BANK & FINANCE
CONSULTING GROUP

I. Designing Financial Ecosystems:
A Five-Layer Architecture for Resilience, Performance, and Public Value

Bank & Finance
Consulting Group

December 2025

Contents

Preface

From Synthesis to Foundations

Over the past several years, **Bank & Finance Consulting Group** has developed an extensive body of work aimed at understanding the evolving structure of modern financial systems. This work has established an integrated framework to assess structural risks, emerging fragilities, and cross-layer interdependencies across finance, organized around five core dimensions: information, infrastructure, innovation, integration, and governance.

That framework has been articulated through a wide-ranging series of technical and thematic reports, including *Navigating the Financial Ecosystem: Risks, Opportunities and a Five-Layer Architecture*; *Navigating the Financial Ecosystem: A Guide for Non-Financial Firms*; *Global Coordination and Standards*; *Macro-Financial Vulnerabilities*; *Financial Geopolitics*; *Biodiversity and Natural Resources*; *Inequality and Polarization*; *Demographic Change*; *Climate Change and Financial Risks*; *Quantum Technology*; *Artificial Intelligence*; *Open Finance*; *Financing Infrastructure*; *Capital Markets and Non-Bank Financial Intermediation*; *Digital Currency Infrastructure*; *Payments and Cross-Border Finance*; *Sovereign Debt*; *Global Financial Stability*; *Cyber Resilience*; *Ponzi Games*; and *The Value of Truth*. Together, these reports examined how financial systems transmit risk, absorb shocks, and interact with long-term economic, technological, and societal forces.

More recently, this body of work was brought together in *Financial Ecosystem Stewardship*, a flagship synthesis that integrated insights from across these deep dives into a unified ecosystem perspective. That synthesis provided a system-wide map of finance, highlighting how interactions across layers shape resilience, performance, and public value in an increasingly complex and interconnected global environment.

This report represents the next, natural step.

Why a Design Deep Dive

Once an ecosystem perspective is established, the relevant question shifts. Rather than asking how individual risks or sectors behave in isolation, the focus turns to the **structural foundations** that condition all such behavior. At this stage of analytical maturity, it becomes both possible and necessary to examine the core elements of the financial ecosystem in greater depth, one by one.

Designing Financial Ecosystems is the first in a new sequence of foundational deep-dive reports that build on the synthesis already released. Its focus is deliberately narrow and prior: it addresses the design of the financial system at the macro level—what a well-functioning financial ecosystem looks like once finance is no longer assumed to be neutral.

This report does not revisit specific risks, sectors, or technologies. Nor does it propose governance arrangements, diagnostic tools, or policy instruments. Instead, it steps back to articulate a normative benchmark for financial performance and a system-level architecture through which real-world financial systems can be understood and evaluated.

The Role of This Report in the Series

This volume establishes the **normative and architectural foundation** of the Financial Ecosystem Series. It defines the benchmark against which financial systems can be assessed, explains why real-world finance systematically departs from that benchmark, and introduces a Five-Layer Financial Ecosystem Architecture that makes those departures legible at the system level. Subsequent volumes in the series will examine other dimensions of ecosystem stewardship in turn, including governance, diagnostics, stress testing, and institutionalization. Each will address a distinct function, but all will build on the design logic articulated here, without re-deriving it.

By proceeding in this sequence, the series moves from synthesis to foundations, and from foundations to application—ensuring that later analytical, governance, and diagnostic work remains grounded in a coherent understanding of financial system structure.

A Foundation for the Next Phase

Designing Financial Ecosystems is intentionally complete in its architecture and intentionally incomplete in its function. It defines the terrain on which governance, diagnostics, and stewardship must operate, without attempting to perform those functions itself.

In doing so, it marks the beginning of a new phase of the Financial Ecosystem Series—one focused on deepening, clarifying, and systematizing the ecosystem perspective through a sequence of dedicated, system-level analyses.

We hope that this report, and the series it initiates, offers a useful foundation for policymakers, supervisors, international organizations, and private-sector leaders seeking to strengthen the resilience, performance, and coherence of modern financial systems.

Bank & Finance Consulting Group
December 2025

Executive Summary

Modern financial systems no longer operate as neutral intermediaries between savings and investment. Once information is imperfect, contracts incomplete, and externalities present, finance shapes economic outcomes rather than merely reflecting them. Under these conditions, the structure of the financial system becomes economically decisive.

This report, *Designing Financial Ecosystems*, addresses a single, prior question: **what does a well-functioning financial system look like once finance is no longer neutral?**

From Synthesis to Design

This volume builds on *Financial Ecosystem Stewardship*, which synthesized nearly two dozen thematic and technical reports developed by Bank & Finance Consulting Group during 2024–2025. That synthesis established an ecosystem view of finance, highlighting how interactions across information, infrastructure, innovation, integration, and governance shape risk, performance, and public value.

Having established that perspective, this report takes the next logical step. It isolates the **design dimension** of the financial ecosystem and treats it as a foundational problem in its own right. Rather than revisiting specific risks, sectors, or technologies, it steps back to articulate the **structural logic** of a resilient, high-performing financial system at the macro level.

A Normative Benchmark and Its Limits

The analysis begins from a clear normative benchmark drawn from economic theory: a world in which finance operates as a veil over real activity. In this benchmark, markets are complete, information is symmetric, contracts enforceable, and financial structure does not affect real allocations.

Real financial systems systematically depart from this benchmark. Asymmetric information, incomplete contracting, externalities, and institutional constraints ensure that valuation, credit allocation, and risk sharing depend on financial structure itself. Once neutrality breaks down, financial systems acquire independent macroeconomic significance.

Design therefore matters.

Financial Systems as Ecosystems

To address this reality, the report treats finance as an **ecosystem** rather than a collection of isolated markets or institutions. In complex, adaptive systems, outcomes emerge from interactions rather than from individual components. Resilience and fragility are system-level properties.

This perspective motivates the introduction of a **Five-Layer Financial Ecosystem Architecture**, organized around:

- **Information** — how data, prices, and risk signals are produced and transmitted;
- **Infrastructure** — the systems that ensure continuity of financial activity;
- **Innovation** — the creation and diffusion of new instruments and technologies;
- **Integration** — the connections across markets, jurisdictions, and time horizons;
- **Governance** — the structural logic that aligns incentives and preserves coherence.

