FAIR VALUE ACCOUNTING FOR LONG-TERM INSURANCE LIABILITIES

Tillinghast – Towers Perrin

17 April 2002

AFA Insurance Group, Klara Södra Kyrkogata 18, Stockholm

Programme:

9.30   **Coffee**

10.00   **Introduction**   *Jan Hagberg, Svenska*
                                                                    Aktuarieföreningen

10.15   **Background**   *Peter Wright, Tillinghast*
— EU adoption of IAS by 2005
— Fair value accounting
— IASB Draft Statement of Principles
— Wider context
  – Reform of IAS 39
  – JWG proposals
  – International adoption of IFRS

10.45   **Valuation of liabilities – overview**   *Anthony Bice, Tillinghast*
— What does "Fair Value" mean
— Allowance for risk
  – Diversifiable vs non-diversifiable
  – Discount rates
  – Market value margins
— Methods for calculating FV
  – Deterministic/certainty equivalent
  – Closed-form solution value of options
  – Stochastic approach
— Embedded value vs Fair Value

11.30   **Coffee**

12.00   **Valuation of liabilities – practical examples**   *Erik Erixon, Tillinghast*
— Modelling approach for different products
— Comparison of results vs embedded value

12.30   **Lunch**

13.30 **Analysis of Fair Value Profit**   *Stephen Hardwick, Skandia*
— Components of profit
— Drivers of profit
— Implications for management
  – Asset/liability matching
  – Charge/expense matching
  – Pricing for guarantees

14.00 **Extending Fair Values**   *Anthony Bice*
— Economic balance sheet
— Management information
— Product pricing

14.30 **Fair Value implementation**   *Artur Chmielewski, Tillinghast*
— What is required
— Suggested timetable

15.00 **Close**   *Jan Hagberg*

Fair Value of Insurance Liabilities

Fair Value - Issues, Problems, Timetable

Peter Wright

17 April 2002

**Background**

Basic Concepts

Issues

Conclusion

Background - why an insurance IAS?

- **No international standard for insurance contracts**

- **Lack of consistency and comparability**
    - **between jurisdictions**
    - **between insurance contracts and similar financial instruments**

- **Duplication of effort for multinationals**

- **EU moving to IAS by 2005 for all listed companies**

- **Could form basis for international solvency standard**
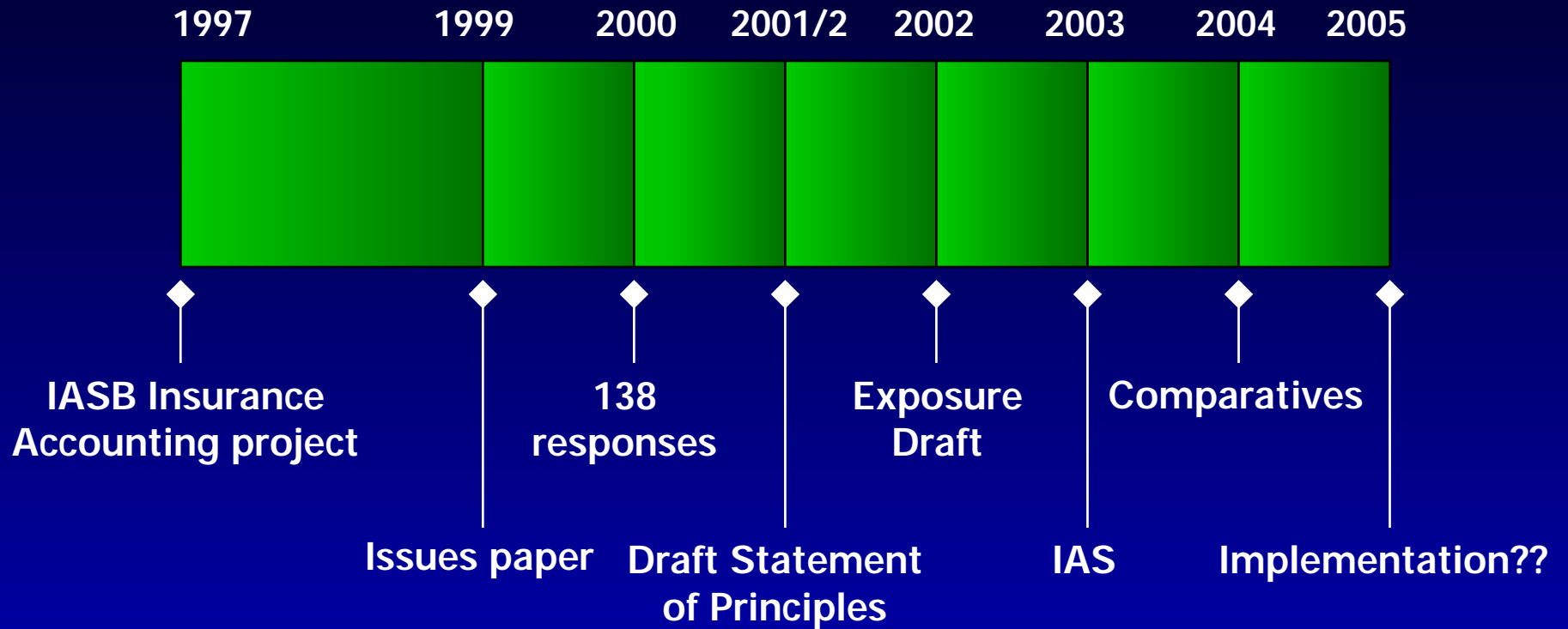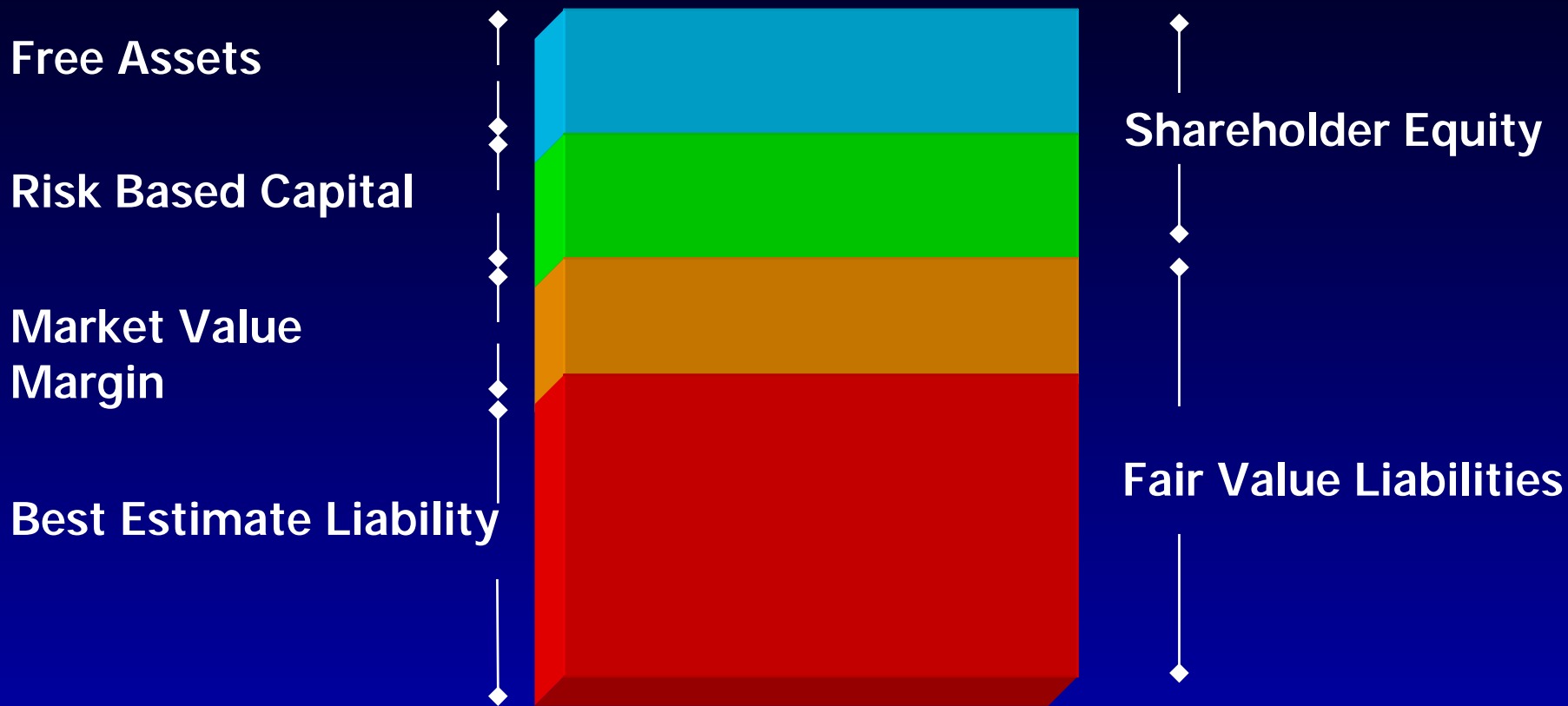
Basic concepts - definitions

Fair Value

- "The amount for which an asset could be exchanged or liability settled between knowledgeable, willing parties in an arm's length transaction"

Entity Specific Value

- "The present value of the cost to the enterprise of running off its liability in an orderly fashion over the life of the liability"

Basic concepts -
what do fair value insurance liabilities look like?

Free Assets

Risk Based Capital

Market Value
Margin

Best Estimate Liability

Shareholder Equity

Fair Value Liabilities

Problems with market value margins

- Not consistent with financial economic theory to allow for diversifiable risk

- Who will set market value margins?

- Market value margins not found in other accounting standards

Need for prudence when setting best estimate assumptions where material uncertainty exists

Issues -
financial instruments and investment property

- **IASB project assumed fair value standard for financial instruments**

- **This is now a long way off**

- **Current standard (IAS 39) not true fair value**
  - permits amortised cost for fixed interest securities
  - requires amortised cost for liabilities

- **Current standard for investment property (IAS 40) permits depreciated cost**

- **Need for insurance companies to adopt fair value options under IAS 39 and IAS 40 - but IASB currently opposed**

Issues -
definition of insurance contract

- ◼ Insurance contract must contain *insurance* risk

- ◼ Must be a *reasonable* possibility of event which will cause a *significant* change in the present value of cash flows

- ◼ Many "insurance" contracts will fail this test e.g. investment linked savings contract

- ◼ Such contracts treated as financial instruments, but how?

Issues -
recognition of future renewal premiums

Future renewal premiums recognised if, and only if

- ■ increase measure of insurer's liability, OR

- ■ option to renew valuable to policyholder

- ■ renewal option valuable if it constrains ability to re-price

So:-

- ■ ignore renewals for non-life business

- ■ recognise renewals if guaranteed insurability with mortality risk or significant initial charges/surrender penalties
- ■ may not be able to recognise renewals for many investment contracts

Could lead to need for supplementary information for some contracts

Issues -
own credit standing

- Market value of assets allows for credit risk of issuer

- Should fair value of liabilities to policyholders allow for insurer's own credit standing?

- Strict fair value approach says yes - limited liability put option

- BUT is it appropriate for insurance liabilities?

- Exclude from entity specific value

- Could show value of put option in Notes if material

Issues - entity specific value or fair value?

Fair value = market determined value

Entity specific value = present value of cost to company of running off liability

Issues - entity specific value or fair value? (cont)

In practice may not be much difference between the two

Financial assumptions

Claim and persistency assumptions

Expenses assumptions

DSOP proposes use of entity specific values until introduction of true fair value standards for financial instruments

Miscellaneous issues

- **No DAC assets. Acquisition costs immediately written off**

- **No restriction on profit on sale or surrender value liability floor**
  - **brought in by the "back door" for regular premium business?**

- **No catastrophe or claims equalisation reserves for general insurance**

- **Implications for deferred taxes**

Conclusions

Fair values (entity specific values) seem to be coming

Likely opposition from some industry quarters - some products will look bad and volatility an issue

Calculation of fair values insurance liabilities poses many challenges

Need for practical solutions

FAIR VALUE ACCOUNTING FOR LONG-TERM
INSURANCE LIABILITIES
BACKGROUND – 17 APRIL 2002

1. I will start my talk today with some background information. Currently there is no international accounting standard which covers insurance policyholder liabilities. This is one of the last remaining gaps in the set of international accounting standards following a hectic ten year period by the IASC as it was called until April 2001, during which the standards generally have been updated to reflect best accounting practice. It should be noted that international accounting standards, IAS under the old IASC but to be called International Financial Reporting Standards when franked under the authority of the reconstituted IASB, tend to be more principles based as opposed to the US GAAP system of a detailed set of rules. This is perhaps particularly relevant to the development of an insurance standard in that it implies that companies, their actuaries and auditors will be given some scope for pragmatic judgement when applying the eventual IFRS.

