



Joint Colloquium of the IACA, PBSS and IAAHS Sections of the International Actuarial Association

Westin Copley Place Hotel, Boston, U.S.A. – 4-7 May 2008

Pension Finance and the Significance of Defined Benefit Pension Plans

(through considering the essence of Liability Driven Investment)

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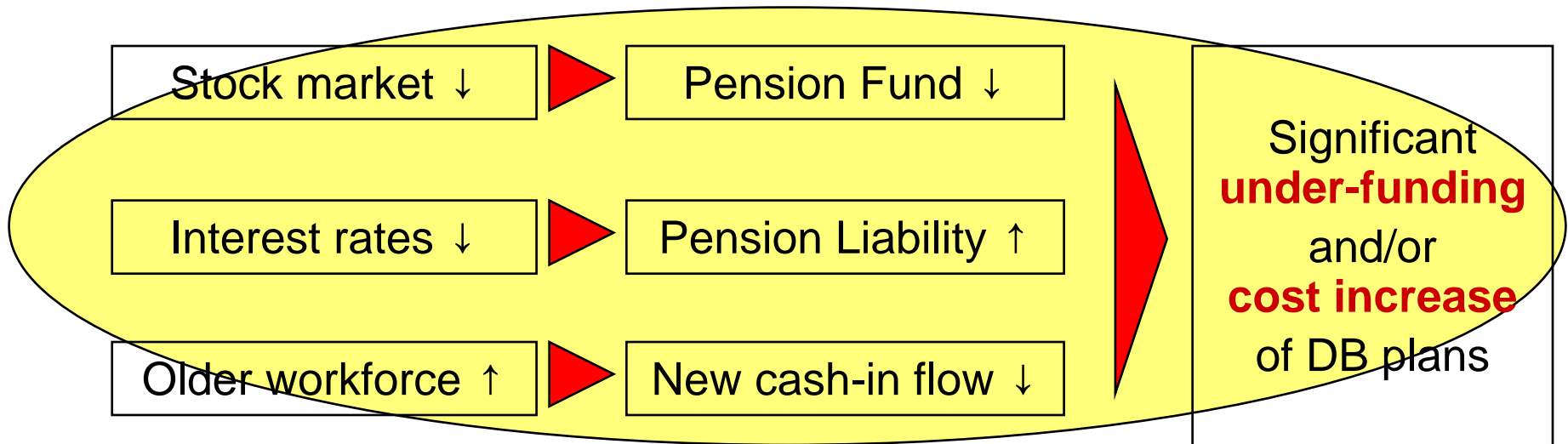
Background of LDI emergence

LDI (Liability Driven Investment) is now becoming popular because ...

- Plan sponsors want to avoid excessive fluctuation of **pension costs**.
- Accounting changes have directly influenced to **pension liabilities**.
- Funding regulations are severer than before toward **under-funding**.
- **Closed plans** should be more controllable.

Background of LDI emergence

Especially for avoiding the next crisis of DB plans under another ‘**perfect storm**’ (Absolute return strategies have also been driven in this context.)



