Deutsche Bank
Corporate and Investment Bank

Inflation
Hedging it & Trading it

Passion to Perform

Deutsche Bank
Corporate & Investment Bank

Winning for our clients: Inflation Derivatives House of the Year.

At Deutsche Bank, we are dedicated to setting the stage so that our clients can perform at their best. We appreciate winning awards that recognize the quality of service that we deliver.

Risk Awards 2011

Passion to Perform

Contents

Introduction
Why inflation, why now?

Inflation Derivatives
House of the Year

There has never been a better time to talk about inflation

– Inflation looks set to be volatile for the next 5 to 10 years
– Any client with a bond portfolio is exposed to inflation risk
– Clients with revenues or liabilities indexed to inflation are especially vulnerable.

Deutsche Bank is very strongly positioned to advise clients on what to do

– We were recently voted the Best Inflation Derivatives house in the industry by Risk magazine
– We have a large global inflation derivatives trading and structuring team
– We have extensive experience of helping clients find inflation solutions

The Deutsche Bank inflation team has developed this briefing document to:

– Set out the challenges and opportunities faced by clients
– Explain the products and strategies we have developed.

The Deutsche Bank Global Inflation team can help

1

Deutsche Bank's credentials and capabilities in the Inflation market

How Deutsche Bank's inflation offerings differ from competitors

Deutsche Bank's credentials and capabilities in the Inflation Market

We offer a full range of inflation services

Our primary capabilities are demonstrated by our leading position in the league tables; we've also played an important role in maintaining order in the secondary markets, distributing and recycling bonds and swaps across the world. DB is the global leader in inflation-linked bond syndication.

Issuing long dated inflation in large sizes can be difficult to manage; debt managers turn to the strongest banks who have the best track record for risk management and distribution – Deutsche Bank leads in this space

Lead syndication mandates awarded to market counterparties

*between September 2009 and February 2011
Source: Bloomberg, Deutsche Bank

Date	Deal	No. Leads	DB	UBS	RBS	Barc	HSBC	GS	JPM	Nomura	BNPP	SG	Calyon	MPS
24 Sep 09	UKTI50	4	1	1			1	1						
29 Sep 09	ACGBi25	3	1	1	1									
21 Oct 09	BTPei41	4	1		1	1					1			
27 Jan 10	UKTI40	4	1	1		1				1				
21 Apr 10	BTPei21	5		1		1						1	1	1
11 May 10	UKRAIL47	2	1		1									
26 May 10	UKTI50	4		1			1	1	1					
27 Jul 10	UKTI40	4	1		1		1	1						
14 Sep 10	ACGBi30	3		1	1				1					
01 Feb 11	NZGBi25	1	1											
Total number			7	6	5	3	3	3	2	1	1	1	1	1

We are outperforming the competition around the world

Deutsche Bank is:

- No 1 in ICAP market share for EUR Inflation/Asset Swaps (2009, 2010)
- No 3 in ICAP market share for UKRPI Inflation/Asset Swaps (2009, 2010)
- No 1 in BGC market share for all US products (Inflation, Asset Swaps, Options) 2010

Fig.1: Global Linker Syndications as Lead Manager

Source: Bloomberg, Deutsche Bank

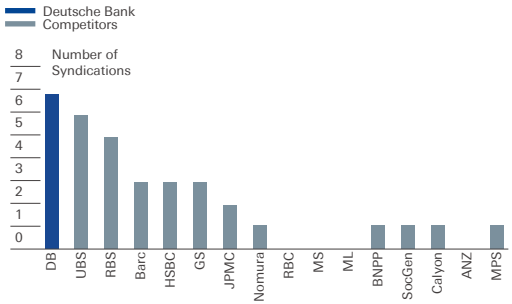


Fig. 2: Expand Total Syndication Size for Global Linkers (mm)

Source: Bloomberg, Deutsche Bank

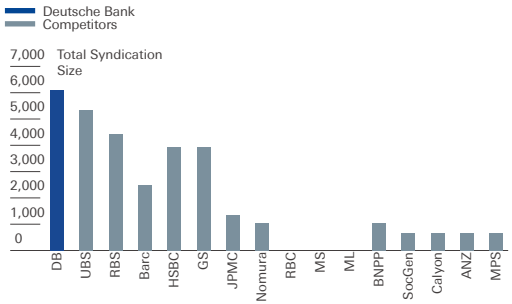
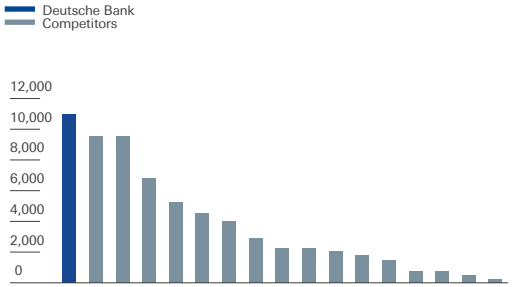


Fig. 3: Expand USD Inflation Market by Volume 2010

Source: Bloomberg, Deutsche Bank



We are outperforming the competition in the UK

Fig. 1: Expand
UK Linkers Syndications as Lead Manager

Source: Bloomberg, Deutsche Bank

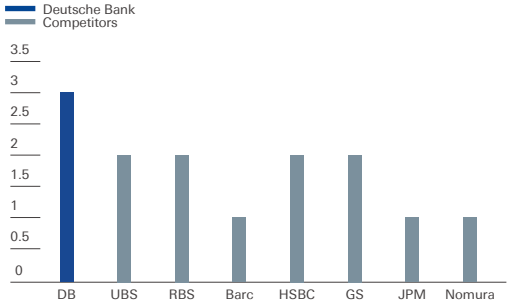


Fig. 2: Expand
UK Linkers and Nominals Syndications as Lead Manager

Source: Bloomberg, Deutsche Bank

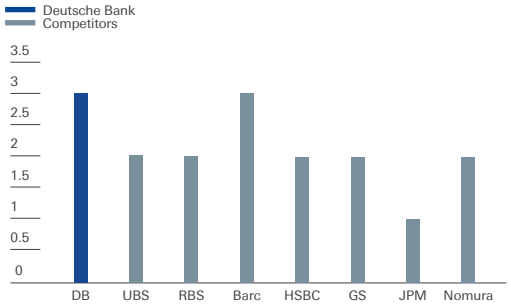


Fig. 3: Expand
UK Linkers Total Syndication Size (mm)

Source: Bloomberg, Deutsche Bank

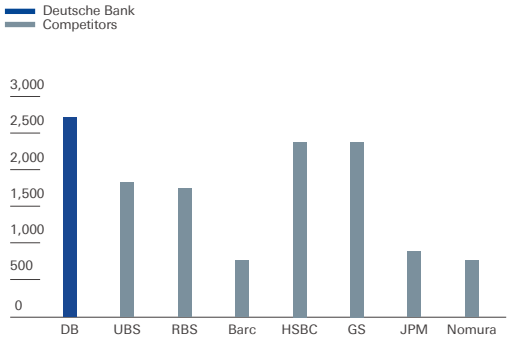
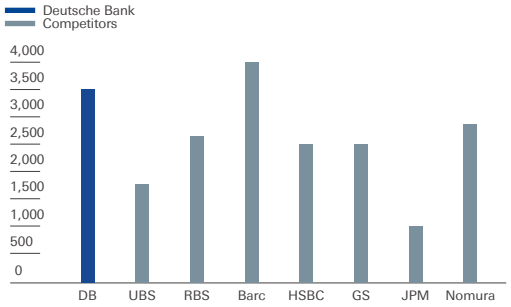


Fig. 4: Expand
UK Linkers and Nominals Syndications as Lead Manager

Source: Bloomberg, Deutsche Bank



How Deutsche Bank's inflation offering differs from competitors

Integrated trading, structuring and research

Unlike some of our competitors, Deutsche Bank's inflation trading, structuring and research professionals work closely together, combining strategic and technical expertise with the macro-economic insights so important to this offering.

Bloomberg

Forecasts, inflation linked bonds, inflation swaps and inflation linked options. US options will be added soon (figure 1)

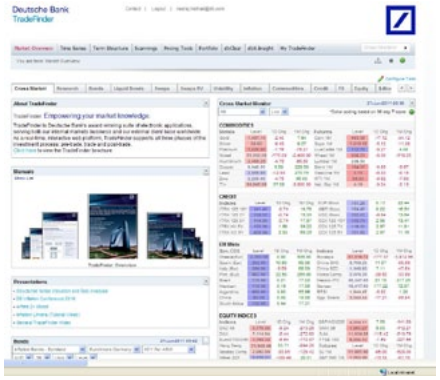
The market is pricing much more upside risk than downside risk – contrary to what we see in other markets

Trade Finder

Currently being upgraded, it will soon include additional functionality: e.g. forward matrices – five year forward on Eurozone or five year to 25 year forward. In Frankfurt and Mumbai, real live zero coupon lives and forward matrices and cross market indicators will soon be added (figure 2)

Fig. 1: Expand
Our inflation page on Bloomberg DBII

Fig. 2: Expand
Inflation on Trade Finder – new improvements coming soon



2

Market Overview

Components of Inflation indices

The rise and rise of inflation

All G7 nations issue inflation-linked bonds

Markets

US TIPS – the US Sovereign linker market is the largest globally with a total market value of over USD700bn but less liquid than EUR

UK – IL Gilts – first issuance 1981; total market value exceeds GBP270bn

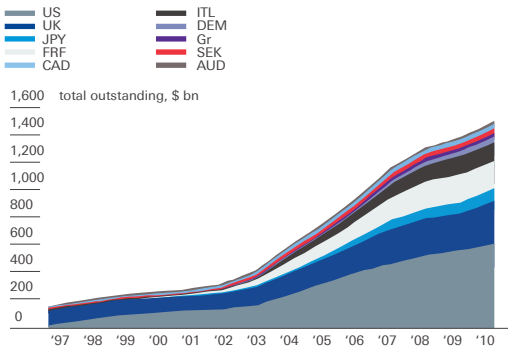
EUR sovereign linkers - expanding rapidly; total market value exceeding EUR320bn as of now; France, Italy, Germany & Greece issue ILBs. Italian, German and Greek ILBs are linked to euro area inflation; France issues bonds linked to EUR inflation and bonds linked to FRF inflation

