
Inflation-linked Products, Pension funds and Liquidity

April 2007

Brice Benaben
Managing Director
Inflation Trading

Agenda

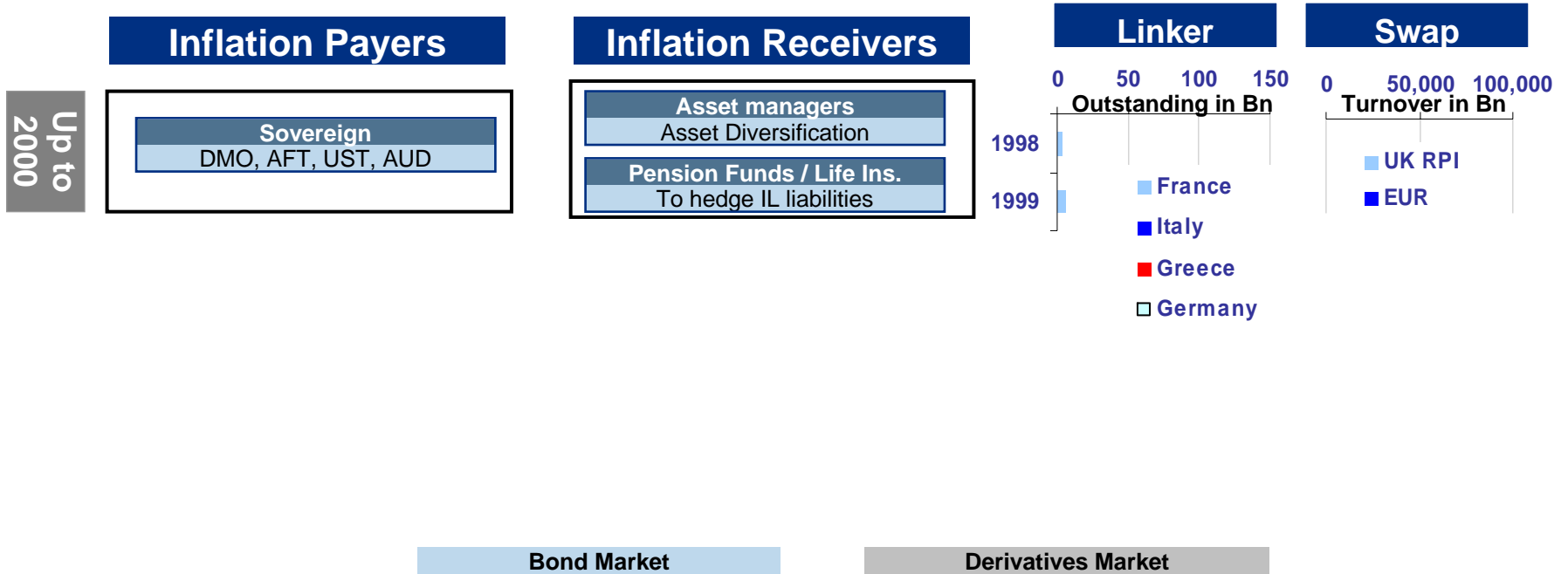
Increasing linkers liquidity & demand

Derivatives development & LDI demand

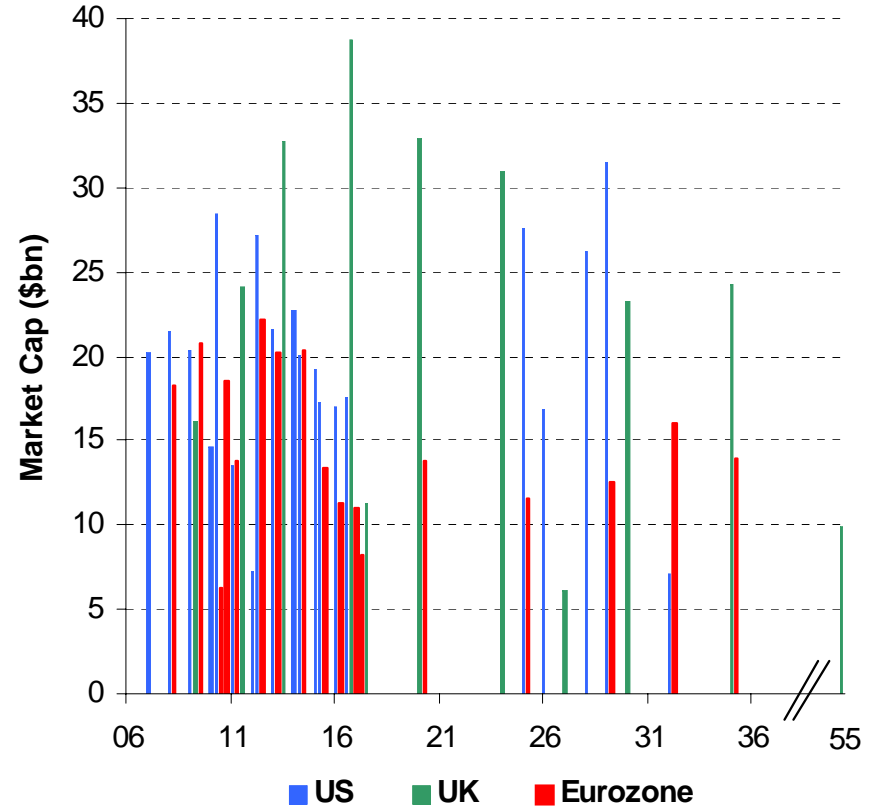
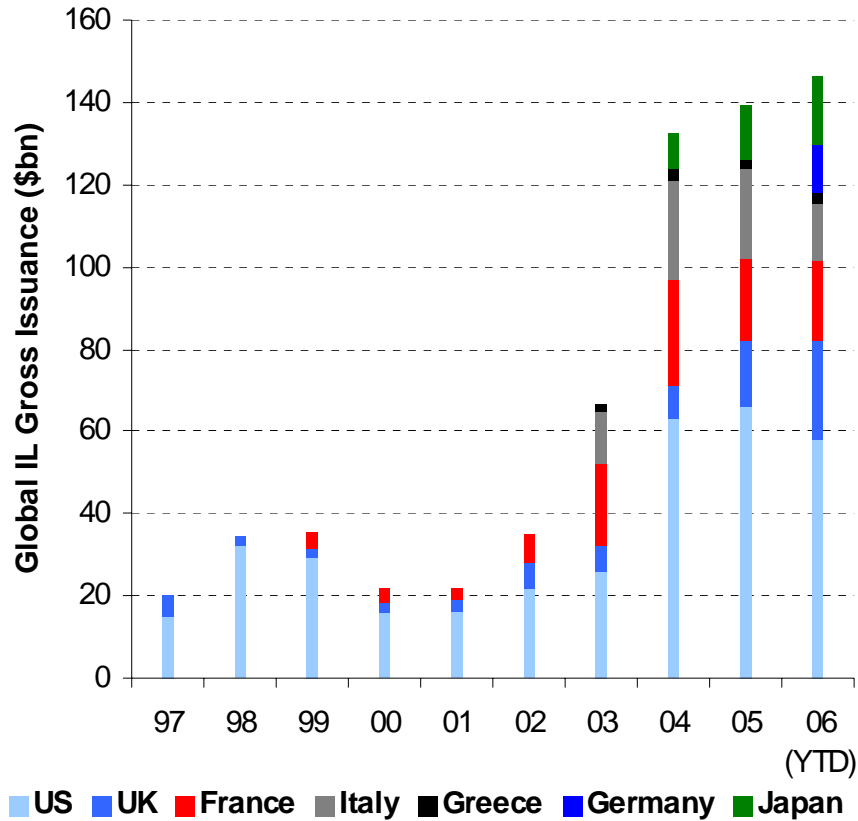
The “less visible” supply via derivatives

Conclusion

At the beginning, an illiquid bond market...



