

# An Introductory Guide To Working In The Finance Sector



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## **Technical Challenge**

Technology plays an integral part in the world of finance, whether it's mathematicians working on complex investment theories, software engineers designing automated trading systems or scientists working in investment banking or venture capital.

With the growth of complex trading instruments, companies require more advanced mathematical strategies, more efficient software and faster platforms to remain competitive (and keep their data secure). Financial companies invest heavily in the best people and the best tools to achieve this, making the finance sector an inviting and rewarding prospect for those who want to work at the cutting edge of technology.

Contrary to some beliefs, working in finance doesn't always involve putting on a suit and pulling long hours in Central London. ECM has also recruited for companies in Cambridge, Oxford, Brighton and further afield (the Channel Islands, Cyprus and the US) offering "Jeans and T-Shirt" working environments and sane 9-to-5 hours.

For those that haven't worked in finance this guide is a brief introduction to some financial terminology and is designed to give jobseekers an understanding of some of the different job opportunities within the finance sector. Please note that this is not meant by any means to be a definitive, expert's guide to the finance sector.

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## Financial Markets

A financial market is not a tangible entity, rather it is a mechanism that allows people to buy and sell items of financial value. There are lots of different types of financial markets. Examples include:

**Capital Markets** trade “securities”, which are divisible into “equities” (shares) and “debt” (money lent to organisations):

- └ **Stock Markets** trade shares in companies (also called common stock). The shareholders have the right to vote on corporate policy, elect board members and receive a share in the company’s profit (dividends).
- └ **Bond Markets** trade bonds, which are a type of loan. The bond issuer (companies or governments) owes the holder a debt to be repaid with interest at a later date.

**Commodity Markets** trade livestock, meat, grain, energy, petrochemicals, metals and other minerals and materials. Commodities are broadly defined as the raw materials that humans use to create a liveable world.

**Money Markets** trade money or credit on a short-term basis (typically between 1 day and 13 months). Items include car loans, credit card receivables and mortgages.

**Insurance Markets** trade non-financial risk such as theft, fire, loss, accident and health insurance etc.

**Foreign Exchange (FX) Markets** trade foreign currency.

The prices of all these assets rise and fall continually. Changing prices are governed by numerous real-world factors and the constant movement of prices creates **Risk**. There are many different types of risk such as:

**Equity Risk** – share prices may go up or down! You may lose money due to falling share values

**Commodity Risk** – you may lose money due to changing goods values

**Currency Risk** – currency movements may affect the value of money you hold in another currency

**Interest Rate Risk** – investments held at a fixed interest rate may lose value if interest rates rise

**Liquidity Risk** – you may struggle to sell assets if there is a shortage of buyers

**Credit Risk** – you may lose money if a debtor cannot repay your loan, or your employer cannot pay your wages

**Operational Risk** – you may lose money due to poor business decisions, internal processes or external events

Many risks can be traded just like any other item. Buying and selling risk allows investors to fine-tune the amount of risk they are exposed to. This is done by trading derivative contracts on the Derivatives Market.

**Derivatives** are financial instruments whose value is dependent on (derived from) the value of another asset such as:

- Commodities (property, freight, credit, energy, agricultural goods etc)
- Securities (equities and bonds)
- Interest Rates
- Exchange Rates
- Indices (stock market index or consumer price index)
- Other Derivatives

There are three main types of derivatives:

**Forwards / Futures** – agreements to sell a specific asset at a specified future date (the settlement date) and price (the forward price).

The forward price is typically at least the current price plus the risk-free return (ie bank interest rate). If the forward price is less than this amount the seller would be better to sell at the current price and put the money in the bank.

Forwards are very commonly used as tools for reducing risk in business. Agreeing a forward contract allows a company to eliminate uncertainty in the cost of future supplies, leading to stable and predictable operational costs.

For example a haulage company that is concerned about the rising cost of fuel for its fleet of lorries may want to lock in the price at which it will buy fuel in 12 months time. While the company may lose out financially if the fuel price falls, the forward contract guarantees the settlement date and settlement price at which they will receive the fuel, and they can budget accordingly. If the fuel price rises the company will save money, as the settlement price will be lower than the market price on the settlement date.