Industrial country sovereign linker markets – Other important markets include Australia, Canada and Sweden. AUD: govt suspended issuance in 2003, started again in 2009. Sweden: linkers account for almost 30% of total govt bond market, higher share than in any other industrial market

EM sovereign linker markets - most LatAm inflation markets have long histories; Brazil is the largest market, suppression of investment restrictions in 2006 spurred international demand. Chile, Colombia & Uruguay also issue ILB. Israel is big (USD27bn market value). More recently: South Africa, Poland, Turkey (2007) and South Korea (2007)

Fig. 1: Expand
A Fast Growing Asset Class

Source: Deutsche Bank



Components of Inflation Indices

Fig. 1:
Weights in the US CPI

Source: Deutsche Bank

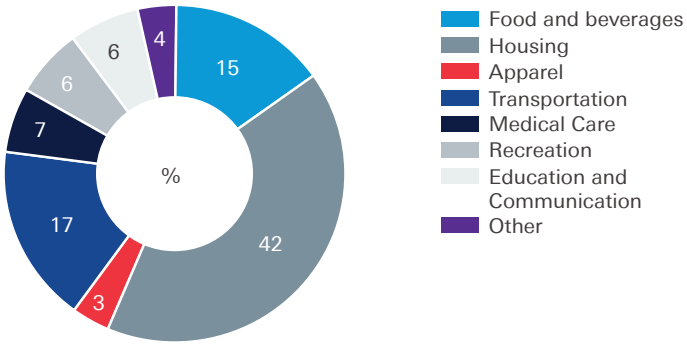


Fig. 2: Expand
Weights in the UK RPI

Source: Deutsche Bank

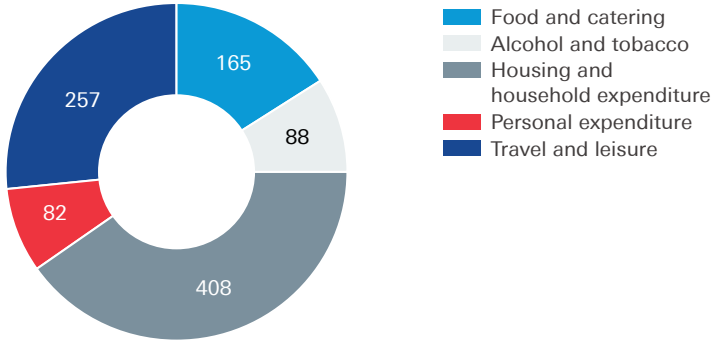
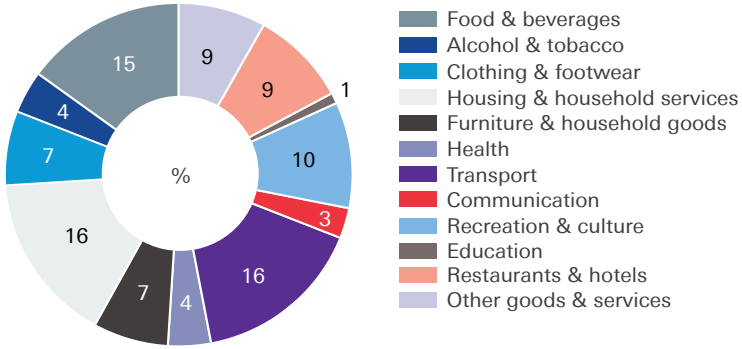


Fig. 3: Expand
Weights in the EUR

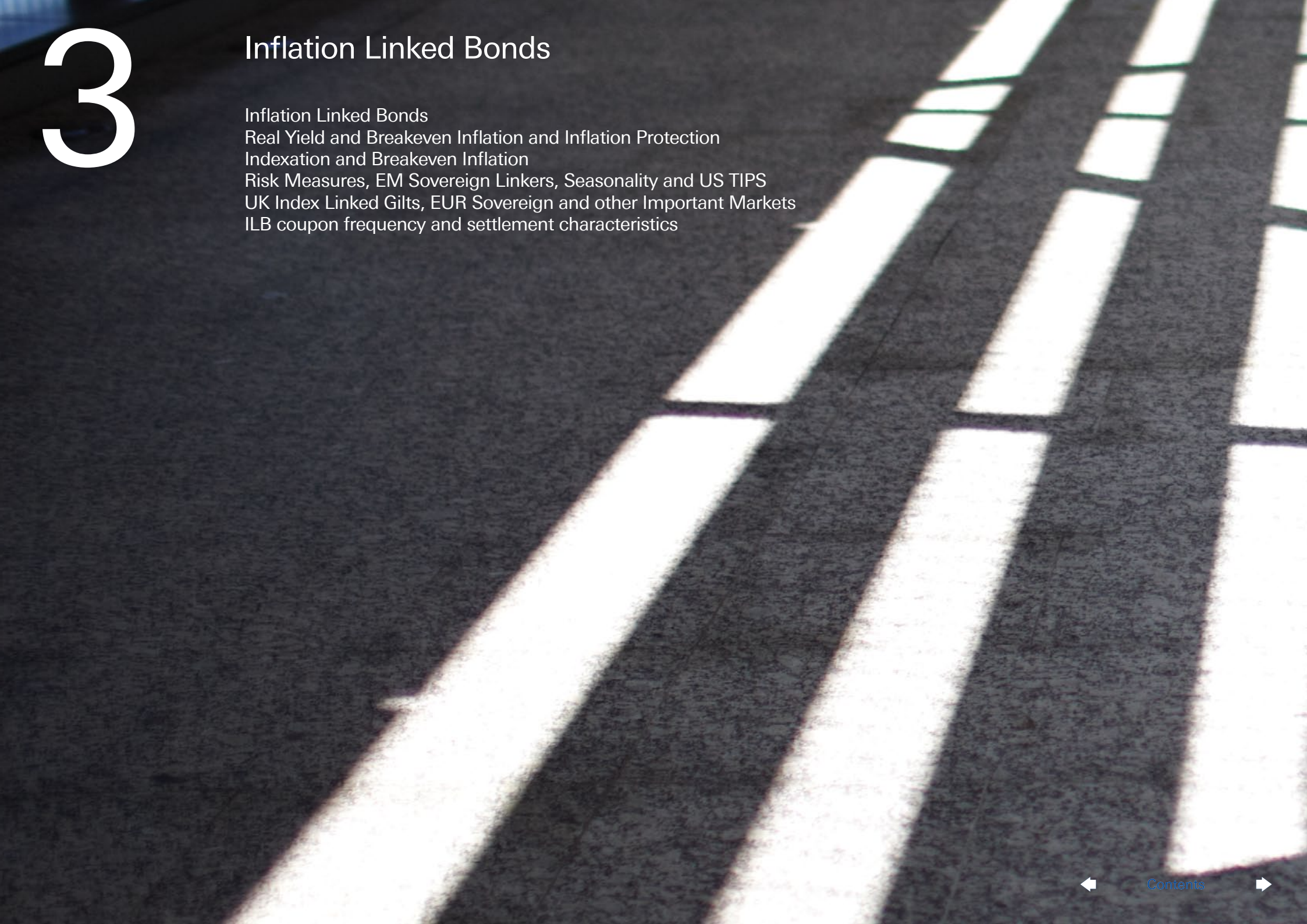
Source: Deutsche Bank



3

Inflation Linked Bonds

Inflation Linked Bonds
Real Yield and Breakeven Inflation and Inflation Protection
Indexation and Breakeven Inflation
Risk Measures, EM Sovereign Linkers, Seasonality and US TIPS
UK Index Linked Gilts, EUR Sovereign and other Important Markets
ILB coupon frequency and settlement characteristics



Inflation Linked Bonds

Inflation Bonds 'Linkers'

Inflation Linked Bonds (also known as inflation indexed bonds) or 'Linkers'.

These are Treasury bonds designed to cancel the capital eroding effects of inflation. Called TIPS (Treasury Inflation Protection Securities) in the US, their interest rate remains fixed but the principal is adjusted to match changes in a price index.

For example:

A vanilla fixed rate bond pays a fixed coupon and redeems at 100

- Interest Paid = Fixed Rate * Constant
- Notional (e.g. 5% * 100 = 5)
- Redemption = Constant Notional (e.g. 100)

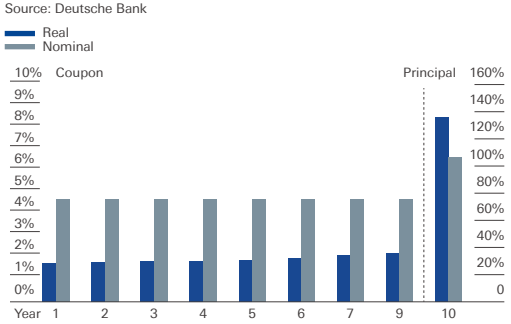
A 'Canadian style' Linker pays a 'real' coupon and redeems at 100 in 'real' terms

- Index Ratio = CPI Index on Payment Date / CPI Index on Issue Date
- Interest Paid = Fixed Rate * Inflated Notional
- = Fixed Rate * Notional * Index Ratio (e.g. 2% * 100 * 1.5 = 3)
- Redemption = 100 * Index Ratio (e.g. 100 * 1.5 = 150)

Some ILBs (like US TIPS or OATei/i) have a deflation floor, meaning a principal repayment of minimum par is guaranteed by the issuer

Fig. 1:
Vanilla Fixed Rate Bond versus Inflation Linked Bond

Source: Deutsche Bank



Real Yield and Breakeven Inflation and Inflation Protection

Real Yield and Breakeven Inflation

Components of nominal interest rate:

- Real yield
- Expected Inflation
- Risk Premium
- Liquidity Premium

Issuing nominals means investors need compensation for inflation uncertainty.

Linkers save issuers the risk premium by providing certainty about real cash flows in the future i.e. their increase in purchasing power is 'locked in'. (figure 1)

Inflation Protection

With positive inflation, the ILB's cash flows will increase over time to secure the investor's purchasing power.

