Negative Swap Spreads?

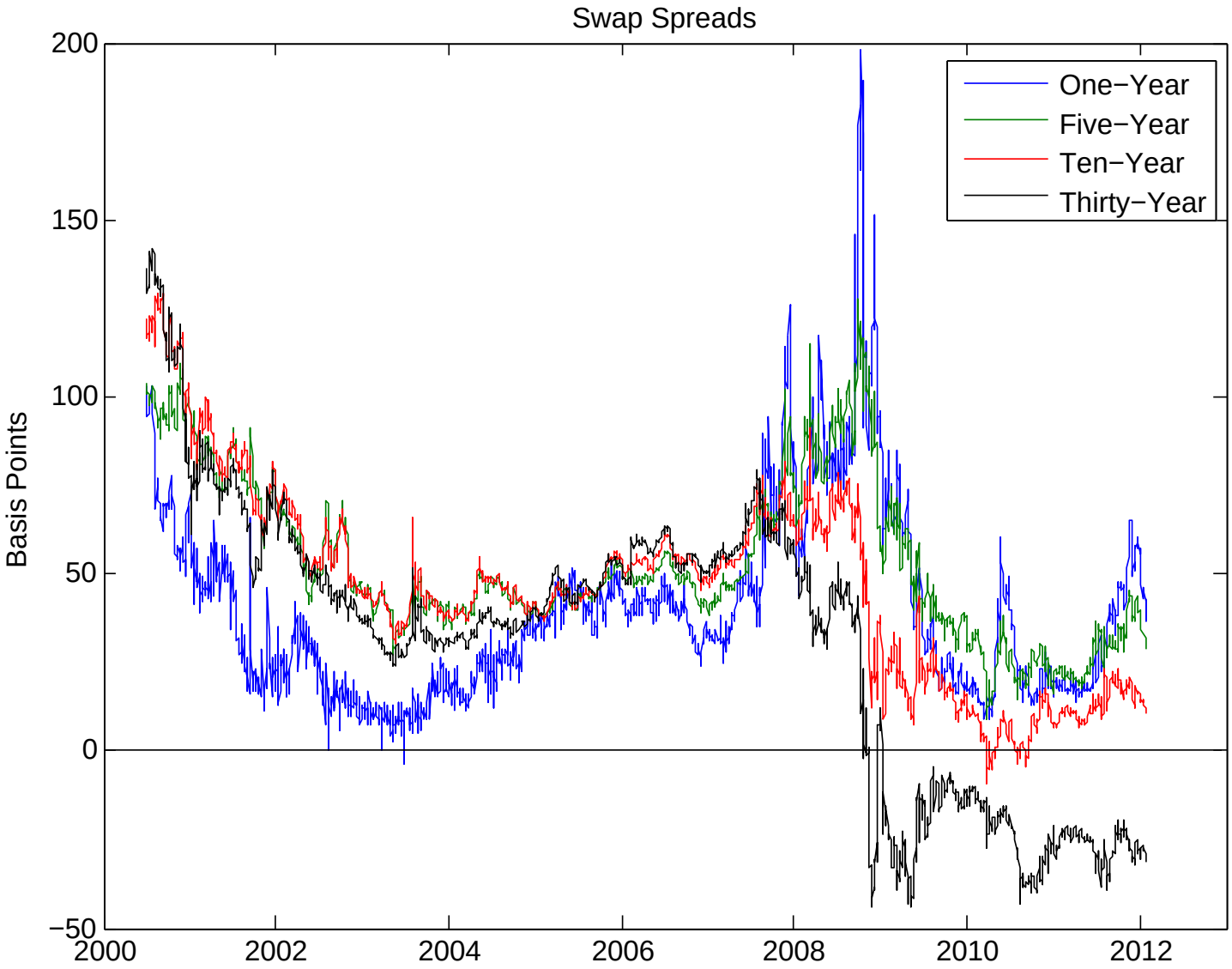
Josephine Smith

NYU Stern

Negative Swap Spreads?

- The swap spread is the difference between the fixed rate on a plain vanilla fixed-for-floating interest rate swap of a particular maturity and the yield on a Treasury of the same maturity.
- The swap is a LIBOR swap, with a floating rate based on the three-month borrowing rates quoted by contributor banks identified by the British Bankers Association.
- The borrowing rates of these banks reflect default and liquidity risks, and thus are higher than riskless (Treasury) short-term rates.
- What does that imply for the spread between swaps and Treasuries?

