

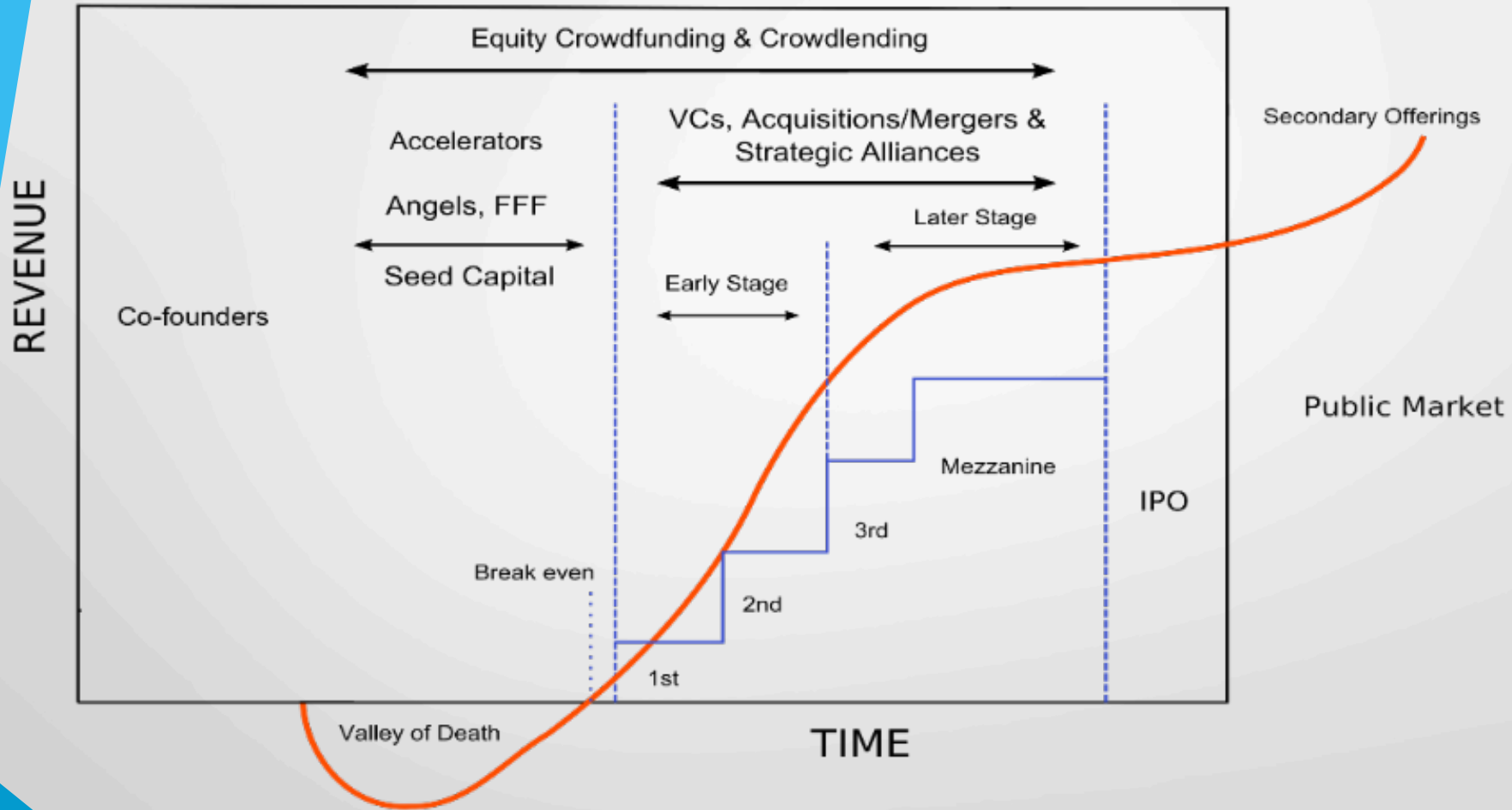


# Venture Capital

Robust features that influence change in industry specific deals

Harrison Zhao and Andrew Koe

# Startup Financing Cycle



# Data

- Venture capital data obtained from PriceWaterhouseCoopers (PWC)
- NASDAQ data obtained from Yahoo finance.
- Data starts at Q1 1997 and ends Q3 2015