Compared to a nominal bond early coupon payments will tend to be lower, and the final repayment will tend to be higher.

The examples below assume an annual coupon and inflation at 2%. (figures 2 and 3)

Fig. 1: Expand
Components of Nominal Yield

Source: Deutsche Bank

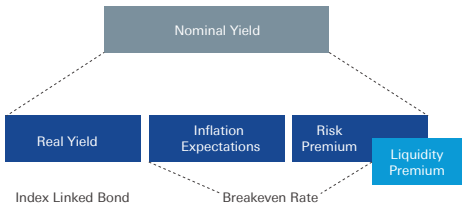


Fig. 2: Expand
Nominal cash flows

Source: Deutsche Bank

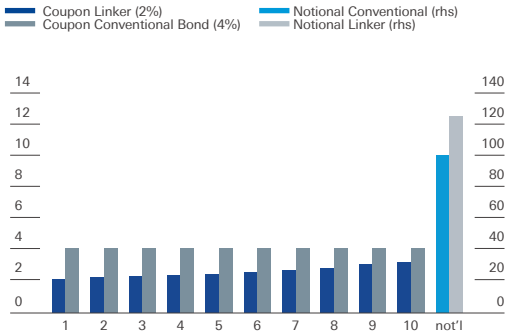
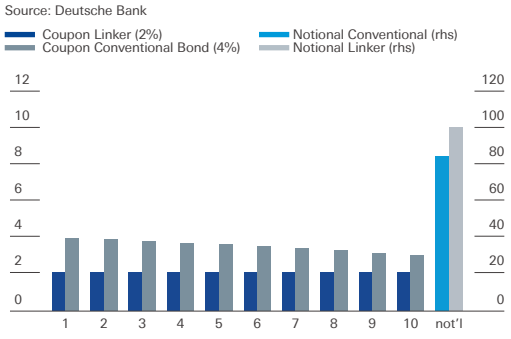


Fig. 3: Expand
Real cash flows (purchasing power of the CFs)

Source: Deutsche Bank



Indexation and Breakeven Inflation

Indexation

To offer inflation protection you need to: (i) choose a price index, (ii) define precise linking rules.

Price index: typically a non-seasonally adjusted, official consumer price index

Indexation: the 'Canadian' model is now the benchmark, adopted among others by TIPS, EUR ILBs and new UKTi (figure 1)

- Problem: CPI only monthly and published with a delay
- The price factor used to inflation adjust cash flows, the 'Daily Inflation Reference' (DIR), is a linear interpolation of the two monthly values of the official price index three months earlier and two months earlier, e.g.:
  - The DIR for 1 June is the official CPI March (released mid-April)
  - The DIR for 1 July is the official CPI April (released mid-May)
  - The DIR for 23 June is : CPI(Mar) + 22/30 * [CPI(Apr) – CPI(Mar)]

Breakeven Inflation

Canadian style linkers are quoted in real terms and the real price (P) - real yield (r) relationship is equivalent to that of a conventional bond (c: coupon):

ILBs' value is often expressed in terms of inflation rather than in terms of real yields by considering the difference in yield between nominal and real bonds.

BEI (Breakeven Inflation) is the inflation rate that equates the expected return of an ILB and a comparable nominal bond; i.e. if actual inflation until maturity exceeds BEI, linkers outperform nominals.

In practice, the market looks at simple yield spreads (figure 2).

Fig. 1: Expand
Indexation

Source: Deutsche Bank

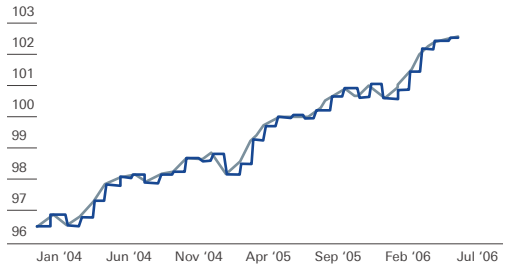
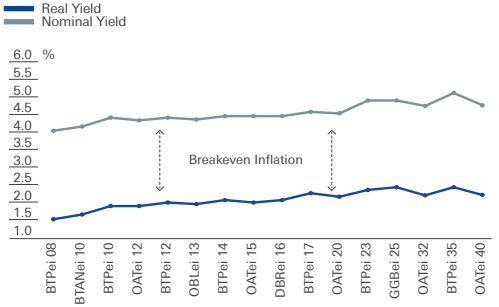


Fig. 2: Expand
BEI ≈ nominal yield – real yield

Source: Deutsche Bank



Risk Measures, EM Sovereign Linkers, Seasonality and US TIPS

Risk Measures

– The concepts of duration and convexity can be applied to linkers in the same way as for conventional bonds
– But in the case of linkers, duration describes the sensitivity of the price to a change in the real rate
– Linkers have a higher duration than same maturity conventionals
– Convexity rises exponentially with duration, for the same maturity ILBs have a higher convexity than nominals

EM Sovereign Linker Markets

– Most Latin American inflation markets have long histories; Brazil is by far the largest market, suppression of investment restrictions in 2006 spurred international demand
– Chile, Colombia & Uruguay also issue ILB
– Israel has a large linker market (USD27bn market value)
– More recently South Africa, Poland, Turkey (2007) and South Korea (2007)

Seasonality

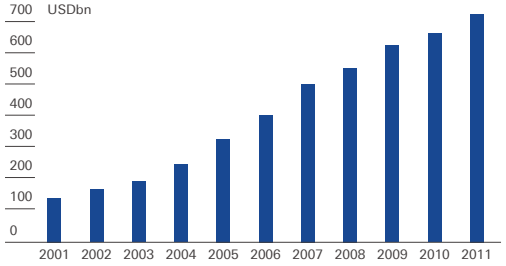
– Seasonal movements in price indices mean that inflation accrual is not linear
– Quoted real yields of ILB adjust to the changing inflation uplift
  – real yields & BEI exhibit seasonal patterns
  – detecting the seasonal pattern in prices is important for valuing ILBs
– Estimation of seasonal factors is not without difficulties, especially in the euro area where there is instability
– There is no consensus on their precise value

US TIPS

– The US sovereign linker market is the largest globally with total market value in excess of USD700bn (figure 1)
– TIPS were first issued in 1997; in recent years, there have been two 5y, two 20y and four 10y auctions per year; in February 2010 30y TIPS were reintroduced, replacing the 20y
– Maturities range from 1y to 30y

Fig. 1: Expand
US TIPS total outstanding market value

Source: US Treasury



UK Index Linked Gilts, EUR Sovereign Linkers, and other Important Markets

UK Index Linked Gilts

– The UK linker market is the oldest in Europe (first issuance 1981)
– Total market value exceeds GBP270bn and more than 20% of sovereign debt is linked to inflation
– Traditionally bonds have an 8M indexation lag, but since Sep 2005 all new issues follow the 3M lag model; UKTi have no deflation floor
– Issuance has been weighted towards the long end
– Maturities range from 1Y to 50Y, with issues available on all main curve points (figure 1)

EUR Sovereign Linkers

– Euro area sovereign inflation-linked bond (ILB) markets are expanding rapidly with the total market value exceeding EUR320bn today
– France, Italy, Germany & Greece issue ILBs
– Italian, German and Greek ILBs are linked to euro area inflation; France issues both bonds linked to EUR inflation and bonds linked to FRF inflation
– Maturities range from 1Y to 32Y, with issues available on all main points on the curve (figures 2 and 3)

Other important markets include Australia, Canada and Sweden

– AUD: govt suspended issuance in 2003, but started again in 2009. Strong liability related demand from PF and insurance companies
– Sweden: linkers account for almost 30% of the total government bond market, a higher share than in any other industrial market

Fig. 1: Expand
UK Total Outstanding Market Value

Source: UK DMO

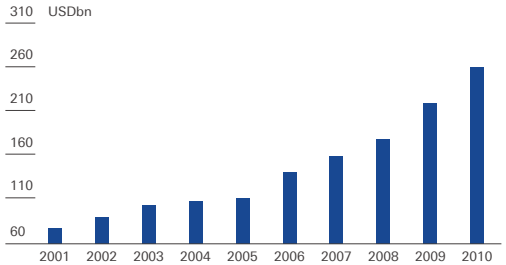


Fig. 2: Expand
EUR Sovereign Linker Issuance

Source: National Treasury

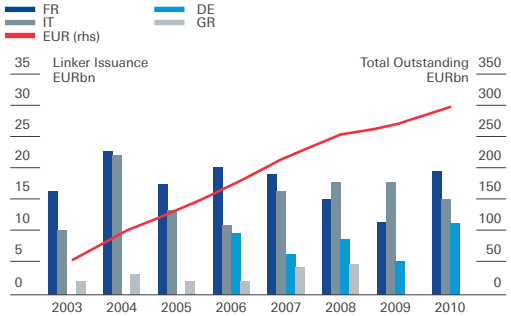
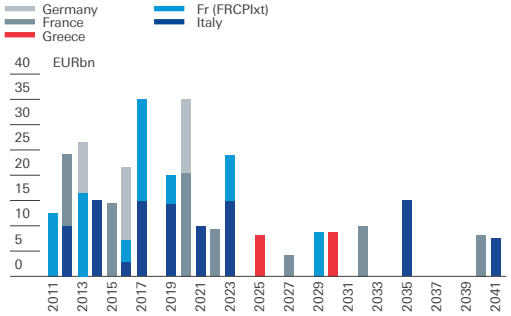


