Final NOTE

1. M&A-Pinkerton

- In the acquisition method, the acquirer books the difference between the purchase price and the net value of the target's assets (the book value of equity) adjusted to fair market value as goodwill on its balance sheet.
- Equity accounting (see IAS 28) is used when **more than 20% but less than 50%** of the voting stock of the target is acquired. In equity accounting, the percentage ownership of the target is reflected on the acquirer's **income statement and balance sheet** (both: assets and equity side). Note that the target is considered an unconsolidated subsidiary, from owner's perspective; the target could be a freestanding, publicly traded company.
- Cost accounting is used when **less than 20%** of the target stock is acquired. In cost accounting, the acquirer simply records the investment on its balance sheet at **cost**. If the target company pays a dividend, the acquirer recognizes a portion of the dividend income on its **income statement**. No other target income is recognized.

2. IPO-Netscape

- IPO
  - A privately held company issues new stocks, register the stocks for public trading on a stock exchange, and sell the stocks to investors.
  - Advantages
    - Access to more capital later
    - Liquidity for the stock: Enables initial investors to cash out
    - Provides visibility
    - Facilitate mergers (促进合并)
  - Disadvantages
    - Expensive, gross spread is 7%
    - Ongoing need to provide financial reports
    - Subjected to (hostile) takeovers (恶意收购)
    - Legal liability (法律责任) (liable for information in prospectus)
    - IPO process diverts attention from business
    - Loss of confidentiality (保密)
  - IPO fee
    - Gross spread (7% of proceeds): Management fee, Underwriting fee, Selling concession
- Assumptions
  - Growth assumptions (decrease and stay a growth rate)
- Alternatives to an IPO
  - Angels, Venture capital, Bank loans
- Green Shoe (Overallotment option)
  - Underwriter's call option to buy an additional 15% shares from the issuer at the issue price. Underwriter sell 115%

        - **Stock price up**: underwriter exercise the option and cover the 15% extra
        - **Stock price down**: underwriter buy 15% shares in the market to cover the short position. (gain to cover the loss of impression)
        - exam2015:
        - Refer to the IPO market. A typical IPO prospectus contains an overallotment option.
            - ☑ Define this option.
                - ◆ it's underwriter's call option to buy an additional 15% shares from the issuer at the issue price.
            - ☑ How does the overallotment option help the main investment bank with the price support?
            - ☑ What theories explain IPO discount?
                - Winner's curse
                - Costly information acquisition
        - exam2017:
            - ☑ How many additional shares are issued in an IPO with the Greenshoe option?
                - 15% if price is higher
                - 0% if price is lower
        - exam2018:
            - ☑ How does the Greenshoe option work if the price after IPO falls?
                - underwriter buy stock from market to cover the 15% short position, and the option will not be exercised
    - ○ Selling mechanisms
        - **Book-building** (favors large institutional investors)
        - **Auction**
            - □ benefits:
                - ◆ No intermediary.
                - ◆ Universal access: more democratic process as all investors have a chance to participate.
                - ◆ One price: No preferential allocations as all pay one price.
                - ◆ Better price discovery: bids from all investors.
                - ◆ Results: **lower costs and wider investor base.**
                - ◆ Benefits from advances in communications technology: reduced
                - ◆ costs of information production for securities offered.
        - Fixed-price
        - exam2017:
            - ☑ Define an alternative IPO mechanism to the bookbuilding and suggest two advantages.
                - Auction
                - No intermediary
                - lower costs and wider investor base.
    - ○ Explaining the IPO underpricing:
        - **explanations**
            - □ **Winner's curse**

        - reinforced by pre-rationing(预分配) of big investors
    - **Costly information acquisition**
- Explanations why change over time
    - Changing issuer objective function(research coverage and spinning)
    - Changing risk composition(company characteristics)
    - Realignment of incentives(CEO ownership, family and friends share)
- exam2016:
    - ☑ How does the CEO ownership lead to underpricing?
        - CEOs got tax benefit to exercising options at IPO if the spread between the strike price and the fair market value is taxable.
        - CEOs may be willing to accept underpricing as an inevitable consequence of going public since they protect their own total positions in the firm.
        - CEO ownership is low and they have no motivation to increase the IPO price.
- exam2018:
    - ☑ Relate information asymmetry to the underpricing of IPO by giving an example of relevant underpricing hypothesis(es).
        - Informed investors only buy when the issue is underpriced.
        - If they are allocated shares, it is because the informed investors did not want to buy (the issue is overpriced)
        - I If they are not allocated shares, it is because the informed investors want to buy (the issue is underpriced)

