

P.8

FIN3080: Investment Analysis and Portfolio Management 

7/23/2023

L1-2 Introduction

1. Basic question about Finance

① Role of Finance

- Source Reallocation
- Risk Reallocation
- Payment

② Financial Asset vs Real Asset

Validity of Financial Asset: Whether verifiable
Whether implementable

Financial Asset: Intangible, essentially a promise about cash flows

Real Asset: Tangible goods

③ How do investors make money?

Delay of Happiness (Time)

Uncertainty (Risk)

Wisdom to make good use of money
(Info)

④ Why hedge fund reduces the risk but it is the riskiest?

Reduce the risk:
Reduce unsystematic risk
Reduce "industry risk"

Riskier than mutual fund: Allows other trading strategies like shorting, alternative investment and derivatives

如债券、股票、现金等

可以对冲行业风险

⑤ GDP

Consumption + Investment + Export

(企业, 房地产, 基建)

2. Overview of Valuation

① Facts

a. Valuation is biased

b. The payoff is greatest when valuation is least precise (VC)

c. Simpler valuation is better (全通模型比复杂模型好)

d. Valuation is to correct inefficiencies in the market (Likewise, valuation is one kind of justification in the efficient market)

e. Sell-side analyst does valuation, judge over-valued / under-valued then makes recommendation for the buy-sides.

② Comparison of different valuations

Intrinsic valuation: Less exposed to market moods, but needs more explicit information

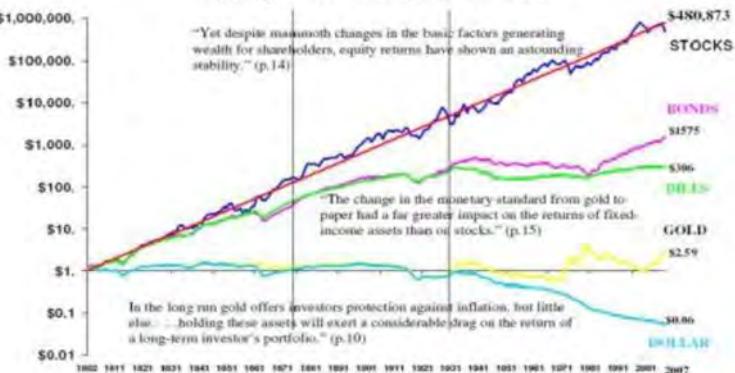
Relative valuation: In sync with market, implicit assumptions are made about other variables

L3-10 DCF

1. A graph

Total Real Return Indexes

January 1802 – December 31, 2008



2. DCF

① Definitions

a. Def 1

$$\text{Value} = \frac{E(CF_1)}{1+r} + \dots + \frac{E(CF_n)}{(1+r)^n}$$

b. Def 2

$$\text{Value} = \frac{CE(CF_1)}{1+r_f} + \dots + \frac{CE(CF_n)}{(1+r_f)^n}$$

Certainty Equivalent $CE(\tilde{Z}) = E(u(Y-a))$

② Types

a. Book valuation & Market valuation

(Book valuation: Balance sheet value (based on historical data))

(Market valuation: True value (based on future data))

b. Firm valuation & Equity valuation

(Firm valuation: Asset

→ Cost of capital (Weighted average of Cost of Equity & Cost of Debt)

(Equity valuation: Equity (Asset - Liability) → Cost of equity

→ all stockholders

→ all stakeholders

④ Detailed steps

a. Confirm CF

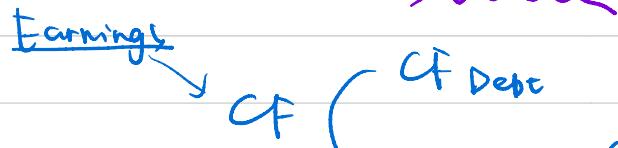
Firm: Pre-debt CF ← Expected Growth: Growth in Operating Earnings

$\rightarrow \text{ACF}$ (左边CF是哪部分的CF)

Equity: After-debt CF ← Expected Growth: Growth in Net income / Earnings per share

b. Confirm Discount Rate

Firm: Cost of Capital



Equity: Cost of Equity

c. Apply DCF

⑤ Example of DCF: The Dividend Discount Model

DDM 适用于所有公司 → Equity Valuation (e.g. Apple)

a. Confirm CF

$CF = \text{Expected Dividend} = \text{Expected net Income} \times (1 - \text{Retention Ratio})$

b. Confirm Discount Rate

Discount Rate = Rate of return demanded by equity investors,

r_E

c. Apply DCF

⑥ Some useful formulas

a. CFs are constant and infinite

$$PV = \frac{CF_1}{(1+r)} + \dots + \frac{CF_n}{(1+r)^n} = CF \left(\frac{1}{1+r} + \dots + \frac{1}{(1+r)^n} \right) = CF \left(\frac{\frac{1}{1+r}(1 - \frac{1}{(1+r)^n})}{1 - \frac{1}{1+r}} \right) = CF \left(\frac{1 - \frac{1}{(1+r)^n}}{\frac{r}{1+r}} \right) = CF \left(\frac{1 - \frac{1}{(1+r)^n}}{r} \right)$$

$$= \frac{CF}{r} \quad (\text{As } n \rightarrow \infty)$$

b. CFs are growing constantly and infinite

$$PV = \frac{CF_1}{(1+r)} + \dots + \frac{CF_n}{(1+r)^n} = CF \left(\frac{1}{1+r} + \dots + \frac{(1+g)^{n-1}}{(1+r)^n} \right) = CF \left(\frac{\frac{1}{1+r}(1 - \frac{(1+g)^n}{1+r})}{1 - \frac{1+g}{1+r}} \right) = CF \left(\frac{1 - \frac{(1+g)^n}{1+r}}{\frac{r-g}{1+r}} \right)$$

$$= \frac{CF_1}{r-g} \quad (r > g)$$

当 g 趋近于 0 时, DCF 成 variant, 变成单 P.