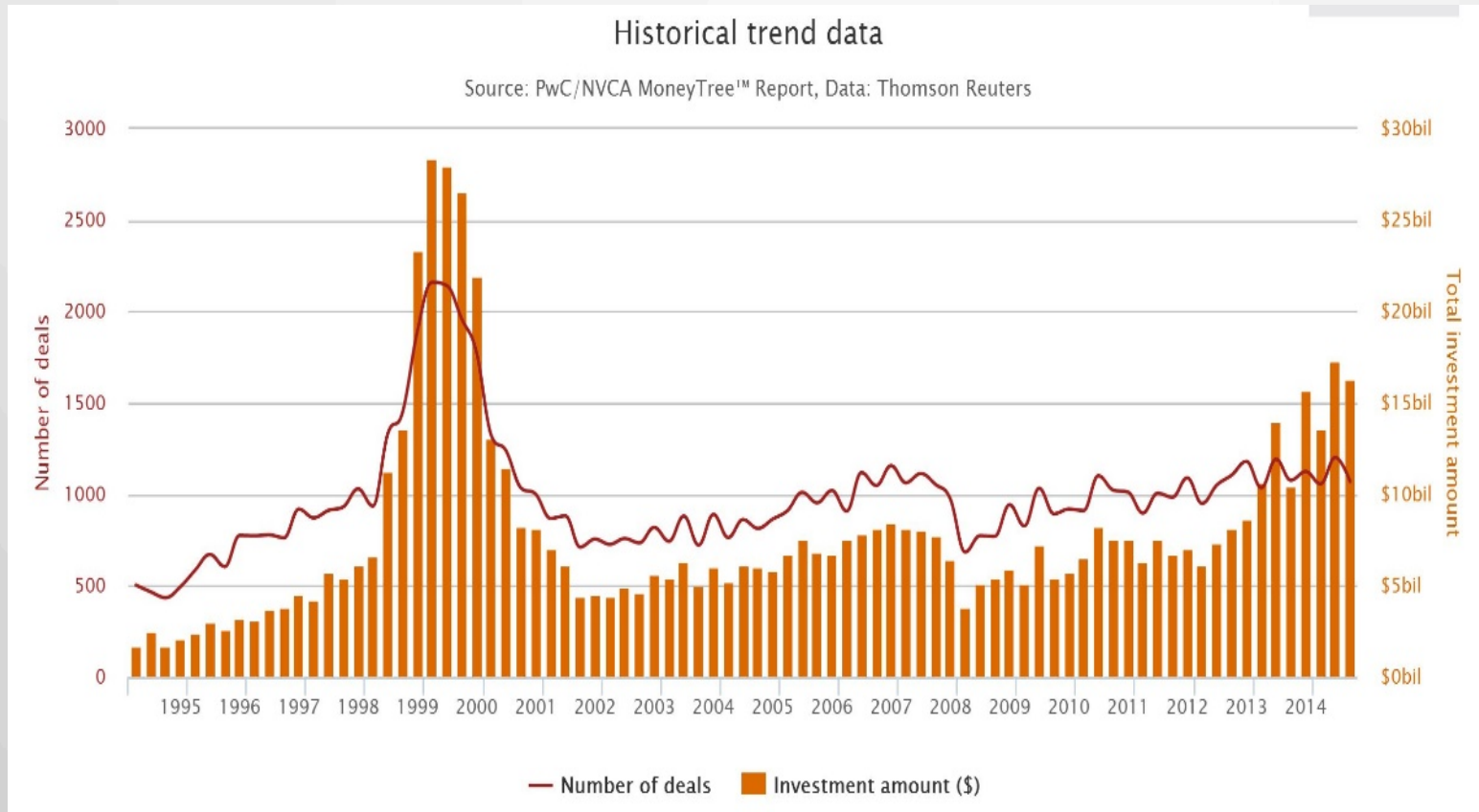
# Venture Sectors

- Biotechnology
- Energy
- Financial
- Healthcare
- Industrial
- IT
- Software
- Telecommunication
- Semiconductors

# NASDAQ Sector Indices

- Bank
- Biotechnology
- Computer
- Industrial
- Insurance
- Other finance
- Telecommunication

