Evidence of effective financial crisis management from South Korea: An example for other regions

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ABSTRACT

Evidence from the global financial crisis (2007–2008) and the Asian financial crisis (1997) have taught policymakers valuable lessons. The contagious effects of these crises have proven unavoidable and have led to negative economic development. However, South Korea, unlike other countries, has recovered remarkably from both episodes of financial turmoil and proved their ability to maintain positive growth throughout the two periods. This study investigates the correlation between the evolution of South Korean banking and corporate sector before, during and after these crises. A VAR model was employed to test the effectiveness of the South Korean government’s policies, in response to the financial crisis from 1997 to 2017, using macroeconomic variables as proxies for newly introduced policies, and non-performing loans for controlled risks. The empirical results indicate impulse response functions which suggest that changes in macroeconomic variables as a representation for the policies resulted in a reduction of non-performing loans. This implies successful risk reduction and an overall economic recovery.

KEYWORDS

financial crisis, South Korea banking sector

JEL CODES

E44, E52, G01

1. INTRODUCTION

In 1960, South Korea was amongst the world’s poorest countries with a GDP per capita of US $158. By the 1990s however, they had reached a GDP per capita of $6,516; and in 2018,
according to the World Bank, it was as high as $31,362. Despite some economic indicators in the pre-financial crisis periods, there were no early signs of the crisis hitting South Korea in 1997. As a result, when the Korean government formally announced the crisis and requested an emergency standby loan from the International Monetary Fund (IMF), the public was shocked.

The key interpretations of the financial crisis in the case of South Korea can be categorised into three main factors: currency, foreign currency debts and liquidity crises. A currency crisis can be defined as a significant change in the exchange rate, followed by inflation. The threshold for these changes is a sharp depreciation of at least 25%, cumulative over 12 months, and at least 10% points greater than in the preceding 12 months (Claessens and Kose 2013). Other assets-based stress indicators are developed by Berlinger et al. (2016) and Domotor andVARAD (2019).

Sharma (2018), in a case study, argues that the sharp fall in the value of the Korean Won in the fourth quarter of 1997 during the Asian financial crisis (AFC) marks the beginning of the currency crisis. Faced with a currency crisis, foreign banks recalled claims on Korean banks, pressuring them to purchase US dollars in order to meet debt repayments. As a result, the central bank resorted to using their foreign reserves, causing a depletion of the national reserves from $30 billion to less than $15 billion in November 1997. This led the country from a currency crisis to a liquidity crisis. Moreover, the global financial crisis (GFC) revisited South Korea in 2007, yet they managed to maintain positive growth.

Although both financial crises had unexpectedly hit other emerging Asian countries, South Korea successfully recovered. According to the World Bank’s indicators, South Korea had sustained a strong GDP growth performance of 11.31% in 1999 and 9.92% in 2000 in the post-Asian financial crisis period. It was a huge recovery since their GDP growth was $-5.47$% in 1998. Similarly, they continued to maintain a positive GDP growth during the global financial crisis at 2.83% in 2008, 0.71% in 2009 and a vastly improved 6.5% in 2010. The South Korean economy continues to maintain a positive GPD growth rate to date. As part of IMF-led policy reforms, Korea had successfully continued to attract foreign direct investment (FDI) in the face of plummeting currency devaluation. The government was able to take control of currency instability.

In this paper, we investigated questions such as how South Korea responded to the two crises; whether they can continue to remain insulated from the uncertainty and volatility; what lessons can be learnt from the experience; and what policy measures the government has introduced to insulate itself from global financial and currency markets. To answer these questions, the paper begins by providing an overview of the South Korean experiences during the AFC in 1997 and GFC in 2007, followed by a discussion where we examine the newly introduced policies as a response to the crises and the challenges concerning their implementation. This was done by applying measurements of the impulse responses to shocks, using a VAR model on pre- and post-financial crisis periods. The analysis is divided into two groups: the first one covers the post-AFC period from 1997 to 2007 and the second one is the post-GFC period from 2007 to 2017. The final part takes a long-term view and assesses the overall impacts of the crises.

