

# SGX eLearning

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## Exchange traded funds (ETFs)

### What is an ETF?

- An ETF is a type of investment fund that is listed on a stock exchange.
  - An investment fund invests the pooled funds of individual investors according to pre-set objectives
  - Through investment funds, investors can afford to hire professional fund managers, diversify their portfolio, access baskets of investments, and lower expenses through economies of scale
- It gives investors exposure to different asset classes e.g. stocks, bonds, commodities.
  - An asset class is a group of investments that have similar characteristics, behave similarly and are subject to similar market forces, e.g. equities (stocks), fixed income (debt), real estate, commodities
- They are passive instruments that aim to replicate the performance of an underlying index.
  - An index reflects the movement of an investment portfolio
  - Indexes are formed by baskets of securities or other assets (e.g. commodities), and are calculated by aggregating the value of these instruments and expressing them against a base value
  - Index constituents refer to the instruments that make up the index, and are selected and maintained by index providers e.g. iEdge, FTSE, S&P, etc.

- They are expected to provide returns similar to the index in the long run.

## How to buy or sell an ETF?

- You can buy or sell ETFs through a broker at market price throughout the trading day because a Designated Market Maker (DMM) is appointed

## What is the NAV of an ETF?

- NAV reflects the fair value of an ETF unit
- $$\text{NAV per unit} = \frac{(\text{Total fund assets} - \text{Total fund liabilities})}{\text{Number of outstanding ETF units}}$$
- While the NAV reflects the fair value, an ETF may at times trade at a price that differs from its NAV at either a premium (higher price) or discount (lower price)

In summary, ETFs trade at **market price** that provide returns similar to the performance of the underlying index; this market price may or may not be the same as the NAV.

- Just like shares, the price of an ETF is quoted as bid/ask prices on a stock exchange
- With ETFs, you can enter and exit positions quickly at any time during trading hours and at prices that reflect real-time market conditions

## How do ETFs track an index?

ETFs listed on SGX-ST can be divided into two types depending on how they track the performance of the underlying index

### Cash-based

- Direct replication: ETF directly invests in the same constituents and in the same proportion as the underlying index to closely track the performance of the underlying index
- Statistical or representative sampling: ETF invests in a selected number of constituents of the underlying index to track its performance
  - Commonly used when the index has too many constituents, making it difficult to acquire and manage the proportion of all index constituents

## **Synthetic**

- Does not invest in the constituents of the benchmark index but uses derivatives to replicate the index's performance
- Such an ETF may hold cash and/or a basket of securities that are not constituents of the stocks of the underlying index
- It uses derivatives such as swaps to exchange the performance of the basket of securities with the performance of the index
- It may also purchase derivatives issued by a third party such as participatory notes (P-notes) to replicate the index

### **Advantages of synthetic ETFs**

- Allow issuer to minimize tracking error

### **Disadvantages of synthetic ETFs**

- ETF will be exposed to the credit risk of the swap counterparty and used by the issuer to exchange the performance of the assets held by the ETF for the performance of the underlying index
  - ⇒ The synthetic ETF is not immune to default risks of the counterparty
- If the swap counterparty defaults, the ETF will not be able to obtain the performance of the underlying index from the swap counterparty
- The extent of losses arising from the default of the swap counterparty depends on the ETF's exposure to the swap counterparty
  - E.g. if ETF exposure to swap counterparty is 10%, maximum loss due to derivative exposure is 10%
- However, the ETF still holds onto a pool of assets which generates performance used to swap for the performance of the underlying index

## **Advantages of ETFs**

- Lower fees and transaction costs: An ETF allows you to trade funds like shares, but at a lower cost than unit trusts
- Transparency and tradability: ETFs reveal their holdings daily; with ETFs, you can enter and exit positions quickly at any time during trading hours and at prices that reflect real market conditions

Unit trust: If you invest in a unit trust, your money is pooled with money from other investors and invested in a portfolio of assets according to the unit trust's stated

## **ETF risks**

### **Market risk**

- The underlying index that ETF tracks is susceptible to market volatility
- Changes in market conditions will affect the price of the underlying constituents, which affects the NAV of the ETF, which affects its price

### **Foreign exchange risk**

- Arises when currency of actual assets held by ETF differs from denomination currency of the ETF
- Trading currency of the ETF differs from the denomination currency of the ETF

### **Liquidity risk**

- Active trading of the ETF will not be maintained when the authorised participants or DMM ceases to perform its obligation to provide continuous quotes in the ETF  
→ buyer may not be able to buy or sell the ETF in a timely manner at a fair price

### **Tracking error**

- Measure of how the value of the ETF may deviate from the value of the underlying index it tracks
- Arises from various factors e.g. ETF management fees, transaction cost, replication methodology, cash holdings that do not generate returns

### **Bid-ask spreads**

- Bid-ask spread is determined by the difference of the price that a buyer is willing to pay for an asset, and the price that a seller is willing to sell
- Scenarios such as market volatility or illiquidity of the underlying instruments can cause the bid-ask spread of the underlying to widen

## **Exchange Traded Note**

### **What is an ETN?**

- A debt security (or debt obligation) that is traded on exchange, and designed to track the performance of underlying assets such as an equity index, commodity price and currency rate
- The entity who issues the ETN (usually an investment bank) is obligated to deliver the index or asset performance (less fees) upon repurchase or maturity