Fig. 3: Expand
Sovereign Linkers, Outstanding Volume

Source: National Treasury



ILB coupon frequency and settlement characteristics

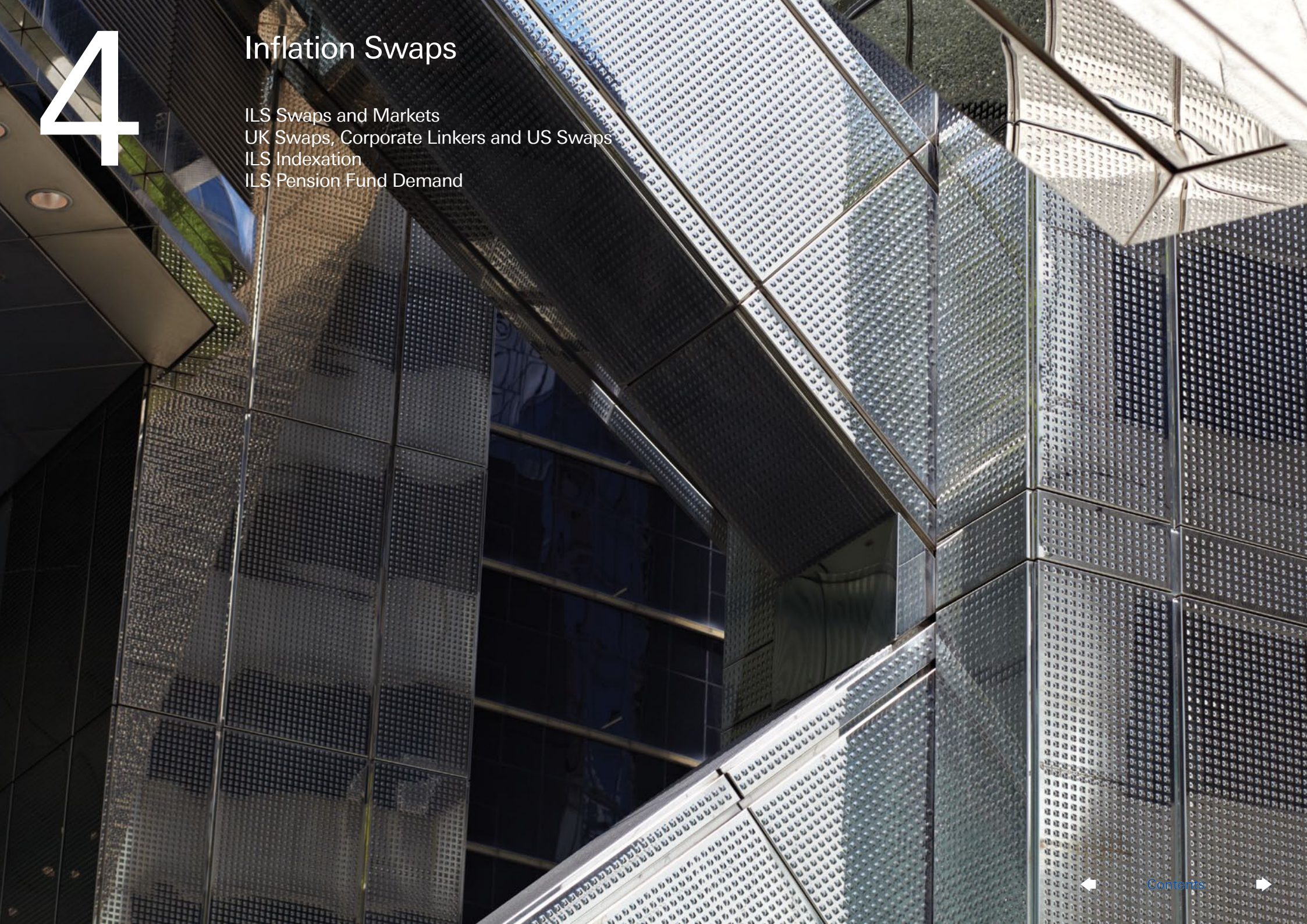
Most ILBs have coupon frequency and settlement characteristics in line with the nominal market

	Price index	BBG	Index lag	Deflation floor	Coupon
US	CPI-U	CPURNSA	3M	YES	semi-ann
UK	RPI	UKRPI	8M/3M	NO	semi-ann
FR	CPI x tob, FR	FRCPXTOB	3M	YES	annual
	HICP x tob, EMU	CPTFEMU	3M	YES	annual
IT	HICP x tob, EMU	CPTFEMU	3M	YES	semi-ann
JP	CPI x fresh food	JCPNJGBI	3M	NO	semi-ann
SE	CPI	SWCPI	3M	YES (new ILB)	annual
CA	CPI	CACPI	3M	NO	semi-ann
GR	HICP x tob, EMU	CPTFEMU	3M	YES	annual
DE	HICP x tob, EMU	CPTFEMU	3M	YES	annual
AU	CPI quarterly	ACIF	6M	YES	quarterly

4

Inflation Swaps

ILS Swaps and Markets
UK Swaps, Corporate Linkers and US Swaps
ILS Indexation
ILS Pension Fund Demand



ILS Swaps

Inflation Linked Swaps (ILS) – a pure inflation product as opposed to a real rate product

What is an Inflation Swap?

The cash-flows

– Receive Compounded Inflation from Start to Maturity: pay one cash-flow
– CPIt/CPI0 -1
– Pay a known Fixed cash-flow at Maturity
– (1 + X%)^t

What is the break-even rate?

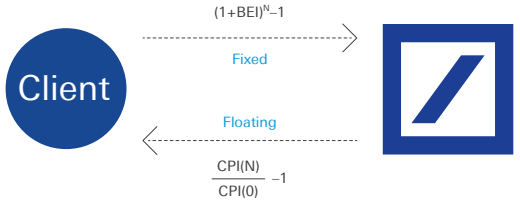
– Receive Compounded Inflation from Start to Maturity: pay one cash-flow
– CPIt/CPI0 -1
– Pay a known Fixed cash-flow at Maturity
– (1 + X%)^t

ILS Markets

The most liquid ILS are typically those linked to the same price index as the inflation-linked government bonds of the corresponding market (US CPI-U, EUR HICP ex-tobacco, French CPI ex tobacco, UK RPI).

For the major markets, ZC ILS are usually quoted for tenors out to 30 years, sometimes 50 years.

Fig. 1:
Inflation Swaps



UK Swaps, Corporate Linkers and US Swaps

UK Swaps and Corporate Linkers

Non-sovereign inflation supply in bonds & swaps has grown rapidly in the UK in particular 2006 and H107

Market	Price Index	Lag	CPI Fixing
US	CPI-U	3M	Interpolated
Euro area	HICP ex tobacco	3M	Straight
France	CPI ex tobacco	3M	Interpolated
UK	RPI	2M	Straight

US Swaps

The inflation swap market has developed rapidly from 2004, but remains less liquid than its European counterparts

A lack of 'natural' inflation swap supply translates into structural richness in swap BEI vs bond BEI… and wide linker ASW discounts

Fig. 1: Expand
Bond Breakevens vs Swap Breakevens

Source: Deutsche Bank

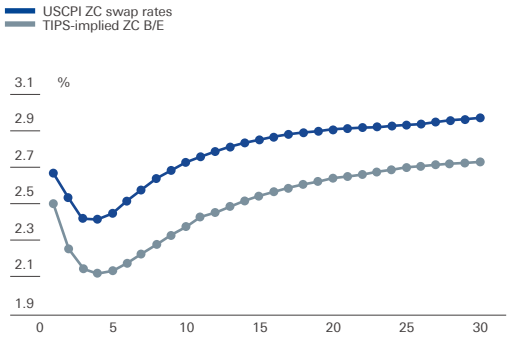
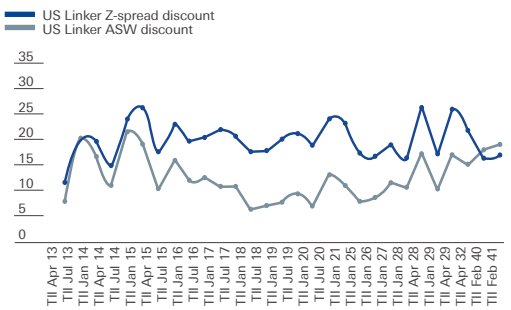


Fig. 2: Expand
Measures of Relative Value: ASW Spread and Z-spread

Source: Deutsche Bank



ILS Indexation

ILS Indexation

For FRCPIxt & US CPI, the indexation lag convention is the same as for the corresponding inflation-linked bond markets

– Strong demand has led to a low level of real interest rates, lock in low financing costs
– PFI projects with inflation component (usually bonds, but typically transformed into ASW)
– Credit wrapping allowed corporates to issue highly rated debt which is more appealing to institutional investors

But has fallen significantly during the credit crisis

Main sources: regulated utilities, PFIs, property leases, railway companies, retailers, supranationals

Alternative supply has led to two-way swap market and narrow swap-bond B/E spread, but swap richness has increased again during the crisis

ILS Pensions Fund Demand

ILS Pension Fund demand

– In the UK, pension indexation to RPI (LPI) is more explicit than elsewhere and the pension industry is larger than in other European countries
– Accounting rules ('Financial Reporting Standard 17') have encouraged pension funds to match their indexed liabilities more closely
– As a result, demand growth from pension funds and life insurers has outstripped supply leading to low real yields and expensive BEI at the long-end of the curve But has fallen significantly during the credit crisis
– Long-term investors own the majority of ILB as a hedge for their real liabilities
– All public and part of private sector pension liabilities will be linked to CPI (instead of RPI) from fiscal year 2011/12 future issuance of CPI linked Gilts looks possible