Fisher (2003) argues that continual enhancement of the country’s legal framework is one of the factors which can help strengthen the economy, while Sharma (2018) found evidence that the financial recovery was partly due to the country’s economic resilience. The results of this paper are in line with these findings, as we found evidence that a prudent structure and governance are essential in stabilising the economy. The recovery process can be considered a success in the case of South Korea.
2. LITERATURE REVIEW

The literature review can be divided into three distinct categories: 1) studies that focused on causes of financial crises; 2) empirical research on financial contagion from the US market to the emerging markets during the GFC; and 3) empirical literature on the volatility of the banking sector that preceded the financial crisis.

Financial crises are recurring events in markets (Reinhart – Rogoff 2008; 2009; 2014), and the empirical literature extensively covers this topic (Allen – Gale 1998; 2000; Diamond – Dybvig 1983; Csóka – Herings 2018). The economy undergoes crises despite having gone through the same previously; the fact that crises reoccur reveals an underlying weakness in the financial system. Some of the recurring symptoms are higher leverage rates of financial intermediaries and asset price bubbles (Reinhart – Rogoff 2009). Naffa (2009) studies multifactor approaches in explaining asset pricing anomalies. Furthermore, Fain and Naffa (2019) show how active investment strategies fare during times of crises using pure factor portfolios.

Many researchers have studied the causality behind financial crises with varying approaches yielding varying results. For instance, Corsetti et al. (1998) examined the state of crisis in East Asia and argued that it was primarily triggered by the failure of a poorly regulated banking system and policy distortions. Another research, by Haussmann and Gavin (1996), asserted that aggregate shocks weaken the stability of financial institutions, leading to a crisis. However, they did not explain the causation of the examined banking crises; instead, they assumed that financial institutions become increasingly vulnerable when income, asset quality and liquidity are affected. Encompassing the broader phenomenon and leaning towards solutions, Ciro (2016), in his study on the causation and reforms of the GFC, investigated the triggers and evaluated the rescue packages, policy responses and supervisory frameworks that promote sustainable banking and modern financial systems for the future. Another study by Kovacs et al. (2011) examined the impact of the global financial crisis on the private pension funds in Hungary. They concluded that investments during the crisis are handicapped with limited benefits of diversification.

Bongini et al. (2001) and Rojas-Suarez (2001) conducted similar research. Their findings suggested that countries undergoing crises suffered a higher number of bank failures simply because they were affected by adverse aggregated shocks. Additionally, Bongini et al. (2001) also examined the determinants of distress in the financial system and the closure of financial institutions using the CAMELS system, a standard analytical tool to assess banks. Contrary to these, a different perspective was presented by Claessens and Kodres (2014) who believe that the new instruments created by the financial sector contributed to the crisis. They argued that these innovative products relied heavily on bullish macroeconomic assumptions, financial liberalisation and deregulation. Thus, this study provided evidence that the system repeatedly falls into the same cycle and does not learn from previous crises.

Weaknesses in the financial and corporate sectors are believed to have caused an increased vulnerability to external shocks in the economy (Johnson et al. 2000). They examined the relationship between corporate governance and the financial crisis, and argued that poor corporate governance was a major destabilising factor in South Korea’s case. One of the findings of Johnson et al. (2000) showed that imprudent governance had led to the fragility of the corporate sector and triggered the crisis. Other studies focused more on South Korea’s suggestion that internal capital markets of large South Korean corporate groups (‘chaebols’) helped
mitigate the negative effects of the AFC and that capital reallocation had facilitated the investment and performance in its aftermath (Almeida et al. 2015). Moreover, actors. Shin (2017) analysed the impact of the IMF-led financial and corporate sector restructuring programmes in South Korea following the AFC and outlined challenges faced by the government in crisis reforms. However, he found adequate evidence that the IMF-led restructuring programme was realised effectively despite strong public criticism.

