DYNAMIC INTERPRETATION OF EMERGING SYSTEMIC RISKS
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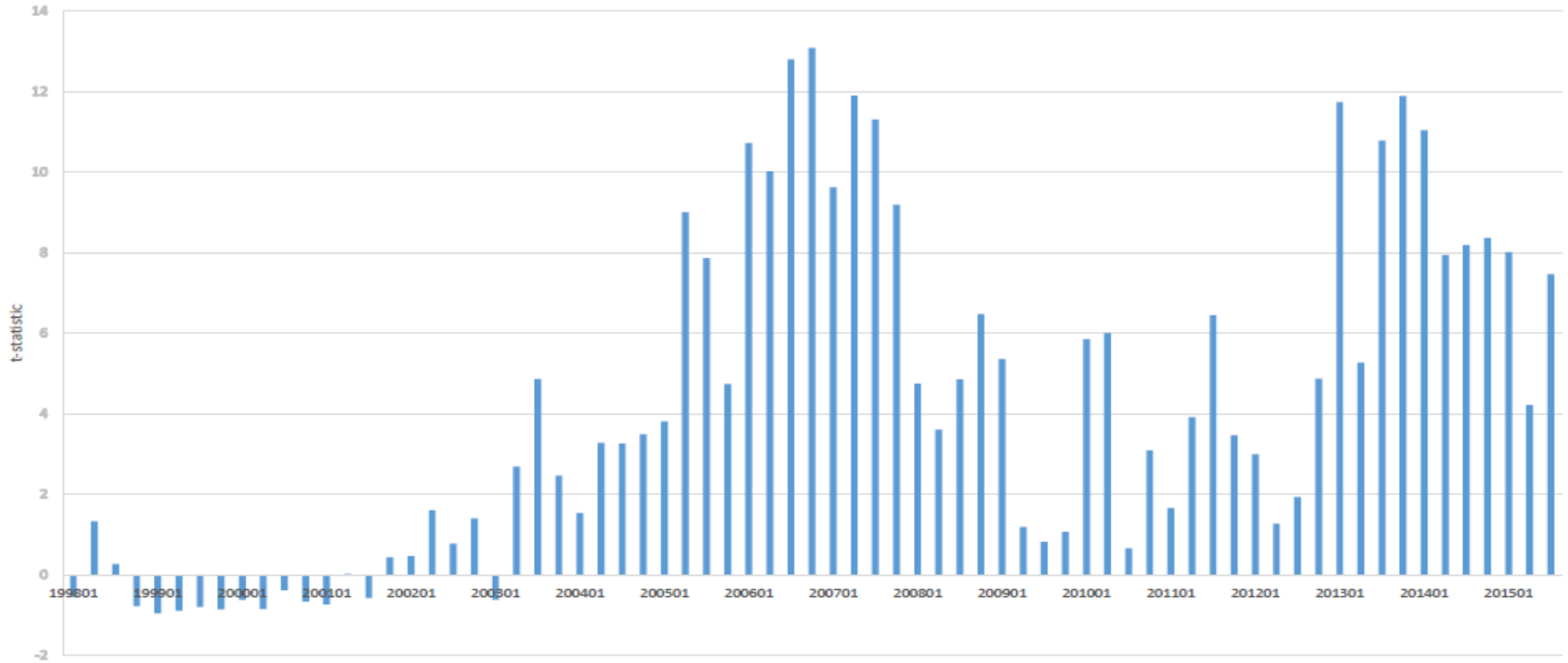
GOALS OF PAPER

- INCORPORATE TEXTUAL MATERIAL FROM 10-K FILINGS INTO SYSTEMIC RISK MEASURES
- FIRMS ARE REQUIRED TO REPORT A SYNOPSIS OF RISKS IN ANNUAL FILINGS.
- INVESTORS ALSO PROVIDE INFORMATION FROM EQUITY PRICES.
- COMBINE THESE TO GET A FORWARD LOOKING SYSTEMIC RISK MEASURE

HOW DO THEY DO THIS?

