

The background features several large, overlapping, semi-transparent swirls in shades of purple, green, and blue. Scattered throughout are numerous small, yellow, triangular shapes pointing in various directions, resembling confetti or a sunburst effect.

BRE561 Corporate Real Estate Asset Management
MSc in International Real Estate
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Derivatives in Real Estate Markets

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Objectives

Risk Management in the Global Real Estate Markets



Risk and Uncertainty

- What action an investment manager should take in the face of risk and uncertainty?
 - Avoid risk exposure?
 - Defer investment until more information?
 - Reduce risk by diversification?
 - Hedge or arbitrage?



Arbitrage

- Is arbitrage possible in real estate markets?
 - What can you do if you expect market plummets in the next period?
 - Sell your current assets?
 - Defer your purchase decision until more information?
 - Buy a diversified portfolio?
 - Sell short?
 - Buy a put options contract?

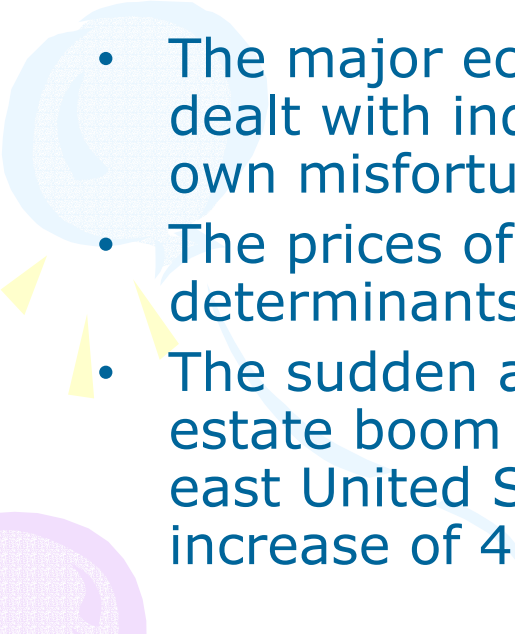



Shiller's risk management institutions

- Shiller, R.J. (1998) *Macro Markets: Creating Institutions for Managing Society's Largest Economic Risks*, Oxford, UK.





Shiller (1998,v)

- 
- The major economic risks the society faces are dealt with individually: each person bears his or own misfortunes.
 - The prices of homes are an important part of the determinants of our standard of living.
 - The sudden and spectacular residential real estate boom in the mid 1980s afflicted the north-east United States resulted in an average increase of 40% per annum in price.
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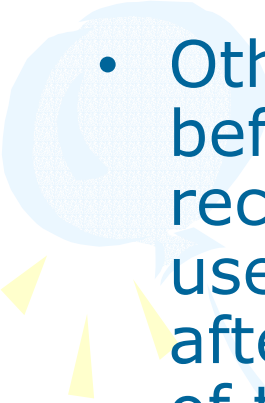



Shiller (1998,v) cont'd

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- People who had not purchased homes realized that they might never be able to afford them.
 - Young people who did not feel ready to buy housing felt compelled to make great sacrifices to invest in a home, or else risk being priced out of the market.


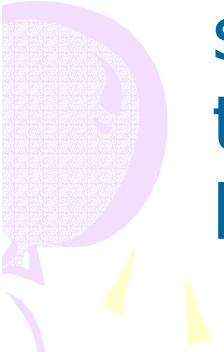


Shiller (1998,v) cont'd

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- Others (like myself) who had brought before the boom felt a little guilty to receive this windfall, which could be used to borrow against or used later after selling and moving to another part of the country...
 - What did I do to deserve this windfall? When had I asked to play this game of chance with my friends and neighbors?



Shiller (1998,vi) cont'd

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- Then real estate prices tumbled in the 1990s.
 - Those young friends, who had put their savings in a house that they did not want yet, saw their savings wiped out, and found themselves unable to sell the house to pay off their debts.