Perfect Storm

Concept of LDI

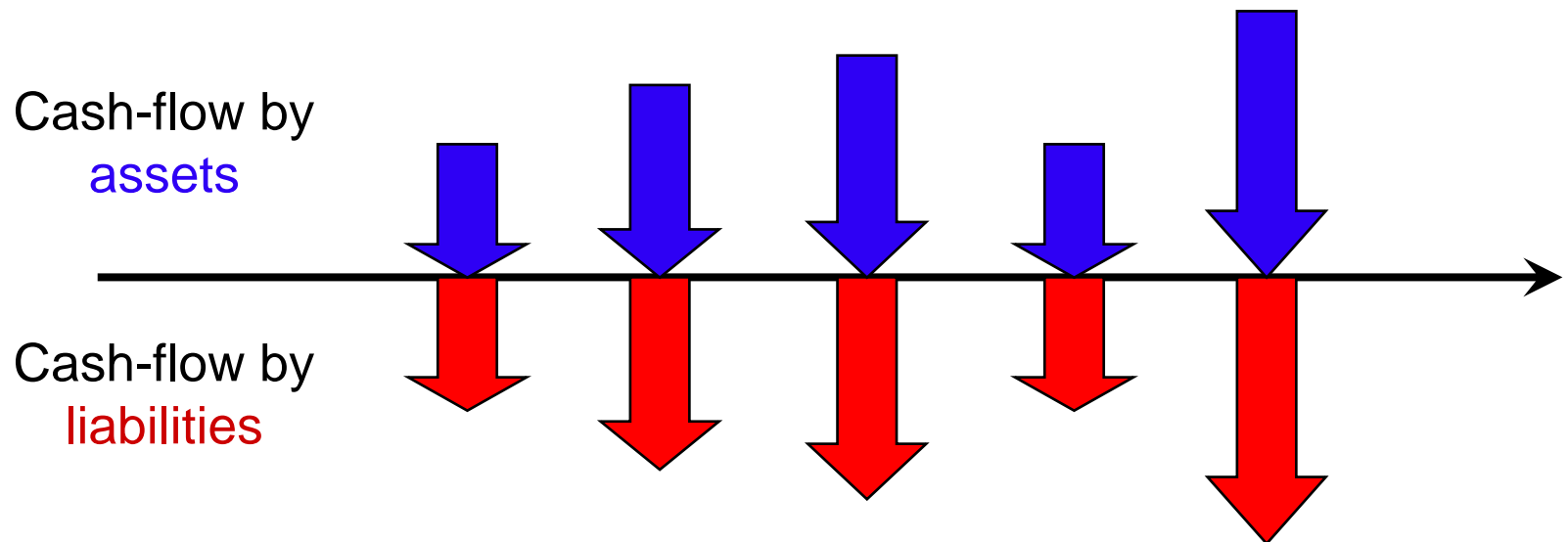
LDI seems to be a kind of fashion words that many people have different interpretations.

In general consensus, LDI is simply the practice of investing against a **benchmark reflecting liabilities, not reflecting markets** as traditional investment strategies.

Therefore, LDI should be considered in a context of **Asset Liability Management (ALM)**.

