

Biennial Convention 2007

Adventures in Risk

23-26 September 2007 • Christchurch, New Zealand



Institute of Actuaries of Australia



An Insight into Property Derivatives

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Objectives

- Explain the nature of a property derivative.
- Examine the development of property derivatives, the property index and the incentives.
- Estimate the cost of a mortgage derivative.
- Estimate the cost of a property indexed swap.
- Discuss debt based products with property linking.
- Examine possible changes in the role of the Actuary, resulting from the development of these derivatives.
- Summarise the findings.



Nature of a property Derivative

- You can buy or sell forward according to a property index.
- You may buy or sell an option to buy or sell in the future according to an index.
- You can swap a set of cash flows that are based on different property sectors and or indices.
- You may index link a mortgage and or a security to a property index or a combination of indices.
- You can combine a property derivative with other derivatives such as interest rate collars, credit default swaps and currency options.



Development of Property Derivatives

- The All-Property Index was first developed by the Investment Property Databank (IPD) in the UK in the 1990s. In 2007, 8 billion in UK is estimated.
- The index was applied to over-the-counter property derivatives and this was followed by exchange traded contracts. This spread to countries like France, Sweden, Canada, Hong Kong and Ireland.
- In the US, the key index was developed by the National Council of Real Estate Fiduciaries.
- IPD, RPData and others are developing an Australian property index based on more than 800 properties consisting of a mix of commercial, retail and industrial sectors.
- Property Indexed Certificates were introduced to provide a return based on an index.



Development of Property Derivatives

- The forward market in Europe grew slowly at first, largely through a lack of understanding and confidence in the new products.
- Over –the-counter arrangements developed with the introduction of Total Rate of Return Swaps, where returns of capital and/or income were swapped for a fixed rate income eg Libor related.
- To cover possible counterparty default, credit derivatives were integrated with the property derivative.
- Asset/liability matching was enhanced by the integration of currency and/or interest rate derivatives.



The Incentives for Embarking on Property Derivatives

- There is a low cost, easy and fast entry, for standard derivative traders. Direct property is expensive often with high barriers, high legal, stamp duty, marketing and other fees and may take a long time to complete or make good.
- Indirect property has low transaction costs relative to direct property and is flexible and fast to transact. It can be made more flexible and timely by the use of derivatives. eg to reduce portfolio duration synthetically.
- Derivatives can also be applied to direct property to meet benchmarks eg synthetically modifying sector proportions.
- Liquidity may be a problem for direct and indirect property and over-the-counter derivatives. Exchange traded derivatives pose few difficulties, except in a shallow and/or volatile market.



The Incentives for Embarking on Property Derivatives

- Asset/liability matching can be more easily achieved synthetically via derivatives.
- Exchange traded derivatives have few legal restrictions and are generally secure in an established market. There is still margin and counterparty risk.
- Derivatives can be used to quickly draw on particular expertise eg swapping local sector assets for a foreign sector which is managed by a foreign expert.



The Risks of Property Derivatives

- The risk of the derivative includes lack of correlation with the underlying, default of a counterparty, market risk, diversification risk, liquidity risk, currency risk, operational risk, interest rate and possible commodity risk and more.
- Exchange traded forwards may have margin call exposure.
- Mortgages linked to a property index have “sub-prime” risk.



Property Indices

- Ideally the index should correlate with the property being covered.
- The index therefore should be segregated according to country, region and property type eg commercial, industrial, retail and residential.
- The index should show, income, capital and combined returns.
- The index should be timely, easy to understand and apply and meet the purpose specified.



Mortgage Derivative

- The equity in a property is partially protected by an option. If the index falls, the seller of the option will pay part or all of the difference between the index prevailing at the date of exercise and the exercise value of the index.
- The interest rate may float, be capped or collared.
- The probability of default may be covered by credit derivatives.