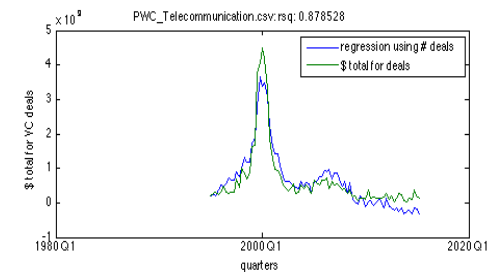
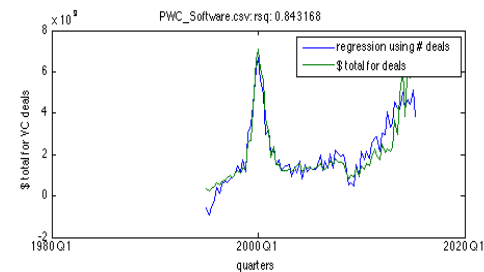
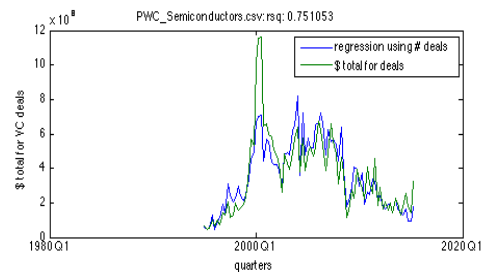
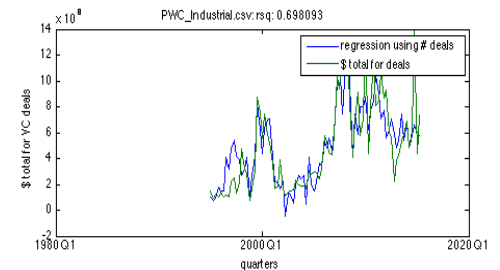
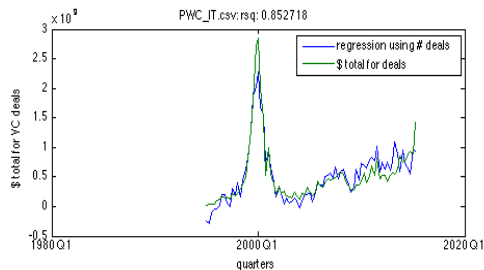
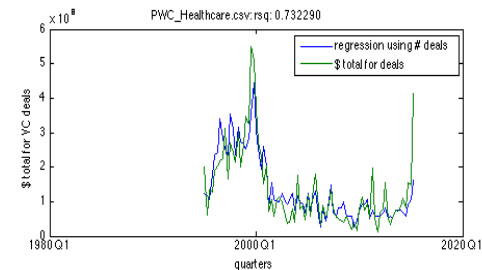
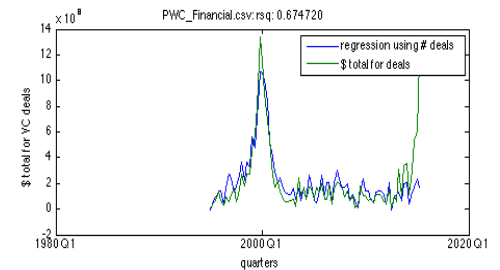
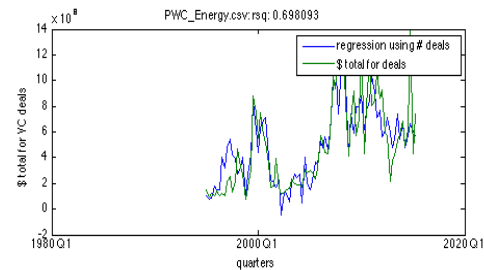
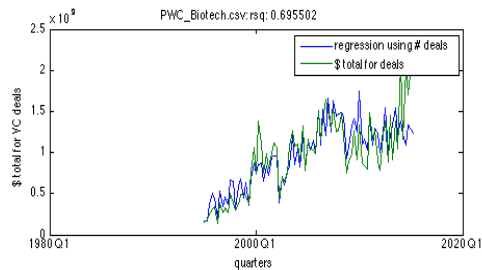
# PWC Historical Venture Capital



# Preprocessing Data - PWC

- Formatted as quarterly data
- Raw data features are:
  - Number of deals and total amount of dollars invested
- Number of deals is highly correlated with total dollar amount invested
- Features used are:
  - Number of deals
- De-mean and standardize

