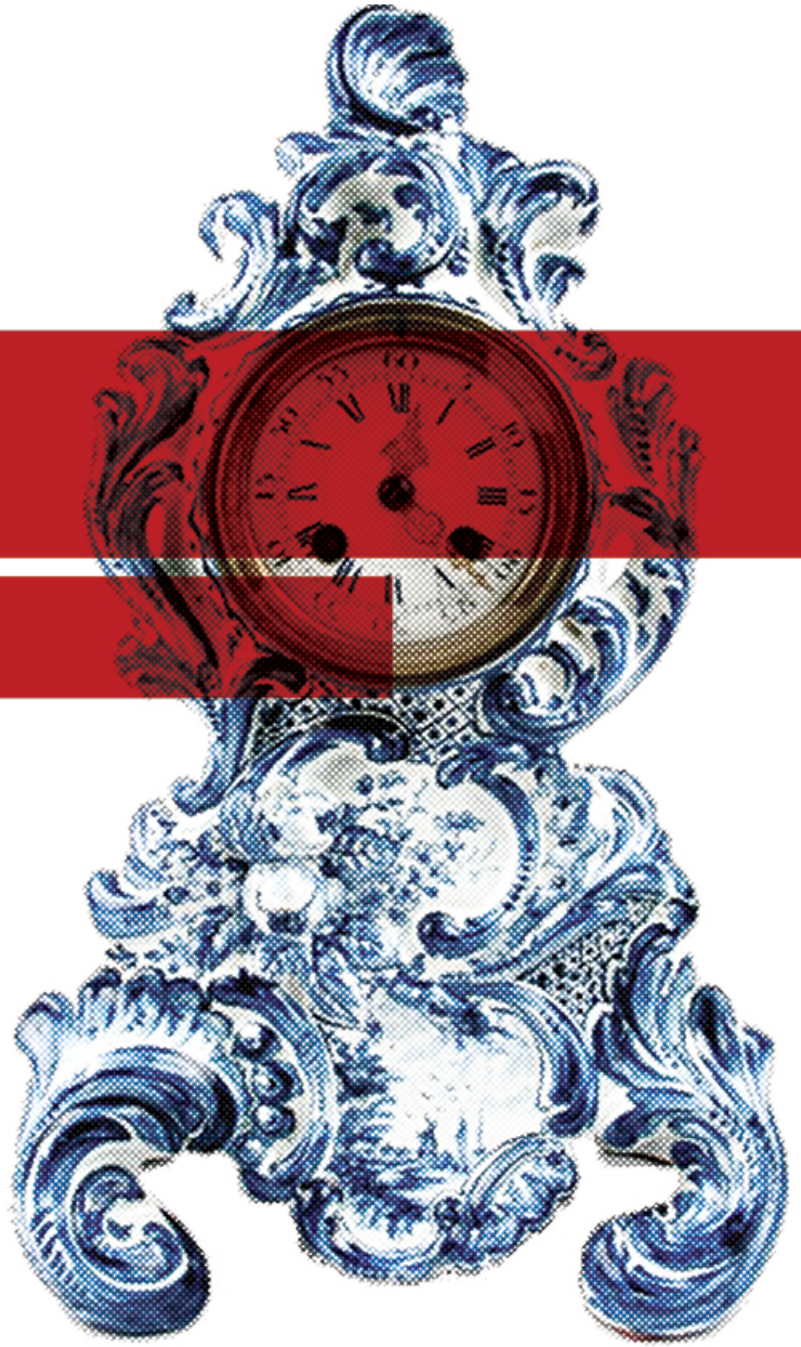
Masters in FINANCE

HYBRID FINANCING
Warrants & Rights Issues

Corporate Investment Appraisal

Fall 2017



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OUTLINE

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1. Warrants
2. Rights issues

1. Warrants

Warrants are similar to call options traded in the market: their owner has the right to buy shares of a company for a certain exercise price at (or until) maturity.

However, there are some differences:

- When the warrant is issued by a company, the company raises that amount of cash;
- When the warrant is exercised, the exercise price is received by the company;
- When the warrant is exercised, NEW shares are issued by the company ("dilution" effect).

Payoff at Maturity

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Consider the payoff at maturity for the warrant-holders:

- n shares outstanding;
- m warrants issued;
- Each warrant convertible into r shares;
- At an exercise price K.

V* is the value of the company at maturity, if the warrants were not exercised.

