A BEGINNER'S GUIDE TO OPTIONS

IRISH STUDENT MANAGED FUND

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1. The Fundamentals of Options: Structure, Mechanics, and Payoffs

Options are financial instruments that confer the right, but not the obligation, to buy or sell an underlying asset at a set strike price. This structure allows investors to achieve leverage or, alternatively, to hedge an existing position. A distinctive feature of options is that the buyer is not required to own the underlying asset in order to take a position on it. Instead, the buyer is paying for optionality, which is why options can be a lower-cost method of expressing a view on a stock's movement.

A central concept in options trading is the expiration date. This forces the option holder to decide, before that date, whether to exercise the option or let it expire. In simple terms, if the option moves in the expected direction and lies in the money, the holder can either exercise the option to buy or sell the asset at the strike price for a profit, or sell the option itself for a gain. If the asset moves in the opposite direction, the option is not exercised and the holder loses only the premium paid.

A number of key terms recur throughout this guide:

- **Strike price:** the fixed price stated in the contract at which the option holder can buy or sell the underlying asset.
- **Exercising the option:** buying or selling the underlying asset through the option contract.
- **Expiration date:** the maturity of the option, and the last day on which the contract is valid.
- **European vs American options:** American options may be exercised at any time on or before the expiration date, whereas European options may only be exercised on the date of expiration itself.

The Contract

There are two sides to every option contract: the buyer and the seller. The buyer of the option is referred to as the option holder; the seller is known as the writer. The buyer is going long — buying a call or put option in the expectation of profiting if the market moves in their favour. The seller is going short — writing a call or put option and collecting the premium upfront, while also taking on the obligation embedded in the contract.

If the market moves unfavourably for the writer, losses can be substantially larger than the premium received. In the case of an uncovered short call, losses are theoretically unlimited because there is no upper limit to how high the price of the underlying asset can rise. Long positions, whether calls or puts, have limited downside, with the maximum loss capped at the premium paid. Gains on a long call are theoretically unlimited, while the maximum profit on a long put is capped at the strike price multiplied by the contract size and number of contracts — the so-called "stock at zero" scenario.

Short positions, by contrast, have limited profit potential, with the maximum gain capped at the premium received upfront. The risks, however, are significantly higher: short calls carry unlimited loss potential for the writer, while short puts have a maximum loss capped at the strike price multiplied by the contract size and number of contracts.

The Premium

The price paid for the option is referred to as the premium. This represents the maximum loss faced by an investor going long on an option. If the option lies out of the money at expiration, the investor will not exercise and will simply lose the premium paid. For the writer, the premium is the fixed price received in exchange for selling the option contract.

Option Basics

Options are among the most complex and significant financial instruments in modern markets. Average daily trading of options exceeded 61 million contracts in 2025, marking the sixth consecutive year of record growth for U.S.-listed options, with the year closing at a volume of 15.2 billion contracts. They remain the third most widely used asset class for algorithmic trading, after equities and FX, making them a key instrument for the world's leading hedge funds.

Option pricing is increasingly complex, drawing on factors such as volatility and time to expiration, and is typically conducted using models such as the Binomial Pricing Model and the Black–Scholes Model. There are two primary types of options: the call option and the put option. A call option is the right to buy an underlying asset at a strike price and benefits from an increase in the price of the underlying. A put option is the right to sell an underlying asset at a strike price and benefits from a decline in the asset's price.

The most common type of option is a call option — specifically, a long call, which is the right to buy an asset at a particular price. The call option benefits from an increase in the price of the underlying asset. At expiration, if the share price is greater than the exercise price, the option is in the money. The value of the call increases by £1 for every £1 rise in the share price.

A put option — specifically a long put — can be viewed as the mirror image of a call option. It is the right to sell the asset at a fixed price. The put benefits from a decrease in the price of the underlying. At expiration, if the share price is below the exercise price, the option is in the money. The value of the put increases by £1 for every £1 decline in the share price.

