems over time. Consequently, current theoretical perspectives remain insufficient to explain how financial ecosystems evolve, reorganize, and support long-term economic transformation under conditions of persistent uncertainty.

Addressing these gaps requires moving beyond conventional conceptions of financial resilience that emphasize recovery toward a broader theoretical perspective centered on adaptation and transformation. Rather than viewing resilience as the ability to return to a previous equilibrium following disruption, this paper conceptualizes resilience as the dynamic capability of financial ecosystems to absorb shocks, learn from crises, reconfigure institutional and network structures, foster financial innovation, and facilitate sustainable economic transformation. Such a perspective aligns resilience theory with complexity science and acknowledges that financial systems increasingly operate as adaptive ecosystems characterized by continuous interaction among institutions, markets, technologies, policies, and societal actors.

Accordingly, this conceptual paper proposes the Theory of Adaptive Financial Resilience, which positions financial resilience as an emergent capability of adaptive financial ecosystems operating under polycrisis conditions. The proposed framework integrates insights from resilience theory, complexity theory, systemic risk research, financial ecosystem literature, and sustainability transition studies to explain how adaptive capacities enable financial systems not only to withstand cascading crises but also to contribute to long-term economic transformation. By introducing adaptive financial ecosystems as the central unit of analysis, this study extends existing financial resilience literature from a predominantly stability-oriented perspective toward a dynamic, ecosystem-based understanding of resilience. In doing so, the paper contributes to the growing discourse on financial resilience by offering an integrative conceptual foundation capable of supporting future theoretical development and empirical investigation in an increasingly uncertain global environment.

2. Theoretical Foundations

2.1 Polycrisis as a New Context for Financial Systems

The concept of polycrisis has emerged to describe a condition in which multiple crises occur simultaneously and interact through reinforcing feedback mechanisms, creating outcomes that cannot be explained by analyzing each crisis independently (Lawrence *et al.*, 2024). Unlike conventional crisis frameworks that assume discrete and sequential shocks, polycrisis emphasizes systemic interdependence, nonlinear interactions, and cascading disruptions across social, economic, environmental, and political systems (Søgaard Jørgensen *et al.*, 2024). In such circumstances, crises no longer represent temporary deviations from equilibrium but become persistent features of an increasingly interconnected global system.

Recent scholarship argues that polycrisis is fundamentally characterized by crisis entanglement, whereby disturbances originating in one domain propagate rapidly into others through tightly coupled institutional and economic networks (Helleiner, 2024). Climate change intensifies food insecurity, geopolitical conflicts disrupt global energy markets, pandemics accelerate digital transformation, and financial instability amplifies macroeconomic vulnerabilities. These mutually reinforcing dynamics create feedback loops that increase uncertainty and reduce the effectiveness of conventional stabilization policies (Ullah *et al.*, 2025).

For financial systems, polycrisis fundamentally alters the nature of systemic risk. Traditional models generally treat financial shocks as exogenous events that propagate through interconnected balance sheets or market relationships (Allen & Gale, 2000; Gai & Kapadia, 2010). Under polycrisis, however, financial systems are continuously exposed to multiple endogenous and exogenous disturbances occurring simultaneously, including climate risks, cyber threats, technological disruption, geopolitical instability, inflationary pressures, and supply-chain fragmentation. Consequently, financial resilience can no longer be understood merely as the ability to absorb isolated shocks but must encompass continuous adaptation under evolving conditions of uncertainty.

2.2 Financial Ecosystems as Complex Adaptive Systems

Financial systems have traditionally been conceptualized as networks of institutions that facilitate capital allocation, liquidity provision, and risk sharing (Beck *et al.*, 2000; King & Levine, 1993). However, increasing digitalization, globalization, and institutional interconnectedness have transformed these systems into highly complex ecosystems characterized by nonlinear interactions among banks, financial markets, regulators, technology firms, investors, and governments.

Complexity theory provides an appropriate lens for understanding these evolving financial structures. Rather than behaving as predictable equilibrium systems, complex adaptive systems consist of heterogeneous agents whose interactions generate emergent behaviors that cannot be inferred from individual components alone (May *et al.*, 2008). In financial contexts, these interactions produce both efficiency and fragility, since greater interconnectedness simultaneously enhances resource allocation and facilitates contagion during periods of stress (Battiston *et al.*, 2016).

The network perspective has significantly advanced understanding of systemic financial risk. Studies demonstrate that the position of institutions within financial networks influences their capacity to transmit or absorb shocks (Battiston *et al.*, 2012; Elliott *et al.*, 2014). Likewise, Haldane & May (2011) argue that banking systems resemble ecological ecosystems in which excessive interconnectedness may increase systemic vulnerability despite improving operational efficiency. Acemoglu *et al.* (2015) further show that network structures determine

whether shocks remain localized or escalate into systemic crises depending on their magnitude and distribution.

Despite these advances, existing network-based perspectives primarily emphasize contagion mechanisms and systemic stability. Comparatively less attention has been devoted to explaining how financial ecosystems adapt, reorganize, and evolve following repeated disruptions. Viewing financial systems as adaptive ecosystems shifts analytical attention from structural stability toward dynamic capabilities such as institutional learning, innovation, collaboration, and network reconfiguration. These adaptive processes become particularly important under polycrisis, where continuous change rather than temporary equilibrium increasingly defines the operating environment.

The emergence of digital finance further reinforces the ecosystem perspective. Financial technologies have expanded interactions among traditional financial institutions, fintech firms, digital platforms, regulators, and consumers, creating more decentralized and adaptive financial architectures (Goldstein *et al.*, 2019; Gomber *et al.*, 2017). While digitalization increases efficiency and financial inclusion (Ozili, 2018), it also introduces new systemic vulnerabilities related to cybersecurity, operational resilience, regulatory arbitrage, and technological dependence (Thakor, 2020; Vives, 2019). These developments suggest that financial resilience increasingly depends on the adaptive capacity of the ecosystem as a whole rather than the robustness of individual institutions.

