High Frequency Trading
&
Academic Research

Frank Zhang

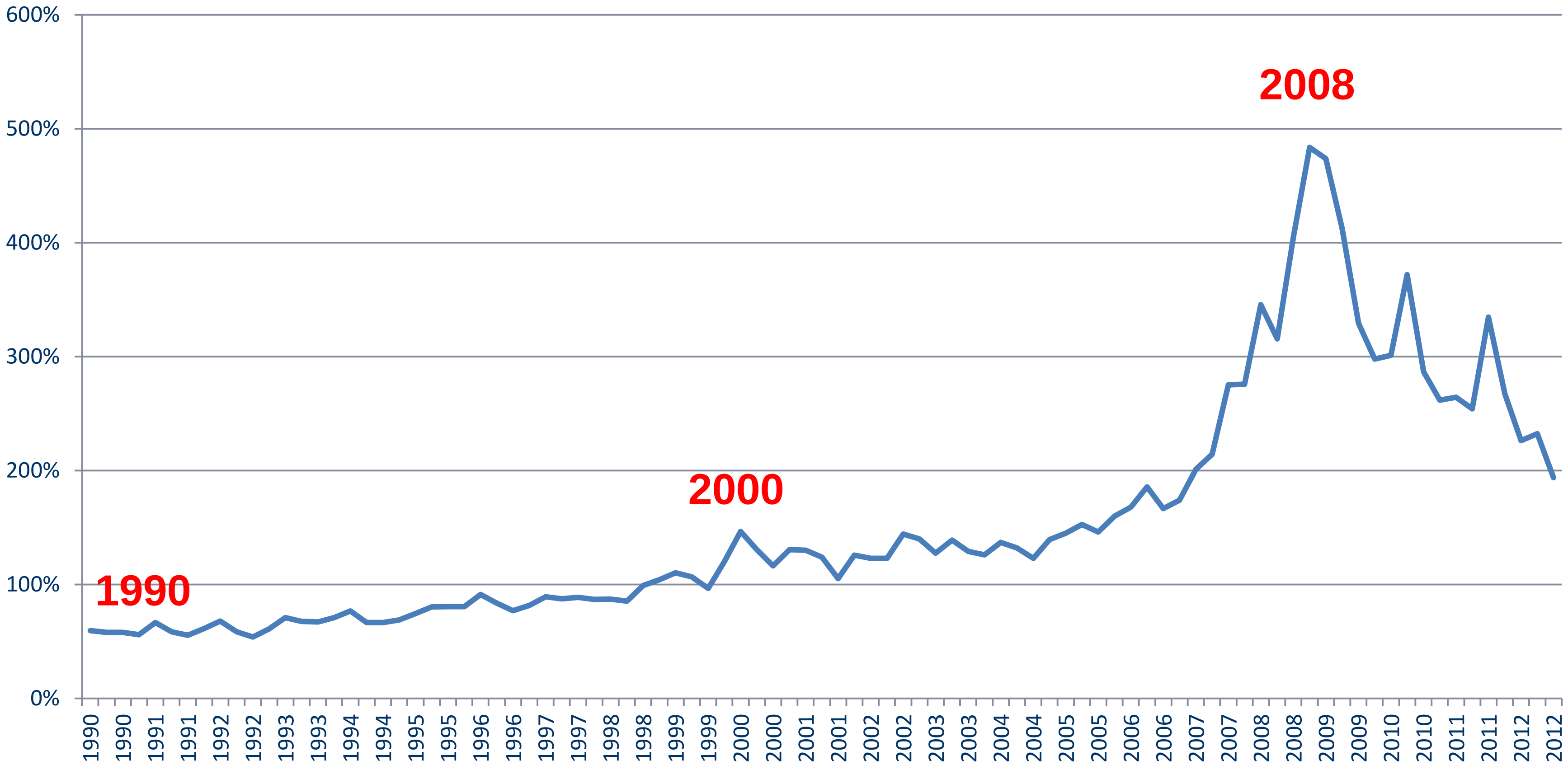
Yale University

Yale SCHOOL OF MANAGEMENT

High Frequency Trading (HFT)

- HFT characteristics
  - Use very high-speed and sophisticated computer programs
  - Co-locate computers with stock exchanges
  - Have extremely short holding periods (milliseconds to minutes, perhaps hours)
  - Do not carry any significant position overnight
- Who are HFTs?
  - Proprietary trading firms
  - Proprietary trading desks of multi-service broker-dealers
  - Hedge funds

Annual Stock Turnover



Yale SCHOOL OF MANAGEMENT

Kirilenko, Kyle, Samadi, and Tuzun (2011)
The flash crash: The impact of high frequency trading on an electronic market

- May 6, 2010: The DJIA dropped 1000+ points and rebounded in less than an hour
- HFT's role
  - Did not trigger the crash, but contributed to it.
  - Aggressively took liquidity from the market when prices were about to change
  - Generated a "hot potato" effect: rapid buying/selling from each other before fundamental buyers stepped in

Hirschey (2011)
Do high-frequency traders anticipate buying and selling pressure?

- HFTs' aggressive positions predict non-HFTs' liquidity demand
  - Not market-makers, which tend to provide liquidity
  - Resemble "order anticipation strategies" that SEC is concerned about

Brogaard, Hendershott, and Riordan (2013)
High frequency trading and price discovery

- HFT enhances price discovery
  - Non-market-makers trade in the direction of permanent price changes and in the opposite direction of transitory pricing errors.
    - HFT predicts price changes over 1 or 2 seconds.

  - Market-makers trade in the opposite direction of permanent price changes and in the same direction of transitory pricing errors.
    - They provide liquidity.

Overall Findings

- HFT market-makers provide liquidity.
  - But have no obligation and can withdraw from the market freely.
  - Other market-makers may provide less liquidity to the market
- HFT non-market makers' positions predict price changes over horizons of seconds.
  - HFTs anticipate orders from other investors.
  - HFTs trade faster than long-term investors.

Big Research Questions

- How does HFT affect the market's incorporation of fundamentals into stock prices?
  - HFTs care little about firm fundamental value.
- How does HFT affect long-term investors' behavior?
  - The capital market's primary goal is to relocate resources from investors to users.
  - SEC focuses on the interests of long-term investors.
- Does HFT affect the stability of U.S. financial markets?

Nasdaq HFT data

- Available free to academic researchers
- Cover 120 stocks over 2008-2009
- Time-stamp trades to the millisecond
- Identify the liquidity supplier and demander as HFT or non-HFT.
- Limitations
  - Small sample in an unusual period (financial crisis)
  - Do not identify all HFTs.
    - The 26 HFT firms are best thought of independent proprietary trading firms.