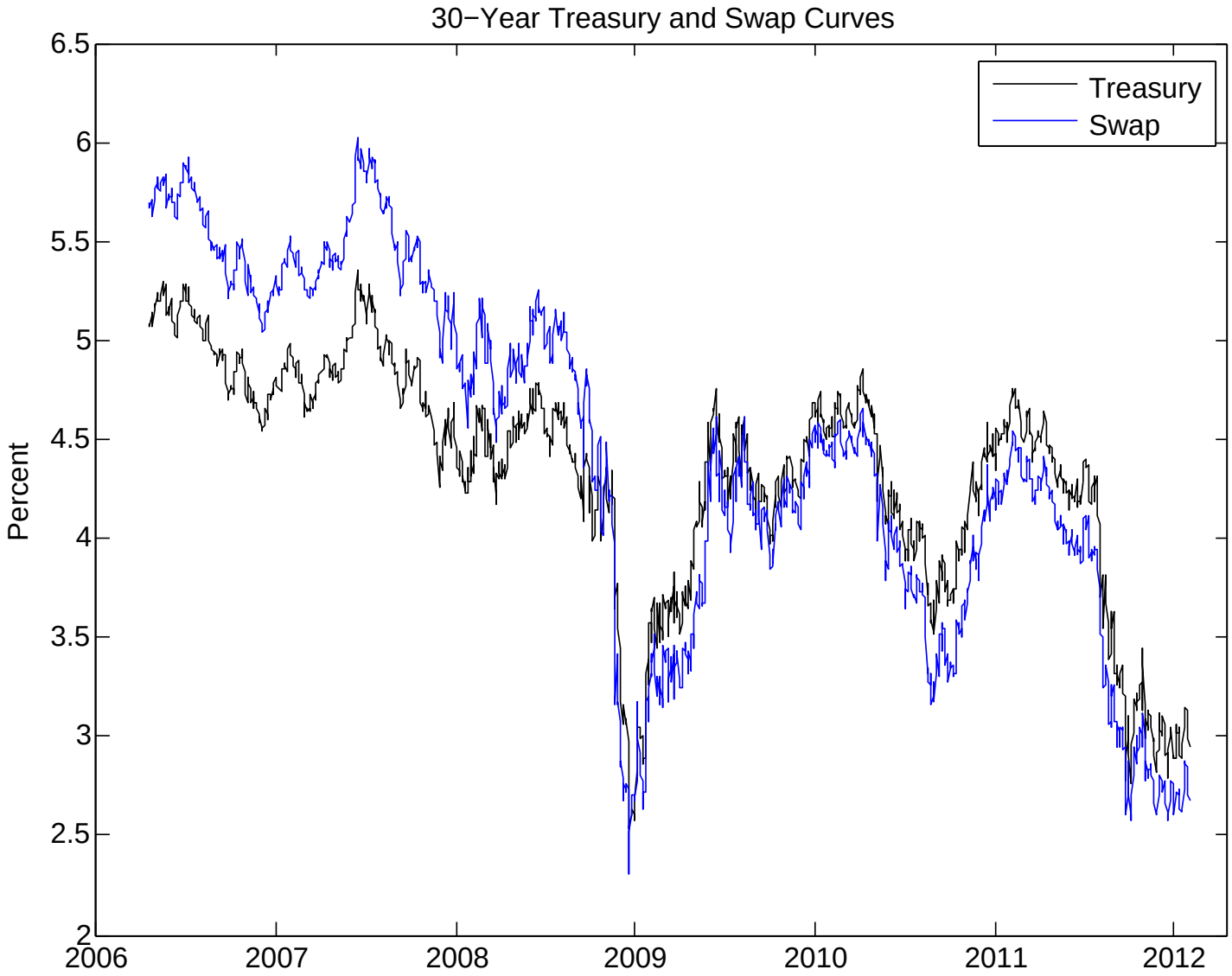
The Term Structure of Swap Spreads



Negative Swap Spreads?

- The spread of the three-month LIBOR rate over the three-month T-Bill rate is the TED spread.
- In a LIBOR swap, the floating payments are three-month riskless plus the TED spread.
- Even without default risk, the fixed rate of a LIBOR swap (i.e. the swap rate) has to include a fixed spread *over* the corresponding riskless Treasury rate to compensate for the floating TED spread.
- Implication: The spread of the swap rate over the Treasury rate for a particular maturity is positive?
- No... but is there an arbitrage if the answer is no?

Thirty-Year Swap Spread



Negative Swap Spreads?