2.3 From Stability to Adaptive Financial Resilience

Resilience theory originated within ecology as an alternative to equilibrium-based perspectives on system stability. Holling (1973) distinguished resilience from stability by defining resilience as the capacity of systems to absorb disturbances while maintaining essential structures and functions. This perspective challenged the assumption that systems naturally return to a single equilibrium following disruption, proposing instead that adaptive capacity determines long-term system persistence.

Subsequent developments expanded resilience beyond ecological systems to encompass social and institutional contexts. Walker *et al.* (2004) introduced the concepts of adaptability and transformability, arguing that resilient systems continuously adjust internal structures in response to changing environmental conditions. Folke (2006) further emphasized learning, self-organization, experimentation, and institutional flexibility as fundamental characteristics of resilient complex adaptive systems.

These theoretical developments imply that resilience is not merely the capacity to resist shocks but the capability to evolve through disturbance. Accordingly, resilience becomes a dynamic process involving continuous adaptation rather than a static condition of robustness.

Within financial research, however, resilience has often been interpreted more narrowly. Existing studies typically associate financial resilience with banking stability, liquidity management, capital adequacy, prudential regulation, or post-crisis recovery (Adrian & Brunnermeier, 2016; Brunnermeier & Pedersen, 2009; Diamond & Dybvig, 1983). While these perspectives provide valuable insights into financial stability, they generally conceptualize resilience as preserving system functionality under stress rather than facilitating adaptive transformation.

Recent developments in climate finance have begun expanding this perspective. Climate-related financial risks increasingly require financial institutions to integrate long-term environmental uncertainty into investment decisions, stress testing, and regulatory frameworks (Campiglio *et al.*, 2018; Carè *et al.*, 2024). Similarly, research on carbon-transition risk demonstrates that financial resilience depends on institutional capacity to anticipate structural economic transitions rather than merely responding to realized losses (Bolton & Kacperczyk, 2023; Ilhan *et al.*, 2021). These emerging studies suggest that

resilience should increasingly be understood as an adaptive capability that enables financial systems to evolve alongside changing environmental, technological, and societal conditions.

2.4 Financial Resilience as a Driver of Economic Transformation

Financial systems perform functions extending beyond financial intermediation. They influence technological innovation, industrial restructuring, sustainability transitions, and long-term economic development through capital allocation and risk management (Beck *et al.*, 2000; Rajan & Zingales, 1998). Consequently, the resilience of financial systems directly shapes the capacity of economies to undergo structural transformation under conditions of persistent uncertainty.

Transition theory offers important insights into this relationship. Sustainability transitions are understood as long-term processes involving technological innovation, institutional change, policy evolution, and societal learning (Geels, 2002; Markard *et al.*, 2012). Transition management further emphasizes adaptive governance, experimentation, and institutional coordination as essential mechanisms for navigating systemic change (Loorbach, 2010). More recently, the Deep Transitions framework argues that large-scale societal transformations emerge through the interaction of multiple socio-technical systems operating over extended periods (Kanger & Schot, 2019).

These perspectives highlight that transformation requires financial systems capable of supporting innovation while managing uncertainty. Climate finance and sustainable investment exemplify this evolving role by directing financial resources toward low-carbon technologies, resilient infrastructure, and sustainable economic activities (Giglio *et al.*, 2021; Pástor *et al.*, 2021; Pedersen *et al.*, 2021). Likewise, financial institutions increasingly function as strategic actors that influence the pace and direction of sustainability transitions through investment decisions, risk assessment, and governance mechanisms.

Nevertheless, existing transition research rarely conceptualizes financial systems themselves as adaptive ecosystems undergoing transformation. Instead, finance is generally treated as an enabling instrument rather than an evolving system with its own adaptive dynamics. This limitation restricts understanding of how financial ecosystems simultaneously respond to polycrisis and facilitate broader economic transformation.

Taken together, the preceding theoretical perspectives suggest the need for an integrative framework that connects polycrisis, complex adaptive financial ecosystems, resilience theory, and economic transformation. While each literature offers valuable insights independently, their conceptual integration remains underdeveloped. Bridging these perspectives provides the theoretical foundation for reconceptualizing financial resilience as an emergent capability of adaptive financial ecosystems. This integrated understanding serves as the basis for developing the proposed Theory of Adaptive Financial Resilience, which is elaborated in the following section through an analysis of the existing conceptual gaps and the formulation of a new theoretical framework.

The preceding discussion demonstrates that existing theoretical perspectives provide complementary insights but remain fragmented. Their systematic integration establishes the conceptual foundation for developing a comprehensive theory of adaptive financial resilience.

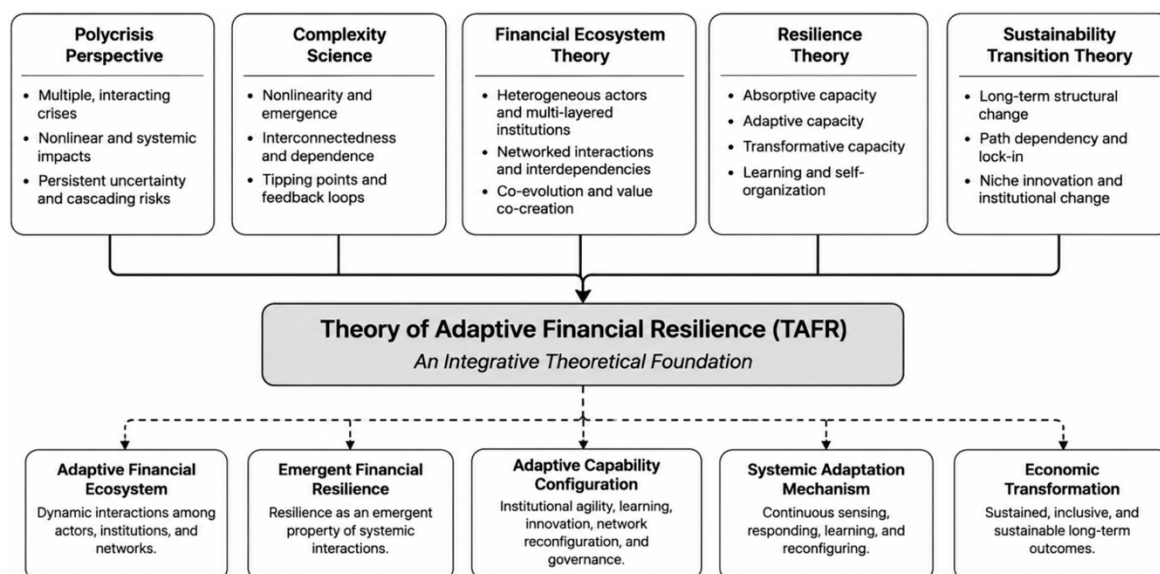


Figure 1. Theoretical Integration Underpinning the Theory of Adaptive Financial Resilience (TAFR)
Source: Developed by the author based on Holling (1973), Walker et al. (2004), Folke (2006), Battiston et al. (2012, 2016), Haldane and May (2011), Lawrence et al. (2024), Sogaard Jorgensen et al. (2024), Geels (2002), Loorbach (2010), Markard et al. (2012), and Kanger and Schot (2019).

