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경제학 석사학위 논문

Sovereign Credit Risk and Business Cycles
in Emerging Market Economies

국가 신용리스크가 신흥국 경제에 미치는 영향

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Sovereign Credit Risk and Business Cycles in Emerging Market Economies

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Abstract

This paper investigates the effects of sovereign credit risk shock on business cycles of emerging market economies. The empirical research is conducted with panel vector auto–regressive model and economic variables of both real and financial sectors. This includes domestic bank lending–borrowing spread to demonstrate the transmission channel by incorporating bank balance sheet effect. Sovereign credit default swap (CDS) spread is used as sovereign credit risk measure. The main findings are: (1) the sovereign spread shock has negative effects on GDP, investment and domestic credit; and (2) the shock increases domestic banking spread, which shows that the shock would be transmitted through banking sector; (3) narrowing down to pre–crisis period, this research finds that impacts on output, investment and credit are smaller than that of whole period while banking spread surges more.

Key words: Sovereign Credit Risk, Sovereign CDS Spread, Bank Balance Sheet Effect, Emerging Market Business Cycle

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Contents

1. Introduction	1
2. Transmission Channel	7
3. Data and Empirical Model	10
3.1. Data	10
3.2. Panel Vector Auto–regressive Model	14
4. Estimation Results	17
4.1. Baseline Model	17
4.2. Model with Portfolio Balance	20
4.3. Subsample Analysis	23
4.4. Robustness Check	27
5. Conclusion	28
References	29

Tables

Table 1: Correlation Coefficients between sovereign CDS spreads and VXO	3
Table 2: Correlation Coefficients between GDP growth rates and CDS spreads	10
Table 3: Summary Statistics of CDS spreads of Sample Sovereigns	13
Table 4: Lag selection criteria results	16

Figures

Figure 1: Co-movement of sovereign CDS spreads and VXO	3
Figure 2: Co-movement of GDP growth rates and CDS spreads	6
Figure 3: Baseline model IRF to CDS spread shock.....	19
Figure 4: Baseline model cumulative IRF to CDS spread shock	19
Figure 5: Model with portfolio balance IRF to CDS spread shock	22
Figure 6: Model with portfolio balance cumulative IRF to CDS spread shock.....	22
Figure 7: Subsample baseline model IRF to CDS spread shock	25
Figure 8: Subsample baseline model cumulative IRF to CDS spread shock	25

Figure 9: Subsample model with portfolio balance IRF to CDS spread shock	26
Figure 10: Subsample model with portfolio balance cumulative IRF to CDS spread shock	26

1. Introduction

The global financial crisis and following recessions which emerging market economies had experienced for last decade called attention to external shocks and their impact on the overall economy. Especially, the growing concerns are about financial shock which spreads across 'borders'. The integration of world financial markets has neutralized the geographic borders that an amount of international capital flows in and out of the territories. And what world experienced from 2007–2008 crisis is an evidence of destruction of the other one, the border between financial and real economic sectors. Sovereign spread reflects the recognized riskiness of the sovereign by international investors, which is closely related to their investment decision. Recent European sovereign debt crisis and the consequences have shown that sovereign credit risk could be hazardous to real and financial economy. Thus unexpected movements in sovereign spread which represents its credit risk should be considered important factor that could threaten economic stability. Figure 1 shows the co-movements of VXO index¹, the implied U.S. stock market volatility which is proxy of global financial risk and Credit Default Swap (CDS) spreads of nine emerging countries (Brazil, Chile, Indonesia, Republic of Korea, Malaysia, Mexico, Philippines, South Africa and Thailand). There exists highly positive correlation between two indices as shown in Table 1 and this shows that CDS spreads well reflect global financial market risk. And also, Figure 2

¹ The index uses options data on the S&P 100 index to compute an average of the Black and Scholes option implied volatility and introduced by Chicago Board of Options Exchange (CBOE) in 1993. It is considered as benchmark for stock market volatility. (Carr and Wu(2006))

shows the negative correlation of the spreads and each sovereign's gross domestic product (GDP) growth rates. This tells us that sovereign credit risk is related not only to external shock, but also to domestic economy.

There exist abundant literatures studying the relation of sovereign spread and its economic activities. Especially a large number of studies are concentrated on recent European sovereign debt crisis period and related sovereigns. In case of emerging market economies, there are a relatively small number of preceding researches. Uribe and Yue (2006) showed that sovereign spread affects its economic activity by playing a role of transferring world interest rate shock. They studied using seven emerging countries (Argentina, Brazil, Ecuador, Mexico, Peru, Philippine, and South Africa) data of period from 1994 Q1 to 2001 Q4. Akinci (2013) investigated how global financial conditions cause sovereign economic fluctuation of six emerging markets (Argentina, Brazil, Mexico, Peru, South Africa and Turkey) with different period coverage. The study also found that the country spreads is important conveyer of global financial shock. Brei and Buzaushina (2015) analyzed the country spread shock effects with quarterly data from 1995 to 2007 for five Latin America countries. Their findings show the shock is followed by long-lasting recession of economic activities and also domestic credit.

Although there are growing literatures studying the interrelation of global financial condition, sovereign risk and its economy, there has been little consensus about the transmission channel. BIS (2011) suggested the bank balance sheet channel, which explained how sovereign credit risk affects domestic banks' balance sheet position and funding condition. The paper introduced four channels; asset valuation, collateral valuation, bank credit risk and guarantee channels. According to the study, unexpected increase in sovereign credit risk weakens bank balance sheet position and funding condition.

This would in turn reduce domestic credit by increasing lending–borrowing spread, which directly cause downturn in investment and real economy. This transmission mechanism would be given detailed accounts later in this study.

