

Financial Markets and Institutions

Module 4: Traditional Digital Finance — Lesson 37

Digital Finance

December 13, 2025

Learning Objectives

- Understand the structure of modern financial markets
- Identify key market participants: buy-side, sell-side, intermediaries
- Recognize roles of exchanges, clearinghouses, and regulators
- Comprehend market infrastructure and trading venues

Primary Markets

- New securities issued
- IPOs and bond issuances
- Direct capital raising
- Underwriters coordinate

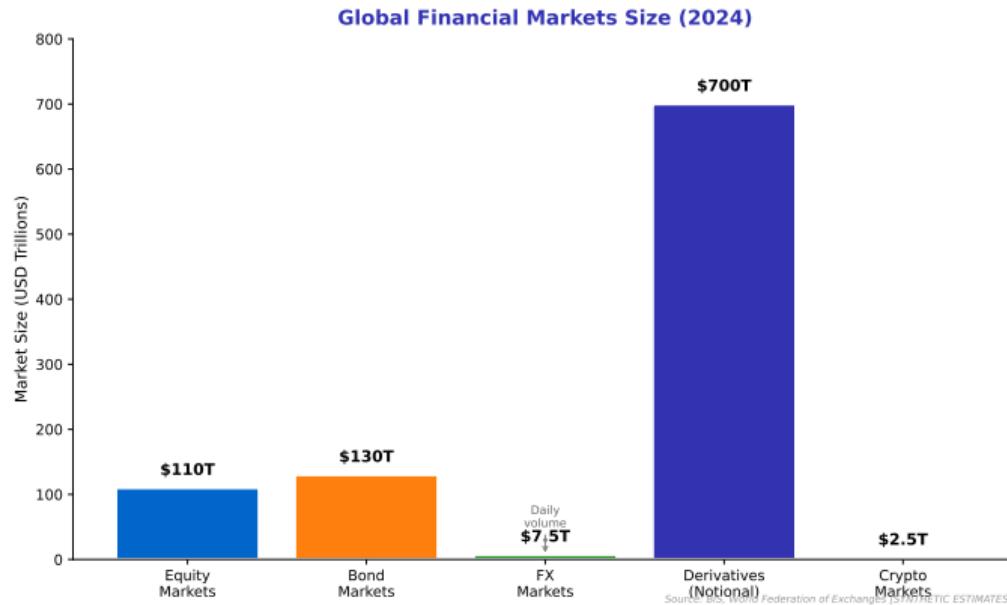
Secondary Markets

- Existing securities trade
- Provides liquidity
- Price discovery mechanism
- Exchanges and OTC

Market Categories: Equities, Fixed Income, Derivatives, FX, Commodities

Financial markets connect savers and borrowers, enabling capital allocation.

Market Structure Overview



Modern financial markets operate across multiple layers with specialized participants.

Buy-Side Institutions

- Asset managers
- Pension funds
- Insurance companies
- Hedge funds
- Sovereign wealth funds
- *Manage assets for clients*

Sell-Side Institutions

- Investment banks
- Broker-dealers
- Market makers
- Prime brokers
- Research providers
- *Facilitate transactions*

Comparative analysis helps identify the right tool for specific requirements.

Asset Managers

- Mutual funds
- ETF providers
- Active management
- Passive indexing
- AUM: BlackRock \$10T+

Hedge Funds

- Alternative strategies
- Long/short equity
- Quantitative trading
- Event-driven
- Global macro

Pension Funds: \$50+ trillion globally (2024), long-term horizon

Key concepts from this slide inform practical applications in finance.

Investment Banking

- Underwriting services
- M&A advisory
- Capital markets
- Syndication
- IPO management

Broker-Dealer Functions

- Execute client orders
- Market making
- Liquidity provision
- Prime brokerage
- Securities lending

Top Firms: Goldman Sachs, Morgan Stanley, JP Morgan, Citi

Banks play a central role in the financial system as intermediaries.

Market Makers and Liquidity Providers

Role: Continuous bid-ask quotes, facilitate trading

Functions

- Provide two-sided quotes
- Reduce bid-ask spreads
- Absorb temporary imbalances
- Earn spread revenue

Examples

- Citadel Securities
- Virtu Financial
- Jane Street
- Flow Traders

Technology: High-frequency trading, co-location, low latency

Key concepts from this slide inform practical applications in finance.