Figure 1 illustrates how previously independent theoretical traditions converge to establish the conceptual foundation of TAFR. Rather than treating resilience, financial ecosystems, complexity, polycrisis, and sustainability transitions as separate perspectives, the framework integrates their complementary explanatory roles into a unified theoretical basis for explaining adaptive financial resilience and long-term economic transformation under persistent systemic uncertainty.

3. Conceptual Gap and Toward a Theory of Adaptive Financial Resilience

The preceding discussion demonstrates that the literature on polycrisis, financial ecosystems, resilience, and economic transformation has developed substantially over the past two decades. Each stream has generated important theoretical insights into systemic uncertainty, financial stability, adaptive systems, and structural change. Nevertheless, these perspectives have largely evolved in parallel, resulting in fragmented explanations of how financial systems respond to increasingly interconnected and persistent crises. This fragmentation limits the ability of existing theories to explain the dynamic processes through which financial systems not only survive crises but also adapt, reorganize, and contribute to long-term economic transformation. Accordingly, a more integrative conceptual perspective is required.

The first conceptual limitation concerns the dominant understanding of financial resilience itself. Existing financial literature generally conceptualizes resilience as the capacity of financial institutions or financial systems to maintain stability, preserve liquidity, or recover rapidly following external shocks (Adrian & Brunnermeier, 2016; Brunnermeier & Pedersen, 2009; Diamond & Dybvig, 1983). This perspective reflects a stability-oriented paradigm in which resilience is primarily associated with restoring pre-crisis conditions. While such an approach has proven valuable for analyzing financial crises characterized by temporary disruptions, it becomes increasingly inadequate under conditions of polycrisis where disturbances are continuous, overlapping, and mutually reinforcing.

Unlike isolated financial crises, polycrisis creates persistent uncertainty in which systems rarely return to their previous equilibrium. Instead, financial institutions must continuously

adjust their strategies, governance structures, technological capabilities, and risk management practices in response to evolving conditions. Consequently, resilience should no longer be interpreted solely as recovery or resistance but as an ongoing adaptive capability that enables financial systems to evolve while maintaining their core economic functions. This perspective is more consistent with resilience theory developed in ecological and social-ecological systems, which emphasizes adaptation, learning, and transformability as defining characteristics of resilient systems (Folke, 2006; Holling, 1973; Walker *et al.*, 2004). However, these insights remain only partially incorporated into mainstream financial resilience research.

A second conceptual gap concerns the treatment of financial ecosystems. Existing studies on systemic risk have significantly advanced understanding of financial contagion, interconnectedness, and network fragility (Acemoglu *et al.*, 2015; Battiston *et al.*, 2012; Ullah *et al.*, 2025). Complexity theory likewise explains how interactions among heterogeneous financial actors generate nonlinear outcomes that influence overall system stability (Battiston *et al.*, 2016; Haldane & May, 2011). Nevertheless, the dominant focus remains on identifying vulnerabilities and preventing systemic collapse.

Although network theory successfully explains how risks spread across interconnected institutions, it provides comparatively limited explanation of how networks reorganize after repeated disturbances. Financial ecosystems are typically modeled as static network structures rather than adaptive configurations capable of institutional learning, innovation, and strategic reconfiguration. As digital finance, artificial intelligence, decentralized finance, and platform-based financial services increasingly reshape financial interactions, ecosystem adaptability becomes as important as network stability. Therefore, understanding financial resilience requires moving beyond structural interconnectedness toward a broader ecosystem perspective that recognizes continuous adaptation as an inherent characteristic of financial systems operating under persistent uncertainty.

The third conceptual limitation relates to the emerging literature on polycrisis. Recent studies convincingly demonstrate that contemporary crises are increasingly interconnected through feedback loops and cascading mechanisms that span environmental, economic, technological, and geopolitical domains (Lawrence *et al.*, 2024; Søgaaard Jørgensen *et al.*, 2024; Ullah *et al.*, 2025). These contributions successfully redefine the nature of systemic uncertainty but devote relatively limited attention to the adaptive mechanisms through which financial systems respond to crisis entanglement.

Most polycrisis studies focus on identifying the causes and interactions of crises rather than explaining how financial institutions, markets, and regulatory systems dynamically reorganize in response to prolonged uncertainty. Consequently, financial systems often appear as passive recipients of systemic shocks rather than active adaptive systems capable of facilitating broader societal resilience. This omission is particularly significant because financial institutions influence investment allocation, technological innovation, infrastructure development, and risk distribution, all of which shape societal capacity to respond to polycrisis.

A fourth conceptual gap concerns the relationship between financial resilience and economic transformation. Existing literature increasingly recognizes the importance of finance for sustainability transitions, climate adaptation, and technological innovation (Geels, 2002; Kanger & Schot, 2019; Markard *et al.*, 2012). Likewise, climate finance and sustainable investment research demonstrate that financial decisions influence long-term structural change by reallocating capital toward low-carbon and resilient economic activities (Giglio *et al.*, 2021; Pástor *et al.*, 2021; Pedersen *et al.*, 2021). Despite these developments, transformation is generally treated as an outcome of financial investment rather than as a process emerging from the adaptive evolution of financial ecosystems themselves.

