
University of Birmingham

Trading Techniques

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Lecture 5

Capital Markets & Corporate Finance

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Capital Markets & Corporate Finance

- Mergers and Acquisitions: Do they Pay?
 - Short and Long Run Performance
- Private Equity
 - Leveraged Buyout
 - Distressed Investing
 - Venture Capital
 - Valuation
 - Role of Private Equity: International Evidence
 - Why does a LBO works?
- Exchange Traded Funds
- Non-Traditional Funds
- Market Indexes definition and uses
 - Methods
 - Free Flotation
 - Fundamental Weighted Indices
 - Tracking error

Capital Markets & Corporate Finance (cont.)

- **Commodity Markets and Commodity Derivatives**

- Commodity Futures
- Collateralized Futures
- Commodity-Linked Securities
- Commodity Basics:
 - Contango
 - Backwardation
 - Contrasting Equity Markets to Commodity Markets
- Commodities and Volatility

- **Credit Derivatives**

- Total return swaps
- Credit default products
- Credit spread option

Mergers and Acquisitions

A *merger* involves joining two or more economically separate entities into one larger economic unit.

An *acquisition* is simply the purchase of assets, or the purchase of another business entity

A *takeover* means that effective control of a company changes hands

A *buyout* usually refers to the case where management purchases or buys out the entire public interest in a publicly traded company.

If a buyout is financed using debt, it is a *leverage buyout* (LBO)

If shares of the company no longer trade on a stock exchange, the buyout process is called “*going private*”

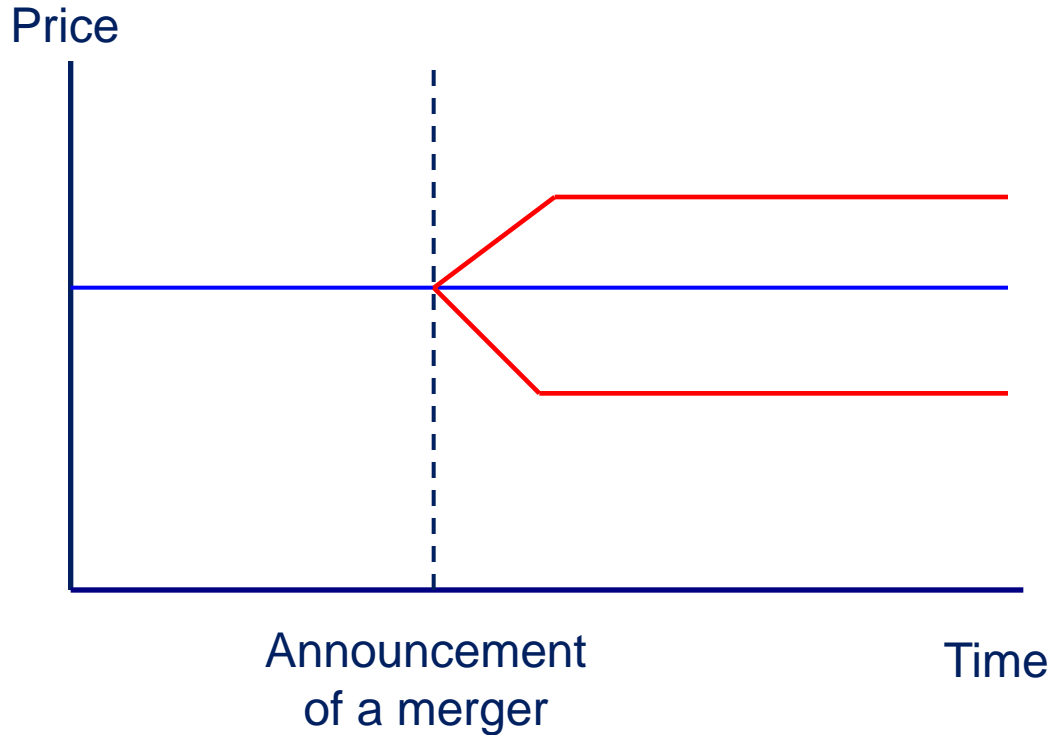
Joint venture, alliances, and networks are forms of collaboration between firms

Do M&A Pay? – Introduction

Objective:

- Analyse the impact on the wealth of shareholders from the announcement of an event
 - Public announcement
 - Unanticipated announcement
- Stock market reaction
- The market changes at the point in time where financial markets change their *expectations*

Announcement of a merger



The announcement was unexpected and there is a wealth gain to the acquire

The announcement was expected or there are no wealth effects

The announcement was unexpected and there is a negative wealth effect

Economic analysis using event studies

For mergers we are often interest in testing the value effects of:

- Cash versus stock payments
- Type of mergers (horizontal, vertical, etc)
- Domestic versus international mergers
- Successful versus unsuccessful tender offers

Problems: Why we did not find any wealth effect:

- There is no impact on the wealth of the share holders
- The event was anticipated by the financial market
- The model we are using is not powerful enough to detect the impact

Measurement of wealth effects

- Yardstick (benchmark)
- Abnormal or excess return to stock “j” is measured as the difference between the actual return at time t, $r_{j,t}$ and the expected return $E[r_{j,t}]$:

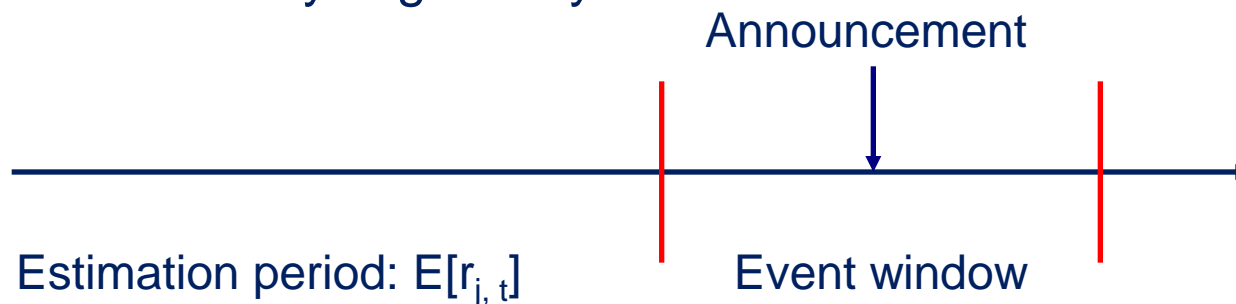
$$A_{j,t} = r_{j,t} - E[r_{j,t}]$$

- Asset pricing model, “CAPM”:

$$r_{j,t} = \alpha_i + \beta_i r_{m,t} + \varepsilon_{i,t}$$

Event Study

The time line for the study is given by:



- During the estimation period we estimate the expected return
- During the event window we test if the actual returns are different from the expected returns – *removing the overall effect from the market*

Why an event window and not just one day?

- We are not always sure what day markets received the information
- Information may leak to the markets
- Information may be released on Thursday but markets react Friday since the information was released after closing

Do M&A pay?

Short Run Performance

Table 3

Announcement Period Abnormal Returns by Decade, 1973-1998

	1973-79	1980-89	1990-98	1973-98
<i>Combined</i>				
[-1, +1]	1.5%	2.6% ***	1.4% ***	1.8% ***
[-20, Close]	0.1%	3.2%	1.6%	1.9%
<i>Target</i>				
[-1, +1]	16.0% ***	16.0% ***	15.9% ***	16.0% ***
[-20, Close]	24.8% ***	23.9% ***	23.3% ***	23.8% ***
<i>Acquirer</i>				
[-1, +1]	-0.3%	-0.4%	-1.0%	-0.7%
[-20, Close]	-4.5%	-3.1%	-3.9%	-3.8%
No. Obs.	598	1,226	1,864	3,688

Note: Statistical significance at the 1% and 5% levels are denoted by *** and **, respectively.

“New evidence and perspective in Mergers”

Gregor Andrade, Mark Mitchell and Erik Stafford

Do M&A pay?

- Not only in the short run but also negative return in the long-run

- Large Firms perform better

- Cash financed deals perform better

- Value firms perform better than growth/glamour firms

Long Run Performance

Table 5

Three-Year Post-Merger Abnormal Returns for Acquiring Firms, 1961 to 1993

Portfolio Composition	Equal-Weight	Value-Weight
Full Sample	-5.0% ***	-1.4%
Financed with Stock	-9.0% ***	-4.3%
Financed without Stock	-1.4%	3.6%
Growth Firms	-6.5%	-7.2%
Value Firms	-2.9%	1.1%

Source: Mitchell and Stafford (2000)

Note: Statistical significance at the 1% and 5% levels are denoted by *** and **, respectively.

Questions:

Why does stock financed deals drop in value?

Why are value firm better than growth firms?

Why do M&A come in waves?

Conclusion

- It is good to be a target
- Mixed evidence for acquire, a few have very large negative returns, the rest insignificant
- The return may vary depending on the type of merger
- Cash financing is better than issuing stock

Private Equity

Broadly term that commonly refers to an equity investment in a potential successful company or asset not publicly traded on capital market.

Private Equity Investments: Equity investments that are not traded in exchanges.

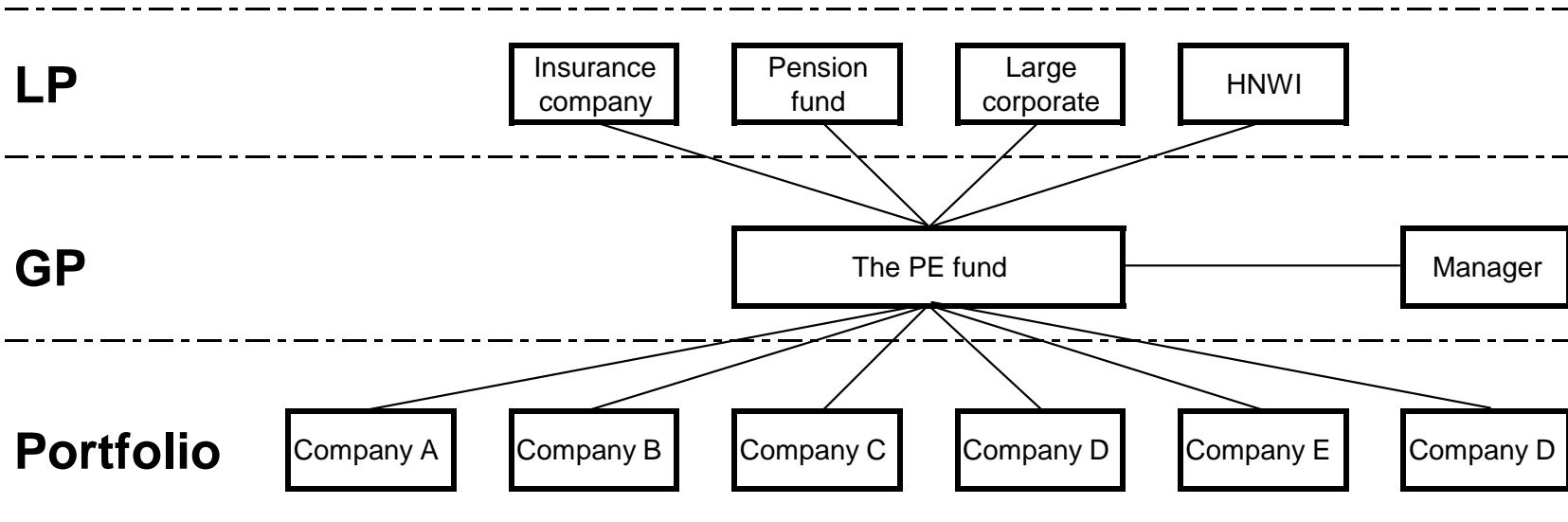
Asset class representing the companies not publicly traded (vs. public equity traded on stock exchange);

PE funds are raised from pension funds, insurance companies, large corporate, HNWI (High-net-worth-individual), etc...;

Investors in PE funds are called “**Limited Partners**”;

PE funds are managed by the “**General Partners**”

Structure of private equity participations



Institutional and Individual investors usually invest in private equity through **limited partnerships**, which allow investors (the limited partners) to participate in a portfolio of private equity projects while **preserving limited liability** (the initial investment) and leaving management to the general partners, **who are private equity experts**.

The limited partnership is often called **the fund** and the general partners are sometimes designed as the **management company**.

Funds of Funds are also offered that pool investments in several private equity funds.

Three main categories of private equity funds:

- Venture capital
- Leveraged Buyout investing, and
- Distressed Investing

Leveraged Buyout

Buyout investors typically take a majority control in acquired companies. These companies are often publicly traded. In buyouts, investors put up an equity stake, typically between 20-40 percent of total purchase price and borrow the rest (hence the term leverage).

After purchase the company is taken private.

The objective is to resell the acquired company, or part of it, within a few years at a higher price.

The sale is done privately or through an IPO.

Management Buyout is a special form of LBO in which managers of the acquired company become large investors of the company after its privatization.

Distressed Investing

Also called *special situations or vulture investing*.

Investing in equity and debt of companies in financial distress.

The concept is to invest in operationally sound, financially distressed companies and reorganize them.

Venture Capital

One of the main categories of private equity investing and the most traditional one.

Stages of Venture Capital Investing:

Seed-Stage financing is capital provided for a business idea. The capital generally supports product development and market research.

Early stage financing is capital provided for companies moving into operation and before commercial manufacturing and sales have occurred.

- *Start-up* is capital provided for companies just moving into operation but without any commercial product or service sales. The capital generally supports product development and initial marketing
- *First-stage* financing is capital provided to initiate commercial manufacturing and sales.

Formative-stage financing includes seed stage and early stage

Later-stage financing is capital provided after commercial manufacturing and sales have begun but before any initial public offering.

- **Second-stage** financing refers to capital used **for initial expansion of a company** already producing and selling a product but perhaps not yet profitably.
- **Third-stage** financing is capital provided **for major expansion**, such as physical plant expansion, product improvement, or a major marketing campaign.
- **Mezzanine (bridge)** financing is capital provided to **prepare for the step of going public** and represents the bridge between the expanding company and the initial public offering (IPO)

Expansion-stage financing includes **second and third stage**

Balanced-stage financing is a term used to **refer to all stages**, seed through mezzanine

Characteristics of Venture Capital

- Illiquid
- Long-term commitment
- Difficult to value
- Little historical risk and return data
- Limited information upon which to base estimates
- Entrepreneurs and VCs can clash
- Manager incentives can distort objectives
- Competitive structure is volatile or uncertain
- Vintage cycles create periods of excess VC funds and shortages
- VCs bring financial expertise and business experience to the venture

Investment Characteristics

Illiquidity: Venture capital do not provide an easy or short-term path for cashing out. Liquidation or divestment of each venture within a portfolio is dependent on the success of the fund manager in creating a buyout or IPO opportunity.

Long-term commitment required: investors with a longer than average time horizon can expect to profit from this liquidity premium.

Difficulty in determining current market values: Because there is no continuous trading of the investments within a venture fund portfolio, there is no way of determining the current market value of the portfolio. This poses a problem for reporting the market value exposure of the current venture capital portion of an investor's portfolio.

Limited historical risk and return data: Because there is no continuous market in venture capital, historical risk and return data have limitations.

Limited information: Because entrepreneurs operate in previously uncharted territory, there is little information on which to base estimates of cash flows or the probability of success of their ventures.

Vintage years: Some years are better than others. Both entry and exit are factors here. Thus, some years provide better firm planting and growing conditions than others.

Extensive operations analysis and advise may be required: More than financial engineering skill is required of fund managers. A venture capital manager **who can add value** will be the one who has both financial and operating experience, and knowledge of the emerging industry in which the entrepreneur is operating.

Valuation of Venture Capital

Requires three assessments:

- Exit value of the firm
- Time until exit (IPO)
- The probability of failure

Compute an expected NPV based on the probability of success and the probability of failure

$$E(NPV) = NPV_{\text{SUCCESS}} \times P(\text{SUCCESS}) + NPV_{\text{FAILURE}} \times P(\text{FAILURE})$$

$$P(\text{success}) + P(\text{failure}) = 1.0$$

Venture Capital Valuation and Risk

Investor estimates that investing \$1 million in a particular venture capital project will pay \$16 million at the end of 7 years if it succeeds. The investor is considering an equity investment in the project and the cost of equity for a project with this level of risk is 18 percent.

