

## Index linked bonds

The future starts  
every day...



# Content

- **Framework index linked bonds.**
  - Optimization of risk sharing.
- **Background demand and supply side.**
  - Need for house price index linked bonds?
    - No transparent price of the risk of housing market (due to illiquidity).
  - Especially for the Dutch housing market.
    - Rising costs of mismatch assets and liabilities.
  - Who wants to and can participate in the house price risk of the bank? And what are the risk premia?
- **Real life examples.**

# What is an index linked bond?

- **Index linked bond:** A bond of which the coupon payments and the principal is related to a specific index (e.g., the consumer price index (CPI)).
- **What is the advantage of index linked bonds compared to standard bonds?**
  - An index linked bond is valuable for investors because it provides protection against the developments of an index. For example, a pension fund with a cost obligation: an ordinary bond delivers a fixed interest rate but an index linked bond delivers protection against rising inflation.
- **Example:** Suppose we buy a standard bond with a coupon of 4%. If the inflation equals 3%, we have a real rate of return of 1%. A CPI index linked coupon of e.g. 2% pays, in the case of a CPI increase of 3%, in nominal terms 5%. In real terms, a yield of 2% with certainty.



Why?

# Framework for risk-sharing

- **Possession of houses leads to risk. Who will take that risk?**
  - Banks: get the credit losses in the event that the client is not able to meet expenses.
  - NHG: in case of financing under NHG conditions.
  - Consumer: equity losses if the value of the house decreases.
  - Society: stop loss of NHG and fall in consumer confidence.
- **Current situation of the housing market.**
  - Housing market is mature with a long term upward pressure on house prices due to scarcity.
  - Currently, fall in house prices and little movements.
  - Broader lending surge and low interest rates lead to the risk of a shrink in case of rising interest rates or more stringent requirements.
  - Fluctuations in the long term, not a problem as long as they can comply with payment commitments.

# Supply side

- **Banks have relatively much risk related to the housing market on balance sheet.**
  - The risk is low because of the stringent requirements, but there is concentration risk.
  - Diversification of house price risk lowers capital requirements and reduces the cost of financing.

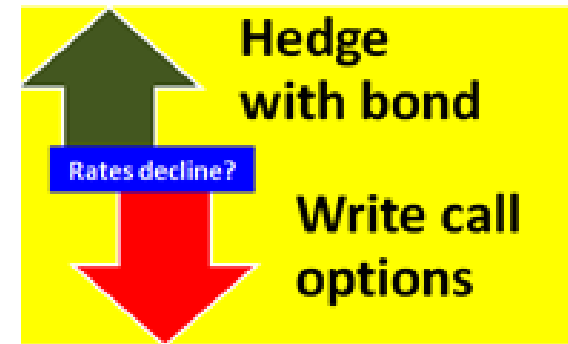
**Solution:** hedge for house price risk through index linked bonds.
- **For house owners often a large portion of their equity is in their house.**
  - Temporary declines have considerable impact on consumer confidence and the economy.
  - Customers in the age group 55-65 years want the possibility to make their equity liquid without moving.

