The rocky ride of the breakeven inflation rates

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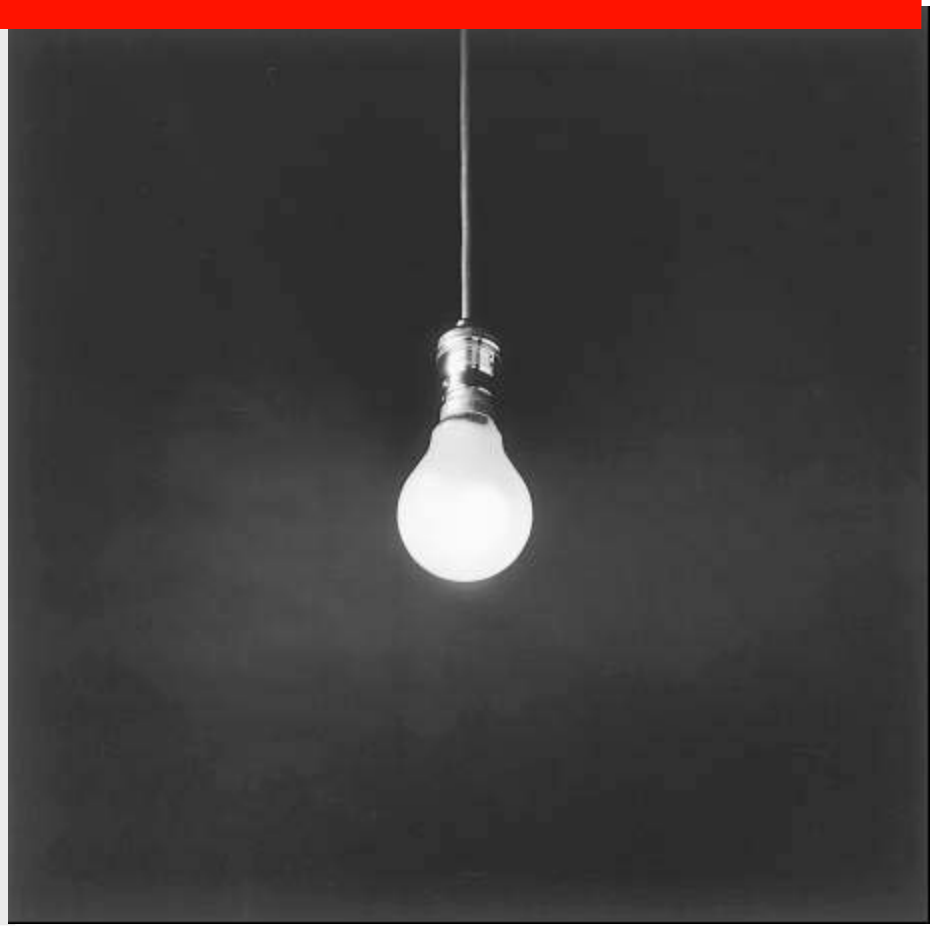

