How the central bank talks to the market

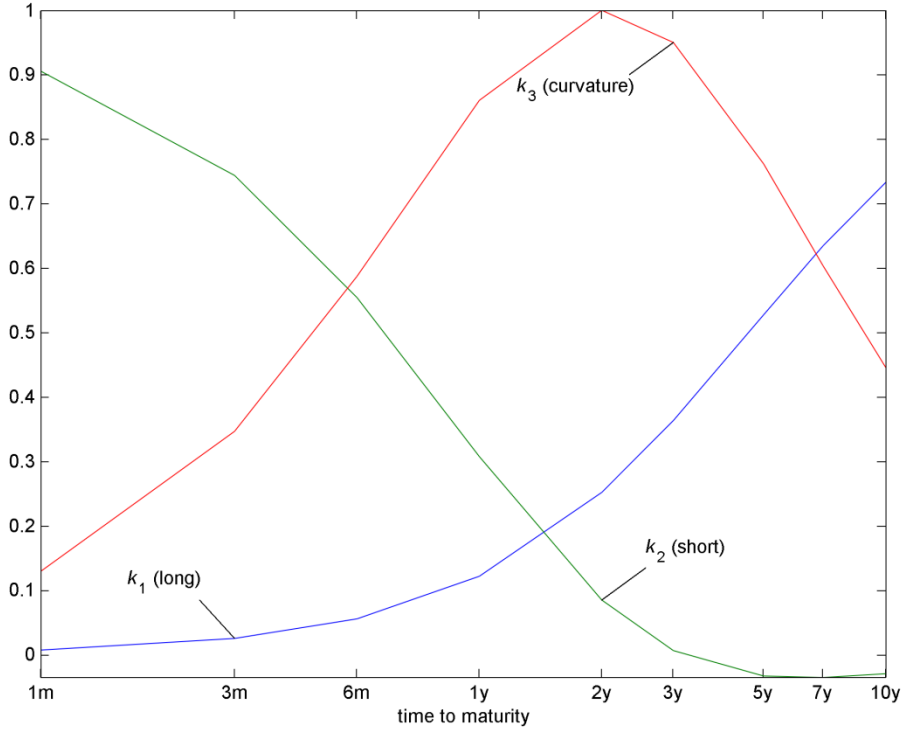
A story from Switzerland

Y Lengwiler (University of Basel) and
C Lenz (Swiss National Bank)

strategy

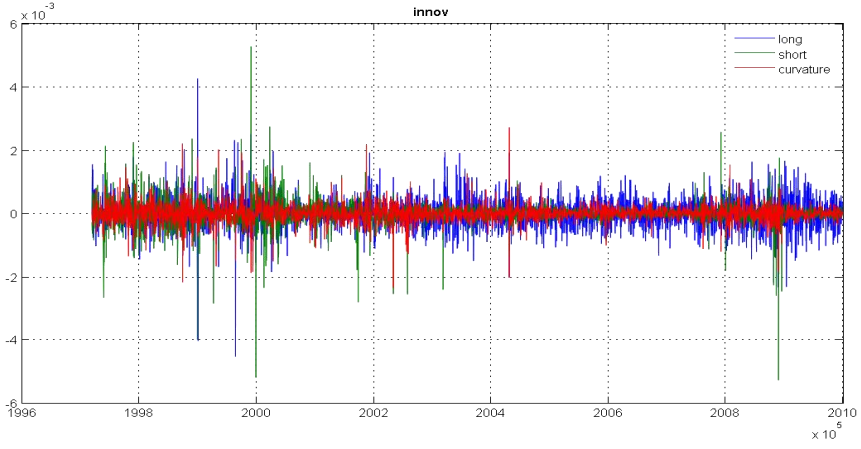
- We investigate the question by looking at the term structure of interest rates.
- Yields of different maturities are important measures of monetary policy.
- We decompose the cross section (linear factors) and the time series (VAR) properties of the term structure in a way that lends itself to an interpretation in monetary policy terms.

$$r_t(m) = k_1(m) \cdot \Phi_{1,t} + k_2(m) \cdot \Phi_{2,t} + k_3(m) \cdot \Phi_{3,t} + \varepsilon_t(m)$$



- Shapes of loadings suggest the names:
  - First factor is 'long' **(blue)**
  - Second factor is 'short' **(green)**
  - Third factor is 'curvature' **(red)**
  - (this is unlike traditional long, slope, curvature)
- Design of loadings is connected to the dynamic model of the factors...