The GFC had affected emerging economies and, as a result, gave rise to financial stress and instability in the banking sectors. The contagion escalated the negative developments in the global economy. The adverse effects underline the importance of identifying and assessing links between financial distress and real economic actors. Aloui et al. (2011) studied the financial contagion of the GFC; they investigated the financial interdependences of selected emerging markets. Their findings revealed a strong dependence between the US and selected emerging markets. Another study by Syllignakis and Kouretas (2011) applied a DCC-GARCH model to capture contagion effects among the US and seven emerging Central and Eastern European equity markets. They also found similar results for a significant spillover effect from the US equity market. Kenourgios and Padhi (2012) found that the GFC was contagious for both equity and bond markets in the emerging economies around the world. Similar results were recorded by Dooley and Hutchison (2009) as well as Dimitriou et al. (2013). Wang (2014) examined how interdependencies among the US and six major East Asian stock exchanges during the GFC evolved over time and found the interdependence strengthened during the crisis period. A study by Li and Giles (2015) discovered a robust transmission of unidirectional spillovers of the shock and volatility from the US market to both the Japanese market and emerging markets in Asia during two major crises in 1993 and 2012.

The second branch of the literature concerns the impact of the contagion. Hung (2019) examined the effect of Chinese stocks’ volatility spillover to stock markets of four Southeast Asian countries, Vietnam, Thailand, Singapore and Malaysia. Hung applied generalised VAR to examine the pre- and post-period of the 2008 GFC and found evidence that the Chinese equity market had significantly affected the Southeast Asian markets. To address the volatility clustering, he applied a bivariate GARCH-BEKK model. Saqip et al., 2019 adopted a similar methodology to examine the existence of cointegration between the US and emerging stock markets, including South Korea. They found an increased level of cointegration after the 2008 crisis and evidence that co-movements of markets increase during times of crises. Apostolakis (2016) also applied a VAR model to examine the level of financial stress and spillover effects during the financial crisis in five Asian countries, China, South Korea, Malaysia, Thailand and Philippines. They found that China is the dominant stress transmitter among the five countries, which corroborates the results of Hung (2019). Kovacs et al. (2011) discussed how investment decisions were formed during the GFC and performed a study of private pension fund investments.

Increasing globalisation, credit diversification and portfolio allocation of the financial sector could also result in higher volatility in the economy. Cevik et al. (2016) constructed a financial stress index to estimate the degree of financial stress in Asian countries for the period of 1995–2013. Their findings revealed that foreign exchange risk had led to a more volatile stock market and increased sovereign risks. Hence, financial stress had risen substantially. Batten and Szilagyi (2011) presented evidence that global banks significantly reduced their exposure to the Asia-Pacific region as a result of the AFC. Further research by Horvath and Vaško (2016) argued that
economic stability could have been promoted. The authors developed an index that assesses the degree of transparency of central banks on their policy frameworks to safeguard financial stability for 110 countries in 2000–2001. They argued that more transparent monetary policies tend to exhibit better financial stability.

There have been numerous studies on financial policy reforms following the crises. Given the argument that financial liberalisation without prudential regulation often causes financial instability or crises, Sharma’s (2018) carried out detailed case studies of the AFC in Thailand, Indonesia, South Korea and the People’s Republic of China (PRC). He revealed that the recovery process was partly due to the economic resilience of the economies—such as massive capital injections—and the existing industrial and manufacturing infrastructure ability to quickly recover export capacities, which helped restore investor confidence, overcome the withdrawal of FDI and improve foreign-exchange reserves. Another study, by Shin (2013), focused on financial crisis reform; it discussed the strengths and weaknesses of South Korea compared to other East Asian countries. Shin found that the challenges faced by South Korea during the 1990s were partly due to accelerated globalisation. The financial reforms focused too much on corporate reform, which subsequently led to further transition costs. However, Fisher (2003) presented different opinions. He argued that, based on lessons learnt from the IMF-led policy reforms, evidence suggested that a flexible exchange rate is crucial for emerging economies and their financial sectors. Lowering debt to GDP ratios and the continual enhancement of the country’s legal framework will help strengthen the economy as well.