# Regression of VC investment





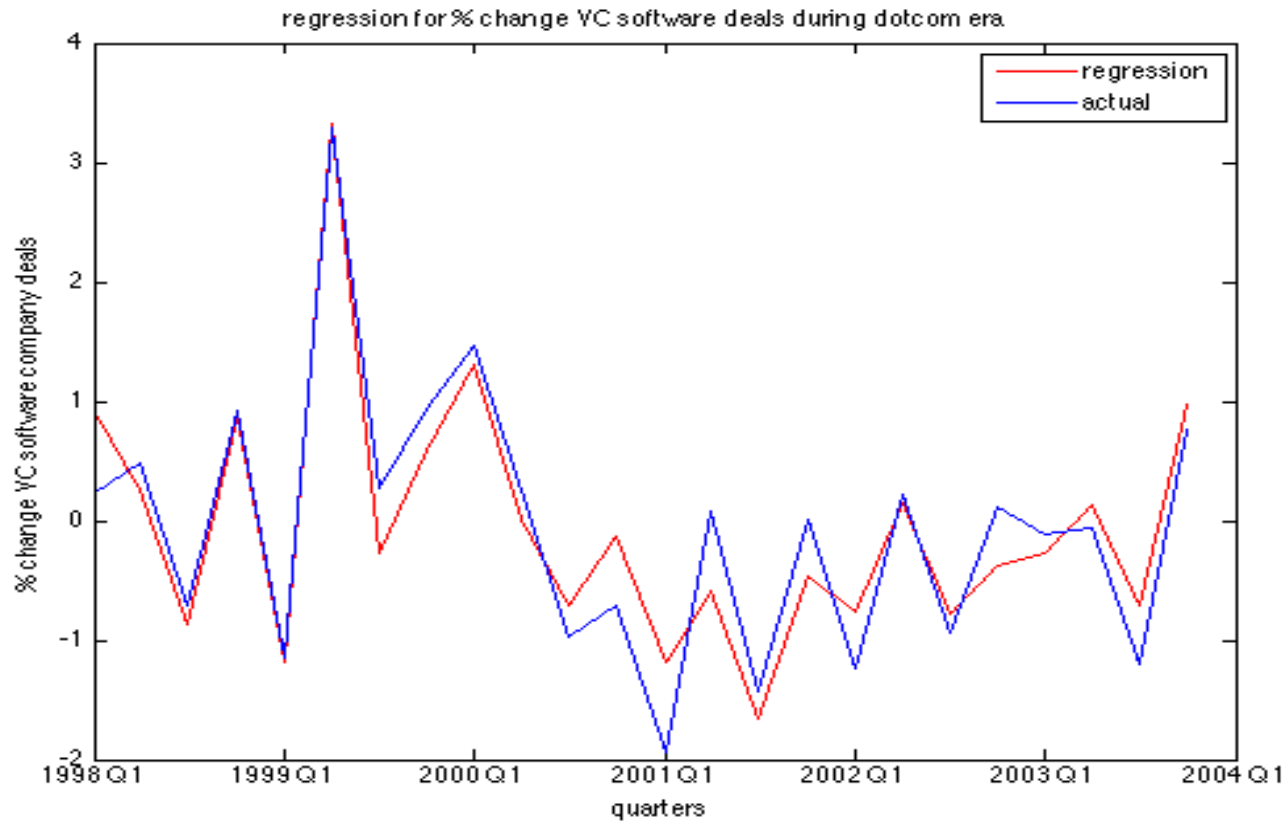
# Preprocessing Data - NASDAQ

- Monthly data converted to quarterly data
- Raw data features are:
  - Opening, high, low, and close indices
- Features extracted are:
  - Opening, high, low, close indices, momentum, and swing
- De-mean and standardized
- All features other than momentum are converted to units of % change since last quarter