Assume a firm with $CF=100$, and discount rate $k=20\%$, then

if	$g=0, PV=100/0.20=500$
	$g=5\%, PV=100/0.15=667$
	$g=18\%, PV=100/0.02=5000$
	$g=19\%, PV=100/0.01=10000$
	$g=19.5\%, PV=100/0.005=20000$

I ↓ 波动极大

3. Index Fund / ETF (Exchange-Traded funds)

① Creator

John Bogle

② Market share

(Actively managed : $\frac{2}{3}$)

(Passively managed : $\frac{1}{3}$)

③ Management fee

(Actively managed : 2%)

(Passively managed : 0.05%)

4. Accounting

① Motivation in asset pricing

$$PV = \frac{CF_1}{r-g}$$

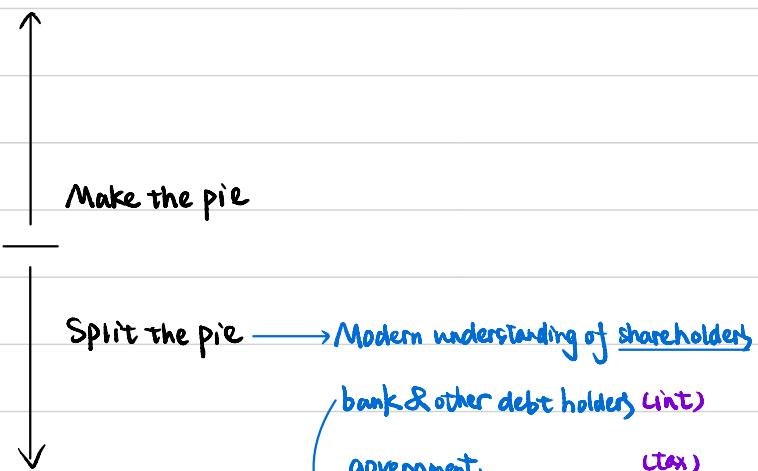
← Accounting helps compute CF (CF1, TFCF, TBCF, v)

*Insight of the industry/company
Similar value
for many financial institutions*

分析CF的各个成分

② Income statement

Revenue	
Sales Revenue	\$20,438
Operating Expenses	
Cost of goods sold	\$7,943
Selling, general and administrative expenses	\$8,172
Depreciation and amortization	\$960
Other expenses	\$138
Total operating expenses	\$17,213
Operating income	\$3,225
Non-operating income	\$130
Earnings before Interest and Taxes (EBIT)	\$3,355
Financial income	\$45
Income before Interest Expense (IBIE)	\$3,400
Financial expense	\$190
Earnings before Income taxes	\$3,210
Income taxes	\$1,027
Net Income	\$2,183



Net Income

- Dividend
- Reinvestment
- Cash

③ Adjusted income statement

EXHIBIT 1.29 Adjusted Income Statement

Income Statement			
	Reported 2007	Adjustments	Adjusted 2007
Sales	\$1,000.0		\$1,000.0
Cost of Goods Sold	625.0	(5.0) ←	620.0 [Inventory write-down]
Gross Profit	\$375.0		\$380.0
Selling, General & Administrative	230.0		230.0
Restructuring Charges	10.0	(10.0) ←	- [Restructuring charge related to severance from downsizing the sales force]
Operating Income (EBIT)	\$135.0		\$150.0
Interest Expense	35.0		35.0
Pre-tax Income	\$100.0		\$115.0
Income Taxes	40.0	6.0 ←	46.0 [= (Inventory write-down + Restructuring charge) x Marginal Tax Rate = (\$5.0 million + \$10.0 million) x 40.0%]
Net Income	\$60.0		\$69.0
Operating Income (EBIT)	\$135.0	15.0 →	\$150.0
Depreciation & Amortization	50.0		50.0
EBITDA	\$185.0		\$200.0
Weighted Avg. Diluted Shares	30.0		30.0
Diluted EPS	\$2.00		\$2.30
\$15.0 million add-back of total non-recurring items			

Nature of EBITDA: real CF created by this firm
(Taxes & Capital costs are not included)

④ Some important financial data

a. EBITDA margin

$$\text{EBITDA margin} = \frac{\text{EBITDA}}{\text{Sales revenue}}$$

Idea: The proportion of created CF

b. Net income (CF Outstanding stocks)

$$\text{Net income} = \text{EBIT} - \text{Interest} - \text{Taxes} - \text{Non-controlling interest} - \text{Preferred dividend}$$

NCI: Minority interest An innovation in security market: Bond → Preferred Stock → Stock
 ↑ e.g. Buffett bought \$8 billion Constant div Ownership
 Preferred stock of GS

c. P/E Ratio (市盈率)

$$\text{P/E Ratio} = \frac{\text{Share price}}{\text{EPS (Earnings per share)}}$$

Idea: The true price of the security. Valuation

not the share price even any financial asset (anything that creates CF)

d. ROE

$$\text{ROE} = \frac{\text{Net income}}{\text{Net asset}} \xrightarrow{\text{Earnings equity}} \xleftarrow{\text{equity}} \text{Book value of Equity}$$

During planned economy, when national assets were sold, MV > BV (不完全竞争)

e. ROA

$$\text{ROA} = \frac{\text{Net income}}{\text{Total asset}} \xleftarrow{\text{asset}}$$

f. Enterprise value (EV) \rightarrow 非现金 EV Sales 是 P/E 的 alternative

$$\text{EV} = \text{Stock market value} + \text{Total liability} - \text{Cash and cash equivalents}$$

Idea: $\begin{array}{|c|c|}\hline F & L \\ \hline C & E \\ \hline \end{array}$ $\text{EV} = F + \text{公司卖出价格}$

g. Interest coverage ratio

$$\text{Interest coverage ratio} = \frac{\text{EBIT}}{\text{Interest}}$$

Idea: If interest coverage ratio < 1, then out of cash (OOC)

5. Dividend Growth Model

① Constant growth model (CGM)

$$P_0 = \frac{D_1}{r-g}$$

Undervalued company scarcely pays dividend.

Undervalued → (Pay dividend ✗
Reinvestment ✓) → Increase the stock price

② Two-stage dividend growth model

Two-stage, Two-stage of dividend

Financial crisis → panic → Cash / Risk-free investment ↑ → r_f ↓

What is a good company: American data

	Firms persistently beat the median									
	1	2	3	4	5	6	7	8	9	10
Big firm										
Sales growth	53	31.3	18.9	11.7	7.5	4.8	3.2	2.2	1.6	1.1
ROE	46.7	21.9	10	4.7	2.2	1.2	0.7	0.4	0.3	0.2
Small firm										
Sales growth	47	26.1	14.7	8.6	5.2	3.2	2.1	1.4	1	0.7
ROE	53.3	25	12.5	6.3	3.1	1.6	0.8	0.4	0.2	0.1

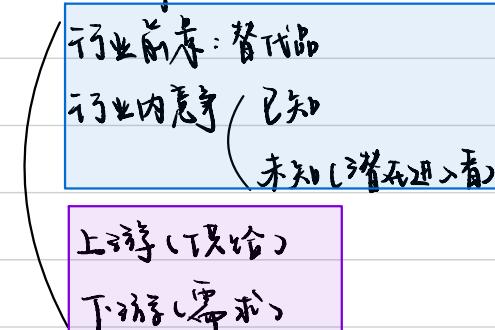
几乎所有公司可以一直经营
 (高增长 : g
 高回报 : ROE) $g = ROE - b$ (WJ相关)