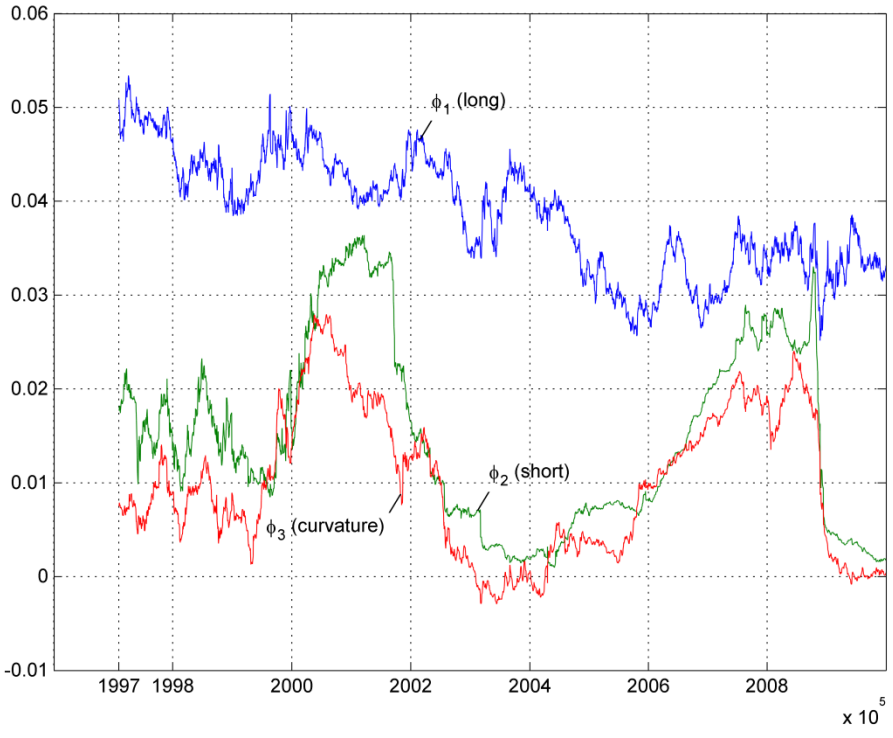
$\phi_t = D_0 + D_1 \cdot \phi_{t-1} + \ldots + D_p \cdot \phi_{t-p} + u_t$



2.5e-07	2.7e-17	-7.9e-23
2.7e-17	1.6e-07	-2.6e-23
-7.9e-23	-2.6e-23	9.1e-08

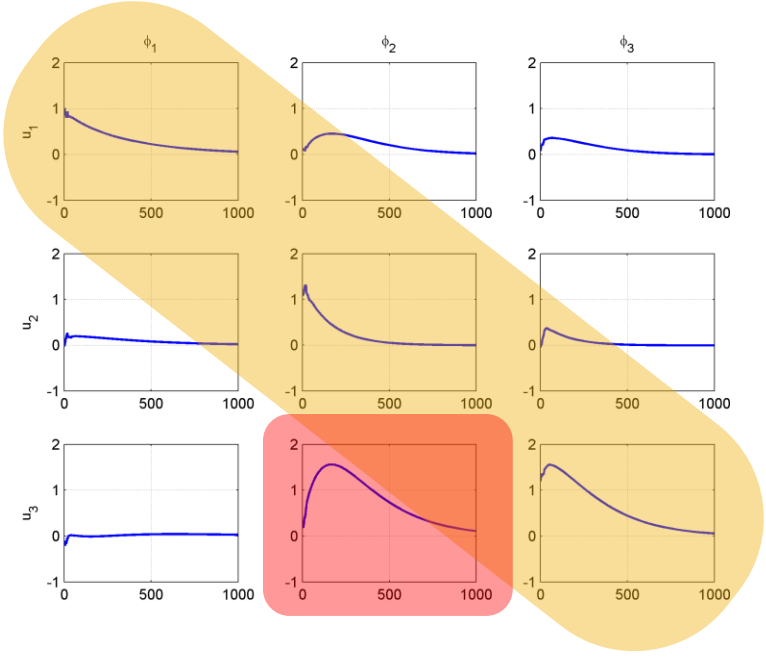
- *p* long enough so that serial correlation disappears.
- Loadings *k* are designed in such a way that VAR of factors (ϕ) is structural in the sense that covariance matrix of *u* is diagonal.
- Details see Lengwiler-Lenz, J Econometrics, 2010.