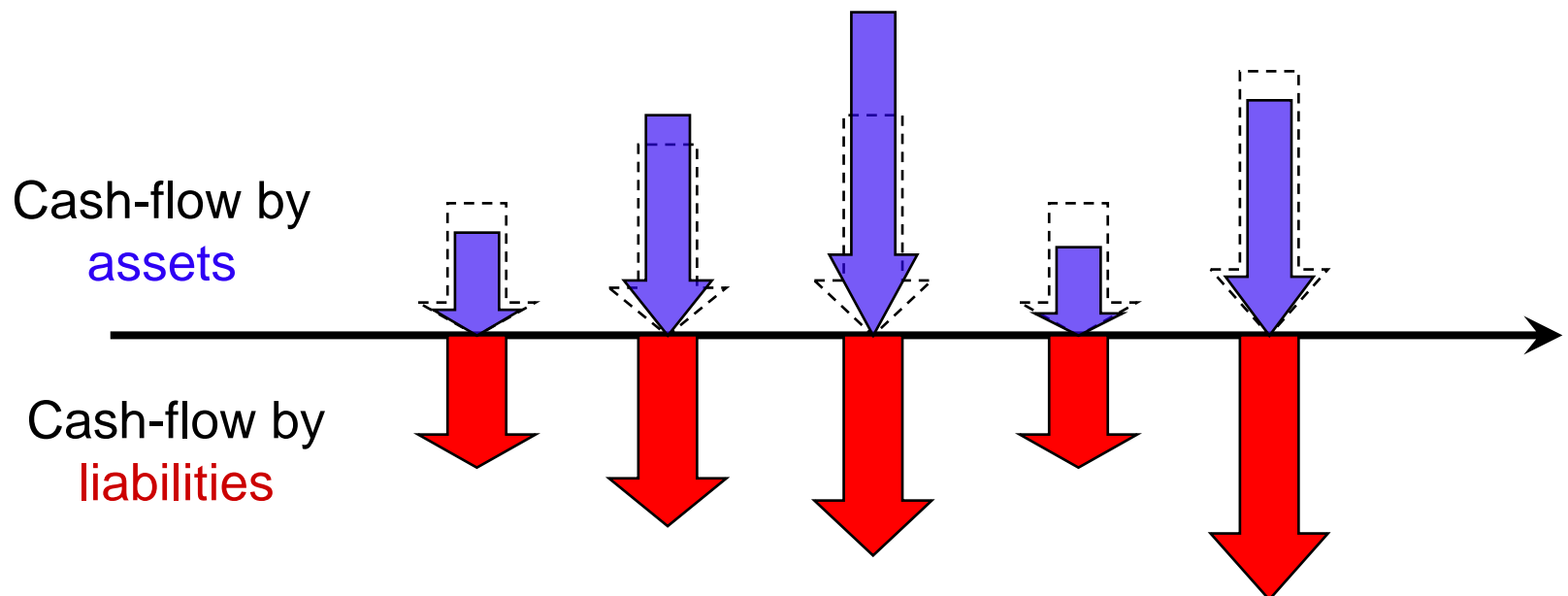
Risk-free portfolio against liabilities

At first, we should consider **the risk-free portfolio** (base-line) against pension liabilities. It should be **cash-flow matching** of assets for liabilities that can offset market fluctuations.



Seeking opportunity better than risk-free

Next, we may seek **opportunity of investment better than risk-free**. It means bearing some risks not to match cash-flow of liabilities.



Definition of Pension Liabilities

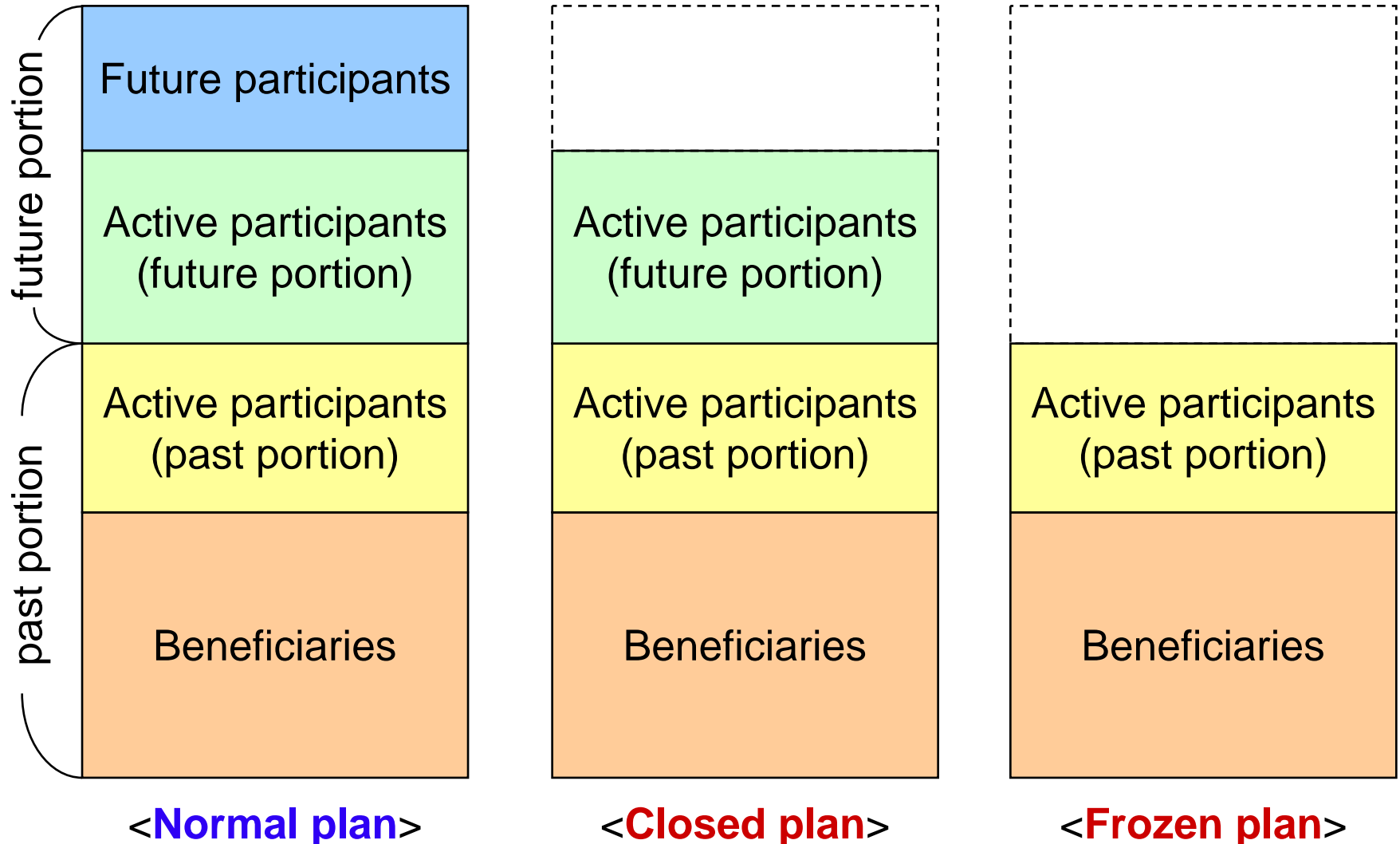
For ALM, the most important thing is **how we should define pension liabilities**.

