

# News Implied Volatility and Disaster Concerns

**Authors:**

**Asaf Manela**

**Alan Moreira**

**Discussant:**

**Paul Tetlock, Columbia University**

# Idea

- Measure investors' fears of stock market uncertainty using the text of front page WSJ articles

**THE WALL STREET JOURNAL**

THURSDAY, SEPTEMBER 18, 2008 • VOL. CCLII NO. 67 \*\*\*\*\* \$2.00

MARK: 10,600.66 YIELD: 3.61% NASDAQ: 2,061.05 P/E: 15.85 NIKKEI: 11,741.79 A.D.N. 30 STOCKS: 2,507.45 P.231 30-YR TREAS: 4.2272, YIELD: 3.61% 06:50:30 A.D.N. GOLD: 1,046.44 \$70.33 EURO: 1.4752 YEN: 104.74

## Mounting Fears Shake World Markets As Banking Giants Rush to Raise Capital

By Tom Ichniowski, Liz Rapoport and Alessandra Lonn

Just over a month ago, the U.S. financial system on Wednesday, as hope for a resolution to the 30-year-old credit crisis faded.

Stocks tumbled, economic growth slowed, financial firms would fail, and investors rushed toward the safe haven of government bonds in the wake of the collapse of Lehman Brothers Holdings Inc. and the onset of a massive American International Group.

The market turmoil is doing more than inflicting losses on investors. Borrowing costs for U.S. companies have skyrocketed and the debt markets have become nearly inaccessible to all but the most creditworthy borrowers.

The department was rapidly reacting to the market for U.S. government debt, long considered the safest of investments. At the peak during the day, investors were willing to pay more for one-month Treasury bills than they would expect to get back when the bills matured. Some investors, in fact, had decided that a small loss now was better than the uncertainty associated with any other type of investment.

That's never happened before. In a similar government auction on Wednesday, demand for an \$18-billion Treasury Department bond sold for \$100 million in bids, far beyond what it needed to cover the government's obligations.

"We've seen crisis. We've seen the end of the financial system shake the city," says Joseph Rotundo, a portfolio manager at Federal Investments. "It's just crazy."

A 440-point rally took the Dow Jones Industrial Average to its lowest level in almost three years, leaving it 20% below where it stood a year ago. Volatility on the New York Stock Exchange was the second highest in history, falling just shy of the record set on Tuesday. The VIX, a widely watched measure of market volatility that is often referred to as the "fear index," hit its highest level since late 2003.

In Europe, stock market indexes roughly 20% of their value in Rome. The scene of recent market declines, ending on the contrary, major exchanges was halted for the second day in a row. On the city's stock index, half the nation. Gold prices rose 9% to \$2,600 an ounce, the highest since 2001.

"Forget about retail investors, all the pros are scared," says a trader at a major investment bank. "People are in the state where to get their money."

For now, "if you have cash, you're going to get it in the short term, then liquidate your cash," says Steve Van Orden, head of asset management for Calvert Asset Management.

Adding to the fear was a loss in a government money market fund, the Reserve Primary Fund, which held Lehman Brothers debt. It was the first time since 2001 that such a fund, which is supposed to be as safe as a bank account, had lost money. The loss was made worse by rumors on the fund that two days before the fund's loss, the fund's

**Morgan Stanley in Talks With Wachovia, Others**

By Aaron Lucchetti, Barbara Sime and Janet Studdard

Morgan Stanley sought shelter from the growing financial storm Wednesday, seeking preliminary merger talks with Wachovia Corp. and other banks as a way to strengthen its balance sheet in the company's share price after the stock to its lowest level since 1929.

After a hair-raising day, Morgan Stanley's share price tumbled down 50%, or 26%, to \$21.75. Goldman Sachs Group, the largest U.S. investment bank by market value, also fell 15.1%, or 18.6%, to \$146.50.

While the situation is more acute at Morgan Stanley, the other Wall Street banks are both being extraordinary market pressure. Citicorp, already pushed stable franchise such as Lehman Brothers Holdings Inc. and Merrill Lynch & Co. 2008 bankruptcy protection to heavy merger deals. At Morgan Stanley and Goldman Sachs, two of the oldest and most successful investment banks, market conditions withered to the point 24 hours for firms that were once considered solid assets.