The Payoff

Calls

- **Long Call Payoff:** if the asset price exceeds the strike price, the buyer can exercise the option, resulting in a payoff equal to (asset price − strike price − premium paid). If the asset price remains at or below the strike price, the option expires worthless and the buyer loses the premium paid.
- **Short Call Payoff:** if the asset price exceeds the strike price, the writer must deliver the asset at the strike price, incurring losses that grow as the asset price rises. These losses are partially offset by the premium initially received. If the asset price is below the strike price, the option expires worthless and the writer retains the entire premium as profit.

Puts

- **Long Put Payoff:** if the asset price falls below the strike price, the buyer can exercise the option, selling the asset at the strike price for a payoff equal to (strike price − asset price − premium paid). If the asset price remains above the strike price, the option expires worthless and the buyer loses only the premium paid.
- **Short Put Payoff:** if the asset price falls below the strike price, the writer must buy the asset at the strike price, which exceeds its market value, incurring losses that grow as the asset price falls. These losses are partially offset by the premium received. If the asset price is above the strike price, the option expires worthless and the writer retains the premium as profit.

2. American and European Options

American and European options share many of the same fundamentals, but each carries important nuances that set them apart in practice.

European Options

European options first appeared in the 17th century, particularly around Amsterdam. They are considerably simpler contracts than their American counterparts. Typically, European options can only be settled at maturity. For example, a five-year call option at €120 can only be exercised exactly five years after the commencement of the contract, regardless of whether the option is in the money (the stock being priced above €120) at any point before that date. This makes the contract structurally simpler, as there is no early exercise feature — only a single date on which the option may be utilised. Because of this lack of flexibility, European options are always priced equal to, or below, comparable American options. The difference reflects the additional profit potential of American options, which can be cashed in as soon as they move into the money.

European options are far more commonly used in index markets, such as the FTSE 100. They are particularly popular for institutional hedging. Many funds hold positions across an index, and by using

index-wide options such as European-style contracts they can efficiently hedge their broader market risk. This is considerably simpler than purchasing an option on each individual constituent, which would be both expensive and operationally cumbersome. European options are commonly valued using the Black–Scholes model — a relatively simple and elegant framework, made possible by the single expiry date. European options are typically settled on a cash basis, given that they are commonly written on a basket of stocks. This means that, if exercised, the net pay-off is transferred in cash (for example, a profit of €200,000) rather than transferring the underlying basket of equities that make up the index.

American Options

American options emerged after their European counterparts, in the 19th century, following the formation of the Chicago Board Options Exchange. They are considerably more complex than European options and provide additional flexibility to the trader, which is why they are always priced at least equally, and usually above, comparable European contracts. As noted above, while European options tend to dominate index markets, American options dominate the equities market. They are commonly traded on exchanges and over the counter on individual stocks, allowing investors to speculate on the specific prospects of a particular equity. This concentrates risk and tends to make performance and valuation more volatile. American options are also more difficult to value than European options because their pricing must account for the possibility of early exercise at any point before maturity. As a result, they are typically valued using numerical methods such as binomial tree models or finite-difference approaches, rather than closed-form solutions like Black–Scholes. American options are usually physically settled, given that they typically concern a single underlying asset. This means the actual underlying asset (the equity) is transferred when the option is exercised — the holder buys the asset on exercise of a call, and sells the asset on exercise of a put. This is operationally simpler, as the assets physically exist and the transfer of rights is less complex than with indices.

Practical Case Comparison

Consider an identical call option on a US stock at €100, with each option carrying a maturity of one year. The only difference between the two contracts is that one is European-style and one is American-style. The current share price is €95 and the options are priced accordingly: European option = €8.20; American option = €9.00.