Project may fail at any time between now and the end of seven years.

Year	1	2	3	4	5	6	7
Failure Probability	0.25	0.22	0.20	0.20	0.20	0.20	0.20

Note: the payoff structure of actual projects is generally more complex than that of this example. Practitioners may use a multiple-scenario approach to valuation.

- Determine the probability that the project survives to the end of the seventh year
- Determine the expected NPV of the project
- Make a recommendation

a.

Probability of Success $(1 - 0.25) \times (1 - 0.22) \times (1 - 0.20)^5 = 0.192$ or 19.2%

b.

$$NPV_{SUCCESS} = -\$1 + \frac{\$16}{(1.18)^7} = \$4.02$$

$$NPV_{FAILURE} = -\$1$$

$$E(NPV) = (\$4.02 \times 0.192) + (-\$1 \times 0.808) = -\$ = 36,106$$

c.

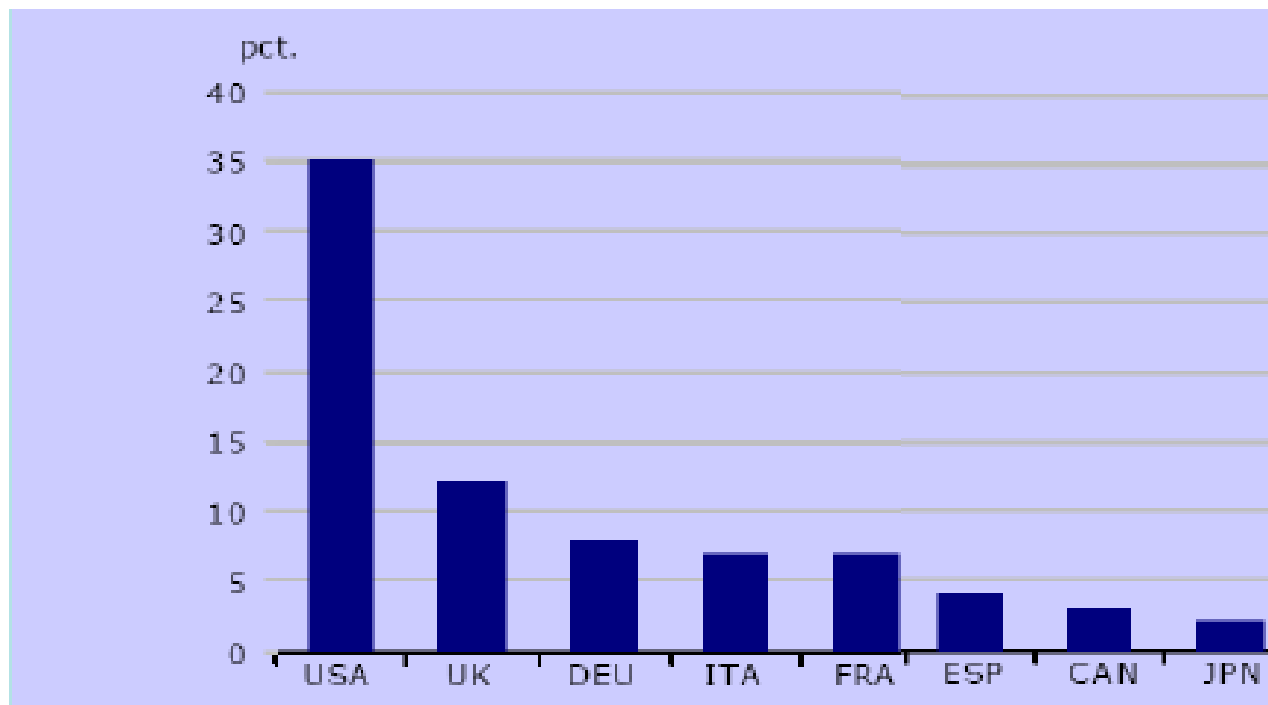
Based on its negative NPV, the recommendation is to **decline the investment.**

Role of Private Equity

- Private equity funds are deeply involved in the market
- Large increase over the last 25 years
- Morgan Stanley estimates that 2700 Private Equity Funds represents
 - 25% of Global M&A activity
 - 50% of leverage loan volume
 - 33% of the high yield market (junk bonds)
 - 33% of IPO market

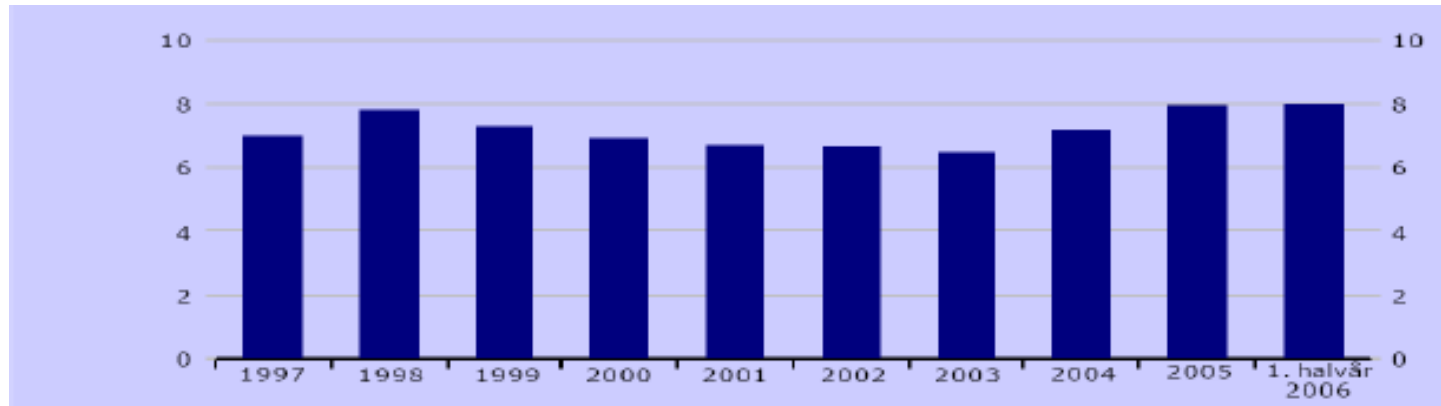
Investments by Private Equity Funds

Investments by Private Across countries in 2005

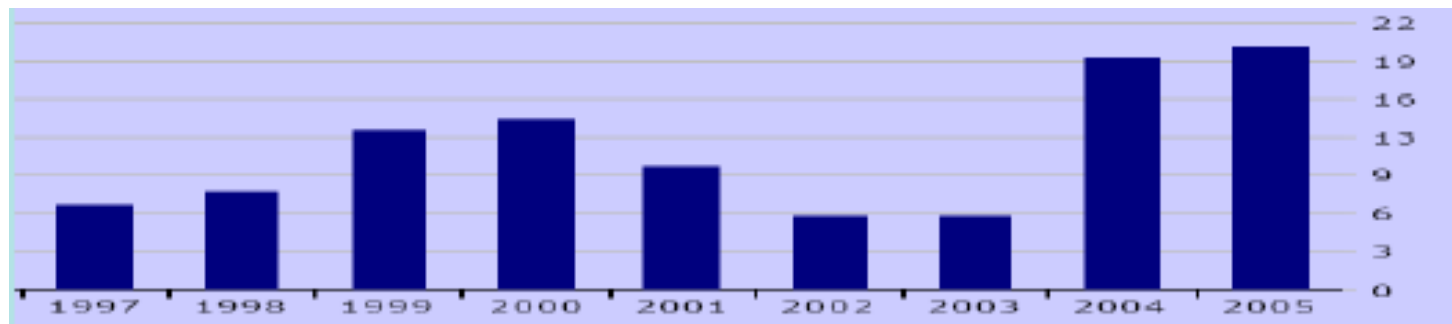


What did the Private Equity Funds pay for the firms

Prices paid by PE funds in terms of multiple of EBIT



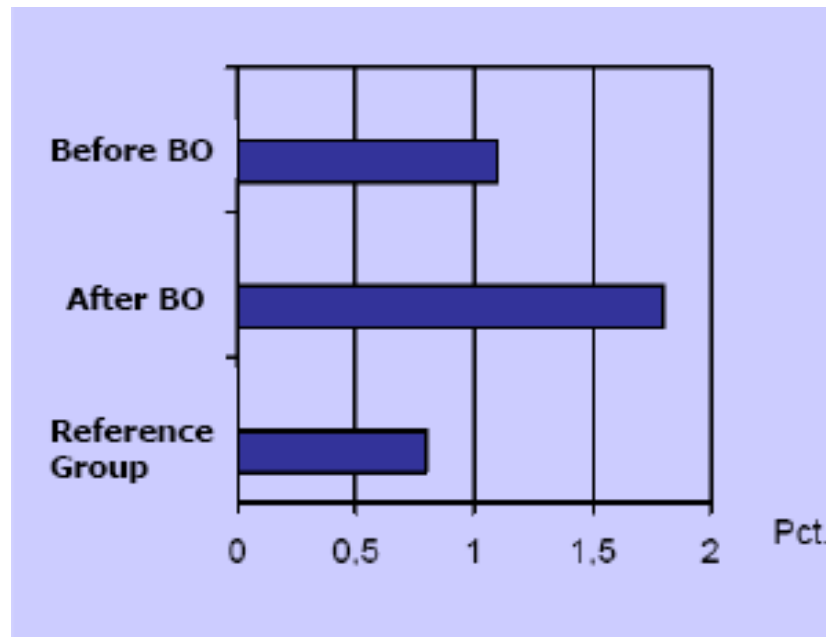
Number of transactions



- They pay more or less the same as in “normal” M&A transactions if anything a bit more
- Two trends:
 - In the late nineties they bought when prices were low
 - From around 2000 they bought a lot when prices were high

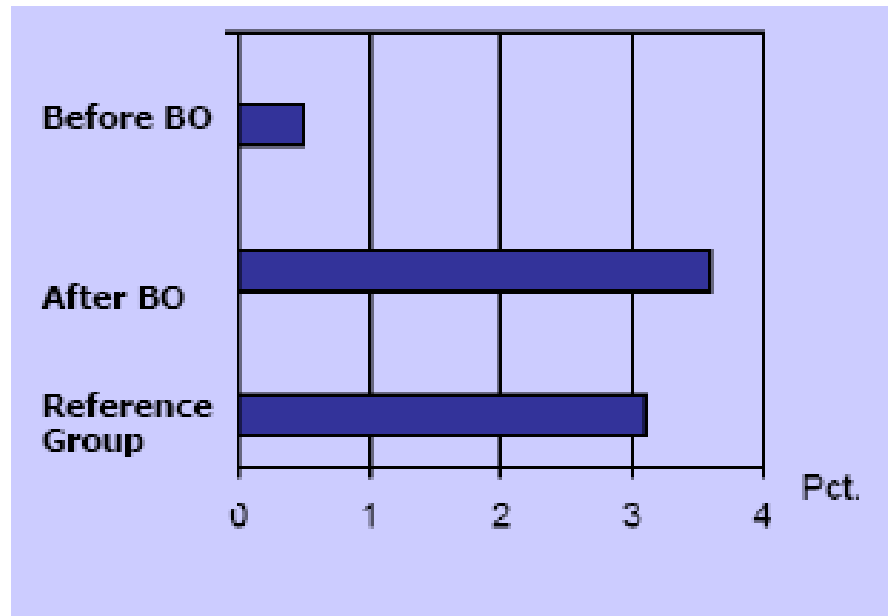
Do PE funds lay-off workers?

Growth in employment



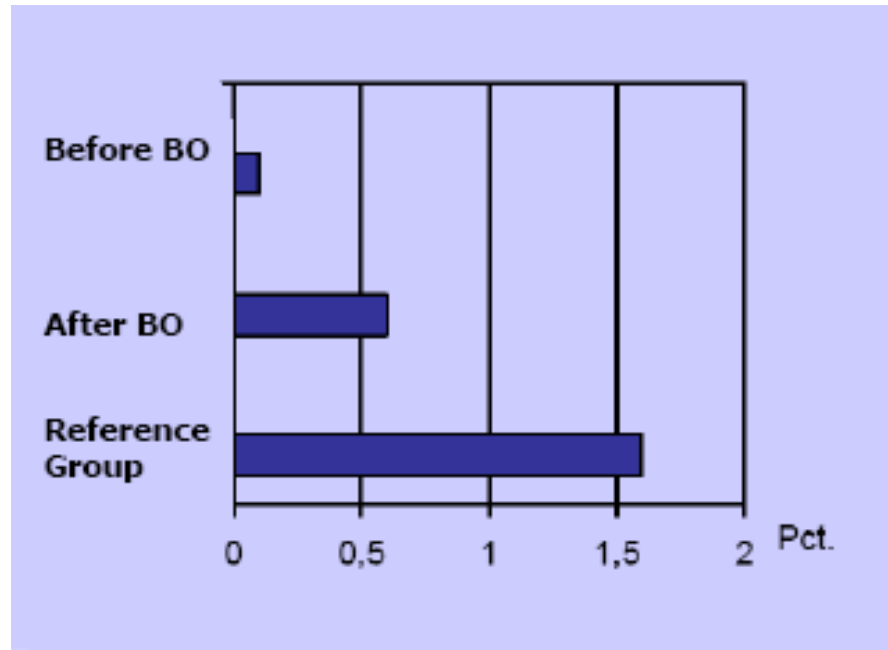
Increase in employment!

Sales Growth



- Clear improvement in sales
- Bought firms with small growth (below the reference group)

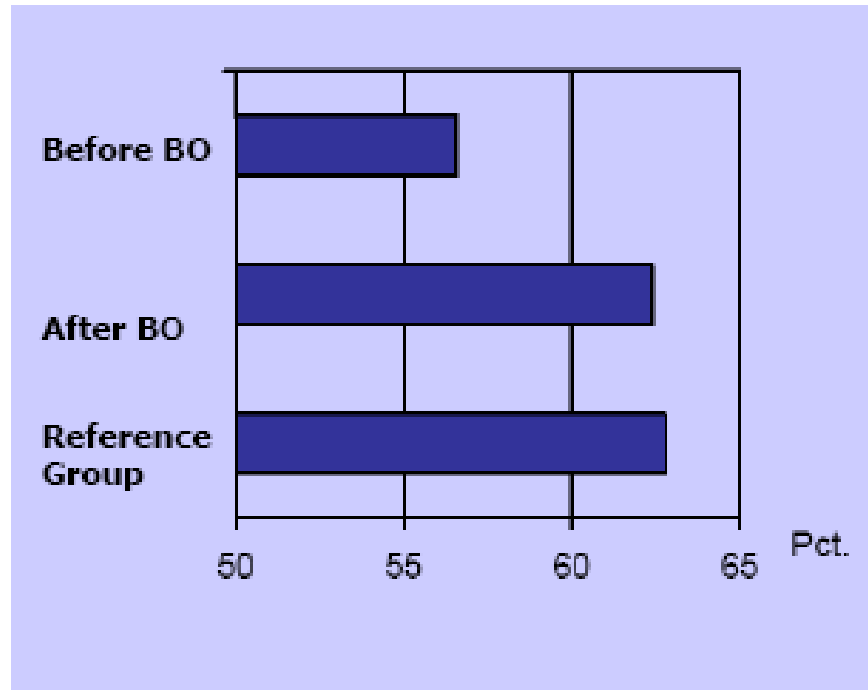
Increase in fixed assets (investment)



- Weak before purchase
- Increase after purchase but not at the same level as the reference group

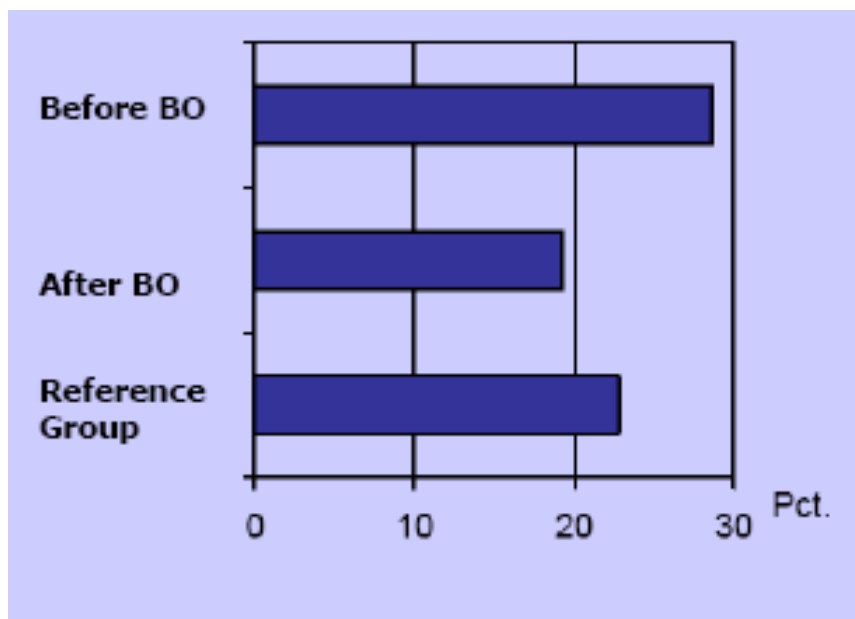
So are they LBO's?