Some research argues that financial crises are unavoidable and normal consequences of modern capitalism. Lo (2009) analysed regulatory reform in the wake of the financial crisis of 2007–2008. He claimed that we need greater transparency, improved systemic risk measures, more adaptive regulations and more emphasis on financial literacy for management. Allen et al (2012) examined the relationship between the structure of financial systems and financial crises using cross-sectional data over the period 1970–2009. They found that emerging markets have mainly bank-based financial systems, hence requiring more time to recover from economic downturns. He also argued that governments should emphasise a balanced financial structure, as it will help countries recover from financial crises more rapidly as compared to those who lack stable structures. A similar study by Gomes (2018) also found that structural reforms have positive short-run effects that reduce the size of a recession in the euro area. However, Thakor (2018) argued that the 2007–2009 crisis was due to insolvency risk and was not a liquidity crisis; his conclusions included steps that regulators can take to achieve financial stability. The two most important measures are to strengthen capital requirements to reduce solvency risk and to eliminate liquidity requirements, due to evidence that Basel III’s liquidity requirement was not useful in dealing with the root causes of financial stresses.

Although the topic of financial crises has been researched extensively, lessons learnt from previous experiences still remain relevant. This paper aims to contribute to the literature by focussing on South Korea. We aim to identify signs of financial shocks related to the AFC and GFC, both of which impacted South Korea. We aim to assess the newly introduced policies as a response to the crises and challenges concerning their implementation. We apply a measurement of the impulse response to shocks using a VAR model during both the pre- and post-financial crises periods. Our results can be useful in setting a benchmark for designing macroeconomic policies in the future. We have captured non-performing loans to measure the effectiveness of the policies that are put in place to contain the crises.
3. WHAT HAPPENED IN THE ASIAN FINANCIAL CRISIS?

South Korea enjoyed continuous economic growth between 1960 and 1997. It had achieved a well-educated population of 42 million in the 1990s. The economy was expanding at a rate of approximately 8% in 1996, with macroeconomic fundamentals looking sound (Ariff – Khalid, 2000). The data in Fig. 1 indicate overall positive trends of the macro data, despite the slight fluctuation in the international investment trend. The figure shows no apparent abnormalities in the economic indicators before the commencement of the two crises.

When crisis unexpectedly hit Southeast Asia, it was widely believed that the crisis would not spill over to South Korea since they had accumulated significant foreign reserves from trade surplus, experienced higher rates of domestic investment over the past 30 years and adopted an export-oriented development strategy. Sharma (2018) argued that the AFC had started when the Bank of Thailand devalued the Thai baht in July 1997. The Thai economy took a downturn and the contagion had spread to other countries by the end of August 1997. Hence, the currencies of Asian countries had all been substantially devalued (outlined in Table 1).

The AFC set off with the South Korean currency coming under pressure as the US exchange rate had risen from 870 won in the first quarter of 1997 to 1,100 won in the fourth quarter. Foreign banks recalled their claims on South Korean banks, forcing them to buy US dollars to pay their debts. The Central Bank needed to assist the local banks by selling dollars directly and depositing dollar reserves. As a result, foreign reserves depleted from US$30 billion to less than US$15 billion by November 1997. This led South Korea from a currency to a liquidity crisis. The country’s real GDP growth fell from 5% in 1997 to −5.8% in 1998. In the wake of the turmoil, the IMF granted a rescue package of $US57 billion to assist South Korea.

4. IMPLEMENTATION OF MONETARY POLICY, FINANCIAL AND CORPORATE SECTOR REFORMS AND CHALLENGES

The government worked with the IMF and the World Bank to introduce policy reforms and challenge the structural adjustment to address problems in the financial and corporate sectors for capital market development. The government moved towards expansionary policies by lowering interest rates and increasing the money supply (Fig. 1).

The additional root cause of the financial crisis has been claimed to originate from the banking sector itself. The South Korean financial system comprised three main types of institutions: commercial banks, specialised and development banks and non-bank financial institutions (NBIFs). The growing domination of NBIFs and the unbalanced regulations for banks and NBIFs provided much independence in the management of assets. According to the South Korea Banking Authority, NBIFs accounted for more than 50% of loans on the market, whereas the share of bank loans fell from 60% in 1980 to 27% in the 1990s. To stabilise the financial system and impose controlled regulations, the South Korean government formed an agency called Korea Asset Management Corporation to oversee the banking sector in 1999, whereby a total of 786 insolvent financial institutions were merged or closed down by 2003 (Table 2).