- CALCULATE AN "AGGREGATE EMERGING RISK SCORE" WHICH IS AN R^2 FROM QUARTERLY CROSS SECTIONAL REGRESSIONS WITH FROM 500 TO 700 US FINANCIAL INSTITUTIONS
- REGRESSIONS ARE OF RETURN COVARIANCES ON BANK CROSS PRODUCTS OF EXPOSURES TO EACH OF THE REPORTED RISKS AS WELL AS OTHER VARIABLES
- R^2 IS REDUCED BY THE R^2 FROM EACH REGRESSION WITHOUT TEXT DATA AND FROM A BASELINE PERIOD FROM 1998-2003
- USE ADVANCED TEXTUAL ANALYSIS TO SORT RISK DESCRIPTIONS INTO 18 CATEGORIES WHICH ARE "INTERPRETABLE AND DYNAMIC" THESE ARE THE NEW DATA - *A SCORE FOR EACH BANK-RISK-YEAR*

AGGREGATE EMERGING RISK SCORE



OVERALL COMMENT

- PAPER IS HIGHLY ORIGINAL AND BREAKS NEW GROUND IN MANY DIRECTIONS
- THE ANALYSIS OF THE 10-K RISKS IS UNIQUE AND I AM NOT QUALIFIED TO CRITIQUE THE METHODOLOGY
- THE USE OF THE TEXTUAL DATA IS ALSO UNIQUE AND INNOVATIVE
- AS WITH MANY INNOVATIVE STUDIES – THERE ARE CHOICES THAT I THINK CAN BE IMPROVED

- I WILL DISCUSS THE ECONOMIC MODEL AND THE ECONOMETRICS

CONCEPTUAL ISSUES

- IS THE COVARIANCE OF RETURNS A RISK FACTOR?
- IS THE R^2 PREDICTING IT A RISK FACTOR?
- IS COVARIANCE A SYSTEMIC RISK OR A SYSTEMATIC RISK?
- IF BANKS ARE SUBJECT TO THE SAME SHOCKS, THEN COVARIANCES WILL BE LARGE BUT THIS IS NOT A MARKET FAILURE.
- WHERE IS THE RISK RETURN TRADE-OFF IN THIS MODEL? BANKS TAKE RISK TO MAKE RETURN. HOW DO WE KNOW WHETHER HIGH RISK IS GOOD OR BAD FOR SYSTEMIC RISK?
  - IS A RISK FACTOR ALWAYS BAD FOR SYSTEMIC RISK? WHAT ABOUT COMPLIANCE RISK OR CAPITAL ADEQUACY RISK OR RISK MANAGEMENT RISK? EVERY INDUSTRY MEETING I HAVE ATTENDED OVER THE LAST COUPLE OF YEARS HAS COMPLAINED THAT COMPLIANCE COSTS ARE EXCESSIVE.
  - BEFORE THE FINANCIAL CRISIS, THERE WERE POSITIVE RETURNS FROM INVESTING IN THE MORTGAGE MARKET. THE BANKS WERE THE DARLINGS OF WALL STREET. SO COVARIANCES WOULD BE LARGE DUE TO POSITIVE RETURNS. BANKS WERE SEEKING NEW RISKS TO ENHANCE RETURNS.

MORE THOUGHTS

- ARE RISKS MORE DANGEROUS IF THEY ARE ANTICIPATED THAN IF THEY ARE NOT?
- IF TWO FIRMS FACE THE SAME RISK FACTORS, WILL THE RETURNS BE MORE CORRELATED
  - YES IF THE RISKS MATERIALIZE. BUT THERE ARE MANY SHOCKS SO THE COVARIANCE IS DUE ONLY TO THE EXPOSURES IF THE DISTRIBUTION OF RISKS IS CONSTANT AND THEY ARE INDEPENDENT.
  - MULTIFACTOR MODEL: SOME ARE RISK FACTORS, OTHERS ARE RETURN FACTORS

$$r_{i,t} = \alpha_i + \sum_{k=1}^{K} \beta_{i,\mathrm{k}} f_{k,t} + \varepsilon_{i,t}$$

$$Cov_t\left(r_i, r_j\right) = \sum_{i,j}^{N} \beta_{i,k}\beta_{j,k}\omega_{i,j,t}, \ \ \omega_{i,j,t} \text{ is the ex ante or ex post covariance between factors}$$

- SYSTEMIC RISK IS TYPICALLY ASSOCIATED WITH LARGE BANKS WITH HIGH LEVERAGE AND INTERCONNECTEDNESS. HERE ALL ARE TREATED AS EQUALLY IMPORTANT IN CROSS SECTION.
- STRESS TESTS ARE FOCUSSED ON CAPITAL ADEQUACY GIVEN THE RISK. THIS IS MISSING HERE.