The architecture emphasizes interaction rather than hierarchy. No layer is sufficient on its own; system behavior emerges from their alignment—or misalignment.

Design Trade-offs and Public Value

A central conclusion of the report is that financial system design is characterized by **irreducible trade-offs**. Efficiency and resilience, integration and modularity, innovation and stability, openness and control, performance and public value cannot be simultaneously maximized.

These trade-offs are not policy failures. They are structural conditions arising from the multiple functions finance is expected to perform under real-world constraints. Design makes these tensions explicit, but it does not resolve them.

Recognizing trade-offs also clarifies the role of public value. Financial systems are public-critical infrastructures. Their design shapes not only private returns, but long-term growth, inclusion, stability, and the distribution of risk across society and generations.

Why Design Comes First

The implications of design choices are structural. Fragility can be endogenous to architecture rather than the result of isolated shocks or failures. Governance cannot fully compensate for poor design; it operates within the space that design defines.

For this reason, **design precedes governance conceptually**. This report defines the terrain on which financial systems operate. It does not govern the system, diagnose vulnerabilities, model stress, or institutionalize responses. Those functions require distinct analytical treatments built on the design logic articulated here.

Position in the Financial Ecosystem Series

Designing Financial Ecosystems is the foundational volume of a new phase of the Financial Ecosystem Series. Subsequent volumes will examine governance, diagnostics, stress testing, and institutionalization in turn, each addressing a distinct system-level function.

This report is intentionally complete in its architecture and intentionally incomplete in its function. Its purpose is to establish a stable reference point for system stewardship by making financial ecosystem design explicit.

In doing so, it provides the conceptual foundation for understanding why governance is unavoidable once finance is non-neutral—and why how governance is exercised must be addressed separately.

1. The Design Problem: Finance Once Neutrality Is Abandoned

1.1 Finance as a Veil: The Normative Benchmark

Modern economic theory begins from an idealized benchmark in which finance is neutral with respect to real economic outcomes. In this benchmark, financial arrangements facilitate exchange, savings, investment, and risk sharing without independently shaping production, consumption, or growth. Finance operates as a *veil*—a coordinating mechanism rather than an autonomous engine of economic dynamics.

This benchmark plays a foundational role in economic reasoning. It establishes the conditions under which financial structure would be economically irrelevant and provides a disciplined reference point against which real-world financial systems can be evaluated. When these conditions hold, differences in financial arrangements do not affect real allocations; when they fail, structure becomes decisive.

The benchmark is most clearly formalized in the general equilibrium framework developed by Kenneth Arrow and Gérard Debreu, in which a complete set of state-contingent claims allows agents to insure fully against uncertainty, and competitive prices aggregate all relevant information (Arrow, 1953; Debreu, 1959). Under these conditions, risk is optimally shared across time and states of the world, and financial markets do not distort real decisions.

A closely related result appears in corporate finance. The irrelevance propositions of Franco Modigliani and Merton Miller demonstrate that, in frictionless markets, a firm's financial structure does not affect its investment or production choices (Modigliani and Miller, 1958). Financing arrangements matter only insofar as they replicate the same underlying cash flows.

Taken together, these results define a clear normative benchmark: finance supports real economic activity without shaping it. This benchmark is neither descriptive nor attainable in practice. Its value lies in its analytical clarity. By specifying the conditions under which finance would be neutral, it clarifies why departures from neutrality—rather than finance itself—must be the starting point for any serious design analysis.

Box 1 summarizes this benchmark and clarifies its role in the design problem addressed in this report.

Box 1. Finance as a Veil: The Normative Benchmark

In much of economic theory, finance is treated as a *veil* over real economic activity: a coordinating mechanism that facilitates exchange, savings, investment, and risk sharing without independently shaping real outcomes. This benchmark provides the normative reference point for evaluating financial system performance.

The conceptual foundation of this view lies in the general equilibrium framework developed by **Kenneth Arrow** and **Gérard Debreu**. In an Arrow–Debreu economy, a complete set of state-contingent claims allows agents to insure fully against uncertainty, prices aggregate all relevant information, and resources are allocated efficiently across time and states of the world (Arrow, 1953; Debreu, 1959). Under these conditions, financial markets allocate risk optimally and do not distort real decisions.

A closely related result appears in corporate finance. The irrelevance propositions of **Franco Modigliani** and **Merton Miller** show that, in frictionless markets, a firm's financial structure does not affect its investment or production choices (Modigliani and Miller, 1958). Financing arrangements matter only insofar as they replicate the same underlying cash flows.

Together, these contributions define a benchmark with three defining features:

- **Completeness** — all relevant risks can be traded and insured;
- **Informational efficiency** — prices fully reflect available information;
- **Neutrality** — financial structure does not influence real economic allocations.

This benchmark is neither descriptive nor attainable in practice. Its purpose is analytical rather than empirical. By specifying the conditions under which finance would be neutral, it provides a disciplined reference against which real-world financial systems can be assessed.

***Source**: Bank and Finance.*

Finance as a veil is not a policy objective. It is a normative benchmark that clarifies when financial systems support real economic activity without distortion—and why, once neutrality fails, financial ecosystem design becomes a first-order concern. The remainder of this section proceeds from this benchmark.

1.2 Why Neutrality Fails in Real Financial Systems

Real-world financial systems depart systematically from the conditions required for finance to remain a veil. These departures are not temporary imperfections or episodic distortions; they are structural features of financial exchange. Once they are acknowledged, financial structure ceases to be neutral and becomes a central determinant of economic outcomes.

A first source of departure is **asymmetric information**. Borrowers typically possess superior information about the risk and quality of their projects relative to lenders, while financial intermediaries accumulate information that is not fully observable by markets or principals. Foundational contributions by **George Akerlof** (1970), **Michael Spence** (1973), and **Joseph Stiglitz** (2000) demonstrate how adverse selection, moral hazard, and signaling distortions prevent prices from fully reflecting underlying risk. In financial markets, these mechanisms lead to credit rationing, inefficient risk pricing, and persistent misallocation of capital.