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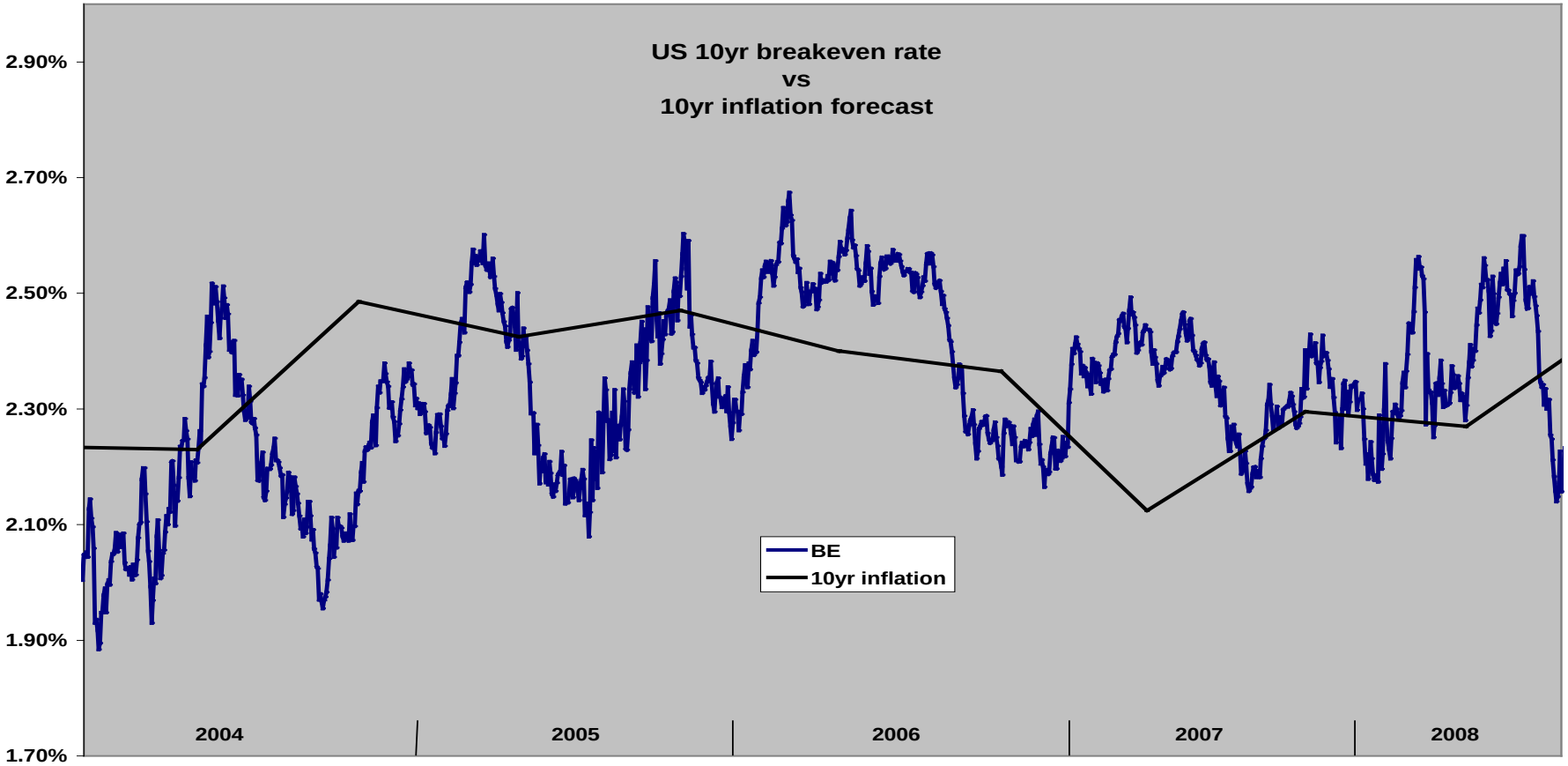
The issuance of **inflation-linked bonds** has given :

- life to two hitherto theoretical concepts : the **real interest rate** and the nominal-real rate differential called the **breakeven inflation rate**,
- new investment opportunity,
- new risk diversification opportunity,
- feedback to central banks on their monetary policy,
- some thought-provoking surprises …

… breakeven rates go through a rocky ride



- Bernanke (2004) :

  « breakeven inflation rates have proven surprisingly volatile over their short history »