**Solution:** insurance against house price fall through index linked bond.

# Demand side

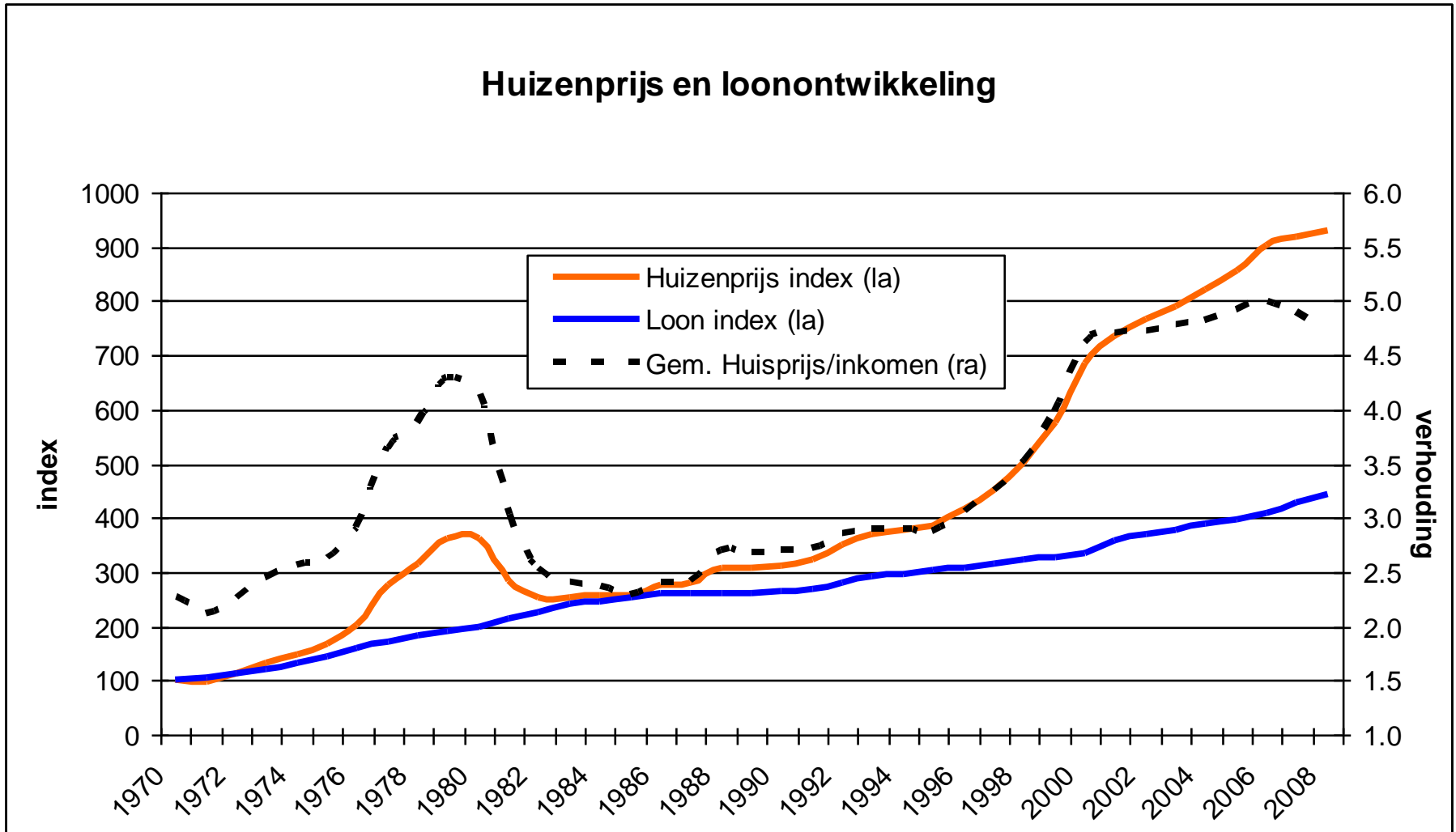
- **Increase in home ownership provides an increase in risk.**
  - Starters on the housing market have relatively high mortgages.
  - Public debate about maximum mortgage value (AFM).
  - Solution:** saving accounts with interest related to house prices.
  
- **Appropriate investment opportunity for pension funds (foreign).**
  - House price index linked bonds provide diversification opportunities.
  - Movements are related to inflation in the euro zone.
  - Solution:** issuance of index linked bonds.

# Hedge for banking



- There are two reasons for a hedge on the housing market:
  - Risk management
  - Capital management
- **Risk management:** The hedge gives a positive cash flow and/or book value in case of decreasing house prices, which results in more stable incomes.
- **Capital management:** A decreasing housing market is incorporated in the capital charge (downturn LGD) for mortgages and gives an additional charge of 20%-70% economic capital (EC). Issuance of index linked bonds lowers the effect of decreasing house prices and therefore lowers the EC charge.

# Increase in risk exposure of Dutch households

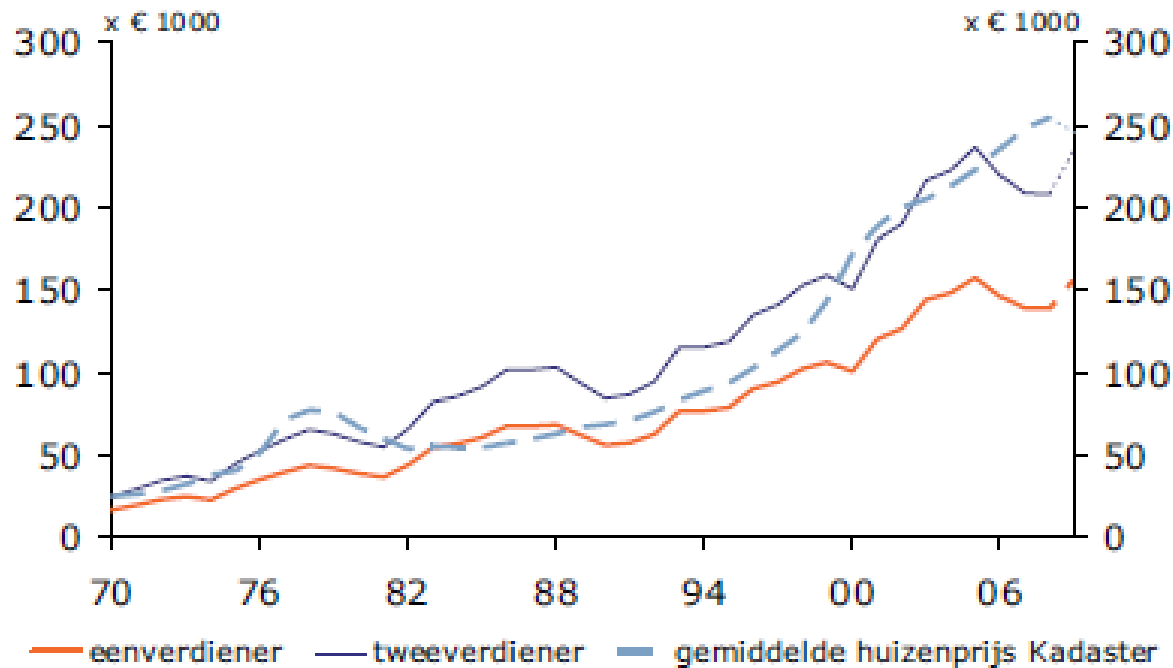




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# Maximum mortgage increases

**Figuur 12: Maximale hypotheeksom neemt toe**



Bron: CPB, Kadaster, Reuters Ecwin, Rabobank



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# Insurance?

