경제학석사학위논문

Change of Credit Supply Channel During the 2008 Global Financial Crisis

2013년 2월

서울대학교 대학원

경제학부 경제학전공

김 준 엽

Change of Credit Supply Channel During the 2008 Global Financial Crisis

지도교수 김 소 영

이 논문을 경제학석사 학위논문으로 제출함

2013년 2월

서울대학교 대학원

경제학부 경제학전공

김 준 엽

김준엽의 경제학석사 학위논문을 인준함

2013년 2월

위 원 장 윤 택 (인)

부 위 원 장 김 소 영 (인)

위 원 김 재 영 (인)

Change of Credit Supply Channel
During the 2008 Global Financial Crisis

ABSTRACT

This paper elucidates that there exists (weak) substitution relationship between a bank loan (BL) channel and a corporate bond (CB) channel confirmed by analyses of multi-national data. The degree of substitution seems to be higher after the financial crisis. In particular, this counter-cyclicality between the BL and CB appears more clearly under the GDP shock. Two of key results, i) higher level of substitution between BL and CB channel after a macroeconomic impact ii) the consistent counter-cyclicality between CB and GDP growth rates, provide a policy implication. Thus, if CB markets are developed and controlled efficiently with minimization of detrimental effects caused by default risks, a CB channel would play an important role in funding credits for firms when there is illiquidity in a bank financing channel.

Keyword: Credit Financing Channel, Bank Loan, Corporate Bond, Substitution Relationship, Global Financial Crisis

Student Number: 2011 – 20170

Contents

Figures

Tables

1. Introduction

Since the 2008 global financial crisis, credit supply channels through financial intermediaries, banks, to non-financial firms have been constrained. This financial friction in banking sector has made these firms to find alternative channels of financing. According to the Financial Times, $120bn of corporate bond was issued even for one month, August 2012.[1] Moreover, The Economist pointed out that banks have not been able to lend enough money for firms because of the tightened regulations on banks' balance sheets and the concern about higher fund raising cost of banks themselves.[2] The substitution between credit financing channels under the economic and financial recessions has been also captured by academia. According to Adrian, Colla, and Shin (2012), a corporate direct financing channel of the US firms described by corporate bond volume has expanded since the 2008 global financial crisis. The authors argue that this increase of corporate bond issuing of US firms has tended to "make up" the decline of the credit supplied by the banking sector. The shift of the financing composition of firms caused by the constrained credit supply from intermediated institutions is supported by several literatures such as Kashyap, Stein, and Wilcox (1993), Baumann, Hoggarth and Pain (2005), and Becker and Ivashina (2011).

However, it is not sure until when this kind of "disintermediation" would be continuous. Moreover, there is lack of evidence that justifies this kind of financing channel shift in fundamental one. The reason is that current situation seems to be happened by that large scale of investment fund cannot find profitable investment markets because of low key interest rate and too much low yield rate of riskless assets such as U.S Treasury bonds. Furthermore, larger firms tend to issue corporate debt with much higher volume. Thus, the larger firm size is, the easier bond financing is (Denis and Mihov (2003), Adrian, Colla, and Shin (2012)).

---

[1] Michel Stothard and Mary Watkins, "Corporate Debt Issuance Red Hot in August," Financial Times, 26 August 2012

[2] "Buttonwood: Money for Nothing," The Economist, 4 August 2012

Having various sources of the credit supply, nevertheless, would be an effective strategy for firms regarding the perspective of risk allocation or risk hedging. In addition, if alternative channels become vitalized as much as the intermediary financing, this would play an essential role in alleviating systemic risk, which is triggered by financial market crisis. Furthermore, as mentioned in the beginning, the substitution between two funding sources has occurred in real economy. To explain this substitution theoretically, Adrian, Colla, and Shin (2012) suggests a model using Value at Risk. Also, De Fiore and Uhlig (2011, 2012) builds a dynamic stochastic general equilibrium (DSGE) model to present an optimal choice of the external financing channel among alternatives. In particular, De Fiore and Uhlig (2012) provides three "financial shocks" to affect firms' decision on whether they modify their debt composition: higher bank financing cost, lower "capital quality", and higher economic instability. The second and the third factors are also introduced in Gertler and Karadi (2011) and in Christiano, Motto, and Rostagno (2010) respectively. De Fiore and Uhlig (2012) finds that ratio of each financing channel among total credit pool becomes changed when banking credit cost increases that is caused by higher inefficiency of banks. Under this circumstance, the authors construct a DSGE model replicating macroeconomic situation. They point out that detrimental effects on investment and output become amplified if there is no bond financing channel. Furthermore, De Fiore and Uhlig (2011) mainly focuses on comparison between the US financing structure and EU area in terms of accessibility to corporate credit risk information. This paper argues that the share of bank loans of the US firms among total debt composition is relatively lower than that of the Eurozone firms because European governments put more weight on the role of banks to provide credit information of firms.

In the case of Holmstrom and Tirole (1997), wealth level is positively related to possibilities of direct financing. This means that a firm with higher net worth would have more chances to enter the debt market such as corporate bonds. They also premise a remark that banks have stronger monitoring power to financial conditions of firms compared to private investors, who buy corporate bonds. This

means that corporations with large volume of net financial capacity have incentives to expand the composition of funding through direct financing. This result is also consistent with the argument of Repullo and Suarez (2004).

Becker and Ivashina (2011) insists that substitution between bank loan and corporate bond is mainly caused by credit supply channel when there are tightening credit lending standards, larger volume of non-performing loans, and smaller volume of total credit scale. Furthermore, the authors explain that the changes of substitution level between the bank finance and external finance provides a signal forecasting the contraction of credit supply to both firms that can and cannot access to public bond markets. Adrian, Colla, and Shin (2012) describes that "larger and tangible assets" and better credit rating are two of main factors that play a significant role in bearing the drastically lower credit supply during the financial crisis. This implies that firms having conditions for entering into both direct and indirect financing source are more sustainable even in financial downturn.

Many pieces of the previous research, however, usually focus on an individual country or a specific region such as the United States (US) and European Union (EU). The composition of credit source of non-financial firms in the US is a kind of exceptional case. According to the US Flow of Funds, the ratio of corporate bond financing of these firms is more than 50% among the total credit. Furthermore, the composition of credits are various even within Europe according to data, which will be provided in Section 2. This means that it is necessary to examine the trends of more countries in different regions to confirm whether the issues mentioned above are common in credit financing channel (of each country). This paper will focus on the grasp characteristics of credit financing channel changes during the recent financial crisis. To do this, it will be confirmed whether there exists a substitution relationship between bank loan and corporate bond in non-financial firms or private sectors of 20 sample countries.[3] Then, in these 20 countries, it will

[3] Australia, Brazil, Finland, France, Germany, Greece, Hong Kong, Ireland, Italy, Japan, Mexico, Netherlands, Norway, Portugal, Republic of Korea, Spain, Sweden, Thailand, United Kingdom, United States

be examined whether the degree of this substitution becomes higher since the 2008 financial crisis. These will be implemented in Section 2 and Section 3 through cross correlation estimations, regression analyses, Granger Causality test, and impulse-response functions derived by vector autoregression (VAR) models with the Cholesky Decomposition.

2. Data Analysis

2.1. Data Description

For multi-national analyses, I select countries with following two criteria.[4]

First, among countries surveyed in *12C. Corporate Issuers – 12. International Debt Securities by Nationality of Issuer – Securities Statistics and Syndicated Loans – Securities – Bank for International Settlements*, I choose countries satisfying the following two conditions:

* All corporate bond outstanding volume data exist during Q1 2000 ~ Q4 2011.
* Countries also surveyed in *16B. Financial Institutions and Corporate Issuers – 16. Domestic Debt Securities by Sector and Residence of Issuer – Securities – Bank for International Settlements*

Second, among the countries in the first criterion, countries providing two categories of data – bank loan to non-financial firms (or private sector)[5] outstanding volume and real GDP growth rate – from Q1 2000 to Q4 2011[6] are become the subjects of this research.

These 20 subject countries are divided with four groups in terms of the average ratio of corporate bond volume (outstanding) among total credit pool during total period such as,

$$Ratio\ (\%) = \frac{Corporate\ \ Bond\ Volume\ (Outstanding)}{Bank\ Lending\ Volume\ (Outstanding) + Corporate\ \ Bond\ Volume\ (Outstanding)} \times 100.$$

Through this calculation, Group 1 (G1) is defined as countries that have the ratio larger than 40%. Also, Group 2 (G2) includes the countries with value higher than

[4] More specific information about data sources is provided in Appendix I.

[5] Because of the limit of data sources, there are two types of bank-lending as follows.

<Bank Lending to Total Private Sector>	<Bank Lending to Non-Financial Corporation>
Brazil, Finland, Germany, Hong Kong, Japan, Mexico, Thailand	Australia, France, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, United Kingdom, United States, Republic of Korea

[6] Some countries – Greece, Ireland, Mexico, Republic of Korea, Spain – have missing data. Data period setting information is explained in Appendix I.

30% and under 40%. Countries in Group 3 (G3) have the ratio more than 20% and fewer than 30%. The last group, Group 4 (G4), indicates the country category having the value under 20%. The country division in each group is informed in Table 1.

Period	Average Ratio (%)	Category 1 by Ratio
United States	59.85	Group 1 ($Ratio \geqq 40\%$)
France	46.30	
Greece	35.76	Group 2 ($30\% \leqq Ratio < 40\%$)
Republic of Korea	34.83	
Finland	33.24	
Netherlands	33.00	
Sweden	32.77	
United Kingdom	31.19	
Thailand	30.93	
Mexico	27.38	Group 3 ($20\% \leqq Ratio < 30\%$)
Norway	25.10	
Portugal	22.12	
Italy	22.09	
Japan	17.07	Group 4 ($Ratio < 20\%$)
Australia	12.96	
Germany	7.37	
Brazil	6.95	
Hong Kong	6.25	
Spain	5.11	
Ireland	1.88	

Table 1. Country Group

Along with this quantitative categorization, for Section 2.2 Aggregate Level Analyses, regional groupings are implemented in Table 2.

Period	Category 1: by Ratio	Category 2: by Region
Republic of Korea	G2	Asia – Pacific
Thailand	G2	Asia – Pacific
Japan	G4	Asia – Pacific
Australia	G4	Asia – Pacific
Hong Kong	G4	Asia – Pacific
France	G1	Core Europe
United Kingdom	G2	Core Europe
Germany	G4	Core Europe
Greece	G2	PIIGS Europe

Portugal	G3	PIIGS Europe
Italy	G3	PIIGS Europe
Spain	G4	PIIGS Europe
Ireland	G4	PIIGS Europe
Finland	G2	Other Europe
Netherlands	G2	Other Europe
Sweden	G2	Other Europe
Norway	G3	Other Europe
United States	G1	North and South America
Mexico	G3	North and South America
Brazil	G4	North and South America

Table 2. Country Group by Ratio and Region Standard
(PIIGS stands for Portugal, Italy, Ireland, Greece, and Spain.)

In Category 2, European countries are divided by three subgroups - Core, PIIGS, and Other - reflecting the on-going fiscal crisis. Thus, countries in the core group have had the largest economic volume in terms of GDP and suffered less from the European sovereign debt crisis than countries in PIIGS Europe group. Other Europe group contains the countries, which have smaller economic size compared to the nations in core group and have been relatively less affected by the fiscal crisis.[7]

Units of all volume data are local currencies. This is to minimize the overestimation or underestimation caused by exchange rate. Since all corporate bond volume (outstanding) data from BIS are presented in US Dollar, they are recalculated by exchange rate (end of each quarter) data in International Financial Statistics (August 2012). In order to commit stationarity of time series analysis, all data will be analyzed by growth rate except aggregate level analyses in Section 2.2. Both bank loan growth rate and corporate bond growth rate are provided by natural log difference and seasonally adjusted by moving average method. Most of time series growth rate data sets are stationary during the total periods of review confirmed by the unit-root test. From now on, unless it is specially stated, BL and CB mean bank loan and corporate bond respectively.

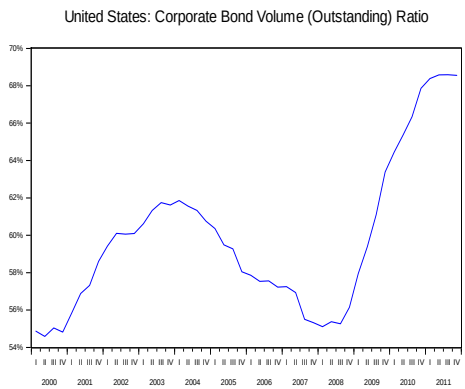
[7] IMF, "World Economic Outlook Database April 2012," <http://www.imf.org/external/pubs/ft/weo/2012/01/weodata/index.aspx> (27 September 2012)

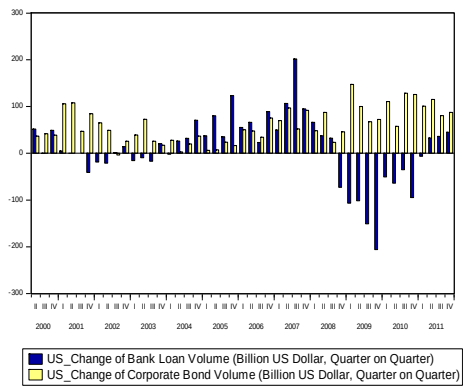
2.2. Aggregate Level Analysis

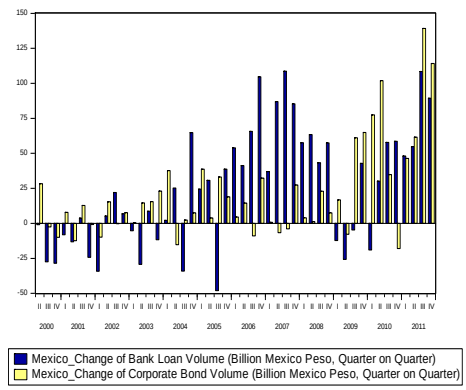
: Corporate Bond Volume Ratio among Total Credit, Change of Bank Loan Volume and Corporate Bond Volume (Quarter on Quarter)

To confirm whether the substitution relationship between bank loan and corporate bond described in Adrian, Colla, and Shin (2012) and De Fiore and Uhlig (2012) is found, values of corporate bond volume ratio among total credit (CBR), change of bank loan volume (BLVC), and change of corporate bond volume (CBVC) are described from Figure 1 to Figure 5 grouped by Category 2. Before the further expansion, in BLCV and CBVC, if the bar in the diagram is denoted at Q2 2000 period, this describes the amount volume change between Q1 2000 and Q2 2000. This is applied to all periods.

2.2.1. North and South America Group







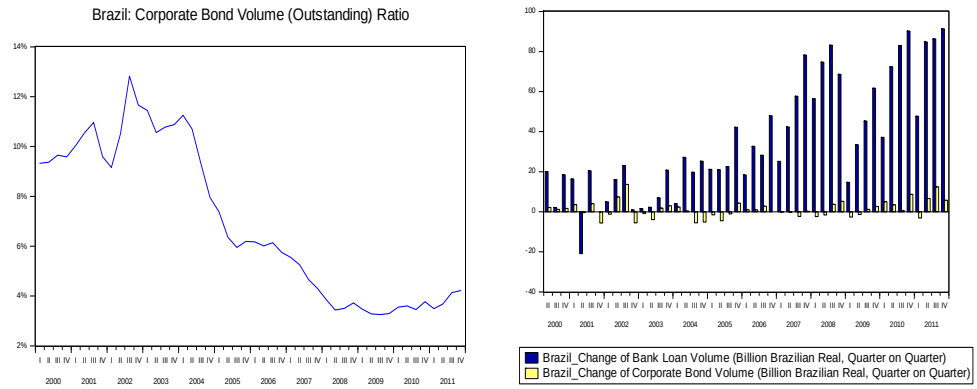


Figure 1. North and South America Group: US (G1), Mexico (G3), Brazil (G4)

According to Figure 1, US and Mexico show similar trends both in CBR during all periods. However, as regarding the BLVC and CBVC from the end of 2008, a reason of trends similarity between two countries seems to be somewhat different. On the one hand, BL volume change of US has stayed negative until the beginning of 2011. On the other hand, CB volume change of US has been positive until Q4 2011. That is why CBR has become increased since Q3 2008. By the way, in Mexico, net volume of both BL and CB has been positive except for four periods since Q3 2008. That is, the overall incremental of CBR comes from the larger amount of CBVC compared to BLVC. In the meantime, the financing channel in Brazil seems to depend on BL mostly. Although the BL data of Brazil includes lending to all private sectors, the data of BL in Mexico also contains all lending amounts of commercial banks to private sectors. Thus, at least, it may be stated that the CB channel in Brazil is much less developed compared to other two North American countries.

2.2.2. European Group: Core, PIIGS, and Others

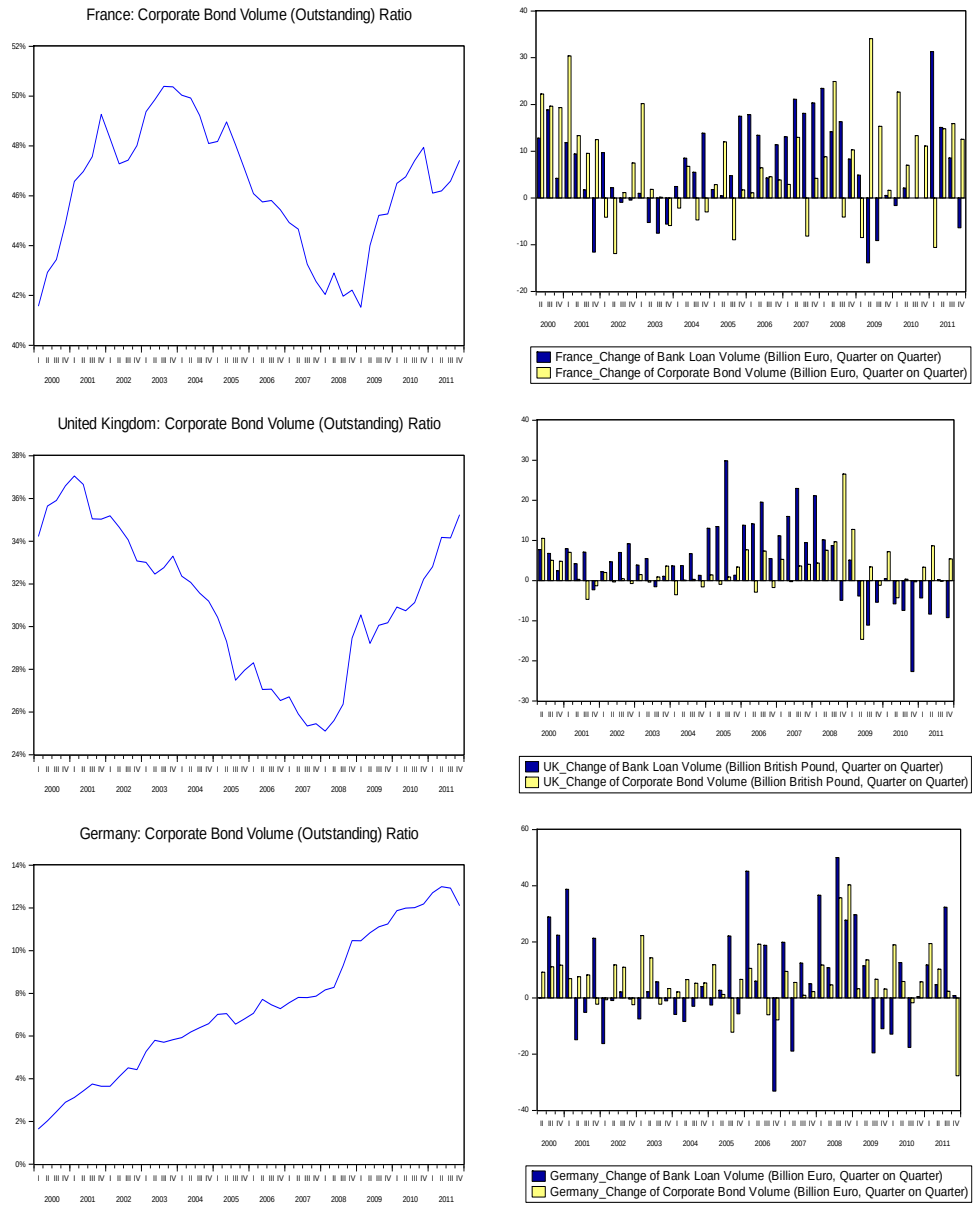


Figure 2. Core Europe Group: France (G1), United Kingdom (G2), Germany (G4)

In Figure 2, the CBR, BLVC, and CBVC of the core European countries are described. Overall trends of CBRs of France and UK move similarly. From Q1 2003 to around beginning of the financial crisis, Q1 2008 and Q1 2009, CRBs

become lower continuously. The CBRs of two countries have generally increased since these periods. The movement is also consistent with the case of the US. The sources of this, nonetheless, are distinct. In France, both net BL volume and net CB volume are stayed in positive level in the most of the early stage of the financial crisis, from Q1 2008 to Q4 2008. However, from Q1 2009, most of the CBR increase seems to be caused by positive net CB volume. Compared to the CBVC, the net BLVC is quite small or similar to those of CB (except Q1 2011), which countervail changes of BL and CB. The case of the UK is somewhat opposite. Thus, the rising of CBR values from Q1 2009 is originated from the fact that BLVC negatively with much larger absolute size than CBVC. Dissimilar from above two core European countries, the CB financing channel in Germany still plays in tenuous role in funding credits. Although the BL volume data of Germany consists of bank lending amounts to all private sectors, low level of CB channel may be justified by high reliance on banking sectors in credit market of Germany. Under this circumstance, it is obscured to state that continuous increasing in CBR is caused by a drastic shift between BL channel and CB channel.

For the analyses of the countries in PIIGS Europe Group, they are divided with two sub-groups, which are presented in Figure 3-1 and Figure 3-2. The former includes the countries having higher than 20% of CBR on average such as Greece, Portugal, and Italy. The latter contains countries having CBR fewer than 20% on average such as Spain and Ireland. The CBR of Greece seems to increase in principle until Q1 2010. However, higher CBR in 2009 is caused not by positive CBVC but by negative level BLVC. This fact indicates that since Q4 2009 when sovereign-debt crisis of Greece began in earnest, both financing channels have not functioned well to supply credits into non-financial firms. In the meantime, the CBR of Portugal has been increased on the whole since 2004 with some fluctuations. However, it is difficult to evaluate that one channel replaces the other one significantly in Portugal. In particular, since Q3 2009, the declination of net BL volume has not been cancelled out by CB financing. Thus, the continuous CBR rise of Portugal from the second half of 2009 is mainly caused by larger negative

volume change of BL. Net BLVC and CBVC in Italy from 2009 to 2011 shows clearer substitute relationship between two financing channels. This characteristic, nevertheless, includes two opposite aspect.

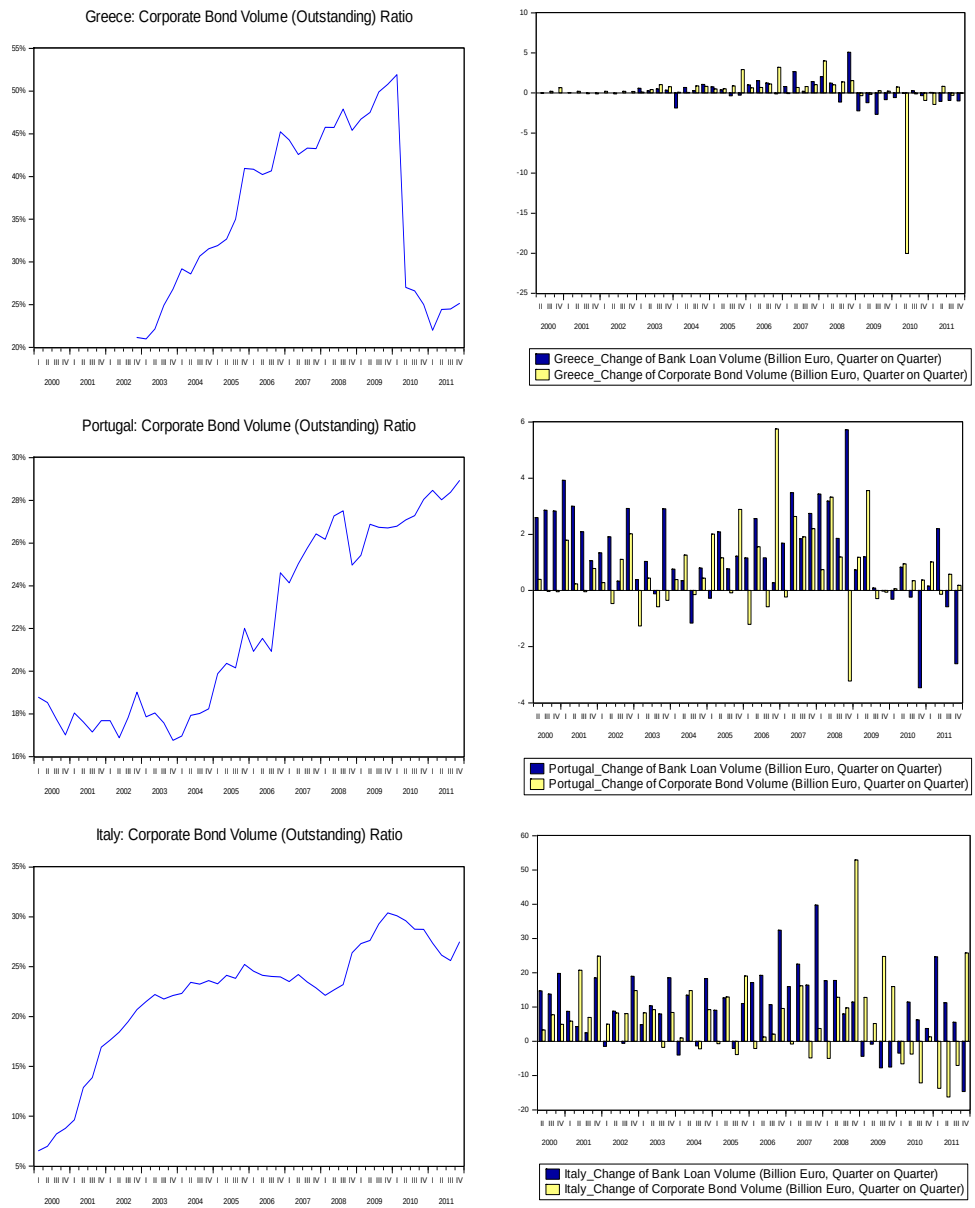


Figure 3-1. PIIGS Europe Group (1): Greece (G2), Portugal (G3), Italy (G3)

Thus in 2009, the CB channel compensates the loss of credit from the BL channel. On the contrary, in 2010 and 2011, funding through the BL mutes the decreasing credit supply through the CB channel. The movement of the CBR of Italy from 2009 reflects this relationship shift.

Figure 3-2 describes the situation of the other two PIIGS countries: Spain and Ireland. In both countries, the position of CB as a source of credit supply is quite insubstantial. Most of CBR changes are affected by net BLVC. An interesting point is that the BL change of Ireland has stayed positive except for three periods (Q2 2009, Q3 2010, and Q4 2010) after the beginning of the global financial crisis (Q3 2007). Distinguished from Ireland and Spain, it shows that the minus net volume change of BL has been continuing since Q1 2009.

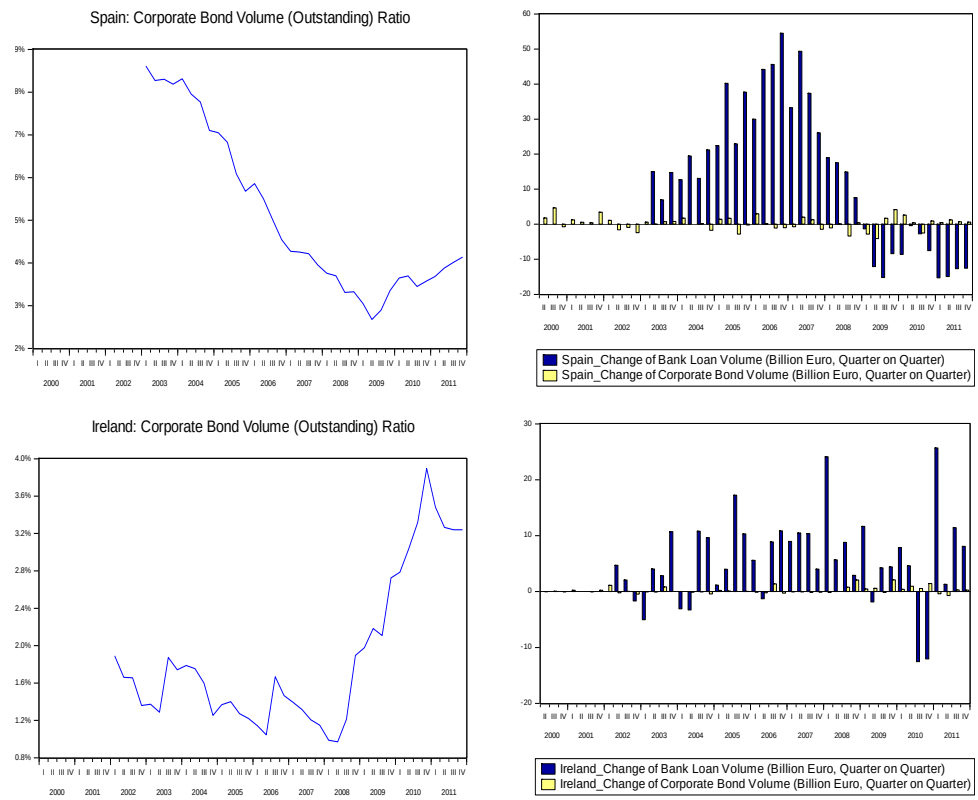
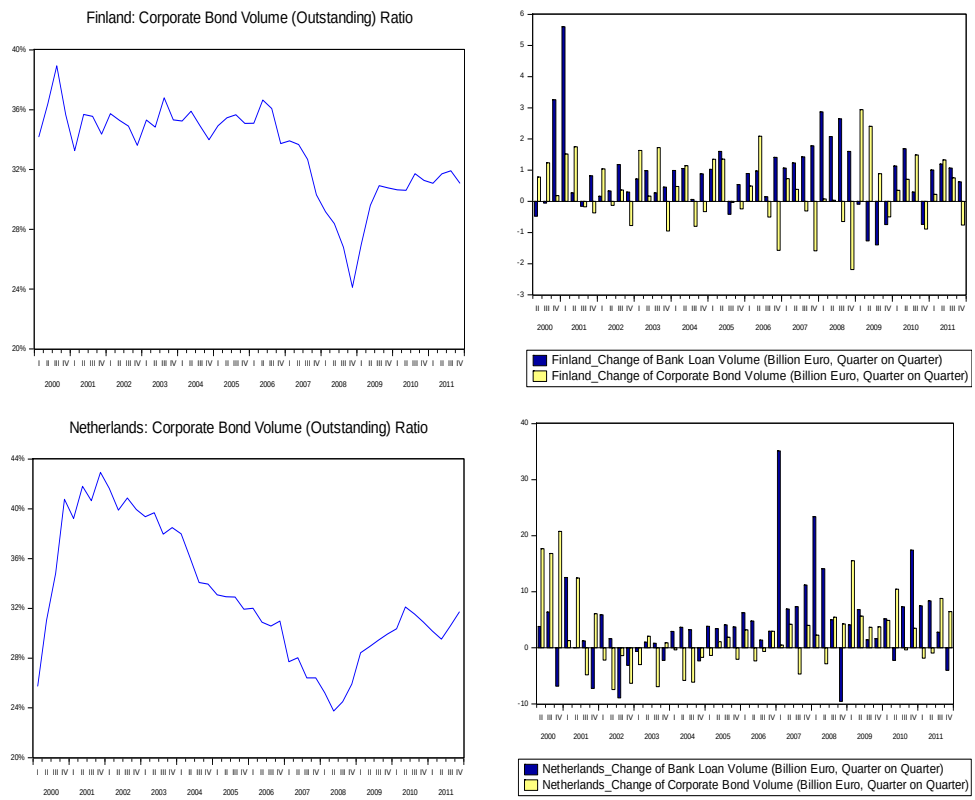


Figure 3-2. PIIGS Europe Group (2): Spain (G4), Ireland (G4)

In Figure 4, there are CBR, BLVC, and CBVC of countries in the Other Europe Group. Since these countries have been less affected by the financial and sovereign debt crisis compared to the countries in the Core and PIIGS Group, it seems that the BL channel in each country is expanded from the beginning of 2000 to around 2008. There are, nevertheless, comparatively larger losses of credits supplied by banking sector between 2008 and 2009. That is why a big sunken shaped area is found in CBR graph of each country. Except Netherlands, the size of minus level BLVC in after the financial crisis periods is unprecedented. Although this credit constraint between 2008 and 2009 may be caused by the European sovereign debt crisis, it is not sure whether the CB will play a more important role in supplying the credit. The reason is that the BL channel seems to regain features of the volume change trend, which shows before the financial crisis.



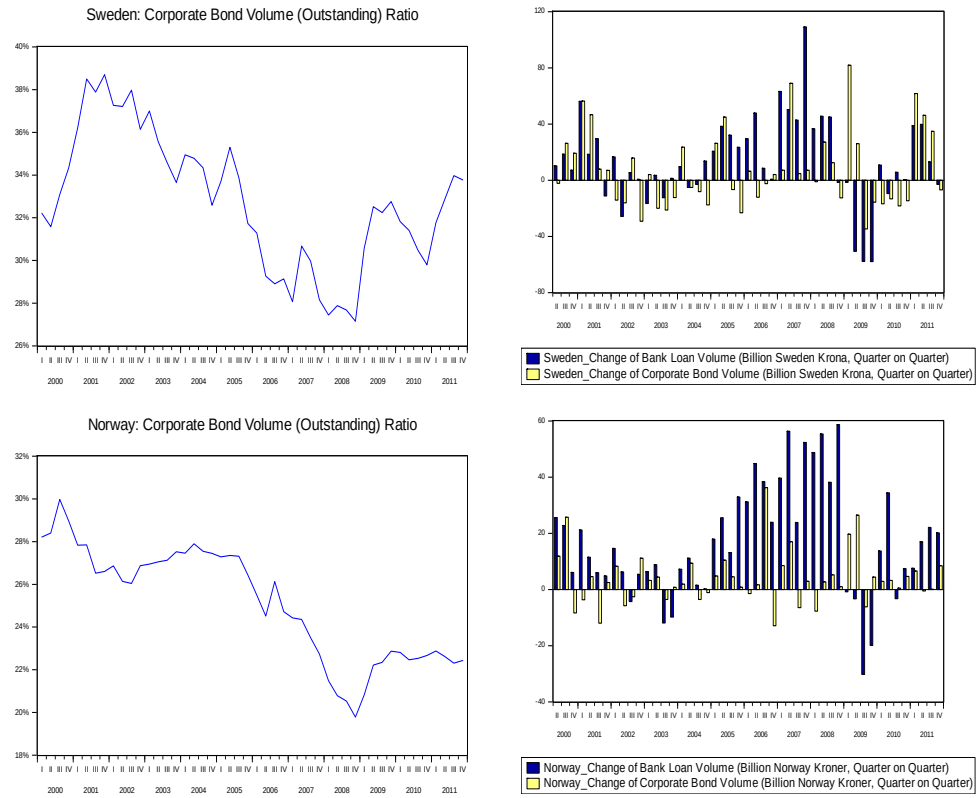


Figure 4. Other Europe Group: Finland (G2), Netherlands (G2), Sweden (G2), Norway (G3)

2.2.3. Asia – Pacific Group

Data of countries in Asia – Pacific Group are described in Figure 5-1 and Figure 5-2. The former consists of countries in G2, and the latter contains countries in G4.

According to Figure 5-1, the CB channel of Republic of Korea as a credit supplier consistently contracts from 2004 and 2007. This trend, by the way, has shifted from 2008; the CB becomes more significant as an alternative credit source. This shifting pattern, however, may be somewhat obscured to assess that the BL is substituted with CB. Although average size of the net BLVC becomes relatively smaller from Q4 2008 compared to the size between Q1 2007 to Q3 2008, this still remains on the positive side. That is, it may be reasonable to comment that increasing CBR since Q2 2008 is mainly caused by the fact that credit supply

volume from the CB channel increases more largely than that from BL channel. Meanwhile, the case of Thailand shows much more obvious substitution relationship between BL and CB during the most of the review period. In addition, the direction of substitution between BL and CB is shifted cyclically. This means that in Thailand, it is difficult to judge whether the shock of the financial crisis causes any credit channel shifts.

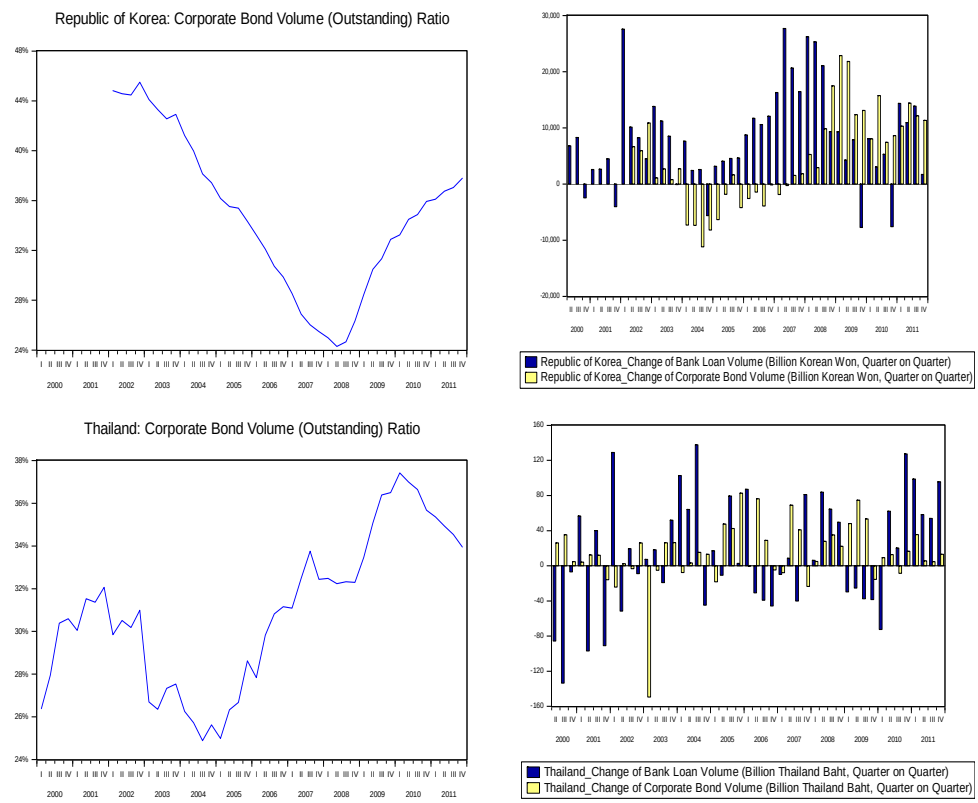


Figure 5-1. Asia – Pacific Group (1): Republic of Korea (G2), Thailand (G2)

According to Figure 5-2, although the average ratio of CB volume among total credit of Japan is under 20%, the substitution between the BL and the CB is presented distinctively in all periods. The noticeable point is that the size of the BLVC and CBVC becomes drastically smaller compared to the periods before Q2 2009. In Australia, negative sign of CBVC is recorded in the data between Q2 2009

to Q4 2010. However, overall size gap between the BLVC and the CBVC is too big to offset. The case of Hong Kong seems to be too much affected by the data source that BL includes all credit supply to private sectors. Compared to the BLVC, CBVC is so little that it is almost impossible to measure the substitution between BL and CB.