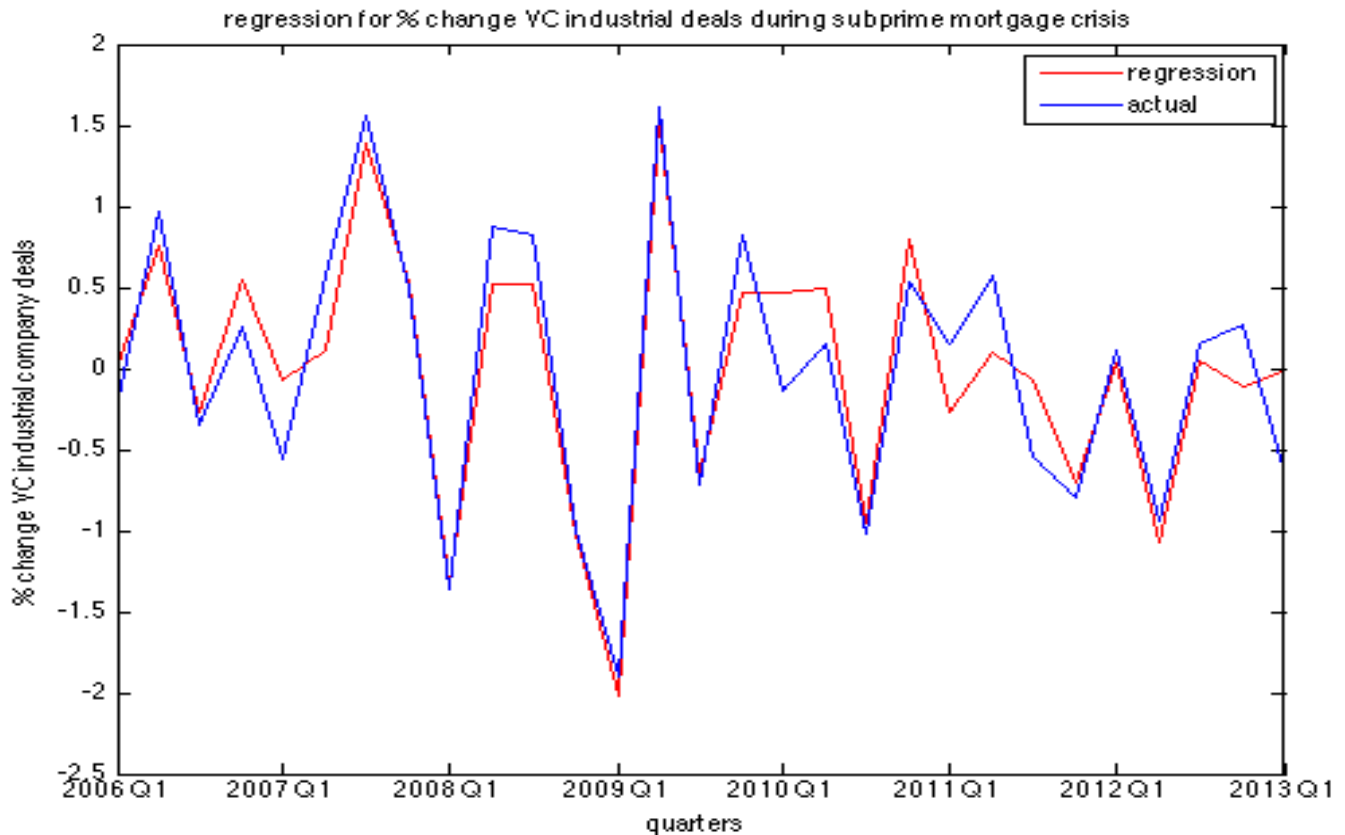
# Preliminary Analysis

- Perform regression analysis on atypical periods of time
  - Dotcom bubble (Q1 1998 – Q1 2004)
  - Subprime Mortgage Crisis (Q1 2006 – Q1 2013)
- Use related NASDAQ industries as independent variables
- Use F-test to identify relevant variables

