A STRUCTURAL VAR ANALYSIS OF THE IMPACT OF HALLYU ON TOURISM INBOUND TO KOREA

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ÖZET

HALLYU'NUN KORE TURİZM SAYISI ÜZERİNDEKİ ETKİSİNİN
YAPISAL VAR ANALİZİ

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Çalışmanın amacı, Hallyu'nun Kore'ye yönelik turizm talebi üzerindeki etkisini incelemektir. Hallyu, 'Kore popüler kültürünün yurtdışındaki popülaritesini' ve genel olarak 'Kore kültürünün kendisini' ifade eder. Hallyu fenomeni tüm dünyada gözlemlenmektedir, ancak Hallyu çalışmaları yalnızca Kore'nin komşu ülkeleri bağlamında ele alınmıştır ve anket yöntemi ile sınırlı kalmıştır. Literatürde yer alan bu eksikliği gidermek üzere, çalışmamız beş kıtadan 18 ülkeye ilişkin verileri ele almış ve Hallyu'yu SVAR analizi ile incelemiştir. SVAR analizi sonuçları, Hallyu talebinin sadece komşu ülkeler için değil, aynı zamanda Kore'ye olan coğrafi mesafelerine rağmen Anglosphere ve Avrupa ülkeleri için de Kore'ye yönelik turizm talebini etkilediğine işaret etmektedir. Çalışmamızın, geniş bir coğrafi etki yelpazesinde ve ekonometrik analiz bağlamında Hallyu'nun anlaşılmasına katkı sağlayacağı düşünülmektedir.

Anahtar Sözcükler : Hallyu, Kültüren ürünler, Turizm, Güney Kore, SVAR

ABSTRACT

A STRUCTURAL VAR ANALYSIS OF THE IMPACT OF HALLYU

ON TOURISM INBOUND TO KOREA

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The purpose of the study is to examine the impact of Hallyu on the tourism demand to Korea. Hallyu refers to narrowly 'popularity of Korean popular culture in abroad’ and broadly 'Korean culture itself'. Under circumstance that the Hallyu phenomenon is being observed all over the world, yet Hallyu studies only remain in the Korea's neighboring countries and depend on survey method. To overcome such limitation, our study covers 18 countries from five continents and identifies Hallyu as an econometric variable in the SVAR analysis. The SVAR analysis results confirmed that the Hallyu demand influences tourism demand to Korea not only for neighboring countries but also for Anglosphere and European countries despite the geographical distance from Korea. The result of our study will provide a new perspective on the study of Hallyu in a broader range of influence and in econometric analysis.

Keywords: Hallyu, Cultural products, Tourism, South Korea, SVAR

09. 03. 2021

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I hereby truthfully declare that this thesis is an original work prepared by me; that I have behaved in accordance with the scientific ethical principles and rules throughout the stages of preparation, data collection, analysis and presentation of my work; that I have cited the sources of all the data and information that could be obtained within the scope of this study, and included these sources in the references section; and that this study has been scanned for plagiarism with "scientific plagiarism detection program" used by Anadolu University, and that "it does not have any plagiarism" whatsoever. I also declare that, if a case contrary to my declaration is detected in my work at any time, I hereby express my consent to all the ethical and legal consequences that are involved.

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1. INTRODUCTION

U$ 756 million. It is the sum of the direct and indirect economic return[1] of the three-day concert held by BTS, a popular Korean music band, in Seoul in November 2019. The economic effect caused by this seven-membered boy group for only three days of concert is equal to the sum of the annual sales of six medium-sized companies[2] of Korea (Pyun et al, 2020). While the number of visitors to Korea including athletes, delegates, press and tourists was 280,000 due to the one-month Winter Olympic held in Pyeongchang in 2018 (Korean Culture and Tourism Ministry, 2019), the number of foreign visitors BTS gathered for 3 days of concert was 187,000, which is equivalent to 67% of the visitors made by the Pyeongchang Winter Olympic. Since the early 2000s, when Hallyu, the Korean pop culture, was preparing for its foothold to spread its territory, the scale of the economic effects created by so-called "Hallyu Stars", those who have gained popularity in foreign countries, used to be compared to that of successful small-medium sized company. In this regard, such metaphor phrases like "Walking Enterprise" or "Moving Company"[3] were often used to describe the economic effect of the Hallyu stars. However, this phenomenal record in the history of the Korean economy, created by a Korean pop music group during only 3 days, cannot be compared to any other event ever happened. This is not the only case for the music filed. In February 2020, in Los Angeles, USA, another phenomenal sight in the American history or rather in the film history was broadcast on TV. That is, a film made of a foreign language won the award for the best picture at Academy Award. The film named "Parasite" directed by Korean director,

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[1] This is the sum of the direct and indirect economic effect. The direct effects are the sum of revenues generated by holding a concert, such as ticket sales, concert broadcasting venue rental fees, V-live broadcast fees, concert hall venue rental fees, stage installation costs, labor costs, loading and transportation of the visitors, and tourist expenditures. The indirect effects are the sum of the economic effect derived by the direct effect such as the effect of increase in consumption as a result of temporary increase in household in income, effect of inducing production and added value, and the effect of revisit to Korea of foreign visitors (Pyun et al, 2020).

[2] Korean companies are classified into the following four categories according to the size of the company ; Large, medium-sized, medium-small sized, and small sized enterprises. The size of the company is categorized according to some division standards such as sales volume, capital, and number of regular employees. A medium-sized company refers to a company with average annual sales of more than KRW150 billion (U$123,000) over a three fiscal year period according to the Korean business classification.

[3] Bae Yong-joon, the actor who led the first generation of Hallyu, and BoA, the singer who is also described as "the Star of Asia" were often expressed with these nicknames.

Bong Joon-ho who swept all the prizes at major international film awards such as Cannes and Berlin Film Festivals, won the Oscars, which used to be considered as an exclusive possession of American. The era of Hallyu, the Korean popular culture, which was thought to only work in Asia, opened up in the Western region.

In 1997, the term Hallyu first showed its appearance in Chinese media. The term Hallyu, which refers to narrowly "popularity of Korean popular culture in abroad"(Jun and Kim, 2017, 2018) and broadly "Korean culture itself"(Yang, 2012), was coined by Chinese media to describe the unusual phenomenon that influenced by Korean TV series, Chinese consumers were enthusiastically consuming Korean TV series related products in the late 1990s during the time Korean TV series were actively exported and earning popularity in China. The term whose actual meaning is "Flow of Korea" is, interestingly, flowed to Korea back later and played a role as a term representing Korean TV series and celebrities that became popular in the countries in Asian region including China.

Beyond its regional borders, which was once only covering Asian countries, Hallyu is now expanding its territory to Western countries by forming its 3.0 generation. Furthermore, the Hallyu has grown beyond the notion of Korean popular culture, and has become a concept of Korea itself, such as Korean culture, Korean history, and Korean language. Such popularity of Hallyu continues in academic research either. According to Forbes (2020), Hallyu is currently the most prominent keyword in the academic World. (Jstor 276, Sage Journal at least 100, academia.edu over 16,000). Interest fields encompass various categories ranging from foreign policy to fandom (Macdonald, 2020/Forbes). Then, what aspects of Hallyu attract people?

It is not new that a country's popular culture is gaining popularity in abroad. Hollywood of the United Stated did, and so did the band culture of the United Kingdom. It was not the only possession of Western countries. Japanese animation and Indian Bollywood are also popular cultures around the world. But there seems to be something unique about Hallyu. Hallyu is experiencing a new phenomenon in which the entire Korean popular culture, such as TV series, movies, music, fashion, beauty, and games is becoming known worldwide. This is how the success of Hallyu differs from others. It is not just a success of one popular culture related industry unlike other countries (Dal Yong Jin, 2020, Forbes). Hallyu now goes beyond the term representing Korean popular culture, and Korea, itself is becoming the subject of consumption. According to survey conducted by Korea Association of Travel Agents to the 1,134 of foreign tourist to Korea in 2019, 63.3% of respondents answered the purpose of their visiting to Korea was to experience Hallyu (popular culture, food, traditional culture). Hallyu is creating a new phenomenon that is definitely different from that of other popular cultures, and this phenomenon arouses the interest of many researchers. From this perspective, there is no wonder to expect Hallyu to have a great impact on the Korean economy.

Not just is Hallyu consumption of products, but consumption of culture. Cultural industries organize economic sectors in which dynamic future development is expected as they play an important role in the economy by presenting new concepts to economic development and growth. (Lash and Urry, 1994; Jensen, 1999; Pine and Gilmore, 1999, UNESCO, 2009). So does Hallyu. The consumption of Hallyu does not end with the consumption of Hallyu contents but evokes demands of further consumptions such as purchasing Korean made products and tourism. The consumption linkage derived from the first consumption to Hallyu to second and third consumption leads to improve a better image of Korea beyond providing positive impact on Korean economy. And ultimately, it will bring a positive effect to other economic sectors by introducing Korea to the positive way to abroad.

Despite the fact the positive economic effects of Hallyu on economy of Korea are predicted in a various way in different fields, few quantitative economic studies have been conducted to examine the impact of Hallyu on the Korean economy. One of the major reasons is that due to the characteristic of Hallyu which is cultural products and services, conceptual definition is possible, but there is a practical limit of defining it for use as a quantitative economic variable. Furthermore, there has not been consensus on the definition due to the limitations of the new variable thrown into the academia. Quantitative studies on Hallyu conducted by this time had confined the Hallyu variables to some contents related products or specific categories such as consumer goods (Jun and Kim, 2017, 2018; Huh and Wu, 2017; Bae et al., 2017). Another problem that Hallyu is not considered as a doable variable for an economic analysis is the lack of the economic models that include Hallyu as an endogenous variable. Given circumstances that Hallyu is a culture-related product and is still a novel variable in academic field, Hallyu seems to be a fairly difficult variable to deal with. Many studies conducted on cultural related goods, however, used Gravity model introduced by Tinbergen (1962), which determines the flow of trade between countries. Most studies take culture-related products as an explanatory variable to explain the export, the dependent variable, and explain the cultural goods in the causal relationship. Furthermore, such traditional approaches are encountering some limitations that do not reflect the real economy properly, the identification problem, and the univariate problem.

In order to overcome such difficulty that Hallyu variable is encountering to become a quantitative variable, we define Hallyu variable according to the classification made by Jun and KOFICE, which can best reflect the characteristics of Hallyu at present. In our study, Hallyu is a set of products identified as HS-Code classified by Jun's category, and the Hallyu demand is the amount of export of the set to a selected country. The analysis utilizes the SVAR model. The SVAR model is based on the VAR model first devised by Sims (1980) and has since been improved by Watson (1986), Bernanke (1986), and Sims (1986). The SVAR supports economic frame by giving structural restrictions to the VAR model which enables identification of economic variables exogenously without distinction between endogenous and exogenous. The study interprets the result of the SVAR estimation to understand the impact of the Hallyu on Korean economy and tourism by performing the Impulse Response Function (IRFs) and Forecasting Error Decomposition Variance (FEDV) depending on Cholesky decomposition method.

2. LITERATURE

2.1. Hallyu, The Definition

"Hallyu", the term which refers to "Korean wave/flow Korea" was first coined in China in 1997 in order to refer to the immense popularity of Korea TV series in China (Yang, 2012). The term Hallyu is a combined two words, "Han[4]" which refers to "Korea" and "Lyu" which refers to "flow" or "wave" in Chinese language. As understood in its emergence, the beginning of Hallyu first appeared in China, yet the concept has been around before. The term Hallyu, which represents the influence of the Korean popular culture in abroad yet most of the people living in Korea did not notice, was first recognized officially in Korea as Korean Tourism and Culture Ministry released the album named "Hallyu, Song from Korea" in order to introduce and promote popular Korean culture in abroad. (Kim, 2004; Jang, 2011)

The concept of Hallyu has been expending its geographical and genre borders consistently (Ko, 2008). In its earlier times, the term Hallyu was confined as a term representing such Korean TV series, actors and actresses, music and groups that are popular in the neighbor Asia countries such as China, Hong Kong, Taiwan, Singapore, Thailand, Malaysia and Indonesia (Yang, 2012), however, it took the place of the proper noun that represents the Korean popular culture itself in recent years. According to the report published by Korean Foundation for International Cultural Exchange in 2018, Hallyu is now its third generation by covering not only the TV series and music but also all the Korean culture. The report asserted that Korea is even at the borderline to meet the 4th generation of Hallyu.

Though in many literatures, the interpreted term "Korean wave" is more frequently seen, the term "Hallyu" is showing an ascending trend used as an academic term in recent studies[5] (Yang, 2012; Bok-rae, 2015; Jun and Kim, 2016; Lim & Giouvris, 2017; Bae et al., 2017; Seo & Kim, 2020). In conjunction with this, attempts are made to define Hallyu as cultural phenomena, as well as the consumption of Korean cultural products made by the consumers abroad. Korea Tourism Organization (2012) defined Hallyu as a "favorite

[4] The original sound is Han and is pronounced as Hal when it is combined with a word starting with r or l due to the prolonged sound rule.
[5] The word "Hallyu" is variously present, such as "Korean wave", "Flow of Korea", and "K-culture", but "Hallyu" is collectively referred to all of them in this paper.

phenomenon of Korean popular culture abroad". Jun and Kim (2016) attempted to identify Hallyu as cultural phenomena in the study of measuring the effect of Hallyu on economy by specifying the consumption variables only made by the consumers who recognized the products were made in Korea. Kim (2015) developed Hallyu as phenomena by focusing on the changes of the feature of Hallyu and classifying them into 1.0 generation to 4.0 generation.

Notionally, what Hallyu is defined is the phenomena of Korean popular culture in abroad. And so is the way most academic articles take the term Hallyu. However, we need to define the term Hallyu more technically for more precise quantitative analysis. This is because, in order to take Hallyu as a proper variable in the economic model for quantitative analysis, an economic definition of the variable called Hallyu is required. There are two main opinions regarding defining Hallyu in terms of an economic variable. One is to define it as a set of content and consumer goods related to Korea popular culture including tourisms. The contents include broadcast, music, film/animation/character, game and publication. The consumer goods include food and beverage, cosmetic products, clothes, accessories, electric home appliances, mobile phone and automobile (Jun and Kim, 2018). Another opinion is to define Hallyu as the entire Korean culture, not only the popular culture. It includes traditional culture, pure art, and history (KOTRA, 2013).

2.2. Hallyu, From the Perspective of Its Cause

The popular culture of Anglosphere has long shown its ripple effects around the world thanks to its economic and historical background. There is no wonder for the popular stars of the stated countries to gain popularity in the rest of the world. Along with the Anglosphere countries, Japan has greatly influenced other Asian countries with its strong economic power and unique culture. This is in line with Stigler and Becker's (1977) theory of stable preference, which states that consumer preferences in two countries become similar by trading goods, services, direct investment, and human capital. This is, possibly interpreted as a natural phenomenon derived through a series of processes where there is an active trade between two countries and the consumers of both countries are naturally being exposed to the cultures of each country, and consequently, become familiar with the each other's culture. The ripple effect of Hallyu seems to be consistent with it. Kim and Lee (2018) suggested that Hallyu adequately permeated to the consumers who become to have purchasing power in the East Asian region, such as China and Vietnam, where economic growth has led to a sharp increase and there is a lack of cultural contents. Looking back at this in comparison with Stingler and Becker (1997), Korea, a relatively economic powerhouse, might have had more opportunities to introduce its various products including culture to neighbor countries, and consumers with increased purchasing power might have purchased Hallyu products as they are easily accessed. Through this process, Hallyu might have had more chances to become familiar with the customers in abroad. This can be interpreted in terms of "Cultural discount". Kim and Lee (2018) empathized that the fact that Korea has relatively low rate of cultural discount in Asia region lowered the barrier of entrance for Hallyu to enter the Asian markets, by employing the concept of cultural discount[6] (Kim & Lee, 2018). Indeed, it is possible to observe these theories during the growth of Hallyu. It was in China that Hallyu began in earnest as can be seen from the origin of the term. In the last 1990s, when the viewer rating of foreign TV shows in China was lower than 2%, Korean TV shows such as "What is Love", "Stars in My Heart", and "Autumn in My Heart" had an explosive rating of around 5%. Following this momentum, the concert of Korean popular music dance group 'Clon' in 1999 and of 'HOT' in 2000 were held successfully. Korean TV shows and music, which were entirely of Korean consumers could easily enter and spread in the Chinese market with the help of 'cultural discount' in China, which share many cultural backgrounds with Korea.

Korea is not the sole country that succeeded spreading its culture in abroad. Japan made its animation culture spread worldwide, so did India its unique movie culture so-called Bollywood. But there must be something unique about Hallyu. It is, Korea is the first country who succeeded introducing and spreading its entire popular culture industry, not the one or two industries. (Dal Yong Jin, 2020). Various attempts are made to explain the cause of success of Hallyu. Cai (2011) pointed out that the success of Hallyu is due to the distinct characteristics of Korea that has been rapidly westernized and kept its own at the same time.

[6] Cultural discount is a concept which refers to the reduction in values from which media products suffer when they travel from one culture to another, coined by Hoskins & Mirus (1988). "When a cultural product enters another cultural area, the product may suffer from under-evaluation due to the cultural difference. This is a phenomenon called cultural discount" (quoted from Kim & Lee, 2018)

In other words, that Hallyu has been successful in both East and West is attributed to the combination of Western culture and Eastern culture.[7] Jang and Paik (2012) indicated that the ripples of the Hallyu is based on the peculiarities of Korean culture, which has a strong connection to music and dance. On the other hand, some studies attempted to find the cause of Hallyu externally. Some studies indicated that narrowing the physical distance due to the growth of social media such as Youtube and Facebook plays a large role in the ripple effect of Hallyu (Jang and Paik, 2012), while others suggested that consumers who are tired of American contents that have been almost monopolized their cultural contents for a long period actively accepted Hallyu contents (Cai, 2011).

2.3. Hallyu, From the Perspective of Its Growth

Since its first appearance in 1997, Hallyu has expanded its conceptually and regionally territory (Ko, 2008) beyond its initial conceptual definition. The interest toward the Korean TV series and celebrities in its early days gradually expanded its coverage to entire Korea such as Korean food, culture, history and even language. Not only its interest coverage in contents, but in region was gradually expanded. Hallyu, which seemed to have limited potential to be welcomed only by some countries whose cultural background is similar to Korea such as China and Japan, has surprisingly widened worldwide. "Hallyu Star" is no longer a term with a great significance in Korea which was once used to play a role as a pronoun that represents the celebrities who gained popularity in abroad. In other words, celebrities who have gained popularity in Korea continue to become popular in foreign countries as a natural procedure. This is due to the fact that consumption of Hallyu is now taking place all over the world.

[7] Cai (2011) emphasized the Eastern culture is Confucianism culture.

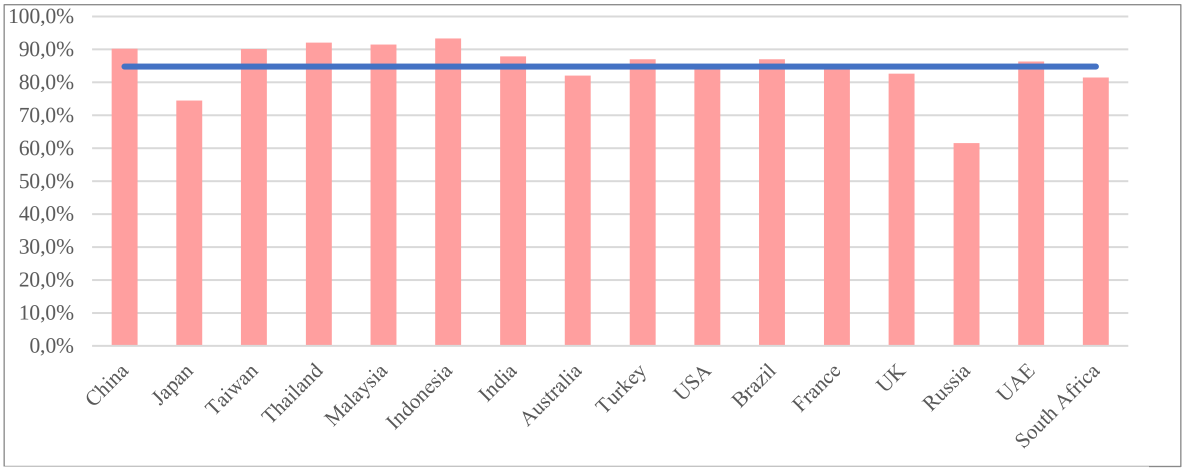

Figure 2.1. *The rate of Hallyu experience, Research of the Hallyu's Ripple Effect 2018, (Korea Foundation for International Cultural Exchange, 2018)*

KOFICE, Korea Foundation for International Cultural Exchange published report related to the ripple effect of Hallyu in 2017 and in 2018. Led by Jun and Kim, this study is considered as the largest research conducted about Hallyu, in terms of both qualitatively and quantitatively in Korea to date. According to the results of the Hallyu related survey conducted on 400-500 people from selected country, the rate of Hally contents experience such as TV seris, shows, movies, music, animation, publiscation, game, fashion, beauty and food for latest 1 year was an average of 84%, which confirmed that Hallyu is being consumed at a fairly high level in foreign countries. China, which used to lead the Hallyu contents consumption in early days, is still holding the super consumer's position, showing 90.2% of Hallyu experience rate. It is also noticeable that the East and Southeast Asian countries such as Taiwan (90.1%), Thailand (92.1%), Malaysia (91.5%), and Indonesia (93.3%) have fairly high experience rates of Hallyu.

Table 2.1. *The rate of Hallyu experience, Research of the Hallyu's Ripple Effect 2018, (Korea Foundation for International Cultural Exchange, 2018)*

	TV Series	Show	Movie	Music	Anima-tion	Public ation	Game	Fash-ion	Beau-ty	Food	Avera-ge
China	95.5%	94.5%	94.6%	91.9%	78.3%	81.5%	86.2%	90.0%	93.6%	96.2%	90.2%
Japan	72.2%	70.5%	66.4%	80.2%	65.0%	68.5%	77.6%	78.3%	78.6%	87.4%	74.5%
Taiwan	93.5%	93.9%	94.1%	95.3%	80.3%	84.4%	86.8%	86.4%	92.4%	93.9%	90.1%
Thai-land	93.5%	94.4%	95.3%	94.2%	86.2%	91.3%	89.9%	88.3%	93.8%	94.1%	92.1%
Malay-sia	94.8%	96.4%	94.2%	96.6%	84.7%	79.8%	84.7%	91.6%	95.3%	97.1%	91.5%
Indone-sia	95.1%	95.6%	97.5%	98.5%	88.8%	90.7%	88.3%	88.4%	93.8%	96.4%	93.3%
India	93.3%	90.7%	91.1%	86.8%	85.3%	83.2%	86.7%	83.3%	88.9%	89.5%	87.9%
Austral-ia	82.5%	83.2%	81.3%	86.4%	75.8%	73.7%	85.9%	79.8%	85.4%	86.8%	82.1%
Turkey	92.4%	89.5%	94.5%	92.4%	82.3%	79.6%	86.6%	75.0%	87.4%	90.2%	87.0%
USA	89.1%	84.8%	79.0%	88.6%	83.1%	84.7%	76.8%	84.3%	87.3%	89.2%	84.7%
Brazil	85.3%	83.5%	90.3%	94.1%	88.1%	83.5%	87.2%	81.9%	88.0%	88.3%	87.0%
France	81.9%	78.8%	80.1%	87.5%	82.2%	80.8%	84.2%	83.2%	90.3%	91.6%	84.1%
UK	86.8%	77.8%	76.3%	86.2%	79.0%	82.0%	82.3%	81.3%	89.0%	85.4%	82.6%
Russia	64.9%	52.6%	58.8%	66.2%	56.1%	56.4%	61.8%	61.4%	75.2%	62.0%	61.5%
UAE	88.7%	82.9%	88.6%	89.5%	87.0%	70.8%	87.4%	84.8%	90.7%	92.9%	86.3%
South Africa	80.3%	80.3%	76.5%	84.9%	82.2%	73.4%	80.9%	78.9%	92.1%	85.5%	81.5%
Average	86.9%	84.3%	84.9%	88.7%	80.3%	79.0%	83.3%	82.3%	88.9%	89.2%	84.8%

It is undiniable that the survey could contain some factors that might have occurred an artifact like showing higher value of the result as the survey has a small number of subjects and was conducted on subjects who already knew Hallyu (Jun and Kim, 2018)[8], nevertheless, the result is worth to understand the status of Hallyu contents in other countries.

[8] Jun and Kim (2018) underlined that comparison is the right way to understand these data due to such limitations on survey. However, there are only 2 years of survey data which are not sufficient to suggest us much meaningful insight. Thus, only the latest data were placed in this report to provide more intuitive insight to the readers.

Table 2.2 *Evolution and Expansion of Hallyu, Research of the Ripple Effect of Hallyu 2018, (Korea Foundation for International Cultural Exchange, 2018)*

STAGE	TARGETS	GENRE	CONSUMER STYLE	REGIONAL RANGE
Hallyu 1.0	Stars	K-Drama	Interesting Style	East Asia
↓	↓	↓	↓	↓
Hallyu 2.0	Idols	K-Pop	Experience Style	Asia
↓	↓	↓	↓	↓
Hallyu 3.0	Style	K-Culture	Prosumer[9] Style	The World

According to the report associated with the studies of method to measure the impact and measurement of Hallyu published by Korean Foundation for International Cultural Exchange in 2018, the Hallyu generation is defined as follow : 1) Hallyu 1.0 : The period where the consumption of Hallyu was mostly Korean TV series, the spread of Hallyu was mostly in Korea’s neighbor countries such as China, Japan, Hong Kong and Singapore, and the target of consumption was the Hallyu celebrities itself. (Late 90s to mid 2000s) 2) Hallyu 2.0 : The period where K-pop music leads the mainstream of Hallyu, singer groups, so called as “Idol groups” become the center of Hallyu consumption, and the consumption of Hallyu was spread throughout Asia. (Mid 2000s to mid 2010s) 3) Hallyu 3.0 : The period where Hallyu is not confined to Korean TV series and popular music but Korea itself, the consumption target is Korean-made products and Hallyu is consumed worldwide.

The leading industries that have been leading Korean export for last 20 years are semi-conductors, shipbuilding, automobiles and mobile phones. Under circumstance that Korea’s positions in these industries was narrowed due to the recent rapid growth of China, however, the export of high-end[10] consumer goods have been increased. High-end consumer

[9] Prosumer is a term which refers to “consumers who actively participate in product development and express their intentions”. This term is derived from "Prosumption", the term meaning "production by consumers", coined by Alvin Toffler in 1980, the American Futurist.

[10] “High-end consumer goods” is a new category of consumer goods assorted by Korean International Trading Association.

goods refer to consumer goods in which consumers can possess superiority by consuming them as they represent the scarcity and unique value. High-end consumer goods consist of the goods that are highly related to Hallyu, such as fashion and beauty. Although the volume is still small compared to that of the entire volume of export, it provides us a great insight to understand the increase of the Hallyu consumption.

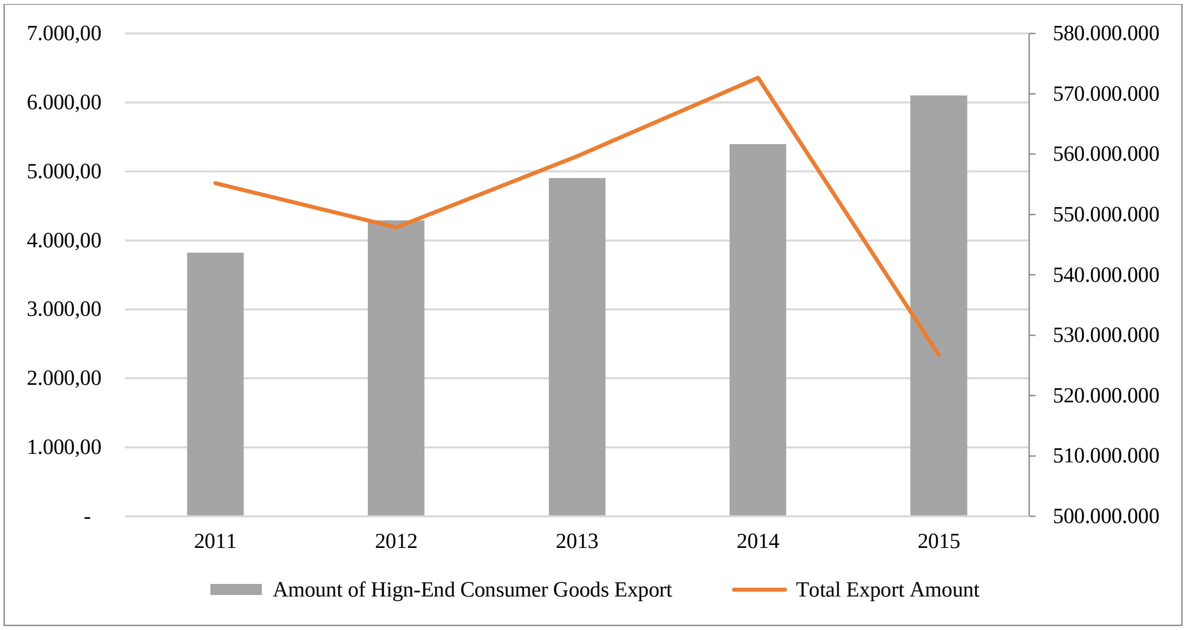

Figure 2.2 *Amount of High-end Consumer Goods(Left Axis) Export and Total Export(Right Axis), Open a New Way of Export with High-End Consumer Goods 2016 (Korea International Trading Association)*

2.4. Hallyu, From the Perspective of the Policy

The view that explains the appearance of Hallyu policy is divided in two in literature. One is, the most reason that Hallyu, the popular culture of Korea, could be successfully expanded is because it was led by private dimension not by government dimension. (Kim and Lee, 2018) They argue that Hallyu has been led by private sectors since its emergence and is culture acceptance within the cycle in the digital culture of the globalization. In other words, Hallyu was able to succeed because the government did not know what Hallyu was and did not intervene at the first place. In this regard, they assert that the government's aggressive and explicit willingness to take advantage of Hallyu can eventually provoke other countries' backlash. Another view is that Hallyu is a consequence of a culture prosperity policy planned and led by the government. (Moon, 2018). This view is based on the thought that even though Hallyu was first launched in China and spread with an unexpectedly large reaction, the government's planned and active support for Hallyu in various fields were the main resource that makes today's Hallyu.