③ Growth rate

Mechanically: $g = ROE \times b$ (b: Reinvestment rate) $\nabla g = \text{Net income} + \text{Reinvestment}$ 的部分
 Practically: Insight $b = 1 - \text{Dividend rate}$

$ROE \neq r_e$: Investors $\xrightarrow{r_e}$ Firm \xrightarrow{ROE} Profit

The Five-force Model



④ Dividend adjustment

Dividend = Dividend + Buy-back

Dividend rate = $\frac{\text{Dividend} + \text{Share repurchase}}{\text{Net earnings}}$

When a firm want to give out money to shareholders

By giving dividend

By repurchasing the stock → Stock price ↑

Better, since shareholders need to pay taxes when receiving dividends

⑤ P/E Ratio & ROE

a. Relationship

$$\frac{P}{E} = \frac{D}{r-g} \cdot \frac{1}{\frac{D}{1-b}} = \frac{D}{r-b \cdot ROE} \cdot \frac{1-b}{D}$$

$$= \frac{1-b}{r-b \cdot ROE}$$

($ROE \uparrow, \frac{P}{E} \uparrow$)

b. Optimization ($\max \frac{P}{E}$)

$ROE < r_e$: $b^* = 0$

另外 -xf:

$ROE = r_e$: $b^* = [0, 1]$ (Anywhere)

$ROE \rightarrow ROIC = \text{Net operating profit after tax} / \text{Average total invested capital}$

$ROE > r_e$: $b^* = 1$

$r \rightarrow WACC$

(ROE : 代表盈利能力, $WACC$: 一个公司加权的资本成本 (36))

Market cap: Size of a firm (大)

⑥ Value growth decomposition

$$\frac{P_2}{P_1} = \frac{P_1 E_2}{P_1 E_1} \times \frac{ROE_2}{ROE_1} \times \frac{B_2}{B_1}$$

book value



⑦ ROE decomposition (DuPont decomposition)

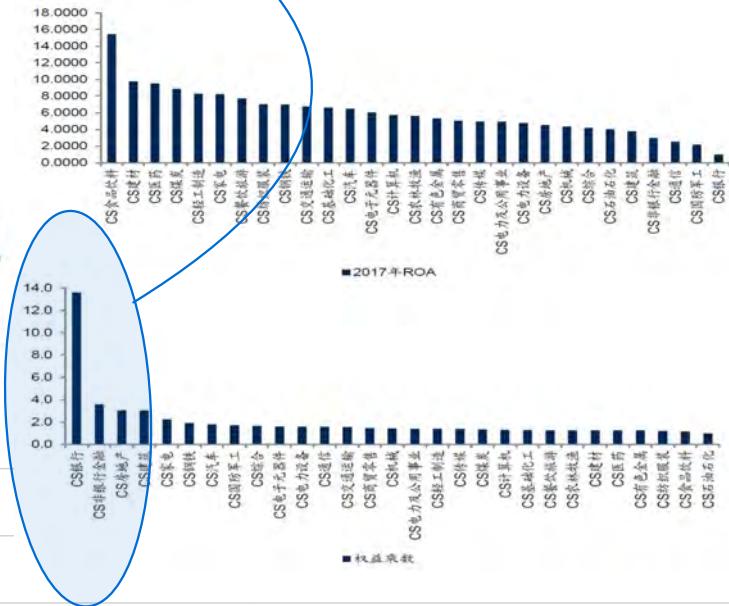
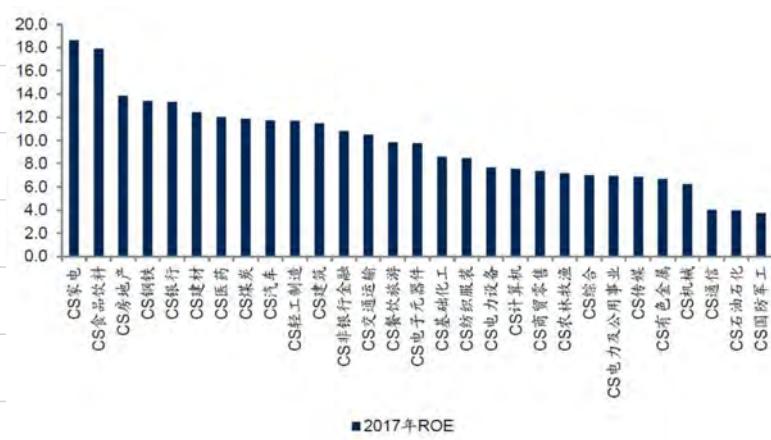
$$ROE = \frac{E}{B} = \frac{E}{S} \times \frac{S}{A} \times \frac{A}{B}$$

↑ Book value of equity

ROE (Sales margin)
Capital turnover rate
Leverage ratio

Profitability (代表: 营业、销售净额)
Efficiency (代表: 汽车、效率)
Risk (代表: 银行、风险)

解决 “金融危机” 中央银行



⑧ Why printing currency is important?

- Mitigate the effect of financial crisis (Save Commercial bank)
- Money is the media of trading, is the protection for division of labor, then is a must for GDP Growth