A second departure arises from **incomplete contracts and limited commitment**. Financial contracts are inherently intertemporal and contingent on uncertain future states. When contracts cannot specify or enforce all contingencies, optimal risk sharing breaks down. The theory of incomplete contracts shows that limited commitment constrains financing, elevates the role of collateral, and renders balance sheet structure economically meaningful (Hart and Moore, 1994; Holmström and Tirole, 1997). Investment and liquidity provision therefore depend not only on fundamentals, but on financial arrangements themselves.

Third, financial systems are characterized by **externalities** that are not internalized by private agents. Decisions regarding leverage, maturity transformation, and interconnected exposures may be privately optimal while generating systemic risk. In the presence of such externalities, decentralized market outcomes need not be Pareto efficient, even if agents are rational and markets competitive. Financial structure thus becomes a source of amplification rather than mere intermediation.

Finally, **market power and institutional constraints** shape financial outcomes. Economies of scale, network effects, and standardization tend to concentrate activity in intermediation, infrastructure, and data. Institutional arrangements and legal frameworks further condition how financial contracts are written, enforced, and adapted over time (Williamson, 1985; North, 1990). These factors embed historical and jurisdictional path dependence into financial systems, making structure persistent and difficult to unwind.

Taken together, asymmetric information, incomplete contracting, externalities, and institutional constraints explain why finance cannot remain neutral in practice. Once these conditions prevail, financial systems no longer simply reflect the real economy; they actively shape it.

1.3 Valuation and Credit as Transmission Channels

Once neutrality fails, the mechanisms through which finance influences real activity become central to the design problem. Two transmission channels are particularly important: **valuation** and **credit**.

The role of valuation was formalized by **James Tobin** in his *q-theory* of investment (Tobin, 1969). In this framework, investment decisions depend on the relationship between the market valuation of existing capital and its replacement cost. When financial markets function well, asset prices aggregate information and guide investment efficiently. When they do not, mispricing distorts capital allocation and amplifies cycles. Valuation is therefore not a passive reflection of fundamentals, but a structural channel through which financial design affects real outcomes.

A complementary insight concerns the **credit channel**. Work by **Ben Bernanke** and co-authors demonstrated that balance sheet conditions, collateral values, and financing constraints materially affect investment and output (Bernanke and Gertler, 1989; Bernanke, Gertler and

Gilchrist, 1999). In the presence of financial frictions, shocks propagate through credit relationships, and financial structure determines the strength and persistence of these effects.

These insights reinforce a common conclusion: once markets are incomplete and information is imperfect, **financial transmission is endogenous to system structure**. Valuation and credit do not merely transmit shocks; they are shaped by the architecture of the financial ecosystem itself.

1.4 From Market Failure to Design

The failure of neutrality does not imply that financial systems are inherently unstable or inefficient. It implies that outcomes depend on **design choices**—often implicit—about how information is produced, how intermediation is organized, how risks are shared, and how public value is defined.

At this point, the design problem becomes explicit. If financial structure shapes valuation, credit, and risk transmission, then the architecture of the financial system cannot be treated as an afterthought. It must be analyzed, compared, and evaluated at the system level.

This report approaches that task by treating the financial system as an **ecosystem**: an interconnected set of layers whose interactions condition performance, resilience, and fragility over time. The next section introduces this perspective formally and explains why an ecosystem view is necessary once finance is no longer neutral.

1.5 Section 1 Takeaway

The benchmark of finance as a veil provides a clear normative reference, but real-world conditions ensure that neutrality fails. Asymmetric information, incomplete contracts, externalities, and institutional constraints make financial structure economically decisive. Valuation and credit emerge as key transmission channels through which design choices shape real outcomes. Recognizing this reality is the starting point for any serious analysis of financial ecosystem design.

2. From Markets to Ecosystems: Why Structure Must Be Systemic

2.1 Beyond Entities: The Limits of Market- and Institution-Centric Views

Once finance is no longer neutral, the analytical focus must shift from individual entities and markets to the **structure of the system as a whole**. Traditional approaches in economics and financial policy tend to analyze financial systems either through markets (prices, volumes, equilibrium conditions) or through institutions (banks, funds, infrastructures, regulators). While

both perspectives are indispensable, neither is sufficient to explain how modern financial systems generate resilience or fragility.

Market-centric views excel at describing price formation and allocation under well-defined conditions, but they abstract from the institutional and infrastructural arrangements that shape how markets function in practice. Institution-centric views, by contrast, illuminate incentives, balance sheets, and governance within specific entities, but struggle to capture how interactions across entities and markets generate system-level outcomes.

As the preceding section established, once information is imperfect, contracts are incomplete, and externalities are present, outcomes depend not only on the behavior of individual actors, but on how **interactions are structured**. Systemic properties—such as amplification, persistence, and coordination failures—emerge from these interactions and cannot be reduced to any single market or institution.

This limitation is not unique to finance. In complex adaptive systems more broadly, aggregate behavior arises from the configuration and interaction of components rather than from their isolated properties. Financial systems share this characteristic.

2.2 Financial Systems as Complex Adaptive Ecosystems

Viewing finance as an **ecosystem** provides a way to make these interaction effects analytically legible. In this perspective, the financial system is understood as a set of interdependent components that co-evolve over time, adapt to shocks, and generate emergent properties that cannot be inferred from any single element in isolation.

This view draws on insights from complexity economics and institutional analysis, which emphasize that system behavior depends on structure, feedback loops, and adaptation rather than on static equilibrium alone (North, 1990; Arthur, 1999). In financial systems, these features are particularly salient because:

- financial contracts are intertemporal and contingent;
- balance sheets link present decisions to future outcomes;
- expectations shape prices and behavior;
- and institutional arrangements evolve unevenly across jurisdictions.

Under these conditions, resilience and fragility are **systemic properties**, not attributes of individual entities. A system composed of individually sound components can nonetheless be fragile if interactions are poorly structured. Conversely, systems can absorb shocks even when some components fail, provided the architecture supports containment and adaptation.

The ecosystem lens therefore does not replace market or institutional analysis; it **subsumes them within a system-level framework**.