- Since the financial crisis, longer-maturity swap rates have been *lower* than Treasury rates. Is this a puzzle?
- The obvious arbitrage: Go long in the Treasury, finance the purchase through borrowing at short-term repo rates, and simultaneously enter into a swap paying fixed and receiving floating LIBOR.
- This position must be held until maturity, consuming balance sheet and relying fundamentally on smooth functioning of the repo markets.
- Therefore, the spread this trade generates may just be fair compensation for refinancing risk.

Goal of This Paper

- Empirically understand the term structure of swap spreads over the last 10+ years (data dependent).
- What are the main driving factors of these swap spreads?
- How do the swap spreads vary by maturity?
- Has the relationship between a swap spread at a given maturity and its determinants changed over time, particularly since the crisis?
- Going forward: Estimate a term structure model to understand risk premia in the swap spread term structure.

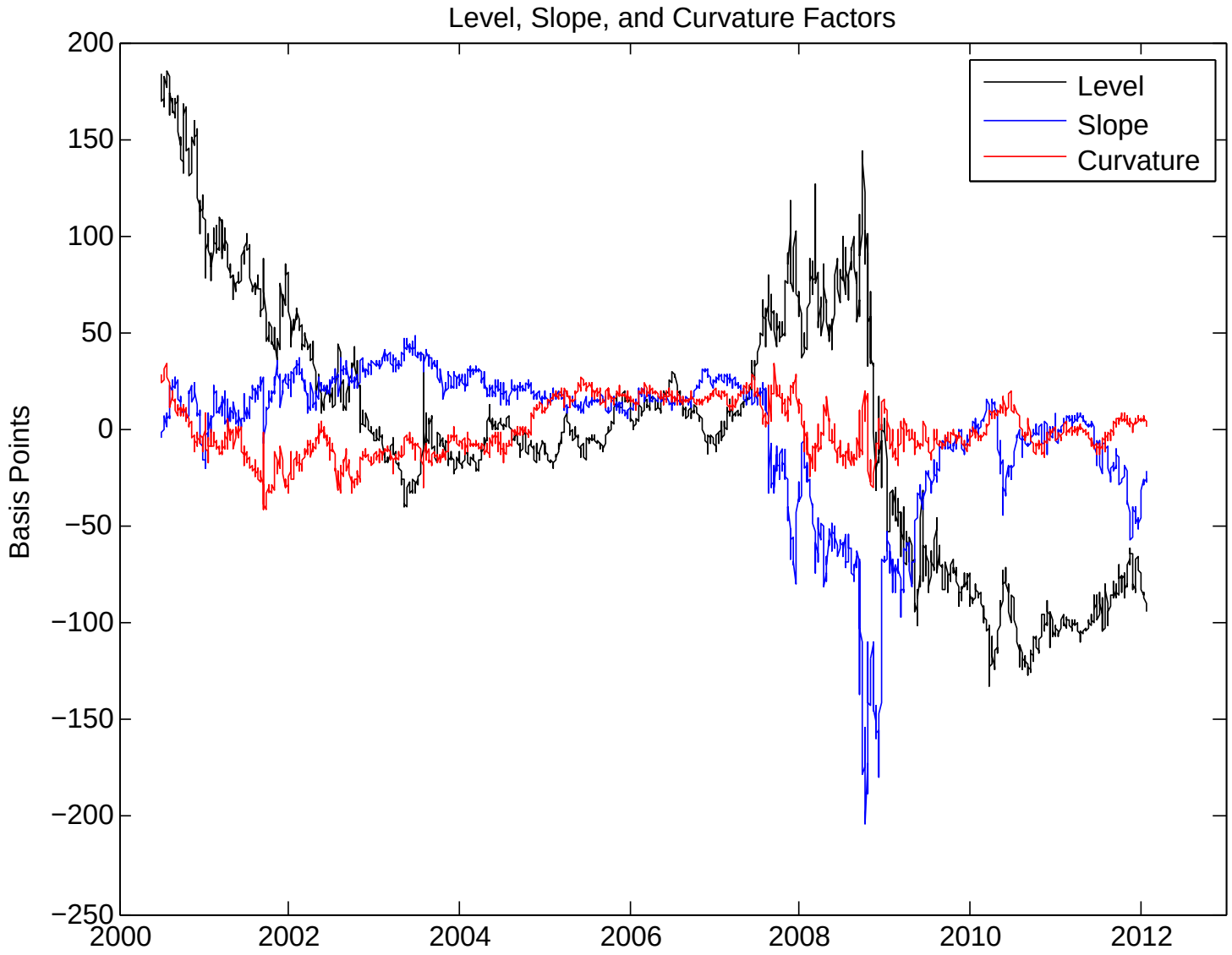
Data on Swap Spreads

- Use daily swap spread data from Bloomberg from 07/03/2000 to 02/01/2012.
- Swap Maturities (Years): 1, 2, 3, 5, 7, 10, 20, 30
- The 20-year swap spread is imputed through interpolation on Bloomberg.
- The 1-year swap spread through Bloomberg is incomplete; I supplement with H.15 data from the Fed.