2. As a result of the absence of any agreed international accounting standard, there is little comparability in the way insurance results, particularly long term insurance results, are reported between companies operating in different countries. Some jurisdictions adopt a pure deferral and matching approach (eg US GAAP) whilst others use a prospective, balance sheet orientated, approach. I think, however, it is fair to say that a "fair value" approach as envisaged by the IASB is not currently adopted anywhere in the world. This presents a real challenge to the acceptability of any standard based on such an approach – both to preparers and users of the accounts.

3. The absence of a worldwide standard causes complications for multinational companies that seek listings on foreign stock exchanges. They are forced to go to the considerable inconvenience of restating their results to conform with the "host country" GAAP. An international standard would remove this requirement, with the exception of those seeking a listing in Canada or the USA, where IAS are currently not accepted. Clearly this is a major drawback and it must be hoped that either US

GAAP is changed to be consistent with the eventual insurance IFRS and other standards relevant to the preparation of an insurance company's accounts or that the attitude adopted by the SEC, the US securities regulator, to overseas registrants reporting under international accounting standards, changes. Confidence in US GAAP generally has been undermined by the Enron affair and this makes such changes in attitude rather more likely than was the case before.

4. Even without the effective participation of the North Americans, the introduction of an IFRS would still be of direct importance for all listed EU insurance companies, because of the decision by the EU to require all such companies to report in their consolidated group accounts on the basis of "agreed" IAS/IFRS from 2005. Interest has also been shown by the international supervisory body, the IAIS, in the possibility of using fair value liabilities, with the addition of a risk based capital system, for solvency monitoring purposes. The EU Solvency II review is aiming to come up with such a RBC system.

5. Well, the IASB and the IASC before it have been working on the insurance project since 1997 with the project headed up by a Steering Committee. An issues paper was published at the end of November 1999 and 138 responses on it were received including a lengthy one from the International Actuarial Association. Draft Statement of Principles (DSOPS) are still emerging from the Steering Committee and these are being placed on the IASB's website together with a note of the Board's discussion on them. The intention of the IASB is still that an exposure draft of an IFRS can be published within the next 12 months and that a final standard will be available for the 2005 deadline. This timetable is looking increasingly unlikely to be fulfilled as the Board's deliberations on the DSOPS are very protracted with no real decisions having been taken to date. I hope that if the introduction of an insurance standard is delayed by a couple of years that we in the EU will be able to stick with the Insurance Accounts Directive, as currently implemented in the various member states, for the interim period. It would be horrendous to have to contemplate making two major changes in a short period – a possible problem here, though, is

that parts of the Directive, eg the inclusion of DAC assets, may be deemed to be incompatible with the IASB's framework for accounting rules.

6. Turning now to Basic Concepts, here we see a generalised definition of "fair value" taken from the Joint Working Party's Financial Instruments Paper, about more of which later. The same definition applies to the insurance project, although here we are only talking about liabilities. Because of the likelihood that the IFRS may eventually adopt an "entity specific" approach, I have also given this definition on the slide. We shall return to this subject shortly but throughout the rest of this talk I will assume that "entity specific" values are also fair values – except where the context makes it clear that I am seeking to distinguish the two.

7. What would a fair value balance sheet look like? Here we see the DSOP proposals with a risk based capital amount, part of shareholders equity, superimposed. The "Best Estimate liability" incorporates an allowance for non-diversifiable risk (defined in a financial economics sense) but note the inclusion of a "Market Value Margin" for diversifiable risk. The IAA supports the inclusion of such margins, but I have three concerns with them:

■   They are not consistent with financial economic theory, which suggests that no reward is given for taking non-market related risk.

■   In practice it is difficult to see how they could be set in a consistent way, without the introduction of a vast bureaucracy.

■   They are not found in other, similar, accounting standards – for example that on accounting for post retirement benefits.

In my view, rather than apply market value margins all that is needed is to follow the normal accounting requirement to adapt a prudent approach to the selection of a "best estimate" assumption in conditions of considerable uncertainty. The need for such prudence could be evidenced, in a competitive market, by the existence without their inclusion of excessive "up front" profits on sale.

8. I will now turn to some specific issues related to the insurance project. Most of these are covered in the DSOPS, but I will start with a consideration of issues related to financial instruments. The definition of financial instruments covers most of the asset side of an insurance company's balance sheet, with the one major exception of property. It also covers any corporate debt issued by the company and by default, as we shall see later, any liabilities under long term insurance contracts which do not fulfil the insurance standard's requirement to incorporate a material level of insurance risk.

9. Unlike insurance policyholder liabilities, there is already an IAS (39), which covers financial instruments. This standard requires securities held to be classified into trading, available for sale and held to maturity categories in a similar way to the rules under US GAAP. Only the trading classification requires both market value for the balance sheet and movements in market value to be passed through the income statement. In other cases amortised or historical cost can be used for either or both of the balance sheet and income statement. Under IAS 39 liabilities under financial instruments other than derivatives are valued at historical, or amortised, cost.

10. The Joint Working Group paper, to which I referred earlier, had proposed in December 2000 that all financial instruments, both assets and liabilities, should with only limited exceptions be marked to market with changes in market value going through the income statement. The Steering Committee for the insurance project assumed that this system would be in place when their own IFRS became effective.

11. It is, however, now understood that opposition from the banks has been successful in pushing back the start date for the JWG's proposals to around 2009. Some limited changes to IAS 39 are proposed in the meantime but my understanding is that these will not, for example, address the issue of liabilities. At the very least, it must be hoped that a fair value of insurance policyholder liabilities is required to be matched by a fair value of assets or else nonsense will result. It would seem appropriate to require insurance companies to adopt a trading classification for their financial instruments and also adopt the market value option for investment property under

the relevant IAS (40). The Board, however, appear to be reluctant to impose these restrictions on insurance companies.

12. The next issue, which is closely related to the last, concerns the definition of an insurance contract. This is likely to require a contract to contain significant underwriting risk, which will mean that many UK pension and unit-linked contracts will fall outside the standard and hence be classified as financial instruments. This would not matter if liabilities under financial instruments were also subject to similar fair value rules, but as I have just mentioned this is unlikely to happen before 2009. In the meantime, in the absence of any action to reform the standard, it seems possible that IAS 39 may require some form of historical or amortised cost measure to be used. This could seriously undermine the relevance of the financial statements.

13. The next issue concerns the extent to which allowance should be made for future premium renewals. The IASB are understandably concerned at the "knock on" impact for revenue recognition in other industries if too liberal a stance is taken for insurance renewals. One example often given is the supply of a magazine subscription where the customer can always cancel for future editions. Currently the DSOP proposes that there must be some financial advantage to a policyholder in renewing before credit can be taken. Such advantage could arise through guaranteed insurability or the existence of front-end charges on alternative new contracts as well as where the option to renew is financially onerous to the insurance company. This is a difficult area, and it is likely that some policy types will fall foul of these rules. This, combined with the last issue, may mean that there is a continuing demand for supplementary financial reporting, perhaps along embedded value lines.

14. Should an insurance liability be reduced to allow for the value of the put option inherent in limited liability? To be consistent with both financial economic theory and the valuation of assets the answer is yes. However, on an entity specific approach, there seems little justification for making a reduction and even on a pure fair value approach there are difficulties, both practical and theoretical, in reducing liabilities - for example the accounts become of very limited value for policyholders if

liabilities to them are reduced as insolvency approaches. Perhaps a sensible approach is to include the value of the put option in Notes to the accounts, but only where material. For most well run life companies in a properly regulated environment, this value will hopefully not be material.

15. I have previously referred to the respective definitions of fair value and entity specific value. In theory a fair value is market determined but in practice a discounted cash flow method may have to be used for both fair value and entity specific value. The DSOP proposes that insurance liabilities should be calculated on an entity specific basis, until such time as financial instruments are required to be valued on a true fair value basis when the position should be reconsidered. There is no implication that the reconsideration should automatically result in a change of basis.

16. Financial assumptions will be market driven on both bases. It is also unlikely that demographic assumptions will differ significantly as these are heavily driven by the original underwriting and marketing approaches adopted, which surely cannot be ignored even in a true fair value world. The approach to expense assumption is, however, potentially different on the two approaches. In practice it will be difficult to derive true, market related, expense assumptions given the need to have regard to the particular "quirks" found in a company's own in-force portfolio. Many would also have concerns at adopting expense assumptions below those likely to be incurred in practice. The entity specific approach seems the most practical one – maintenance expenses will need to incorporate a reasonable allocation of overheads and care will be required to avoid aggressive assumptions being made regarding future expense earnings.

17. Finally, a few miscellaneous issues are on this slide. DAC assets are not consistent with a prospective, balance sheet orientated, valuation basis and hence must not be included as an asset; acquisition costs must be expensed as incurred. On a fair value approach there seems to be no reason to prohibit an "up front" profit to be recorded on sale or to require a floor to the liability equal to the surrender value. These are the recommendations in the DSOP but it is not yet certain that they will be accepted

by the IASB itself. Note that a prohibition on allowing for future renewals could bring in these two restrictions by the back door for regular premium business.

18. Now, although this conference is about long term insurance, I fell I must mention catastrophe/equalisation reserves because I know, from my general insurance days, that Scandinavians are particularly attached to them. Sadly, they do not seem to conform with the IASB's definition of a policyholder liability.

19. Deferred taxes under the current IAS must not be discounted. The Insurance Steering Committee proposed that insurance companies should discount deferred tax liabilities but the IASB appear to have rejected this recommendation. This will introduce major inconsistency into the calculation of an insurance company's liabilities.

20. In conclusion, it does seem likely that fair values, at least in entity specific form, are coming, although as with the JWG's proposals on financial instruments there is a strong lobby to delay their introduction. Why is there opposition? Really for three reasons. As I am sure we will hear later, many contracts currently marketed will not look financially attractive to shareholders when assessed on a fair value basis. A fair value basis will also, in the presence of asset/liability mismatch, introduce greater volatility into the results than the typical deferral and matching basis used in many countries and this will no doubt be unwelcome to some. Finally, there are practical problems with the calculation of liabilities when a stochastic approach is required.

21. I hope the IASB reject the first two of these as special pleading; volatility can be handled using the experience we have gained from embedded value reporting. The third, however, is a genuine issue and the IASB will have to show some pragmatism and not take theory to the nth degree. The position regarding "non-insurance" insurance contracts and the allowance for future renewals could stimulate a continuing demand for some form of supplementary embedded value reporting.

P.W.Wright

Valuation of Liabilities - Overview

Svenska Aktuarieföreningen

Anthony Bice

17 April 2002

Tillinghast - Towers Perrin

Agenda

- **What does Fair Value mean?**

- **Allowance for Risk**

- **Methods for calculating Fair Values**

- **Fair Value vs Embedded Value vs Economic Value**

What does Fair Value mean?

Allowance for risk

Methods for calculating Fair Value

Fair Value vs Embedded Value

What is a Fair Value?