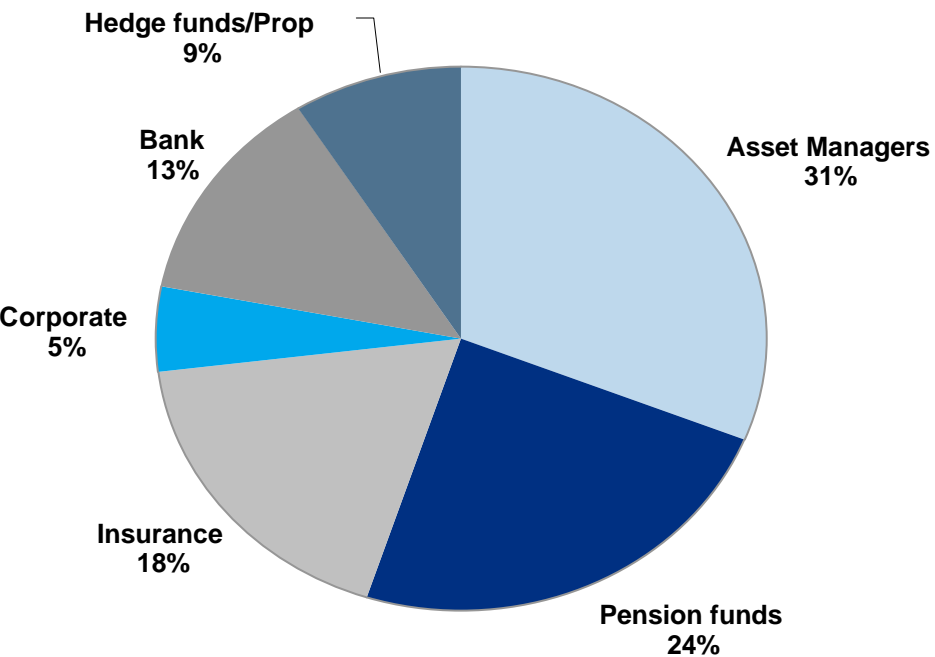
... sovereign issuance has increased...



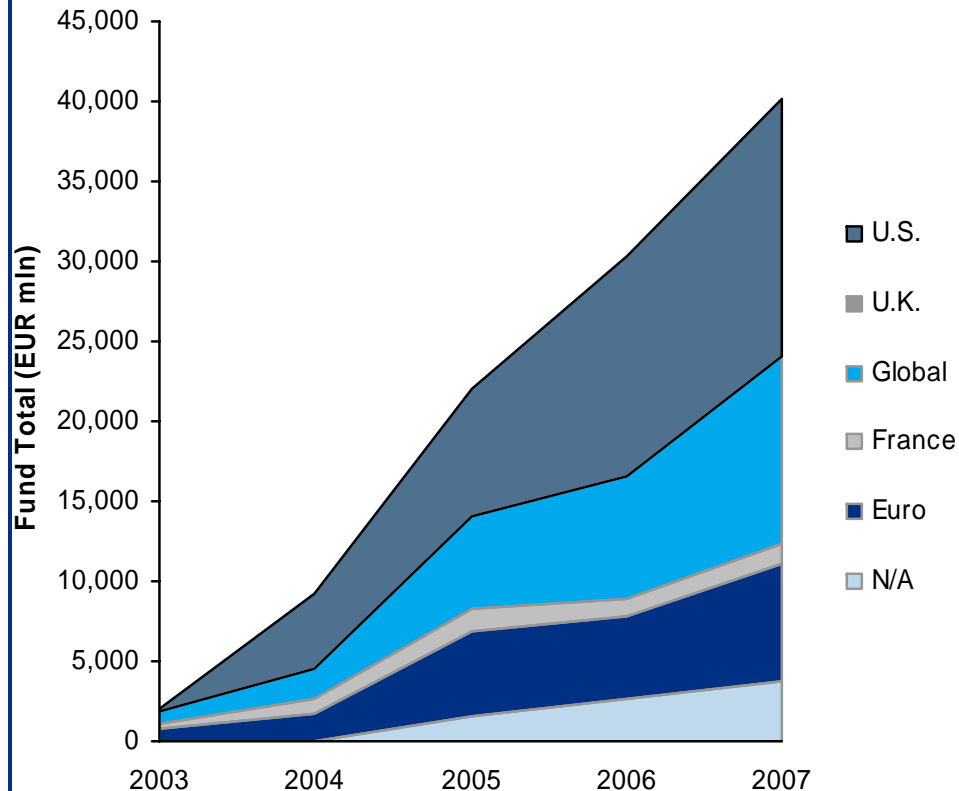
... helping a specialization of the market ...

Investors

Breakdown of EUR154Bn linkers asset holders



Growth of Inflation benchmarked funds



... but is the demand still exceeding the supply?

\$ Billions	Government index-linked bonds	Pension fund assets	Inflation exposure	
			Pensions	Insurance/ Banks
United States	300	11,190	558	n/a
United Kingdom	94	1,175	223	150
France	85	123	..	285
Italy	35	44	14	10
Australia	7	465	135	146
Japan	1	661	111	n/a

