Financial Contagion of Chinese Financial Market to the Developed and Developing Countries During the Corona Virus Disease 2019 (COVID-19) Epidemic

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Abstract. Financial contagion is market disturbance from one country to another. The paper focuses on financial contagion from China to the developed and developing countries. More specifically, this paper selects US and UK as cases of developed countries, and Brazil and Thailand for developing countries. Spillover rate, correlation figure, capital returns, price of stock and index of whole market were considered in the analysis of financial contagion phenomena. The magnitude of financial contagion impacts from Chinese financial market to different countries were summarized based on analysing articles on the topic of financial contagion during the COVID-19 pandemic period. Generally speaking, the figure provides precise explanation for magnitude of contagion effects, help countries evaluate risk level from Chinese market in pandemic. For investor side, this essay could provide how capital returns are affected by contagion effects.

Keywords: Contagion effect · Financial market · COVID-19 · China · Developed country · Developing country

1 Introduction

Financial contagion means distress spread from nations, markets, firms, districts to other entities (Corsetti et al. 2011). This phenomenon imply for disorder, dislocation and deformation economically (Corsetti et al. 2011). But anyway, Mardi claimed there's no general consensus or optimal definition for financial contagion. Financial contagion can be divided into four types, media attention, financial contagion, situation of macro economy and catalyst of contagion (Corbet et al. 2020). Unlike other concepts with a long history, Claessens found that contagion effect first proposed in 1997. But Bordo reported that contagion effect was also happened in 1825 financial crisis between UK and Latin American. Contagion effects seem more obviously and frequently in financial market (Chinn and Ito 2011), so this paper is mainly emphasis the contagion effect in different countries' financial markets.

In the data reference of the article, Mardi found two points were wildly recognized: first, magnitude of contagious crisis was connected with changes in conditional volatility of market return. Second, excess returns for different countries after fundamental

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controlled were identical with financial market contagion. The objective of this paper is to categorize and summarize contagion effects from China to both of the developed and developing countries in Corona virus pandemic. Moreover, the paper compares spillover rate, correlation coefficient, capital returns, prices of stock and examines magnitude of inflation status. In general, data provides evidence of financial contagion from Chinese market. The strength of financial contagion and the relationship between financial markets among countries can be shown based on the comparison of data before and after the epidemic.

This paper reveals correlation from Chinese to other counties increase during COVID-19. For developed countries, they were similarly infected. But for developing countries, Latin American suffers higher contagion effect from Chinese market compare with developing countries in Asia and Africa. Developing countries which have compact trade with China tend to bear higher risk. But on the other hand, spillover from Chinese financial market is relative weak and government amends financial market on time, so it will not directly cause financial disaster to other countries.

The paper contributes literature from three aspects. First, it focuses on contagion effects to developed countries. It helps to clarify shock to their financial market in epidemic. Second, clarify contagion effects to developing countries, analyse geographical significance. Third, paper analyse special characteristic of developed or developing countries which lead them bear higher risk level.

Remainder of this paper consists of two sections: Sect. 2 reviews contagion effects for developed and developing countries in Corona Virus Pandemic. Section 3 provides conclusion.

2 Literature Review

Financial contagion is the spread of disturbance between financial markets from different countries. Compared with non-financial markets, financial markets have more compact connect in corona virus pandemic (Akhtaruzzaman et al. 2021). Daily trading volume, stock price or correlation between markets can help reveal effects of collapse or fluctuation for one financial market on another financial market. Based on former studies, this paper illustrates the specific correlation induced by financial contagion to separate markets, which would help better comprehend impacts of financial contagion in different countries during COVID-2019 Pandemic.

2.1 The Financial Contagion of Financial Market Decline Crisis from China to the Developed Countries

The first sufferer of Corona Virus in China is diagnosed on 17 November 2019 which is record in unpublished government corpus. The first case recorded in World Health Organization appeared on 31 December in 2019 (Corbet et al. 2021), first cross border infection adventured on 13 January 2019 (Corbet et al. 2021). As COVID-19 got worse in Wuhan, Chinese stock market experienced twice significant drops, first in mid-January and second in March of the 2019, compared with one decline in United states and German (in March) (Corbet et al. 2021), Chinese financial market suffered earlier break compare

with US and Germany (Gunay 2020). By the shock of Chinese market, all financial markets of G7 countries suffered series loss on return simultaneously; correlation-ship for G7 countries and Chinese financial market also becomes closer with phenomenon of financial contagion from China (Akhtaruzzaman et al. 2021). The Correlation coefficient illustrates huge negative correlation between number of patients who are infected by COVID-19 and stock market return (Ashraf 2020), this means substantial foreign investors from developed countries suffer from loss.