# Dotcom Bubble Analysis



# Subprime Mortgage Crisis Analysis



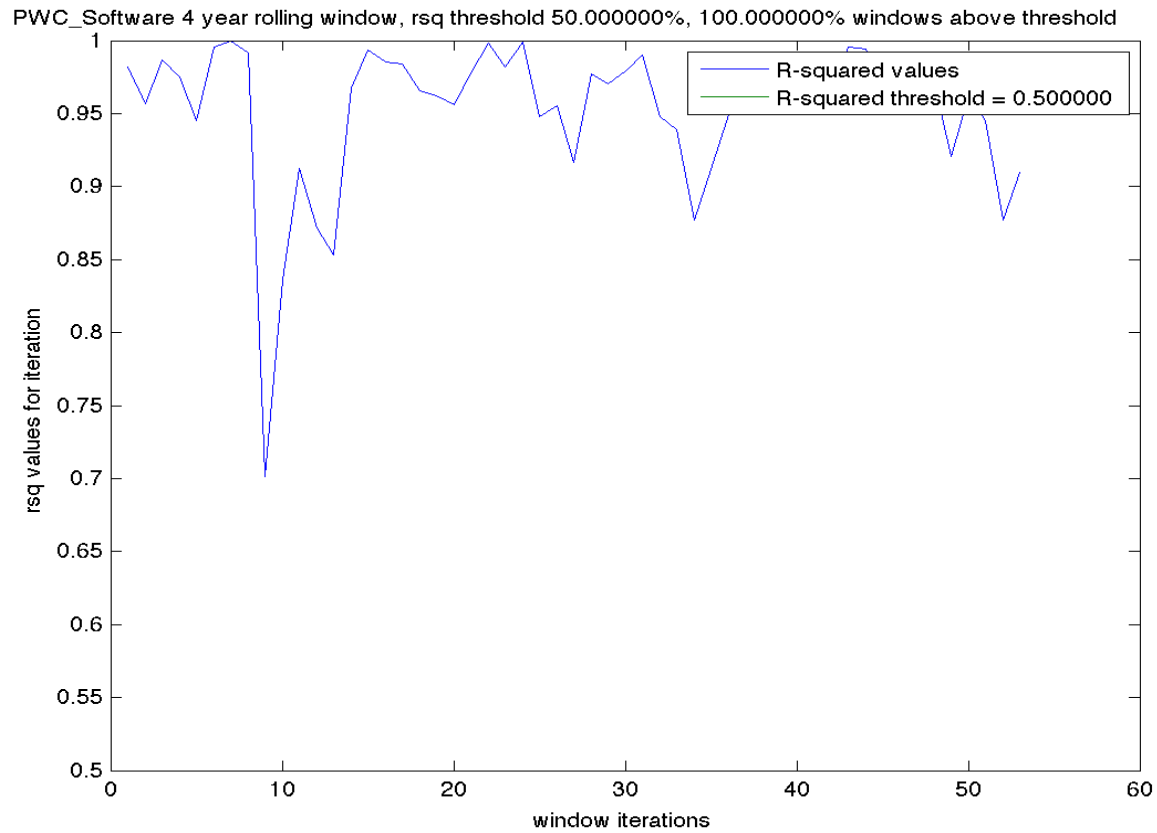
# Rolling Window Analysis

- Perform regressions on 3, 4, and 5 year windows on the PWC data
- Roll the window forward one quarter and iteratively perform regressions
- Identify NASDAQ features that are valuable independent variables
- Choose independent variables that yield stable regression coefficients throughout the analysis