There are several types of pension liabilities such as for **funding or accounting**.

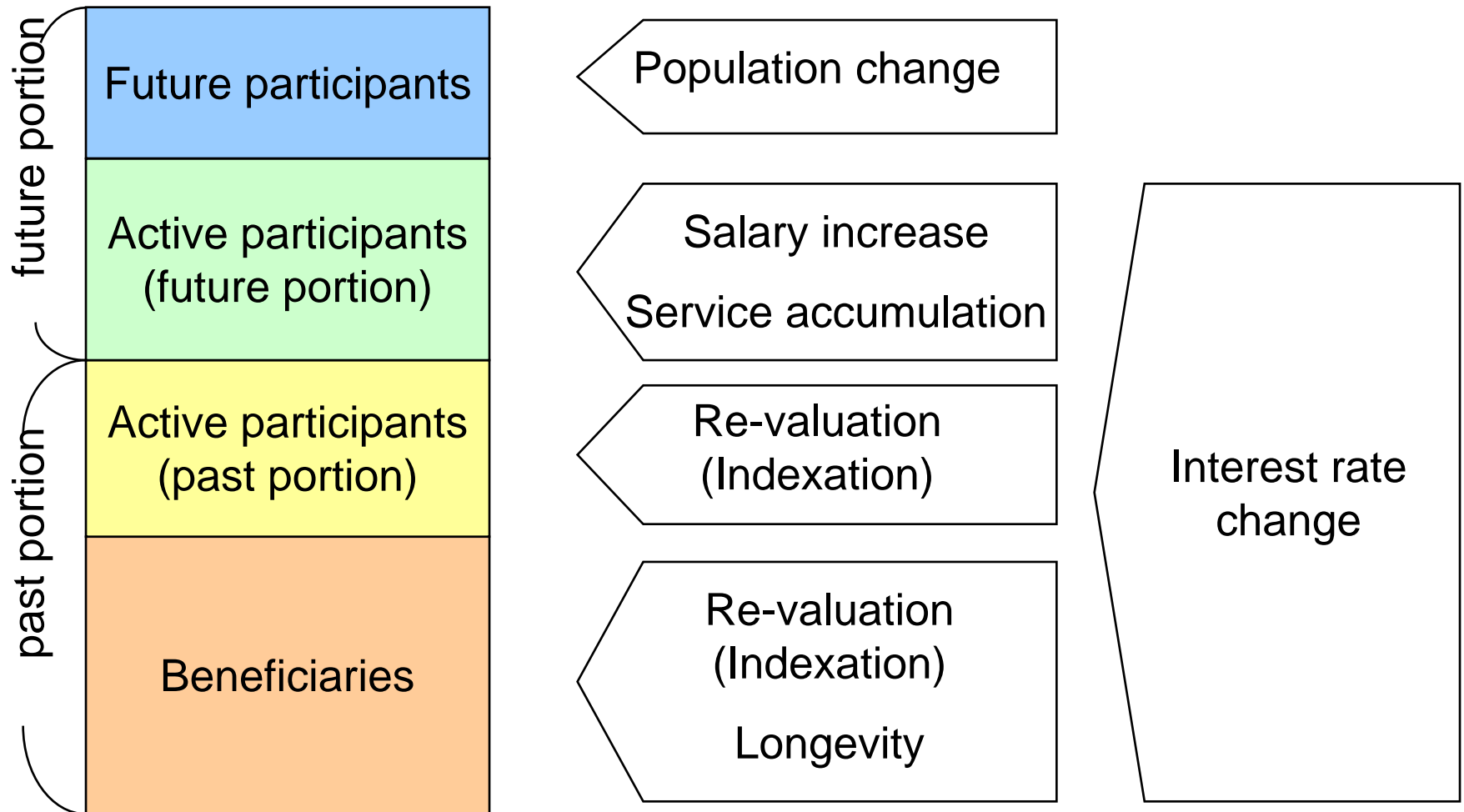
Also, pension liabilities are divided into **past portion and future portion**.