We buy insurance against fire, water damage, sickness and unemployment. Then, why not against falling house prices and remaining debt?

# Change risk exposure of Dutch households



- **Increase in risky assets (including shares and houses)**  
**Dutch households 1980 – 2007**
  - From 50% to 85% of the total equity, CPB.
  - From 200% to 700% of the total income, CPB.
- Dutch households and consumer confidence are more depending on the stock and housing market.
- Major demographic shift: "Baby boom" generation.

# Long term perspective

- **Opportunities for index linked bonds are:**
  - Investment possibility in housing market without having to buy a house.
  - Possibility of sharing risk among different generations.
  - Transparent price of risk regardless of number of transactions.
  - Investing in housing market without high transaction costs and long transaction times.
  - More flexible diversification opportunities for banks and pension funds (risk reduction).
  - Ingredient for saving, insurance and pension products.

How do we create an index linked bond?

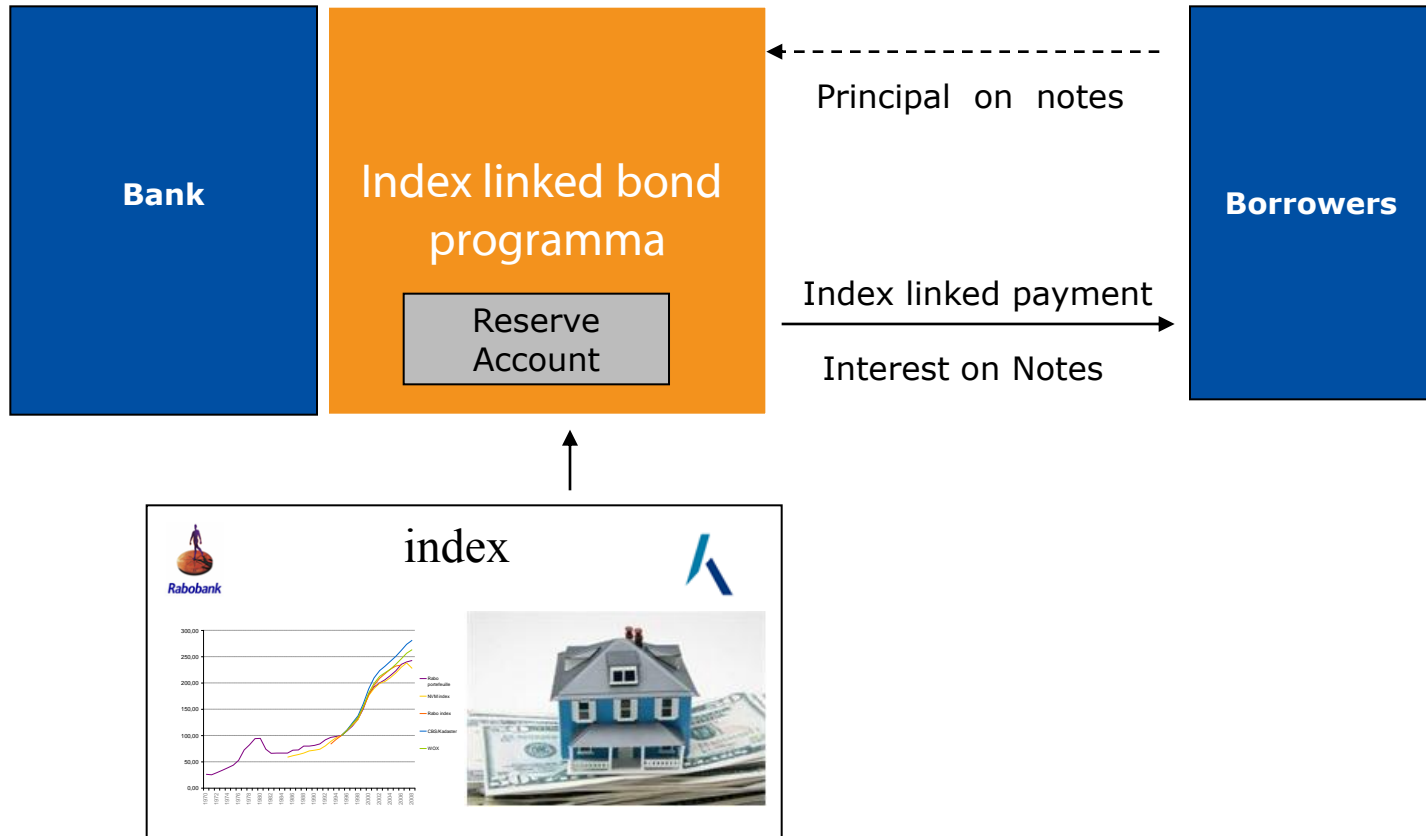


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# What is a house price index linked bond?