The emergence of Hallyu might seem to be a coincidence, however, there have been uncountable efforts behind the success of Hallyu. In 1994, when the name Hallyu had not been appeared yet, a report was presented to the President from the Science and Technology Committee. It is, the profit the Hollywood movie "Jurassic Park" have earned is equivalent to the profit that Hyundai Motors could get by selling 1.5 million of the automobiles. Accordingly, it is needed to invest to the industries relevant for supporting next generation. (Shim, 2006; Jang and Paik, 2012). With regard to that, the President[11] instructed "Cultivate a high-value-added cultural industry and enhance the international competitiveness by putting cultural clothes on general industrial products" (Moon, 2018). In response, the government did not delay, and soon the "Culture Industry Bureau"[12] was newly established under the Ministry of Culture and Sports. Through the Culture Industry Bureau, support and promotion policies for cultural contents such as publication, movies, games, and music record were made for the first time in Korean history. Due to such move of the Cultural Industry Bureau, a new awareness began to arise that the outcomes of cultural activities could lead to industries with high economic value. (Moon, 2018) This cultural prosperity policy is further embodied in the plan "Cultivating the cultural industry as a national key industry in the 21st century" announced by the Ministry of Culture and Tourism in 1999. This 5 year-plan from 1999 to 2003, which culture industry was subdivided into seven industries [13], consists of establishing the infrastructure, technology development and training of skilled workers, system maintenance, funding, entrepreneurship promotion, and overseas market development. Since then, the cultural industry has been adopted as an important national policy by reflecting the strong willingness of the government to foster it as a national key industry in the 21st century along with the semiconductor, steel, shipbuilding, automobile

[11] Kim Young-sam, the 14th president of Korea who led "Civilian Government" during 1993-1998.
[12] This is the first bureau related to culture established in government. (Jang and Paik, 2012, Moon, 2018).
[13] They were animation/Film, broadcasting vide, game, music record, publication, fashion/design, and ceramics and other craft industries.

and mobile phone industries which has been the pillar of Korea's export industry. Since then, with the various support from the government, a social foundation has been created to make cultural-related projects even easier in the private sector. Based on these policies, the cultural industry has always been placed at the forefront priority of the government's economic development.

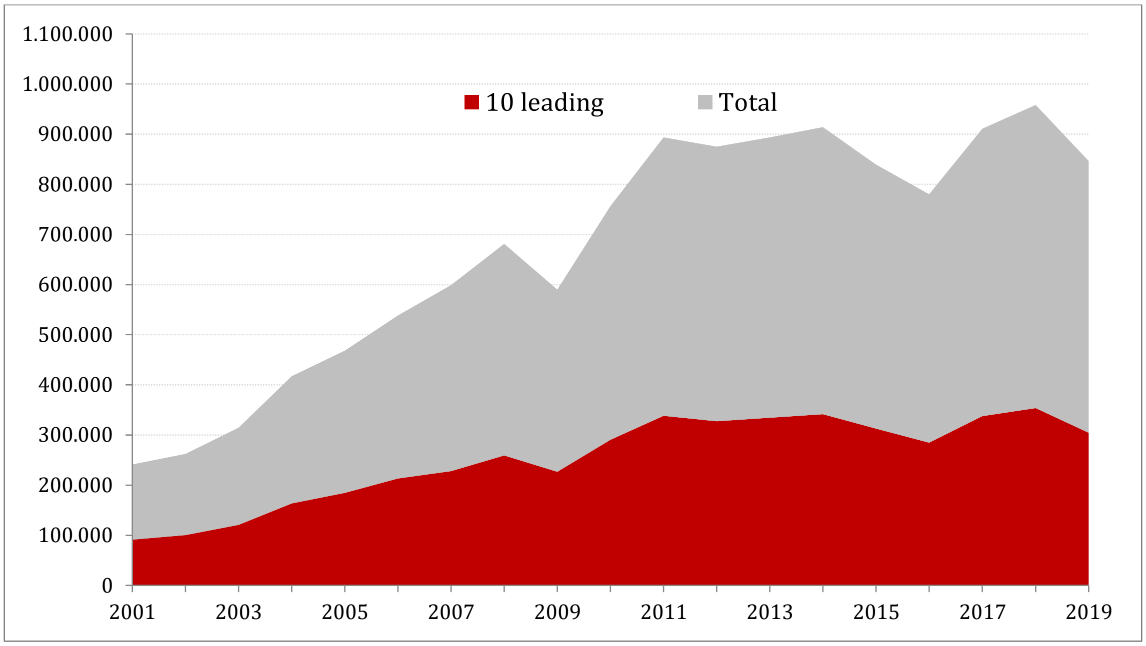

Figure2.3. *The Change of Weight of 10 Leading Export Items in The Total Amount of Export 2001~2019 (unit: US$ Million, Korea International Trade Association)*

Since the 2010s, Hallyu has gradually changed Korea's trade pattern with its various products entry. Since 2010, when export of technology-based products such as semiconductor and wireless communication device, which had been Korea's major export products, have been lost the lead to emerging competitors including China, Hallyu became a new export flagship industry in Korea by filling the gap occurred in the technology-based industries due to rapidly increased competitiveness. The Figure 2.3. shows the share of Korea's 10 leading export items in the total export since 2001. In the early 2000s, the top 10 export items accounted for almost half of all export items, whereas in the 2010s, due to the diversification of export products, it is shown that the share of the top 10 export items in total exports was decreasing. This is, the diversification of export items due to the increase in various consumer goods, which have not been very popular as export products, became the popular in abroad due to Hallyu. This is, due to Hallyu's popularity, consumer goods, which had not been very popular as export products, became popular in abroad, and consequently, it led the diversification in the export items of Korea. In this regard, it is undeniable that Hallyu is an output of the combination of the government's rapid movement in line with the era, generous investment to culture as a future industry, and constant and planned support to culture industry.

2.5 Hallyu and Tourism

Images of tourist destinations can be created without physical visits to tourist destinations, and these images can be affected by various intermediary factors such as advertisements, movies or news (Gartner, 1989). The positive image of the tourist destination generated during this process has an absolute influence on the decision-making of the tourist (Pearce, 1982; Woodside & Lysonsky, 1989) and there is a positive correlation between the tourist destination image and the tourist destination preference or intention to visit (Mayo, 1973; Hunt 1975). This phenomenon is also confirmed between Hallyu and tourism to Korea. According to the Korean Tourism Organization (2006), the number of visitors to Korea from neighboring countries increased by almost 36% after the TV show 'Winter Sonata' was aired. The reason for their visit was to visit the places, which the famous TV show was filmed (Korea Tourism Organization, 2006). As an extension of this phenomenon, studies related to the influence of Hallyu on tourism have been conducted in the form of a survey to the tourists visiting famous 'Hallyu tourist spots' in Korea.

Kim et al. (2007) surveyed Japanese visitors who visited Hallyu tourist spots in Korea, which was the background of 'Winter Sonata', a Korean TV show that gathered so much popularity in Japan at that time, to analyze the impact of Hallyu (Korean Tv show) on Japanese tourists. The study found that the tourist in their 40s or older who prefer Korean TV show have great aspirations for Hallyu tourism. Study suggested that the main characters of Korean TV show are the decisive factor that makes Japanese tourists prefer Korean TV show. Kim et al. (2009) conducted a Chow test to analyze whether there was a structural change in the tourism of Taiwanese to Korea after a Korean TV show 'Fireworks' aired and gained huge popularity in Taiwan in 2000. The result indicated that there was a significant structural change before (1997-2000) and after(2000-2005) the TV show aired in the tourism demand of Taiwanese to Korea. Kim, S (2012) conducted a survey study to the tourist from China, Japan, Taiwan and Thailand that visited to the touristic spots which were the main backgrounds of Korean TV show 'Dae Jang Geum[14]' which gained so much popularity in Asian region. The study suggested that the nationality of the tourists influences the on-site experience. Park & Choi (2013) investigated how Hallyu affects to the image of the Korean touristic spots and the satisfaction of tourists by conducting a survey to the Chinese tourists to Korea. In the study, they confirmed the hypothesis that the preferences of Korean movies, music and fashion more than other countries has a positive influence on the cognitive and emotional images of tourist attractions. Seo and Seo (2004), Kim and Kang (2007), Choi (2007), Chiu and Zeng (2016) also found positive influence of Hallyu to the tourism to Korea by using a survey method. That Hallyu has a positive effect on tourism means that consumers of Hallyu, especially the consumers of Korean TV show, undergo a process of increasing their familiarity with certain spots in Korea and synchronizing themselves with the TV characters by having emotional transferring with them, and finally showing behavior that leads to tourism to Korea with the positive image accumulated through a series of processes (Kim et al., 2007; Kim, Chen, et al., 2009; Russell et al., 2006).

The significance of these studies to us is intuitive and insightful. They directly show the relationship between the Hallyu phenomenon observed and the tourism inbound which is expected to be highly related. However, the relationship between the positive influence of Hallyu and tourism is still not far from the simple relationship between the video media such as TV shows and movies and the tourist attractions exposed within the video media (Seo & Kim, 2019). Survey method study on Hallyu and tourism faces a fundamental limitation that the study is only reflected by a part of Hallyu, the TV show, not the rest of Hallyu in the current environment where Hallyu is not a representative of Korean TV shows but the popular culture of Korea unlike earlier. However, few approaches have been attempted in

[14] Also frequently translated to 'Jewel in the Palace'

relation to Hallyu study. According to the study by Kim & Kim (2014), there were only 6.6[15]% of empirical studies related to Hallyu whereas the survey method was accounted 45.9% in literature about Hallyu written Korean language. It is attributed to the characteristics of Hallyu, which is a cultural product. Given the characteristic of Hallyu which is aggregate cultural products, it is nearly impossible to include and measure every product with which is associated, and thus, in an effort to offer a convenience to the studies. “It is important to say that it is difficult to develop a clear and objective economic measure of the economic impacts of cultural industries that is presented in monetary value and in relation with costs (UNESCO, 2009)”. In other words, it is because we have not yet developed an economical instrument that allows us to measure cultural products, and moreover, a very unique cultural product called Hallyu with great precision.

Nevertheless, attempts are being made to define and analyze Hallyu as an economic variable, although in the studies where Hallyu was used as an economic variable in quantitative analysis, the Hallyu variable has been taken in different forms. Park and Choi (2009) defined Hallyu based on the UNESCO’s cultural commodity definition in the study that investigated the trade-creation effect of Hallyu. The study proved that the trade-creating effect that the accumulated exported of cultural goods (Hallyu) promotes the export of other goods. Kang (2009) also defined Hallyu by UNESCO’s classification in a study analyzing the influence of Hallyu on export and FDI to Southeast Asian countries. The study suggested that Hallyu was significant for the export of Southeast Asian countries. Jun and Kim proposed a new perspective on the definition of Hallyu. In the study about the ripple effect of Hallyu on the Korean economy, Jun (Jun et al., 2014, 2015; 2016; Jun and Kim 2018) specified eight different categories such as TV, music, film, food, fashion/beauty, animation/cartoon/ character, game and books as Hallyu variables. These categories were created by combining the observations of experts on the unique and unprecedented phenomenon of Hallyu. In the study, Jun and Kim calculated the volume of Hallyu contents among the total Korean export by estimating Hallyu coefficient.[16] Despite the fact that their studies were not solely based

[15] The number is 4.

[16] It is the amount of “Hallyu contents” exported to USA, China, Japan, Hong Kong (by year). The Hallyu contents are calculated by multiplying the “Hallyu coefficient” to the total amount of export to selected countries. Estimation of Hallyu coefficient is a combination of multiple methods such as survey, expert

on the econometric method but also survey method, they should be appreciated as highly meaningful studies that have provided new perceptions in defining and analyzing the abstract phenomena as an analytic variable. Jun and Kim's research has been contributing to other researchers to include Hallyu as an analyzable variable. Huh and Wu (2017) defined the Hallyu variable based on the KCCA (Korean Creative Contents Agency) classification which is originally defined and developed by Jun (Jun et al., 2014, 2015; 2016; Jun and Kim 2018). The study conducted upon 40 countries by using panel analysis proved that Hallyu has a positive effect on the export of consumer goods and on tourism inbound. Bae et al. (2017) also adopted the estimated volume predicted by Jun & Kim (2018) and KOFICE (Korean Foundation for International Cultural Exchange) as a Hallyu variable in their study of examining the economic impact of Hallyu to Korean tourism. In their study that adopted the Hallyu variable in the Gravity model, it is suggested that Hallyu has a significant impact on Korean inbound tourism. Jang and Kim (2019) defined Hallyu based on Jun & Kim's classification in a study on the ripple effect of Hallyu contents on export of consumer goods. The study using the Gravity model confirmed the ripple effect that exports of cultural products (Hallyu) lead to an increase in export of consumer goods in most countries. Lim and Giouvris (2017) defined Hallyu with movies, TV series and music in the study on the determinants of Korean tourism inbound. They included Hallyu along with macroeconomic variables such as unemployment rate, inflation, GDP and exchange rate besides sentiment and mood as the determinants of tourism in the study. The study confirmed that Hallyu is a variable that is hard to be ignored in the determinants of tourism inbound of Korea. Seo and Kim (2019) conducted a study to analyze the effect of Korean pop culture phenomenon (Hallyu) on inbound tourism. This study using the Bayesian Autoregressive model found that product placement is a powerful marketing strategy for the tourism inbound of Korea.

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interviews and gathering reports from resident employees. This research is conducted by Korean Foundation for International Cultural Exchange led by Jun and Kim since 2015.

3. STUDY PURPOSE

The Hallyu phenomenon is being observed all over the world, and tourism inbound to Korea is living in an era higher than ever. In line with this, numerous studies are being conducted on the effect of Hallyu and Korean tourism inbound, however, research on this remains in the neighboring countries of Korea. In the early period when Hallyu phenomenon was only observed in surrounding Asian countries, Hallyu studies which analyzed the influence of neighboring countries, was sufficient to analyze the Hallyu phenomenon. However, in the current circumstance where Hallyu is being observed all over the world, analyzing Hallyu limited to East and Southeast Asia does not sufficiently explain Hallyu phenomenon. Considering that one of the main determinants of tourism demand is transportation cost (Lim, C. 1997), analyzing the influence of Hallyu on tourism demand only for neighboring countries with low transportation cost, in other words, for the countries that have relatively closer physical distance to Korea, always overestimate the influence of Hallyu on tourism demand. Attempts are being made to conduct studies for broader range of countries (Jang & Kim, 2019), yet mainstream of Hallyu research still remains in countries around Korea. Therefore, our study conducts research targeting broader range of countries. In our study, 18 countries are selected with high tourism demand to Korea, average of more than 100,000 tourists annually for two years in 2017 and 2018, and exceeding a certain ratio of number of tourists per population[17].

As discussed earlier, the major trend of the Hallyu impact on tourism is largely depending on the survey method from tourists visiting the famous Hallyu spots that have become very popular through the Korean TV shows. As this method implicitly defines Hallyu as simply a TV show, it results in excluding other aspects of Hallyu such as music, food and fashion. This biased phenomenon of the study method is attributed to its convenience. It is because it is much easier to analyze Hallyu by defining it as a product, rather than analyzing a variable whose definition has not been discussed academically. However, the situation in

[17] East Asia countries : 0.3%, Southeast Asia countries : 0.4%, and the others : 0.1%

which a part of Hallyu represents the entire Hallyu may cause distortion of the influence of it. In order to compensate for these limitations, attempts have been made to define Hallyu following the criteria of UNESCO's cultural good and services classification (Park & Choi, 2009; Kang, 2009). This attempt seems to be a solution to the phenomenon that Hallyu is represented by one certain category or product. But it contains another problem. UNESCO's standards consist mostly of tangible cultural products including traditional cultural properties. Hallyu refers to the popular culture of Korea from a narrower perspective, and UNESCO's classification has a limitation for describing Hallyu as it does not reflect the popular culture, the characteristics of Hallyu. Furthermore, UNESCO's standards, which are classified as most traditional culture products and services, do not reflect the consumption of digitized video materials, sound sources and book that represent current consumption behavior where social media is the largest provider of the consumption of the cultural products. Thus, application of UNESCO's classification for the case of Hallyu may cause a result that the study does not reflect the characteristics of Hallyu and the consumption behavior of the cultural products and services in the present era. In recent years, with the efforts to analyze Hallyu more precisely, classification of Hallyu products is being carried out (Jun et al., 2014, 2015; 2016; Jun and Kim 2018; KOFICE[18]). According to this classification, Hallyu consists of eight different categories; TV, music, film, food, fashion/beauty, animation/cartoon /character, game and books and the sophistication of the classification is being updated every year. For this research which is considered the most extensive and sophisticated Hallyu research in Korea, Jun and KOFICE prepared the classification through observation and analysis with experts from each field for many years. Our current study, the classification made by Jun and KOFICE, which can best reflect the characteristics of Hallyu at present, is adopted to define the Hallyu variable. In our study, Hallyu is a set of products identified as HS-Code classified by Jun's category, and the Hallyu demand is the amount of export of the set to a selected country.

Another reason behind the limitation that Hallyu studies depend on survey method is, the absence of an economic model in which Hallyu is defined as an economic variable. Of course, Hallyu is not being studied solely by a survey method. Researchers made attempts to

[18] Korean foundation for international cultural exchange

analyze Hallyu with the efforts to include Hallyu as a quantitative variable. (Jun et al., 2014, 2015; 2016; Jun and Kim 2018; Huh & Wu, 2017; Lim & Giouvris, 2017; Seo & Kim, 2019). Nevertheless, quantitative analysis related to Hallyu is still very small in academic research. The major reason that we have very few quantitative studies on Hallyu is, as discussed earlier, the lack of the economic structure models that ease the researchers to identify Hallyu variables in the model. According to the traditional approach of economic analysis, variables should be identified in the model built on the economic theory. However, Hallyu does not have many options to fit itself into economic models due to its special location which is popular culture and a newly introduced concept to the field of economics. Most of the quantitative analysis studies using Hallyu are based on the Gravity model which is one of the traditional approaches. Over the past 40 years, the Gravity model, which was introduced by Tinbergen (1962), is the most commonly used analytical model when analyzing factors that determine the flow of trade between countries. The Gravity model is seen in most of the studies dealing with cultural products and export as a formula to build economic models. In order to model the Hallyu variable in the way of the traditional approach, which is fitting it in the Gravity model, studies took the Hallyu variable as exogenous. In the traditional regression models, however, as we will see in the next chapter, the traditional approaches are encountering some limitations that do not reflect the real economy properly, the identification problem, and the univariate problem. To overcome such problems which makes the traditional approach unrealistic, we adopt the SVAR method, the Structural Vector Autoregression method in this study. Structural vector autoregressive is a model that assumes all the variables in the model is exogenous and the time variable *t* is multivariate. Furthermore, the SVAR model applies the structural restrictions which is missing in the VAR model. By adopting SVAR model in the study, we can solve the identification problem and the univariate problem in the tradition structural model, and nonstructural problem in the VAR model.

To sum up, in order to overcome the limitation of Hallyu research, the scope of the analyzed countries, the problem of defining variable, and the limitation of the current economic model, our study enlarges the range of the analyzed countries from Asian regions to the world, defines Hallyu according to the Hallyu classification which is the most actively developed, and utilizes the SVAR model. Through this process, this study will not distort the influence of Hallyu on tourism, will help to expand econometric literature in the study of Hallyu, and will contribute to the study of Hallyu from a different perspective.

4. METHODOLOGY

4.1. Structural Vector Autoregression

4.1.1. The Emergence of the SVAR Model

Structural Vector Autoregression is a useful econometrical instrument which enables the analysis of dynamic relations in the model by employing unexpected shock (Gottschalk, 2001). As SVAR identifies structure in the model by imposing economically meaningful constraints on the reduced VAR[19] model, it is necessary to review the appearance of the VAR model before we discuss the SVAR model. The VAR model was suggested by Sims in 1980, at the time when many scholars began to question the ability of theoretical and empirical interpretation of traditional large-scale economic models (Kilian, 2011). The gap from the reality that traditional approach of simultaneous equation in economics had had led many economists to raise doubts on whether the theory of economics represents the real economy. One of the major problems that the tradition approach has is identification of the model. Intuitively and empirically, we know the economic change does not occur solely by endogenous variables within a given economic model. Economic changes and shocks are often caused by exogenous variables, or perhaps by a sequence of processes affected by exogenous variables. However, it is inevitable that endogenous variables are identified in order to build a model based on the assumptions and theories economically given. In the process of identifying the variables that might not have had a significant impact on the real economy as endogenous variables just to fit the model's framework, we might begin to encounter the first possibility of discrepancies between theoretical economy and the real economy. In this regard, Sims (2002) asserted that "In the traditional simultaneous equations models, the intervention was ordinarily taken to correspond to changing the parameters in an equation or block of equations in the model." by quoting Hurwics (1962) "A model is structural if it allows us to predict the effect of "interventions." This is frequently observed in monetary and finance economics, as priori in these fields, variables go exogenous as they are determined by a market of given so-called well-formed and reasonable expectations

[19] Reduced VAR refers to the VAR, Vector Autoregression. To distinguish VAR from SVAR, "reduced VAR" is used in the paper.

(Gottschalk, 2001). VARs[20] identify every variable in the model as exogenous. The approach of VARs to identification of the model and variables is designed to avoid such problems that traditional dynamic simultaneous equation approach has (Gottschalk, 2001). Gottschalk (2001) emphasized this VARs approach as "incredible" identifying restriction. Owing to the availability of VARs assumption that identifies all the variables as exogenous in the model, it has become possible to analyze only the observed variables without the effort to establish a model consisting of endogenous variables with a basis of economic theory. This was the main reason behind the emergence of the VAR, we can say. Quite simply, VARs are the way of approaching of identify all variables in the model as exogenous in order to narrow the "gap from the real economy" that the traditional approach of simultaneous equation has. Of course, this way of approach is not monopolized by VARs. ARIMA, Auto Regressive Integrated Moving Average suggested by Box and Jenkins(1976) shares the credit. To meet its purpose in which the overcome the inflexibility that traditional approach of simultaneous equations have, ARIMA assumes that the current observation Zt is reproduced by any regularity in the past, and this regularity is maintained in the future. Despite the fact that ARIMA succeeded formulating the availability by adopting lag time, it still encounters the limitation that the traditional structural models have, the univariate problem which is not a matter in VARs.

In order to grasp understanding of SVAR, it is necessary to review the problem of the traditional approach of the simultaneous equation and to discuss how VARs approach solves them. Before a more in-depth discussion, a very brief of the relationship between VAR and SVAR is needed.

4.1.2. The Traditional Approach and the VARs

As the appearance of the VAR model was intended to solve for the problems that traditional approaches would inevitably have, it is possibly said the SVAR mode was born in order to compensate for the "economically unstructured problem" that VAR inevitably had. Thus, it is necessary to understand the formation of VAR to understand SVAR

[20] VARs include VAR and Structural VAR in this paper.

ultimately. Four decades ago, Sims(1980) proposed a new framework to the macroeconomics by brining out a new concept of approaching method, the VAR. With its emergence, VAR has been leading massive empirical studies of macroeconomics over the past 30 years. Sims(1980) introduced VAR as an alternative to traditional large-scale dynamic simultaneous in order to provide immediate simultaneous restrictions to the model and to avoid the a priori implausible assumption, “exogeneity” that traditional simultaneous equations have. From this point of view, we can see two limitations in the traditional approach.

First, it is the major problem of the traditional approach, the identification. The traditional approach of the contemporaneous equation accounts for the economic model based on the function built on the economic theory. These economic models are a form in which dependent variables are explained by several explanatory variables through causal relationships among variables in the model. This way of approach needs to set the distinction between endogenous and exogeneous variables in the model. However, in practice, we are unable to directly observe structural shocks or the effects of shocks on other variables. Nevertheless, endogenous and exogenous variables should be identified in the model even when the separation is ambiguous in order to build the economic model.

This problem is consistent with the problem of this study. According to the traditional approach, it is necessary to first assume a function that takes Hallyu variable as an endogenous variable in order to define a variable called Hallyu that this study wants to analyze. However, it is nearly impossible to set the proper function to endogenize the Hallyu variable due to the limitations in which it is a new variable in the literature where few quantitative data are found and few empirical studies have been made. Most of the quantitative studies that took Hallyu as one of the variables used the Gravity model which is introduced by Timbergen(1962). The Gravity model is modelling the factors that determine a country’s trade flow and it is the most used model when analyzing factors that determine the flow of the trade between countries since its first appearance. Most of the studies that employed the Gravity model used Hallyu by treating it as an exogenous variable to examine its effect on the dependent variable in the model, the export. By taking advantage of the Gravity model, it become possible to model and explain the Hallyu variable within frame of the economic theory, yet it still encounters the limitation that the way of traditional approach has, the univariate problem which we see as the second problem of the traditional approach.

In practice, it is possible to observe exogenous variables over time. Therefore, it is possible to predict how the past values would affect the future value. This is where the VAR model solves this problem of traditional methods. In this way, VARs provide the remarkable convenience of not having to set up a model based on economic theory by assuming variables as exogenous variables as a result of an observation. VARs improves the problem of the variable identification of the traditional simultaneous equation approach by identifying the variables in the model through this process.

The second problem of the traditional structural approach is from its assumption of time variable. The traditional approach basically assumes that the univariate, this is, the change in the time variable t in the model is applied to all variables en bloc. As mentioned above, the structural equation model based on the traditional regression model describes the dependent variable by several explanatory variables through the causal relationship between the variables. However as the effect of the explanatory variable is always constant even when the time t is changed due to the univariate assumption, the model is vulnerable to explain when the structural change is rapidly progressed, and thus, the effect of the explanatory variable cannot be properly reflected. Therefore, in this traditional approach with a single-equation, single-variable linear model, it is needed to employee the time lag of its own variable to be able to explain the present value of the variable (Stock and Watson, 2001). In VARs, the present value is explained by the time lag of its own variable. Unlike the traditional structural approach, VARs are a liner model associated with n-equations and n-variables. The availability of VARs is manifested right here. The VARs in the form of a vector make it possible to describe the present and past values of non-self-variable (n-1).

4.1.3. The VAR and the SVAR

As we discussed earlier, VAR is an alternative model appeared to solve two limitations in which of the traditional simultaneous equations, the identification problem and the univariate problem. As its birth suggests, the VAR model has been frequently used for time series analysis due to its usefulness and flexibility since its appearance. Yet VAR also has a limitation that VAR cannot reflect the contemporaneous relationship of the variables in the model. In the VAR model, error terms are correlated which is attributed to the fact that the no economical restriction is imposed to the VAR model, in other words, the VAR model is not structural. Therefore, the VAR model is criticized that it is not theoretical and ad hoc (Cooley and LeRoy, 1985; Leamer, 1985).

The VAR is called the reduced VAR as the VAR is a reduced form of Structural VAR. In this regard, it is possible to induce the VAR form from the SVAR. The SVAR consists of 2 variables, X and Y is as below.

$$Y_t = \beta_{10} - \beta_{12}X_t + \gamma_{11}Y_{t-1} + \gamma_{12}X_{t-1} + u_{yt} \tag{1}$$

$$X_t = \beta_{20} - \beta_{21}Y_t + \gamma_{21}Y_{t-1} + \gamma_{22}X_{t-1} + u_{xt} \tag{2}$$

Where Y_t and X_t are stationary time series variables, and u_{yt} and u_{xt} are uncorrelated white noise error terms. If we form the equation to a matrix,

$$\begin{bmatrix} 1 & \beta_{12} \\ \beta_{21} & 1 \end{bmatrix} \begin{bmatrix} Y_t \\ X_t \end{bmatrix} = \begin{bmatrix} \beta_{10} \\ \beta_{20} \end{bmatrix} + \begin{bmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{bmatrix} \begin{bmatrix} Y_{t-1} \\ X_{t-1} \end{bmatrix} + \begin{bmatrix} u_{yt} \\ u_{xt} \end{bmatrix} \tag{3}$$

$$BZ_t = \mathit{\Gamma}_0 + \mathit{\Gamma}_1 Z_t + u_t \tag{4}$$

then, by multiplying B^{-1}, we can get

$$Z_t = B^{-1}\mathit{\Gamma}_0 + B^{-1}\mathit{\Gamma}_1 Z_{t-1} + B^{-1}u_t \tag{5}$$

$$= A_0 + A_1 Z_{t-1} + e_t \tag{6}$$

then, by writing it in algebraic form, we can get

$$Y_t = \alpha_{10} + \alpha_{11}Y_{t-1} + \alpha_{12}X_{t-1} + e_{yt} \tag{7}$$

$$X_t = \alpha_{20} + \alpha_{21}Y_{t-1} + \alpha_{22}X_{t-1} + e_{xt} \tag{8}$$

the reduced VAR form where the error terms $e_{yt} and\ e_{xt}$ are correlated as below.

$$e_{xt} = (u_{yt} + \beta_{12}u_{xt})/(1 - \beta_{12}\beta_{21}) \quad (9)$$

$$e_{yt} = (u_{xt} + \beta_{21}u_{yt})/(1 - \beta_{12}\beta_{21}) \quad (10)$$

The VAR requires the impact response functions (IRFs) and the variance decomposition test to interpret the result, however, as the error terms are correlated, the accuracy and meaning of the tests remain unclear. The VAR with time variable p can be written as,

$$-y_t = \nu + \Phi_1 y_{t-1} + \ldots + \Phi_p y_{t-p} + \epsilon_t \quad (11)$$

In many literatures, it is shown that the finite order autoregression model, AP with stationary time series can be converted to the infinite order moving average model, MA[21] (Box and Jenkins, 1976; Hamilton, 1994).

$$-y_t = \nu + \textstyle\sum_{i=0}^{\infty} \psi_i \epsilon_{t \cdot i} \quad (12)$$

Where $\psi_0 = I_n$, ψ_i is simple IRFs. Simple IRFs assumes 1 unit of shock affects to the underlying variable at t=0 but 0 unit of shock to the rest variables which causes the result ϵ_t cannot reflect the correlation between variables unlike the variance-covariance matrix $\sum$. In this regard, the reduced VAR has a shortcoming in which does not investigate the contemporaneous relationship between variables as it uses the simple IRFs.

4.2. Cholesky Decomposition (IRFs and FEVD)

As the VAR model depends on the Forecasting Error Vector Decomposition (FEVD) process to interpret its result, so does the SVAR. IRFs is a function that shows how the variables response to the impulse imposed on the variables in the model as time flows, which is a very useful economic instrument to grasp an understanding of the economy as it reflects the paths of the ripple occurred by the impulse imposed on the certain variable in the model (Sims 1980a, b). By enabling visual test, IRFs makes it easier to understand the durability of variables' response to the impulse on other variables. FEVD is a ratio of how much the impact

[21] Only when inverse matrix exists.

given to other variables in the model can explain the change in a specific variable in decomposing the error term in a time series. FEVD stands on the assumption that it is possible to obtain useful information by decomposing the error term depending on the importance of each factor as the error term consists of the shocks on the variables. Based on this assumption, the FEVD divides the variables in the VAR model according to its importance to the error. Therefore, FEVD can measure relative importance of each impact in the model in explaining the change in a variable.