Futures are a particular type of highly tailored forwards, which are traded directly between two parties on individually negotiated terms.

**Swaps** – agreements between two parties to exchange one income stream against another, allowing both parties to easily spread their risk.

For example a corn farmer who is concerned that his income would suffer if the price of corn dropped, may agree to swap a portion of his income stream with a beef farmer. By agreeing the swap both farmers can hedge against a drop in the value of their own product.

**Options** – agreements giving the holder the right to buy or sell an underlying asset at a specified future date and price.

A “Call” gives the holder the right to buy – and a “Put” the right to sell – the underlying asset at a set “strike price” on or before the expiry date.

Some employers offer stock options as part of a remuneration package, giving the employee the right to buy the company’s stock at a future date (the “exercise date”) for the current price. If the stock value rises over time (due in part to their good work) then on the exercise date the employee will have the right to buy the company’s shares at a price below the market price and can then sell the shares immediately at the market price to lock in a profit.

In a similar way two people may enter into “call” or “put” with each other. Imagine a contract giving Person A the right to sell some shares to person B at a future price. Person A does not even need to own the underlying shares to enter into the contract. Rather he/she gambles that the market price of the shares will fall below the strike price during the period of the contract. If this happens Person A will be able to buy shares at the market price and sell them to person B at the strike price, for a profit.

Derivatives themselves have a value and can be bought and sold like any other asset. Valuing derivatives is a complex field of financial mathematics. Valuations depend on the current market price of the underlying asset, the strike price, the time to expiry, any exercise restrictions, any interest or dividends to be earned while holding the position and an estimate of market volatility. There are a number of pricing models to be aware of:

**The Black Scholes Model** was the first closed form (analytical) solution for pricing options. While it was groundbreaking (and won a Nobel Prize for its authors) it does assume that some basic variables remain constant (dividend payments, volatility and interest rates). It is still used when the calculated error is within a set margin of tolerance.

**The Stochastic Volatility Model** assumes the market volatility to be random. Certain forms of this model can be solved analytically.

Other, more complex models require numerical solutions:

**The Binomial Tree Pricing Model** is a time-stepping technique that allows variables to be given reassigned values at each future time-step.

**The Monte-Carlo Model** determines the option value over a wide range of random input variables to calculate an average expected value.

The standard reference for further reading in this field is “Options, Futures and Other Derivatives” by John C Hull.

## Financial Establishments

An **Exchange** is an organisation that facilitates the trading of assets. The aim of the exchange is to match buyers' and sellers' interest in acquiring and selling assets. In this way the exchange improves the liquidity of the market.

There are exchanges for many of the financial markets, such as Stock Exchanges for securities and Futures Exchanges for options and futures. You might also be familiar with some web-based exchanges such as eBay (a goods exchange) and Betfair (a betting exchange). The exchanges act as central counterparties between traders to:

- Improve market liquidity
- Guarantee fulfilment of contracts and payment
- Allow trading parties to deal anonymously
- Attract investors
- Keep markets orderly

Trading on an exchange is by members only and there is a transaction fee associated with each trade. This is how exchanges themselves make money and run as profitable businesses. Some exchanges are even listed on the Stock Exchange and you can buy and sell shares in them just like any other business.

In the era of high technology, exchanges are less and less a physical place. All financial markets in the developed world are based on highly complex electronic networks, which are lower cost and allow trading at higher speeds. The failure of any of these systems would be disastrous given the vast sums of money being traded on the exchanges and so the systems are backed up multiple times over and require 24 hour technical support.

Not all trading takes place through an exchange though. The alternative to trading on an exchange is to trade **Over-the-Counter**. Dealers trade directly over the phone or electronically.

Trading over-the-counter is much less restricted and unlike the highly standardised products listed on an exchange, over-the-counter products can be highly tailored to meet the buyers' and sellers' needs. Over-the-counter trading has lower transaction costs than exchange-trading and can offer trading outside stock exchange hours.