- For a house price index linked bond the coupon payments and the repayment of the principal depend on the house price index.
- This transfers the house price risk (partly) to the bondholder (risk management) and lowers the capital charge of the issuer (capital management).
- **Rational of the idea:**
  1. The lower capital charge gives an opportunity to create a higher return on equity to compensate for the costs of the issuance of index linked bonds.
  2. Issuance of bonds creates risk sharing and more diversified portfolios.
  3. Possibilities for development of new products which give protection against house price risks.

# Overview





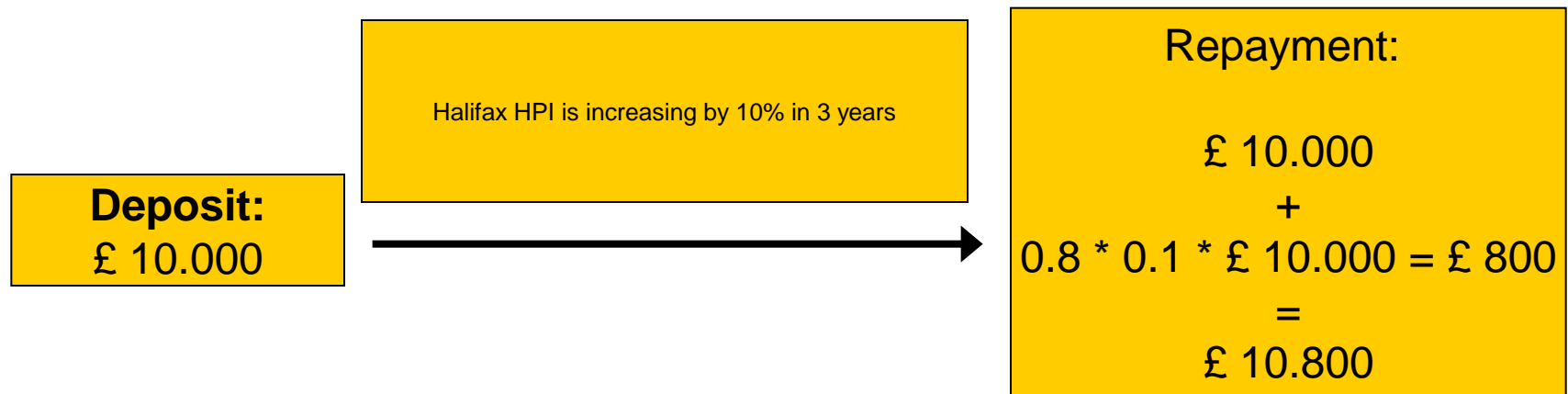
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# Example 1: Index-Linked Bond (Halifax)



## Guaranteed UK House Price Index Tracker Bond

- Index: Halifax House Price Index.
- Duration: 3 years.
- Coupon: zero coupon.
- Principal: refund original principal after 3 years + 80% of the Halifax price rise (floor of 0).





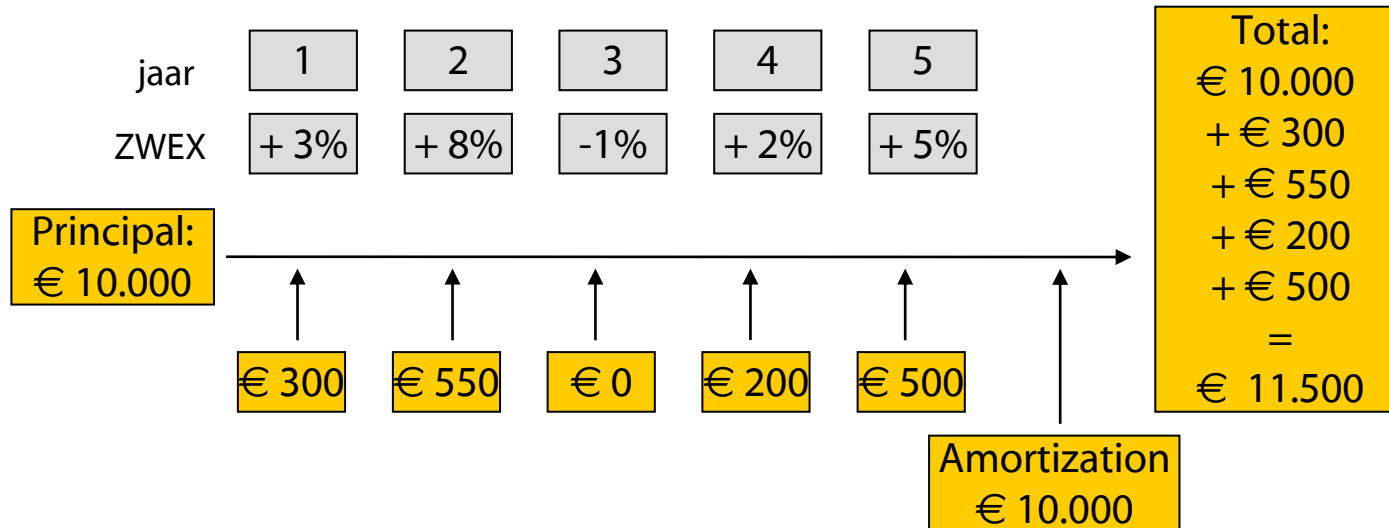
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## Example 2: Index-Linked Bond (ZWEX)