However, applying them to the SVAR without any restriction causes the same result that the VAR model has, the contemporaneous problem. To overcome this problem, the VAR model needs structural restriction. There are several ways to structure the VAR model. The most commonly used method is interpreting the model through Cholesky decomposition by restrict the matrix to lower triangular matrix A and diagonal matrix B (Fatas and MIhov, 2000; Favero, 2002). There are other methods such as giving sign restriction to the model (Mounford and Uhlig, 2002), and setting the model to structural vector by examining the cointegration relationship between equations (Becker, 1997; Krusec, 2003). In order for the model to be Cholesky decomposed, the error terms should be identified uncorrelated, in which orthogonal in the matrix, which enables to explain the contemporaneous correlation of the residual terms precisely.

The three variables used in the current study can be identified as the vector matrix y_t as seen in the formula (13) below. y_t is then structed by matrix A and matrix B according to the Cholesky decomposition as seen in the formula (14) and (15).

$$y_t = \begin{bmatrix} HA_{it} \\ TO_{it} \\ GDP_t \end{bmatrix} \tag{13}$$

$$A = \begin{bmatrix} 1 & 0 & 0 \\ a_1 & 1 & 0 \\ a_2 & a_3 & 1 \end{bmatrix} \tag{14}$$

$$B = \begin{bmatrix} b_1 & 0 & 0 \\ 0 & b_2 & 0 \\ 0 & 0 & b_3 \end{bmatrix} \tag{15}$$

The lower triangular matrix A restricts the contemporaneous relationship between variables. The first row of the matrix A shows that the changes in $HA_{it}(Hallyu)$ are not contemporaneously affected by $TO_{it}(Tourism)$ or GDP_t, the second row of the matrix A represents the changes in TO_{it} is affected by contemporaneous changes in HA_{it}, but GDP_t, and the third row of the matrix A shows the changes in GDP_t are affected by contemporaneous changes in both HA_{it} and TO_{it}. The diagonal matrix B restricts the weighs given to the error terms in the SVAR.

The IRFs can be modified by adopting Cholesky decomposition in which uses lower triangular matrix on the variance-covariance matrix. By multiplying variance-covariance matrix estimated from the VAR model to the lower triangular matrix and its transposed matrix, we get diagonal matrix.

$$\sum = PP' \tag{16}$$

$$P^{-1}\Sigma P'^{-1} = I_n \tag{17}$$

$$E\{P^{-1}\epsilon_t(P^{-1}\epsilon_t)'\} = P^{-1}E\{\epsilon_t\epsilon_t'\}P^{-1} = P^{-1}\sum P'^{-1} = I_n \tag{18}$$

where P^{-1} transforms ϵ_t to the error terms that do not have correlation.

We can transform the MA model induced from VAR(p) by using P^{-1} as below,

$$-y_t = \nu + \sum_{i=0}^{\infty} \psi_i \, PP^{-1}\epsilon_{t-1} = \nu + \sum_{i=0}^{\infty} \Xi_i \, \nu_{t-i} \tag{19}$$

$$\Xi_i = \psi_i, \; \nu_t = P^{-1}\epsilon_t \tag{20}$$

which now enables mutual orthogonal as below,

$$\nu_t \nu'_t = I \tag{21}$$

Now the model can explain the relationship to impulse without considering the correlations among other error term. However, this does not mean Cholesky decomposition, the orthogonalized impulse response function, is free from shortcomings. Let's represent the equation above to the matrix.

$$\nu_t = P^{-1}\epsilon_t \tag{22}$$

$$Pv_t = \epsilon_t \tag{23}$$

$$-\begin{bmatrix} P_{11} & 0 & 0 \\ P_{21} & P_{22} & 0 \\ P_{31} & P_{31} & P_{33} \end{bmatrix} \begin{bmatrix} v_{1t} \\ v_{2t} \\ v_{3t} \end{bmatrix} = \begin{bmatrix} \epsilon_{1t} \\ \epsilon_{2t} \\ \epsilon_{3t} \end{bmatrix} \tag{24}$$

Now the SVAR is identified through the process of setting the causal chain among variables by using Cholesky decomposition. The error terms consist of multiplying of lower triangular matrix. In this case, setting the causal chain is the same process of modelling a recursive form equation model. In other words, the result varies depending on the order of the variables consisting vector time series. This is the biggest problem that the SVAR model encounters. To remove such ambiguity of the model, attempts are made to offer a precise insight by taking additional processes such as Granger causality. However, taking the orders of the variable vectors to the a priori way is most seen in the literatures. This is because observing exogenous variables for a long period can provide a priori insight about the order of causality among variables to the clearer way than the additional process of ordering decision can suggest. Therefore, in our study, we order the variables to the way from that are more exogeneous and less exogeneous. The order is from Hallyu, GDP to tourism inbound, as a result we observe from the real economy.

4.3. Unit Root Test

The unit root test is what must be performed prior to the full-scale SVAR analysis. The unit root test is an analysis method that determines whether a time series is a stationary time series or a non-stationary time series. A unit root is a stochastic trend in a time series which leads the time series non-stationary by causing spurious regression problem. The credibility of a time series analysis depends on the assumption that the time series is stationary. Stationary is a characteristic of the time series variable that even if the time series variable deviates from the equilibrium due to the short-term shock, it returns to the equilibrium in long-term. The condition of the stability of time series is as below.

$$E(x_t) = \mu \tag{25}$$

$$Var(x_t) = E(x_t - \mu)^2 = \gamma_0 = \sigma^2 \quad (26)$$

$$Cov(x_t, x_{t-k}) = E(x_t - \mu)(x_{t-k} - \mu) = \gamma_k = \gamma_k \quad (27)$$

Where t is time a time variable, $E(x_t)$ is an average of the variable x_t, $Var(x_t)$ is a variance of the variable x_t, and $Cov(x_t, x_{t-k})$ is the covariance of the variable x_t and x_{t-k}. Stability occurs when the condition that the average and the variance of $x_t$is consistent and the covariance depends on the time lag of the $x_t - x_{t-1}$ is satisfied.

On the contrary, time series variables have a unit root when the average of the time series variables vary as time variable t changes. In this case, we say the time series is in the random walking process and thus, non-stationary. The unit root test was positioned as an inevitable test before conducting empirical analyses after Nelson and Plosser (1982)'s study which suggested that 13 out of 14 time series of America's major macroeconomy and finance they investigated are found non-stationary.

It is important to test the stability of the time series before conducting empirical analyses using time series data in macroeconomy and finance as it may occur spurious regression as a result of misleading the statistical inference. Spurious regression is a situation in which that shows correlation between variables even when there is no correlation which can cause a misleading in interpretation of the result. In other words, there is a possibility that such a false regression may lead to a wrong conclusion if the time series is analyzed while the time series are non-stationary. Therefore, understanding the importance of the unit root test is an important prerequisite for macro and financial time series analysis.

4.3.1. Augmented Dickey-Fuller (ADF) Test

Among several methods to do the unit test in time series, the most widely used method is the Dickey-Fuller (DF) test and the Augmented Dickey-Fuller test (ADF) introduced by Dickey and Fuller in 1979 and 1981 respectfully. The DF test estimates a regression equation by the LSM method and tests whether , the regression coefficient of y_{t-1} is equal to 0 or not, however, the DF does not provide an answer in case the residuals are heteroscedasticity since it is based on assumption that the error term does not contain autocorrelation. The ADF test is suggested as an augmented method to improve the DF unit root test which cannot overcome the problem that has an autocorrelation in error terms. The ADF made it possible to explain the residual under heteroscedasticity by adding time lag in the model, which is done by comparing the t-statistics and the threshold in the distribution table. In our study, the Augmented Dickey-Fuller (ADF), the most widely used unit root test method, is used for the time series unit root test. The ADF estimation varies depending on the characteristics of the time series variables. 1) When time series variables have no constant and no trend, 2) when time series variables have constant but trend, 3) when time series variables have both constant and trend.

$$\Delta y_t = \gamma y_{t-1} + \sum_{s=1}^{m} a\Delta y_{t-s} + e_t \quad (28)$$

$$\Delta y_t = \alpha + \gamma y_{t-1} + \sum_{s=1}^{m} a\Delta y_{t-s} + e_t \quad (29)$$

$$\Delta y_t = \alpha + \delta t + \gamma y_{t-1} + \sum_{s=1}^{m} a\Delta y_{t-s} + e_t \quad (30)$$

Where γ is a regression coefficient of y_{t-1}, $\sum_{s=1}^{m} a\Delta y_{t-s}$ is time lags, α is a constant, δt is a trend, and e_t is a error term. The ADF estimates the regression coefficient γ and the decides whether the time series variables have a unit root according to the hypothesis as below.

$H_0 : p = 1(\gamma = 0)$: y is non-stationary, variable has a unit root. (31)

$H_1 : p < 1(\gamma < 0)$: y is stationary, variable does not have a unit root. (32)

Time series variables usually show that the variables have a unit root on its level. One of the most common method of stabilizing a time series data is to make a difference. In some cases, if it is non-stationary in the first difference, the second difference may be used. Alternatively, even if the time series is non-stationary, if cointegration is found between equations, in the long run, it is possible to use the Vector Error Correction Model(VECM) by checking whether there is a stationary long-term equilibrium relationship between the integrals. The reason this analysis is possible is based on the assumption that if there exists a equilibrium between variables, the deviation from a long-run equilibrium is adjusted as time passes by. In this regard, VECM examines the information in long-run equilibrium. The mostly used method is to examine the VECM is Johansen cointegration test (Johansen, 1991). Another method is Philips-Perron(PP) test that is widely used to do a unit root test. The PP test is based on the assumption that the residual in the time-series model does not have autocorrelation and homoscedasticity. Furthermore, the PP test has an advantage of being able to test a wider range of variables compared to the DF or the ADF test. However, it also has a disadvantage in that the statistics should be obtained by estimating the long-term variance of the error term which makes the process of the test demand more efforts. In our study, we analyze the time series data after the unit test by using the ADF test.

4.3.2. The Decision of the Optimal Time Lag

The ADF test is a method suggested to supplement the autocorrelation problem of the DF test by adding time lag variables to the time series variables in the model. In addition, the SVAR model which is used for the analysis of our study analyzes how an effect of one variable affects to other variables' changes by using time lag variables. Therefore, determining the optimal time lag of the given time series variables is what is needed to be preceded before the full-scale analysis. There are several ways to determine the optimal time lag, including AIC and SC, LR, FPE, and HQ and AIC and SI are commonly selected test methods among them.

$$AIC(\rho) = ln\left|\hat{\Sigma}_p\right| + \frac{2(N^2p+1)}{T-p} \tag{33}$$

$$SC(\rho) = ln\left|\hat{\Sigma}_p\right| + \frac{(N^2p+1)ln(T-p)}{T-p} \tag{34}$$

Most of the statistical analysis programs are designed to show the optimal time lags found by using different test methods at once. Thus, it is possible to confirm which time lag is optimal by executing the optimal time lag test at once.

5. EMPIRICAL ANALYSIS

5.1. Study 1] SVAR Analysis by Country

5.1.1. Data

In order to analyze the effect of Hallyu on the tourism of Korea under given condition, defining Hallyu as a quantitative variable should be preceded. The definition of Hallyu as a quantitative variable has not been agreed upon in academia yet there are two major opinions as a conceptual definition of Hallyu. In the narrow sense, Hallyu is Korean popular culture contents including TV shows, movies, music, fashion, beauty, and games (Jun and Kim, 2017, 2018). In a broad sense, Hallyu is the entire Korean culture or even Korea itself (Yang, 2012).

In the current study, we accept the first definition and adopt the classification made by Jun and KOFICE, which can best reflect the characteristics of Hallyu at present. The Hallyu variable is identified as HS-Code corresponding to the items from each category. The Hallyu demand is defined as the amount of export of the item set to a selected country. As an economic variable, Gross Domestic Products of Korea and the number of inbound tourists to Korea were taken to be used. The period of the analysis is between 1998 and 2018, from the period in which the term Hallyu was confirmed to be used officially in the government of Korea to the present. The term of the data is quarter. All variables were used as natural logarithm. Seasonality of all the time series variables has been removed through STL decomposition method before time series analysis.[22]

[22] STL, Seasonal and Trend decomposition using Loess is a time series decomposition technique developed by Cleveland & McRae & Terpening (1990).

Table 5.1. *Study 1. Data Description*

Variables	Description	t, Time Variable		Source
		Period	term	
HA_{it} **Hallyu variable** of country variable *i* and time variable *t*	**65 Hallyu goods** exported from Korea to country *i* during time period *t*	1998-2018	Quarter	- 47 items categorized as Hallyu Cultural Goods by Korea Creative Content Agency by Korea Creative Content Agency : Contents Industry Trend Analysis Reports - 18 items categorized as Hallyu consumer goods classified by Ministry of Culture, Sports and Tourism : Contents Industry Statistical Analysis
TO_{it} **Tourism variable** of country variable *i* and time variable *t*	The number of tourists inbound to Korea from country *i* during the time period *t*	1998-2018	Quarter	Korea Tourism Organization
GDP_t of Korea with time variable *t*	Gross Domestic Product of Korea during time period *t*	1998-2018	Quarter	Bank of Korea
i, Country Variable	Among the countries considered to have the influence of Hallyu effect, 18 countries with annual average number of tourists to Korea in 2017 and 2018 exceeding 100,000 and the number of visitors to the population exceeding a certain rate. (East Asia : 0.3%, Southeast Asia : 0.4%, and the others : 0.1%) [23]	East Asia : China, Hong Kong, Japan, Taiwan Southeast Asia : Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam Anglosphere : Australia, Canada, UK, USA Europe : France, Germany, Russia, Turkey[24] * Turkey does not exceed 100,000 visitors per year on average but included in the data		

[23] The standard rate of the tourist to population of East Asia exceeds 2% excluding China.
[24] Turkey does not exceed 100,000 visitors per year on average but included in the data.

Table 5.2. *Hallyu Products by HS Code*

Goods	Category	Items		HS CODE
Cultural Goods	Music	Music Cd, Tape, etc.	1	8523292119
			2	8523292129
			3	8523292139
			4	8523292919
			5	8523292992
			6	8523292999
			7	8523402119
			8	8523402120
			9	8523402992
			10	8523402999
			11	8523512190
			12	8523512920
			13	8523512990
			14	852410
			15	852432
			16	852451
			17	852452
			18	852499
	Movie Data	Developed Movie Films	19	3706
			20	370590
	Broadcast	Recorded Video Tape, Disk, etc.	21	8524991000
			22	8523292211
			23	8524539000
			24	8524531000
			25	8524399000
			26	8523291130
			27	8523292219
			28	8523292229
			29	8523292231
			30	8523292239
			31	8523292991
			32	8523402139
			33	8523402991
			34	8523512910
			35	8523802910
			36	8528690000

Table 5.2. *Hallyu Products by HS Code*

Cultural Goods	Publication	Printed books and booklet leaflets, newspapers, magazines and periodicals, Children's picture books and books, sheet music, maps, charts and similar charts, Blueprints and drawings, stamps, income stamps, other securities, transcriptions, Printed postcards, print cards, calendars, and other printed materials	37	4901
			38	4902
			39	4903
			40	4904
			41	4905
			42	4906
			43	4907
			44	4908
			45	4909
			46	4910
			47	4911
Consumer Goods	Processed Food	Favorite Food	48	015
		Agricultural Processed Products	49	016
		Livestock Processed Products	50	024
		Seafood Processed Products	51	046
	Clothing	Clothing	52	441
		Fashion Accessories	53	518
	Cosmetics	Makeup Products, Basic Cosmetics, Perfume, Lotion, Hair Products, Oral and Dental Hygiene Products Soap,	54	227320
			55	227310
			56	227330
			57	511640
			58	227100
	IT Products	Wireless Communication Device, Computer, Refrigerator, Color TV, Black and White TV, Other Video Cameras	59	812
			60	813
			61	823
			62	8211
			63	8212
			64	821490
	Automobiles	Sedan	65	7411

5.1.2. Optimal Lag Selection

Before performing the SVAR analysis, the optimal lag test was conducted to determine the optimal lag between time series data of each country. Each country's measured optimal lag was used for SVAR analysis based on AIC. The optimal lag based on the AIC of each country is shown in the table below.

The time variable *t* of the data used in this study is quarter, in which 1 lag corresponds to 1 quarter, 2 lags to half a year, and 4 lags to 1 year.

Table 5.3. *Study 1. The AIC Test Result*

Lag	Australia	Canada	China	France	Germany	Hong Kong
0	-15.03914	-16.90167	-9.994406	-13.57891	-15.61023	-12.85356
1	-17.45655	-18.93017	-12.79131	-15.40929	-19.16656	-15.07092
2	-17.52936	-19.34391	-12.87983	**-15.42145***	-19.50483	-15.1535
3	-17.61025	-19.2803	-12.85125	-15.31939	-19.47392	-15.11637
4	**-17.62093***	**-19.42756***	**-12.98622***	-15.31609	-19.44091	-15.08866
5	-17.61956	-19.39052	-12.89698	-15.20132	-19.45459	-15.13917
6	-17.53283	-19.33533	-12.91711	-15.32135	**-19.51100***	-15.1137
7	-17.50139	-19.22119	-12.84137	-15.28948	-19.42126	**-15.31925***
Lag	**Indonesia**	**Japan**	**Malaysia**	**Philippines**	**Russia**	**Singapore**
0	-13.53342	-13.93406	-15.23223	-11.02904	-11.78182	-16.73448
1	-16.03828	-17.34248	-16.85721	-13.49633	-13.99331	-18.5445
2	-16.21048	**-17.55677***	-16.85837	-13.55185	**-14.27335***	-18.67567
3	**-16.42892***	-17.46479	-16.8351	-13.60615	-14.13514	-18.95084
4	-16.33005	-17.33162	-16.78975	-13.56553	-14.13469	**-19.14704***
5	-16.31233	-17.38282	-16.92414	**-13.60676***	-14.20957	-19.09696
6	-16.2984	-17.34786	**-17.02198***	-13.48165	-14.06877	-19.09553
7	-16.17228	-17.35102	-16.90847	-13.46528	-14.05559	-19.05448
Lag	**Taiwan**	**Thailand**	**Turkey**	**UK**	**USA**	**Vietnam**
0	-14.08949	-9.609491	-12.49118	-16.33902	-17.27175	-8.209492
1	-15.93998	-11.77136	-15.77506	-19.7665	-20.04107	-9.547439
2	-15.9701	-12.22002	-16.3672	**-20.07272***	-20.61662	-9.729755
3	-15.95927	-12.59718	-16.39265	-19.99781	-20.8457	-9.681116
4	-15.86422	-12.65842	-16.53176	-19.97648	-20.94838	-9.716712
5	-15.85825	**-12.72830***	-16.58268	-19.89682	-21.06428	-9.662919
6	-15.89728	-12.64755	-16.57892	-19.88425	**-21.14188***	-9.594223
7	**-16.01663***	-12.5975	**-16.61485***	-19.76938	-21.13752	**-9.736333***

* indicates lag order selected by the AIC

5.1.3. Unit Root Test

In order to confirm the GDP_t time series variable is stationary, the Augmented Dickey-Fuller Test (ADF Test) was performed with level data. The result could not reject the null-hypothesis at the 5% level of probability. In other words, the GDP_t has a unit root at the 5% level of probability, which means the time series is non-stationary. Accordingly, the ADF test was conducted after the GDP_t variable is first-differenced. The test result could reject the null-hypothesis at the 5% probability level. In accordance with the result, our study used the first-differenced and stationary GDP_t variable.

Table 5.4. *Study 1. The Results of the ADF Test on GDP*

	t-Statistics		**Prob***	**t-Statistics**		**Prob***
	5% level	Level		5% level	**1.D**	
GDP	-3.466966	-3.225341	0.0869	-3.466966	-5.126834	0.0003*

As a result of the ADF test performed with the level data of HA_{it}, in all countries except Indonesia, Taiwan, and the United States, it was not possible to reject null-hypothesis at the 5% of probability level. Accordingly, the ADF test was performed after HA_{it} was first-differenced. The test results of all countries except for those of Malaysia, Singapore and Taiwan could reject the null-hypothesis. Those countries that could not reject the null-hypothesis at the first-difference level, could reject the null-hypothesis at the 5% of probability after second-differenced. The test results are shown at the table below.

Table 5.5. *Study 1. The Results of the ADF Test on Hallyu*

	At Level			Difference			
	t-Statistics		Prob	t-Statistics			Prob*
	5% level	Level		5% level	1.D	2.D	
Australia	-3.467700	-2.282594	0.4381	-3.470032	-4.402558		0.0039
Canada	-3.466966	-2.166982	0.5009	-2.901217	-3.602825		0.0079
China	-3.467703	-1.370920	0.8620	-3.466248	-4.208160		0.0068
France	-3.467703	-1.885087	0.6529	-3.465548	-11.251030		0.0000
Germany	-3.465548	-1.740682	0.7241	-2.899619	-3.900029		0.0032
Hong Kong	-3.465548	-2.379161	0.3875	-3.465548	-4.828681		0.0009
Indonesia	-3.464865	-3.936153	0.0147*	-3.466966	-5.703840		0.0000
Japan	-3.467703	-2.638144	0.2651	-1.944862	-3.387281		0.0009
Malaysia	-3.464865	-1.975763	0.6056	-3.466248		-7.071226	0.0000
Philippines	-3.464865	-3.563438	0.0393	-1.944915	-3.703824		0.0003
Russia	-3.466248	-2.650840	0.2597	-3.465548	-7.812172		0.0000
Singapore	-3.466248	-2.730870	0.2274	-3.470851		-6.276877	0.0000
Taiwan	-3.467703	-4.469873	0.0031*	-2.902358		-5.714795	0.0000
Thailand	-3.464865	-3.119832	0.1086	-3.466248	-5.336648		0.0002
Turkey	-3.464865	-1.951893	0.6184	-1.944862	-4.339401		0.0000
UK	-3.465548	-2.197042	0.4846	-1.944862	-3.486004		0.0007
USA	-3.467703	-3.533111	0.0427*	-1.944862	-3.762756		0.0003
Vietnam	-3.464865	-2.204853	0.4804	-3.466248	-7.538644		0.0000

Tourism variable (TO_{it}) of each country's was ADF tested at the level. The result showed that the Tourism variable of all countries except Australia and the UK did not reject the null hypothesis at the 5% probability level. In other words, the Tourism time series variables of those countries have unit root, hence non-stationary. Accordingly, the ADF test was performed again after the time-series variables were first-differenced. As a result, Tourism variables of all countries except Malaysia finally reject the null-hypothesis by showing stationary at the level of 5% probability. The Tourism variable of Malaysia rejected the null-hypothesis at the level of 5% probability after second-differenced.

Table 5.6. *Study 1. The Results of the ADF Test on Tourism*

	At Level			**Difference**			
	t-Statistics		**Prob**	**t-Statistics**			**Prob***
	5% level	**Level**		**5% level**	**1.D**	**2.D**	
Australia	-3.467703	-3.476314	0.0490*	-3.469235	-4.059568		0.0107
Canada	-3.471693	-1.784915	0.7022	-2.898145	-7.645373		0.0000
China	-3.464865	-3.349553	0.0656	-3.466966	-8.274086		0.0000
France	-3.470032	-1.117212	0.9190	-3.465548	-4.185807		0.0072
Germany	-3.466966	-1.438938	0.8418	-3.466248	-5.034686		0.0005
Hong Kong	-3.468459	-1.378343	0.8598	-1.944811	-3.310621		0.0012
Indonesia	-3.469235	-1.492990	0.8237	-3.466966	-7.061748		0.0000
Japan	-3.464865	-3.239950	0.0839	-1.944862	-3.984367		0.0001
Malaysia	-3.470032	1.179886	0.9999	-3.466248		-8.084101	0.0000
Philippines	-3.467703	-3.230928	0.0860	-3.466966	-8.951977		0.0000
Russia	-3.467703	-0.762970	0.9642	-3.466248	-5.964181		0.0000
Singapore	-3.470851	-1.686209	0.7478	-3.465548	-5.163809		0.0003
Taiwan	-3.464865	-2.581674	0.2897	-2.897223	-4.275684		0.0009
Thailand	-3.470851	-2.093908	0.5405	-3.467703	-5.372151		0.0001
Turkey	-3.466966	-2.336000	0.4099	-2.897678	-6.500958		0.0000
UK	-3.464865	-5.305770	0.0002*	-1.944862	-3.660661		0.0004
USA	-3.470032	0.366045	0.9987	-2.899115	-4.591796		0.0003
Vietnam	-3.470032	4.456124	1.0000	-3.466966	-8.726768		0.0000

* Mackinnon (1996) one-sided p-values.

Below is the data graph of GDP_t, HA_{USAt}(Hallyu variables of the USA), and TO_{USAt} (Tourism variables of the USA) at level and after first-differnece. 3 graphes on the left were drawn at the level state. All three variables show a trend in which the time series is upward gradually as the time variable t increases, in which the three time series variables are non-stationary. Graphs on the right side are drawn after all three variables were first differenced. Graphs shows the time series variables are stationary after first-differenced.

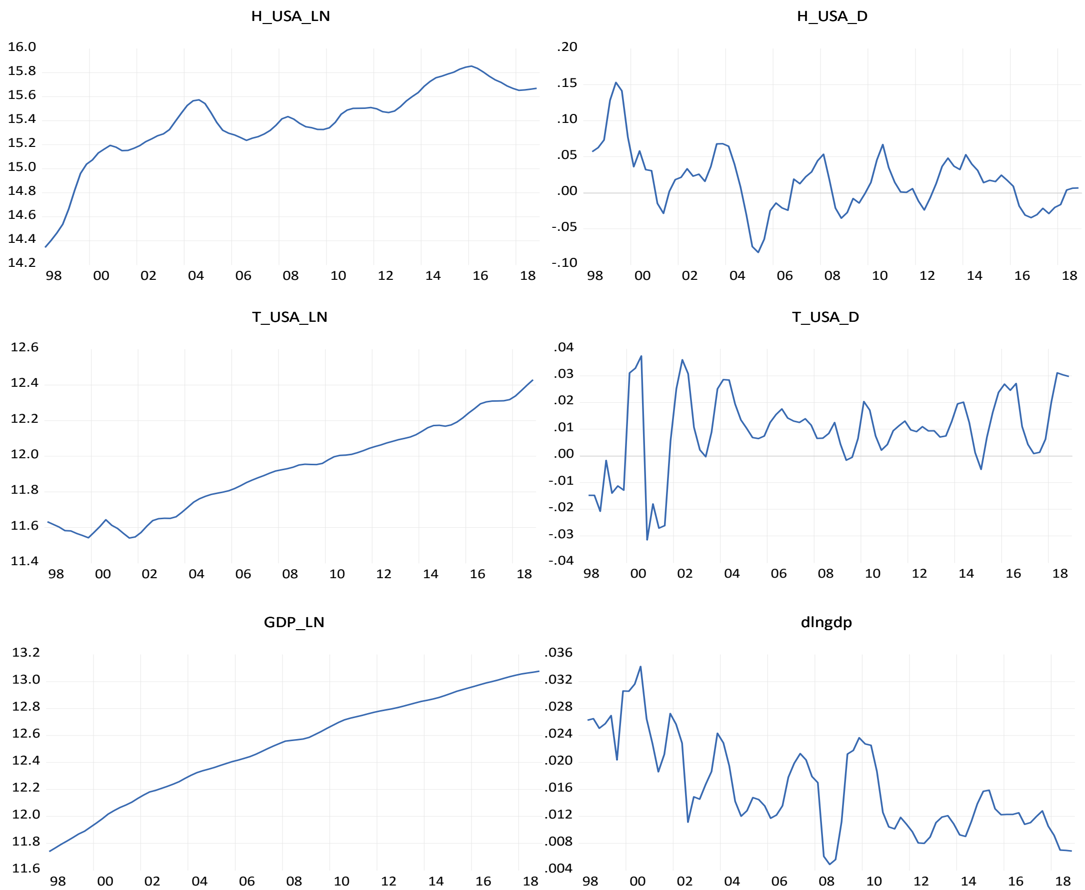

Figure 5.1. *Study 1. Time Series Variables on Level (Left) and First Difference (Right)*

5.1.4. Structural Vector Autoregression Estimation

In order to analyze the effect of Hallyu on tourism and GDP of Korea that our study wishes to investigate, the structural VAR analysis was conducted. Variables were identified in the order of HA_{it} (Hallyu time series t data of each country i), TO_{it} (Tourism time series data t of each country i), and GDP_t (GDP time series data of Korea). Variables were exactly identified by structurally restricted with lower triangular matrix A and diagonal matrix B on the reduced VAR form. When matrix A and matrix B are as below,

$$y_t = \begin{bmatrix} HA_{it} \\ TO_{it} \\ GDP_t \end{bmatrix} \quad (13)$$

$$A = \begin{bmatrix} 1 & 0 & 0 \\ a_1 & 1 & 0 \\ a_2 & a_3 & 1 \end{bmatrix} \quad (14)$$

$$B = \begin{bmatrix} b_1 & 0 & 0 \\ 0 & b_2 & 0 \\ 0 & 0 & b_3 \end{bmatrix} \quad (15)$$

Let's see the result of the SVAR estimation of the China case obtained by this process as an example.[25]

Table 5.7. *Study 1. The SVAR Estimation Result of China*

	Coefficient	Std. Error	z-Statistic	Prob.
a_1	-0.55881	0.798253	-0.70004	0.4839
a_2	-0.00040	0.011136	-0.03544	0.9717
a_3	-0.00183	0.001565	-1.16696	0.2432
b_1	0.030524	0.002428	12.56980	0.0000
b_2	0.216566	0.017229	12.56980	0.0000
b_3	0.003012	0.000240	12.56981	0.0000

It can be written as matrix below.

$$A = \begin{bmatrix} 1.000000 & 0.000000 & 0.000000 \\ -0.558811 & 1.000000 & 0.000000 \\ -0.000395 & -0.001826 & 1.000000 \end{bmatrix} \quad (35)$$

$$B = \begin{bmatrix} 0.030524 & 0.000000 & 0.000000 \\ 0.000000 & 0.216566 & 0.000000 \\ 0.000000 & 0.000000 & 0.003012 \end{bmatrix} \quad (36)$$

The result of the SVAR estimation obtained through a series of process can be interpreted through additional analysis instruments, IRFs, Impulse Response Function and FEVD, Forecast Error Variance Decomposition.

[25] Estimation results for all countries are attached at page 102.