## How much do ETNs return?

- The return of an ETN is based on the performance of the underlying asset
- ETNs do NOT provide periodic coupon repayment (like bonds), pay interest, or guarantee returns or return of principal
  - In contrast, for ETFs, custody of fund assets are segregated and the liquid assets directly held by the fund are recoverable

## Risk factors with ETNs

- Investors are exposed to the credit risks of ETN issuers, who are usually unrelated to the issuers of the underlying assets — this is known as *issuer risk*
  - If the issuer defaults on the ETN, the entire investment in the ETNs may be lost
- Other general risks such as market risk and liquidity risk also apply

## ETFs vs ETNs

	Exchange Traded Funds	Exchange Traded Notes
<b>Security type</b>	Investment Funds	Debt security
<b>Diversification</b>	Varies, depending on underlying index	Varies, depending on underlying index
<b>Dividend distribution</b>	Yes, depending on individual ETF	No
<b>Principal guaranteed</b>	No	No
<b>Expiry</b>	No	Generally yes
<b>Tracking error</b>	Yes	No
<b>Credit risk of issuer</b>	No. Fund assets are segregated from issuer's assets	Yes. ETNs are debt obligations owed by the issuer to investors

# Futures

## What is a derivative?

- A derivative is a type of financial contract whose value is *derived* from other underlying assets, e.g.
  - Financials (e.g. an equity index, stocks, currency)
  - Commodities (e.g. gold, oil, iron, rubber)
- Types of derivatives include futures, options, forwards, and warrants
- Derivatives can be used for speculative or hedging purposes
- Most derivatives are *leveraged products*, meaning you get a larger exposure in the underlying asset for a relatively small cost
  - Both gains and losses are magnified

## What are futures?

- Futures contracts give investors the obligation to buy or sell the underlying asset in a specified quantity at a specified price (the future price or delivery price) on a specified future date (the delivery date or settlement date)
- Futures are subject to margin requirements (see below), and have partial settlements of emerging gains/losses through daily mark-to-market processes (see below)
- Types of futures include
  - Financial futures: futures contracts based on financial instruments, e.g. currencies, equities, equity indices, interest rates
  - Commodity futures: contracts based on physical commodities, e.g. crude oil, gold, etc.

## How do futures work?

- An investor who expects the price of the underlying assets to appreciate (increase) adopts a "long position" – they agree to **buy** and **receive** delivery of the underlying at the delivery price
- Similarly, if he expects the price to fall, he adopts a "short position", i.e. agree to **sell** and **deliver** the underlying at the delivery price

## Margin

- Futures are traded on margin, i.e. using borrowed funds from a broker to trade a financial asset
- The initial cash outlay is called the **initial margin**
- The broker may add additional margin requirements for specific clients, products, or markets based on risk analysis
- The ability to trade at a fraction of the value of the actual contract creates the *leverage effect* of futures trading

## What is mark-to-market?

- This is the daily process of revaluing outstanding positions to the daily settlement price. The resulting profit and loss are added to or deducted from the margin account
  - i.e. the process of checking the price of the future that day and seeing how it affects profit/loss
- The broker issues a margin call when the initial margin is eroded by loss and falls below the minimum margin requirement (the maintenance margin)
  - The initial margin and the maintenance margin may not be the same!
- The additional amount required to restore the account to the initial margin is called variation margin
- Losses can exceed the initial margin deposited. If the margin call is not met (i.e. the margin is not topped up to meet the maintenance margin), then the broker has the right to liquidate the holdings in the futures to raise the necessary amount.
  - The maximum loss can hence be more than the initial margin placed

### Example

Consider a futures that has an initial margin of \$2500 and a maintenance margin of \$2000.

- If the *value* of the futures drops by \$1000, the loss is offset from your margin account of \$2500, bringing it down to \$1500.

- This makes your margin funds lower than the maintenance margin. Your broker will issue a margin call and request that you top up the account to restore the balance to the initial margin of \$2500.
- If the *value* drops by \$300, then your margin account reduces to \$2200. As this remains above the maintenance margin of \$2000, no margin call is made, even though it is below the initial margin.

If the value of underlying asset of the futures is \$20000, then if its value changes to \$18000, then its value has dropped by \$2000. This loss is offset against your margin account funds.

## Settlement methods

Futures contracts can be settled in two ways, and the way used is specified in the contract.

- Physical delivery: Underlying assets are delivered by the seller to the specified delivery location
- Cash settlement: Parties settle by paying (or receiving) cash for the loss (or gain) related to the contract

## Exchange traded futures

- A central clearing house acts as a counterparty to fulfil the contract terms
- Clarity of standardised futures
- Availability of an avenue for price discovery and thus trading

## Futures vs options



	Futures	Options (covered in the next chapter)
Definition	A Futures contract is a binding agreement, for buying and selling of an underlying asset at a predetermined price at a future specified date	Options are the contract in which the investor gets the right to buy or sell the underlying asset at a predetermined exercise price, on or before a certain date, however the investor is <b>not obligated</b> to do so
Obligation of Buyer	Yes, to execute the contract	No, there is no obligation
Execution of Contract	On the agreed date of a futures exchange	<ul style="list-style-type: none"> <li>• <b>European style:</b> A contract that may only be exercised on expiration</li> <li>• <b>American style:</b> A contract that may be exercised on any trading day on or before expiry date</li> </ul>
Risk	High	Loss limited to invested amount for long position but higher when writing/short selling options
Advance Payment	No advance payment, only requires deposit of margins	Paid in the form of premiums that indicate the probability that the option will expire In-The-Money
Degree of Profit/Loss	Unlimited – both profits and losses	Unlimited profit and limited loss (Option buyer)