Source: OECD, Citigroup

Agenda

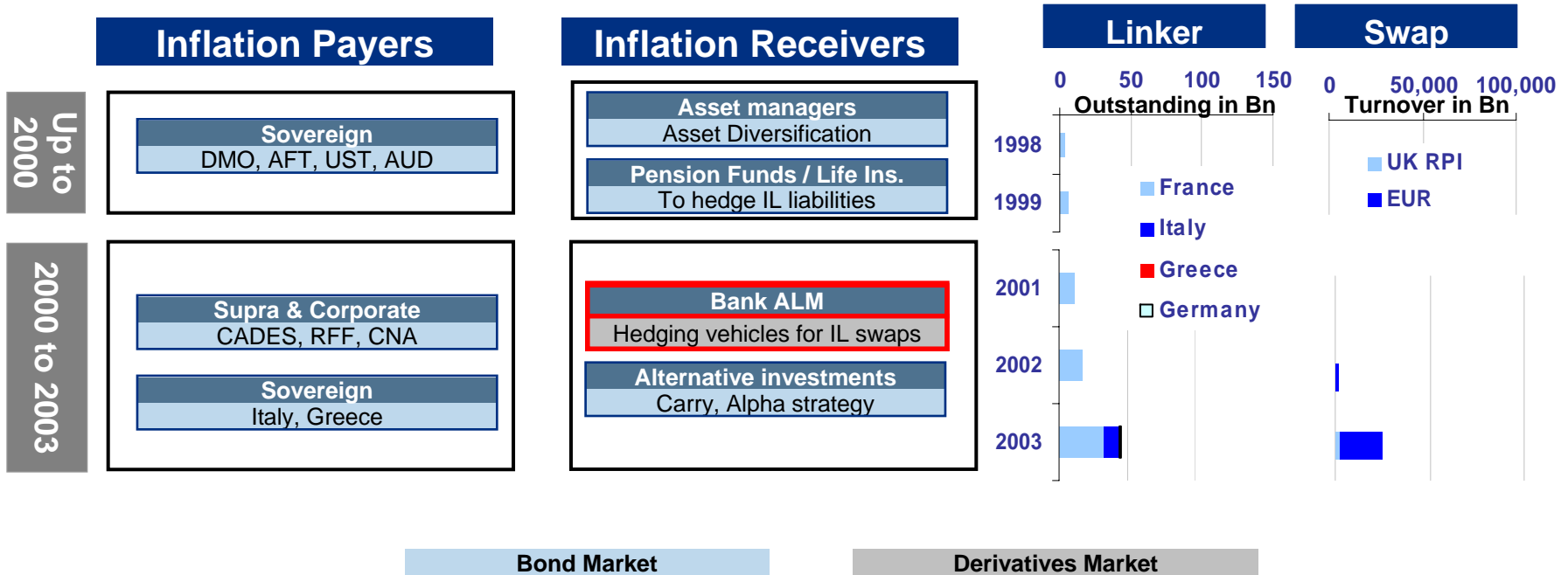
Increasing linkers liquidity & demand

Derivatives development & LDI demand

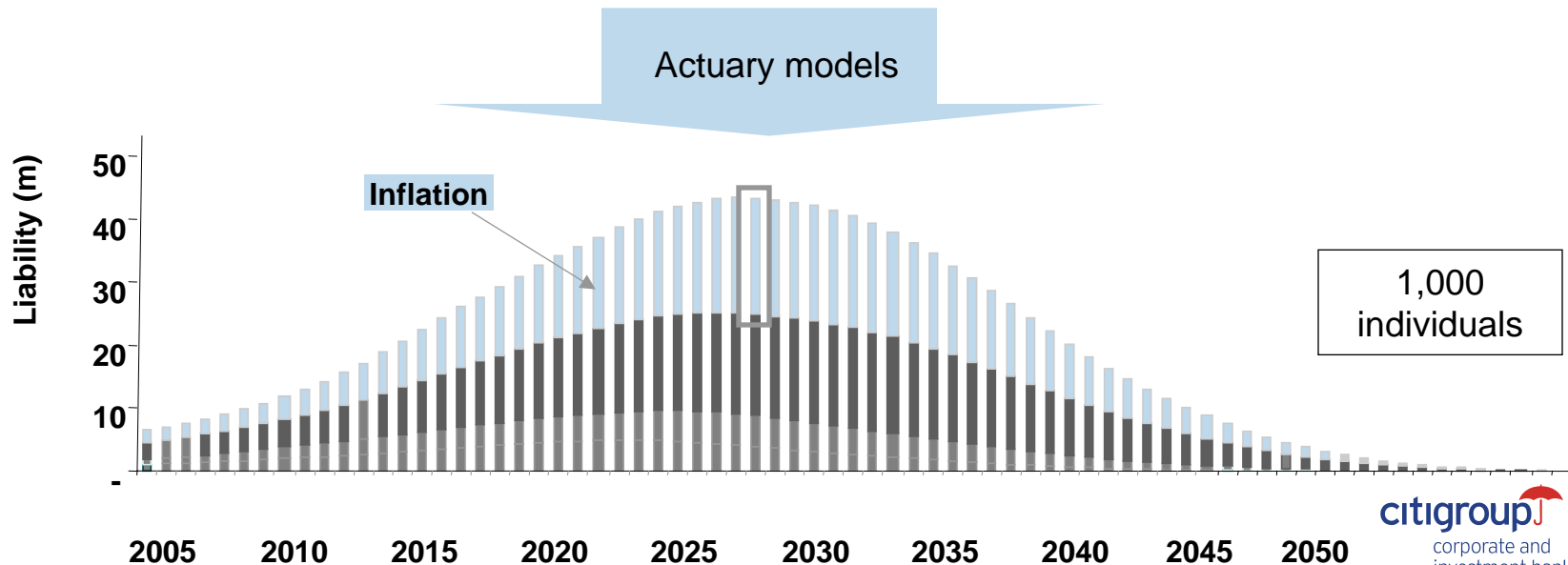
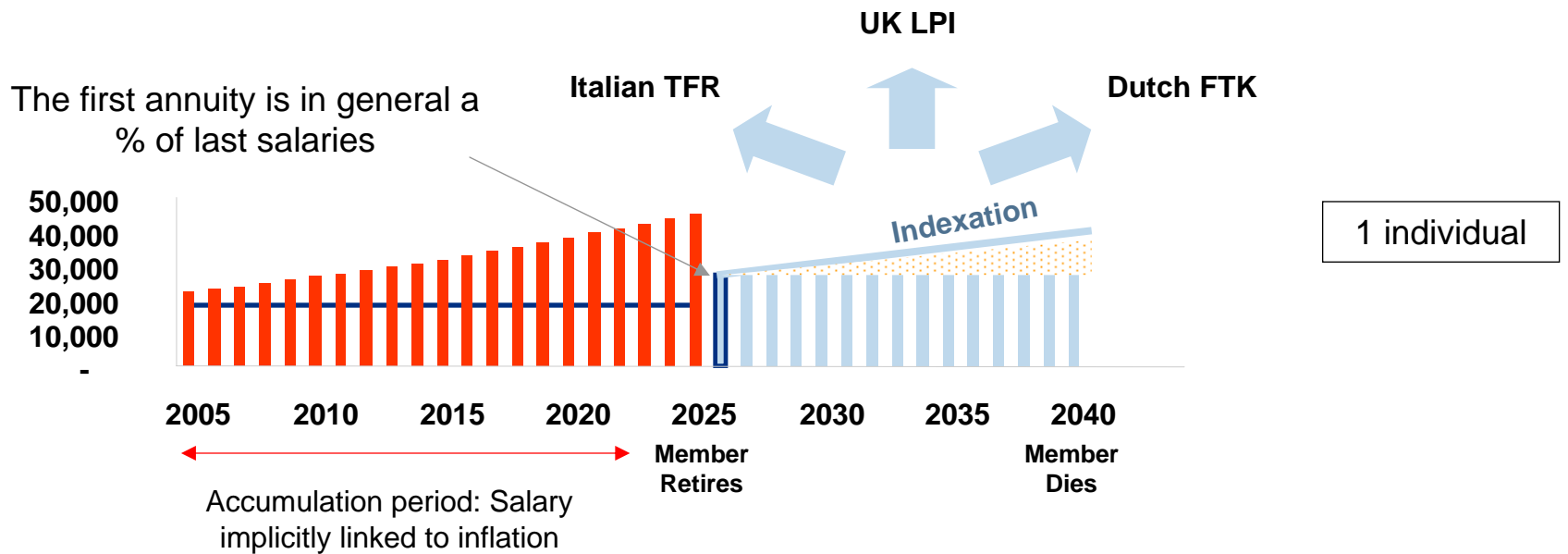
The “less visible” supply via derivatives

Conclusion

The derivatives have developed around the liquid linkers

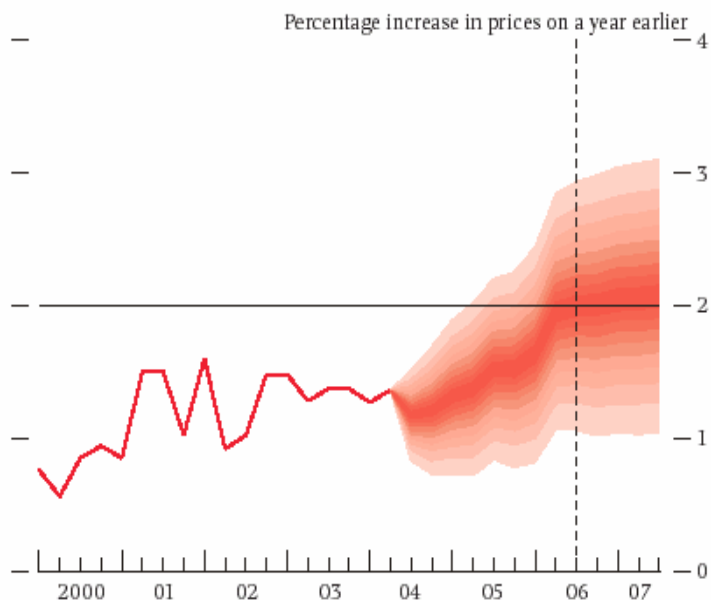


... as LDI demand developing

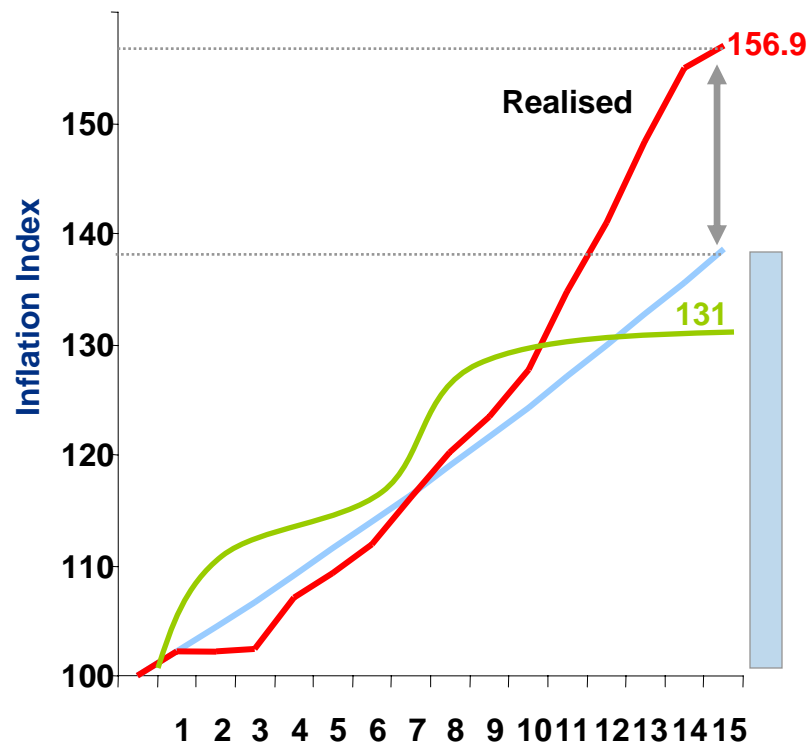


... , which aims at mitigating inflation risk ...