Debt to Total Assets



- Not really firms had low debt before they buyout
- Same level as the reference group after the buyout

So, what about tax payments?



- Decrease in tax payments after the buyout
- Pay less tax than the reference group
- Evidence of better tax planning

Summary

- PE funds make large returns on the funds
- PE management funds receive large fees
- They buy firms and
 - Improve performance
 - Increase employment
 - Increase investment
 - Increase debt to that of the reference group
 - Decrease tax payment
- Consistent with international evidence

Why does a LBO works?

Increase in debt

- Tax shield
- Disciplinary effects from debt

Design of the partnership fund

- Limited Life – Focus on performance and refinancing of the fund

Improvement on Corporate Governance

- Efficient Boards
- Specialists appointed to the boards
- Incentive schemes

Exchange Traded Funds

Index-based investment products that allow investors to buy or sell exposure to an index through a single financial instrument.

ETFs are funds that trade on a stock market like shares of any individual companies.

ETFS represent shares of ownership in either open-end funds or unit investment trusts that hold portfolios of stocks or bonds in custody, which are designed to track the price and yield performance of their underlying indexes – broad market, sector/industry, single country/region (multiple countries), or fixed income.

S&P500=SPDRS

DJIA = DIAMONDS

NASDAQ-100 = QQQQ

Advantages of ETFs

- Ease to trading
- Continuous pricing
- Low cost for major indexes
- Can be shorted
- Risks are basically the same as indexed funds (market risk and tracking error)

Disadvantages of ETFs

- In many countries, actively traded ETFs track a narrow-based market index
- Many investors do not require the intraday trading opportunity (they have long investment horizon)
- Some ETFs do not have large trading volumes and the bid-ask spread can be quite large.

Types of ETFs

Broad domestic index: French CAC40, German DAX30 index are by far the most actively traded in Europe. In the US iShares S&P500, Nasdaq-100 QQQ, etc. There are also ETFS based on very broad US market indexes such as the Russell 1000, Russell 3000, or Wilshire 5000 indexes.

Style: Some ETFS track a specific investment style, namely value and growth. There also exist ETFs specialized by market capitalization (large, mid, and small cap.).

Foreign country or region (multiple countries): Funds tracking foreign-country indexes and regional indexes.

Fixed income and commodity (broad-based commodity index).

Risks in ETFs

- Market risk , trading risk and tracking error risk affect all ETFs.
- Sector risk, currency risk mad country risk may affect sector and country ETFs.

Applications of ETFs

- Implementing asset allocation
- Diversifying sector/industry allocation
- Gaining exposure to international markets
- Completing overall investment strategy
- Managing portfolio risk

Non-Traditional Funds

Sovereign Wealth, Socially Responsible, and Islamic Funds

What are Sovereign Wealth Funds

Countries have international reserves that they use for financing payments imbalances and limit exchange rate volatility so they need to be liquid

- International reserves are managed by central banks and invested in liquid assets
- If the level of reserves is greater than the need for these purposes, they can be invested in riskier and less liquid assets

Therefore, a SWF is a state owned investment fund investing globally in stocks, bonds, property, precious metals and other financial instruments

SWF is funded by foreign exchange assets

Funding of SWFs

Foreign exchange assets used for funding SWFs can include: balance of payments surpluses, official foreign currency operations, the proceeds of privatizations, fiscal surpluses, and/or receipts resulting from commodity exports

Funds have origin in:

- **Commodities** (commodity exports either taxed or owned by the government)
- **Non-commodities** (transfer of assets through official foreign exchange reserves)

Oil producing countries make up half of the SWFs (commodity based funds)

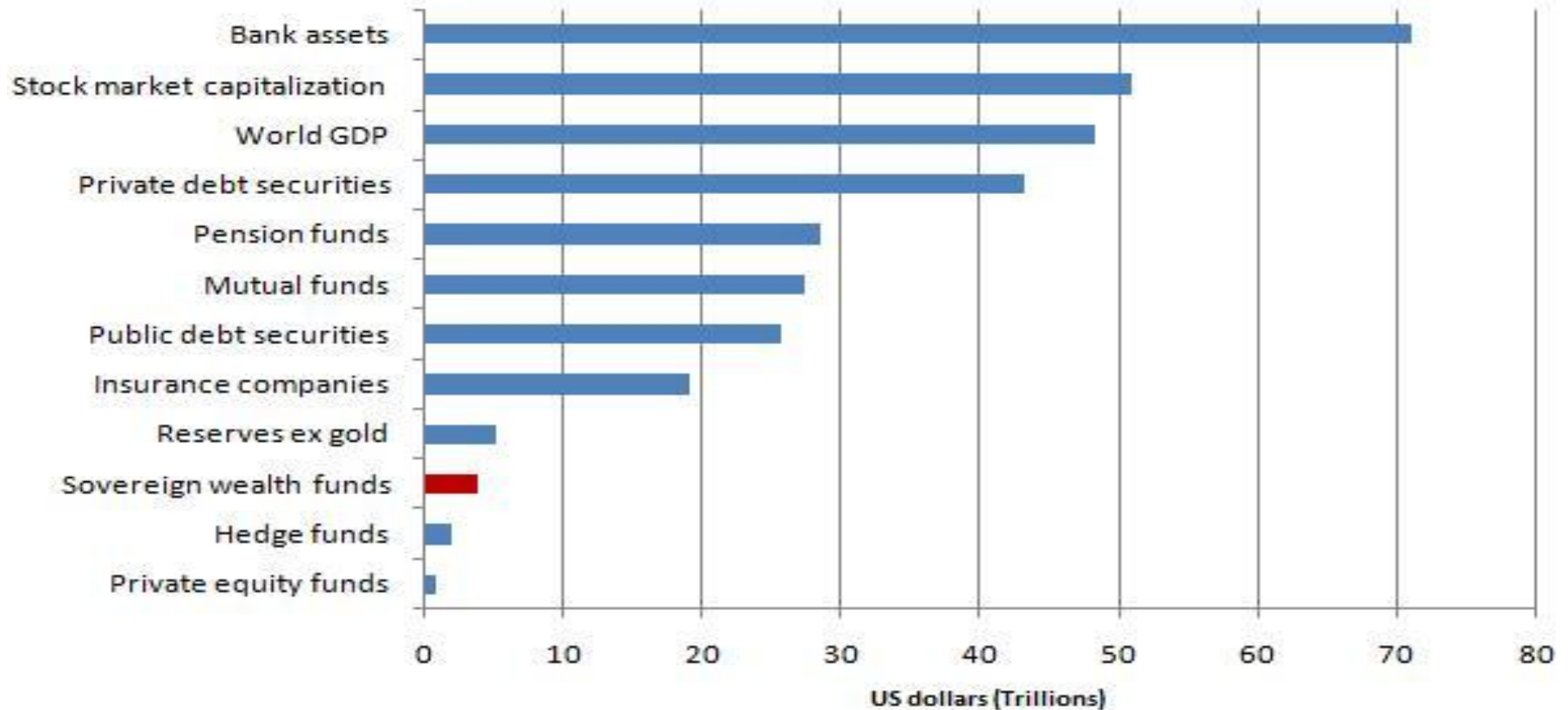
Nature and Purpose of SWFs

Each fund has their own objectives, these are just some examples:

- Diversify from non-renewable commodity exports
- Earn greater returns than on foreign exchange reserves
- Increase savings for future generations
- Fund social and economical development
- Sustainable long term capital growth for target countries
- Political strategy

SWFs vs. other major assets and investors

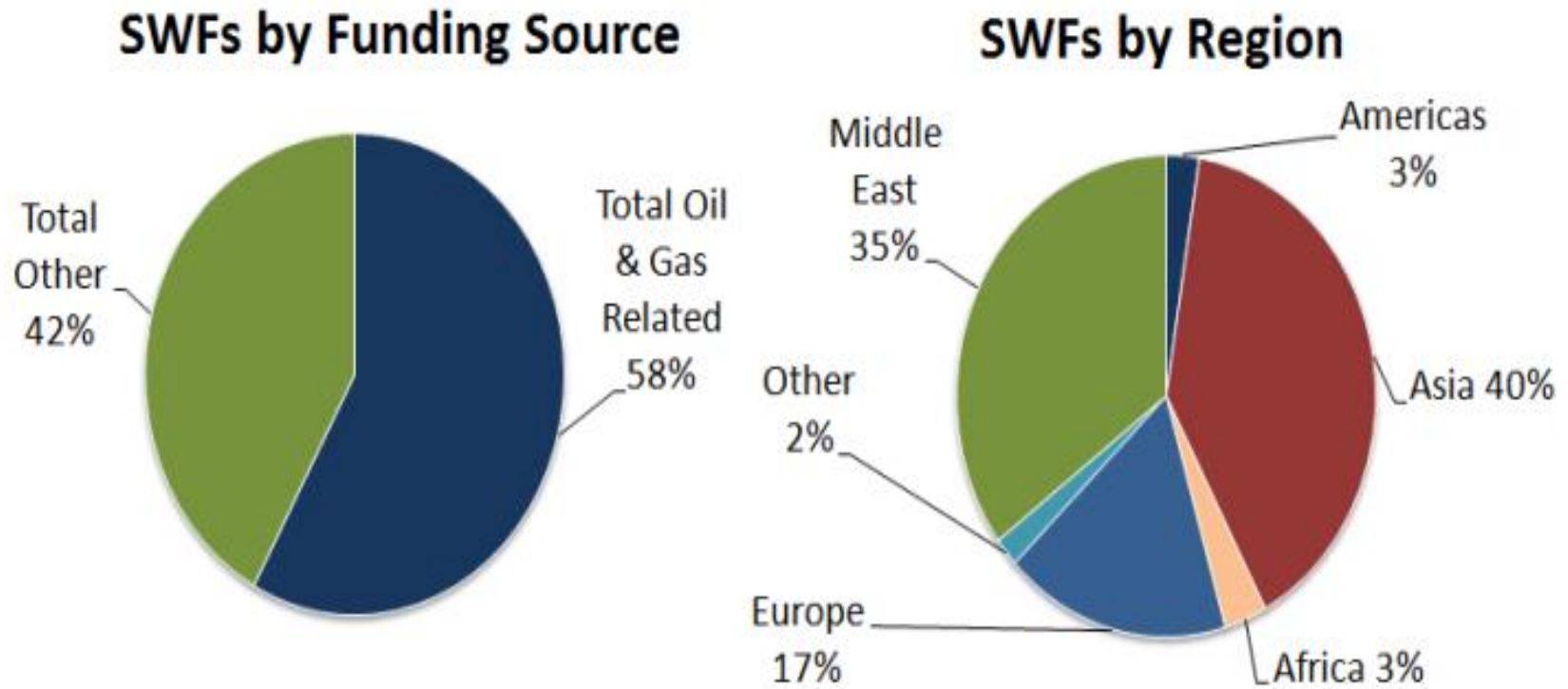
Asset Comparison - Investor Classes and Asset Classifications



Source: IFSL Maslakovic (2008), various IMF publications - Global Financial Stability Report, Sovereign Wealth Fund Institute

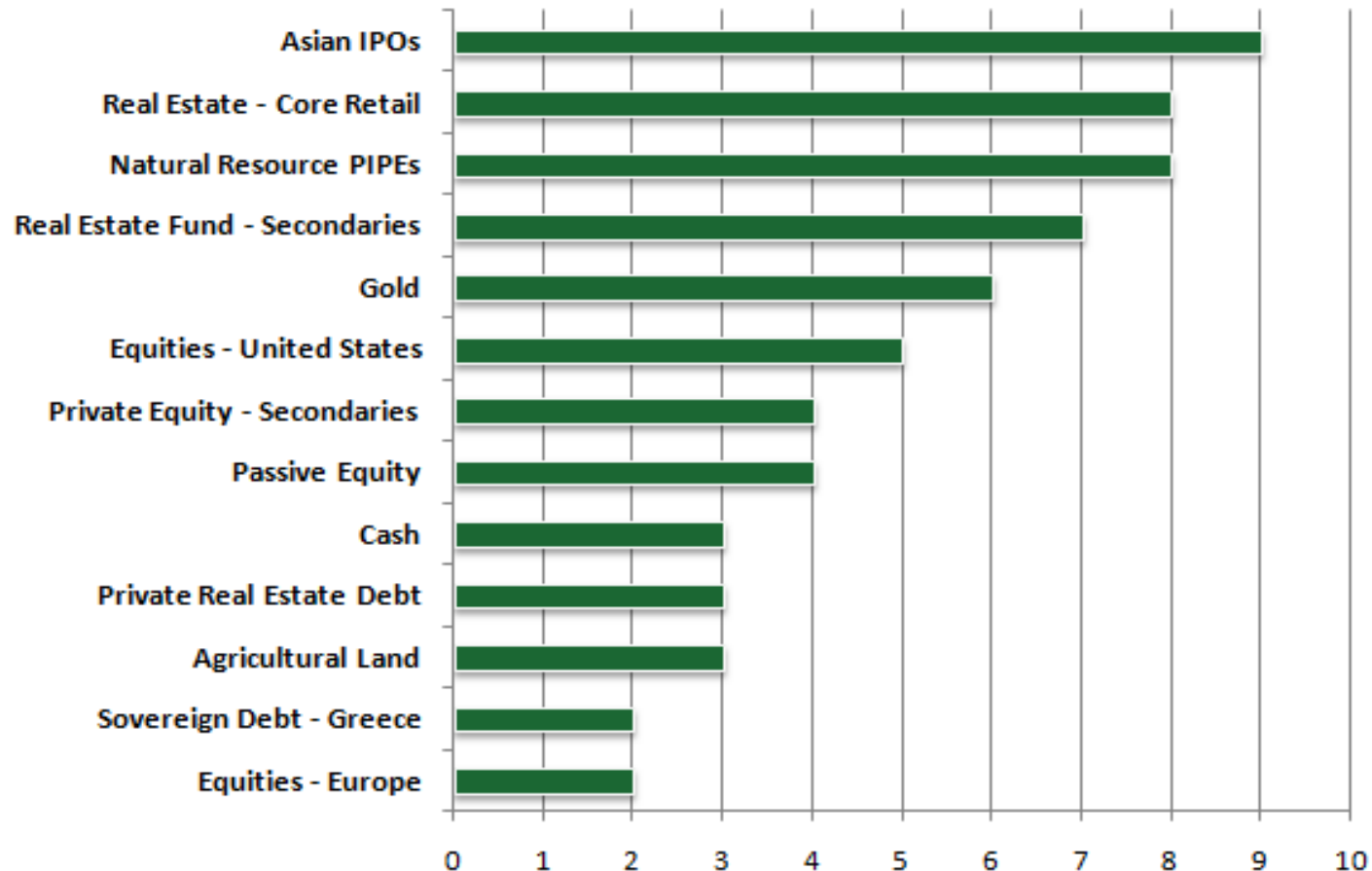
Last updated August 2008

SWFs by funding source and region



Source: SWF Institute, November 2010

SWF- Consensus demand meter



As of September 2010, **Source: SWF Institute**. Score of 10 indicates that the area/activity is attractive for majority of SWFs, while a score of 1 indicates that most SWFs will try to lower or eliminate exposure to that asset/sector

Concerns with SWFs

Concern that SWF investment strategies may be politically motivated and potentially in conflict with the national interests of the countries in which they invest.