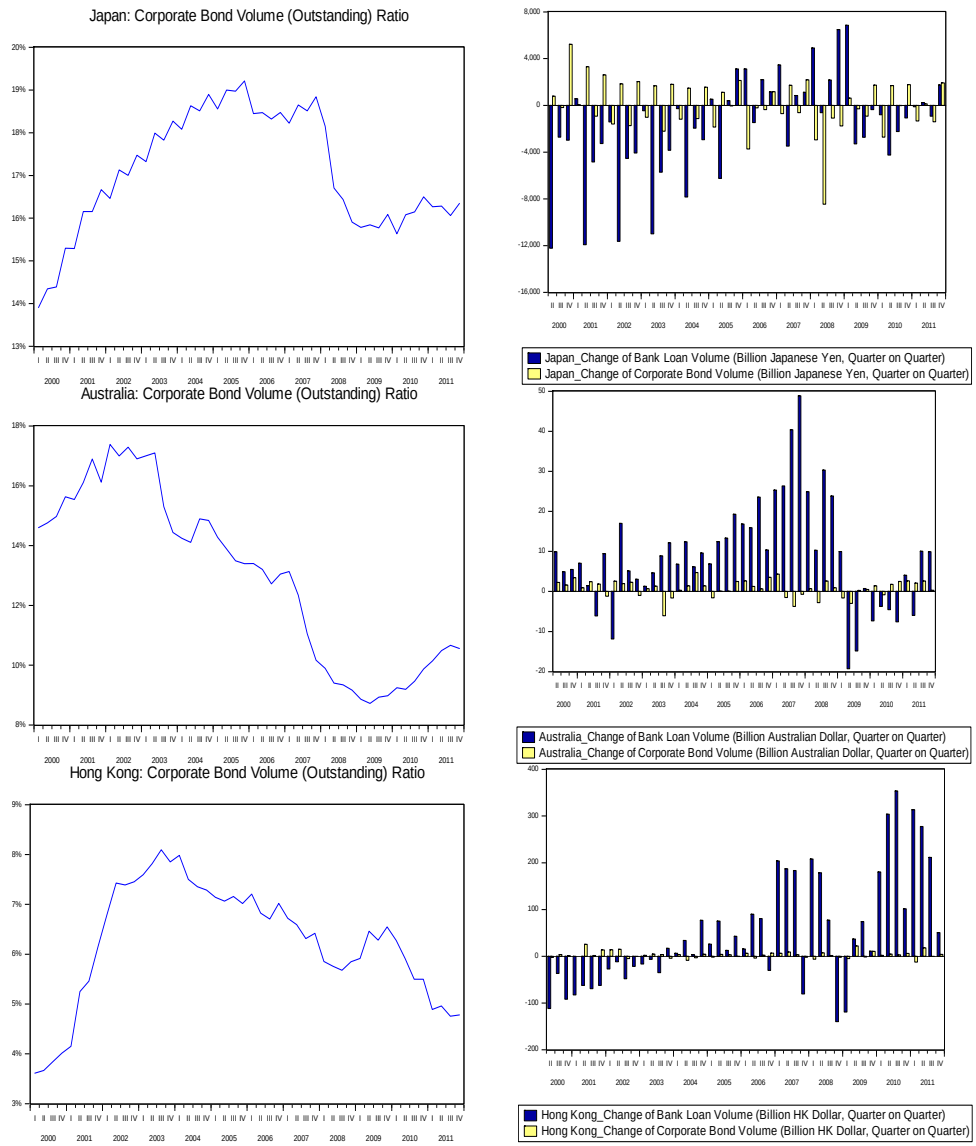


Figure 5-2. Asia – Pacific Group (2): Japan (G4), Australia (G4), Hong Kong (G4)

To conclude, only with outstanding volume change data analysis, it is difficult to judge that the strengthening substitution relationship between the BL and the CB after the financial crisis similar to US case is general in every sample countries. However, it may be reasonable to explain that CB has made up the loss of BL in several countries such as France, United Kingdom, Italy, Finland, Sweden, Netherlands, and Republic of Korea since 2007 and 2008, which may illustrate that CB is substituted for BL weakly.

2.3. Closer Look through Cross-Correlation Estimation, Multivariate Regression, and Granger Causality Test

In this section, to understand the relationship between BL and CB more specifically, the coefficients of cross-correlation between each variable are provided first. Second, regression models benchmarked from De Bondt, Maddaloni, Peydró, and Scopel (2010) are suggested and their results are analyzed. Third, the relationship between each financing channel is analyzed through Granger Causality Tests. All terms – BL, CB – are growth rate basis. To observe the effects of the financial crisis on each relationship, the periods of review are divided with before and after the financial crisis cases as follows:[8]

Before the Financial Crisis:	*Q2 2000 ~ Q2 2007*[9]
After the Financial Crisis:	*Q3 2007 ~ Q4 2011*

[8] It may be true that the effects of the recent financial crisis have started in earnest since Q3 2008, when Lehman Brothers went into bankruptcy. The period, Q3 2007, designated in this paper, is the time when the subprime mortgage crisis became severe. The reason why I choose the "Q3 2007" as the beginning of the financial crisis is that the number of data is too small to do econometric analyses if "Q3 2008" is set for the start of the financial crisis. In addition, Adrian, Colla, and Shin (2012) also chooses "Q3 2007" as the beginning of the financial crisis for its analyses.

[9] The reason why the beginning quarter of the period, "Before the Financial Crisis", is Q2 2000 is that it is necessary to have the outstanding data of Q4 1999 to calculate growth rates of Q1 2000.

2.3.1. Cross - Correlation Estimation

Before the further expansion, it is necessary to define the coefficient of cross-correlation, $r_{xy}(h)$, as follows.

$$r_{xy}(h) = \begin{cases} \dfrac{\frac{\sum_{t=1}^{T-h}(x_t - \bar{x})(y_{t+h} - \bar{y})}{T}}{\sqrt{\frac{\sum_{t=1}^{T}(x_t - \bar{x})^2}{T}} \cdot \sqrt{\frac{\sum_{t=1}^{T}(y_t - \bar{y})^2}{T}}} = \dfrac{\sum_{t=1}^{T-h}(x_t - \bar{x})(y_{t+h} - \bar{y})}{\sqrt{\sum_{t=1}^{T}(x_t - \bar{x})^2 \cdot \sum_{t=1}^{T}(y_t - \bar{y})^2}} & \text{where } h = 0,1,2,\dots \\ \dfrac{\frac{\sum_{t=1}^{T+h}(y_t - \bar{y})(x_{t-h} - \bar{x})}{T}}{\sqrt{\frac{\sum_{t=1}^{T}(x_t - \bar{x})^2}{T}} \cdot \sqrt{\frac{\sum_{t=1}^{T}(y_t - \bar{y})^2}{T}}} = \dfrac{\sum_{t=1}^{T+h}(y_t - \bar{y})(x_{t-h} - \bar{x})}{\sqrt{\sum_{t=1}^{T}(x_t - \bar{x})^2 \cdot \sum_{t=1}^{T}(y_t - \bar{y})^2}} & \text{where } h = 0,1,2,\dots \end{cases}$$

$$T\text{: Total Amount of Periods} = \begin{cases} 29 & (Q2\ 2000 \sim Q2\ 2007) \\ 18 & (Q3\ 2007 \sim Q4\ 2011) \end{cases}$$

Table 3 shows the leading and lagging relationships between each variable. It is conventional that the largest positive (not absolute) value of correlation coefficient of h judges the leading and lagging relationship. "$+h$" sign between $X:Y$ relationship means X leads Y with h periods. " – " sign denotes vice versa. For instance, "+2 (0.5)" describes that X moves two period earlier than Y, and the correlation coefficient between X_t and Y_{t+2} is 0.5. For the criteria of correlation coefficients in terms of each period, it is assumed that leading and lagging eight quarters (as same as two years) guarantee the availability of the cross-correlation coefficients. Overall, the BL growth rate leads the CB growth rate before the financial crisis. After the financial crisis, the CB growth rate moves earlier than the BL growth rate in the additional four countries – US, Thailand, Japan, Brazil, Hong Kong, and Spain –, where the BL growth rate leads the CB growth rate before the financial crisis period. This shift, however, seems to be not dominant but just a partial phenomenon among the sample countries. In the meantime, GDP growth rates move simultaneously or prior to the growth rates of BL and CB before the crisis period. After the crisis, it is difficult to report that there exists a sudden change in lagging to leading relationship.

Country		BL:CB Time Period (Corr. Coefficient)		GDP:BL Time Period (Corr. Coefficient)		GDP:CB Time Period (Corr. Coefficient)	
		Q2 2000 ~ Q2 2007	Q3 2007 ~ Q4 2011	Q2 2000 ~ Q2 2007	Q3 2007 ~ Q4 2011	Q2 2000 ~ Q2 2007	Q3 2007 ~ Q4 2011
G1	United States	+ 8 (0.3965)	- 4 (0.3301)	+ 5 (0.3857)	+ 3 (0.5028)	+ 4 (0.1816)	- 3 (0.3744)
	France	+ 2 (0.5994)	+ 7 (0.3398)	0 (0.5607)	+ 2 (0.5142)	+ 2 (0.3265)	- 6 (0.3124)
G2	Greece	+ 2 (0.3217)	+ 5 (0.3940)	- 1 (0.6909)	- 4 (0.4932)	+ 1 (0.2708)	- 2 (0.5732)
	Republic of Korea	0 (0.7563)	+ 4 (0.3990)	0 (0.4723)	- 7 (0.3416)	+7 (0.3503)	- 2 (0.3459)
	Finland	- 2 (0.3916)	- 4 (0.2839)	+ 1 (0.1802)	+ 3 (0.3833)	+ 8 (0.2410)	- 4 (0.4887)
	Netherlands	+ 1 (0.3215)	+ 4 (0.4455)	0 (0.4899)	0 (0.4855)	+ 1 (0.3063)	- 3 (0.3556)
	Sweden	0 (0.4687)	+ 3 (0.4925)	+ 4 (0.377)	+ 3 (0.5057)	+ 5 (0.3578)	+ 5 (0.6942)
	United Kingdom	+ 2 (0.3753)	+ 3 (0.5219)	+ 7 (0.2373)	+ 8 (0.2609)	0 (0.2215)	+ 3 (0.3533)
	Thailand	+ 7 (0.5109)	- 7 (0.3602)	+ 1 (0.4242)	+ 4 (0.3202)	+ 8 (0.4661)	- 4 (0.2372)
G3	Mexico	- 5 (0.3460)	- 5 (0.3601)	+ 4 (0.4895)	+ 1 (0.4049)	0 (0.4175)	+ 7 (0.4421)
	Norway	0 (0.4735)	+ 2 (0.3129)	+ 4 (0.2401)	+ 4 (0.2892)	- 1 (0.1649)	+ 6 (0.3628)
	Portugal	- 5 (0.2015)	- 2 (0.4438)	- 1 (0.2245)	+ 4 (0.2345)	+ 2 (0.3251)	- 1 (0.5059)
	Italy	+ 3 (0.4214)	+ 4 (0.5432)	0 (0.4338)	+ 3 (0.3482)	+ 3 (0.3090)	- 5 (0.4279)
G4	Japan	+ 5 (0.2658)	- 7 (0.3069)	+ 7 (0.3094)	+ 8 (0.3662)	+ 8 (0.1996)	- 3 (0.5341)
	Australia	+ 8 (0.3462)	+ 7 (0.2579)	+ 3 (0.2446)	+ 3 (0.1922)	+ 4 (0.2429)	- 5 (0.3001)
	Germany	- 2 (0.5299)	0 (0.4547)	0 (0.3536)	+ 4 (0.4542)	+ 8 0.2876	- 6 (0.3017)
	Brazil	0 (0.4144)	- 6 (0.2748)	+ 1 (0.3202)	+ 1 (0.4263)	+ 7 (0.3389)	+ 1 (0.2807)
	Hong Kong	+ 8 (0.0774)	- 4 (0.3505)	+ 5 (0.4132)	+ 1 (0.6009)	+ 5 (0.1486)	+ 8 (0.3853)
	Spain	+ 2 (0.2261)	- 3 (0.2853)	- 6 (0.4322)	+ 8 (0.1399)	+ 3 (0.2350)	0 (0.4450)
	Ireland	0 (0.6636)	+ 5 (0.5455)	- 7 (0.4857)	+ 7 (0.1866)	- 7 (0.3661)	- 5 (0.3377)

Table 3. Leading and Lagging Relationship through Cross-Correlation

: This indicates the lead and lag relationships between each variable, which are statistically significant. " – " describes that a variable in the left side is lagging compared to one in the right side. " + " illustrates that a variable in the left side is preceding compared to one in the right side.

However, the information provided in Table 3 only considers the positive values of correlation coefficients to prove the leading and lagging relationship. Table 4 shows the period h when the largest absolute value of correlation coefficient is recorded.[10] In the case of BL:CB, the largest absolute values of the correlation coefficients change from the positive side to negative side in countries such as France, Finland, Sweden, Thailand, Mexico, Norway, Australia, Brazil, and Ireland after the financial crisis. This correlation shift, nonetheless, may support that the degree of substitution between two financing channels is comparatively stronger after the crisis than before the crisis.

Country		BL:CB Time Period (Corr. Coefficient)		GDP:BL Time Period (Corr. Coefficient)		GDP:CB Time Period (Corr. Coefficient)	
		Q2 2000 ~ Q2 2007	Q3 2007 ~ Q4 2011	Q2 2000 ~ Q2 2007	Q3 2007 ~ Q4 2011	Q2 2000 ~ Q2 2007	Q3 2007 ~ Q4 2011
G1	United States	+ 3 (- 0.5625)	- 4 (0.3301)	+ 5 (0.3857)	- 4 (- 0.6896)	+ 1 (- 0.4243)	- 3 (0.3744)
	France	+ 2 (0.5594)	0 (- 0.5322)	0 (0.5607)	- 4 (- 0.6402)	- 6 (- 0.4011)	- 6 (0.3124)
G2	Greece	0 (- 0.3713)	+ 6 (- 0.5412)	- 1 (0.6909)	- 4 (0.4932)	0 (- 0.3566)	- 2 (0.5732)
	Republic of Korea	0 (0.7563)	+ 4 (0.3990)	0 (0.4723)	- 1 (- 0.4187)	+ 7 (0.3503)	+ 3 (- 0.4780)
	Finland	- 2 (0.3916)	0 (- 0.6650)	- 1 (- 0.2876)	- 2 (- 0.5985)	- 6 (- 0.3068)	- 4 (0.4887)
	Netherlands	+ 1 (0.3215)	+ 4 (0.4455)	0 (0.4899)	- 4 (- 0.5778)	- 5 (- 0.4921)	0 (- 0.5086)
	Sweden	0 (0.4687)	+ 7 (- 0.5891)	+ 4 (0.3770)	- 4 (- 0.7428)	+ 2 (0.3578)	+ 5 (0.6942)
	United Kingdom	+ 2 (0.3753)	+ 2 (0.5219)	+ 4 (- 0.3698)	- 3 (- 0.7058)	+ 6 (- 0.2397)	0 (- 0.6608)
	Thailand	+ 7 (0.5109)	- 2 (- 0.5843)	+ 1 (0.4242)	- 4 (- 0.4274)	- 2 (- 0.4703)	- 2 (0.3582)
G3	Mexico	- 5 (0.3460)	+ 2 (- 0.4169)	+ 4 (0.4895)	- 6 (- 0.5407)	0 (0.4175)	+ 5 (- 0.4989)
	Norway	0 (0.4735)	- 2 (- 0.5435)	+ 7 (0.2333)	- 1 (- 0.3409)	- 1 (0.1649)	+ 2 (- 0.4033)
	Portugal	- 5 (0.2015)	- 2 (0.4438)	- 7 (- 0.4428)	- 7 (0.3526)	+ 2 (0.3251)	- 1 (0.5059)
	Italy	+ 3 (0.4214)	+ 4 (0.5432)	0 (0.4338)	- 5 (- 0.5385)	- 6 (- 0.3986)	- 1 (- 0.6732)

[10] It is noted that h is not the object of analysis for the leading and lagging relationship in Table 4.

G4	Japan	- 2 (- 0.4346)	- 2 (- 0.5016)	+ 7 (0.3094)	0 (- 0.5351)	- 3 (- 0.5724)	- 3 (0.5341)
	Australia	+ 8 (0.3462)	+ 6 (- 0.5208)	+ 3 (0.2446)	- 3 (- 0.3085)	+ 7 (- 0.2884)	- 5 (0.3001)
	Germany	- 1 (0.5299)	0 (0.4547)	0 (0.3536)	- 1 (- 0.6758)	- 6 (- 0.3360)	- 1 (- 0.6902)
	Brazil	0 (0.4144)	- 1 (- 0.4565)	+ 1 (0.3202)	- 2 (- 0.5266)	+ 3 (- 0.4244)	- 1 (- 0.4694)
	Hong Kong	+ 4 (- 0.3205)	+ 2 (- 0.3743)	+ 5 (0.4132)	+ 1 (0.6009)	+ 1 (- 0.5287)	+ 4 (- 0.3978)
	Spain	+ 7 (- 0.3675)	- 3 (0.2853)	- 7 (- 0.5101)	- 5 (- 0.2915)	+ 7 (- 0.2909)	+ 4 (- 0.5433)
	Ireland	0 (0.6636)	- 8 (- 0.5051)	- 7 (0.4857)	- 5 (- 0.4484)	- 7 (0.3661)	0 (- 0.4721)

Table 4. Cross-Correlation (The Largest Absolute Value)

That is, regardless of the leading and lagging relationship between BL and CB, it is reasonable to state that the level of substitution between the BL growth rate and the CB growth rate might become higher after the financial crisis regarding the results of the cross-correlation analyses.

2.3.2. Regression Analysis

In this section, the regression models, which benchmark the regression model of De Bondt, Maddaloni, Peydró, and Scopel (2010), are implemented. De Bondt, Maddaloni, Peydró, and Scopel (2010) builds a panel regression model to measure the effects of financial and macroeconomic variables on the BL growth rate of 12 eurozone countries. The authors set the BL growth rate as a dependent variable and BL growth rate with lag one, 15 BLS[11] variables, and nine macroeconomic and financial variables as independent variables. Applying this model, the following benchmarked regression models are constructed:

[11] BLS stands for "Bank Lending Survey." This is a survey which is supervised by the European Central Bank to check the financing conditions of eurozone countries. More detailed information is provided in De Bondt, Maddaloni, Peydró, and Scopel (2010) and <http://www.ecb.int/stats/money/surveys/lend/html/index.en.html (December 21, 2012)>.

$$\begin{cases} \text{Model I: } BL_t = c + \alpha_1 BL_{t-1} + \alpha_2 CB_{t-h} + \alpha_3 GBY_{t-h} + \alpha_4 GDP_{t-h} + \alpha_5 IR_{t-h} \quad \text{where } h = 0,1 \\ \text{Model II: } CB_t = c + \beta_1 CB_{t-1} + \beta_2 BL_{t-h} + \beta_3 GBY_{t-h} + \beta_4 GDP_{t-h} + \beta_5 IR_{t-h} \quad \text{where } h = 0,1 \end{cases}$$

where $GBY: Goverment\ Bond\ Yield\ Rate, IR: Bank\ Lending\ Rate$[12]

The GBY means the government bond yield rate of each country. The reason why this data set is included because the corporate bond yield rate data of all 20 sample countries are difficult to obtain. Furthermore, according to Duffee (1998), there is a (negative) correlation between treasury yields and spreads of corporate bond yields. The bank lending rate is the simple average of bank lending interest rates to private sectors. In De Bondt, Maddaloni, Peydró, and Scopel (2010), the lag term h is from zero to four. However, regarding the number data, h of this paper is set from zero to one.

Table 5 and Table 6 provide the coefficients of the independent variables of Model I when $h = 0$. Compared between the results during before and after the financial crisis, the degree of substitution between the BL and CB growth rates becomes stronger more than half of countries. The results are presented similarly in Model II and the cases of each regression model when $h = 1$. The former is described in Table 7 and Table 8. Also, others are informed from Table A2 to Table A5 in Appendix II.

[12] International Financial Statistics (August 2012)

Regression Model: Q2 2000 ~ Q2 2007									
	Country	$BL(-1)$	CB	GBY	GDP	IR	C	R^2	$\bar{R}^2$
		Coefficient P-value	Coefficient P-value	Coefficient P-value	Coefficient P-value	Coefficient P-value	Coefficient P-value		
G1	United States	- 0.072	- 0.889**	- 1.845**	0.836	1.124**	3.761	0.628	0.544
		0.712	0.004	0.026	0.191	0.001	0.178		
	France	0.350***	0.092	15.482	3.198**	- 15.499	- 0.580	0.479	0.361
		0.060	0.456	0.887	0.004	0.887	0.819		
G2	Greece	- 0.070	0.438	- 245.435	- 2.630	250.725	- 25.355	0.329	0.024
		0.825	0.142	0.652	0.244	0.645	0.152		
	Republic of Korea	- 0.105	0.002	1.529	- 0.275	2.121	- 16.468	0.491	0.321
		0.644	0.975	0.211	0.677	0.278	0.102		
	Finland	0.327***	0.200	- 424.857***	1.498	425.928***	- 3.913	0.317	0.162
		0.099	0.358	0.096	0.247	0.095	0.478		
	Netherlands	- 0.073	- 0.024	- 376.040**	4.094**	376.774**	- 3.740	0.392	0.254
		0.710	0.804	0.034	0.010	0.034	0.452		
	Sweden	- 0.137	0.081	- 7.047**	- 1.094	5.896**	8.483**	0.599	0.508
		0.524	0.319	0.002	0.245	0.013	0.012		
	United Kingdom	- 0.226	- 0.037	- 3.605**	0.195	1.741**	12.308**	0.363	0.219
		0.335	0.807	0.011	0.822	0.013	0.036		
	Thailand	- 0.278	0.040	0.238	- 0.009	- 2.424**	15.269**	0.292	0.131
		0.180	0.770	0.778	0.991	0.013	0.021		
G3	Mexico	0.159	- 0.104	- 1.014	0.548	0.316	8.172	0.277	0.112
		0.468	0.581	0.254	0.600	0.561	0.131		
	Norway	- 0.044	0.158**	5.547**	0.285	- 7.137**	11.320**	0.828	0.789
		0.800	0.001	0.000	0.166	0.000	0.000		
	Portugal	0.257	0.022	- 109.728	0.067	110.866	- 3.698	0.506	0.394
		0.223	0.629	0.187	0.850	0.183	0.087		
	Italy	0.127	0.013	- 7.050	1.117***	7.137	0.752	0.227	0.051
		0.536	0.717	0.387	0.057	0.382	0.662		
G4	Japan	0.428**	- 0.019	0.888**	- 0.081	- 1.454	1.072	0.712	0.647
		0.022	0.814	0.013	0.562	0.163	0.529		
	Australia	- 0.054	- 0.101	0.335	0.690	1.016	- 8.492	0.079	-0.130
		0.815	0.453	0.837	0.459	0.299	0.537		
	Germany	- 0.324	0.048**	57.721	0.591**	- 57.732	- 0.127	0.368	0.224
		0.103	0.032	0.268	0.031	0.268	0.899		
	Brazil	- 0.412**	0.076	0.140	0.840	- 0.260	16.495**	0.476	0.357
		0.028	0.148	0.687	0.200	0.106	0.003		
	Hong Kong	0.457**	- 0.071	-1.431***	- 0.004	1.696***	- 6.766	0.416	0.283
		0.014	0.485	0.100	0.991	0.078	0.106		
	Spain	- 0.486	- 0.330	- 573.144	5.221	570.076***	15.952	0.454	0.180
		0.117	0.313	0.099***	0.231	0.100	0.207		
	Ireland	0.122	0.072	26.773	0.249	- 29.531	12.917	0.198	- 0.088
		0.664	0.415	0.337	0.696	0.300	0.292		

** 5% Significance Level, *** 10% Significance Level

Table 5. Multivariate Regression Model I when $h = 0$

- Dependent Variable : BL_t
- Independent Variable : $BL_{t-1}, CB_t, GBY_t, GDP_t, IR_t$

Regression Model: Q3 2007 ~ Q4 2011									
	Country	$BL(-1)$	CB	GBY	GDP	IR	C	R^2	$\bar{R}^2$
		Coefficient P-value	Coefficient P-value	Coefficient P-value	Coefficient P-value	Coefficient P-value	Coefficient P-value		
G1	United States	0.429	- 0.423	-1.300	0.431	0.845	0.956	0.565	0.367
		0.312	0.670	0.566	0.570	0.577	0.847		
	France	0.599**	**- 0.400****	22.927	1.260**	- 21.671	- 3.357	0.786	0.689
		0.003	0.008	0.788	0.016	0.799	0.175		
G2	Greece	- 0.207	- 0.016	- 1397.249***	3.626	1397.454***	0.752	0.371	- 0.022
		0.508	0.814	0.071	0.141	0.071	0.872		
	Republic of Korea	0.005**	**0.007**	- 0.016	0.004	0.044**	- 0.180**	0.894	0.845
		0.019	0.800	0.117	0.115	0.004	0.001		
	Finland	0.596**	**- 0.165**	110.608	0.341	- 109.723	- 2.355	0.726	0.601
		0.007	0.206	0.347	0.196	0.350	0.450		
	Netherlands	0.017	**- 0.140**	- 64.743	1.126	65.677	- 0.678	0.315	0.003
		0.962	0.541	0.832	0.230	0.829	0.874		
	Sweden	0.554**	0.178	2.254	0.932	0.326	- 9.542	0.665	0.512
		0.045	0.276	0.245	0.109	0.528	0.269		
	United Kingdom	0.248	- 0.021	- 0.560	0.235	0.845***	0.400	0.747	0.632
		0.389	0.857	0.494	0.677	0.063	0.885		
	Thailand	- 0.160	**- 0.344**	- 0.823	- 0.025	2.797	- 12.666	0.409	0.140
		0.671	0.238	0.697	0.944	0.341	0.329		
G3	Mexico	0.405**	0.184**	- 2.696**	0.789**	1.549**	10.090**	0.793	0.689
		0.016	0.042	0.010	0.012	0.015	0.024		
	Norway	0.700**	**- 0.244**	1.182	0.792***	- 0.926	0.335	0.730	0.607
		0.012	0.168	0.605	0.098	0.751	0.938		
	Portugal	0.465	**- 0.088**	74.019	0.482	- 74.203	1.584	0.373	0.088
		0.181	0.488	0.607	0.532	0.606	0.309		
	Italy	0.453	**-0.030**	1.304	0.079	- 2.055	3.809	0.225	- 0.128
		0.179	0.811	0.994	0.889	0.990	0.357		
G4	Japan	0.091	**- 0.054**	- 1.334	- 0.148	2.236	- 2.071	0.465	0.221
		0.734	0.412	0.466	0.159	0.265	0.309		
	Australia	0.613**	0.222	- 0.019	- 0.057	0.586	- 4.301	0.689	0.548
		0.028	0.438	0.983	0.949	0.431	0.380		
	Germany	0.270	0.019	82.106	- 0.103	- 81.862	- 0.506	0.364	0.075
		0.492	0.712	0.321	0.579	0.321	0.620		
	Brazil	0.473	**- 0.007**	0.535	0.298	- 0.138	2.181	0.746	0.631
		0.167	0.882	0.168	0.275	0.296	0.688		
	Hong Kong	0.502**	**- 0.234**	2.346	1.021**	- 6.144**	31.908**	0.723	0.597
		0.011	0.329	0.337	0.008	0.038	0.029		
	Spain	- 0.120	- 0.170	- 539.417	- 0.180	538.466	5.365	0.299	- 0.019
		0.607	0.361	0.110	0.931	0.110	0.552		
	Ireland	- 0.239	**- 0.082**	4.991**	- 0.194	- 5.100**	4.051	0.552	0.348
		0.295	0.267	0.033	0.746	0.028	0.142		

** 5% Significance Level, *** 10% Significance Level

Table 6. Multivariate Regression Model I when $h = 0$

- Dependent Variable : BL_t
- Independent Variable : $BL_{t-1}, CB_t, GBY_t, GDP_t, IR_t$

Regression Model: Q2 2000 ~ Q2 2007									
	Country	$CB(-1)$	BL	GBY	GDP	IR	C	R^2	$\bar{R}^2$
		Coefficient P-value	Coefficient P-value	Coefficient P-value	Coefficient P-value	Coefficient P-value	Coefficient P-value		
G1	United States	0.425**	- 0.299**	-0.662	0.026	0.469**	1.405	0.624	0.539
		0.022	0.011	0.196	0.945	0.004	0.420		
	France	0.496**	0.297	104.912	- 1.588	- 104.268	- 1.614	0.444	0.318
		0.012	0.340	0.543	0.401	0.545	0.697		
G2	Greece	1.000**	0.000	0.000**	0.000	0.000**	1.000**	1.000	1.000
		0.000	0.610	0.005	0.998	0.005	0.000		
	Republic of Korea	- 0.262	0.249	-1.632	4.011	9.043	- 53.506	0.193	- 0.095
		0.339	0.862	0.804	0.233	0.326	0.227		
	Finland	- 0.218	0.313	43.350	- 1.651	- 42.088	- 1.868	0.231	0.057
		0.349	0.135	0.872	0.184	0.876	0.731		
	Netherlands	0.568**	- 0.673	-118.549	3.775	119.083	- 3.223	0.510	0.399
		0.002	0.126	0.736	0.223	0.735	0.759		
	Sweden	- 0.018	0.509	-8.461	- 1.408	11.227***	- 9.746	0.413	0.280
		0.934	0.403	0.144	0.548	0.053	0.330		
	United Kingdom	- 0.012	- 0.041	- 1.008	0.340	1.588	- 1.629	0.168	- 0.021
		0.947	0.893	0.551	0.785	0.114	0.830		
	Thailand	- 0.005	0.086	2.225	0.045	- 1.080	-2.628	0.145	- 0.050
		0.984	0.793	0.143	0.974	0.460	0.811		
G3	Mexico	- 0.223	- 0.136	0.014	1.821	- 0.309	4.448	0.269	0.102
		0.203	0.560	0.988	0.112	0.597	0.442		
	Norway	- 0.107	2.379**	- 10.966**	- 0.797	14.012**	- 21.288**	0.418	0.286
		0.541	0.002	0.026	0.336	0.026	0.032		
	Portugal	- 0.336	0.731	256.901	- 0.290	- 259.255	13.560	0.156	- 0.036
		0.123	0.436	0.492	0.858	0.489	0.153		
	Italy	- 0.066	0.435	46.843	- 5.601	- 38.715	- 27.555**	0.509	0.398
		0.758	0.735	0.334	0.109	0.426	0.014		
G4	Japan	- 0.205	0.574	- 0.815	0.194	9.183**	- 14.672**	0.438	0.311
		0.318	0.292	0.453	0.625	0.001	0.002		
	Australia	0.158	- 0.291	3.596	- 0.519	1.932	- 34.482***	0.222	0.046
		0.419	0.390	0.149	0.725	0.176	0.093		
	Germany	0.141	2.586	- 340.142	- 2.909	344.150	- 12.190	0.426	0.296
		0.516	0.243	0.469	0.247	0.464	0.206		
	Brazil	0.305	1.768**	- 0.681	- 1.377	0.407	- 15.165	0.270	0.104
		0.162	0.021	0.626	0.588	0.531	0.447		
	Hong Kong	- 0.041	- 0.431	1.414	- 0.197	- 1.085	6.506	0.137	- 0.059
		0.841	0.274	0.455	0.776	0.609	0.487		
	Spain	- 0.117	- 0.062	277.207	3.350	- 273.900	- 14.980	0.225	- 0.127
		0.697	0.835	0.442	0.481	0.446	0.269		
	Ireland	- 0.065	0.717	49.676	- 0.092	- 52.881	12.340	0.118	- 0.175
		0.776	0.428	0.560	0.962	0.553	0.734		

** 5% Significance Level, *** 10% Significance Level

Table 7. Multivariate Regression Model II when $h = 0$

- Dependent Variable : CB_t
- Independent Variable : $CB_{t-1}, BL_t, GBY_t, GDP_t, IR_t$

Regression Model: Q3 2007 ~ Q4 2011									
	Country	$CB(-1)$	BL	GBY	GDP	IR	C	R^2	$\bar{R}^2$
		Coefficient P-value	Coefficient P-value	Coefficient P-value	Coefficient P-value	Coefficient P-value	Coefficient P-value		
G1	United States	- 0.300	- 0.078	- 0.569	0.225	0.162	3.792**	0.246	- 0.097
		0.301	0.383	0.269	0.346	0.563	0.012		
	France	- 0.352	**- 0.812****	140.093	0.870	- 138.511	- 1.854	0.499	0.272
		0.115	0.021	0.356	0.312	0.362	0.689		
G2	Greece	- 0.324	**- 0.436**	- 1162.051	5.659	1156.728	29.616	0.263	- 0.198
		0.450	0.817	0.794	0.678	0.795	0.306		
	Republic of Korea	- 0.305	**- 0.548**	0.051	- 0.016	- 0.058	0.229	0.102	- 0.307
		0.402	0.844	0.650	0.656	0.761	0.761		
	Finland	- 0.001	**- 0.854**	51.315	- 0.781	- 53.277	9.612	0.567	0.371
		0.998	0.237	0.843	0.240	0.836	0.141		
	Netherlands	- 0.314	- 0.276	558.921	- 2.208	- 559.765	7.831	0.427	0.167
		0.239	0.507	0.159	0.123	0.159	0.214		
	Sweden	- 0.095	0.217	2.362	- 1.341	1.231	- 12.525	0.361	0.070
		0.777	0.678	0.579	0.161	0.283	0.513		
	United Kingdom	- 0.384	0.501	0.353	- 4.389**	- 0.286	1.778	0.583	0.393
		0.248	0.596	0.864	0.017	0.820	0.796		
	Thailand	0.012	**- 0.506**	- 0.185	- 0.117	0.154	1.966	0.230	- 0.120
		0.968	0.125	0.925	0.740	0.949	0.866		
G3	Mexico	0.263	1.245***	8.428**	- 1.795***	- 5.087**	- 28.279	0.637	0.456
		0.332	0.094	0.019	0.097	0.013	0.107		
	Norway	- 0.108	**- 0.204**	- 2.201	0.050	2.694	- 1.154	0.107	- 0.298
		0.782	0.645	0.619	0.945	0.635	0.887		
	Portugal	- 0.269	**- 0.018**	- 8.881	1.719	8.820	3.096	0.115	- 0.287
		0.452	0.981	0.980	0.379	0.980	0.389		
	Italy	0.067	**- 0.297**	- 661.775	- 2.143	660.148	9.224	0.483	0.247
		0.911	0.787	0.151	0.430	0.152	0.503		
G4	Japan	- 0.306	**- 1.237**	- 12.466	0.138	4.944	6.504	0.422	0.159
		0.268	0.352	0.109	0.782	0.566	0.453		
	Australia	0.212	- 0.236	- 0.331	1.095	1.038	- 5.785	0.251	- 0.089
		0.540	0.541	0.841	0.393	0.352	0.410		
	Germany	- 0.018	1.039	624.838	- 0.653	- 621.243	- 8.163	0.481	0.245
		0.968	0.582	0.201	0.689	0.203	0.192		
	Brazil	- 0.432	**- 2.711**	2.987	- 3.325	- 1.902***	70.880***	0.339	0.039
		0.219	0.185	0.185	0.126	0.060	0.087		
	Hong Kong	- 0.439	- 0.195	- 4.052	0.760***	2.334	- 8.566	0.456	0.209
		0.084	0.446	0.156	0.094	0.510	0.627		
	Spain	- 0.078	**- 0.522**	- 718.383	3.979	717.337	6.959	0.288	- 0.035
		0.814	0.322	0.280	0.236	0.280	0.636		
	Ireland	- 0.039	**- 1.970*****	3.886	- 4.240***	- 4.995	18.039	0.489	0.256
		0.857	0.093	0.720	0.062	0.642	0.120		

** 5% Significance Level, *** 10% Significance Level

Table 8. Multivariate Regression Model II when $h = 0$

- Dependent Variable : CB_t
- Independent Variable : $CB_{t-1}, BL_t, GBY_t, GDP_t, IR_t$

However, a critical problem is that most of the coefficients are statistically insignificant neither under 95% confidence level nor under 90% confidence level. To manage this problem, two diagnostic analyses are suggested in the following two sections.

2.3.2.1. Multicollinearity Tests

In this section, the multicollinearity tests are implemented in every model and every h. To judge the existence of multicollinearity, variance inflation factor (VIF) is calculated. As a conventional rule of thumb, if VIF of an independent variable X is larger than 10, there is multicollinearity between X and other independent variables. Table 9, Table 10, Table 11, and Table 12 show the results of the multicollinearity tests of Model I ($h = 0$) and Model II ($h = 0$). That is, in more than half of the sample countries, there exists multicollinearity in the bank lending interest rate (IR) and the government bond yield rate (GBY) with other independent variables. This is almost similar to the cases of Model I ($h = 1$) and Model II ($h = 1$). The results are described in Table A5, Table A6, Table A7, and Table A8 in Appendix II.

Q2 2000 ~ Q2 2007						
	Country	$BL(-1)$	CB	GBY	GDP	IR
G1	United States					
	France			√		√
G2	Greece			√		√
	Republic of Korea					
	Finland			√		√
	Netherlands			√		√
	Sweden			√		√
	United Kingdom					
	Thailand					
G3	Mexico					
	Norway			√		√
	Portugal			√		√
	Italy			√		√
G4	Japan					
	Australia					
	Germany			√		√
	Brazil					
	Hong Kong			√		
	Spain					
	Ireland			√		√

Table 9. Multicollinearity Test (Model I when $h = 0$)
: Independent variables having "√" indicates that there exists multicollinearity with other ones. This is judged if variance inflation factor (VIF) is larger than 10.

Q3 2007 ~ Q4 2011						
	Country	$BL(-1)$	CB	GBY	GDP	IR
G1	United States					
	France			√		√
G2	Greece					
	Republic of Korea			√		√
	Finland			√		√
	Netherlands			√		√
	Sweden					
	United Kingdom					
	Thailand					
G3	Mexico					√
	Norway			√		√
	Portugal			√		√
	Italy			√		√
G4	Japan					
	Australia					
	Germany			√		√
	Brazil					
	Hong Kong			√		√
	Spain			√		√
	Ireland			√		√

Table 10. Multicollinearity Test (Model I when $h = 0$)

: Independent variables having "√" indicates that there exists multicollinearity with other ones. This is judged if variance inflation factor (VIF) is larger than 10.

Q2 2000 ~ Q2 2007						
	Country	$CB\ (-1)$	BL	GBY	GDP	IR
G1	United States					
	France			√		√
G2	Greece			√		√
	Republic of Korea					
	Finland			√		√
	Netherlands			√		√
	Sweden			√		√
	United Kingdom					
	Thailand					
G3	Mexico					
	Norway			√		√
	Portugal			√		√
	Italy			√		√
G4	Japan					
	Australia					
	Germany			√		√
	Brazil					
	Hong Kong			√		
	Spain					
	Ireland			√		√

Table 11. Multicollinearity Test (Model II when $h = 0$)

: Independent variables having "√" indicates that there exists multicollinearity with other ones. This is judged if variance inflation factor (VIF) is larger than 10.

