# Quant Institutions & Career Paths

## A Comprehensive Guide to Roles and Employers

**Understanding Where Quants Work and What They Do**

# Hedge Funds v Prop Trading Firms

## Hedge Funds

### Business Model:

Manage external investor capital for returns

### Common Roles:

- Quantitative Researcher
- Portfolio Manager
- Risk Analyst

### Examples:

Two Sigma, Renaissance Technologies, Citadel, D.E. Shaw, AQR Capital

## Prop Trading Firms

### Business Model:

Trade firm capital for profit

### Common Roles:

- Quantitative Trader
- Algorithmic Developer
- Low Latency Engineer

### Examples:

Jane Street, Optiver, IMC Trading, Susquehanna, Flow Traders

## Similarities

- Quantitative research and systematic trading strategies
- High performance computing and low latency requirements
- Competitive compensation and performance based incentives

## Key Differences

**Capital Source:** Hedge funds use investor money; prop firms use own capital

**Strategy Horizon:** Hedge funds often multi strategy; prop firms focus on market making

**Regulation:** Hedge funds face more regulatory oversight than proprietary firms

**Compensation:** Prop firms often offer higher base; hedge funds include carry allocation

# Investment Banks v Asset Managers

## Investment Banks

### Business Model:

Trading, market making, client services

### Common Roles:

- Quantitative Strategist
- Derivatives Pricing Analyst
- Electronic Trading Developer

### Examples:

Goldman Sachs, J.P. Morgan, Morgan Stanley, Barclays, Bank of America

## Asset Managers

### Business Model:

Long term portfolio management for clients

### Common Roles:

- Quantitative Analyst
- Portfolio Construction Specialist
- Risk Management Analyst

### Examples:

BlackRock, Vanguard, State Street, Fidelity, PIMCO

## Similarities

- Quantitative modeling for investment decisions and risk assessment
- Structured work environment with established processes
- Global presence and diverse client base across markets

## Key Differences

**Trading Focus:** Banks emphasize active trading; asset managers focus on long portfolios

**Time Horizon:** Banks operate on shorter timeframes; asset managers take longer views

**Revenue Model:** Banks earn from spreads and fees; asset managers charge management fees

**Work Culture:** Banks tend toward faster pace; asset managers offer more stability

# Front Office v Back Office

## Front Office Roles

### Primary Function:

Revenue generation and trading activities

### Common Roles:

- Quantitative Trader
- Quantitative Researcher
- Desk Strategist

### Characteristics:

Direct P&L responsibility, high visibility, performance bonuses tied to trading results

## Middle & Back Office

### Primary Function:

Risk management, infrastructure, operations

### Common Roles:

- Quantitative Risk Analyst
- Model Validation Specialist
- Quantitative Developer

### Characteristics:

Support functions, regulatory focus, stable work hours with project based deliverables

## Similarities

- Strong quantitative and programming skills required
- Deep understanding of financial products and markets
- Collaboration across teams to support business objectives

## Key Differences

**Compensation:** Front office typically earns higher bonuses based on trading performance

**Work Pace:** Front office faces market pressure; middle/back office more structured

**Career Path:** Front office leads to trading or portfolio management; back to risk or tech

**Pressure Level:** Front office high stress from P&L; back office focused on accuracy

# High Frequency Trading Firms

## Specialized Trading Technology

### Business Model:

Execute large volumes of trades at microsecond speeds using proprietary algorithms

### Common Roles:

- Low Latency Developer
- FPGA Engineer
- Quantitative Trader
- Network Optimization Specialist
- Market Microstructure Researcher

### Key Requirements:

Expert level C++ and systems programming, hardware optimization, deep understanding of exchange protocols and market microstructure, ability to work under extreme performance constraints

## Notable Firms

Virtu Financial, Tower Research Capital, Hudson River Trading, Jump Trading, XTX Markets, Citadel Securities

## Distinguishing Features

**Technology Focus:** Cutting edge hardware and software for nanosecond advantages

**Strategy Type:** Market making, arbitrage, and statistical trading at high speeds

**Work Environment:** Highly technical teams with significant engineering resources

**Compensation:** Very competitive with strong emphasis on technical expertise

# Research & Consulting Institutions

## Academic & Advisory Roles

### Business Model:

Provide quantitative research, modeling services, and strategic consulting to financial institutions

### Common Roles:

- Quantitative Researcher
- Financial Engineer
- Risk Consultant
- Model Validator
- Data Scientist

### Key Requirements:

Advanced degree in quantitative field, strong publication record or industry experience, ability to explain complex concepts to non technical clients, expertise in statistical modeling

## Notable Institutions

MSCI, FactSet, Moody's Analytics, S&P Global Market Intelligence, Numerix, university research labs

## Distinguishing Features

**Work Style:** Project based with longer timelines and academic rigor

**Client Interaction:** Regular presentations and consulting with financial institutions

**Research Focus:** Developing new methodologies and improving existing models

**Work Life Balance:** Generally more predictable hours than front office trading roles