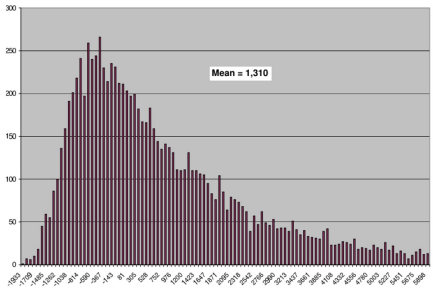
- exam2018:
    - ☑ Considering the big question in Netscape, propose and justify two sensitivity analyses that would best fit the arguments.
        - the growth rate: the growth rate determine the future development and cash flow and the issue price depend on it.
        - the market shares: the market shares is not certain. and this will effect the revenue a lot
        - capex: if the capex not decrease in the future, the profit will decrease.

3. Break-even-Airbus

- the case
    - Is the NPV positive:
        - Break-even number of aircrafts (ignores demand)
        - Analyze demand
    - Sensitivity analysis
        - Break-even sensitive to: Operating margin; Cost of capital

4. real options-Antamina

- No Real option
    - Must invest I and develop the Antamina mine after exploration stage.



- Convenience yield
  - Commodity held primary for investment: long or short are riskless and certain
  - Commodity not held primary for investment: holding copper has a convenience value.
- price formulas

Forward price

$$F_c(T) = P_c e^{(r-\delta_c)(T-t)} \quad (1)$$

Commodity prices

$$\frac{dP_c}{P_c} = rdt + \sigma_c dz_c \quad (2)$$

$$\frac{dP_z}{P_z} = rdt + \sigma_z dz_z \quad (3)$$

Convenience yields

$$d\delta_c = k_c(\alpha_c - \delta_c)dt + \sigma_{\delta c} dz_{\delta c} \quad (4)$$

$$d\delta_z = k_z(\alpha_z - \delta_z)dt + \sigma_{\delta z} dz_{\delta z} \quad (5)$$

Correlations

$$dz_c dz_z = \rho_{cz} dt \quad (6)$$

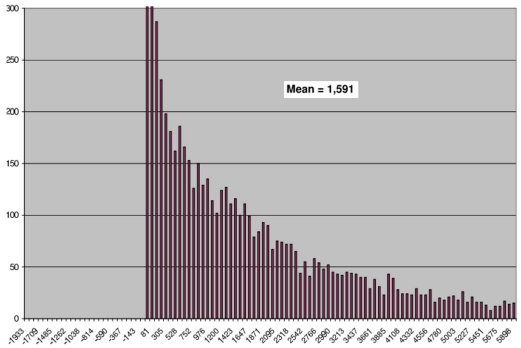
$$dz_c dz_{\delta c} = \rho_{c,\delta c} dt \quad (7)$$

$$dz_z dz_{\delta z} = \rho_{z,\delta z} dt \quad (8)$$

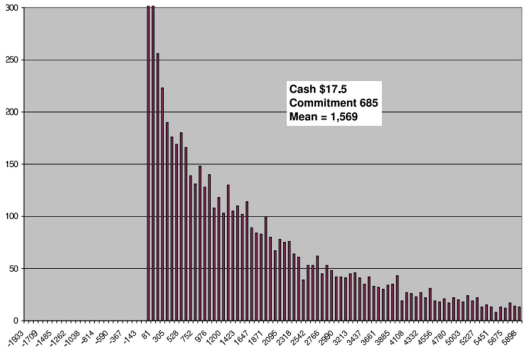
- exam2015:
  - ☑ Define the convenience yield by using the arbitrage argument linking the spot price of commodity with the future price of commodity.
    - *convenience yield is the benefit of holding an underlying product, because of no arbitrage, one hold the underlying should have the same return with one hold an forward and got the convenience yield.* $p * e^r = f * e^c$.
  - ☑ Compare Antamina case to an option. Is it a call or a put? What would be the strike price, the underlying asset, expiration
    - *an call option. the strike price is 30% of the investment commitment plus capex. the underlying asset is value of this mine. expiration is 2 years.*
  - ☑ Define all variables in the formula (2)
    - *p: spot price of cooper*
    - *r: risk-free rate, commodity drift rate*
    - *sigma: the annual volatility of cooper price*
    - *z: Brownian process*