表1：估值表

收盘日：	港元汇率	收盘价 (元)	普通股 ROE			归母净利润同比			PB			PE		
			2018A	2019E	2020E	2018A	2019E	2020E	2018A	2019E	2020E	2018A	2019E	2020E
601398.SH	工商银行	5.30	13.7%	13.0%	12.5%	4.1%	5.0%	5.1%	0.84	0.77	0.70	6.4	6.1	5.8
601288.SH	农业银行	3.41	13.4%	12.5%	12.2%	5.1%	5.8%	5.5%	0.75	0.69	0.63	6.0	5.7	5.4
601988.SH	中国银行	3.55	12.0%	11.3%	11.1%	4.5%	3.9%	4.9%	0.69	0.64	0.59	6.0	5.8	5.5
601328.SH	交通银行	5.20	11.5%	11.2%	10.6%	4.9%	4.5%	2.8%	0.60	0.56	0.52	5.4	5.2	5.0
1658.HK	邮储银行	4.42	13.2%	12.7%	12.6%	9.7%	15.1%	13.2%	0.90	0.77	0.70	7.1	6.6	5.8
—														
600036.SH	招商银行	34.20	16.6%	16.6%	16.9%	14.8%	14.3%	14.4%	1.70	1.51	1.33	10.9	9.5	8.3
601166.SH	兴业银行	17.29	14.2%	13.8%	13.4%	6.0%	8.6%	8.2%	0.82	0.73	0.66	6.1	5.6	5.1
600016.SH	民生银行	5.72	13.0%	12.2%	11.7%	1.0%	3.9%	4.8%	0.61	0.56	0.51	4.8	4.6	4.4
600000.SH	浦发银行	10.85	13.0%	12.8%	12.4%	3.1%	10.7%	6.8%	0.72	0.65	0.59	5.9	5.3	5.0
601998.SH	中信银行	5.43	11.2%	10.5%	10.1%	4.6%	4.2%	3.1%	0.66	0.61	0.57	6.2	5.9	5.7
000001.SZ	平安银行	14.50	11.4%	11.2%	10.9%	7.0%	13.6%	13.9%	1.28	1.03	0.94	11.8	10.3	9.0
601818.SH	光大银行	3.78	11.7%	11.4%	11.1%	6.7%	6.0%	5.6%	0.68	0.63	0.58	6.2	5.8	5.5
600015.SH	华夏银行	6.95	12.3%	10.1%	9.1%	5.2%	0.9%	1.2%	0.54	0.50	0.46	5.3	5.3	5.2
—														
601169.SH	北京银行	5.11	11.6%	11.2%	11.1%	6.8%	6.2%	6.9%	0.62	0.57	0.53	5.6	5.3	4.9
601009.SH	南京银行	7.76	16.9%	16.6%	16.8%	14.5%	13.2%	13.0%	0.97	0.86	0.76	6.2	5.4	4.8
002142.SZ	宁波银行	25.16	19.0%	17.3%	16.9%	19.9%	18.5%	16.4%	2.14	1.87	1.45	12.9	10.9	9.3
600919.SH	江苏银行	6.38	12.4%	13.1%	13.5%	10.0%	15.5%	13.6%	0.72	0.65	0.59	6.1	5.2	4.6
601077.SH	邮储银行	5.74	13.5%	13.9%	13.3%	1.4%	19.1%	16.8%	0.93	0.73	0.66	7.2	6.0	5.2
—														
603323.SH	苏农银行	4.62	9.2%	8.6%	8.8%	9.7%	15.9%	13.7%	0.91	0.72	0.67	10.4	9.0	7.9
002839.SZ	张家港行	5.39	9.2%	9.5%	10.1%	9.4%	14.0%	14.5%	1.03	0.96	0.89	11.7	10.2	8.9
601128.SH	常熟银行	7.94	13.3%	11.8%	12.3%	17.5%	18.6%	19.4%	1.70	1.32	1.21	14.6	12.3	10.3
平均			12.9%	12.4%	12.2%	8.0%	10.3%	9.7%	0.94	0.82	0.74	7.8	7.0	6.3

6. DCF Models with FCF

① Equity valuation

本页=可用于股利的CF
a. FCFE (Free Cash Flow of Equity)

FCFE = Net income + Depreciation - Capital expenditure (Reinvestment) - Change of working capital (account receivables,..)

b. Pricing

$$MVE(Equity) = \frac{FCFE}{r-g}$$

② Firm valuation

a. FCFF (Free Cash Flow of Firm)

b. Pricing

$$MVF(Firm) = \frac{FCFF}{r-g}$$

L11-14 Relative Pricing

1. Relative Pricing

① Assumptions

Comparable assets are correctly priced

Comparable assets are truly comparable

② Steps

a. Determine the comparable assets

b. Get the relative pricing ratios of comparable assets

c. Acquire the relative pricing ratio of this asset by benchmarking (Find the mean & median of the most relevant asset)

③ Relative pricing ratios / multiples (不同版本的 P/B Ratio)

a. P/E Ratio
 $\frac{\text{risk}}{\text{growth rate}}$
静态 - 过去一年
动态 - 现在一年 (预期)
流动 - 过去12个月
(TTM)

PEG = P/E / Expected growth rate

b. P/B Ratio

Pro: Book value is linked to Long-run profit \rightarrow Bank & Oil industry use P/B

Con: Book value does not necessarily reflect earnings \rightarrow Manufacturing industry does not use P/B

c. EV/EBITDA Ratio

d. EV/EBIT Ratio

e. EV/Sales (P/S Ratio)

Sales 不同于 Earnings 更加稳定与准确，更适用于零售行业

④ Pros & Cons

a. Pros

Fewer assumptions

Easy and fast

Up to date

b. Cons

Lack own judgement \rightarrow 结果比较“平坦” for Buffet.



2. M&A

① Types of buyers

财务买家：买→卖，赚钱

战略买家：1+1>2 (Synergy)