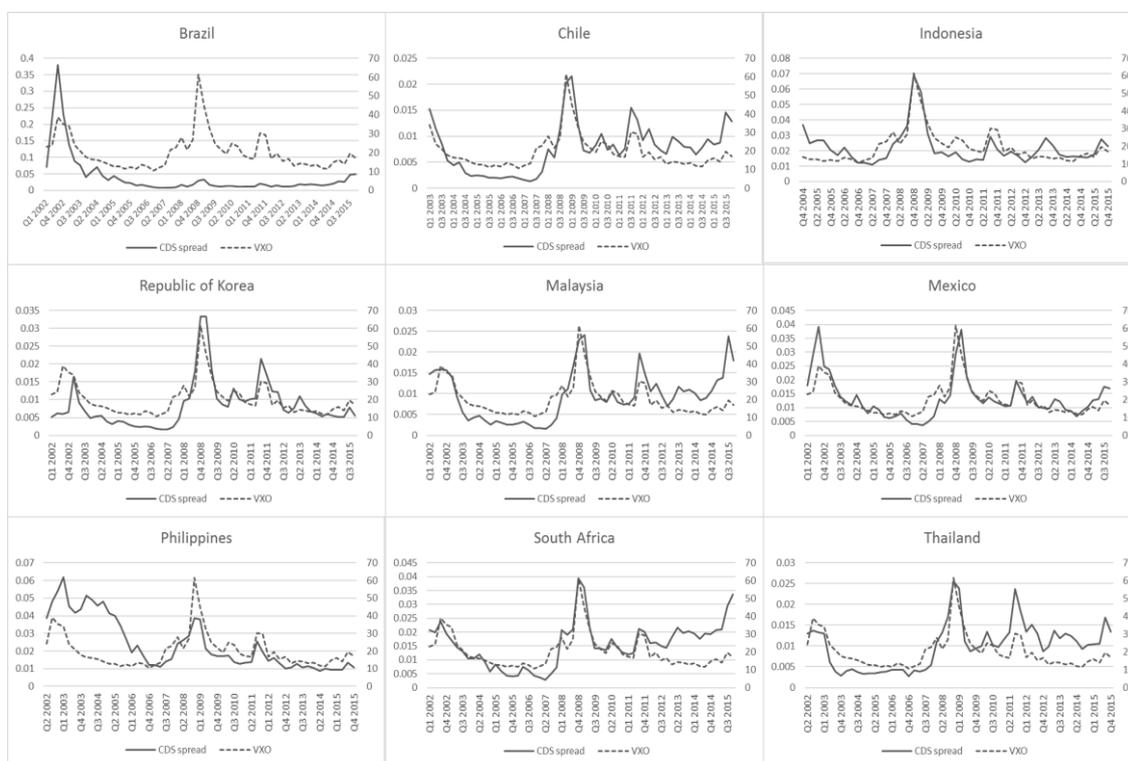


Figure 1. Co-movement of sovereign CDS spreads and VXO (Note: The left axis represents the CDS spread value and the right axis represents VXO index) (Source: Bloomberg)

Brazil	Chile	Indonesia	Korea	Malaysia	Mexico	Philippines	South Africa	Thailand
0.39	0.76	0.76	0.81	0.67	0.82	0.40	0.64	0.67

Table 1. Correlation Coefficients between sovereign CDS spreads and VXO (Source: Bloomberg)

There are several literatures applying the bank balance sheet effect to investigate the intricate relations of sovereign credit risk shock and its impact on real economy. Agénor et al(2007) incorporated the banking sector as transmission channel of sovereign spread shock to Argentina economy using 1990s data. They showed that the shock increases domestic lending–borrowing spread while has negative impact on GDP movement. Akıncı(2013) extended its baseline model by implying domestic spread and found that global financial shock drives domestic spread up while the impact is mostly transmitted through sovereign spread. Bottero et al(2015) investigated the channel with bank–firm panel data set and found that negative shock to sovereign bond could tighten credit to private sectors through bank balance sheet effect.

In this paper, I attempt to figure out the effects of sovereign spread shock on emerging market' s economic activities with panel vector auto–regressive(P–VAR) model. The model specification is based on that of Uribe and Yue (2006) which incorporated interaction of global financial risk and domestic macro economy in P–VAR model. However, empirical model of this paper is additionally based on the assumption of above mentioned bank transmission channel. This study is differentiated from earlier literatures in several ways. The data for empirical analysis is from nine emerging countries of various geographical regions; Latin America (Brazil, Chile, Mexico), Asia (Indonesia, Republic of Korea, Malaysia, Philippines, Thailand) and also South Africa. And data period covers from 2002 Q1 to 2015 Q4, which could reflect balanced time spans before and after the 2008 financial crisis. Also empirical model in this paper consists of several variables applying both financial and real sectors of domestic economy to reflect banking channel. Introduction of domestic bank playing a role in transmission of CDS premium shock to real sector is in line with recent literatures applying 'financial frictions' .

The remainder of this paper consists of five chapters. In chapter 2, the explanations about transmission channel that sovereign spread shock going through and toward real economy would be suggested. The bank balance sheet effect is considered to shed light on the black box. And in chapter 3, I would give accounts for data and empirical model to verify the effects and transmission of the shock. In chapter 4, the estimation result would be shown with additional variable of portfolio balance and subsample analysis for before-crisis period. And the following chapter 5 concludes this paper.

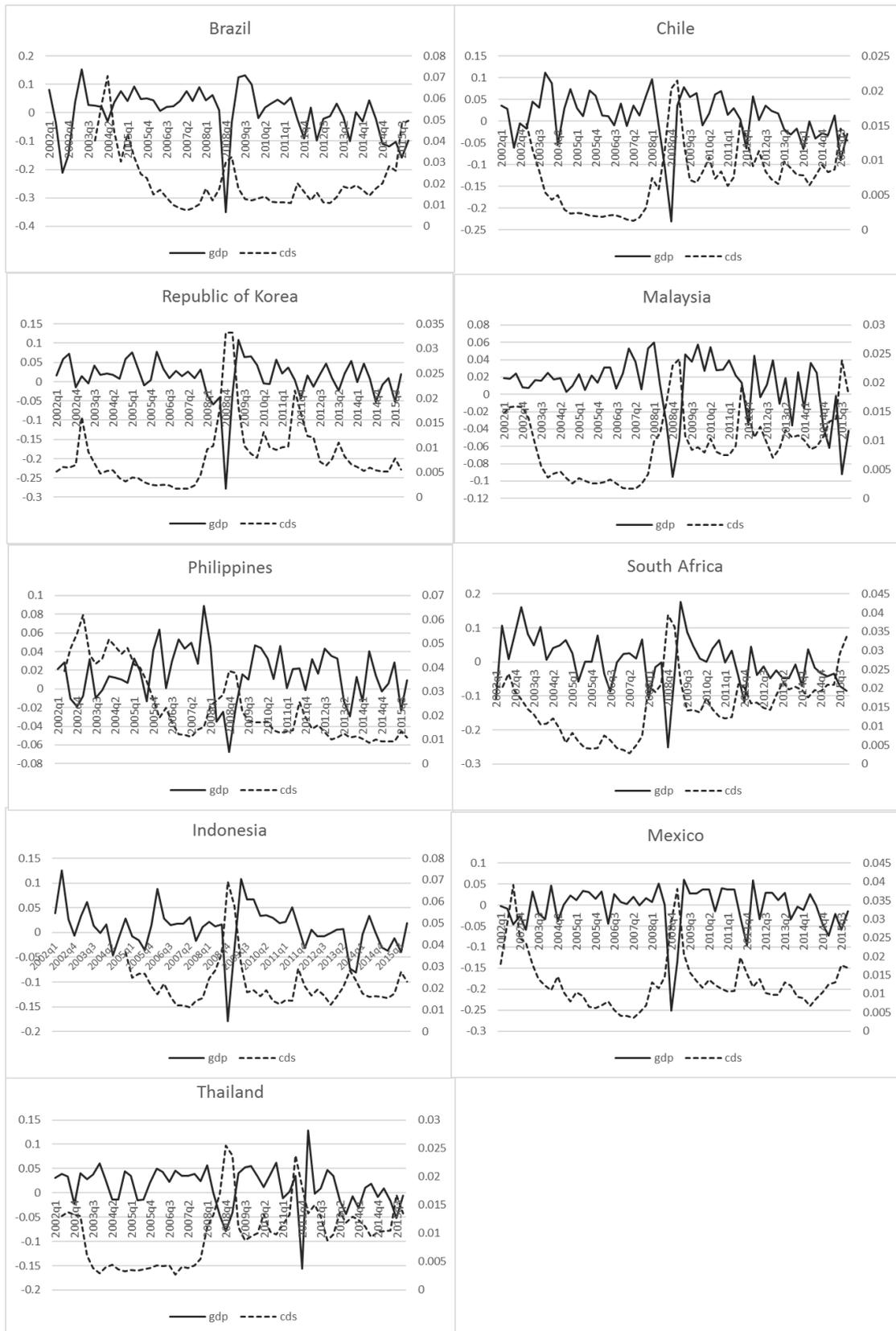


Figure 2. Co-movement of GDP growth rates and CDS spreads (Note: The left axis represents GDP growth rate and the left axis represents CDS spread value) (Source: IMF International Financial Statistics, Bloomberg)

2. Transmission Channel

The credit risk of a sovereign is the risk associated with any kind of credit-linked events such as credit quality changes, credit spread variations and default of the sovereign.² This chapter investigates the channel that sudden increasing in sovereign spread as credit risk shock is transmitted into its economy with domestic banking sector. BIS (2011) explains the channel with bank balance sheet effect. They argue that sovereign credit risk has impact on the bank funding conditions in several ways.