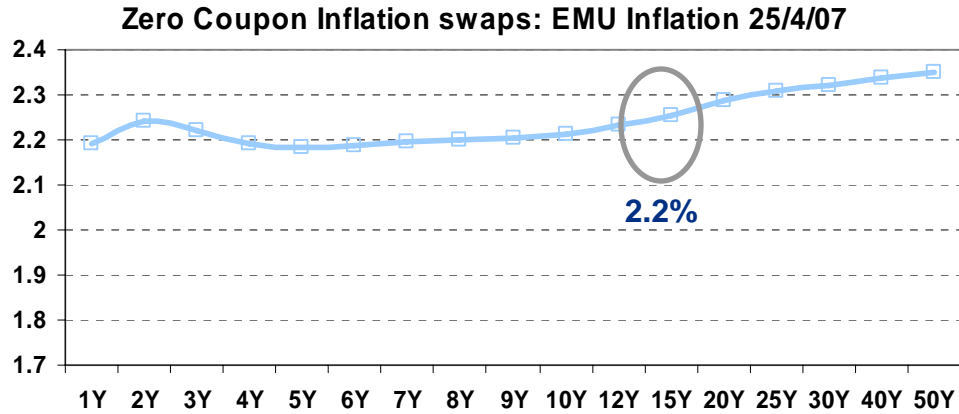
Current CPI inflation projection based on market interest rate expectations



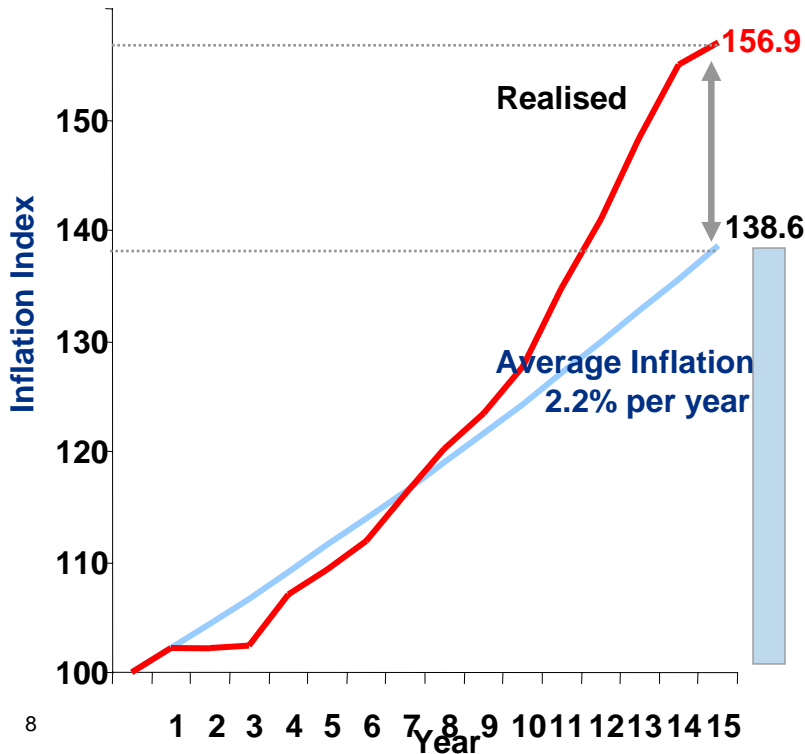
The fan chart depicts the probability of various outcomes for CPI inflation in the future. The darkest band includes the central (single most likely) projection and covers 10% of the probability. Each successive pair of bands is drawn to cover a further 10% of probability, until 90% of the probability distribution is covered. The bands widen as the time horizon is extended, indicating increasing uncertainty about outcomes. See the box on pages 48–49 of the [May 2002 Inflation Report](#) for a fuller description of the fan chart and what it represents. The dotted line is drawn at the two-year point.



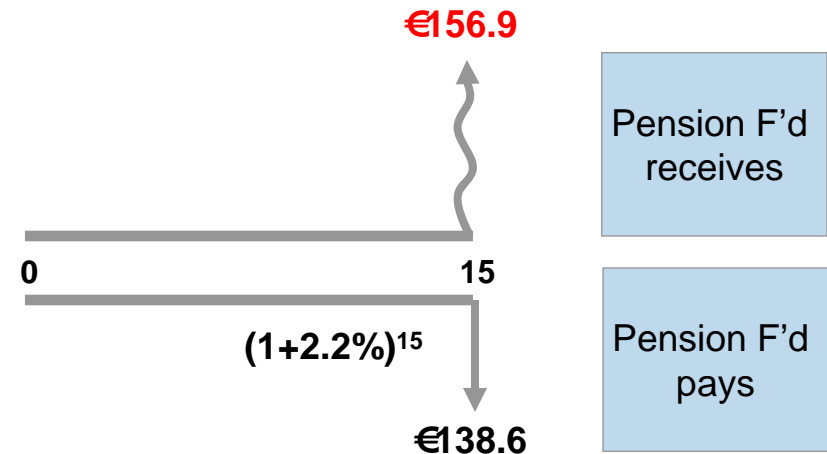
... with Inflation swaps...



Inflation forward and realised



Flows at maturity



... but intensification of the demand?

Main Change



- Moving gradually from DB into DC plans
- Regulatory changes encouraging/forcing hedging risk:
 - FRS17 (2000): liabilities mark-to-market using AA discount yield curve, => **change in deficit impacting P/L**
 - 2004 Pension act (Pension Protected Fund)

Indexation

- DB scheme **liability explicitly linked to LPI** (RPI with 0% floor and 5% cap) – **Pension act 1995**
- **FRS17 (2000): inflation liabilities mark-to-market using market forward inflation prices**
- Consequence: Growing hedging activities with **linkers and UK RPI/LPI swaps**

Main Change



- Change from DB schemes with final pay to average salary.
- **FTK: New Regulatory Framework as of 1 January 2007**

Indexation

- Involvement in inflation products non homogenous between pension funds
- In new regulation, **pension funds can choose a type indexation of pension; it is not required**
- FTK requires to describe precisely the indexation policy like
 - No indexation
 - Conditioned to cover ratio
 - Unconditional indexation
- Usually linkage to **Dutch inflation but hedging with proxy inflation (like EMU HICP)**

Main Change



- With Law Decree no. 252, December 2005, the government added a last step to **TFR reform** (Trattamento di Fine Rapporto)
- **Covip**, the Pension Fund Regulator, has been mandated to issue a specific regulation and to monitor its application by the supervised entities, full compliance with which will be necessary to be authorized to receive further contributions after the cut-off date of January 1st 2008

Indexation

- On 28 June 2006, Covip introduces obligation for Pension Funds receiving TFR money to Guarantee Principal over a „period of several years“, plus a return „comparable“ to Tfr's return ($1.5\% + 75\% * \text{IT CPI}$) with „high probability“.

