

# SYSTEMIC RISK, CONTAGION AND SHADOW BANKS

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# SYSTEMIC RISK

- Systemic risk refers to the risk of a breakdown of an entire system rather than simply the failure of individual parts.
- In a financial context, it denotes the risk of a cascading failure in the financial sector, caused by linkages within the financial system, resulting in a severe economic downturn.
- A key question for policymakers is how to limit the build-up of systemic risk and contain economic crises events when they do happen.
- Reducing the likelihood and severity of future financial crises can be ensured by a coordinated global effort to monitor market trends and bubbles, and to decrease bailouts for failing financial institutions.

# REGULATION OF SYSTEMIC RISK

- In the US, the Dodd-Frank Wall Street Reform and Consumer Protection Act created an Office of Financial Research (OFR) to monitor global market developments that might lead to systemic failure.
- OFR is part of the US Department of the Treasury and supports the Financial Services Oversight Committee of federal financial regulators.
- The Financial Stability Oversight Commission (FSOC) directs the OFR and requests data and analyses to support its members' work.
- Despite warnings in Dodd-Frank that federal bailouts were a thing of the past, Dodd-Frank specifically authorizes the FDIC to guarantee the assets and liabilities of failing financial firms.
- It also calls on the Fed to create a list of systemically significant firms for special oversight

# REGULATION OF SYSTEMIC RISK

- The FDIC is an independent federal agency created by the US Congress in 1933 in response to the thousands of bank failures that occurred in the 1920s and early 1930s.
- A number of European and global entities have undertaken efforts to address systemic risk. For example, the G–20 nations agreed to reduce bank leverage by increasing the Basel III capital requirements for financial institutions.
- The European Union has worked to create a European Financial Stability Facility (EFSF) to provide temporary help to member states regarding fiscal debt burdens and fiscal deficits. The EFSF is a significant part of the €750 billion European Stabilization Mechanism to help member states.
- The federal government uses systemic risk as a justification—sometimes correct sometimes incorrect—to intervene in the economy. The basis for this intervention is the belief that the government can reduce or minimize the ripple effect from a company-level event through targeted regulations and actions.

# EXAMPLES OF SYSTEMIC RISK

- Lehman Brothers' size and integration into the U.S. economy made it a source of systemic risk. When the firm collapsed, it created problems throughout the financial system and the economy.
- Capital markets froze up while businesses and consumers could not get loans or could only get loans if they were extremely creditworthy, posing minimal risk to the lender.
- Simultaneously, AIG was also suffering from serious financial problems. Like Lehman, AIG's interconnectedness with other financial institutions made it a source of systemic risk during the financial crisis.
- AIG's portfolio of assets tied to subprime mortgages and its participation in the residential mortgage-backed securities (RMBS) market through its securities-lending program led to collateral calls, a loss of liquidity, and a downgrade of AIG's credit rating when the value of those securities dropped.
- While the U.S. government did not bail out Lehman, it decided to bail out AIG with loans of more than \$180 billion, preventing the company from going bankrupt. Analysts and regulators believed that an AIG bankruptcy would have caused numerous other financial institutions to collapse as well.

# SYSTEMIC RISK MEASURES – CONDITIONAL VALUE-AT-RISK

- This measure corresponds to the value at risk (VaR) of the financial system conditional on institutions being under distress.
- Here, an institution's contribution to systemic risk is defined as the difference between CoVaR conditional on the institution being under distress and the CoVaR in the median state of the institution.

# SYSTEMIC RISK MEASURES – MARGINAL EXPECTED SHORTFALL

- The Marginal Expected Shortfall measures a firm's expected equity loss when market falls below a certain threshold over a given horizon.
- MES is simple to compute and therefore easy for regulators to consider. It can be calculated as the average return of a firm during the  $x\%$  worst days for the market.
- MES and leverage are able to predict a firm's contribution to a crisis

# TWO STEP ESTIMATION- SYSTEMIC EXPECTED SHORTFALL

$$realized\ SES_{i,crisis} = a + b \times MES_{i,pre-crisis} + c \times LVG_{i,pre} + \epsilon_i$$

$$LVG_{i,pre-crisis} = \left( \frac{book\ assets - book\ equity + market\ equity}{market\ equity} \right)_{i,pre-crisis}$$

*realized SES<sub>i,crisis</sub>*                      Is the stock return during the crisis

*MES<sub>i,pre-crisis</sub>*                      The firm's average return during the 5% worst days for the market.

Fit values after estimation

$$fitted\ SES = \frac{b}{b+c} MES + \frac{c}{b+c} LVG$$



## EXAMPLE

- A cross-sectional regression of the firm's market performance before and after the last financial crisis leads the following estimates.

$$realized\ SES_{i,crisis} = \widehat{0.001} + \widehat{1.054} \times MES_{i,pre-crisis} + \widehat{0.24} \times LVG_{i,pre}$$

Compute the fitted systemic expected shortfall for a bank that has a marginal expected shortfall of 10% and a leverage of 5

$$fitted\ SES = \frac{1.054}{1.294} 10 + \frac{0.24}{1.294} 5 = 9.07$$

# GLOBAL SYSTEMICALLY IMPORTANT BANKS

The Basel Committee's assessment methodology for G-SIBs requires a sample of banks to report a set of indicators to national supervisory authorities. These indicators are then aggregated and used to calculate the scores of banks in the sample. Banks above a cut-off score are identified as G-SIBs and are allocated to buckets that will be used to determine their higher loss absorbency requirement.