It was also argued that poor corporate governance was another major destabilising factor for the economy. SaKong and Koh (2010) claimed that because the conglomerate group of firms or chaebols was financially interdependent through cross-shareholdings and cross-loan guarantees,
the financial trouble of one chaebol could adversely affect the whole group, including the banking system. The average return on assets of a large corporation in South Korea (Table 3) shows instability which indirectly represents the performance of the private sectors and the overall investment environment, leading up to the crisis in 1997. The asset value of the 20 largest corporations began to drop below the breakeven point, and many of them became bankrupt. The corporate and financial sectors became highly exposed to liquidity risks due to large short-term foreign currency dominated borrowings, especially in USD. They also had mismatched

Note: the two dashed lines in each figure represent the AFC in 1997 and the GFC respectively.

**Figure 1. South Korea’s banking sector and GDP indicators in 1980–2015**

**Sources:** Bank of Korea, OECD, and World Bank
maturity terms. However, in South Korea, an increase in foreign equity participation in the financial sector had provided an additional source of inflows. Balance of payment surpluses allowed the crisis-hit countries to accumulate international reserves and the gradual appreciation of their currencies (Sharma 2018).

On the other hand, the IMF’s financial crisis reform programme was not an entirely smooth process. The government faced challenges of public criticism and negative attention from the local media. South Korean citizens did not perceive the IMF as a supporting partner, but as an invader who took control of the nation with strict restrictions on how the government should operate. Additionally, the domestic financial sector had a strong influence on the capital inflows because banks are the sole agents with access to short-term external credit required for the provision of over-the-counter foreign exchange contracts, where gains or losses are

Table 1. Official exchange rate in 1995–1998 (local currency unit per US dollar, period average)

| Country    | 1995   | 1996   | 1997   | 1998   |
|------------|--------|--------|--------|--------|
| Indonesia  | 2,248.61 | 2,342.30 | 2,909.38 | 10,013.62 |
| South Korea| 771.27  | 804.45 | 951.29 | 1,401.44 |
| Malaysia   | 2.50 | 2.52 | 2.81 | 3.92 |
| Philippines| 25.71 | 26.22 | 29.47 | 40.89 |
| Thailand   | 24.92 | 25.34 | 31.36 | 41.36 |

Source: World Bank.

Table 2. Restructuring of the banking sector (1997; 2003; 2016)

| Type of FIs           | Overall restructuring in (1997–2003) |
|-----------------------|--------------------------------------|
|                       | Licence revoked | Merger | Others | Sub-total | Ratio % | New | 2003 | 2016 |
| Bank                  | 33 | 5 | 10 | - | 15 | 45.5% | 1 | 19 | 17 |
| Merchant bank         | 30 | 22 | 6 | - | 28 | 93.3% | 1 | 3 | 1 |
| Bank securities       | 36 | 5 | 3 | 2 | 10 | 27.8% | 18 | 44 | 54 |
| Life insurance        | 50 | 8 | 6 | 2 | 16 | 32.0% | 13 | 47 | 25 |
| Investment trust business | 31 | 6 | 1 | - | 7 | 22.6% | 9 | 32 | 56 |
| Mutual savings        | 231 | 100 | 27 | 1 | 128 | 55.4% | 12 | 115 | 79 |
| Credit unions         | 1666 | 2 | 106 | 463 | 571 | 34.3% | 9 | 1,104 | 906 |
| Leasing               | 25 | 9 | 1 | 1 | 11 | 44.0% | 4 | 17 | 25 |
| Total                 | 2,102 | 157 | 160 | 469 | 786 | 67 | 1,381 | 1,163 |

Source: Adapted from SaKong and Koh (2010).
5. THE 2007 GLOBAL FINANCIAL CRISIS: THE SPILOVER EFFECT

The outbreak of the 2007 financial crisis affected many globalized economies, including South Korea. The contagion effect of the GFC revealed that South Korea was still vulnerable to the global funding environment, partly due to its significant levels of short-term external debt and FX derivatives operations (Fritz – Prates 2014). Similarly, when the foreign currency loan crisis occurred during the AFC in 1997, Korean banks and the locally established branches of foreign banks rapidly increased short-term foreign currency liabilities from 2005 to 2007. Subsequently, this reversed abruptly after the Lehman Brothers bankruptcy in September 2008 (Bruno – Shin 2014).