Fig. 1: Expand
Real Yields

Source: Deutsche Bank

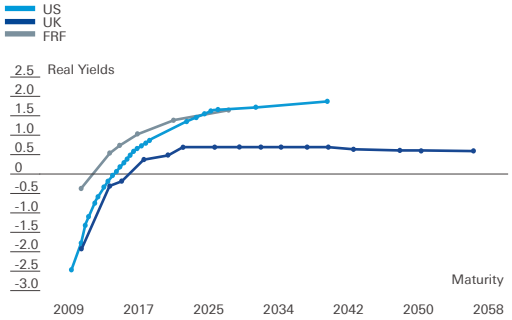


Fig. 2: Expand
UK Non-sovereign Inflation Supply

Source: Deutsche Bank

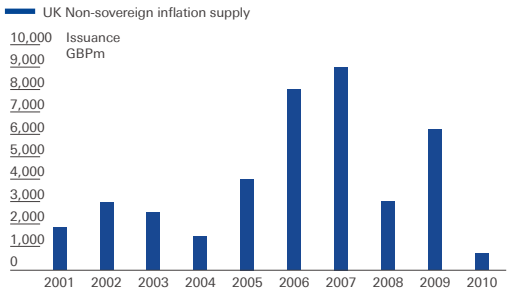
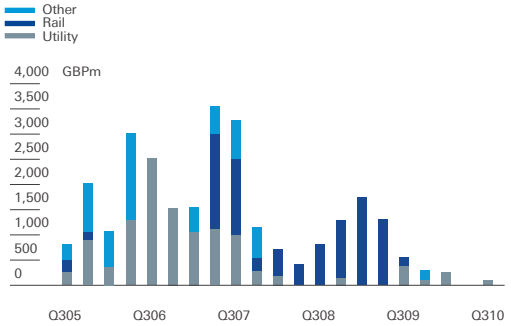
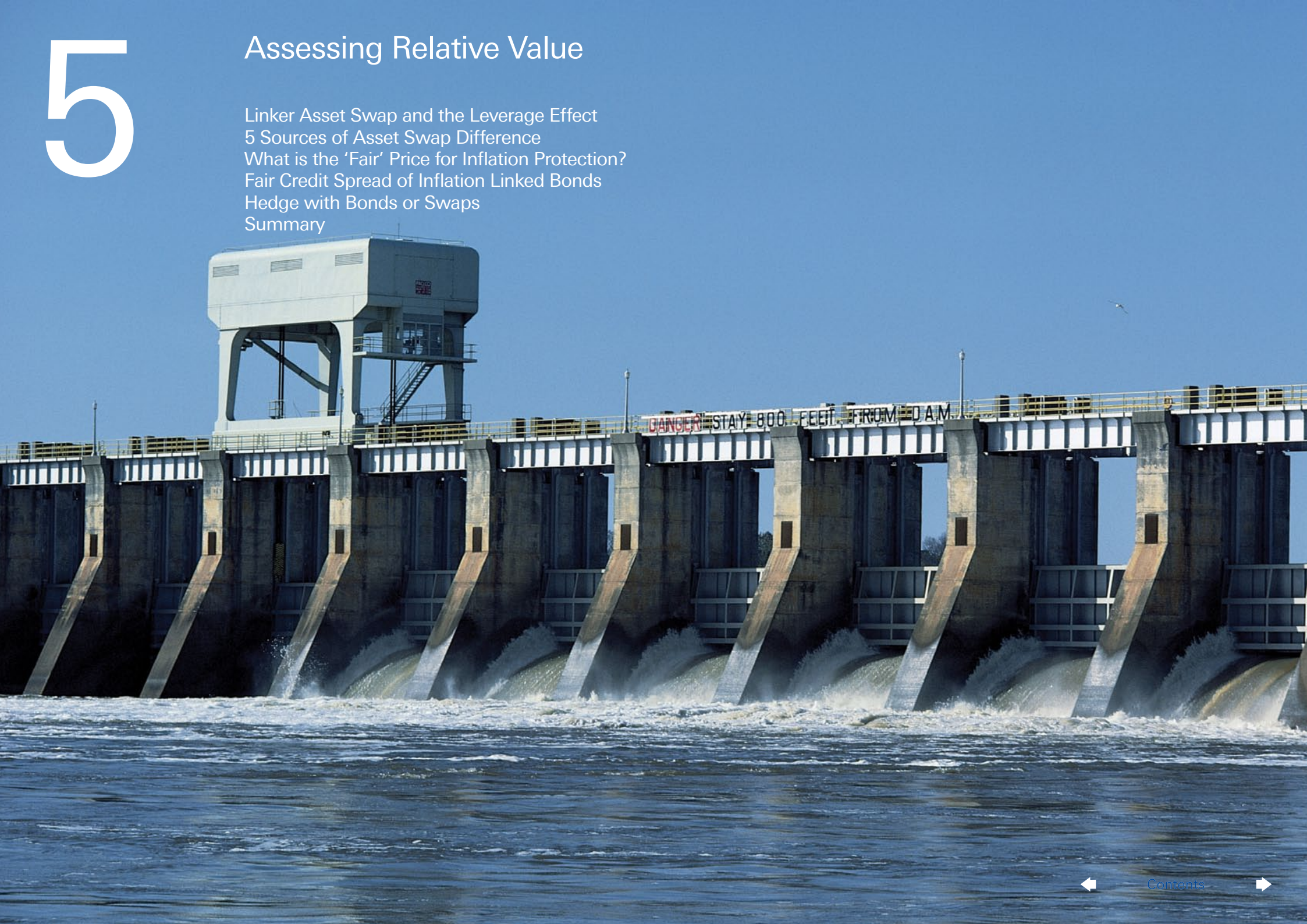


Fig. 3: Expand
UK Non-sovereign Inflation Supply

Source: Deutsche Bank



5 Assessing Relative Value



Linker Asset Swaps and the Leverage Effect

Linker Asset Swap

– Investor buys an Inflation Bond
– Investor agrees to pay away all the cash-flows (P+I) from the bond
– Investor receives in return Libor + x% until maturity as well as a principal payment

"The increasing credit exposure, and thereby return, on a linker asset swap generates significant outperformance…"

– Daragh McDevitt,
Global Head of Inflation Structuring

The Leverage Effect

Sophisticated investors may not be able to borrow to buy additional nominal bonds due to constraints, hence are willing to give up some of their excess return

Some investors just like the pick-up over equivalent tenor nominal bonds on asset swap (figure 2)

For example

This is how we expect a Linker to increase in the Eurozone over time

Why is this important?

Sovereign default is currently very real possibility… like for like exposures need to be carefully assessed for fair value – some investors have increased credit risk for very little reward

Fig. 1:
Linker Asset Swap

Source: Deutsche Bank

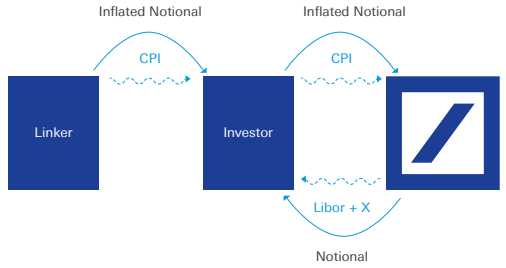
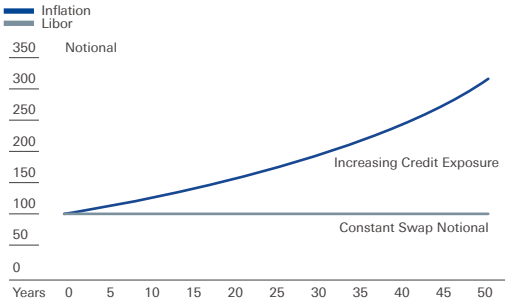


Fig. 2: Expand
The Leverage Effect

Source: Deutsche Bank



5 Sources of Asset Swap Difference

5 Sources of Asset Swap Difference

PV01 difference
– Linkers have a higher duration

Swap richness
– The spread between inflation-linked swaps and implied bond break-evens gives rise to different asset swap levels for linkers and nominals
– It also usually tells the story of swap supply and demand…

Seasonality
– See the section on page 3.4

Credit / Liquidity
– Mis-priced credit cost leading to 'value' for issuers

Tax
– Favourable deferrals for issuers encourage supply

The difference between a nominal asset swap and a Linker Asset Swap of the same maturity is a function of the larger credit exposure, the term structure of credit and the swap richness

For example
20 bps richness results in an additional 28 bps on asset swap – a 40% increase

> "Of these comparative measures… richness is the true measure"
>
> – Stephane Salas,
> Global Head of Inflation Trading

Fig. 1:
Measures of Relative Value

Source: Deutsche Bank

	Adjusts for Dirty Price	Accounts for Cashflow Pattern	Accounts for Term Structure of Credit	Fair Value Discounting
Par par ASW				
Net Proceeds ASW	√			
Z spread	√	√		
'Richness'	√	√	√	√

What is the ‘Fair’ Price for Inflation Protection?

What is the ‘Fair’ Price for Inflation Protection?

Inflation ‘Breakeven’ is not equal to market inflation expectations but is a factor of
– Inflation expectations
– ‘Risk Premium’
– ‘Liquidity Premium’

Inflation expectations over the very long run are hard to judge but tend to be based on current economic policy
– ECB target rate is ‘under, but close to 2%’

Risk Premium includes
– Potential change in monetary policy target (e.g. 4% plus or minus 1% instead of under 2%)
– Abandonment of monetary policy in favour of employment or currency board
– EUR breakup, expansion or succession
– Asymmetric elasticity of inflation: wages are easier to raise than to cut

Liquidity premium includes
– Relative demand and supply for inflation bonds v nominal bonds
– Balance sheet costs of holding inflation bonds to recycle inflation
– Opportunity cost of capital for cash used to hedge inflation

“The biggest mistake people make with inflation-linked bonds is thinking that the breakeven inflation is the market’s expected inflation rate. It is not and should not be. The breakeven includes what the market expects inflation to be and the major portion of the risk premium that you should find in the nominal market, and the liquidity premium”

– Markus Heider,
Global Head of Inflation Research

Fair Credit Spread of Inflation Linked Bonds

Fair Credit Spread of Inflation Linked Bonds

Issuing Linkers equates to borrowing more over time in nominal terms i.e. it can be thought of as a set of forward starting bonds

Forward starting bonds = greater credit risk

Two components to fair price:

– The issuer's current credit spread for the maturity of the bond
– Forward credit spreads for each of the forward starting borrowings i.e. forward credit spreads

A simple point, but investors may not recognise and price this correctly

Fig. 1: Expand
Linker as a Series of Forward Starting Bonds

Source: Deutsche Bank

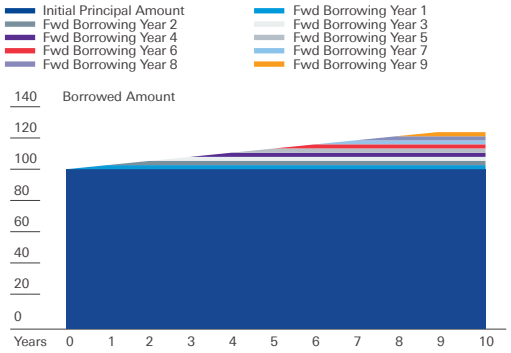


Fig. 2: Expand
Creating a synthetic 30-year old Nominal Bond

Source: Deutsche Bank

Hedge with Bonds or Swaps

The Question is…

Hedge with Bonds or Swaps

Traditionally, many investors have primarily considered inflation-linked bonds to hedge exposure

However, a more modern approach is:
– Bonds can be cheaper or more expensive than swaps
– Buy the cheapest asset
– Hedge the inflation with swaps
– Opportunistically switch between assets

This also gives a lot more flexibility to hedge the desired cash flows, since at the long-end there are only relatively few bonds outstanding (and liquidity can be better as well)

The Bond Universe

Value within the UK – for example

Figures 3 and 4 on the right depict the value that can be created by switching between similar maturity nominal and inflation linked bonds.