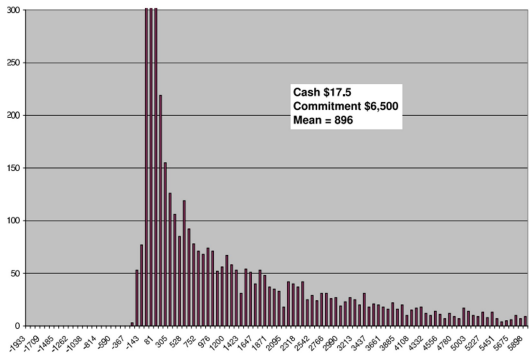
- ☑ Define all variables in the formula (4)
  - *delta: the convenience yield of copper*
  - *k: convenience yield mean reversion parameter*
  - *alpha: the long-term mean of convenience yield of copper*
  - *sigma_delta: the volatility of the convenience yield of copper*
  - *z_delta: standard Brownian process*
- ☑ Explain economic intuition behind formulas 6, 7 and 8
  - *the imcremental of price of c and z are related, so as they and their imcremental of convience yield.*
- ☑ Propose how to improve the price structure suggested by formulas 6, 7, and 8
  - *simulated the joint Brownian processes*
- ☑ How do we use values that are calculated from the formulas 2-8 in Antamina simulations?
  - *use it to do the Monte Carlo simulation*

○ Real option. No penalty



○ Real option + non-investment penalty





○ exam2017:

- payout formula with full government rules is:
  - E[PV(Max(S – 0.7*X – 0.3*B2, 0))] – B1

- it's Profit
- S is spot price
- 03*B2 is investment commitment
- 0.7*X is investment
- B1 is initial payment

☑ a. Relate the payout formula to the financial option.

1) What option is it?
   - *a call option*
2) What parameter/variable in financial option does the investment commitment change?
   - *both premium (initial payment) and strike price*

☑ b. How does the probability of developing the mine changes with the investment commitment?
   - *decrease with commitment increase*

☑ c. How is the quantity and price related in the model supplied with the Antamina case?
   - *quantity and price is unrelated but should be.*
   - *Last price* exp[drift - convenience yield - (Annual Commodity Volatility)^2/2]/12+(Annual Commodity Volatility)*sqrt(1/12)*(correlation factor)*

5. Leveraged Buyout-Medimedia

- Leveraged Buyout (LBO)
  - Acquisition of all equity in a (public) corporation largely financed with debt. Target taken private.
  - Incumbent (now) management typically included in the group of buyers.
  - Sponsor or buyout specialist organizes the deal and provide some equity.
  - Make firm more efficient.
  - Exit the investment.
- Management Buyout (MBO)
  - No private equity fund involved
  - All or most equity provided by management (obtains control)
- LBO candidate characteristics
  - **Cash flow**
    - ☐ History of profitability
    - ☐ Strong predictable cash flows
    - ☐ Unused debt capacity
  - Assets and no capex (capital expenditure)
    - ☐ Tangible assets (有形资产)
    - ☐ low expected capex
  - Management
    - ☐ Proven track record (业绩记录)
- Stages in a typical LBO
  - Raising the cash required for the buyout.
  - Stocks or assets acquired, firm taken private

- Reorganize the operations of the firm
- Exit
  - Take the firm public again
  - Being acquired

- **Mezzanine debt**
  - The Mezzanine debt: $15 million
  - Warrants: Mezzanine lenders get 1.94 million warrants (like a call options) that gives the right to acquire 1.94 million shares at $0.01. (抵押品就是这些 warrants)
    - Purpose: Share upside (share the good performance of company)
  - Put option: Shares acquired through warrant are puttable (可回售) at (7 times fully diluted(稀释) earnings per share) after (seventh year).
    - Purpose: mezzanine investors could exit and stay private.
  - Valuation of Warrant
    - Option could use Black-Scholes but once warrants are exercised the firm has to issue new stocks and this will dilution, price will decrease, then can't use BSM.
    - Price of warrant < price of call option
    - Have to adjust price for dilution.
- Vendor note (Junior Subordinated)
  - Junior(次级) to both senior debt and mezzanine debt
  - Could report nice gain if price of MediMedia inflated (increase)
- BSM

Notation:

S	=	Current value of stock
S^a	=	Adjusted stock price
γ	=	Each warrant entitles the holder to purchase γ shares
N_S	=	Number of shares outstanding
N_W	=	Number of warrants outstanding
W	=	Market value of warrant outstanding

The Black-Scholes Model

$$BS(S, K, r, T-t) = SN(d_1) - Ke^{-r_f(T-t)}N(d_2)$$

1. **Stock price:** Adjust stock price for dilution by replacing S with

$$S^a = S + \frac{N_W}{N_S} W_0$$

2. **Call Value:** Diluted adjusted option value

$$W_1 = \left[\frac{\gamma N_S}{N_S + \gamma N_W}\right] BS(S^a, K, r, \sigma^2, T)$$

3. **Iterate:** Use W_1 instead of W_0 in step 1 and iterate until $W_1 \approx W_0$.