As investors search for stability, creating strong incentives for investment banks to link up with them, as Merrill Lynch did earlier this week with Bank of America Corp. But even investment banks are under attack, such as the large savings and loan

Reaching Down  
Morgan Stanley's share price slipped 26% on Wednesday.

Annualized yield on the 3-month Treasury bill

High Anxiety, Low Returns

In a stark sign of the severity of the crisis, investors poured money into Treasury bills, one of the safest investments. Wednesday yields hit their lowest level since the 1930s, as the premium on a security rose sharply.

Commercial banks such as Wachovia are perceived as more stable, creating strong incentives for investment banks to link up with them, as Merrill Lynch did earlier this week with Bank of America Corp. But even investment banks are under attack, such as the large savings and loan

Please turn to page A6

**What's News** — Business Finance World-Wide

**Bad Bets and Cash Crunch Pushed Ailing AIG to Brink**

**Worst Crisis Since '30s, With No End**

# Identification

- *WSJ* news selection reflects topics of interest to investors
  - The front page features investors' primary interests
  
- Option-implied volatility (VIX) reflects investors' fears
  - Prices of options on the market increase with fear of “disasters”
    - Disaster: a long period of reduced consumption (-15% to -30%)
  
- Proxy for uncertainty/fear using words in high VIX months
  - NVIX is fit to mimic the implied volatility of options on the market

# Key Tests

- Establish the validity of the uncertainty measure (NVIX)
  - Predict stock market volatility out of sample
  - Predict economic disasters out of sample
  
- Apply the uncertainty measure
  - Decompose NVIX into categories of investors' concerns
    - War, government, intermediation, etc.
  - Predict stock returns out of sample
    - High (disaster) risk = high expected returns in several theories

# Main Findings

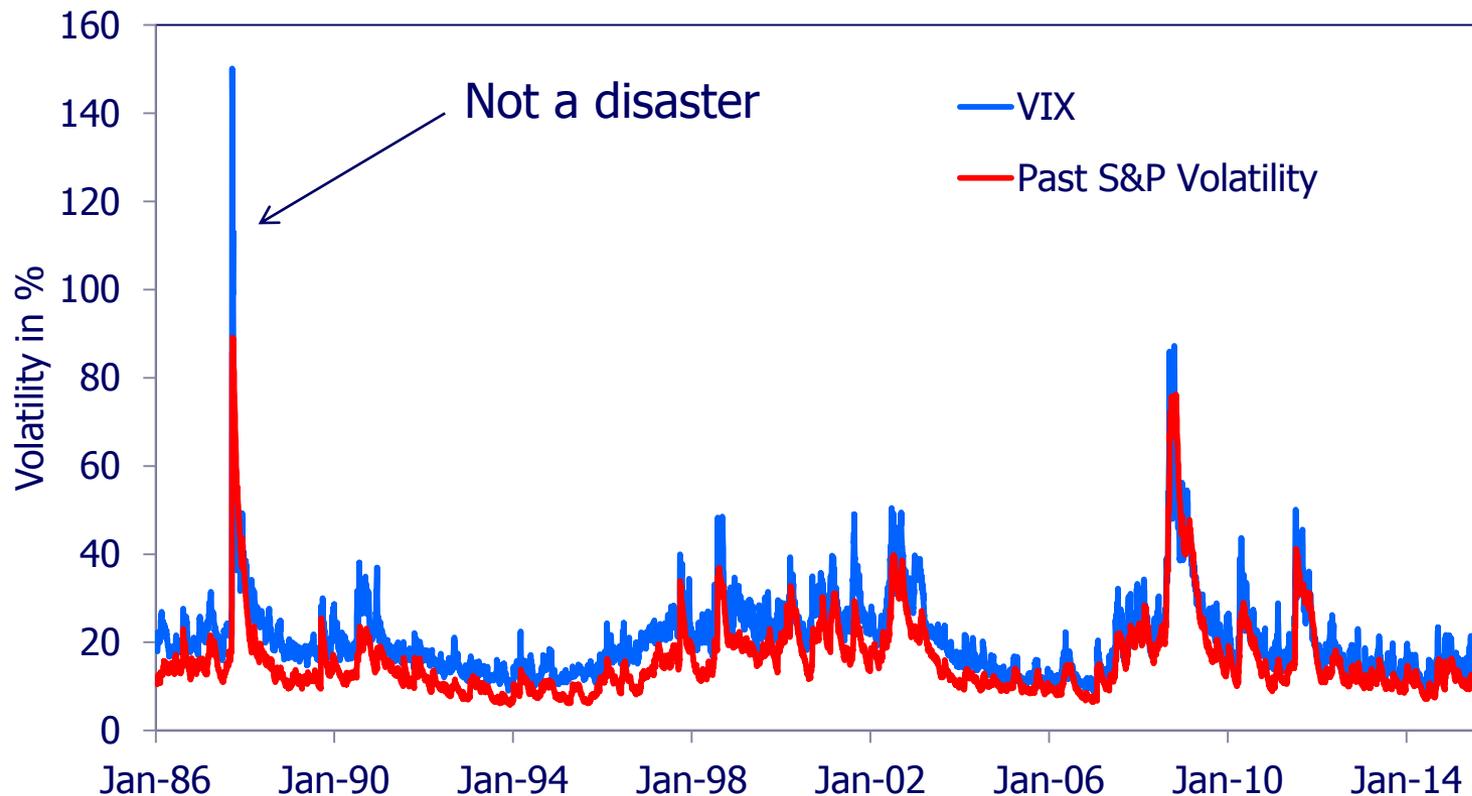
- NVIX predicts volatility (implied and realized)
  - $R^2$  values ranging from 16% to 20% (not 34%)
- NVIX predicts disasters based on models
  - $t$ -stat between 1.5 and 2.0 in most specifications
- High values of NVIX are associated with words related to “war” and “government” (disasters?)
- NVIX predicts stock returns
  - Magnitude/significance peaks around the 12-month horizon
  - “War” words are especially predictive of stock returns