Figure 2 below depicts the value in switching between short and long maturity linkers.

In terms of trading capability, how does this work?

We should always be free to switch between UK Bonds and UK Linkers

Fig. 1: Expand
Swap Inflation Price – Bond Inflation Price

Source: Deutsche Bank
Past performance is not a reliable indicator of future performance

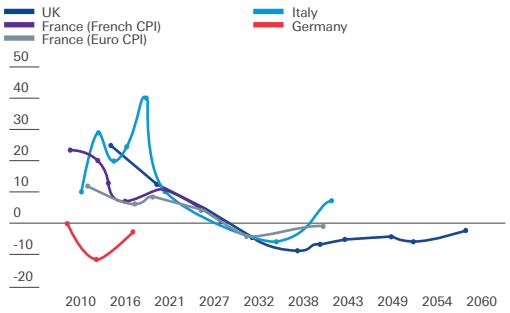


Fig. 2 : Expand
PV Gain of UKTi40 over the UKTi27

Source: Deutsche Bank
Past performance is not a reliable indicator of future performance

Fig. 3: Expand
PV Gain of UKTi27 over the UKT27

Source: Deutsche Bank
Past performance is not a reliable indicator of future performance

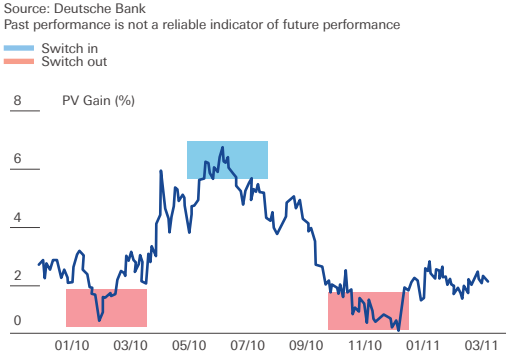
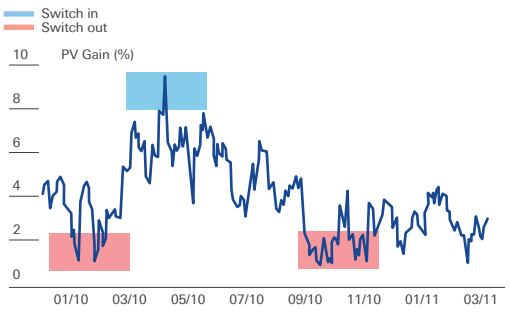


Fig. 4: Expand
PV Gain of UKTi40 over the UKT40

Source: Deutsche Bank
Past performance is not a reliable indicator of future performance



Summary

To sum up…

- Given the displacement between inflation and nominal markets, there are opportunities for arbitrage
- Asset swap spreads on linkers represent a premium for credit that is hard to price, and when coupled with demand/supply imbalances and higher duration, they offer a pickup to nominals for the same underlying issuer
- Switching between equivalent risk sovereigns/supra sovereigns can often, driven by dynamics of the cross currency swaps market, provide additional yield pick-ups
- These displacements can be assessed by a variety of metrics
- The value of switching is evident from the incremental excess pickup that is generated by selling the costlier asset to buy the cheapest asset from time to time
  - Used as a systematic strategy this can yield substantial returns over medium term horizons
- These represent incredible opportunities for 'asset-heavy' investors, and the markets will likely normalize with time, hence it is important to act quickly

"There isn't one risk free curve, there are 100, 150, 200… the key is when do you pick 'the fruit', when is the bond cheap enough?"

– Daragh McDevitt,
Global Head of Inflation Structuring

"…there are incredible opportunities for asset-heavy investors…it is important to act quickly"

– Haroon Sana,
Global Head of Rates Sales

6 Inflation Options

Inflation Options

A relatively new market, inflation options traded between Europe and the US have doubled every year since trading started in inflation swaps in 2002/2003. 2010 saw a particular growth spurt.

Long term growth looks set to continue at this explosive rate, which is clearly indicative of its importance to clients and represents a substantial opportunity to DB as intermediary between buyers and sellers of inflation.

Interbank volumes reached 50bn in 2010, up from 13bn in 2009, and just 1bn in 2005.

Fig. 1: Expand
London Options Volumes

Source: Tullett Prebon

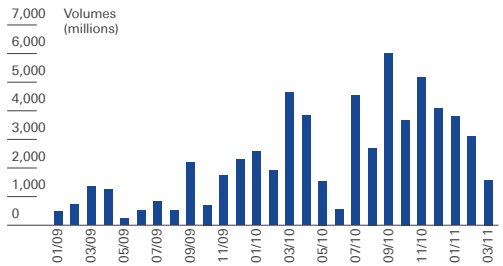
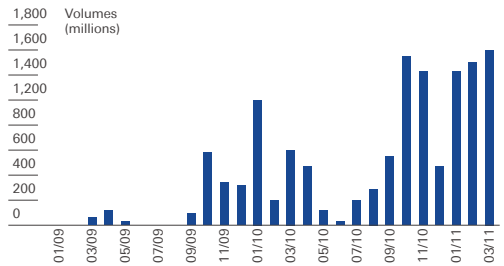


Fig. 2: Expand
NY Options Volumes

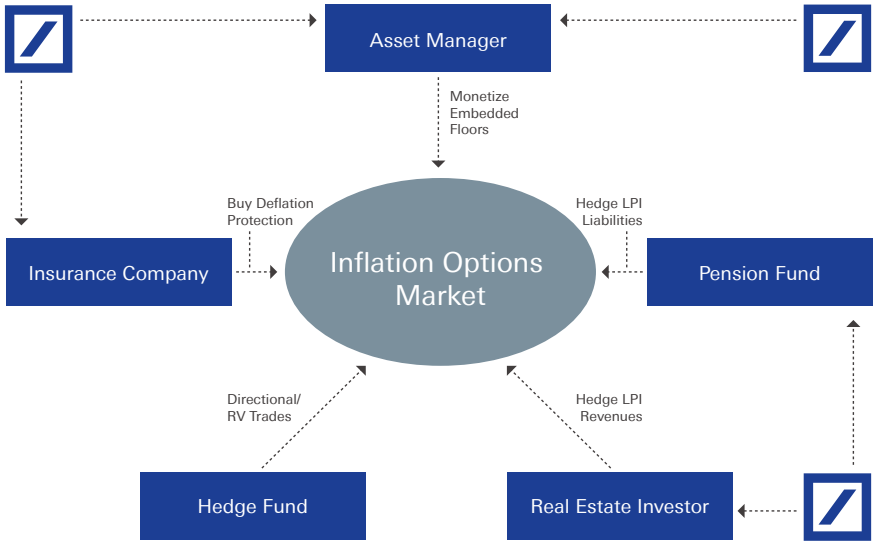
Source: Tullett Prebon



Who are the major players in the Options market?

The market is becoming more and more complex as sophisticated new players such as hedge funds, liability driven investors, and non-life insurance practitioners are added to the mix.

Any client:
– holding a bond portfolio
– subject to tail inflation – high or low
– who has revenues or liabilities that are indexed to inflation
is exposed to inflation risk



Expand

Options products

Year on Year cap/floor

– YoY floorlet : Max [K - YoY_t , 0]
– With $YoY_t = I_t/I_{t-1} - 1$
– A 5 year 0% YoY floor costs 80c or 18bp p.a.
– Demand from retail notes >> Supply from premium sellers

Zero Coupon cap/floor

– ZC floor: Max [$(1+K)^t - I_t/I_0$, 0]
– A 10 year 0% ZC floor costs 55c
– Supply from linkers and asset swaps >> Demand from deflation hedgers

Limited Price Index (LPI)

– $LPI_t = LPI_{t-1} * \{ 1 + \max [\min [YoY_t , 5\%] , 0\%] \}$
– Inflation observed annually, collared, compounded… and paid at maturity
– Demand from LDI funds >> Supply from real estate investors

Fig. 1: Expand
5y 0% YoY floor HICPxT

Source: Deutsche Bank
Past performance is not a reliable indicator of future performance

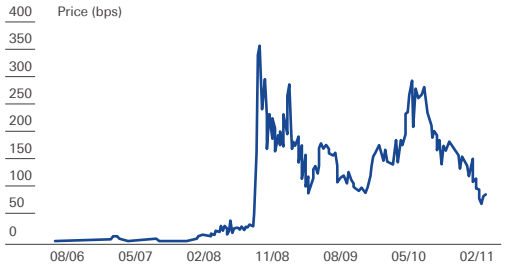


Fig. 2: Expand
10y 0% ZC floor HICPxT

Source: Deutsche Bank
Past performance is not a reliable indicator of future performance

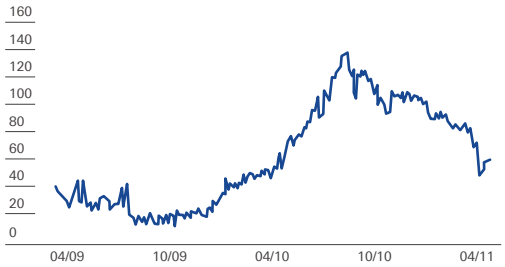


Fig. 3: Expand
Limited Price Index (LPI)

Source: Deutsche Bank

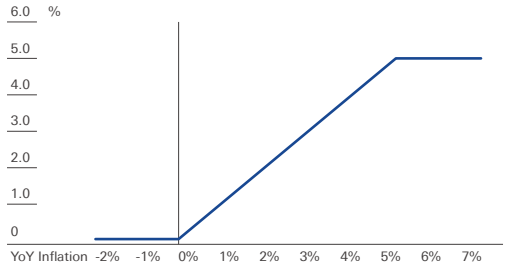
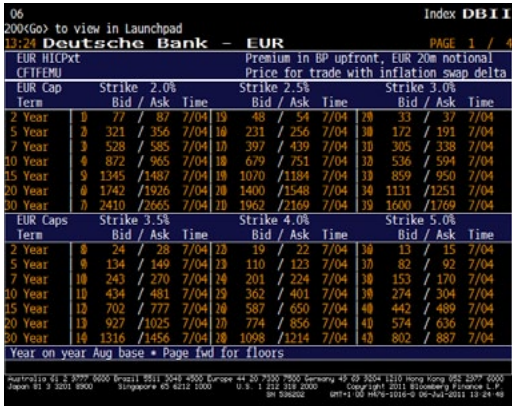


Fig. 4: Expand
DB Inflation pages: DBII



What are the trading opportunities?