The first one is ‘asset valuation channel’ which explains the effect with asset and equity accounts variation of bank balance sheet. The increasing sovereign credit risk would decrease market price of government debt securities and related derivatives. This directly affect balance sheet position of bank by lowering profitability of such assets that bank owns. Net profit would also decrease that overall financial condition of the bank would be weakened.

Secondly ‘collateral valuation channel’ considers the aspect that the bank’s assets could be used as collateral for funding money. The government debt securities are extensively used as collateral by banks when it borrows money from central bank, private repo market and issues covered bonds. Thus, decreasing value as collateral would make it difficult for bank to fund enough money and this would much serious problem in economic crisis.

Third, ‘bank credit risk channel’ would matters. Increase in sovereign spread could cause successive surge of domestic bank credit risk. This would happen

² Duffie and Singleton(2012)

due to other mentioned channels that have negative effect on bank' balance sheet position and funding condition. In addition, credit rating of the sovereign and domestic banks is closely related. Especially, downgrading of the sovereign is often followed by that of domestic banks' ratings, which directly and significantly affects funding availability.

Lastly, when the government becomes riskier, the guarantee for the bank's credit would be weakened. This 'guarantee channel' serves for both implicitly and explicitly guaranteed banks. Especially the effects on banks so-called SIFIs which are considered to be implicitly protected by government could severely threaten overall economy as world already experienced in recent financial crisis.

There are growing literatures that attempt to empirically verify these channels. Especially sovereign debt crisis of Europe broke out just after the 2008 crisis has boosted the related studies with the sovereigns' data. Angeloni, C., & Wolff(2012) tried to verify asset valuation channel with effects of sovereigns bond holding on banks' performances. They found that strong relations between sovereign and banks is not much explained by government asset holding. De Bruyckere et al(2013) found that default risk of banks holding more government debt are more strongly related to that of the sovereign. And they showed that the relation is stronger when the bank is relatively more dependent on short-term funding, which could be an evidence of collateral channel. Williams et al(2013) found that there emerging market banks have very high probabilities of being upgraded (downgraded) soon after an upgrade (downgrade) to their corresponding sovereign rating with data of three global rating agencies across 54 countries for 1999-2009. Williams et al(2015) also asserted that the bank credit risk channel is main for the transmission while collateral and guarantee channels only play modest role. The results of De Bruyckere et al(2013) showed that there exists higher excess correlations between large banks and

the sovereign. And also found that debt-to-GDP ratios have high and positive impacts on the excess correlation between banks and sovereign, which verifies existence of guarantee channel.

3. Data and Empirical Model

3.1. Data

This chapter would give accounts for the variables and data used to empirical estimation in this study. The basic empirical model deals with five economic variables; GDP, investment, domestic credit, bank lending–borrowing spread and CDS spread. They are chosen to figure out whether sovereign risk shock affects both financial and real sectors. The data covers quarterly economic variables of nine emerging countries (Brazil, Chile, Indonesia, Republic of Korea, Malaysia, Mexico, Philippines, South Africa and Thailand). The sample countries are selected based on data availability and suitability for the research purposes. Table 2 shows the correlation of GDP growth rate and CDS spread of sample countries. Malaysia has highest correlation with -0.61 correlation coefficient and lowest figure is -0.32 which is of Philippines. Although there exists difference in levels, the aggregate economic activity of all sample countries have significant negative correlation with sovereign risk spread.

Brazil	Chile	Indonesia	Korea	Malaysia	Mexico	Philippines	South Africa	Thailand
-0.35	-0.45	-0.51	-0.53	-0.61	-0.55	-0.32	-0.42	-0.46

Table 2. Correlation Coefficients between GDP growth rates and CDS spreads (Source: IMF International Financial Statistics, Bloomberg)

GDP variable in this research represents growth rate of real Gross Domestic Product and investment variable is growth rate of gross fixed capital formation.

Credit variable is also the growth rate of total loan from depository corporations. All the variables are quarterly growth rates calculated by first log difference of real and seasonally adjusted data. The raw data are in domestic currency that could avoid unnecessary effects of exchange rate change. Bank spread represents the difference of firm's borrowing rate and deposit rate.

The sovereign risk shock that reflect unanticipated surge of riskiness recognition by international investors is measured by increasing in 5-year maturity sovereign Credit Default Swap spread. Another variable represents sovereign credit risk is the spread between the sovereign bond rate and risk-free bond rate. This bond spreads are also often used in related empirical studies but I instead chose CDS spreads for reasons. First, although those two variables data closely co-move with each other, CDS data tends to lead bond data for emerging market sovereigns.³ Moreover bond spreads include inflation expectations as well as default risk so using CDS spreads is more appropriate in that this study focuses in credit risk.⁴ The summary statistics for CDS spreads are suggested in Table 3. The sub sample periods statistics are also given for more precise comparison of the most important variable in this study.

The data except CDS spread cover period from 2002 Q1 to 2015 Q4 that this estimation reflects recent economy changes after 2008 global financial crisis. CDS spread data of several sample countries have shorter time span; data of Indonesia started from 2004 Q4, Chile from 2003 Q1, Thailand from 2002 Q2.

³ Coudert and Gex(2010)

⁴ De Bruyckere et al(2013)

Full Sample (2002Q1-2015Q4)

	Average	Std. dev	Min	Median	Max	Observations
Brazil	0.0404	0.0639	0.0076	0.0176	0.3790	56
Chile	0.0076	0.0047	0.0013	0.0075	0.0215	55
Indonesia	0.0219	0.0111	0.0110	0.0183	0.0691	54
Republic of Korea	0.0084	0.0066	0.0017	0.0064	0.0333	53
Malaysia	0.0094	0.0058	0.0016	0.0090	0.0241	52
Mexico	0.0133	0.0074	0.0036	0.0117	0.0392	51
Philippines	0.0240	0.0148	0.0087	0.0173	0.0618	50
South Africa	0.0156	0.0080	0.0029	0.0155	0.0394	49
Thailand	0.0100	0.0055	0.0027	0.0103	0.0255	48

Before Crisis (2002Q1-2008Q1)

Brazil	0.0672	0.0887	0.0076	0.0326	0.3790	25
Chile	0.0042	0.0037	0.0013	0.0024	0.0153	21
Indonesia	0.0200	0.0074	0.0110	0.0190	0.0367	14
Republic of Korea	0.0048	0.0032	0.0017	0.0040	0.0163	25
Malaysia	0.0061	0.0051	0.0016	0.0036	0.0159	25
Mexico	0.0125	0.0088	0.0036	0.0104	0.0392	25
Philippines	0.0341	0.0157	0.0111	0.0393	0.0618	24
South Africa	0.0105	0.0065	0.0029	0.0083	0.0238	25
Thailand	0.0058	0.0037	0.0027	0.0042	0.0138	24