## Structured warrants and options

### What are structured warrants and options?

- Structured warrants and options give the holder the right to buy or sell the underlying asset at a predetermined price (exercise price or strike price) on or by a specified date (expiry or exercise date)
- There are two main types of structured warrants
  - Call warrant/option: The right to **buy** the underlying asset. It will rise in value when the price of the underlying asset **increases**
  - Put warrant/option: The right to **sell** the underlying asset. It will rise in value when the price of the underlying asset **decreases**
- The exercise/strike price is the predetermined price that is fixed in advance before the structured warrant or option is listed. It is a price at which the holder of the structured warrant or option can buy (for a call warrant) or sell (for a put warrant) the underlying asset
- The expiry/exercise date is the final date of the product's life. After expiry, structured warrants and options no longer have value and will not be tradable anymore, as the right to buy or sell no longer exists
- There are two styles of contracts that determine when the trader can buy or sell the warrant/option
  - European style: The warrant/option is a contract that may only be exercised on the expiry/exercise date (most warrants listed on SGX are European

style)

- American style: The warrant/option can be exercised on any trading day on or before the expiry/exercise date
- SGX allows investors to trade structured warrants on the Securities (ST) market and options on the Derivatives market (DT)
- Structured warrants also have **conversion ratios** (aka entitlement ratios), which is the number of structured warrants that a holder will need to hold to have the right to buy (or sell) one unit of the underlying asset
  - E.g. a structured warrant with a conversion ratio of 5:1 means that 5 structured warrants are needed to convert into 1 unit of the underlying asset

## Value of a warrant/option

- The **intrinsic value** of the structured warrant/option is the **difference** between the **price of the underlying asset** and the **strike/exercise price**
  - Call:  $(\text{Underlying asset price} - \text{Strike price})$  or 0, whichever is greater
  - Put:  $(\text{Strike price} - \text{Underlying asset price})$  or 0, whichever is greater
- The **time value** is the amount of premium above the intrinsic value. It is the portion of a warrant/option's value that is attributable to the amount of time remaining until the warrant/option expires; it decreases over the life of the warrant/option and is 0 on the expiry date
- $\text{Value of a structured warrant} = \text{Intrinsic value} + \text{Time Value} = (\text{Price of underlying asset} - \text{strike price}) + \text{Time value}$

## Moneyness

- A structured warrant can be "In-The-Money" or "Out-of-the-Money"
- "Moneyness" is determined by whether the price of the underlying asset is higher or lower than the strike/exercise price of the structured warrant
- The underlying asset price is also called the "spot price"
- For a call warrant,
  - $\text{Strike price} < \text{underlying asset price} \Rightarrow \text{"In-the-money"}$
  - $\text{Strike price} > \text{underlying asset price} \Rightarrow \text{"Out-of-the-Money"}$
  - $\text{Strike price} = \text{underlying asset price} \Rightarrow \text{"At-The-Money"}$

- For a put warrant, it is the opposite:
  - Strike price < underlying asset price  $\Rightarrow$  "Out-of-the-Money"
  - Strike price > underlying asset price  $\Rightarrow$  "In-the-money"
  - Strike price = underlying asset price  $\Rightarrow$  "At-The-Money"
- So a warrant that is "In-the-money" has a positive intrinsic value, while a warrant "out-of-the-money" has a negative (technically 0) intrinsic value

## Factors that influence warrant price

### Factors that affect intrinsic value

- Current price of the underlying asset
  - An appreciation in price of the underlying asset will result in a call warrant price rising as the probability of the call warrant expiring In-the-Money has increased
  - In contrast, an appreciation in price causes put warrant prices to fall as the probability of the put warrant expiring Out-of-the-money has increased
  - The opposite is true for decreases in price of the underlying asset –call warrant prices fall, but put warrant prices increases

Current Price of Underlying Asset	Change in Structured Warrant Price	
	Call	Put
Increase	↑	↓
Decrease	↓	↑

- Exercise price of the structured warrant
  - A call warrant with a high exercise price has a lower probability of expiring in the money  $\rightarrow$  lowers in price, while a low exercise price increases that probability  $\rightarrow$  increases the price
  - A put warrant with a high exercise price has a higher probability of expiring in the money  $\rightarrow$  increases the price, while a high exercise price lowers that probability  $\rightarrow$  lowers the price

Exercise price of Warrant	Change in Structured Warrant Price	
	Call	Put
Increase	↓	↑
Decrease	↑	↓

- Implied or perceived future volatility of the underlying asset
  - Implied volatility = market's expectation of the underlying asset price fluctuation over the remaining lifespan of the warrant
  - If implied volatility is high, then the market expects that the underlying asset price will fluctuate more widely → higher probability that the warrant will expire In-the-Money → investor will make a higher profit → Increase in price of both call and put warrants
  - A higher implied volatility also attributes higher hedging risks to structured warrant issuers → higher price for both call and put warrants

Implied volatility of the Underlying Asset	Change in Structured Warrant Price	
	Call	Put
Increase	↑	↑
Decrease	↓	↓

### Factors affecting time value

- Lifespan of the structured warrant
  - If the time to expiry for a structured warrant is longer, there is more time for the underlying asset to move in the direction favourable to the structured warrant holder → warrant price is higher

Time to Expiry	Change in Structured Warrant Price	
	Call	Put
Increase	↑	↑
Decrease	↓	↓