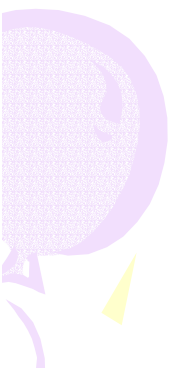


Shiller (1998,vi) cont'd

- Lending institutions, who had provided mortgages to these people, were in trouble.
- Builders, who had rushed to meet the demand, found themselves in a difficult situation, with inventories of houses that could not be sold at cost.
- Why does society let this happen, I wondered?
- At least, why does society not create institutions that would help people deal better with such market dislocations?
- Or is this nonsense just part of living, which we cannot ever avoid?

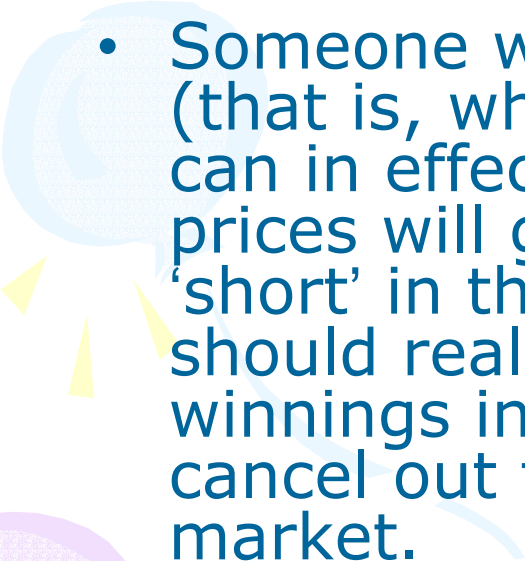
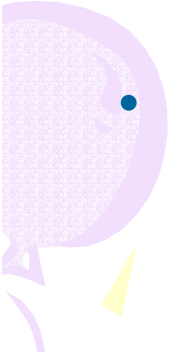


Shiller (1998,vi) cont'd

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- We tried to convince a futures exchange to start futures markets in residential real estate prices.
 - The primary purpose of these markets is not to enable people to gamble but to hedge, to cancel out the bets that they have already found themselves making due to their economic

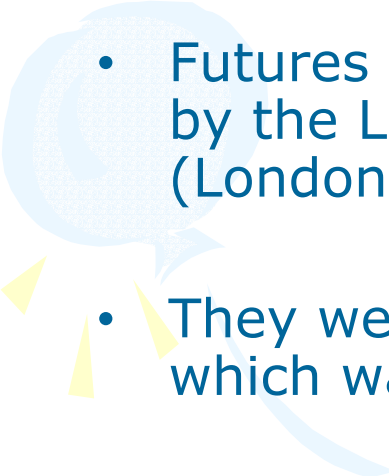



Shiller (1998,vi) cont'd

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- Someone who is a holder of real estate (that is, who is 'long' in the 'cash market') can in effect place a bet that real estate prices will go down (that is, can go 'short' in the futures market). Then, should real estate prices indeed fall, the winnings in the futures market would cancel out the losses in the real estate market.
 - When they hedge in such a market, they can in effect just announce that they are not playing this real estate game.

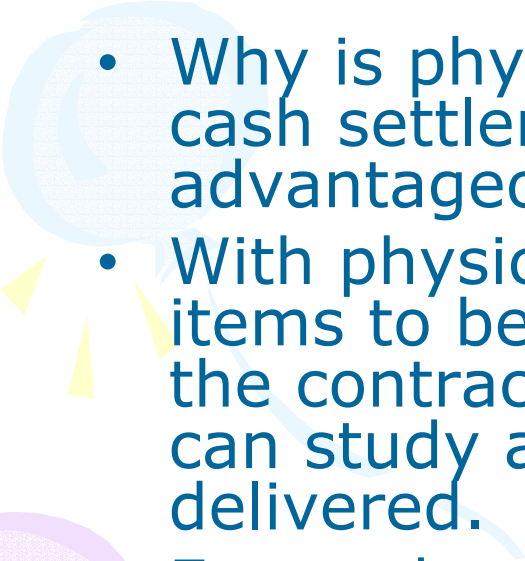
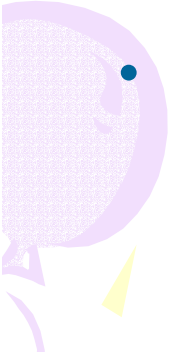