For firm side, Chinese financial firms are continuous transmit spillover to G7 countries (Akhtaruzzaman et al. 2021). The origin of financial contagion in Chinese market is information exchange at the trend of globalization, which in both trade and financial aspects (Yarovaya et al. 2020), and financial contagion can independently impact economy no needs of financial crisis (Banerjee 2021). From module of spillover index, which first achieve highest point in early February 2020, financial market shock because support of nation-wide policy to combat with rapidly pace of spread. This figure then inhabit in mid and end of February (Corbet et al. 2021). Because Chinese government decide to amend the extra risks for financial market in Shanghai and Shenzhen (Corbet et al. 2021) meanly from 3 objectives, which are sustain operation, support working and save markets (Gunay 2020). These policies have curbed some China's stock market crisis, tending to decrease level of contagion effects (Contessi and Pace 2021). From analysis of spillover rate, short-run net market spillover Index performs that Chinese market's coefficient drop from −0.088 to −2.46 (Liu et al. 2022). Medium-term net market spillover index descend 1.2 (Liu et al. 2022). Long-run net market spillover index shrink from −0.134 to −0.675 during COVID-19 pandemic (Liu et al. 2022). The contagion in Chinese financial market will not unduly affect the developed countries market during COVID-19 Pandemic (Sansa 2020). However, it still output instability and contagion effects to US, Germany, Singapore, Australia, Canada, Italy, Spain and several developed countries at beginning of COVID-19 (Banerjee 2021; Zorgati and Garfatta 2021; Fu et al. 2021). Following cases introduce contagion effects for USA and UK respectively.

2.1.1 The USA

At the time of virus advent, The Dow Jones Industrial Average (DJIA) and the Standard and Poor's 500 Index (S&P 500) in US stock market experienced an unprecedented one-day drop ever since 1987 (Sansa 2020). And along with subtleties increase, correlation between Chinese market and West Texas Intermediate (US) arose from +0.091 to +0.485 (Corbet et al. 2020). According to another research, America firm STZ (Constellation) does not have any obvious correlation with Chinese financial market before COVID-19 (Contessi and Pace 2021). But during pandemic, after ease international influence, dynamic correlation figure from STZ to Shanghai and Shenzhen ascend significantly (Contessi and Pace 2021). The stock prices of internationally oriented firms which involve with Chinese market devaluation in great extend compare with other firms in United States (Yarovaya et al. 2020). And over all, literature show there's huge positive correlation between China and USA financial market in March 1st to March 25th (Sansa 2020), the correlation index increase around 0.166 (Chevallier 2020), this means financial contagion from China is more significant in COVID-19 pandemic than usual. Reasons of

contagion effects from Chinese market to US can divide to three parts: balance sheet of person and institute, cross-sectors loans between different economic sectors in financial market, cross-boarder debts which related with current account (Chevallier 2020). After the time government adjust market environment and ease the market panic, the optimum weight of US financial sector's portfolio for Chinese financial market increase around 0.12 during COVID-19 period (Akhtaruzzaman et al. 2021). Not only intrinsic reason for Chinese market, but also accompany with externality. From statistics of WTO, people who infect COVID-19 in US leap to over 67 million, empirical result illustrate a diminishing tendency of financial contagion according to this circumstance (Fu et al. 2021). On the other hand, US suffer special contagion effect from China (Banerjee 2021). The magnitude of Z-statistic between US and China is 2.83, which is greater than standard volume 2.33 for 1% significance levels (Zorgati and Garfatta 2021). It illustrates diversify of investment portfolio may unnecessary for stock to get rid of significant decline (Zorgati and Garfatta 2021).

2.1.2 The UK

UK also suffers specific extend financial contagion in COVID-19 pandemic, market instability in Britain, France, Germany, Italy, Spain, Sweden and Switzerland reached its peak on March 12th (Contessi and Pace 2021). From the analyse of dynamic correlation test, UK, US and France suffer similar quantity of contagion, and the magnitude is obviously lower than developing countries such as Brazil before COVID-19 pandemic (Banerjee 2021). This may because connection of stock market between UK and China are lower than UK and Italy, UK and Germany before crisis occur. But during virus outbreak, correlation between UK and China ascend 0.211, this magnitude is exceed correlation vary between US and China (Fu et al. 2021). This means the phenomenon of financial contagion to UK upgrade during COVID-19 pandemic. But in general, UK suffers more serious financial contagion from US stock market than Chinese in both pandemic and non-pandemic era (Nguyen et al. 2021). In the descriptive statistics analysis for stock market index, the FTSE (UK) is 7151 (Banerjee 2021). This figure is lower than S&P 500 (US). Moreover, volatility of stock index for UK does not really change during pandemic, it has great consistence and can take reference for prediction (Nguyen et al. 2021).