- *Fair Value* is the amount for which an asset could be exchanged or a liability settled between knowledgeable, willing parties in an arm's length transaction

- *Entity-Specific Value* represents the value of an asset or liability to the enterprise that holds it… In particular the entity-specific value is the present value of the costs that the enterprise will incur in settling the liability with policyholders

Key components of FV/ESV

- **Prospective/Balance Sheet approach**

- **Capital Market-Consistent Value of assets and liabilities**
  - **Market price for risk**
    - systematic risk
    - diversifiable risk
  - **Best estimate cash flows**

Prospective/Balance Sheet approach

- **Profit is calculated broadly as difference between end-year FV net assets and start-year FV net assets**

- **No DAC**

- **Liabilities are discounted (general insurance)**

- **Allows profit or loss on sale of business**
  - **no "deferral and matching"**

- **No smoothing of investment fluctuations**

- **No hidden reserves - only liability or equity**
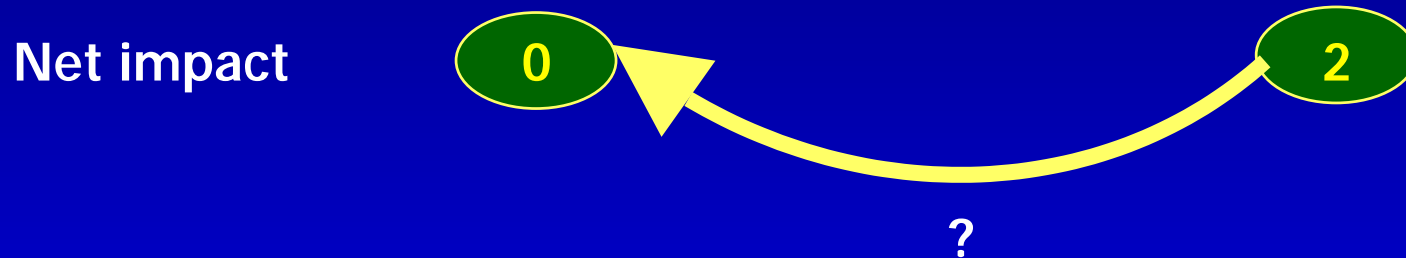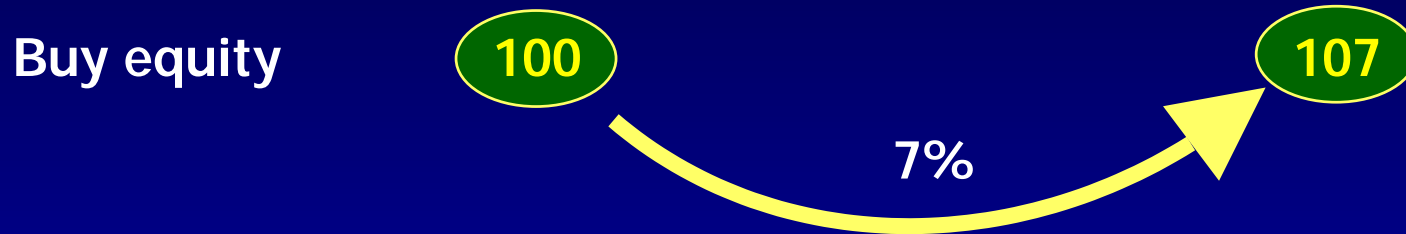
What is Capital Market Consistent Valuation?

- ◼ "That's a good question"

- ◼ "Something to do with option prices and volatility"

- ◼ "Valuing options in line with a replicating portfolio"

- ◼ "Valuing assets and liabilities separately"

> A CMC approach places a value on assets and liabilities consistent with the market prices of traded assets

What are we trying to avoid?

Sell a bond   100 ──5%──▶ 105

Buy equity   100 ──7%──▶ 107

Net impact   0 ◀──?── 2

Capital Market Consistent Valuation - The question we actually answer

"What price would insurance assets/liabilities trade at if they could be sold in a perfect market"

Fair Values - allowing for risk

"Fair Value of an insurance liability…should always reflect both diversifiable and non-diversifiable risk"

Principle 5.4

Fair Values - allowing for non-diversifiable risk

- **The price of non-diversifiable (or "market") risk is reflected in the price of traded securities**
  - **if the market cannot diversify risk away, it will demand a risk-premium for it**

- **We can determine this value with reference to market prices at the valuation date**

- **Our balance sheet liabilities will be consistent with the balance sheet assets, provided assets are measured at market value**

Diversifiable risk - the view of the investor

	Life Insurance Investor	General Investor
Company 1	$r_1 = r_\beta + r_m + r_{d_1}$	$r_1 = r_\beta + r_m + r_{d_1}$
Company 2	$r_2 = r_\beta + r_m + r_{d_2}$	$r_2 = r_\beta + r_e + r_{d_2}$
Company 3	$r_3 = r_\beta + r_m + r_{d_3}$	$r_3 = r_\beta + r_t + r_{d_3}$
Company 4	$r_4 = r_\beta + r_m + r_{d_4}$	$r_4 = r_\beta + r_u + r_{d_4}$
	$r_{total} = \sum r_\beta + r_m + r_{dn}$ systemic	common to life companies	diversifies	$r_{total} = \sum r_\beta + r_{sector} + r_{dn}$ systemic	diversifies

Diversifiable risk and MVMs

DSOP suggests a Market Value Margin for diversifiable risk

- **how do we determine the MVM?**
    - with reference to technical assumptions?
    - estimating standard deviations?
    - target non-positive profit on new business (MoS)?

- **what happens to MVMs when we write more of the same business?**
    - "diversification credits"

- **what happens when we write offsetting business?**
    - term insurance and annuities

What is CMC Valuation?

Allowance for risk

Methods for calculating Fair Values

Fair Value vs Embedded Value

A simple example -
one year guaranteed income bond

Time = 0

Time = 1

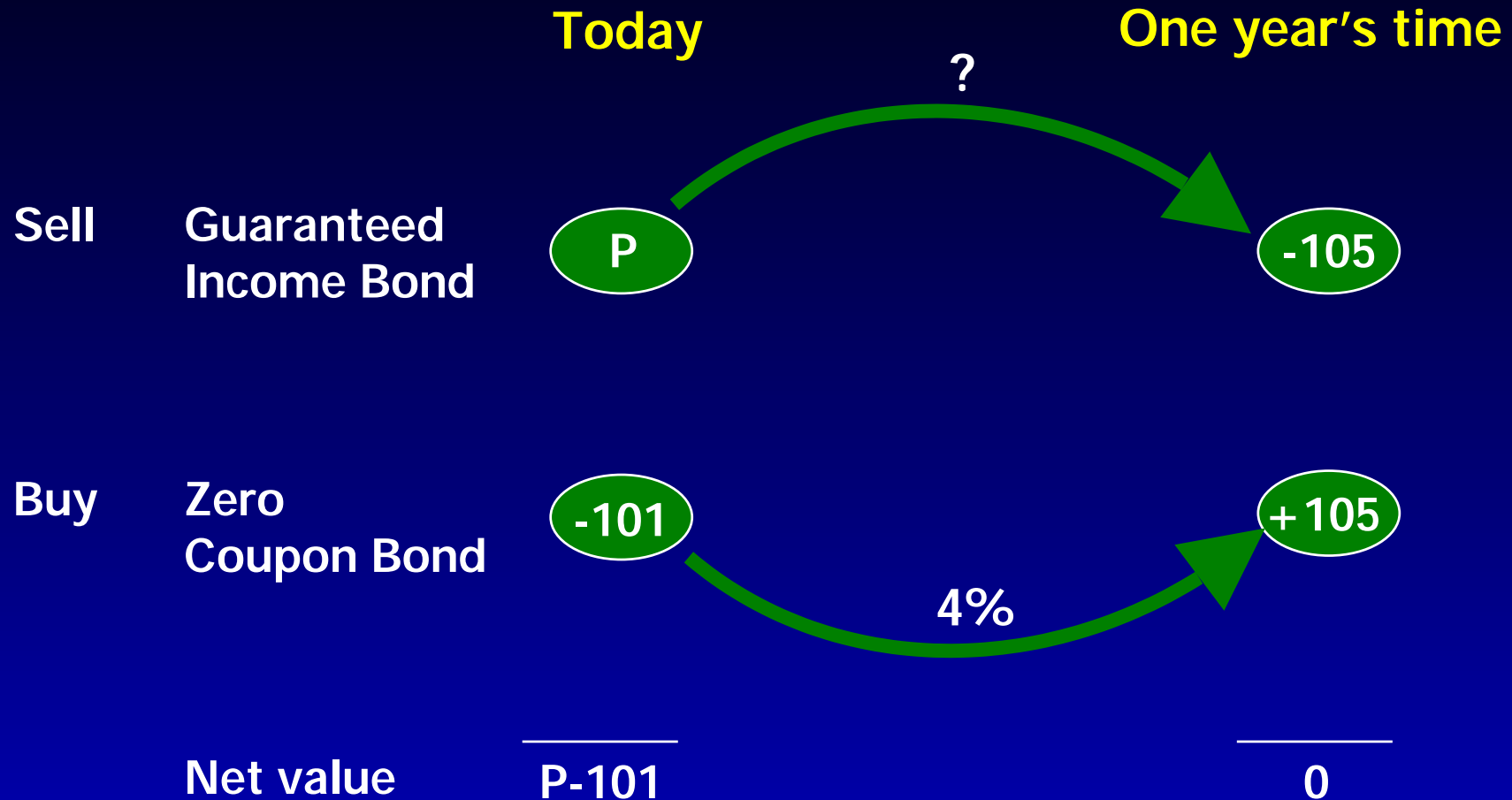Receive a premium of 100 →→→ Pay out 105 (i.e. guaranteed return of 5%)

What is (CMC) value today?

Ignore expenses, taxes and other "frictional" items.

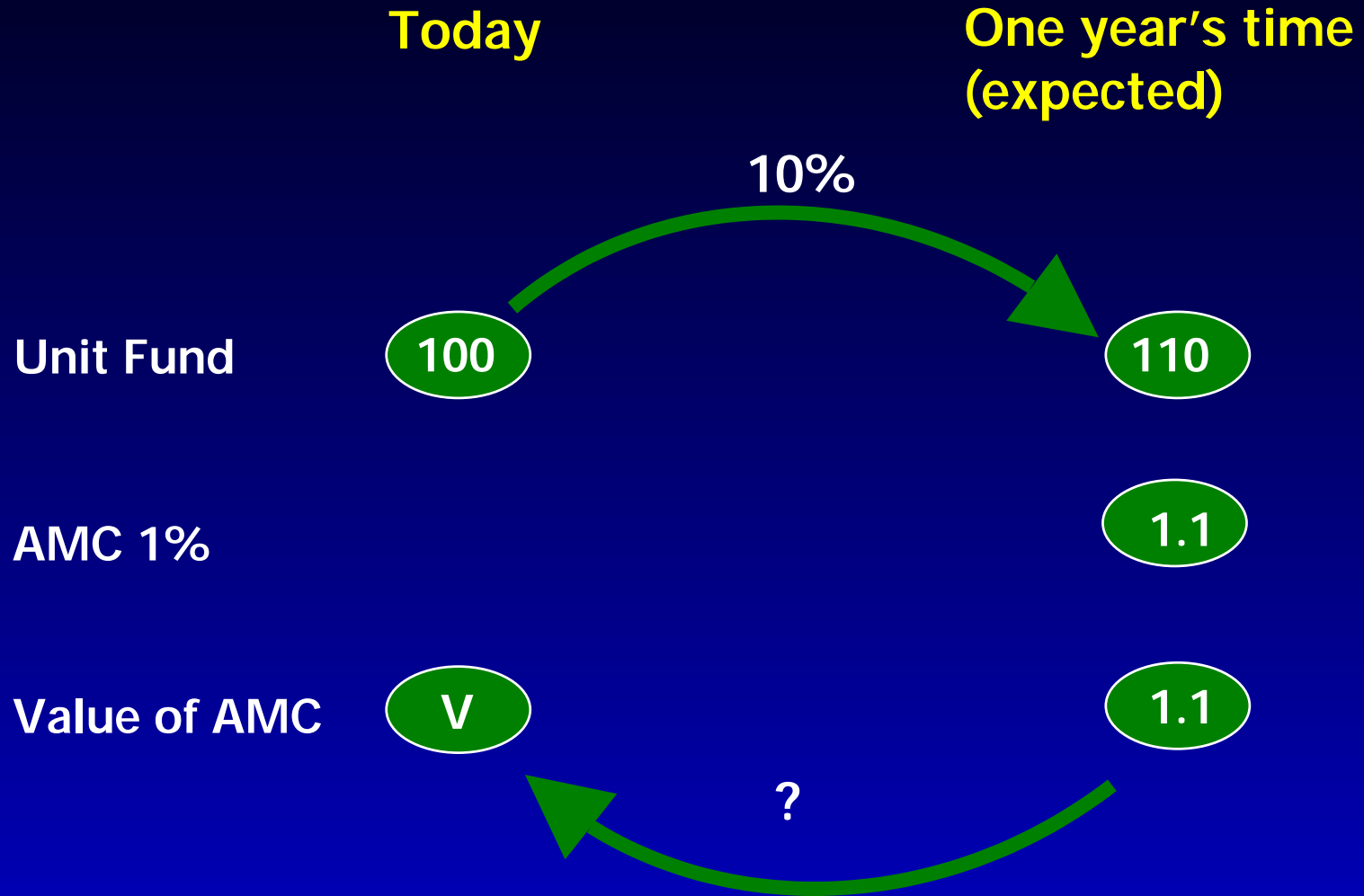Approach 1 - Relative valuation "replication" or "arbitrage-free pricing"

Today — One year's time

?