Major Exchanges

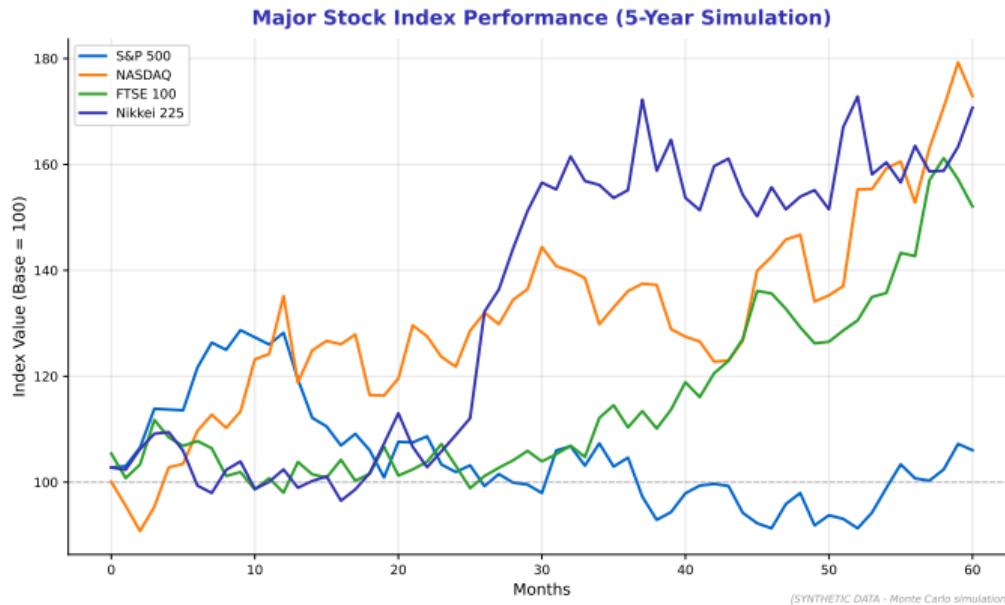
- NYSE (New York)
- NASDAQ (US)
- LSE (London)
- Euronext (Europe)
- Tokyo Stock Exchange
- Shanghai Stock Exchange

Functions

- Order matching
- Price discovery
- Listing standards
- Market surveillance
- Data dissemination

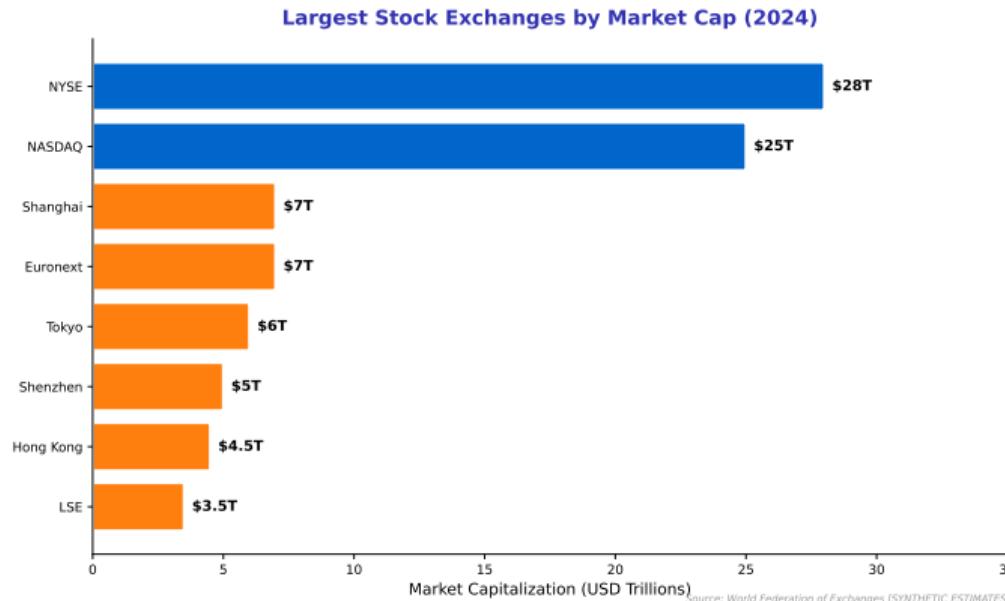
Trading Hours: NYSE 9:30-16:00 EST, after-hours 4:00-20:00

Key concepts from this slide inform practical applications in finance.