Crisis Period (2008Q2-2009Q2)

Brazil	0.0219	0.0089	0.0121	0.0176	0.0325	5
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Chile	0.0143	0.0065	0.0058	0.0124	0.0215	5
Indonesia	0.0444	0.0181	0.0282	0.0360	0.0691	5
Republic of Korea	0.0227	0.0102	0.0104	0.0184	0.0333	5
Malaysia	0.0172	0.0063	0.0108	0.0168	0.0241	5
Mexico	0.0228	0.0109	0.0115	0.0207	0.0380	5
Philippines	0.0306	0.0074	0.0216	0.0286	0.0386	5
South Africa	0.0275	0.0095	0.0191	0.0219	0.0394	5
Thailand	0.0181	0.0064	0.0111	0.0170	0.0255	5
After Crisis (2009Q3-2015Q4)						
Brazil	0.0182	0.0101	0.0108	0.0151	0.0495	26
Chile	0.0091	0.0025	0.0063	0.0084	0.0215	26
Indonesia	0.0185	0.0045	0.0124	0.0175	0.0691	26
Republic of Korea	0.0091	0.0039	0.0051	0.0083	0.0333	26
Malaysia	0.0112	0.0041	0.0070	0.0104	0.0241	26
Mexico	0.0123	0.0030	0.0068	0.0122	0.0380	26
Philippines	0.0134	0.0040	0.0087	0.0131	0.0386	26
South Africa	0.0182	0.0050	0.0120	0.0181	0.0394	26
Thailand	0.0124	0.0033	0.0087	0.0115	0.0255	26

Table 3. Summary Statistics of CDS spreads of Sample Sovereigns (Source: Bloomberg)

3.2. Panel Vector Auto-regressive Model

Now, the empirical model to verify the effects sovereign spread shock has on domestic economy is demonstrated. Panel vector auto-regressive (P-VAR)⁵ model is used.

$$Y_{i,t} = \sum_{k=1}^p A_k Y_{i,t-k} + u_i + e_{it} \quad (1)$$

$$Y_{i,t} = \begin{pmatrix} gdp_{i,t} \\ inv_{i,t} \\ cre_{i,t} \\ cds_{i,t} \\ spread_{i,t} \end{pmatrix} \quad u_i = \begin{pmatrix} u_{i,gdp} \\ u_{i,inv} \\ u_{i,cre} \\ u_{i,cds} \\ u_{i,spread} \end{pmatrix}, \quad e_{it} = \begin{pmatrix} e_{i,t,gdp} \\ e_{i,t,inv} \\ e_{i,t,cre} \\ e_{i,t,cds} \\ e_{i,t,spread} \end{pmatrix}$$

$$(i = 1 \dots n, k = 1 \dots p, t = 1 \dots T)$$

The model consists of five variables. $gdp_{i,t}$, $inv_{i,t}$, $cre_{i,t}$, $cds_{i,t}$, $spread_{i,t}$ each represents GDP, investment, credit, sovereign CDS spread and domestic bank spread variables. $Y_{i,t}$ is vector of dependent variables and u_i is dependent variable-specific panel fixed effect. $e_{i,t}$ is vector of idiosyncratic shock to each variable. i denotes each sovereign, k and t each indicates lag order and time period. $E(e_{it}) = 0$, $E(e_{it}e_{it}') = \Sigma$ and $E(e_{it}e_{is}') = 0$ for all $t > s$ are also assumed.

⁵ The panel vector auto-regressive model estimation is done with STATA PVAR package which is distributed by Abrigo and Love(2015).

The panel fixed effect could be eliminated by first-difference transformation and instrumenting the variables with differences and levels dependent variables as proposed by Anderson and Hsiao (1982). However, the method has weakness in information validity. When the panel data is not balanced, the effect of the gap becomes large with the method. For example, if an observation of period T is missing, that of T-1 would be also invalid. An alternative method, forward orthogonal transformation which was proposed by Arellano and Bover (1995) could be the remedy. It removes fixed effect of a panel by subtracting average of all future observations as equation (2).

$$Y_{i,t}^* = \sqrt{\frac{(T-t)}{(T-t+1)}} \left[Y_{i,t} - \frac{1}{(T-t)} (Y_{i,t+1} + \dots + Y_{i,T}) \right] \quad (2)$$

Especially when the sample covers short time period, the latter is more preferable because the former needs more minimum sample periods for estimation with same lags order estimation. Also, as using future observables for transformation, all the past period samples would be valid for instrument variables. Thus, with missing CDS spread data of early sample period for several countries and relatively short time span with about 56 quarters, the forward orthogonal transformation would be more appropriate for this study.

The estimation is done by Generalized Method of Moments (GMM) method using deeper lags of dependent variables as instrument. The model is estimated as system of equations. And optimal lag order is selected by following the result of moment and model selection criteria (MMSC) for GMM models which was proposed by Andrews and Lu (2001). It consists of various information criteria each is analogue to widely used criteria, AIC, BIC and HQIC, which are based

on Hansen's (1982) J statistic of over-identifying restrictions. Table 4 compares the different criteria and first lag should be chosen following the result.

The matrix A_0 is lower-triangular matrix with unit diagonal. This implies that real economy sector variables have influence on financial variables within the period but changes in financial variables affect domestic real variables with one lag.

Lag	MBIC	MAIC	MQIC
1	-493.56	-86.6865	-247.183
2	-368.573	-63.268	-183.79
3	-244.302	-40.7652	-121.113
4	-127.123	-25.3543	-65.5283

Table 4. Lag selection criteria results

The estimation includes exogenous time dummy variable to avoid biased results due to global financial crisis period. The data of period from 2008 Q2 to 2009 Q3 are excluded to see more precise relation of the model variables.

4. Estimation Result

4.1. Baseline model

The impulse response graphs to orthogonal CDS spread shock are shown in figure 3. The solid lines denote the responses and 95 percent confidence intervals with 1000 Monte-carlo simulations are expressed with dotted line around the response graphs. The left axis ticks are in percentage point values. The result shows that the sovereign spread shock has significant effects on domestic economy.

Once CDS spread increases, GDP growth rate immediately fall to about -0.14 percentage point. The level of the negative effect decreases for following quarters but the growth rate stays negative for next five quarters. The shock has much impact on investment that its growth rate falls about -0.3 percentage point at second quarter. The effect also starts to decrease after it hits the bottom but stays negative for about seven quarters. Credit growth rate reaches its bottom, about -0.4 percentage point in the very following period after shock. This tells that investment is affected about one period slowly than output and credit while they response immediately. And also, the surge of CDS spread significantly increase domestic banking spread. The spread immediately increases and reaches about 0.12 percentage point at peak. And it slowly goes down to its original level for the twenty periods. Lastly the increase in CDS spread itself gradually goes down and the effect diminishes in ten quarters.