# GLOBALLY SYSTEMICALLY IMPORTANT BANKS

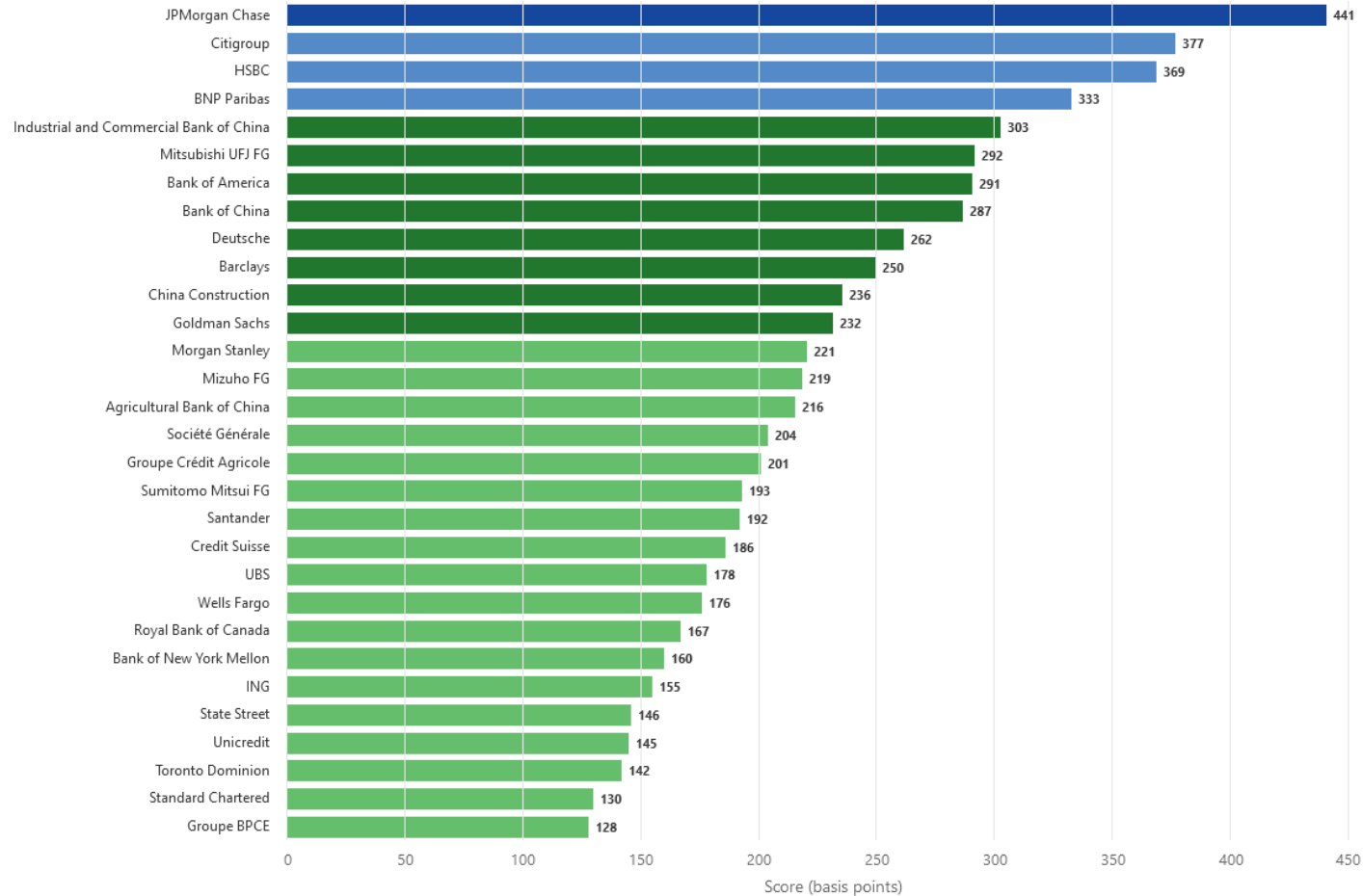
Year ▾

Category ▾

Chart data ↕

Basel G-SIB capital surcharge % 1.0 1.5 2.0 2.5 3.5

## International Banks (2021)



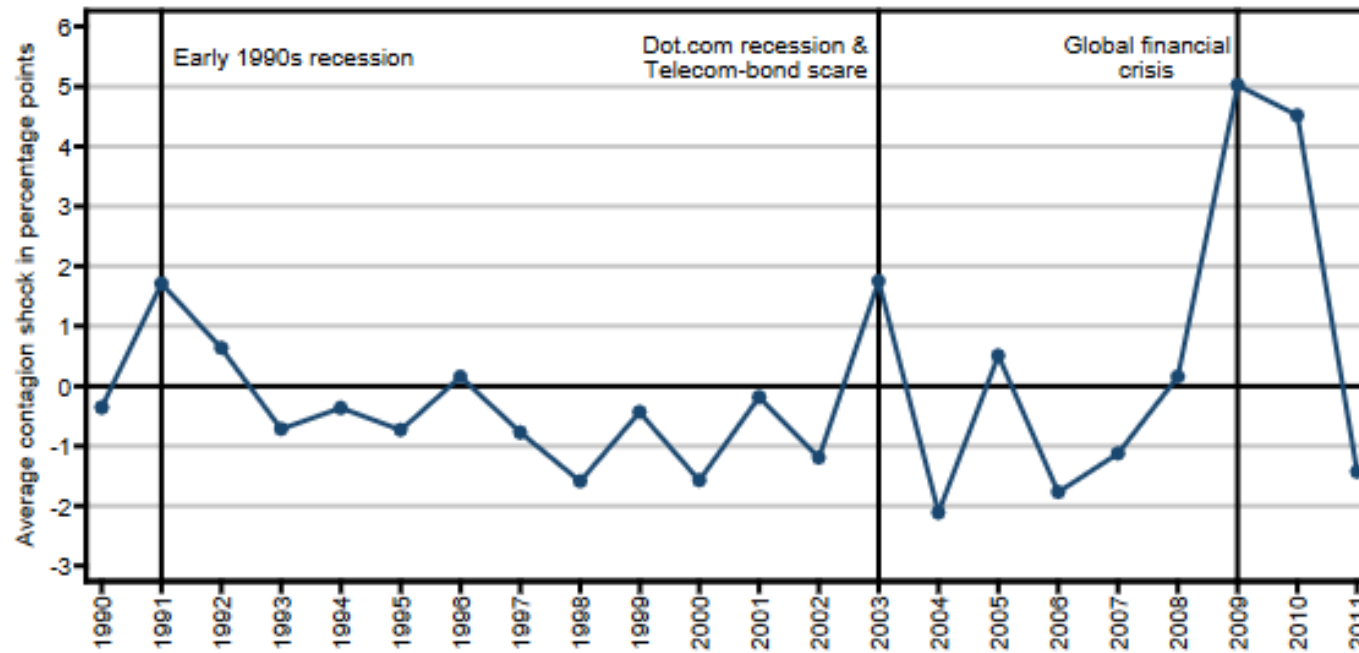
# CONTAGION

- A contagion is the spread of an economic crisis from one market or region to another and can occur at both a domestic or international level.
- Contagion can occur because many of the same goods and services, especially labor and capital goods, can be used across many different markets and because virtually all markets are connected through monetary and financial systems.
- One factor that made the recent financial crisis so deep and widespread is the extent and nature of international banking integration, which led to unprecedented transmission of financial instability.
- Financial contagion through international banking occurs e.g. when banks in a given country respond to deteriorations in their balance sheet by reducing cross-border loans, including vis-à-vis clients in countries that are not directly exposed to the initial financial shock.
- Initial deteriorations in a bank's balance sheet can result from an adverse shock to its home country's economy, but also from a deterioration in the quality of its loans vis-à-vis third party debtor countries. This implies that countries may suffer from shocks to countries with which they have no direct economic or financial connection

# CONTAGION

- During the recent crisis, several Central and Eastern European countries that were particularly exposed to Western European banks saw their financial conditions deteriorate as the latter sought to repatriate loans to these countries in reaction to losses incurred on their asset portfolio in other countries.