- Concerns have increased with the size of the SWFs and with the establishment of SWFs by strategically important countries, such as China and Russia.
- The countries running the SWFs argue that their investments are motivated by return maximization, not politics.

Many SWFs do not publicly reveal their investments: **lack of transparency, regulation and accountability**

- **Chhaochharia and Laeven (2008)** find that SWFs diversify risk by investing in industries that are under-represented in the sponsoring country but that they also tend to invest in countries that share religious outlooks with their own.
- Generally Accepted Principles and Practices (GAPP) - Santiago Principles
- Linaburg Maduell SWF Transparency Index

SWFs want to be seen **as 'passive' investors**

- Singapore Investment Corporation refused a seat on Board of UBS after acquiring a large stake in that company

Linaburg-Maduell SWF Transparency Index

Point	Principles of the Linaburg-Maduell Transparency Index
1	Fund provides history including reason for creation, origins of wealth, and government ownership structure
1	Fund provides up-to-date independently audited annual reports
1	Fund provides ownership percentage of company holdings, and geographic locations of holdings
1	Fund provides total portfolio market value, returns, and management compensation
1	Fund provides guidelines in reference to ethical standards, investment policies, and enforcer of guidelines
1	Fund provides clear strategies and objectives
1	If applicable, the fund clearly identifies subsidiaries and contact information
1	If applicable, the fund identifies external managers
1	Fund manages its own web site
1	Fund provides main office location address and contact information such as telephone and fax

Developed by Carl Linaburg and Michael Maduell

Sovereign Wealth Fund Institute recommends a minimum rating of 8 in order to claim adequate transparency. Transparency ratings may change as funds release additional information

The role and future of SWFs

SWFs exist from 1950s

Asset size has grown dramatically in the last 10-15 years

- Significant role in rescuing banks during subprime crisis
- For example, Morgan Stanley received \$5 billion from the Chinese SWF China Investment Corporation; the SWF Abu Dhabi Investment Authority purchased a 4.9% equity share in Citibank; Merrill Lynch received \$5 billion from Singapore's Temasek Holdings.

State Street estimates that the growth for SWF assets will range from \$12 trillion to \$20 trillion by 2020

- Currently, SWF assets are at around \$4 trillion

What is Socially Responsible Investments (SRIs)

- Also known as sustainable, ethical, green or socially-conscious investing
- Covers diverse issues such as: GM foods, gambling, tobacco production, child labour, erosion of rain forests etc.
- Aim is to maximise both return and social good
- Popular nowadays, many funds publish ethical/green policy and aim to invest only in companies involved in activities that satisfy the fund's policy

Approaches used in SRI investing

Screening

Positive

- Investing in activities that the fund wants to support, that have a positive social impact (such as companies producing environmentally friendly products)

Negative

- Not investing in activities that the fund wants to avoid (such as companies using animal testing, tobacco production, etc.)

Social Responsible

- This is a broader, more pragmatic approach which allows investing in companies that are neither obviously harmful nor obviously beneficial (such as retail companies, hotels etc.)

Divesting

- Removing 'unethical' shares from the existing portfolio

Approaches used in SRI investing

Shareholder Activism/Advocacy

- Attempt to positively influence corporate behaviour through conversations with corporate management on issues of social, environmental or governance concern.
- Submitting and voting on AGMs of companies for proxy shareholder resolutions on corporate governance, climate change, political contributions, gender/racial discrimination, pollution, problem labour practices
 - In US, to file such a resolution, a shareholder has to have a minimum \$2000 investment in a company share for at least a year
- Creates pressure on company management, often garners media attention, and educates the public on social, environmental and labour issues
- Resolutions filed by SRI investors are aimed at improving company policies and practices, encouraging management to exercise good (ethical) practice and enhancing financial performance

Approaches used in SRI investing

Community Investing

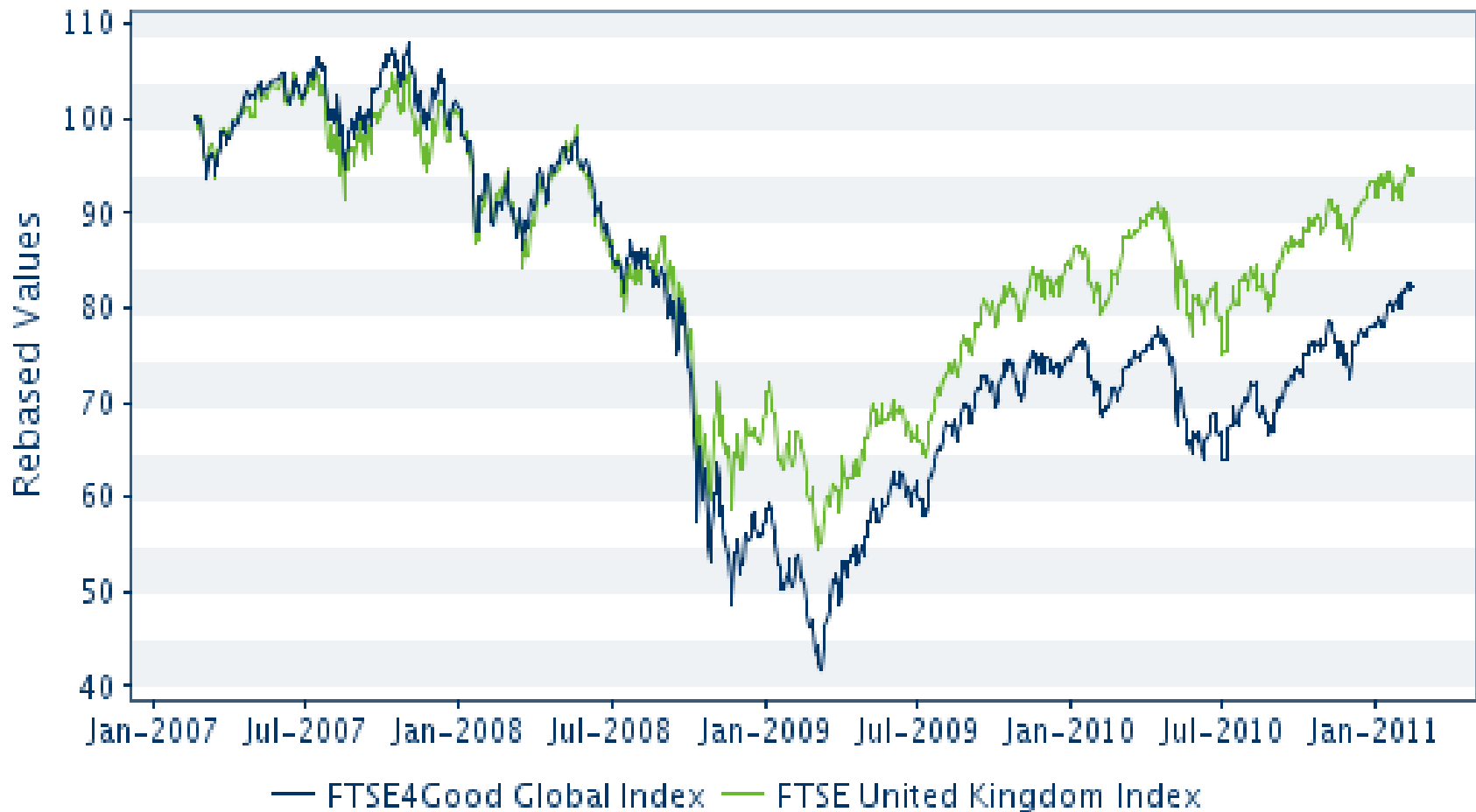
- Investing **directly** in an institution, not its stock
- Use investor capital to finance or guarantee loans to individuals and organizations that have historically been denied access to capital by traditional financial institutions. These loans are used **for housing, small business creation, and education, healthcare or personal development in the domestic country** or are made available to local financial institutions abroad to finance international community development.
 - Provides access **to credit, equity, capital, and basic banking products** that these communities would otherwise lack.
- The community investing institution typically **provides training and other types of support and expertise** to ensure the success of the loan and its returns for investors

SRI and Implications on risk and return

- Does investing in SRI lowers your returns and increases your risks?
 - SRI investing tends to be in smaller companies, as larger firms have more diverse operations and are more likely not to pass the negative screening test (e.g. travel company such as Thomson has its own airline fleet, so although travel is not unethical, flying causes pollution).
 - Diversification is often restricted as many sectors are automatically excluded due to their business (e.g. mining, tobacco, auto industry)
- Empirical evidence suggests that SRI funds have performed slightly less well than their non-SRI equivalents.

FTSE4Good vs FTSE UK Index Performance

(source: www.ftse.com)



SRI funds in the UK

Started in 1985: Friends Provident – excluded alcohol, tobacco, arms and oppressive regimes

Since then, most of major investment companies run an ethical fund

- Debate: what is 'ethical'? Some companies apply a more rigorous screening process than others

At the end of 2010, there was 47 ethical funds (52 in 2009) and £6.6 billion invested in SRIs in the UK

SRI funds represent around 1.1% of total UK Assets Under Management, proportion that hardly changed over the last 20 years.

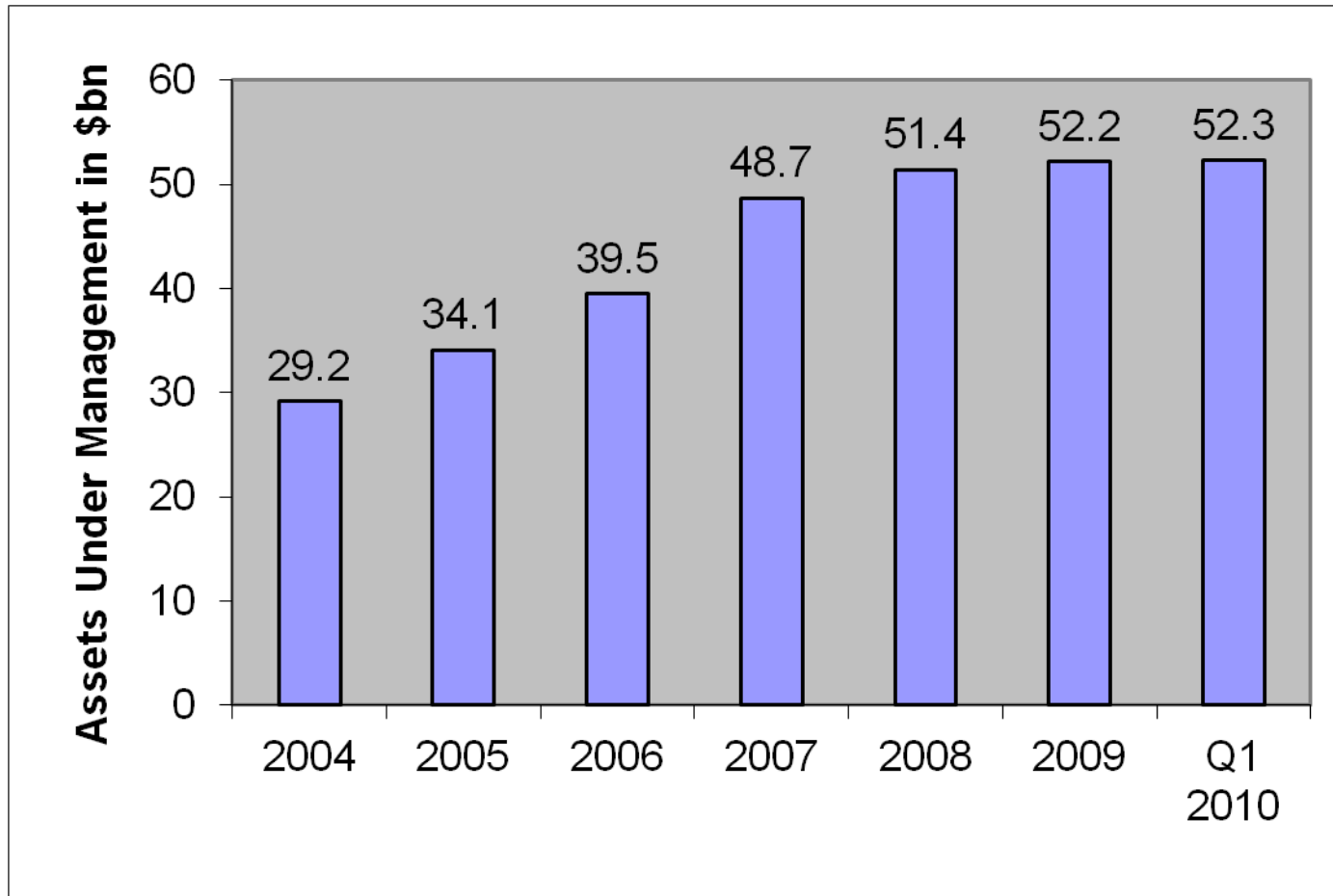
What are Islamic funds?

Islamic funds are Shariah-law compliant investments

Islamic equity funds use negative screens to identify from the possible investment universe companies that are engaged in businesses not compliant with Shariah law

- These include prohibitions interest on monetary loans, preventable ambiguity in contract essentials such as price, companies involved in gambling, alcohol, pork products, and pornography. In contrast to conventional financing, which can rely heavily on monetary loans, Islamic finance promotes trading of real assets and risk-reward sharing, encourages entrepreneurship and discourages speculative behaviour
- Some countries such as Saudi Arabia have a stricter approach to screening than some Asian countries
- The remaining companies are then subject to financial ratio screens limiting debt and interest income
- Dividends attributable to income that was not earned in accordance with Shariah principles are donated to charities

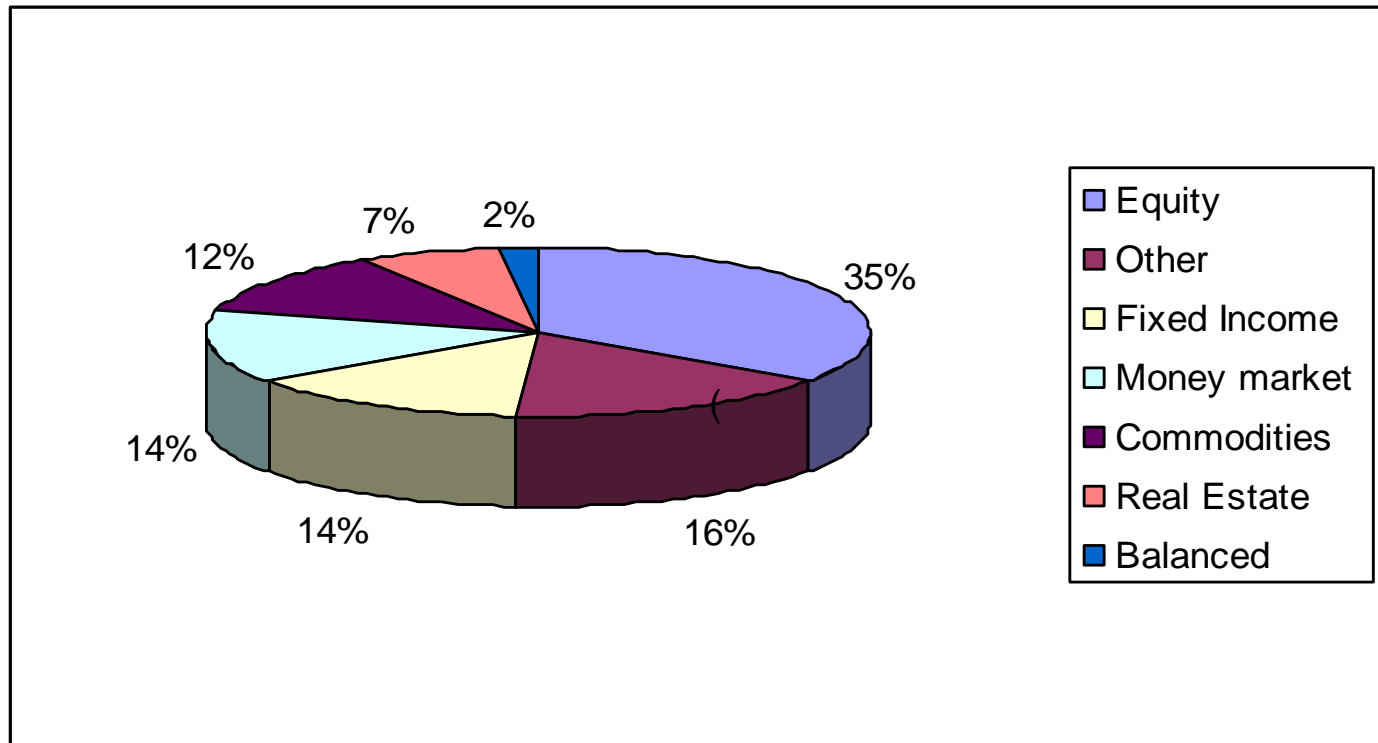
Global Islamic Fund Management Industry



Global Islamic Fund Management Industry

- Number of funds: around 750
- 29 New funds launched in 2009 (significantly less than in 2008 (78) and 2007 (173))
- In 2009, almost 70% of funds was institutional, 30% retail
- Islamic funds represent only 5.5% of total Islamic financial services industry
 - Large proportion of potential investors deposits money in banks rather than invest in Islamic fund
- Shift towards investment in alternative investments during credit crunch period