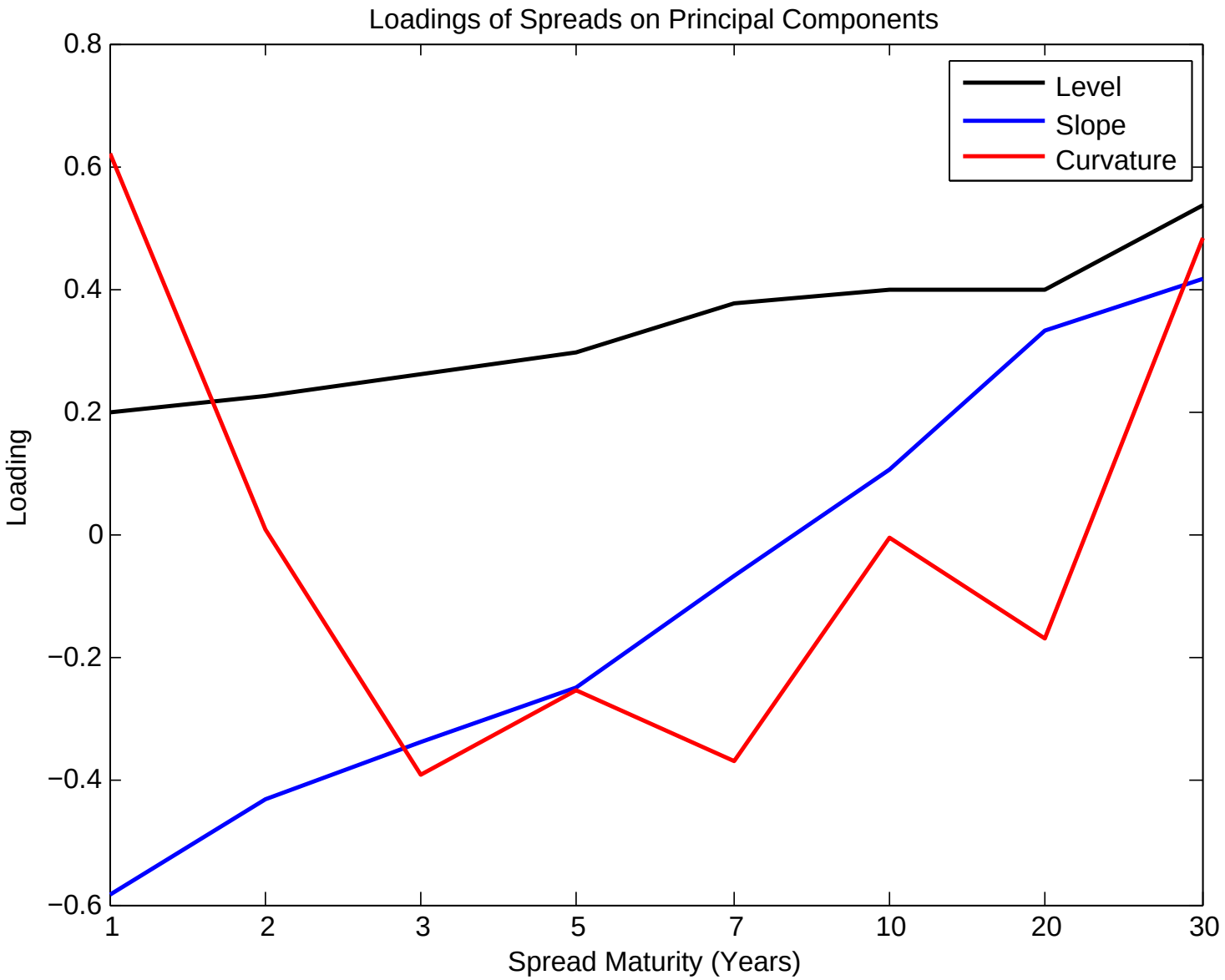
Principal Component Analysis

- As a first pass, we estimate the principal components of the given term structure of swap spreads.
- Common intuition is that three factors will account for 99% of the movements in swap spreads: level, slope, and curvature.
- When we look at the term structure of *spreads*, we think that we have removed the level factor that would affect both parts of the spread, so what is the level factor here?
- A similar argument applies to the slope and curvature factors.
- What do these factors look like, and how do each of the swap spreads load on these factors?