- International financial integration is commonly seen as increasing economic efficiency and growth, but it may also increase countries' vulnerability to contagion. Not surprisingly, the more banks lend to each other through cross-border loans, the higher the risk of contagion. Larger roll-over risk due to shorter maturities of cross-border bank debt further increases vulnerability.
- Countries with better capitalized banking systems that finance credit to a larger degree by deposits have been less vulnerable to contagion.
- Inflow controls on credit operations can help mitigate bank-driven financial contagion, possibly by restraining cross-border bank debt or by lengthening its maturity.
- Vulnerability to contagion has been lower in situations of abundant global liquidity, underlining the importance of major central banks ensuring strong international liquidity at times of financial turmoil.

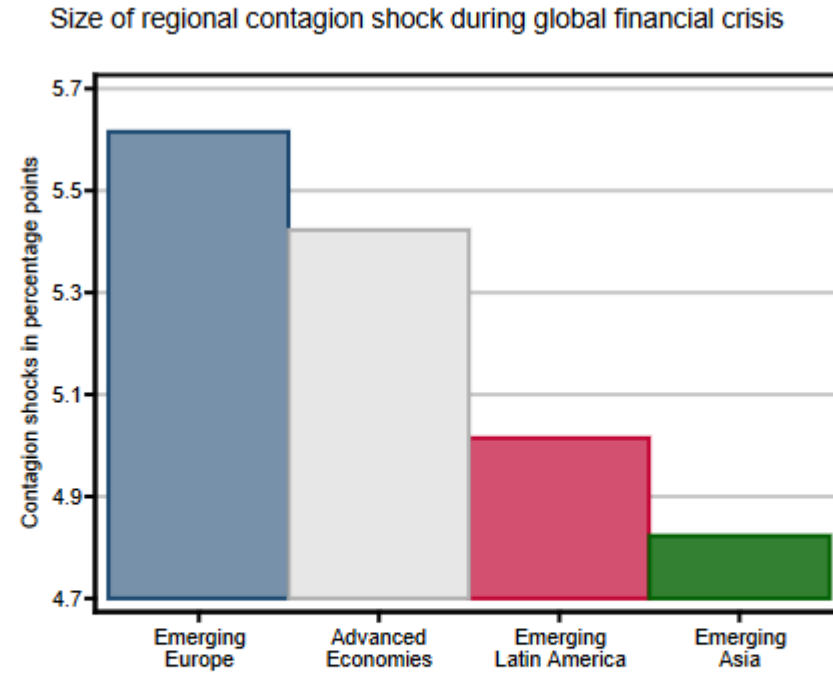
# CONTAGION



*Note: The average contagion shock is measured as the unweighted average of countries' contagion shocks. Each country's contagion shock is calculated as the aggregated sovereign rating downgrade of its creditors.*

*Source: Ahrend and Goujard, 2011.*

# CONTAGION



Note: Each bar represents the contagion shock a region has been subjected to, calculated as the aggregated sovereign rating downgrade of its creditors. The percentage point increases in the size of the contagion shocks shown on the y-axis correspond to equivalent percentage point downgrades in sovereign ratings which are coded on a scale from 0 to 100. See Ahrend and Goujard (2011) for further details.