2.3 Structure, Interaction, and Emergence

An ecosystem perspective emphasizes three features that are central to financial system design.

First, **structure matters**. How information is generated and transmitted, how intermediation is organized, and how risks are distributed condition system behavior. These structural features are often the product of historical, technological, and institutional choices rather than explicit design.

Second, **interactions matter more than components**. Feedback loops between valuation, credit, liquidity, and expectations can amplify or dampen shocks depending on how connections are arranged. The same shock can have radically different consequences in systems with different architectures.

Third, **emergence matters**. System-level outcomes—such as sustained growth, chronic misallocation, or episodic instability—emerge from interaction patterns rather than from any single failure. This explains why policies that focus narrowly on individual institutions or instruments often fail to address systemic fragilities.

These features imply that financial design cannot be reduced to optimizing individual markets or strengthening isolated institutions. It requires reasoning about **how layers interact**.

2.4 Why an Ecosystem Architecture Is Necessary

Recognizing finance as an ecosystem raises an immediate design challenge. Without an explicit architectural framework, system-level analysis risks remaining descriptive rather than analytical. To reason rigorously about design, it must be possible to distinguish structural domains, identify their interfaces, and trace how interactions across those domains shape aggregate outcomes.

This report addresses that challenge by introducing a **layered ecosystem architecture**. The purpose of layering is not to impose hierarchy or sequencing, but to make structural interaction explicit. Each layer captures a distinct function performed by the financial system, while system-level behavior emerges from their configuration and interaction.

The value of this approach is twofold. First, it allows persistent patterns observed across countries and over time—such as recurring fragilities, uneven development, and differential resilience—to be analyzed within a common conceptual framework. Second, it provides a disciplined way to surface trade-offs that are otherwise treated implicitly or addressed in isolation.

Table 1. From Markets and Institutions to Financial Ecosystems

	Market-Centric View	Institution-Centric View	Ecosystem View
Core organizing principle	Prices and equilibria coordinate savings, investment, and risk allocation	Financial outcomes are shaped by institutions, contracts, and balance sheets	System-level outcomes emerge from interactions across structural layers
Key elements	- Financial markets as the primary unit of analysis - Prices (interest rates, asset prices) as sufficient statistics - Allocation driven by supply and demand - Risk priced and diversified through markets	- Banks, non-bank intermediaries, markets, and infrastructures - Intermediation, maturity transformation, leverage - Incentives, agency problems, and contractual frictions - Bilateral exposures and network connections	- Markets and institutions embedded within an ecosystem - Interacting layers: • Information • Infrastructure • Innovation • Integration • Governance - Feedback loops and cross-layer dependencies -Emergent properties: resilience, misallocation, fragility
Implicit assumptions	- Complete or near-complete markets - Information efficiently reflected in prices - Financial structure does not affect real outcomes	- Institutional behavior can be analyzed largely in isolation - Micro-level soundness aggregates into system-level stability - Systemic outcomes can be inferred from balance-sheet linkages	- Structure can be meaningfully decomposed into layers - System behavior is shaped by interaction rather than optimization - No single layer or actor determines outcomes
Analytical strength	- Clear normative benchmark - Powerful allocation logic - Strong welfare interpretation	- Explains micro-level fragilities - Highlights incentive conflicts and institutional vulnerabilities - Illuminates contractual and balance-sheet risks	- Makes structure and interaction explicit - Explains why similar components produce different outcomes - Captures non-linearity and systemic behavior
Structural limitation	- Abstracts from institutions, infrastructure, and interaction effects - Cannot explain system-level fragility or resilience	- Treats institutions largely in isolation - Struggles to explain emergent system-wide behavior - Fragmented view of cross-domain interactions	- Does not, by itself, explain dynamics, crises, or adjustment paths - Requires complementary analysis to assess vulnerabilities and evolution
Implication	Financial structure is analytically irrelevant by construction	Systemic risk is understood as the aggregation of institutional risks	Financial performance and fragility are properties of architecture, not components

***Source**: Bank and Finance.*

Traditional representations of financial systems typically focus on either **markets**—emphasizing prices, volumes, and equilibria—or **institutions**, emphasizing balance sheets, contracts, and incentives. While both perspectives capture essential elements of financial activity, they abstract from the structural interactions through which system-level outcomes emerge. An ecosystem perspective addresses this limitation by situating markets and institutions within a broader architecture of interacting layers that jointly shape performance, resilience, and fragility. **Table 1** summarizes this conceptual shift.

This comparison highlights a central insight of the ecosystem view. Systemic outcomes are not the result of any single market or institution, nor can they be inferred from their aggregation. They emerge from the interaction of informational structures, infrastructures, innovation processes, integration patterns, and governance arrangements.

By making these interactions explicit, the ecosystem perspective transforms diffuse complexity into analyzable architecture. It clarifies why strengthening individual markets or institutions—while often necessary—is insufficient to ensure system-wide resilience. Understanding financial systems therefore requires an architectural framework capable of organizing structure, interaction, and emergence.

2.5 From Ecosystem Perspective to Architectural Design

The ecosystem perspective establishes **why** system-level design is necessary, but it does not yet specify **how** the system is structured. That task requires identifying the core layers through which financial activity is organized and understanding their functional roles.

The next section introduces the **Five-Layer Financial Ecosystem Architecture**, which provides the structural foundation for the remainder of this report. Each layer captures a distinct dimension of financial organization, while their interaction defines system behavior. Together, they form the architectural foundation for analyzing design trade-offs and public value in modern financial systems.

2.6 Section 2 Takeaway

Once finance is no longer neutral, system-level outcomes depend on structure and interaction rather than on individual markets or institutions. Treating the financial system as an ecosystem makes these interactions visible and analytically tractable. This perspective motivates the need for a layered architecture capable of organizing complexity without reducing it. The next section develops that architecture explicitly.

3. The Five-Layer Financial Ecosystem Architecture

3.1 Why a Layered Architecture

Once finance is understood as a non-neutral ecosystem, the central analytical task becomes architectural: to identify the **structural domains** through which financial activity is organized and through which system-level outcomes emerge. Without an explicit architecture, analysis risks either collapsing complexity into undifferentiated "systemic risk" or reverting to entity-level descriptions that obscure interaction effects.