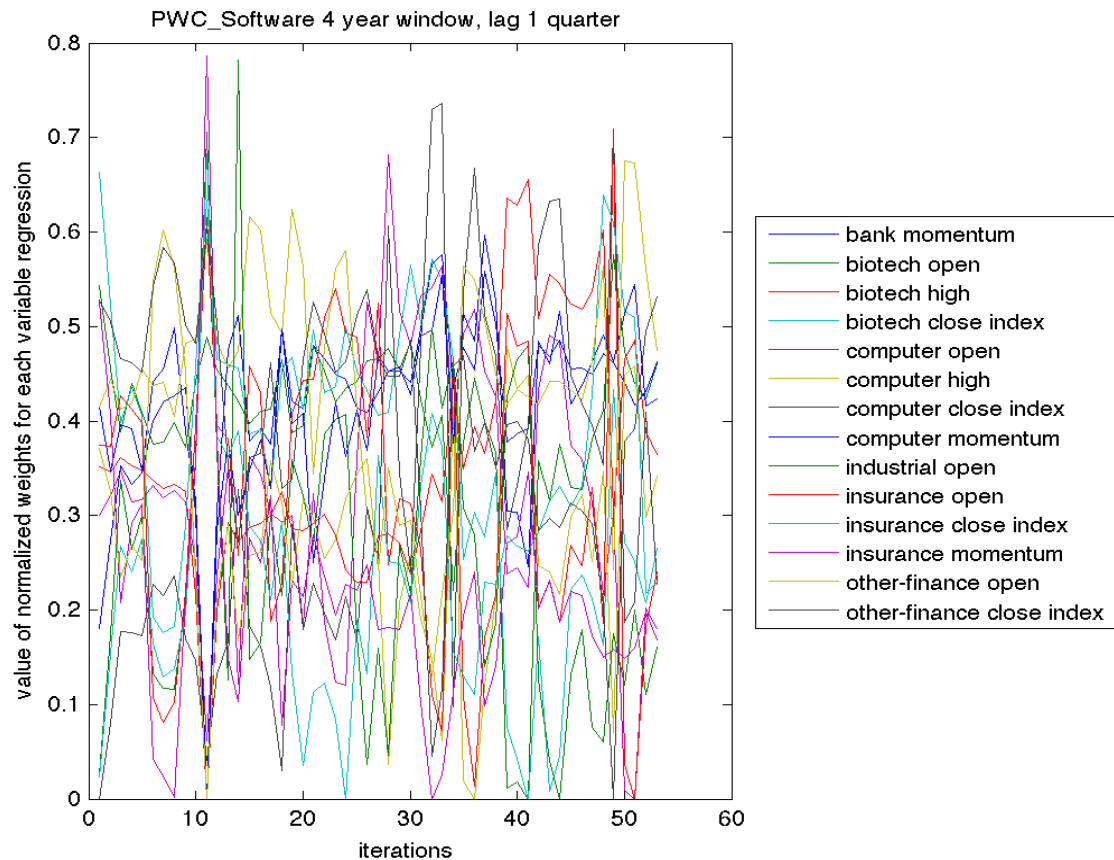
# Data in Rolling Window Analysis

- All the features extracted from the NASDAQ data are candidate independent variables
  - 7 NASDAQ indices
  - 6 features per index
  - 42 total features
- Regression is performed for each of the 9 PWC sector indices
- NASDAQ features are filtered down using the F-test