Main Change

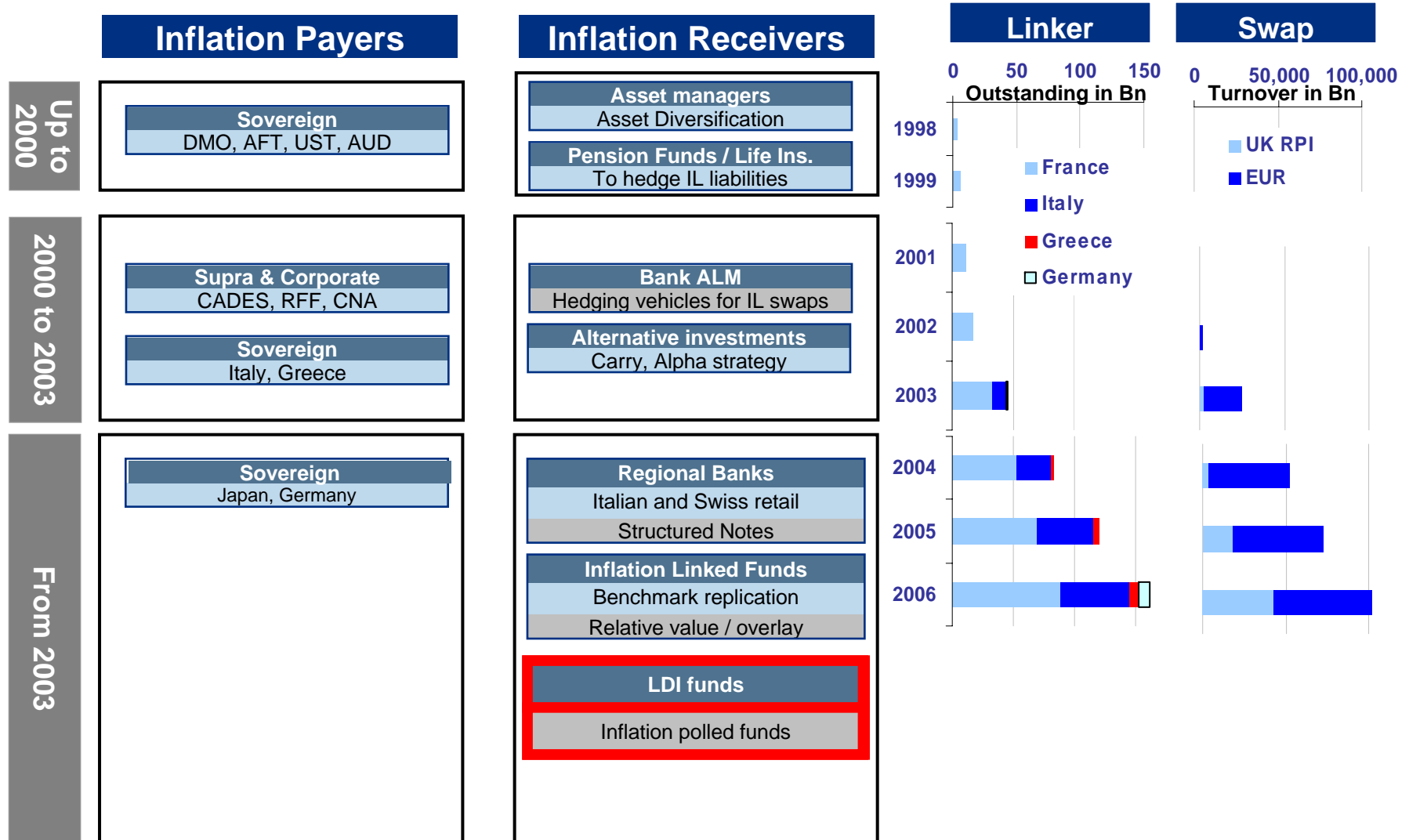


- **IAS19 / IFRS** must be implemented before **1st of January 2008**
- The new Pension law (Loi sur la Réforme des Retraites) stipulates that the current institutions managing the **Second Pillar pension reserves** must be change into one of the new types of institutions (IP, IGRS) before **31st of December 2008**.
- To benefit from some tax exemptions, employers must pay additional pension reserves before this change.

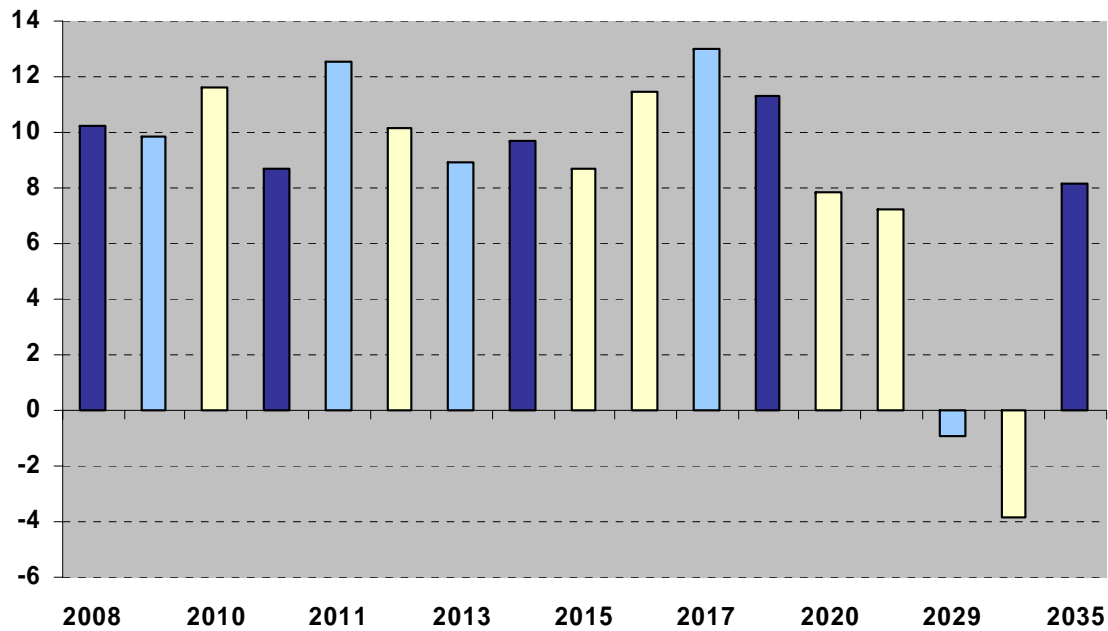
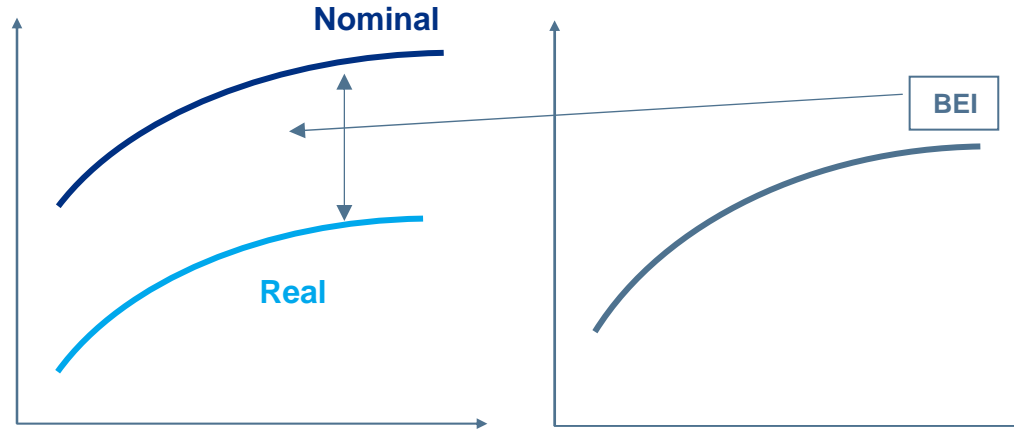
Indexation

- Indexation is negotiated between Unions and Employers
- Usually linkage to **FR CPI or EUR HICP real yield** discount factors

Where is the supply?