For more precise analysis, the cumulative impulse response graphs for three variables—GDP, investment, domestic credit are also presented. Figure 4 shows how the variables cumulatively response for forty periods. The graphs tell that

GDP decreases by about 0.22 percent and slowly increases in five quarters. Investment goes down by about 0.8 percent. The downward effect is more significant for domestic credit. It decreases by about to 1.4 percent and stays around there for whole periods. Among those variables, domestic credit responses the most to the shock.

From these results, we could verify that shock in sovereign spread negatively affects domestic economy of emerging countries while increasing domestic lending–borrowing spread.

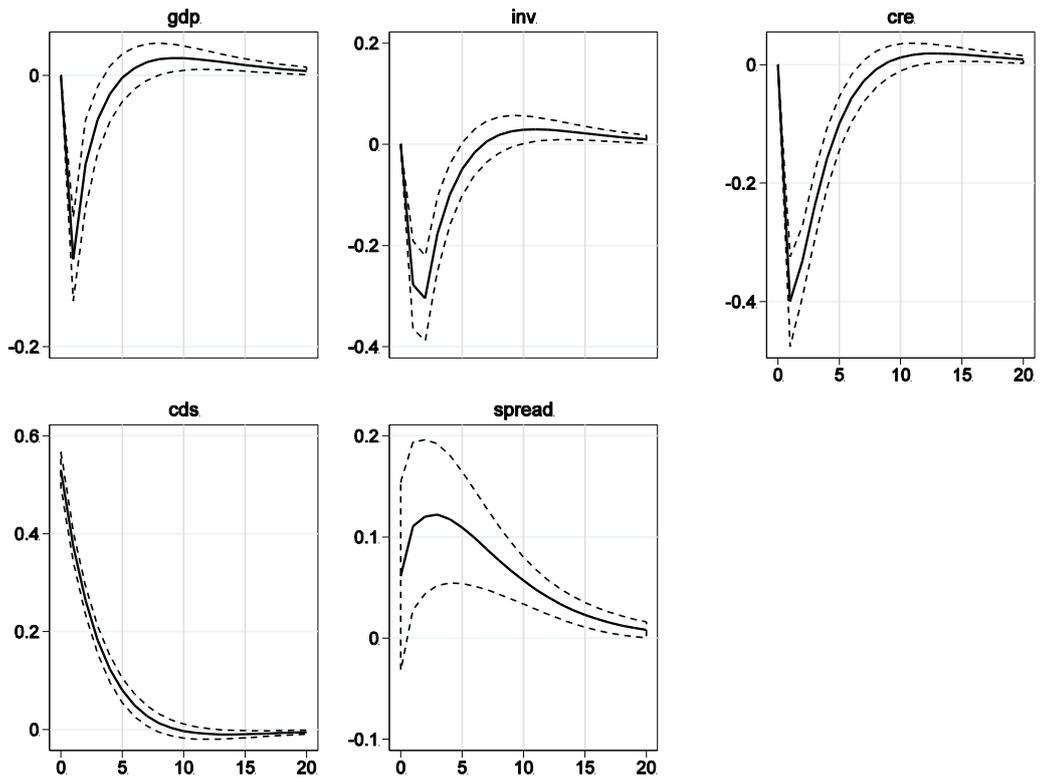


Figure 3. Baseline model IRF to CDS spread shock

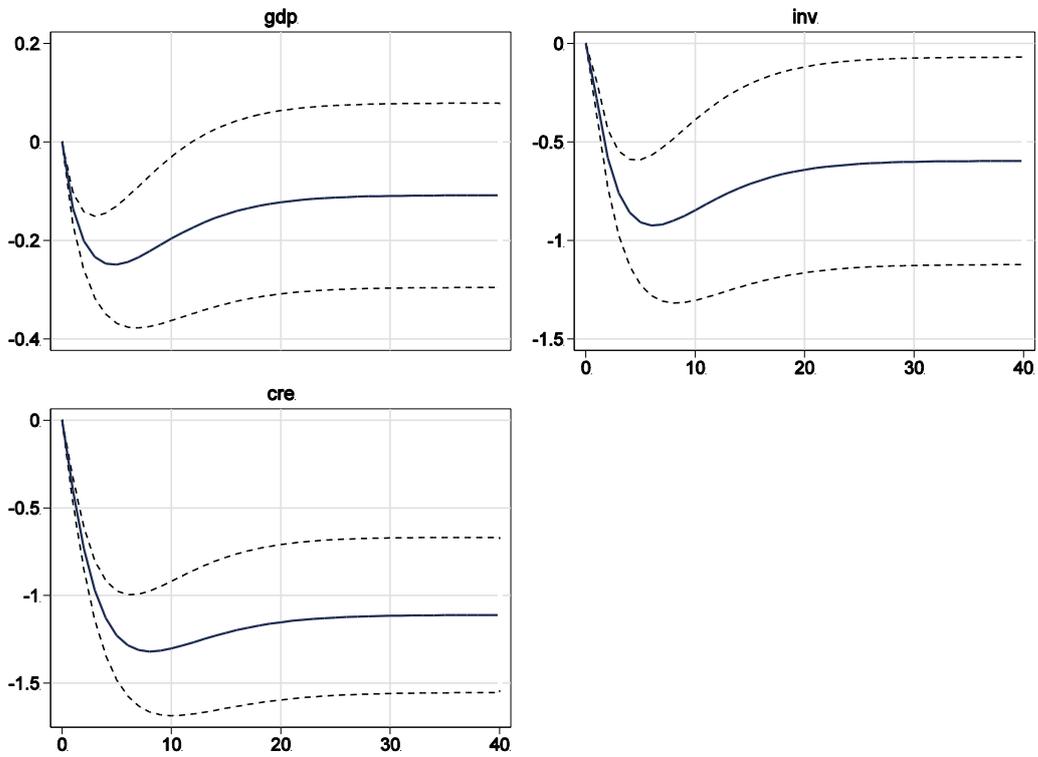


Figure 4. Baseline model cumulative IRF to CDS spread shock

4.2. Model with Portfolio Balance

To study further the effects on the overall economy, the model is extended to include financial market condition. The sovereign CDS spread indicates the credit riskiness which is reflected in financial market. And the market participants react to any shock and economic tension in the rapid and sensitive way. Considering growing importance of financial market for overall economy, it would be important to investigate response of domestic financial market variable to unexpected surge in sovereign spread. In this regard, the extended model includes portfolio balance variable.

Among endogenous variables of the extended panel vector auto-regressive model, $port_b_{i,t}$ indicates portfolio balance of each sovereign. The variable is the growth rate of seasonally adjusted real net liability to foreign investors. Similar to other variables, the data is in domestic currency to avoid unnecessary effects from exchange rate changes. And the variable is ordered before CDS spread to reflect that the changed movement of investors in portfolio investment markets is shown in the balance with one period lag after the spread surges.

$$Y_{i,t}^{extended} = \begin{pmatrix} gdp_{i,t} \\ inv_{i,t} \\ cre_{i,t} \\ port_b_{i,t} \\ cds_{i,t} \\ spread_{i,t} \end{pmatrix} \quad (3)$$

$$(i = 1 \dots n, k = 1 \dots p, t = 1 \dots T)$$

Estimation results of extended model are suggested in figure 5 and figure 6. The impulse response graphs show that once the shock hits, growth rate of net portfolio investment liability falls in following period. And it sharply increases to positive growth rate in second quarter and starts to decrease toward initial level for several periods while other variables still significantly responses to the shock. However, the response of portfolio balance variable moving below and above the zero line is inside error band, which means that the country spread shock has no significant effect on portfolio balance of the sovereign in 95 percent confidence level. The cumulative response graph shows that portfolio balance is increased after two quarters and reaches above 0.1 percent but it also can't be considered as significant effect.

