

Financial Markets and Institutions

Module 4: Traditional Digital Finance — Lesson 37

Digital Finance

January 3, 2026

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

Source: Financial industry data and regulatory publications

Primary Markets

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

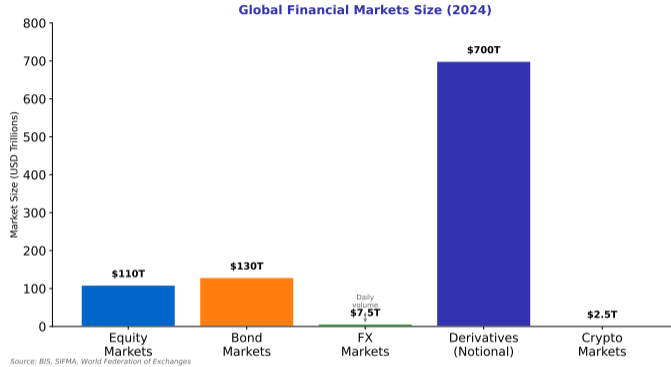
Secondary Markets

- 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*

Source: Financial industry data and regulatory publications

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

Source: Financial industry data and regulatory publications

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

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

Examples

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

Source: Financial industry data and regulatory publications

Major Exchanges

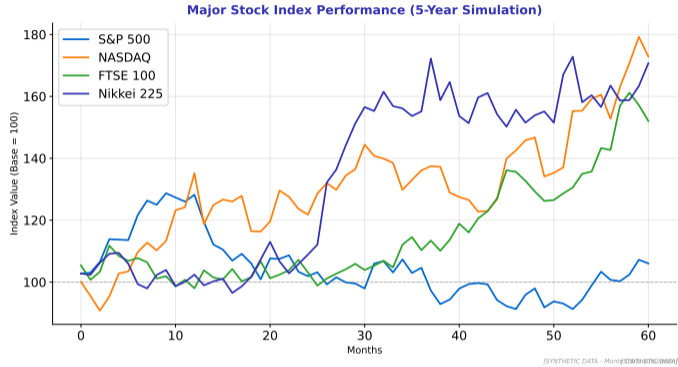
- NYSE (New York)
- NASDAQ (US)
- LSE (London)
- Euronext (Europe)
- Tokyo Stock Exchange
- Shanghai Stock Exchange

Functions

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

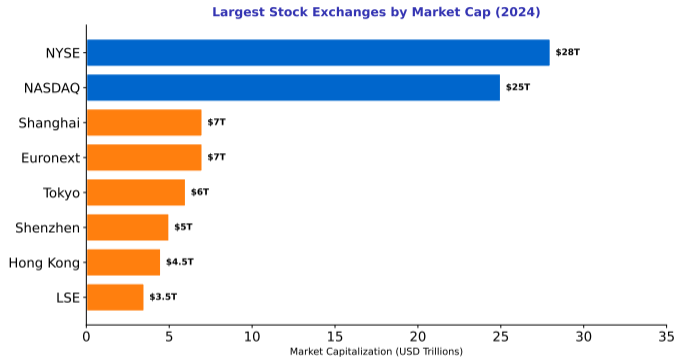
Trading Hours: NYSE 9:30-16:00 EST, after-hours 4:00-20:00

Source: Financial industry data and regulatory publications



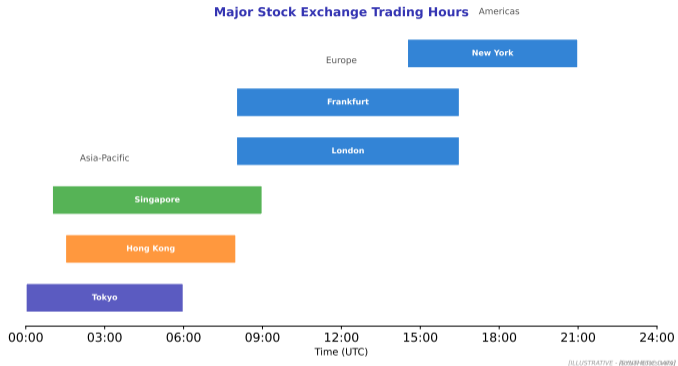
Major indices track market performance and serve as benchmarks for investors.

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

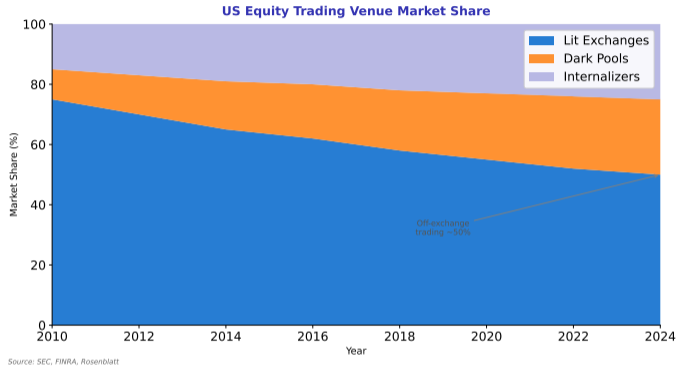
Electronic Communication Networks

- 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

Source: Financial industry data and regulatory publications

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

Source: Financial industry data and regulatory publications

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

Source: Financial industry data and regulatory publications

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

Source: Financial industry data and regulatory publications

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

Source: Financial industry data and regulatory publications

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

Source: Financial industry data and regulatory publications

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.