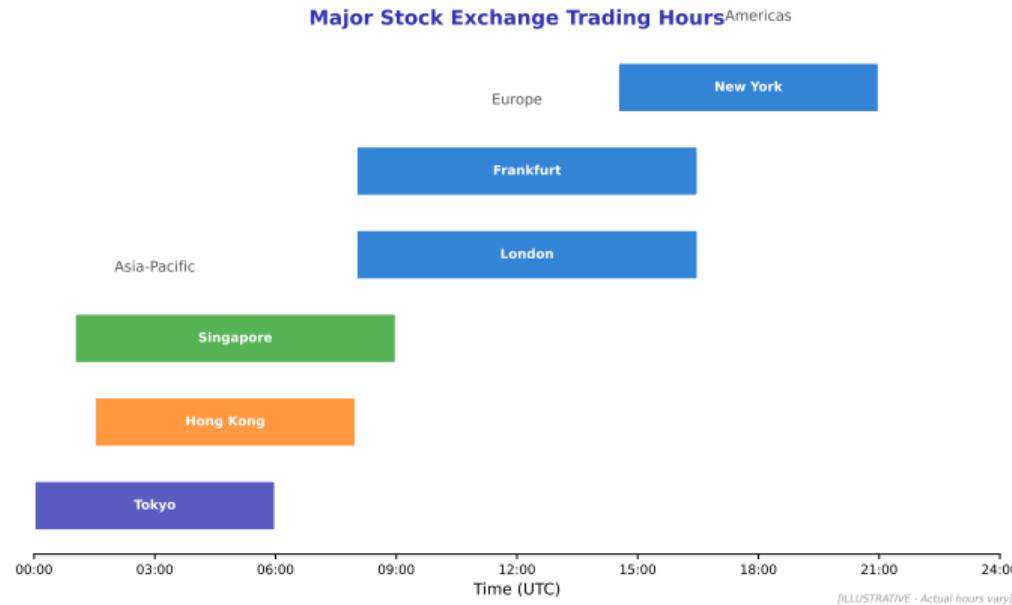
Major indices track market performance and serve as benchmarks for investors.

Exchange Market Capitalization



Market cap reflects the size and importance of different global exchanges.

Trading Hours Across Global Markets



24-hour global trading coverage requires coordination across time zones.

Dark Pools

- Private exchanges
- No pre-trade transparency
- Large block trades
- Reduced market impact
- 15-20% US equity volume

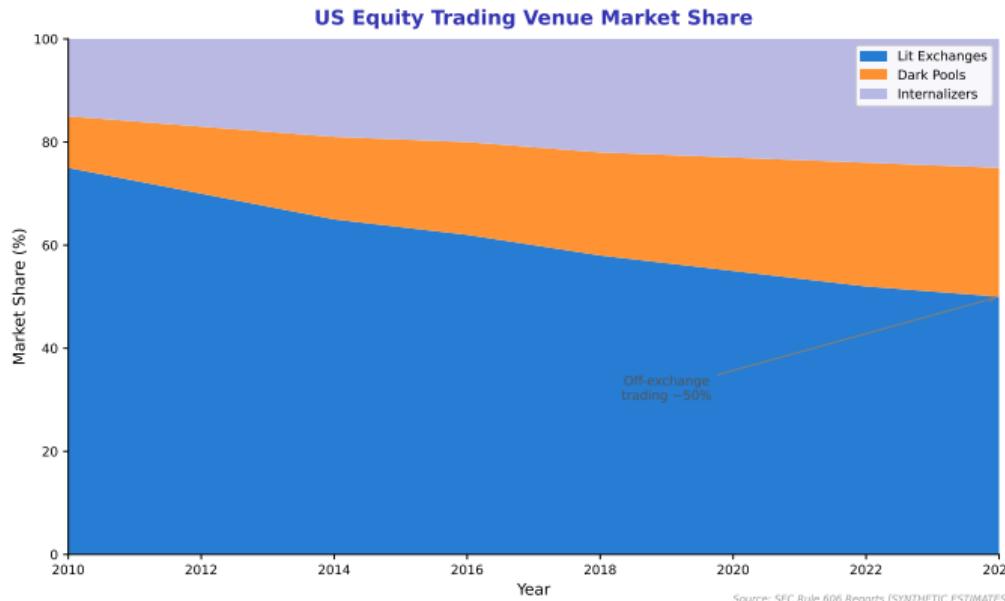
Electronic Communication Networks

- Automated matching
- Direct market access
- Lower fees
- INET, Arca, BATS

Fragmentation: US equities trade across 16+ exchanges, 40+ dark pools

Electronic trading has transformed market structure and efficiency.