TEXTUAL ANALYSIS OF 10-K

- USES SVA AND LDA IN TANDEM ON EDGAR DATABASE WITH SOFTWARE PROVIDED BY META HEURISTICA.
- EACH YEAR IS PROCESSED SEPARATELY BY LDA TO IDENTIFY TOPICS AND THEN SVA GENERATES THEMES THAT ARE “FULLY INTERPRETABLE”.
- TO ME THE THEMES ARE NOT SO EASILY INTERPRETED
- HOW CAN WE BE SURE THAT INCREASED SCORES ON SOME RISK FACTORS ARE DUE TO INCREASED EXPOSURES RATHER THAN INCREASED RISK?
- HOW CAN WE KNOW WHETHER THE THEMES ARE CONSTANT OVER TIME?


7,606
results operations
not able
adversely affect
financial condition
r-00
6,095
risk risk
risk management
rate risk
credit risk
r-05
5,848
interest rate
interest rates
interest income
net interest income
r-06
5,148
results operations
financial statements
see item
financial condition
r-07
4,952
fair value
interest rate
rate risk
financial instruments
r-08
7,055
interest rates
interest rate
interest income
net interest income
r-01
4,833
allowance loan losses
loan losses
loan portfolio
charge offs
r-09
4,383
federal home
funding sources
cash flow
fhlb advances
r-13
4,358
holding company
pay dividends
united states
common stock
r-14
4,232
farmer mac
backed securities
investment securities
northern trust
r-15
6,864
approximately million
ended december
million million
weighted average
r-02
4,779
real estate
loan portfolio
real estate loans
commercial real estate
r-10
4,208
common stock
per share
stock price
shares common stock
r-16
2,853
letters credit
credit risk
balance sheet
standby letters credit
r-19
2,355
financial statements
accounting policies
sarbanes oxley
internal control over
r-20
6,299
mortgage loans
servicing rights
mortgage servicing rights
mortgage loan
r-03
4,595
laws regulations
adversely affect
federal state
rules regulations
r-11
4,118
income tax
tax exempt
fair value
income taxes
r-17
2,354
fair value
sfas no
financial statements
sfas no accounting
r-21
2,337
board directors
common stock
lazard group
toronto dominion
r-22
6,107
economic conditions
adversely affect
united states
old national
r-04
4,492
products services
financial institutions
technology changes
customer deposits
r-12
3,085
deciding whether
third party
third parties
operational risk
r-18
2,256
executive officer
adverse effect
key employees
vice president
r-23
2,024
doral financial
performance diversifi
arises possibility
bok financial
r-24