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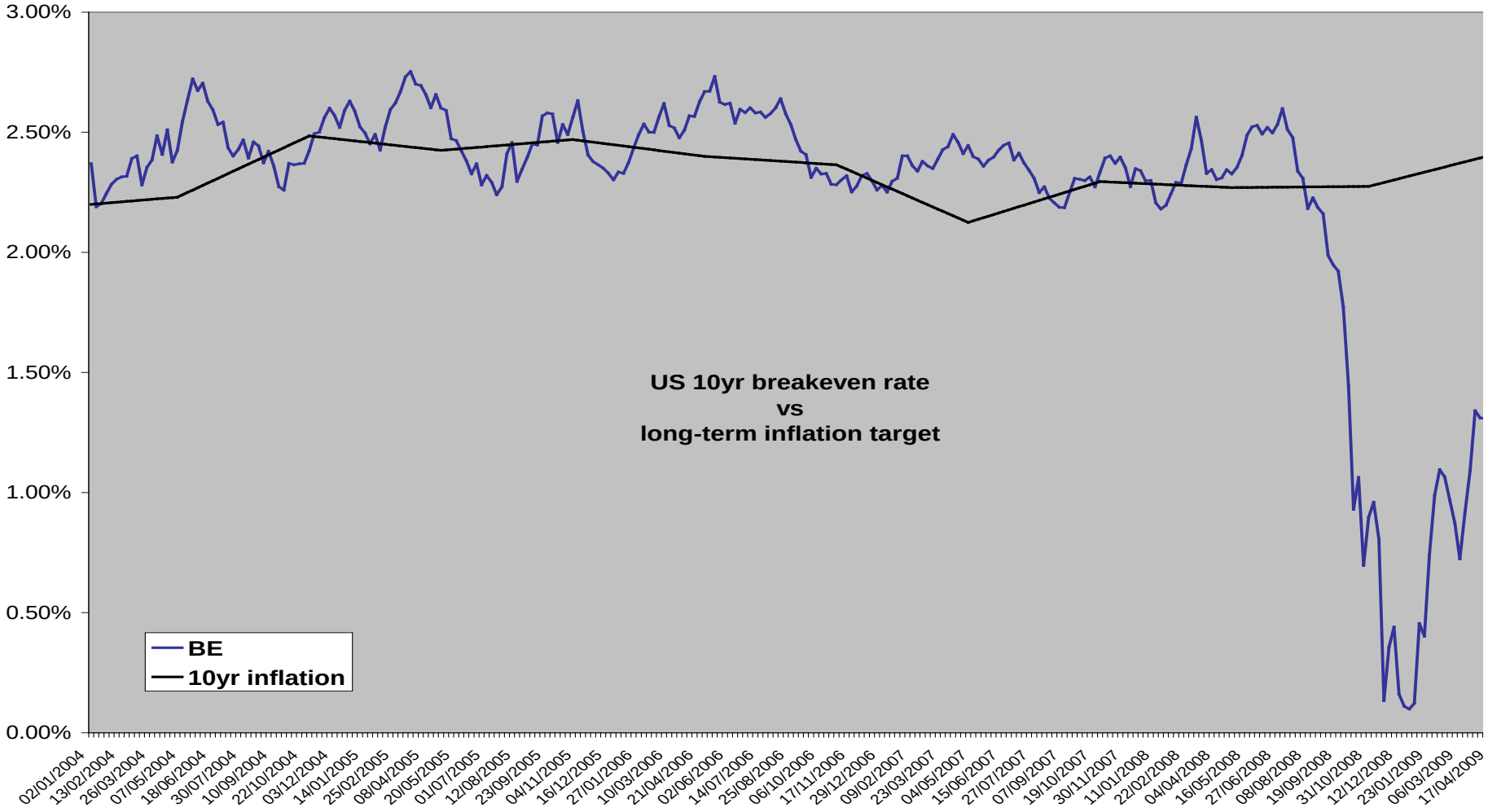
… becoming rockier …



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… their co-movements with real rates are surprising …

- Breakeven rates are systematically correlated with real interest rates in other countries, but **NOT** with the real rate in their own country.

on weekly data 2002-2008

breakeven rates \ ***real rates***	Australia	Canada	Euro Area	Great-Britain	Sweden	United States
Australia	0.27	0.19	0.37	0.33	0.41	0.34
Canada	0.30	-0.06	0.37	0.33	0.29	0.45
Euro Area	0.20	0.04	-0.18	0.09	0.11	0.13
Great-Britain	0.20	0.14	0.31	-0.07	0.28	0.29
Sweden	0.30	0.19	0.43	0.39	0.13	0.37
United States	0.19	0.10	0.10	0.15	0.13	-0.03

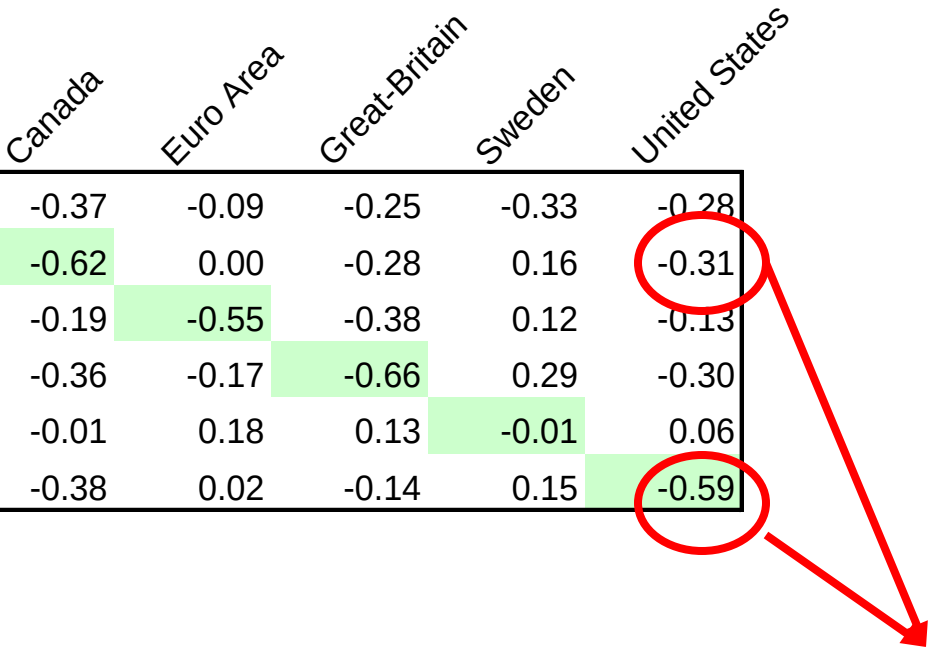
- An investor who buys a US inflation-linked bond (a TIPS) is, as expected, unexposed to the US breakeven rate, yet finds himself exposed to the Canadian breakeven rate movements.