Payoff to all warrant-holders in case they exercise:

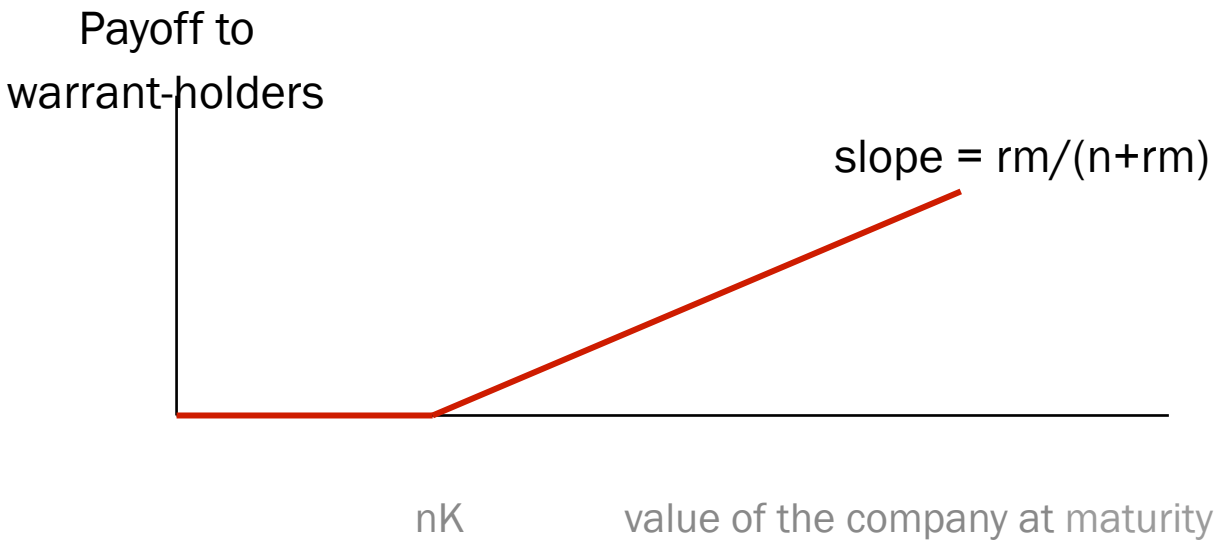
$$\frac{rm}{n+rm}\left(V^{*}+rmK\right)-rmK=\frac{rm}{n+rm}\left(V^{*}-nK\right)$$

The dilution factor of the warrants is:

$$\lambda=\frac{rm}{n+rm}$$

Diagram of Payoff at Maturity

Suppose that each warrant is convertible into r shares:



Thus, the Value of All Warrants = rm/(rm+n)*C(V,nK,t,sigma,Rf)

Note: C(.) represents the value of a call written on the assets of the company, with an exercise price nK.

Black-Scholes Formula to value Warrants of a Zero-Debt Firm

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- Value of the warrants = $\lambda * Call\left(V, nK, t, \sigma, R_f\right)$
- C(.) = N(d1)*V - N(d2)*PV(nK)

$$d_1 = \frac{\ln\left(V / PV(nK)\right)}{\sigma\sqrt{T}} + \frac{\sigma\sqrt{T}}{2}$$

$$d_2 = d_1 - \sigma\sqrt{T}$$

- N(d): distribution function of a standardized Normal;
- n: initial number of shares;
- K: exercise price for each new share;
- T: time to maturity;
- V: current value of the assets of the firm;
- σ : volatility (annualized standard-deviation of the rate of return of the assets).

Example

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100%-Equity Firm

Shares (n) = 1 million
No. of warrants (m) = 100,000
Conversion ratio (r) = 1
Exercise Price (K) = 10
Time to Maturity (T) = 4 years
Current Value of the Assets
= 12 million (including sale of the warrants)
Volatility (σ) = 40%
Risk-free interest rate (Rf) = 10% p.a.

- Value of the warrants:

$$\frac{100{,}000}{1{,}100{,}000} C\left(\begin{array}{l} V = 12\text{ million}, nK = 10\text{ million}, \\ T = 4, \sigma = 0.4, \text{Rf} = 0.1 \end{array}\right)$$
$$= 0.0909 \times 6.152\text{ million} = 559{,}271$$

- What should the current price of a share be?

(12 million - 559,271) / 1 million = 11.44

... or ...

The warrant may be written as a call on the value of the shares, in terms of its value "per share":

$$\frac{100{,}000}{1{,}100{,}000} \times 1\,\text{million} \times C\left(S = 12, T = 4, \sigma = 40\%, K = 10\right) =$$
$$= 0.0909 \times 1\,\text{million} \times 6.152 = 559{,}271$$

Note 1: [m/(n+m)](V*-nK) or [m/(n+m)]n(V*/n-K)

Note 2: we have the value of "equity per share" (V*/n), and not the price of the share!

2. Rights Issues

Current shareholders receive “rights”, which may be converted into new shares at a pre-established strike price.

Example:

Before the Rights Issue:

Number of shares:	100
Market price per share:	€ 10

Rights Issue:

2 rights per share;

Each right is convertible into 1 share for a price of € 5.

Are the shareholders better off as a result of this rights issue?