Q3 2007 ~ Q4 2011						
	Country	$CB(-1)$	BL	GBY	GDP	IR
G1	United States					
	France			√		√
G2	Greece					
	Republic of Korea			√		√
	Finland			√		√
	Netherlands			√		√
	Sweden					
	United Kingdom					
	Thailand					
G3	Mexico					√
	Norway			√		√
	Portugal			√		√
	Italy			√		√
G4	Japan					
	Australia					
	Germany			√		√
	Brazil					
	Hong Kong			√		√
	Spain			√		√
	Ireland			√		√

Table 12 Multicollinearity Test (Model II when $h = 0$)

: Independent variables having "√" indicates that there exists multicollinearity with other ones. This is judged if variance inflation factor (VIF) is larger than 10.

Although all of the following regression models are constructed to find a model which has more statistically significant coefficients, there is few case to clarify the relationship between BL and CB (statistically).

$$
\begin{cases}
BL_t = c + \alpha_1 BL_{t-1} + \alpha_2 CB_{t-h} + \alpha_3 GBY_{t-h} + \alpha_4 GDP_{t-h} \\
BL_t = c + \alpha_1 BL_{t-1} + \alpha_2 CB_{t-h} + \alpha_4 GDP_{t-h} + \alpha_5 IR_{t-h} \\
BL_t = c + \alpha_1 BL_{t-1} + \alpha_2 CB_{t-h} + \alpha_4 GDP_{t-h} \\
\\
CB_t = c + \beta_1 CB_{t-1} + \beta_2 BL_{t-h} + \beta_3 GBY_{t-h} + \beta_4 GDP_{t-h} \\
CB_t = c + \beta_1 CB_{t-1} + \beta_2 BL_{t-h} + \beta_4 GDP_{t-h} + \beta_5 IR_{t-h} \\
CB_t = c + \beta_1 CB_{t-1} + \beta_2 BL_{t-h} + \beta_4 GDP_{t-h}
\end{cases}
\qquad \text{where } h = 0,1
$$

2.3.2.2. Checking Correlation Coefficients and Estimating Correlation Coefficients of the Modified Regression Model

This paper focuses on the substitution relationship between BL and CB. Thus, although there exist multicollinearity among independent variables except the financing channel variables, there is no problem that the P-value of the coefficients of the BL_{t-h} and CB_{t-h} become valid factors for testing the significance of these predictive coefficients (of the two financing channels). Based on this convention, first, the correlation coefficients among independent variables in Model I and Model II are calculated. In addition, to choose the relatively larger correlation coefficients under the absolute value criteria, 10% significance level is set as a standard of significance judgment.[13]

Modified Model I $(h=0)$ (Dependent Variable: BL_t)				**Modified Model II $(h=0)$ (Dependent Variable: CB_t)**			
Independent Variable: CB_t				Independent Variable: BL_t			
Q2 2000 ~ Q2 2007		Q3 2007 ~ Q4 2011		Q2 2000 ~ Q2 2007		Q3 2007 ~ Q4 2011	
Country	Coefficient P-value	Country	Coefficient P-value	Country	Coefficient P-value	Country	Coefficient P-value
Sweden	0.21** (0.012)	Finland	- 0.38** (0.006)	France	0.70*** (0.056)	Finland	- 1.44** (0.014)
		Thailand	- 0.47*** (0.083)				
Modified Model I $(h=1)$ (Dependent Variable: BL_t)				**Modified Model II $(h=1)$ (Dependent Variable: CB_t)**			
Independent Variable: CB_{t-1}				Independent Variable: BL_{t-1}			
Q2 2000 ~ Q2 2007		Q3 2007 ~ Q4 2011		Q2 2000 ~ Q2 2007		Q3 2007 ~ Q4 2011	
Country	Coefficient P-value	Country	Coefficient P-value	Country	Coefficient P-value	Country	Coefficient P-value
Finland	0.41*** (0.061)	Finland	- 0.33** (0.014)	France	0.74** (0.042)	Netherlands	- 0.94** (0.025)
		UK	0.33*** (0.065)	Sweden	1.43** (0.003)		

** 5% Significance Level, *** 10% Significance Level

Table 13. Predictive Coefficients of BL_{t-h} and CB_{t-h} of the Selected Sample Countries

Second, using the results of the first step, the Modified (Regression) Model I and II excluding the independent variables having relatively higher level of correlation with BL_t and CB_t from Model I and Model II are constructed for every sample

[13] The most of significant correlation coefficients are higher than 0.35 with absolute value term. Also, they are relatively larger than other coefficients.

country and period. Table 13 provides the pieces of information that the predictive coefficients of BL_{t-h} and CB_{t-h} become shifted from insignificant one to significant one after the regression model adjustment. It is true that predictive coefficients of BL_{t-h} and CB_{t-h} become significant when the independent variables having relatively high level of correlation with BL_t or CB_t are not included in Model I or Model II (in one or two sample countries). However, as regarding the situation that the number of samples having significant coefficients either in BL_{t-h} or CB_{t-h} is still too small to judge whether the degree of substitution between two credit financing channels becomes higher or not.

As a result, the multivariate regression analyses implemented in this section do not provide any valid and meaningful pieces of evidence to judge neither whether there exist a substitution relationship between BL and CB nor whether the degree of substitution between two channels is higher.

2.3.3. Granger Causality Test: BL Growth Rate and CB Growth Rate

Table 14 illustrates the results of Granger Causality tests between BL growth rate and CB growth rate. According to the results of the Granger Causality tests, there is no common Granger Causality result between BL growth rate and CB growth rate of the sample countries. Since there exists a statistically significant Grange Causality only in 10 sample countries, it is difficult to find any evidence between two financing channels through this analysis.

Granger Causality Test (Q2 2000 ~ Q4 2011)									
	Country	Lag 1		Lag 2		Lag 3		Lag 4	
		H_A	H_B	H_A	H_B	H_A	H_B	H_A	H_B
G1	France				**		**		
G2	Netherlands		***						**
G3	Italy						**		**
G2	Republic of Korea	**				**	**	**	**
G3	Norway	**		***					
	Portugal							**	
G4	Brazil	***		**		***		***	
	Germany	**		**		**		**	
	Ireland			***					
	Japan			***					
G1	United States								
G2	Greece								
	Finland								
	Sweden								
	Thailand								
	United Kingdom								
G3	Mexico								
G4	Australia								
	Hong Kong								
	Spain								

** *means H is rejected under* 5% significance level., *** 10% *means H is rejected under* significance 10% level.

Table 14. Granger Causality Test

■ Bank Loan Growth Rate – Corporate Bond Growth Rate

H_A : Corporate Bond Growth Rate does not Granger Causes Bank Loan Growth Rate.

H_B : Bank Loan Growth Rate does not Granger Causes Corporate Bond Growth Rate.

2.4. Results and Discussion

Through the data analyses in Section 2, the following fact is derived. Compared with the situation before the financial crisis, the level of substitution between a bank lending channel and a corporate bond financing channel has risen after the financial crisis in many sample countries. The main sources of this shift can be explained with a couple of ways. First, as mentioned in Section 2.2, if the size of the bank financing channel decreases overwhelmingly after the financial crisis compared to the corporate finance channel, this may over-estimate the role of the corporate bond as a credit funding source. Second, the asymmetric information problem may be relevant to this trend shift. According to De Fiore and Uhlig (2012), the reason why the corporate bond market of the US is more developed than that of European countries is that investors can access to firm's credit information more easily in the US. If firms of sample countries try to fund money through direct financing channels after the financial crisis because of the contraction of bank lending channel, they would provide more information about their business conditions and performances even temporarily to the public.

3. Vector Autoregression (VAR) Model

3.1. VAR Model

In this chapter, two types of VAR models are constructed to identify the impulse-response relationship among variables. Since the periods of data are distinguished between "Before the Financial Crisis" and "After the Financial Crisis" as well as Section 2.3, there happens a problem of the small number of time periods.[14] Regarding this, all lags in each VAR model is set to one. Under this circumstance, the model consists of GDP growth rate, BL growth rate, and CB growth rate with two sub-models as follows.

$$\begin{cases} \text{Model III: } \begin{bmatrix} 1 & 0 & 0 \\ a_{21} & 1 & 0 \\ a_{31} & a_{32} & 1 \end{bmatrix} \begin{bmatrix} Y_t \\ B_t \\ C_t \end{bmatrix} = \begin{bmatrix} a_{10} \\ a_{20} \\ a_{30} \end{bmatrix} + \begin{bmatrix} \alpha_{11} & \alpha_{12} & \alpha_{13} \\ \alpha_{21} & \alpha_{22} & \alpha_{23} \\ \alpha_{31} & \alpha_{32} & \alpha_{33} \end{bmatrix} \begin{bmatrix} Y_{t-1} \\ B_{t-1} \\ C_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{bt} \\ \varepsilon_{ct} \end{bmatrix} \\ \text{Model IV: } \begin{bmatrix} 1 & 0 & 0 \\ b_{21} & 1 & 0 \\ b_{31} & b_{32} & 1 \end{bmatrix} \begin{bmatrix} Y_t \\ C_t \\ B_t \end{bmatrix} = \begin{bmatrix} b_{10} \\ b_{20} \\ b_{30} \end{bmatrix} + \begin{bmatrix} \beta_{11} & \beta_{12} & \beta_{13} \\ \beta_{21} & \beta_{22} & \beta_{23} \\ \beta_{31} & \beta_{32} & \beta_{33} \end{bmatrix} \begin{bmatrix} Y_{t-1} \\ C_{t-1} \\ B_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{ct} \\ \varepsilon_{bt} \end{bmatrix} \end{cases}$$

where Y: GDP Growth Rate, B: Bank Loan Growth Rate, C: Corporate Bond Growth Rate

The reason why Y_t is put in the first order is that it is assumed that current financial shock does not affect current real economy. Thus, the models in this section assume that it needs time that shocks in the financing channel of the current period affect the real variables. With the above VAR, impulse-response functions analyses are implemented in the next section.

[14] The number of periods of "Before the Financial Crisis" and "After the Financial Crisis" is 29 and 18 respectively.

3.2. Impulse - Response Analysis

For Model III, Figure 6, Figure 7, and Figure 8 describe the impulse - response relationships of the selected sample countries. Figure 6-1, Figure 7-1, and Figure 8-1 illustrate the impulse – response of the before the financial crisis cases. Moreover, Figure 6-2, Figure 7-2, and Figure 8-2 show the impulse – response of the after the financial crisis cases. Depending on the countries or variables, a trend of each impulse – response seems to be different. This section focus on how the direction of response to shock changes comparing between before and after the financial crisis. For the reference, all of the impulse – response diagrams for Model III and Model IV are provided in Appendix III.

Q2 2000 ~ Q2 2007

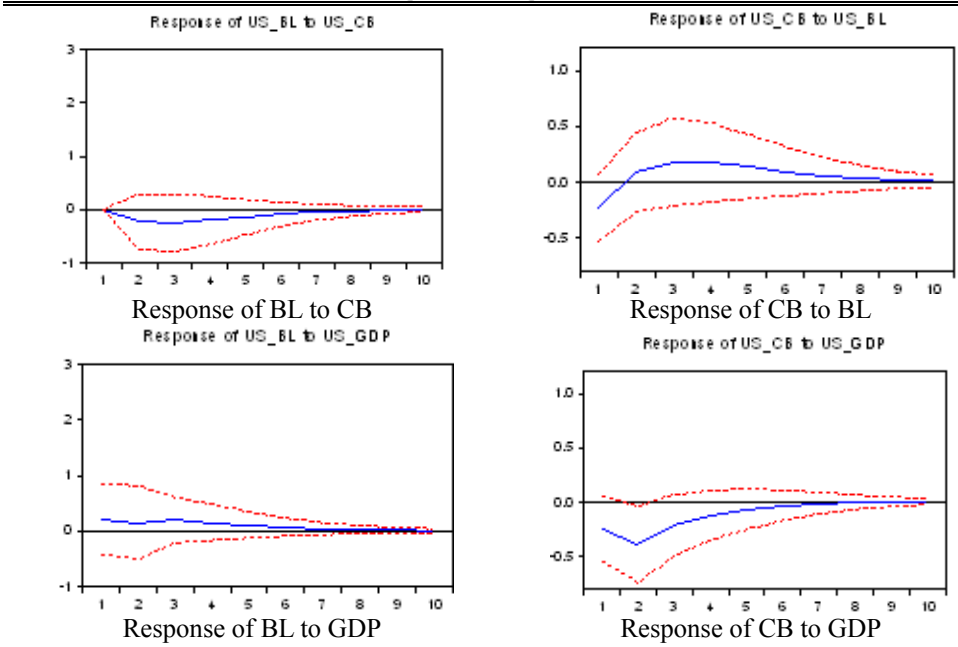


Figure 6-1. US: Impulse – Response Relationship

Q3 2007 ~ Q4 2011

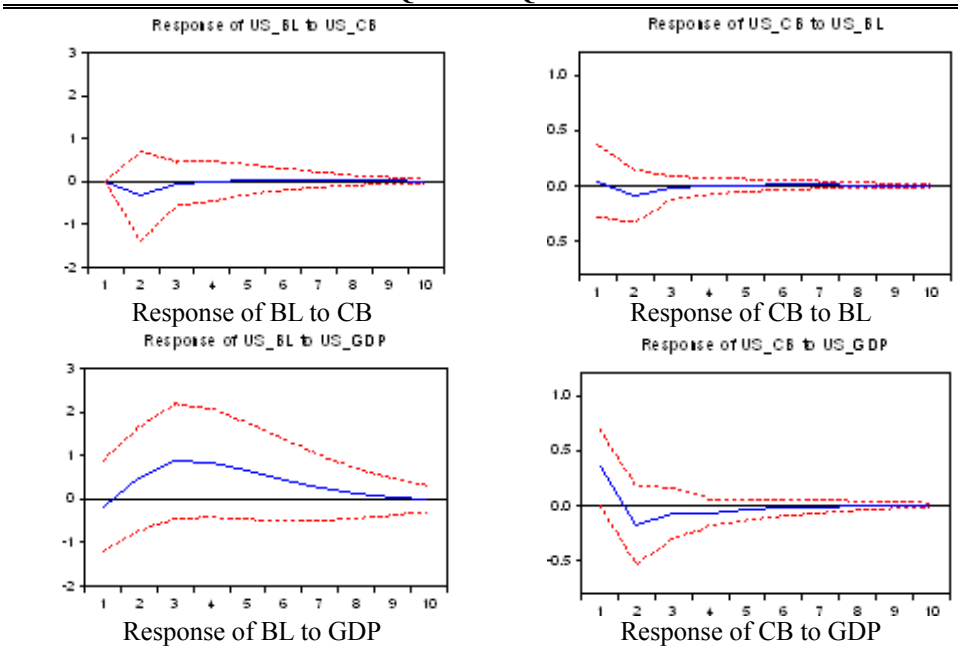


Figure 6-2. US: Impulse – Response Relationship

Q2 2000 ~ Q2 2007

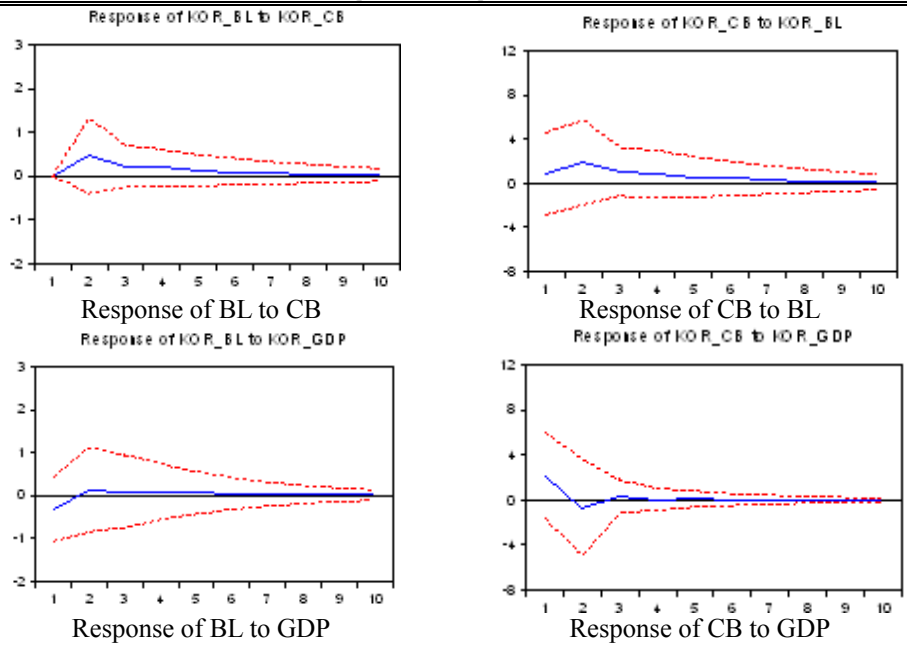


Figure 7-1. Republic of Korea: Impulse – Response Relationship

Q3 2007 ~ Q4 2011

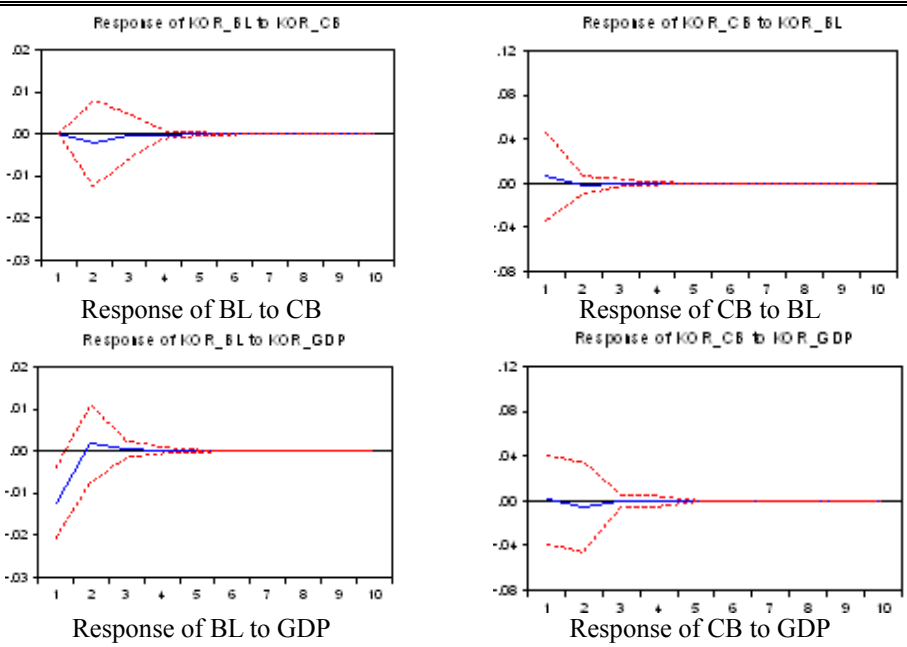


Figure 7-2. Republic of Korea: Impulse – Response Relationship

Q2 2000 ~ Q2 2007

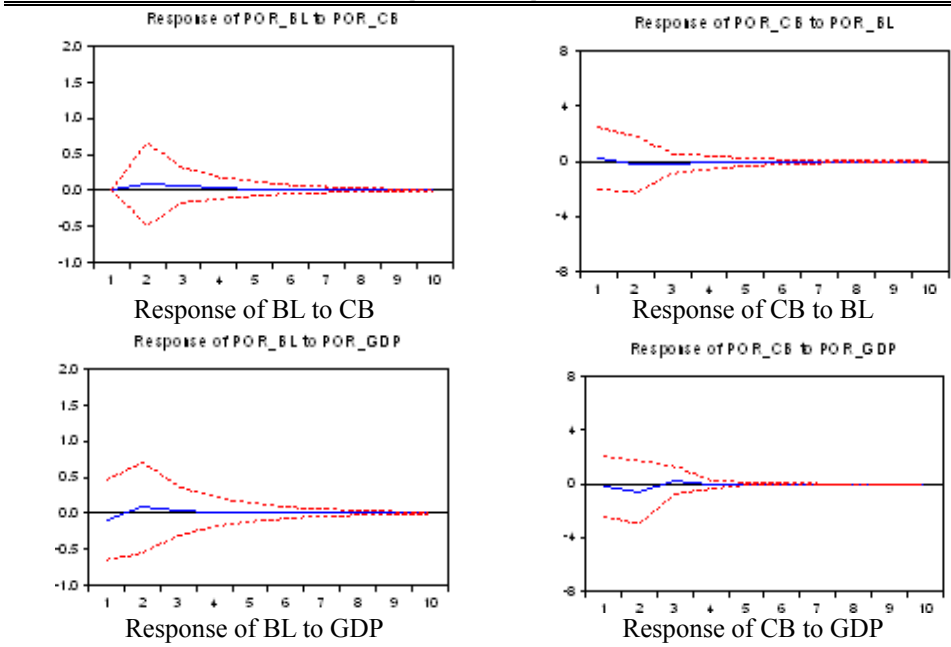


Figure 8-1. Portugal: Impulse – Response Relationship

Q3 2007 ~ Q4 2011

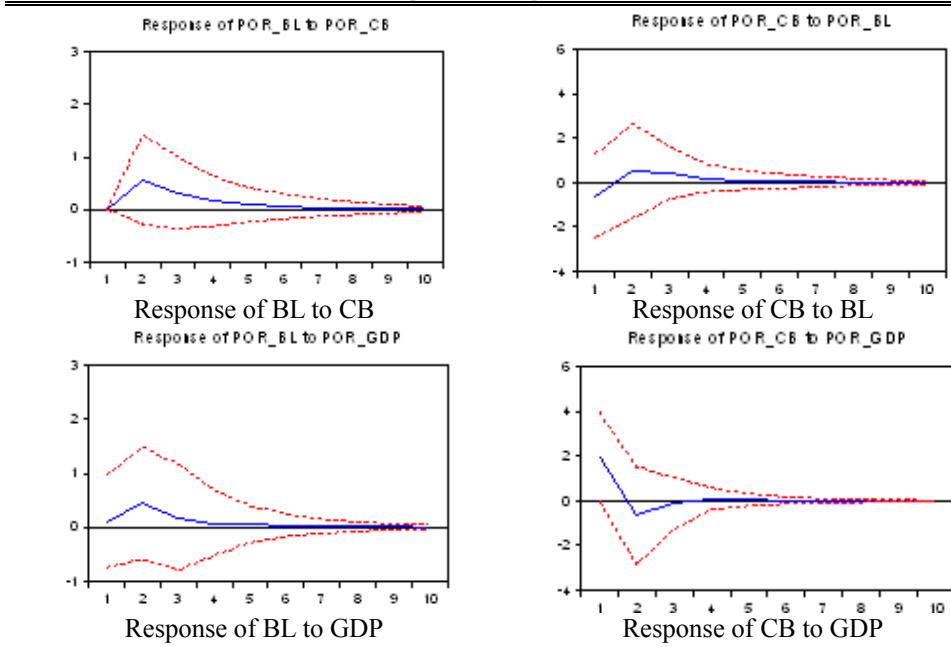


Figure 8-2. Portugal: Impulse – Response Relationship

Table 15 shows the results of impulse – response relationship of Model III. "$X:Y$" indicates the "Response of X to Y." In addition, BC and AC mean "Before the Financial Crisis" and "After the Financial Crisis" respectively. "+" sign denotes that when there is a shock on Y, X responses to the same side with the shock on Y. "–" describes that X responses to the opposite side with the shock on Y. Regarding BL:CB and CB:BL, the complement relationship between BL and CB is shifted to substitution relationship only in seven to eight countries. In addition, this does not support the argument in Section 2 that the source of this shift is originated from BL channel. However, if the real variable shock is conditioned, the substitution relationship between BL and CB is more clearly indentified. This is estimated by BL:GDP and CB:GDP. More than half of the sample countries, BL is procyclical with GDP both before and after the financial crisis periods. CB shows, nonetheless, counter-cyclicality with GDP in 12 countries before the financial crisis and 10 countries after the financial crisis.[15] Although it is ambiguous to judge whether the degree of counter-cyclicality becomes stronger or not since the financial crisis, it is justifiable that the CB channel is more counter-cyclical than the BL channel to GDP. This may be explained by the fact that firms prefer to being financed through the BL channel to being funded through the CB channel when macroeconomy is not under recession. When there exist financial shocks and economy goes into a recession, the intermediated financing channel would become illiquid. Then, the direct financing channels would become alternative sources of credit to firms.

[15] If a response function is converged to zero with oscillation, it is premised that the largest absolute value represents cyclicality property.

Impulse-Response Analysis: Model III									
	Country	BL:CB		CB:BL		BL:GDP		CB:GDP	
		BC	AC	BC	AC	BC	AC	BC	AC
G1	United States	-	-	- +	+ -	+	- +	-	+ -
	France	+	+ -	+	-	+	+ -	- +	-
G2	Greece	NA	NA	NA	NA	NA	NA	NA	NA
	Republic of Korea	+	-	+	+	- +	- +	+ - +	-
	Finland	+	-	+	-	+	+	- +	-
	Netherlands	+		- +	-	+	+	- +	-
	Sweden	+	-	+	+	-	+	-	+ - +
	United Kingdom	+	+	+	+	+	+	+	-
	Thailand	-	+	+	- +	+	- +	-	+ -
G3	Mexico	-		+	-	+	+	+	+ - +
	Norway	-	-	+	-	+ -	+	-	+
	Portugal	+	+	+ -	- +	- +	+	- +	+ -
	Italy	-	-	+	-	+	- +	- +	-
G4	Japan	-	-	-	- + -	- +	-	+ -	+ - +
	Australia	+	-	- +	+ -	+	+	-	+ -
	Germany	+	+	+	+	+ -	-	-	+
	Brazil	-	-	+ - + -	-	+	+	+ -	- + -
	Hong Kong	-	- +	-	- +	+	+	-	+ -
	Spain	+	-	- +	+	+	- +	+ - +	+
	Ireland	+	-	+ - +	- + - +	- +	+	- +	-

BC: Q2 2000 ~ Q3 2007, AC: Q3 2007 ~ Q4 2011

Table 15. Impulse-Response Function – GDP, BL, CB Growth Rates

: "X: Y" indicates the "Response of X to Y." In addition, BC and AC mean "Before the Financial Crisis" and "After the Financial Crisis" respectively. "+" sign indicates that when there is a shock on Y, X responses to same direction. "– " describes the vice versa.

: Greece case is derived as near singular matrix by Eviews 7.0.

Table 16 describes the results of the impulse – response relationship of Model IV. The shaded area indicates the different characteristics compared to Table 15. There is little difference between two models.

Impulse-Response Analysis: Model IV									
	Country	BL:CB		CB:BL		BL:GDP		CB:GDP	
		BC	AC	BC	AC	BC	AC	BC	AC
G1	United States	-	-	- +	+ -	+	- +	-	+ -
	France	+	- +	+	-	+	+ -	- +	-
G2	Greece	NA	NA	NA	NA	NA	NA	NA	NA
	Republic of Korea	+	-	+	+	- +	- +	+ - +	-
	Finland	+	-	+	-	+	+	- +	-
	Netherlands	+		- +	-	+	+	- +	-
	Sweden	+	-	+	+	-	+	-	+ - +
	United Kingdom	+	+	+	+	+	+	+	-
	Thailand	-	+	+	- +	+	- +	-	+ -
G3	Mexico	-		+	-	+	+	+	+ - +
	Norway	-	-	+	+	+ -	+	-	+
	Portugal	+	+	+ -	- +	- +	+	- +	+ -
	Italy	-	-	+	-	+	- +	- +	-
G4	Japan	-	-		- + -	- +	-	+ -	+ - +
	Australia	+	-	- +	+ -	+	+	-	+ -
	Germany	+	+	+	+	+ -	-	-	+
	Brazil	-	-	+ - + -	-	+	+	+ -	- + -
	Hong Kong	-	- +	-	- +	+	+	-	+ -
	Spain	+	-	- +	+	+	- +	+ - +	+
	Ireland	+	-	+ - +	- + - +	- +	+	- +	-

BC: Q2 2000 ~ Q3 2007, AC: Q3 2007 ~ Q4 2011

Table 16. Impulse-Response Function - GDP, CB, BL Growth Rates

: "X: Y" indicates the "Response of X to Y." In addition, BC and AC mean "Before the Financial Crisis" and "After the Financial Crisis" respectively. "+" sign indicates that when there is a shock on Y, X responses to same direction. "– " describes the vice versa.

: Greece case is derived as near singular matrix by Eviews 7.0.

: The shaded areas mean that there is a difference in the Impulse-Response relationship compared to the results of Model III. In the "BL:CB" and "CB:BL" cases, differences in the current period $(= 1)$ of Impluse-Response diagrams are not counted because of the restrictions on the present time t of each VAR model.

4. Conclusion

This paper contributes to elucidate that there exists a (weak) substitution relationship between a BL channel and a CB channel in multi-national level. In particular, this counter-cyclicality between the BL and the CB seems to be clearer under the GDP shock, which is described in the results of the impulse-response analyses through BL:GDP and CB:GDP.

As the limitation of this research, there are two representative points. First, regarding many literatures, to check several issues related to relationships between indirect financing channels and direct financing channels, spread variables such as corporate bond rates and bank lending interest rate should be included mainly in econometric analyses. Moreover, because of the commitment and non-commitment problems in bank loan, the cyclical properties of bank lending channels are difficult to confirm. These limitations are mainly caused by the lack of data sources. That is, it is difficult to select variables which are compiled with same standards and same periods. For the further studies, more micro (firm) level data sets of many countries are necessary to be surveyed. Second, this paper does not check the relationship between credit financing channels and real economy. To identify the role and effects of each financing channel and channel shift, it is helpful to apply Markov Regime Switching concept to VAR model without any period separation – Before the Financial Crisis, After the Financial Crisis – in data set. This will be done in future research.

In spite of the limitation of this research, two key results are i) higher level of substitution between BL and CB after the macroeconomic impact such as the recent financial crisis in many of sample countries, ii) the consistent counter-cyclicality between CB channel and GDP growth rate both in before and after the financial crisis periods, which provide a policy implication. Thus, if CB markets are developed and controlled efficiently to minimize the detrimental effects caused by bond default risks, CB channel would play an important role in funding credits for firms when there is illiquidity in a bank financing channel. This portfolio

diversification would be helpful to relieve the deleterious effects lead by massive shock either in credit markets or in macroeconomy.

References

[1] Adrian, Tobias, Paolo Colla and Hyun Song Shin (2012) "Which Financial Frictions? Parsing the Evidence from the Financial Crisis of 2007-9," NBER Macro Annual Conference, April 2012.

[2] Baumann, Ursel, Glenn Hoggarth and Darren Pain (2005) "The Substitution of Bank for Non-Bank Corporate Finance: Evidence for the United Kingdom," Working Paper (274), Bank of England, September 2005.

[3] Becker, Bo and Victoria Ivashina (2011) "Cyclicality of Credit Supply: Firm Level Evidence," NBER Working Paper 17392, National Bureau of Economic Research, September 2011.

[4] De Bondt, Gabe, Angela Maddaloni, José-Luis Peydró, and Silvia Scopel (2010) "The Euro Area Bank Lending Survey Matters: Empirical Evidence for Credit and Output Growth," ECB Working Paper Series 1160.

[5] Duffee, Gregory R. (1998) "The Cyclical Behavior of Debt and Equity Finance," *The Journal of Finance* LIII(6), December 1998, 2225-2241.

[6] De Fiore, Fiorella and Harald Uhlig (2011) "Bank Finace versus Bond Finance," *Journal of Money, Credit and Banking* 43, 1399-1421.

[7] De Fiore, Fiorella and Harald Uhlig (2012) "Corporate Debt Structure and the Financial Crisis," Working Paper, May 2012.

[8] Gertler, Mark and Peter Karadi (2011) "A Model of Unconventional Monetary Policy," *Journal of Monetary Economics* 58(1), 17-34.

[9] Gilchrist, Simon, Jae W. Sim and Egon Zakrajšek (2010) "Uncertainty, Financial Frictions, and Investment Dynamics," Working Paper.

[10] Holmstrom, Bengt and Jean Tirole (1997) "Financial Intermediation, Loanable Funds, and the Real Sector," The Quarterly Journal of Economics 112(3), August 1997, 663-691.

[11] Ivashina, Victoria and David Scharfstein (2010) "Bank Lending during the Financial Crisis of 2008," *Journal of Financial Economics* 97, 319-338.

[12] J. Christiano, Lawrence, Roberto Motto, and Massimo Rostagno (2010) "Financial Factors in Economic Fluctuations," ECB Working Paper No. 1192.

[13] J. Denis, David and Vassil T. Mihov (2003) "The Choice among Bank Debt, Non-Bank Private Debt, and Public Debt: Evidence from New Corporate Borrowings," *Journal of Financial Economics* 70(1), 3-28.

[14] Kashyap, Anil, Jeremy Stein and David Wilcox (1993) "Monetary Policy and Credit Conditions: Evidence from the Composition of External Finance," *American Economic Review* 83(1), 78-98.

[15] Repullo, Rafael and Javier Suarez (2004) "Venture Capital Finance: A Security Design Approach," *Review of Finance* 8(1), 75-108.

[16] T. Leary, Mark (2009) "Bank Loan Supply, Lender Choice, and Corporate Capital Structure," *The Journal of Finance* 64(3), 1143-1185.

[17] 강종구 (2003) "最近 企業의 金融機關借入 鈍化 原因과 政策課題," 2006년 한국금융학회 경제학 공동학술대회 (written in Korean).

[18] 신현열, 김보성 (2007) "기업의 외부자금 조달경로로서 은행대출과 회사채 시장의 대체성 분석," 한국은행 조사통계월보 (2007.1) (written in Korean).

[19] Bank for International Settlements, Statistics, "Securities Statistics and Syndicated Loans," <http://www.bis.org/statistics/secstats.htm> (23 August 2012).

[20] "Buttonwood: Money for Nothing," The Economist. 4 August 2012.

[21] ECB, "Eurosystem, Euro Area Bank Lending Survey," <http://www.ecb.int/stats/money/surveys/lend/html/index.en.html> (December 21, 2012).

[22] IMF, "World Economic Outlook Database April 2012," <http://www.imf.org/external/pubs/ft/weo/2012/01/weodata/index.aspx> (27 September 2012).

[23] OECD, "Investment-Expenditure-National Accounts at a Glance 2011," <http://www.oecd-ilibrary.org/sites/na_glance-2011-en/03/03/index.html;jsessionid=fmw46d9yzgp4.delta?contentType=&itemId=/content/chapter/na_glance-2011-14-en&containerItemId=/content/serial/22200444&accessItemIds=/content/book/na_glance-2011-en&mimeType=text/html> (27 September 2012).

[24] Michel Sothard and Mary Watkins, "Corporate Debt Issuance Red hot in August," Financial Times, 24 August 2012.

[25] Thomson Reuters, Datastream, Advance 4.0.

[26] Hong Kong, Census and Statistics, < http://www.censtatd.gov.hk/hkstat/sub/sp250.jsp?productCode=B1030001> (3 October 2012).

[27] International Financial Statistics (August 2012).

[28] OECD.StatExtracts, <http://stats.oecd.org/Index.aspx?DatasetCode=SNA_TABLE1> (3 October 2012).

[29] Thailand , Office of the National Economic and Social Development Board, <http://eng.nesdb.go.th> (3 October 2012).

[30] Board of Governors of the Federal Reserve System, "Flow of Funds Accounts of the United States," <http://www.federalreserve.gov/releases/z1> (27 September 2012).

[31] 금융감독원 금융통계정보시스템 자본시장통계, "11. 회사채 발행, 상환, 잔액," (*11. Issues, Redemptions and Outstanding Amounts of Corporate Bonds, Credit Market, Financial Statistics Information System, Financial Supervisory Service*) <http://fisis.fss.or.kr> (14 September 2012).

[32] 한국은행 경제통계시스템, "3.3.2.1 총대출금(예금취급기관)," (*3.3.2.1 Loans & Discounts by Industry, Economic Statistics System, The Bank of Korea*) <http://ecos.bok.or.kr> (27 September 2012).