LPI Collars represents a great inflation-hedging alternative

Inflation risk for Pension funds and other liability-driven investors is big, 20 – 30% of scheme risk.

Breakevens are deemed expensive: if, for example, breakeven is 3.7% and the scheme expected inflation of 2.8%, hedging loses value (figure 1).

What's the solution?

Cover inflation risk by creating an inflation collar
– Pay LPI
– Receive RPI

"The catalyst that makes this trade work is inflation at above 5% – this 5% strike is currently lower than spot inflation – a change from the last five years"

– Nicolas Tabardel,
Global Head of Inflation Volatility and Exotics

Expert historical perspective

Markus Heider, responsible for European inflation research at DB Global Markets Research, provides a useful long term perspective: this graph shows how the volatility we have seen in the last three years is nothing compared to the last 200 years. In the long run, inflation is a very volatile entity, which means risk and therefore, opportunity.

The relative stability we've seen in the last 20 years can very quickly change

Significant risk factors currently include governments with unsustainable deficits and globalisation; the need to hedge inflation risk is becoming increasingly relevant

Fig. 1: Expand
Assumed Constant Year on Year Inflation Return

Source: Deutsche Bank

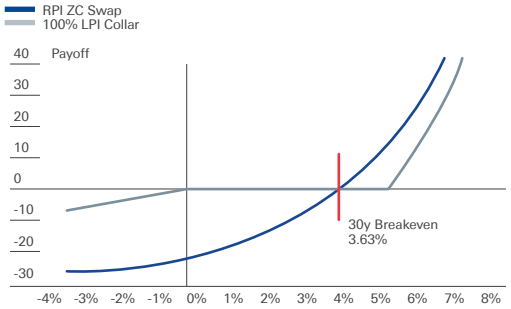
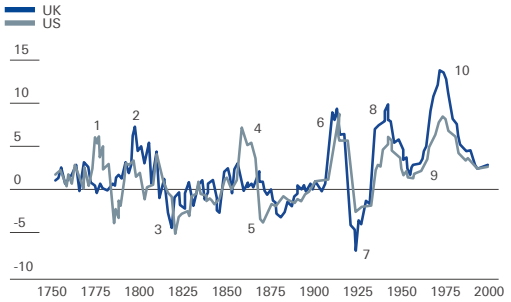


Fig. 2: Expand
Consumer price inflation, y/y%, 11-yr MA

Source: EH Net



1. US war of Independence
2. Napoleonic Wars deficit monetised
3. 1st Industrial Revolution: productivity-led deflation
4. US Civil War
5. 2nd Industrial Revolution: productivity rebounds; gold finds
6. Fiscal monetisation during WWI
7. Great Depression
8. Fiscal monetisation during WWII
9. Fiscal monetisation during Vietnam War; oil shocks
10. Volcker clamps down on inflation

Market vs Economist Expectations

UK RPI future inflation: the market in the long term is pricing much more downside risk than upside risk. In the UK, the risks of inflation overshooting are much higher than them undershooting. This is contrary to what we see in other markets.

In Europe and the US, there is more balance; caps are becoming more much more expensive than floors.

Consensus economist predictions indicate that market implied volatility is too high; tails are too fat and the skew is too deep. Caps have no natural supply in Europe or the US so the tail risk is always expensive (figure 1).

In Europe, volatility is too high, tails are too fat, and the skew is too steep.

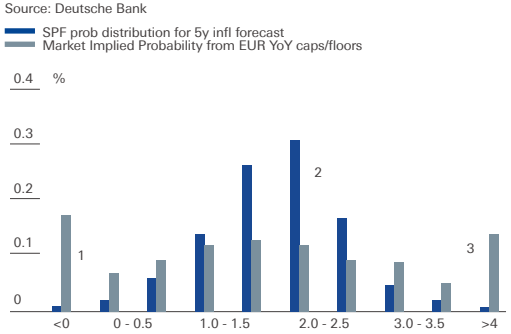
What does this mean? Selling volatility now is a good idea

The skew was pricing floors higher than caps; the skew is now symmetric (figure 2).

> "We expect this trend to continue, so that by the end of 2011, caps become more expensive than floors, better reflecting fundamentals"
>
> – Stephane Salas,
> Global Head of Inflation Trading

Fig. 1: Expand
Skew prices floors higher than caps

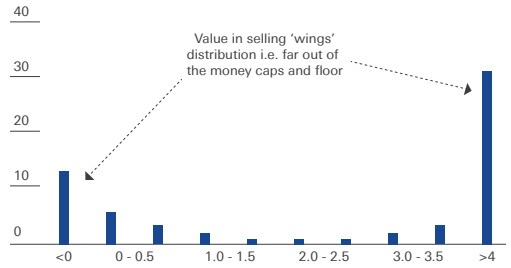
Source: Deutsche Bank



1. Deflation risk is overpriced
2. Consensus economist predictions imply market implied volatility is too high
3. 'Fat Tails'

Fig. 2: Expand
Ratio of market implied probability vs. Economist Expectations

Source: Deutsche Bank



Option Strategies

Collars (figure 1)
– Sell Floor
– Buy Cap

Strangles (figure 2)
– Sell OTM Floor
– Sell OTM Cap

Straddles
– Sell Floor and Cap at same strike

Range Accruals
– Pays N/12 * Fixed Rate, Annual
– N = No. of months 1% < YoY EUR HICP <3%
– 5y Note with DB funding, Fixed Rate = 3.40%

Fig. 1: Expand
Long (0,3) Collar

Source: Deutsche Bank

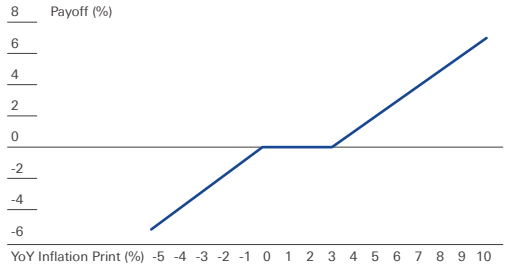
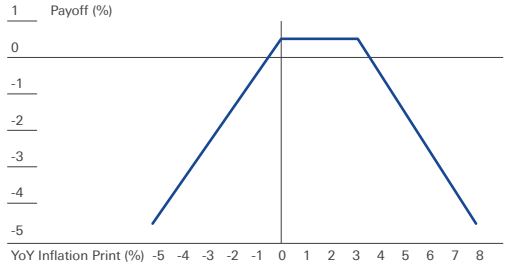


Fig. 2: Expand
Short (0,3) Strangle

Source: Deutsche Bank



Creating Optimal Hedges

Building Blocks
– Selling a 0% YoY floor
– Selling a 1x / 2x cap spread

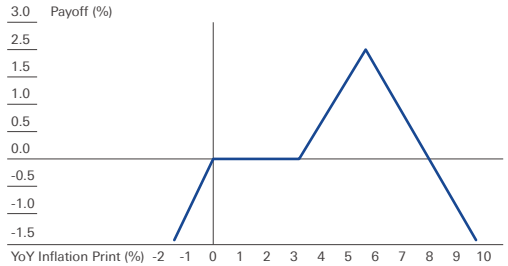
Premiums
– 5Y 0% floor generates 160bps
– 5Y 2% cap costs 260bps
– 5Y 5% cap costs 100bps

Using these components…
Zero cost and benefits from inflation between 2% and 8%

Covered Linker Switches
– Sell nominal bond
– Buy Linker
– Sell year on year caps @ 2.5% on coupons and principal