Derivatives become expensive



Agenda

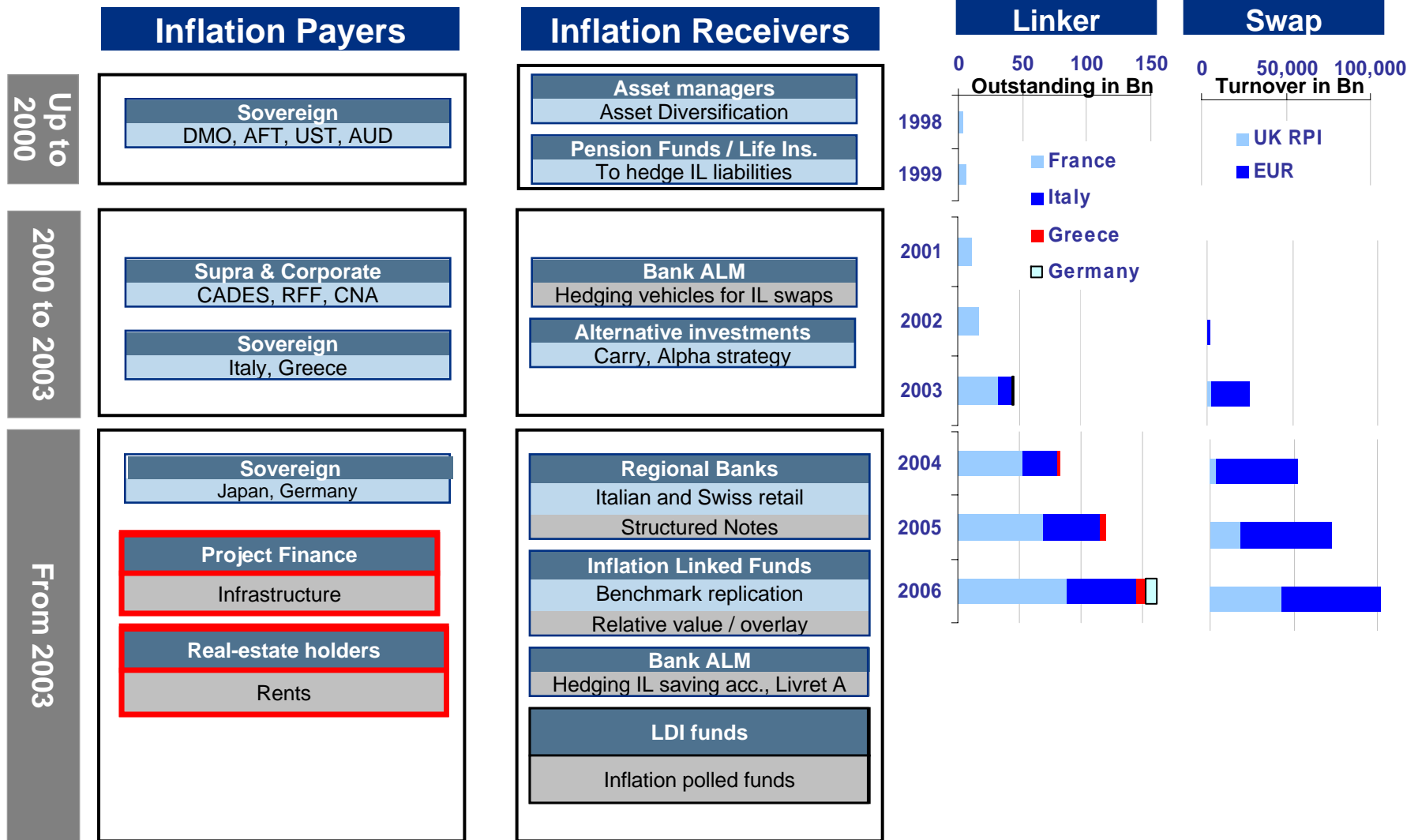
Increasing linkers liquidity & demand

Derivatives development & LDI demand

The “less visible” supply via derivatives

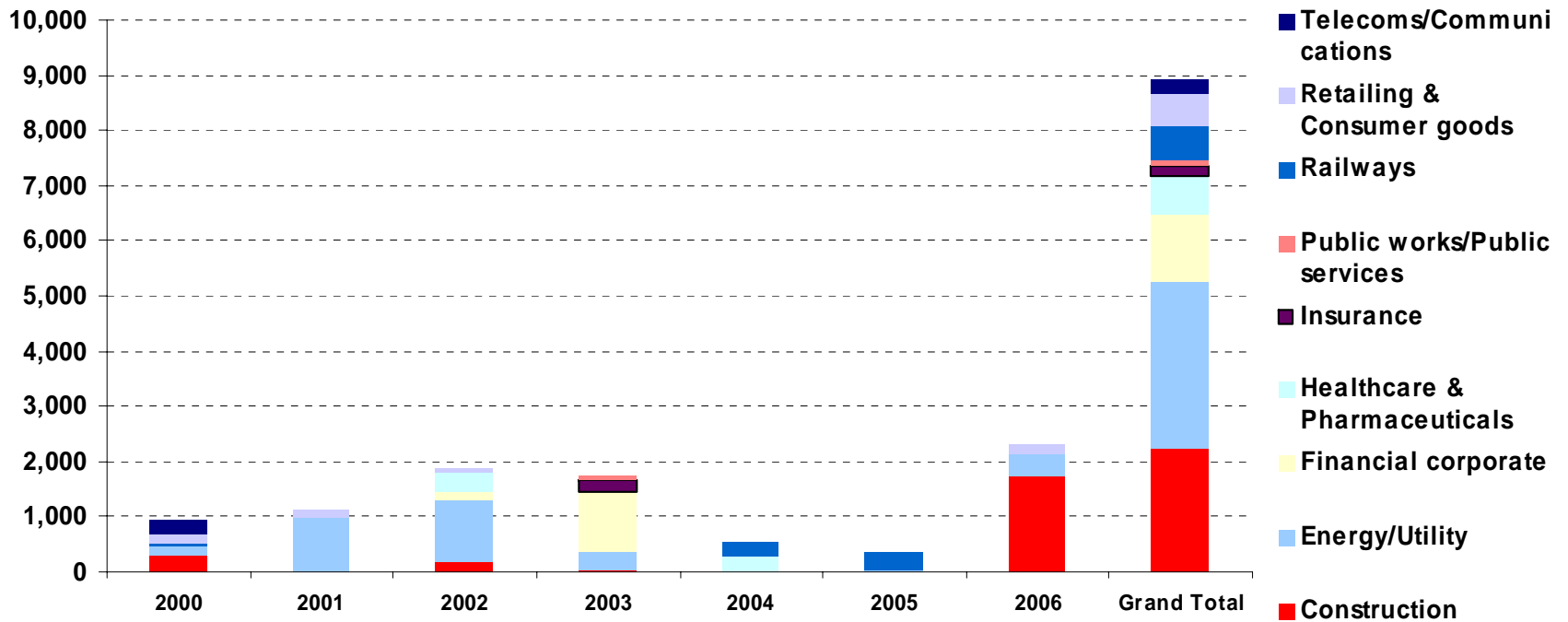
Conclusion

New supply ...



... and infrastructure...

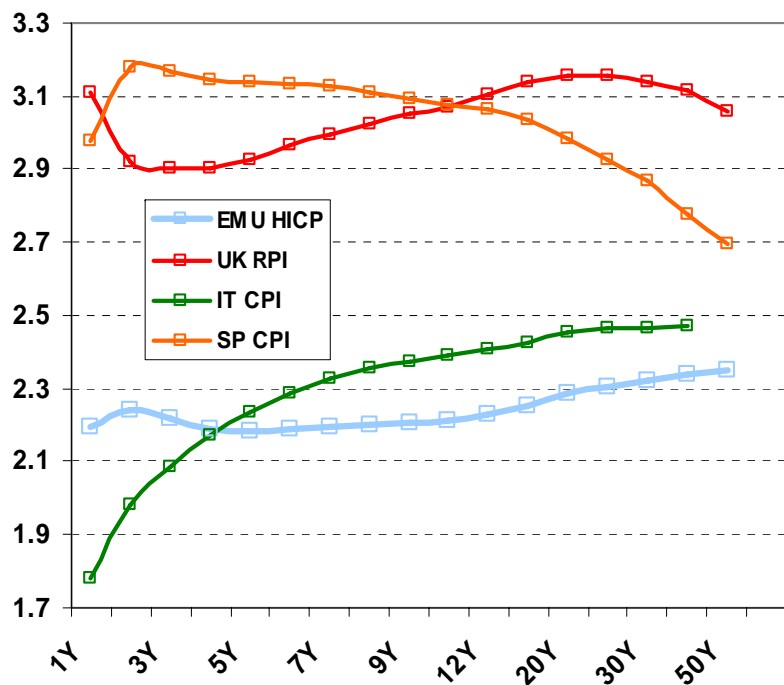
UK RPI linked Non Sovereign Issuance in GBP millions since 2000