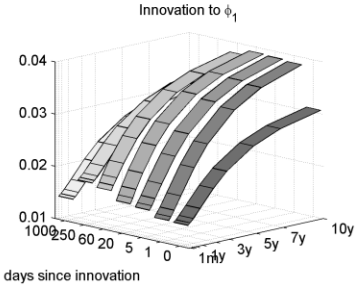
$\Phi_t = D_0 + D_1 \cdot \Phi_{t-1} + \ldots + D_p \cdot \Phi_{t-p} + u_t$

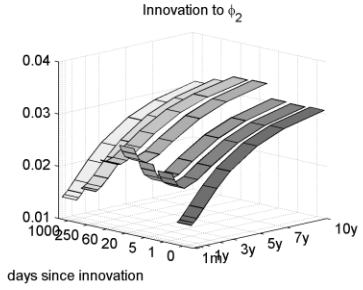


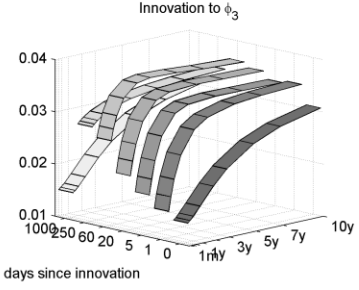
- Short and curvature factors appear to be correlated.
- But the innovations into these processes are not.
- Correlation of factors is due to VAR dynamics.

$\phi_t = D_0 + D_1 \cdot \phi_{t-1} + \ldots + D_p \cdot \phi_{t-p} + u_t$









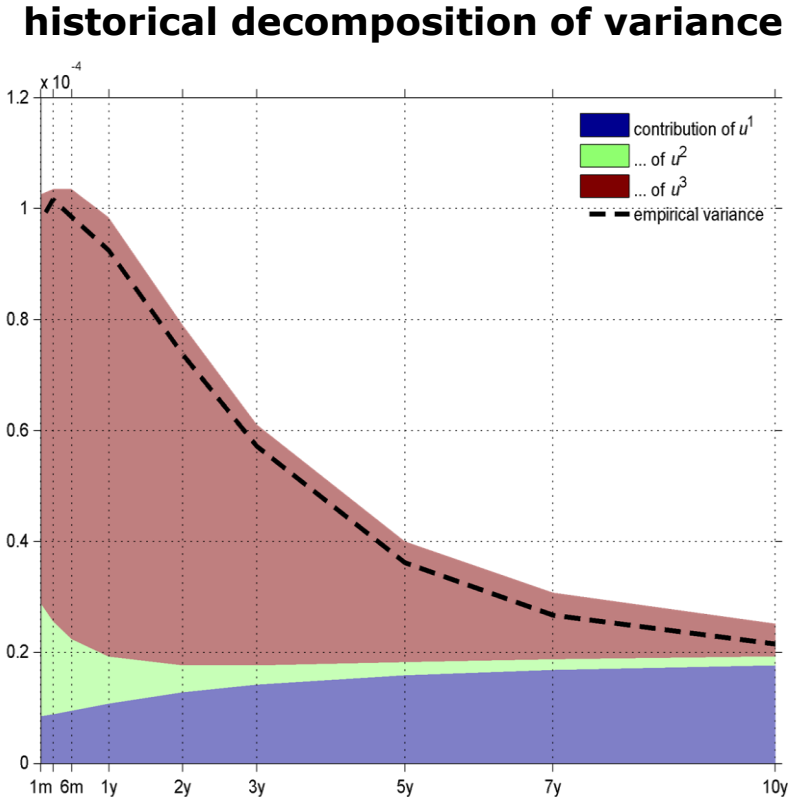
talking and trading

- Short factor shows what goes on in the money market. It reflects the interest rate setting of the central bank.
- But short factor innovations are relatively unimportant; short rate movements are mainly driven (with a lag) by curv innovations.
- Thus, most of the innovation happens in the middle and then propagates to the short maturities. Most of the short end movements is expected by the market when it happens.

talking and trading

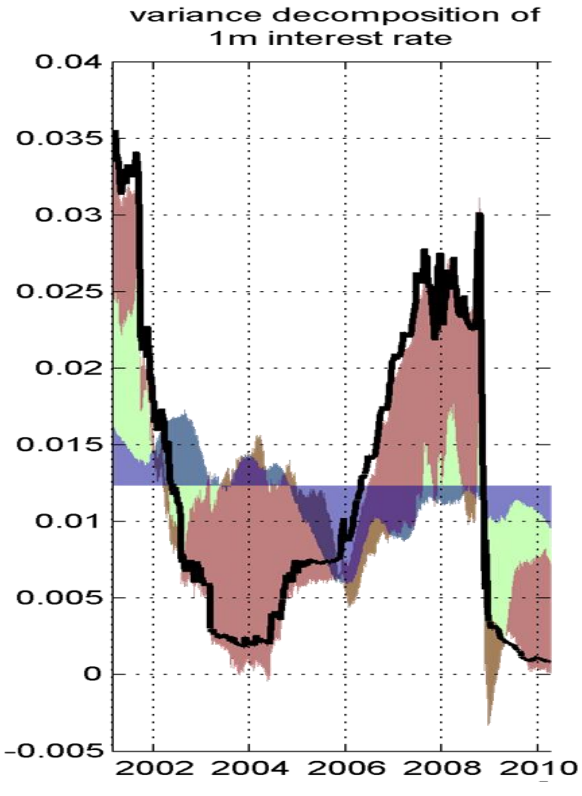
- This is why we interpret curvature (or curvature innovations) as a measure of the expected, or communicated, action of the SNB (the **'talking channel'**).
- The **'trading channel'** is only the short factor innovations that were engineered by the SNB without preparing the market beforehand (so unexplained by curvature innovations).