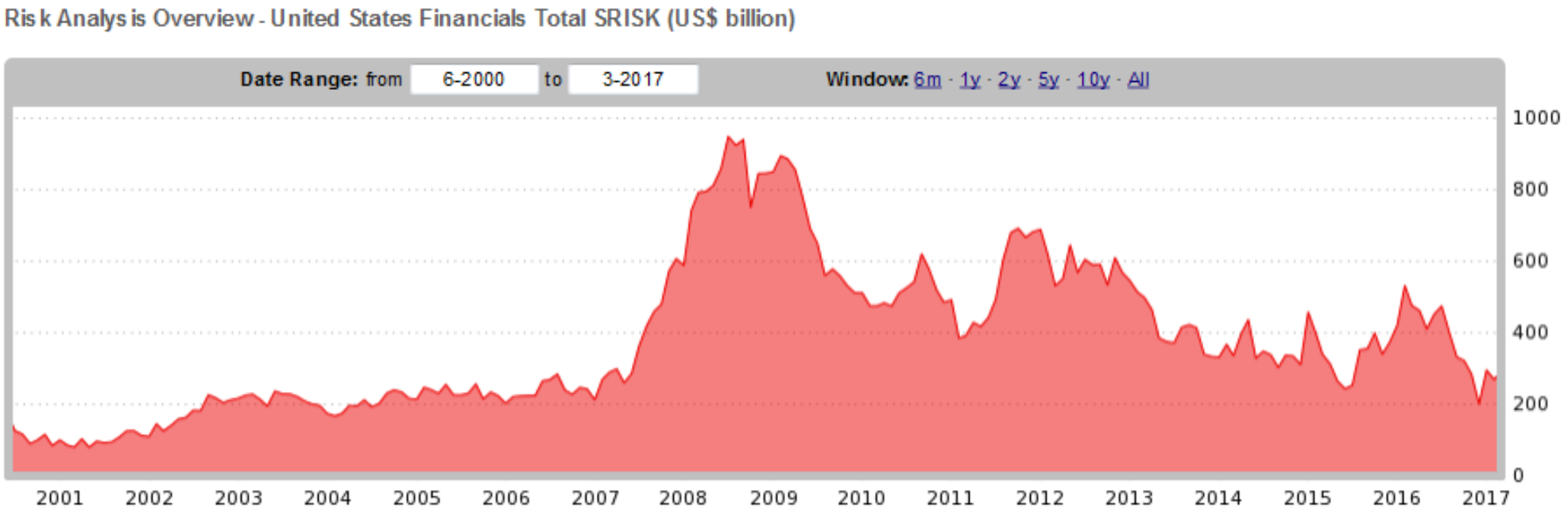
ECONOMETRIC ISSUES:CROSS SECTIONAL REGRESSIONS OF COVARIANCES ON EXPOSURES

- THERE ARE N(N-1)/2 OBSERVATIONS OR AT LEAST 100,000 OBSERVATIONS
- ARE THESE ALL INDEPENDENT? NO BECAUSE THEY HAVE NAMES IN COMMON AND MUST PRODUCE A POSITIVE DEFINITE COVARIANCE MATRIX. HENCE OLS WILL NOT HAVE CONVENTIONAL PROPERTIES, EVEN ASYMPTOTICALLY.
- DECOMPOSITION OF R^2 IS NOT A UNIQUE OR STATISTICAL PROCEDURE. DOES TEXTUAL ANALYSIS ADD TO THE EXPLANATORY POWER? I WOULD TEST THE HYPOTHESIS THAT ALL THE TEXT COEFFICIENTS ARE ZERO WITH AN F TEST AND REPORT P VALUE.
- EMERGING RISK MEASURE IS THE DIFFERENCE BETWEEN R^2 IN PERIOD T AND IN PERIOD 1998-2003. WHY DO THIS? JUST SHOW PLOTS.
- WHAT IS T-STATISTIC OF R^2 ? THE NUMERATOR OF THIS STATISTIC CANNOT HAVE A NORMAL DISTRIBUTION AS IT IS BETWEEN (0,1). COMPUTE MEAN AND STANDARD DEVIATION OF R^2 FROM 1998-2003 (SEVEN YEARS OR 28 OBSERVATIONS). REPORT Z-SCORE BY SUBTRACTING MEAN AND DIVIDING BY STD. PROPOSAL: CALL IT A Z-SCORE, NOT T-STATISTIC SINCE IT DOES NOT HAVE A T-DISTRIBUTION.

SINGLE BANK MEASURES

- FOR BANK i MEASURE AVERAGE COVARIANCE WITH ALL OTHER BANKS. THIS IS A COVARIANCE WITH AN EQUAL WEIGHTED FINANCIAL INDEX AND IS WIDELY USED FOR SYSTEMIC RISK.
- CAN MEASURE INDIVIDUAL BANK RISK BY EXAMINING ITS EMERGING RISKS. THE GREATER THE EMERGING RISKS FROM 2006 TO MID 2008, THE GREATER THE STOCK DECLINE SEPT 2008-DEC 2012.
- THE GREATER THE EXPOSURE TO EMERGING RISKS BY 2005, THE GREATER THE PROBABILITY OF FAILING IN 2008 OR LATER.
- FAMA -MACBETH REGRESSIONS OF MONTHLY VOLATILITY ON LAGGED RISK FACTORS SHOW THAT RISK FACTORS PREDICT VOLATILITY
- WHY NOT USE LEVERAGE HERE AS WELL AS RISK? WHY NOT USE COVARIANCE RATHER THAN PREDICTED COVARIANCE?
- COULD DO STRESS TESTS USING PUBLICLY AVAILABLE DATA AS IN SRISK.

US SRISK 2000-2017



AGGREGATE EMERGING RISK SCORE