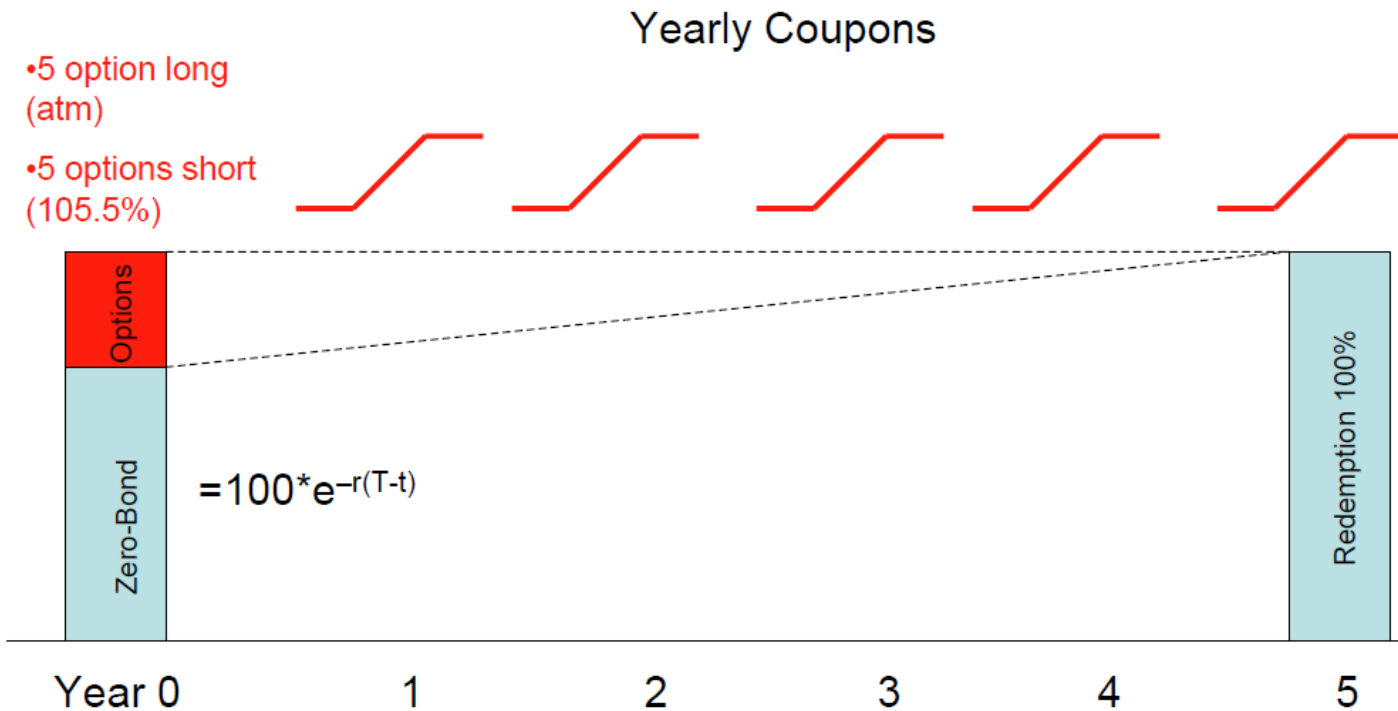


### Capital Protected Note on the ZWEX

- Index: ZWEX (Zürcher Wohneigentums Index).
- Duration: 5 years.
- Coupons annually: ZWEX index with floor of 0% and cap of 5,5%.
- Principal: refund original principal.



