DYNAMIC INTERPRETATION OF EMERGING SYSTEMIC RISKS
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DISCUSSION BY ROBERT ENGLE,
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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

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

\[ \text{Cov}_t(r_i, r_j) = \sum_{i,j} \beta_{i,k} \beta_{j,k} \omega_{i,j,k}, \ \omega_{i,j,k} \text{ is the ex ante or ex post covariance between factors} \]

- 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 FOCUSED 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?
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 R² 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 R² IN PERIOD T AND IN PERIOD 1998-2003. WHY DO THIS? JUST SHOW PLOTS.
- WHAT IS T-STATISTIC OF R²? THE NUMERATOR OF THIS STATISTIC CANNOT HAVE A NORMAL DISTRIBUTION AS IT IS BETWEEN (0,1). COMPUTE MEAN AND STANDARD DEVIATION OF R² 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.
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.


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.
AGGREGATE EMERGING RISK SCORE