This distinction is theoretically important. If financial systems are conceptualized merely as channels of capital allocation, resilience remains confined to financial stability. However, if financial systems are viewed as adaptive ecosystems composed of interconnected institutions, technologies, governance arrangements, and knowledge networks, resilience becomes a dynamic capability that enables continuous institutional transformation. In this perspective, resilient financial ecosystems do not simply recover from crises; they actively reshape financial practices, governance mechanisms, innovation processes, and resource allocation in ways that facilitate broader economic transformation.

Collectively, these four conceptual gaps reveal a common limitation across existing literature. Current theories explain either crisis interaction, systemic financial risk, resilience, or economic transformation, but they rarely integrate these perspectives into a coherent conceptual framework. Consequently, there remains no comprehensive theory explaining how adaptive financial ecosystems develop resilience under polycrisis while simultaneously supporting long-term economic transformation.

To address this limitation, this paper proposes a shift from a stability-based paradigm toward an adaptation-based paradigm of financial resilience. Rather than defining resilience as the preservation or restoration of equilibrium, resilience is conceptualized as an emergent capability arising from continuous interactions among institutions, markets, technologies, regulatory arrangements, and societal actors. This capability enables financial ecosystems to absorb disturbances, generate organizational learning, reconfigure institutional relationships, foster financial innovation, and adapt governance mechanisms in response to evolving systemic risks.

Building on resilience theory, complexity science, financial network research, and sustainability transition studies, this paper introduces the concept of the Adaptive Financial Ecosystem as the primary analytical unit. Unlike institution-centered approaches, the Adaptive Financial Ecosystem recognizes that resilience emerges from interactions among multiple actors rather than from the robustness of individual organizations. Adaptive capacity therefore becomes a system-level property generated through learning, collaboration, institutional agility, technological innovation, and network reconfiguration.

Accordingly, this study defines Adaptive Financial Resilience as the emergent capability of *interconnected financial ecosystems to continuously absorb, learn from, adapt to, and transform in response to persistent and interacting crises while sustaining financial intermediation and enabling long-term economic transformation*. This definition extends conventional financial resilience in three important respects. First, it shifts the analytical focus from post-crisis recovery to continuous adaptation. Second, it positions the financial ecosystem, rather than individual institutions, as the primary unit of resilience. Third, it explicitly incorporates economic transformation as an intended outcome of resilient financial systems operating under polycrisis.

This reconceptualization provides the theoretical foundation for developing the Theory of Adaptive Financial Resilience (TAFR). Rather than viewing resilience as a defensive response to systemic disruption, TAFR conceptualizes resilience as a dynamic and evolutionary capability through which adaptive financial ecosystems continuously reorganize themselves under conditions of uncertainty. In doing so, the proposed theory integrates previously fragmented literatures into a unified framework capable of explaining how financial systems can simultaneously withstand cascading crises and catalyze sustainable economic transformation. The following section develops this theoretical proposition by presenting the conceptual architecture of the Adaptive Financial Resilience Framework and explaining the mechanisms through which adaptive capabilities generate resilience and transformation.

4. Proposed Adaptive Financial Resilience Framework

The conceptual gaps identified in the preceding section indicate that existing theories remain insufficient to explain how financial systems continuously adapt under conditions of persistent and interacting crises. While research on systemic risk explains the propagation of shocks, resilience theory emphasizes adaptive capacity, and transition studies focus on long-term structural change, these perspectives have rarely been integrated into a unified theoretical framework. To address this limitation, this paper proposes the Adaptive Financial Resilience Framework, which serves as the conceptual foundation of the Theory of Adaptive Financial Resilience (TAFR).

The proposed framework conceptualizes financial resilience as an emergent capability of an adaptive financial ecosystem rather than as an inherent characteristic of individual financial institutions. In contrast to traditional approaches that view resilience as post-crisis recovery or equilibrium restoration, TAFR argues that resilience is continuously produced through interactions among financial institutions, regulatory bodies, technological platforms, markets, and broader socio-economic actors. Under polycrisis conditions, these interactions become increasingly dynamic because financial systems must simultaneously respond to multiple sources of uncertainty while sustaining their essential functions of financial intermediation, capital allocation, and risk management.

Accordingly, the framework consists of four interconnected conceptual components: (1) Polycrisis as the external systemic context; (2) Adaptive Financial Ecosystem as the system-level adaptive architecture; (3) Adaptive Financial Resilience as the emergent system capability; and (4) Economic Transformation as the long-term systemic outcome. Rather than representing a linear causal chain, these components interact recursively through continuous feedback processes that enable financial systems to learn, reorganize, and evolve over time.

The proposed theory conceptualizes financial resilience as an ecosystem-level capability emerging through continuous adaptation. The following framework summarizes the recursive relationships connecting polycrisis, adaptive ecosystems, resilience, and transformation.

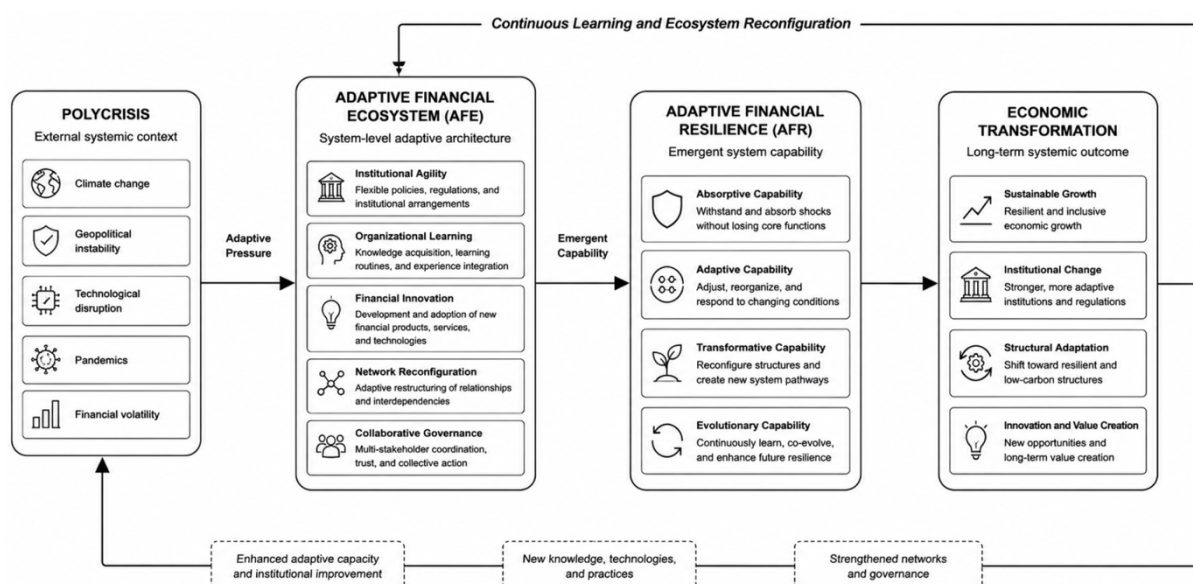


Figure 2. Adaptive Financial Resilience Framework (TAFR)