Six months into the contract, the company has seen unprecedented demand on the back of favourable market conditions and online trends. Earnings comfortably exceed expectations for the period and the stock price rises to €140. The investor holding the American option believes demand will fade in the second half of the year as social media hype and traction die down. They decide to exercise all of their call options, believing this is close to the stock's peak, realising a gain of €40 per share and closing out their

position. The option is physically settled and the investor receives 10,000 shares of the stock. In practice, rather than exercising the call and taking delivery, the investor would more likely sell the option on the open market in order to preserve the remaining six months of time value, which would allow them to realise more than €40 per option given the further upside potential still embedded in the contract.

The holder of the European option also believes this is likely to be the peak for the stock. However, due to the nature of the contract, they are unable to exercise the €100 strike until maturity. They are forced to hold the option for another six months and reassess closer to expiration.

Six months later, as both investors predicted, demand faded. The second half of the year proved disappointing, and the company only just met expectations for the year as a whole. The share price experienced a sharp pullback to €107, roughly in line with the broader market return. The holder of the European option still chose to exercise, realising a gain of €7 per share. Assuming for illustrative purposes that the option was written on a cash settlement basis (although this is uncommon for single-security options), no assets exchange hands and the investor simply receives the cash flow of €7 per share.

Net of the premium paid for each option, the realised profits are as follows:

- **European option holder:** €7 (profit per share) − €8.20 (cost per option) = −€1.20 per option.
- **American option holder:** €40 (profit per share) − €9.00 (cost per option) = €31 per option (exercising); or approximately €45 (potential option sale price) − €9 (option purchase price) = €36 per option (selling the contract).

This example illustrates the flexibility and power of the American option relative to the European option, although it is admittedly an extreme case. The European option holder still chose to exercise, as doing so minimised their overall loss.

3. Hedging with Options

Hedging is the practice of taking a position that offsets potential losses arising from another position. Unlike most trading strategies, its utility derives not from its ability to generate returns, but from its capacity to limit downside. Common methods of hedging include futures contracts, forward contracts and swaps. Arguably the most important tool in the hedging toolkit, however, is the option. This instrument allows for the complete customisation of a hedging strategy according to risk appetite and time horizon.

The foundation of options-based hedging is the protective put. This is one of the most straightforward strategies: the investor owns shares in a given asset and then buys a put option on those same shares. The put acts as a safety net should the stock fall, rising in value and offsetting the losses on the underlying position. If, instead, the stock rises in value, the put expires worthless and the investor retains the gains,

net of the premium paid. While this is most commonly executed using put options, the same logic can be applied to call options in some cases, such as input cost hedging, discussed further below.

By choosing the strike price of a protective put, the investor effectively decides how large a deductible they are willing to carry. An at-the-money (ATM) put is set at the current stock price, meaning it protects against any decline below the current price from the outset. This variant is, accordingly, relatively expensive. Out-of-the-money (OTM) puts are cheaper alternatives with a strike price below the current market price. Under this structure, the investor absorbs the first tranche of losses before the protection takes effect.

In practice, many institutional investors with large and diversified portfolios do not hedge their positions using puts on the individual equities that make up their holdings, as this is generally too expensive and operationally inefficient. Instead, they protect themselves from broader market exposure using index put options, which hedge overall market risk in a single trade. This is effective where the chosen index has a high beta relative to the investor's portfolio. An index put will never be a flawless hedge for a diversified portfolio, as there will always be some divergence in correlation. If the portfolio drops more than the index, the hedge will under-compensate, and vice versa. The lower the beta, the more inaccurate the hedge will be. This problem is known as basis risk, and it is one of the most significant limitations of index puts.

Another important limitation of using put options as a hedging tool is cost. Depending on the implied volatility of the market, the time to expiration and the strike selected, premiums can be substantial. To navigate this, the collar strategy is often used. This involves combining three positions: ownership of the underlying stock, a purchased put on the stock for downside protection, and a sold (written) call that collects a premium to offset the cost of the put. While the written call has the effect of capping the upside potential of the investment, the premium received can fully fund the cost of the put, bringing the net cost of the hedge to zero.