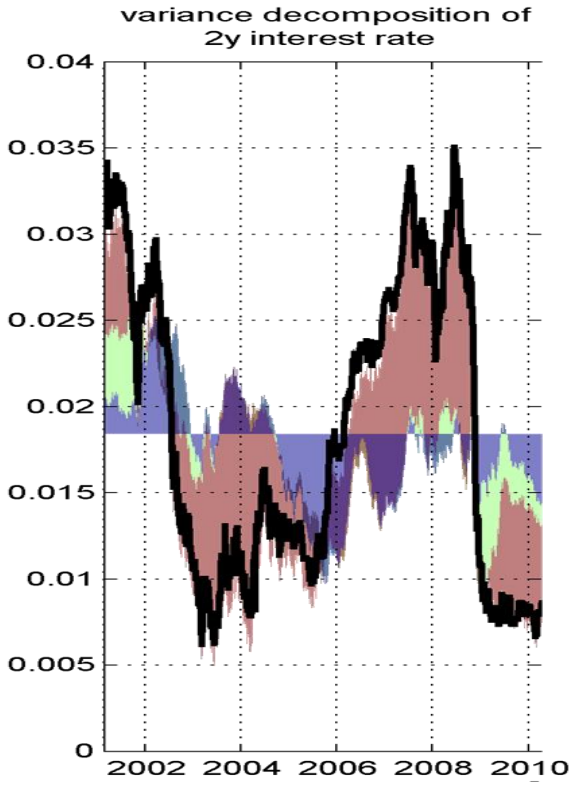
talking more important than trading

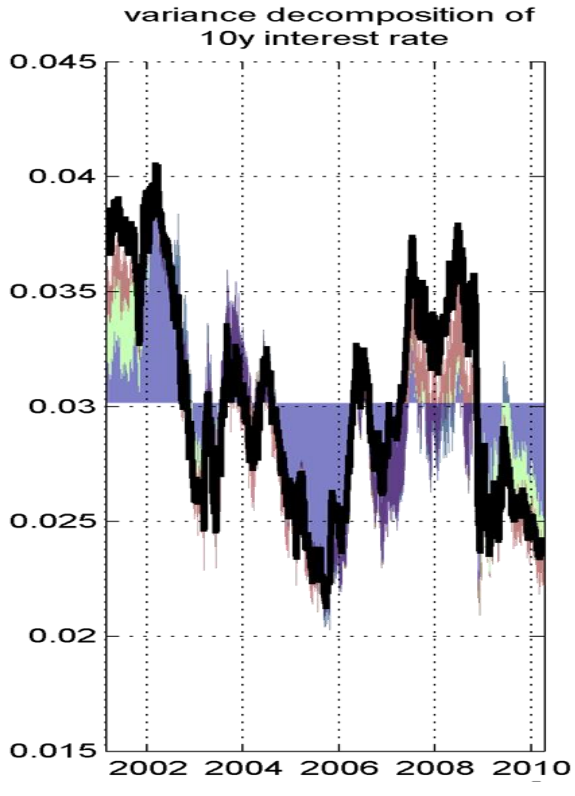


- Curvature innovations explain the lion's share of interest volatility up to 5y maturity.
- Long factor innovations still explain almost 10% of variance of 1-month rate.
- Short factor innovations explain very little.