… and continue to surprise …

- Breakeven rates are anti-correlated with real interest rates nearly everywhere.

on weekly data 05/2008-04/2009

breakeven rates \ real rates	Australia	Canada	Euro Area	Great-Britain	Sweden	United States
Australia	-0.33	-0.37	-0.09	-0.25	-0.33	-0.28
Canada	0.12	-0.62	0.00	-0.28	0.16	-0.31
Euro Area	0.00	-0.19	-0.55	-0.38	0.12	-0.13
Great-Britain	-0.04	-0.36	-0.17	-0.66	0.29	-0.30
Sweden	0.19	-0.01	0.18	0.13	-0.01	0.06
United States	0.25	-0.38	0.02	-0.14	0.15	-0.59



- The holder of the TIPS is now very exposed to US inflation concerns, while its price reaction to inflation concerns elsewhere has inverted.

Explanations of the price performance

- For the **excess volatility** of the breakeven inflation rates
  - Consensus up to 2008
  - Views today
- For the **atypical correlation structure**
  - Valid up to 2008
  - Views today

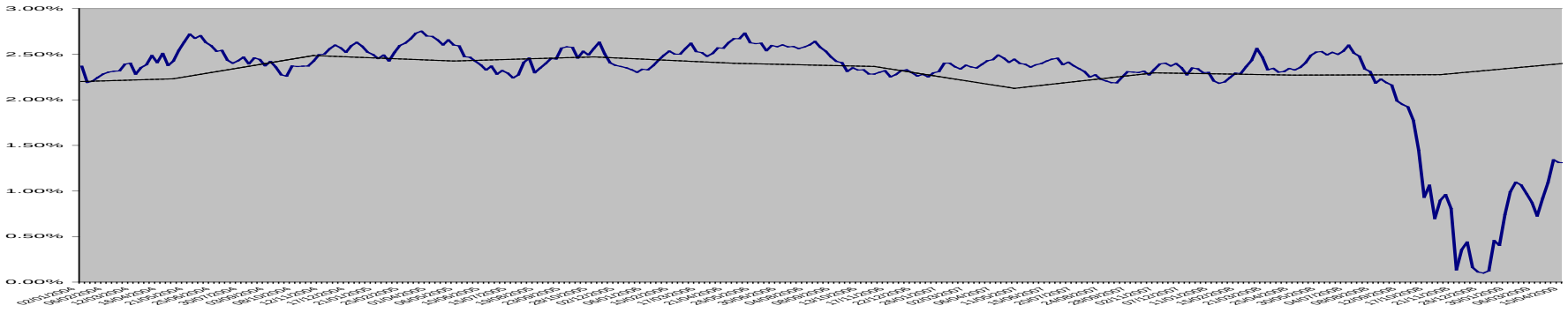
Explanations of the excess volatility – up to 2008

The Fisher (1930) equation, decomposing the nominal rate (*NR*) into the real rate (*RR*) and the inflation expectation (*INF*), has been augmented by a time-varying premium variable π, that captures

$$NR = RR + INF = RR + BE + \pi$$

- a **liquidity premium** on inflation-linked bonds, according to Shen (2001,2006).
- a **risk premium,** according to Hördahl (2007), Emmons (2000), Evans (1998) and Côté (1996).
- the **seasonality** in consumer prices within the year, according to Ejsing (2007).

Explanations of the excess volatility - today



- Hefty **inflation shocks** in 2008

  The record levels of the Brent have installed a new fear of inflation and the financial crisis has provoked a fear for deflation thereafter.

- Collapse of **Lehman Brothers**

  Leading experts on inflation-linked bonds.

- **Quantitative easing**

  Nominal bonds have been bought back massively whereas real bonds have been left untouched.