A layered architecture provides a disciplined way to organize complexity. It does not impose hierarchy or sequence. Instead, it distinguishes **functional layers** that perform different roles in the financial system, while recognizing that outcomes depend on how these layers interact.

Layering has a long pedigree in systems thinking, institutional economics, and networked infrastructures, where it is used to make complex systems intelligible without assuming centralized control or uniform design (North, 1990; Williamson, 1985). Applied to finance, a layered approach allows persistent patterns—resilience, misallocation, fragility—to be traced back to structural configurations rather than isolated failures.

This report adopts a **Five-Layer Financial Ecosystem Architecture** to organize the design problem at the system level.

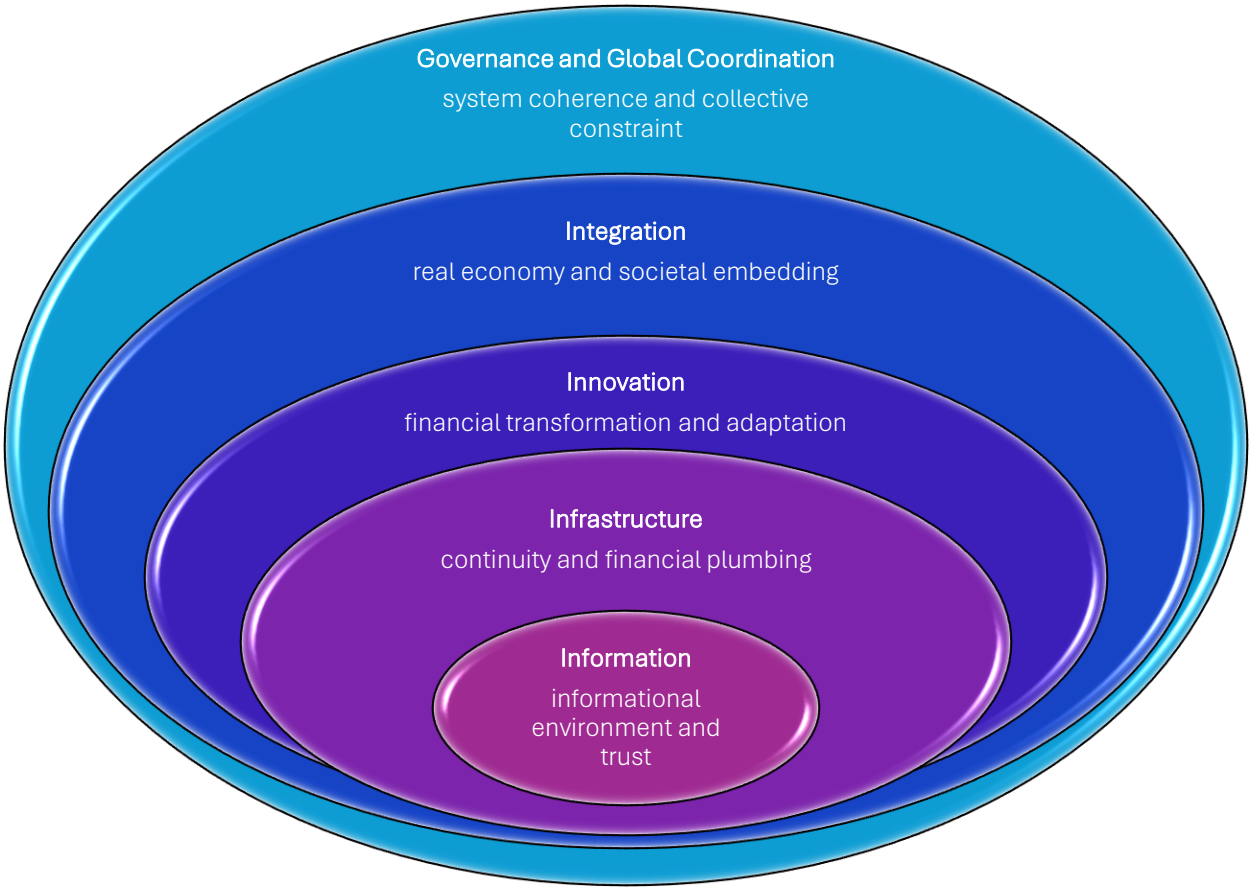
3.2 Overview of the Five Layers

The financial ecosystem is organized around **five interdependent structural layers**: Information, Infrastructure, Innovation, Integration, and Governance. Each layer captures a distinct function performed by the financial system, and each shapes how financial activity is generated, transmitted, and constrained.

No single layer is sufficient to explain system-level outcomes. Financial performance, resilience, and fragility do not arise from the optimization of any one domain, but from the **configuration and interaction** of all five. The ecosystem perspective therefore treats layers as co-present and mutually conditioning rather than sequential or hierarchical.

Figure 1 presents a schematic representation of the Five-Layer Financial Ecosystem Architecture. The figure serves as a stable reference point for this report and for the broader Financial Ecosystem Series. It illustrates structure without implying sequence, control, or priority among layers, emphasizing instead their interdependence and the interfaces through which interaction occurs.

Figure 1. The Five-Layer Financial Ecosystem Architecture



Source: *Bank & Finance.*

The subsections that follow define each layer in turn. Each definition focuses on the structural role played by the layer within the ecosystem, setting the foundation for subsequent analysis of trade-offs and system-level implications.

3.3 Information: The Foundation of Financial Coordination

The **Information layer** encompasses the production, processing, verification, and dissemination of information relevant to financial decisions. This includes data on prices, risks, balance sheets, identities, and expectations.

In the benchmark world of complete markets and symmetric information, prices aggregate all relevant information and guide allocation efficiently (Arrow, 1964). In real systems, information is incomplete, asymmetric, and costly to obtain (Akerlof, 1970; Stiglitz, 2000). As a result, the structure of information—who observes what, when, and with what credibility—becomes a primary determinant of financial outcomes.

Design choices at the information layer condition:

- the quality of valuation signals,
- the effectiveness of risk pricing,
- and the scope for adverse selection and moral hazard.

Weaknesses at this layer propagate throughout the ecosystem, affecting intermediation, innovation, and integration. Conversely, improvements in information quality do not automatically translate into better outcomes unless other layers can absorb and act on that information.