Principal Components



Loadings on Principal Components



Regressions of Swap Spreads on Principal Components

Level

	One-Year	Two-Year	Five-Year	Ten-Year	Thirty-Year
Level	0.20	0.23	0.30	0.40	0.54
	(0.06)	(0.04)	(0.02)	(0.02)	(0.04)
R^2	0.25	0.48	0.79	0.96	0.82

Slope

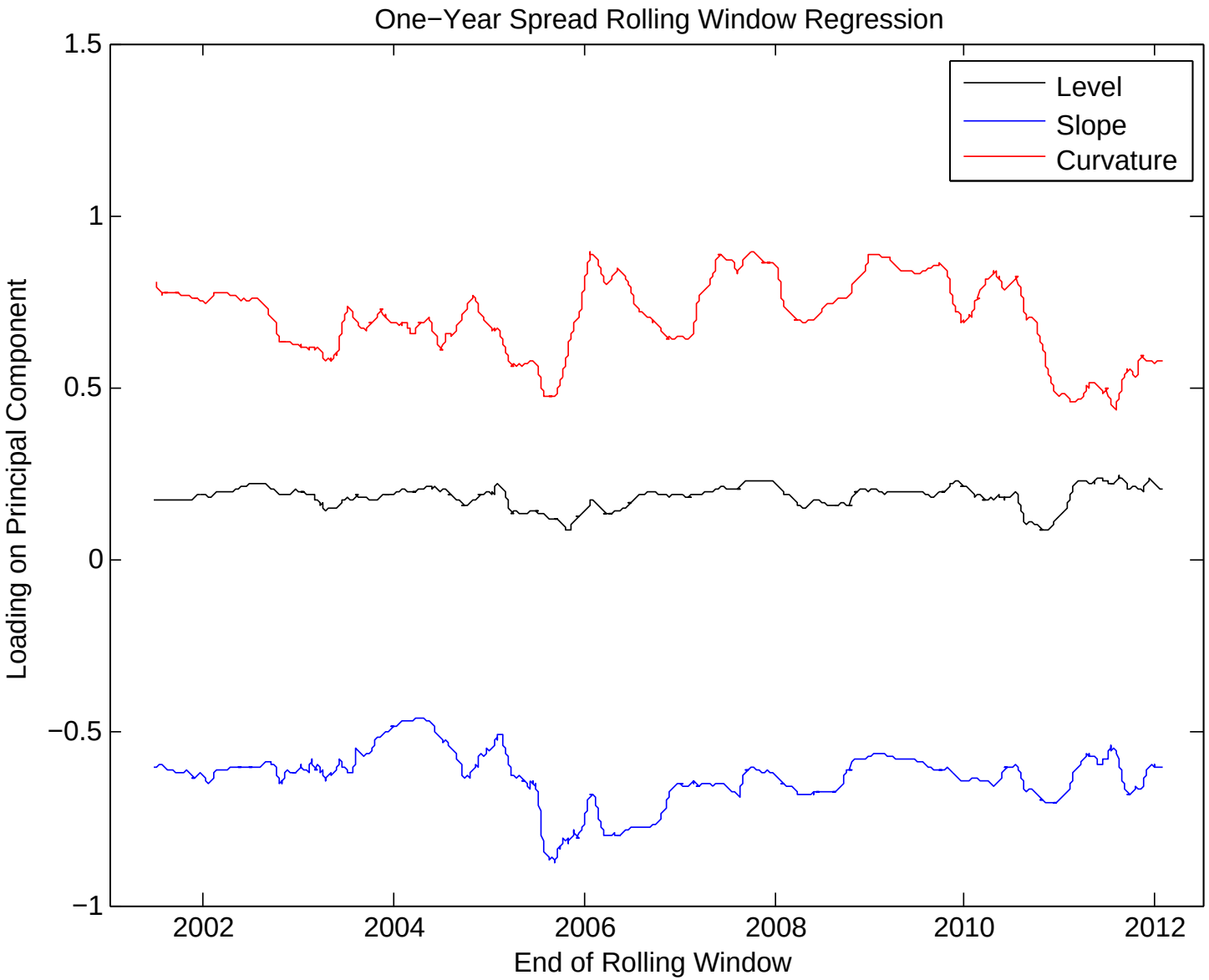
	One-Year	Two-Year	Five-Year	Ten-Year	Thirty-Year
Slope	-0.58	-0.43	-0.25	0.11	0.42
	(0.06)	(0.08)	(0.09)	(0.11)	(0.16)
R^2	0.63	0.50	0.16	0.02	0.14

The R^2's vary greatly with maturity!