A Failure Experience

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- Futures markets in real estate were attempted by the London Futures and Options Exchange (London Fox) in 1991;
 - They were settled on a hedonic price index, which was questioned on its reliability;
 - Unfortunately, the contracts were traded only from May to October, 1991.
 - Trading volume had been very low, and the exchange involved serious false trades.
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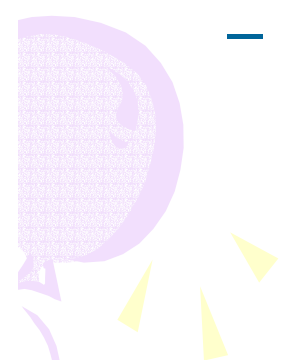


Forward contracts

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- Why is physical delivery, rather than cash settlement based on a price index, advantageous?
 - With physical delivery, the quality of items to be delivered can be specified in the contract; experts at the delivery site can study and test the commodity delivered.
 - Forward contracts, instead of futures, are more viable in real estate markets before the establishment of a constant quality price index.



My Studies on Price Index

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- Constant Quality Price Index Construction Method
 - Chau et al. (2003) Adjusting for Age Effects in the Repeat-Sales Index
 - Chau et al. (2004) Data on Hong Kong Real Estate Price Indices
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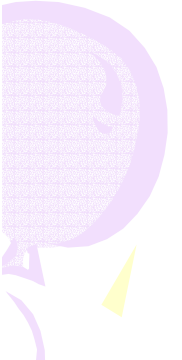
Derivatives

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- Are derivatives available in real estate markets?
 - Futures
 - Forward contracts
 - Options
 - Etc.
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Forward Contracts

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- Pre-occupation sales (pre-sales) of real estate are forward contracts



The contracting parties have agreed on the price but the subject property, which is still under construction, is transferred to the assignee at

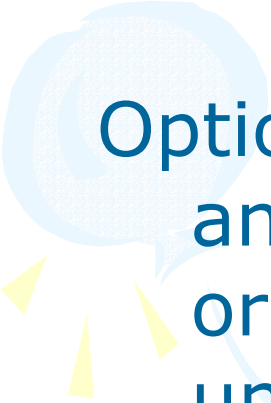


My studies on pre-sales

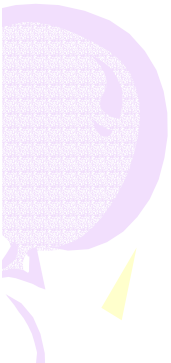
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- Chau et al. (2003) Price Discovery Function of Forward Contracts in the Real Estate Market
 - Yiu et al. (2003) Lead-lag relationship between the real estate spot and forward contract markets
 - Chau et al. (2004) Do the forward sales of real estate stabilize the real estate spot market
- 