Explanations of the atypical correlation structure

Method of analysis

- Decompose into global and country-specific interest rate movements.

$$BE\begin{bmatrix} 0 & \dots & + \\ \vdots & \ddots & \vdots \\ + & \dots & 0 \end{bmatrix} = \begin{bmatrix} ? \end{bmatrix} + \begin{bmatrix} ? \end{bmatrix}$$

RR $\quad$ $global$ $\quad$ $country-specific$

- Explain the two components separately.

has changed

has remained unchanged over 2008

Decomposition of the interest rate movements

- Let ΔBE_{it} : the weekly variation of the *BE* in country *i*, analogous for *RR*.

$$\Delta BE_{it} = \beta_i^{BE} * F_t^{BE} + \varepsilon_{it}$$
$$\Delta RR_{it} = \beta_i^{RR} * F_t^{RR} + \eta_{it}$$

- The share of variance explained by the global factor **up to 2008**

variance share	Australia	Canada	Euro Area	Great-Britain	Sweden	United States
RR	39%	41%	77%	69%	63%	77%
BE	44%	55%	24%	29%	50%	39%

- The betas

betas	Australia	Canada	Euro Area	Great-Britain	Sweden	United States
RR	0.77	0.55	1.19	1.12	0.85	1.47
BE	1.26	1.19	0.59	0.69	1.15	1.05

Decomposition of the correlation matrix

- Let Γ be the correlation matrix under study and S_{BE} a composed diagonal matrix of variance shares (S_{RR} analogous) :

$$S_{BE} = \left[S_{BE}^{glob} \quad S_{BE}^{spec} \right]$$

- Then Γ can be decomposed as :

$$\Gamma = S_{BE} \circ \begin{bmatrix} \Gamma^{glob\ glob} & \Gamma^{glob\ spec} \\ \Gamma^{spec\ glob} & \Gamma^{spec\ spec} \end{bmatrix} \circ S_{RR}^{T}$$

The decomposed correlation matrix* :

*on weekly data
2002-2008

$$\begin{bmatrix} \Gamma^{glob\ glob} & \Gamma^{glob\ spec} \\ \Gamma^{spec\ glob} & \Gamma^{spec\ spec} \end{bmatrix} =$$

$$\begin{pmatrix} \begin{bmatrix} \mathbf{.48} & \mathbf{.48} & \mathbf{.48} & \mathbf{.48} & \mathbf{.48} & \mathbf{.48} \\ \mathbf{.48} & \mathbf{.48} & \mathbf{.48} & \mathbf{.48} & \mathbf{.48} & \mathbf{.48} \\ \mathbf{.48} & \mathbf{.48} & \mathbf{.48} & \mathbf{.48} & \mathbf{.48} & \mathbf{.48} \\ \mathbf{.48} & \mathbf{.48} & \mathbf{.48} & \mathbf{.48} & \mathbf{.48} & \mathbf{.48} \\ \mathbf{.48} & \mathbf{.48} & \mathbf{.48} & \mathbf{.48} & \mathbf{.48} & \mathbf{.48} \\ \mathbf{.48} & \mathbf{.48} & \mathbf{.48} & \mathbf{.48} & \mathbf{.48} & \{\mathbf{.48}\} \end{bmatrix} & \begin{bmatrix} .11 & -.19 & .02 & -.03 & -.02 & .00 \\ .11 & -.19 & .02 & -.03 & -.02 & .00 \\ .11 & -.19 & .02 & -.03 & -.02 & .00 \\ .11 & -.19 & .02 & -.03 & -.02 & .00 \\ .11 & -.19 & .02 & -.03 & -.02 & .00 \\ .11 & -.19 & .02 & -.03 & -.02 & \{.00\} \end{bmatrix} \\ \begin{bmatrix} .12 & .12 & .12 & .12 & .12 & .12 \\ .10 & .10 & .10 & .10 & .10 & .10 \\ -.19 & -.19 & -.19 & -.19 & -.19 & -.19 \\ -.02 & -.02 & -.02 & -.02 & -.02 & -.02 \\ .10 & .10 & .10 & .10 & .10 & .10 \\ -.26 & -.26 & -.26 & -.26 & -.26 & \{-.26\} \end{bmatrix} & \begin{bmatrix} -\mathbf{.08} & .04 & .00 & .00 & .19 & -.05 \\ -.05 & -\mathbf{.43} & -.02 & -.04 & -.10 & .25 \\ .16 & .10 & -\mathbf{.60} & .07 & .12 & .15 \\ -.01 & .09 & .21 & -\mathbf{.57} & .18 & .16 \\ -.04 & .05 & .16 & .14 & -\mathbf{.45} & .02 \\ .12 & .21 & .02 & .18 & .12 & \{-\mathbf{.33}\} \end{bmatrix} \end{pmatrix}$$