Fig. 1: Expand
Sell 0% floor, But 1x/2x Cap Spread

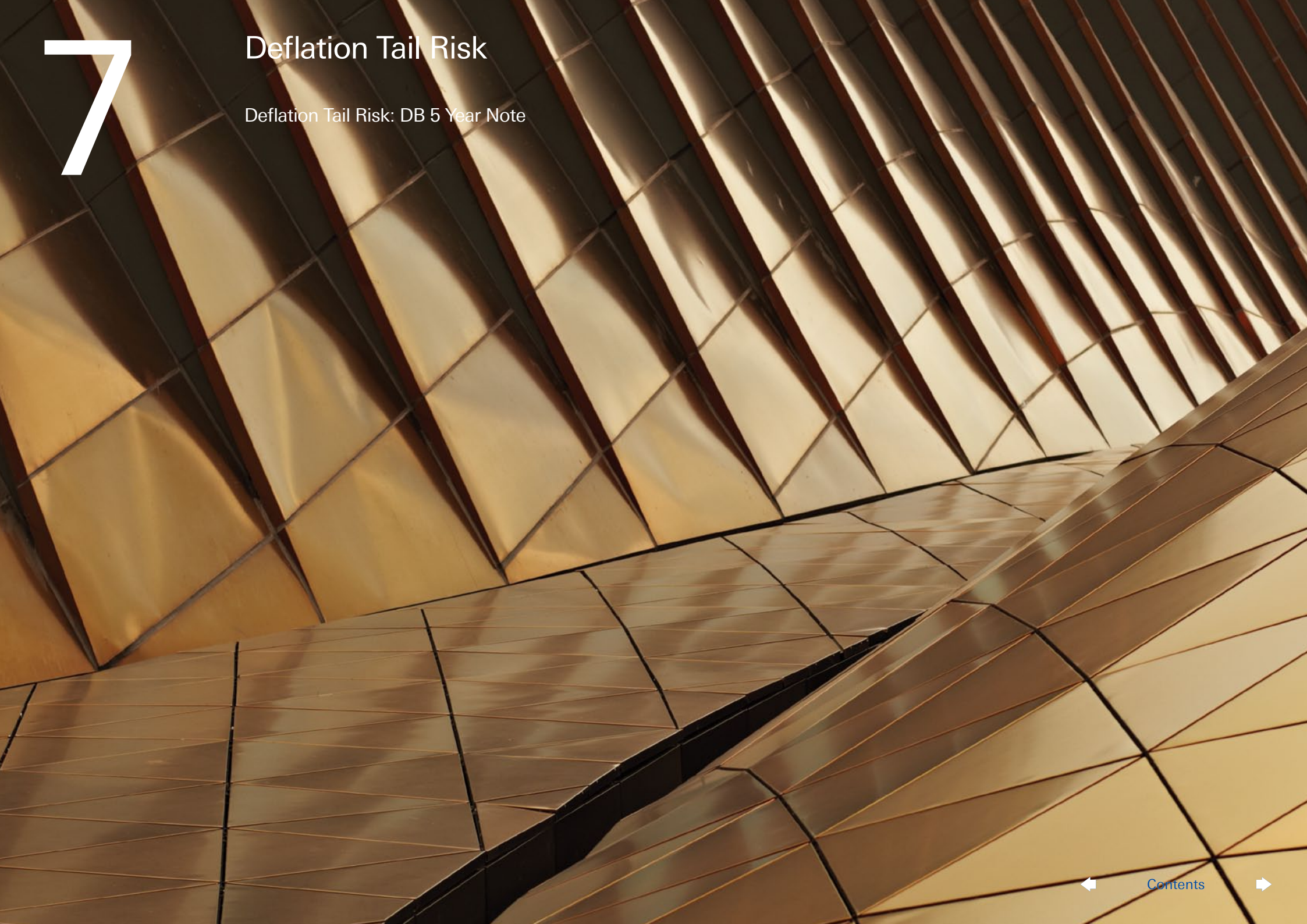
Source: Deutsche Bank



	OATei15	OATei22	OATei32
Covered Caps	(%)	(%)	(%)
Upfront Premium	1.59%	3.95%	11.39%
Running Premium (annual, 30/360)	0.40%	0.42%	0.73%
Real Yield Pick-Up	0.32%	0.35%	0.43%
Effective Breakeven Rate for outperformance of nominals	1.25%	1.44%	2.67%

7 Deflation Tail Risk

Deflation Tail Risk: DB 5 Year Note



Deflation tail risk: DB 5 Year Note

Deflation tail risk: DB 5 Year Note

Investors can take advantage of the substantial dislocations in the Inflation Option Market by selling deep out of the money Inflation Floors.

A 5 year DB Deflation Note provides a return over 4% per annum if YoY Euro-zone Inflation prints above -2.0%, providing 190 bps of pick up over 5y EUR Swap Rates.

Euro-zone inflation printing below -2.0% is an unprecedented event, never seen in ANY Euro economy.

The below note details indicative terms and compelling reasons for investors to take on this risk for above market returns. The last section looks at variations in USD, GBP in addition to alternate ways of monetizing the opportunity in EURs

The underlying market dislocations are unsustainable and will soon be removed by exogenous liquidity provided by real money accounts. This opportunity represents clear value.

DB Short Deflation Risk Note – Indicative Trade Terms

Indicatitive Terms	
Currency	EUR
Format	DB Funded Note
Maturity	5 years
Issue Price	100.00
Re-Offer	99.00
Redemption	121 - Floor(T), minimum return of 0.00
Where	
FLOOR(T)	121 * Sum[Floor(t)] for t = 1,2,3,4,5
Floor(t)	12 * Max (Floor Strike - YoY Inflation, 0%)
Floor Strike	-2.00%
YoY Inflation	CPI(t) / CPI(t-1) -1 Where CPI(t) is the EUR HICP ex Tobacco Index (CPTFEMU Index) 3m prior to Observation Date t CPI(t-1) is the EUR HICP ex Tobacco Index (CPTFEMU Index) 15m prior to Observation Date t

Reference Rates

5y Inflation B/E	1.735%
5y Swap Rate	2.16%
Max IRR	4.065%

8

Case Study: Zero-Coupon Option Trade

Case Study: Zero-Coupon Option Trade

During the first six months of 2010, a Toronto-based insurer purchased deflation protection worth $21.539 billion in notional, paying $173.7 million in premium. The 10-year zero-coupon 0% options were denominated in dollars, euros and sterling, and were executed by Deutsche Bank and Citi.

The other side of the trade was largely taken by California-based fixed-income manager Pimco, which reported it had sold more than $8 billion of 10-year zero-coupon 0% inflation floors in a filing dated August 27. The floors were sold in return for more than $70 million in premium, with Deutsche and Citi as counterparties.

The transaction made perfect sense for both participants. For the insurer, the 0% floors acted as a hedge against deflation and the impact that would have on its equity portfolio. At the same time, Pimco was able to cash in on 0% inflation floors embedded in its sizable portfolio of Treasury inflation-protected securities (Tips). Dealers say the headlines generated by the trade had a positive impact on the market, encouraging other clients to express their views on the direction of inflation by buying or selling zero-coupon options.

Daragh McDevitt, DB Global Head of Inflation Structuring said, “It sparked interest because you have very intelligent investors on both sides who are taking opposite sides of the trade.”

Since Q2, 2010, quantitative easing has encouraged more clients to sell implied inflation volatility at levels that look expensive. In particular, many market players have looked to play inflation volatility versus interest rate volatility – for example, by buying interest rate caps and selling inflation caps at similar strikes. “We’ve seen a lot of clients coming in on the same side as Pimco, viewing the probability of deflation priced in by these options to be inflated. They are either selling the options embedded in their bond portfolios, selling the options outright or entering into some kind of interest rate options strategy,” says McDevitt.

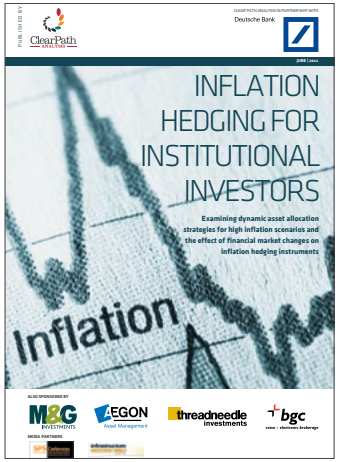
The transaction made perfect sense for both participants. For the insurer, the 0% floors acted as a hedge against deflation and the impact that would have on its equity portfolio. At the same time, Pimco was able to cash in on 0% inflation floors embedded in its sizable portfolio of Treasury inflation-protected securities.

9 Further Reading

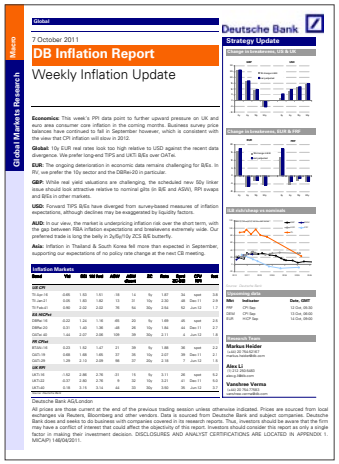
Further Reading

Inflation Hedging for Institutional Investors

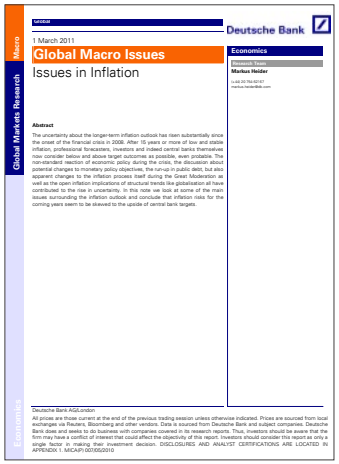
Examining dynamic asset allocation strategies for high inflation scenarios and the effect of financial market changes on inflation hedging instruments.



Weekly Inflation Research update



Inflation Big Picture Study



Research Inflation Markets Guide

10 Contacts

Contacts – Deutsche Bank Global Inflation Team

Sales

Haroon Sana
Haroon.Sana@db.com
+44 20 754 73671

Matthew Yencken
Matthew.Yencken@db.com
+31 2 8258 2010

Michael Durr
Michael.Durr@db.com
+44 20 754 73671

David Martins-da-Silva
David.Martins-da-Silva@db.com
+44 20 754 74159

Matthew Blackwell
Matthew.Blackwell@db.com
+65 68 83 16 20

Ed Rubin
Ed.Rubin@db.com
+1 212 250 0551

Tai-Zhong Jiang (Tai-Chu)
Tai-Zhong.Jiang@db.com
+81 3 5156 6186

Structuring

Daragh McDevitt
Daragh.McDevitt@db.com
+44 20 754 52750

Xavier Avila
Xavier.Avila@db.com
+44 20 754 72731

Michael Parker
Michael.Parker@db.com
+65 68 83 08 88

Josh Heller
Josh.Heller@db.com
+61 2 8258 3619

Research

Markus Heider
Markus.Heider@db.com
+44 20 754 2167

Alex Li
Alex-G.Li@db.com
+1 212 250 5483

Trading

Stephane Salas
Stephane.Salas@db.com
+44 20 754 78809

Nicolas Tabardel
Nicolas.Tabardel@db.com
+44 20 754 55748

Allan Levin
Allan.Levin@db.com
+1 212 250 7105

Katsuya Miyoshi
Katsuya.Miyoshi@db.com
+81 3 5156 6205

Vaughan Harvey
Vaughan.Harvey@db.com
+61 2 8258 1848

Integrated trading, structuring and research

Unlike some of our competitors, Deutsche Bank's inflation trading, structuring and research professionals work closely together, combining strategic and technical expertise with the macro-economic insights so important with this offering.