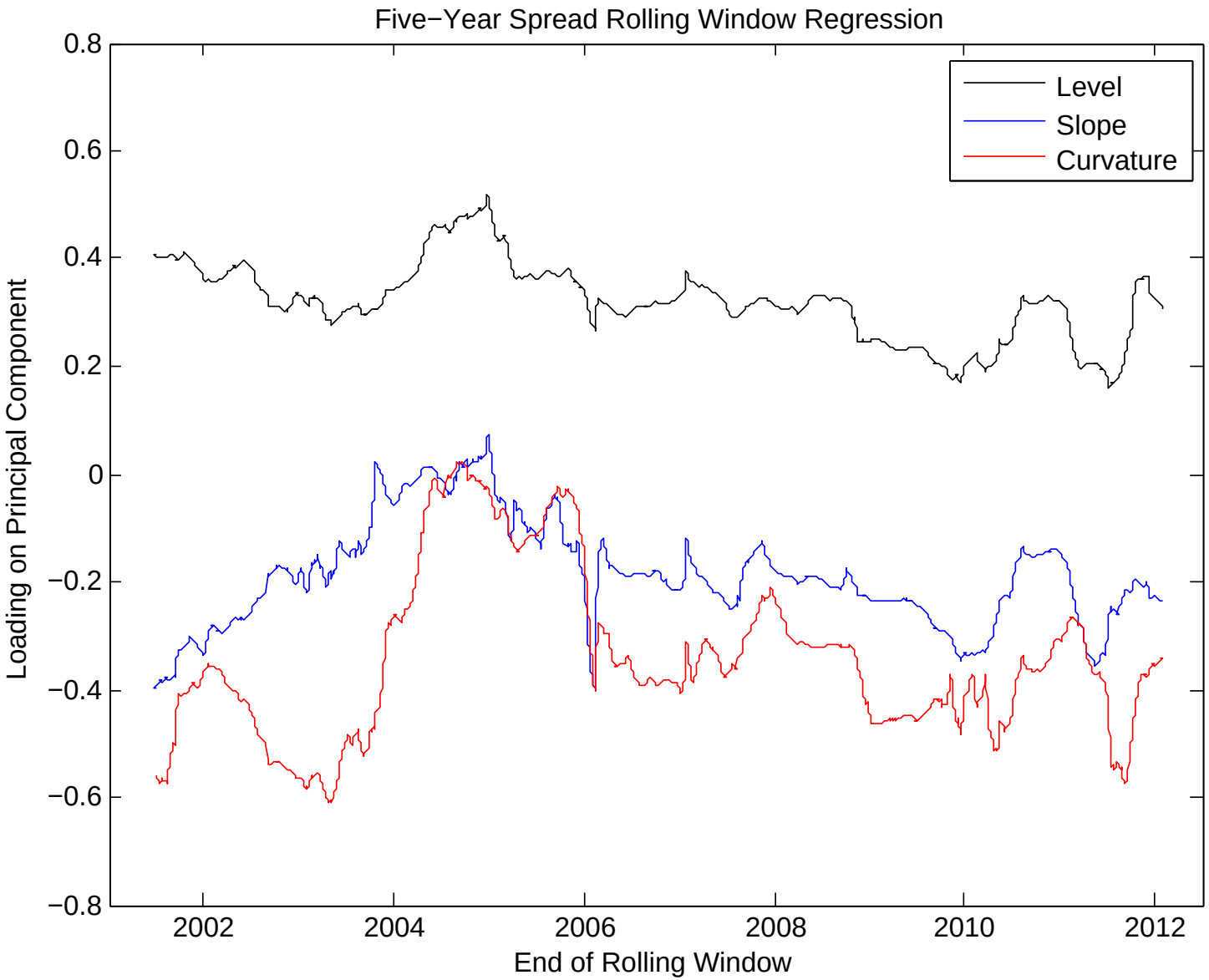
Do the loadings change over time?

- Even the behavior of the loadings over the entire data sample is different that what we normally see. The level factor is not always explaining 90% or more of the variation; slope and curvature are also important.
- Does the relationship between the swap spreads and these principal components change over time?
- Next step: Rolling window regressions.
- Window size: One year, overlapping windows.
- Two things to look for: Relationships over time (for a given maturity swap spread) and across maturities.