5.1.5. Impulse Response Function Estimation

To examine how an impulse imposed on one variable evokes responses of other variables within a model, Impulse Response Function analysis has been performed. Graphs below are the result of the impulse responses of the TO_{it} (Tourism variables) to the HA_{it} (Hallyu variables)[26]. The first graph set of the graphs below is the response of the Tourism variables of the 18 countries studied in our study when an impulse is imposed on the Hallyu variable. The second graph set is the response of the GDP variable of Korea to the Hallyu variable of each country when there is a shock on the Hallyu variable. The horizontal axis represents the time variable t, in which corresponds to 3 months as the time variable used in our study is derived quarterly.

[26] In the figure, the solid line represents the IRFs estimation, and the dotted lines represent the band of the standard error.

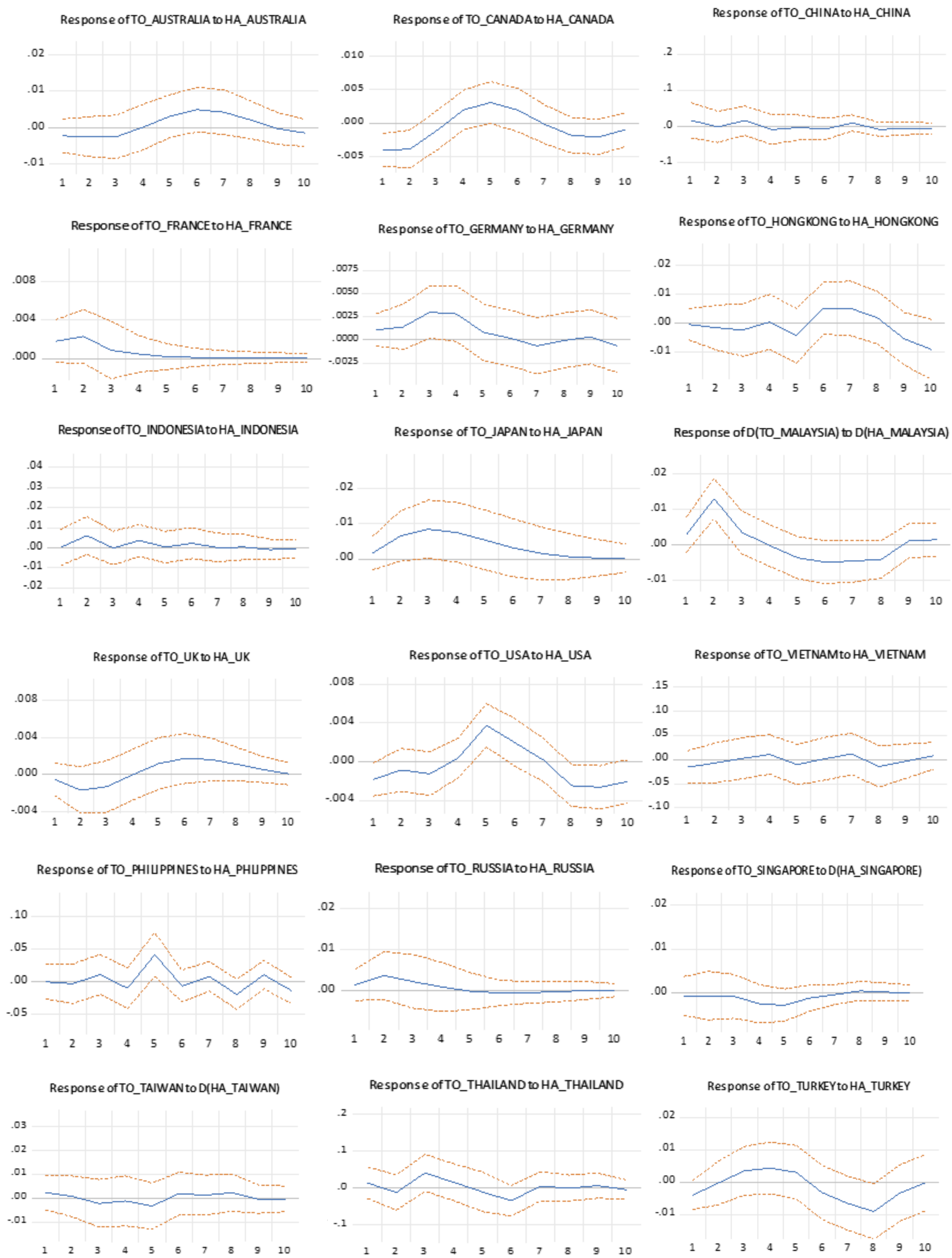

Figure 5.2. *Study 1. Impulse Response of* TO_t *to* HA_{it}

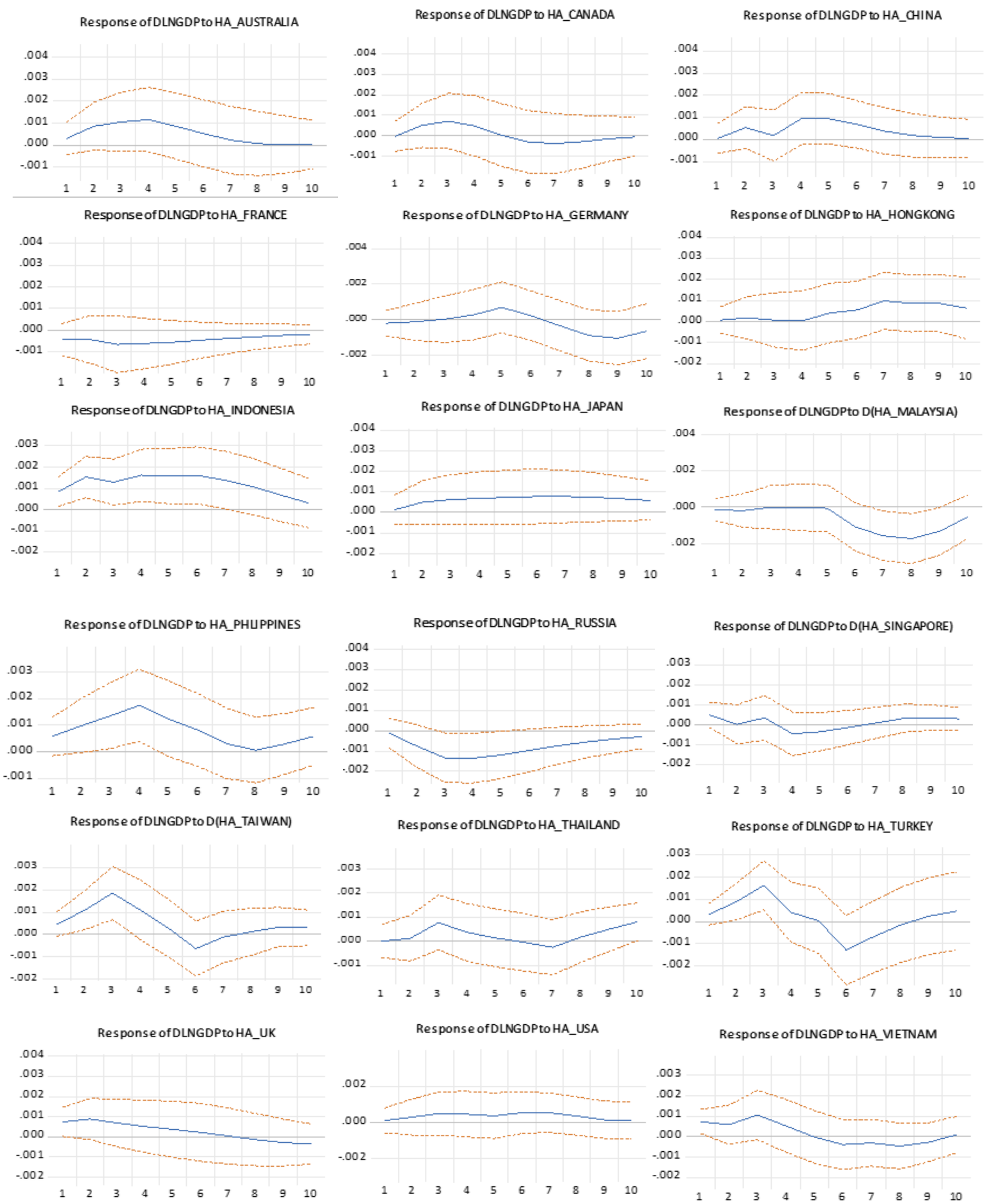

Figure 5.3. *Study 1. Impulse Response of GDP_t to HA_{it}*

5.1.6. Forecast Error Variance Decomposition Estimation

In order to interpret the importance of the variables to other variables in the model, the Forecast Error Variance Decomposition (FEVD) was estimated which decomposes the error term depending on the contribution of the variables in the model. The result is seen below. Each estimation shown in the Table 5.8. represents the explanatory power of each variable to other variables in the model. The values in each table below are the estimates for the 10th quarters.

Table 5.8. *Study 1. Variance Decomposition Result of* HA_{it} *:*

	of HA_{it} (Hallyu)		
	To HA_{it}	**To TO_{it}**	**To GDP_t**
USA	63.62383	21.81994	14.55624
Turkey	80.01928	15.10811	4.872613
Vietnam	81.56805	12.95825	5.473700
Singapore	81.43653	11.08056	7.482910
Malaysia	75.06624	10.46272	14.47104
Hong Kong	85.65346	9.973497	4.373039
Germany	88.64863	6.621079	4.730295
Taiwan	81.96189	4.904759	13.13335
Indonesia	83.67593	3.561061	12.76301
France	92.54220	2.715161	4.742643
Australia	89.27748	2.374963	8.347555
Thailand	79.88319	2.181577	17.93523
Canada	68.96324	1.891778	29.14498
China	78.69640	1.863467	19.44013
Philippines	96.46671	1.685680	1.847606
Russia	96.76052	0.953541	2.285938
Japan	99.46073	0.227976	0.311291
UK	98.04268	0.101199	1.856123

Table 5.9. *Study 1. Variance Decomposition Result of* TO_{it} *:*

	of TO_{it} (Tourism)		
	To HA_{it}	**To TO_{it}**	**To GDP_t**
Malaysia	31.83911	65.62424	2.536654
USA	22.85536	69.91380	7.230836
Canada	22.00993	73.58106	4.409012
Turkey	18.37586	66.37191	15.25223
Hong Kong	12.19054	81.38155	6.427915
Japan	12.18611	84.28701	3.52688
Germany	11.14631	77.18083	11.67285
Philippines	9.72823	85.97545	4.296317
Australia	7.984433	81.08202	10.93355
UK	7.088758	87.73781	5.173437
France	5.290678	88.99569	5.713629
Thailand	4.302058	95.24839	0.449556
Vietnam	2.578193	95.53965	1.882157
Russia	2.514963	97.00819	0.476852
Singapore	2.422061	88.57297	9.004972
Indonesia	2.379756	95.61671	2.003537
Taiwan	1.577715	88.21146	10.21083
China	1.443172	96.97437	1.582462

Table 5.10. *Study 1. Variance Decomposition Result of* GDP_t *:*

	Of GDP_t		
	To HA_{it}	To TO_{it}	To GDP_t
Indonesia	31.56182	9.324542	59.11364
Philippines	21.67286	1.182212	77.14493
Malaysia	21.52271	2.073724	76.40356
Taiwan	18.45229	4.322372	77.22534
Turkey	18.05787	14.44306	67.49907
Russia	16.29109	1.589165	82.11975
Hong Kong	9.902551	4.362398	85.73505
Australia	9.26279	0.991164	89.74605
Japan	9.113334	12.23982	78.64684
Vietnam	7.961851	12.19614	79.84201
China	6.394229	1.021064	92.58471
Germany	6.181477	5.044422	88.77410
UK	5.402302	10.12797	84.46973
Thailand	5.169676	5.331079	89.49925
France	4.322396	5.791157	89.88645
USA	3.10554	27.24396	69.65050
Singapore	2.690347	22.09707	75.21258
Canada	2.588154	3.600516	93.81133

5.1.7. Results

The study analyzed the significance of Hallyu to the economy and tourism of Korea by using the SVAR model. The Impulse Response Function (IRFs) and Forecast Error Variance Decomposition (FEVD) using Cholesky Decomposition were performed to interpret the result.

The response of the Tourism variable to the impulse imposed on the Hallyu variable

The Impulse Response Function was performed to examine the response of the TO_{it} **,** the Tourism variable and the estimate results are shown in the table below. Fastest response speed of the Tourism variable to the impulse to the Hallyu variable is appeared in France, Germany, Japan, Malaysia and Russia in the first quarter. Then Turkey showed its first response in the third quarter, Australia, Canada and the USA showed the first response in the fourth quarter, the UK in the fifth quarter, and Hong Kong in the sixth quarter. Examining the estimates of the IRFs, it is possible to calculate the duration of the response by looking at the difference between the term of the first response appearance and the term of the last response disappeared. In terms of the duration of the response of the Tourism to the shock on the Hallyu variable, Japan showed the longest duration with eight quarters. Following Japan, Germany and the UK showed the second longest duration with six quarters, Australia and France are the third with five quarters of duration and Canada, Malaysia, Russia and the USA are in the next order with four quarters of duration. Hong and Turkey follow them with 3 quarters of duration.

China, Indonesia, the Philippines, Singapore, Taiwan, Thailand and Vietnam, however, did not draw sufficient graphs that provide insight to understand the response of the Tourism variable to the shock on the Hallyu variable.

Table 5.11. *Study 1. The IRFs Test Result of Tourism to Hallyu*

	First response		Last response		Response lasts for	
	Term	**Corresponds to**	**Term**	**Corresponds to**	**Term**	**Corresponds to**
Australia	4	1 year	8	2 years	5	1 year and 3 months
Canada	4	1 year	7	1 year and 9 months	4	1 year
France	1	3 months	5	1 year and 3 months	5	1 year and 3 months
Germany	1	3 months	6	1 year and 6 months	6	1 year and 6 months
Hong Kong	6	1 year and 6 months	8	2 years	3	9 months
Japan	1	3 months	8	2 years	8	2 years
Malaysia	1	3 months	4	1 year	4	1 year
Russia	1	3 months	4	1 year	4	1 year
Turkey	3	9 months	5	1 year and 3 months	3	9 months
UK	5	1 year and 3 months	10	2 years and 6 months	6	1 year and 6 months
USA	4	1 year	7	1 year and 9 months	4	1 year

The response of the GDP variable to the impulse imposed on the Hallyu variable

The result of the IRFs test to investigate the response of the GDP of Korea to the impulse imposed on the Hallyu variables of each country showed that Australia, Indonesia, Japan, the Philippines, Taiwan, Turkey, the UK and Vietnam evoke the fastest response of the GDP variable of Korea in the first quarter. The GDP of Korea then show its first response in the second quarter in case of Canada and Thailand, in the third quarter for China, in the fourth quarter for Germany, and in the fifth quarter for Hong Kong. In terms of the duration of the GDP variable response to the shock in the Hallyu variable, it showed the longest duration in case of Indonesia and Japan with ten quarters. The duration lasts for eight quarters in Australia and the Philippines, six quarters in China, Hong Kong, and the UK, 5 quarters for Taiwan, four quarters for Canada, Thailand and Turkey, and 3 quarters for Germany.

Table 5.12. *Study 1. The IRFs Test Result of GDP to Hallyu*

	First response		Last response		Duration	
	Term	**Corresponds to**	**Term**	**Corresponds to**	**Term**	**Corresponds to**
Australia	1	3 months	8	2 years	8	2 years
Canada	2	6 months	5	1 year and 3 months	4	1 year
China	3	9 months	8	2 years	6	1 year and 6 months
Germany	4	1 year	6	1 year and 6 months	3	9 months
Hong Kong	5	1 year and 3 months	10	2 years and 6 months	6	1 year and 6 months
Indonesia	1	3 months	10	2 years and 6 months	10	2 years and 6 months
Japan	1	3 months	10	2 years and 6 months	10	2 years and 6 months
Philippines	1	3 months	8	2 years	8	2 years
Taiwan	1	3 months	5	1 year and 3 months	5	1 year and 3 months
Thailand	2	6 months	5	1 year and 3 months	4	1 year
Turkey	1	3 months	4	1 year	4	1 year
UK	1	3 months	6	1 year and 6 months	6	1 year and 6 months
Vietnam	1	3 months	4	1 year	4	1 year

The GDP variable of Korea did not show visible responses to the impulse to the Hallyu variables of Malaysia, Russia, Singapore, and the USA.

Forecast Error Variance Decomposition

The FEVD analysis was conducted to investigate how the Tourism variable of each country is decomposed by the error of the Hallyu variable as the time variable changes. According to the result, Malaysia showed 32% of the variance decomposition rate of the Hallyu variable by the Tourism variable, in which the Hallyu variable plays a significant role in the Tourism variable of Malaysia to Korea. The Hallyu variable decomposition rate showed 22.8% for the USA, 22% for Canada, 18.3% for Turkey, 12.2% for Japan, 11.1% for Germany, 9.7% for the Philippines, 8% for Australia, 7% for the UK, 5.3% for France, 4.3% for Thailand, 2.5% for Vietnam and Russia, 2.4% for Singapore, 1.6% for Indonesia, and 1.4% for China.

Table 5.9. *Study 1. Variance Decomposition Result of* TO_{it}

	of TO_{it} (Tourism)		
	To HA_{it}	**To TO_{it}**	**To GDP_t**
Malaysia	31.83911	65.62424	2.536654
USA	22.85536	69.91380	7.230836
Canada	22.00993	73.58106	4.409012
Turkey	18.37586	66.37191	15.25223
Hong Kong	12.19054	81.38155	6.427915
Japan	12.18611	84.28701	3.52688
Germany	11.14631	77.18083	11.67285
Philippines	9.72823	85.97545	4.296317
Australia	7.984433	81.08202	10.93355
UK	7.088758	87.73781	5.173437
France	5.290678	88.99569	5.713629
Thailand	4.302058	95.24839	0.449556
Vietnam	2.578193	95.53965	1.882157
Russia	2.514963	97.00819	0.476852
Singapore	2.422061	88.57297	9.004972
Indonesia	2.379756	95.61671	2.003537
Taiwan	1.577715	88.21146	10.21083
China	1.443172	96.97437	1.582462

5.2. Study 2] The SVAR Analysis by Culture Area

Following Study 1, which investigated the effect of Hallyu demand of selected countries on tourism and economy of Korea, respectively, Study 2 classified the selected countries by their cultural background to find out how the different demand to Hallyu based on the culture-base has different impact on Korean tourism and economy.

5.2.1. Data

The data used in Study 2 are basically identical to the data used in Study 1. As the 18 countries filtered in the criteria of Study 1 were classified as culture area in Study 2, the Hallyu variable and Tourism variable were needed to be modified. Details are as follows.

Table 5.13. *Study 2. Data Description*

Variables	Description	t, Time Variable		Source
		Period	**Term**	
HA_{jt} **Hallyu variable** of culture area variable *j* and time variable *t*	**65 Hallyu goods** exported from Korea to culture area *j* during time period *t*	1998-2018	Quarter	- 47 items categorized as Hallyu Cultural Goods by Korea Creative Content Agency by Korea Creative Content Agency : Contents Industry Trend Analysis Reports - 18 items categorized as Hallyu consumer goods classified by Ministry of Culture, Sports and Tourism : Contents Industry Statistical Analysis
TO_{jt} **Tourism variable** of Culture area variable *j* and time variable *t*	The number of tourists inbound to Korea from culture area *j* during the time period *t*	1998-2018	Quarter	Korea Tourism Organization
GDP_t of Korea with time variable *t*	Gross Domestic Product of Korea during time period *t*	1998-2018	Quarter	Bank of Korea

Table 5.13. *Study 2. Data Description*

j, Culture area Variable	18 countries selected in Study 1 were divided into 4 culture areas, East Asia, Southeast, Anglosphere and Europe.[27]	East Asia : China, Hong Kong, Japan, Taiwan Southeast Asia : Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam Anglosphere : Australia, Canada, UK, USA Europe : France, Germany, Russia, Turkey

5.2.2. Optimal Lag Selection

The optimal lag selection test was executed before performing the SVAR analysis. The results of the AIC estimation are seen in the Table 5.14.

Table 5.14. *Study 2. AIC Test Result*

Lag	East Asia	Southeast	Anglosphere	Europe
0	-14.67264	-15.17107	-17.76342	-14.82359
1	-16.89475	-18.16447	-20.63598	-18.83068
2	-16.99835	-18.74293	-21.52658	-20.01491
3	-16.91224	-18.71198	-21.70649	-20.09367
4	**-17.06459***	-18.75541	-21.74322	-19.98693
5	-17.01275	-18.8296	-21.76708	-20.06727
6	-16.87186	**-19.06746***	-21.87278	-20.08106
7	-16.99131	-18.95432	**-22.02822***	**-20.14629***

The result of the AIC test suggested 4 lags corresponding to one year for East Asia, 6 lags corresponding to one year and six months for Southeast Asia, and 7 lags corresponding to 1 year and 9 months for Anglosphere and Europe.

[27] Of these, Turkey and Russia need another classification to be put, however they were included in the Europe group due to the practical limitation that is difficult to separate within the given country list.

5.2.3. Unit Root Test

The Augmented Dickey-Fuller Test was performed to determine whether the data classified by culture area are proper to be time-series analyzed. As a result of examining on the basis of 5% of prob, it was shown that both the Hallyu variable and the tourism variable are stationary in the first difference[28]. The estimation is shown in the Table 5.15.

Table 5.15. *Study 2. The Result of ADF Test on Hallyu and Tourism*

	Hallyu Variables			Tourism Variables		
	t-Statistics		Prob*	t-Statistics		Prob*
	5% level	1.D		5% level	1.D	
East Asia	-1.944915	-3.298502	0.0012	-2.897223	-5.136928	0.0000
Southeast Asia	-1.945139	-3.176565	0.0018	-2.897678	-5.277935	0.0000
Anglosphere	-2.899115	-4.566203	0.0004	-2.898145	-8.149134	0.0000
Europe	-2.898145	-4.584621	0.0003	-2.897678	-6.946069	0.0000

* Mackinnon (1996) one-sided p-values.

As can be seen from the graph in below, both variables show distinct upward pattern in the at level graphs on the left. On the graphs on the right, it is seen that time series are stationary in which the graphs fluctuate up and down based on the reference point after variables are first-differenced

[28] Since Study 2 uses the GDP variable used in Study 1 as it is, the unit root test for the GDP variable was not separately performed in Study 2.

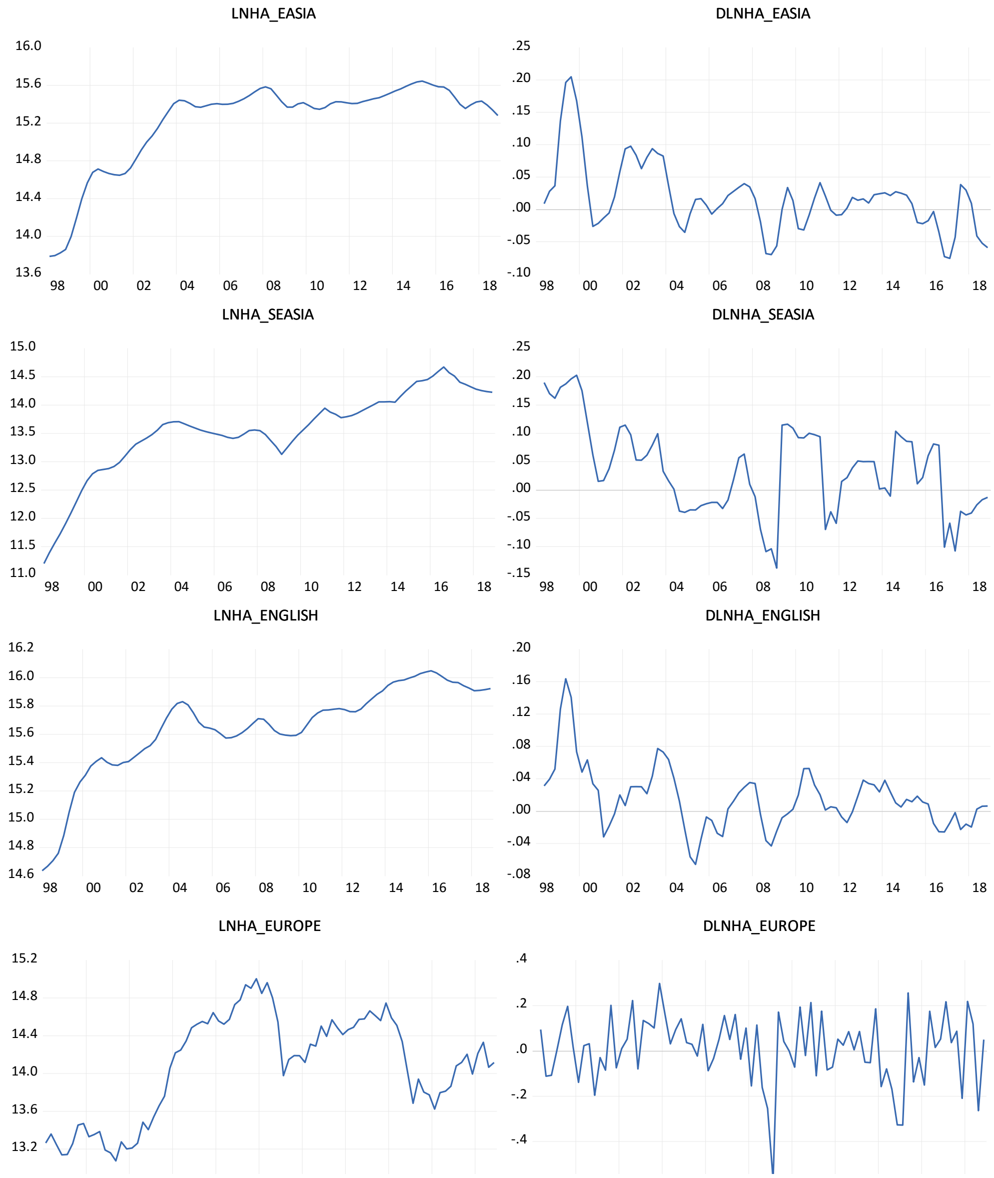

Figure 5.4. *Study 2. The Hallyu Variable on Level and First Difference*

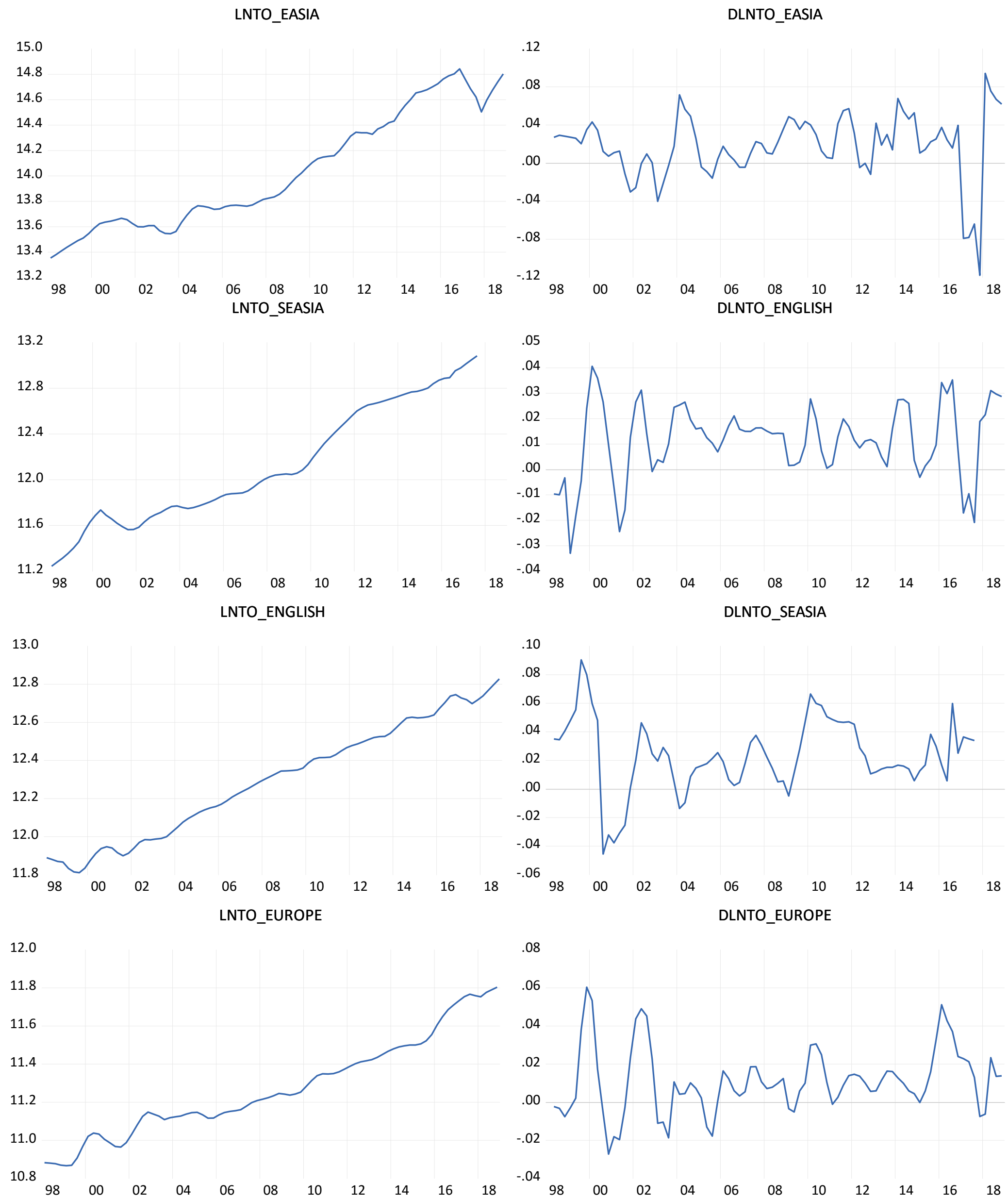

Figure 5.5. *Study 2. The Tourism Variable on Level and First Difference*

5.2.4. Structural Vector Autoregression Estimation

The Structural Vector Autoregression Analysis was performed to investigate the impact of the Hallyu consumption of the each culture area to the Tourism of each culture area to Korea and the economy of Korea. All variables were exactly identified in the order of HA_{jt} (Hallyu time series *t* data of each country *j*), TO_{jt} (Tourism time series data *t* of each culture area *j*), and GDP_t (GDP time series data of Korea) as in the Study 1. Variables were identified under structural restrictions with lower triangular matrix A and diagonal matrix B on the reduced VAR form. The SVAR estimation result for each group is as below.

