Summary

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An equity warrant gives the holder the right to purchase shares at a fixed price from a firm. It is an option on the common stock of a firm issued by the same firm.

Warrants are in many ways similar to call options, but a few key differences distinguish them.

- Warrants tend to have longer durations than do exchange-traded call options.
- They are traded over the counter more often than on an exchange.
- Investors cannot write warrants like they can options.
- Warrants do not pay dividends or come with voting rights.
- When warrants are exercised, the company typically issues new shares at the exercise price to fill the order, resulting dilution of the share value.
The Use of Equity Warrants

- Investors are attracted to warrants as a means of leveraging their positions in a security.
- Warrants provide investors a way to hedge risk or speculate. They can also be used to exploiting arbitrage opportunities.
- Warrants are frequently attached to bonds or preferred stock as a sweetener, which can be used to enhance the yield of the bond and make them more attractive to potential buyers.
- Most commonly issued warrants are often detachable, meaning that they can be separated from the bond and sold on the secondary market.
- Wedded warrants are not detachable. The investor must surrender the bond or preferred stock in order to exercise it.
- Naked Warrants are issued on their own.
If there were $n$ shares outstanding and $m$ warrants exercised, the dilution factor corresponding to the percentage of the firm value that is represented by the warrants is given by

$$\alpha = \frac{m}{m + n}$$

The payoff of the warrant at $T$ is given by

$$payoff = \frac{m}{m + n} \max(A - K, 0)$$

where

$$A = V/m$$ the asset price

$$V$$ the firm value
Warrant Valuation

- Warrants can be valued by the Black-Scholes model, but some modifications must be made to the parameters.
- The price of a warrant under the diluted Black-Scholes model is given by

\[ W = \frac{m}{m+n} \left( A e^{-qT} \Phi(d_1) - K e^{-rT} \Phi(d_2) \right) \]

where

\[ d_{1,2} = \frac{\ln\left(\frac{A}{K}\right) + (r-q \pm 0.5\sigma T)}{\sigma \sqrt{T}} \]

- \( r \)  the interest rate
- \( q \)  the dividend yield
Strictly speaking, $A$ is the asset price of the firm and $\sigma$ is the volatility of the firm (not stock). Both of them are not observable.

For simplicity, people may use stock price and stock volatility to replace the firm value $A$ and the firm volatility $\sigma$ above, although this simplification generally underestimates the warrant’s price.
Valuation Model Assumption

- There are several assumptions in this simplified warrant mode.
- The price process of the stock follows a geometric Brownian motions.
- The stock provides a continuous dividend.
- The risk-free interest rate is deterministic.
- The volatility is constant.
- The asset value per share is equal to the stock price.
- The volatility of the firm is equal to the volatility of the stock.
# Equity Warrant

## A Real World Example

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<table>
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<tr>
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<tbody>
<tr>
<td><strong>Outstanding Shares</strong></td>
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Thank You

You can find more details at https://finpricing.com/lib/IrCurve.html