Asset Allocation in Islamic Funds as of Q1 2010

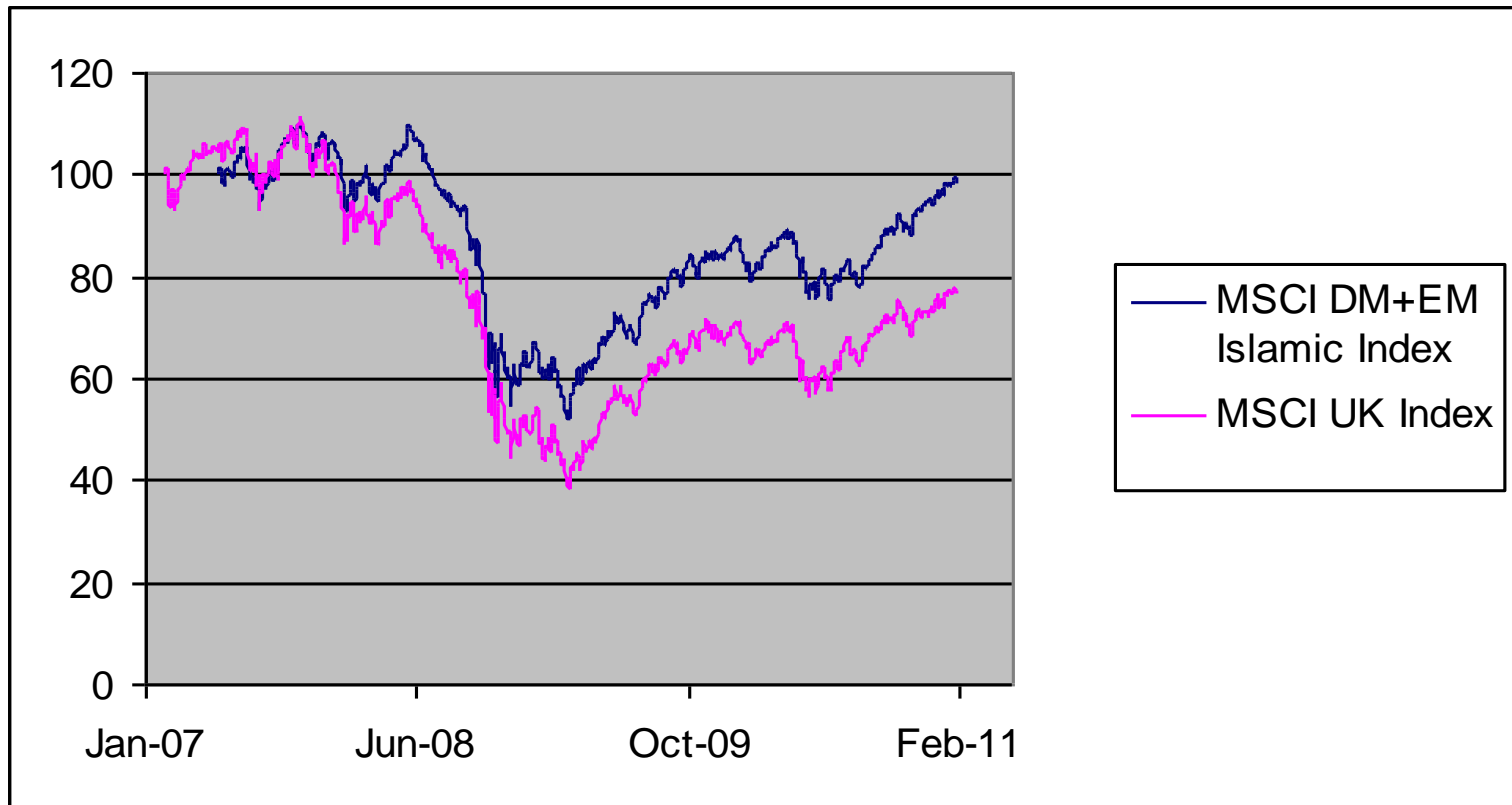


Source: Ernst & Young IFIR 2010 report

Indices

- **Dow Jones Islamic market index** (DJ pioneered Islamic investment indexing in 1999)
- **FTSE Shariah Global Equity Index Series**
 - 96 indices
 - Based on the Large and Mid Cap stocks in the FTSE Global Equity Index Series universe, screening is then undertaken by Shariah consultants, Yasaar Research Inc., against a clear set of guiding principles
 - Stocks of companies in the alcohol, entertainment, financial services, pork products, armaments and tobacco fields are excluded, as well as those where debt is more than 33 per cent of total assets
- **Other:** S&P 500 Shariah index, MSCI Islamic Index Series

MSCI Developed + Emerging Markets Islamic Index vs. MSCI UK Index performance



Performance: Islamic vs. Conventional Funds

Short track record of Islamic funds so difficult to evaluate performance

Islamic funds do not invest in financials or in conventional companies with high levels of leverage, so they are more likely to do better when financials are performing poorly and interest rates are rising and vice versa

Hoepner, Rammal and Rezec (2009):

- In Western markets, Islamic equity funds appear to underperform their equity market benchmark returns on average and are significantly exposed to small stocks
- Islamic funds from countries with a significant Muslim population neither underperform their equity market benchmarks nor experience a small cap preference
- study also finds some evidence that the pattern of investment in assets with a low debt to equity ratio may help explain the strong performance of the Islamic financial sector during economic downturns

Reading

Sovereign Wealth Fund Institute website: <http://www.swfinstitute.org>

Social Investment Forum website: <http://socialinvest.org>

Statman, M. (2000), "Socially Responsible Mutual Funds", Financial Analysts Journal, May/June 2000, Vol 56, pg. 30-41

Ferri, R. (2008) "The ETF Book- All You Need to Know About Exchange-Traded Funds" , Wiley

Hoepner, A.G.F., Rammal, H.G. and Rezec, M. (2009) "Islamic Mutual Funds' Performance and Investment Style: Evidence from 20 countries" (Available at SSRN: <http://ssrn.com/abstract=1475037>)

Ernst & Young IFIR report 2010, downloadable from: [http://www.ey.com/Publication/vwLUAssets/Islamic_Financial_Investment_Report/\\$FILE/IFIR%202010%20finalv3.pdf](http://www.ey.com/Publication/vwLUAssets/Islamic_Financial_Investment_Report/$FILE/IFIR%202010%20finalv3.pdf)

Index definition and uses

Index definition and uses

Indices are designed to provide a **concise summary** of the price movements of their constituents

Uses are:

- To provide a **record of historical price movements**, which facilitates determination of trends
- To serve as **benchmarks** in performance measurement
- To act as a basis for **index tracking funds, exchange-traded funds (ETFs) and index derivatives**
- To support **portfolio management research and asset allocation decisions**

Index weighting schemes

There are three weighting schemes:

1. Market value or capitalisation weighting

The largest stock has the largest influence on the index value

- Example: S&P 500, FTSE 100

2. Price weighting

- The highest price stock has the greatest influence on the index value
- Example: Dow Jones Industrial Average Index

3. Equal weighting

- All stocks are assigned an equal weight, these are known as unweighted indices
- Example: FT 30
- Difficult to replicate equal weights, so never used as a benchmark in index tracking

Methods of averaging an Index

- Arithmetic vs. Geometric average
- All indices are calculated as arithmetic averages nowadays except unweighted indices (e.g. FT 30)
- As the price of a stock increases, the weights adjust automatically for the consistency with the share amount
- Although the weightings change, the share amounts do not, consequently, **no rebalancing is necessary**
- Therefore, arithmetic indices can be tracked exactly by owning all stocks in the index in the proportions suggested by its weights in the index

Example

Period	Stock X (800 shares in issue)	Stock Y (100 shares in issue)	Stock Z (100 shares in issue)	Price weighted arithmetic index	Unweighted geometric index	Value weighted arithmetic index
t_0	100p	100p	100p	100	100	100
t_1	90p	105p	120p	105	104.3	94.5
t_2	100p	0p	100p	?	?	?

Example – calculations for period t_1

1. Price weighted arithmetic index:

$$\begin{aligned} & \sum P_{t_1} / \sum P_{t_0} \times \text{previous index value} \\ &= \left[\frac{(90 + 105 + 120)}{(100 + 100 + 100)} \right] \times 100 = 105 \end{aligned}$$

2. Unweighted geometric index:

$$\begin{aligned} & \sqrt[n]{\frac{\text{product of current share prices}}{\text{product of base share prices}}} \times \text{previous index value} = \\ & \sqrt[3]{\frac{90 \times 105 \times 120}{100 \times 100 \times 100}} \times 100 = 104.3 \end{aligned}$$

Example – calculations for period t_1

3. Value weighted arithmetic index:

$$\frac{\sum P_{t_1} q_{t_1}}{\sum P_{t_0} q_{t_0}} \times \text{previous index value} =$$
$$\frac{90 \times 800 + 105 \times 100 + 120 \times 100}{100 \times 800 + 100 \times 100 + 100 \times 100} \times 100 = 94.5$$

Task: Calculate the value of the index in period t_2 using all three methods

Comparison of index averaging methods: concluding comments

1. Price weighted arithmetic indices

- Ignore the number of shares in issue and **favour highly priced shares**
- Not representative of the real world portfolio – limited use as performance measurement benchmarks

2. Unweighted geometric indices

- It always **understates the price rises and overstates the price falls** of constituents relative to that of a price weighted index
- It collapses if the price of an index constituent is zero

Comparison of index averaging methods: concluding comments

3. Value weighted arithmetic indices

- More complex calculations and significant data requirements
- Replicate the precise effect that changing share values would have on a portfolio comprising the same underlying index constituents weighted in accordance with their relative market capitalisations
- They have a **broad coverage** of the market being represented
- Therefore, **they are the most suitable indices to assess market trends**, act as performance benchmarks and provide a basis for index tracking

Free flotation

- The value of market value weighted index as a performance measurement benchmark can be compromised if those index constituents make significantly less than 100% of their equity available to the market are accorded a full market value index weighting
- Restricted supply of the stock prevents a portfolio manager from holding a full weighting of the stock within their portfolio
- Price of the stock will be distorted given the need of index tracking funds to hold the stock in accordance with their index weighting
- Hence, free floating rules were introduced

Dealing with the free float

FTSE (source: www.ftse.com)

	Ineligible
• Less than or equal to 5%	Actual
• Greater than 5% but less or equal to 15%	20%
• Greater than 15% but less or equal to 20%	30%
• Greater than 20% but less or equal to 30%	40%
• Greater than 30% but less or equal to 40%	50%
• Greater than 40% but less or equal to 50%	75%
• Greater than 50% but less or equal to 75%	100%
• Greater than 75%	

MSCI

Usually stocks with free-float under 25% are excluded
(Lower cut-off for emerging markets)

The main equity indices

FTSE Index	Constituents	% of FTSE All Share
FTSE 100	100 largest companies	80%
FTSE 250	The next 250 largest companies	15%
FTSE 350	FTSE100+ FTSE250	95%
FTSE SmallCap	FTSE All Share – FTSE 350	5%
FTSE All Share	FTSE 350+ FTSE SmallCap	100%
FTSE Fledgling	Those that do not meet the size criteria for FTSE All Share	1.5%

The main equity indices

Examples of other Indices:

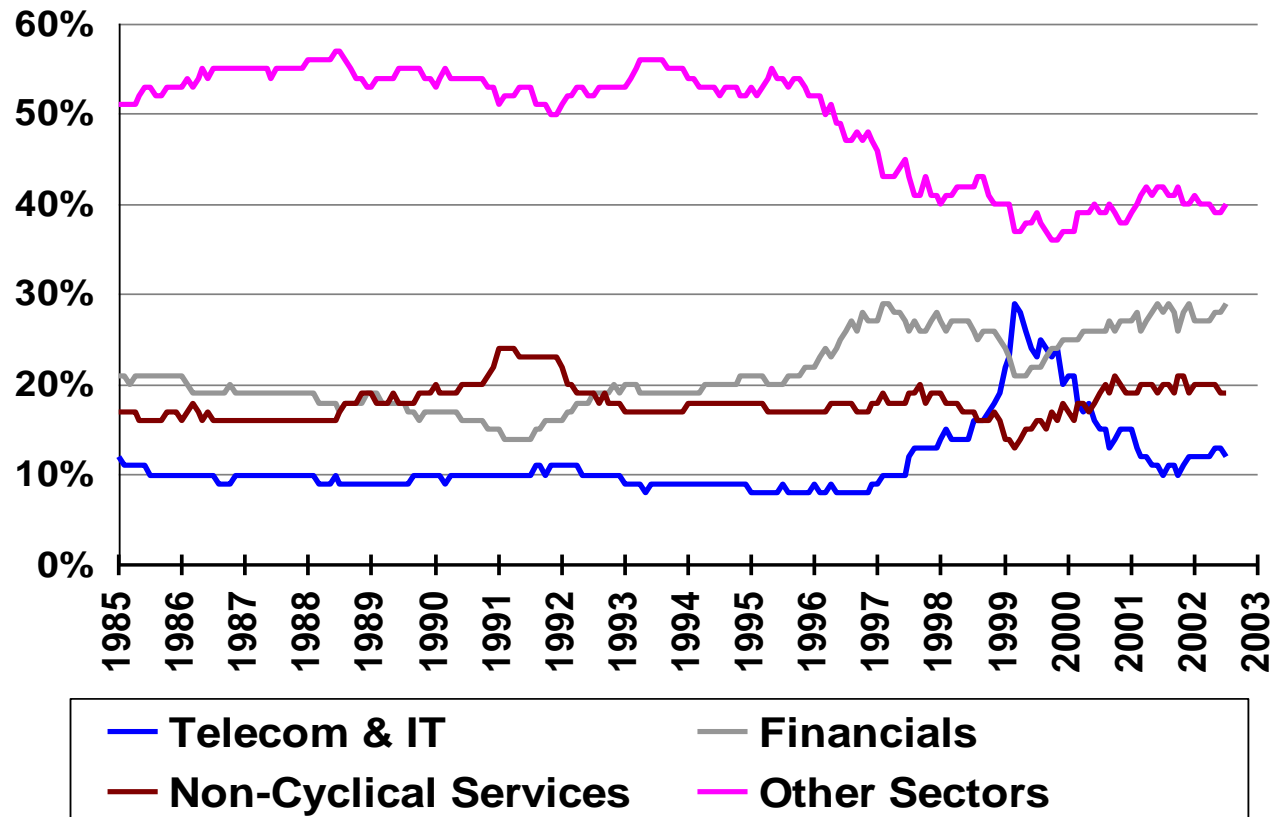
- **FTSE All World Index** (2700 stocks, 49 countries, 90-95% capitalisation of each of the markets, in US\$)
- **MSCI World Index** (1700 stocks, 23 countries, 85% capitalisation of each market, in US\$ and local currency)
- **S&P 500** (500 most widely held NYSE stocks, 80% of NYSE market capitalisation)
- **Nikkei Indices** (Nikkei 225 – **price weighted index** of 225 Japanese companies representative of the market; more suitable is Nikkei 300 which is value weighted)
- There are around 3000 indices globally available

Fundamental Weighted Indices

- What are Fundamental Weighted Indices?
 - Selects, ranks and weights companies, not by market capitalisation, but by financial data points, such as sales, cash flow, book value, or dividend yield.
- How do they work?
 - Stocks are reviewed using fundamental factors *not* the stock price/mkt cap
 - The constituents are then weighted in the index according to the factors themselves *not* the mkt cap

Why the move away from market cap weighted?