Dark Pool Trading Volume



Dark pools provide pre-trade anonymity but raise transparency concerns.

Central Counterparties (CCPs)

Role: Become buyer to every seller, seller to every buyer

Functions

- Novation of trades
- Multilateral netting
- Margin collection
- Default management
- Risk mutualization

Major CCPs

- LCH (London)
- CME Clearing
- Eurex Clearing
- ICE Clear
- OCC (options)

Post-Crisis: Dodd-Frank/EMIR mandate clearing of standardized derivatives

Key concepts from this slide inform practical applications in finance.

Trade Lifecycle: Execution → Clearing → Settlement

Clearing (T+0 to T+1)

- Trade confirmation
- Novation to CCP
- Margin calculation
- Netting process

Settlement (T+1 to T+2)

- Securities delivery
- Cash payment
- CSD involvement
- DVP mechanism

T+1 Migration: US moved from T+2 to T+1 in May 2024, EU in 2027

Key concepts from this slide inform practical applications in finance.

Central Securities Depositories (CSDs)

Functions

- Immobilize securities
- Electronic book-entry
- Settlement finality
- Corporate actions
- Securities lending

Major CSDs

- DTCC (US)
- Euroclear (Europe)
- Clearstream (Europe)
- JASDEC (Japan)

DTCC: Settles \$2.5 quadrillion annually, 100M+ transactions/day

Key concepts from this slide inform practical applications in finance.

United States

- SEC: Securities markets
- CFTC: Derivatives
- Federal Reserve: Banks
- FINRA: Self-regulatory
- OCC: National banks

Global Coordination: IOSCO, FSB, Basel Committee

Europe

- ESMA: Pan-European
- EBA: Banking
- FCA: UK markets
- BaFin: Germany
- AMF: France

Key concepts from this slide inform practical applications in finance.

Market Structure Rules

- MiFID II (Europe)
- Reg NMS (US)
- Best execution
- Transparency requirements
- Pre/post-trade reporting

Prudential Regulation

- Basel III capital
- Dodd-Frank stress tests
- EMIR derivatives
- SFTR securities financing
- Volcker Rule

Market Abuse: MAR (Europe), Reg M (US), insider trading prohibitions

Key concepts from this slide inform practical applications in finance.

Monitoring: Real-time surveillance, pattern detection, anomaly alerts

Surveillance Activities

- Insider trading detection
- Market manipulation
- Spoofing and layering
- Front-running
- Wash trading

Enforcement Tools

- Fines and penalties
- Trading suspensions
- License revocation
- Criminal prosecution
- Disgorgement

Technology: AI/ML for pattern recognition, NLP for communications

Key concepts from this slide inform practical applications in finance.

Data Types

- Level 1: Best bid/ask
- Level 2: Order book depth
- Level 3: Full order book
- Trade tape
- Reference data

Distribution

- Direct exchange feeds
- Consolidated tape
- Vendor platforms
- Low-latency feeds
- Cloud delivery

Latency: Co-location < 1ms, microwave 8ms NY-Chicago, fiber 13ms

Quality data is the foundation for effective machine learning models.

Trading Technology Stack

Ecosystem: Order management, execution, risk, compliance, reporting

Front Office

- Order management (OMS)
- Execution management (EMS)
- Algorithmic trading
- Risk analytics

Infrastructure

- FIX protocol
- Market data handlers
- Smart order routing
- Co-location services

Vendors: Bloomberg EMSX, Charles River, Fidessa, FlexTrade

Electronic trading has transformed market structure and efficiency.

- Financial markets connect capital suppliers and users via intermediaries
- Buy-side manages assets; sell-side facilitates transactions
- Exchanges provide transparent price discovery; dark pools reduce impact
- CCPs mitigate counterparty risk through novation and netting
- CSDs enable efficient settlement via immobilization and book-entry
- Regulators ensure market integrity, transparency, and investor protection
- Technology infrastructure spans data feeds, trading systems, and connectivity

Further Reading

- Harris, L. (2003). *Trading and Exchanges: Market Microstructure for Practitioners*. Oxford University Press.
- Hasbrouck, J. (2007). *Empirical Market Microstructure*. Oxford University Press.
- Madhavan, A. (2000). Market microstructure: A survey. *Journal of Financial Markets*, 3(3), 205-258.
- SEC Market Structure Concept Release (2010)
- MiFID II/MiFIR Technical Standards (ESMA)

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