Sell — Guaranteed Income Bond — P → -105

Buy — Zero Coupon Bond — -101 → +105 (4%)

Net value — P-101 — 0

Approach 1 - Relative valuation "replication" or "arbitrage-free pricing"

- **Basis of most "finance" models and textbooks**

- **Makes no assumptions about investor preferences or pricing of assets - market values of existing assets taken as given**

- **Depends upon existence of traded "replicating" assets**

- **Theoretically only applicable if assets to be valued are also to be traded**

- **Depends upon "perfect market" assumptions**
  - **no frictional costs**
  - **continuous trading**
  - **no short selling restrictions**

Another simple example -
AMC of 1% in 1 year's time

Today

One year's time (expected)

10%

Unit Fund   100   110

AMC 1%   1.1

Value of AMC   1   1.1

10%
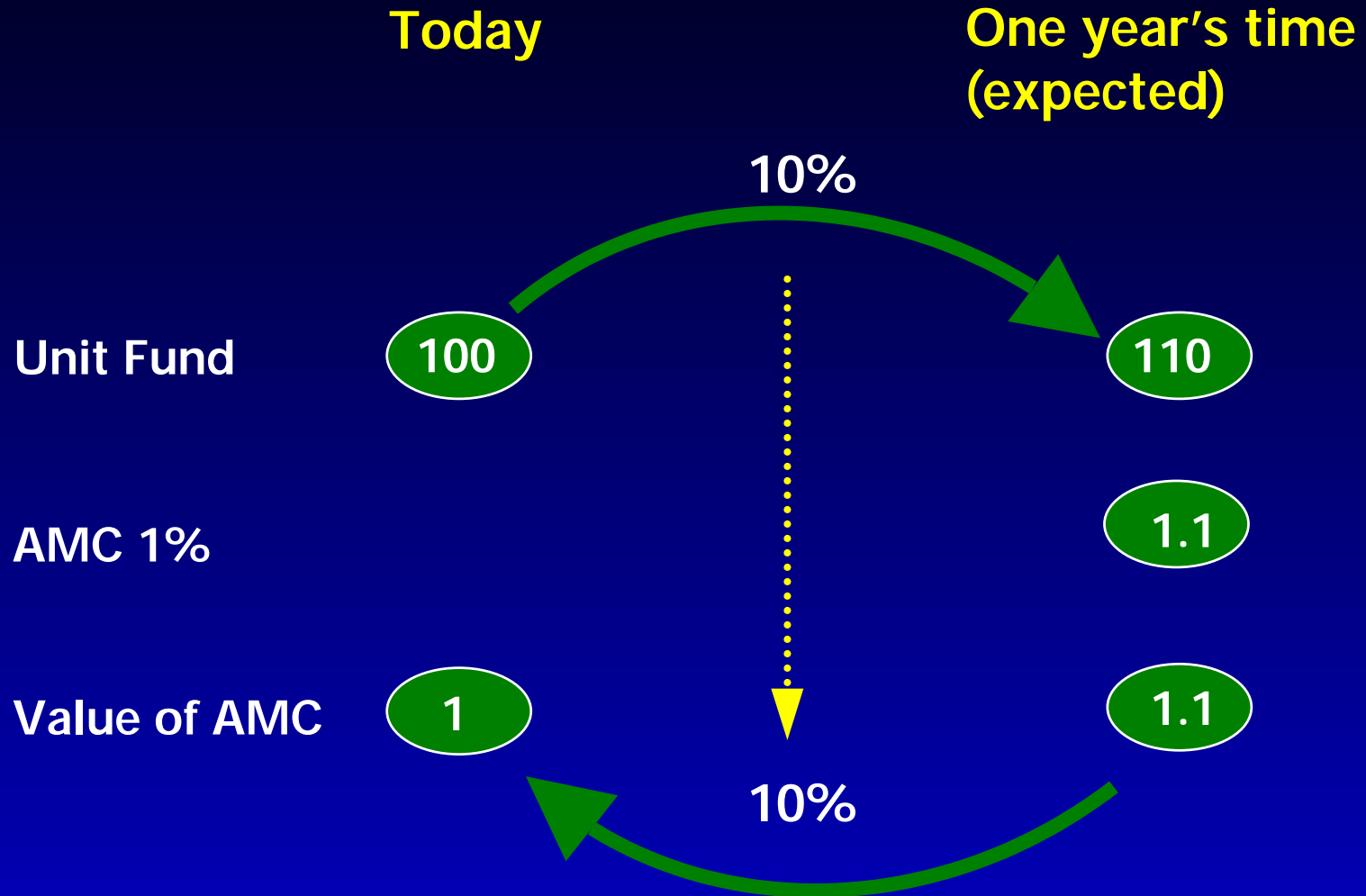
Approach 2 - Absolute valuation the "equilibrium" approach

- **Basis of financial economic models, understanding and textbooks**

- **Attempts to ask what value investors would place on an asset from first principles - CAPM is best known example**

- **Requires significant assumptions about investor preferences and behaviour, takes nothing as given**

- **Does not depend on existence of replicating portfolio, or require assets being valued to be traded**

Both approaches give the same answers

Which approach should we use?
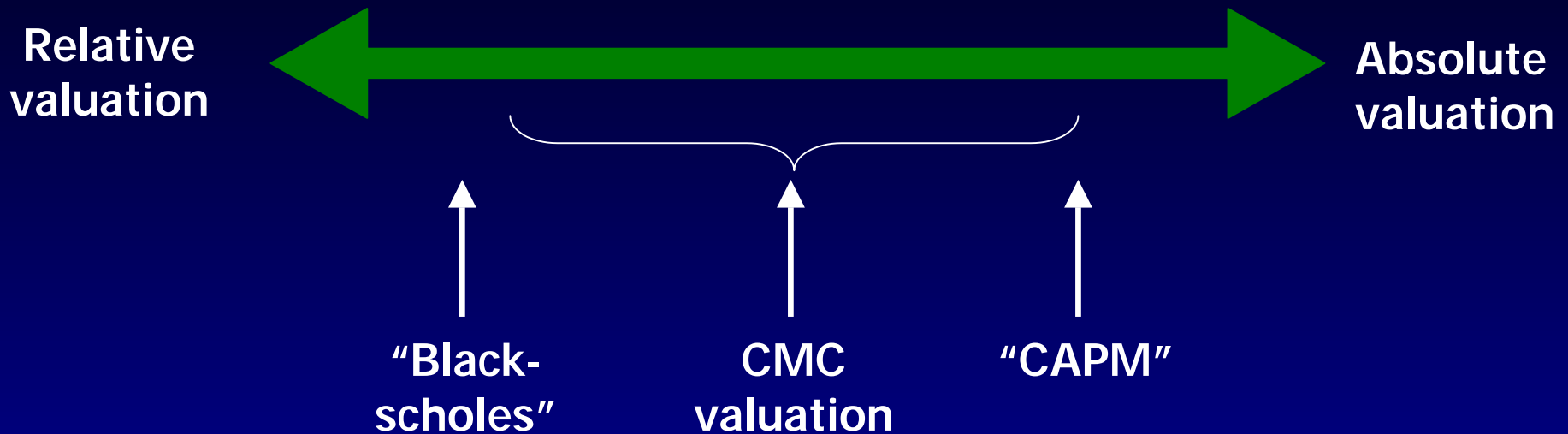
- Accept market prices as given (Relative)

- Assume apply to non-traded assets (Absolute)

- Value diversifiable/non-traded risks (Absolute)

Non-linear risk - embedded options and guarantees

We cannot use simple best-estimates when we have non-linear risks
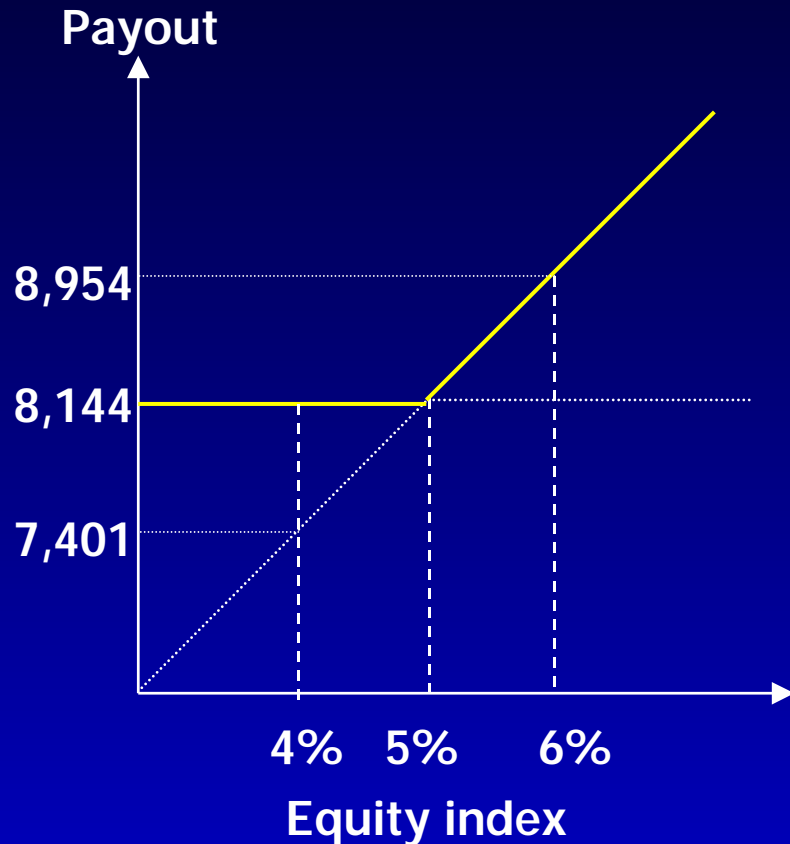
- 10-year bond

- Payout equals greater of return on equities or 5% per annum

- If expected return is 6%, option has zero value

- If expected return is 4%, option is worth 743

- Required discount rate is a complex function of expected return

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Calculating a CMC valuation in the presence of options

Replicating portfolio

- Find a portfolio of traded assets which has same payments in all circumstances as the liabilities

- Value of portfolio equals value of liabilities

Model-based

- Determine the *value* of the replicating portfolio without directly determining its components

- Based on the concept of the dynamic hedge - asset mix can be adjusted continuously based on liability profile

In all cases, we only want to replicate *non-diversifiable* risk

Three approaches to a model-based valuation of options and guarantees

Analytically — Simple products, eg puts and calls, a few insurance products

Numerically — More complex products, exotic options

Simulation — Very complex products, products based on several sources of risk, most insurance products

Simulation methods - building the model

- **Many different asset models, with differing degrees of realism**
  - **all are arbitrage free and market-consistent**
  - **but no one perfect**
  - **need to pick a model which is sufficient for the purpose**

- **Liability model is crucial to results, should reflect impact of asset behaviour on**
  - **policyholder behaviour (eg lapses)**
  - **investment policy**
  - **bonus strategy**
  - **charging structure**

- **Trade-off required between realism and complexity**

Example - Bond with guaranteed bonuses

- £10,000 single premium paid

- Office grants bonuses each year, which cannot be taken away

- After 10 years payout is greater of asset value, or premium plus bonuses

- Bonus rate depends on performance of assets in a complex way

General approach

- **Define (risk neutral) asset model**

- **Define liability model - how bonus rates depend upon assets - how payment is calculated**

- **Simulate 1000 asset paths**

- **For each path calculate final payout**

- **For each path discount payout at (path specific) risk free rate**

- **Average discounted value is the value of the product**

Asset models

- **Necessary for stochastic modelling**

- **Must be arbitrage-free**
  - **i.e. ensure that £100 = £100**
  - **otherwise we may create spurious liability or equity**

- **Should be as simple as possible**
  - **ease of implementation**
  - **closed-form solutions to asset prices**

- **Calibration is at least as important as the type of model**

Calibration of asset models

- **Interest rate model must be consistent with current gilt yield curve**

- **Interest rate model should also give consistent prices of interest rate derivatives**
  - **swaptions**
  - **caps and floors**
  - **beware of swaps curve - it contains credit risk margins**

- **Equity volatilities should be consistent with implied volatilities of equity derivatives**
  - **puts and calls**
  - **suitable term -> OTC options**