Table 5.16. *The SVAR Estimation Result of East Asia*

	Coefficient	Std. Error	z-Statistic	Prob.
a_1	0.147803	0.115692	1.277563	0.2014
a_2	0.002787	0.012932	0.215525	0.8294
a_3	0.003993	0.012448	0.320743	0.7484
b_1	0.027903	0.00222	12.5698	0.0000
b_2	0.028693	0.002283	12.5698	0.0000
b_3	0.003174	0.000253	12.5698	0.0000

Table 5.17. *The SVAR Estimation Result of Southeast Asia*

	Coefficient	Std. Error	z-Statistic	Prob.
a_1	-0.00328	0.076142	-0.043008	0.9657
a_2	-0.06285	0.01418	-4.43249	0.0000
a_3	-0.01182	0.021222	-0.55693	0.5776
b_1	0.021472	0.00173	12.40967	0.0000
b_2	0.014347	0.001156	12.40968	0.0000
b_3	0.002672	0.000215	12.40968	0.0000

Table 5.18. *The SVAR Estimation Result of Anglosphere*

	Coefficient	Std. Error	z-Statistic	Prob.
a_1	0.141965	0.039251	3.616813	0.0003
a_2	-0.046417	0.021662	-2.142762	0.0321
a_3	-0.020412	0.058473	-0.349076	0.7270
b_1	0.013991	0.001135	12.32883	0.0000
b_2	0.004787	0.000388	12.32883	0.0000
b_3	0.00244	0.000198	12.32883	0.0000

Table 5.19. *The SVAR Estimation Result of Europe*

	Coefficient	Std. Error	z-Statistic	Prob.
a_1	0.060854	0.037659	1.615928	0.1061
a_2	-0.011207	0.014166	-0.791151	0.4289
a_3	0.03109	0.042426	0.732819	0.4637
b_1	0.021902	0.001777	12.32883	0.0000
b_2	0.007191	0.000583	12.32883	0.0000
b_3	0.002659	0.000216	12.32883	0.0000

5.2.5. Impulse Response Function Estimation

To interpret the SVAR estimates obtained through a series of procedures, the IRFs analysis was performed. The IRFs show how other variables response when an impulse is imposed to a certain variable within the model. The results are shown in the graphs below, and the graphs are in order of East Asia, Southeast Asia, Anglosphere and Europe. The response of the Tourism variable to the shock on the Hallyu variable is at the second row and first column, and the response of the GDP to the shock on the Hallyu variable is at the third row and first column of each graph.

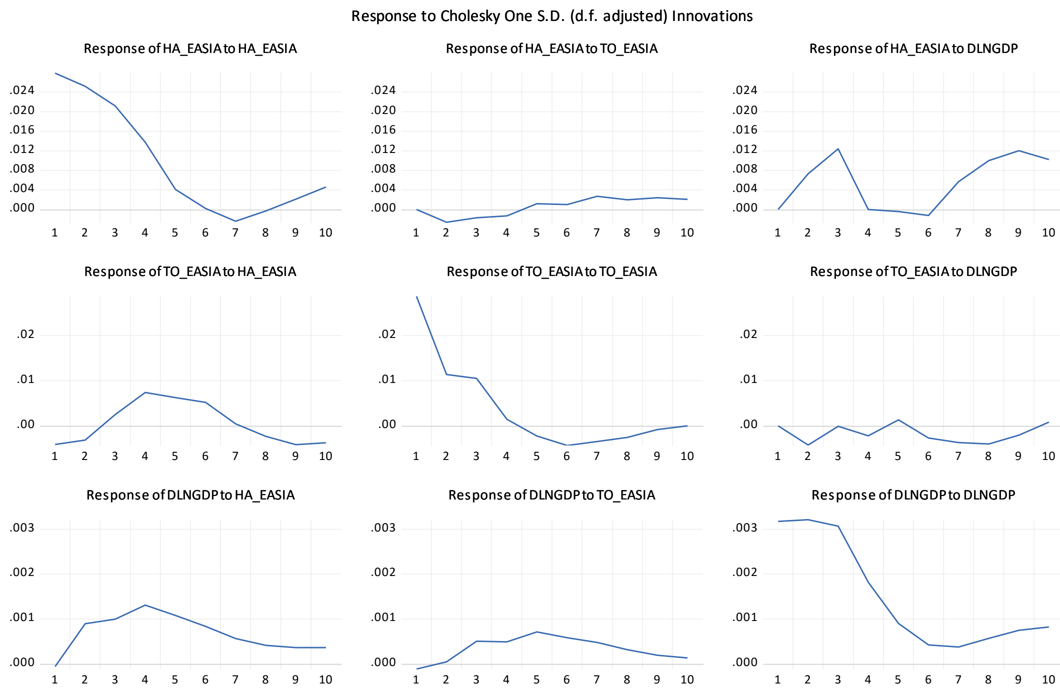

Figure 5.6. *Study 2. Impulse Response of East Asia*

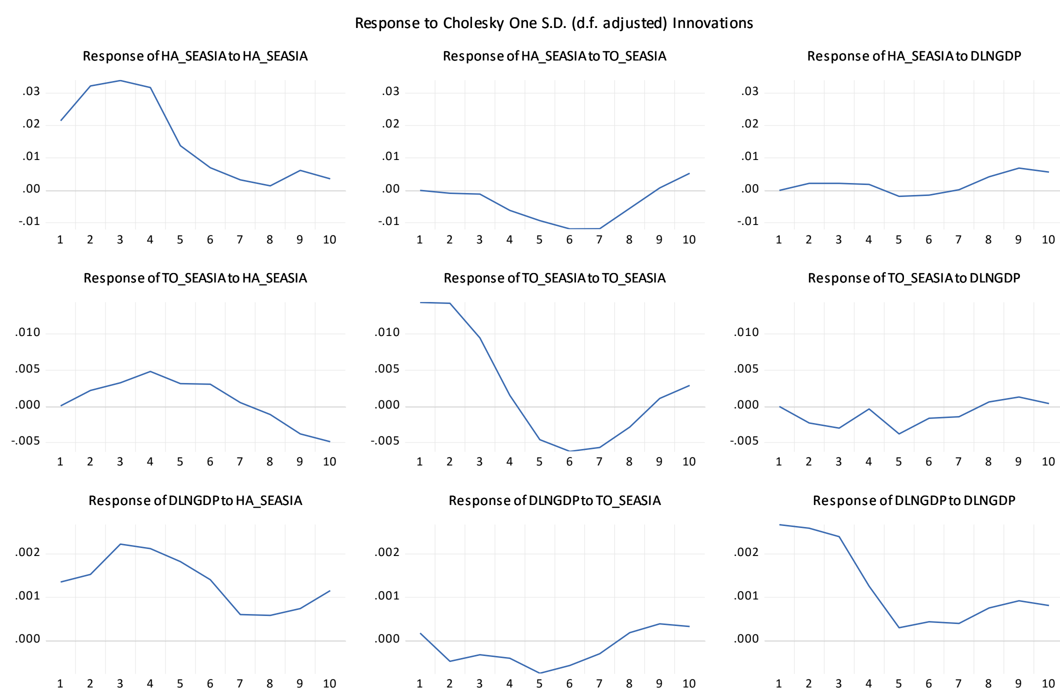

Figure 5.7. *Study 2. Impulse Response of Southeast Asia*

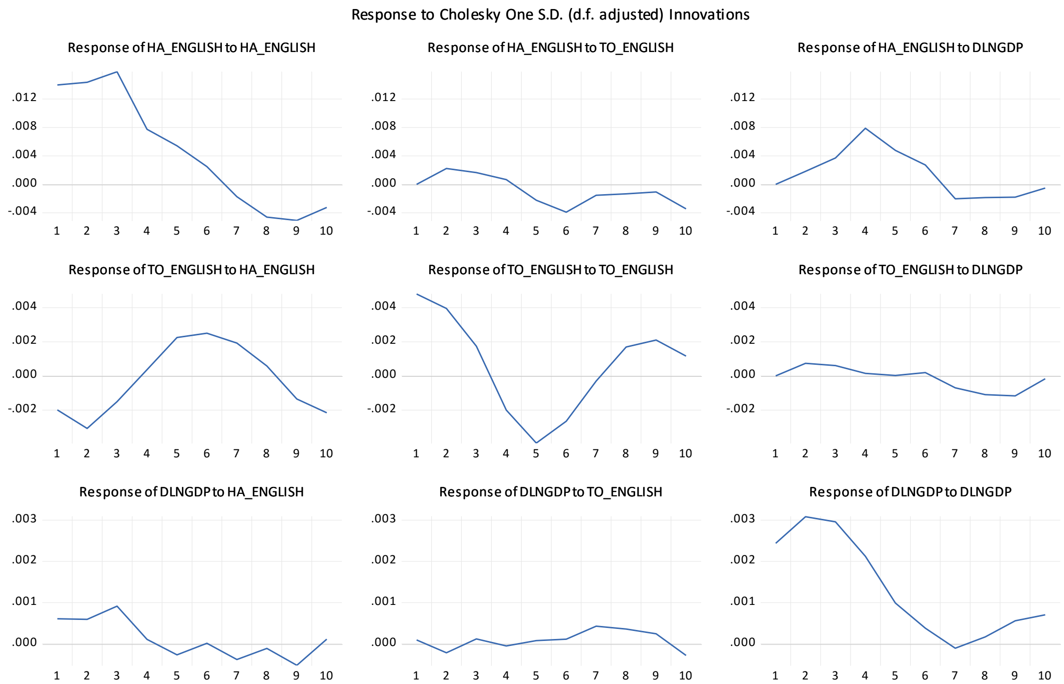

Figure 5.8. *Study 2. Impulse Response of Anglosphere*

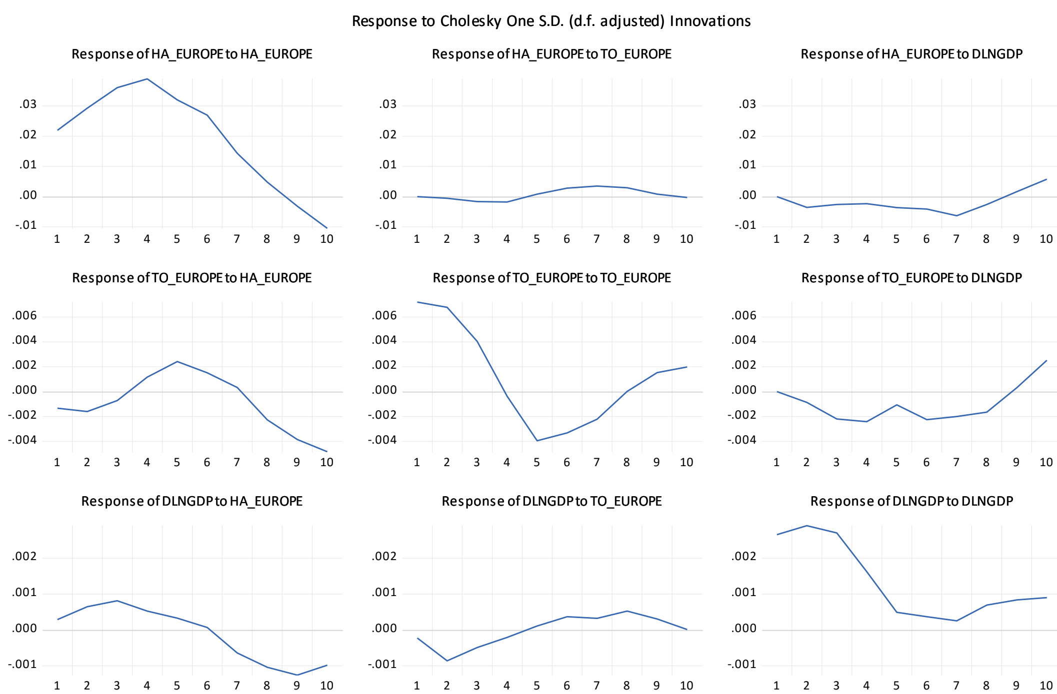

Figure 5.9. *Study 2. Impulse Response of Europe*

5.2.6. Forecasting Error Variance Decomposition Estimation

The FEVD analysis was conducted to examine the contribution of the Hallyu variable to the Tourism variables within the model through the error variance decomposition. Estimates are shown in the tables below. The tables are the FEVD in order of East Asia, Southeast Asia, Anglosphere and Europe.

Table 5.20. *Study 2. FEVD of the Tourism Variable of East Asia*

Period	S.E.	HA_EASIA	TO_EASIA	DLNGDP
1	0.028987	2.024215	97.97578	0.000000
2	0.031596	2.701615	95.47319	1.825190
3	0.033394	2.979689	95.38563	1.634685
4	0.034302	7.452226	90.58187	1.965902
5	0.034962	10.35677	87.61324	2.029987
6	0.035723	12.05357	85.42441	2.522024
7	0.036086	11.82802	84.63981	3.532170
8	0.036477	11.98303	83.32906	4.687912
9	0.036782	13.07052	82.00577	4.923710
10	0.036983	13.96298	81.11908	4.917938

Table 5.21. *Study 2. FEVD of the Tourism Variable of Southeast Asia*

Period	S.E.	HA_SEASIA	TO_SEASIA	DLNGDP
1	0.014347	0.002402	99.99760	0.000000
2	0.020460	1.153577	97.58132	1.265102
3	0.022967	2.917312	94.37605	2.706637
4	0.023523	7.012995	90.38389	2.603111
5	0.024468	8.136022	87.05365	4.810327
6	0.025481	8.957993	86.19268	4.849324
7	0.026147	8.546069	86.54954	4.904396
8	0.026334	8.607900	86.50322	4.888877
9	0.026660	10.42331	84.56912	5.007563
10	0.027262	13.17965	82.01174	4.808605

Table 5.22. *Study 2. FEVD of the Tourism Variable of Anglosphere*

Period	S.E.	HA_ENGLISH	TO_ENGLISH	DLNGDP
1	0.005183	14.68471	85.31529	0.000000
2	0.007241	25.44225	73.51217	1.045578
3	0.007620	26.85139	71.57676	1.571847
4	0.007889	25.27240	73.22583	1.501770
5	0.009091	25.12929	73.73888	1.131831
6	0.009796	28.1594	70.82502	1.015579
7	0.010009	30.63758	67.91597	1.446454
8	0.010228	29.66694	67.79646	2.536597
9	0.010592	29.27336	67.16032	3.566316
10	0.010872	31.69511	64.89735	3.407542

Table 5.23. *Study 2. FEVD of the Tourism Variable of Europe*

Period	S.E.	HA_EUROPE	TO_ EUROPE	DLNGDP
1	0.007313	3.321691	96.67831	0.000000
2	0.010144	4.229922	95.03272	0.737361
3	0.011161	3.910424	91.60507	4.484507
4	0.011486	4.709603	86.59723	8.693168
5	0.012430	7.802394	84.04431	8.153300
6	0.013146	8.293365	81.49454	10.21210
7	0.013484	7.944230	80.14841	11.90736
8	0.013773	10.32459	76.82387	12.85154
9	0.014388	16.6437	71.52982	11.82649
10	0.015516	24.0599	63.13417	12.80593

5.2.7. Results

The results of examining the Impulse Response Function analysis of the Tourism variable to the impulse imposed on the Hallyu variable of each group is as follows.

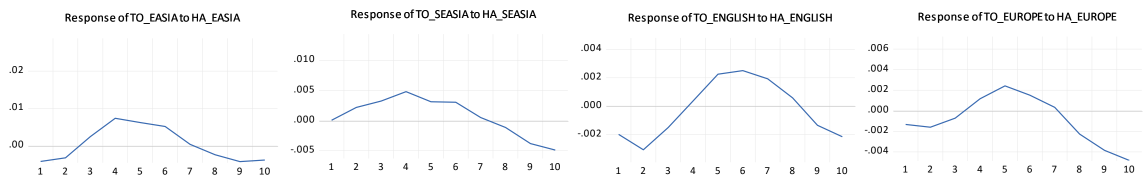

Figure 5.10. *Study 2. Impulse Response of Tourism Variable*

At the East Asia graph, it was seen that the shock on the Hallyu variable in the zero quarter evoked the response of the Tourism variable in the third quarter. The response then peaks in the fourth quarter and is finally disappeared in the seventh quarter after showing gradual decrease after fourth quarter. The duration of the response of the East Asia lasted for 5 quarters. The response of the Southeast Asia's Tourism variable to the impulse occurred in the Hallyu variable appeared in the first quarter and increased gradually to the fourth quarter. Then it gradually decreased and disappeared in the seventh quarter. The response lasted for seven quarters. The response of the Tourism variable of Anglosphere case, it showed its first appearance in the fourth quarter and its peak in the sixth quarter after showing gradual increase. Then it disappeared in the eighth quarter after showing gradual decrease. Europe showed the response of the Tourism variable to the shock on the Hallyu variable in the fourth quarter first. It lasted for four quarters as it disappeared in the seventh quarter after showing its peak in the fourth quarter.

The response speed of the Tourism variable to the impulse imposed on the Hallyu variable was in the order of Southeast Asia (first quarter), East Asia (third quarter), and Anglosphere and Europe (fourth quarter). It is possibly interpreted that when there occurred a factor that could enhance the Hallyu consumption in abroad, for instance, a music band such as BTS gaining popularity internationally, the Southeast Asia's consumers start to visit to Korea within 3 months as a result of the Hallyu consumption. The visit is made within nine months in case of East Asia and one year for Anglosphere and Europe under the same circumstance.

Table 5.24. *Study 2. The IRFs Test Result of Tourism to Hallyu*

	First response		Last response		Duration	
	Term	**Corresponds to**	**Term**	**Corresponds to**	**Term**	**Corresponds to**
East Asia	3	9 months	7	1 year and 9 months	5	1 year and 3 months
Southeast Asia	1	3 months	7	1 year and 9 months	7	1 year and 9 months
Anglosphe re	4	1 year	8	2 years	5	1 year and 3 months
Europe	4	1 year	7	1 year and 9 months	4	1 year

In respect of the response duration, tourists from Southeast Asia continued coming for one year and nine months after they make their first visit due to the influence of the Hallyu consumption. Tourist from East Asia visited to Korea for one year and three months, from Anglosphere for one year and three months quarters and from Europe for one year.

Graphs in below are the results of examining the Impulse Response Function analysis of the GDP variable of Korea to the impulse imposed on the Hallyu variable of each group.

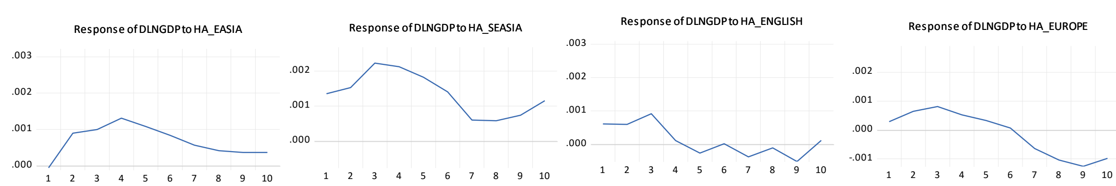

Figure 5.11. *Study 2. Impulse Response of GDP Variable*

For East Asia, the response of the GDP of Korea to the shock occurred in the Hallyu variable of each culture area appeared first in the first quarter and peaked in the fourth quarter. The response then did not disappear even after tenth quarter. For Southeast Asia's case, the response showed a similar pattern to East Asia's. The response first appeared in the first quarter and did not completely disappear after tenth quarter. One interesting fact about the Southeast Asia's case is it showed a high level of response of the GDP of Korea to the shock on the Hallyu variable than shown in other culture area cases. For Anglosphere, the response of the GDP of Korea showed its first appearance in the first quarter and disappeared in the fourth quarter, and for Europe, it appeared in the first quarter and disappeared in the sixth quarter.

In terms of the response of the GDP variable of Korea to the impulse imposed on the Hallyu variable of each culture area, it did not show precise differences between culture areas as it all showed its first appearance in the first quarter for every culture area. However, it showed differences in the duration of the response. For East Asia and Southeast Asia, the response lasted for ten quarters and more while it lasted for six quarters for Europe and four quarters for Anglosphere.

Table 5.25. *Study 2. The IRFs Test Result of Tourism to GDP*

	First response		Last response		Duration	
	Term	Corresponds to	Term	Corresponds to	Term	Corresponds to
East Asia	1	3 months	10	2 years and six months	10	2 years and six months
Southeast Asia	1	3 months	10	2 years and six months	10	2 years and six months
Anglosphere	1	3 months	4	1 year	4	1 year
Europe	1	3 months	6	1 year and six months	6	1 year and six months

Table 5.26. *Study 2. The Variance Decomposition Result of Tourism*

Period	Hallyu	Tourism	GDP
East Asia	13.96298	81.11908	4.917938
Southeast Asia	13.17965	82.01174	4.808605
Anglosphere	31.69511	64.89735	3.407542
Europe	24.05990	63.13417	12.80593

As a result of decomposing the error term of the Tourism variable, it was found that the error term of Anglosphere group consists of approximately 32% of the Hallyu variable at the tenth quarter. The Hallyu variable covers 24% in case of Europe, 14% for East Asia, and 13% for South Asia.

6. CONCLUSION

In the study, we examined the effect of the Hallyu demand on the tourism demand to Korea through the SVAR analysis. In the result of Study 1, which analyzed the impact of the Hallyu demand to the tourism demand to Korea of eighteen individual countries, the speed of the response of the tourism demand to the impulse imposed on the Hallyu demand was shown first in France, Germany, Japan, Malaysia and Russia according to the result of the IRFs test. In terms of the duration of the response evoked from the shock in the Hallyu demand, Japan showed the longest lasting power of two years. It lasted for one year and six months for Germany and the UK, and one year and three months for Australia and France. Unfortunately, the result did not include the countries from Southeast Asia region as they did not show meaningful graphs, yet it was a very interesting result that European countries such as France, Germany and the UK showed fast and long response in their tourism demand to the Hallyu demand. The result of the FEVD showed the similar context as the IRFs analysis result. The FEVD analysis showed that the tourism variables at the tenth quarter of the USA and Canada were explainable with the Hallyu variables. It is possibly interpreted that the tourism demand of the USA and Canada at the tenth quarter was caused by their Hallyu demand. Taken together, the result of the Study 1 is possibly concluded that the Hallyu phenomenon exists not only in Korea's neighboring countries, but also in the countries in distance. Considering the determinants of the tourism demand, it is possibly interpreted that these countries, which ought to be inferior in transportation cost and geographical proxy to Korea comparing to the Korea's neighboring countries, may have been motivated to demand tourism to Korea after consumption of cultural products called Hallyu. The result will provide a basis for broadening the scope of the geographical assumption, which has been accepted implicitly, that Hallyu is only influential within neighboring countries that have similar cultural background due to its cultural product characteristics.

The Study 2, which classified countries by culture area, showed results that proved the intuition formed from existing studies. The response speed of tourism demand to the impulse imposed on the Hallyu demand was in the order of Southeast Asia, East Asia, Anglosphere and Europe. The result showed that Asian countries are more rapidly and durably influenced by Hallyu than non-Asian countries. However, this result also provides meaningful insights for us. That is, despite its geographical disadvantage, Southeast Asia has a faster response to tourism demand by the impact of the Hallyu consumption than East Asia. As we discussed earlier, the geographical characteristics of East Asia can be explained by the superiority of transportation cost and geographical proxy, which are ones of determinants of the tourism demand. In this situation, Southeast Asia should show lower tourism demand than East Asia when the other conditions are fixed. However, we observed that Southeast Asia has the fastest growing demand for tourism when demand for Hallyu rises. According to the result of the FEVD analysis, the Study 2 showed that approximately 32% of tourism variables in the tenth quarter can be explained by the Hallyu variable in case of the Anglosphere group, and about 24% for Europe. This is a much higher figure than East Asia and Southeast Asian countries, which was around 13% of explanatory power. The results tell us that Southeast Asia, which is inferior to East Asia in terms of tourism demand to Korea, shows the faster response in tourism demand when an impulse is imposed to the Hallyu demand. Furthermore, European and Anglosphere countries are showing longer response in the tourism demand than those countries in East Asia and Southeast Asia in terms of durability. The Study 2 indicates that countries in Anglosphere and Europe whose importance has not been considered in the previous studies related the Hallyu influence proved that they are under great influence by Hallyu, thereby increasing tourism demand and generating sustained tourism demand for Korea.

In the study, we did not constrain the influence of Hallyu to the neighboring countries of Korea but analyzing for the countries from all over the world that have tourism demand to Korea. The analysis results confirmed that European and Anglosphere countries, despite the geographical distance from Korea, were influenced by the demand for Hallyu and increased and continued tourism demand to Korea. This will provide a new perspective on the research trend of the influence of Hallyu confined within the Korea's neighboring countries which are believed to be more influenced by Hallyu due to their high geographical proximity, hence having high tourism demand to Korea.

"The most Korean is the most international." This may be the most used phrase when describing Hallyu in Korean media. It has been three decades after the term "Hallyu" appeared, Hallyu goes beyond popular culture and returns as a great impact on the Korean economy. Now, Hallyu plays a key role even in politics and diplomacy, and it prepares its role as a core industry to lead the next generation of Korea economy. As to proves the importance of Hallyu, various academic approaches to Hallyu are taking place, and Hallyu is taking its place academically. However, in the economic analysis, Hallyu still is a difficult variable to deal with. This is because, as discussed in this study, Hallyu is a cultural product that is difficult to measure and a new variable that no consensus has made on yet. Such difficulties will be hopefully solved with further studies and discussions. To this end, more economic research attempts should be made on Hallyu.

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TEST RESULT SCREEN

Table 8.1. *Australia_VAR Lag Order Selection Criteria*

VAR Lag Order Selection Criteria
Endogenous variables: HA_AUSTRALIA TO_AUSTRALIA DLNGDP
Exogenous variables: C
Date: 06/09/20 Time: 11:09
Sample: 1998Q1 2018Q4
Included observations: 76

Lag	LogL	LR	FPE	AIC	SC	HQ
0	574.4874	NA	5.90e-11	-15.03914	-14.94714	-15.00237
1	675.3489	191.1060	5.27e-12	-17.45655	-17.08854*	-17.30948*
2	687.1158	21.36610	4.90e-12	-17.52936	-16.88534	-17.27198
3	699.1896	20.97024*	4.53e-12	-17.61025	-16.69023	-17.24256
4	708.5952	15.59364	4.51e-12*	-17.62093*	-16.42489	-17.14293
5	717.5434	14.12873	4.56e-12	-17.61956	-16.14752	-17.03126
6	723.2474	8.555889	5.04e-12	-17.53283	-15.78478	-16.83422
7	731.0528	11.09199	5.30e-12	-17.50139	-15.47733	-16.69248

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 8.2. *Canada_VAR Lag Order Selection Criteria*

VAR Lag Order Selection Criteria
Endogenous variables: HA_CANADA TO_CANADA DLNGDP
Exogenous variables: C
Date: 06/09/20 Time: 11:21
Sample: 1998Q1 2018Q4
Included observations: 76

Lag	LogL	LR	FPE	AIC	SC	HQ
0	645.2634	NA	9.17e-12	-16.90167	-16.80967	-16.86490
1	731.3465	163.1048	1.21e-12	-18.93017	-18.56216	-18.78310
2	756.0687	44.89042	7.99e-13	-19.34391	-18.69990*	-19.08653*
3	762.6514	11.43298	8.54e-13	-19.28030	-18.36027	-18.91261
4	777.2472	24.19830*	7.41e-13*	-19.42756*	-18.23152	-18.94956
5	784.8398	11.98833	7.76e-13	-19.39052	-17.91848	-18.80222
6	791.7426	10.35426	8.31e-13	-19.33533	-17.58728	-18.63673
7	796.4053	6.625907	9.49e-13	-19.22119	-17.19713	-18.41228

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 8.3. *China_VAR Lag Order Selection Criteria*

VAR Lag Order Selection Criteria
Endogenous variables: HA_CHINA TO_CHINA DLNGDP
Exogenous variables: C
Date: 06/09/20 Time: 11:36
Sample: 1998Q1 2018Q4
Included observations: 76

Lag	LogL	LR	FPE	AIC	SC	HQ
0	382.7874	NA	9.16e-09	-9.994406	-9.902404	-9.957638
1	498.0699	218.4298	5.59e-10	-12.79131	-12.42330*	-12.64424*
2	510.4334	22.44956	5.12e-10	-12.87983	-12.23581	-12.62244
3	518.3477	13.74588	5.29e-10	-12.85125	-11.93123	-12.48357
4	532.4763	23.42376*	4.65e-10*	-12.98622*	-11.79018	-12.50823
5	538.0854	8.856439	5.13e-10	-12.89698	-11.42494	-12.30868
6	547.8501	14.64712	5.09e-10	-12.91711	-11.16906	-12.21850
7	553.9721	8.699707	5.60e-10	-12.84137	-10.81731	-12.03246

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 8.4. *France_VAR Lag Order Selection Criteria*

VAR Lag Order Selection Criteria
Endogenous variables: HA_FRANCE TO_FRANCE DLNGDP
Exogenous variables: C
Date: 06/09/20 Time: 11:48
Sample: 1998Q1 2018Q4
Included observations: 76

Lag	LogL	LR	FPE	AIC	SC	HQ
0	518.9986	NA	2.54e-10	-13.57891	-13.48691	-13.54214
1	597.5532	148.8402	4.08e-11	-15.40929	-15.04128*	-15.26222*
2	607.0151	17.18075	4.03e-11*	-15.42145*	-14.77743	-15.16407
3	612.1370	8.896013	4.48e-11	-15.31939	-14.39937	-14.95171
4	621.0112	14.71255	4.52e-11	-15.31609	-14.12005	-14.83809
5	625.6500	7.324312	5.12e-11	-15.20132	-13.72927	-14.61302
6	639.2115	20.34224*	4.60e-11	-15.32135	-13.57330	-14.62275
7	647.0003	11.06831	4.84e-11	-15.28948	-13.26542	-14.48057

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 8.5. *Germany_VAR Lag Order Selection Criteria*

VAR Lag Order Selection Criteria
Endogenous variables: HA_GERMANY TO_GERMANY DLNGDP
Exogenous variables: C
Date: 06/09/20 Time: 12:43
Sample: 1998Q1 2018Q4
Included observations: 76

Lag	LogL	LR	FPE	AIC	SC	HQ
0	596.1889	NA	3.34e-11	-15.61023	-15.51823	-15.57347
1	740.3293	273.1081	9.52e-13	-19.16656	-18.79855	-19.01949
2	762.1836	39.68280*	6.80e-13*	-19.50483	-18.86081*	-19.24745*
3	770.0091	13.59160	7.03e-13	-19.47392	-18.55390	-19.10624
4	777.7545	12.84107	7.31e-13	-19.44091	-18.24487	-18.96291
5	787.2746	15.03172	7.28e-13	-19.45459	-17.98255	-18.86629
6	798.4180	16.71522	6.97e-13	-19.51100*	-17.76295	-18.81240
7	804.0078	7.943375	7.77e-13	-19.42126	-17.39720	-18.61235