APPENDIX I Data Description

■ Corporate Bond Data

[1] Source:
- Bank for International Settlements – Statistics – Securities <http://www.bis.org/statistics/secstats.htm>
- 금융감독원 금융통계정보시스템 자본시장통계, 11. 회사채 발행, 상환, 잔액 (*11. Issues, Redemptions and Outstanding Amounts of Corporate Bonds, Credit Market,Financial Statistics Information System, Financial Supervisory Service*) <http://fisis.fss.or.kr>

[2] Period: Q1 2000 ~ Q4 2011

[3] Data Type: Quarterly, Outstanding, Non-Seasonally Adjusted

[4] Unit: Billions of US Dollar (Original) ⟹ Billions of Local Currency
* Transforming Billions of Local Currency through exchange rates provided by International Financial Statistics Data

[5] Method: Adding the following domestic debt securities (D) and international debt securities (F)
* (D) Corporate Issuers 16B. Financial Institutions and Corporate Issuers – 16. Domestic Debt Securities by Sector and Residence of Issuer
* (F) 12C. (Non-Financial) Corporate Issuers – 12. International Debt Securities by Nationality of Issuer

■ Bank Lending Data

[1] Source:
- Thomson Reuters Datastream Advance 4.0
- Republic of Korea: Bank of Korea,
- United States: Board of Governors of the Federal Reserve System)

[2] Period: Q1 2000 ~ Q4 2011

[3] Data Type: Quarterly, Outstanding, Non-Seasonally Adjusted

[4] Unit: Billions of Local Currency

[5] Data Coverage of Each Country:
- Australia: Australia Business Lending (Datastream Code: 440176488)
- Brazil: Brazil Financial System Credit – Private Sector (Datastream Code: 802000562)
- Finland: Finland Bank Lending Private Sector (Datastream Code: 450200044)

- France: France Lending by Banks to Non-Financial Corporations (Datastream Code: 689152962)
- Germany: Germany Lending to Enterprises and Individuals (Datastream Code: 309844876)
- Greece: Greece Bank Prime Lending to Non-Financial Corporations (Datastream Code: 388602200)
- Hong Kong: Hong Kong Loans and Advances (Datastream Code: 482420129)
- Ireland: Ireland Financial Balance Sheet, Non-Financial Corporations, Liabilities, Loans – Short-term, Long-term (Datastream Code: 440503553, 440503554)
- Italy: Italy Non-Financial Corporation Loans: Maturity Up to 1 Year, 1~5 Years, Over 5 Years (Datastream Code: 316877185, 316877186, 316877187)
- Japan: Japan Aggregate Bank Lending (Excl. Shinkin Banks) (Datastream Code: 497933382)
- Mexico: Mexico Commercial Bank Credit to the Private Sector (Datastream Code: 518800966)
- Netherlands: Netherlands Bank Lending to Non-Financial Corporations: Maturity Up to 1 Year, 1~5 Years, Over 5 Years (Datastream Code: 440163813, 440163814, 440163815)
- Norway: Norway Credit to Non-Financial Enterprises (Datastream Code: 343101919)
- Portugal: Portugal MFI Loans to Non-Financial Corporations (Datastream Code: 595600751)
- Republic of Korea: 한국은행 경제통계시스템, 3.3.2.1 총대출금(예금취급기관)
  (*3.3.2.1 Loans & Discounts by Industry, Economic Statistics System, The Bank of Korea*)
- Spain: Spain MFI Loans to Non-Financial Corporations (Datastream Code: 424003721)
- Sweden: Sweden Banks to Non-Financial Corporations (Datastream Code: 365440033)
- Thailand: Thailand Commercial Banks Credits: Loan-Business (Datastream Code: 440434309)
- United Kingdom: UK MFI's: Loans: Private Non-Financial Corporations (Datastream Code: 15630790)
- United States: Board of Governors of the Federal Reserve System, Flow of Funds Accounts of the United States

■ Real GDP Growth Rate

[1] Source:	▪ OECD StatExtracts ▪ Hong Kong: Census and Statistics ▪ Thailand: Office of the National Economic and Social Development Board
[2] Period:	Q1 2000 ~ Q4 2011
[3] Data Type:	Change over Previous Quarter, Seasonally Adjusted
[4] Unit:	%

■ Government Bond Yield Rate and Bank Lending Interest Rate

[1] Source:	International Financial Statistics
[2] Period:	Q1 2000 ~ Q4 2011
[3] Unit:	%

■ **Data Period Setting (Growth Rate Data)**

Country	Start	Finish
Australia	Q2 2000	Q4 2011
Brazil	Q2 2000	Q4 2011
Finland	Q2 2000	Q4 2011
France	Q2 2000	Q4 2011
Germany	Q2 2000	Q4 2011
Greece	Q1 2003	Q4 2011
Hong Kong	Q2 2000	Q4 2011
Ireland	Q2 2002	Q4 2011
Italy	Q2 2000	Q4 2011
Japan	Q2 2000	Q4 2011
Republic of Korea	Q2 2002	Q4 2011
Mexico	Q3 2003	Q4 2011
Norway	Q2 2000	Q4 2011
Netherlands	Q2 2000	Q4 2011
Portugal	Q2 2000	Q4 2011
Spain	Q2 2003	Q4 2011
Sweden	Q2 2000	Q4 2011
Thailand	Q2 2000	Q4 2011
United Kingdom	Q2 2000	Q4 2011
United States	Q2 2000	Q4 2011

APPENDIX II Coefficients of Regression Model

Regression Model: Q2 2000 ~ Q2 2007									
	Country	$BL(-1)$	$CB(-1)$	$GBY(-1)$	$GDP(-1)$	$IR(-1)$	C	R^2	$\bar{R}^2$
		Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient		
		P-value	P-value	P-value	P-value	P-value	P-value		
G1	United States	- 0.009	- 0.718***	- 1.846***	0.478	0.840**	5.383***	0.421	0.289
		0.975	0.100	0.054	0.484	0.032	0.071		
	France	0.413	0.094	46.557	0.454	- 47.219	3.380	0.271	0.105
		0.103	0.492	0.712	0.753	0.708	0.257		
G2	Greece	0.000	0.362	- 162.642	0.964	163.633	- 9.688	0.161	-0.220
		1.000	0.275	0.796	0.548	0.794	0.670		
	Republic of Korea	0.421	0.057	0.796	0.060	0.150	- 2.907	0.462	0.270
		0.219	0.309	0.535	0.933	0.937	0.733		
	Finland	0.225	0.265	218.537	1.736	- 216.379	- 9.360 ***	0.339	0.189
		0.248	0.234	0.411	0.165	0.415	0.090		
	Netherlands	0.010	0.193**	- 4.957	0.540	2.263	12.474**	0.347	0.199
		0.966	0.031	0.981	0.749	0.991	0.023		
	Sweden	- 0.435**	0.191**	- 8.232**	- 0.064	6.561**	10.670**	0.646	0.565
		0.038	0.018	0.000	0.930	0.003	0.002		
	United Kingdom	0.033	- 0.005	- 1.767	- 0.044	0.958	6.586	0.163	-0.027
		0.892	0.974	0.202	0.965	0.191	0.286		
	Thailand	- 0.333***	- 0.060	0.297	1.040	- 2.267**	12.884**	0.403	0.267
		0.091	0.644	0.703	0.192	0.017	0.036		
G3	Mexico	0.098	- 0.050	- 1.636**	1.547***	0.830***	9.383**	0.482	0.364
		0.587	0.739	0.019	0.091	0.073	0.014		
	Norway	0.325	- 0.077	3.210***	- 0.333	- 4.599**	9.634**	0.713	0.647
		0.247	0.281	0.067	0.209	0.041	0.008		
	Portugal	0.428***	0.018	62.735***	0.141	- 62.000***	- 2.220	0.440	0.313
		0.063	0.708	0.500	0.687	0.506	0.309		
	Italy	0.293	- 0.033	- 1.970	- 0.255	2.233	0.452	0.114	-0.087
		0.218	0.396	0.824	0.696	0.801	0.795		
G4	Japan	0.197	0.108	1.044**	0.171	- 3.003**	3.376**	0.756	0.700
		0.263	0.124	0.004	0.188	0.003	0.027		
	Australia	- 0.100	0.076	- 0.708	1.022	1.017	- 3.183	0.097	-0.108
		0.654	0.580	0.647	0.284	0.290	0.800		
	Germany	- 0.289	0.079**	- 7.351	0.175	6.930	1.488	0.440	0.313
		0.140	0.001	0.873	0.438	0.880	0.111		
	Brazil	- 0.380***	- 0.050	0.079	1.018	- 0.208	14.684**	0.365	0.220
		0.075	0.401	0.842	0.177	0.256	0.019		
	Hong Kong	0.433***	- 0.037	- 0.239	0.580	0.305	- 1.567	0.397	0.260
		0.028	0.691	0.793	0.084	0.761	0.719		
	Spain	- 0.169	0.146	16.773	- 0.591	- 18.832	14.427	0.070	-0.395
		0.624	0.693	0.968	0.916	0.964	0.385		
	Ireland	- 0.094	0.117	4.645	- 0.311	- 6.533	10.972	0.185	-0.105
		0.735	0.193	0.873	0.648	0.829	0.327		

** 5% Significance Level, *** 10% Significance Level

Table A1. Multivariate Regression Model I when $h = 1$

- Dependent Variable : BL_t
- Independent Variable : $BL_{t-1}, CB_{t-1}, GBY_{t-1}, GDP_{t-1}, IR_{t-1}$

Regression Model: Q3 2007 ~ Q4 2011									
	Country	$BL(-1)$	$CB(-1)$	$GBY(-1)$	$GDP(-1)$	$IR(-1)$	C	R^2	$\bar{R}^2$
		Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient		
		P-value	P-value	P-value	P-value	P-value	P-value		
G1	United States	0.528***	**- 1.149**	- 2.797	1.431***	0.829	7.683	0.676	0.528
		0.052	0.225	0.168	0.067	0.329	0.201		
	France	0.577***	0.187	- 39.876	1.021	40.768	- 3.358	0.567	0.370
		0.070	0.387	0.749	0.133	0.744	0.343		
G2	Greece	- 0.221	**- 0.043**	- 662.008	2.911	661.901	2.070	0.155	- 0.314
		0.571	0.560	0.449	0.310	0.449	0.681		
	Republic of Korea	0.007**	**- 0.020**	- 0.015	0.010**	0.041**	- 0.174**	0.779	0.679
		0.015	0.619	0.322	0.025	0.046	0.011		
	Finland	0.224	**- 0.145**	217.073	0.361	- 215.066	- 6.045	0.670	0.520
		0.359	0.334	0.130	0.187	0.132	0.140		
	Netherlands	0.212	0.210	- 667.732**	0.929	668.461**	- 1.818	0.482	0.247
		0.430	0.283	0.024	0.261	0.024	0.661		
	Sweden	0.352	**- 0.121**	2.894	0.262	0.631	- 12.566	0.495	0.265
		0.277	0.567	0.220	0.678	0.345	0.232		
	United Kingdom	0.179	0.146	- 0.354	0.725	0.705	- 0.662	0.787	0.690
		0.514	0.183	0.724	0.135	0.116	0.848		
	Thailand	- 0.003	0.069	- 2.779	0.715	4.154***	- 14.602	0.258	- 0.079
		0.992	0.824	0.163	0.161	0.086	0.191		
G3	Mexico	0.509**	- 0.041	0.105	0.220	- 0.324	2.517	0.623	0.434
		0.035	0.704	0.937	0.595	0.685	0.673		
	Norway	0.185	**- 0.234**	3.837	0.211	- 3.658	2.713	0.734	0.613
		0.423	0.172	0.112	0.542	0.243	0.577		
	Portugal	0.441	0.141	8.926	- 0.010	- 9.187	1.446	0.405	0.134
		0.136	0.230	0.948	0.988	0.947	0.347		
	Italy	0.491	**- 0.161**	- 67.868	- 0.324	66.017	8.794	0.376	0.092
		0.135	0.161	0.663	0.535	0.671	0.169		
G4	Japan	- 0.132	**- 0.049**	- 0.781	- 0.189***	2.311	- 2.921	0.480	0.244
		0.671	0.427	0.615	0.098	0.247	0.175		
	Australia	0.312	**- 0.181**	1.081	0.472	0.845	- 11.907**	0.742	0.625
		0.155	0.350	0.304	0.562	0.232	0.023		
	Germany	- 0.004	**- 0.006**	42.911	- 0.210	- 42.312	- 1.518	0.409	0.140
		0.989	0.891	0.547	0.177	0.552	0.147		
	Brazil	0.509***	**- 0.097****	0.221	0.019	- 0.211	9.315***	0.789	0.692
		0.065	0.023	0.489	0.938	0.107	0.074		
	Hong Kong	0.096	**- 0.192**	1.829	1.179	- 3.399	19.229	0.524	0.308
		0.734	0.502	0.571	0.033	0.399	0.339		
	Spain	- 0.217	**- 0.126**	216.599	1.992	- 216.435	- 1.174	0.189	- 0.180
		0.419	0.552	0.601	0.382	0.600	0.925		
	Ireland	- 0.415	**- 0.031**	- 0.302	0.011	0.574	1.451	0.227	- 0.125
		0.273	0.737	0.926	0.989	0.860	0.688		

** 5% Significance Level, *** 10% Significance Level

Table A2. Multivariate Regression Model I when $h = 1$

- Dependent Variable : BL_t
- Independent Variable : $BL_{t-1}, CB_{t-1}, GBY_{t-1}, GDP_{t-1}, IR_{t-1}$

Regression Model: Q2 2000 ~ Q2 2007									
	Country	$CB(-1)$	$BL(-1)$	$GBY(-1)$	$GDP(-1)$	$IR(-1)$	C	R^2	$\bar{R}^2$
		Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient		
		P-value	P-value	P-value	P-value	P-value	P-value		
G1	United States	0.275	- 0.052	0.140	- 0.539	0.264	- 0.775	0.617	0.530
		0.178	0.694	0.747	0.105	0.141	0.569		
	France	0.401**	0.304	229.325	0.427	- 227.724	- 6.376***	0.546	0.443
		0.021	0.308	0.138	0.805	0.141	0.081		
G2	Greece	1.000**	0.000	0.000**	0.000	0.000**	1.000**	1.000	1.000
		0.000	0.449	0.007	0.915	0.007	0.000		
	Republic of Korea	- 0.187	0.312	1.898	- 0.379	3.379	- 30.984	0.120	- 0.194
		0.510	0.855	0.771	0.918	0.728	0.481		
	Finland	- 0.123	0.272	128.772	0.357	- 127.163	- 5.283	0.172	- 0.016
		0.584	0.176	0.634	0.776	0.639	0.339		
	Netherlands	0.430**	0.666***	- 201.760	2.050	203.994	- 11.525	0.614	0.526
		0.005	0.079	0.554	0.459	0.551	0.180		
	Sweden	- 0.018	0.509	- 8.461	- 1.408	11.227***	- 9.746	0.413	0.280
		0.934	0.403	0.144	0.548	0.053	0.330		
	United Kingdom	0.034	- 0.238	- 2.462	0.477	1.651***	5.339	0.198	0.015
		0.849	0.433	0.151	0.700	0.072	0.479		
	Thailand	0.094	0.014	1.017	- 0.598	- 1.269	5.130	0.081	- 0.128
		0.687	0.967	0.468	0.670	0.426	0.625		
G3	Mexico	- 0.119	- 0.064	- 0.919	- 0.707	0.153	10.925**	0.187	0.002
		0.563	0.796	0.311	0.562	0.802	0.034		
	Norway	- 0.462***	1.489	- 5.914	- 0.854	7.116	- 8.214	0.170	- 0.018
		0.081	0.146	0.338	0.368	0.363	0.503		
	Portugal	- 0.319	- 0.032	- 277.811	- 0.724	276.962	8.314	0.146	- 0.048
		0.134	0.973	0.482	0.626	0.484	0.368		
	Italy	0.056	- 0.409	27.752	1.896	- 20.382	- 26.306**	0.478	0.359
		0.801	0.761	0.586	0.613	0.689	0.014		
G4	Japan	- 0.322***	1.283**	- 0.504	0.229	11.651**	- 19.092**	0.565	0.466
		0.090	0.011	0.569	0.505	0.000	0.000		
	Australia	- 0.052	0.161	5.236**	- 0.191	2.470***	- 49.552**	0.323	0.170
		0.795	0.625	0.030	0.891	0.089	0.013		
	Germany	0.219	0.006	199.105	- 0.159	- 194.503	- 15.416	0.342	0.192
		0.320	0.998	0.684	0.947	0.691	0.119		
	Brazil	0.282	- 1.136	- 1.369	- 0.255	0.370	9.089	0.189	0.005
		0.205	0.144	0.352	0.926	0.580	0.675		
	Hong Kong	- 0.044	- 0.071	1.469	- 1.618**	- 1.053	7.575	0.370	0.227
		0.793	0.830	0.369	0.010	0.557	0.335		
	Spain	- 0.284	- 0.443	355.464	- 3.232	- 354.882	3.410	0.435	0.152
		0.336	0.120	0.294	0.464	0.294	0.789		
	Ireland	0.078	- 0.649	- 93.299	- 1.277	89.911	19.685	0.217	- 0.063
		0.763	0.435	0.286	0.526	0.322	0.548		

** 5% Significance Level, *** 10% Significance Level

Table A3. Multivariate Regression Model II when $h = 1$

- Dependent Variable : CB_t
- Independent Variable : $CB_{t-1}, BL_{t-1}, GBY_{t-1}, GDP_{t-1}, IR_{t-1}$

Regression Model: Q3 2007 ~ Q4 2011									
	Country	$CB(-1)$	$BL(-1)$	$GBY(-1)$	$GDP(-1)$	$IR(-1)$	C	R^2	$\bar{R}^2$
		Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient		
		P-value	P-value	P-value	P-value	P-value	P-value		
G1	United States	- 0.312	- 0.028	- 0.512	- 0.089	0.074	4.129***	0.180	- 0.193
		0.360	0.756	0.474	0.735	0.808	0.070		
	France	- 0.497	**- 0.499**	33.427	0.403	- 32.657	1.081	0.175	- 0.200
		0.171	0.311	0.870	0.703	0.873	0.849		
G2	Greece	- 0.226	**- 1.264**	- 6422.495***	32.764**	6426.065***	- 11.167	0.585	0.355
		0.386	0.365	0.057	0.007	0.057	0.531		
	Republic of Korea	- 0.189	**- 0.014**	0.020	- 0.008	- 0.027	0.151	0.117	- 0.284
		0.526	0.483	0.857	0.768	0.849	0.734		
	Finland	- 0.127	**- 0.114**	- 210.688	- 1.073	206.684	16.420	0.315	0.004
		0.740	0.856	0.555	0.138	0.561	0.126		
	Netherlands	- 0.571	**- 0.667*** **	474.603	- 2.430**	- 473.143	1.713	0.625	0.454
		0.034	0.067	0.171	0.033	0.173	0.744		
	Sweden	- 0.349	0.413	0.278	- 2.635**	1.623***	- 6.609	0.582	0.393
		0.213	0.319	0.924	0.007	0.074	0.615		
	United Kingdom	- 0.235	**- 0.878**	1.917	- 1.292	1.453	- 7.887	0.461	0.216
		0.472	0.305	0.537	0.370	0.277	0.462		
	Thailand	0.039	0.232	0.804	- 0.588	- 1.248	6.352	0.203	- 0.159
		0.902	0.488	0.681	0.253	0.590	0.565		
G3	Mexico	0.007	**- 0.296**	3.490	- 0.235	- 2.658	- 2.600	0.469	0.203
		0.982	0.639	0.380	0.846	0.271	0.881		
	Norway	0.153	0.242	- 0.037	- 0.139	- 1.357	6.335	0.113	- 0.290
		0.627	0.579	0.993	0.832	0.815	0.497		
	Portugal	- 0.081	0.031	261.445	- 0.435	- 261.734	2.982	0.125	- 0.272
		0.773	0.964	0.452	0.801	0.452	0.433		
	Italy	0.232	**- 0.809**	- 193.743	- 0.062	199.080	- 21.433	0.333	0.031
		0.513	0.423	0.697	0.970	0.688	0.285		
G4	Japan	- 0.135	**- 0.424**	8.552	- 0.567	- 16.941***	16.887	0.345	0.047
		0.638	0.772	0.255	0.276	0.085	0.104		
	Australia	0.085	**- 0.676****	1.613	- 0.417	0.942	- 14.048**	0.556	0.355
		0.710	0.019	0.209	0.670	0.267	0.026		
	Germany	0.161	0.130	- 474.667	0.002	478.742	- 11.021	0.426	0.165
		0.616	0.949	0.332	0.999	0.328	0.122		
	Brazil	- 0.087	**- 4.257****	5.124**	3.185***	- 0.613	- 9.336	0.506	0.281
		0.706	0.017	0.020	0.057	0.422	0.753		
	Hong Kong	- 0.196	**- 0.074**	1.743	- 0.208	- 3.292	18.468	0.237	- 0.109
		0.502	0.796	0.595	0.681	0.421	0.365		
	Spain	0.481	0.419	1172.698***	- 0.165	- 1169.884***	- 15.664	0.319	0.009
		0.143	0.296	0.074	0.960	0.074	0.401		
	Ireland	0.228	1.917	- 2.784	0.057	1.058	12.029	0.276	- 0.053
		0.531	0.197	0.825	0.984	0.933	0.398		

** 5% Significance Level, *** 10% Significance Level

Table A4. Multivariate Regression Model II when $h = 1$

- Dependent Variable : CB_t
- Independent Variable : $CB_{t-1}, BL_{t-1}, GBY_{t-1}, GDP_{t-1}, IR_{t-1}$

Q2 2000 ~ Q2 2007						
	Country	$BL(-1)$	$CB(-1)$	$GBY(-1)$	$GDP(-1)$	$IR(-1)$
G1	United States					
	France			√		√
G2	Greece			√		√
	Republic of Korea					
	Finland			√		√
	Netherlands			√		√
	Sweden			√		√
	United Kingdom					
	Thailand					
G3	Mexico					
	Norway			√		√
	Portugal			√		√
	Italy			√		√
G4	Japan					
	Australia					
	Germany			√		√
	Brazil					
	Hong Kong			√		√
	Spain					
	Ireland			√		√

Table A5. Multicollinearity Test (Model I when $h = 1$)

: Independent variables having "√" indicates that there exists multicollinearity with other ones. This is judged if variance inflation factor (VIF) is larger than 10.

Q3 2007 ~ Q4 2011						
	Country	$BL(-1)$	$CB(-1)$	$GBY(-1)$	$GDP(-1)$	$IR(-1)$
G1	United States					
	France			√		√
G2	Greece					
	Republic of Korea			√		√
	Finland			√		√
	Netherlands			√		√
	Sweden					
	United Kingdom					
	Thailand					
G3	Mexico					√
	Norway			√		√
	Portugal			√		√
	Italy			√		√
G4	Japan					
	Australia					
	Germany			√		√
	Brazil					
	Hong Kong			√		√
	Spain			√		√
	Ireland			√		√

Table A6. Multicollinearity Test (Model I when $h = 1$)

: Independent variables having "√" indicates that there exists multicollinearity with other ones. This is judged if variance inflation factor (VIF) is larger than 10.

Q2 2000 ~ Q2 2007						
	Country	$CB(-1)$	$BL(-1)$	$GBY(-1)$	$GDP(-1)$	$IR(-1)$
G1	United States					
	France			√		√
G2	Greece			√		√
	Republic of Korea					
	Finland			√		√
	Netherlands			√		√
	Sweden			√		√
	United Kingdom					
	Thailand					
G3	Mexico					
	Norway			√		√
	Portugal			√		√
	Italy			√		√
G4	Japan					
	Australia					
	Germany			√		√
	Brazil					
	Hong Kong			√		√
	Spain					
	Ireland			√		√

Table A7. Multicollinearity Test (Model II when $h = 1$)

: Independent variables having "√" indicates that there exists multicollinearity with other ones. This is judged if variance inflation factor (VIF) is larger than 10.

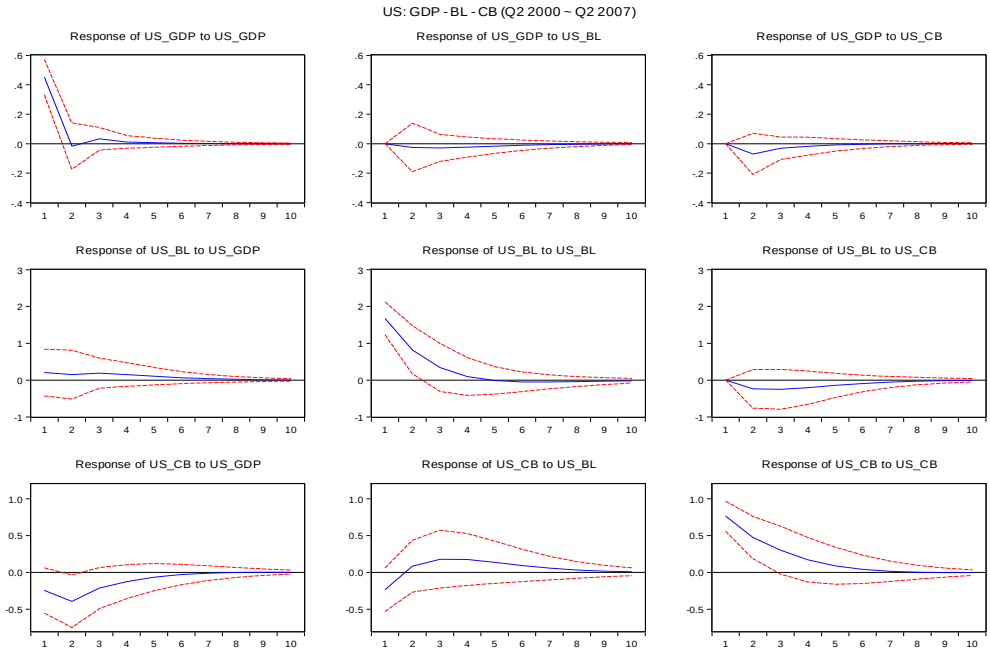
Q3 2007 ~ Q4 2011						
	Country	$CB(-1)$	$BL(-1)$	$GBY(-1)$	$GDP(-1)$	$IR(-1)$
G1	United States					
	France			√		√
G2	Greece					
	Republic of Korea			√		√
	Finland			√		√
	Netherlands			√		√
	Sweden					
	United Kingdom					
	Thailand					
G3	Mexico					√
	Norway			√		√
	Portugal			√		√
	Italy			√		√
G4	Japan					
	Australia					
	Germany			√		√
	Brazil					
	Hong Kong			√		√
	Spain			√		√
	Ireland			√		√

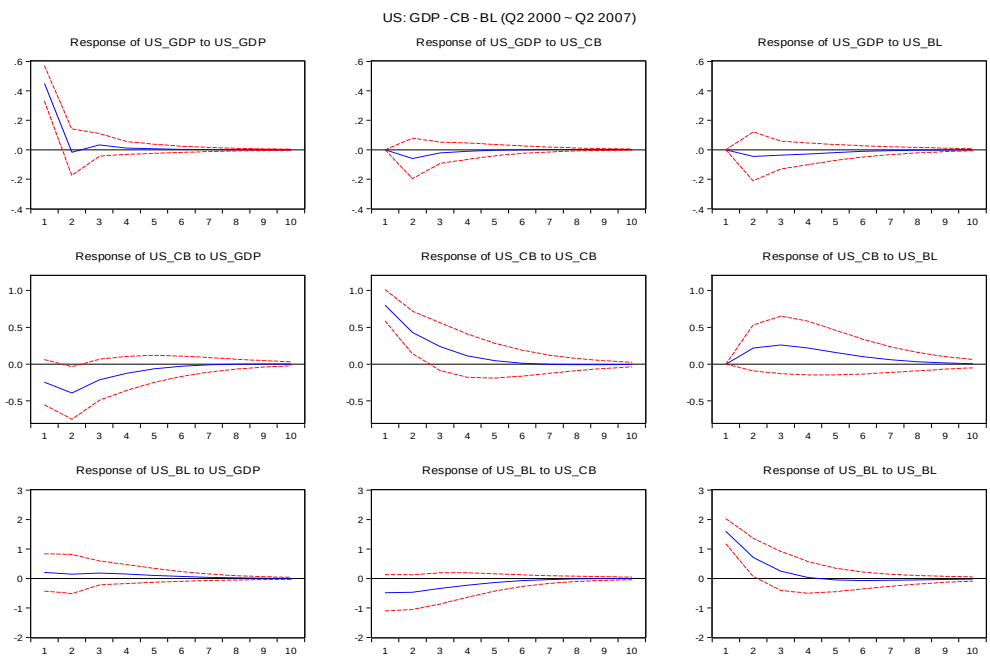
Table A8. Multicollinearity Test (Model II when $h = 1$)

: Independent variables having "√" indicates that there exists multicollinearity with other ones. This is judged if variance inflation factor (VIF) is larger than 10.

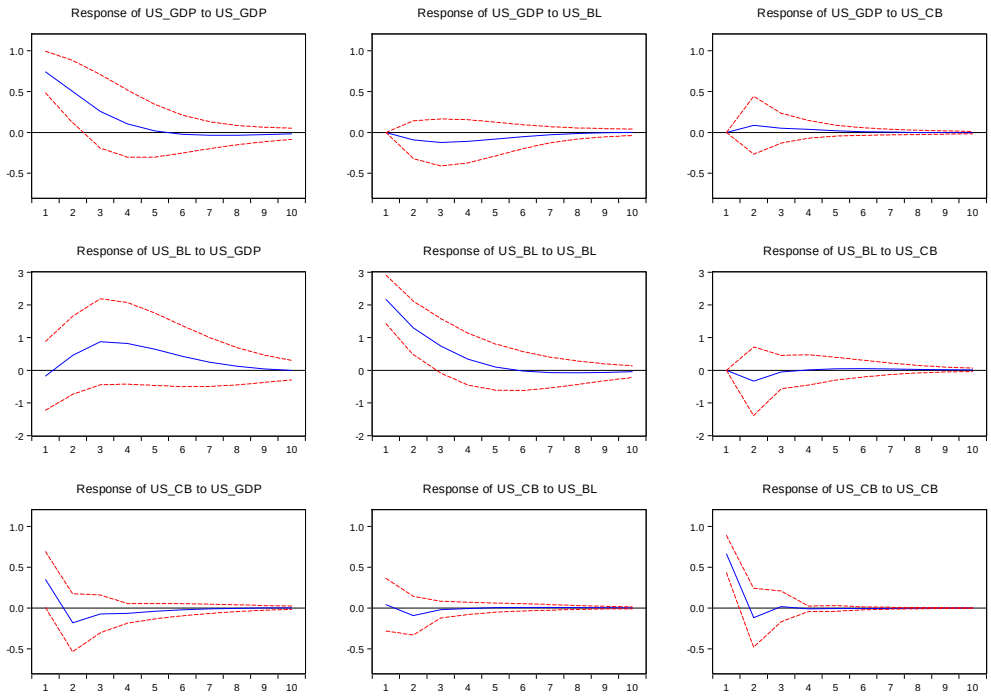
APPENDIX III Impulse - Response Relationship: Figures

■ Model III and Model IV in Section 3

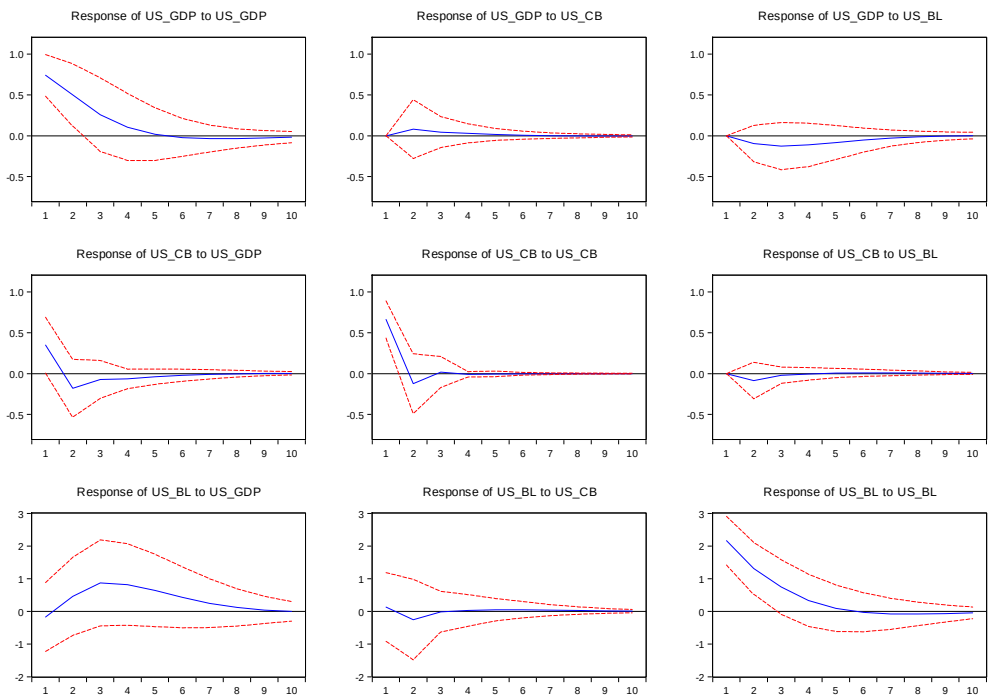




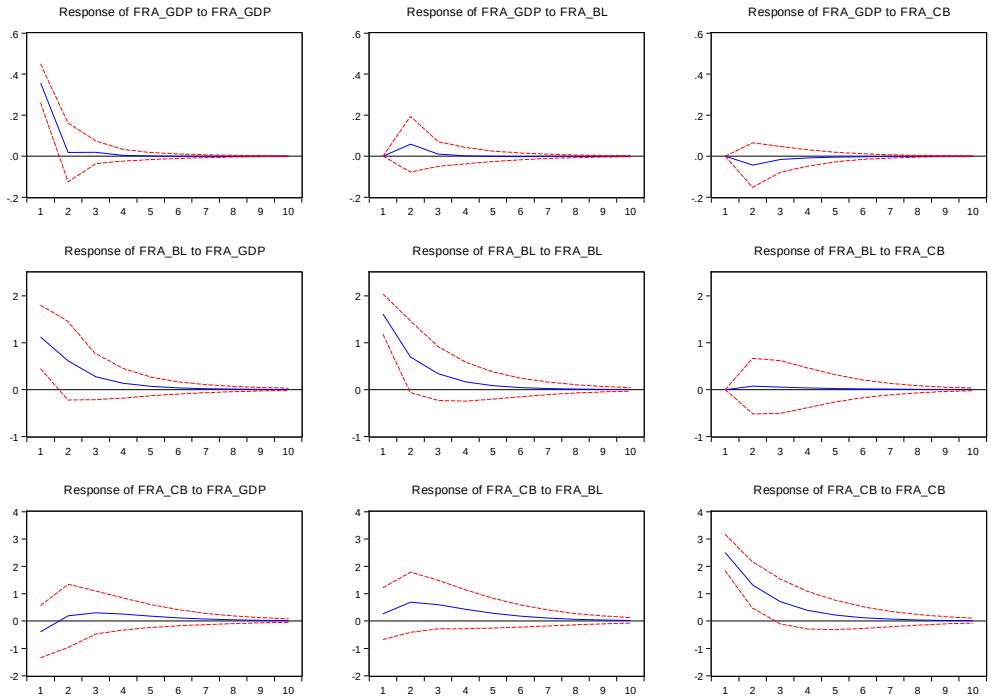
US: GDP - BL - CB (Q3 2007 ~ Q4 2011)



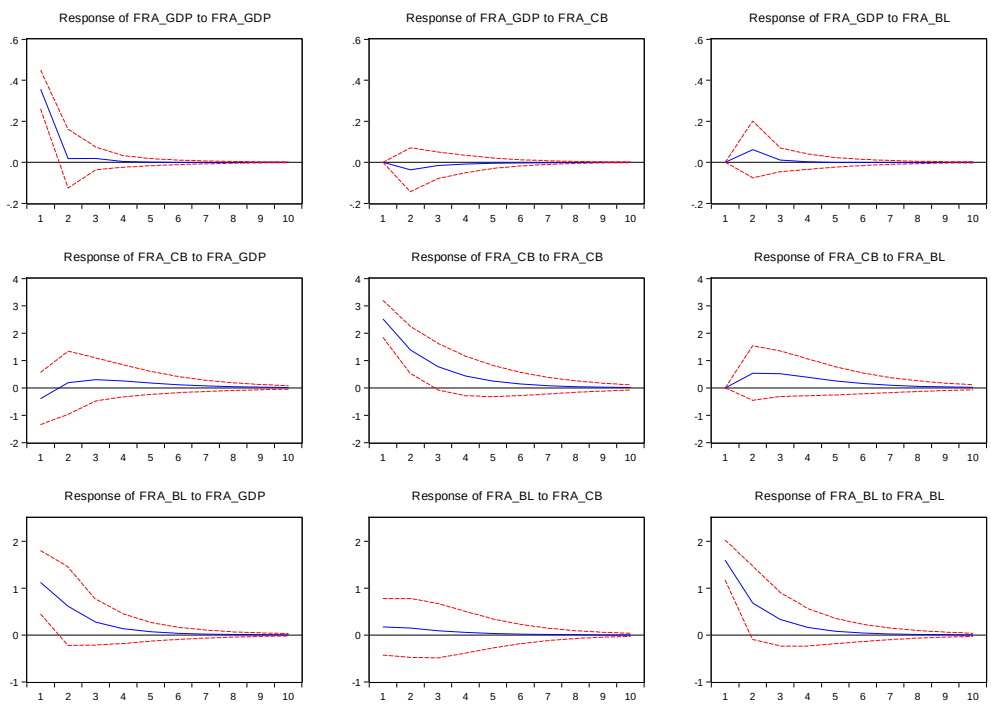
US: GDP - CB - BL (Q3 2007 ~ Q4 2011)



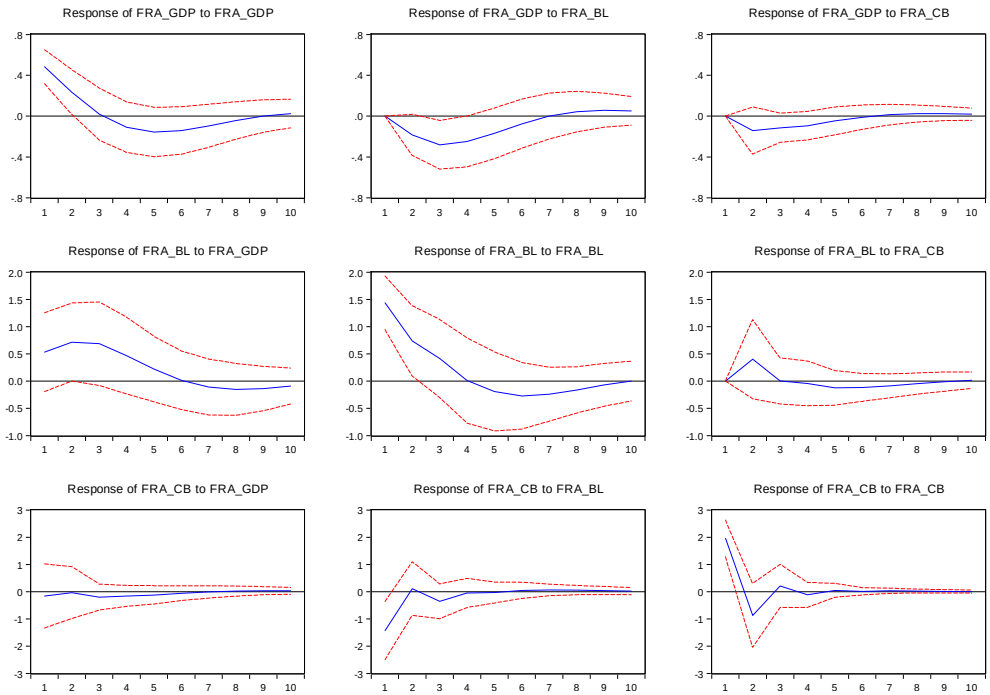
France: GDP - BL - CB (Q2 2000 ~ Q2 2007)



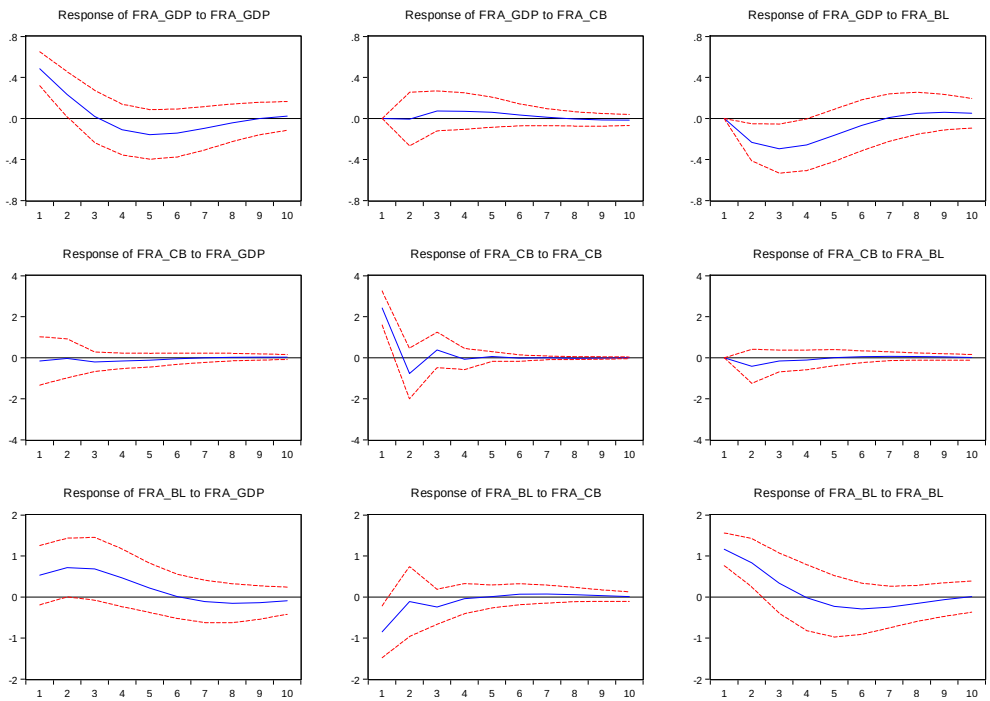
France: GDP - CB - BL (Q2 2000 ~ Q2 2007)