The sudden capital outflow caused a severe credit crunch, domestic banks in South Korea struggled to roll-over foreign debt, the won had radically weakened and exports, investment and GDP growth had dropped. As a result, the banking sector experienced an outflow of short-term liabilities, which largely accounted for the net decrease in South Korea’s foreign exchange reserves (Bruno – Shin 2014). During the GFC, the government continued to play an active role by providing guarantees on foreign borrowings, increasing export credit and offering emergency lending to help domestic banks and the local market. The Bank of Korea and the Federal Reserve System entered into a USD 30 billion-dollar swap agreement, which helped resolve the liquidity shortage. The government announced tax cuts and adopted an expansive fiscal policy. The capital injection was set-up within state-owned corporations to distribute policy loans to banks and non-bank financial institutions, since the financial sector continued to play a fundamental role in ensuring stability and facilitating funding to the corporate sector.

6. DATA AND MODEL

An increasing amount of literature on the global financial crises focuses on the relationship between the crisis and economic indicators (Hakkio and Keeton 2009; Cardarelli et al. 2009; Ciro 2016; Claessens – Kodres 2014). In the empirical tests, we apply the Vector autoregression

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Table 3. Return on assets of chaebols in South Korea

| Large corporation by asset size | 1993 | 1995 | 1997 |
|-------------------------------|------|------|------|
| Largest 5                    | 1.86 | 4.86 | 0.43 |
| Next largest 5               | 0.87 | 1.1  | -2.15|
| Next largest 20              | -0.4 | -0.08| -3   |

Source: Fair Trade Commissions, as cited in SaKong and Koh (2010).
(VAR) methodology, which has been widely used in applied research by Kaminsky and Reinhart (1999), Radelet and Sachs (1998), Demirurg-Cunt and Detragiache (1997, 1999, 2000), Cevik et al. (2016). The VAR method incorporates several measures simultaneously and deals with multicollinearity, it is a model used to capture the linear interdependencies among multiple time series variables, making it a useful tool for these measurements (also adopted by Apostolakis

**Table 4. Descriptive statistics**

| Post-Asian financial crisis | FDI_net inflow GDP | M2 | NPL_loans | Real_interest |
|----------------------------|--------------------|----|-----------|--------------|
| Mean                       | 1.274100           | 25219.57 | 3.945455 | 5.767498     |
| Median                     | 1.223577           | 24545.70 | 2.600000 | 4.515195     |
| Maximum                    | 2.049274           | 34451.10 | 8.900000 | 10.54862     |
| Minimum                    | 0.507453           | 13218.60 | 0.700000 | 2.748275     |
| Std. Dev.                  | 0.498348           | 7617.885 | 3.090749 | 2.771887     |
| Skewness                   | 0.143223           | −0.147914 | 0.536220 | 0.558996     |
| Kurtosis                   | 1.834892           | 1.753572 | 1.697964 | 1.907184     |
| Jarque–Bera                | 0.6500             | 0.7522 | 1.3042    | 1.120236     |
| Probability                | 0.4616             | 0.6865 | 0.5210    | 0.571142     |
| Sum                        | 14.01511           | 277415.3 | 43.40000 | 63.44248     |
| Sum Sq. Dev.               | 2.483503           | 5.80E +08 | 95.52727 | 76.83356     |