Modelling requirements for Fair Values
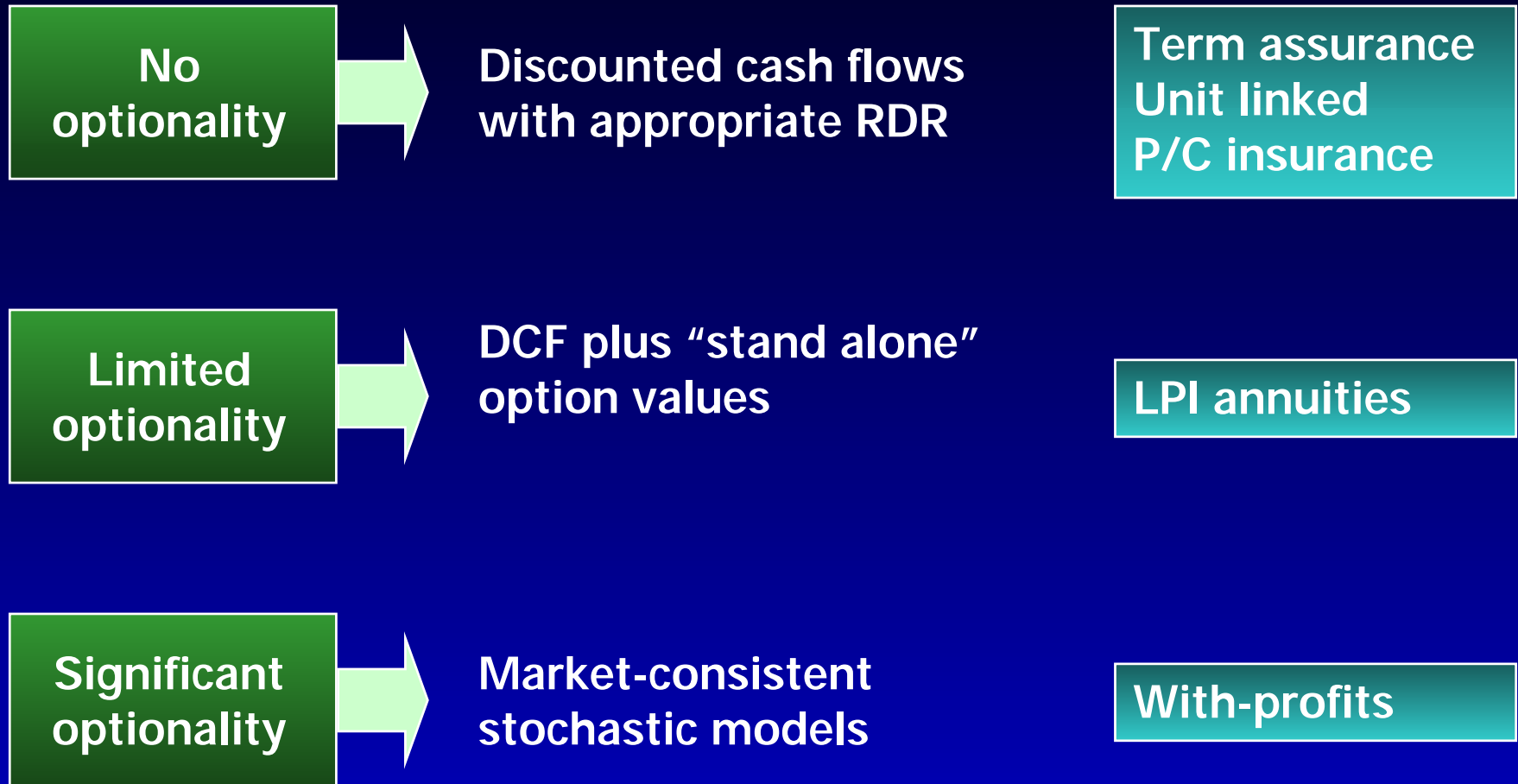
| No optionality | → | Discounted cash flows with appropriate RDR | Term assurance Unit linked P/C insurance |

| Limited optionality | → | DCF plus "stand alone" option values | LPI annuities |

| Significant optionality | → | Market-consistent stochastic models | With-profits |

What is CMC Valuation?

Allowance for risk

Methods for calculating Fair Values

Fair Value vs Embedded Value

Fair Value vs Embedded Value vs Economic Value

- Fair Value is an accounting standard
  - Based on market-consistent valuation techniques, but excludes certain items, eg goodwill, cost of capital
  - Important to ensure internal consistency

- Embedded Value can be considered an approximation to economic valuation or an "accounting" standard
  - Makes indirect (and ill-defined) allowance for intangible items
  - Approximation can be significant where there are guarantees

- Economic Value takes account of all factors which have an affect on value
  - Intangible items - "value of the firm"
  - Appropriate for pricing, internal performance measurement, M&A and (maybe) risk management

Fair value of insurance liabilities

Fair value accounting

Erik Erixon

17 April 2002

Agenda

- **Introduction**
- Methods
- Examples

Introduction (1)

■ Fair value of liabilities on the balance sheet

Assets		Liabilities	
Market value of tangible assets	XXX	Present value of future liabilities	XXX
		Economic equity	XXX
	XXX		XXX

■ Issue is how do we calculate the fair value of liabilities

Introduction (2)

- How can we do this?
  - What is practical?
  - What is needed?

- Examples of Swedish traditional products

- Comparison with embedded value

Agenda

- ■ Introduction
- ■ Methods
- ■ Examples

Methods

- Method for calculating fair value of liabilities is dependent on the product

- The two main methods are
  - Replicating portfolio
  - Simulation techniques

- Main principle should be to use the simplest method allowed for

- Which method is best used when?

- Product should decide

Replicating portfolio technique (1)

- The replicating portfolio technique is
  - Simple to understand and work with
  - Limited by the assets traded
  - Uncomplicated products
  - Fast calculations

- Products which could be valued are for example
  - Annuities and endowments with terminal bonuses
  - Unit-linked style products
  - Non participating products
  - Uncomplicated charging structures

Replicating portfolio technique (2)

- Assets used for replicating liabilities
  - Government bonds for sure payments
  - Equities for development of unit-linked and bonuses
  - Options for terminal bonuses
  - Bond options for corporate bonds

- Liabilities are calculated using expectation values
  - Number of maturity payments will follow the expected number of people l_x
  - Looping over the policies used to work out the total assets to be replicated

Replicating portfolio technique (3)
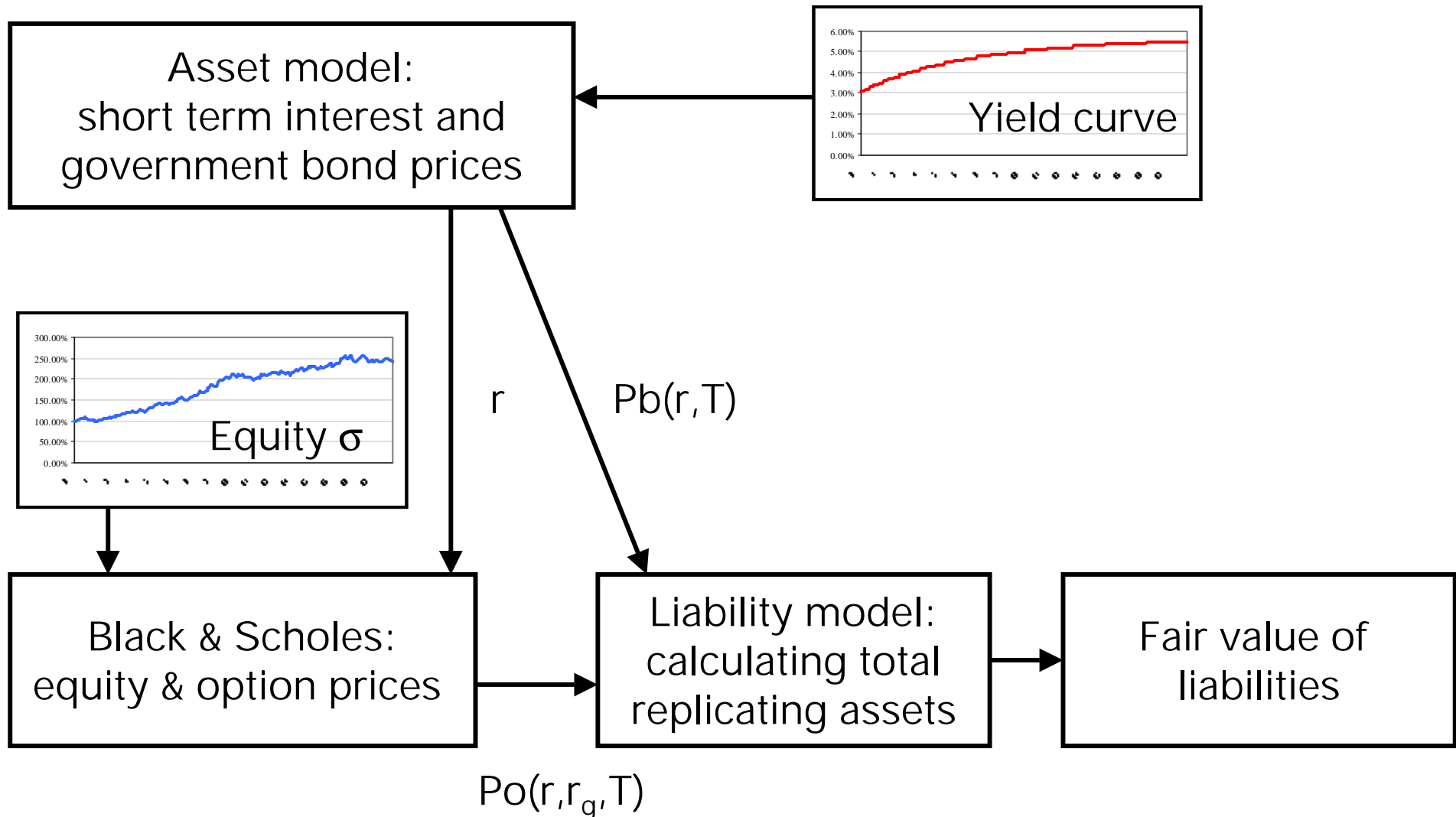
Replicating portfolio technique (4)

■ Denotation

r	Short term interest
σ	Equity volatility
T	Outstanding term of bond or option
r_g	Development of strike price
Pb(r,T)	Price of government zero-coupon bond
Po(r,r_g,T)	Price of option

Simulation technique (1)

- If the replicating assets are too complex to figure out - resort to simulations

- Product is complex
  - Bonus distribution system
  - Lapse rate depending on yields/bonuses
  - Charging structures

- Most insurance products have these features

- Examples of products
  - Traditional products
  - Unit linked with guarantees

Simulation technique (2)

Rand x → Asset model: short term interest and government bond prices at t ← Yield curve

Equity σ, ρ

$r(t)$ $r(t)$

$Pb(r(t),T)$

Corr(X,Y)

Rand y

Black & Scholes: equity & option prices at t → Liability model: running projections → Fair value of liabilities

$EI(t)$

$Po(r(t),r_g,T)$
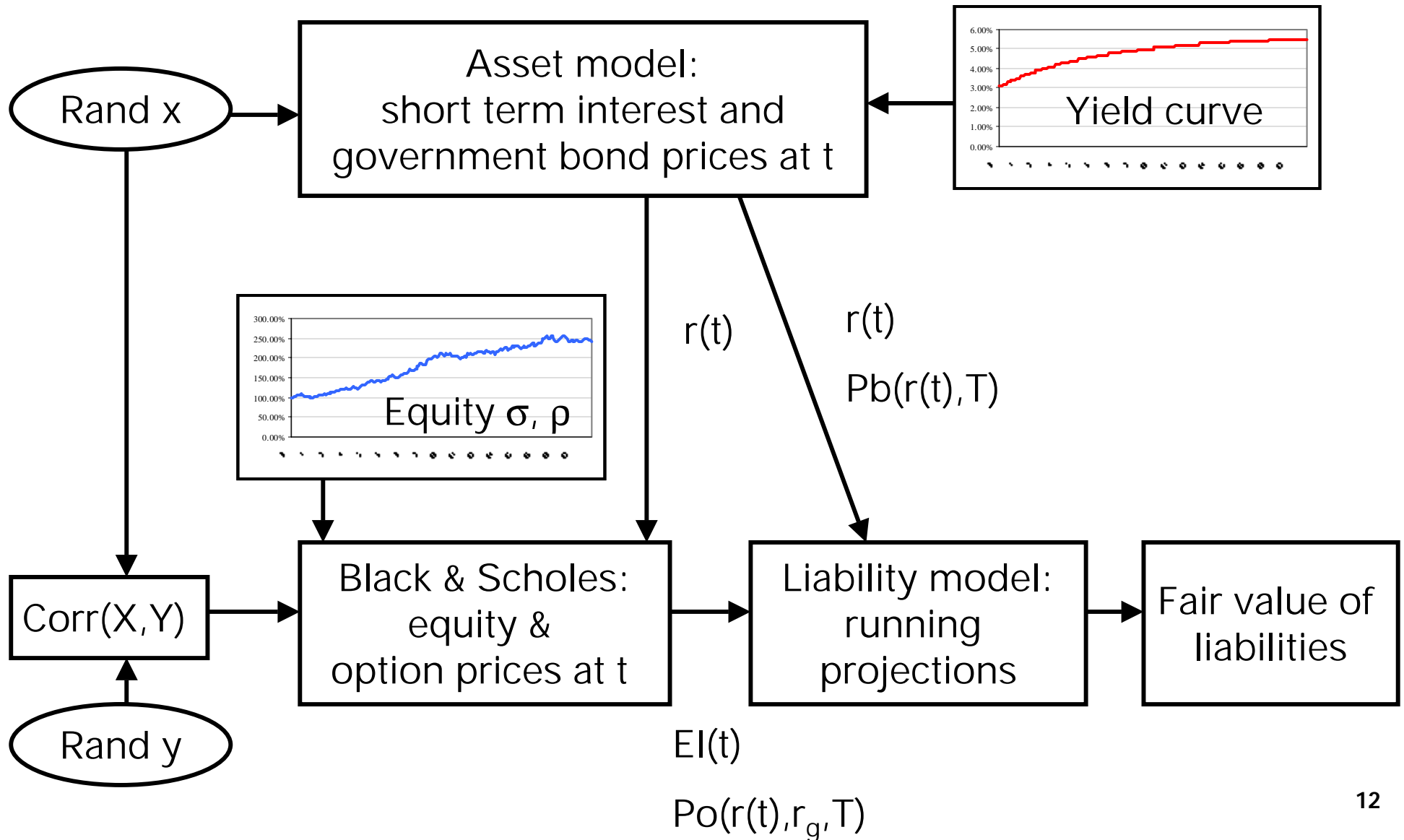
Simulation technique (3)