# Goal: Estimate Fear of Disasters

- NVIX is a novel measure of stock market uncertainty
  - It could reflect investors' fears of disasters
  - Textual data can be used to estimate disaster expectations
  
- NVIX is designed to mimic VIX (option-implied volatility)
  
- But VIX is not closely related to disasters
  - “Conventional measures of financial volatility have virtually no information about impending transitions into a disaster regime”
    - Page 3 of the introduction

## Past Volatility vs. NVIX

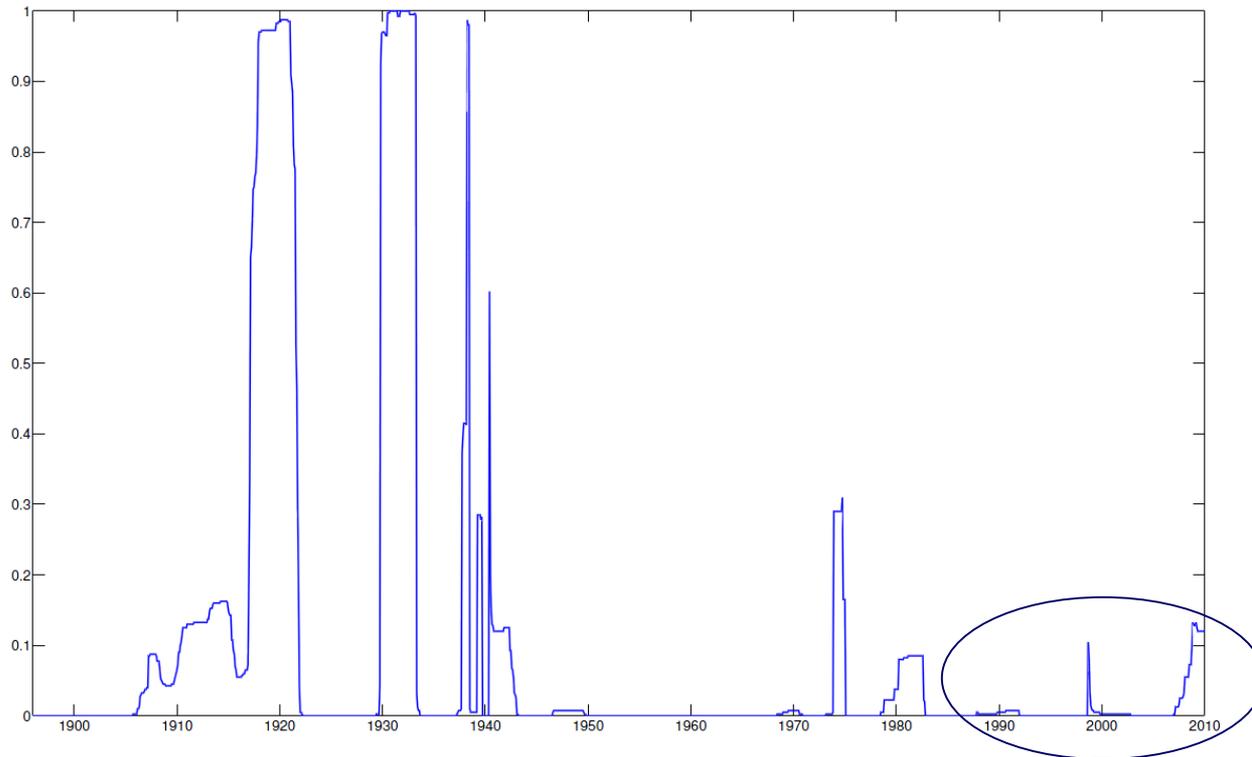
- Besides, past S&P volatility mimics VIX better than NVIX
  - $R^2$  of 83% based on past volatility vs. 20% based on NVIX



# Model-based Disaster Expectations

- Disasters occur only in the early years (before 1950)
  - But NVIX is based only on recent data (1986 onward)

Figure 5: Filtered Probability that the Economy is in a Disaster State,  $I_t^D = Prob(s_t = 1|y^T)$



# An Alternative: News Implied Disasters

- Estimate disaster probabilities using NSBU (2013)
  - Use economic and financial data (as the authors already do)
- Estimate the model using data that contains disasters
  - Early part of sample (pre-1950) in multiple countries
- **Determine which words are associated with disasters**
- Examine model implications for US and recent data
  - Disaster probabilities; and the words associated with disasters
  - Stock return predictability; and VIX and the variance premium

# Interpreting the News

- Some findings depend on word categorization methods
- SVM used to determine word combinations linked to VIX
- WordNet used to form topics and decompose NVIX