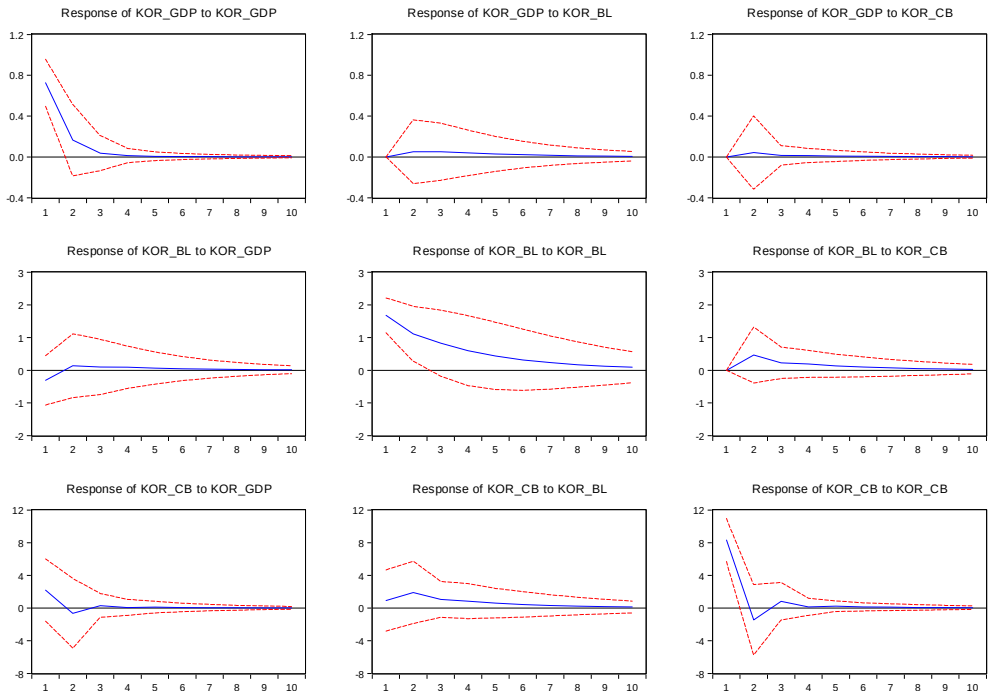
France: GDP - BL - CB (Q3 2007 ~ Q4 2011)



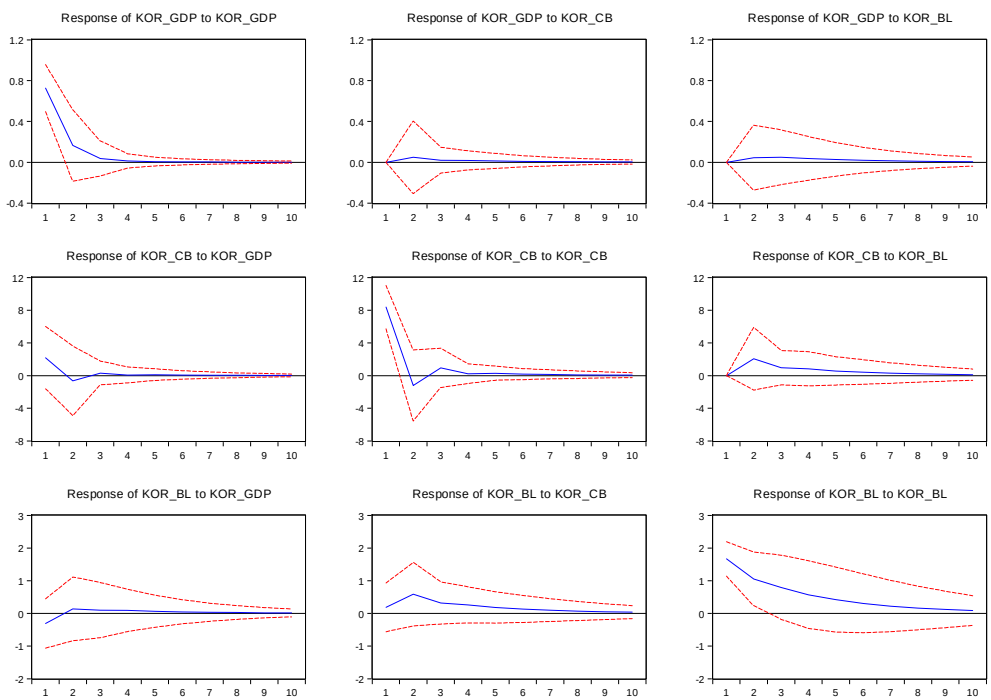
France: GDP - CB - BL (Q3 2007 ~ Q4 2011)



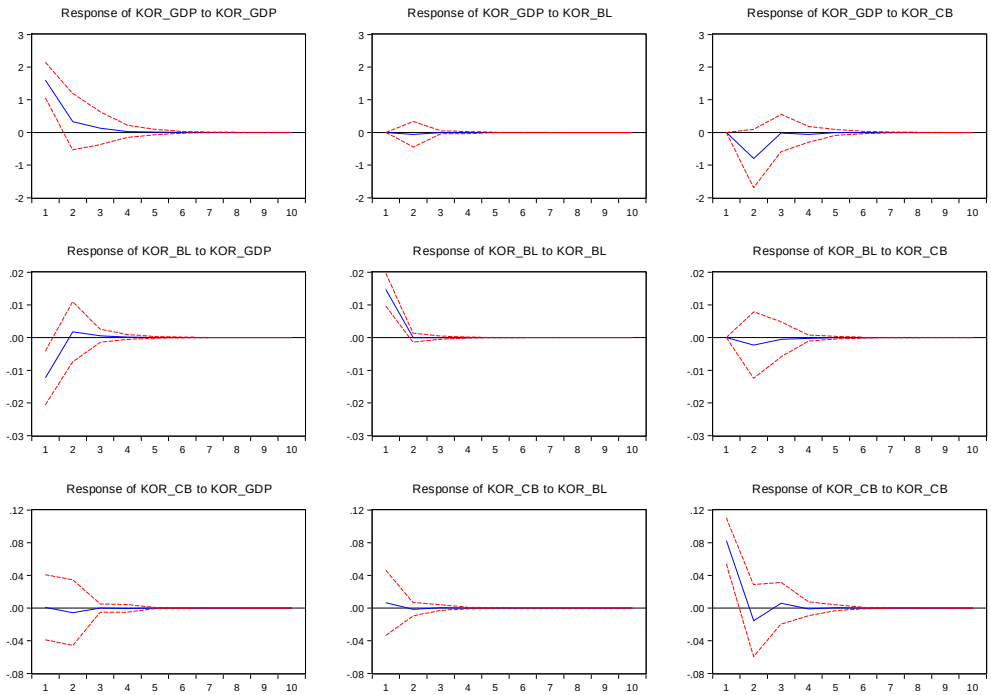
Republic of Korea: GDP - BL - CB (Q2 2002 – Q2 2007)



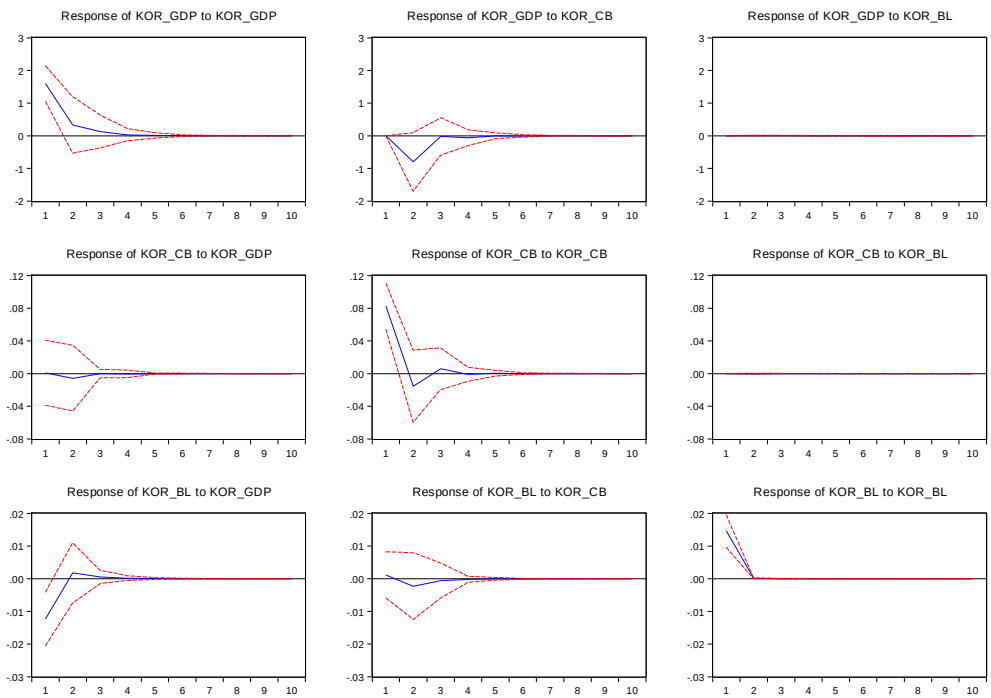
Republic of Korea: GDP - CB - BL (Q2 2002 – Q2 2007)



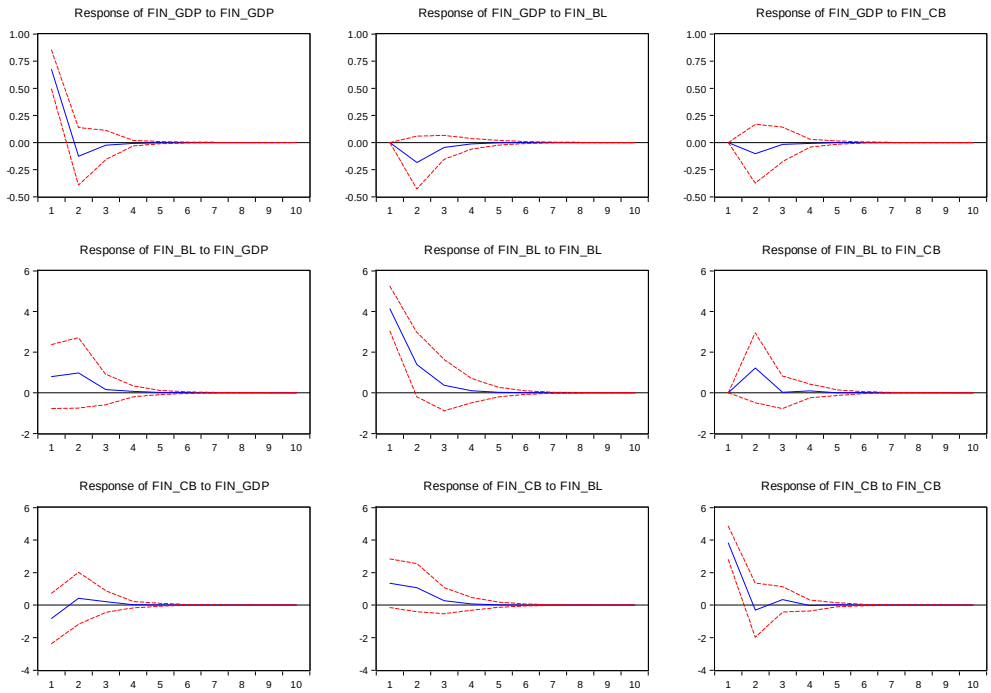
Republic of Korea: GDP - BL - CB (Q3 2007 – Q4 2011)



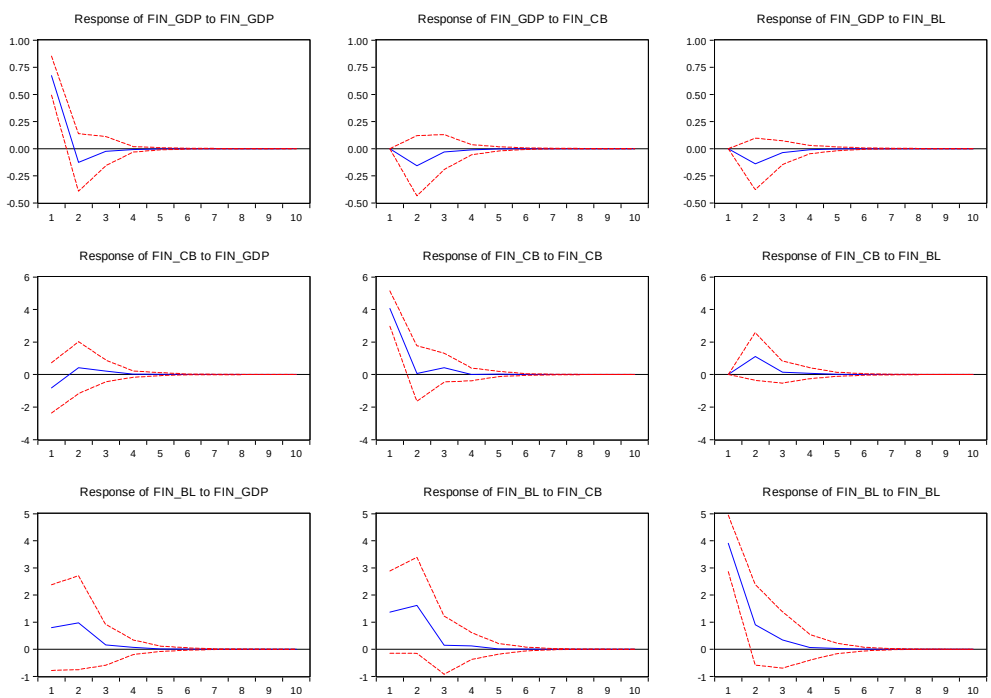
Republic of Korea: GDP - CB - BL (Q3 2007 – Q4 2011)



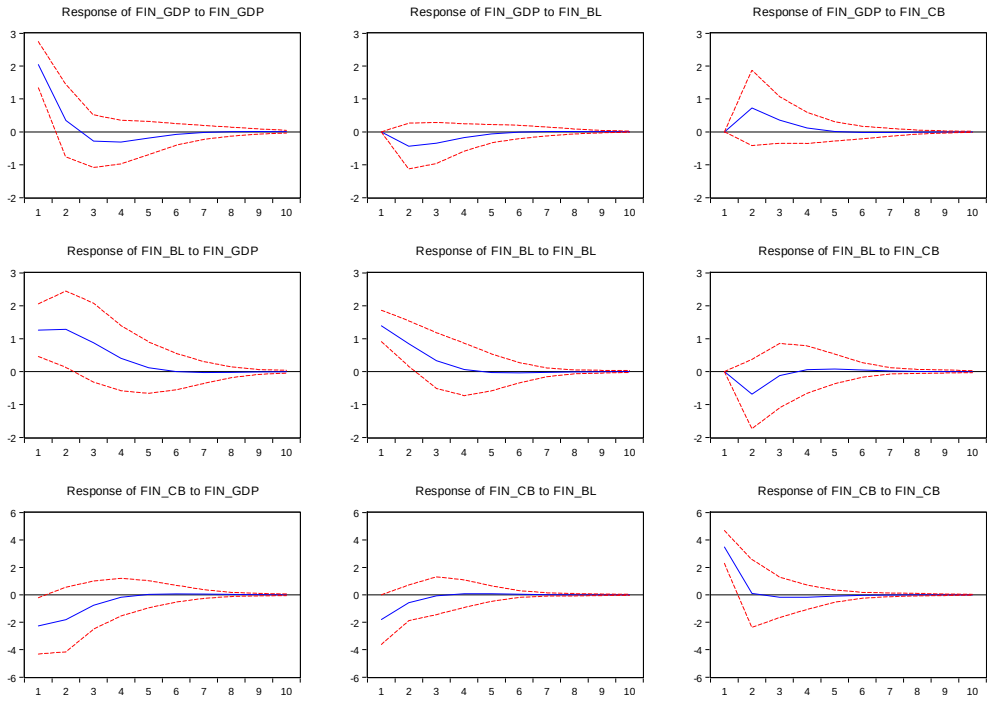
Finland: GDP - BL - CB (Q2 2000 ~ Q2 2007)



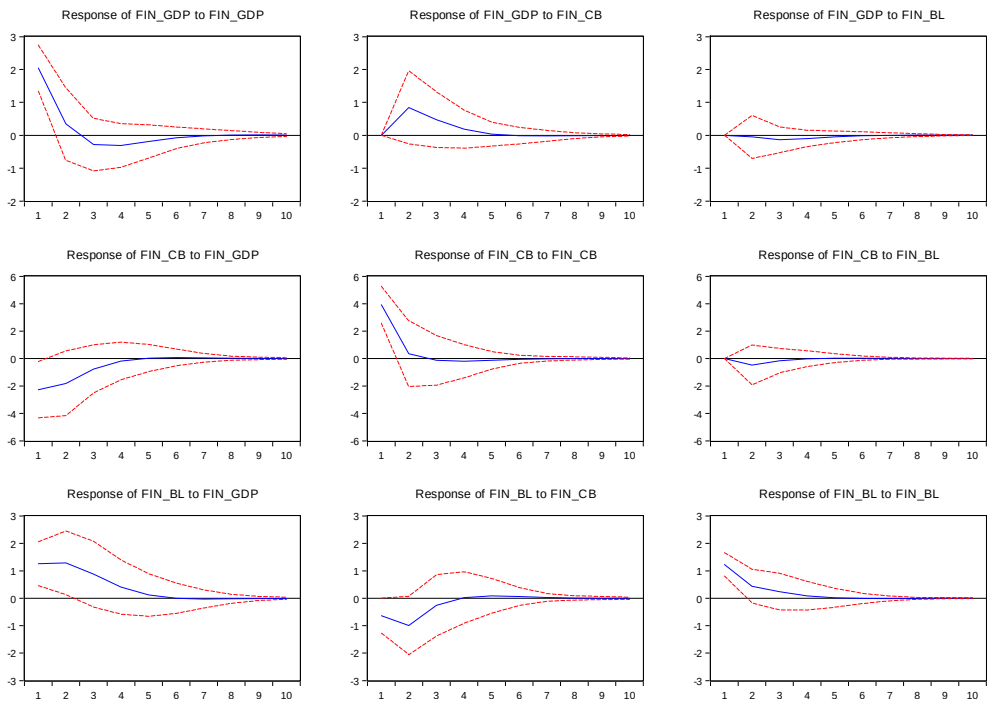
Finland: GDP - CB - BL (Q2 2000 ~ Q2 2007)



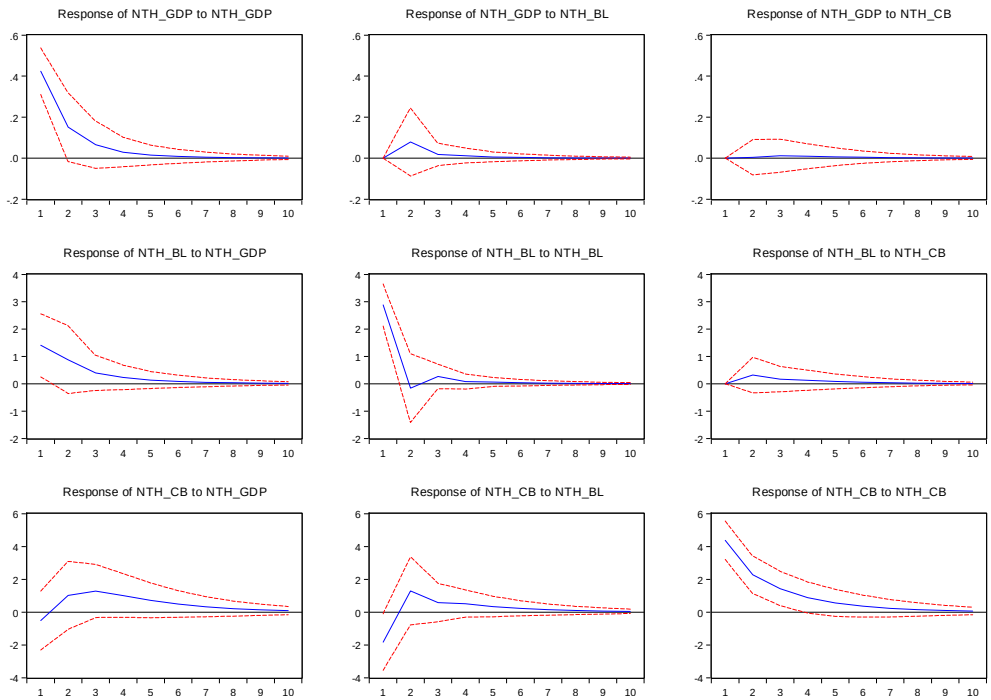
Finland: GDP - BL - CB (Q3 2007 ~ Q4 2011)



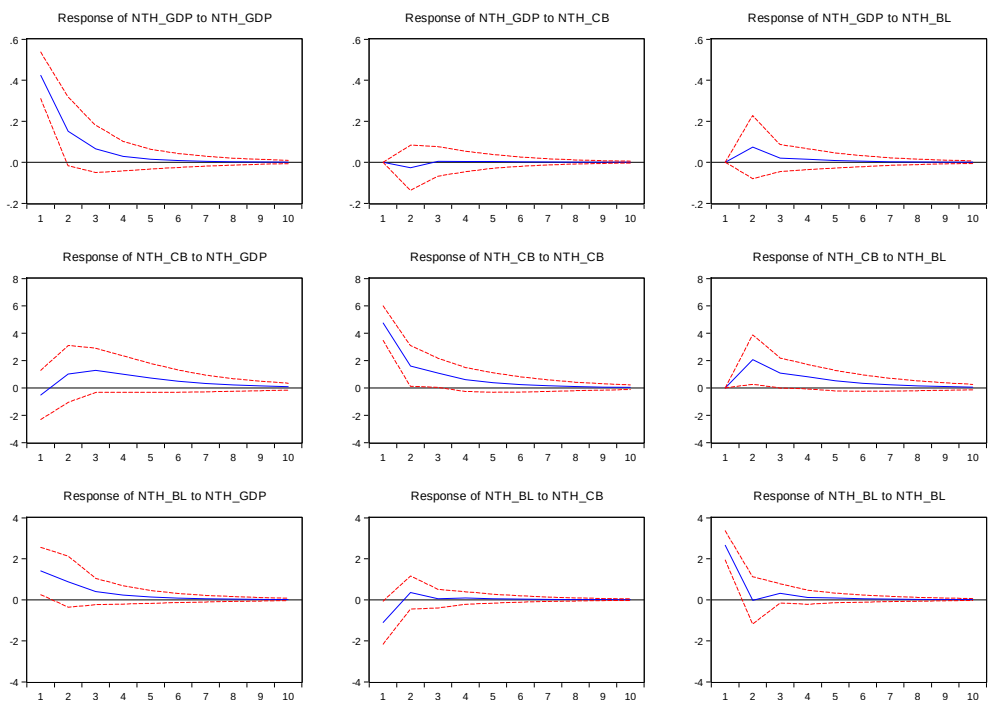
Finland: GDP - CB - BL (Q3 2007 ~ Q4 2011)



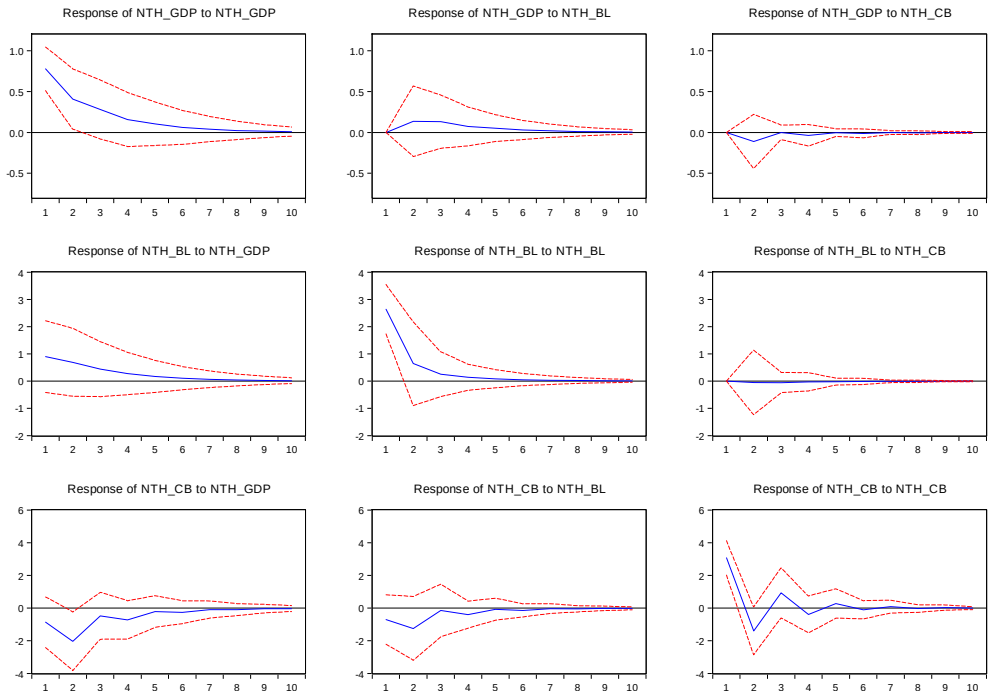
Netherlands: GDP - BL - CB (Q2 2000 ~ Q2 2007)



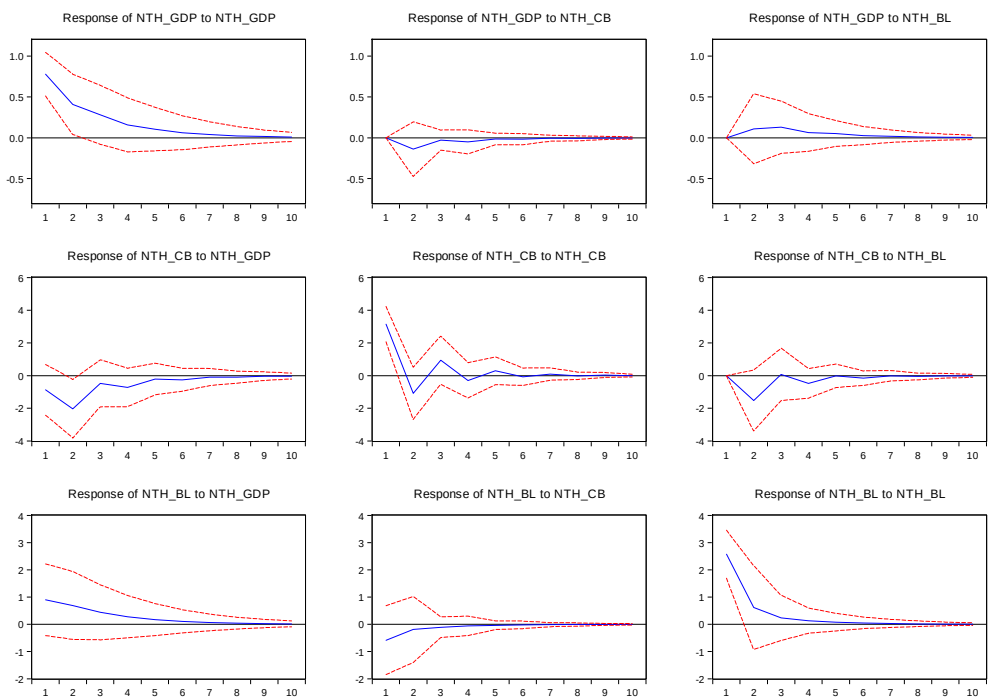
Netherlands: GDP - CB - BL (Q2 2000 ~ Q2 2007)



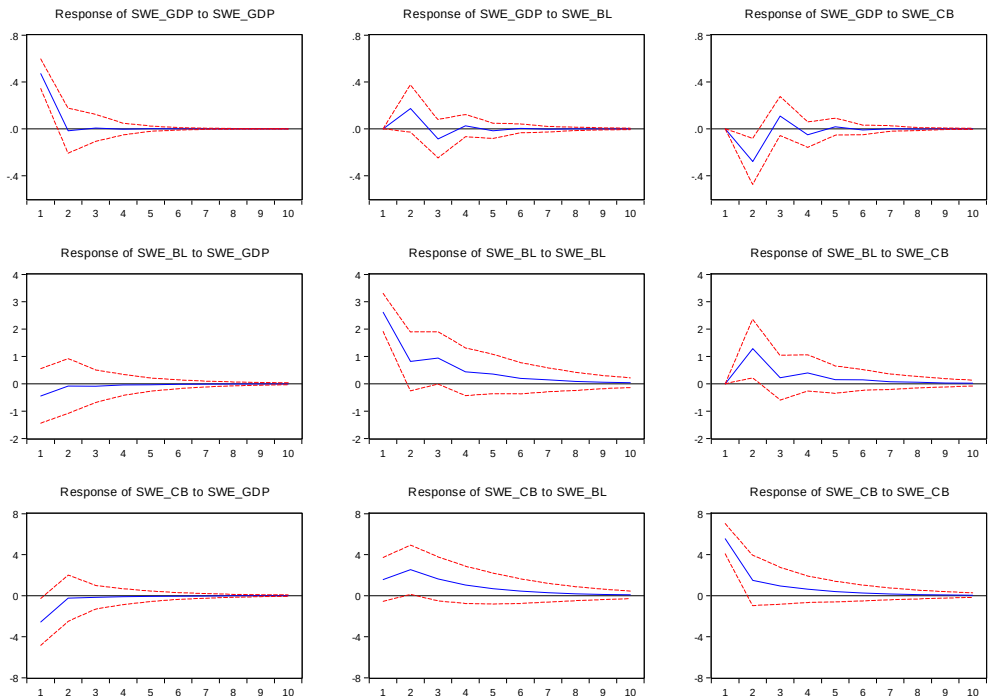
Netherlands: GDP - BL - CB (Q3 2007 ~ Q4 2011)



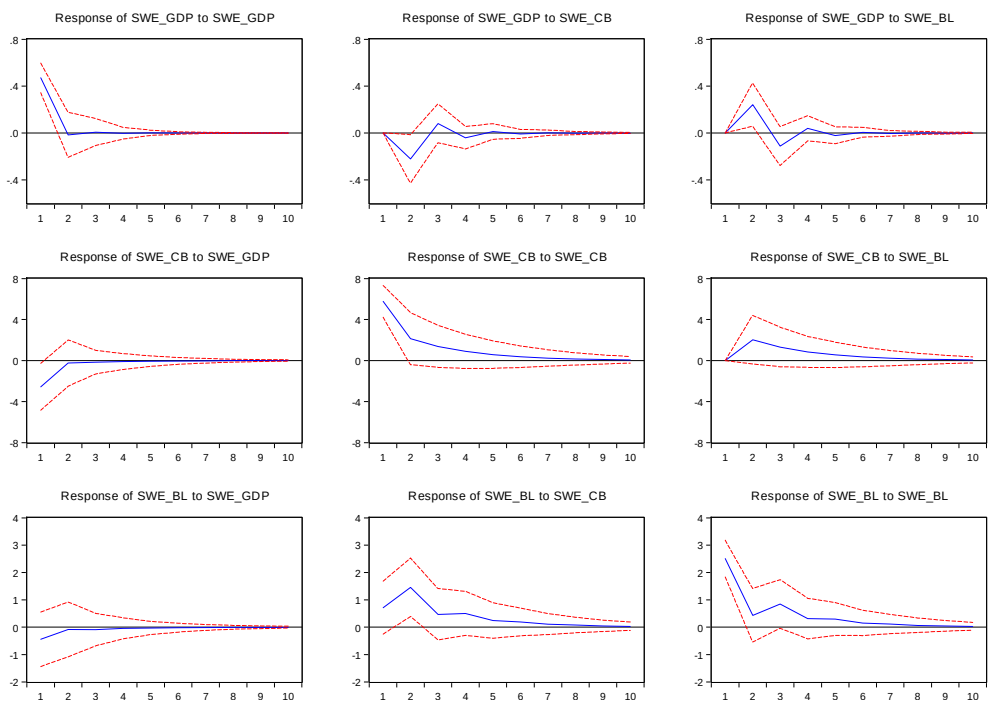
Netherlands: GDP - CB - BL (Q3 2007 ~ Q4 2011)



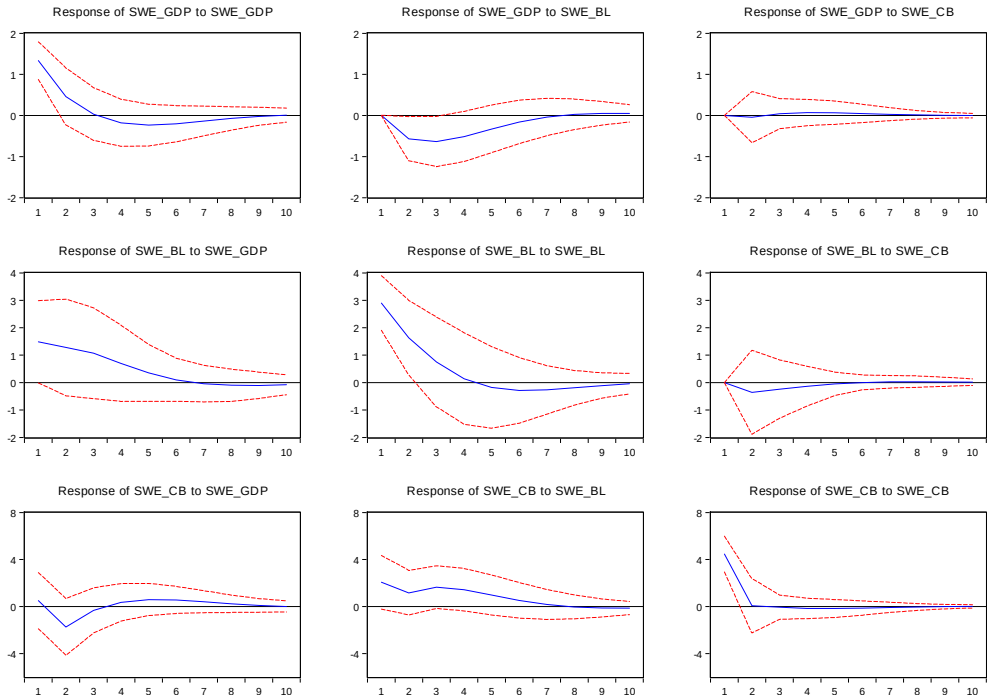
Sweden: GDP - BL - CB (Q2 2000 ~ Q2 2007)



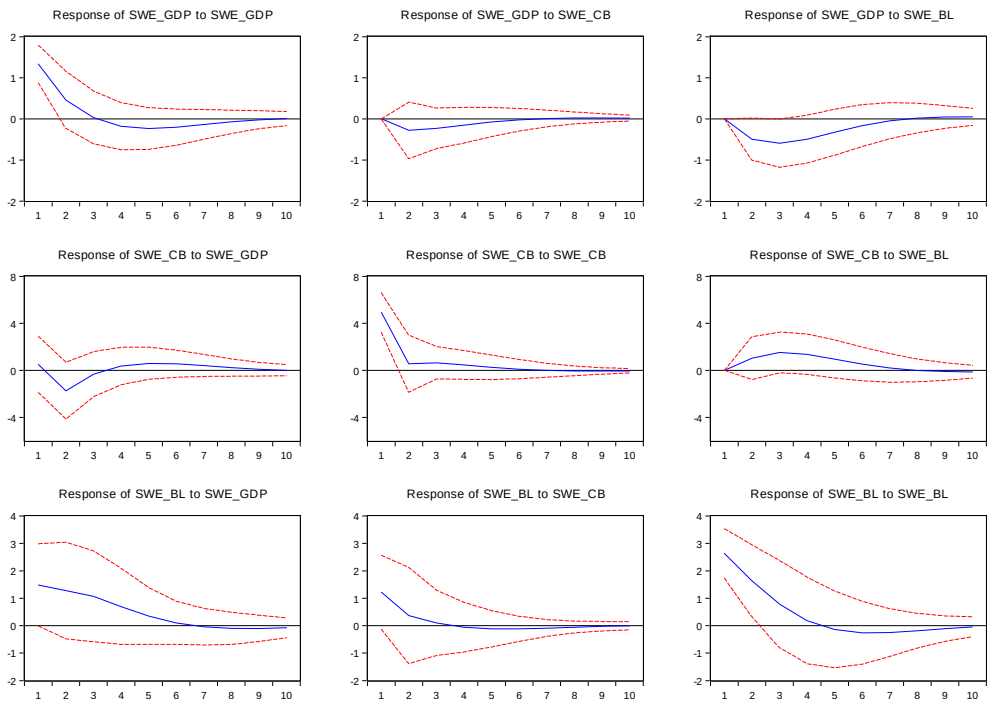
Sweden: GDP - CB - BL (Q2 2000 ~ Q2 2007)



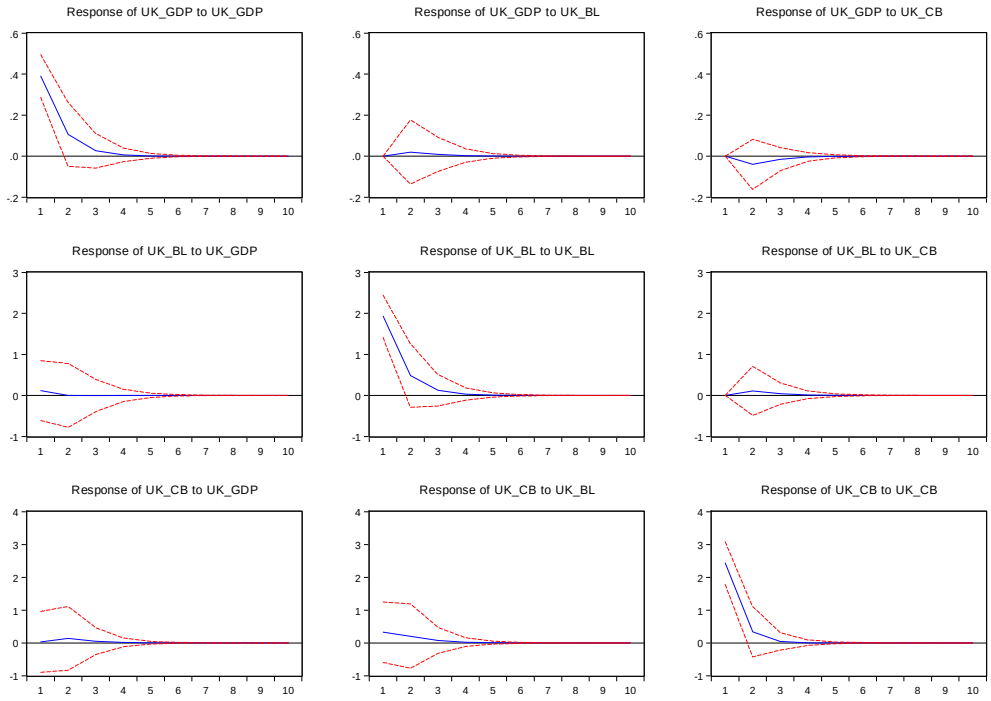
Sweden: GDP - BL - CB (Q3 2007 ~ Q4 2011)