Source: OECD calculations based on Ahrend and Goujard, 2011.

# SHADOW BANKS

- If it looks like a duck, quacks like a duck, and acts like a duck, then it is a duck—or so the saying goes. But what about an institution that looks like a bank and acts like a bank? Often it is not a bank—it is a shadow bank.
- Shadow banking, as usually defined, comprises a diverse set of institutions and markets that, collectively, carry out traditional banking functions—but do so outside, or in ways only loosely linked to, the traditional system of regulated depository institutions. Examples of important components of the shadow banking system include securitization vehicles, asset-backed commercial paper [ABCP] conduits, money market funds, markets for repurchase agreements, investment banks, and mortgage companies



# SHADOW BANKS

- A shadow banking system is the group of financial intermediaries facilitating the creation of credit across the global financial system but whose members are not subject to regulatory oversight.
- The shadow banking system also refers to unregulated activities by regulated institutions. Examples of intermediaries not subject to regulation include hedge funds, unlisted derivatives, and other unlisted instruments, while examples of unregulated activities by regulated institutions include credit default swaps.

# SHADOW BANKS

- The shadow banking system consists of lenders, brokers, and other credit intermediaries who fall outside the realm of traditional regulated banking.
- It is generally unregulated and not subject to the same kinds of risk, liquidity, and capital restrictions as traditional banks are.
- The shadow banking system played a major role in the expansion of housing credit in the run up to the 2008 financial crisis, but has grown in size and largely escaped government oversight even since then.

# SHADOW BANKS

- The shadow banking system has escaped regulation primarily because unlike traditional banks and credit unions, these institutions do not accept traditional deposits.
- Shadow banking institutions arose as innovators in financial markets who were able to finance lending for real estate and other purposes but who did not face the normal regulatory oversight and rules regarding capital reserves and liquidity that are required of traditional lenders in order to help prevent bank failures, runs on banks, and financial crises.
- As a result, many of the institutions and instruments have been able to pursue higher market, credit, and liquidity risks in their lending and do not have capital requirements commensurate with those risks.

# SHADOW BANKS

- Shadow banking is a blanket term to describe financial activities that take place among non-bank financial institutions outside the scope of federal regulators. These include investment banks, mortgage lenders, money market funds, insurance companies, hedge funds, private equity funds and payday lenders, all of which are a significant and growing source of credit in the economy.

# WHO IS WATCHING THE SHADOW BANKS?

- The shadow banking industry plays a critical role in meeting rising credit demand in the United States. Although it's been argued that shadow banking's disintermediation can increase economic efficiency, its operation outside of traditional banking regulations raises concerns over the systemic risk it may pose to the financial system.
- The reforms enacted through the 2010 Dodd-Frank Wall Street Reform and Consumer Protection Act focused primarily on the banking industry, leaving the shadow banking sector largely intact.
- While the Act imposed greater liability on financial companies selling exotic financial products, most of the non-banking activities are still unregulated.
- The Federal Reserve Board has proposed that non-banks, such as broker-dealers, operate under similar margin requirements as banks. Meanwhile, outside of the United States, China began issuing directives in 2017 directly targeting risky financial practices such as excessive borrowing and speculation in equities.

# FINANCIAL CONTAGION DURING COVID-19 CRISIS

AKHTARUZZAMAN, BOUBAKER AND SENSOY (2021)

FINANCE RESEARCH LETTERS



## Financial contagion during COVID-19 crisis

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# INTRODUCTION

- The outbreak of COVID–19 has shaken the global financial markets. Level 1 market-wide circuit-breakers based on drops of 7% from the previous close were triggered four times on 9, 12, 16 and 18 March 2020 in the US stock market to prevent larger crashes.
- This mechanism has been triggered only once in 1997 since its implementation in 1988. Dow Jones Industrial Average (DJIA) and S&P500 indices dropped by 33% and 29%, respectively on March 20, 2020 from December 31, 2019.
- The International Monetary Fund (IMF) estimated that government stimulus packages adopted during the COVID–19 pandemic amounted to USD3.3 trillion, and that additional loans, equity injections and guarantees amounted to USD4.5 trillion. The Federal Reserve has taken exceptional steps to address the economic and announced a zero-percent interest rate policy on March 15, 2020 and declared a USD700 billion Quantitative Easing (QE) program. effects of COVID–19.
- The paper examines the effects of COVID–19 on financial firms compared to nonfinancial firms, financial contagion originated by them, and its implications on the portfolio design

# MAIN RESULTS

- Dynamic conditional correlations (DCCs) between Chinese and G7 stock returns, financial and nonfinancial alike, increased significantly during the COVID–19 period.
- However, the magnitude of the increase in DCCs is higher for financial firms, implying that they play a more important role in transmitting financial contagion than nonfinancial firms do.
- During the outbreak, China and Japan appear to be net transmitters of spillovers, suggesting that financial contagion follows a similar pattern to that of the virus contagion