# Decomposition ZWEX Index Linked Bond

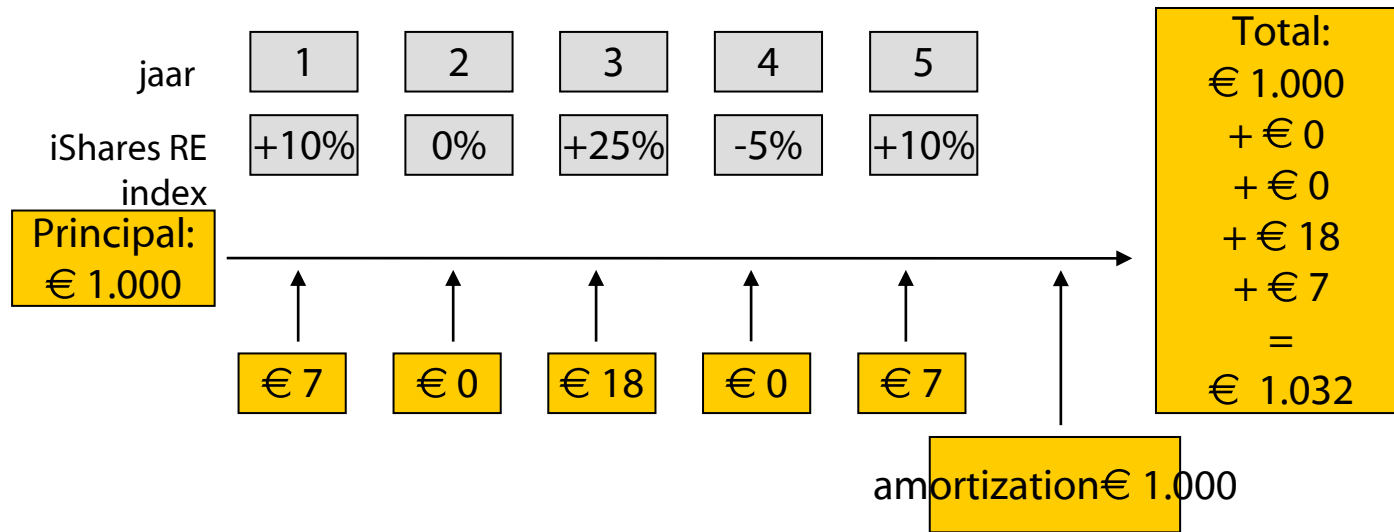


# Example 3: Index-Linked Bond (Nordea)



iShares Dow Jones U.S Real Estate Index Fund.

- Index: iShares Dow Jones U.S Real Estate Index Fund.
- Duration: 5 years.
- Coupons: 70% on an annual basis and floor index of 0%.
- Principal: refund original principal after 5 years.



# Example 3: Nordea

## US Real Estate

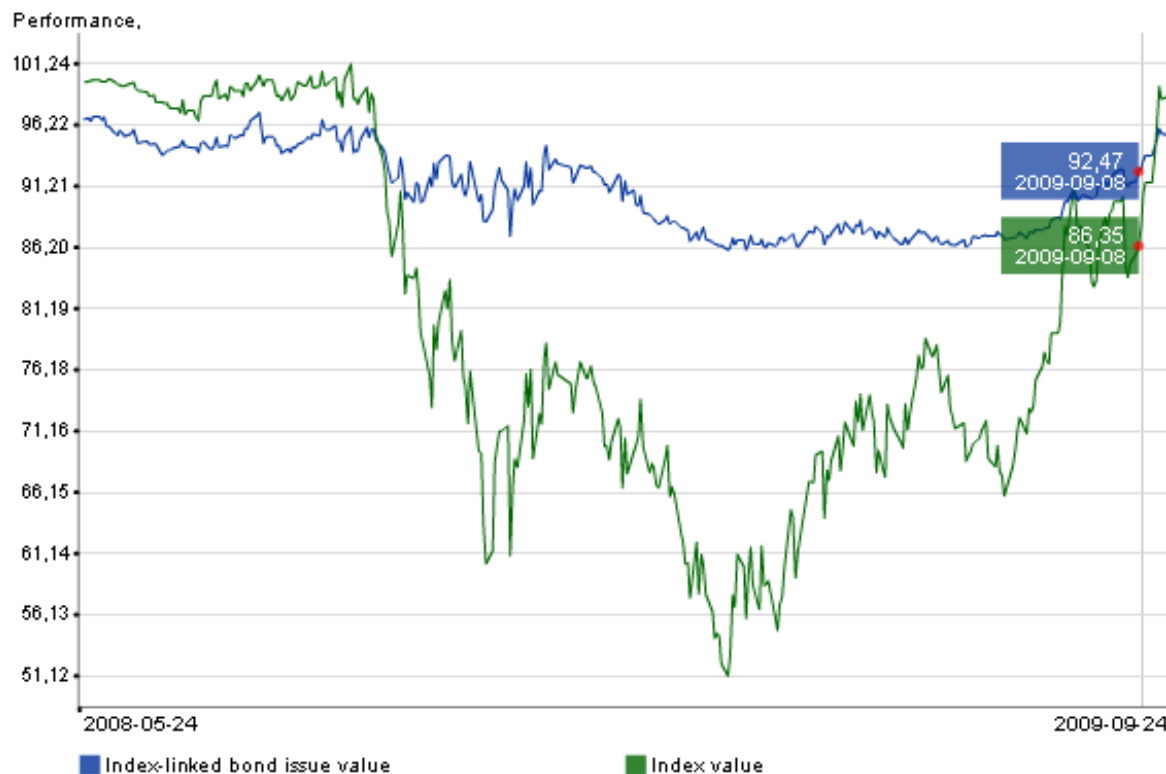
Choose another index-linked bond issue

US Real Estate

Performance for period: **-1.6 %**

[Download data in CSV format](#)