■ Denotation

r(t)	Short term interest rate at time t
σ	Equity volatility
ρ	Equity bond correlation factor
T	Outstanding term of bond or option
r_g	Development of strike price
Pb(r(t),T)	Price of government zero-coupon bond
Ei(t)	Equity index
Po(r(t),r_g,T)	Price of option
rand x, y	Normal distributed random variables $\sim N(0,1)$

Agenda

- ■ Introduction

- ■ Methods

- ■ Examples

Traditional Swedish products (1)

- Mutual companies
  - Trivial since fair value of liabilities equals net assets

- Non mutual companies
  - Shareholders take a losses if guarantees are hit
  - Bonus is not guaranteed but not likely to be taken back
  - Modelling is non trivial because of bonus system
  - Modelling with simulation

Traditional Swedish products (2)

- Example model of simulating technique

- Modelled two traditional products
  - Endowments
  - Annuities

- Main features
  - Guarantees
  - Bonuses declared monthly
  - Transfers and mortality modelled
  - The company is matching assets to liabilities
  - Future premiums are included

Endowments & annuities

- Central assumptions
  - Guaranteed interest rate: 3 %
  - Premiums indexed according to CPI: 2 %
  - Profit sharing according to solvency of company
  - Bonus is guaranteed
  - Transfer value is policyholder reserve
  - Sum assured is individual for each contract
  - Administrational charge: 1 %
  - Lapse rate: 4 %

Model points

- 5 endowment contracts
  - Terms of 5, 10, 15, 20, 25
  - Premium 20 000
  - Total reserve 750 000
  - Sum insured 1 000 000
  - Age 45, 40, 35, 30, 25, male & females
- 5 annuity contracts
  - Terms of 5, 10, 15, 20, 25 & pay-out period of 10
  - Premium 20 000
  - Total reserve 750 000
  - Sum insured 0
  - Age 45, 40, 35, 30, 25, male & females

Company

- Central assumptions
  - Policyholder/shareholder profit distributed according to 90/10 principle
  - Distributing bonus for all policies
  - Bonus is distributed monthly
  - Investment strategy
    - 50 % bonds
    - 30 % equity
    - 20 % cash
  - Costs are 0.75 % of reserves
  - Shareholder equity: 300 000
  - Policyholder reserves: 1 500 000

Model (1)

- Model is running either stochastic scenarios or deterministic embedded value calculations

- Model consists of three interacting parts
  - Company model
  - Asset model
  - Liability model

- Monthly loop over all policies

Model (2)
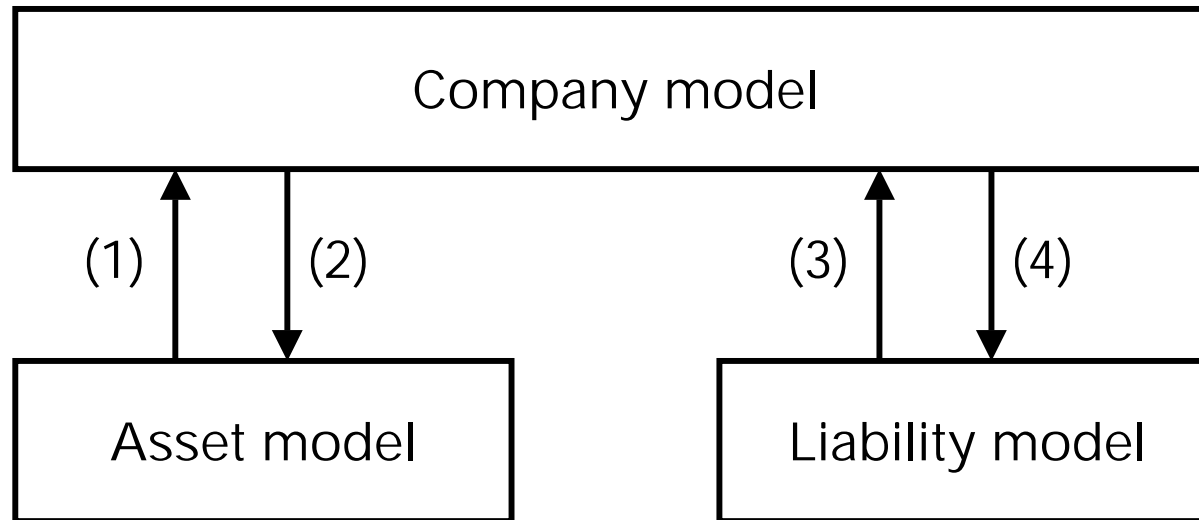
(1)	Investment return on equities, bonds and cash and short term interest rate
(2)	Seeding of scenarios
(3)	Premiums, claims etc
(4)	Bonus rate

Asset model stochastic

- Cox, Ingersoll & Ross short term interest rate model
  - Mean reversion
  - Volatility proportional to $\sqrt{r}$
  - One factor model

- Black & Scholes equity model

- Central assumptions for asset model
  - Calibrated according to government bonds giving
    - Long term interest of 6.8 %
    - Short term interest of 3.5 %
  - Equity volatility 20 %
  - Correlation between equity & bonds -40 %

Asset model deterministic

- Embedded value central assumptions
    - Long term bonds yielding 6.8 %
    - Equities yielding 9.3 %
    - Cash yielding 5.3 %
    - Risk discounting rate of 9.3 %

Central results (1)

■ Present value of future liabilities
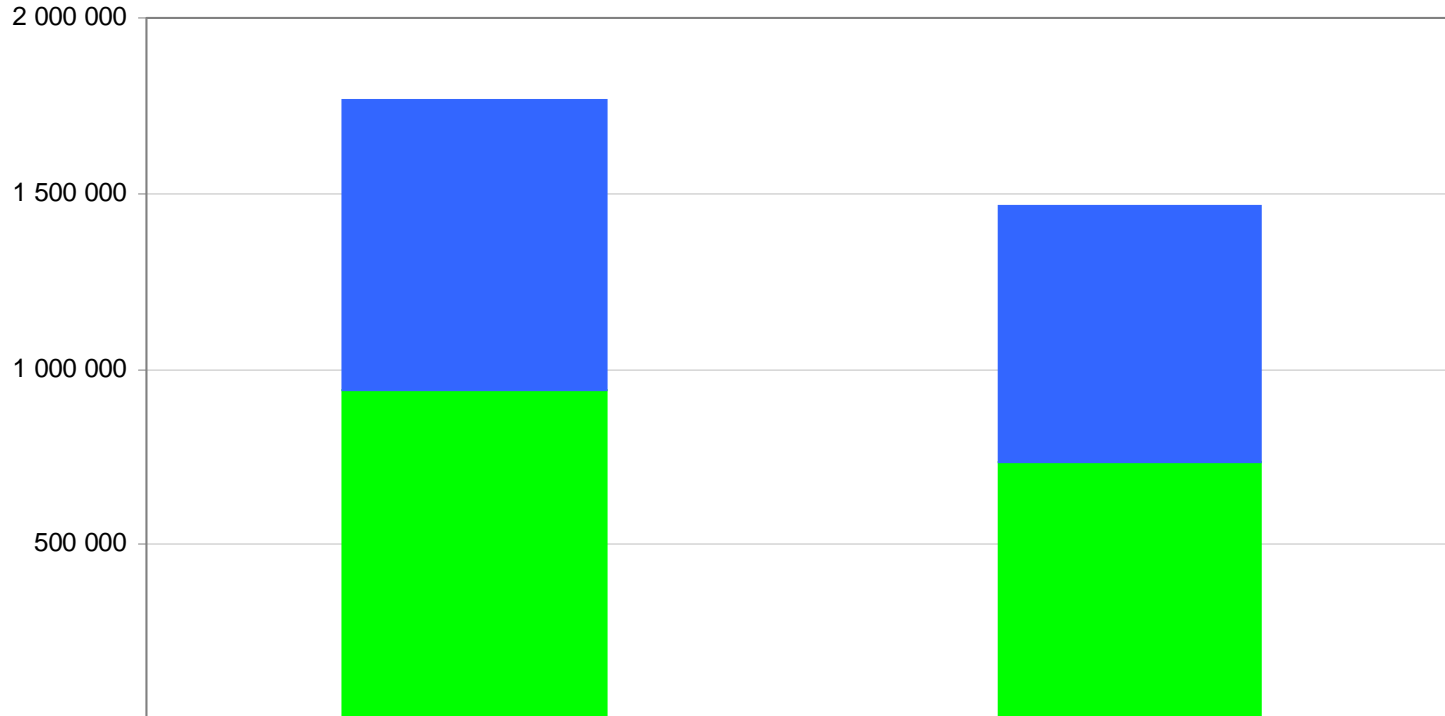
	Fair value method	Embedded value method
■ Endowments	829,743	733,206
■ Annuities	938,796	732,312

Central results (2)

■ Ratio of fair value over embedded value

	Fair value method	Embedded value method	Ratio FV / EV
Endowments	829,743	733,206	113%
Annuities	938,796	732,312	128%
Total	1,768,539	1,465,518	121%

■ Ratio of present value of liabilities over reserve

	Fair value method	Embedded value method
Endowments	111%	98%
Annuities	125%	98%
Total	118%	98%

Sensitivities

■ Sensitivities conducted

  ■ Actuarial

    A Lapse rate * 125 %

    B Mortality * 120 %

  ■ Economic

    C Expenses * 110 %

    D Investment strategy 70 % bonds, 20 % equity, 10 % cash

    E Investment strategy 50 % bonds and 50 % equity

    F Equity volatility of 25 % (simulating US market)

    G Correlation -50 %

    H Profit sharing according to 80/20 principle

Results sensitivities (1)

■ Present value of future liabilities over reserve

	FV	Change	EV	Change	Ratio
Central	118%		98%		121%
A Lapse rate * 125 %	117%	-1%	98%	0%	120%
B Mortality * 120 %	117%	0%	98%	0%	120%
C Expenses * 110 %	119%	1%	98%	0%	121%
D 70 % b, 20 % e, 10 % c	115%	-2%	98%	0%	118%
E 50 % b, 50 % e	156%	33%	96%	-2%	163%
F Equity volatility 25 %	121%	3%	98%	0%	124%
G Correlation -50 %	116%	-1%	98%	0%	119%
H Profit sharing 80/20	114%	-3%	95%	-2%	120%

Results sensitivities (2)

- Fair value of liabilities is sensitive to
  - Investment volatility (E & F)
  - Profit sharing formula (H)

- New business and lapse implications not captured

- Embedded value of liabilities is slightly sensitive to
  - Investment strategy (E)
  - Profit sharing formula (H)

Results sensitivities (3)

■ Net assets less present value of future liabilities

	FV	Change	EV	Change	Ratio
Central	32 889		334 508		10%
A Lapse rate * 125 %	43 886	33%	332 785	-1%	13%
B Mortality * 120 %	40 914	24%	334 745	0%	12%
C Expenses * 110 %	22 441	-32%	332 861	0%	7%
D 70 % b, 20% e, 10% c	70 567	115%	332 503	-1%	21%
E 50 % b, 50 % e	- 544 511	-1756%	361 223	8%	-151%
F Equity volatility 25 %	- 20 404	-162%	335 178	0%	-6%
G Correlation -50 %	58 043	76%	334 508	0%	17%
H Profit sharing 80/20	83 788	155%	368 388	10%	23%

Results sensitivities (4)

- Fair value is about 10 % of the embedded value

- Fair value is sensitive to
    - Investment volatility (D, E & F)
    - Profit sharing formula (H)

- Embedded value is sensitive to
    - Investment strategy (E)
    - Profit sharing formula (H)

- Business implications not captured

Analysis of Fair Value Profit

Steve Hardwick

Skandia Group Chief Actuary

17 April 2002

Traditional income statement

- Tells nothing about business drivers:
  - New sales
  - Profitabillity of new sales
  - Development of old business
  - External effects (e.g. Equity market fall) on shareholder value
- These are value questions

Fair value profit

- Fair Value profits =

  $FV_1 - FV_0$

  $+$ dividends paid

  $-$ capital injections

IAS Income statement includes

+ Net gain or loss on issue (Split between old customers and new customers)

+ Investment return on assets

– Interest on the fair insurance liability

– Overhead expenses

± Experience differences (including the planned release of Market Value Margins)

± Change in assumptions

Skandia Trading Analysis

TRADING ANALYSIS, UNIT LINKED ASSURANCE

SEK million	2001	2000
Present value of new business for the year	1,381	2,243
Return on value of contracts in force from previous years	3,095	2,629
Outcome compared with operative assumptions	361	174
Change in operative assumptions	600	1,809
Value-added from operations	5,437	6,855

Note that premiums, claims and expenses do not appear

Business implications - 1

- New business will be assessed on a fair value basis therefore expect repricing! (Particularly for investment guarantees) However, the DSOP expects zero value added.