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 8.6. *Hong Kong_VAR Lag Order Selection Criteria*

VAR Lag Order Selection Criteria
Endogenous variables: HA_HONGKONG TO_HONGKONG DLNGDP
Exogenous variables: C
Date: 06/09/20 Time: 12:55
Sample: 1998Q1 2018Q4
Included observations: 76

Lag	LogL	LR	FPE	AIC	SC	HQ
0	491.4351	NA	5.25e-10	-12.85356	-12.76155	-12.81679
1	584.6949	176.7027	5.72e-11	-15.07092	-14.70291*	-14.92384*
2	596.8328	22.03998	5.27e-11	-15.15350	-14.50948	-14.89612
3	604.4220	13.18114	5.49e-11	-15.11637	-14.19634	-14.74868
4	612.3692	13.17571	5.68e-11	-15.08866	-13.89263	-14.61067
5	623.2886	17.24102	5.45e-11	-15.13917	-13.66713	-14.55087
6	631.3206	12.04811	5.66e-11	-15.11370	-13.36565	-14.41510
7	648.1314	23.88902*	4.70e-11*	-15.31925*	-13.29519	-14.51034

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 8.7. *Indonesia_VAR Lag Order Selection Criteria*

VAR Lag Order Selection Criteria
Endogenous variables: HA_INDONESIA TO_INDONESIA DLNGDP
Exogenous variables: C
Date: 06/09/20 Time: 13:03
Sample: 1998Q1 2018Q4
Included observations: 76

Lag	LogL	LR	FPE	AIC	SC	HQ
0	517.2701	NA	2.66e-10	-13.53342	-13.44142	-13.49666
1	621.4546	197.4022	2.17e-11	-16.03828	-15.67027*	-15.89120
2	636.9983	28.22398	1.83e-11	-16.21048	-15.56646	-15.95310
3	654.2991	30.04889*	1.48e-11*	-16.42892*	-15.50890	-16.06124*
4	659.5421	8.692270	1.64e-11	-16.33005	-15.13402	-15.85206
5	667.8684	13.14688	1.68e-11	-16.31233	-14.84029	-15.72403
6	676.3393	12.70622	1.73e-11	-16.29840	-14.55035	-15.59980
7	680.5467	5.979028	2.00e-11	-16.17228	-14.14822	-15.36337

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 8.8. *Japan_VAR Lag Order Selection Criteria*

VAR Lag Order Selection Criteria
Endogenous variables: HA_JAPAN TO_JAPAN DLNGDP
Exogenous variables: C
Date: 06/09/20 Time: 13:20
Sample: 1998Q1 2018Q4
Included observations: 76

Lag	LogL	LR	FPE	AIC	SC	HQ
0	532.4942	NA	1.78e-10	-13.93406	-13.84206	-13.89729
1	671.0142	262.4590	5.90e-12	-17.34248	-16.97447*	-17.19541
2	688.1572	31.12803	4.77e-12*	-17.55677*	-16.91275	-17.29939*
3	693.6619	9.560720	5.24e-12	-17.46479	-16.54476	-17.09710
4	697.6017	6.531759	6.03e-12	-17.33162	-16.13559	-16.85363
5	708.5473	17.28264*	5.78e-12	-17.38282	-15.91078	-16.79453
6	716.2188	11.50720	6.06e-12	-17.34786	-15.59981	-16.64926
7	725.3389	12.96007	6.16e-12	-17.35102	-15.32696	-16.54211

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 8.9. *Malaysia_VAR Lag Order Selection Criteria*

VAR Lag Order Selection Criteria
Endogenous variables: D(HA_MALAYSIA) D(TO_MALAYSIA) DLNGDP
Exogenous variables: C
Date: 06/09/20 Time: 17:24
Sample: 1998Q1 2018Q4
Included observations: 75

Lag	LogL	LR	FPE	AIC	SC	HQ
0	574.2088	NA	4.87e-11	-15.23223	-15.13953	-15.19522
1	644.1452	132.4129	9.59e-12	-16.85721	-16.48641*	-16.70915*
2	653.1889	16.39928	9.59e-12	-16.85837	-16.20947	-16.59927
3	661.3161	14.08715	9.85e-12	-16.83510	-15.90810	-16.46496
4	668.6157	12.06868	1.04e-11	-16.78975	-15.58466	-16.30857
5	682.6552	22.08886	9.15e-12	-16.92414	-15.44095	-16.33192
6	695.3244	18.91923*	8.41e-12*	-17.02198*	-15.26069	-16.31872
7	700.0675	6.703668	9.60e-12	-16.90847	-14.86908	-16.09416

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 8.10. *Philippines_VAR Lag Order Selection Criteria*

VAR Lag Order Selection Criteria
Endogenous variables: HA_PHLIPPINES TO_PHILIPPINES DLNGDP
Exogenous variables: C
Date: 06/09/20 Time: 13:48
Sample: 1998Q1 2018Q4
Included observations: 76

Lag	LogL	LR	FPE	AIC	SC	HQ
0	422.1034	NA	3.26e-09	-11.02904	-10.93703	-10.99227
1	524.8605	194.6977	2.76e-10	-13.49633	-13.12832*	-13.34925*
2	535.9702	20.17289	2.62e-10	-13.55185	-12.90783	-13.29447
3	547.0338	19.21566*	2.49e-10*	-13.60615	-12.68613	-13.23846
4	554.4901	12.36183	2.60e-10	-13.56553	-12.36949	-13.08754
5	565.0568	16.68432	2.52e-10	-13.60676*	-12.13472	-13.01846
6	569.3026	6.368675	2.90e-10	-13.48165	-11.73360	-12.78304
7	577.6808	11.90585	3.00e-10	-13.46528	-11.44123	-12.65637

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 8.11. *Russia_VAR Lag Order Selection Criteria*

VAR Lag Order Selection Criteria
Endogenous variables: HA_RUSSIA TO_RUSSIA DLNGDP
Exogenous variables: C
Date: 06/09/20 Time: 16:23
Sample: 1998Q1 2018Q4
Included observations: 76

Lag	LogL	LR	FPE	AIC	SC	HQ
0	450.7091	NA	1.53e-09	-11.78182	-11.68982	-11.74505
1	543.7457	176.2797	1.68e-10	-13.99331	-13.62530	-13.84623
2	563.3872	35.66499	1.27e-10*	-14.27335*	-13.62933*	-14.01597*
3	567.1355	6.510086	1.46e-10	-14.13514	-13.21512	-13.76746
4	576.1183	14.89264	1.47e-10	-14.13469	-12.93866	-13.65670
5	587.9638	18.70342*	1.38e-10	-14.20957	-12.73753	-13.62128
6	591.6133	5.474258	1.61e-10	-14.06877	-12.32072	-13.37017
7	600.1123	12.07752	1.66e-10	-14.05559	-12.03153	-13.24668

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 8.12. *Singapore_VAR Lag Order Selection Criteria*

VAR Lag Order Selection Criteria
Endogenous variables: D(HA_SINGAPORE) TO_SINGAPORE DLNGDP
Exogenous variables: C
Date: 06/09/20 Time: 17:06
Sample: 1998Q1 2018Q4
Included observations: 75

Lag	LogL	LR	FPE	AIC	SC	HQ
0	630.5429	NA	1.08e-11	-16.73448	-16.64178	-16.69746
1	707.4187	145.5516	1.77e-12	-18.54450	-18.17370*	-18.39644
2	721.3378	25.23984	1.56e-12	-18.67567	-18.02678	-18.41658
3	740.6564	33.48570	1.19e-12	-18.95084	-18.02384	-18.58070
4	757.0139	27.04440*	9.81e-13*	-19.14704*	-17.94194	-18.66586*
5	764.1361	11.20551	1.04e-12	-19.09696	-17.61377	-18.50474
6	773.0824	13.35987	1.06e-12	-19.09553	-17.33424	-18.39227
7	780.5430	10.54428	1.12e-12	-19.05448	-17.01509	-18.24017

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 8.13. *Taiwan_VAR Lag Order Selection Criteria*

VAR Lag Order Selection Criteria
Endogenous variables: D(HA_TAIWAN) TO_TAIWAN DLNGDP
Exogenous variables: C
Date: 06/09/20 Time: 17:53
Sample: 1998Q1 2018Q4
Included observations: 75

Lag	LogL	LR	FPE	AIC	SC	HQ
0	531.3558	NA	1.53e-10	-14.08949	-13.99679	-14.05247
1	609.7492	148.4250	2.40e-11	-15.93998	-15.56918*	-15.79192*
2	619.8787	18.36802	2.33e-11*	-15.97010	-15.32120	-15.71100
3	628.4726	14.89611	2.36e-11	-15.95927	-15.03227	-15.58913
4	633.9082	8.986851	2.61e-11	-15.86422	-14.65912	-15.38304
5	642.6842	13.80768	2.66e-11	-15.85825	-14.37505	-15.26602
6	653.1481	15.62610	2.59e-11	-15.89728	-14.13599	-15.19402
7	666.6237	19.04543*	2.34e-11	-16.01663*	-13.97724	-15.20233

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 8.14. *Thailand_VAR Lag Order Selection Criteria*

VAR Lag Order Selection Criteria
Endogenous variables: HA_THAILAND TO_THAILAND DLNGDP
Exogenous variables: C
Date: 06/09/20 Time: 18:02
Sample: 1998Q1 2018Q4
Included observations: 76

Lag	LogL	LR	FPE	AIC	SC	HQ
0	368.1607	NA	1.35e-08	-9.609491	-9.517488	-9.572722
1	459.3118	172.7075	1.55e-09	-11.77136	-11.40335	-11.62429
2	485.3607	47.29921	9.91e-10	-12.22002	-11.57600	-11.96264
3	508.6930	40.52456	6.82e-10	-12.59718	-11.67716*	-12.22950*
4	520.0201	18.77918	6.45e-10	-12.65842	-11.46239	-12.18043
5	531.6756	18.40336*	6.07e-10*	-12.72830*	-11.25626	-12.14001
6	537.6068	8.896897	6.67e-10	-12.64755	-10.89950	-11.94894
7	544.7049	10.08667	7.14e-10	-12.59750	-10.57344	-11.78859

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 8.15. *Turkey_VAR Lag Order Selection Criteria*

VAR Lag Order Selection Criteria
Endogenous variables: HA_TURKEY TO_TURKEY DLNGDP
Exogenous variables: C
Date: 06/10/20 Time: 08:58
Sample: 1998Q1 2018Q4
Included observations: 76

Lag	LogL	LR	FPE	AIC	SC	HQ
0	477.6648	NA	7.55e-10	-12.49118	-12.39918	-12.45441
1	611.4523	253.4921	2.83e-11	-15.77506	-15.40705	-15.62799
2	642.9536	57.19976	1.57e-11	-16.36720	-15.72318*	-16.10982*
3	652.9208	17.31138	1.53e-11	-16.39265	-15.47263	-16.02496
4	667.2070	23.68504	1.34e-11	-16.53176	-15.33573	-16.05377
5	678.1418	17.26558*	1.29e-11	-16.58268	-15.11064	-15.99438
6	686.9991	13.28588	1.31e-11	-16.57892	-14.83087	-15.88032
7	697.3642	14.72934	1.29e-11*	-16.61485*	-14.59079	-15.80594

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 8.16. *UK_VAR Lag Order Selection Criteria*

VAR Lag Order Selection Criteria
Endogenous variables: HA_UK TO_UK DLNGDP
Exogenous variables: C
Date: 06/10/20 Time: 09:51
Sample: 1998Q1 2018Q4
Included observations: 76

Lag	LogL	LR	FPE	AIC	SC	HQ
0	623.8827	NA	1.61e-11	-16.33902	-16.24701	-16.30225
1	763.1271	263.8315	5.23e-13	-19.76650	-19.39849	-19.61943
2	783.7635	37.47141*	3.85e-13*	-20.07272*	-19.42871*	-19.81534*
3	789.9168	10.68739	4.17e-13	-19.99781	-19.07779	-19.63012
4	798.1061	13.57686	4.28e-13	-19.97648	-18.78044	-19.49848
5	804.0792	9.431306	4.68e-13	-19.89682	-18.42478	-19.30852
6	812.6014	12.78328	4.80e-13	-19.88425	-18.13620	-19.18564
7	817.2365	6.586671	5.48e-13	-19.76938	-17.74532	-18.96047

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 8.17. *USA_VAR Lag Order Selection Criteria*

VAR Lag Order Selection Criteria
Endogenous variables: HA_USA TO_USA DLNGDP
Exogenous variables: C
Date: 06/10/20 Time: 10:06
Sample: 1998Q1 2018Q4
Included observations: 76

Lag	LogL	LR	FPE	AIC	SC	HQ
0	659.3266	NA	6.33e-12	-17.27175	-17.17975	-17.23498
1	773.5605	216.4433	3.97e-13	-20.04107	-19.67306	-19.89399
2	804.4317	56.05545	2.24e-13	-20.61662	-19.97260*	-20.35924
3	822.1366	30.75072	1.78e-13	-20.84570	-19.92567	-20.47801*
4	835.0385	21.38996	1.62e-13	-20.94838	-19.75235	-20.47039
5	848.4427	21.16456	1.45e-13	-21.06428	-19.59224	-20.47598
6	860.3914	17.92306*	1.36e-13*	-21.14188*	-19.39383	-20.44327
7	869.2258	12.55403	1.40e-13	-21.13752	-19.11346	-20.32861

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 8.18. *Vietnam_VAR Lag Order Selection Criteria*

VAR Lag Order Selection Criteria
Endogenous variables: HA_VIETNAM TO_VIETNAM DLNGDP
Exogenous variables: C
Date: 06/10/20 Time: 11:35
Sample: 1998Q1 2018Q4
Included observations: 76

Lag	LogL	LR	FPE	AIC	SC	HQ
0	314.9607	NA	5.46e-08	-8.209492	-8.117490	-8.172724
1	374.8027	113.3848	1.43e-08	-9.547439	-9.179428*	-9.400364
2	390.7307	28.92192	1.20e-08*	-9.729755	-9.085737	-9.472374*
3	397.8824	12.42141	1.26e-08	-9.681116	-8.761090	-9.313429
4	408.2351	17.16358	1.22e-08	-9.716712	-8.520678	-9.238719
5	415.1909	10.98293	1.30e-08	-9.662919	-8.190877	-9.074619
6	421.5805	9.584349	1.41e-08	-9.594223	-7.846173	-8.895618
7	435.9806	20.46340*	1.25e-08	-9.736333*	-7.712275	-8.927421

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 8.19. *Australia_The Result of the ADF Test*

Null Hypothesis: HA_AUSTRALIA has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 6 (Automatic - based on AIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.402558	0.0039
Test critical values:	1% level	-4.083355	
	5% level	-3.470032	
	10% level	-3.161982	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HA_AUSTRALIA)
Method: Least Squares
Date: 06/09/20 Time: 11:28
Sample (adjusted): 2000Q1 2018Q4
Included observations: 76 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HA_AUSTRALIA(-1)	-0.582054	0.132208	-4.402558	0.0000
D(HA_AUSTRALIA(-1))	0.340828	0.135771	2.510321	0.0145
D(HA_AUSTRALIA(-2))	0.338115	0.130663	2.587696	0.0118
D(HA_AUSTRALIA(-3))	0.198535	0.127853	1.552836	0.1252
D(HA_AUSTRALIA(-4))	0.244660	0.125096	1.955774	0.0547
D(HA_AUSTRALIA(-5))	0.123936	0.122732	1.009808	0.3162
D(HA_AUSTRALIA(-6))	0.229654	0.121764	1.886050	0.0636
C	0.021303	0.009034	2.358161	0.0213
@TREND("1998Q1")	-0.000299	0.000165	-1.817916	0.0735

R-squared	0.248925	Mean dependent var	-0.000692
Adjusted R-squared	0.159245	S.D. dependent var	0.031910
S.E. of regression	0.029259	Akaike info criterion	-4.114442
Sum squared resid	0.057359	Schwarz criterion	-3.838434
Log likelihood	165.3488	Hannan-Quinn criter.	-4.004136
F-statistic	2.775688	Durbin-Watson stat	2.016392
Prob(F-statistic)	0.010310		

Null Hypothesis: TO_AUSTRALIA has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 5 (Automatic - based on AIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.059568	0.0107
Test critical values:	1% level	-4.081666	
	5% level	-3.469235	
	10% level	-3.161518	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO_AUSTRALIA)
Method: Least Squares
Date: 06/09/20 Time: 11:29
Sample (adjusted): 1999Q4 2018Q4
Included observations: 77 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TO_AUSTRALIA(-1)	-0.734531	0.180938	-4.059568	0.0001
D(TO_AUSTRALIA(-...	0.402707	0.173340	2.323215	0.0231
D(TO_AUSTRALIA(-...	0.571943	0.150587	3.798093	0.0003
D(TO_AUSTRALIA(-...	-0.163758	0.124064	-1.319952	0.1912
D(TO_AUSTRALIA(-...	-0.092172	0.122276	-0.753806	0.4535
D(TO_AUSTRALIA(-...	0.266207	0.115858	2.297696	0.0246
C	0.025932	0.008108	3.198142	0.0021
@TREND("1998Q1")	-0.000236	0.000116	-2.029190	0.0463

R-squared	0.515058	Mean dependent var	0.000265
Adjusted R-squared	0.465861	S.D. dependent var	0.026402
S.E. of regression	0.019296	Akaike info criterion	-4.959796
Sum squared resid	0.025690	Schwarz criterion	-4.716283
Log likelihood	198.9521	Hannan-Quinn criter.	-4.862393
F-statistic	10.46929	Durbin-Watson stat	2.042539
Prob(F-statistic)	0.000000		

Table 8.20. *Canada_The Result of the ADF Test*

Null Hypothesis: HA_CANADA has a unit root
Exogenous: Constant
Lag Length: 8 (Automatic - based on AIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.602825	0.0079
Test critical values:	1% level	-3.521579	
	5% level	-2.901217	
	10% level	-2.587981	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HA_CANADA)
Method: Least Squares
Date: 06/09/20 Time: 11:17
Sample (adjusted): 2000Q3 2018Q4
Included observations: 74 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HA_CANADA(-1)	-0.369585	0.102582	-3.602825	0.0006
D(HA_CANADA(-1))	0.286879	0.125493	2.286020	0.0256
D(HA_CANADA(-2))	0.024535	0.121635	0.201711	0.8408
D(HA_CANADA(-3))	-0.167950	0.116771	-1.438290	0.1552
D(HA_CANADA(-4))	-0.082751	0.117438	-0.704631	0.4836
D(HA_CANADA(-5))	0.058418	0.112594	0.518840	0.6057
D(HA_CANADA(-6))	-0.106072	0.102464	-1.035218	0.3045
D(HA_CANADA(-7))	-0.140215	0.098908	-1.417622	0.1612
D(HA_CANADA(-8))	0.283500	0.099993	2.835206	0.0061
C	0.004896	0.003287	1.489420	0.1413

R-squared	0.481933	Mean dependent var	-0.002055
Adjusted R-squared	0.409080	S.D. dependent var	0.028122
S.E. of regression	0.021618	Akaike info criterion	-4.705521
Sum squared resid	0.029909	Schwarz criterion	-4.394161
Log likelihood	184.1043	Hannan-Quinn criter.	-4.581315
F-statistic	6.615121	Durbin-Watson stat	1.772394
Prob(F-statistic)	0.000001		

Null Hypothesis: TO_CANADA has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on AIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.645373	0.0000
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO_CANADA)
Method: Least Squares
Date: 06/09/20 Time: 11:18
Sample (adjusted): 1999Q1 2018Q4
Included observations: 80 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TO_CANADA(-1)	-0.949218	0.124156	-7.645373	0.0000
D(TO_CANADA(-1))	0.595717	0.095646	6.228330	0.0000
D(TO_CANADA(-2))	0.252220	0.110607	2.280321	0.0254
C	0.016977	0.002550	6.658921	0.0000

R-squared	0.505163	Mean dependent var	-0.000152
Adjusted R-squared	0.485630	S.D. dependent var	0.015145
S.E. of regression	0.010862	Akaike info criterion	-6.158332
Sum squared resid	0.008967	Schwarz criterion	-6.039231
Log likelihood	250.3333	Hannan-Quinn criter.	-6.110581
F-statistic	25.86195	Durbin-Watson stat	2.038000
Prob(F-statistic)	0.000000		

Table 8.21. *China_The Result of the ADF Test*

Null Hypothesis: HA_CHINA has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.208160	0.0068
Test critical values:	1% level	-4.075340	
	5% level	-3.466248	
	10% level	-3.159780	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HA_CHINA)
Method: Least Squares
Date: 06/09/20 Time: 11:35
Sample (adjusted): 1998Q4 2018Q4
Included observations: 81 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HA_CHINA(-1)	-0.301551	0.071659	-4.208160	0.0001
D(HA_CHINA(-1))	0.074964	0.104608	0.716618	0.4758
C	0.041147	0.012103	3.399775	0.0011
@TREND("1998Q1")	-0.000698	0.000226	-3.093750	0.0028

R-squared	0.194332	Mean dependent var	0.000570
Adjusted R-squared	0.162942	S.D. dependent var	0.042966
S.E. of regression	0.039310	Akaike info criterion	-3.586548
Sum squared resid	0.118987	Schwarz criterion	-3.468303
Log likelihood	149.2552	Hannan-Quinn criter.	-3.539106
F-statistic	6.190939	Durbin-Watson stat	1.985610
Prob(F-statistic)	0.000798		

Null Hypothesis: TO_CHINA has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.274086	0.0000
Test critical values:	1% level	-4.076860	
	5% level	-3.466966	
	10% level	-3.160198	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO_CHINA)
Method: Least Squares
Date: 06/09/20 Time: 11:34
Sample (adjusted): 1999Q1 2018Q4
Included observations: 80 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TO_CHINA(-1)	-1.975381	0.238743	-8.274086	0.0000
D(TO_CHINA(-1))	0.602201	0.178424	3.375112	0.0012
D(TO_CHINA(-2))	0.292621	0.108944	2.685980	0.0089
C	0.124552	0.053357	2.334323	0.0223
@TREND("1998Q1")	-0.001102	0.001044	-1.055806	0.2944

R-squared	0.677115	Mean dependent var	-0.003913
Adjusted R-squared	0.659894	S.D. dependent var	0.365386
S.E. of regression	0.213088	Akaike info criterion	-0.193764
Sum squared resid	3.405479	Schwarz criterion	-0.044887
Log likelihood	12.75055	Hannan-Quinn criter.	-0.134075
F-statistic	39.32013	Durbin-Watson stat	1.882707
Prob(F-statistic)	0.000000		

Table 8.22. *France_The Result of the ADF Test*

Null Hypothesis: HA_FRANCE has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-11.25103	0.0000
Test critical values:	1% level	-4.073859	
	5% level	-3.465548	
	10% level	-3.159372	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HA_FRANCE)
Method: Least Squares
Date: 06/09/20 Time: 11:40
Sample (adjusted): 1998Q3 2018Q4
Included observations: 82 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HA_FRANCE(-1)	-1.229646	0.109292	-11.25103	0.0000
C	0.061079	0.044354	1.377077	0.1724
@TREND("1998Q1")	-0.001269	0.000912	-1.392307	0.1677

R-squared	0.615766	Mean dependent var	2.09E-05
Adjusted R-squared	0.606039	S.D. dependent var	0.309399
S.E. of regression	0.194199	Akaike info criterion	-0.403972
Sum squared resid	2.979334	Schwarz criterion	-0.315921
Log likelihood	19.56284	Hannan-Quinn criter.	-0.368621
F-statistic	63.30205	Durbin-Watson stat	1.993919
Prob(F-statistic)	0.000000		

Null Hypothesis: TO_FRANCE has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.185807	0.0072
Test critical values:	1% level	-4.073859	
	5% level	-3.465548	
	10% level	-3.159372	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO_FRANCE)
Method: Least Squares
Date: 06/09/20 Time: 11:47
Sample (adjusted): 1998Q3 2018Q4
Included observations: 82 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TO_FRANCE(-1)	-0.367511	0.087799	-4.185807	0.0001
C	0.007284	0.002950	2.469255	0.0157
@TREND("1998Q1")	-1.27E-05	4.74E-05	-0.267941	0.7894

R-squared	0.182162	Mean dependent var	3.73E-05
Adjusted R-squared	0.161457	S.D. dependent var	0.011008
S.E. of regression	0.010081	Akaike info criterion	-6.320496
Sum squared resid	0.008028	Schwarz criterion	-6.232445
Log likelihood	262.1403	Hannan-Quinn criter.	-6.285145
F-statistic	8.798052	Durbin-Watson stat	1.900454
Prob(F-statistic)	0.000355		

Table 8.23. *Germany_The Result of the ADF Test*

Null Hypothesis: HA_GERMANY has a unit root
Exogenous: Constant
Lag Length: 5 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.900029	0.0032
Test critical values:	1% level	-3.517847	
	5% level	-2.899619	
	10% level	-2.587134	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HA_GERMANY)
Method: Least Squares
Date: 06/09/20 Time: 11:55
Sample (adjusted): 1999Q4 2018Q4
Included observations: 77 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HA_GERMANY(-1)	-0.232163	0.059529	-3.900029	0.0002
D(HA_GERMANY(-1))	0.506615	0.104775	4.835266	0.0000
D(HA_GERMANY(-2))	0.126887	0.109682	1.156862	0.2513
D(HA_GERMANY(-3))	0.002010	0.107755	0.018649	0.9852
D(HA_GERMANY(-4))	-0.187841	0.107384	-1.749255	0.0846
D(HA_GERMANY(-5))	0.478107	0.109220	4.377487	0.0000
C	0.000365	0.003358	0.108652	0.9138

R-squared	0.415173	Mean dependent var	-0.001140
Adjusted R-squared	0.365045	S.D. dependent var	0.036708
S.E. of regression	0.029250	Akaike info criterion	-4.139334
Sum squared resid	0.059891	Schwarz criterion	-3.926261
Log likelihood	166.3644	Hannan-Quinn criter.	-4.054107
F-statistic	8.282253	Durbin-Watson stat	2.015676
Prob(F-statistic)	0.000001		

Null Hypothesis: TO_GERMANY has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.034686	0.0005
Test critical values:	1% level	-4.075340	
	5% level	-3.466248	
	10% level	-3.159780	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO_GERMANY)
Method: Least Squares
Date: 06/09/20 Time: 12:41
Sample (adjusted): 1998Q4 2018Q4
Included observations: 81 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TO_GERMANY(-1)	-0.354578	0.070427	-5.034686	0.0000
D(TO_GERMANY(-1))	0.352258	0.101002	3.487623	0.0008
C	0.007246	0.002132	3.397909	0.0011
@TREND("1998Q1")	-7.68E-05	3.79E-05	-2.027439	0.0461

R-squared	0.288430	Mean dependent var	0.000122
Adjusted R-squared	0.260706	S.D. dependent var	0.008963
S.E. of regression	0.007706	Akaike info criterion	-6.845392
Sum squared resid	0.004573	Schwarz criterion	-6.727147
Log likelihood	281.2384	Hannan-Quinn criter.	-6.797950
F-statistic	10.40379	Durbin-Watson stat	2.113862
Prob(F-statistic)	0.000008		

Table 8.24. *Hong Kong_The Result of the ADF Test*

Null Hypothesis: HA_HONGKONG has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.828681	0.0009
Test critical values:	1% level	-4.073859	
	5% level	-3.465548	
	10% level	-3.159372	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HA_HONGKONG)
Method: Least Squares
Date: 06/09/20 Time: 12:52
Sample (adjusted): 1998Q3 2018Q4
Included observations: 82 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HA_HONGKONG(-1)	-0.449117	0.093010	-4.828681	0.0000
C	0.025627	0.019068	1.343955	0.1828
@TREND("1998Q1")	-0.000408	0.000387	-1.053998	0.2951

R-squared	0.228103	Mean dependent var	0.000895
Adjusted R-squared	0.208561	S.D. dependent var	0.091710
S.E. of regression	0.081588	Akaike info criterion	-2.138377
Sum squared resid	0.525868	Schwarz criterion	-2.050327
Log likelihood	90.67347	Hannan-Quinn criter.	-2.103026
F-statistic	11.67260	Durbin-Watson stat	2.193390
Prob(F-statistic)	0.000036		

Null Hypothesis: TO_HONGKONG has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.310621	0.0012
Test critical values:	1% level	-2.593468	
	5% level	-1.944811	
	10% level	-1.614175	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO_HONGKONG)
Method: Least Squares
Date: 06/09/20 Time: 12:54
Sample (adjusted): 1998Q3 2018Q4
Included observations: 82 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TO_HONGKONG(-1)	-0.237450	0.071724	-3.310621	0.0014

R-squared	0.119024	Mean dependent var	0.000383
Adjusted R-squared	0.119024	S.D. dependent var	0.028560
S.E. of regression	0.026807	Akaike info criterion	-4.388224
Sum squared resid	0.058206	Schwarz criterion	-4.358874
Log likelihood	180.9172	Hannan-Quinn criter.	-4.376441
Durbin-Watson stat	1.782644		

Table 8.25. *Indonesia_The Result of the ADF Test*

Null Hypothesis: HA_INDONESIA has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.703840	0.0000
Test critical values:	1% level	-4.076860	
	5% level	-3.466966	
	10% level	-3.160198	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HA_INDONESIA)
Method: Least Squares
Date: 06/09/20 Time: 13:00
Sample (adjusted): 1999Q1 2018Q4
Included observations: 80 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HA_INDONESIA(-1)	-0.339942	0.059599	-5.703840	0.0000
D(HA_INDONESIA(-1))	0.378951	0.094797	3.997523	0.0001
D(HA_INDONESIA(-2))	0.373707	0.104027	3.592392	0.0006
C	0.029155	0.011187	2.606179	0.0110
@TREND("1998Q1")	-0.000486	0.000218	-2.228753	0.0288

R-squared	0.407467	Mean dependent var	-4.96E-05
Adjusted R-squared	0.375865	S.D. dependent var	0.051895
S.E. of regression	0.040998	Akaike info criterion	-3.490118
Sum squared resid	0.126064	Schwarz criterion	-3.341241
Log likelihood	144.6047	Hannan-Quinn criter.	-3.430429
F-statistic	12.89381	Durbin-Watson stat	1.904153
Prob(F-statistic)	0.000000		