  - Alternative is to apply a topic algorithms such as LDA
- Government: “tax, money, rates, government, plan”
  - Should government include “treasury” and “Washington”?
- Intermediation: “financial, business, bank, credit, loan”
  - Should “money” and “rates” be part of intermediation?

# Predicting Stock Returns

- NVIX predicts returns in the 1945-2009 sample
  - Not in the early 1890-1944 sample
- War and Government topics are the most important
  - War: “war, military, action, world war, violence”
- War robustly predicts stock returns across subsamples
  - Intuitive positive relation between (disaster) risk and return
- Government only works in the 1945-2009 sample
  - Questionable whether high taxes represent a disaster

# Relating Topics to Disasters

- Are the “war” and “government” topics associated with disaster probabilities?
  - Are other topics associated with disasters?
  - Again, a direct approach would eliminate any doubt
  
- Predictability from NVIX and its components should be interpreted in light of previous results
  - Bekaert and Horoeva (2014, JE) decompose VIX and find that VP predicts returns and conditional volatility predicts economic activity
    - Their findings extend those in Bollerslev, Tauchen, and Zhou (2009, RFS)

# Concluding Thoughts

- Creative and clever use of textual data
- Intriguing evidence on words linked to return volatility
  - But we can already measure and forecast volatility fairly well
- Which words relate to investors' disaster concerns?
  - Disaster probabilities are otherwise difficult to assess
- This study has the potential to shed light on the link between economic disasters and stock market activity