(Here, I would like to avoid 'past service liabilities' that have special meaning.)

Structure of Pension Liabilities



Volatility of Pension Liabilities



Variation of Pension Liabilities

| Liabilities | Portion | Past portion recognition | Discount rates | Salary increase |
|--------------------|--------------------------------|------------------------------|-----------------------------|-----------------|
| Funding | <u>Future + Past</u> → Past | <u>Spread</u> | <u>Single</u> → Multiple | <u>Include</u> |
| Pension protection | <u>Past</u> | <u>Immediate</u> | <u>Single</u> → Multiple | <u>Exclude</u> |
| Accounting | <u>Past</u> | <u>Spread</u> → Immediate | <u>Single</u> | <u>Include</u> |

Current Japan

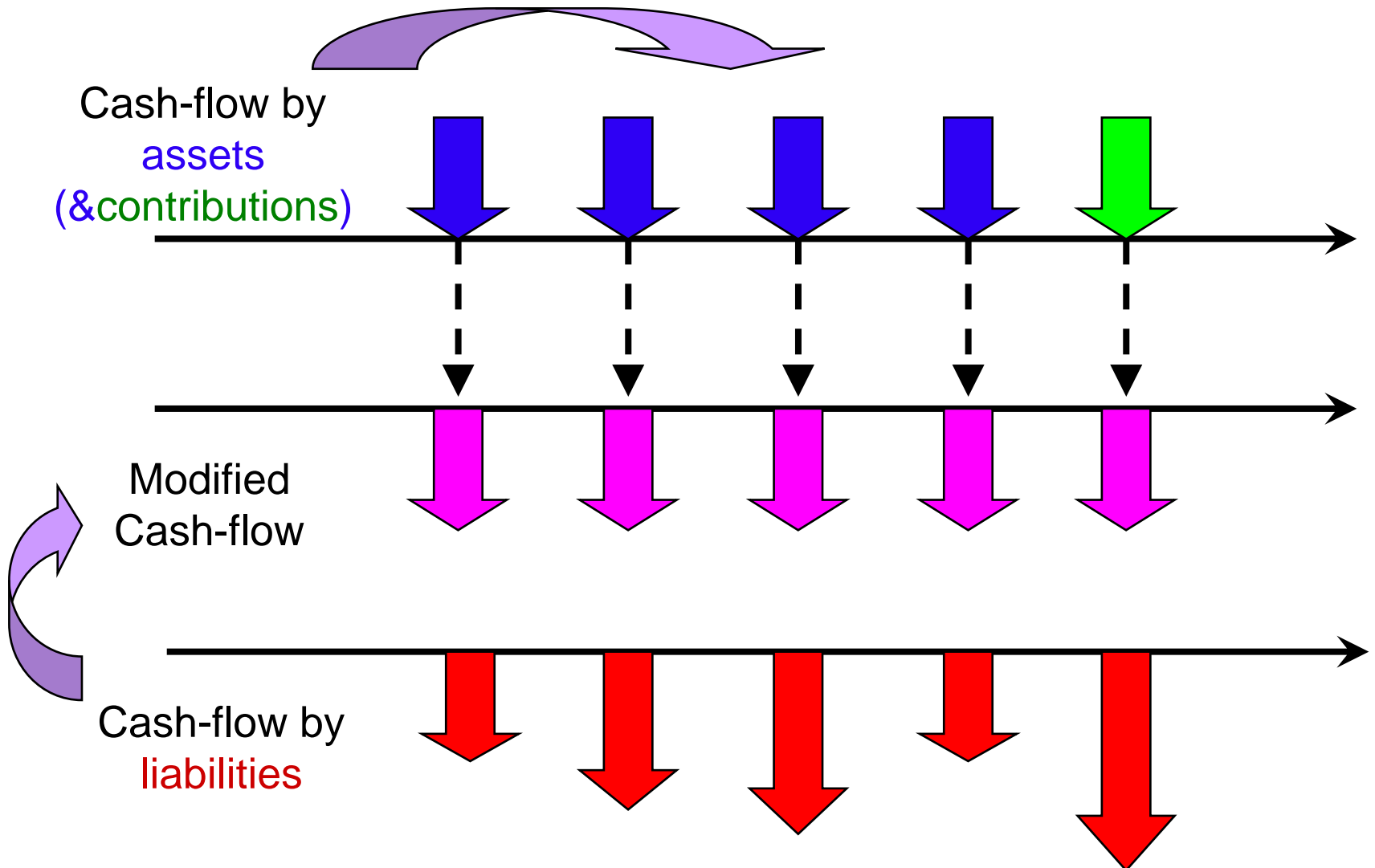
| | | | | |
|---------|------|-----------|-------------|---------|
| Unified | Past | Immediate | Yield curve | Exclude |
|---------|------|-----------|-------------|---------|