Short term share prices **are volatile** and consequently mislead...causing misdirected capital



The FTSE GWA (Global Wealth Allocation) Index Series

- The **FTSE GWA Index Series** therefore constructs portfolios without referring to share prices – stocks should be weighted according to their proven ability to create wealth
- Wealth is measured by three fundamentals – **net income, cash flow & book value**
- The review process holds every company in the index, but **weights it according to wealth**

FTSE GWA UK Index Top Five

Overweights/Underweights in 2008

Overweight

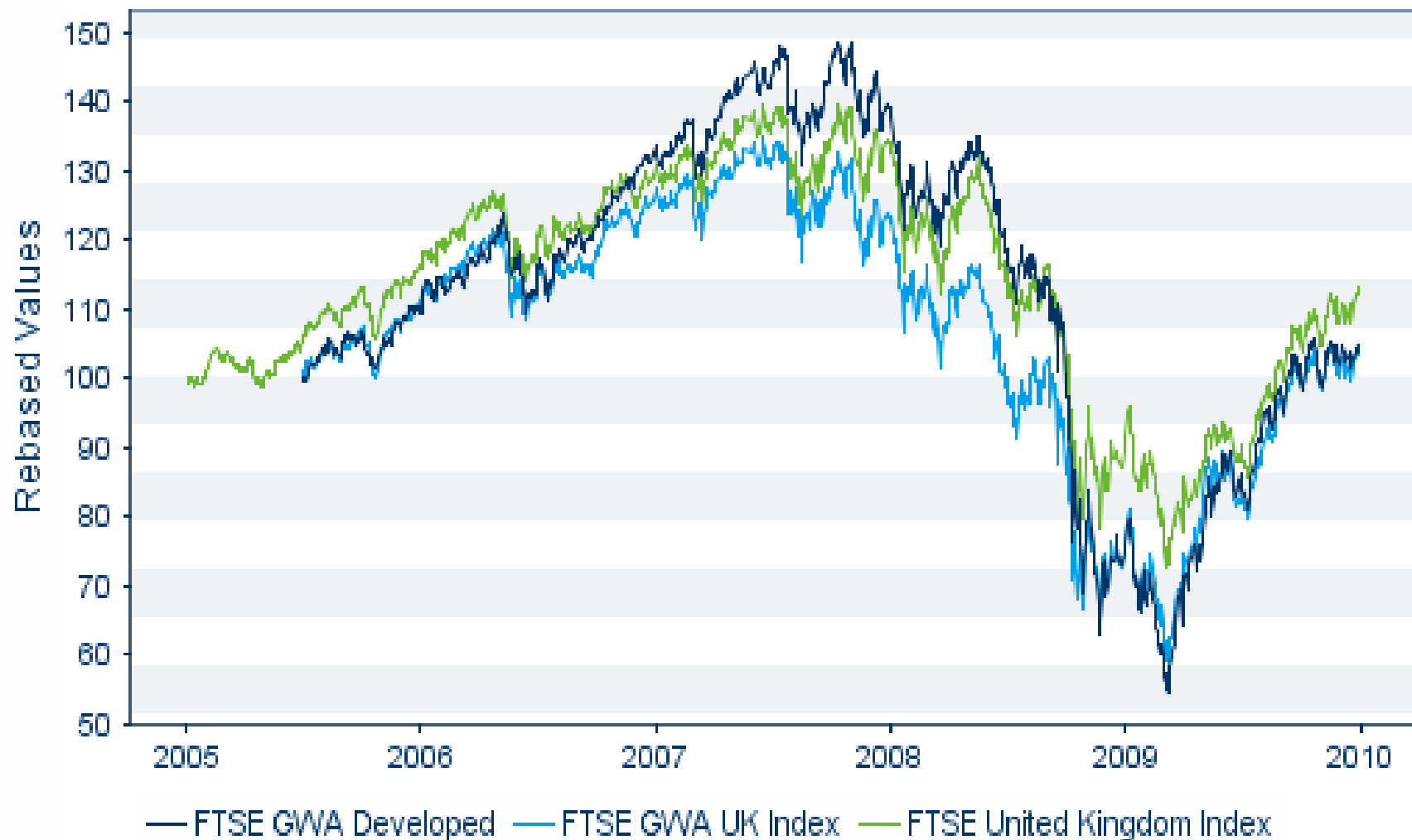
Company	Sector	Wgt in FTSE GWA UK Index	Wgt in FTSE All-Share Index	Difference
Vodafone Group	Mobile Telecommunications	7.02%	5.68%	1.34%
Royal Bank Of Scotland Group	Banks	4.36%	3.09%	1.27%
HBOS	Banks	3.03%	2.01%	1.03%
Barclays	Banks	3.13%	2.24%	0.89%
British Energy Group	Electricity	0.91%	0.16%	0.75%

Underweight

Company	Sector	Wgt in FTSE GWA UK Index	Wgt in FTSE All-Share Index	Difference
GlaxoSmithKline	Pharmaceuticals & Biotechnology	2.97%	5.14%	-2.17%
AstraZeneca	Pharmaceuticals & Biotechnology	1.59%	2.56%	-0.97%
HSBC Hldgs	Banks	5.72%	6.25%	-0.53%
Diageo	Beverages	1.00%	1.47%	-0.47%
British American Tobacco	Tobacco	0.74%	1.15%	-0.41%

FTSE GWA UK Index vs. the FTSE All-Share Index vs. FTSE GWA

Developed markets index; source: www.ftse.com



Definition of indexing

Index fund: portfolio of securities that replicates the returns of a selected index

Process of investing in such a portfolio: **indexing**

Index funds exist across asset classes but are predominant in equities – **hence equity indexing**

Achievement of optimal diversification

This strategy is response to both theoretical aspirations and practical needs

- responds to the concept of the **efficient market hypothesis and CAPM**
- **maximises** control over investment outcomes and **minimises** costs of investment
- no outperformance but assurance of no underperformance

Development of index funds

- In 1970 Wells Fargo Bank introduced the Stagecoach Fund
 - tracking NYSE Composite Index
 - lack of interest, so discontinued
 - published research helped in understanding how difficult it is to outperform the market through active strategies
- In 1973, Wells Fargo introduced the fund to track more widely followed **S&P 500 Index**
- J. Bogle introduced one of the most popular index tracking funds **Vanguard 500 Index Fund in 1976** which also tracks S&P 500
- Increased popularity in 1990s
- In the US, 20-30% of funds are managed passively nowadays
- Three largest pension fund managers in the UK £800bn pension fund market are index-tracking specialists

Measuring Tracking Error (TE)

- Index tracking objective:
 - minimise the cost while retaining the replicating portfolio's ability to track the benchmark index
- Holding fewer stocks than in the index generates tracking error
- Tracking error represents the risk that the replicating portfolio will perform differently to benchmark
- In statistical terms, there are two commonly used definitions of ex-post tracking error:
 - Tracking error as Residual risk and
 - Tracking error as Performance volatility

TE as Residual Risk

- Market model suggests that:

$$R_p = \alpha + \beta R_b + \varepsilon$$

where R_p is return of the replicating portfolio, R_b is return of the benchmark portfolio and ε is residual risk

- TE is then defined as:

$$TE = \text{variance}(\varepsilon) = \text{variance}(p) \times (1 - \text{correlation}(R_p, R_b)^2)$$

- TE is model dependant in this definition (model risk!)
- Residuals and Variance of residuals can easily be obtained in excel and more sophisticated statistical packages

TE as Performance Volatility

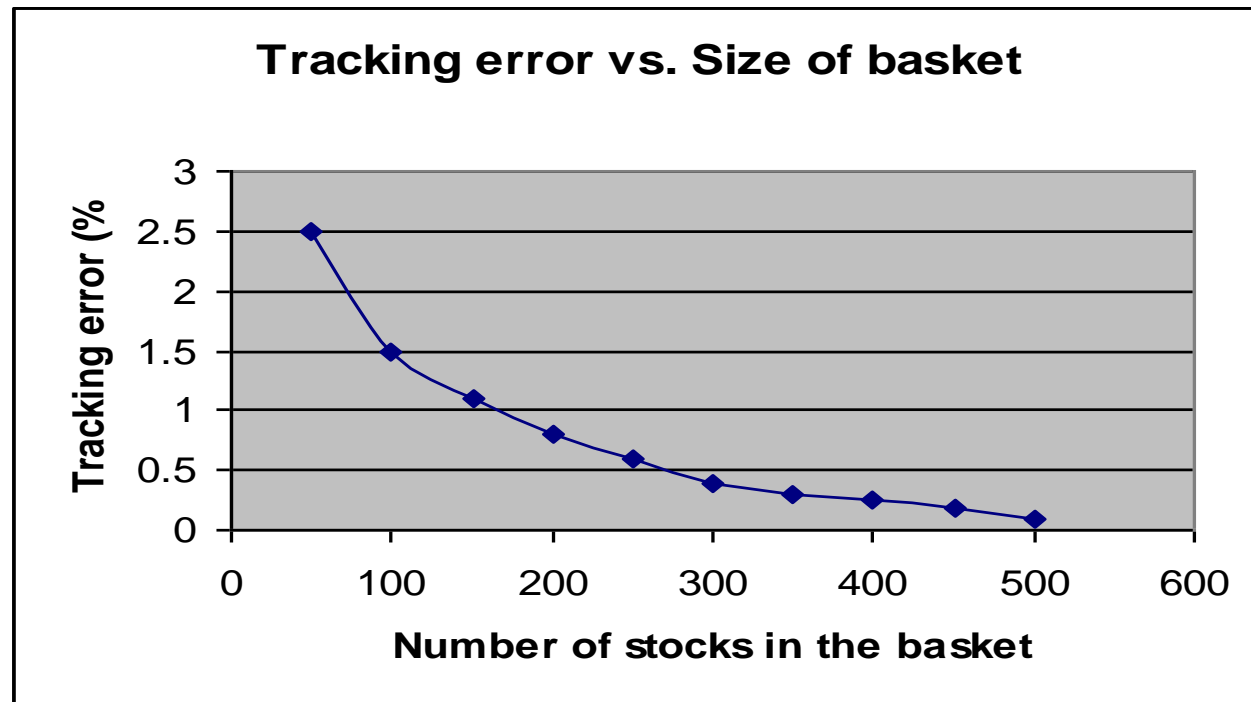
- TE is defined as the standard deviation of the difference in expected returns between the replicating/basket portfolio and the benchmark portfolio:

$$TE = \text{Standard Deviation}(R_p - R_b)$$

- TE depends on benchmark volatility which cannot be controlled by investment manager
- For all portfolio betas not equal to 1, the volatility of performance is larger than residual risk, so TE will be different

Relationship between TE and size of the replicating/basket portfolio

Hypothetical replication of a benchmark that has 500 stocks will result in the following tracking errors for different sizes of the basket portfolio:



Reasons for existence of tracking errors of perfect baskets

Example shows that even if we have perfect replication of benchmark, TE is present. The reasons for this are:

1. Odd-lot purchases of stocks vs. round-lots

- **Index funds are comprised of round lots:** the number of shares of each stock in the basket is rounded off to the nearest hundred from the exact number of shares indicated by basket building model. This might affect the ability of smaller baskets to track the index

2. Changing composition of the benchmark index

- **weights of stocks** in the index are changing
 - hold all the stocks as in the index and the **weights will be self-adjusting**
 - if fewer stocks held, **rebalancing is needed**
- **list of stocks** is changing

Tracking error interpretation

- TE statistic has some desirable properties:

A fund with a TE of 2% p.a. is expected to have 2/3 of its annual returns fall within -2% and +2% of the benchmark and 95% of its returns within -4% and +4% of the benchmark

- Is 2% TE small or large?

This depends on the volatility of the underlying benchmark, the type of benchmark and the method used to construct the basket/replicating portfolio

Empirical evidence on Tracking Errors

- Larsen & Resnick (1998)
- Data: US, 200 high capitalisation (HC) and 200 low capitalisation (LC) stocks used to create value weighted and equally weighted indices
- Period 1981-1997
- Main conclusions:
 - Indexed portfolios from HC indexes have less tracking error and lower standard deviation of tracking error than indexed portfolios of LC indexes
 - Value weighted portfolio can be indexed more accurately than equally weighted ones
 - The more stocks there is in a tracking basket portfolio, the smaller the tracking error

Empirical evidence on Tracking Errors- results of the study

TRACKING ERROR(TE)/STANDARD DEV OF TE FOR ALL INDEXED PORTFOLIOS							
No of		EW				VW	
stocks	Stratified		Non-stratified		Stratified		Non-stratified
			HC PORTFOLIOS				
10	1.60/1.29		1.89/1.38		1.50/1.19		1.53/1.13
20	1.40/1.11		1.47/1.08		1.37/1.01		1.22/0.95
40	1.14/0.79		1.27/0.91		1.02/0.74		1.06/0.80
80	0.78/0.64		0.82/0.65		0.75/0.57		0.71/0.56
			LC PORTFOLIOS				
10	2.50/2.07		2.59/1.85		2.43/1.90		2.42/1.75
20	1.84/1.38		1.75/1.36		1.79/1.19		1.68/1.27
40	1.51/1.24		1.44/1.04		1.42/1.10		1.43/0.99
80	1.08/0.84		1.08/0.81		1.04/0.89		1.08/0.81

Difficulties in trading the basket portfolio

- Difficult situation arises when stocks are deleted from or added to the benchmark index
- Benchmark is calculated as though the changes were made at closing prices
- However, changes are not publicly announced until the market has already closed
- Therefore, the index fund managers must trade the following day at prevailing prices which may be less advantageous than the previous day's closing price

Commodity Markets and Commodity Derivatives

Investing in commodities complements the investment opportunities offered by shares of corporations that extensively use those commodities in their production process.

Average investors usually prefer commodity derivatives (financial instruments that derive their value from the value of the underlying commodity).

Futures contracts: standardized, exchange-traded agreement.

Bonds indexed on some commodity price.

Stocks of companies producing the commodity.

Commodity Futures

Futures contracts are the easiest and cheapest way to invest in commodities

Three major categories:

Agricultural products, including fibers (wool, cotton), grains (wheat, corn, soybeans), food (coffee, cocoa, orange juice), and livestock (cattle, hogs, pork bellies).

Energy, including crude oil, heating oil and natural gas.

Metals, such as copper, aluminum, gold, silver and platinum.

Motivation and Investment Vehicles

Motivation ranges from the **diversification benefits** achievable by a **passive investor** to the **speculative profits** sought by an **active investor**.

Collateralized Futures

A collateralized position in futures is a portfolio in which an investor takes a long position in futures for a given amount of underlying value and simultaneously invests the same amount in government securities, such as Treasury bills.

Example:

Futures price currently is \$100. If \$100 million is added to the fund, the manager will take a long position in the futures contract for \$100 million of underlying value and simultaneously buy \$100 million worth of Treasury bills (part of this will be deposit as margin).

If futures price drop to \$95: Have to sell \$5 million of the treasury bills to cover loss (marked to market).

If futures price rises to \$105: will invest additional \$5 million in Treasury Bills.

The total return on the collateralized futures position comes from the changes in futures price and the interest income on the Treasury Bonds⁹⁸

Commodity-Linked Securities

Two major types of commodity linked securities are bonds and equity.

Indexation clause is explicit for commodity-linked bonds but implicit for equity.

Commodity-linked bonds

Inflation-indexed gilts became popular in the United Kingdom during the 1980s. The capital and coupons of these bonds are indexed to British retail prices.

US Treasury (1997) started to offer Inflation-Indexed Securities. The first was a 10-year bond issued with a real yield of 3.45 percent (the principal is adjusted for changes in the consumer price index (CPI) on each semiannual coupon payment date.

Commodity-linked Equity

The value of some companies is directly affected by commodity prices. Clearly the case with so-called energy companies.

Example: companies in oil and gas industries are affected by the evolution of oil prices.

The link between commodity prices and stock prices is more evident for small undiversified companies that specialize in one type of activity, for example, oil and gas exploration and production.