- exam2016:
  - ☑ What is the **circularity issue** if you value warrant for nonlisted firm, where your starting point is the total enterprise value?

        - *we know the TEV here so we could get the equity value and then the price of shares, and we use BSM get the warrant value, no circularity issue.*
    - ☑ What is the **circularity issue** if you value (warrant for a) traded firm where the starting point in the traded stock price?
        - *warrants are exercised, the value of all equity and the number of shares changed, then stock price change, we need to know the value of warrants to get the new price, but the new price also affect the warrant value.*
- exam2018:
    - ☑ In MediMedia, we estimate the enterprise value. What is the underlying asset for a warrant used in Black Sholes formula?
        - the adjust stock price of MediMedia (considering the warrant)
    - ☑ What is the **circularity issue** of valuing this warrant? Explain how to solve it.
        - *no circularity issue, because we know the TEV using APV method. and then the equity value and stock price. and we use BSM get the warrant value, no circularity issue.*

6. Earnouts-printicomm

- Printicomm's choices
    - Build for $50 million
    - Acquire Digitech (Marketelegence)
    - Acquire another company
- Acquire Digitech
    - Fixed price deal
    - Construct an Earnout
- Earnouts
    - Consideration that depends on target future performance.
        - Revenue
        - Operating profit
- What can you write the contract on
    - **Revenue**
        - Advantages: operations can be integrated (to obtain cost savings), measurable.
        - Disadvantages: may **decrease margins** to increase revenue
    - **Operating Profit**
        - Advantages: revenue stream can be high quality, measurable.
        - Disadvantages: harder to integrate
    - Non-financial milestones:
        - Product launches
        - Contracts secured
- **Advantages**
    - **bridge value gap**
    - **retain managers in the acquired firm**

        - **incentives (激励)**
        - **decrease risk for bidder**
        - **improve the chances of good performance**
    - **Disadvantages**
        - **difficult and costly to monitor**
        - **difficult to integrate operations**
        - **create arguments between shareholding/non-shareholding managers**
        - **Increased risk for seller**
    - exam2016:
        - ☑ What are advantages and disadvantages of an Earnout?
        - ☑ If cost management is primary concern for an acquirer, what financial hurdle should be used an Earnout? What problems does it introduce?
    - Other structural considerations
        - Consolidation
        - Management incentive
        - Capital allocation
        - Earnout protection
        - Monitoring
        - Dispute resolution
        - Tax
            - Consolidation. The earnout places limitations on the degree of post-acquisition consolidation of operations. Can limit both revenue enhancements and cost savings that motivated the acquisition.
            - Management incentive. Earnout are structured for selling shareholders. If there are key non-shareholding managers, you may want to give them similar incentives.
            - Capital allocation. The bidder typically assumes control of financing. Expansion and growth (and hence meeting targets) depends on the bidder making the necessary investments.
            - Earnout protection. Bidders ability to fund the earnout may deteriorate (escrow account). Get protection against a takeover of the bidder (change in control of bidder).
            - Monitoring. The performance goals needs to be monitored. Financial statements may receive separate audit. Monitoring is costly. Becomes more costly as time-horizon is extended.
            - Dispute resolution. Independent auditor.
            - Tax. Maximum 50% of deal value and max 5 years to be part of a tax free reorganization (all other criteria for a tax-free reorganization has to be satisfied)
    - Earnout valuation Increasing as:
        - earnout target (strike price) decrease
        - time to maturity increase
        - volatility of the underlying (operating income) increase
    - Complicated contract (path-dependent barrier options) *
        - Caps (maximum payments)
        - Floors (minimum payments)
        - Lost payments may cumulate and may be obtained later.
    - Key take away
        - Earnouts bridge conflicts due to differences in expectations
        - The option like features of earnouts
        - Incentive effects of the earnout provisions
    - exam2018:
        - ☑ In setting up Monte Carlo simulation for a Printicomm Earnout, what are the key considerations to have meaningful estimates?
            - revenue growth

- operating margin

- [x] Of the contracts offered in the Printicomm case, name the contract which was the best option. Propose one and only one of main problems with the contract.
  - 5 years
  - the target is higher, monitoring cost is high