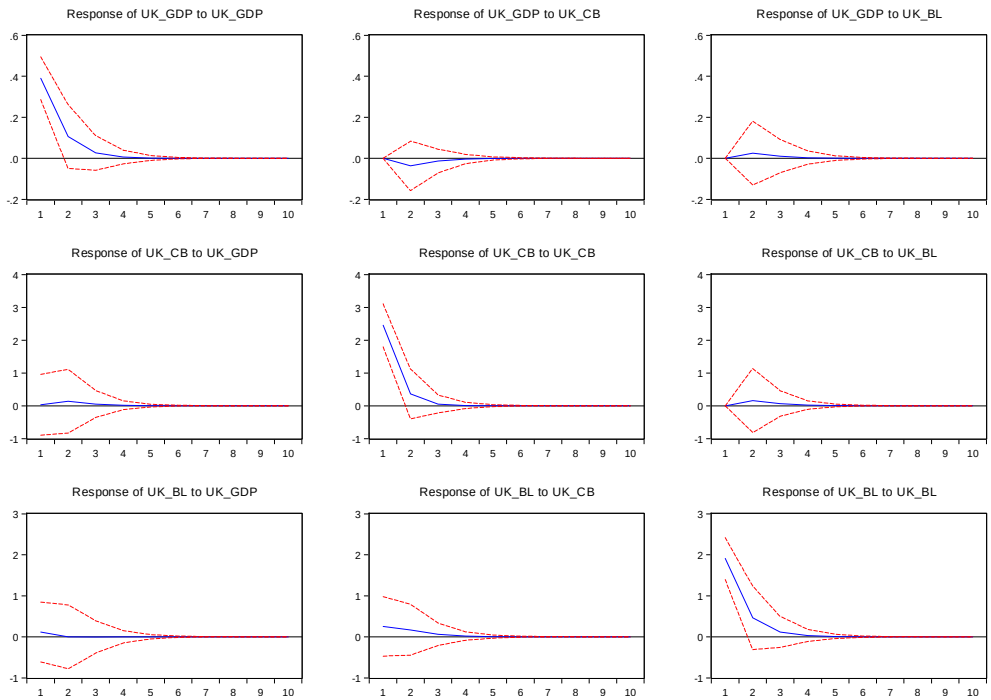
Sweden: GDP - CB - BL (Q3 2007 ~ Q4 2011)



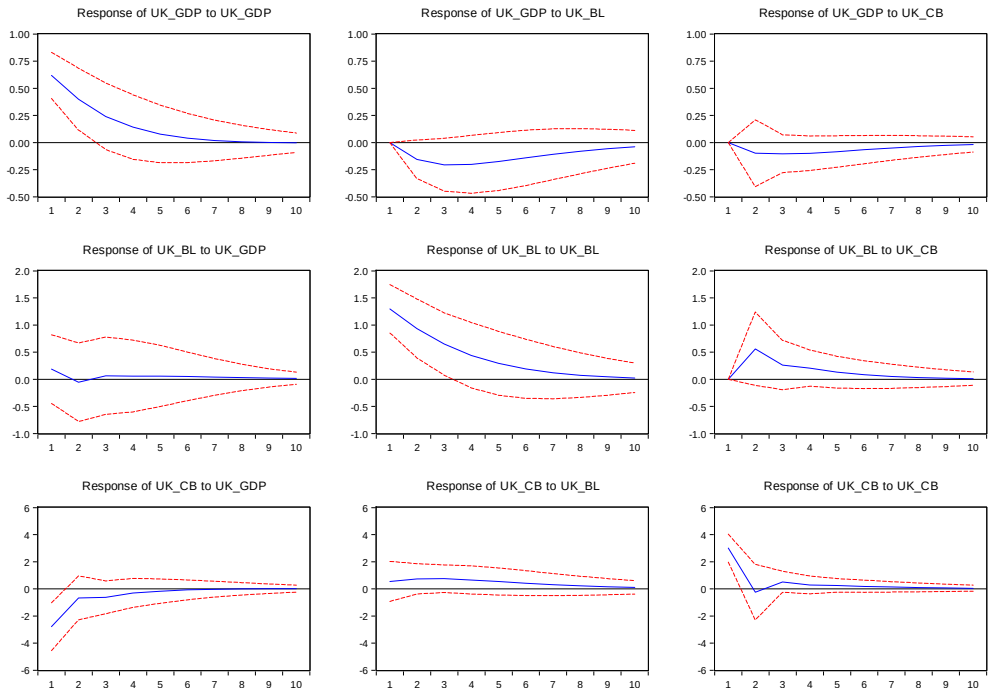
UK: GDP - BL - CB (Q2 2000 ~ Q2 2007)



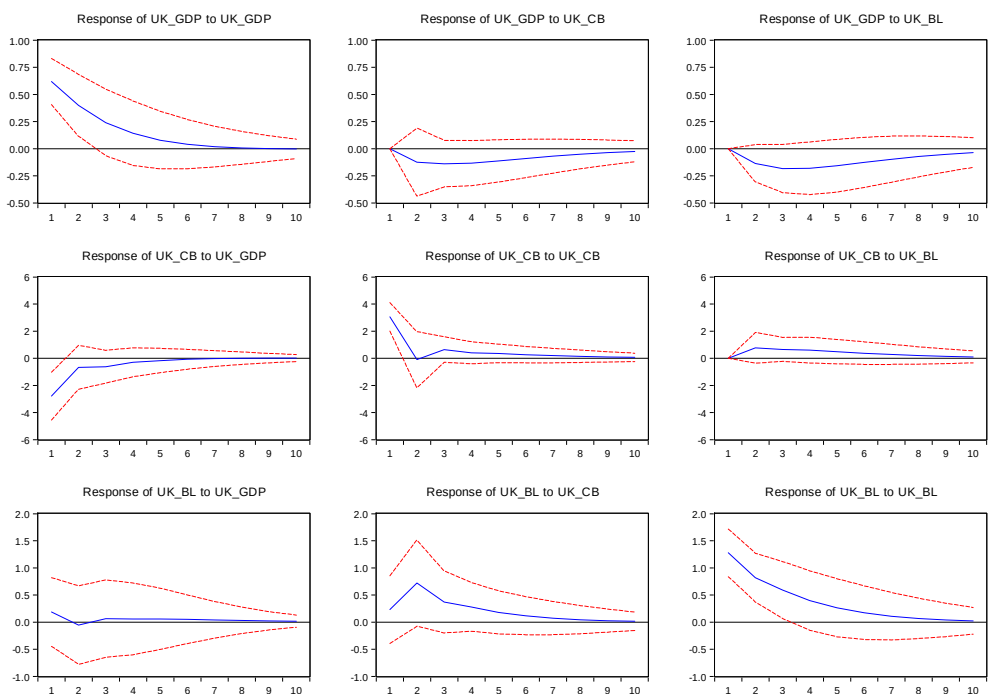
UK: GDP - CB - BL (Q2 2000 ~ Q2 2007)



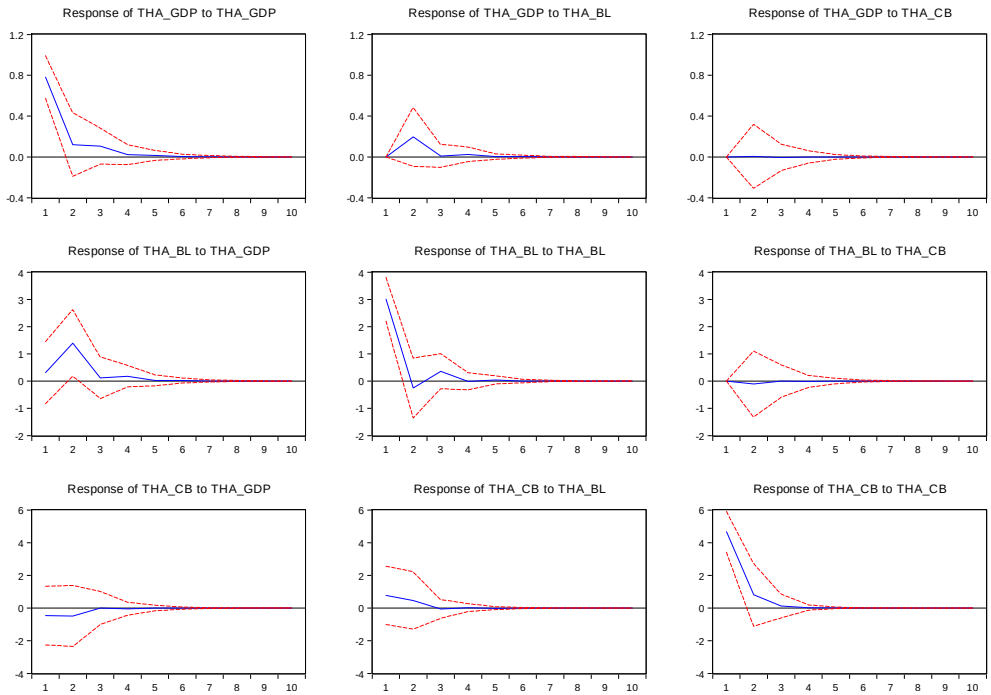
UK: GDP - BL - CB (Q3 2007 ~ Q4 2011)



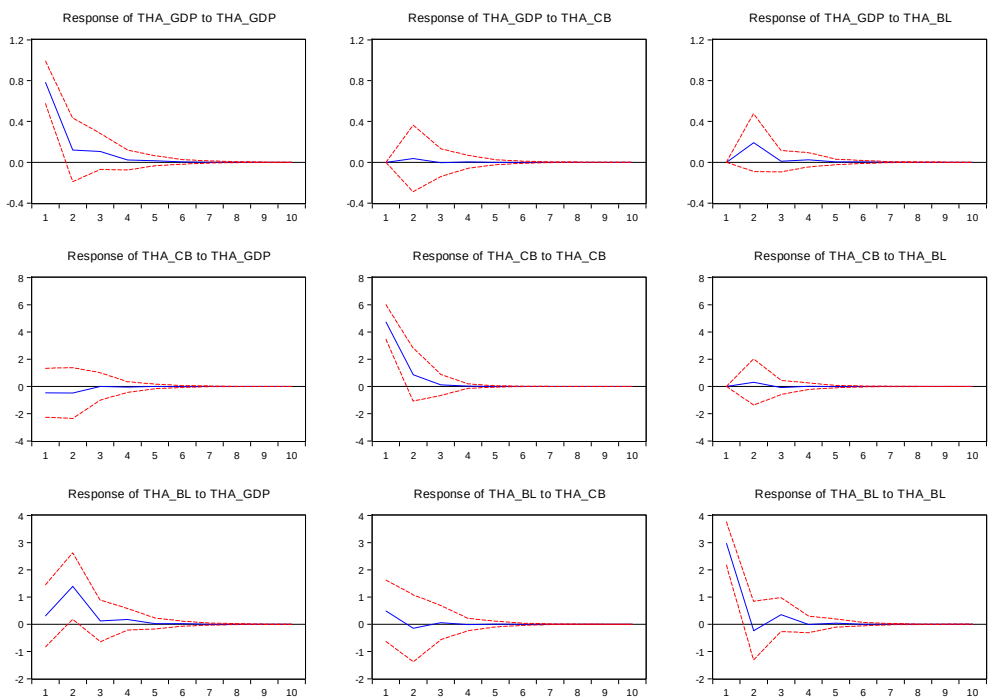
UK: GDP - CB - BL (Q3 2007 ~ Q4 2011)



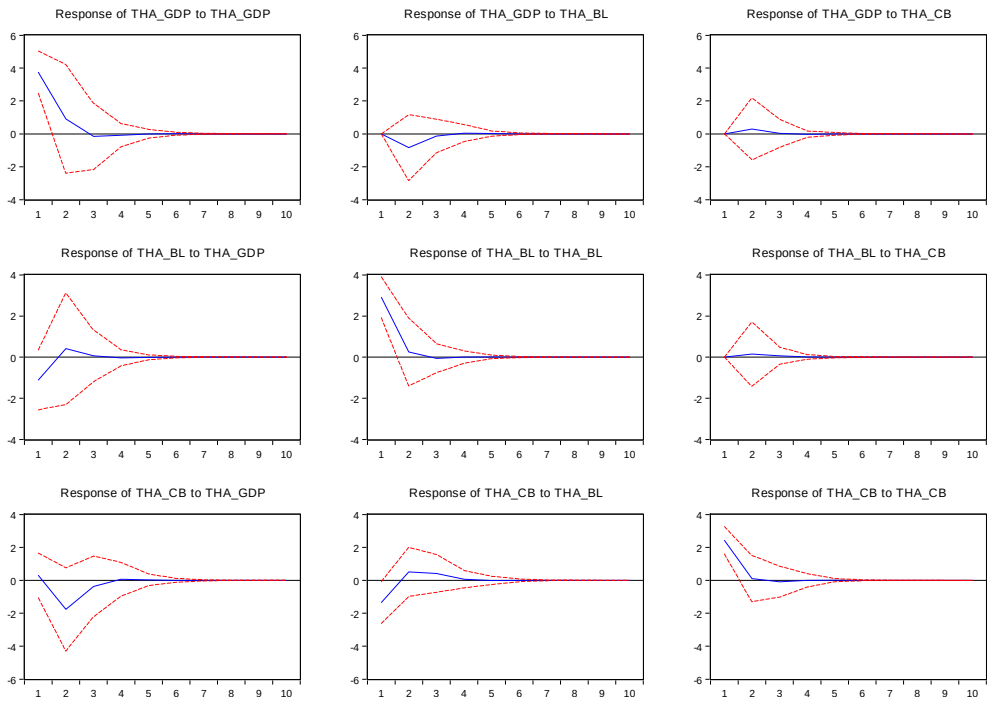
Thailand: GDP - BL - CB (Q2 2000 ~ Q2 2007)



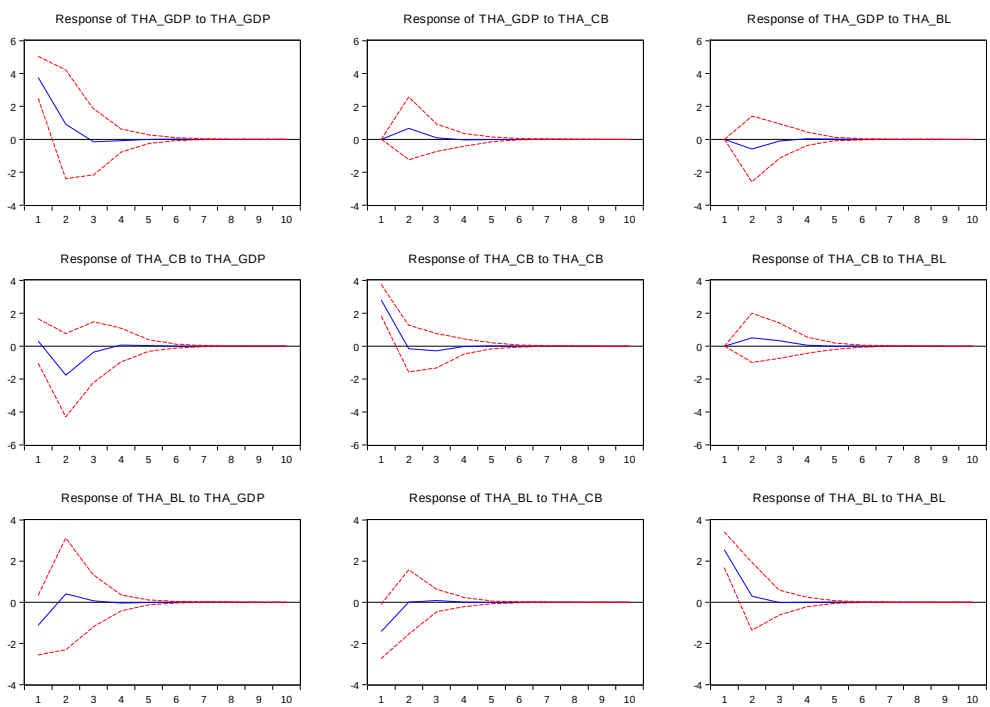
Thailand: GDP - CB - BL (Q2 2000 ~ Q2 2007)



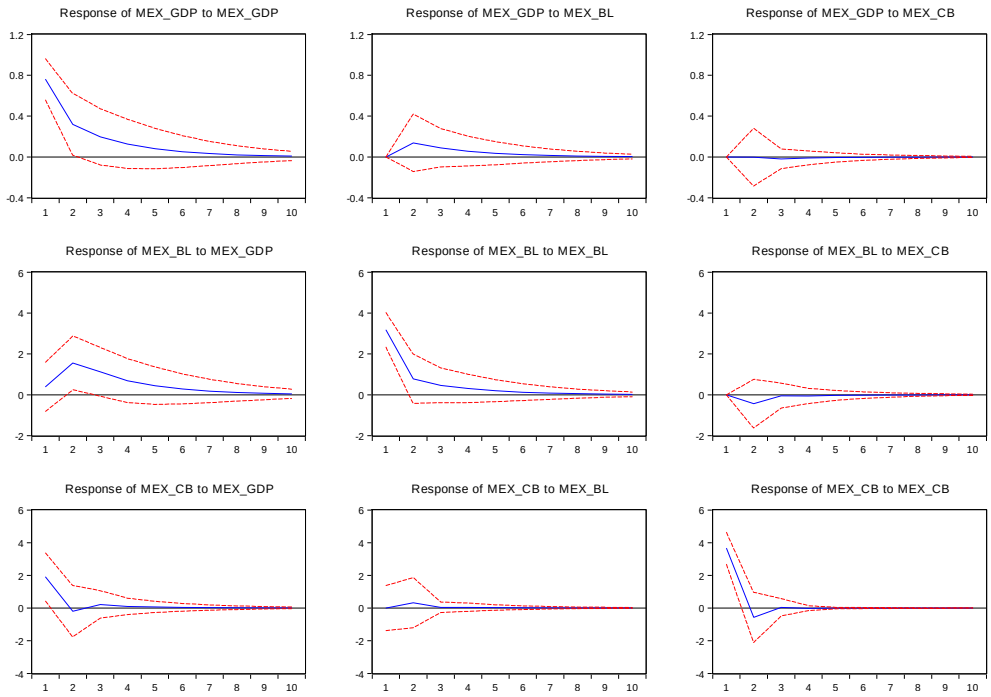
Thailand: GDP - BL - CB (Q3 2007 ~ Q4 2011)



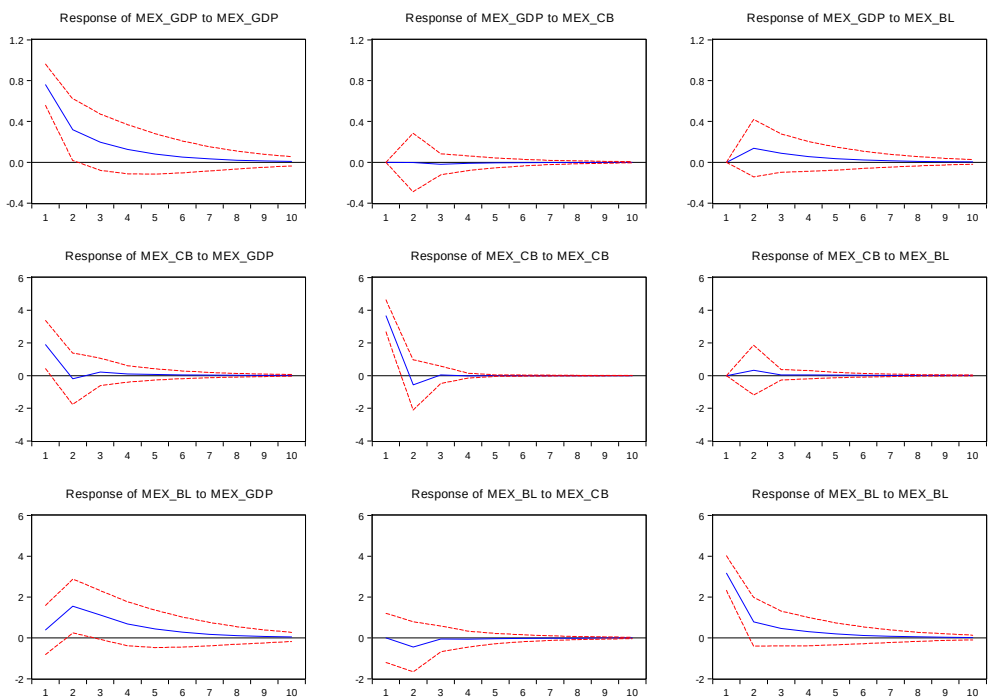
Thailand: GDP - CB - BL (Q3 2007 ~ Q4 2011)



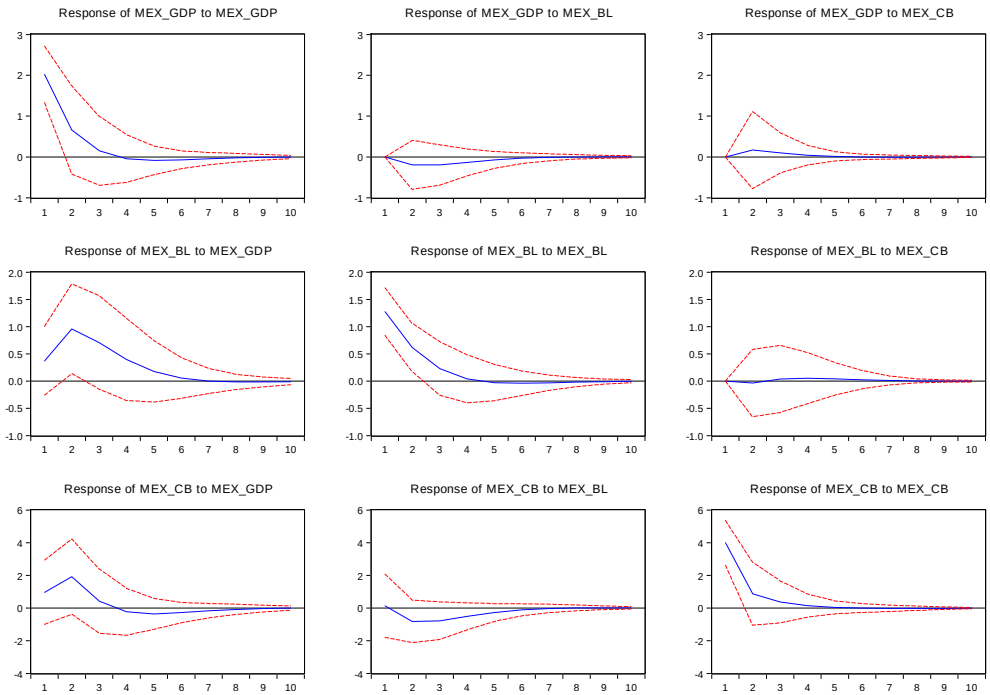
Mexico: GDP - BL - CB (Q3 2003 ~ Q2 2007)



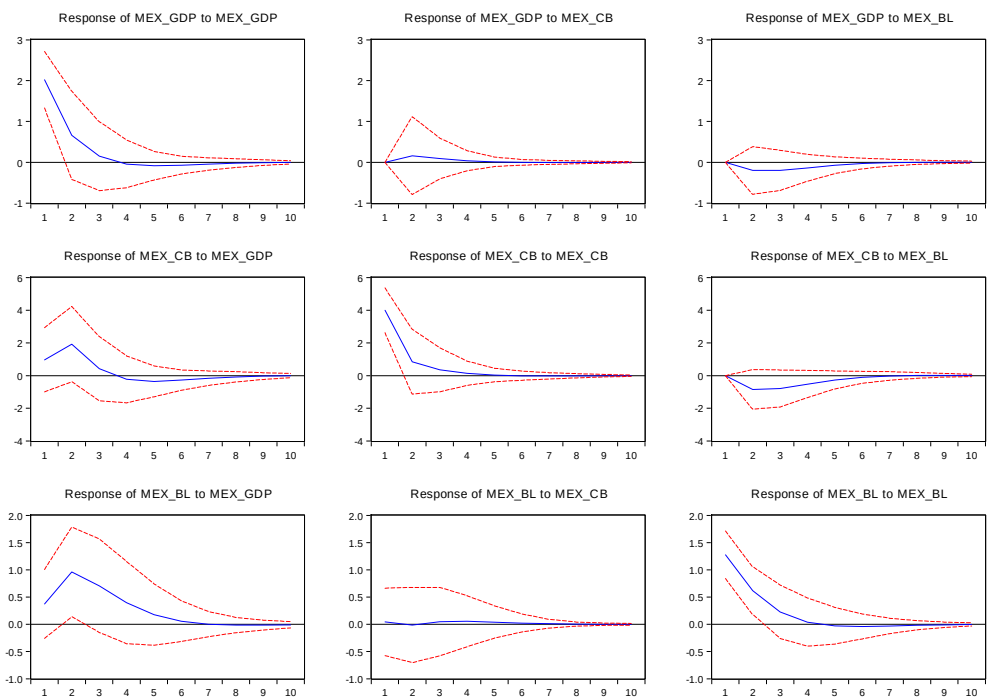
Mexico: GDP - CB - BL (Q3 2003 ~ Q2 2007)



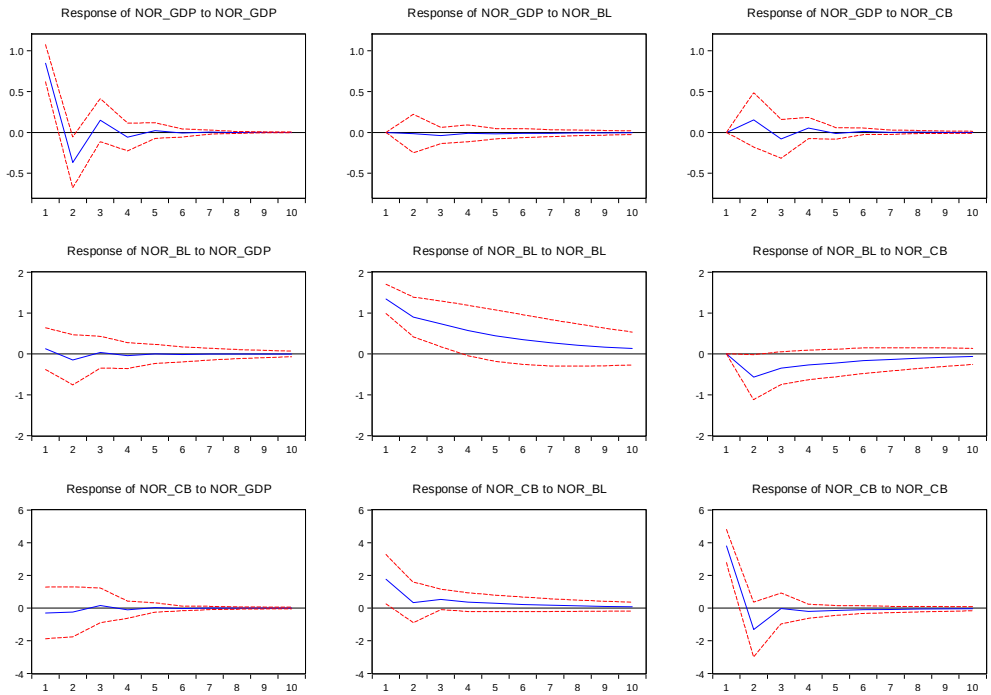
Mexico: GDP - BL - CB (Q3 2007 ~ Q4 2011)



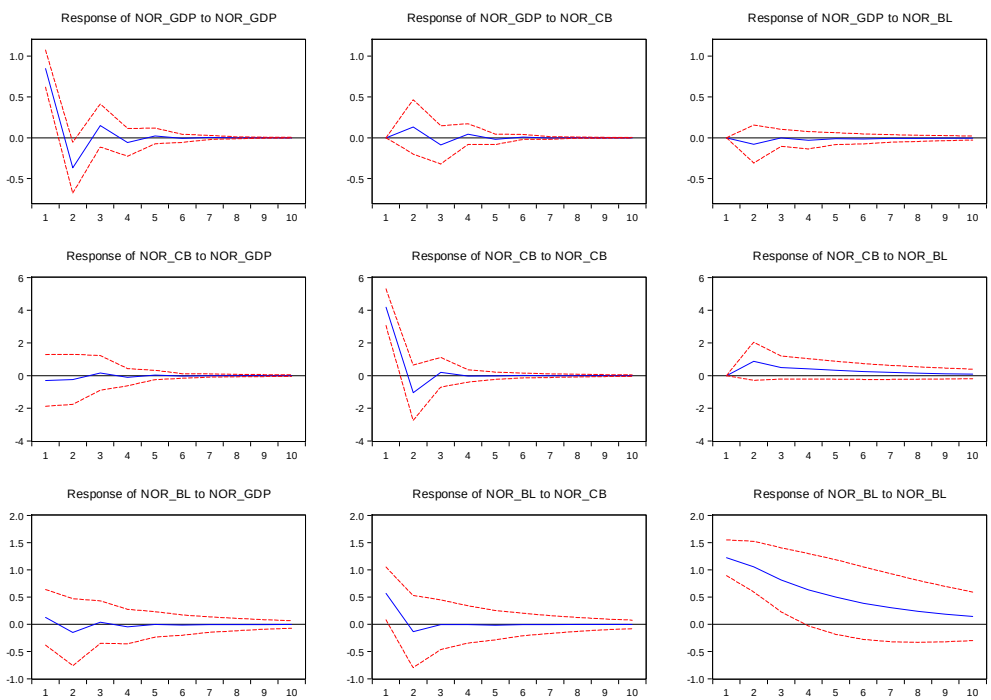
Mexico: GDP - CB - BL (Q3 2007 ~ Q4 2011)



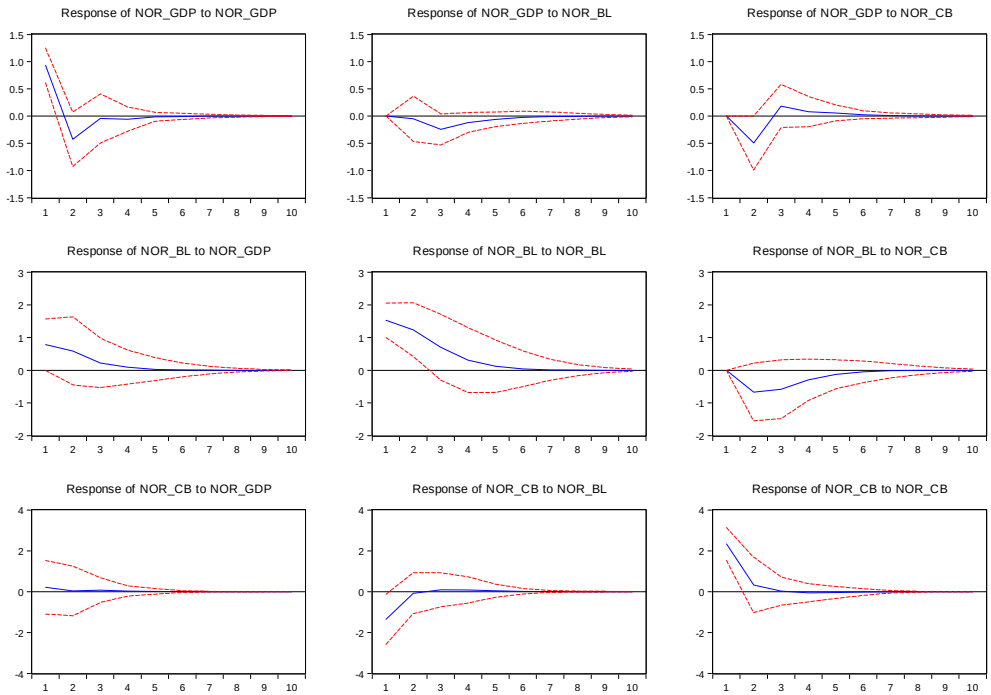
Norway: GDP - BL - CB (Q2 2000 ~ Q2 2007)



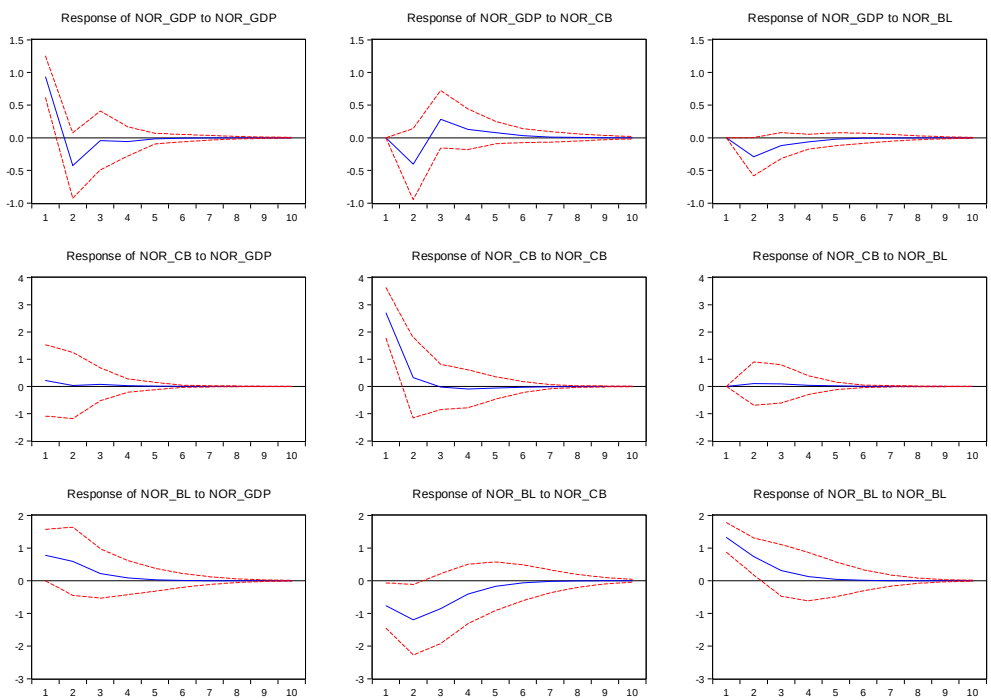
Norway: GDP - CB - BL (Q2 2000 ~ Q2 2007)



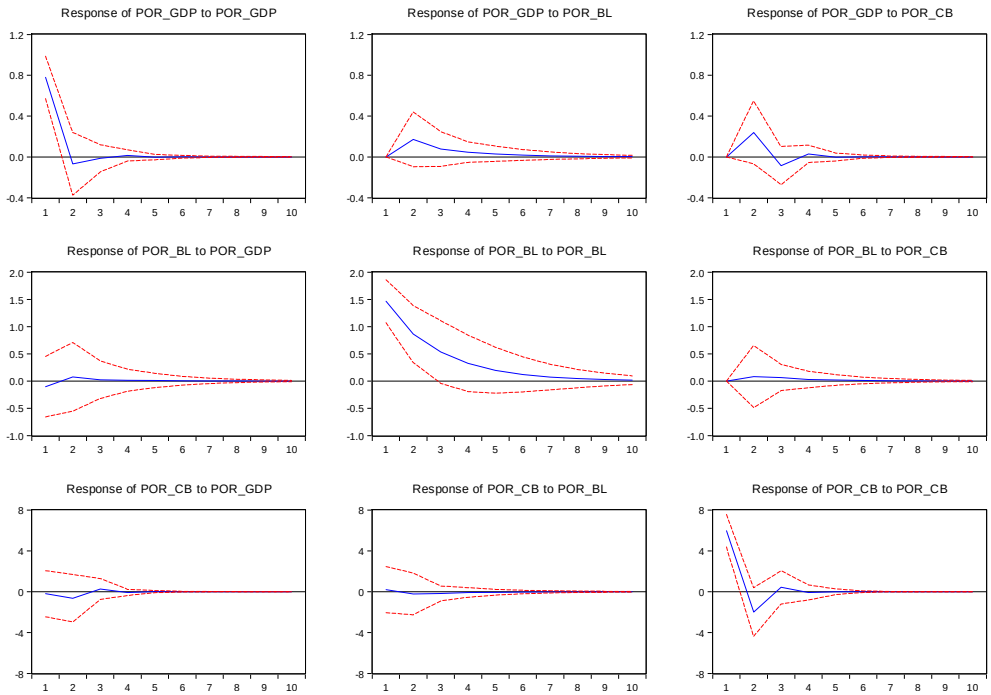
Norway: GDP - BL - CB (Q3 2007 ~ Q4 2011)



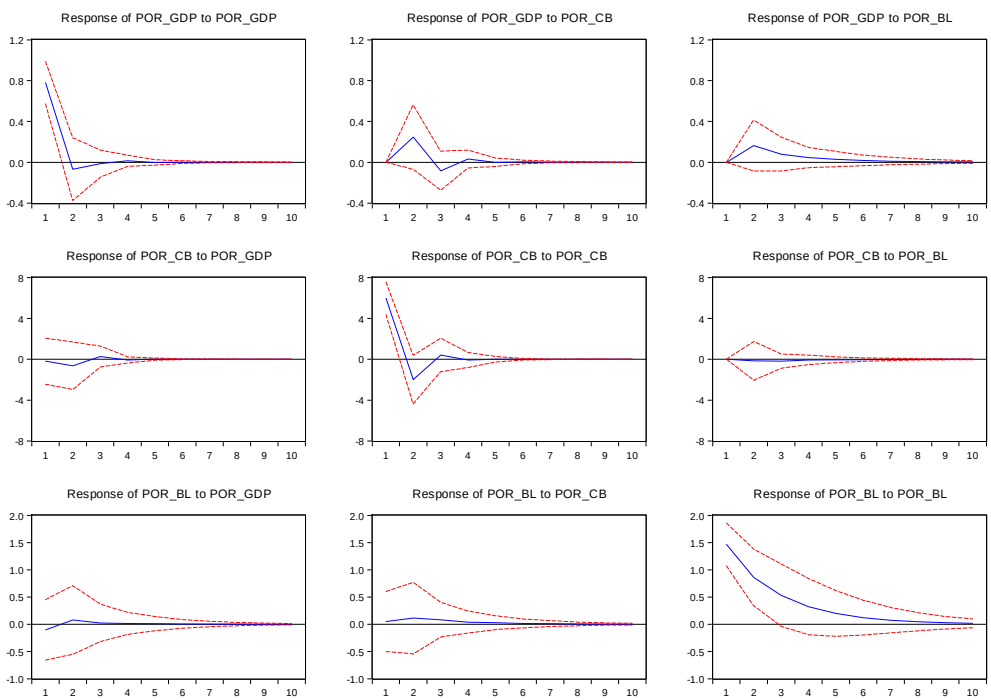
Norway: GDP - CB - BL (Q3 2007 ~ Q4 2011)