3.4 Infrastructure: The Continuity of Financial Activity

The **Infrastructure layer** comprises the physical, digital, and institutional systems that enable financial transactions to occur reliably over time. This includes payment systems, settlement mechanisms, custody arrangements, clearing, and basic market plumbing.

Infrastructure determines **continuity**: whether financial activity can proceed smoothly across time, states of the world, and stress conditions. While often taken for granted, infrastructure failures can fragment markets, disrupt intermediation, and amplify shocks.

From a design perspective, infrastructure shapes:

- transaction costs,
- settlement risk,
- interoperability across markets and jurisdictions.

Infrastructure does not allocate capital on its own, but it conditions whether allocation mechanisms function at all. Its interaction with information and integration layers is particularly critical.

3.5 Innovation: The Expansion of Financial Possibilities

The **Innovation layer** captures the creation and diffusion of new financial instruments, technologies, organizational forms, and business models. Innovation expands the space of possible contracts and can improve risk sharing, access, and efficiency.

In the benchmark world, innovation would move systems closer to complete markets. In practice, innovation interacts with information asymmetries, incentives, and institutional constraints, often creating new forms of fragility alongside new opportunities.

Design challenges at this layer involve:

- pacing and absorption of innovation,
- compatibility with existing infrastructure,

- and interaction with valuation and credit channels (Tobin, 1969).

Innovation is neither inherently stabilizing nor destabilizing. Its system-level impact depends on how it is embedded within the broader ecosystem.

3.6 Integration: Connecting Markets, Institutions, and Horizons

The **Integration layer** governs how financial activities are connected across markets, sectors, jurisdictions, and time horizons. It determines the degree to which risks and resources can be pooled, diversified, or transmitted.

Integration enables scale and diversification, but it also creates channels for contagion and synchronization. Design choices at this layer shape:

- cross-border capital flows,
- maturity and currency mismatches,
- and exposure to global shocks (Végh, 2013).

Integration is not binary. Systems vary in how, where, and to what extent integration occurs. These patterns interact closely with infrastructure and governance layers, and strongly influence systemic resilience.

3.7 Governance: Structural Coordination, Not Control

The **Governance layer** captures the structural arrangements through which system-wide coherence is maintained. At the design stage, governance is not about institutions or mandates, but about **coordination logic**: how rules, norms, and constraints align incentives across layers.

Governance shapes:

- how trade-offs are confronted,
- how externalities are internalized,
- and how adaptation occurs over time (North, 1990).

Importantly, governance is treated here as a **layer of the ecosystem**, not as an external authority acting upon it. Its full analysis is reserved for the next volume in the series.

3.8 Interaction, Not Hierarchy

The Five-Layer Architecture is not hierarchical. No layer "sits above" the others. Instead, system behavior emerges from **interfaces**:

- information feeds valuation and innovation,

- infrastructure enables integration,
- innovation reshapes information and infrastructure needs,
- governance conditions how these interactions evolve.

Design failures typically arise not from weaknesses in a single layer, but from **misalignment across layers**. This insight will become central when trade-offs are examined in the next section.

3.9 Section 3 Takeaway

The Five-Layer Financial Ecosystem Architecture provides a structured way to analyze non-neutral finance at the system level. By distinguishing information, infrastructure, innovation, integration, and governance—and by emphasizing their interaction rather than hierarchy—it establishes the architectural foundation for evaluating design trade-offs and public value. The next section uses this architecture to examine the irreducible trade-offs inherent in financial system design.

4. Design Trade-offs and Public Value

4.1 Why Trade-offs Are Central to Financial System Design

Once finance is no longer neutral, financial system design necessarily involves trade-offs. These trade-offs do not arise from poor policy choices or implementation failures. They arise because financial systems must perform **multiple, partially incompatible functions simultaneously**: allocating capital efficiently, sharing risk, maintaining continuity under stress, enabling innovation, and supporting broader public value.

In the benchmark world of complete markets and frictionless exchange, such tensions would not arise. Efficiency, stability, and welfare would be jointly maximized (Arrow, 1964; Debreu, 1959). In real financial systems, however, information asymmetries, incomplete contracts, externalities, and institutional constraints ensure that improvements along one dimension often come at the expense of another.

Design, therefore, is not about selecting an optimal configuration. It is about **making trade-offs explicit**, understanding where they originate, and recognizing their implications for system behavior over time.

4.2 Efficiency and Resilience

A first fundamental trade-off exists between **efficiency** and **resilience**.

Efficiency-oriented designs prioritize low transaction costs, rapid price discovery, and tight coupling between valuation and allocation. Such systems can deliver strong performance in stable environments. However, high efficiency often relies on concentration, leverage, and synchronization, which can reduce buffers and amplify shocks.

Resilience-oriented designs, by contrast, emphasize redundancy, buffers, and modularity. These features enhance shock absorption but may appear inefficient in normal times, as they entail higher costs and slower adjustment.

This trade-off is structural. No financial ecosystem can simultaneously minimize costs and maximize shock absorption across all states of the world. Design choices determine where fragility accumulates and how it manifests.

4.3 Integration and Modularity

A second trade-off concerns **integration** versus **modularity**.

Integration allows risks and resources to be pooled across markets, institutions, and borders. It supports diversification, scale, and liquidity. However, integration also creates channels through which shocks propagate rapidly, synchronizing behavior and reducing the scope for local containment (Végh, 2013).

Modularity limits propagation by segmenting activity across markets or jurisdictions. It can enhance containment and adaptability but may reduce diversification and raise costs.

This trade-off is particularly salient in global financial systems, where cross-border integration delivers efficiency gains while simultaneously increasing exposure to external shocks.

4.4 Innovation and Stability

A third trade-off arises between **innovation** and **stability**.

Financial innovation expands the set of available contracts and technologies, potentially improving access, risk sharing, and efficiency. In theory, innovation can move systems closer to the benchmark of complete markets (Arrow, 1964).

In practice, innovation often interacts with information asymmetries, incentive distortions, and valuation dynamics in ways that introduce new vulnerabilities. Novel instruments and platforms may outpace the capacity of existing information and infrastructure layers to absorb them, creating fragility even as functionality expands (Tobin, 1969).