### Index and price value performance



#### Detailed information

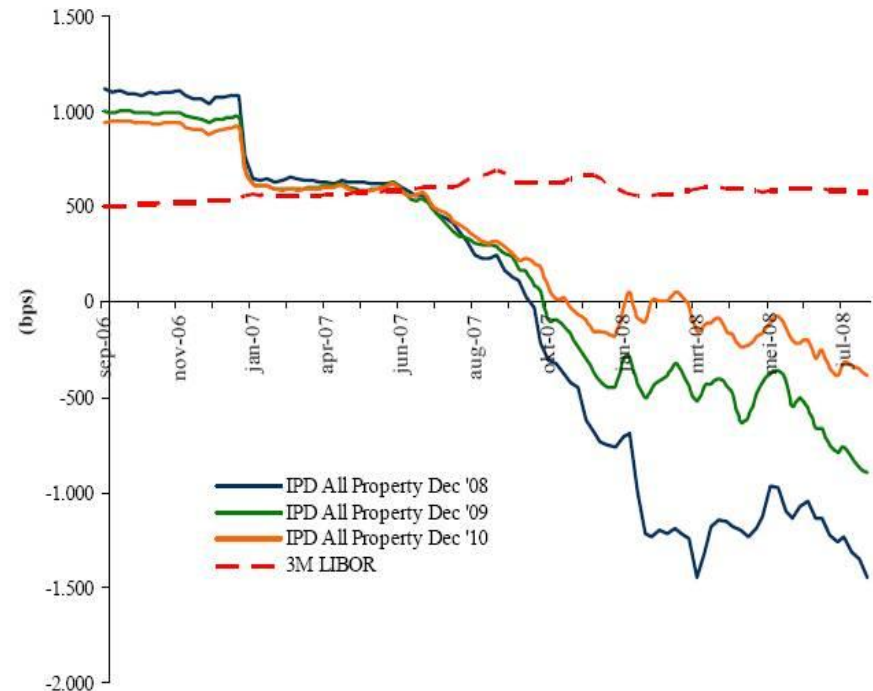
Name	US Real Estate
Issue date	08.05.2008
Redemption Date	09.05.2013
Reference index	iShares Dow Jones U.S. Real Estate Index Fund
Index performance	<b>-4.2 %</b>
Participation rate	70 %
Actual value	95.1 %
Subscription price	100 %
ISIN	FI0003027771

Past performance is no indication of current or future performance.

How to value house price index  
linked bonds?

# Pricing real estate derivatives

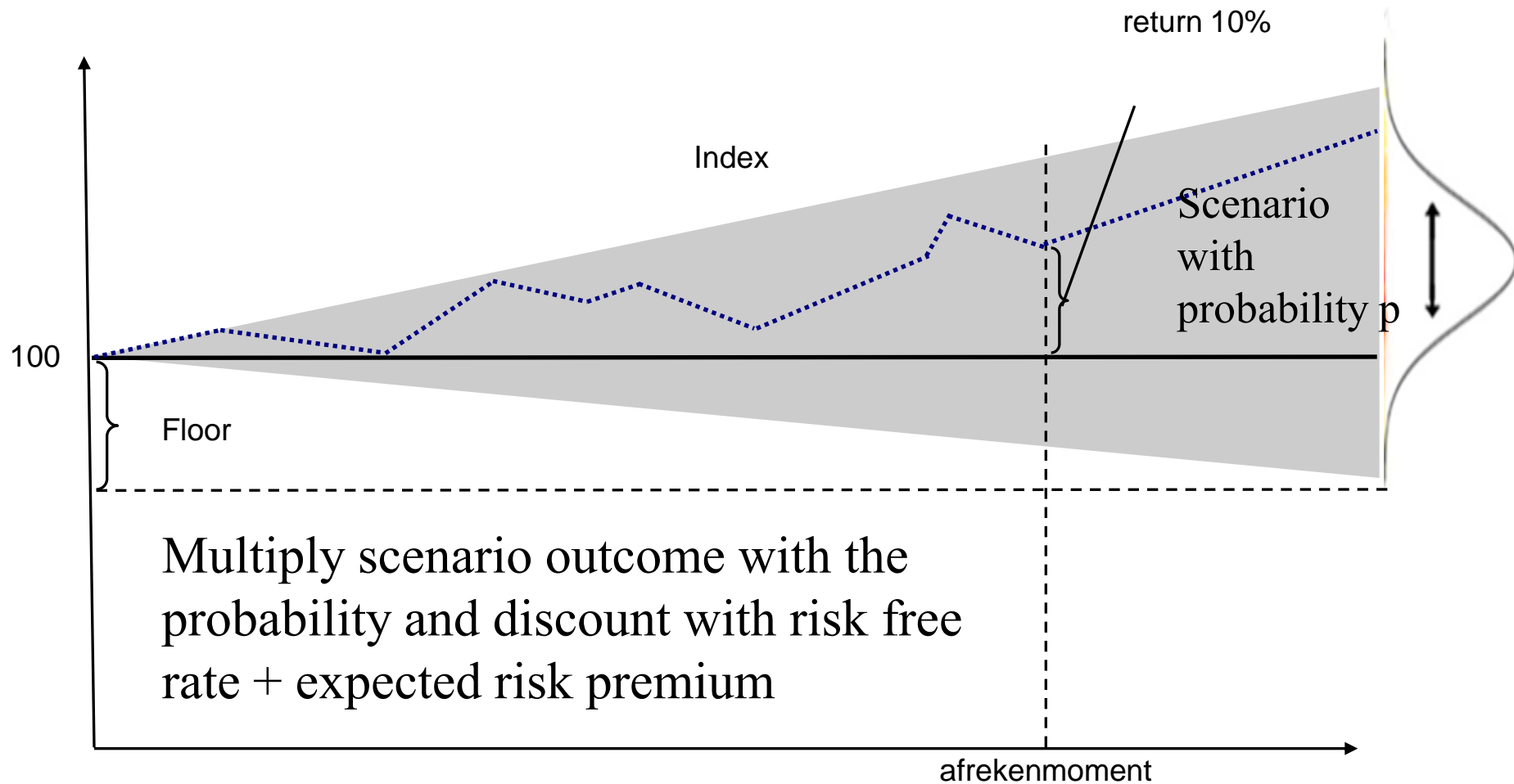
- **Real estate is tradable, but**
  - High transaction costs and long transaction times.
  - Real estate is heterogeneous.
  - Short selling is not possible.
- Risk-neutral valuation can't be applied, but we have to use **expectation-based valuation** (the expectation of future index movements impacts the price).
- For example, TRS on IPD all property index).