# TECHNICAL DETAILS

Model returns and covariances

*VARMA (1,1) DCC-GARCH model*

$$r_t = a + \phi r_{t-1} + \omega \epsilon_{t-1} + \epsilon_t$$

Return  
autocorrelation

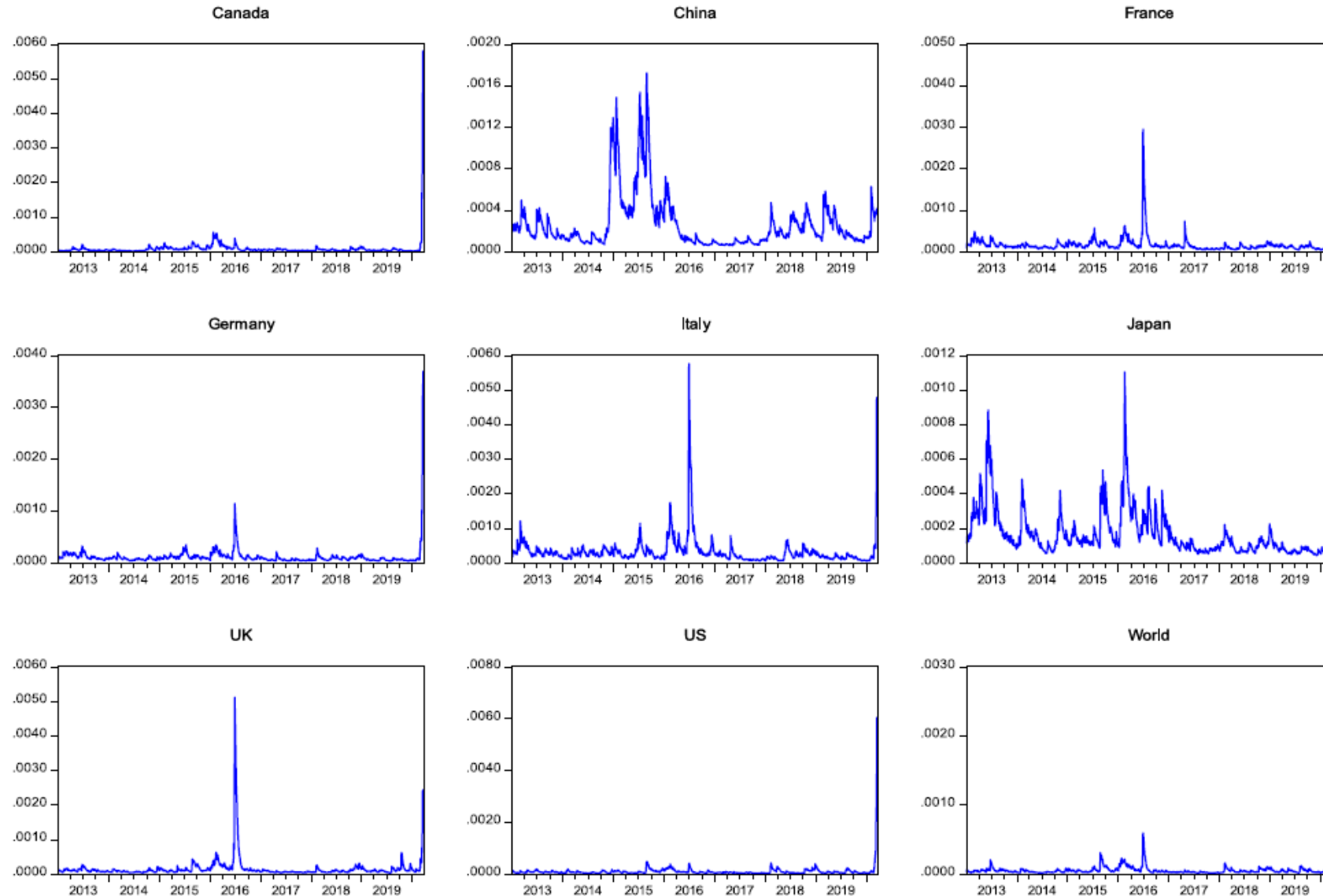
$$\epsilon_t = H_t^{\frac{1}{2}} \eta_t$$