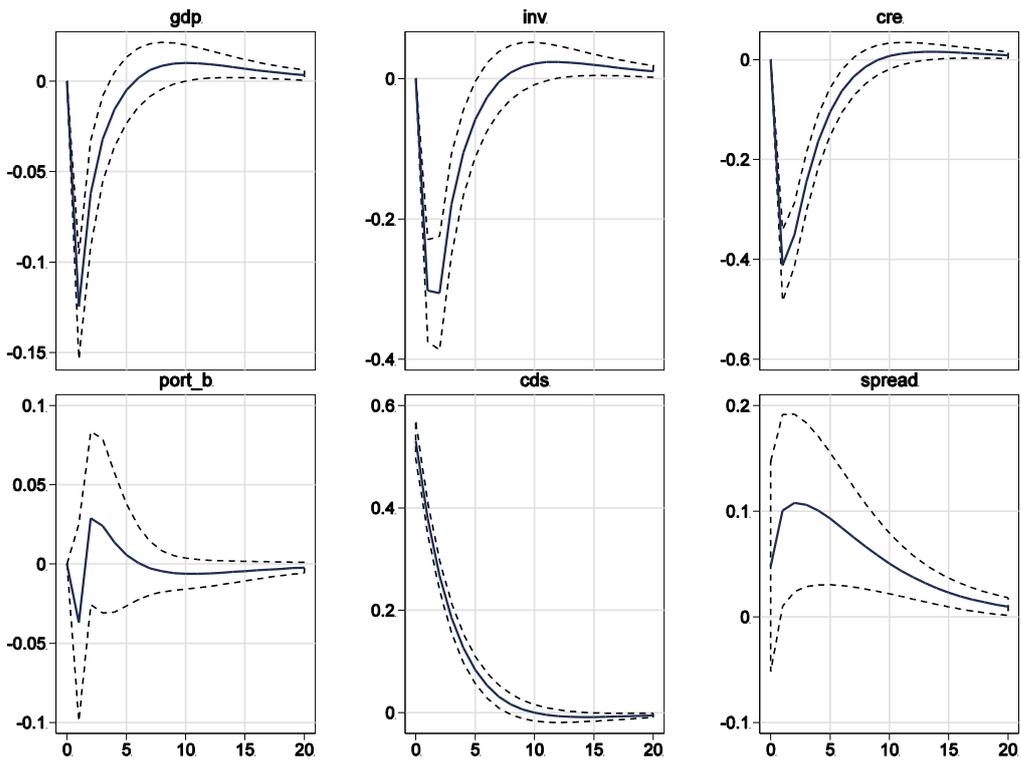


Figure 5. Model with portfolio balance IRF to CDS spread shock

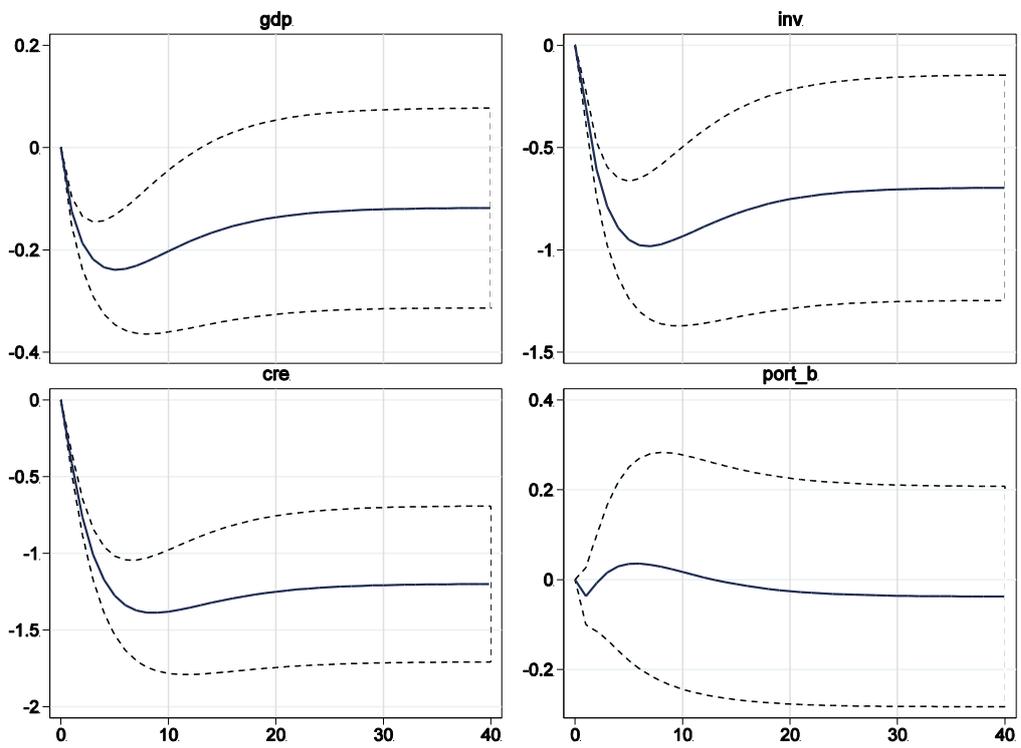


Figure 6. Model with portfolio balance cumulative IRF to CDS spread shock

4.3. Subsample Analysis

The recent global financial crisis had serious impacts on world economy, including both financial and real sectors. And the effects still remain that economic conditions are not fully recovered. Considering this, it would be necessary to find out whether the effects of sovereign CDS spread shock cause any different responses before and the crisis. Thus the empirical analysis in this chapter is focused to sub sample period of the data. To study the effects of increasing in country spread on sovereign economy before the crisis attacks, period from only 2002 Q1 to 2008 Q1 is included for estimation. The analysis is also done with base line and extended model which includes portfolio balance as endogenous variable.

The estimation results with base line model are shown in figure 7 and figure 8. The graphs show how economic variables are influenced when sovereign spread shock occurs. The overall movements are similar in their direction to full sample estimation results. The growth rates of output, investment and domestic credit immediately decrease after shock while domestic bank lending–borrowing spread increases. However, the responses are different from sample period covering both before and after the crisis in levels of responses. GDP growth rate decreases to about -0.04 percentage point and returns to its steady state level in about ten quarters. This is much smaller impact than full sample estimation results of -0.14 percentage point. Investment variable also responses less with -0.13 percentage point than with -0.3 percentage point. This is also the case for domestic credit which the growth rate decreases less to about -0.16 percentage point comparing with -0.4 percentage point. Thus these three variables responses not much before the crisis. However, the impact on domestic bank spread is not shown in same context. The shock increases domestic spread to reach about 0.12 percent in full

sample results but in subsample, it increases to 0.15 percent. This means that the effect on banking sector is grater before the crisis while other economic variables are influenced less by the shock. The cumulative responses show that the shock decrease GDP by about 0.11, investment by about 0.43 and credit by about 0.61 percent, which are all less than the results of full sample analysis.