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# Theoretical value

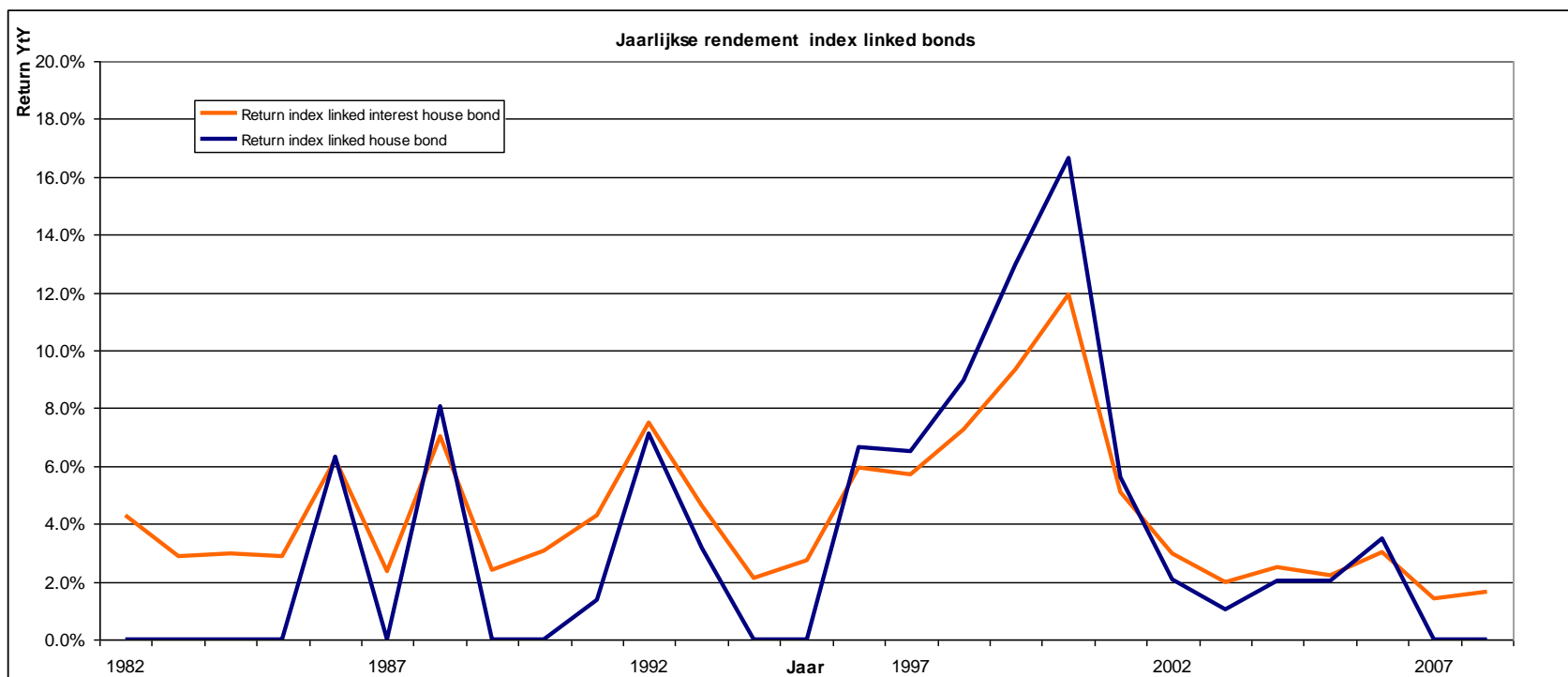


# Example: index linked bond

## **Hypothetical Dutch example:**

- Index: Kadaster house price index.
- Duration: 5 years.
- Coupon: yearly floor 0% + return index minus 200 bps.
- Principal: refund of original principal after 5 years.
- **Costs: 150 bps put option and 50bps spread.**

# Yearly return index linked bond



Expected return: 4.5% (risicopremium of 200 bps)

Volatility: 3-4%



Questions?