2.2 The Financial Contagion of Financial Market Decline Crisis from China to the Developing Countries

To discuss contagion effects on developing countries, the VAR module react emerging economy like Brazil market may also suffer similar financial contagion like developed economy (Banerjee 2021). Countries like South Korea, India, Russia, Brazil, Thailand are impacted from China financial contagion (Zorgati and Garfatta 2021). For Asian countries, China contagion effect are more straightly and directly, compared with US and Eurozone (Chantathaweewat 2014). Another research demonstrated that developing countries likely have less faculty and utility on ease spillover and contagion effects, they usually afford more strain on dealing with this issue (Gunay and Can 2022). From geographical position for developing countries, financial contagion is more harmful

in Latin American than Asia, data demonstrate that Brazil indicated around 29.85% (Fu et al. 2021). For Asia developing countries, South Korea suffers higher contagion effects than Indonesia, Malaysia and India (Benkraiem et al. 2022). Similarly, developing countries with higher infected people tend to face stronger financial contagion, because there's more acute sense of panic in financial market (Fu et al. 2021). Thorough analyse of cokurtosis or covolatility figure, it shown China had significant contagion effect which affected most developing countries (Fu et al. 2021). Taking Russia as a special case, it suffers low contagion effects (Fu et al. 2021). This might due to depreciation of rouble by 11% and descend of international oil price (World Bank 2020).

2.2.1 Brazil

Brazil is a member of BRICS and has relative close trade with China, BRICS tends to have advanced contagion and integration levels (Matos et al. 2015); empirical result reveals that there's high spillover volatility from Chinese market (Banerjee 2021). From dynamic correlation coefficient to Chinese financial market, Brazil soar 0.24 during pandemic, which still relative high compare with other developing countries (Banerjee 2021). Another article contribute separate reasons, which is Brazil has long distance with China, so there's a special connect out of vigilance and alarming (Zorgati and Garfatta 2021). From module of unadjusted correlation, empirical result show Brazil is infected by contagion effects, but another adjust correlation module perform Brazil do not really infect (Zorgati and Garfatta 2021). For cokurtosis contagion test, Brazil's index is 55.87 and 3.44 respectively; this shift is sharper than in most developed countries (Fu et al. 2021). Not only contagion test, EGARCH model also proofed existence of serious contagion effect from China (Fu et al. 2021). Another intensity contagion test provide similar result, Brazil's contagion figure due to China increase 0.1688, which is higher than Latin American developing countries such Mexico and Argentina (Benkraiem et al. 2022). For special contagion test for China and Brazil, Z-statistic of Brazil is 1.7, which is over 1.65 (Zorgati and Garfatta 2021). This means Brazil is infected by special contagion from China.

2.2.2 Thailand

Thailand's market instability peaked on February 26, one month later than the Chinese market, but there was already mildly collapse in February 24 (Contessi and Pace 2021).The major stock market index in Thailand (SET100) was experienced reduction around 21.1% during March 6 to April 2 (Contessi and Pace 2021). For SET Due to dynamic correlation module, mean value and variance fluctuate moderately (Banerjee 2021). The dynamic correlation figure between China and Thailand is 0.3938 before and 0.3912 after COVID-19pandemic (Banerjee 2021). This figure is lower than change of correlation between China and Brazil (0.1614 and 0.3967 respectively) (Banerjee 2021). But for another analysis, there are frequent financial contagion jumps to Thailand from Chinese market, but Chinese market does not contribute highest jumps. Moreover, this connection is more forceful during COVID-19 pandemic (Matos et al. 2015).

2.3 The Summary of Contagion Effect to Developed and Developing Countries During COVID-19 Pandemic

COVID-19 was first out broke in end of 2019, and then spread rapidly all over the world. First paper emphasis analyses for developed countries. Due to virus out broke in Wuhan, China financial market was shocked relative earlier, which led foreign investors suffered a certain degree of losses. Fortunately, however, the spillover index in the Chinese market was low, so impact was limited. For contagion effect to US, the correlation figure between Chinese market and some enterprises promoted. US also suffered special contagion from Chinese market. Another case is UK, dynamic analysis for UK was similar with US and France. Connection between UK financial market and Chinese financial market was relative weakness before COVID-19.

In the study of developing countries, China's financial contagion to ASEAN countries was more serious than that from Europe and the United States. Financial contagion effects seem more obvious in Latin America rather than Asia and Africa. Russia played a special role which is not really infected by contagion effect. In the case of Brazil, which has close trade with China, this makes it suffer more significant contagion effects from China. For Thailand, the percentage increase of correlation for Thailand in COVID-19 is lower than Brazil's, but it still suffers few jumps from China.

3 Conclusion

On this basis, we use 3 figures to judge the contagion effects to developed and developing countries from Chinese financial market in COVID-19. The findings of this study can be understood as both developed and developing countries were impacted by contagion effects in specific extend. Our data indicated that countries had closed-trade with China were easily jumped by contagion effects. During COVID-19 pandemic, correlation between market from US, UK, Brazil and Thailand to China were ascend simultaneously. Among them, Brazil's correlation figure increases most significant, while America seems suffer lowest assimilate in financial market. Not only correlation figure, stock market's return rate also becomes closer for China and developed and developing countries (such as US). But anyway, spillover rate for different time period in Chinese market are in reasonable range, this characteristic might mitigate the spread of financial contagion in COVID-19 pandemic. Globalization tendency might deteriorate in future because of COVID-19, which led epidemic become vital turning point for analyse. By corpus for few countries, express the impact from Chinese financial market to developing and developed countries, respectively.

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