The results would suggest that output, the sovereign domestic economy is less subject to credit risk shock before the crisis and it becomes sensitive to external financial shock after world experienced the crisis. And the transmission of the shock is less through the banking sector after the financial crisis and sovereign CDS spread has impact on the economy with other channels rather than bank balance sheet.

The analysis concentrating on before–crisis period is also done with extend model. The estimation results with portfolio balance variable are shown in Figure 9 and Figure 10. The results indicate that the sovereign spread shock has significant effect on the portfolio investment of foreign investors when the estimation focuses on sub sample period. Once the CDS spread surges, net portfolio liability growth rate starts to increase and reaches its peak of about 0.04 percentage point in fourth quarter. Then it decreases for following quarters but the responses remain positive in twenty periods. Cumulatively, portfolio balance increases by about 0.21 percent in ten quarters. The results indicate that foreign investors invest more or domestic investors invest much less when credit risk of the sovereign increases.

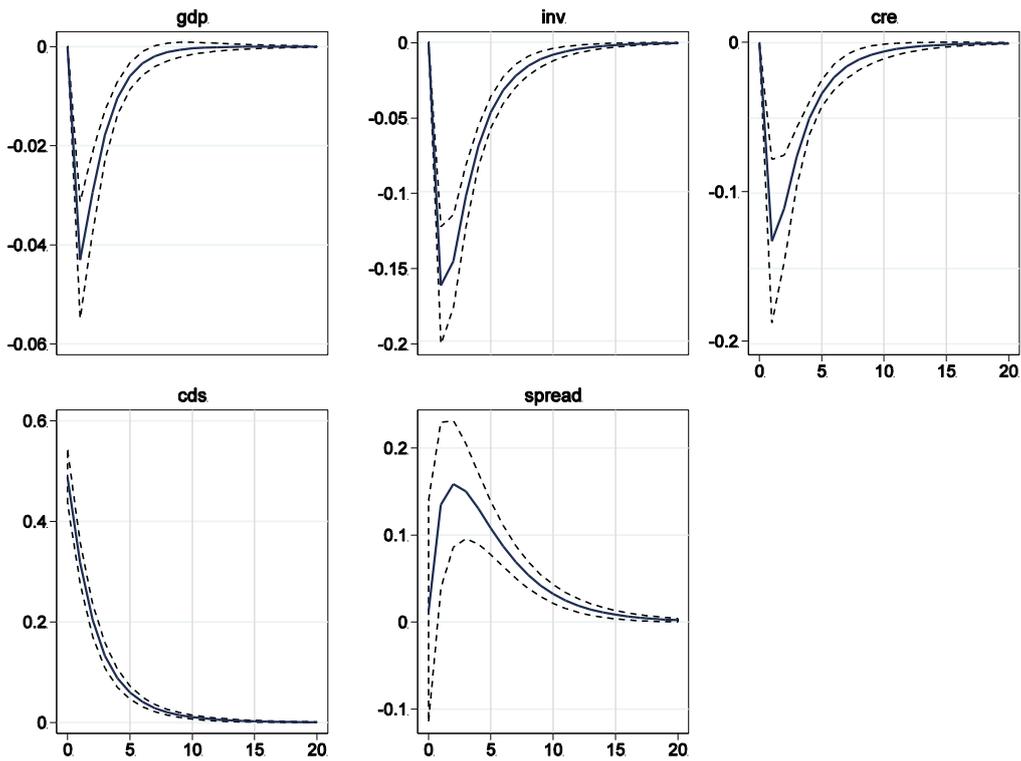


Figure 7. Subsample baseline model IRF to CDS spread shock

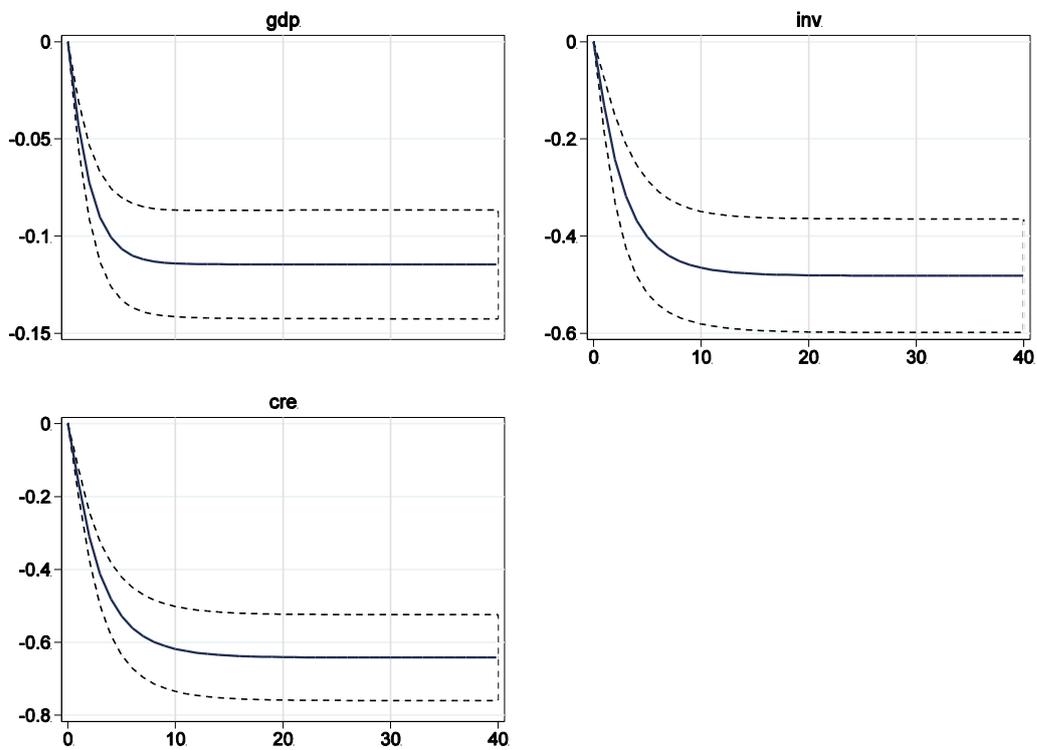


Figure 8. Subsample baseline model cumulative IRF to CDS spread shock

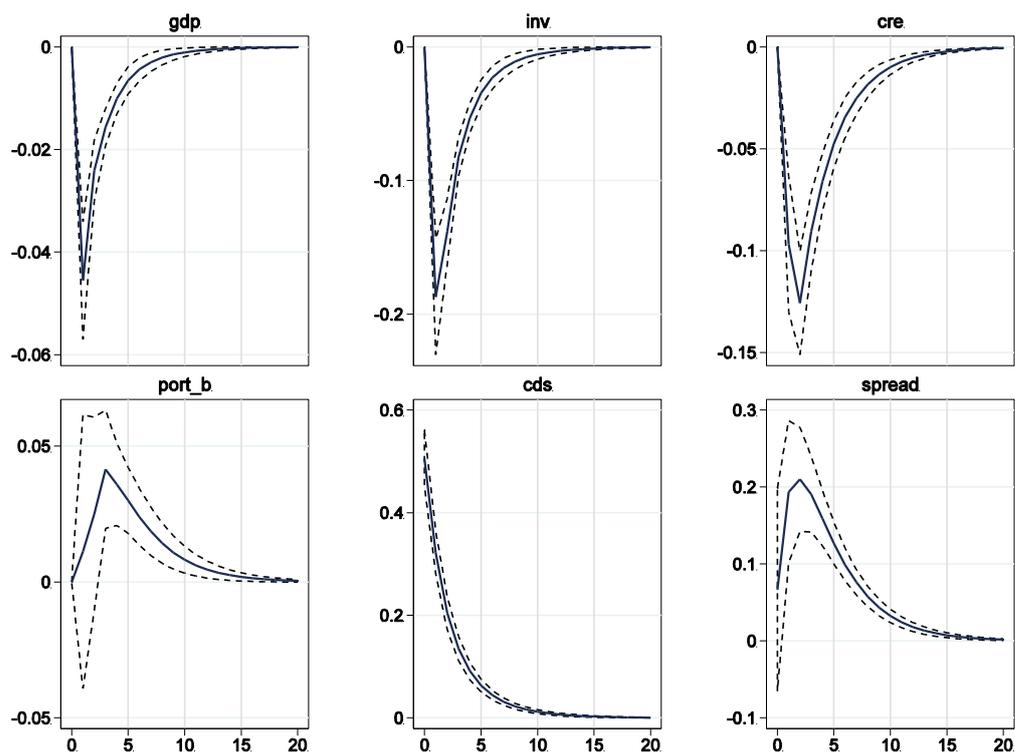


Figure 9. Subsample model with portfolio balance IRF to CDS spread shock

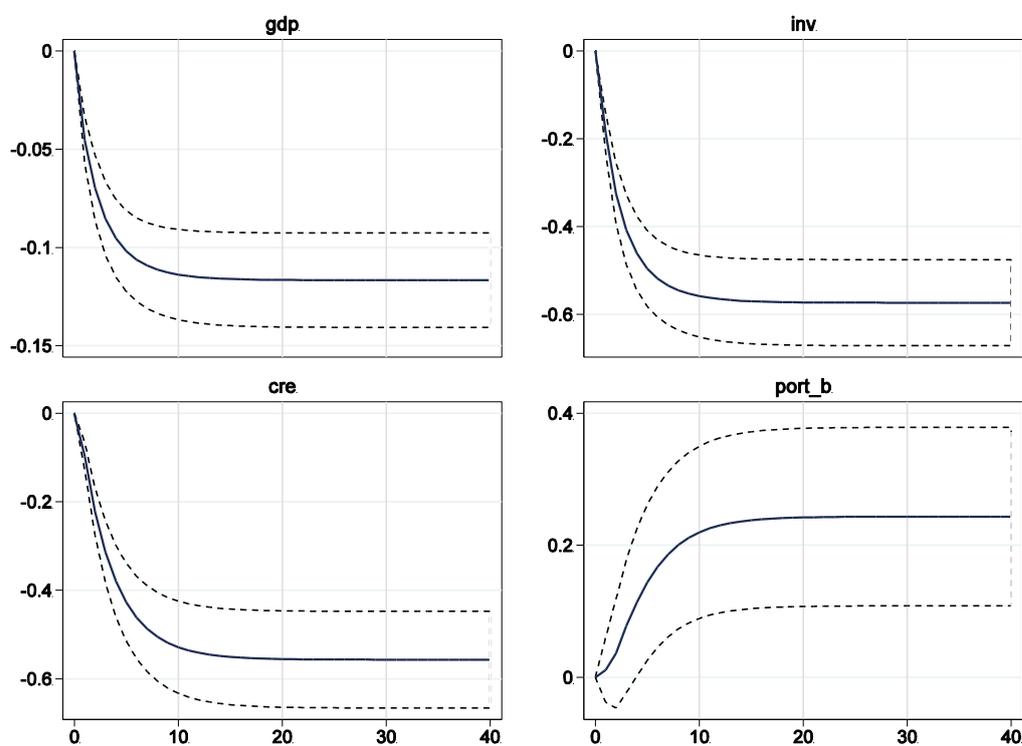


Figure 10. Subsample model with portfolio balance cumulative IRF to CDS spread shock

4.4. Robustness Check

The economic crisis hit South American sovereigns in 2002 caused extraordinary increase in CDS spreads of the sovereigns. And among the samples of this study, CDS spread of Brazil in the period excessively surged in 2002–2003 period. To avoid biased results due to this crisis, robustness check is carried out by excluding this period from estimation sample of Brazil. The results show that GDP growth rate decreases to -0.1 percentage point in next quarter and investment growth rate drops to about -0.4 percentage point. The domestic credit variable also goes down to -0.4 percentage point. And domestic credit still increased to about 0.1 percent in the very period that shock hits and slowly goes down to zero for twenty quarters. The results are all significant while the level of impact are somehow decreased comparing to the original results.