Time varying cross-  
sectional  
correlations

Estimate the model using time-series data on G7 and China Stock Indexes

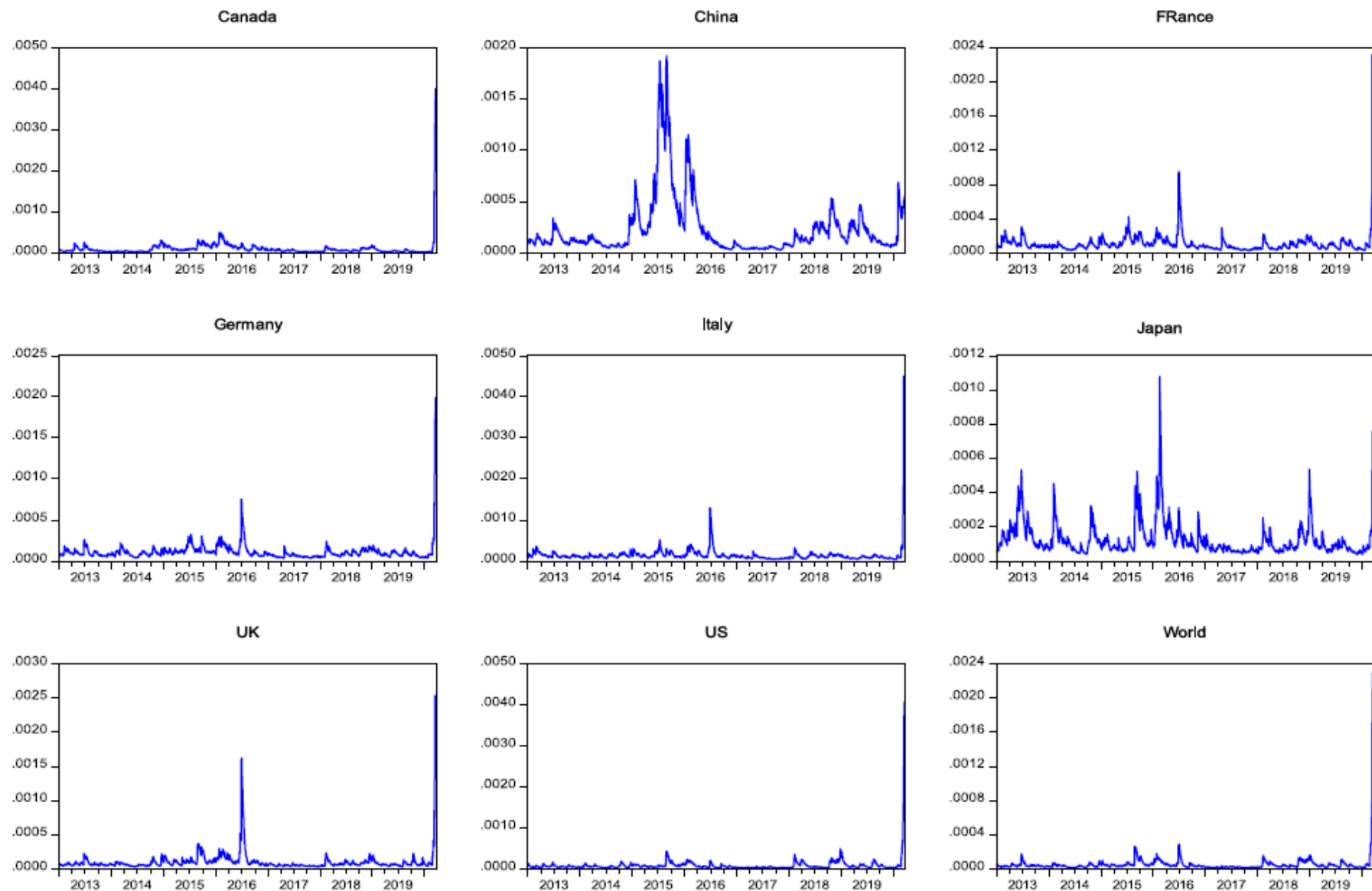
# RETURN VOLATILITY

## Panel A: Financial firms



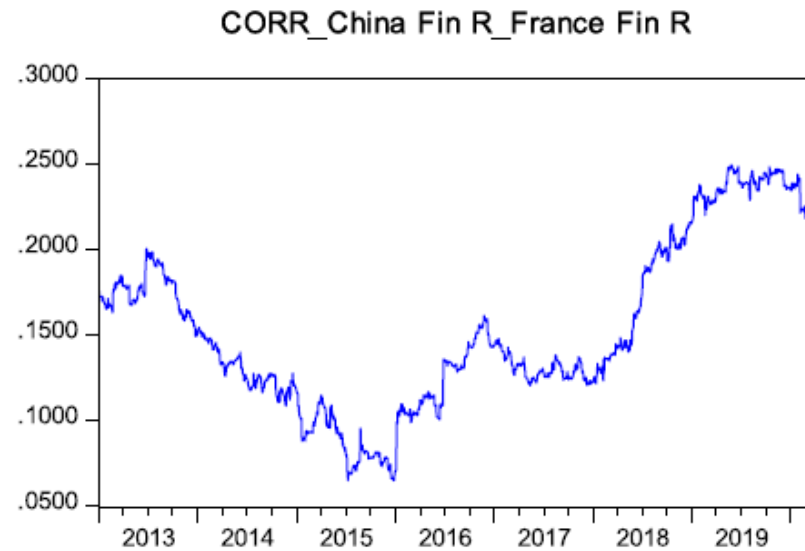
# RETURN VOLATILITY

## Panel B: Nonfinancial firms



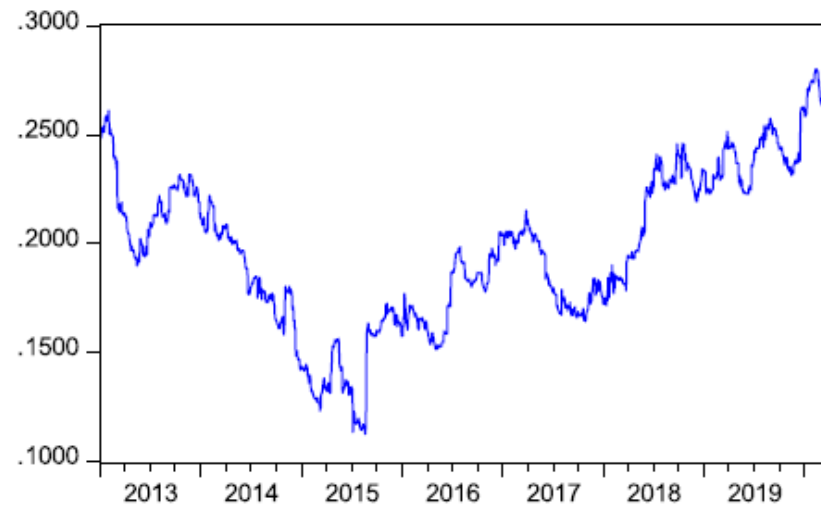