Synthesis of the decomposition exercise

- Ignoring the (small) cross-terms and ignoring the fact correlations don't exactly add, we obtain schematically :

$$BE \begin{bmatrix} 0 & .. & + \\ : & \ddots & : \\ + & .. & 0 \end{bmatrix}_{RR} = \begin{bmatrix} + & .. & + \\ : & & : \\ + & .. & + \end{bmatrix}_{global} + \begin{bmatrix} - & .. & 0 \\ : & \ddots & : \\ 0 & .. & - \end{bmatrix}_{country-specific}$$

up to 2008

$$BE \begin{bmatrix} -- & .. & - \\ : & \ddots & : \\ - & .. & -- \end{bmatrix}_{RR} = \begin{bmatrix} - & .. & - \\ : & & : \\ - & .. & - \end{bmatrix}_{global} + \begin{bmatrix} - & .. & 0 \\ : & \ddots & : \\ 0 & .. & - \end{bmatrix}_{country-specific}$$

over last year

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Synthesis of the decomposition exercise

- Three observations :

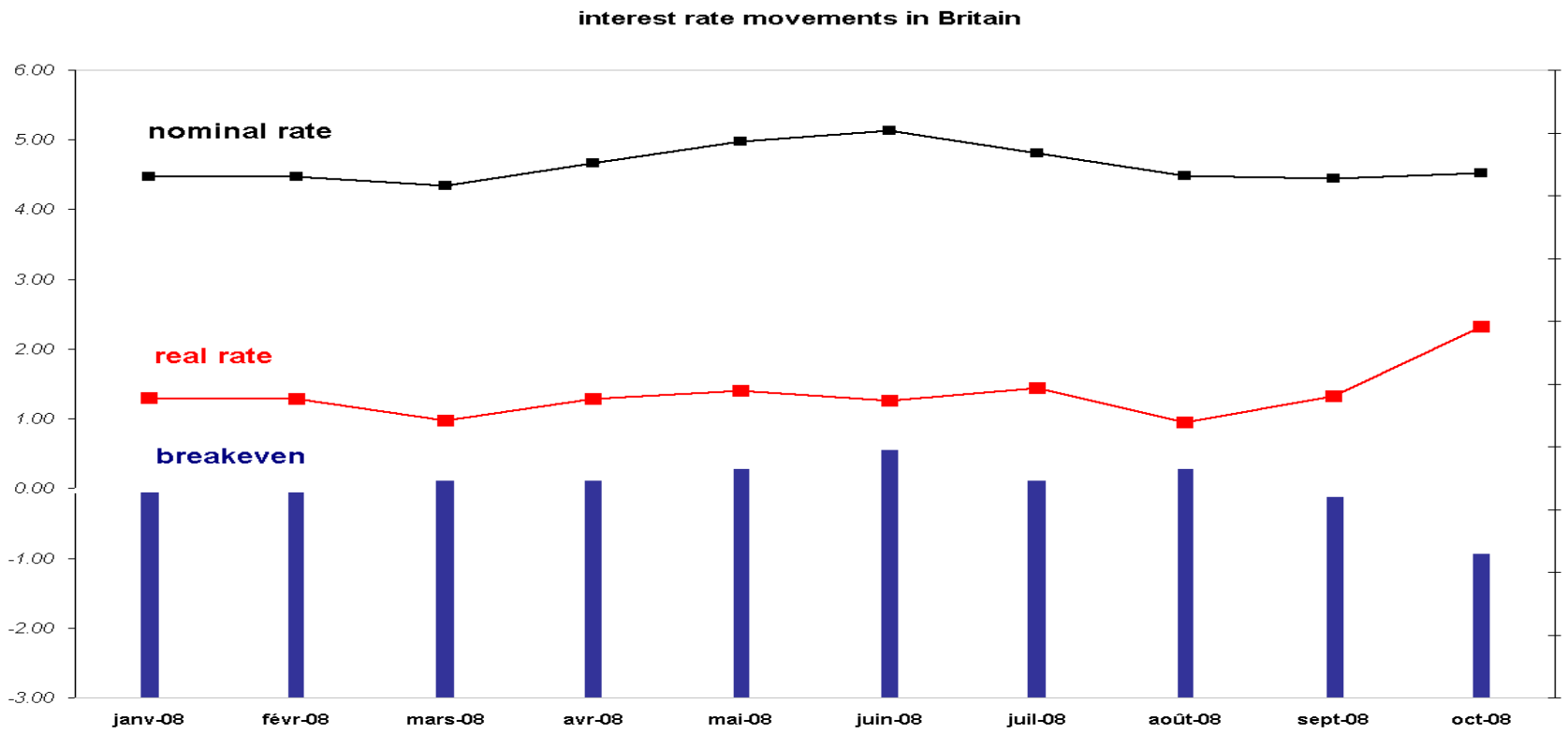
1. The country-specific breakeven inflation rate moves against the country-specific real interest rate.