| Post-Global Financial Crisis | FDI_net inflow GDP | M2 | NPL_loans | Real_interest |
|------------------------------|--------------------|----|-----------|--------------|
| Mean                         | 0.847028           | 66719.39 | 0.565028 | 0.024773     |
| Median                       | 0.855460           | 60769.50 | 0.571915 | 0.025000     |
| Maximum                      | 1.170203           | 108912.5 | 0.700000 | 0.050000     |
| Minimum                      | 0.296804           | 31184.50 | 0.484156 | 0.012500     |
| Std. Dev.                    | 0.238054           | 28264.03 | 0.065196 | 0.010574     |
| Skewness                     | −0.893507          | 0.200934 | 0.504376 | 1.130661     |
| Kurtosis                     | 3.767951           | 1.562132 | 2.677817 | 3.970906     |
| Jarque–Bera                  | 1.733951           | 1.021607 | 0.513967 | 2.775774     |
| Probability                  | 0.420221           | 0.600013 | 0.773381 | 0.249602     |
| Sum                          | 9.317308           | 733913.3 | 6.215307 | 0.272500     |
| Sum Sq. Dev.                 | 0.566695           | 7.99E + 09 | 0.042505 | 0.001118     |

*Source: author.*
2016; Hung 2019; Kovacs et al. 2011). The VAR model is an ad hoc dynamic, multivariate model treating simultaneous sets of variables equally, and each endogenous variable is regressed on its lags and the lags of all other variables in a finite-order system, based on Sun et al. (2010) model. If all variables integrated with order 1 and if the co-integration relationships among them exist, the model can provide an appropriate estimation for variance decomposition and impulse response, such as in Johansen (1988), Juselius (2006) and Sun et al. (2010).

This study investigated how the correlation between the South Korean banking sector evolved before, during and after each crisis period. Evidence from the literature suggests that prudential regulation for the banking sector is a critical instrument for tackling the causes of external vulnerability and currency appreciation. Additionally, macroeconomic and banking system variables affected the financial crises. We employed a VAR model to test the effectiveness of the policy in response to the crisis or the non-performing loans for the period between 1997

| Table 5. Correlations matrix |
|-----------------------------|

| Covariance | FDI_net inflow GDP | M2 | NPL_loans | Real interest |
|------------|-------------------|----|-----------|--------------|
| Post-Asian financial crisis | | | | |
| Correlation | FDI_net inflow GDP | M2 | NPL_loans | Real interest |
|-------------|-------------------|----|-----------|--------------|
| FDI_net inflow GDP | 0.225773 | | | |
| | 1.000000 | | | |
| M2 | 179.8435 | 52756513 | | |
| | 0.052110 | 1.000000 | | |
| NPL_loans | 0.713591 | −16069.74 | 8.684298 | |
| | 0.509620 | −0.750764 | 1.000000 | |
| Real interest | 0.389362 | −10583.49 | 6.314952 | 6.984869 |
| | 0.310055 | −0.551330 | 0.810818 | 1.000000 |
| Post-Global Financial Crisis | | | | |
| FDI_net inflow GDP | 0.051518 | | | |
| | 1.000000 | | | |
| M2 | −1617.016 | 7.26E + 08 | | |
| | −0.264361 | 1.000000 | | |
| NPL_loans | 0.000181 | −960.2015 | 0.003864 | |
| | 0.012843 | −0.573193 | 1.000000 | |
| Real interest | 0.000158 | −207.0928 | 0.000419 | 0.000102 |
| | 0.069147 | −0.762197 | 0.668360 | 1.000000 |

*Source:* Author.
and 2017. Therefore, the hypothesis tests whether the macroeconomic variables M2 (the currency in circulation), the Non-Performing Loan (NPL) ratio to gross loans, (the ratio of bank non-performing loans to total gross loans divided by the total value of the loan portfolio), real interest rate and Foreign Direct Investment (FDI) net inflows to GDP impact the stability of the county as follows:

- H0: FDI, money supply and real interest rate in South Korea had no impact on NPL ratios.
- Ha: FDI, money supply and real interest rate in South Korea had an impact on NPL ratios.