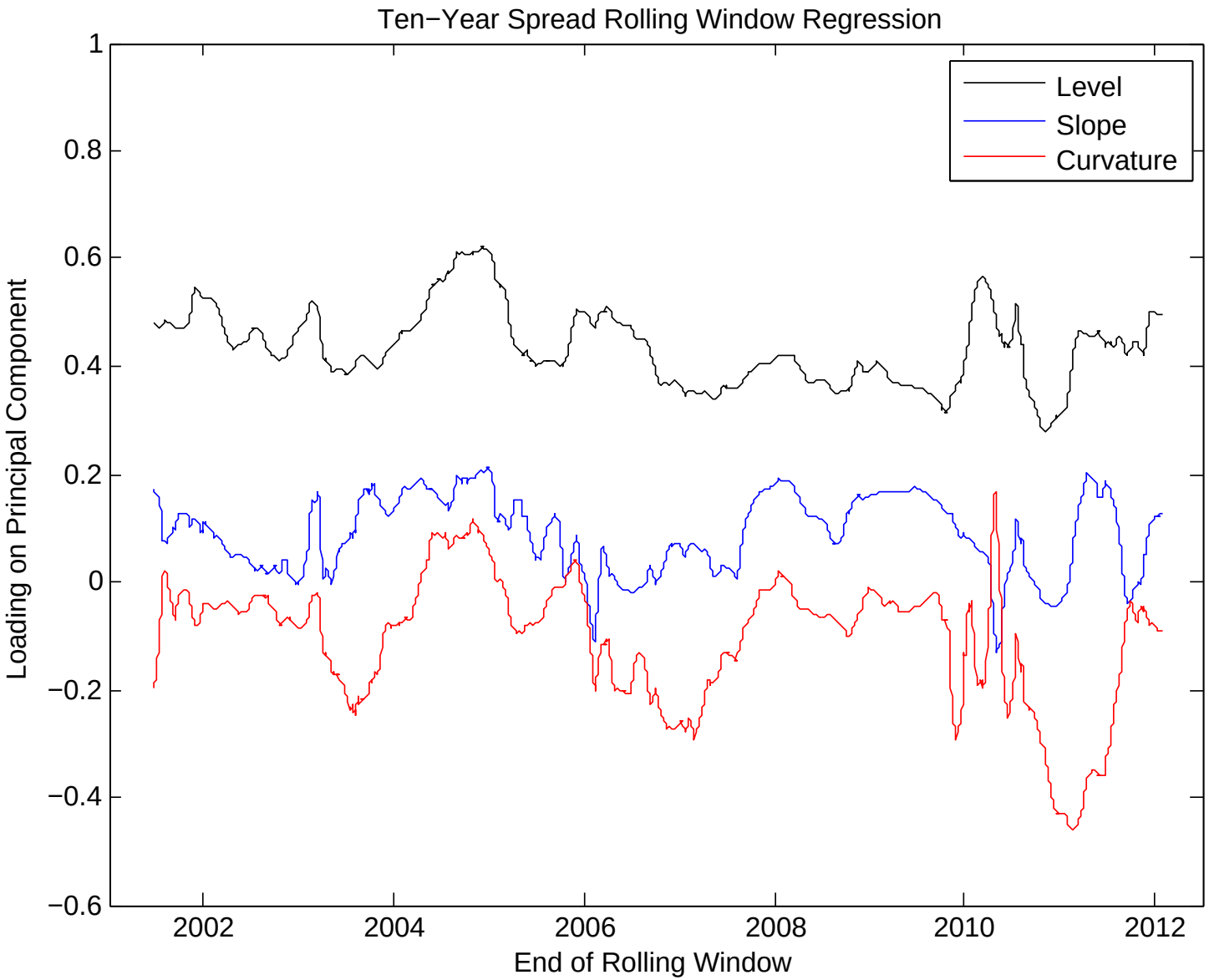
One-Year Rolling Regressions



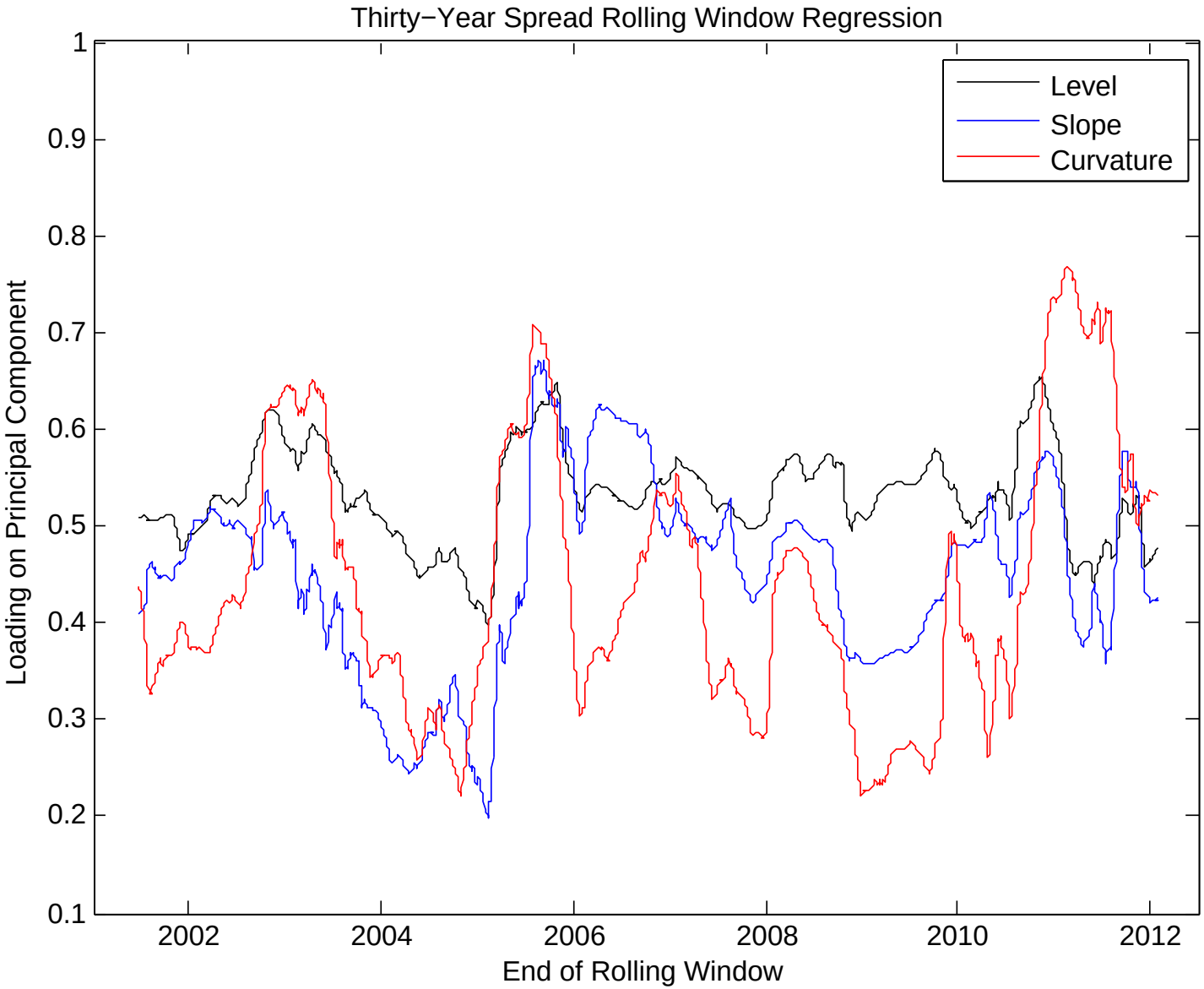
Five-Year Rolling Regressions



Ten-Year Rolling Regressions



Thirty-Year Rolling Regressions



Going Forward...

- There is something interesting going on here with all three factors.
- Goal: Estimate a term structure model to capture movements in risk premia.
- Are risk premia predictable with any of these factors? Or is there another factor?
- Are these factors capturing some sort of crisis arbitrage factor?
- Is the reliance of swap spreads on the slope factor capturing asymmetric counterparty risk?

Other Things To Think About...

- On the more regulation-orientated side of things, bank capital charges can't be all of it (differences in Basel 1 (no), Basel 2 (yes), and Basel 3 (no)).
- Banks can't long the Treasury, short the swap, and offset them on their balance sheets for capital charge purposes.
- Lastly, there is another Basel constraint that also applies. The risk weighted capital requirements are similar, but the accounting treatment of the positions is very different. Only the NPV of the swap shows up on the GAAP balance sheet, while the full notional amount of the bond (and the repo) will be on the balance sheet. To the extent a bank is constrained not by their tier 1 ratio to RWA, but rather by the 13 times equity total balance sheet constraint, the physical position is tougher to hold.
- So if there is a 13 times equity total balance sheet constraint and the Treasury violates it, but the swap doesn't, that's important.
- Would love to discuss this more with practitioners...

Crisis Arbitrage?