② Types of M&A

The auction 主动买

Equal participation 平等买

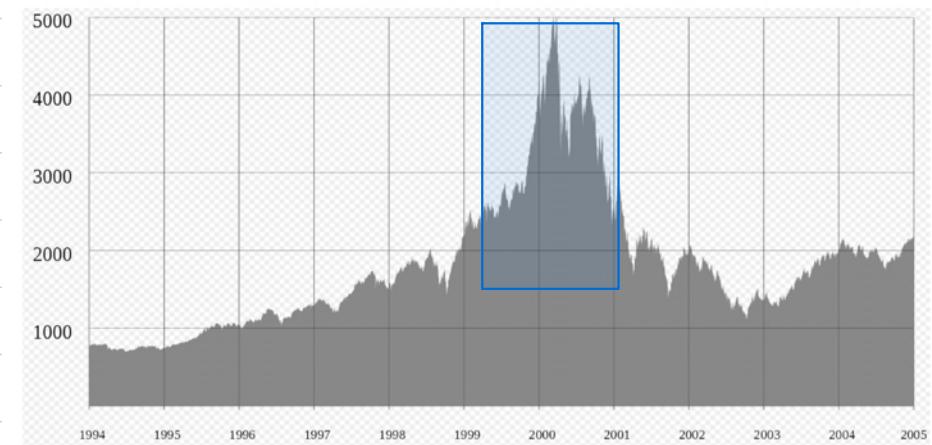
A hostile takeover 买冲头

③ Result historically

Lose money on average

3. Others

① 2000年美国股市科技泡沫



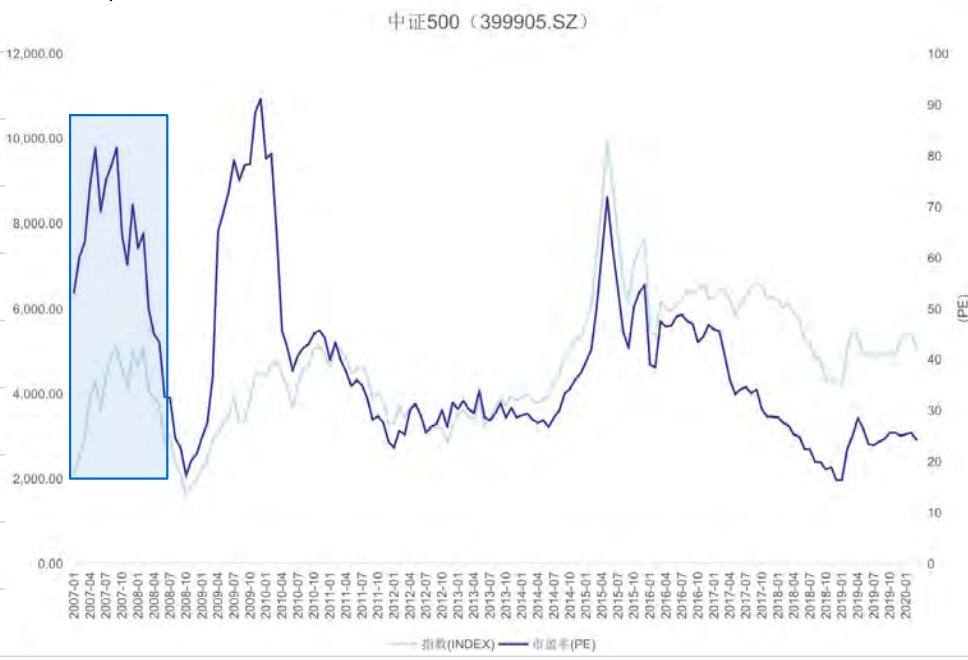
美国股市
林普 500 (加权)
道琼斯 30 (平均)
纳斯达克 Nasdaq (加权)

巴菲原则: Keep away from the bubble

老虎基金: Fight against with the bubble (图见)

豪罗基: Ride on the bubble

② 2005年中国股权分置改革



三分之二 Outstanding → 对于公司: 股东收益激励小 → 股指低迷
 三分之一 Non-outstanding → 对于投资者: 供给随时可能收缩
 (国有资产“不要颜色”)

→ 股指高泡沫

③ Layers of Risk ☆

- Layer 1 Time α
- Layer 2 Risk β
- Layer 3 Information & Insight α

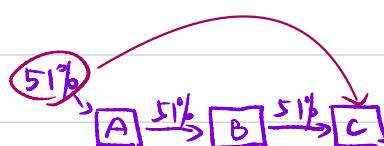
④ 上市

a. IFRS

优点: 高度风险管理(杠杆率相对低)
无股东会
品牌价值高

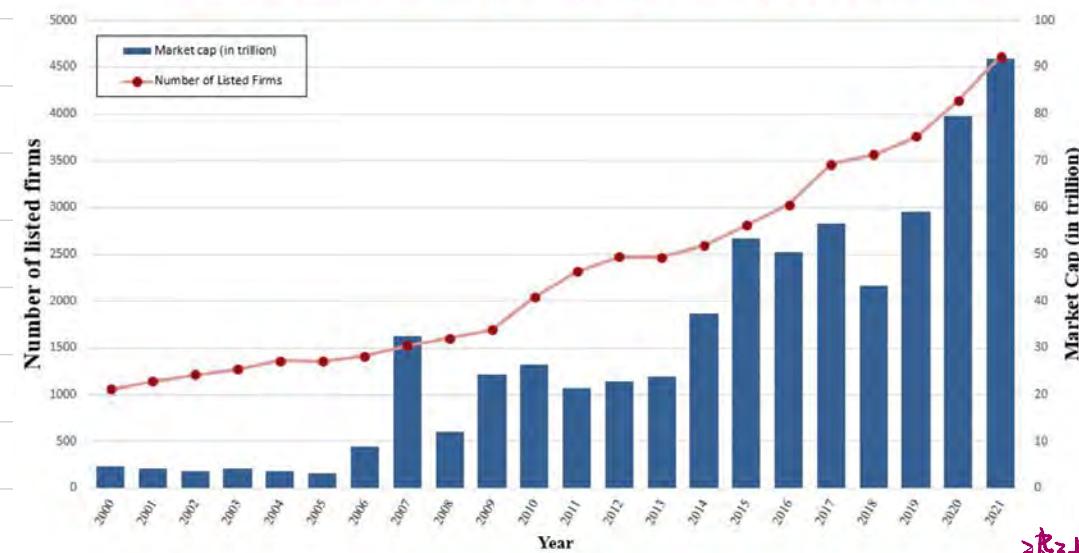
缺点: 信息披露(有可能是合同行为)
股权稀释

股权稀释+控制力下降:



b. 中美特色差异

Number of Listed Firms and Market Capitalization in China, 2000 - 2021



中: 支持上市

上市与否与政策相关

退市制度不完善

丁富高上市现象 (Firm A(不被鼓励上市) → Firm B(壳))

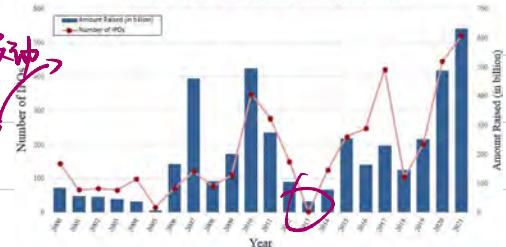
美: 监管力度大, 严格财务造假

中国证监会 (监管)
美国证监会 (发展)

(不给上市, 提供给, 股指↑)
给上市, 扶持中小企业

波动

Number of IPOs and Amount Raised, 2000 - 2021



退市

(大公司: 上市)

(中小公司: 不上市)

⑤ 中国融资

a. Debt vs Equity

Debt Financing > Equity Financing

(百亿元) (千亿元)

银行(间接融资) 股市(直接融资)

大头 小头

~~直接融资~~ ↗ ↗

b. Equity financing

VC、PE
↓

二级 (IPO)

(SEO (更大)) (定向增发 (private)) 对于大多数中国上市企业, 是主要方式
(公开发行 (public)) 监管力度大

⑥ 中国股市收益

(SSE $(1+0.0064)^{12} - 1$)

(S&SE $(1+0.009)^{12} - 1 \rightarrow \approx 12\%$)

L15 CAPM

1. CAPM

① “伟大的经济学家”

(宏观之父：凯恩斯)

(微观之父：亚当·斯密)

② 高利贷主义

$$r > 24\%$$

③ $B < 0$ in CAPM

Insurance

④ Explanation of CAPM

$$E[r_i] = r_f + \beta_i(E[r_m] - r_f)$$

Expected return
Risk premium
Riskless rate (Amount of risk) × (Price of risk)

☆ 叉子圖
Multi-Factor Model : Realized return
CAPM & APT : Expected return

→ 定义：CAPM Expectation of Single-factor Regression

(也称 Reg.)