- Failure to live within expense allowances will be revealed

- Asset-liability mismatching will show as interest on insurance liability different to the return on assets

- Could be a basis for solvency calculations – Will lead to more sophisticated ALM models

Business implications - 2

- Shift towards unit-linked

- Need for significant analysis of operating experience to provide a basis for setting assumptions

- Need for sophisticated actuarial modelling systems including stochastic capability

- Much more focus on actuarial activity!

- Need for (international) standards for stochastic investment models, tailored to local currency

Extending Fair Values

Svenska Aktuarieföreningen

Anthony Bice

17 April 2002

Tillinghast – Towers Perrin

The Fair Value balance sheet

Assets		Liabilities	
MV of tangible assets	XXX	PV insurance liabilities	XXX
		MV of debt	XXX
			XXX
			XXX
	XXX	Economic Equity	XXX

What is missing from the Fair Value Balance Sheet?

- Impact of limited liability?

- Cost of capital?

- Impact of "diversifiable" risk?

- Goodwill?

- Tax?

The Economic balance sheet

Assets		Liabilities	
MV of tangible assets	XXX	PV insurance liabilities	XXX
Limited Liability put option	XXX	MV of debt	XXX
Tax shields	XXX	Cost of double taxation	XXX
Franchise value	XXX	Agency Costs	XXX
		Cost of financial distress	XXX
			XXX
		Economic Equity	XXX
	XXX		XXX

Tangible assets have an observed market value

Assets		Liabilities	
MV of tangible assets	**XXX**	PV insurance liabilities	XXX
Limited Liability put option	XXX	**MV of debt**	**XXX**
Tax shields	XXX	Cost of double taxation	XXX
Franchise value	XXX	Agency Costs	XXX
		Cost of financial distress	XXX
			XXX
		Economic Equity	XXX
	XXX		XXX

Insurance liabilities do not have an observable price ...

Assets		Liabilities	
MV of tangible assets	XXX	**PV insurance liabilities**	**XXX**
Limited Liability put option	**XXX**	MV of debt	XXX
Tax shields	XXX	Cost of double taxation	XXX
Franchise value	XXX	Agency Costs	XXX
		Cost of financial distress	XXX
			XXX
		Economic Equity	XXX
	XXX		XXX

… but can be valued using market consistent financial models

Market Values ← Actively traded assets or liabilities

Close comparables ← Infrequently traded assets or liabilities

Models ↔ **Insurance liability**
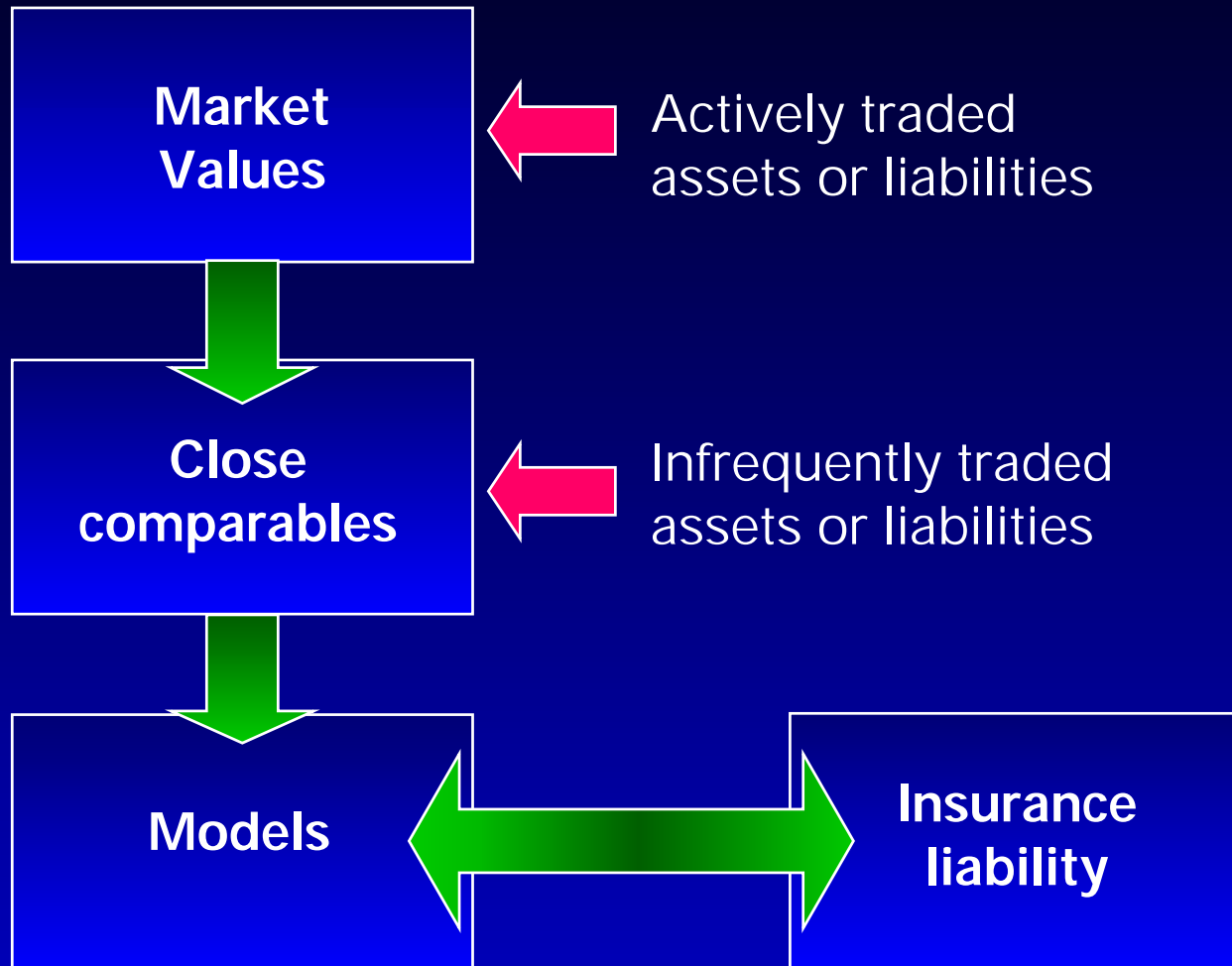
What is a market consistent model?

- **Arbitrage-free**

- **Recognises the role of diversification**

- **Reproduces prices of traded assets**

Value of insurance liabilities reflects credit standing

Assets		Liabilities	
MV of tangible assets	XXX	**PV insurance liabilities**	**XXX**
Limited Liability put option	**XXX**	MV of debt	XXX
Tax shields	XXX	Cost of double taxation	XXX
Franchise value	XXX	Agency Costs	XXX
		Cost of financial distress	XXX
			XXX
		Economic Equity	XXX
	XXX		XXX

Limited liability put option

Payment

Value of company
excluding PV
insurance liabilities
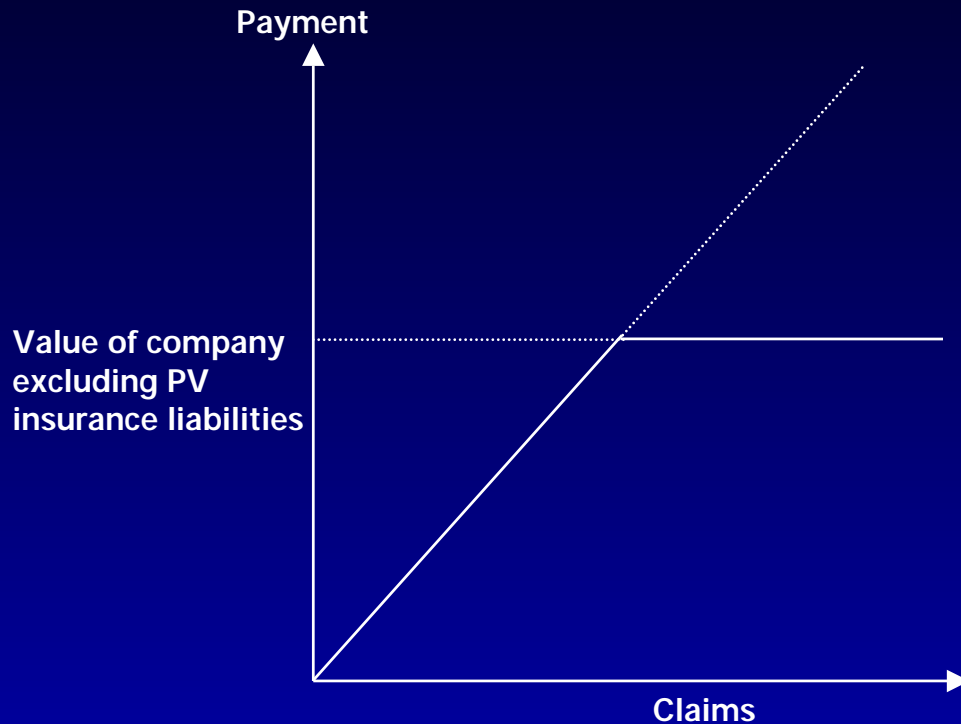
Claims

- Limited liability places a cap on claims payments

- Payments = Max (Claims, Value)

- LLPO = Put(Value)

- Upper bound to value can be approximated using company credit ratings

- However, regulation may reduce Put(Value) towards zero

- LLPO is company specific

FV accounting and a company's own credit risk

- There is a strong view that the fair value of liabilities should exclude the risk of default
    - regulators and policyholders are interested in reserves required if a company does not default
    - liabilities including an allowance for default will go to zero as the chance of default tends to one

- But tangible assets allow for the possibility that an insurers creditors will default - this introduces an inconsistency, especially if payments depend on asset performance

- This is resolved if the "option to default" is treated as an asset and included in the FV balance sheet, or at least as a footnote.

Value depends upon the difference between company and investor taxation

Assets		Liabilities	
MV of tangible assets	XXX	PV insurance liabilities	XXX
Limited Liability put option	XXX	MV of debt	XXX
Tax shields	XXX	Cost of double taxation	XXX
Franchise value	XXX	Agency Costs	XXX
		Cost of financial distress	XXX
			XXX
		Economic Equity	XXX
	XXX		XXX

Taxation

Included in PV liabilities	Double taxation/tax shields
■ Assuming no excess capital ■ Assuming reserves equal PV liabilities ■ Allowing for all relevant insurance company taxation ■ If tax rules are "fair", should be zero on average (except for policyholder taxation) ■ Tax payments may depend non-linearly upon returns	■ Based on excess capital and regulatory reserves ■ Based up difference between investor taxation with and without the existence of an insurance company ■ Tax payments may depend non-linearly upon returns

Franchise value reflects a company's ability to write profitable new business

Assets		Liabilities	
MV of tangible assets	XXX	PV insurance liabilities	XXX
Limited Liability put option	XXX	MV of debt	XXX
Tax shields	XXX	Cost of double taxation	XXX
Franchise value	**XXX**	Agency Costs	XXX
		Cost of financial distress	XXX
			XXX
		Economic Equity	XXX
	XXX		XXX

Franchise value

- Value of projected future profits

- Allows for impact of economy on new business

- Not allowing for financial distress

- In practice, Franchise value = NBV x multiplier, but both NBV and multiplier will be different from those used in appraisal values

- Most likely approach will be to estimate multiplier from traded prices and the EBS

"Are management an off balance-sheet liability?"