While equities are one of the most widely hedged asset classes using options, the same strategies can be applied to a broad range of asset classes and risk types. One important example is input cost hedging, undertaken by companies which are heavily exposed to changes in commodity prices. Airlines, which are exposed to fuel price volatility, use call positions on oil as a form of insurance against price spikes. Other examples include car manufacturers taking positions in aluminium and steel, and food producers buying options in soft commodities such as corn and wheat.

Options-based hedging is also used to mitigate interest rate risk and foreign exchange risk. Companies that hold floating-rate debt are typically exposed to meaningful macroeconomic risk, with even modest changes in rates having a disproportionate effect on their borrowing costs. To navigate this, interest rate

cap options are used to create a borrower's hedge. These options pay out if benchmark rates rise above a specified level, effectively capping the cost of debt service. The same logic applies to foreign exchange hedging, used by companies that receive a significant share of their revenues in foreign currencies. If, for example, a European company is expecting a large sum from an American client at some point in the future, it can use options to reduce its exposure to adverse currency movements. Put options on USD would set a floor on the exchange rate, so that if the dollar weakens, the hedge would compensate for the loss in conversion value.

In summary, options provide investors with a precise and flexible way to manage downside risk. The protective put sets a floor on an individual stock position in exchange for a premium. Index puts extend this protection to entire portfolios efficiently and at lower cost, although the trade-off in this case is basis risk. To control the often substantial cost of these strategies, the collar can be employed, levelling out the cost with the premium collected on a written call. These principles can be applied to markets well beyond equities, with uses across commodity exposure, interest rate risk, foreign exchange movements and beyond.

4. The Pricing Behind Options

4.1 Introduction: From Hedge to Price Tag

In Section 3, we established that options serve as powerful hedging instruments — allowing investors to cap downside risk or secure exit prices for volatile positions. But when one pulls up an options chain for any Irish-listed equity (for example, CRH plc or Bank of Ireland), the numbers displayed are not arbitrary. They represent the market's collective forecast of probability, volatility and time. For the portfolio, understanding how these prices are derived is critical. Overpaying for "insurance" (puts), or underpricing the risk embedded in covered call strategies, directly erodes alpha. This section demystifies option pricing by splitting the black box into two components: the analytical framework (the Black–Scholes legacy and the Greeks) and the economic intuition (what volatility and time decay actually represent in euro terms).

4.2 The Building Blocks: Intrinsic vs. Extrinsic Value

Before any complex model is applied, every option price decomposes into two intuitive parts:

Component	Definition	Economic Interpretation
Intrinsic Value	max(S − K, 0) for calls; max(K − S, 0) for puts	Immediate payoff if exercised today. Pure equity risk.
Extrinsic Value	Market Price − Intrinsic Value	The "uncertainty premium." Compensation for the probability

Component	Definition	Economic Interpretation
		of favourable moves before expiry.

Key takeaway: options are rarely bought to be exercised immediately. Extrinsic value is therefore where the win or loss is realised. Buying options when implied volatility (IV) is elevated is akin to buying home insurance after a flood warning — it works, but at an inflated price for the risk being transferred.

4.3 The Black–Scholes Framework: An Intuitive Sketch

While the full Black–Scholes–Merton partial differential equation lies beyond the scope of a beginner's guide, its underlying assumptions reveal what the market implicitly believes:

- **Log-normal distribution:** stock prices cannot fall below zero, but can spike infinitely upward.
- **Constant volatility (σ):** the market's best estimate of future swings in the underlying.
- **Risk-free rate (r):** the opportunity cost of tying up capital (relevant for EURIBOR-based pricing).

The analytical core. The formula discounts the expected payoff under a "risk-neutral" world. For a European call:

$$C = S_0 \cdot N(d_1) - K \cdot e^{-rt} \cdot N(d_2)$$

where $N(d_1)$ and $N(d_2)$ are probabilities (technically, deltas) derived from volatility and time.