# RETURN CORRELATIONS = FINANCIAL FIRMS

**Panel A: Between financial firms**

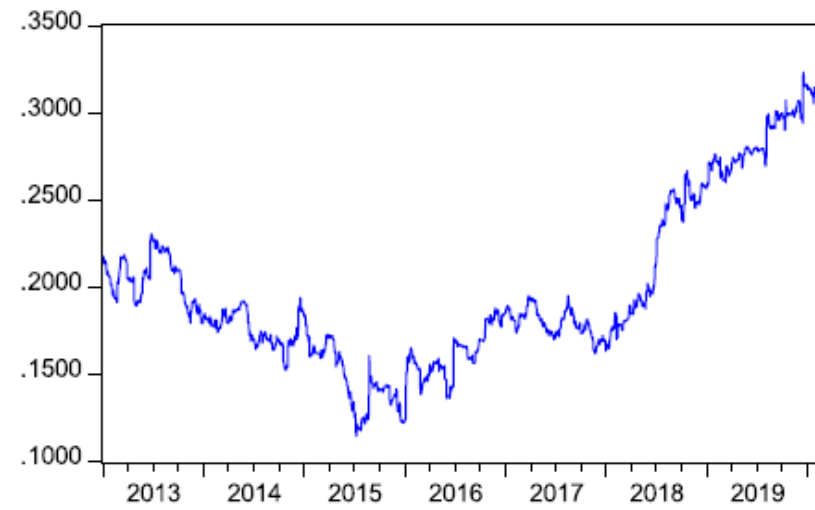


# RETURN CORRELATIONS- FINANCIAL FIRMS

CORR\_China Fin R\_Japan Fin R



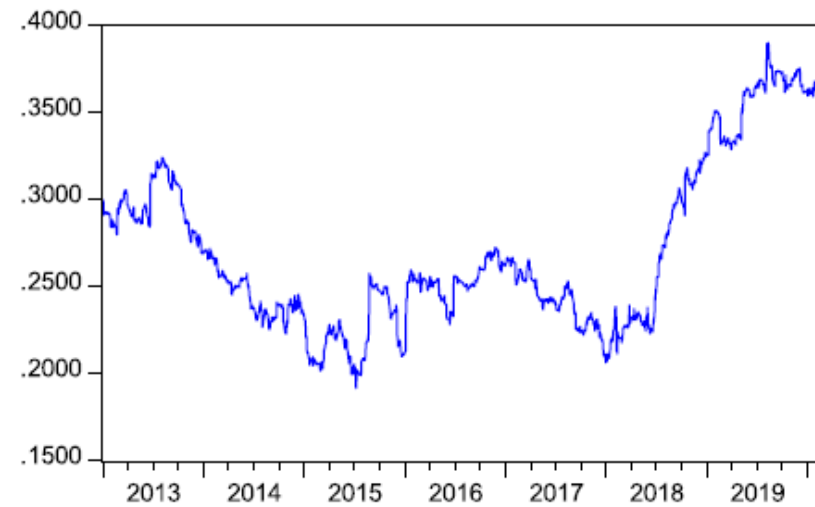
CORR\_China Fin R\_UK Fin R



CORR\_China Fin R\_US Fin R

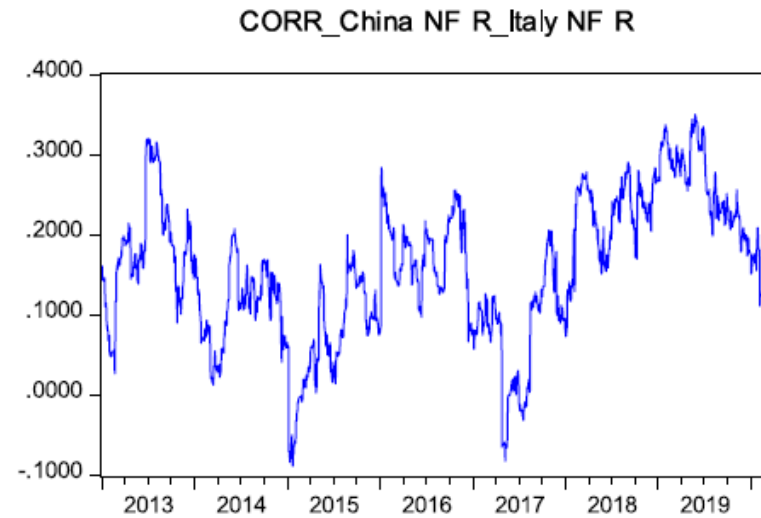
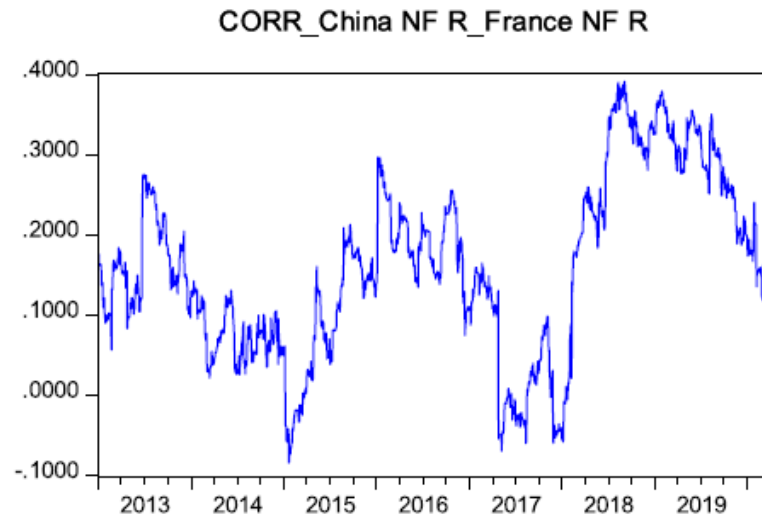
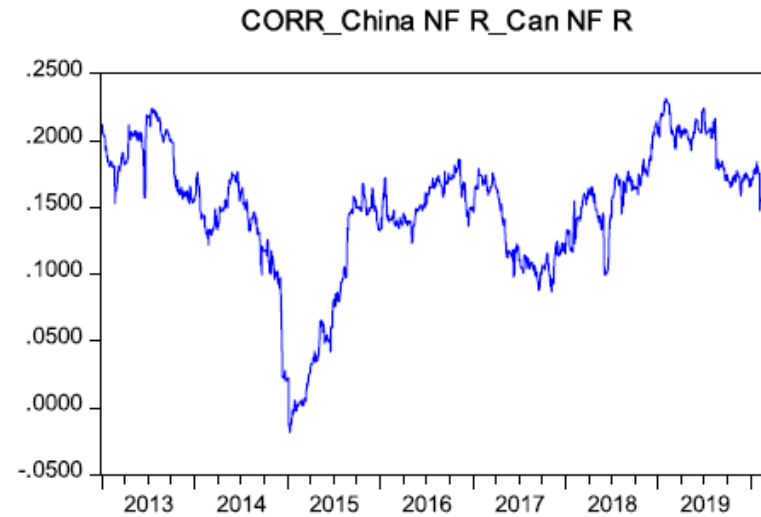