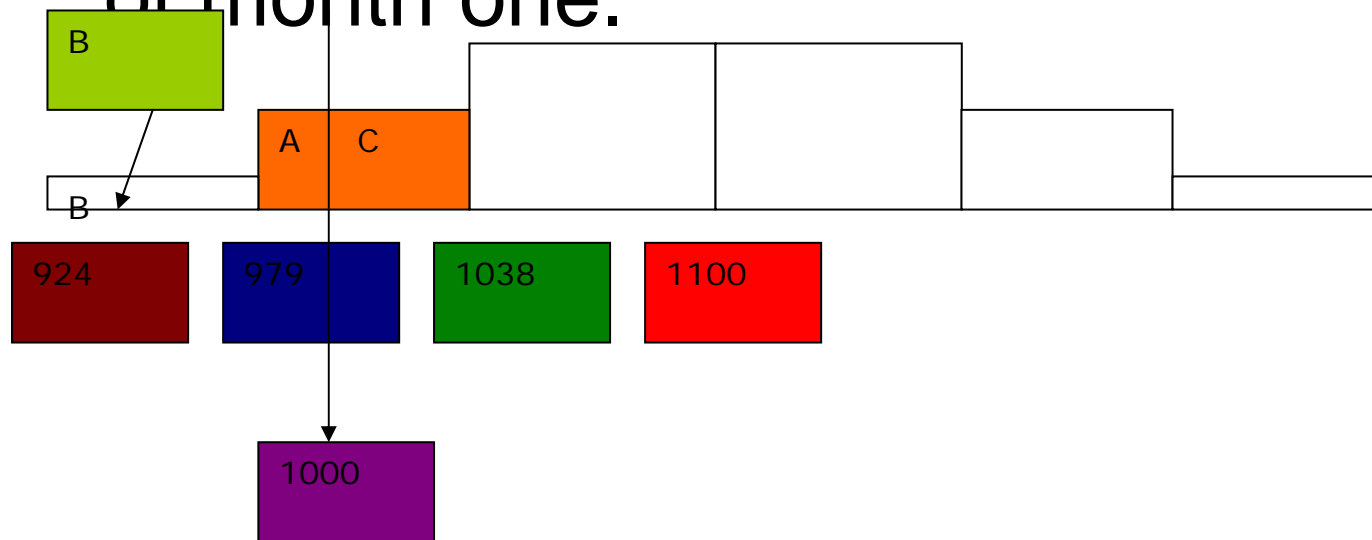
Mortgage Derivative Example

- Annual volatility of index is 20%.
- The mortgage term is 5 years and the cost of the option is calculated on a rolling monthly basis.
- Forward property index in one month is \$1100.
- Loan is \$300,000 on interest only basis.
- Debt will be reduced by 80% of reduction in value of property as measured by index.
- The probability of exit after one month is assumed to be 0.011.
- Exit is assumed to occur at the end of the month.



Rectangular Modelling the Option to Cover 80% of Equity Loss.

- The estimated cost below is at the end of month one.



$$\text{Cost in A} = 0.011 * 0.135 * 21 / (1038 - 979) * 0.021 * 300000 / 2 * 0.8$$



Total Rate of Return Swap for Property (TRORS)

- The property owner pays fixed interest to a TRORS receiver.
- The TRORS receiver shares in any capital gain on the property, based on an index.
- Any capital loss may be covered by the receiver.
- The receiver pays floating interest to the property owner.