# How call warrants work

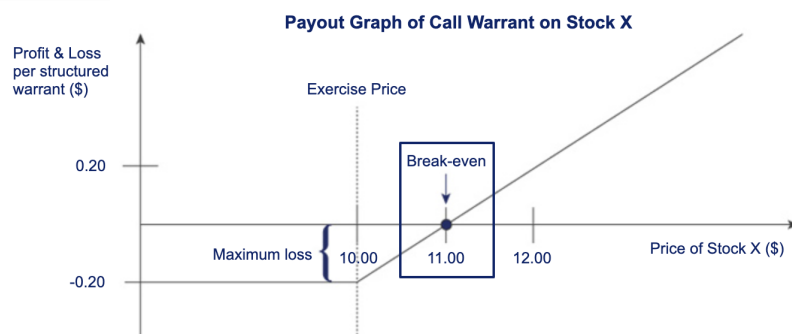
## How Do Structured Warrants Work? (Call Warrants)

### European-style Call Warrant Issued on Stock X

Click the buttons to learn about the key features.

In practice, when buying 5 call warrants at a price of \$0.20 per warrant you would have invested \$1 when Stock X traded at \$10. Therefore, Stock X would have to increase with more than \$1 for the call warrant to become profitable. For that reason, the break-even level for this example would be Stock X trading at \$11.

Click [here](#) to view more call warrant scenarios.



European-style Call Warrant on Stock X	
Current Price of Underlying Stock X	\$10.00
Exercise Price of Call Warrant	\$10.00
Conversion Ratio of Call Warrant	5 structured warrants:1 share
Current Call Warrant Price	\$0.20
Scenario 1: Settlement Price is Higher Than the Exercise Price The Call Warrant Expires In-The-Money	
At Expiry, Settlement Price of Stock X	\$12.00
Cash Pay Out per Call Warrant $[(\$12.00 - \$10.00) / 5]$	\$0.40
Profit per Call Warrant $(\$0.40 - \$0.20)$	\$0.20
% Change in Underlying Stock X Price [i.e. $(\$12.00 - \$10.00) / \$10.00 \times 100\%$ ]	Profit of 20%
% Change in Call Warrant Price [i.e. $(\$0.40 - \$0.20) / \$0.20 \times 100\%$ ]	Profit of 100%
Scenario 2: Settlement Price is Equal To Or Lower Than The Exercise Price The Call Warrant Expires Worthless / Out-Of-The-Money	
At Expiry, Settlement Price of Stock X	\$8.00
Cash Payout per Call Warrant	\$0
Loss per Call Warrant	\$0.20 (structured warrant price) (i.e. investor will lose his entire investment capital)
% Change in Underlying Stock X Price [i.e. $(\$8.00 - \$10.00 / \$10.00) \times 100\%$ ]	Loss of 20%
% Change in Call Warrant Price	Loss of 100% (structured warrant will expire worthless as the investor will not exercise it)

Click Next below to proceed

# How put warrants work

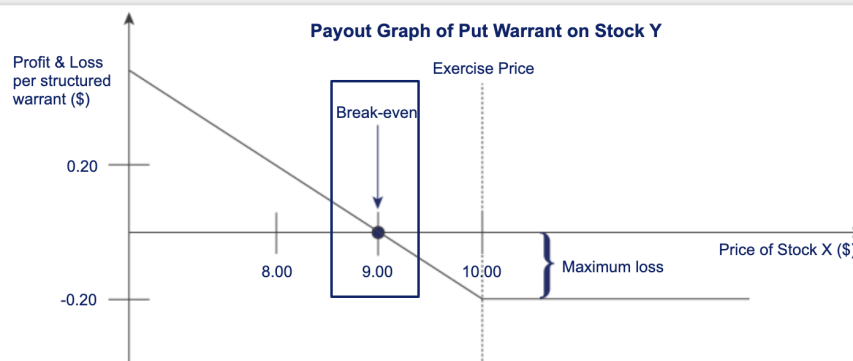
## How Do Structured Warrants Work? (Put Warrants)

European-style Put Warrant Issued on Stock Y

**i** Click the buttons to learn about the key features.

In practice, when buying 5 put warrants at a price of \$0.20 per warrant, you would have invested \$1 when Stock Y traded at \$10. Stock Y would have to decrease by more than \$1 for the put warrant to become profitable. For that reason, the break-even level for this example would be Stock Y trading at \$9.

Click [here](#) to view more put warrant scenarios.



European-style Put Warrant on Stock Y	
Current Price of Underlying Stock Y	\$10.00
Exercise Price of Call Warrant	\$10.00
Conversion Ratio of Put Warrant	5 structured warrants:1 share
Current Put Warrant Price	\$0.20
Scenario 1: Settlement Price is Lower Than the Exercise Price The Put Warrant Expires In-The-Money	
At Expiry, Settlement Price of Stock Y	\$8.00
Cash Pay Out per Put Warrant $[(\$10.00 - \$8.00) / 5]$	\$0.40
Profit per Put Warrant $(\$0.40 - \$0.20)$	\$0.20
% Change in Underlying Stock Y Price [i.e. $(\$8.00 - \$10.00) / \$10.00 \times 100\%$ ]	Loss of 20%
% Change in Put Warrant Price [i.e. $(\$0.40 - \$0.20) / \$0.20 \times 100\%$ ]	Profit of 100%
Scenario 2: Settlement Price Is Equal To Or Higher Than The Exercise Price The Put Warrant Expires Worthless / Out-Of-The-Money	
At Expiry, Settlement Price of Stock Y	\$12.00
Cash Pay Out per Put Warrant	\$0
Loss per Put Warrant	\$0.20 (structured warrant price) (i.e. investor will lose his entire investment capital)
% Change in Underlying Stock Y Price [i.e. $(\$12.00 - \$10.00 / \$10.00) \times 100\%$ ]	Profit of 20%
% Change in Put Warrant Price	Loss of 100% (structured warrant will expire worthless as the investor will not exercise it)

You're making good progress!