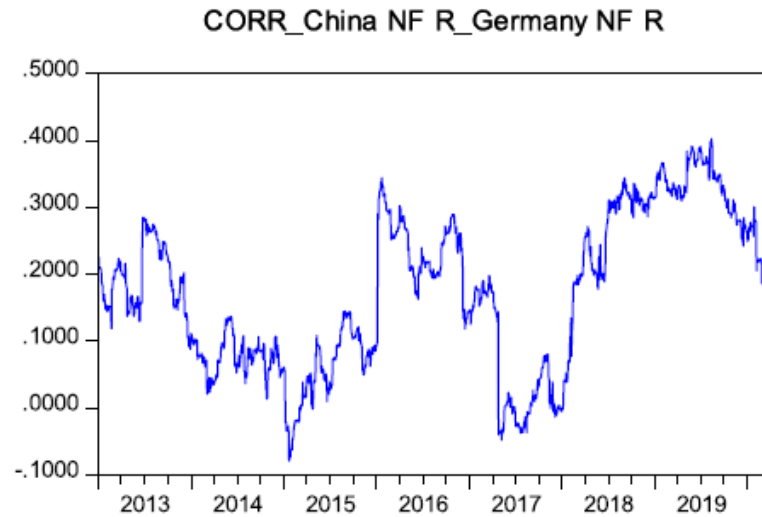


CORR\_China Fin R\_WORLD Fin R



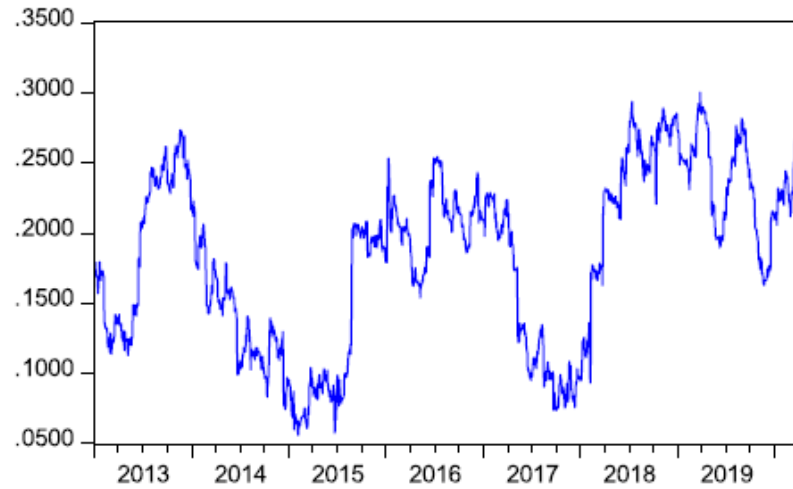
# RETURN CORRELATION – NONFINANCIAL FIRMS

**Panel B: Between nonfinancial firms**



# RETURN CORRELATION – NONFINANCIAL FIRMS

CORR\_China NF R\_Japan NF R



CORR\_China NF R\_UK NF R



CORR\_China NF R\_US NF R



CORR\_China NF R\_WORLD NF R