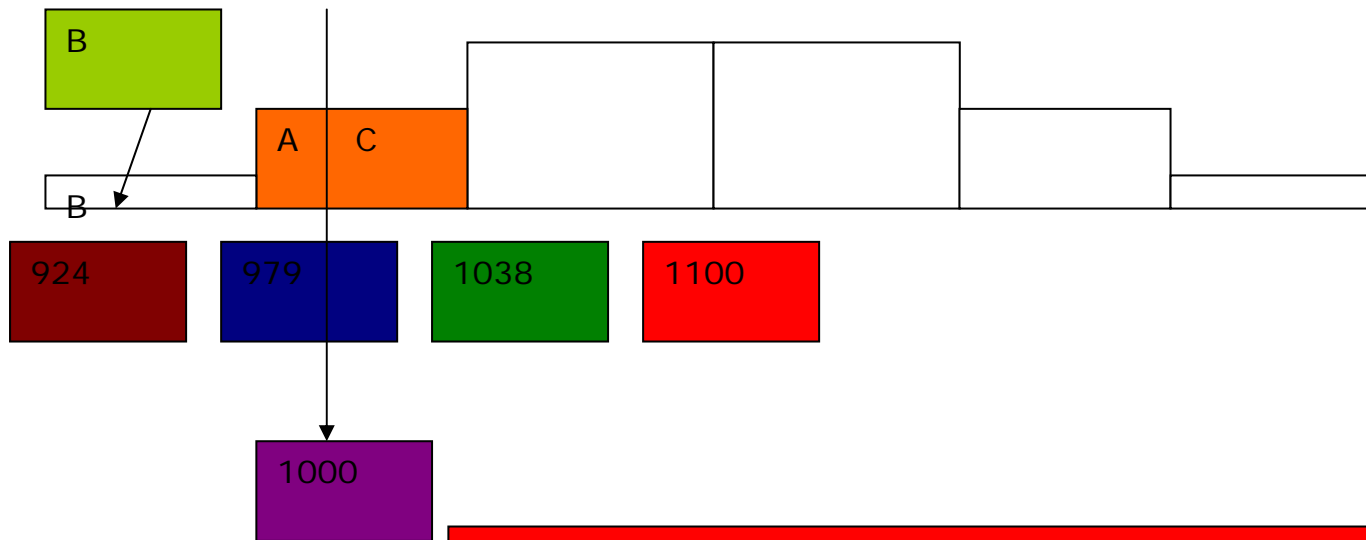
TRORS Example

- 5 year contract
- Receiver pockets capital gain based on \$80m *index at exit/initial index - \$80m.
- Initial index is 1000. Forward index in 1 month is 1100.
- Probability of exit in one month is 0.008.
- Volatility of index is 20% pa.
- The option price is estimated for the first month. A similar process will apply for the remaining 59 months.



Rectangular Modelling the TRORS.

- Estimated cost at end of first month



$$\text{Cost in A} = 0.135 * 21 / (1000) * 80m * 21 / 59 / 2 * 0.008$$



Property Income Certificate

- The capital and or income is linked to a property index.
- The property was matched by a correlated index.
- Barclays experienced considerable basis risk where the index failed to be correlated with changes in value of the matched property asset.



Property Index Return Swap by Country

- A sector of property can be swapped for another sector or the same sector of property from another country.
- It saves transaction costs and draws on the expertise of local property investment and/or development managers.



Securitisation

- Indexed property mortgages can be securitised and sold in the form of structured debt.
- Beware of the “sub-prime” impact.
- The debt issued can have matched indexing on the coupon and/or face amount.



Expanding the Actuarial Role

- Re-allocate and fine tune property sectors.
- Improve the asset liability matching of index linked property.
- Draw on the experience of overseas property experts without buying direct overseas property.
- Reduce the risk of home borrowers through index linked mortgage derivative hybrids.



Expanding the Actuarial Role

- Securitise mortgages using index linked loans and achieve improved credit ratings where property derivatives are included in the loan structure.
- Simulate direct property purchasing without being saddled with the stamp duty and conveyancing fees.
- Improve liquidity and asset liability management.



Summary

- Finesse international cash flow matching by swapping property flows in one country for another.
- Improve risk/return profiles by using appropriate derivative insurance.
- Match property assets with liabilities by sector swaps, exchange traded futures and options and over-the-counter derivatives.



Summary

- Reduce the risk for the home borrower or the commercial borrower through indexed property mortgages, which may provide downside equity protection when indices fall.
- Issue indexed forms of debt, including the securitisation of indexed property loans.
- Financially engineer the combination of property derivatives with credit, interest rate, currency, commodity and other derivatives.