A put warrant has an exercise price of \$18 and a conversion ratio of 5 warrants:1 underlying stock. Lucas buys 5 put warrants at the price of \$0.20 per warrant. In line with Lucas' expectations, the underlying stock has decreased significantly to \$12.

What is his net gain per put warrant at expiry?

**i** Select one option, and then click Submit.

- ☒  $(\$18 - \$12)/5 - \$0.20 = \$1$
- ☐  $(\$18 - \$12) - (\$0.20 \times 5) = \$5$
- ☐  $(\$18 - \$12) - \$0.20 = \$5.80$

Submit

# Structured warrants vs options

Issuer and Market	
Structured Warrants	Options
The issuer is usually a financial Institution, like an investment bank	Developed by an exchange
Traded in the securities market	Traded in the derivatives market

Trading Mechanism	
Structured Warrants	Options
Investors can only be buyers (no writing of positions) <ul style="list-style-type: none"> <li>Positive view: Investors can buy a call warrant</li> <li>Negative view: Investors can buy a put warrant</li> </ul>	<ul style="list-style-type: none"> <li>Positive view: Investors can buy a call option or write a put option</li> <li>Negative view: Investors can buy a put option or write a call option</li> </ul> <p><b>Writing</b> a call or put option means that you are selling a call or put option. If you sell a call then you are obliged to sell the underlying asset at the strike price at a future date. If you sell a put then you are obliged to buy the underlying asset at the strike price at a future date</p>

Writing or selling a call option gives the buyer of the call option the right to buy a stock from you at a certain price by a certain date – the seller of the call option can be forced to sell a stock at the strike price; the seller of the call receives the premium that the buyer of the call option pays

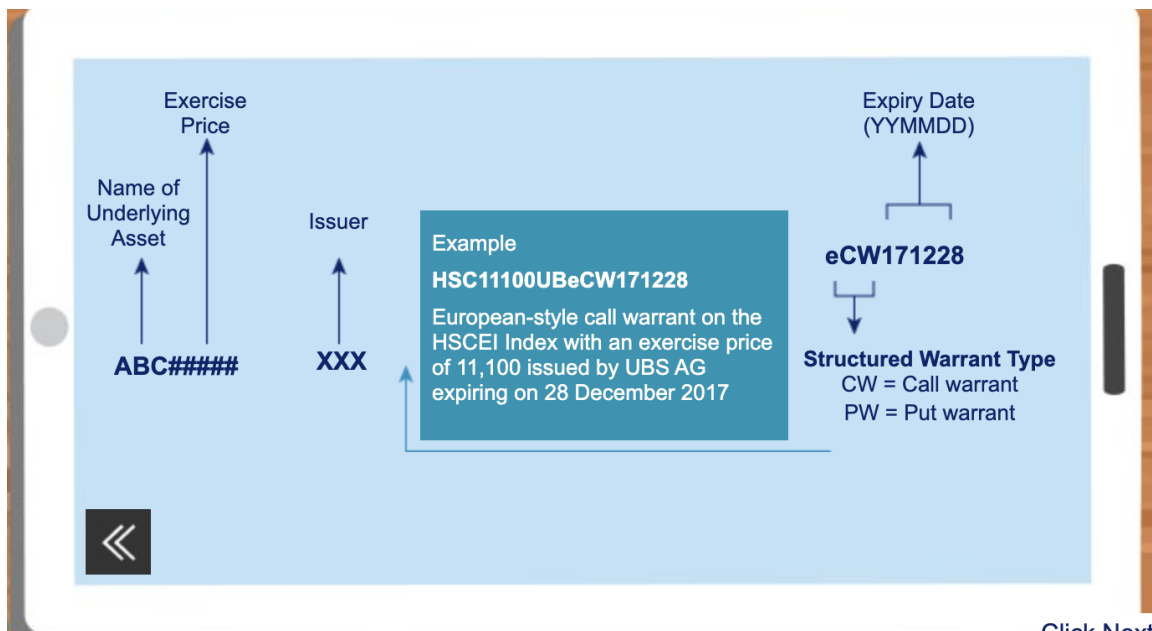
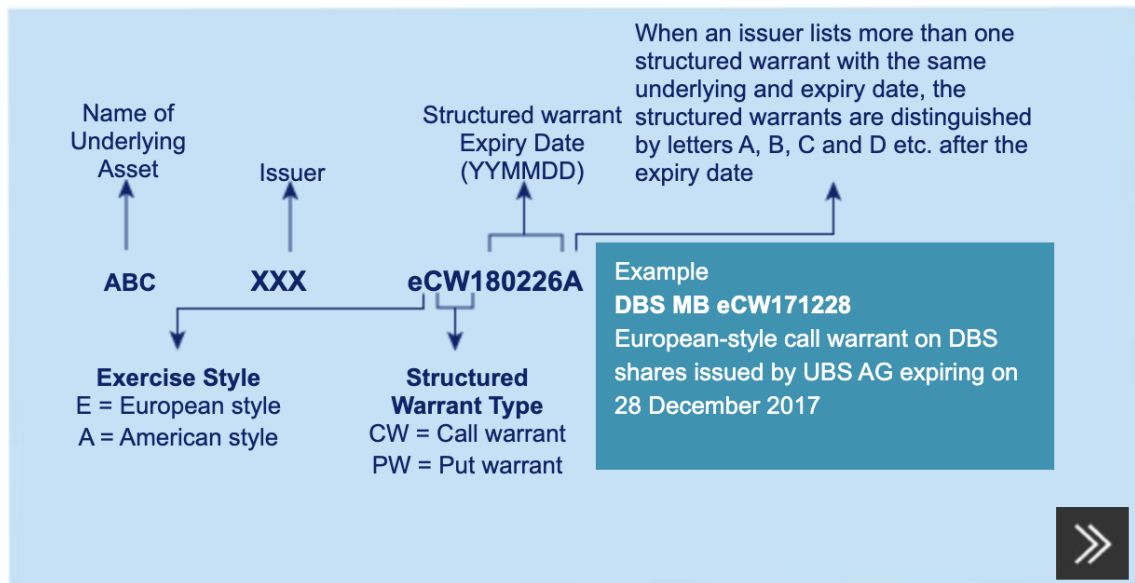
Product Features	
Structured Warrants	Options
Wide range of exercise prices and expiry dates which are determined by the issuer	Contracts are standardised with limited expiry dates and exercise prices