Our sample uses macroeconomic data and bank-level data, namely M2, NPL to gross loan, real interest rate and FDI net inflows to GDP. All data were extracted from the online databases of the Bank of South Korea and the World Bank. The sample was divided into two groups: The first covers the post-AFC period from 1997 to 2007; and the second is the post-GFC period from 2007 to 2017. Table 4 presents the results of the descriptive statistics, unit root test and Jarque–Bera test for the two groups. The analyses show that the sample means of the variables are positive and significantly different from zero for both periods. Table 5 presents the correlation matrix among the variables. The analyses also show that none of the variables in the sample are highly correlated.

Figure 2. Impulse response functions for the post-AFC period
Source: Author
7. EMPIRICAL RESULTS

During the AFC, the government increased the interest rates to restore inflows of FDI, as the IMF-led policy mandated the prioritisation of restoring investor confidence in the currency market. The analysis shows the effects of macroeconomic variables in response to the non-performing loans post two major crises over time. The response impulse functions are estimated in Fig. 2 and Fig. 3. Figure 2 presents impulse response functions for the post-AFC period and Fig. 3 presents impulse response functions for the post-GFC period. We observed a negative relationship between impulse responses of non-performing loans and changes in money supply M2 and FDI inflows, which provide evidence of an effective expansionary policy by the government to increase the money supply.

We used FDI as a proxy for foreign investment, M2 for capital injection and increase in money supply and real interest rate as an instrument for monetary policy. The impact of FDI, M2 and the real interest rate on the quality of the banking sector’s loan portfolio proved to be significant. This suggests that these variables which represent the structure of the financial system may well have had an impact on financial stability in South Korea’s financial market. Our findings are in line with Sharma (2018) and Allen et al., 2012.

Figure 3. Impulse response functions for the post-GFC period
Source: Author
8. THE OVERALL OUTCOME

Theoretically, successful risk reduction in response to the financial crises would lead to a conservative economic performance. The case of South Korea demonstrated that effective risk controls might indirectly promote sustainable growth. Figure 4 shows a sharp declining trend in non-performing loans in 2001 and it continues to further drop from 2002 onwards. The data and our analysis suggest that the ongoing policy reforms, which began in 1997 as a result of the AFC, and the continuous implementation of policy reforms by the government helped the country to recover quickly from the credit crunch that reoccurred in 2008. South Korea performed well by showing a positive GDP growth, although the nominal negative trend often strikes when the crisis initially takes place. The economy rapidly recovered and managed to stabilise over time.

9. CONCLUSION

Even a well-functioning financial sector is inclined towards volatility. A financial crisis, spreading to other, interconnected regions is unavoidable. This study suggests that prudent structure and governance are essential in stabilising the economy and the financial system. Lessons learnt from South Korea’s experience demonstrate that policymakers and chaebols are partly responsible for the failure of the financial system, as well as the negative consequences of short-term foreign borrowing to finance long-term domestic projects. The study examines the policies introduced by the South Korean government during the AFC and GFC and discusses challenges concerning their implementation. We applied the measurement of the impulse response to shocks using a VAR model on pre- and post-financial crises periods. Implications of
South Korea’s effective policy reforms indicate that there are significant results in response to newly introduced structural reform policies for the financial and corporate sectors. Analysis using VAR models revealed impulse response shocks based on four series, including the money aggregate M2, the real interest rate, net FDI inflows to GDP and the non-performing loan ratio to gross loans which demonstrate fluctuating impulse responses. It was apparent from the findings that the negative relationship of impulse responses of non-performing loans to changes in money supply M2 and FDI inflows suggest that the South Korean government’s policies to increase the money supply and restore foreign investor confidence to promote FDI were effective.

Based on the results, the example of effective reforms can provide future policy implications and early warnings in responding to financial turmoil for other regions. However, one of the critical concerns raised from this analysis is that reform may be useful from a particular perspective, yet it cannot eliminate the entire systemic risk. Alternatively, these reforms safeguarded South Korea’s economy and reduced volatility; which performed well by showing a positive GDP growth during and after both periods of crises. The reoccurrence of the GFC in 2007 confirmed that South Korea is not entirely immune to external shocks and contagious effects from a future financial crisis. The country will require a new growth strategy to ensure the stability of the economy by reflecting on their experiences from these previous financial crises.

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