# Rolling Window Analysis



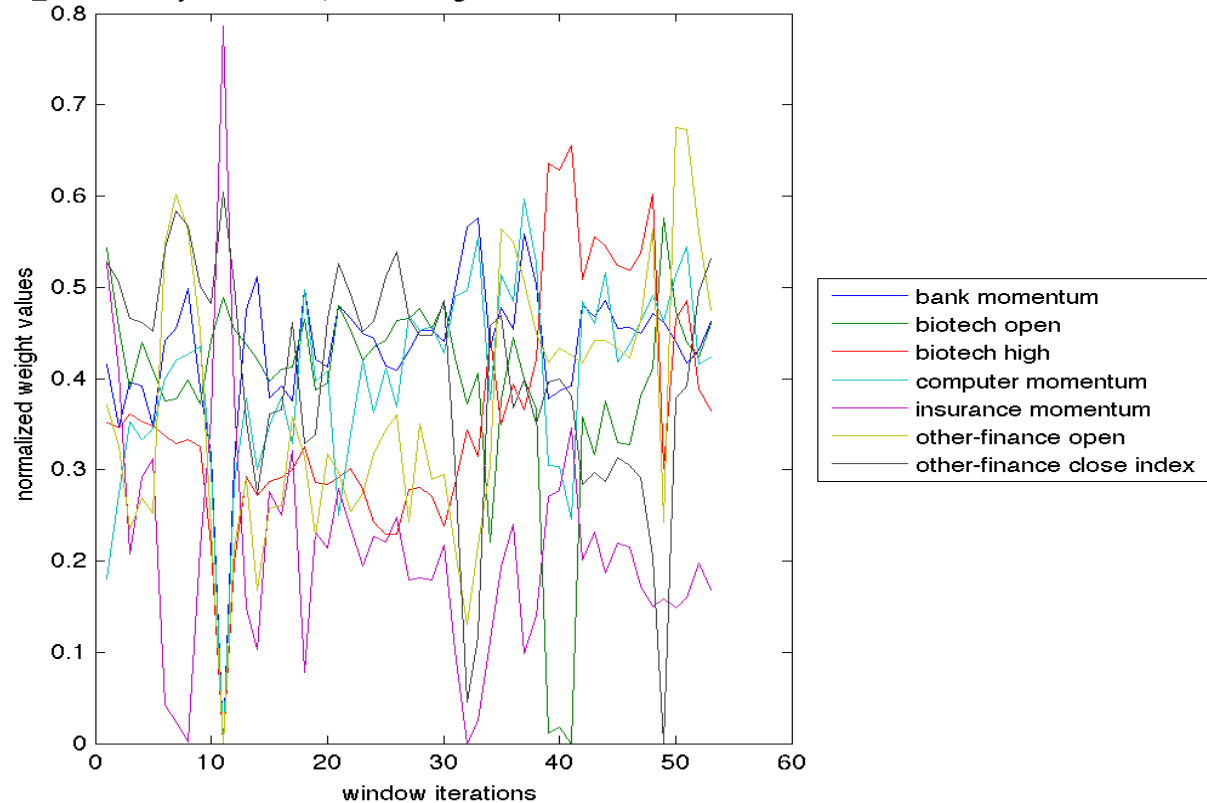
# Relevant Variables and Weights



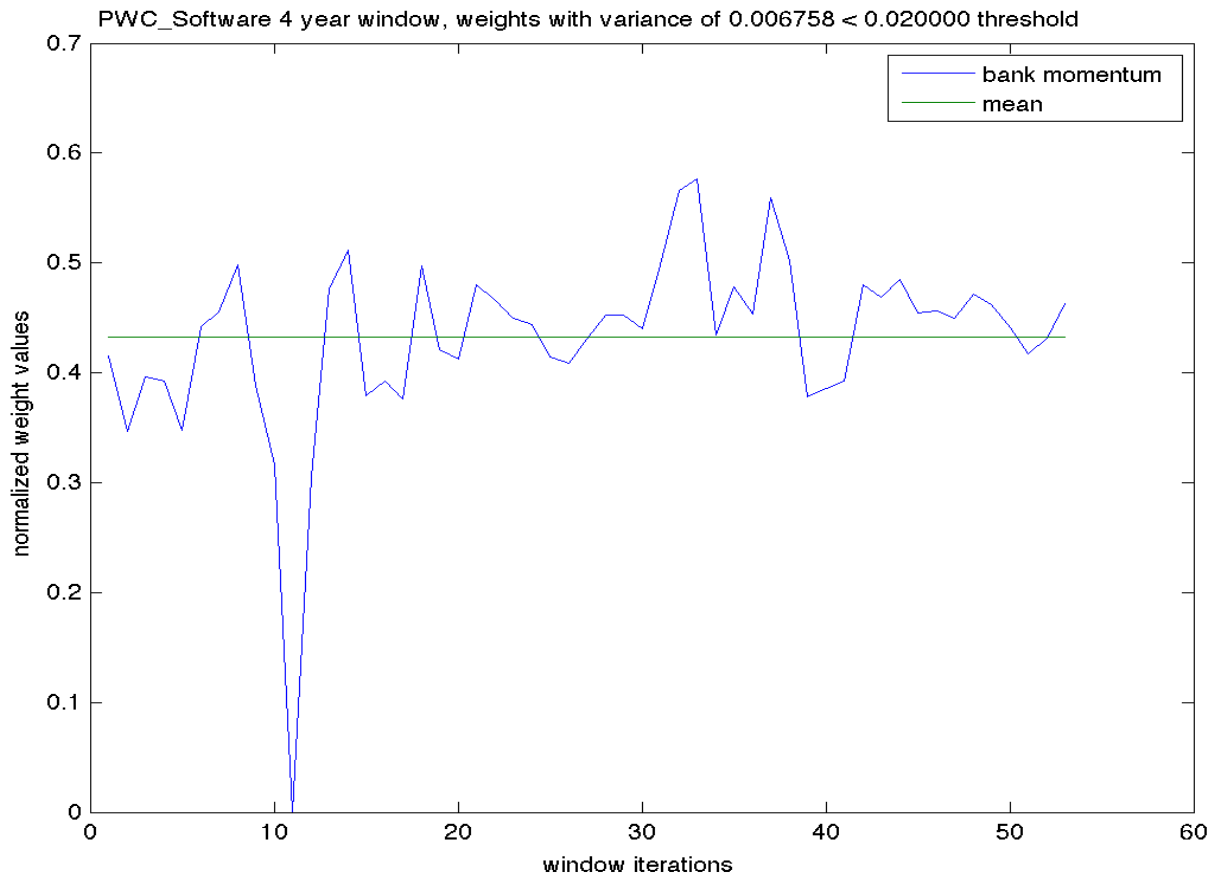


# Stable Weights for Analysis

PWC\_Software 4 year window, stable weights with variance of  $< 0.020000$



# Examining Stable Weights



# Conclusions

- During atypical periods for the public market, market volatility and investor uncertainty was also reflected in private investments
- Performance of related sectors are also strong indicators of investors' willingness to invest in startups



Questions?