Innovation is therefore neither inherently stabilizing nor destabilizing. Its impact depends on how it is embedded within the broader ecosystem.

4.5 Openness and Control

A fourth trade-off involves **openness** versus **control**.

Open financial systems promote competition, entry, and information diffusion. They can support inclusion and innovation. However, openness can also weaken oversight, increase exposure to external shocks, and complicate coordination across jurisdictions and actors.

More controlled systems can internalize externalities and limit destabilizing behavior, but risk entrenching incumbents, reducing adaptability, and constraining innovation.

Design choices at this margin shape not only financial outcomes, but the political economy of the system itself (North, 1990; Williamson, 1985).

4.6 Performance and Public Value

A final trade-off concerns **financial performance** versus **public value**.

Financial systems are often evaluated based on depth, liquidity, and profitability. These metrics capture important dimensions of performance, but they do not fully reflect broader economic and social objectives, such as long-term growth, inclusion, environmental sustainability, or systemic resilience.

Public value considerations introduce objectives that are not automatically internalized by private actors, particularly in the presence of externalities and intergenerational effects. Incorporating public value into design therefore requires acknowledging that some desirable system properties may not emerge spontaneously from market interaction alone.

This does not imply subordinating finance to external objectives. It implies recognizing that **financial systems are public-critical infrastructures**, whose design has consequences beyond private returns.

4.7 A Structured View of Design Trade-offs

Financial ecosystems are designed under conditions of irreducible tension. The functions that finance is expected to perform—allocating capital efficiently, absorbing shocks, supporting innovation, integrating economies, and serving public objectives—cannot be jointly maximized. Design therefore involves trade-offs that are structural rather than contingent, and persistent rather than episodic.

To make these tensions explicit, **Table 2** summarizes the core design trade-offs inherent in financial ecosystems. The purpose of the table is not to recommend particular configurations

or to suggest optimal balances. Rather, it provides a disciplined way to surface the dimensions along which design choices expand some capabilities while constraining others.

Table 2. Core Design Trade-offs in Financial Ecosystems

Trade-off dimension	What is emphasized	What is constrained or foregone
Efficiency vs Resilience	Rapid capital allocation, low intermediation costs, tight pricing, and high throughput in normal times	Redundancy, buffers, slack, and adaptive capacity to absorb shocks
Integration vs Modularity	Cross-market and cross-border connectivity, diversification opportunities, and scale economies	Containment of shocks, firebreaks, and the ability to localize stress
Innovation vs Stability	Expansion of financial instruments, technologies, and business models; adaptability to new needs	Predictability, standardization, and the ability to fully assess risks ex ante
Openness vs Control	Contestability, access, competition, and rapid diffusion of financial services	Oversight, coordination, and the capacity to impose system-wide constraints
Performance vs Public Value	Private returns, financial depth, and market-based measures of success	Distributional objectives, long-term sustainability, and systemic externalities

***Source**: Bank and Finance.*

These trade-offs cannot be eliminated through better modeling, regulation, or execution. They are inherent to the design of financial ecosystems once finance is no longer neutral. Any configuration that strengthens one dimension necessarily weakens another, often in ways that become visible only over time.

By organizing these trade-offs explicitly, the table reinforces a central insight of this report: **design defines the space of possible outcomes, but it does not determine how tensions are resolved**. How trade-offs are confronted, adjusted, and governed is a separate question—one that lies beyond the scope of design and motivates the need for system-level stewardship in subsequent volumes.

4.8 Section 4 Takeaway

Financial ecosystem design is inherently characterized by irreducible trade-offs. These trade-offs arise from the multiple functions financial systems must perform under real-world constraints and cannot be optimized away. Making them explicit is a prerequisite for understanding both resilience and fragility. How these tensions are confronted over time lies beyond design itself and motivates the need for system-level stewardship.

5. Implications of Design Choices

5.1 Design Conditions Outcomes—Not Just Risks

Design choices in financial ecosystems do not merely influence the distribution of risks; they **condition the range of outcomes the system can generate**. Once finance is no longer neutral, the architecture of the system shapes valuation, credit allocation, risk sharing, and adaptation over time.

This has a first-order implication: performance, resilience, and fragility are not solely the result of shocks or behavior. They are the product of **structural configurations**. Two systems exposed to similar economic conditions can exhibit radically different outcomes because their design channels information, incentives, and interdependencies in different ways.

As a result, fragility should not be understood only as the probability of adverse events, but as a **property of system architecture**. Where design concentrates risk, synchronizes behavior, or weakens buffers, fragility accumulates even in the absence of observable stress.

5.2 Structural Fragility Is Often Endogenous

A second implication is that fragility often emerges **endogenously** from design choices that appear benign or even beneficial in isolation. Designs that prioritize efficiency, integration, or innovation can generate hidden vulnerabilities when interactions across layers are misaligned.

This insight has deep roots in economic theory. Once externalities, information asymmetries, and incomplete contracts are acknowledged, decentralized outcomes need not be socially optimal (Arrow, 1964; Stiglitz, 2000). In financial systems, these conditions mean that private incentives can systematically favor configurations that amplify rather than absorb shocks.

Endogenous fragility does not require errors, misconduct, or irrationality. It arises when structural features interact in ways that reinforce leverage, valuation feedbacks, or synchronization. Recognizing this shifts attention away from isolated failures and toward **system-level design logic**.

5.3 Good Governance Cannot Fix Bad Design

A third implication follows directly: **no amount of governance can fully compensate for poor design**.

If information is unreliable, infrastructure fragmented, innovation poorly absorbed, or integration misaligned, attempts to coordinate, constrain, or stabilize the system face inherent limits. Governance may mitigate symptoms, but it cannot eliminate structural tensions embedded in architecture.

This does not diminish the importance of governance. On the contrary, it clarifies its role. Governance operates **within the space defined by design**. It confronts trade-offs, manages externalities, and supports adaptation, but it does not redefine the underlying structure on which outcomes depend.

Design therefore precedes governance conceptually. Treating governance as a substitute for design risks placing excessive weight on coordination mechanisms that are structurally constrained from the outset.