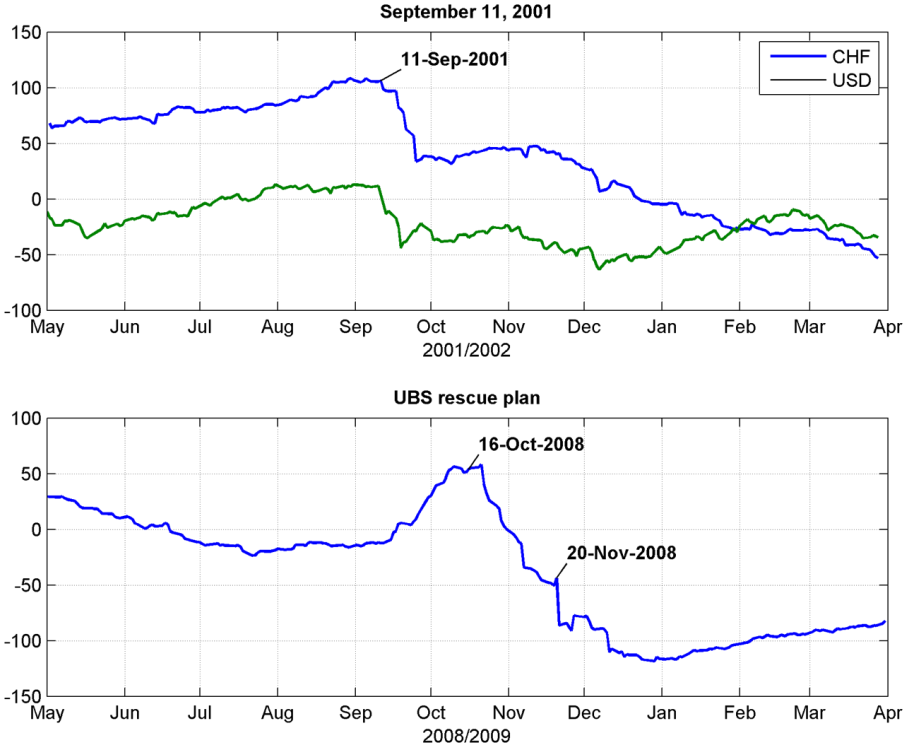
… with exceptions





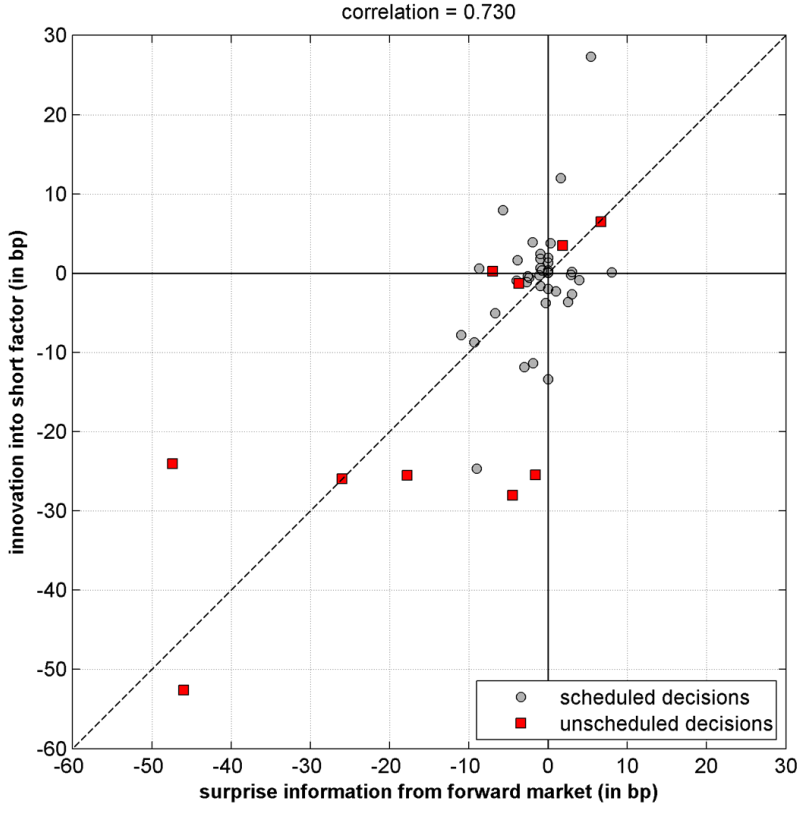


two large trading channel surprises



- **Contribution of short factor innovations on 3m rate.** (historical decomposition)
- 9/11: CHF short factor innovations that amount to -75 bps of 3m rate. USD: only -50 bps.
- UBS bailout: sequence of short factor innovs accumulating to more than -150 bps for 3m rate. Incl very significant innovation on Nov 21, 2008.

short factor innovations



- horiz axis: short rate innov measured from forward market
- vert axis: short factor innovation (u_2)
- Note: large innovs are multiples of 25 bps.
- Only 2 significant innovs at scheduled dates (gray dots).