But anonymity is not preserved, participants are not safe guarded by the same rules governing their conduct, transactions are not guaranteed and, being less regulated, prices can be less accurate.

Like exchange-trading, over-the-counter trading depends increasingly on electronic networks.

**Investment Banks** are financial institutions that perform many functions. Their activities can be divided up into three different categories: front, middle and back office.

**Front Office** activities include:

- Helping companies and governments raise money by issuing and selling securities in capital markets.
- Providing advice on company mergers and acquisitions (including divestitures such as spin-outs).
- Building (or “structuring”) complicated new financial products based on complex derivatives and designed to make greater returns than the underlying assets.
- Managing the investments of institutional investors and very rich individuals, including selling them new financial products and trading on their behalf.
- “Merchant Banking” or “Private Equity” involves investment in companies that are not publicly listed.
- Researching companies to find investment opportunities.
- Researching markets to gain a global overview of investment strategies.
- Providing loans to companies in the form of different types of debt, for which they are paid interest over and above the bank rate.

**Middle Office** activities include:

- Risk management to analyse the bank’s market and credit risk exposure and set trading limits
- Financial analysis to understand the bank’s overall financial position
- Regulatory Compliance

**Back Office** activities include:

- Processing trades, reconciliation, data checking and error checking
- Technology (often referred to as IT), including in-house software development and maintenance, network management and trading support

**Hedge Funds** are lightly-regulated private investment organisations. Hedge Funds are open to a financially limited range of investors, who pay a fee to use their services. The aim of the hedge fund is to make returns over and above the growth of the market. Such returns are called “alpha”.

Most (but not all) hedge funds structure their investments in order to reduce (or hedge against) risk without cutting into investment income. This can be done by:

- Removing market risk (selling market index futures) to hedge against market fluctuations
- Borrowing money (or “leveraging”) to heavily invest in a low risk asset
- Borrowing assets which they believe to be falling in price and selling them, only to buy them back at a cheaper price to repay the loan (short selling)

- Buying assets in the belief they will rise in value (speculating – increasing risk)
- Taking advantage of pricing discrepancies or market latency to buy in one market and sell simultaneously in another market at a higher price (arbitrage)

Hedge funds dominate certain speciality markets such as derivatives and distressed debt (securities of a company or bank that are threatened with bankruptcy), where regulation restricts public funds (such as banks) from investing.

**Proprietary Trading Firms** are companies that trade their own money for the benefit of their owners. They do not have to advertise for clients and so there tends to be little public information about them. Proprietary trading firms may trade in any of the manners mentioned above or may have their own techniques, about which they are very secretive.

**Third Party Software Developers** are independent companies who develop software for financial institutions to use for trading and/or data analysis. Typically software engineers will develop an off-the-shelf software package, which can then be tailored for individual customers to add bespoke functionality and marry properly to their in-house systems.

Hedge funds, investment banks and proprietary trading firms all make increasing use of **Algorithmic Trading** (also called Black Box or Robo-Trading). Algorithmic trading allows automated systems to trade depending on complex pre-determined criteria (algorithms). Automated systems can respond faster than human traders, allowing them to get the best deals first.

Algorithmic trading requires defined protocols for the exchange of information and trading data. The **FIX Protocol** is a trade association which publishes free, open standards for the trading of securities. Many algorithmic trading systems connect to exchanges or other dealers using the FIX protocol.

As algorithmic trading takes advantage of fast response times an ongoing arms race exists between algorithmic trading systems to continually improve the performance of computing systems and software, and reduce network latency.

## **Variety of Jobs**

There is a wide variety of jobs available within the finance sector, offering a range of technical challenges to bright, numerate and scientifically-minded job seekers. For those seeking the City lifestyle (and salaries) Central London beckons. But job opportunities are not geographically limited to Central London and there is an increasing number of opportunities to work in a relaxed environment with sane working hours, while reaping the technical and financial rewards of this sector.

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