Commodity Basics

Commodity strategies require **investing cash collateral** to support derivatives exposure.

The principal derivatives are forwards and futures contracts.

Relationship exists between the **spot (current) price** of the commodity and the **expected spot price** of the commodity at the maturity date of the derivative contract.

If future price is above spot price.....**CONTANGO**

If future price is below the spot price...**BACKWARDATION**

Advantages

- Commodities can help diversify a portfolio of financial assets
- Low correlation to traditional asset classes
- Adding commodities to a portfolio can help improve risk-adjusted returns
- Commodities offer inflation protection

Contango

Is the market condition where the price of a forward or futures contract is trading above the expected spot price at contract maturity.

Futures prices are higher than the spot price because market participants believe the spot price will be higher in the future.

Contango often occurs when a commodity's price is high and volatile, and is the case currently with oil.

The amount by which the relative price of the futures can rise is limited, however, **by a classic arbitrage trade**.

- If the futures price **goes too high**, an investor **can buy** the commodity at the spot price, **store it, insure it, and sell it forward**.

This “carry trade” is a pure financing activity and theoretically limits the futures price to a level called “full carry”

A commodity like gold can be easily borrowed in large size, and the borrowing cost of gold is usually below dollar cash interest rates

Hence, this arbitrage means that gold will often be at full carry in the forward market. But different commodities have unique features that affects this relationship.

For most commodities, investors buys a futures contract with a set maturity date.

When the futures is purchased, the investor deposits cash as collateral for the contract with the exchange (generating additional return called “collateral yield”).

But since the investor wishes to maintain long-buy commodity exposure, when the contract matures, it is closed out and another one is bought with a longer maturity.

For most commodities it would not be practical to actually hold the physical commodity.

Backwardation

When forward price or futures price of a commodity is below its spot price.

Used to be common in the oil market. When the price of oil was low, producers wanted to hedge their risk of further price declines. Lower prices threatened their ability to stay in business.

Backwardation actually used to be the norm in most commodities because a potential price fall had a proportionally bigger impact on the few large producers than on the many small consumers.

- When markets are low and volatile, producers hedge and the market enters backwardation.
- When markets are high and volatile, consumers hedge. At the same time, investors are attempting to hedge inflation risk. The combination of these two actions creates contango.

Contrasting Equity Markets to Commodity Markets

In stock markets, a vast literature has documented the fact that periods with high transacted volumes exhibit high volatilities (both being in general related to news arrival). Higher volatilities are observed during downward moves.

“Leverage Effect”

In contrast, in commodity markets, tight supply and low liquidity are the primary reasons for high volatilities (and peaks in prices): obviously true for electricity, but also for natural gas and oil

“Reverse Leverage Effect”

Returns and Correlations of Commodity Indexes

August 1998 - December 2006

	GSCI	DJ-AIG	RICI
Annualized Return	14.23%	7.93%	16.99%
Volatility	22.54%	14.89%	16.97%
Annualized Sharpe Ratio	0.45	0.26	0.77

Correlations	GSCI	DJ-AIG	RICI
S&P500	0.01	0.13	0.13
Credit Suisse Tremont Hedge Fund	0.21	0.26	0.21
JP Morgan Government Bond Fund	0.04	0.02	0.04

GSCI: Goldman Sachs Commodity Index

DF-AIG: Dow Jones - AIG Commodity Index

RICI: Rogers International Commodity Index

Many Major Indexes

Goldman Sachs Commodity Index
Dow Jones – AIG Commodity Index
Deutsche bank Liquid Commodity Index
Rogers International Commodity Index
S&P Commodity Index
Reuters CRB Commodity Index

Index investing has long been popular in the securities markets. Now it is bringing a new source of liquidity to commodity futures contracts and allows pension funds and other institutional investors to add commodity exposure to their portfolio.

Commodities in a Portfolio

Long term commodity investment offers several positives to a portfolio.

Reduction in portfolio risk, return-timing diversification, inflation shock and liability matching are some important reasons to add commodities to a portfolio.

Portfolio Risk

Portfolio	Equities	Bonds	GSCI	DJ-AIG	Return	Volatility	Worst 12 months
1	60%	40%	---	---	11.3%	8.6%	-12.3%
2	55%	40%	5%	---	11.3%	8.0%	-11.7%
3	50%	40%	10%	---	11.2%	7.5%	-11.2%
4	55%	40%	---	5%	11.0%	8.0%	-11.2%
5	50%	40%	---	10%	10.6%	7.4%	-10.1%

Return Timing Diversification

Long-term returns of any asset class are concentrated in brief periods of time.

If the past 20 years of equity returns were sorted from the highest-returning months to the lowest-returning months and then 7 percent of the highest-returning months were removed, the result would be a returns equal to bonds. If 10 percent of the highest-returning months were removed, equities would have zero return.

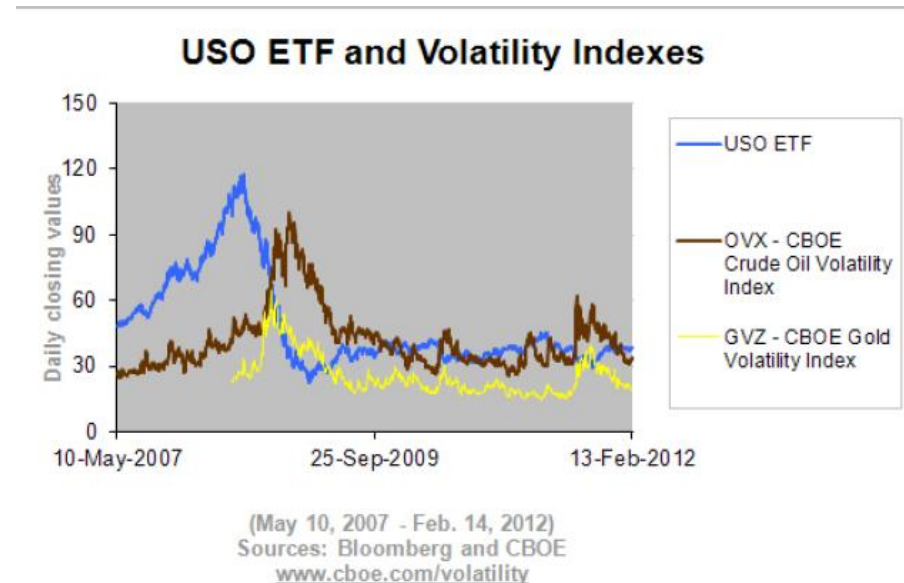
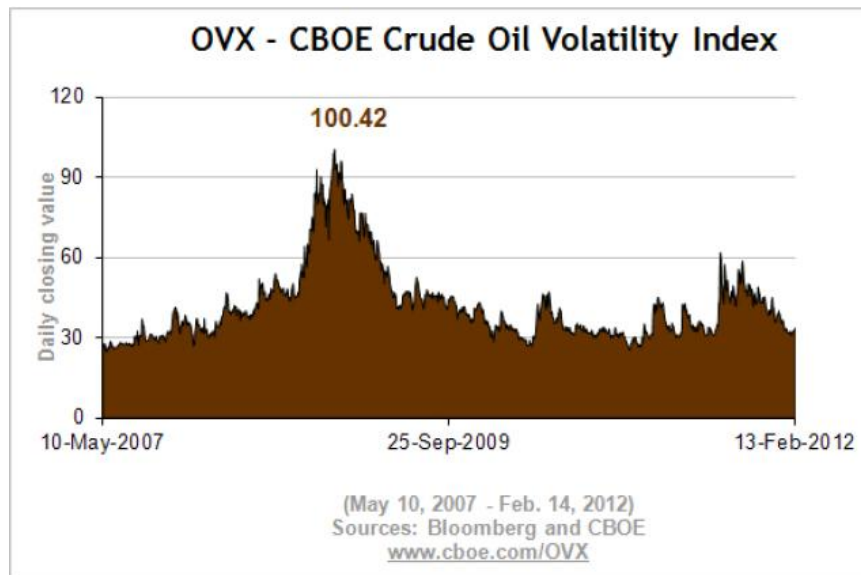
Clearly, the commodity markets are a natural complement to traditional markets and provide the element of time diversification of returns that is so beneficial in controlling portfolio risk.

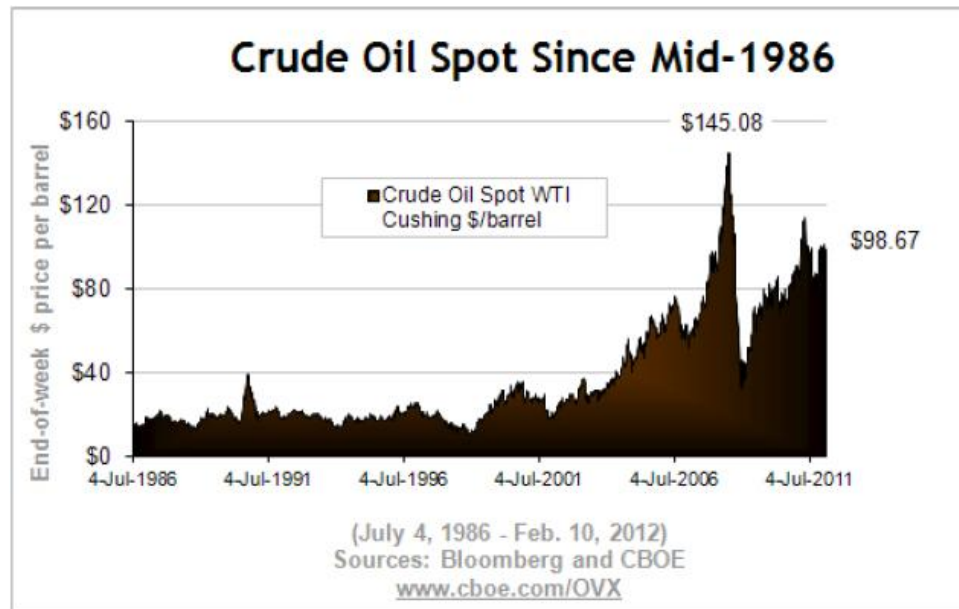
The price of commodities react much more to current supply-demand conditions than do the prices of equities and bonds, which response more closely to the longer-term outlook.

Commodities and Volatility

CBOE began calculating two commodity volatility indexes in 2008:

- CBOE Crude Oil Volatility Index (OVX) based on United States Oil Fund, LP (USO) options;
- CBOE Gold Volatility Index (GVZ) based on the, SPDR Gold Shares (GLD) options





1 year



Credit Derivatives

Derivatives: Financial instruments designed efficiently to transfer some form of risk between two parties.

In the **Fixed-Income market**, derivatives include **interest rate derivatives** (which transfer interest rate risk) and **credit derivatives** (which transfer credit risk).

Credit derivatives: Portfolio manager can either acquire or reduce credit risk exposure.

Credit derivatives can be classified as follows:

- Total return swaps
- Credit default products
- Credit spread option

Market participants

End-buyers of protection, end-sellers of protection and Intermediaries

End-buyers of protection: entities that seek to hedge credit risk taken in other parts of their business. Predominate entity **commercial banks** for their loan portfolio. However, there are also **insurance companies**, **pension funds** and **mutual funds** who seek to diversify their current portfolio and can do so more efficiently with credit derivatives.

End-sellers of protection: entities that seek to diversify their current portfolio and can do so more efficiently with credit derivatives. Entity that provides protection in seeking exposure to a specific credit or a basket of credits.

Intermediaries: include investment arms of commercial banks. **Key role:** provide liquidity to end-users. They trade by their own account looking for arbitrage opportunities and other profitable opportunities.

Why Credit Risk is Important?

A fixed-income instrument represents a basket of risks:

There is: a) interest rate risk (as measured by duration and convexity), b) call risk, and c) credit risk.

Credit risk, includes the risk of defaults, downgrades and widening credit spreads.

The total return from a fixed-income instrument is the compensation for assuming all of these risks.

Depending upon the rating on the underlying debt instrument, the return from credit risk can be a significant part of a bond's total return.

Types of Credit Risk

Default Risk

Risk that the issuer default on its obligations.

Most investors consider the sovereign debt of the G7 countries to be default free.

Sovereign debt default risk is associated mainly with emerging economies.

Credit derivatives therefore appeal to portfolio managers who invest in corporate bonds – particularly, high-yield corporate bonds – and sovereign bonds.

Credit Risk Spread

Risk that the interest rate spread for a risky bond over a riskless bond will increase after the risky bond has been purchased.

Example: in the USA, US Treasury securities are generally considered to be without credit risk (default free). Therefore, corporate bonds, agency debentures and the debt of foreign governments are typically priced at a spread to comparable US treasury securities.

October 1997, rapid decline in Asian market spilled over into the US stock markets, causing a significant decline in financial stocks.

Flight to safety of investment capital resulted in a significant increase in credit spreads of corporate bonds to US Treasuries.

Example

June, 30, 1997, corporate bonds rated BB by Standard & Poor's were trading at an average spread over US Treasuries of 215 basis points.

October, 31, 1997, the spread has increased to 319 basis points.

For a \$1000 market value BB-rated corporate bond with a duration of 5, resulted in a loss of value of about \$52.50 per bond.

Spread duration: approximate percentage change in the bond's price for a 100 basis point increase in the credit spread (holding the treasury rate constant).

A spread duration of 3 means that for a 100 basis point increase in the credit spread, the bond's price will decline approximately 3%.

Downgrade Risk

Occurs when a nationally recognized statistical rating organization such as Standard & Poor's, Moody's Investor Services or Fitch ratings **reduces its outstanding credit rating** for an issuer based on an evaluation of that issuer's **current earning power** versus its **capacity to pay its fixed income obligations as they become due**.

Reasons for selling Credit Protection

Market participant can sell contingent or insurance-type protection. Can be due he believes that **credit performance** will be such that it will be unnecessary to make an insurance payment to a counterparty (party buying credit protection), or, he may want to take the opposite view of a **credit protection buyer** and in fact benefit from an improvement in a credit.

Why are portfolio managers willing to assume credit risk?

- 1) **Credit upgrades versus credit downgrades.** One factor affecting credit rating upgrades is a strong stock market which encourages public offerings of stock by credit risky companies. Often, large portion of these equity financings are used to reduce outstanding costly debt, resulting in improved balance sheets and credit ratings for the issuer.
- 2) **Expectation of other credit events which have a positive effect on credit risky bonds.** Ex. Mergers and acquisitions, have been historically a frequent occurrence in the high-yield corporate bond market. Even though a credit risky issuer may have a low debt rating it may have valuable technology worth acquiring.
- 3) **With a growing economy,** banks may be willing to provide term loans to high-yield companies at more attractive rates than the bond market. **Advantageous to redeem their high-yield bonds and replace with lower cost term loan.** The **resulting premium** for redemption of high-yield bonds is a positive credit event which **improve portfolio returns.**

Total Return Swap

Swap in which one party makes **periodic floating payments** to a counterparty in **exchange for the total return** realized on an individual reference obligation or a basket of reference obligations.

Example:

Portfolio manager believes that the fortunes of XYZ Corporation will **improve next year**, and that the company's credit spread to US Treasury securities **will decline**. The company has issued a 10-year bond at par with a **coupon rate of 8.5%** and therefore **the yield is 8.5%**. Suppose at the time of issuance, **the 10-year Treasury yield is 5.5%**. This means that the **credit spread is 300 basis points** and the portfolio manager believes it will decrease over the year to less this amount.

Enter into a total return swap that matures in one year as a total return receiver with the **reference obligation being the 10-year 8.5% XYZ Corporation bond issue**.

Suppose:

- 1) The swap calls for an exchange of payments semiannually and,
- 2) The terms of the swap are such that the total return receiver pays the 6-month Treasury rate plus 140 basis points in order to receive the total return on the reference obligation. The notional amount for the contract is \$10 million.

Assume that over the one year, the following occurs:

- The 6-month Treasury yield is 4.6% initially;
- The 6-month Treasury rate for computing the second semiannual payment is 5.6%;
- At the end of one year the 9-year Treasury rate is 7%;
- At the end of one year the credit spread for the reference obligation is 200 basis points.