APT Expectation of Multi-factor Regression

⑤ Liquidity

a. Definition

The ease and speed that an asset can be sold at fair market.

b. Measure

Bid-Ask spread provided by dealer: Liquidity ↓, BA Spread ↑

(Dealer: Car Dealer → inventory

Broker: House Broker ← inventory

c. Premium caused by Liquidity

(Liquidity Premium : Liquidity ↓, Return ↑)

(Liquidity Risk Premium : Std of Liquidity ↑, Return ↑)

L16 APT

1. APT

① Tracking portfolio

本质上是 Factor Mining 由 F_1, F_2, \dots, F_k 构成 (一个因子 -> Tracking portfolio)

$$\begin{cases} \tilde{R}_1 = \alpha_1 + 2F_1 + 1F_2 \\ \tilde{R}_2 = \alpha_2 + 1F_2 + 2F_3 \\ \dots \end{cases}$$

$(k+1) \uparrow$ Tracking portfolios $\rightarrow k \uparrow$ Factors.

risk-free portfolio.

$$\textcircled{1} \quad \tilde{Y}_i = \bar{Y}_i + \beta_{i1}\tilde{F}_1 + \beta_{i2}\tilde{F}_2 + \dots + \beta_{ik}\tilde{F}_k + \tilde{\epsilon}_i$$

$$\textcircled{2} \quad E(\tilde{F}_k) = 0, \text{cov}(\tilde{\epsilon}_i, \tilde{\epsilon}_j) = 0, \text{cov}(\tilde{F}_k, \tilde{\epsilon}_i) = 0$$

$\textcircled{3}$ No Arbitrage

\Rightarrow For any portfolio i, j

$$\text{if } \tilde{Y}_i = \bar{Y}_i + \beta_{i1}\tilde{F}_1 + \dots + \beta_{ik}\tilde{F}_k$$

$$\tilde{Y}_j = \bar{Y}_j + \beta_{j1}\tilde{F}_1 + \dots + \beta_{jk}\tilde{F}_k$$

$$\text{if } p_{i1} = \beta_{i1}, p_{i2} = \beta_{i2}, \dots, p_{ik} = \beta_{ik}$$

$$\Rightarrow E(\tilde{Y}_i) = \bar{Y}_i = E(\tilde{Y}_j) = \bar{Y}_j$$

- construct pure factor tracking portfolio

$$\hat{F}_1 = f_1 + \tilde{F}_1$$

$$\hat{F}_2 = f_2 + \tilde{F}_2$$

$$\hat{F}_k = f_k + \tilde{F}_k$$

$$f_i = E(F_i)$$

$$\tilde{F}_i = \hat{F}_i - f_i$$

② For any portfolio

$$\tilde{Y}_i = \bar{Y}_i + \beta_{i1}\tilde{F}_1 + \dots + \beta_{ik}\tilde{F}_k \quad \tilde{F}_i = \tilde{Y}_M = \bar{Y}_M$$

we use $\hat{F}_1, \hat{F}_2, \dots, \hat{F}_k$ to track the return of \tilde{Y}_i .

$$E\left(\beta_1\hat{F}_1 + \beta_2\hat{F}_2 + \dots + \beta_k\hat{F}_k + (1-\beta_1-\dots-\beta_k)\hat{F}_{\text{rf}}\right) = E(\tilde{Y}_i) = \bar{Y}_i$$

$$\bar{Y}_i = \beta_1 f_1 + \beta_2 f_2 + \dots + (1-\beta_1-\dots-\beta_k) f_{\text{rf}}$$

$$\bar{Y}_i - Y_f = \beta_1(f_1 - Y_f) + \beta_2(f_2 - Y_f) + \dots + \beta_k(f_k - Y_f)$$

$$\tilde{F}_1 - Y_f, \tilde{F}_2 - Y_f, \tilde{F}_3 - Y_f$$

$$\tilde{Y}_i = \beta_1(\tilde{F}_1 - Y_f) + \beta_2(\tilde{F}_2 - Y_f) + \beta_k(\tilde{F}_k - Y_f)$$

$$E(\tilde{Y}_i) = \beta_1(f_1 - Y_f) + \beta_2(f_2 - Y_f) + \dots + \beta_k(f_k - Y_f)$$

L17 Risk and Return

1. Return

① Types

(Expected return)

(Realized return)

(Gross return)

(Net return)

(Nominal return)

(Real return)

② Formal definition

$$R_{t+1} (\text{Gross return}) = \frac{P_{t+1} + C_{t+1}}{P_t}$$

Div for Stock
Coupon for Bond

For $R_{t+1,2} = R_{t+1} \cdot R_{t+2,t+2}$, it assumes $P_{t+1}' = P_{t+1} + C_{t+1}$, i.e., Cash Reinvestment

③ Arithmetic average vs. Geometric average

$$(AA: \bar{r} = \frac{1}{n} \sum_{i=1}^n r_i)$$

$$(GA: g = ((1+r_1)(1+r_2) \cdots (1+r_n))^{\frac{1}{n}} - 1)$$

Case 1: returns are not volatile: 9%, 11%

- Arithmetic average: 10%
- Geometric average: 9.995%

The difference is larger when returns are more volatile.

Case 2: returns are volatile: -90%, 110%

- Arithmetic average: 10%
- Geometric average: -54%

L18-19 (In)Efficient Market

1. 经济学基本问题

(市场价格形成 (T) 市场
Tij T2 X
市场经济 vs 计划经济 (计划型市场经济都不可行)

2. Efficient Market

① Background

No standardized answer.

Winners of 2013 Nobel Prize for Economics

Press Release

14 October 2013

The Royal Swedish Academy of Sciences has decided to award The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel for 2013 to

Eugene F. Fama → Eff
University of Chicago, IL, USA

Lars Peter Hansen
University of Chicago, IL, USA

and

Robert J. Shiller → Ineff
Yale University, New Haven, CT, USA

"for their empirical analysis of asset prices".

② Efficient market hypothesis (EMH)

Market is efficient.

Result: No alpha, just α_f & beta.

③ Types of efficiency



④ Test of weak-form EMH: Technical analysis

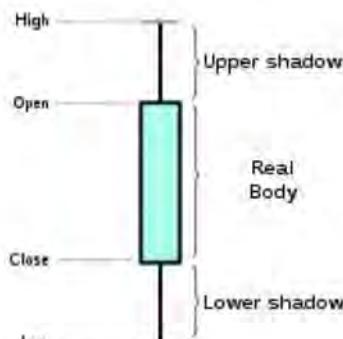
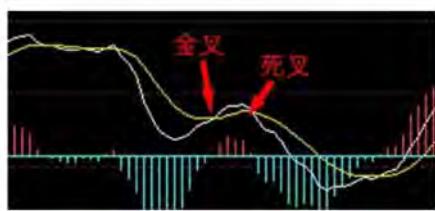
Technical analysis: I can get more info by summarizing historical data.