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

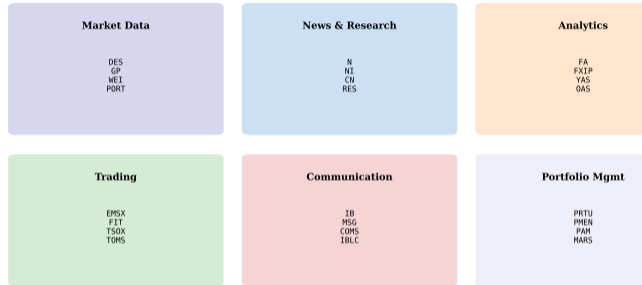
Vendors: Bloomberg EMSX, Charles River, Fidessa, FlexTrade

Electronic trading has transformed market structure and efficiency.

Bloomberg Terminal Functions

Bloomberg Terminal Function Categories

Key function codes by category

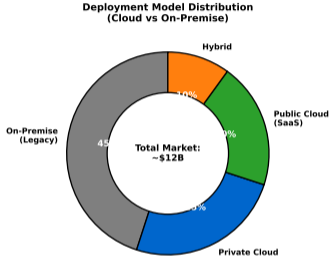
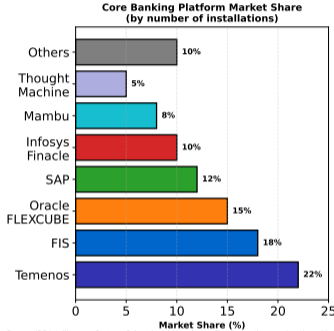


Terminal users access 20,000+ functions via 4-character mnemonics

Source: bloomberg.com/professional

The Bloomberg Terminal remains the gold standard for financial market data and analytics.

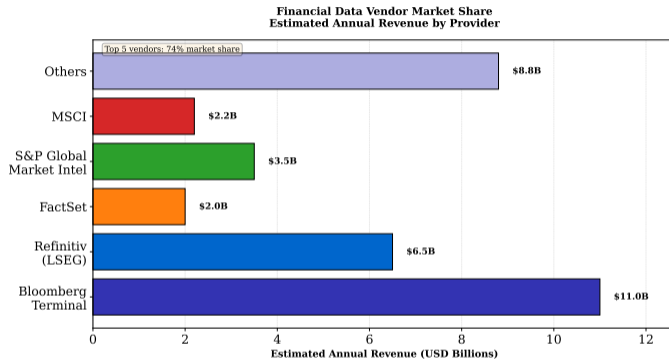
Core Banking Systems Market Landscape (2024)



Source: IBS Intelligence, Gartner, Celent (market estimates) cloud adoption accelerating with 15-20% annual growth in SaaS deployments

Bloomberg and Refinitiv dominate the professional market data industry.

Data Vendor Revenue Breakdown



Terminal subscriptions remain the primary revenue driver for major vendors.

Market Data Licensing Tiers

Market Data Licensing Tiers

Typical pricing structure for exchange data feeds



Prices vary by exchange, region, and usage rights • Enterprise licenses available

Source: NYSE, Nasdaq, CME Group

Data licensing costs vary dramatically based on usage and redistribution rights.

Alternative Data Categories

Alternative Data Categories

Emerging data sources for investment insights

Geospatial & Satellite

- Parking lot traffic
- Oil tank levels
- Construction activity
- Shipping routes

Credit Card & Transaction

- Purchase volumes
- Consumer spending
- Merchant analytics
- Transaction velocity

Social Media & Sentiment

- Twitter sentiment
- Reddit mentions
- News sentiment
- Brand perception

Web Traffic & App Usage

- Website visits
- App downloads
- Page views
- User engagement

IoT & Sensor Data

- Weather patterns
- Foot traffic
- Energy usage
- Air quality

Email & Job Postings

- Receipt data
- Hiring trends
- Job openings
- Career movements

Alternative data market estimated at \$2B+ annually (2024) with 30%+ YoY growth

Source: Bloomberg, J.P. Morgan (2017), Grand View Research (2024)

Alternative data sources provide insights beyond traditional financial statements and prices.

Financial Markets: Key Takeaways

- 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

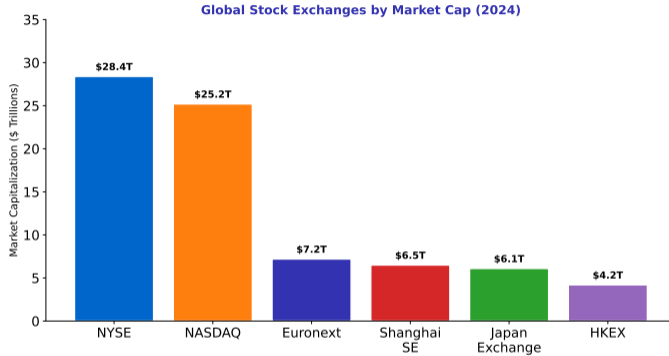
Understanding these market fundamentals is essential for digital finance applications.

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)

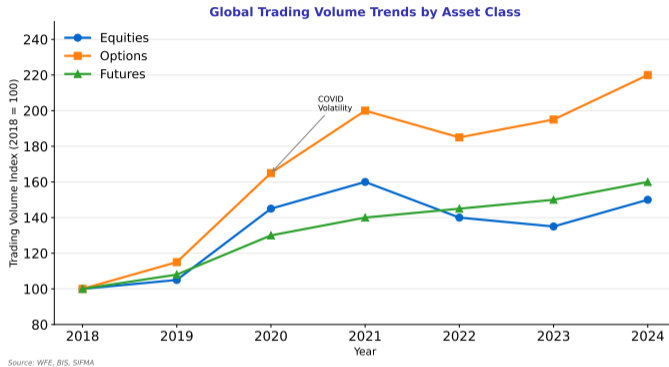
Source: Financial industry data and regulatory publications

Global Exchange Market Capitalization



US and Asian exchanges dominate global markets.

Global Trading Volume Trends



Electronic trading drives volume growth.