Economic translation: the investor is paying for the probability-weighted advantage of owning the stock at strike price K, rather than buying it in the open market at S_0, adjusted for the time value of money.

4.4 The Greeks: Managing Risk in Real Time

Once a position is live, price is not static. The Greeks measure the sensitivity of an option's value to changes in market factors.

Greek	Measures	Practical ISMF Application
Delta (Δ)	Price change per €1 move in the underlying.	Hedge ratio: Δ = 0.5 means two options are needed to hedge one share.
Gamma (Γ)	Rate of change of delta.	Convexity risk: high gamma near expiry means small stock moves can cause large P&L swings.
Theta (Θ)	Daily time decay.	Cost of carry: Θ = −€0.10 means the position loses €0.10 per day, all else equal.

Greek	Measures	Practical ISMF Application
Vega (ν)	Sensitivity to a 1% change in IV.	Volatility risk: if vega = 0.20 and IV drops 5%, the option loses €1.00 regardless of stock price.

Market context from the January '26 report: recall the analysis of Irish financial sector exposure to ECB holding patterns (Section 1). When geopolitical volatility spikes — as observed during the Greenland dispute (Section 5) — implied volatility on defence stocks rises. A long call position would see vega-driven gains before the underlying stock moves, capturing the "fear premium."

4.5 Implied Volatility: The Market's Fear Gauge

Implied volatility is the only unobservable input in a pricing model — it is derived from the market price itself.

- **High IV:** the market expects large moves (uncertainty). Options become expensive.
- **Low IV:** complacency. Insurance is cheap, but potentially justified by a low macro volatility regime.

The volatility smile: plotting IV against strike prices reveals a "smile" shape, with higher IV for deep out-of-the-money puts and calls. This reflects crash-protection demand (left side) and lottery-ticket speculation (right side). For the Irish equity book, observing the skew on CRH options can signal institutional hedging activity ahead of earnings.

4.6 Practical Pricing: A Worked Example

Scenario. ISMF holds 1,000 shares of Ryanair (RYA). To hedge against Q2 earnings volatility (April 2026), we consider buying ATM puts.

Parameters

- Spot (S_0): €18.50
- Strike (K): €18.50 (ATM)
- Time (T): 30 days (0.082 years)
- IV (σ): 28% (elevated due to fuel cost uncertainty)
- Risk-free rate (r): 2.5% (ECB deposit facility rate proxy)

Analytical output. Black–Scholes yields a theoretical premium of €0.68 per share.

Economic breakdown. Intrinsic value: €0.00 (ATM). Time value: €0.68 (a pure volatility bet). Daily theta cost: approximately €0.022, or 3.2% of the premium lost per day to time decay.

Strategic decision. If €0.68 (3.7% of notional) is too expensive given elevated IV, ISMF might sell a covered call at €20 to finance the put (a collar strategy), reducing net premium outlay while capping upside.

4.7 Current Market Considerations (April 2026)

ECB policy and theta. With the ECB in a holding phase at 2% (Section 1), risk-free rates are stable. This reduces the r component of pricing, slightly lowering call premiums relative to the 2023 hiking cycle — favourable for long-call hedging strategies.

AI-driven volatility. Following the RAM market shock (Section 2), tech-adjacent names on the ISEQ show elevated skew. Option pricing models assume log-normality, but supply-chain shocks create "fat tails" (leptokurtosis). It is worth bearing in mind that standard models underprice the probability of extreme moves in semiconductor-exposed names.

4.8 Conclusion

Option pricing is where probability theory meets market psychology. For the portfolio, mastering the Greeks and volatility dynamics transforms options from speculative instruments into precision risk-management tools. The key is balancing the analytical — knowing the model — with the economic — knowing when the model's assumptions break down, such as during geopolitical shocks or supply crunches. As ISMF navigates the "unpredictable American diplomacy" environment highlighted in Section 5 of the January '26 report, recognising that we are not simply buying "time" but buying implied volatility is what separates an efficient hedge from expensive insurance.

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