Gold Crossing (金叉)

- Short term moving average line surpass the long term moving average line upward.

Dead Crossing (死叉)

- Short term moving average line surpass the long term moving average line downward.



白三兵

- 白三兵是牛市的逆转模式，形成三个连贯的长白蜡烛。在一段走低后，白三兵模式指示市场心态的改变和从熊市到牛市的逆转趋势。牛市的确认勿庸置疑，有时逆转会形成一个价格支撑位。

三个黑乌鸦

- 熊市逆转模式，由三个连续的黑烛身组成。每天开盘时高于昨天的最低价，但收盘时低于昨天的最低价。

⑤ Test of semi-strong-form EMH: Fundamental analysis

Use Econ & Act knowledge.

⑥ Test of EMH (Can used to check different forms)

a. Correct test: Event study 从主义出发 → 正确

Check whether prices react to a new info quickly & to the right extent

Rational: $\rightarrow /$ (少数人: 立即吸收信息, 反应迅速)

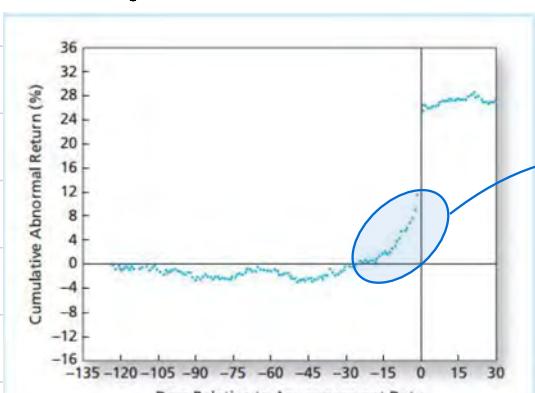
Not quickly: $\nearrow \searrow$ (多数人: 延迟吸收, 导致 Delay.)

Not to the right extent: $\downarrow \uparrow$

e.g. M&A

(Semi-strong: \checkmark (在 $t=0$ 时变化很快))

Strong: \times ($t=t=-15-0$ 时变化慢 → private info 没有及时消化与反映在股价上>)



Inside trading!

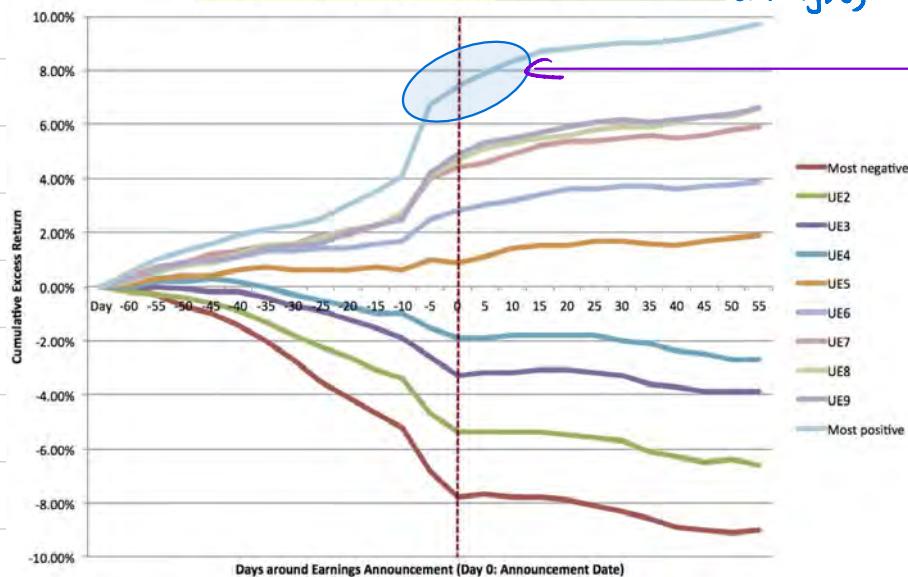
Figure 11.1 Cumulative abnormal returns before takeover attempts: target companies

Source: Arthur Keown and John Pinkerton, "Merger Announcements and Insider Trading Activity," *Journal of Finance* 36 (September 1981). Used with permission of John Wiley and Sons, via Copyright Clearance Center. Updates courtesy of Jinhua Yan.

e.g. Earnings surprise

Semi-strong: \propto ($t=0$ 时慢化缓慢)

Market Reaction to Unexpected Quarterly Earnings Surprises: US Companies from 1988-2002
Earnings Surprise = Actual Earnings - Consensus Earnings Estimate (Analyst)



可用于针对中基金的交易策略

b. Incorrect way: Check arbitrage opportunity 2012 反出发 → 不正确

Check whether professional money managers do not beat the market on average

(No arbitrage) → Efficient market ✓



Not necessarily happen in practice

Short-sells constraint



There are limits to arbitrage

Margin call

⑦ Different standpoints → Different Asset Management Way

(Accept EMH: Passive Management)

(Reject EMH: Active Management)

3. Fama-French factors Model

① Reactions to evidence

Market is not always mispriced.

(Rational finance people e.g. Fama) → extra return (Can be measured in risk → factor)

Behavioral finance people → Market is always mispriced. (cannot be measured in risk)

② 2nd factor: Size (SMB) Small Minus Big.

③ 3rd factor: Book-to-Market Ratio

a. Type

Value stocks: Low P/B

Growth stocks: High P/B

④ 4th factor: Profitability (RMW) Robust weak

a. Theorem

Momentum trading strategy → RMW.

“追涨杀跌” (美国 ✓ → Can be used to reject weak-form efficiency.
中国 ✗)

⑤ Relation with ETF

更“指数增强型” ETF 根据基金公司的策略调整

ETF + Trading strategy (Long-Short strategy) → 指数+增强型 ETF

e.g. Size-B-M ratio

中证500、中证1000 > 上证300

⑥ Efficiency of the factor

(Robustness
Persistency) ← Econ meaning.