Assets		Liabilities	
MV of tangible assets	XXX	PV insurance liabilities	XXX
Limited Liability put option	XXX	MV of debt	XXX
Tax shields	XXX	Cost of double taxation	XXX
Franchise value	XXX	**Agency Costs**	**XXX**
		Cost of financial distress	XXX
			XXX
		Economic Equity	XXX
	XXX		XXX

Agency costs

- **Arise because of separation of ownership and control - leads to a perception that management may not always act in the best interests of shareholders**
    - monitoring costs, internal and external
    - management perquisites
    - management may not aim to maximise value

- **Studies suggest agency costs are linked to free cash flow (free capital), transparency and ease of changing risk profile**

- **Costs in region of $^1/_2$% to 2% of free cash flow; 5% to 20% of free capital**

Loss of franchise value is the main cost of financial distress

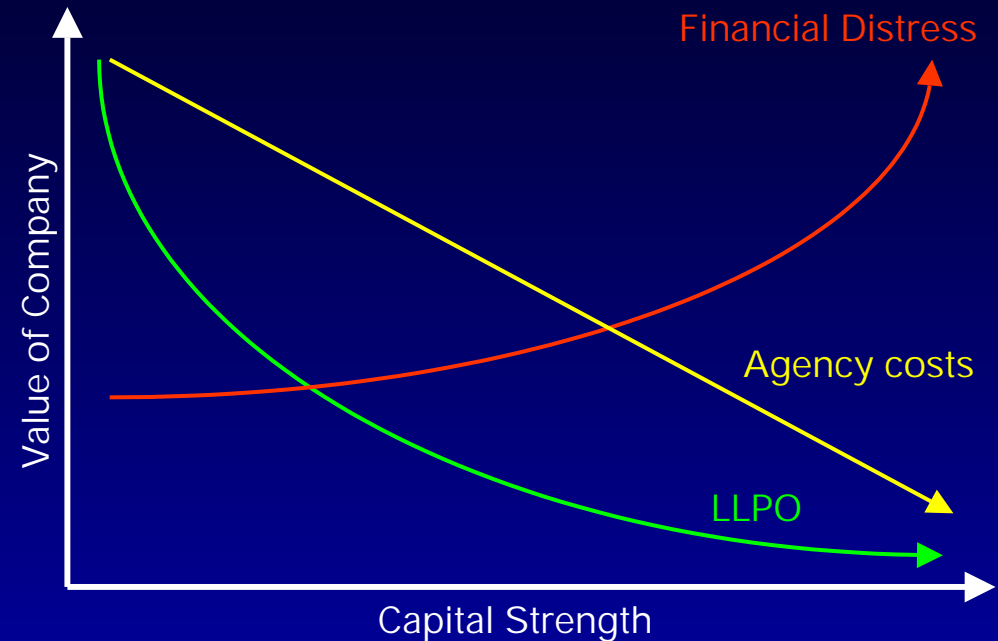| Assets		Liabilities	
MV of tangible assets	XXX	PV insurance liabilities	XXX
Limited Liability put option	XXX	MV of debt	XXX
Tax shields	XXX	Cost of double taxation	XXX
Franchise value	XXX	Agency Costs	XXX
		Cost of financial distress	**XXX**
			XXX
		Economic Equity	XXX
	XXX		XXX

Financial distress

- **Costs of financial, not economic, distress, eg a change in credit rating, Chapter 11 insolvency (in US)**

- **Direct costs 10-20% of pre-distress value**

- **Indirect costs biggest issue for insurers**
  - **loss of future new business**
  - **loss of in-force value (lapses)**

- **High capital levels and good risk management reduce costs for insurers**

- **For major insurance companies, the cost of financial distress is a few percent of Economic Capital**

Does the model make sense?

- **Capital has a cost**
  - **taxation**
  - **agency costs**
  - **loss of LLPO**
- **All risk has a cost**
  - **costs of financial distress**
  - **convex tax**
- **Without these items (ie only PVL/MVA) capital and diversifiable risk don't matter**

Value of Company (vertical axis) vs Capital Strength (horizontal axis). Curves: Financial Distress, Agency costs, LLPO.

Some illustrative results

Assets		Liabilities	
MV of tangible assets	10,000	PV insurance liabilities	8,000
Limited Liability put option	400	MV of debt	0
		Agency Costs	200
Franchise value	1,500	Financial distress	100
		Double taxation	600
		Economic Equity	3,000

CMC/EBS approach addresses the problems with EV

- Market consistent techniques reproduce value of traded securities

- Explicit approach to valuation, encompassing optionality and discount rates

- Consistent with Fair Value approach (in fact, builds understanding of it)

- Recognises additional costs and benefits of being an insurance company
  - cost of variability (financial distress)
  - cost of capital (agency costs)

Where to next?

- **Pricing**

- **Performance measurement**

- **Reserving**

- **ALM/hedging strategy**

- **Acquisitions and divestitures**

- **Financial reporting**

Changes our view of product profitability

More profitable

- Products issued by low-rated insurers

- Products with high statutory capital requirements

- Products with little market exposure, mismatching or guarantees
  - protection
  - U/L

Less profitable

- Products offered by high rated insurers

- Products generating **significant** volatility

- Products with high market exposure mis-matching or guarantees
  - immediate annuities
  - SPDA/Variable Annuity

This also provides a foundation for understanding capital and risk
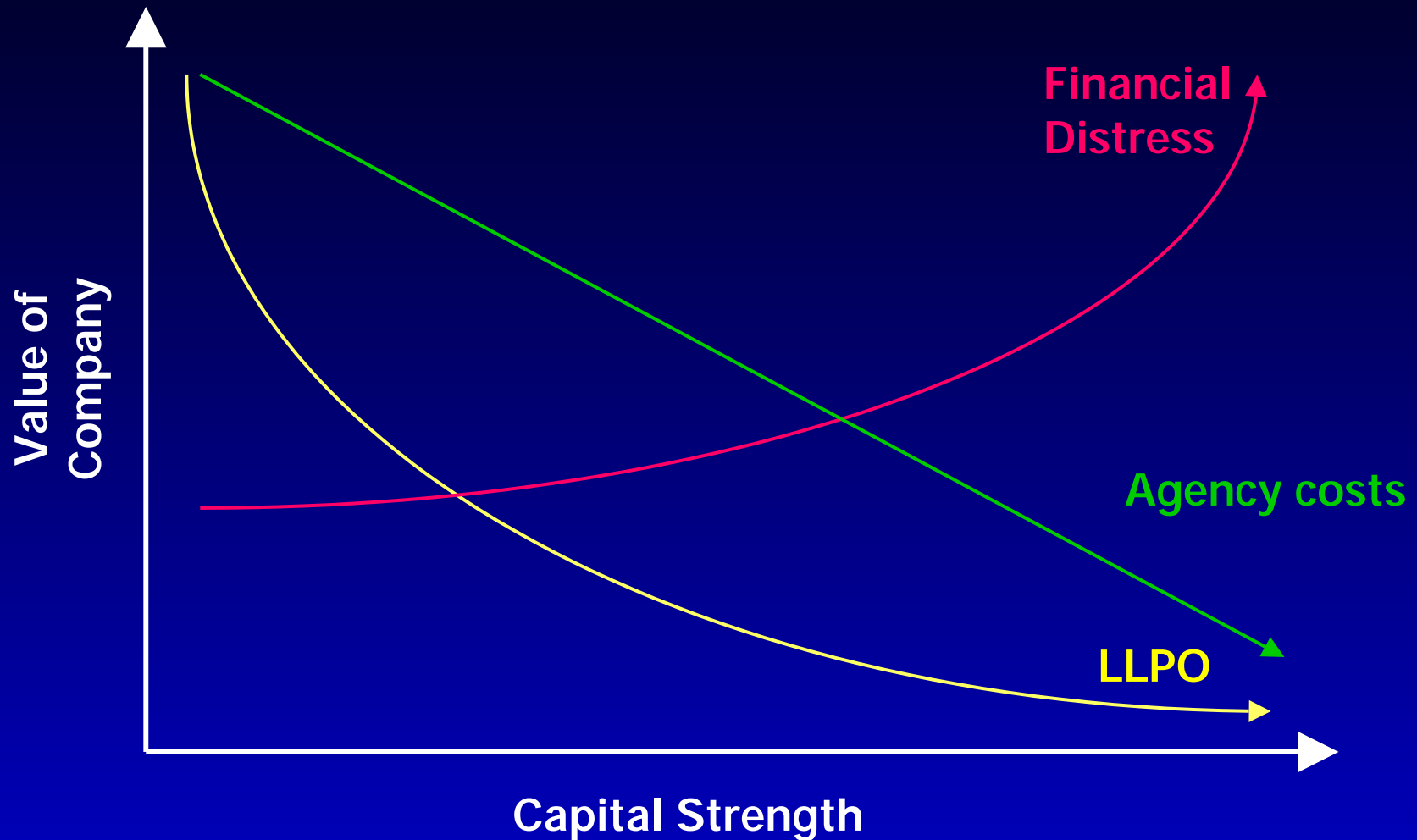
Building on fair values

Question	Insight
Should FV liabilities be based on risk free or risk adjusted discount rates?	■ Limited liability put option required for accurate valuation
How should the "market value margin" be calculated?	■ Depends on agency costs, etc. ■ No unique value ■ Should it be calculated?
Are EVs also required	■ Depends on agency costs, etc. ■ No unique value ■ Should it be calculated?

Fair Value Implementation

Svenska Aktuarieföreningen

Artur Chmielewski

17 April 2002

Tillinghast –Towers Perrin

What is required - deliverables

- IAS accounting standards probably to be adopted by EU for public companies by the end of 2005

- Necessary to produce balance sheets on Fair Value basis for the 2003, 2004 and 2005 year ends, in order to produce income statements for 2004 and 2005

- In order to estimate the impact on earnings of moving to the new standard, and thereby undertake actions in time, the 2002 balance sheet and 2003 earnings should be recalculated internally, at least on approximate basis

- Useful to carry out a detailed calculation for a pilot company for 2002 (can also be a line of business)

What is required - process

- Project outline and plan

- Internal guidance note

- Business analysis

- Systems

- Disclosure

- Taxation

- Impact analysis

- Calculation of balance sheet and earnings analysis

What is required - process

■ Project outline and plan
- → high level summary of the requirements
- → deliverables
- → departments and systems involved

■ Internal guidance note
- → how to calculate the FV of liabilities
- → how to analyse the results
- → should be fairly detailed and cover required valuation techniques

What is required - process

- **Business analysis**
  - → determine broad techniques needed to value each line of business

- **Systems issues**
  - → administration systems (mostly extracting more information)
  - → actuarial systems (will be subject to big changes if the products contain optionality)
  - → accounting systems

What is required - process

- **Disclosure**
  - → requirements not yet finalised by IASB
  - → as for EV reporting the disclosures will include sensitivities, assumptions etc

- **Tax effects?**

- **Impact analysis**
  - → should be carried out as early as possible

- **Calculation of balance sheets and earnings analyses**
  - → initial "surprises" to be expected: unforeseen issues, errors etc

Timetable

- 2002
  - → produce project plan
  - → first draft guidance note
  - → conduct business analysis
  - → identify the pilot
  - → working with the pilot: review and develop guidance, develop approach to option valuation, implement the changes to actuarial systems, set assumptions
  - → produce approximate 2002 balance sheet for entire company

Timetable

- 2003
  - → detailed 2002 balance sheet for the pilot
  - → roll out to wider company
  - → global assumptions for the 2003 balance sheet for wider company
  - → systems across company
  - → develop approach to earnings analysis

Timetable

- 2004
  - → detailed earnings, analysis and disclosure for the pilot
  - → 2003 balance sheet for the whole company
  - → review results, issues and implications
  - → review guidance
  - → roll out earnings analysis for 2004 across the company
  - → update assumptions

Timetable

■ **2005**

→ 2004 balance sheet and earnings across the company

→ review 2004 results (first full results for the whole company), issues and implications

→ produce Fair Value accounts for the first time

→ finalise presentation and disclosure

→ update guidance, systems, assumptions etc

Timetable

- **Early 2006**
  - → 2005 balance sheet and earnings across the company
  - → second Fair Value accounts
  - → publication of accounts

Any questions - give us a call!

- Artur Chmielewski +46 70 622 7172

- Erik Erixon   +46 70 622 7170