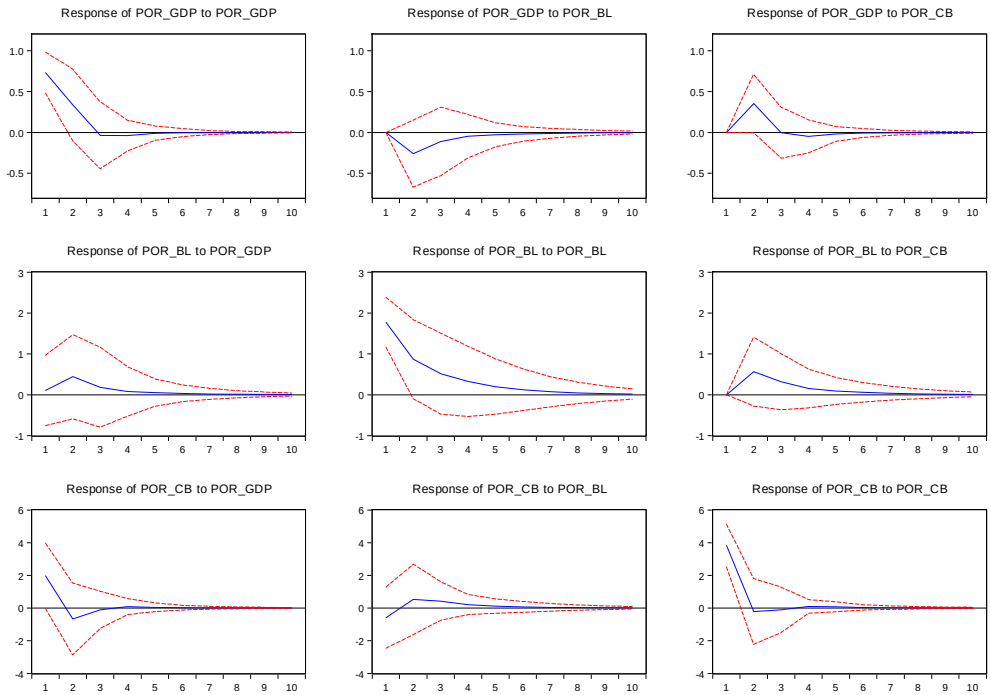
Portugal: GDP - BL - CB (Q2 2000 ~ Q2 2007)



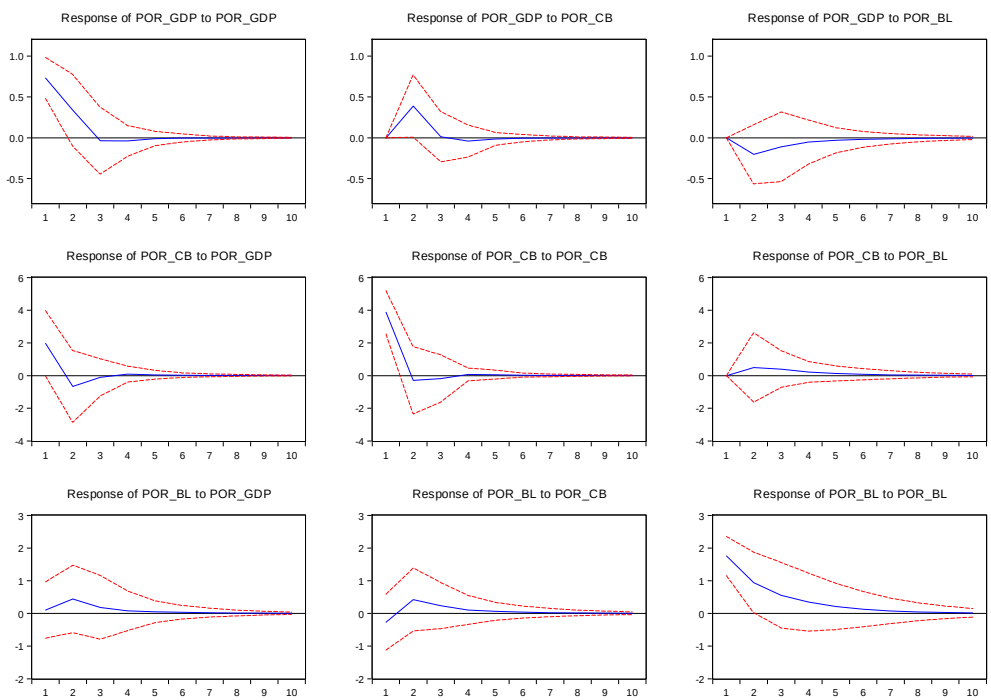
Portugal: GDP - CB - BL (Q2 2000 ~ Q2 2007)



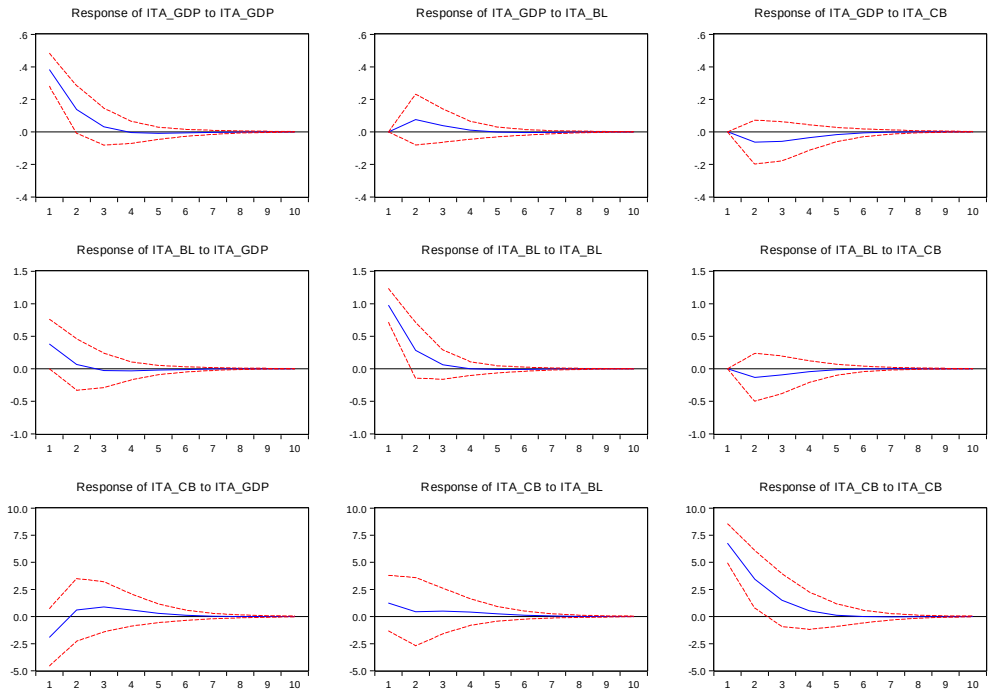
Portugal: GDP - BL - CB (Q3 2007 ~ Q4 2011)



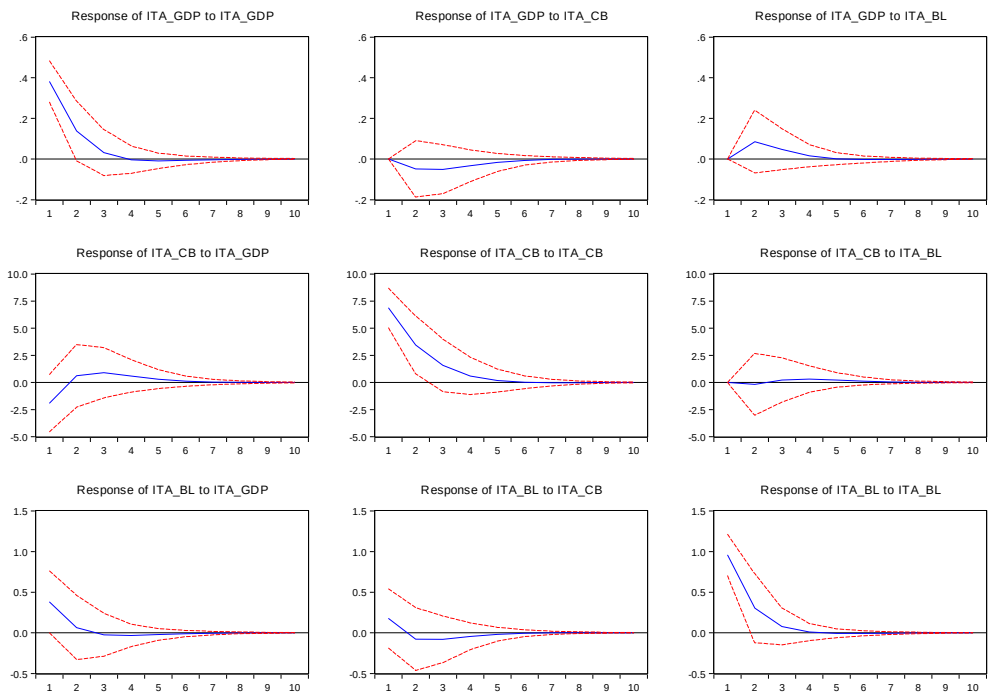
Portugal: GDP - CB - BL (Q3 2007 ~ Q4 2011)



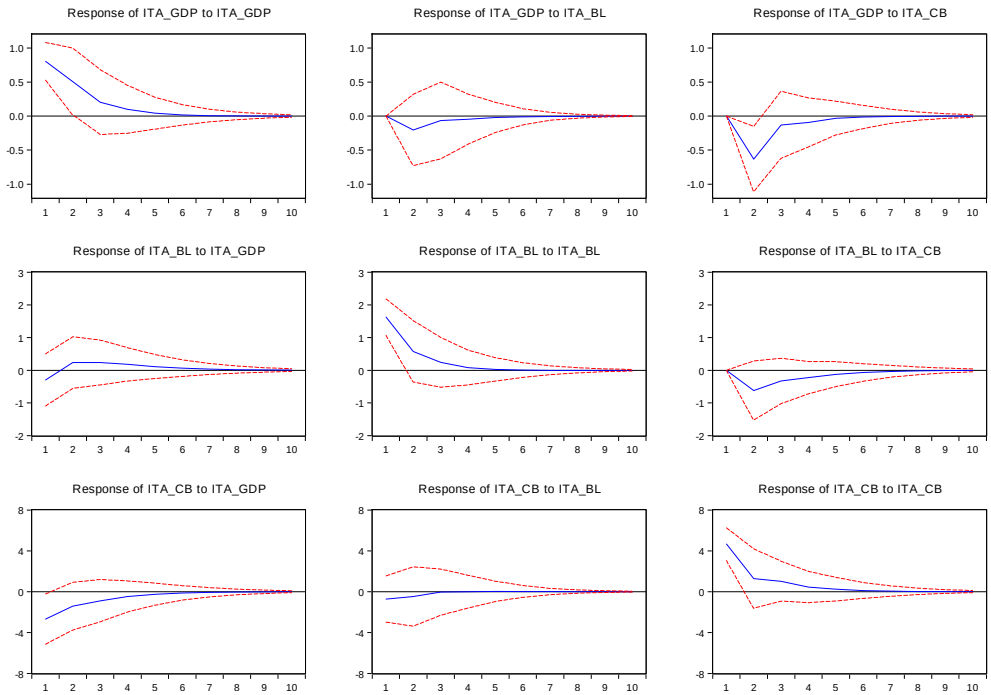
Italy: GDP - BL - CB (Q2 2000 ~ Q2 2007)



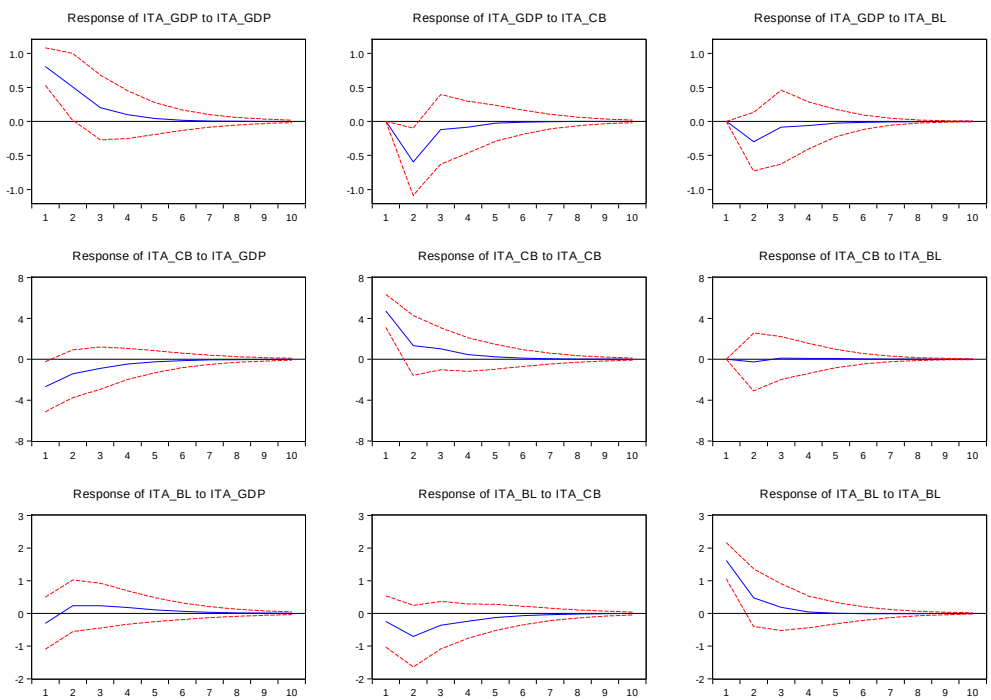
Italy: GDP - CB - BL (Q2 2000 ~ Q2 2007)



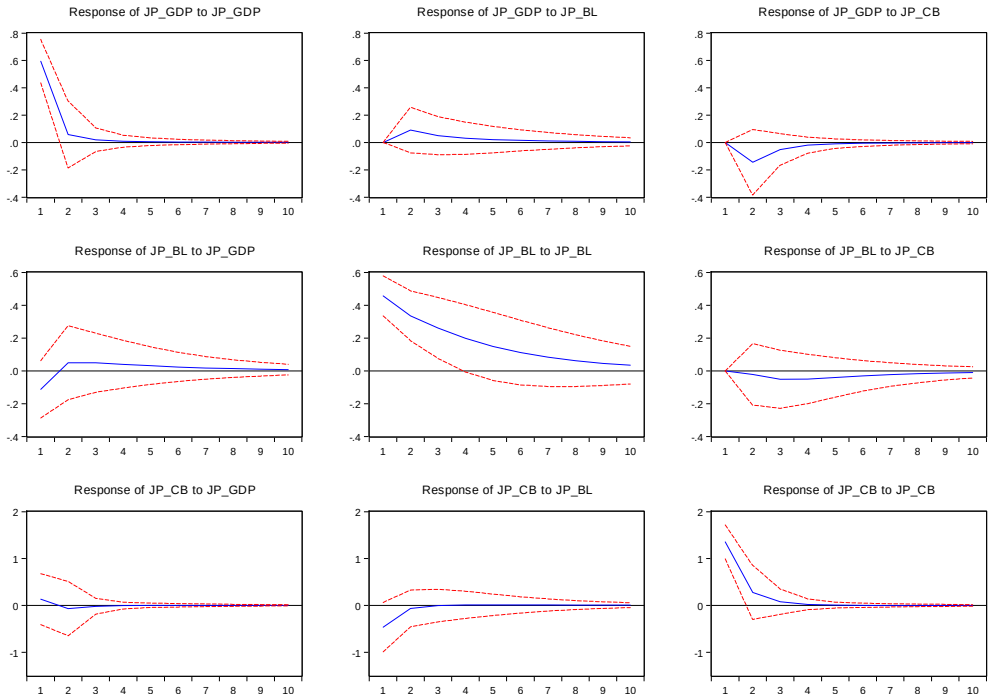
Italy: GDP - BL - CB (Q3 2007 ~ Q4 2011)



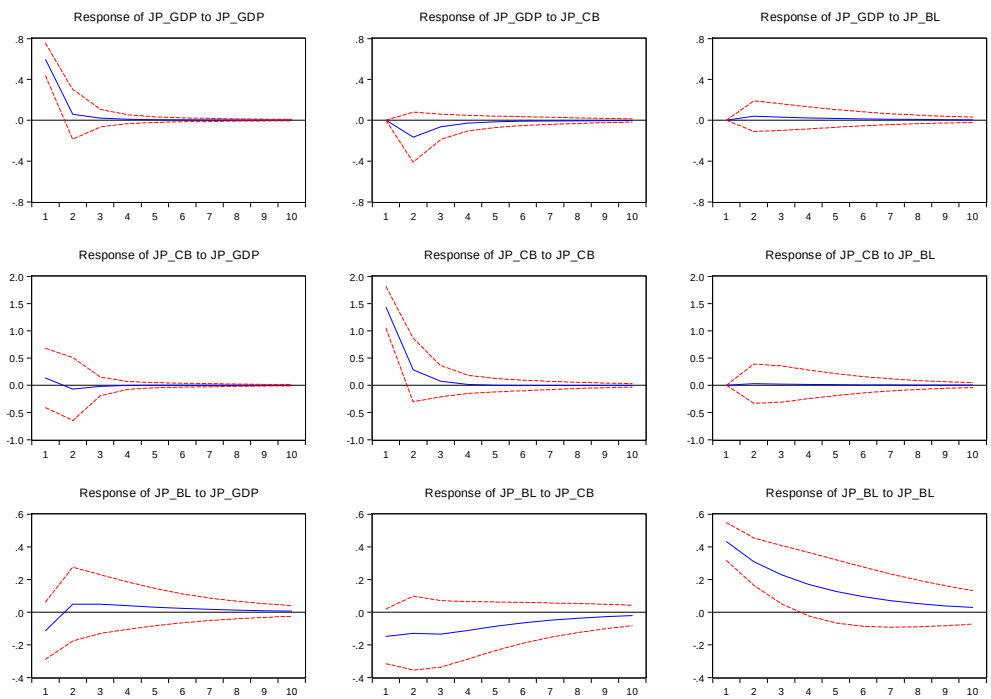
Italy: GDP - CB - BL (Q3 2007 ~ Q4 2011)



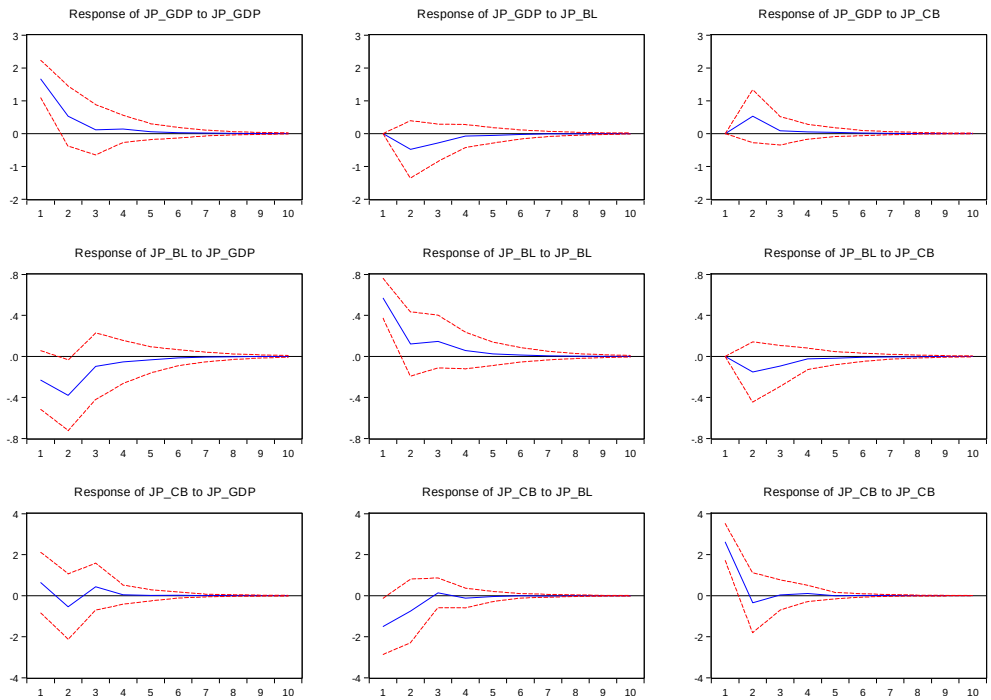
Japan: GDP - BL - CB (Q2 2000 ~ Q2 2007)



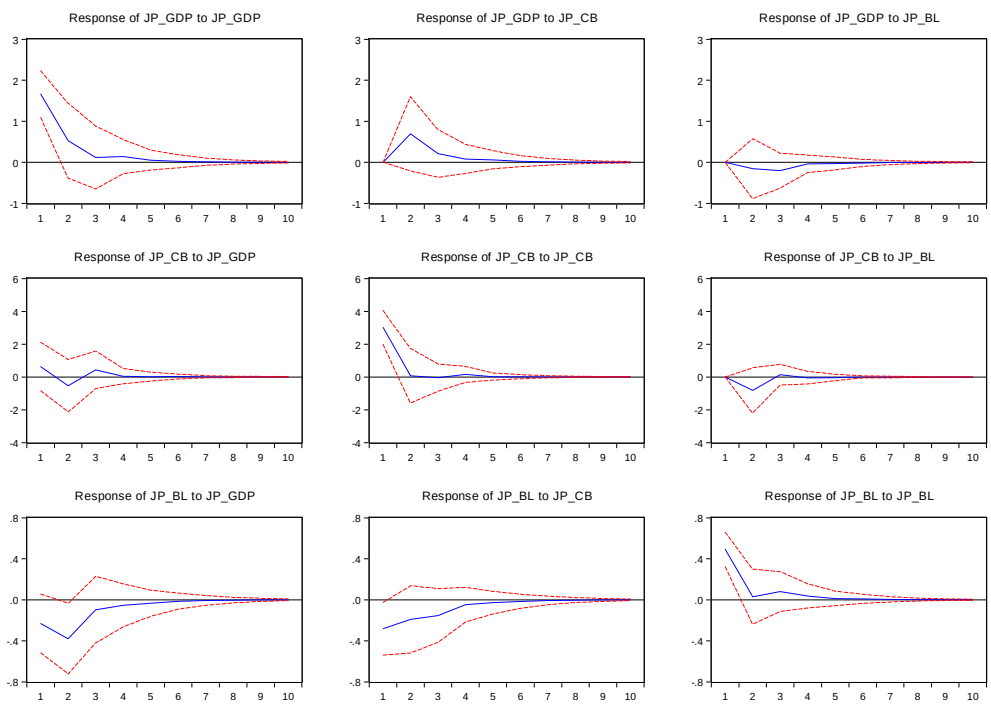
Japan: GDP - CB - BL (Q2 2000 ~ Q2 2007)



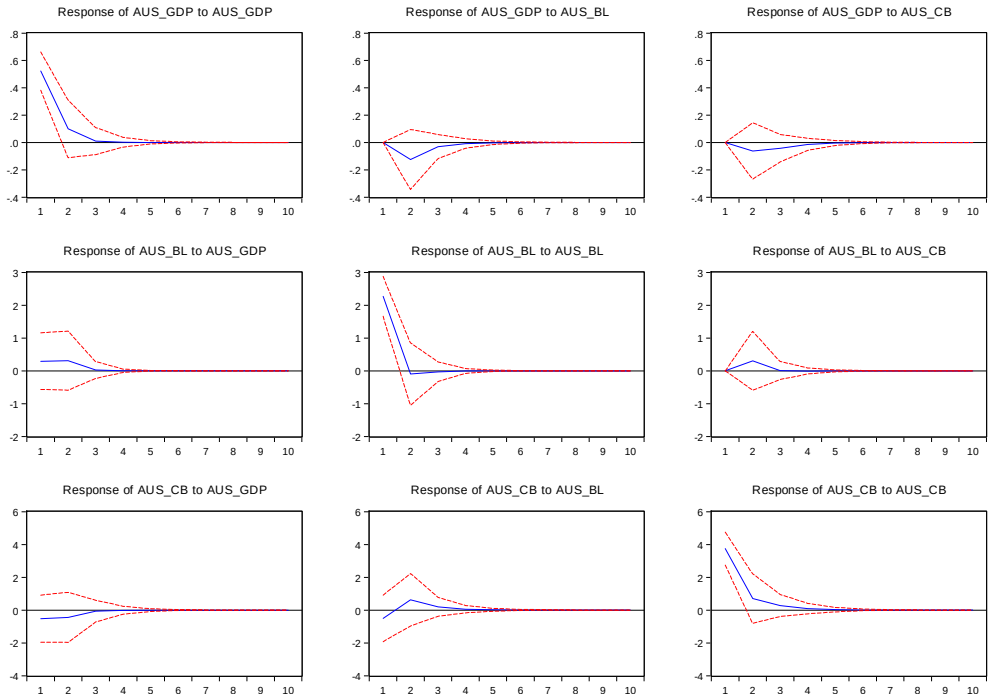
Japan: GDP - BL - CB (Q3 2007 ~ Q4 2011)



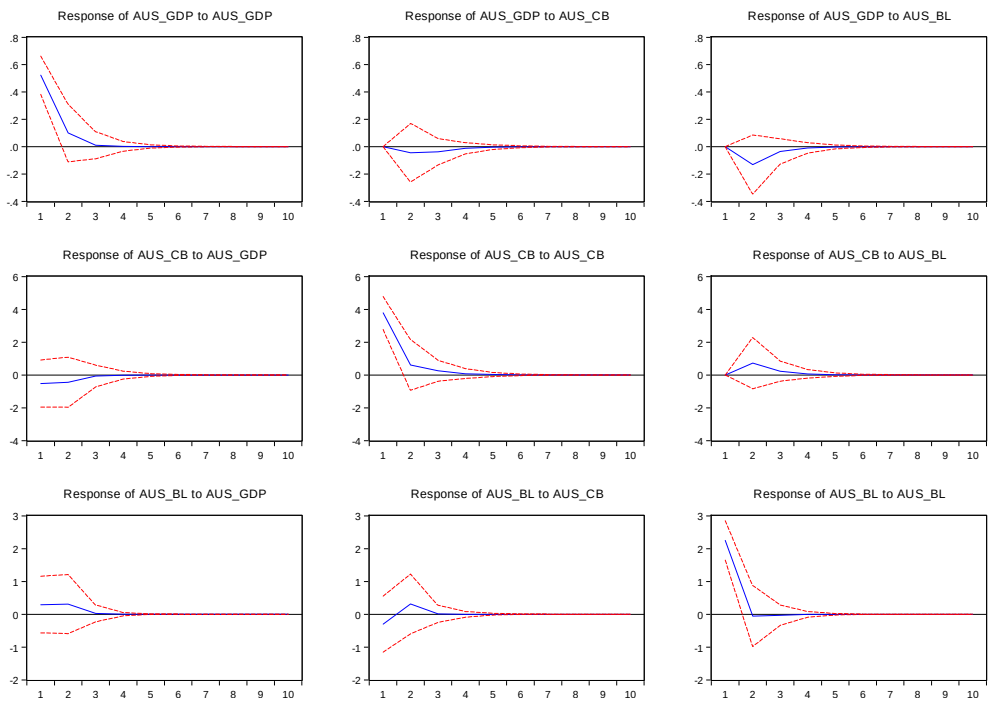
Japan: GDP - CB - BL (Q3 2007 ~ Q4 2011)



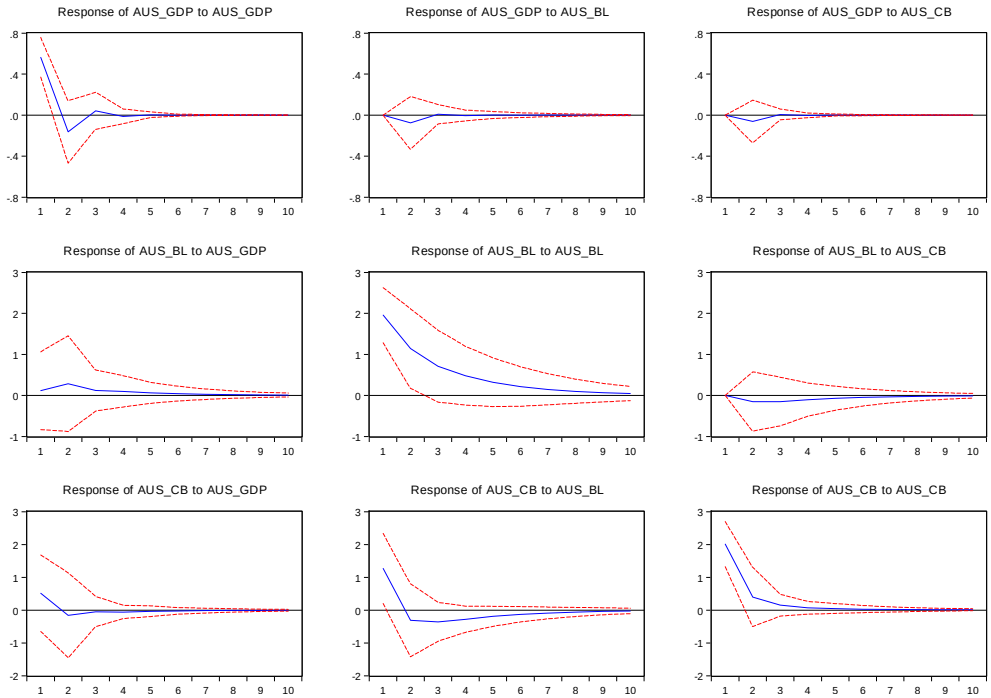
Australia: GDP - BL - CB (Q2 2000 ~ Q2 2007)



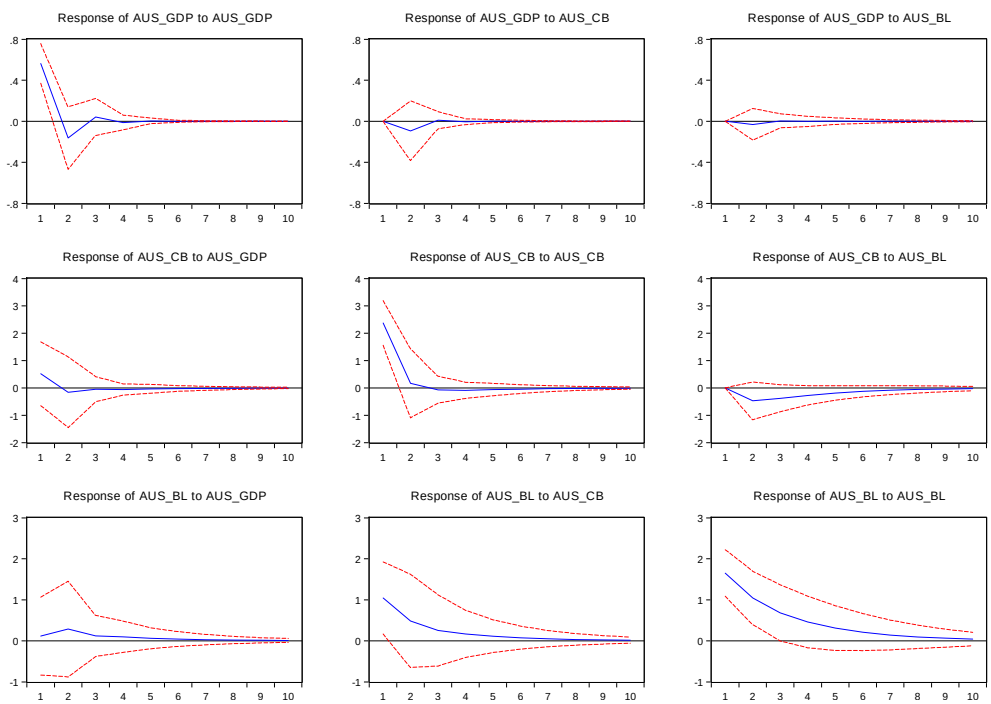
Australia: GDP - CB - BL (Q2 2000 ~ Q2 2007)



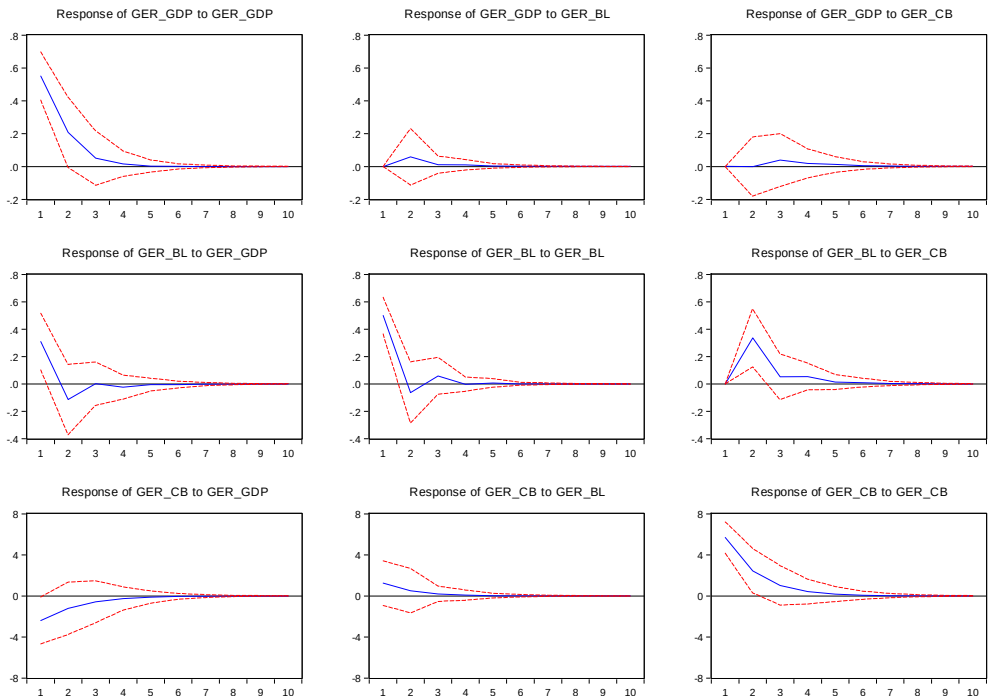
Australia: GDP - BL - CB (Q3 2007 ~ Q4 2011)



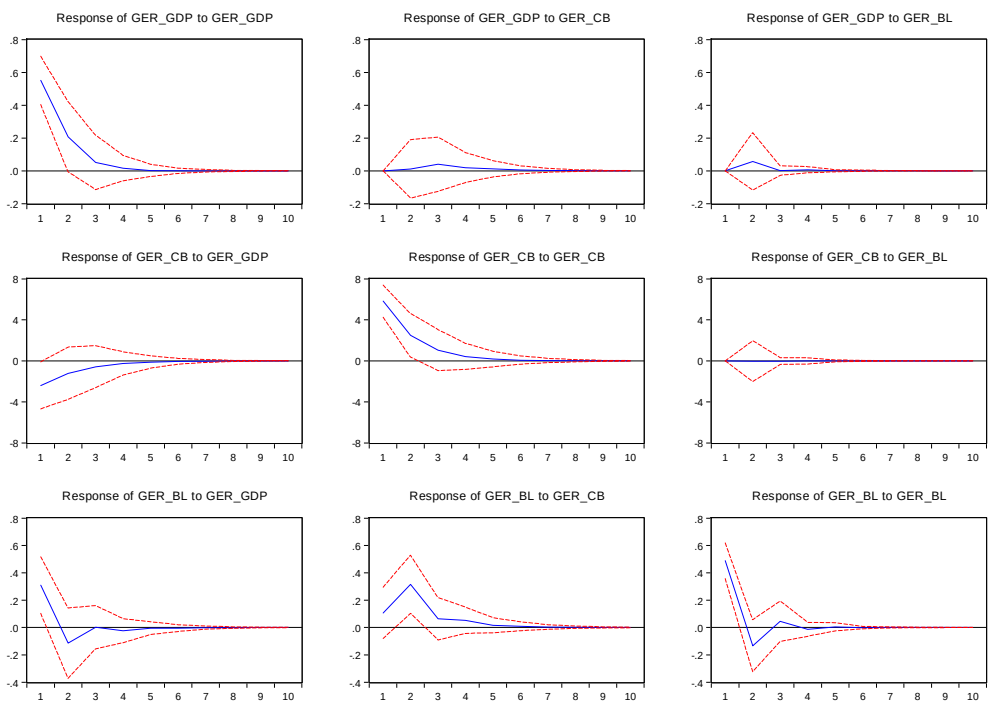
Australia: GDP - CB - BL (Q3 2007 ~ Q4 2011)



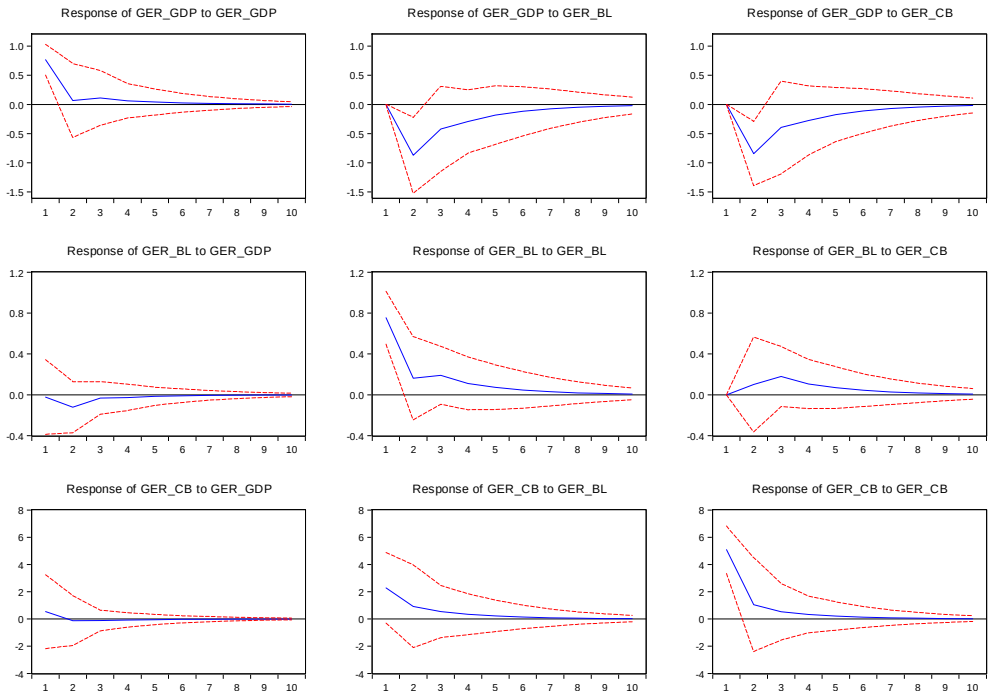
Germany: GDL-BL-CB (Q2 2000 ~ Q2 2007)



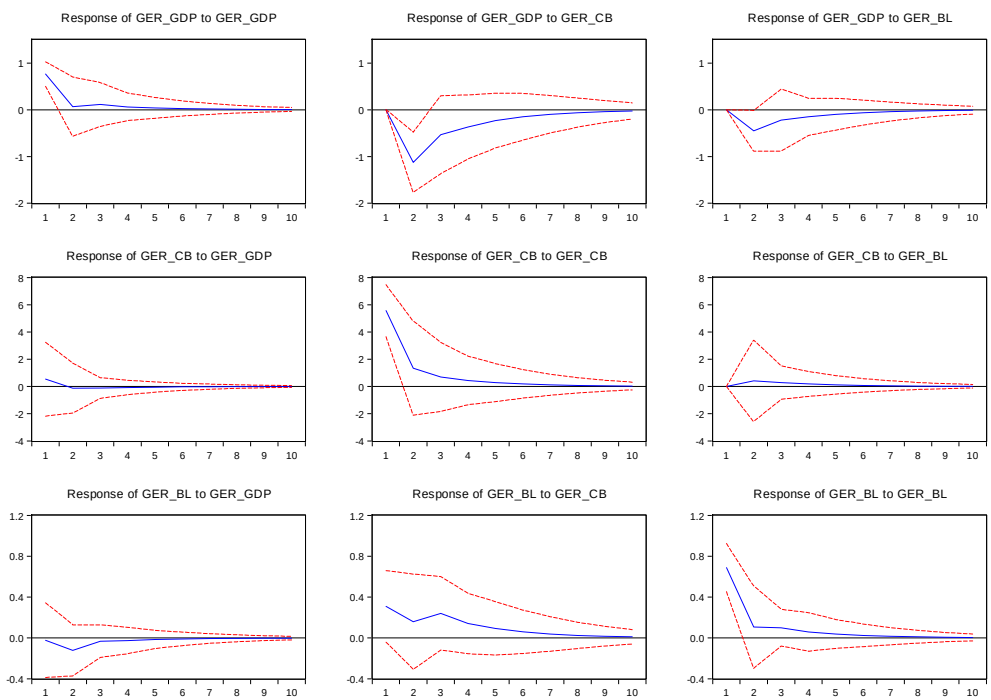
Germany: GDP - CB - BL (Q2 2000 ~ Q2 2007)