If the rights are exercised:

	Old Shares	New Shares	Total
Number	100	200	300
Value	666.67	1333.33	2000

Market Price per share = € 6.67

Market Value of 1 right =

= value of 1 new share – exercise price =

= €6.67 - €5.00 = €1.67

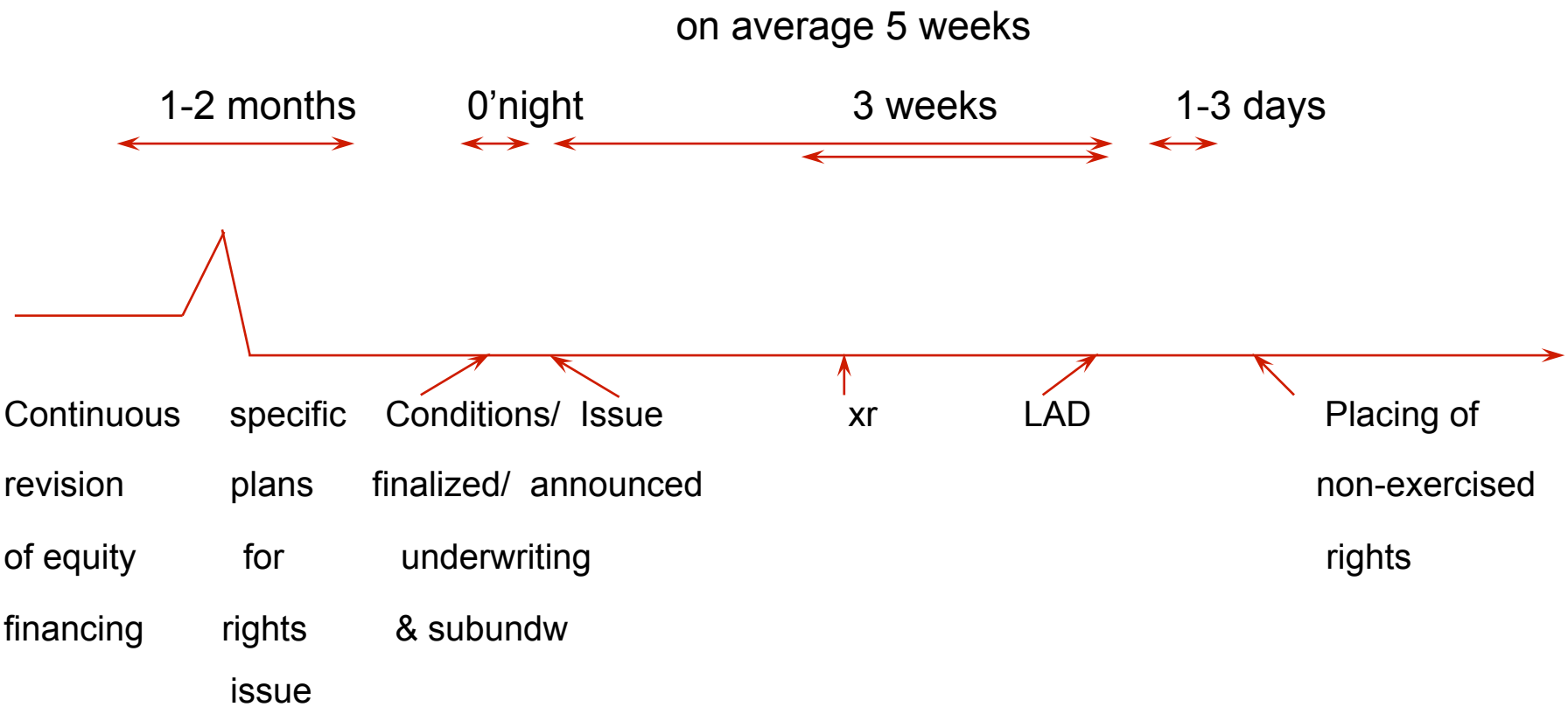
Value of the package "1 share and 2 rights" = € 10

Rights vs. Warrants

Rights are short-termWarrants: typically the right-holders have a few weeks until the option expires.

Rights are issued at price zero.

Rights Issues: sequence of events



Value Rights as Warrants

Example:

Pre - Rights Issue

- Number of shares = 100
- Market Price of a Share = € 10
- Volatility of shares = 60% pa
- Risk-Free interest rate = 10% pa

Rights Issue:

- 2 rights per share;
- Each convertible into 1 share;
- Exercise Price = € 5;
- Time to maturity: 2 months

- Value of All Rights:

2/3*100*C(S=10, T=2months/12, K=5, volatility=60%)= € 339

- Value of 1 right: € 1.695

Rights: Underwriting & Firm Commitment

The underwriter guarantees placing all shares.

Example:

(consider the same example): if only 50 of the 200 rights were exercised, the underwriter would pay the firm € 5*150, receiving 150 new shares.

Rational Investors leave their rights unexercised only if the value of equity at maturity is below € 500.

Firm Commitment is equivalent to selling a put option to the firm.