5. Conclusion

This paper investigated how increasing in sovereign CDS spread affects the domestic economy. The CDS spread shock is found to have significant effects on sovereign economic activities. Important finding is that sovereign risk shock surges its domestic bank lending–borrowing spread while it makes real sector growth rate fall to negative value. However, including portfolio balance variable in extended model, the shock has no significant effect.

Subsample analysis which focuses on period before 2008 global financial crisis shows that the impacts of shock are somehow different to full sample period results. Increase in sovereign CDS spread has less impact on output, investment and credit. But interest result is that domestic bank spread increases more. This may suggest that other channels than bank balance sheet would become more important in transmission of sovereign credit risk shock.

The overall results of this paper demonstrate that banking sector plays a role of transmission channel of sovereign CDS spread shock flowing into macro economy. And increase in sovereign spread has negative effects on business cycle of emerging market economies. The finding has important implication for understanding interaction of financial and real sector, which is important issue for both economics and policy making, while world remain in recession for about decade after global financial crisis hits.

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국가 신용리스크가 신흥국 경제에 미치는 영향

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초록

본 논문은 국가 신용리스크가 상승하는 충격이 발생하였을 때 신흥국 경기변동에 미치는 영향을 탐구하였다. 이를 위해 실물경제는 물론이고 금융부문의 변수를 포함하여 패널 벡터 자기회귀 모형(Panel VAR)을 통해 실증 분석을 실시하였다. 국가 신용리스크 정도를 나타내기 위하여 국가 신용부도스왑(CDS) 스프레드를 이용하였으며, 특히 은행의 예금금리-대출금리간 스프레드를 변수로 사용하여 충격이 국가 경기변동으로 전달되는 데에 은행 대차대조표 경로가 유효하게 작용하는 가를 살펴보았다. 본 연구를 통해 (1) 국가 스프레드 충격은 해당 국가의 GDP, 투자 그리고 국내신용에 부정적인 영향을 미치며 (2) 동시에 국내 은행 스프레드를 증가시킴을 알 수 있었는데, 이는 충격의 영향이 은행 부문을 통하여 경제 전반에 전달됨을 의미한다고 볼 수 있다. 또한 (3) 분석 대상 시기를 2008년 금융위기 이전으로 집중하였을 때, 전 기간 분석 결과에 비해 실물 경제와 신용에 미치는 영향의 크기가 작았으나 은행 스프레드는 오히려 더 크게 증가하며 확장 모델 변수인 포트폴리오 수지 또한 증가함을 알 수 있었다.

주요어: 국가 신용위험, 국가 신용부도스왑 스프레드, 은행 대차대조표 효과, 신흥국 경기변동

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