⑦ 中国的汇率政策

不一致 → Mispricing → 进口大 → 贸易顺差

L20 Performance Evaluation

1. 美方

① Mutual funds & Hedge funds

a. 管理资产

(
在美: $AUM(1.5\% - 2\%) \rightarrow$ Assets under management
不美: $AUM + \text{Performance Benefit} \rightarrow$ 高激励 → 低风险
)

b. 投资对象

(
在美: 个人、大牛、机构
不美: 大牛、机构 (有资金门槛)

c. 交易活动限制

(
在美: 不可以 Short selling, Leverage, Derivatives ; 个股 portfolio 风险 $\leq 10\%$
不美 可以 ;

Derivative 及本底头寸和杠杆:

现金	100	120	
期权	2 (100)	120	20%

100 120
现金
期权 2 (100) 120 20%

d. 交易披露

(
在美: 需要披露
不美: 不需要披露

② LBO Funds

杠杆收购 → 收购公司 → 离
e.g. KKR, TPG, Bain Capital, Blackstone

③ 投资者结构



a. 保障

双轨驱动 (美保障)

自投资 (基金：长期股权投资)

保险：长期价值投资

b. 行业基金

年轻入养老人

c. 信托机构

作为中介，连接投资者与企业

相比于商业银行 (高门槛)

(高风险高回报)

④ 中国股市投资者

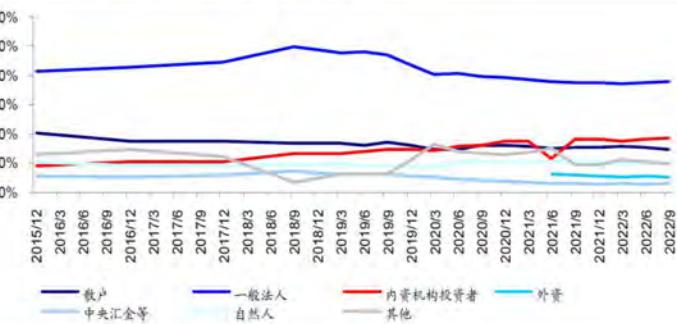
a. 市值角度

法人主导

b. 交易量角度

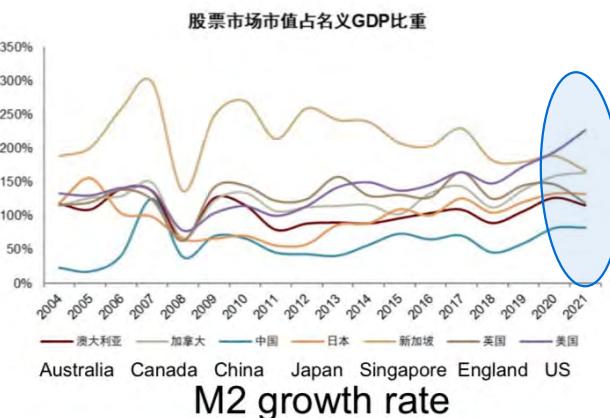
个人投资者主导

图1 2015Q4-2022Q3 A股投资者流通市值占比 (总市值口径)

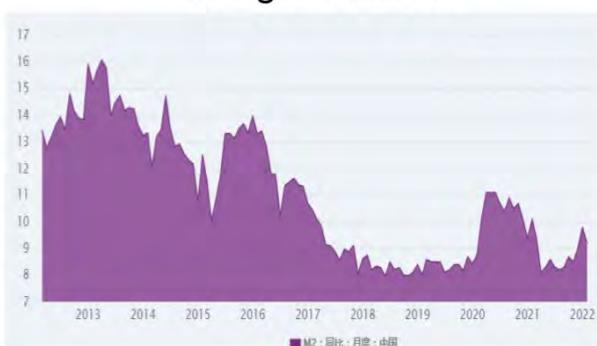
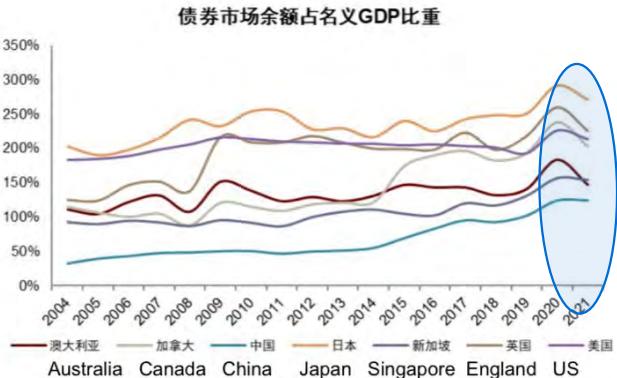


⑤ 中国金融市场增加巨大
 (股市增加大
 债市增加大)

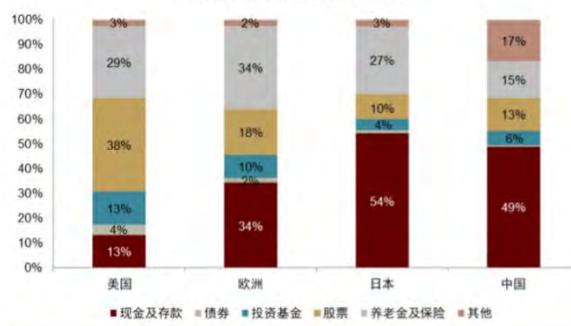
Stock Mkt Cap/GDP



Bond Mkt Cap/GDP



居民金融资产配置结构 (2021)



中国金融 (间接) ← my prefer: 更可控

中国金融 (直接) ← 他们 prefer: 更有效

(可以分散银行风险)

⑥ 中美金融市场

美国: 公募 < 市场 (VIX AUM 管理费用)

中国: 公募 > 市场

原因: (对冲太弱) - 散户多
 (自己太强) - 内幕交易严重.

← 判断指标
 average return
 cumulative return
 sharpe ratio

⑦ Weak persistency

中国与美国的金融表现都不持续

%	G1 (Lowest)	G2	G3	G4	G5 (Highest)	Last year return	Next year return
G1 (Lowest)	23.6	18.8	18.3	20.1	19.1	5.01%	24.15%
G2	16.9	22.7	20.4	20.6	19.1	15.6%	25.34%
G3	16.8	17.0	20.8	25.8	19.7	22.25%	26.82%
G4	20.8	22.2	20.9	18.4	17.4	29.26%	24.28%
G5 (Highest)	22.9	19.4	18.9	15.1	23.6	42.85%	26.02%

→ FOF - Fund of Fund

(基金型基金, 下更多的管理费)

2. 交易策略

① 2013

a. Result: 基金有选股能力

② 技术 (Market Timing)

a. Testing: Treynor - Mazuy Model (T-M Model)

- If the coefficient of the square term is positive and significant, it indicates the existence of market timing

$$R_{it} - R_{ft} = \alpha_i + \beta_{im} * (R_{mt} - R_{ft}) + \gamma_i * (R_{mt} - R_{ft})^2 + \beta_{ismb} * SMB_t + \beta_{ihml} * HML_t \\ + \beta_{imom} * MOM_t + \varepsilon_{it}$$

反映 market movement

b. Result: 基金无择时能力