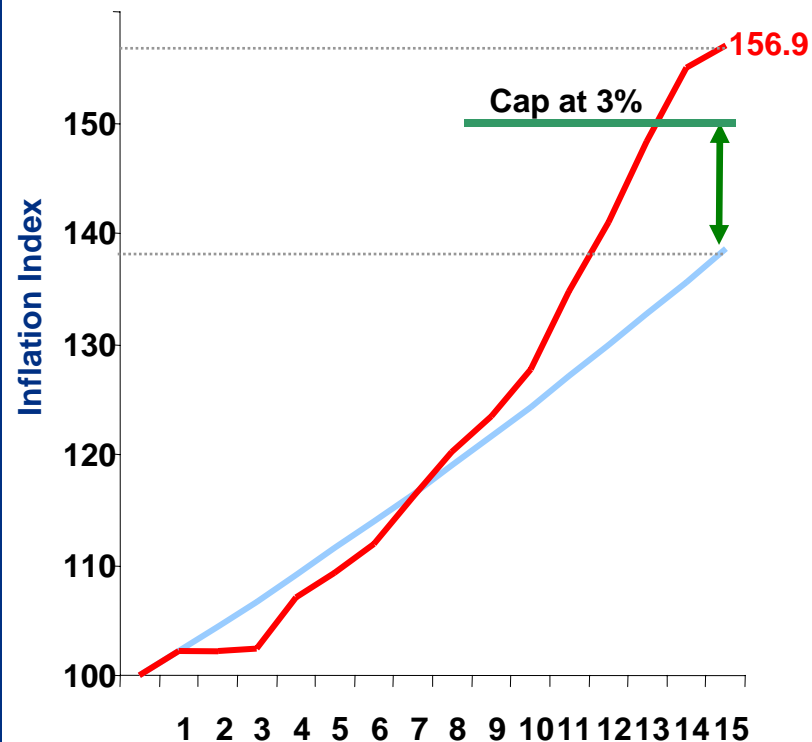
... Open new dimensions ...

More inflation indices

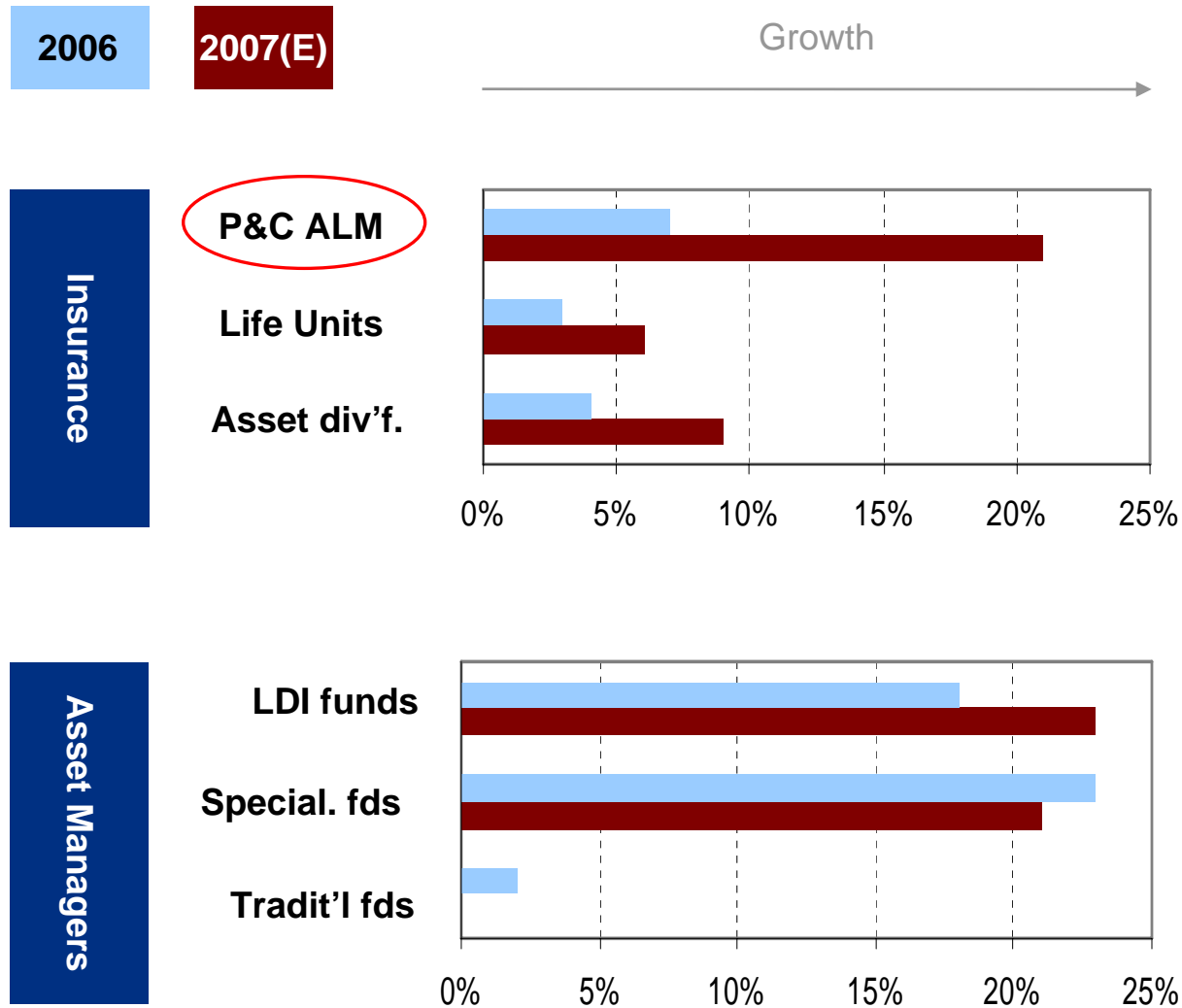
Zero coupon swap curves as of 25 April 2007



Development of the option market



but only a partial answer to unbalanced supply/demand...



New demand...

Rationale

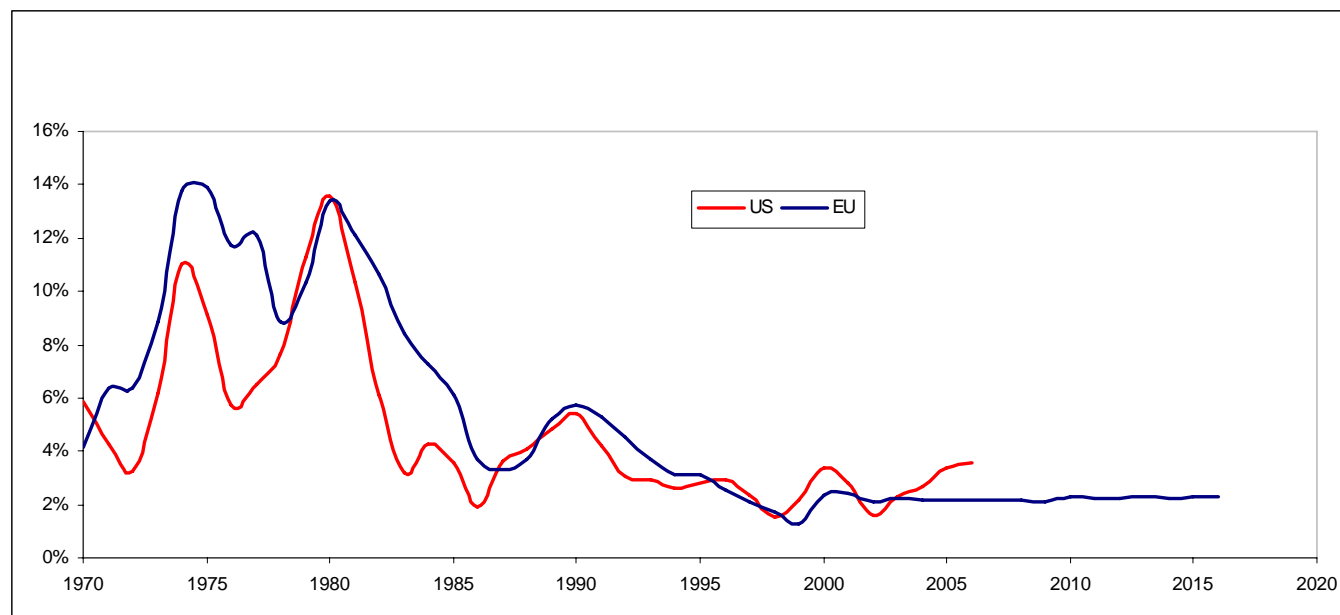
- **Compensatory awards** set at time of claim payment and **punitive damages** subject to general inflation
- **Disability claims** in the form of inflation-linked annuities (e.g. Motor insurance in France, Personal Injury in the UK – Courts Act 2003)