2. The correlation between the global breakeven - and the global real rate movements has been significantly positive for fifteen years,

3. … and is significantly negative since one year.

1. The local *BE* moves against the local *RR* when …

- … a move of the local real rate is not in phase with a move of the local nominal rate. This typically occurs when the *RR* moves for local market-related reasons.



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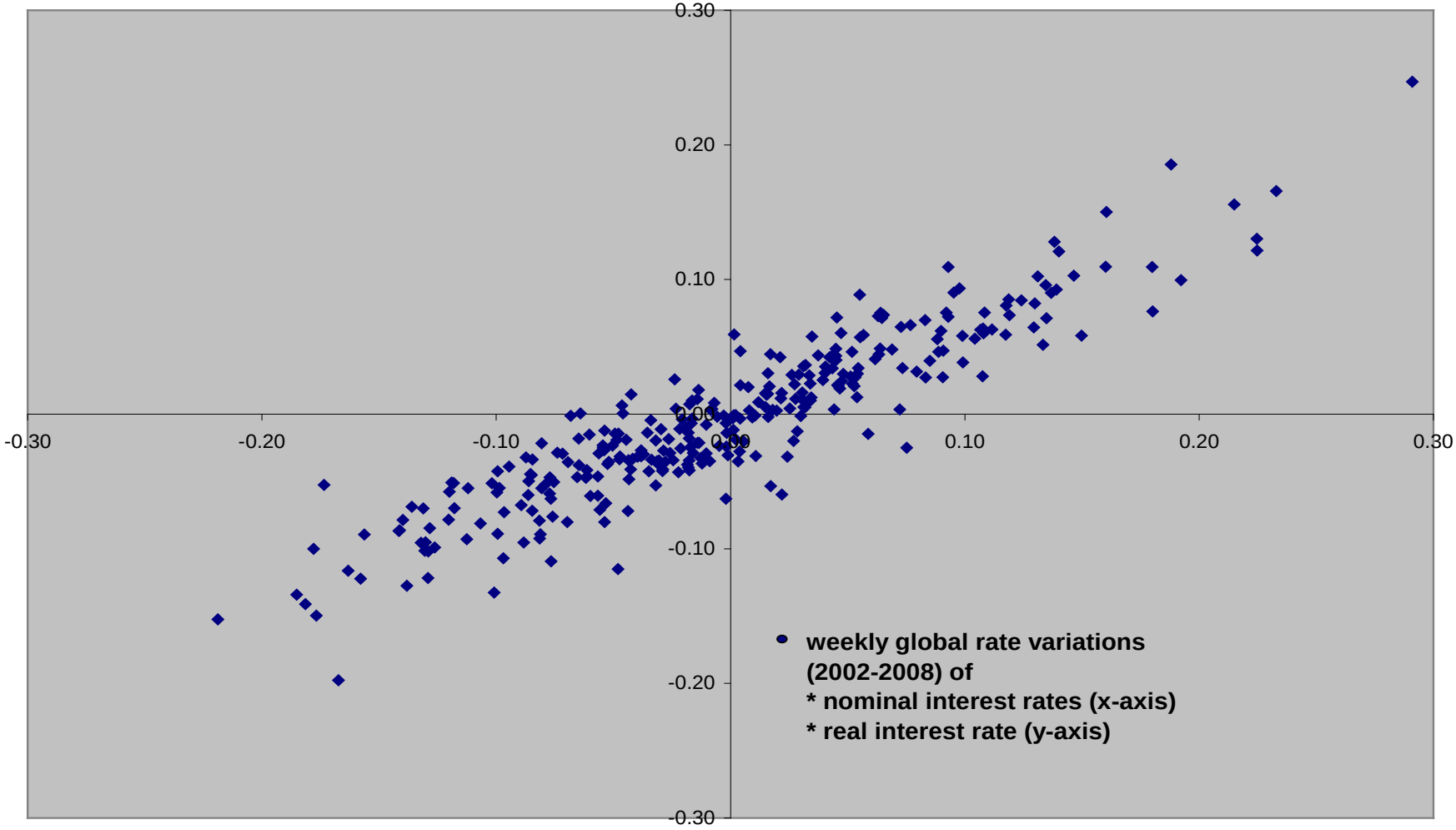
2. Fifteen years of *beta effect**



***described in the Barclays Capital handbook**

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The beta effect

- In theory (according to Fisher) :

impulse	response	result
'pure' inflation shock	*NR* moves alone →	correlation between *BE*
shock without impact on inflation (e.g. technological shock)	*NR* and *RR* move with the same amplitude →	and *RR* zero

- In practice :

2. A beta of 0.7 observed practically every week for fifteen years.
3. A chaotic beta since one year.

→ A lot remains to be learned on the interaction between inflation and the real economy !