Source: Developed by the author based on Holling (1973), Walker et al. (2004), Folke (2006), Battiston et al. (2012, 2016), Haldane and May (2011), Geels (2002), Loorbach (2010), Markard et al. (2012), Lawrence et al. (2024), and Sogaard Jørgensen et al. (2024).

Figure 2 presents the proposed TAFR as a recursive conceptual framework in which polycrisis generates adaptive pressure on financial ecosystems. Adaptive ecosystem

capabilities collectively produce adaptive financial resilience, which subsequently enables long-term economic transformation. Feedback from transformation continuously strengthens ecosystem learning, institutional adaptation, and future resilience, emphasizing resilience as an evolving rather than equilibrium-based capability.

4.1 Polycrisis as the Driver of Adaptive Pressure

The first component recognizes polycrisis as the external environment that generates persistent adaptive pressure on financial systems. Unlike traditional financial crises that originate primarily within financial markets, polycrisis encompasses simultaneous disruptions arising from climate change, geopolitical instability, technological transformation, pandemics, cyber risks, inflationary shocks, and supply-chain fragmentation (Lawrence *et al.*, 2024; Sogaard Jørgensen *et al.*, 2024). These disturbances interact through reinforcing feedback loops, increasing uncertainty while reducing the effectiveness of isolated policy interventions.

Within TAFR, polycrisis is not interpreted merely as a source of external risk but as the catalyst that stimulates adaptive evolution within financial ecosystems. Continuous exposure to interacting crises forces financial actors to revise governance arrangements, redesign financial products, strengthen institutional coordination, and develop new mechanisms for risk management. Therefore, resilience is conceptualized as an adaptive response to sustained systemic pressure rather than as a temporary reaction to isolated shocks.

4.2 Adaptive Financial Ecosystem

The central construct of the proposed theory is the Adaptive Financial Ecosystem (AFE). The concept extends conventional views of financial systems by recognizing that resilience emerges from interactions among heterogeneous actors rather than from the robustness of individual organizations. Drawing upon complexity theory and ecosystem perspectives, the AFE consists of interconnected financial institutions, capital markets, central banks, regulators, fintech firms, digital platforms, investors, governments, and knowledge-producing organizations whose collective interactions determine system adaptability (Battiston *et al.*, 2016; Haldane & May, 2011)

Unlike static financial network models, the Adaptive Financial Ecosystem continuously evolves through learning, experimentation, institutional adjustment, and technological innovation. Its resilience therefore depends on adaptive relationships rather than fixed structural arrangements. This perspective aligns with resilience theory, which argues that adaptive systems maintain functionality by reorganizing internal structures instead of preserving existing configurations (Folke, 2006; Walker *et al.*, 2004).

Within the proposed framework, the Adaptive Financial Ecosystem is characterized by five interrelated adaptive capabilities.

Institutional agility refers to the ability of financial institutions and regulatory authorities to rapidly revise governance arrangements, regulatory frameworks, and organizational practices in response to changing systemic conditions. Agile institutions reduce response delays and enhance collective coordination during periods of heightened uncertainty.

Organizational learning represents the capacity of ecosystem participants to accumulate knowledge from previous crises, integrate new information, and continuously improve decision-making processes. Learning transforms crises from isolated disruptions into opportunities for institutional adaptation.

Financial innovation encompasses technological innovation, digital financial services, climate finance instruments, and new risk-sharing mechanisms that improve the flexibility of financial intermediation. Rather than treating innovation solely as technological advancement, TAFR conceptualizes innovation as a mechanism through which ecosystems expand their adaptive capacity (Gomber *et al.*, 2017; Thakor, 2020).

Network reconfiguration refers to the dynamic restructuring of relationships among financial actors following systemic disturbances. Instead of preserving existing network structures, resilient ecosystems continuously modify collaborative relationships, information flows, and resource allocation to reduce systemic vulnerability.

Finally, collaborative governance captures the collective coordination among regulators, governments, financial institutions, international organizations, and private-sector actors. Since polycrisis extends beyond the capacity of individual institutions, resilience increasingly depends on multi-level governance arrangements capable of coordinating adaptive responses across sectors and jurisdictions.

These five adaptive capabilities collectively constitute the dynamic architecture through which financial ecosystems respond to polycrisis.

4.3 Adaptive Financial Resilience as an Emergent Capability

Building upon the Adaptive Financial Ecosystem, the framework conceptualizes Adaptive Financial Resilience (AFR) as an emergent system capability rather than an organizational attribute. Emergence implies that resilience arises from interactions among ecosystem participants rather than from isolated institutional characteristics (Battiston *et al.*, 2016; May *et al.*, 2008). Consequently, resilience cannot be fully understood by examining banks, regulators, or markets independently; instead, it reflects the adaptive behavior of the ecosystem as an integrated whole.

Adaptive Financial Resilience comprises four sequential yet mutually reinforcing processes.

The first process is absorptive capability, referring to the ecosystem's capacity to maintain essential financial functions during periods of disruption. Consistent with classical resilience theory, absorptive capability prevents systemic collapse by preserving liquidity, payment systems, financial intermediation, and market confidence.

The second process is adaptive capability, whereby ecosystem participants modify organizational routines, governance arrangements, technological infrastructures, and investment strategies in response to evolving conditions. Adaptation enables financial systems to remain functional despite changing external environments.