Maximum Liability/Maximum Loss	
Structured Warrants	Options
Losses capped at total investment sum and transaction fees	Potentially unlimited liability/losses for writing an option (short selling)

Margin Requirements	
Structured Warrants	Options
None	Applicable to an option writer but not option buyer

Liquidity	
Structured Warrants	Options
A designated market maker (DMM) is required under Exchange Rules to provide competitive bids and offer quotations on a continuous basis	Only commercial market makers (CMMs) provide liquidity (A CMM is not regulated under Exchange Rules but will enjoy incentives if they meet certain obligations in terms of providing liquidity and bid-ask quotation)

## Reading names of structured warrants



## Risks when trading structured warrants/options

- Market risks
  - Market price is affected by many – the market value of a structured warrant/option is affected by many market forces e.g. underlying asset volatility, time remaining to expiry, interest rate
  - Loss of entire investment – if the structured warrant/option expires at the money or out of the money, investors will lose their entire investment capital
- Product risks



- Leverage risk: Structured warrants/options are leveraged instruments, so gains and losses are magnified; movement in the underlying asset's price will have a greater percentage impact on the price of the structured warrant/option
- Trading may be suspended: Trading of structured warrants is halted or suspended when underlying stock is halted or suspended
- Liquidity risks
  - The designated market-maker (DMM) appointed for structured warrants may be the only market participant buying and selling the warrants, so the investor may not be able to realize the value of the warrants. Note that bid-ask spread increases with illiquidity
- Issuer risks
  - Structured warrant holders are unsecured creditors of the issuer, so they are exposed to the credit risk of the issuer. They have no preferential claim to any assets that an issuer may hold in the event that the issuer is unable to fulfill its obligations

## Daily leverage certificates

### What is a DLC?

- A DLC offers investors fixed leverage on the daily performance of the underlying asset (e.g. market indices or single stocks)
- E.g. if the underlying asset moves by 1% from its closing price of the previous trading day, the value of a 3x DLC will move by 3%, and that of 7x DLC will move by 7%
- DLCs are designed to be traded over a short period of time, usually within the same day
- There are two types of DLCs
  - Long DLCs rise in value as the underlying asset rises
  - Short DLCs rise in value as the underlying asset falls
- Scenarios:

On Monday the underlying asset closed at a level of 100 and the 3x Long DLC closed at \$2.00 per unit. Assuming the investor believes that the underlying asset is set to rise on Tuesday, he purchased 1,000 units of the 3x Long DLC at a total cost of \$2,000 at the close on Monday.

If at the start of trading on Tuesday, the underlying asset increases by 1% to a level of 101, the value of the 3x Long DLC would have risen by 3% to \$2.06 (before cost & fees) and the 7x Long DLC would have risen by 7% to \$2.14 (before cost & fees).

With the potential for enhanced returns, the investor also faces a high level of risk. If the underlying asset were to decrease by 1% in a day, the value of the 3x Long DLC would have decreased by 3% to S\$1.94 (before cost & fees) and the 7x Long DLC would have decreased by 7% to S\$1.86 (before cost & fees).

## Effects of compounding

- If your trading horizon is over a few days, it is important to note that the performance of the DLC may vary from the leverage factor of the DLC
  - This is because the performance of the underlying asset and the DLC is reset at the end of each trading day
- When markets open the next day, the performance of the underlying asset and DLC will be measured from the **closing levels recorded on the previous trading day**
  - As such, the performance of each day is **locked in** and any subsequent returns are based on what was achieved the day before
  - Over the period of more than one day, the profits or losses are thus **compounded**

### Example of positive compounding

The table below shows that if the underlying asset increases a total of 5.1% over the 5 days, the 3x Long DLC would increase by 15.9% which is 3.1 times the performance of the asset (15.9/5.1) and the 7x Long DLC would increase by 40.26%, which is 7.9 times the performance of the asset.

This disproportionate return is due to the compounding effect. In this example, each day, the previous day's value and gains are again invested with a leverage factor of 3 or 7.