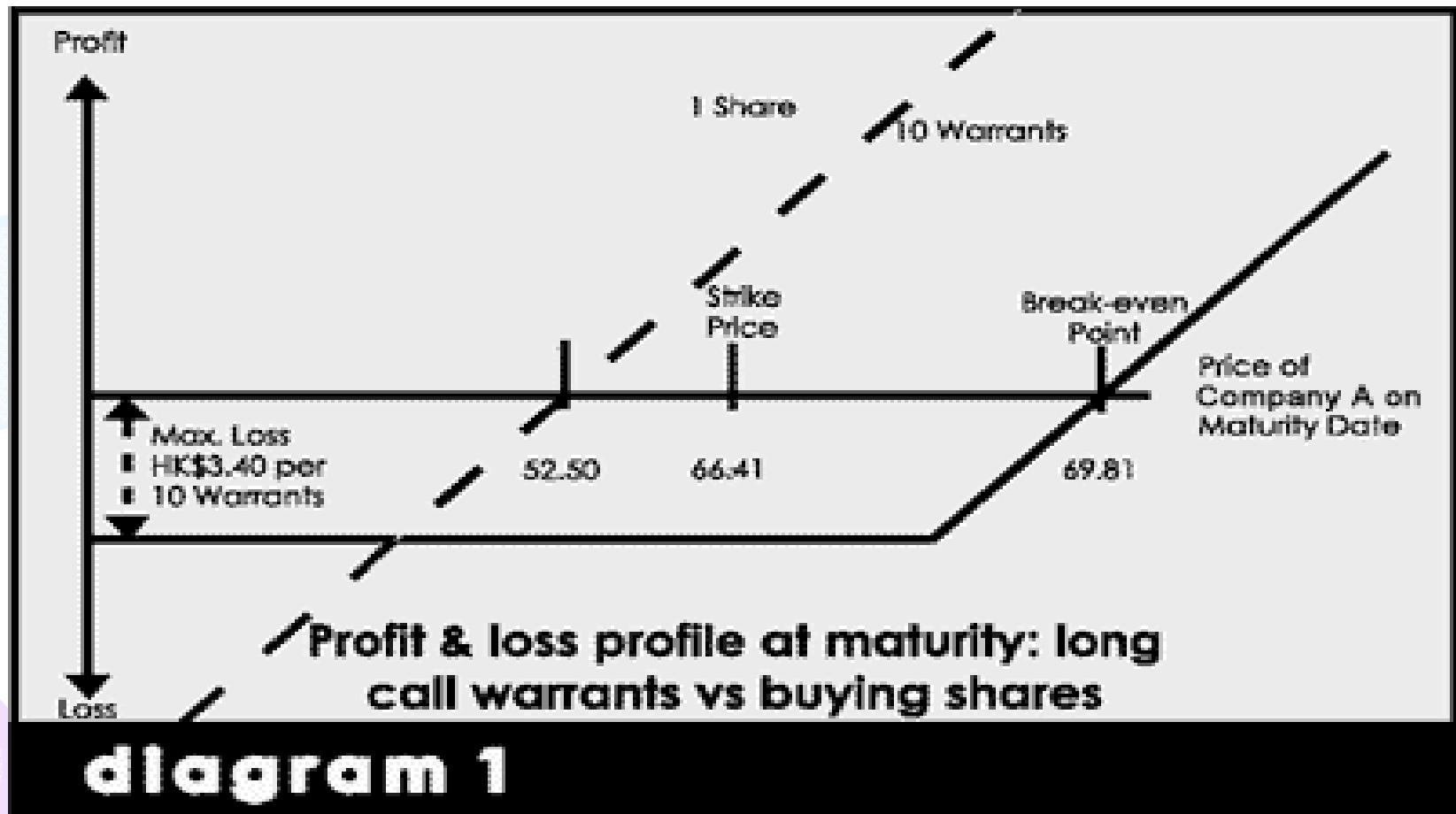
Real Options



Option (Warrant) is a right but not an obligation to buy (call option) or sell (put option) a certain underlying assets (stock, index, currency, or commodity), at a pre-determined price (called the strike price or exercise price), on or before a pre-determined expiry date.



Risk reduction by options



*Source: www.hengsang.com.hk



Real options

There is no market of tradable options in real estate market

But the concept of option is applicable in real estate investment and finance

Real Options Model is a novel idea developed in just about 20 years time



176 years of real options pricing model development

- Robert Brown (1827)
 - Louis Bachelier (1900)
 - Albert Einstein (1905)
 - Norbert Weiner (1918)
 - K. Itô (1951)
 - Franco Modigliani and Merton Miller (1958)
 - Case Sprenkle (1964)
 - James Boness (1964)
 - Paul A. Samuelson (1965)
 - H.P. McKean (1965)
 - Fischer Black and Myron Scholes (1973)
 - John Cox and Stephen Ross (1976)
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Nobel Prize Winners Involvement