The third process is transformative capability, which extends beyond adaptation by fundamentally altering institutional structures, financial practices, and governance mechanisms. Transformation occurs when existing arrangements become insufficient for addressing persistent polycrisis, requiring new organizational configurations capable of supporting future resilience.

The fourth process is evolutionary capability, representing continuous learning across successive crisis episodes. Evolution enables financial ecosystems to accumulate institutional knowledge that improves long-term adaptive performance rather than merely restoring previous operating conditions.

Together, these four capabilities redefine financial resilience as a continuous evolutionary process rather than a temporary recovery mechanism.

4.4 Financial Resilience and Economic Transformation

A distinguishing feature of TAFR is its explicit recognition that financial resilience contributes to economic transformation. Existing financial stability literature generally treats resilience as an end in itself, emphasizing the preservation of market functioning and macro-financial stability. By contrast, the proposed theory argues that resilient financial ecosystems actively facilitate structural economic transformation through adaptive capital allocation, technological innovation, institutional learning, and sustainable investment.

Transition theory suggests that long-term structural change requires coordinated interactions among technological innovation, institutional reform, policy development, and financial investment (Geels, 2002; Loorbach, 2010; Markard *et al.*, 2012). Financial ecosystems influence these processes by directing resources toward emerging industries, financing sustainable infrastructure, supporting climate adaptation, and encouraging innovation under uncertainty (Giglio *et al.*, 2021; Pástor *et al.*, 2021).

Consequently, economic transformation represents not merely the consequence of financial investment but the cumulative outcome of adaptive financial ecosystems continuously responding to polycrisis. Through repeated cycles of learning, innovation, governance adaptation, and network reconfiguration, resilient financial ecosystems become strategic enablers of long-term economic restructuring.

4.5 Conceptual Propositions

Based on the Adaptive Financial Resilience Framework, five conceptual propositions are advanced to guide future empirical investigation.

Proposition 1 (P1)

The intensity of polycrisis increases adaptive pressure on financial ecosystems, requiring continuous institutional adjustment and ecosystem-wide coordination.

Proposition 2 (P2)

The adaptive capabilities of the financial ecosystem: comprising institutional agility, organizational learning, financial innovation, network reconfiguration, and collaborative governance, positively enhance Adaptive Financial Resilience.

Proposition 3 (P3)

Network reconfiguration mediates the relationship between adaptive capabilities and Adaptive Financial Resilience by facilitating the redistribution of information, resources, and institutional coordination following systemic disruption.

Proposition 4 (P4)

Institutional agility strengthens the effectiveness of adaptive capabilities by enabling faster governance responses and regulatory adaptation under conditions of polycrisis.

Proposition 5 (P5)

Adaptive Financial Resilience positively contributes to long-term economic transformation by supporting sustainable capital allocation, institutional innovation, and structural economic adaptation.

Collectively, these propositions position Adaptive Financial Resilience as the central mechanism linking polycrisis to economic transformation.

The proposed propositions collectively specify the internal mechanism through which adaptive capabilities translate persistent polycrisis into resilient financial ecosystems capable of supporting long-term economic transformation.

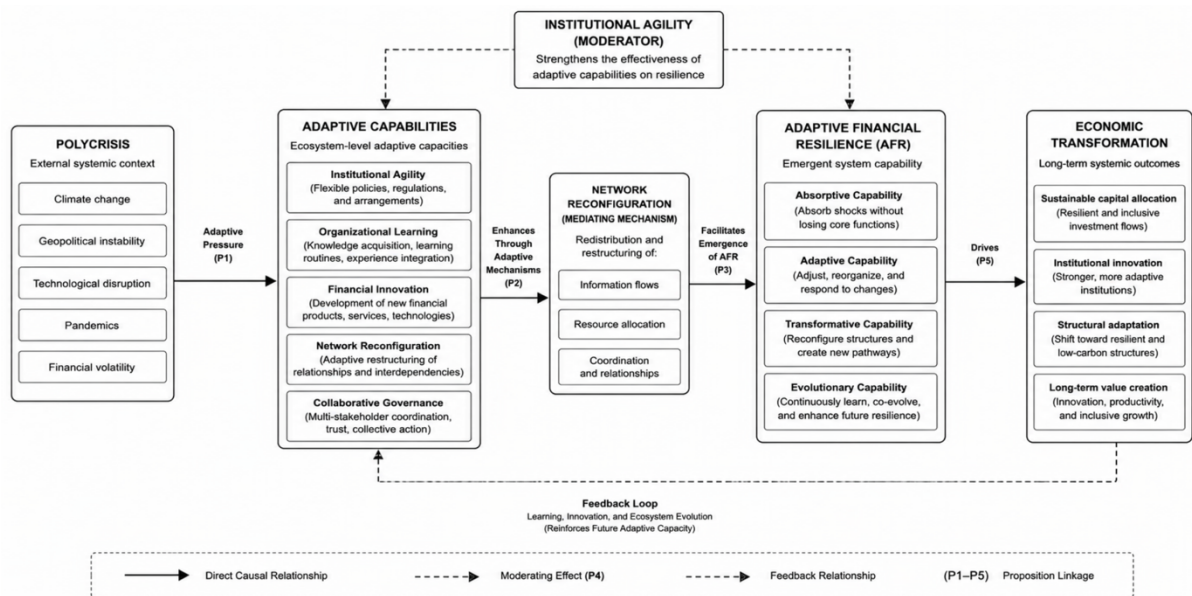


Figure 3. Adaptive Mechanism Linking Polycrisis to Economic Transformation

Source: Developed by the author based on Holling (1973), Walker et al. (2004), Folke (2006), Battiston et al. (2012, 2016), Haldane and May (2011), Lawrence et al. (2024), Søgaard Jørgensen et al. (2024), and the conceptual propositions developed in this study.

Figure 3 illustrates the causal mechanism proposed by TAFR. Persistent polycrisis generates adaptive pressure that activates ecosystem capabilities, while network reconfiguration mediates and institutional agility strengthens their influence on Adaptive Financial Resilience. The resulting resilience enhances sustainable capital allocation, institutional innovation, and structural adaptation, ultimately enabling long-term economic transformation under persistent systemic uncertainty.