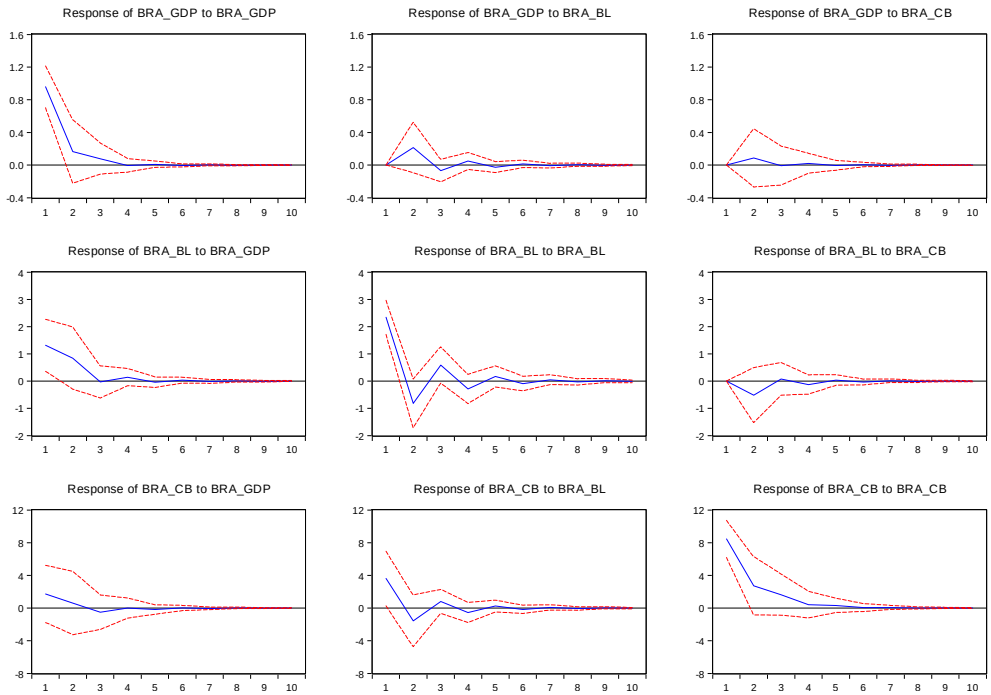
Germany: GDP - BL - CB (Q3 2007 – Q4 2011)



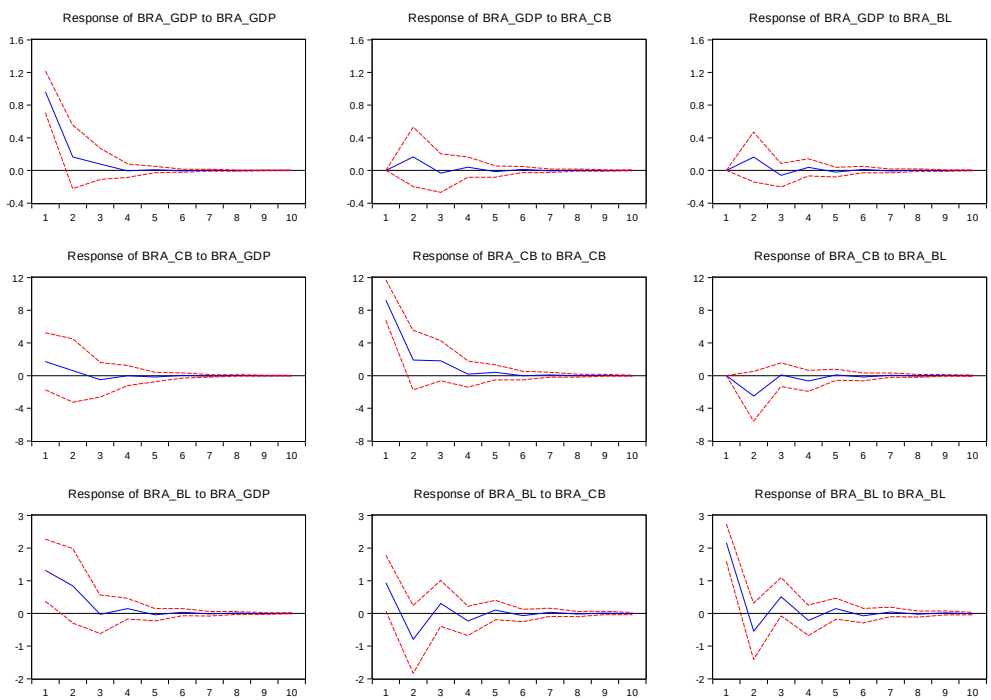
Germany: GDP - CB - BL (Q3 2007 – Q4 2011)



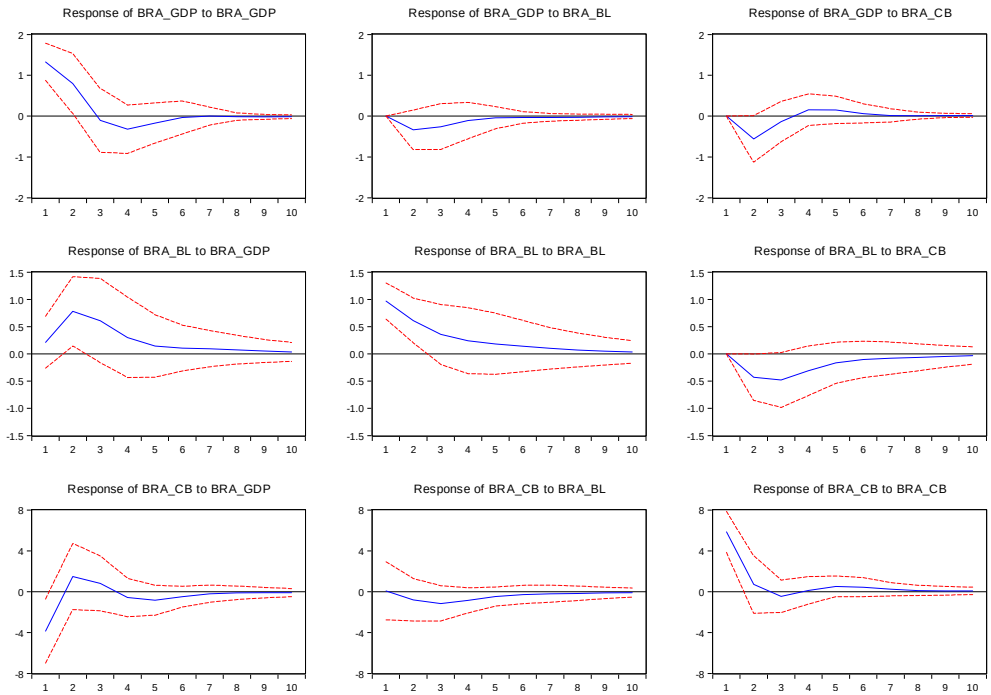
Brazil: GDP - BL - CB (Q2 2000 ~ Q2 2007)



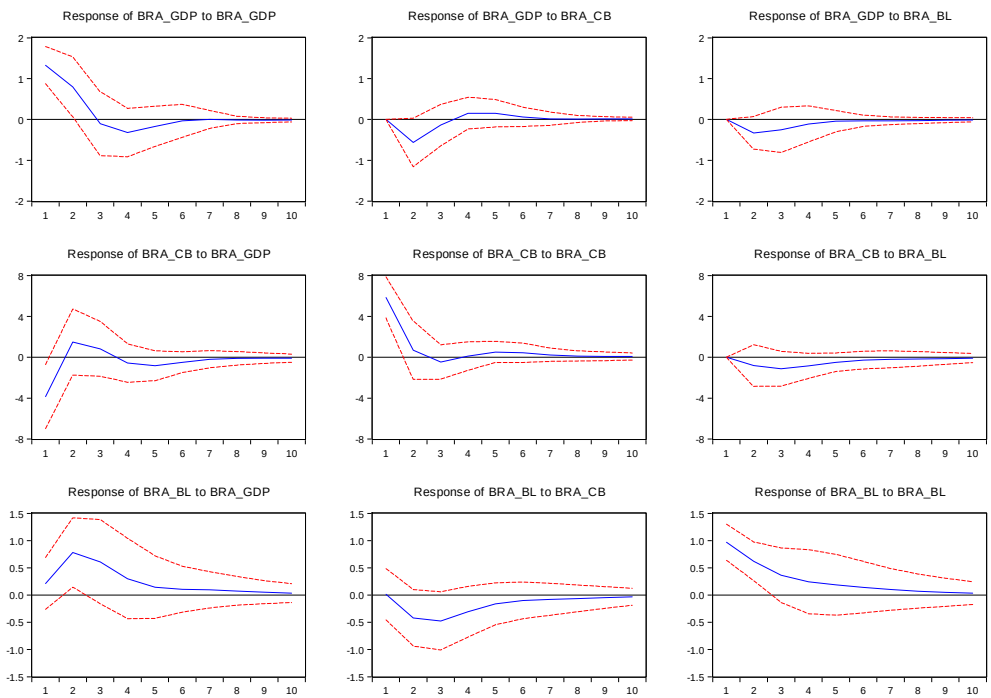
Brazil: GDP - CB - BL (Q2 2000 ~ Q2 2007)



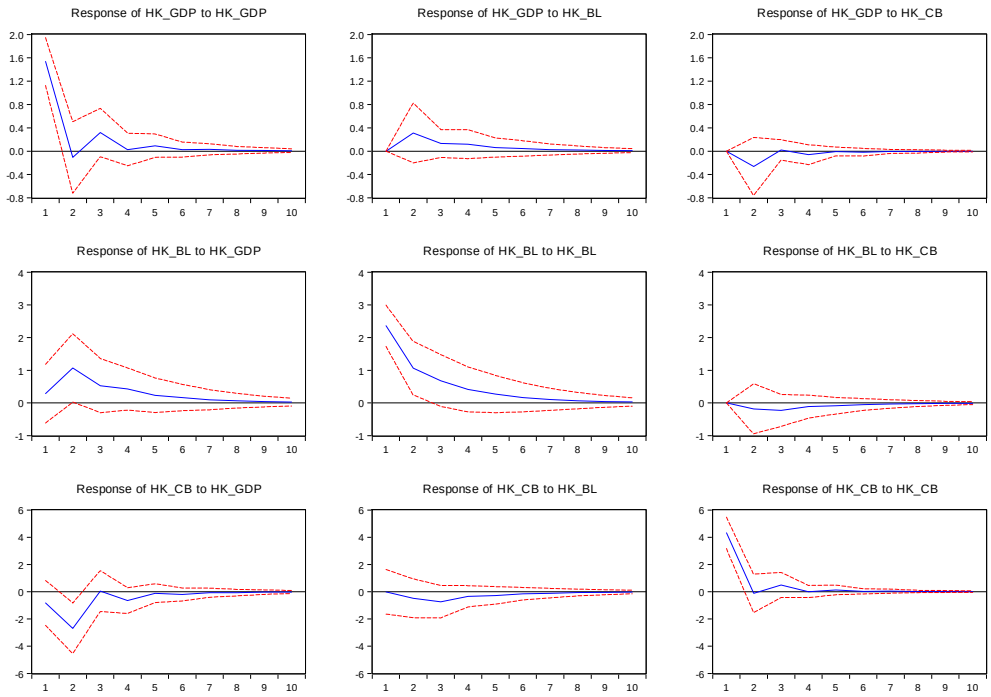
Brazil: GDP - BL - CB (Q3 2007 ~ Q4 2011)



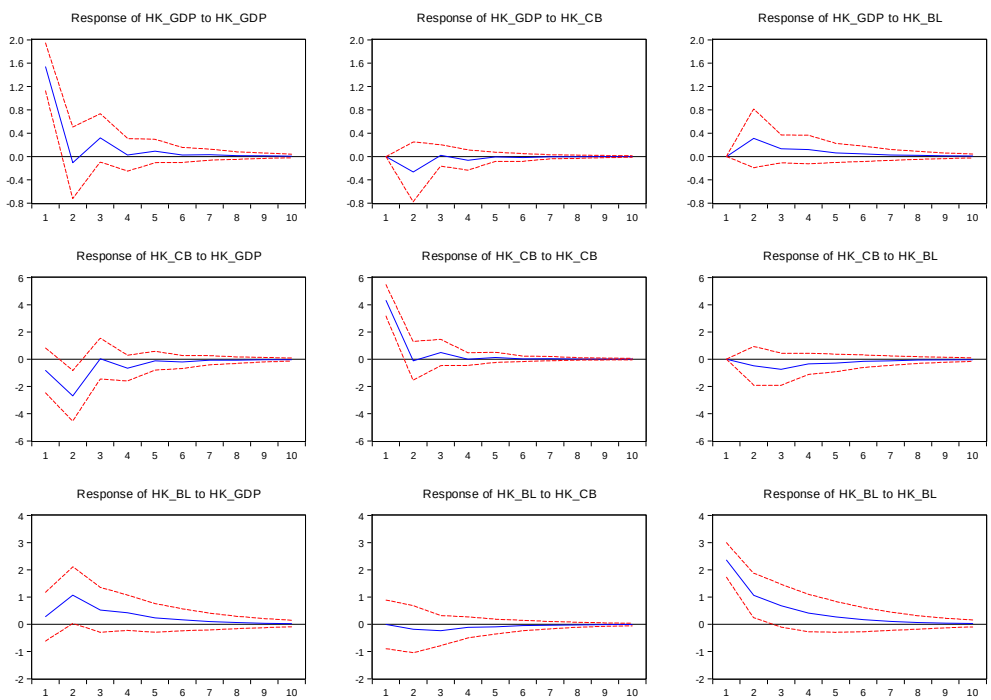
Brazil: GDP - CB - BL (Q3 2007 ~ Q4 2011)



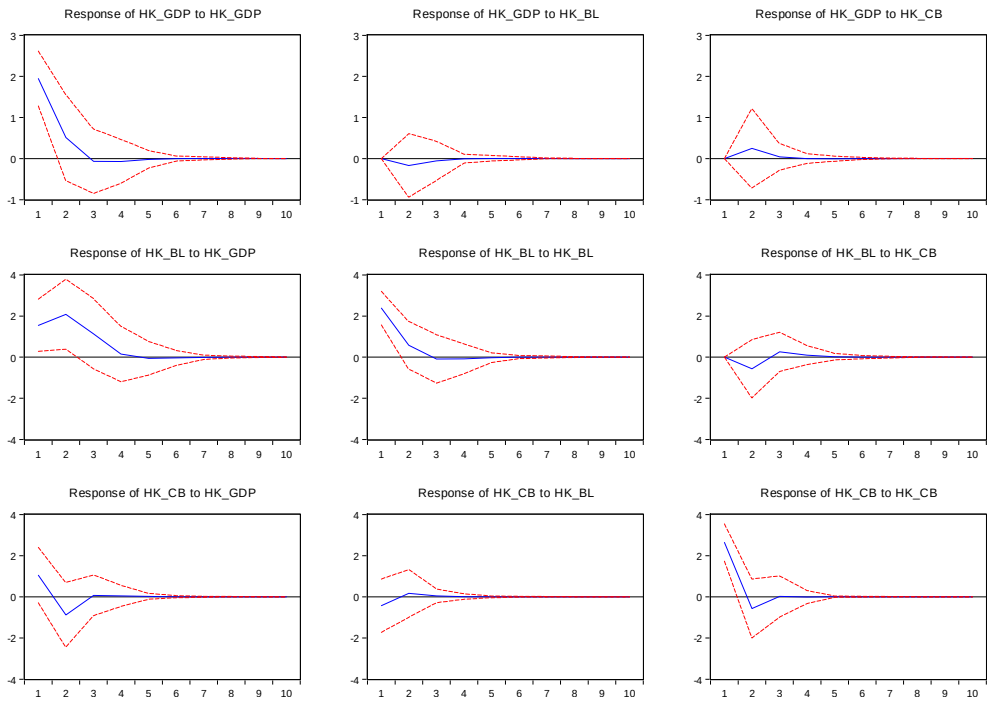
Hong Kong: GDP - BL - CB (Q2 2000 ~ Q2 2007)



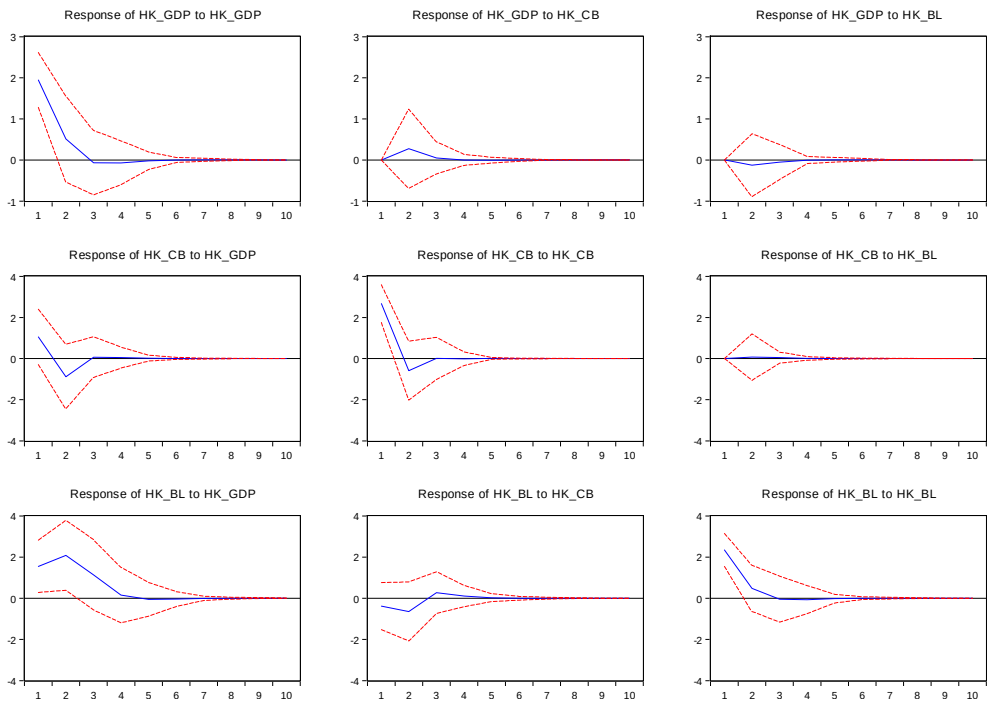
Hong Kong: GDP - CB - BL (Q2 2000 ~ Q2 2007)



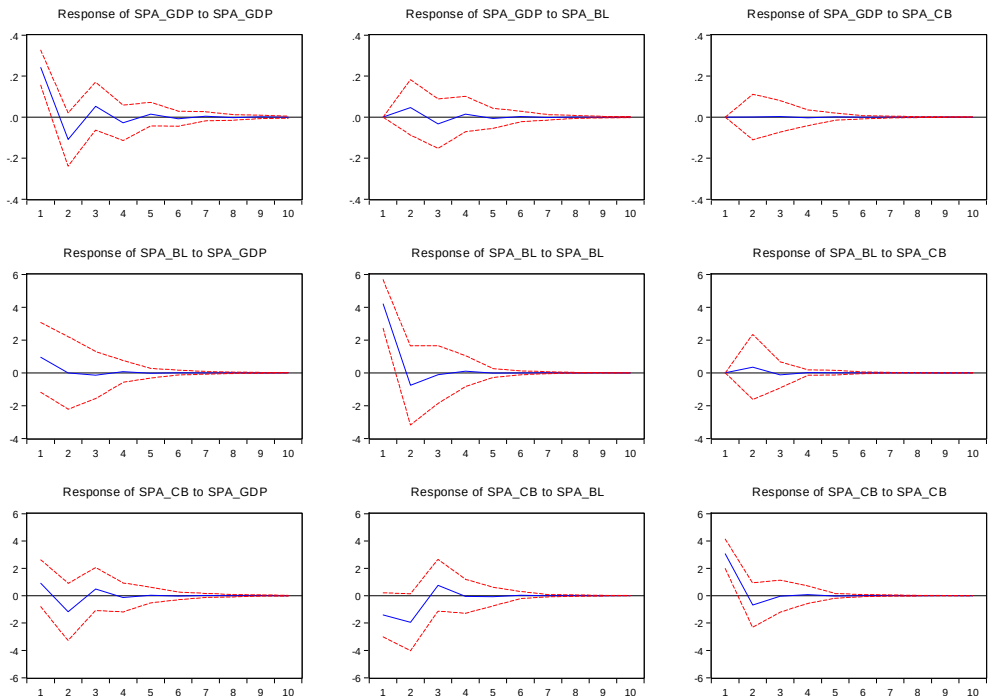
Hong Kong: GDP - BL - CB (Q3 2007 ~ Q4 2011)



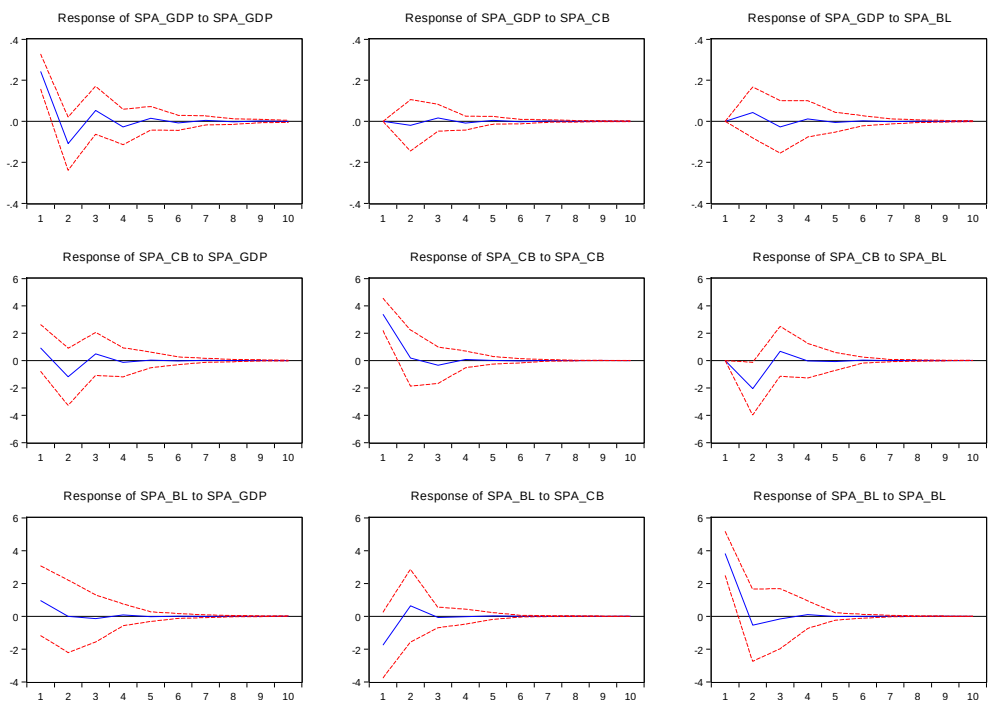
Hong Kong: GDP - CB - BL (Q3 2007 ~ Q4 2011)



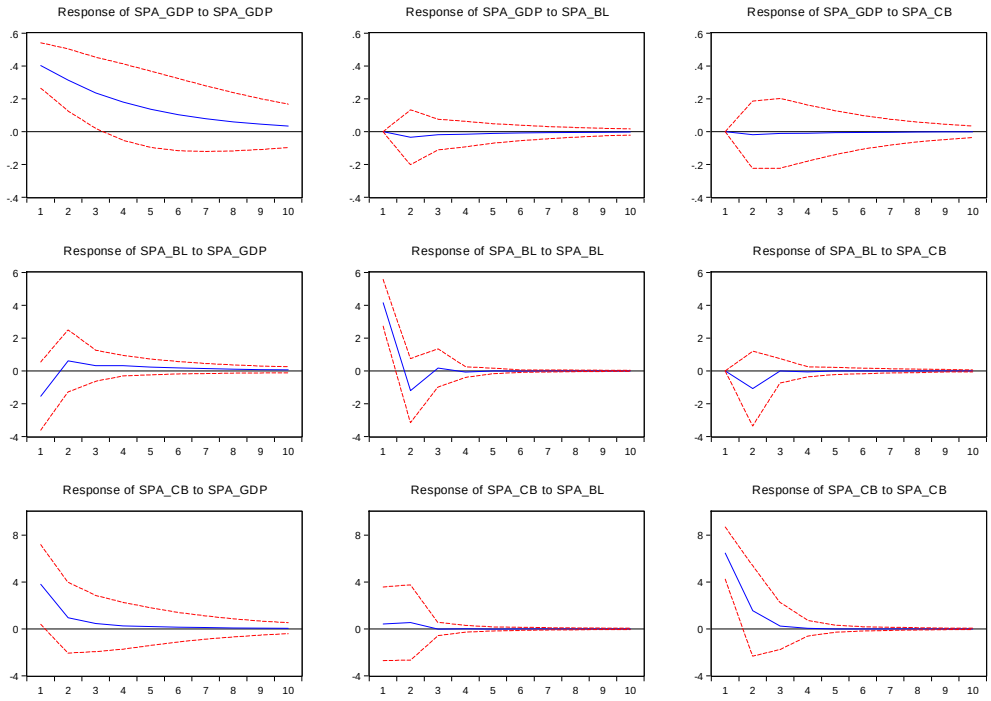
Spain: GDP-BL-CB (Q2 2003 ~ Q2 2007)



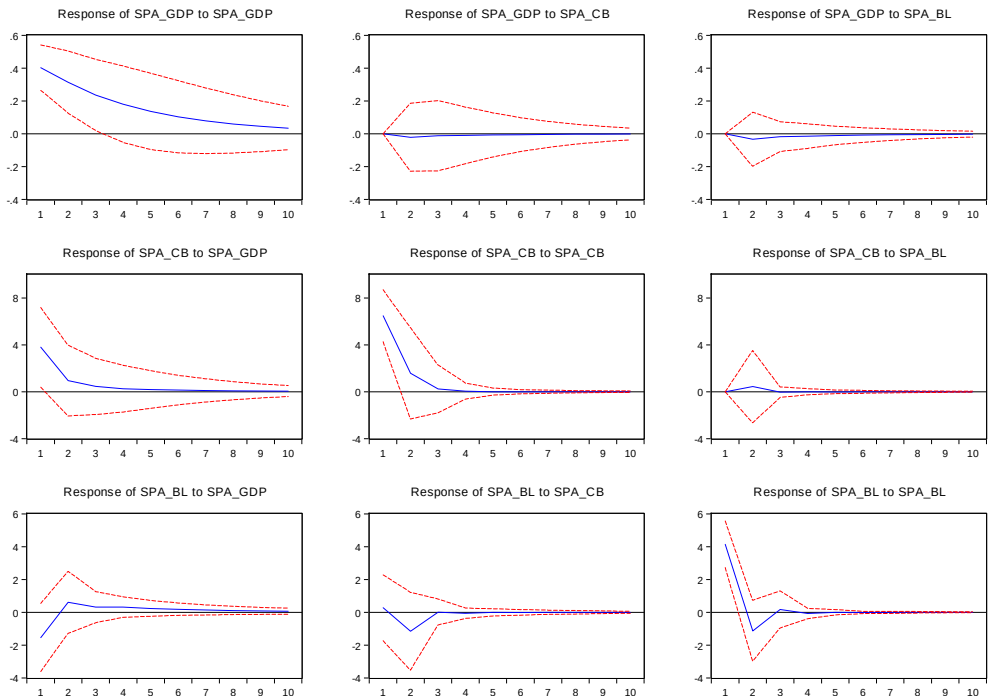
Spain: GDP - CB - BL (Q2 2003 ~ Q2 2007)



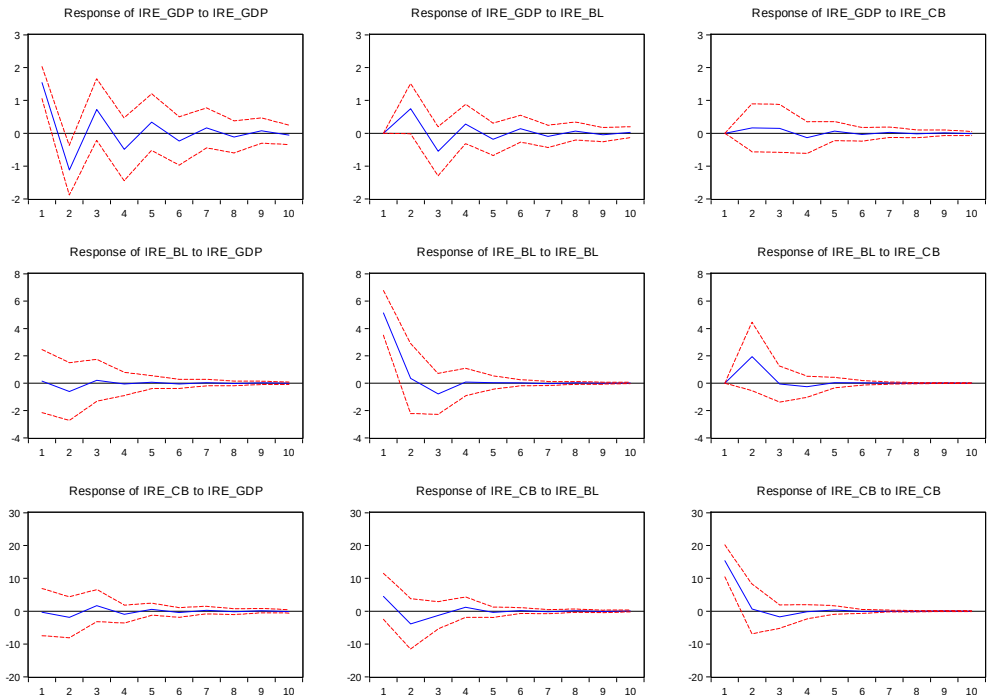
Spain: GDP - BL - CB (Q3 2007 ~ Q4 2011)



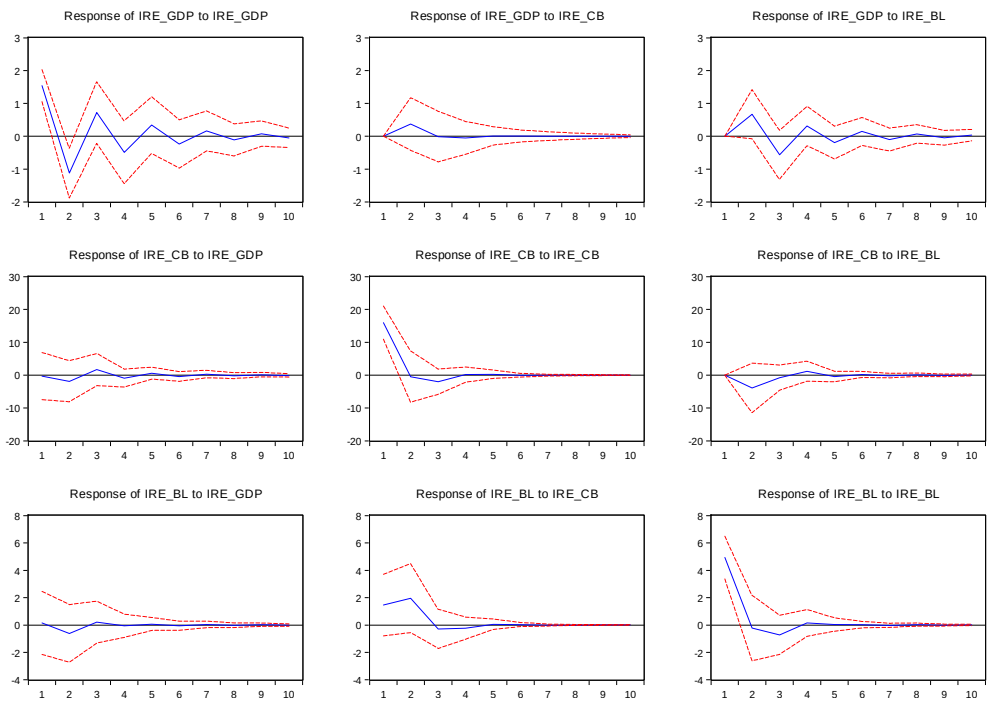
Spain: GDP - CB - BL (Q3 2007 ~ Q4 2011)



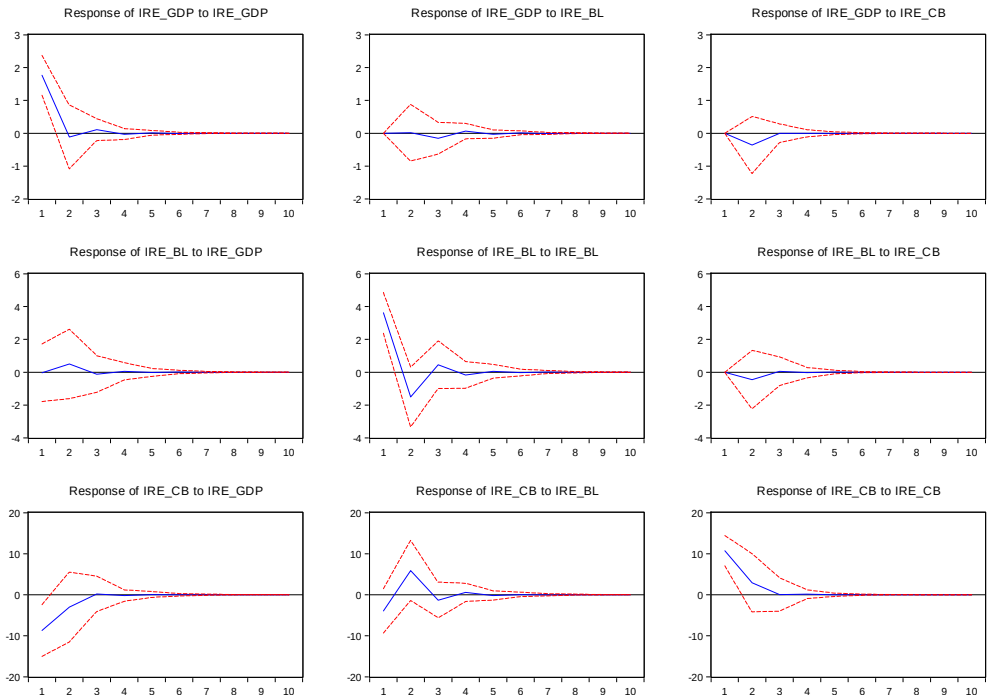
Ireland: GDP - BL - CB (Q2 2002 ~ Q2 2007)



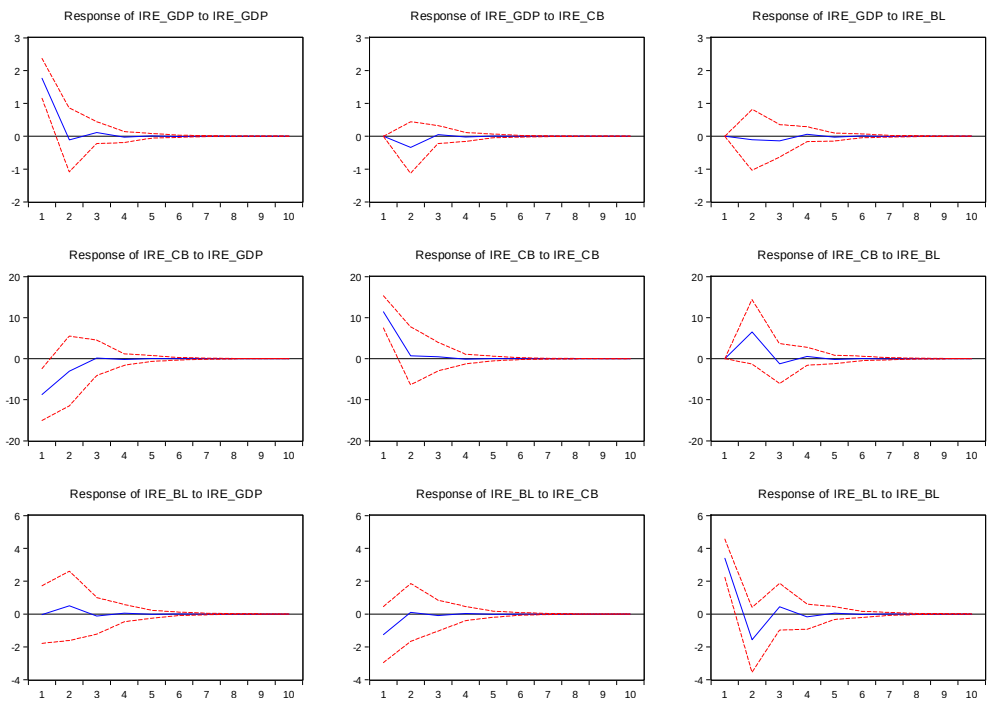
ireland: GDP - CB - BL (Q2 2002 ~ Q2 2007)



Ireland: GDP - BL - CB (Q3 2007 ~ Q4 2011)



Ireland: GDP - CB - BL (Q3 2007 ~ Q4 2011)



국문초록

2008년 금융위기를 전후한 국가별 기업의 자금조달경로 변화에 대한 분석

서울대학교 대학원
경제학부 석사과정
김준엽

본 연구는 2008년 글로벌 금융위기를 전후하여 기업의 자금조달경로에 어떠한 변화가 발생했는지를 확인하고 그것이 주는 시사점은 무엇인지를 분석하는 데 초점이 맞추어져 있다. 이를 위해서 기업의 자금조달경로를 크게 직접금융과 간접금융으로 나누었으며, 회사채와 은행대출을 각각을 대표하는 경로로 가정했다. 또한 본 사안과 관련한 현상이 전세계적으로 유사한 경향을 보이는지를 확인하기 위해서 20개의 표본 국가를 선정하였다.

각 표본국가별로 은행대출과 회사채의 분기별 증감 및 증감률 자료를 통해 시차상관관계분석, 회귀분석, Granger 인과관계분석, 그리고 벡터자기회귀모형(VAR)을 통한 충격반응함수 분석을 실시하였다. 그 결과, 두 경로 사이에는 대체관계가 존재하고, 본 대체관계의 정도는 금융위기 이후에 강화되는 모습을 보였다.

이러한 결과는 회사채 시장이 지니고 있는 부도위험 등을 적절하게 통제하는 수준에서 (회사채 시장의) 규모를 키우고 거래를 활성화 시킬 수 있다면, 기업의 간접금융경로에 경색이 발생하더라도 그와 같은 직접금융경로를 통해 본 충격을 완화시켜, 경제가 경착륙 하는 것을 막아줄 수 있다는 일련의 정책적 함의를 제시한다고 볼 수 있다.

주 요 어: 자금조달경로, 은행대출, 회사채, 대체관계, 글로벌 금융위기

학　　번: 2011 - 20170