Advanced ALM

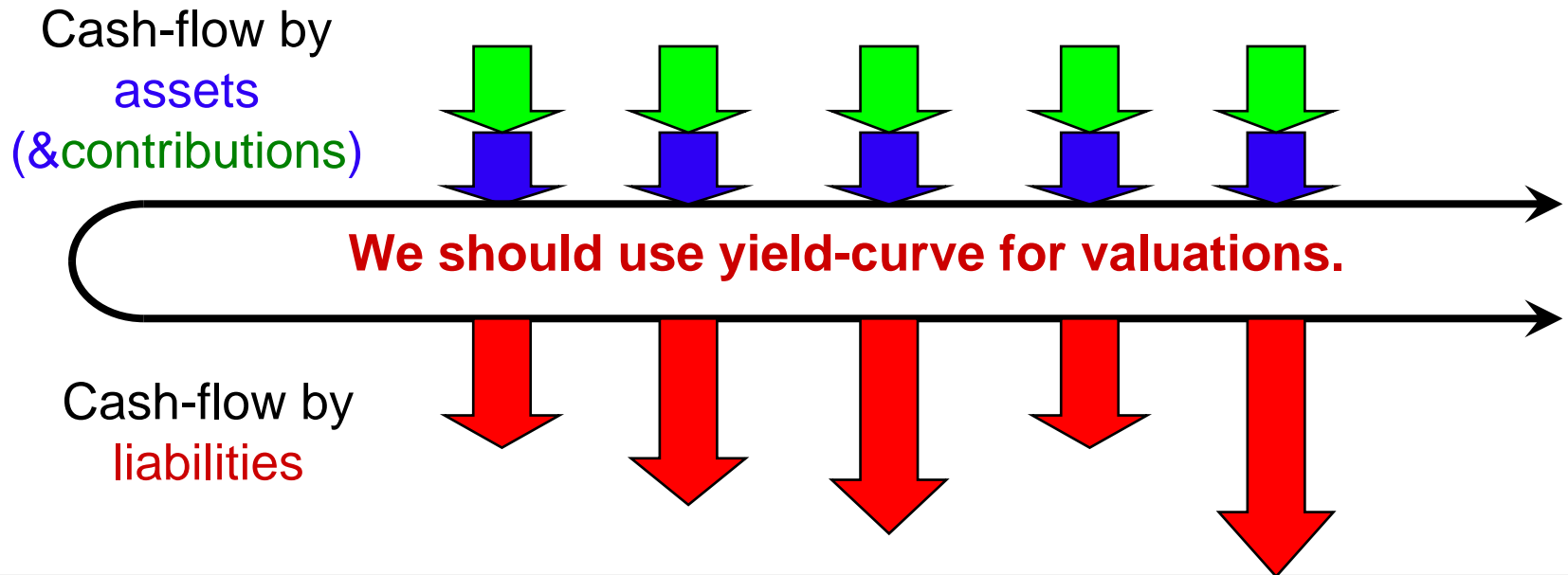
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Effectiveness of Financial Engineering



Origin of Pension Finance



Pension finance should take into account of **mark-to-market movement**.
It is necessary to **unify pension liabilities** for many purposes.
It is important to recognize that pension benefits are financed by
assets and **promises** in DB plans.
(past contributions) (future contributions)

The significance of corporate pensions

<Corporation and Pension Fund>