5.4 Design Shapes the Nature of Public Value

Design choices also shape how financial systems generate—or undermine—**public value** over time.

Public value in finance extends beyond private returns or short-term efficiency. It includes the system's contribution to sustainable growth, inclusion, stability, and the allocation of risk across generations. These dimensions are not automatically internalized by private actors, particularly in the presence of systemic externalities.

By defining how information is produced, how intermediation is organized, and how risks are integrated across horizons, design choices influence whether public value is reinforced or eroded. Systems optimized narrowly for transactional performance may perform well in benign conditions while imposing large social costs under stress.

This reinforces a central theme of the Design volume: financial ecosystems are not neutral infrastructures. They are **public-critical systems** whose architecture has enduring economic and social consequences.

5.5 Why Stewardship Becomes Unavoidable

Taken together, these implications point to an unavoidable conclusion. Once finance is non-neutral, and once trade-offs are irreducible, financial systems require **ongoing stewardship**.

Stewardship is necessitated not by failure, but by structure. Trade-offs cannot be resolved once and for all at the design stage. They persist and evolve as technologies change, markets integrate, and economic conditions shift. The role of design is to define the terrain on which these tensions emerge—not to eliminate them.

This report stops at that boundary. It establishes why design matters, why fragility can be structural, and why public value must be treated as a legitimate design criterion. How coherence is preserved over time, how trade-offs are confronted, and how adaptation occurs are questions that follow logically—but they belong to the next volume.

5.6 Section 5 Takeaway

Design choices condition financial system outcomes by shaping valuation, credit, and interaction across layers. Fragility is often endogenous to architecture rather than the result of isolated shocks. Governance cannot substitute for sound design, and public value is inseparable from structural choices. These implications make stewardship unavoidable, setting the stage for a focused examination of governance at the system level.

6. Conclusions: Design as Necessary, but Insufficient

This report has addressed a single question: **what does a well-functioning financial system look like once finance is no longer neutral?** It has done so by establishing a normative benchmark, identifying the structural reasons why neutrality fails in practice, and proposing a system-level architecture through which real-world financial systems can be understood and evaluated.

Three conclusions follow.

First, **financial system outcomes are shaped by design**. Once information is imperfect, contracts incomplete, and externalities present, financial structure becomes economically decisive. Valuation, credit allocation, and risk sharing no longer operate as neutral transmission mechanisms; they reflect—and are conditioned by—the architecture of the system itself. Performance and fragility therefore cannot be understood independently of design choices.

Second, **design involves irreducible trade-offs**. Financial ecosystems must simultaneously support efficiency, resilience, innovation, integration, and public value. These objectives cannot be jointly maximized. Trade-offs are not failures of policy or execution; they are structural conditions that arise from the multiple functions finance is expected to perform under real-world constraints. Design makes these tensions visible, but it cannot resolve them once and for all.

Third, **sound design is necessary but insufficient**. A coherent architecture defines the terrain on which financial systems operate, but it does not determine how tensions evolve over time. Even well-designed systems face shifting technologies, changing incentives, and evolving patterns of integration. Design can constrain fragility and expand the space of desirable outcomes, but it cannot substitute for ongoing system-level stewardship.

Taken together, these conclusions clarify both the scope and the limits of this volume. *Designing Financial Ecosystems* establishes the structural foundations of financial system performance and resilience. It does not govern the system, diagnose vulnerabilities, model stress, or institutionalize responses. Those functions require additional layers of analysis built on the design logic articulated here.

By making financial ecosystem design explicit, this report provides a stable reference point for the work that follows. It defines the architecture within which coherence must be preserved, trade-offs confronted, and public value protected over time. The next volume in the Financial Ecosystem Series takes up that challenge by examining governance as a system-level function.

7. References

Akerlof, G.A. (1970). 'The market for "lemons": Quality uncertainty and the market mechanism'. Quarterly Journal of Economics, 84(3), pp. 488–500.

Arrow, K.J. (1953). Le rôle des valeurs boursières pour la répartition la meilleure des risques. Econometrie, Centre National de la Recherche Scientifique, Paris, pp. 41–47.

Arrow, K.J. (1964). 'The role of securities in the optimal allocation of risk-bearing'. Review of Economic Studies, 31(2), pp. 91–96.

Arthur, W.B. (1999). 'Complexity and the economy'. Science, 284(5411), pp. 107–109.

Bernanke, B.S. and Gertler, M. (1989). 'Agency costs, net worth, and business fluctuations'. American Economic Review, 79(1), pp. 14–31.

Bernanke, B.S., Gertler, M. and Gilchrist, S. (1999). 'The financial accelerator in a quantitative business cycle framework'. In: Taylor, J.B. and Woodford, M. (eds.) Handbook of macroeconomics, Vol. 1C. Amsterdam: Elsevier, pp. 1341–1393.

Debreu, G. (1959). Theory of value: An axiomatic analysis of economic equilibrium. New Haven, CT: Yale University Press.

Hart, O. and Moore, J. (1994). 'A theory of debt based on the inalienability of human capital'. Quarterly Journal of Economics, 109(4), pp. 841–879.

Holmström, B. and Tirole, J. (1997). 'Financial intermediation, loanable funds, and the real sector'. Quarterly Journal of Economics, 112(3), pp. 663–691.

Modigliani, F. and Miller, M.H. (1958). 'The cost of capital, corporation finance and the theory of investment'. American Economic Review, 48(3), pp. 261–297.

North, D.C. (1990). Institutions, institutional change and economic performance. Cambridge: Cambridge University Press.

Spence, M. (1973). 'Job market signaling'. Quarterly Journal of Economics, 87(3), pp. 355–374.

Stiglitz, J.E. (2000). 'The contributions of the economics of information to twentieth century economics'. Quarterly Journal of Economics, 115(4), pp. 1441–1478.

Tobin, J. (1969). 'A general equilibrium approach to monetary theory'. Journal of Money, Credit and Banking, 1(1), pp. 15–29.

Végh, C.A. (2013). Open economy macroeconomics in developing countries. Cambridge, MA: MIT Press.

Williamson, O.E. (1985). The economic institutions of capitalism. New York: Free Press.