4.6 Theoretical Advancement

The Adaptive Financial Resilience Framework advances the literature in three significant ways. First, it redefines financial resilience from a stability-oriented concept into an adaptive and evolutionary capability suited to environments characterized by persistent polycrisis. Second, it introduces the Adaptive Financial Ecosystem as a new system-level unit of analysis, shifting attention from individual institutions to the interactions among diverse financial actors. Third, it explicitly integrates resilience theory, complexity science, systemic risk research, and sustainability transition theory into a coherent conceptual model that explains not only how financial systems withstand crises but also how they contribute to long-term economic transformation.

Accordingly, the proposed Theory of Adaptive Financial Resilience (TAFR) provides a novel conceptual lens for understanding the evolving role of financial systems in an increasingly uncertain world. Rather than conceptualizing resilience as the restoration of equilibrium, TAFR views resilience as an emergent, adaptive, and transformative capability that enables financial ecosystems to continuously evolve while supporting sustainable economic development under conditions of persistent polycrisis.

5. Discussion

The Theory of Adaptive Financial Resilience (TAFR) proposed in this paper offers a new conceptual perspective for understanding the role of financial systems in an era increasingly characterized by persistent and interconnected crises. Rather than viewing resilience as the capacity to restore stability after isolated disruptions, the proposed framework conceptualizes resilience as an adaptive, evolutionary, and ecosystem-level capability that

enables financial systems to continuously respond to polycrisis while supporting long-term economic transformation. This reconceptualization has important implications for theory, policy, and future research.

5.1 Theoretical Implications

The first theoretical contribution lies in redefining the concept of financial resilience. Existing literature has largely approached resilience through the lenses of financial stability, liquidity preservation, systemic risk mitigation, and post-crisis recovery (Adrian & Brunnermeier, 2016; Brunnermeier & Pedersen, 2009; Diamond & Dybvig, 1983). Although these perspectives remain essential for maintaining the functioning of financial systems, they are primarily rooted in an equilibrium-oriented paradigm that assumes systems eventually return to a stable state after disruption.

The findings of this conceptual analysis suggest that such an assumption is increasingly inconsistent with the realities of polycrisis. Contemporary financial systems operate in environments characterized by continuous uncertainty, where climate risks, technological disruption, geopolitical tensions, pandemics, and macroeconomic instability interact simultaneously (Lawrence *et al.*, 2024; Søgaaard Jørgensen *et al.*, 2024). Under these conditions, resilience should be understood not as the restoration of a previous equilibrium but as the capability to continuously adapt, reorganize, and evolve while maintaining essential financial functions. In this respect, TAFR extends resilience theory by integrating adaptive and transformative dimensions originally developed within ecological systems into the domain of financial ecosystems (Folke, 2006; Holling, 1973; Walker *et al.*, 2004)

A second contribution concerns the analytical unit through which financial resilience is examined. Previous studies have primarily focused on individual institutions, banking systems, or financial markets as the primary objects of analysis. While these perspectives remain valuable, they are insufficient for explaining resilience in highly interconnected financial environments where interactions among multiple actors shape systemic outcomes. By introducing the Adaptive Financial Ecosystem, this paper shifts the analytical focus from organizational resilience to ecosystem resilience. This perspective recognizes that resilience emerges from interactions among financial institutions, regulators, digital platforms, investors, governments, and technological infrastructures rather than from the robustness of any single institution. Such an ecosystem perspective complements complexity theory and financial network research by emphasizing adaptive relationships alongside structural interconnectedness (Acemoglu *et al.*, 2015; Battiston *et al.*, 2016; Haldane & May, 2011).

Third, TAFR contributes to bridging previously fragmented streams of literature. Research on systemic financial risk explains contagion and network vulnerability; resilience theory explains adaptation and learning; sustainability transition studies explain structural transformation; and polycrisis research explains crisis entanglement. However, these perspectives have rarely been integrated into a single theoretical framework. TAFR addresses this fragmentation by positioning adaptive capability as the mechanism that links polycrisis to financial resilience and, ultimately, to economic transformation. In doing so, the proposed theory extends the conceptual boundaries of financial resilience beyond crisis management toward long-term systemic adaptation.

5.2 Practical and Policy Implications

The proposed framework also carries important implications for financial governance and public policy. If resilience is viewed as an ecosystem capability rather than an institutional attribute, policymakers should move beyond regulatory approaches that focus exclusively on capital adequacy, liquidity buffers, or prudential supervision. Although these instruments remain indispensable, they are insufficient for addressing the dynamic and interconnected risks associated with polycrisis.

Instead, regulators should strengthen adaptive governance mechanisms that enhance coordination among financial institutions, central banks, supervisory authorities, technology providers, and international organizations. Institutional agility becomes particularly important because delayed regulatory responses may amplify systemic vulnerability when multiple crises occur simultaneously. Strengthening cross-sector collaboration, information sharing, and coordinated crisis management therefore becomes a strategic priority for improving financial resilience.

The framework also highlights the importance of financial innovation as an adaptive mechanism rather than merely a source of technological efficiency. Digital finance, artificial intelligence, blockchain technologies, and climate-finance instruments have the potential to improve financial inclusion, risk assessment, and capital allocation under conditions of uncertainty (Giglio *et al.*, 2021; Gomber *et al.*, 2017; Thakor, 2020). However, these innovations should be accompanied by adaptive regulatory frameworks capable of balancing innovation with systemic stability. This perspective aligns with recent discussions emphasizing the need for financial regulators and central banks to incorporate climate risks, digital transformation, and technological uncertainty into macroprudential policy (Campiglio *et al.*, 2018; Carè *et al.*, 2024).

Furthermore, TAFR underscores the strategic role of financial systems in facilitating economic transformation. Financial institutions are increasingly expected to support investments in low-carbon technologies, resilient infrastructure, digital innovation, and sustainable industrial development. Consequently, resilience should not be evaluated solely by the ability to withstand crises but also by the capacity to redirect financial resources toward long-term societal priorities. This broader interpretation positions financial systems as active agents of transformation rather than passive intermediaries of capital allocation.