Conclusion

- ***The rocky ride of the breakeven inflation rates* :***

  a high volatility and an untypical correlation structure with real interest rates

- due to
  - market-related factors
  - interaction between inflation and the real economy

- Direct consequences
  - Hinders the assessment of central banks' credibility.
  - The new performance and risk diversification opportunity need to treated with care.

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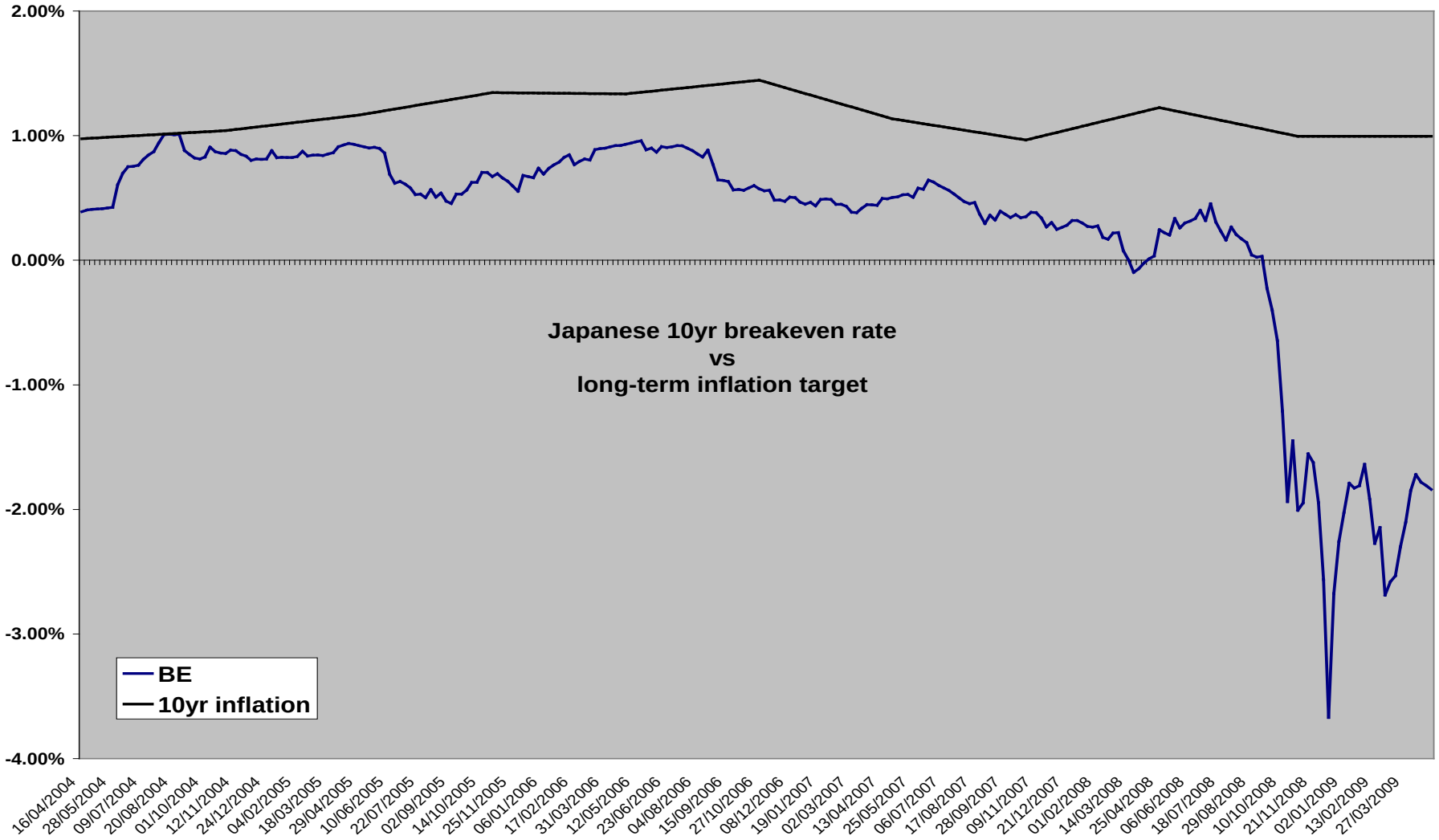
Appendix : the Japanese experience



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