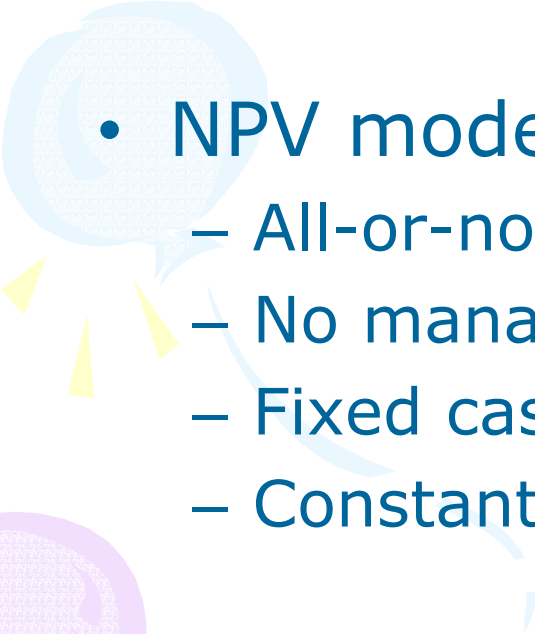
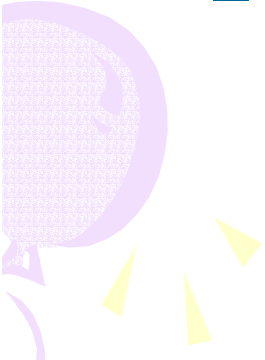
- Albert Einstein (1921 – physics)
- Paul A. Samuelson (1970 – economics*)
- Franco Modigliani (1985 – economics*)
- Merton H. Miller (1990 – economics*)
- Robert C. Merton (1997 – economics*)
- Myron Scholes (1997 – economics*)



*The Sveriges Riksbank (Bank of Sweden) Prize in Economic Sciences in Memory of Alfred Nobel





Traditional NPV model

- 
- NPV model assume:
 - All-or-nothing strategy;
 - No management flexibility;
 - Fixed cash flow or growth rate;
 - Constant discount rate
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Beyond NPV model's assumptions

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- Deferred decision for future ($t > 0$) information
 - Partial investment due to uncertainty
 - Management can alter the investment in the future
 - Cash flow streams are variable
- 



Studies of Real Options

- 
- Shoup (1970), Clarke and Reed (1988), Sing (2001)
 - Optimal timing of land development
 - Achour and Brown (1984), Brown and Achour (1984), Titman (1985), Shilling et al. (1985), Turnbull and Sirmans (1990), Capozza and Li (1994), Grenadier (1995, 1996)
 - Vacant land development options
 - Amin and Capozza (1993), Childs et al. (1998)
 - Sequential development options
 - McDonald and Siegel (1985), Williams (1991, 1993)
 - Abandonment options of real estate development
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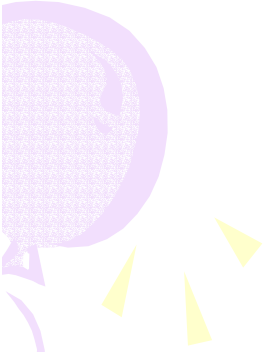
Studies of Real Options

- 
- Capozza and Sick (1994)
 - Land use conversion options
 - Capozza and Sick (1991), Childs et al. (1996), Williams (1997), Yiu (2004)
 - redevelopment options
 - Cauley and Pavlov (2002)
 - Option to delay sale
 - Chau, Greg, Yiu, and Wong (2003)
 - Pre-sales option pricing
- 



Risk Management of Real Estate Investment

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- “The functioning of market economies awaits new inventions”



Shiller
(1998,12)



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References

- Shiller, R.J. (1998) *Macro Markets: Creating Institutions for Managing Society's Largest Economic Risks*, Oxford, UK.
 - Chau, K.W., Wong, S.K. and **Yiu, C.Y.** (2003) ,“Adjusting for Non-linear Age Effects in the Repeat Sales Index”, *Journal of Real Estate Finance and Economics*, a special issue for the inaugural Singapore-Hong Kong International Real Estate Research Symposium
 - Chau, K.W., Wong, S.K. and **Yiu, C.Y.** (2003), “Price Discovery Function of Forward Contracts in the Real Estate Market: An Empirical Test”, *Journal of Financial Management of Property and Construction*, **8**(3), Special Issue, Dec.,
 - **Yiu, C.Y.**, Hui, E.C.M. and Wong, S.K. (under review), “Lead-lag relationship between the Real Estate Spot and Forward Contract Markets”, *Journal of Real Estate Portfolio Management*
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