5.3 Implications for Future Research

Although the Theory of Adaptive Financial Resilience provides an integrative conceptual foundation, several opportunities remain for future empirical and theoretical development.

First, the conceptual constructs introduced in this study require empirical operationalization and validation. Future research should develop multidimensional measures of Adaptive Financial Resilience by capturing ecosystem-level characteristics such as institutional agility, organizational learning, financial innovation, collaborative governance, and network reconfiguration. Developing reliable measurement instruments would enable comparative analyses across countries, financial systems, and institutional contexts.

Second, future studies should examine the dynamic relationships proposed in the conceptual framework using longitudinal and network-based methodologies. Since adaptive capability evolves over time, cross-sectional analyses may be insufficient to capture the recursive interactions among polycrisis, ecosystem adaptation, and economic transformation. System dynamics modelling, agent-based modelling, and longitudinal network analysis may provide promising methodological approaches for examining these complex relationships (Acemoglu *et al.*, 2015; Battiston *et al.*, 2016).

Third, comparative research across developed and emerging economies would provide valuable insights into contextual differences in adaptive financial resilience. Institutional quality, regulatory capacity, technological readiness, and financial market development are likely to influence the adaptive capabilities of financial ecosystems. Comparative studies could therefore identify context-specific mechanisms that strengthen resilience under different forms of polycrisis.

Finally, future conceptual research may extend TAFR by integrating additional theoretical perspectives such as dynamic capabilities, institutional theory, adaptive governance, or socio-technical transition theory. Such integration would further enrich understanding of how

financial ecosystems continuously evolve while responding to increasingly complex global challenges.

5.4 Limitations of the Conceptual Framework

Despite its theoretical contributions, this study has several limitations that should be acknowledged. First, the proposed framework remains conceptual and has not yet been empirically tested. Consequently, the relationships among adaptive capabilities, financial resilience, and economic transformation should be interpreted as theoretical propositions requiring empirical validation.

Second, the framework intentionally adopts a system-level perspective, which may overlook organization-specific heterogeneity among financial institutions. Individual banks, fintech firms, investment funds, and regulatory agencies may exhibit different adaptive capacities depending on their governance structures, technological capabilities, and institutional environments. Future empirical research should therefore examine how micro-level organizational characteristics interact with ecosystem-level resilience.

Third, although TAFR integrates multiple theoretical traditions, it does not claim to provide a comprehensive explanation for all dimensions of financial resilience. Rather, it offers an integrative conceptual lens that synthesizes insights from resilience theory, complexity science, systemic risk research, and sustainability transition studies to explain how adaptive financial ecosystems respond to polycrisis. Additional theoretical refinement will be necessary as new forms of systemic risk emerge and financial ecosystems continue to evolve.

Overall, the discussion reinforces the central proposition of this paper: financial resilience should no longer be understood solely as a mechanism for preserving stability but as an adaptive ecosystem capability that enables continuous learning, institutional renewal, and structural transformation. By repositioning resilience within the broader context of polycrisis and economic transformation, the Theory of Adaptive Financial Resilience contributes to a more dynamic understanding of how financial systems can sustain development in an increasingly uncertain world.

6. Conclusion

This conceptual paper has argued that the increasing prevalence of polycrisis fundamentally challenges conventional understandings of financial resilience. As financial systems are confronted with simultaneous and interconnected disruptions: including climate change, geopolitical instability, technological transformation, and macroeconomic uncertainty, the traditional emphasis on financial stability and post-crisis recovery is no longer sufficient. Instead, financial resilience must be reconceptualized as a dynamic and evolutionary capability that enables financial systems to continuously adapt, reorganize, and transform while maintaining their essential functions.

Building on this premise, the paper proposed the Theory of Adaptive Financial Resilience (TAFR) as a new conceptual framework for understanding how financial systems respond to persistent systemic uncertainty. Unlike existing perspectives that primarily examine resilience at the institutional or sectoral level, TAFR positions the Adaptive Financial Ecosystem as the central unit of analysis. This ecosystem perspective recognizes that resilience emerges from continuous interactions among financial institutions, regulators, markets, technology providers, governments, and other stakeholders. Through adaptive capabilities such as institutional agility, organizational learning, financial innovation, network reconfiguration, and collaborative governance, financial ecosystems develop the capacity not only to withstand cascading disruptions but also to evolve in response to changing environments.

The proposed framework contributes to the literature in three principal ways. First, it redefines financial resilience from a stability-oriented concept to an adaptive and transformative capability suitable for the realities of polycrisis. Second, it introduces the Adaptive Financial Ecosystem as a novel analytical perspective that shifts attention from individual organizations to system-wide interactions and adaptive processes. Third, it integrates previously fragmented theoretical domains—including resilience theory, complexity science, systemic risk, financial ecosystems, and economic transformation—into a coherent conceptual model that explains how adaptive financial systems support long-term structural change.

Beyond its theoretical contribution, the framework offers a broader perspective on the strategic role of finance in contemporary economic development. Financial systems should no longer be viewed solely as mechanisms for mobilizing and allocating capital but also as adaptive infrastructures that strengthen societal capacity to navigate uncertainty, accelerate innovation, and facilitate sustainable economic transformation. Consequently, resilience becomes a strategic capability for enabling long-term development rather than merely a defensive response to crises.

As a conceptual study, this paper is intended to provide a theoretical foundation for subsequent empirical research. Future studies may operationalize the proposed constructs, validate the conceptual propositions across different institutional contexts, and examine how adaptive financial ecosystems evolve under diverse forms of polycrisis. Such investigations will contribute to refining the Theory of Adaptive Financial Resilience and expanding understanding of the mechanisms through which financial systems can enhance resilience while supporting inclusive and sustainable economic transformation.

In conclusion, this paper contends that the future of financial resilience lies not in restoring previous equilibria but in strengthening the adaptive capacities of financial ecosystems to thrive amid continuous change. By placing adaptation, learning, and transformation at the center of financial resilience, the proposed Theory of Adaptive Financial Resilience offers a new conceptual lens for understanding the evolving role of finance in an increasingly complex and uncertain global economy.

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