Positive Compounding					
Underlying			3x Long DLC		7x Long DLC
	100.00		\$2.00		\$2.00
+1%				+3%	+7%
	101.00	Day 1	\$2.06		\$2.14
+1%				+3%	+7%
	102.01	Day 2	\$2.12		\$2.29
+1%				+3%	+7%
	103.03	Day 3	\$2.19		\$2.45
+1%				+3%	+7%
	104.06	Day 4	\$2.25		\$2.62
+1%				+3%	+7%
	105.10	Day 5	\$2.32		\$2.81
	+5.10%		+15.93%		+40.26%

## Example of negative compounding

In this example, if the underlying asset falls a total of 4.9% over a 5-day period, the 3x Long DLC would fall by a total of -14.1%, which is only 2.9 times the performance of the underlying asset (14.1/4.9) and not 3 times. The 7x Long DLC would fall by 30.4% which is only 6.2 times the performance of the asset.

This is due to the compounding effect of a DLC. Each day the loss is calculated based on a progressively smaller amount.

Negative Compounding					
Underlying			3x Long DLC		7x Long DLC
	100.00		\$2.00		\$2.00
-1%				-3%	-7%
	99.00	Day 1	\$1.94		\$1.86
-1%				-3%	-7%
	98.01	Day 2	\$1.88		\$1.73
-1%				-3%	-7%
	97.03	Day 3	\$1.83		\$1.61
-1%				-3%	-7%
	96.06	Day 4	\$1.77		\$1.50
-1%				-3%	-7%
	95.10	Day 5	\$1.72		\$1.39
	-4.90%		-14.13%		-30.43%

- The compounding effect of a DLC may not provide favourable returns when the price of the underlying asset moves in a sideways pattern (i.e. fluctuates about a constant price)
  - Although the price of the underlying asset remains relatively constant, due to compounding effects, the DLC will not remain relatively constant – for this reason, DLCs shouldn't be held for long periods of time or be traded when the market is moving sideways

For example, in the table, the underlying asset registers gains for the first 2 consecutive days but subsequently reverses and loses its previous gains before recovering back to the initial level at the end of the 5 days. In this case, the 3x Long DLC would have registered a loss of 1% at the end of the 5 days instead of breaking even. The 7x Long DLC would have registered a loss of 5.5% instead of breaking even.

This is why these products are not designed to be traded where the market is moving sideways or to be held for long periods of time.

Compounding in a Sideway Market						
Underlying			3x Long DLC		7x Long DLC	
	100.00		\$2.00		\$2.00	
+1%				+3%		+7%
	101.00	Day 1	\$2.06		\$2.14	
+2%				+6%		+14%
	103.02	Day 2	\$2.18		\$2.44	
-3%				-9%		-21%
	99.93	Day 3	\$1.99		\$1.93	
-2%				-6%		-14%
	97.93	Day 4	\$1.87		\$1.66	
+2%				+6%		+14%
	99.89	Day 5	\$1.98		\$1.89	
	-0.11%		-1.00%		-5.52%	

## Airbag mechanism

- DLCs have built in "airbag mechanisms" that slow the rate of loss in value of the DLC in extreme market conditions
- Each DLC listed has a pre-set trigger for the airbag mechanism
  - E.g. for 7x DLCs, the trigger is usually activated upon a 10% movement in the underlying asset (based on the asset's closing price the previous trading day)
- Airbags are only activated upon movement of the underlying index that goes against the direction of the product type
  - Long DLC airbags are triggered by falls in underlying asset price
  - Short DLC airbags are triggered by rises in underlying asset price
- Airbags can only be triggered during trading hours of the relevant stock exchange
- When an airbag is triggered, the DLC issuer will request the exchange to suspend trading in the relevant DLC for a set period of time (e.g. 30min)
- The performance of the DLC after suspension will be based on the New Observed Level instead of the previous day close
  - The New Observed Level is the lowest value of the underlying asset for the Long DLC or the highest value of the underlying asset for the Short DLC during the 15 minute period after the airbag mechanism is triggered
- If the underlying asset continues to fall after the airbag event, the loss to the DLC would be smaller than without airbag activation

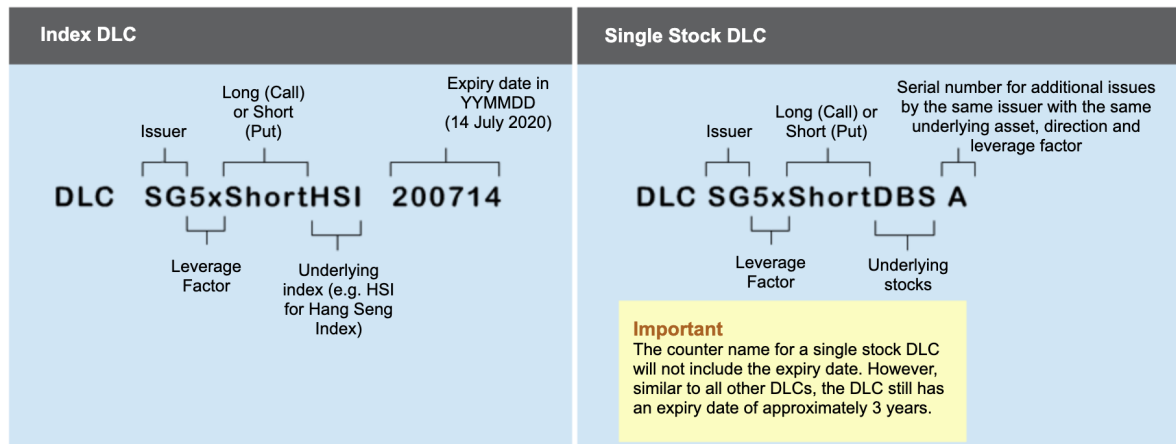
- However, if the underlying asset were to rebound, then the airbag mechanism would reduce the investor's ability to recoup their losses as any subsequent gains would be based on this new observed level, which is a lower value of the underlying asset as compared to the previous day's closing price
- Trigger levels for each DLC vary; the airbag mechanism also may not prevent total loss of investment if there is a sharp overnight or intraday movement of the underlying asset