Payments made by the portfolio manager:

First swap payment paid: $\$10 \text{ million} \times 3\% [(4.6\% + 140 \text{ bp})/2]$	\$300,000
First swap payment paid: $\$10 \text{ million} \times 3\% [(5.6\% + 140 \text{ bp})/2]$	\$350,000
Total payments	\$650,000

Payments received by the portfolio manager

Coupon payment ($8.5\% \times \$1 \text{ million}$)	\$850,000
Capital Loss (9 years maturity, 9-year Treasury rate 7%, credit spread 200 bp, reference obligation yield 9%, (price of an 8.5%, 9-year bond selling to yield 9% is 96.96)	\$304,000
Swap payment	\$546,000

Portfolio manager must make a payment of \$104,000

Even portfolio manager's **expectations were realized** (decline in the credit spread), the portfolio manager had to make a net outlay.

One disadvantage of a total return swap: the return of the investor is dependent on **both credit risk** (declining or increasing credit spreads) and **market risk** (declining or increasing market rates).

To remedy this problem, a total return receiver can customize the total return swap transaction.

Example: could negotiate to receive the coupon income on the reference obligation plus any change in value due to changes in the credit spread. In our example, in addition to the coupon income, the portfolio manager would receive the difference between the present value of the reference obligation at a current spread of 200 basis points and the present value of the reference obligation at a credit spread of 300 basis points.

Credit Default Products

Two categories:

- Credit Default Swap

- Credit Default Options on a Credit-risky asset

Credit Default swap: is a financial swap agreement that the seller of the CDS will compensate the buyer in the event of a loan default or other credit. The buyer of the CDS makes a series of payments (the CDS "fee" or "spread") to the seller and, in exchange, receives a payoff if the loan defaults

Settlement Methods

In the interdealer market, single-name credit default swaps are typically settled physically. Means that if a credit event as defined by the documentation occurs, the **reference obligation** is delivered by the **protection buyer** to the **protection seller** in exchange for a **cash payment**.

When a credit default swaps is **cash settled**, there is a **netting of payment obligations** with the same counterparty.

If **no credit event** has occurred by the maturity of the swap, both sides terminate the swap agreement and no further obligations are incurred.

Illustration of a Standard Single-Name Credit Default Swap

Reference entity: Corporation

5 year schedule term (typical tenor in the interdealer market)

Swap premium (payment made by the protection buyer to the protection seller): 410 basis points

If the credit event occurs, the protection seller pays the protection buyer the notional amount of the contract (\$10 million).

Note: The notional amount is not the par value of the reference obligation. Example: Suppose that a bond issue is trading at 80 (par value being 100). If a portfolio manager owns \$12.5 million par value of the bond issue and wants to protect the current market value of \$10 million (=80% of \$12.5 million), then the portfolio manager will want a \$10 million notional amount. If a credit event occurs, the portfolio manager will deliver \$12.5 million par value of the bond and receive a cash payment of \$10 million.

A standard contract for a single-name credit default swap in the interdealer market calls for a quarterly payment of the swap premium.

The day count convention used for credit default swaps is actual/360.

$$\text{Quarterly swap premium payment} = \text{notional amount} \times \text{swap premium (in decimal)} \\ \times \frac{\text{actual number of days in quarter}}{360}$$

Example: Notional amount \$10 million and there are 92 days in a quarter, then if the swap rate is 410 bp (0.0410), the quarterly swap premium payment made by the protection buyer would be:

$$\$10,000,000 \times 0.0410 \times \frac{92}{360} = \$104,777.80$$

Default Options on a Credit Risky Asset

A Default Option on a credit risky asset is another form of credit default products.

In a **binary credit option** the option seller will pay out a fixed sum if and when a default event occurs with respect to a reference obligation or reference entity. Represents two states of the world: **default and no default**.

At maturity of the option, if the reference obligation or reference entity has **defaulted**, the option holder receives a **predetermined payout**. If there is **no default** at maturity of the option, **the option buyer receives nothing**.

A binary credit option could also be triggered by a **rating downgrade**, both by a put and a call.

Example: binary credit put option

Assume that the portfolio manager purchased at par \$1 million of Company X bonds, currently rated AA. The portfolio manager purchases a put option where he can sell the bonds at par value to the put option seller should the credit rating for Company X fall below investment grade (below BBB). The payoff to this binary put option can be described as:

$$\text{Payoff} = \begin{cases} \$1,000,000 & \text{- market value of bonds, if the credit rating of Company X falls below a BBB rating} \\ \text{or} \\ \$0 & \text{- if the credit rating of Company X remains investment grade} \end{cases}$$

Portfolio manager receives a payout on the credit put option only in one state of the world: Company X is **downgraded** to below investment grade

Example: binary credit call option

Whenever Company X is downgraded, the portfolio manager gets to call for a payment that will compensate her for the greater credit risk associated with her bond holdings.

This is like receiving additional coupon income to reflect the higher credit risk associated with company X's bonds.

Portfolio manager gets to call for an additional 25 basis points of income should Company X be downgraded one credit rating, 50 basis points of income should Company X be downgraded two steps and so forth.

The pay out of this credit call option may be described as:

$$\text{Payoff} = \begin{cases} \$2,500 & \text{- if the credit rating of Company X declines by one credit rating} \\ \text{or} \\ \$5,000 & \text{- if the credit rating of Company X declines by one credit rating} \\ \text{or} \\ \$0 & \text{- if the credit rating of Company X is not downgraded} \end{cases}$$

Where $\$2,500 = 0.25\% \times \$1,000,000$

and $\$5,000 = 0.25\% \times \$1,000,000$

The payout to the binary credit call option is not a function of the bond's market value

Credit Spread Products

Credit Spread Options: is an option whose value/payoff depends on the change in credit spreads for a reference obligation.

The underlying can be: a reference obligation with a fixed credit spread **or** the level of the credit spread for a reference obligation.

Underlying is a reference obligation with a fixed credit spread

When the underlying is a reference obligation with a fixed credit spread.

The credit spread is defined as follows:

Credit spread *put* option: An option that grants the option buyer the right, but not the obligation, **to sell a reference obligation** at a price that is determined by a strike credit spread over a referenced benchmark at the exercise date.

Credit spread *call* option: An option that grants the buyer the right, but not the obligation, **to buy a reference obligation** at a price that is determined by a strike credit spread over the referenced benchmark at the exercise date.

A credit spread option can have any exercise style: only at the exercise date (European), at any time prior to the exercise date (American), or only on specified dates by the exercise date (Bermudean).

The price of the reference obligation (i.e. the credit risky bond) is determined by specifying a strike credit spread over the referenced benchmark, typically a default-free government security.

Example:

- Reference obligation is an 8% 10-year credit-risky bond selling to yield 8%.
- The price of this bond is 100.
- Referenced benchmark is a same maturity US treasury bond that is selling to yield 6%.
- Current credit spread is 200 basis points.

- A strike credit spread of 300 basis points is specified and that the option expires in six-months.
- At the end of six-months, the 9.5-year treasury rate is 6.5%.
- Since the **strike credit spread is 300 basis points**, then the yield used to compute the strike price for reference obligation is 9.5% (the Treasury rate of 6.5% plus the strike credit spread of 300 basis points).
- The price of a 9.5 – year 8% coupon bond selling to yield 9.5% is \$90.75 per \$100 par value.
- **Payoff at the expiration:** Depends on the market price for the reference obligation.

- Suppose that at the end of six months, the reference obligation is trading at 82.59 (yield of 11%) and therefore a credit spread of a 450 basis points over the 9.5-year Treasury yield of 6.5%.
- For a credit spread put option, the buyer can sell the reference obligation (selling at 82.59) for the strike price of 90.75. the payoff from exercising is 8.16 (reduced by the cost of the option).
- For a credit call option, the buyer will not exercise the option and will allow it to expire worthless (loss equal to the cost of the option).

Underlying is a credit spread on a reference obligation

When the underlying for a **credit spread option** is the credit spread for a reference obligation over a referenced benchmark, then the payoff of a call and put option if exercise are as follows:

Credit Spread Call Option

Payoff = (credit spread at exercise - strike credit spread) \times notional amount \times risk factor

Credit Spread Put Option:

Payoff = (strike credit spread – credit spread at exercise) \times notional amount \times risk factor

Strike Credit Spread (in decimal form): fixed at the outset of the option

The Credit Spread at Exercise (in decimal form): is the credit spread over a referenced benchmark at the exercise date

Risk Factor: is based on the interest rate sensitivity of the debt instrument.

Notice

- When the underlying for the credit spread option is the credit spread for a reference obligation over a referenced benchmark, a credit spread *call* option is used to protect against an increase in the credit spread.
- When the underlying for the credit spread option is the reference obligation, a credit spread *put* option is used to protect against an increase in the credit spread.
- The risk factor is determined by the sensitivity of the reference obligation changes in the credit spread. Can be computed as:
 - percentage change in the price of the reference obligation to a 100 basis point change in interest rates.
(since the percentage change will differ depending on whether we are looking at an increase or decrease in the credit spread, the change used will be dictated by the circumstances)

Risk Factor = percentage price change for a 1 basis point change in rates $\times 10,000$

By including **the risk factor**, this form of credit spread option overcomes the problem identified with the credit spread option in which the underlying is a reference obligation: **the payoff depends in both changes in the level of interest rates and the credit spread.**

Fluctuations in the level of the referenced benchmark's interest rates **will not affect** the value of the options.

Example

Consider BB rated, 7.75 XYZ bond due in 2012. In September 1992 this bond was trading at a price of \$104.77 with a yield to maturity around 7.08%. The risk factor is determined using the percentage change in price for an 100 basis point *increase* in interest rates. For the XYZ bond, there would be a percentage price change of 6.65% for a 100 basis point increase in rates.

$$\text{Risk Factor} = 0.000665 \times 10,000 = 6.65$$

At the time that this bond was offering a yield of 7.08%, the 10-year treasury note was yielding about 5.3% for a credit spread of 178 basis point. At the time it was a very narrow spread considering XYZ BB credit rating. Perhaps the market was implying that the credit risk of XYZ was closer to BBB than BB or alternatively the market overvalued the bond.

If a portfolio manager believed that the bond was overvalued, he could purchase a credit spread option strike at 178 basis points. This is the same as the portfolio manager expressing a view that the price of the reference obligation is inflated at the prevailing credit spread, and expecting the credit spread to expand out to more normal levels.

Suppose that the manager believes that the credit spread for this bond will increase to 250 basis points in one year.

The portfolio manager can purchase \$20 million notional at-the-money call option on the credit spread between the debt of XYZ and US Treasury.

One year option, with a premium of 125 basis points and the risk factor is 6.65.

At the maturity of the option, if the credit spread is 250 basis points (credit spread at expiration) the portfolio manager will receive:

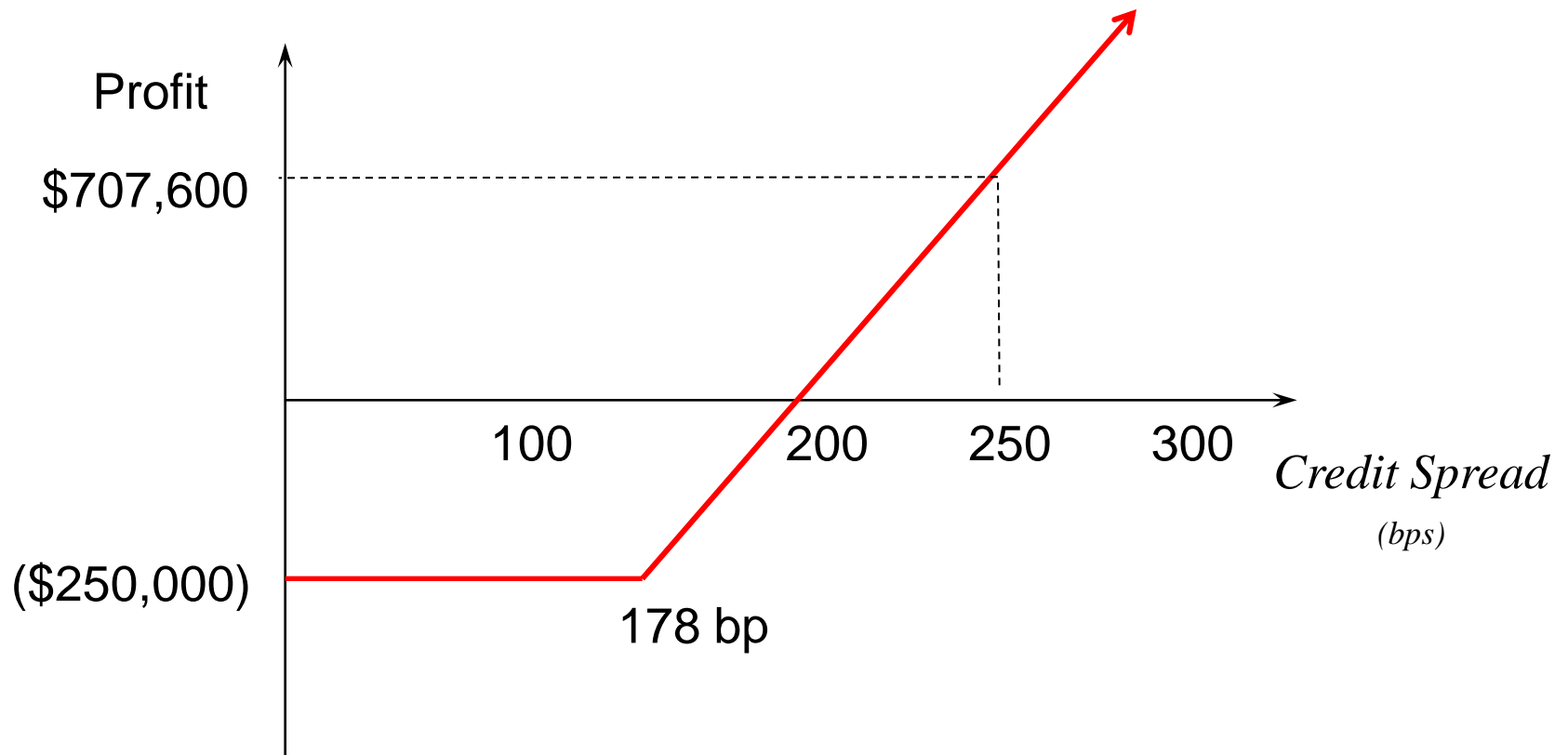
$$\text{Payoff} = (0.025 - 0.0178) \times \$20,000,000 \times 6.65 = \$957,600$$

The amount earned by the portfolio manager is the amount received less the cost of the option.

Since the option cost is 125 basis points for a notional amount of \$20 million, the option cost is \$250,000.

The portfolio manager's profit is \$707,600

$$(\text{= } \$957,600 - \$250,000)$$



Credit Spread Forwards

Requires an **exchange of payments** at the settlement date based on a credit spread.

The payoff depends **on the credit spread** at the settlement date of the contract.

The payoff is positive (i.e. the party receives cash) if the credit spread moves in favor of the party at the settlement date, and the party **makes a payment** if the credit spread moves against.

Suppose that a manager has a view that the credit spread will increase, to **more than the current 250 basis points** in one year for a credit-risky bond.

The payoff function for this credit spread forward contract would be:

$$(\text{Credit Spread at Settlement date} - 250) \times \text{notional amount} \times \text{risk factor}$$

Assuming that the **notional is \$10 million** and the **risk factor is 5**, then if the **credit spread at the settlement date is 325 basis points**, then the amount that will be received by the portfolio manager is:

$$(0.0325 - 0.025) \times \$10,000,000 \times 5 = \$375,000$$

Instead if the credit spread at the settlement date decreased to **190 basis points**, then the portfolio manager **would have to pay \$300,000**:

$$(0.019 - 0.025) \times \$10,000,000 \times 5 = \$300,000$$

In general:

Payoff if the portfolio manager takes a position in a credit spread to benefit from an **increase in the credit spread**:

$(\text{Credit Spread at Settlement date} - \text{Contracted Credit Spread}) \times \text{Notional amount} \times \text{Risk factor}$

Payoff if the portfolio manager takes a position in a credit spread to benefit from an **decrease in the credit spread**:

$(\text{Contracted Credit Spread} - \text{Credit Spread at Settlement date}) \times \text{Notional amount} \times \text{Risk factor}$