Constraint

- Implicit
- Explicit

Exposure

- P&C insurers writing long-tail liabilities and medical insurance (claims inflation)
- P&C insurers writing disability annuities (wages and general inflation)



Agenda

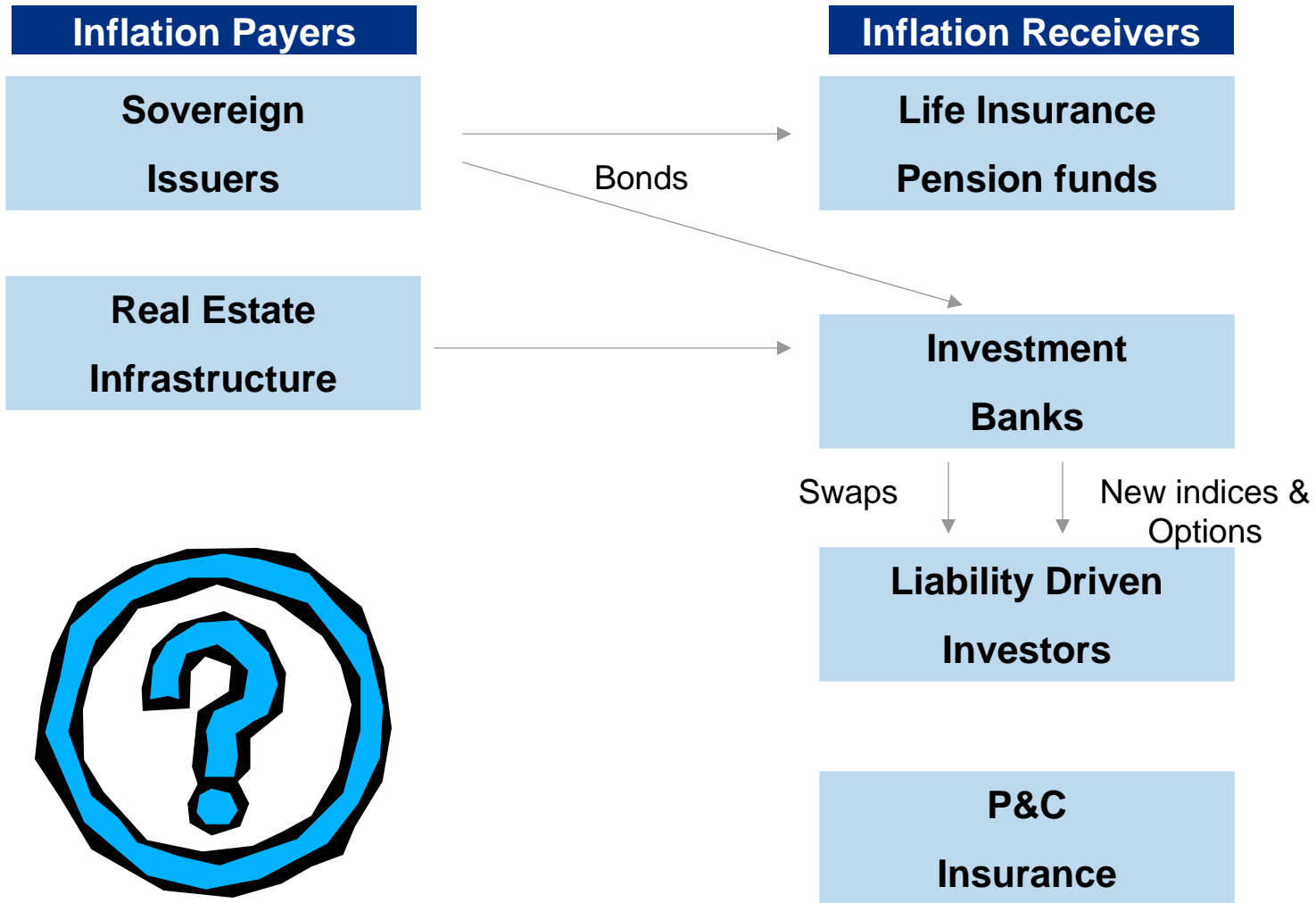
Increasing linkers liquidity & demand

Derivatives development & LDI demand

The “less visible” supply via derivatives

Conclusion

New challenges



Any terms set forth herein are intended for discussion purposes only and are subject to the final terms as set forth in separate definitive written agreements. This presentation is not a commitment to lend, syndicate a financing, underwrite or purchase securities, or commit capital nor does it obligate us to enter into such a commitment, nor are we acting as a fiduciary to you. By accepting this presentation, subject to applicable law or regulation, you agree to keep confidential the existence of and proposed terms for any transaction contemplated hereby (a "Transaction").

Prior to entering into any Transaction, you should determine, without reliance upon us or our affiliates, the economic risks and merits (and independently determine that you are able to assume these risks) as well as the legal, tax and accounting characterizations and consequences of any such Transaction. In this regard, by accepting this presentation, you acknowledge that (a) we are not in the business of providing (and you are not relying on us for) legal, tax or accounting advice, (b) there may be legal, tax or accounting risks associated with any Transaction, (c) you should receive (and rely on) separate and qualified legal, tax and accounting advice and (d) you should apprise senior management in your organization as to such legal, tax and accounting advice (and any risks associated with any Transaction) and our disclaimer as to these matters. By acceptance of these materials, you and we hereby agree that from the commencement of discussions with respect to any Transaction, and notwithstanding any other provision in this presentation, we hereby confirm that no participant in any Transaction shall be limited from disclosing the U.S. tax treatment or U.S. tax structure of such Transaction.

IRS Circular 230 Disclosure: Citigroup Inc. and its affiliates do not provide tax or legal advice. Any discussion of tax matters in these materials (i) is not intended or written to be used, and cannot be used or relied upon, by you for the purpose of avoiding any tax penalties and (ii) may have been written in connection with the "promotion or marketing" of the Transaction. Accordingly, you should seek advice based on your particular circumstances from an independent tax advisor.

We are required to obtain, verify and record certain information that identifies each entity that enters into a formal business relationship with us. We will ask for your complete name, street address, and taxpayer ID number. We may also request corporate formation documents, or other forms of identification, to verify information provided.

Any prices or levels contained herein are preliminary and indicative only and do not represent bids or offers. These indications are provided solely for your information and consideration, are subject to change at any time without notice and are not intended as a solicitation with respect to the purchase or sale of any instrument. The information contained in this presentation may include results of analyses from a quantitative model which represent potential future events that may or may not be realized, and is not a complete analysis of every material fact representing any product. Any estimates included herein constitute our judgment as of the date hereof and are subject to change without any notice. We and/or our affiliates may make a market in these instruments for our customers and for our own account. Accordingly, we may have a position in any such instrument at any time.

Although this material may contain publicly available information about Citigroup corporate bond research or economic and market analysis, Citigroup policy (i) prohibits employees from offering, directly or indirectly, a favorable or negative research opinion or offering to change an opinion as consideration or inducement for the receipt of business or for compensation; and (ii) prohibits analysts from being compensated for specific recommendations or views contained in research reports. So as to reduce the potential for conflicts of interest, as well as to reduce any appearance of conflicts of interest, Citigroup has enacted policies and procedures designed to limit communications between its investment banking and research personnel to specifically prescribed circumstances.

[TRADEMARK SIGNOFF: add the appropriate signoff for the relevant legal vehicle]

© 2006 Citigroup Global Markets Inc. Member SIPC. All rights reserved. CITIGROUP and the Umbrella Device are trademarks and service marks of Citigroup or its affiliates and are used and registered throughout the world.

© 2006 Citigroup Global Markets Limited. Authorized and regulated by the Financial Services Authority. All rights reserved. CITIGROUP and the Umbrella Device are trademarks and service marks of Citigroup or its affiliates and are used and registered throughout the world.

© 2006 [Name of Legal Vehicle] [Name of regulatory body.] All rights reserved. CITIGROUP and the Umbrella Device are trademarks and service marks of Citigroup or its affiliates and are used and registered throughout the world.