## Key risk factors

- Airbag mechanism may not prevent total loss of investment when there is
  - An extreme **overnight** fall or rise in the underlying asset e.g. where the difference between the previous day's closing level and the next day's opening level of the underlying asset is 20% or greater for a 5x DLC (100%/leverage factor), or 14.3% or greater for a 7x DLC, as the airbag mechanism will only be triggered **after** the market opens the next day
  - A sharp intraday fall or rise in the underlying asset of 20% or greater for a 5X DLC, or 14.3% or greater for a 7X DLC, during the observation period following the triggering of the airbag mechanism
- Investor may lose entire investment
  - If underlying asset falls to levels such that value of DLC is calculated to be less than or equal to 0, then the investor will lose his entire investment
  - If the value of a DLC reaches 0, the issuer may request that the DLC is suspended and subsequently apply for it to be de-listed
- Leveraged risks
  - As the investor is taking on leveraged exposure to the underlying asset, any losses are amplified and the investor could lose more than they would if they had invested directly in the underlying asset
- Compounding effect
  - Gains and losses are compounded over periods of more than one trading day, and as such will deviate from the leveraged performance of the underlying index
  - This difference may be amplified in volatile markets with a sideways trend

## DLC trading names

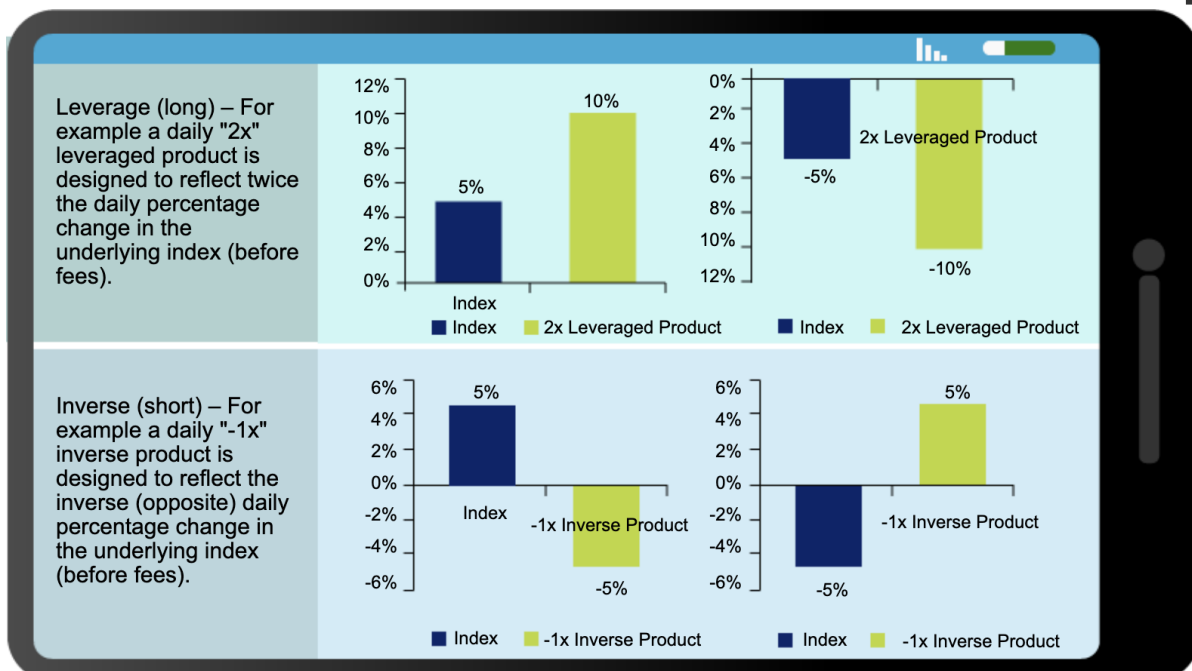
The trading name of the DLCs reveal some important characteristics. The naming convention used by SGX is as follows:



## Leveraged inverse products

### What is a leveraged inverse product?

- A leveraged product uses financial derivatives to amplify the returns of an underlying asset – these products aim to maintain a daily constant amount of leverage during the investment time frame (e.g. DLCs)
- Inverse products use financial derivatives to provide inverse returns of an underlying asset – they tend to have a constant amount of leverage e.g. -1x, -2x, -3x
- Both leveraged products and leveraged inverse products are structured as collective investment schemes (funds)
- Both products aim to delivery a daily return that is based on a multiple (long) or multiple inverse (short) of the daily return of the underlying index that is tracked
- Such products are suitable for sophisticated investors who manage their portfolio on a short-term basis (e.g. daily). They are NOT recommended for long term investment



## Risk factors

- Compounding effect (same as for DLCs)
- Counterparty risk
- Market risk
- Tracking error risk
- Foreign exchange risk
- Interest rate risk
- Liquidity risk