Null Hypothesis: TO_INDONESIA has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.061748	0.0000
Test critical values:	1% level	-4.076860	
	5% level	-3.466966	
	10% level	-3.160198	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO_INDONESIA)
Method: Least Squares
Date: 06/09/20 Time: 13:01
Sample (adjusted): 1999Q1 2018Q4
Included observations: 80 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TO_INDONESIA(-1)	-0.978701	0.138592	-7.061748	0.0000
D(TO_INDONESIA(-...	0.330605	0.122155	2.706441	0.0084
D(TO_INDONESIA(-...	0.417146	0.104122	4.006302	0.0001
C	0.017459	0.009816	1.778553	0.0794
@TREND("1998Q1")	0.000145	0.000194	0.747092	0.4573

R-squared	0.443591	Mean dependent var	0.000468
Adjusted R-squared	0.413916	S.D. dependent var	0.052044
S.E. of regression	0.039843	Akaike info criterion	-3.547274
Sum squared resid	0.119060	Schwarz criterion	-3.398397
Log likelihood	146.8910	Hannan-Quinn criter.	-3.487585
F-statistic	14.94824	Durbin-Watson stat	1.929386
Prob(F-statistic)	0.000000		

Table 8.26. *Japan_The Result of the ADF Test*

Null Hypothesis: HA_JAPAN has a unit root
Exogenous: None
Lag Length: 1 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.387281	0.0009
Test critical values:	1% level	-2.593824	
	5% level	-1.944862	
	10% level	-1.614145	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HA_JAPAN)
Method: Least Squares
Date: 06/09/20 Time: 13:15
Sample (adjusted): 1998Q4 2018Q4
Included observations: 81 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HA_JAPAN(-1)	-0.187249	0.055280	-3.387281	0.0011
D(HA_JAPAN(-1))	0.285947	0.105426	2.712306	0.0082

R-squared	0.160654	Mean dependent var	-0.002160
Adjusted R-squared	0.150030	S.D. dependent var	0.032453
S.E. of regression	0.029920	Akaike info criterion	-4.156228
Sum squared resid	0.070719	Schwarz criterion	-4.097106
Log likelihood	170.3272	Hannan-Quinn criter.	-4.132507
Durbin-Watson stat	2.048311		

Null Hypothesis: TO_JAPAN has a unit root
Exogenous: None
Lag Length: 1 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.984367	0.0001
Test critical values:	1% level	-2.593824	
	5% level	-1.944862	
	10% level	-1.614145	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO_JAPAN)
Method: Least Squares
Date: 06/09/20 Time: 13:16
Sample (adjusted): 1998Q4 2018Q4
Included observations: 81 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TO_JAPAN(-1)	-0.248154	0.062282	-3.984367	0.0001
D(TO_JAPAN(-1))	0.419948	0.104071	4.035212	0.0001

R-squared	0.234861	Mean dependent var	0.000386
Adjusted R-squared	0.225175	S.D. dependent var	0.024223
S.E. of regression	0.021322	Akaike info criterion	-4.833753
Sum squared resid	0.035916	Schwarz criterion	-4.774630
Log likelihood	197.7670	Hannan-Quinn criter.	-4.810032
Durbin-Watson stat	2.099818		

Table 8.27. *Malaysia_The Result of the ADF Test*

Null Hypothesis: D(HA_MALAYSIA) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.071226	0.0000
Test critical values:	1% level	-4.075340	
	5% level	-3.466248	
	10% level	-3.159780	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HA_MALAYSIA,2)
Method: Least Squares
Date: 06/09/20 Time: 13:36
Sample (adjusted): 1998Q4 2018Q4
Included observations: 81 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(HA_MALAYSIA(-1))	-0.778704	0.110123	-7.071226	0.0000
C	-0.007986	0.010861	-0.735247	0.4644
@TREND("1998Q1")	0.000161	0.000222	0.726009	0.4700

R-squared	0.390674	Mean dependent var	-0.000328
Adjusted R-squared	0.375050	S.D. dependent var	0.058834
S.E. of regression	0.046511	Akaike info criterion	-3.261934
Sum squared resid	0.168733	Schwarz criterion	-3.173251
Log likelihood	135.1083	Hannan-Quinn criter.	-3.226353
F-statistic	25.00515	Durbin-Watson stat	1.998069
Prob(F-statistic)	0.000000		

Null Hypothesis: D(TO_MALAYSIA) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.084101	0.0000
Test critical values:	1% level	-4.075340	
	5% level	-3.466248	
	10% level	-3.159780	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO_MALAYSIA,2)
Method: Least Squares
Date: 06/09/20 Time: 13:34
Sample (adjusted): 1998Q4 2018Q4
Included observations: 81 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TO_MALAYSIA(-1))	-0.912163	0.112834	-8.084101	0.0000
C	-0.001788	0.006119	-0.292138	0.7710
@TREND("1998Q1")	5.46E-05	0.000125	0.436387	0.6638

R-squared	0.455970	Mean dependent var	4.51E-05
Adjusted R-squared	0.442021	S.D. dependent var	0.035168
S.E. of regression	0.026270	Akaike info criterion	-4.404450
Sum squared resid	0.053828	Schwarz criterion	-4.315767
Log likelihood	181.3802	Hannan-Quinn criter.	-4.368869
F-statistic	32.68724	Durbin-Watson stat	1.993935
Prob(F-statistic)	0.000000		

Table 8.28. *Philippines_The Result of the ADF Test*

Null Hypothesis: HA_PHLIPPINES has a unit root
Exogenous: None
Lag Length: 2 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.703824	0.0003
Test critical values:	1% level	-2.594189	
	5% level	-1.944915	
	10% level	-1.614114	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HA_PHLIPPINES)
Method: Least Squares
Date: 06/09/20 Time: 13:45
Sample (adjusted): 1999Q1 2018Q4
Included observations: 80 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HA_PHLIPPINES(-1)	-0.188344	0.050851	-3.703824	0.0004
D(HA_PHLIPPINES(-1))	0.237566	0.105012	2.262271	0.0265
D(HA_PHLIPPINES(-2))	0.091512	0.100666	0.909069	0.3662

R-squared	0.190135	Mean dependent var	-0.003258
Adjusted R-squared	0.169100	S.D. dependent var	0.039126
S.E. of regression	0.035665	Akaike info criterion	-3.792507
Sum squared resid	0.097944	Schwarz criterion	-3.703181
Log likelihood	154.7003	Hannan-Quinn criter.	-3.756694
Durbin-Watson stat	1.986775		

Null Hypothesis: TO_PHILIPPINES has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.951977	0.0000
Test critical values:	1% level	-4.076860	
	5% level	-3.466966	
	10% level	-3.160198	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO_PHILIPPINES)
Method: Least Squares
Date: 06/09/20 Time: 13:46
Sample (adjusted): 1999Q1 2018Q4
Included observations: 80 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TO_PHILIPPINES(-1)	-2.203575	0.246155	-8.951977	0.0000
D(TO_PHILIPPINES(-...	0.681106	0.190766	3.570371	0.0006
D(TO_PHILIPPINES(-...	0.437748	0.111917	3.911374	0.0002
C	0.034117	0.029281	1.165140	0.2477
@TREND("1998Q1")	-0.000135	0.000588	-0.228718	0.8197

R-squared	0.754415	Mean dependent var	0.003941
Adjusted R-squared	0.741317	S.D. dependent var	0.238204
S.E. of regression	0.121153	Akaike info criterion	-1.323069
Sum squared resid	1.100848	Schwarz criterion	-1.174192
Log likelihood	57.92274	Hannan-Quinn criter.	-1.263380
F-statistic	57.59827	Durbin-Watson stat	1.789916
Prob(F-statistic)	0.000000		

Table 8.29. *Russia_The Result of the ADF Test*

Null Hypothesis: HA_RUSSIA has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.812172	0.0000
Test critical values:	1% level	-4.073859	
	5% level	-3.465548	
	10% level	-3.159372	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HA_RUSSIA)
Method: Least Squares
Date: 06/09/20 Time: 16:04
Sample (adjusted): 1998Q3 2018Q4
Included observations: 82 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HA_RUSSIA(-1)	-0.875310	0.112044	-7.812172	0.0000
C	0.020363	0.053046	0.383867	0.7021
@TREND("1998Q1")	-8.59E-05	0.001089	-0.078844	0.9374

R-squared	0.435859	Mean dependent var	0.003996
Adjusted R-squared	0.421577	S.D. dependent var	0.306955
S.E. of regression	0.233452	Akaike info criterion	-0.035784
Sum squared resid	4.305476	Schwarz criterion	0.052267
Log likelihood	4.467133	Hannan-Quinn criter.	-0.000433
F-statistic	30.51794	Durbin-Watson stat	1.994394
Prob(F-statistic)	0.000000		

Null Hypothesis: TO_RUSSIA has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.964181	0.0000
Test critical values:	1% level	-4.075340	
	5% level	-3.466248	
	10% level	-3.159780	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO_RUSSIA)
Method: Least Squares
Date: 06/09/20 Time: 16:19
Sample (adjusted): 1998Q4 2018Q4
Included observations: 81 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TO_RUSSIA(-1)	-0.416793	0.069883	-5.964181	0.0000
D(TO_RUSSIA(-1))	0.529821	0.095134	5.569191	0.0000
C	-0.002291	0.003837	-0.597158	0.5522
@TREND("1998Q1")	0.000150	8.13E-05	1.840472	0.0696

R-squared	0.390714	Mean dependent var	-0.000162
Adjusted R-squared	0.366976	S.D. dependent var	0.020682
S.E. of regression	0.016455	Akaike info criterion	-5.328211
Sum squared resid	0.020850	Schwarz criterion	-5.209966
Log likelihood	219.7925	Hannan-Quinn criter.	-5.280769
F-statistic	16.45915	Durbin-Watson stat	2.147677
Prob(F-statistic)	0.000000		

Table 8.30. *Singapore_The Result of the ADF Test*

Null Hypothesis: D(HA_SINGAPORE) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 6 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.276877	0.0000
Test critical values:	1% level	-4.085092	
	5% level	-3.470851	
	10% level	-3.162458	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HA_SINGAPORE,2)
Method: Least Squares
Date: 06/09/20 Time: 17:02
Sample (adjusted): 2000Q2 2018Q4
Included observations: 75 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(HA_SINGAPORE(-1))	-2.029852	0.323386	-6.276877	0.0000
D(HA_SINGAPORE(-1),2)	1.105140	0.237680	4.649703	0.0000
D(HA_SINGAPORE(-2),2)	0.785608	0.210844	3.726013	0.0004
D(HA_SINGAPORE(-3),2)	0.341086	0.167911	2.031345	0.0463
D(HA_SINGAPORE(-4),2)	0.148402	0.096967	1.530442	0.1307
D(HA_SINGAPORE(-5),2)	0.164531	0.073353	2.243020	0.0283
D(HA_SINGAPORE(-6),2)	0.017494	0.055118	0.317395	0.7519
C	-0.009531	0.005111	-1.864758	0.0667
@TREND("1998Q1")	0.000177	9.82E-05	1.804019	0.0758

R-squared	0.664978	Mean dependent var	-0.000755
Adjusted R-squared	0.624369	S.D. dependent var	0.027386
S.E. of regression	0.016785	Akaike info criterion	-5.224536
Sum squared resid	0.018594	Schwarz criterion	-4.946438
Log likelihood	204.9201	Hannan-Quinn criter.	-5.113495
F-statistic	16.37524	Durbin-Watson stat	2.023977
Prob(F-statistic)	0.000000		

Null Hypothesis: TO_SINGAPORE has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.163809	0.0003
Test critical values:	1% level	-4.073859	
	5% level	-3.465548	
	10% level	-3.159372	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO_SINGAPORE)
Method: Least Squares
Date: 06/09/20 Time: 17:04
Sample (adjusted): 1998Q3 2018Q4
Included observations: 82 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TO_SINGAPORE(-1)	-0.497245	0.096294	-5.163809	0.0000
C	-0.005045	0.004538	-1.111648	0.2697
@TREND("1998Q1")	0.000304	0.000109	2.788423	0.0066

R-squared	0.252657	Mean dependent var	0.000980
Adjusted R-squared	0.233737	S.D. dependent var	0.021856
S.E. of regression	0.019132	Akaike info criterion	-5.038992
Sum squared resid	0.028917	Schwarz criterion	-4.950942
Log likelihood	209.5987	Hannan-Quinn criter.	-5.003641
F-statistic	13.35393	Durbin-Watson stat	1.878388
Prob(F-statistic)	0.000010		

Table 8.31. *Taiwan_The Result of the ADF Test*

Null Hypothesis: D(HA_TAIWAN) has a unit root
Exogenous: Constant
Lag Length: 9 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.714795	0.0000
Test critical values:	1% level	-3.524233	
	5% level	-2.902358	
	10% level	-2.588587	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HA_TAIWAN,2)
Method: Least Squares
Date: 06/09/20 Time: 17:29
Sample (adjusted): 2001Q1 2018Q4
Included observations: 72 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(HA_TAIWAN(-1))	-1.657122	0.289971	-5.714795	0.0000
D(HA_TAIWAN(-1),2)	0.798516	0.271039	2.946133	0.0046
D(HA_TAIWAN(-2),2)	0.696283	0.235959	2.950869	0.0045
D(HA_TAIWAN(-3),2)	0.259990	0.208100	1.249350	0.2163
D(HA_TAIWAN(-4),2)	0.138230	0.186411	0.741533	0.4612
D(HA_TAIWAN(-5),2)	0.067632	0.156078	0.433321	0.6663
D(HA_TAIWAN(-6),2)	-0.126684	0.125039	-1.013156	0.3150
D(HA_TAIWAN(-7),2)	-0.084473	0.098363	-0.858788	0.3938
D(HA_TAIWAN(-8),2)	-0.140292	0.078766	-1.781131	0.0799
D(HA_TAIWAN(-9),2)	0.134187	0.053366	2.514465	0.0146
C	-0.000495	0.003603	-0.137406	0.8912

R-squared	0.818254	Mean dependent var	0.002427
Adjusted R-squared	0.788459	S.D. dependent var	0.064013
S.E. of regression	0.029442	Akaike info criterion	-4.073044
Sum squared resid	0.052876	Schwarz criterion	-3.725220
Log likelihood	157.6296	Hannan-Quinn criter.	-3.934574
F-statistic	27.46327	Durbin-Watson stat	1.726790
Prob(F-statistic)	0.000000		

Null Hypothesis: TO_TAIWAN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.275684	0.0009
Test critical values:	1% level	-3.512290	
	5% level	-2.897223	
	10% level	-2.585861	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO_TAIWAN)
Method: Least Squares
Date: 06/09/20 Time: 17:30
Sample (adjusted): 1998Q3 2018Q4
Included observations: 82 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TO_TAIWAN(-1)	-0.367092	0.085856	-4.275684	0.0001
C	0.010750	0.004079	2.635314	0.0101

R-squared	0.186011	Mean dependent var	0.000467
Adjusted R-squared	0.175837	S.D. dependent var	0.032865
S.E. of regression	0.029836	Akaike info criterion	-4.162137
Sum squared resid	0.071213	Schwarz criterion	-4.103437
Log likelihood	172.6476	Hannan-Quinn criter.	-4.138570
F-statistic	18.28148	Durbin-Watson stat	2.212817
Prob(F-statistic)	0.000052		

Table 8.32. *Thailand_The Result of the ADF Test*

Null Hypothesis: HA_THAILAND has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.336648	0.0002
Test critical values:	1% level	-4.075340	
	5% level	-3.466248	
	10% level	-3.159780	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HA_THAILAND)
Method: Least Squares
Date: 06/09/20 Time: 17:59
Sample (adjusted): 1998Q4 2018Q4
Included observations: 81 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HA_THAILAND(-1)	-0.347608	0.065136	-5.336648	0.0000
D(HA_THAILAND(-1))	0.500297	0.093456	5.353285	0.0000
C	0.032528	0.012101	2.687931	0.0088
@TREND("1998Q1")	-0.000590	0.000237	-2.494168	0.0148

R-squared	0.365010	Mean dependent var	-0.003147
Adjusted R-squared	0.340270	S.D. dependent var	0.053630
S.E. of regression	0.043561	Akaike info criterion	-3.381206
Sum squared resid	0.146109	Schwarz criterion	-3.262961
Log likelihood	140.9388	Hannan-Quinn criter.	-3.333764
F-statistic	14.75391	Durbin-Watson stat	1.979298
Prob(F-statistic)	0.000000		

Null Hypothesis: TO_THAILAND has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.372151	0.0001
Test critical values:	1% level	-4.078420	
	5% level	-3.467703	
	10% level	-3.160627	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO_THAILAND)
Method: Least Squares
Date: 06/09/20 Time: 18:00
Sample (adjusted): 1999Q2 2018Q4
Included observations: 79 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TO_THAILAND(-1)	-2.048374	0.381295	-5.372151	0.0000
D(TO_THAILAND(-1))	0.573730	0.294863	1.945754	0.0555
D(TO_THAILAND(-2))	0.157275	0.205154	0.766620	0.4458
D(TO_THAILAND(-3))	-0.279328	0.113106	-2.469611	0.0159
C	0.068159	0.049032	1.390093	0.1687
@TREND("1998Q1")	-0.000190	0.000951	-0.199842	0.8422

R-squared	0.828155	Mean dependent var	0.005077
Adjusted R-squared	0.816384	S.D. dependent var	0.449117
S.E. of regression	0.192448	Akaike info criterion	-0.385067
Sum squared resid	2.703657	Schwarz criterion	-0.205109
Log likelihood	21.21014	Hannan-Quinn criter.	-0.312970
F-statistic	70.36004	Durbin-Watson stat	1.904398
Prob(F-statistic)	0.000000		

Table 8.33. *Turkey_The Result of the ADF Test*

Null Hypothesis: HA_TURKEY has a unit root
Exogenous: None
Lag Length: 1 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.339401	0.0000
Test critical values:	1% level	-2.593824	
	5% level	-1.944862	
	10% level	-1.614145	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HA_TURKEY)
Method: Least Squares
Date: 06/10/20 Time: 08:54
Sample (adjusted): 1998Q4 2018Q4
Included observations: 81 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HA_TURKEY(-1)	-0.226045	0.052091	-4.339401	0.0000
D(HA_TURKEY(-1))	0.675308	0.092834	7.274383	0.0000

R-squared	0.416807	Mean dependent var	-0.005080
Adjusted R-squared	0.409425	S.D. dependent var	0.078937
S.E. of regression	0.060662	Akaike info criterion	-2.742618
Sum squared resid	0.290710	Schwarz criterion	-2.683496
Log likelihood	113.0760	Hannan-Quinn criter.	-2.718897
Durbin-Watson stat	1.886237		

Null Hypothesis: TO_TURKEY has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.500958	0.0000
Test critical values:	1% level	-3.513344	
	5% level	-2.897678	
	10% level	-2.586103	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO_TURKEY)
Method: Least Squares
Date: 06/10/20 Time: 08:57
Sample (adjusted): 1998Q4 2018Q4
Included observations: 81 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TO_TURKEY(-1)	-0.522451	0.080365	-6.500958	0.0000
D(TO_TURKEY(-1))	0.493147	0.096885	5.090015	0.0000
C	0.010919	0.003241	3.369516	0.0012

R-squared	0.388021	Mean dependent var	0.000986
Adjusted R-squared	0.372329	S.D. dependent var	0.032240
S.E. of regression	0.025543	Akaike info criterion	-4.460601
Sum squared resid	0.050889	Schwarz criterion	-4.371917
Log likelihood	183.6543	Hannan-Quinn criter.	-4.425020
F-statistic	24.72763	Durbin-Watson stat	1.881397
Prob(F-statistic)	0.000000		

Table 8.34. *UK_The Result of the ADF Test*

Null Hypothesis: HA_UK has a unit root
Exogenous: None
Lag Length: 1 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.486004	0.0007
Test critical values:	1% level	-2.593824	
	5% level	-1.944862	
	10% level	-1.614145	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HA_UK)
Method: Least Squares
Date: 06/10/20 Time: 09:07
Sample (adjusted): 1998Q4 2018Q4
Included observations: 81 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HA_UK(-1)	-0.211564	0.060690	-3.486004	0.0008
D(HA_UK(-1))	0.347641	0.106544	3.262873	0.0016

R-squared	0.181438	Mean dependent var	-0.000737
Adjusted R-squared	0.171076	S.D. dependent var	0.029202
S.E. of regression	0.026587	Akaike info criterion	-4.392382
Sum squared resid	0.055844	Schwarz criterion	-4.333260
Log likelihood	179.8915	Hannan-Quinn criter.	-4.368662
Durbin-Watson stat	2.040486		

Null Hypothesis: TO_UK has a unit root
Exogenous: None
Lag Length: 1 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.660661	0.0004
Test critical values:	1% level	-2.593824	
	5% level	-1.944862	
	10% level	-1.614145	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO_UK)
Method: Least Squares
Date: 06/10/20 Time: 09:50
Sample (adjusted): 1998Q4 2018Q4
Included observations: 81 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TO_UK(-1)	-0.210545	0.057515	-3.660661	0.0005
D(TO_UK(-1))	0.382792	0.104026	3.679770	0.0004

R-squared	0.210379	Mean dependent var	-0.000218
Adjusted R-squared	0.200384	S.D. dependent var	0.009467
S.E. of regression	0.008466	Akaike info criterion	-6.681219
Sum squared resid	0.005662	Schwarz criterion	-6.622097
Log likelihood	272.5894	Hannan-Quinn criter.	-6.657498
Durbin-Watson stat	1.880888		

Table 8.35. *USA_The Result of the ADF Test*

Null Hypothesis: HA_USA has a unit root
Exogenous: None
Lag Length: 1 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.762756	0.0003
Test critical values:	1% level	-2.593824	
	5% level	-1.944862	
	10% level	-1.614145	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HA_USA)
Method: Least Squares
Date: 06/10/20 Time: 10:04
Sample (adjusted): 1998Q4 2018Q4
Included observations: 81 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HA_USA(-1)	-0.178871	0.047537	-3.762756	0.0003
D(HA_USA(-1))	0.462855	0.098178	4.714467	0.0000

R-squared	0.274484	Mean dependent var	-0.000690
Adjusted R-squared	0.265300	S.D. dependent var	0.021591
S.E. of regression	0.018507	Akaike info criterion	-5.116951
Sum squared resid	0.027058	Schwarz criterion	-5.057829
Log likelihood	209.2365	Hannan-Quinn criter.	-5.093230
Durbin-Watson stat	1.934771		

Null Hypothesis: TO_USA has a unit root
Exogenous: Constant
Lag Length: 4 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.591796	0.0003
Test critical values:	1% level	-3.516676	
	5% level	-2.899115	
	10% level	-2.586866	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO_USA)
Method: Least Squares
Date: 06/10/20 Time: 10:05
Sample (adjusted): 1999Q3 2018Q4
Included observations: 78 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TO_USA(-1)	-0.664648	0.144747	-4.591796	0.0000
D(TO_USA(-1))	0.388711	0.134704	2.885673	0.0052
D(TO_USA(-2))	0.373046	0.109491	3.407104	0.0011
D(TO_USA(-3))	-0.121018	0.113716	-1.064210	0.2908
D(TO_USA(-4))	-0.012507	0.110571	-0.113115	0.9103
C	0.007193	0.001754	4.100789	0.0001

R-squared	0.441472	Mean dependent var	0.000560
Adjusted R-squared	0.402686	S.D. dependent var	0.012144
S.E. of regression	0.009386	Akaike info criterion	-6.425489
Sum squared resid	0.006342	Schwarz criterion	-6.244204
Log likelihood	256.5941	Hannan-Quinn criter.	-6.352917
F-statistic	11.38208	Durbin-Watson stat	2.078177
Prob(F-statistic)	0.000000		

Table 8.36. *Vietnam_The Result of the ADF Test*

Null Hypothesis: HA_VIETNAM has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.538644	0.0000
Test critical values:	1% level	-4.075340	
	5% level	-3.466248	
	10% level	-3.159780	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HA_VIETNAM)
Method: Least Squares
Date: 06/10/20 Time: 11:13
Sample (adjusted): 1998Q4 2018Q4
Included observations: 81 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HA_VIETNAM(-1)	-1.205112	0.159858	-7.538644	0.0000
D(HA_VIETNAM(-1))	0.181499	0.111636	1.625809	0.1081
C	0.087639	0.053860	1.627156	0.1078
@TREND("1998Q1")	-0.000590	0.001076	-0.548506	0.5849

R-squared	0.526259	Mean dependent var	0.000467
Adjusted R-squared	0.507801	S.D. dependent var	0.321975
S.E. of regression	0.225888	Akaike info criterion	-0.089436
Sum squared resid	3.928942	Schwarz criterion	0.028808
Log likelihood	7.622176	Hannan-Quinn criter.	-0.041995
F-statistic	28.51201	Durbin-Watson stat	2.035154
Prob(F-statistic)	0.000000		

Null Hypothesis: TO_VIETNAM has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.726768	0.0000
Test critical values:	1% level	-4.076860	
	5% level	-3.466966	
	10% level	-3.160198	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO_VIETNAM)
Method: Least Squares
Date: 06/10/20 Time: 11:19
Sample (adjusted): 1999Q1 2018Q4
Included observations: 80 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TO_VIETNAM(-1)	-2.258217	0.258769	-8.726768	0.0000
D(TO_VIETNAM(-1))	0.765830	0.188680	4.058874	0.0001
D(TO_VIETNAM(-2))	0.292363	0.116733	2.504540	0.0144
C	0.084744	0.035467	2.389391	0.0194
@TREND("1998Q1")	0.000469	0.000698	0.671144	0.5042

R-squared	0.714856	Mean dependent var	0.000516
Adjusted R-squared	0.699649	S.D. dependent var	0.262095
S.E. of regression	0.143639	Akaike info criterion	-0.982562
Sum squared resid	1.547418	Schwarz criterion	-0.833685
Log likelihood	44.30248	Hannan-Quinn criter.	-0.922873
F-statistic	47.00629	Durbin-Watson stat	1.829774
Prob(F-statistic)	0.000000		

Table 8.37. *Australia_Structural Var Estimates*

Structural VAR Estimates
Date: 06/09/20 Time: 11:11
Sample (adjusted): 1999Q2 2018Q4
Included observations: 79 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)
Convergence achieved after 9 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I

A =

1	0	0
C(1)	1	0
C(2)	C(3)	1

B =

C(4)	0	0
0	C(5)	0
0	0	C(6)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.077242	0.078677	0.981765	0.3262
C(2)	-0.012074	0.012772	-0.945358	0.3445
C(3)	-0.022819	0.018154	-1.256995	0.2088
C(4)	0.029023	0.002309	12.56980	0.0000
C(5)	0.020295	0.001615	12.56980	0.0000
C(6)	0.003275	0.000261	12.56980	0.0000

Log likelihood 703.2373

Estimated A matrix:

1.000000	0.000000	0.000000
0.077242	1.000000	0.000000
-0.012074	-0.022819	1.000000

Estimated B matrix:

0.029023	0.000000	0.000000
0.000000	0.020295	0.000000
0.000000	0.000000	0.003275

Estimated S matrix:

0.029023	0.000000	0.000000
-0.002242	0.020295	0.000000
0.000299	0.000463	0.003275

Estimated F matrix:

0.095824	-0.008464	0.016899
0.005692	0.028864	0.026557
0.005713	0.001202	0.022084

Table 8.38. *Canada_Structural Var Estimates*

Structural VAR Estimates
Date: 06/09/20 Time: 11:24
Sample (adjusted): 1999Q2 2018Q4
Included observations: 79 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)
Convergence achieved after 9 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I

A =			
	1	0	0
	C(1)	1	0
	C(2)	C(3)	1
B =			
	C(4)	0	0
	0	C(5)	0
	0	0	C(6)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.169705	0.049539	3.425699	0.0006
C(2)	-0.009109	0.016203	-0.562204	0.5740
C(3)	-0.056603	0.034336	-1.648494	0.0993
C(4)	0.023623	0.001879	12.56980	0.0000
C(5)	0.010402	0.000828	12.56981	0.0000
C(6)	0.003174	0.000253	12.56981	0.0000
Log likelihood	774.7647			

Estimated A matrix:		
1.000000	0.000000	0.000000
0.169705	1.000000	0.000000
-0.009109	-0.056603	1.000000
Estimated B matrix:		
0.023623	0.000000	0.000000
0.000000	0.010402	0.000000
0.000000	0.000000	0.003174
Estimated S matrix:		
0.023623	0.000000	0.000000
-0.004009	0.010402	0.000000
-1.17E-05	0.000589	0.003174
Estimated F matrix:		
0.054954	0.005788	0.089845
-0.005389	0.008507	0.006071
0.000212	0.001279	0.024393

Table 8.39. *China_Structural Var Estimates*

Structural VAR Estimates
Date: 06/09/20 Time: 11:38
Sample (adjusted): 1999Q2 2018Q4
Included observations: 79 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)
Convergence achieved after 9 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I

A =					
	1	0	0		
	C(1)	1	0		
	C(2)	C(3)	1		
B =					
	C(4)	0	0		
	0	C(5)	0		
	0	0	C(6)		

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.558811	0.798253	-0.700042	0.4839
C(2)	-0.000395	0.011136	-0.035442	0.9717
C(3)	-0.001826	0.001565	-1.166959	0.2432
C(4)	0.030524	0.002428	12.56980	0.0000
C(5)	0.216566	0.017229	12.56980	0.0000
C(6)	0.003012	0.000240	12.56981	0.0000
Log likelihood	518.8316			

Estimated A matrix:		
1.000000	0.000000	0.000000
-0.558811	1.000000	0.000000
-0.000395	-0.001826	1.000000
Estimated B matrix:		
0.030524	0.000000	0.000000
0.000000	0.216566	0.000000
0.000000	0.000000	0.003012
Estimated S matrix:		
0.030524	0.000000	0.000000
0.017057	0.216566	0.000000
4.32E-05	0.000395	0.003012
Estimated F matrix:		
0.205091	-0.016232	0.171283
-0.003798	0.138428	-0.009288
0.003814	-0.000147	0.019165

Table 8.40. *France_Structural Var Estimates*

Structural VAR Estimates
Date: 06/09/20 Time: 11:50
Sample (adjusted): 1998Q4 2018Q4
Included observations: 81 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)
Convergence achieved after 13 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I

A =

1	0	0
C(1)	1	0
C(2)	C(3)	1

B =

C(4)	0	0
0	C(5)	0
0	0	C(6)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.009352	0.005669	-1.649594	0.0990
C(2)	0.003023	0.001870	1.616435	0.1060
C(3)	-0.080341	0.036052	-2.228473	0.0258
C(4)	0.193277	0.015185	12.72792	0.0000
C(5)	0.009861	0.000775	12.72792	0.0000
C(6)	0.003200	0.000251	12.72792	0.0000
Log likelihood	627.8004			

Estimated A matrix:

1.000000	0.000000	0.000000
-0.009352	1.000000	0.000000
0.003023	-0.080341	1.000000

Estimated B matrix:

0.193277	0.000000	0.000000
0.000000	0.009861	0.000000
0.000000	0.000000	0.003200

Estimated S matrix:

0.193277	0.000000	0.000000
0.001807	0.009861	0.000000
-0.000439	0.000792	0.003200

Estimated F matrix:

0.122106	-0.042400	0.123346
0.006407	0.024337	0.003804
-0.005128	0.003120	0.020202

Table 8.41. *Germany_Structural Var Estimates*

Structural VAR Estimates
Date: 06/09/20 Time: 12:45
Sample (adjusted): 1999Q4 2018Q4
Included observations: 77 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)
Convergence achieved after 12 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I

A =

1	0	0
C(1)	1	0
C(2)	C(3)	1

B =

C(4)	0	0
0	C(5)	0
0	0	C(6)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.038318	0.030127	-1.271884	0.2034
C(2)	0.007827	0.012531	0.624575	0.5322
C(3)	-0.034132	0.046912	-0.727576	0.4669
C(4)	0.028644	0.002308	12.40967	0.0000
C(5)	0.007572	0.000610	12.40968	0.0000
C(6)	0.003117	0.000251	12.40967	0.0000
Log likelihood	766.1542			

Estimated A matrix:

1.000000	0.000000	0.000000
-0.038318	1.000000	0.000000
0.007827	-0.034132	1.000000

Estimated B matrix:

0.028644	0.000000	0.000000
0.000000	0.007572	0.000000
0.000000	0.000000	0.003117

Estimated S matrix:

0.028644	0.000000	0.000000
0.001098	0.007572	0.000000
-0.000187	0.000258	0.003117

Estimated F matrix:

0.119720	-0.010435	0.058099
0.001750	0.011930	0.025634
-0.003828	-0.006893	0.023408

Table 8.42. *Hong Kong_Structural Var Estimates*

Structural VAR Estimates
Date: 06/09/20 Time: 12:58
Sample (adjusted): 2000Q1 2018Q4
Included observations: 76 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)
Convergence achieved after 10 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I

A =			
	1	0	0
	C(1)	1	0
	C(2)	C(3)	1
B =			
	C(4)	0	0
	0	C(5)	0
	0	0	C(6)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.005566	0.037150	0.149819	0.8809
C(2)	-0.000948	0.004271	-0.222012	0.8243
C(3)	0.001771	0.013186	0.134326	0.8931
C(4)	0.072946	0.005917	12.32883	0.0000
C(5)	0.023625	0.001916	12.32883	0.0000
C(6)	0.002716	0.000220	12.32883	0.0000
Log likelihood	609.1720			

Estimated A matrix:		
1.000000	0.000000	0.000000
0.005566	1.000000	0.000000
-0.000948	0.001771	1.000000
Estimated B matrix:		
0.072946	0.000000	0.000000
0.000000	0.023625	0.000000
0.000000	0.000000	0.002716
Estimated S matrix:		
0.072946	0.000000	0.000000
-0.000406	0.023625	0.000000
6.99E-05	-4.18E-05	0.002716
Estimated F matrix:		
0.169574	-0.019636	0.055286
-0.054100	0.123205	-0.069274
0.008706	-0.008559	0.020635

Table 8.43. *Indonesia_Structural Var Estimates*

Structural VAR Estimates
Date: 06/09/20 Time: 13:11
Sample (adjusted): 1999Q1 2018Q4
Included observations: 80 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)
Convergence achieved after 12 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I

A =

1	0	0
C(1)	1	0
C(2)	C(3)	1

B =

C(4)	0	0
0	C(5)	0
0	0	C(6)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.005570	0.106771	-0.052169	0.9584
C(2)	-0.019749	0.008024	-2.461316	0.0138
C(3)	0.003105	0.008402	0.369548	0.7117
C(4)	0.042249	0.003340	12.64911	0.0000
C(5)	0.040347	0.003190	12.64911	0.0000
C(6)	0.003032	0.000240	12.64911	0.0000

Log likelihood 633.2902

Estimated A matrix:

1.000000	0.000000	0.000000
-0.005570	1.000000	0.000000
-0.019749	0.003105	1.000000

Estimated B matrix:

0.042249	0.000000	0.000000
0.000000	0.040347	0.000000
0.000000	0.000000	0.003032

Estimated S matrix:

0.042249	0.000000	0.000000
0.000235	0.040347	0.000000
0.000834	-0.000125	0.003032

Estimated F matrix:

0.178027	-0.040675	0.076583
0.012757	0.037723	0.002270
0.011390	-0.005399	0.014690

Table 8.44. *Japan_Structural Var Estimates*

Structural VAR Estimates
Date: 06/09/20 Time: 13:24
Sample (adjusted): 1998Q4 2018Q4
Included observations: 81 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)
Convergence achieved after 13 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I

A =

1	0	0
C(1)	1	0
C(2)	C(3)	1

B =

C(4)	0	0
0	C(5)	0
0	0	C(6)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.051375	0.076301	-0.673319	0.5007
C(2)	-0.005496	0.011532	-0.476563	0.6337
C(3)	0.021557	0.016747	1.287249	0.1980
C(4)	0.030841	0.002423	12.72792	0.0000
C(5)	0.021179	0.001664	12.72792	0.0000
C(6)	0.003192	0.000251	12.72792	0.0000

Log likelihood 714.7404

Estimated A matrix:

1.000000	0.000000	0.000000
-0.051375	1.000000	0.000000
-0.005496	0.021557	1.000000

Estimated B matrix:

0.030841	0.000000	0.000000
0.000000	0.021179	0.000000
0.000000	0.000000	0.003192

Estimated S matrix:

0.030841	0.000000	0.000000
0.001584	0.021179	0.000000
0.000135	-0.000457	0.003192

Estimated F matrix:

0.162367	0.009539	0.005402
0.038575	0.073732	0.024811
0.008435	-0.005177	0.017581

Table 8.45. *Malaysia_Structural Var Estimates*

Structural VAR Estimates
Date: 06/09/20 Time: 17:25
Sample (adjusted): 2000Q1 2018Q4
Included observations: 76 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)
Convergence achieved after 14 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I

A =

1	0	0
C(1)	1	0
C(2)	C(3)	1

B =

C(4)	0	0
0	C(5)	0
0	0	C(6)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.077667	0.068083	-1.140781	0.2540
C(2)	0.003415	0.008305	0.411279	0.6809
C(3)	0.007278	0.013873	0.524594	0.5999
C(4)	0.036252	0.002940	12.32883	0.0000
C(5)	0.021517	0.001745	12.32883	0.0000
C(6)	0.002602	0.000211	12.32883	0.0000
Log likelihood	672.6532			

Estimated A matrix:

1.000000	0.000000	0.000000
-0.077667	1.000000	0.000000
0.003415	0.007278	1.000000

Estimated B matrix:

0.036252	0.000000	0.000000
0.000000	0.021517	0.000000
0.000000	0.000000	0.002602

Estimated S matrix:

0.036252	0.000000	0.000000
0.002816	0.021517	0.000000
-0.000144	-0.000157	0.002602

Estimated F matrix:

0.039899	0.005461	-0.007451
0.009306	0.013702	-0.000825
-0.008713	-0.002569	0.019574

Table 8.46. *Philippines_Structural Var Estimates*

Structural VAR Estimates
Date: 06/09/20 Time: 13:50
Sample (adjusted): 1999Q3 2018Q4
Included observations: 78 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)
Convergence achieved after 10 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I

A =			
	1	0	0
	C(1)	1	0
	C(2)	C(3)	1
B =			
	C(4)	0	0
	0	C(5)	0
	0	0	C(6)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.010636	0.364312	0.029195	0.9767
C(2)	-0.015822	0.009819	-1.611403	0.1071
C(3)	-0.000742	0.003052	-0.243062	0.8080
C(4)	0.036283	0.002905	12.48999	0.0000
C(5)	0.116742	0.009347	12.48999	0.0000
C(6)	0.003146	0.000252	12.49000	0.0000
Log likelihood	543.5737			

Estimated A matrix:		
1.000000	0.000000	0.000000
0.010636	1.000000	0.000000
-0.015822	-0.000742	1.000000
Estimated B matrix:		
0.036283	0.000000	0.000000
0.000000	0.116742	0.000000
0.000000	0.000000	0.003146
Estimated S matrix:		
0.036283	0.000000	0.000000
-0.000386	0.116742	0.000000
0.000574	8.66E-05	0.003146
Estimated F matrix:		
0.205109	-0.020969	0.017126
0.023610	0.043602	-0.030341
0.014990	0.002344	0.019942

Table 8.47. *Russia_Structural Var Estimates*

Structural VAR Estimates
Date: 06/09/20 Time: 16:51
Sample (adjusted): 1998Q4 2018Q4
Included observations: 81 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)
Convergence achieved after 11 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I

A =

1	0	0
C(1)	1	0
C(2)	C(3)	1

B =

C(4)	0	0
0	C(5)	0
0	0	C(6)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.006417	0.008085	-0.793648	0.4274
C(2)	0.000528	0.001548	0.341249	0.7329
C(3)	-0.011930	0.021190	-0.563015	0.5734
C(4)	0.232296	0.018251	12.72792	0.0000
C(5)	0.016903	0.001328	12.72792	0.0000
C(6)	0.003224	0.000253	12.72792	0.0000
Log likelihood	568.6579			

Estimated A matrix:

1.000000	0.000000	0.000000
-0.006417	1.000000	0.000000
0.000528	-0.011930	1.000000

Estimated B matrix:

0.232296	0.000000	0.000000
0.000000	0.016903	0.000000
0.000000	0.000000	0.003224

Estimated S matrix:

0.232296	0.000000	0.000000
0.001491	0.016903	0.000000
-0.000105	0.000202	0.003224

Estimated F matrix:

0.235676	-0.021855	0.108286
0.008464	0.045111	-0.005545
-0.008484	-0.002150	0.017425

Table 8.48. *Singapore_Structural Var Estimates*

Structural VAR Estimates
Date: 06/09/20 Time: 17:20
Sample (adjusted): 1999Q3 2018Q4
Included observations: 78 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)
Convergence achieved after 10 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I

A =

1	0	0
C(1)	1	0
C(2)	C(3)	1

B =

C(4)	0	0
0	C(5)	0
0	0	C(6)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.026875	0.095578	0.281184	0.7786
C(2)	-0.022110	0.013485	-1.639567	0.1011
C(3)	-0.013981	0.015967	-0.875606	0.3812
C(4)	0.023077	0.001848	12.48999	0.0000
C(5)	0.019480	0.001560	12.49000	0.0000
C(6)	0.002747	0.000220	12.49000	0.0000
Log likelihood	729.1205			

Estimated A matrix:

1.000000	0.000000	0.000000
0.026875	1.000000	0.000000
-0.022110	-0.013981	1.000000

Estimated B matrix:

0.023077	0.000000	0.000000
0.000000	0.019480	0.000000
0.000000	0.000000	0.002747

Estimated S matrix:

0.023077	0.000000	0.000000
-0.000620	0.019480	0.000000
0.000502	0.000272	0.002747

Estimated F matrix:

0.015138	0.022152	-0.016177
-0.013056	0.071745	-0.044792
0.002780	-0.015329	0.023952

Table 8.49. *Taiwan_Structural Var Estimates*

Structural VAR Estimates
Date: 06/09/20 Time: 17:56
Sample (adjusted): 2000Q2 2018Q4
Included observations: 75 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)
Convergence achieved after 16 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I

A =

1	0	0
C(1)	1	0
C(2)	C(3)	1

B =

C(4)	0	0
0	C(5)	0
0	0	C(6)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.050516	0.080493	-0.627589	0.5303
C(2)	-0.009960	0.005977	-1.666397	0.0956
C(3)	-0.007634	0.008552	-0.892610	0.3721
C(4)	0.045052	0.003679	12.24745	0.0000
C(5)	0.031405	0.002564	12.24745	0.0000
C(6)	0.002326	0.000190	12.24745	0.0000

Log likelihood 627.5641

Estimated A matrix:

1.000000	0.000000	0.000000
-0.050516	1.000000	0.000000
-0.009960	-0.007634	1.000000

Estimated B matrix:

0.045052	0.000000	0.000000
0.000000	0.031405	0.000000
0.000000	0.000000	0.002326

Estimated S matrix:

0.045052	0.000000	0.000000
0.002276	0.031405	0.000000
0.000466	0.000240	0.002326

Estimated F matrix:

0.012261	0.005887	-0.025404
0.005838	0.082024	-0.002888
0.006820	-0.002796	0.019172

Table 8.50. *Thailand_Structural Var Estimates*

Structural VAR Estimates
Date: 06/10/20 Time: 11:40
Sample (adjusted): 1999Q3 2018Q4
Included observations: 78 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)
Convergence achieved after 10 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I

A =

1	0	0
C(1)	1	0
C(2)	C(3)	1

B =

C(4)	0	0
0	C(5)	0
0	0	C(6)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.362222	0.545662	-0.663821	0.5068
C(2)	0.000377	0.008679	0.043415	0.9654
C(3)	-0.001674	0.001796	-0.931987	0.3513
C(4)	0.038920	0.003116	12.48999	0.0000
C(5)	0.187561	0.015017	12.48999	0.0000
C(6)	0.002975	0.000238	12.49000	0.0000
Log likelihood	505.4867			

Estimated A matrix:

1.000000	0.000000	0.000000
-0.362222	1.000000	0.000000
0.000377	-0.001674	1.000000

Estimated B matrix:

0.038920	0.000000	0.000000
0.000000	0.187561	0.000000
0.000000	0.000000	0.002975

Estimated S matrix:

0.038920	0.000000	0.000000
0.014098	0.187561	0.000000
8.93E-06	0.000314	0.002975

Estimated F matrix:

0.162963	0.009669	0.207738
0.027581	0.071618	-0.019476
0.007130	0.001270	0.026317

Table 8.51. *Turkey_Structural Var Estimates*

Structural VAR Estimates
Date: 06/10/20 Time: 09:01
Sample (adjusted): 2000Q1 2018Q4
Included observations: 76 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)
Convergence achieved after 15 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I
A =

1	0	0
C(1)	1	0
C(2)	C(3)	1

B =

C(4)	0	0
0	C(5)	0
0	0	C(6)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.065932	0.036707	1.796162	0.0725
C(2)	-0.006589	0.003861	-1.706410	0.0879
C(3)	-0.021282	0.011818	-1.800806	0.0717
C(4)	0.061453	0.004985	12.32883	0.0000
C(5)	0.019666	0.001595	12.32883	0.0000
C(6)	0.002026	0.000164	12.32883	0.0000
Log likelihood	658.4048			

Estimated A matrix:		
1.000000	0.000000	0.000000
0.065932	1.000000	0.000000
-0.006589	-0.021282	1.000000
Estimated B matrix:		
0.061453	0.000000	0.000000
0.000000	0.019666	0.000000
0.000000	0.000000	0.002026
Estimated S matrix:		
0.061453	0.000000	0.000000
-0.004052	0.019666	0.000000
0.000319	0.000419	0.002026
Estimated F matrix:		
0.263831	-0.083798	0.124841
-0.016269	0.037700	-0.003641
0.001723	-0.005967	0.021185

Table 8.52. *UK_Structural Var Estimates*

Structural VAR Estimates
Date: 06/10/20 Time: 09:55
Sample (adjusted): 1998Q4 2018Q4
Included observations: 81 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)
Convergence achieved after 11 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I

A =

1	0	0
C(1)	1	0
C(2)	C(3)	1

B =

C(4)	0	0
0	C(5)	0
0	0	C(6)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.019609	0.032173	0.609504	0.5422
C(2)	-0.027747	0.012979	-2.137854	0.0325
C(3)	-0.018659	0.044722	-0.417219	0.6765
C(4)	0.027198	0.002137	12.72792	0.0000
C(5)	0.007875	0.000619	12.72792	0.0000
C(6)	0.003170	0.000249	12.72792	0.0000

Log likelihood 805.6187

Estimated A matrix:

1.000000	0.000000	0.000000
0.019609	1.000000	0.000000
-0.027747	-0.018659	1.000000

Estimated B matrix:

0.027198	0.000000	0.000000
0.000000	0.007875	0.000000
0.000000	0.000000	0.003170

Estimated S matrix:

0.027198	0.000000	0.000000
-0.000533	0.007875	0.000000
0.000745	0.000147	0.003170

Estimated F matrix:

0.126941	-0.002739	0.011680
0.001516	0.016954	0.008756
0.001144	-0.005230	0.017427

Table 8.53. *USA_Structural Var Estimates*

Structural VAR Estimates
Date: 06/10/20 Time: 10:07
Sample (adjusted): 1999Q4 2018Q4
Included observations: 77 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)
Convergence achieved after 12 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I

A =

1	0	0
C(1)	1	0
C(2)	C(3)	1

B =

C(4)	0	0
0	C(5)	0
0	0	C(6)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.128954	0.059633	2.162480	0.0306
C(2)	-0.006163	0.024864	-0.247880	0.8042
C(3)	0.014129	0.046136	0.306255	0.7594
C(4)	0.014203	0.001144	12.40967	0.0000
C(5)	0.007432	0.000599	12.40968	0.0000
C(6)	0.003009	0.000242	12.40967	0.0000

Log likelihood 824.3412

Estimated A matrix:

1.000000	0.000000	0.000000
0.128954	1.000000	0.000000
-0.006163	0.014129	1.000000

Estimated B matrix:

0.014203	0.000000	0.000000
0.000000	0.007432	0.000000
0.000000	0.000000	0.003009

Estimated S matrix:

0.014203	0.000000	0.000000
-0.001831	0.007432	0.000000
0.000113	-0.000105	0.003009

Estimated F matrix:

0.042228	-0.028055	0.021190
-0.004416	0.018148	-0.007997
0.005132	-0.015521	0.019455

Table 8.54. *Vietnam_Structural Var Estimates*

Structural VAR Estimates
Date: 06/10/20 Time: 11:36
Sample (adjusted): 2000Q1 2018Q4
Included observations: 76 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)
Convergence achieved after 9 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I

A =

1	0	0
C(1)	1	0
C(2)	C(3)	1

B =

C(4)	0	0
0	C(5)	0
0	0	C(6)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.075758	0.081896	0.925051	0.3549
C(2)	-0.003685	0.001400	-2.631156	0.0085
C(3)	-0.001597	0.001951	-0.818730	0.4129
C(4)	0.206480	0.016748	12.32883	0.0000
C(5)	0.147417	0.011957	12.32883	0.0000
C(6)	0.002507	0.000203	12.32883	0.0000
Log likelihood	397.0212			

Estimated A matrix:

1.000000	0.000000	0.000000
0.075758	1.000000	0.000000
-0.003685	-0.001597	1.000000

Estimated B matrix:

0.206480	0.000000	0.000000
0.000000	0.147417	0.000000
0.000000	0.000000	0.002507

Estimated S matrix:

0.206480	0.000000	0.000000
-0.015642	0.147417	0.000000
0.000736	0.000235	0.002507

Estimated F matrix:

0.135708	-0.084498	0.093374
-0.017710	0.066854	-0.020317
0.000757	0.001301	0.019385

Table 8.55. *Australia_Variance Decomposition*

Variance Decomposition of HA_AUSTRALIA:				
Period	S.E.	HA_AUST...	TO_AUST...	DLNGDP
1	0.029023	100.0000	0.000000	0.000000
2	0.037987	96.20985	0.066491	3.723657
3	0.043690	94.51472	0.150617	5.334658
4	0.046457	93.66115	1.233708	5.105140
5	0.047631	91.97893	2.026201	5.994865
6	0.048177	90.32946	2.220069	7.450476
7	0.048251	90.06949	2.218503	7.712005
8	0.048306	90.02413	2.279706	7.696164
9	0.048430	89.73155	2.334180	7.934265
10	0.048568	89.27748	2.374963	8.347555
Variance Decomposition of TO_AUSTRALIA:				
Period	S.E.	HA_AUST...	TO_AUST...	DLNGDP
1	0.020419	1.205372	98.79463	0.000000
2	0.024171	1.890497	97.86893	0.240568
3	0.026312	2.489756	94.46788	3.042364
4	0.027437	2.295201	90.23910	7.465701
5	0.028858	3.282228	86.00440	10.71337
6	0.030189	5.690674	83.31634	10.99299
7	0.030497	7.513835	81.64637	10.83979
8	0.030659	7.909488	81.20107	10.88944
9	0.030883	7.801275	81.26218	10.93655
10	0.030930	7.984433	81.08202	10.93355
Variance Decomposition of DLNGDP:				
Period	S.E.	HA_AUST...	TO_AUST...	DLNGDP
1	0.003321	0.812130	1.944903	97.24297
2	0.004841	3.516068	1.699179	94.78475
3	0.005960	5.457002	1.148656	93.39434
4	0.006400	8.004104	1.039827	90.95607
5	0.006592	9.241599	1.000519	89.75788
6	0.006665	9.676843	0.980217	89.34294
7	0.006713	9.653088	1.010369	89.33654
8	0.006760	9.532161	0.997637	89.47020
9	0.006810	9.391830	0.990339	89.61783
10	0.006858	9.262790	0.991164	89.74605
Cholesky Ordering: HA_AUSTRALIA TO_AUSTRALIA DLNGDP				

Table 8.56. *Canada_Variance Decomposition*

Variance Decomposition of HA_CANADA:				
Period	S.E.	HA_CANADA	TO_CANA...	DLNGDP
1	0.023623	100.0000	0.000000	0.000000
2	0.032839	98.50394	0.124004	1.372056
3	0.037931	83.83253	0.634380	15.53309
4	0.038971	79.75891	1.451666	18.78943
5	0.039401	78.42868	1.439395	20.13192
6	0.039566	78.21729	1.550384	20.23233
7	0.039927	76.82589	1.789107	21.38500
8	0.040631	74.32427	1.746396	23.92934
9	0.041595	71.13800	1.743971	27.11803
10	0.042260	68.96324	1.891778	29.14498
Variance Decomposition of TO_CANADA:				
Period	S.E.	HA_CANADA	TO_CANA...	DLNGDP
1	0.011147	12.93366	87.06634	0.000000
2	0.012958	18.66765	81.22867	0.103683
3	0.013074	19.07996	80.78317	0.136870
4	0.013776	19.24245	80.63225	0.125307
5	0.014942	20.47500	78.39216	1.132845
6	0.015336	20.98543	75.80723	3.207349
7	0.015499	20.56413	75.43587	4.000003
8	0.015893	20.94398	75.24483	3.811192
9	0.016198	21.81994	74.15981	4.020247
10	0.016262	22.00993	73.58106	4.409012
Variance Decomposition of DLNGDP:				
Period	S.E.	HA_CANADA	TO_CANA...	DLNGDP
1	0.003229	0.001320	3.325475	96.67320
2	0.004756	1.136527	5.720109	93.14336
3	0.005943	2.203179	3.759414	94.03741
4	0.006430	2.452673	3.212708	94.33462
5	0.006681	2.274957	3.344565	94.38048
6	0.006813	2.368280	3.571243	94.06048
7	0.006914	2.582541	3.507759	93.90970
8	0.007008	2.669784	3.465708	93.86451
9	0.007103	2.638415	3.551913	93.80967
10	0.007177	2.588154	3.600516	93.81133
Cholesky Ordering: HA_CANADA TO_CANADA DLNGDP				

Table 8.57. *China_Variance Decomposition*

Variance Decomposition of HA_CHINA:				
Period	S.E.	HA_CHINA	TO_CHINA	DLNGDP
1	0.030524	100.0000	0.000000	0.000000
2	0.041675	94.28140	1.077069	4.641531
3	0.047064	86.81472	1.724297	11.46099
4	0.051132	87.29152	2.404086	10.30439
5	0.054403	88.31881	2.308769	9.372424
6	0.056797	88.23525	2.124822	9.639933
7	0.058713	86.49217	2.106325	11.40151
8	0.060602	83.71306	1.992290	14.29465
9	0.062409	81.01624	1.958590	17.02517
10	0.063984	78.69640	1.863467	19.44013
Variance Decomposition of TO_CHINA:				
Period	S.E.	HA_CHINA	TO_CHINA	DLNGDP
1	0.217236	0.616504	99.38350	0.000000
2	0.228384	0.559971	99.32123	0.118799
3	0.231526	1.043064	98.83150	0.125440
4	0.233464	1.148374	97.72041	1.131214
5	0.244920	1.054386	97.84937	1.096247
6	0.246731	1.117722	97.68839	1.193886
7	0.247477	1.266816	97.27896	1.454219
8	0.247953	1.363407	97.03537	1.601226
9	0.249524	1.402766	97.01426	1.582970
10	0.249777	1.443172	96.97437	1.582462
Variance Decomposition of DLNGDP:				
Period	S.E.	HA_CHINA	TO_CHINA	DLNGDP
1	0.003038	0.020213	1.694236	98.28555
2	0.004578	1.383998	0.978324	97.63768
3	0.005704	0.986375	0.630122	98.38350
4	0.006118	3.232379	0.760866	96.00676
5	0.006301	5.237044	0.923084	93.83987
6	0.006380	6.232909	0.951295	92.81580
7	0.006413	6.497582	1.019338	92.48308
8	0.006439	6.523246	1.016399	92.46035
9	0.006473	6.473106	1.021108	92.50579
10	0.006515	6.394229	1.021064	92.58471
Cholesky Ordering: HA_CHINA TO_CHINA DLNGDP				

Table 8.58. *France_Variance Decomposition*

Variance Decomposition of HA_FRANCE:				
Period	S.E.	HA_FRAN...	TO_FRAN...	DLNGDP
1	0.193277	100.0000	0.000000	0.000000
2	0.205387	94.12314	2.676112	3.200753
3	0.205854	93.97169	2.674586	3.353729
4	0.206892	93.33329	2.734975	3.931739
5	0.207184	93.08410	2.728086	4.187818
6	0.207479	92.86437	2.724422	4.411206
7	0.207647	92.73087	2.720532	4.548600
8	0.207767	92.63909	2.717970	4.642936
9	0.207842	92.58044	2.716255	4.703307
10	0.207892	92.54220	2.715161	4.742643
Variance Decomposition of TO_FRANCE:				
Period	S.E.	HA_FRAN...	TO_FRAN...	DLNGDP
1	0.010026	3.250264	96.74974	0.000000
2	0.012379	5.562528	90.89307	3.544407
3	0.013156	5.359511	89.44414	5.196349
4	0.013384	5.299663	89.11852	5.581814
5	0.013434	5.281487	89.09976	5.618748
6	0.013443	5.283291	89.10562	5.611085
7	0.013446	5.285985	89.08569	5.628324
8	0.013449	5.288029	89.05216	5.659809
9	0.013451	5.289489	89.02029	5.690218
10	0.013453	5.290678	88.99569	5.713629
Variance Decomposition of DLNGDP:				
Period	S.E.	HA_FRAN...	TO_FRAN...	DLNGDP
1	0.003325	1.743037	5.676110	92.58085
2	0.004871	1.581927	8.161545	90.25653
3	0.005787	2.417605	7.578303	90.00409
4	0.006290	3.020206	6.932293	90.04750
5	0.006573	3.505346	6.442058	90.05260
6	0.006734	3.830666	6.145823	90.02351
7	0.006828	4.045644	5.976672	89.97768
8	0.006886	4.182056	5.880858	89.93709
9	0.006921	4.268212	5.824982	89.90681
10	0.006943	4.322396	5.791157	89.88645
Cholesky Ordering: HA_FRANCE TO_FRANCE DLNGDP				

Table 8.59. *Germany_Variance Decomposition*

Variance Decomposition of HA_GERMANY:				
Period	S.E.	HA_GERM...	TO_GER...	DLNGDP
1	0.028644	100.0000	0.000000	0.000000
2	0.046758	99.16018	0.747220	0.092598
3	0.060955	95.46378	4.319074	0.217146
4	0.067659	95.27077	4.297337	0.431890
5	0.069360	94.24409	4.389500	1.366407
6	0.071159	93.08705	4.179280	2.733669
7	0.072681	92.14516	4.493718	3.361125
8	0.073428	92.09555	4.568449	3.336006
9	0.074097	90.90026	5.422465	3.677275
10	0.075248	88.64863	6.621079	4.730295
Variance Decomposition of TO_GERMANY:				
Period	S.E.	HA_GERM...	TO_GER...	DLNGDP
1	0.007652	2.057667	97.94233	0.000000
2	0.010552	2.851041	97.02625	0.122707
3	0.012231	8.091958	90.97331	0.934737
4	0.012995	11.84234	84.25138	3.906278
5	0.013341	11.62514	80.66750	7.707361
6	0.013558	11.27562	79.29892	9.425460
7	0.013681	11.29055	79.06018	9.649275
8	0.013744	11.18902	79.18075	9.630234
9	0.013781	11.18434	78.79548	10.02018
10	0.013926	11.14631	77.18083	11.67285
Variance Decomposition of DLNGDP:				
Period	S.E.	HA_GERM...	TO_GER...	DLNGDP
1	0.003133	0.355117	0.680370	98.96451
2	0.004479	0.232937	0.392180	99.37488
3	0.005602	0.151780	0.274718	99.57350
4	0.006060	0.343195	0.366519	99.29029
5	0.006247	1.570978	2.271732	96.15729
6	0.006323	1.678238	3.411009	94.91075
7	0.006414	1.891100	5.244315	92.86459
8	0.006562	3.561663	5.466822	90.97151
9	0.006769	5.660560	5.235380	89.10406
10	0.006949	6.181477	5.044422	88.77410
Cholesky Ordering: HA_GERMANY TO_GERMANY DLNGDP				

Table 8.60. *Hong Kong_Variance Decomposition*

Period	S.E.	HA_HONG...	TO_HON...	DLNGDP
Variance Decomposition of HA_HONGKONG:				
1	0.072946	100.0000	0.000000	0.000000
2	0.087319	99.95092	0.029769	0.019313
3	0.100603	95.04381	4.663285	0.292904
4	0.104224	91.32214	8.277003	0.400856
5	0.105990	90.40770	8.493808	1.098494
6	0.106726	90.38602	8.464269	1.149713
7	0.109675	88.02550	10.87829	1.096213
8	0.111320	86.91334	10.61473	2.471935
9	0.113167	86.35120	10.28403	3.364768
10	0.114926	85.65346	9.973497	4.373039
Variance Decomposition of TO_HONGKONG:				
Period	S.E.	HA_HONG...	TO_HON...	DLNGDP
1	0.023628	0.029525	99.97047	0.000000
2	0.031189	0.258222	96.91018	2.831596
3	0.035888	0.628487	93.80261	5.568898
4	0.036472	0.621399	92.76007	6.618529
5	0.036743	2.014482	91.46252	6.523002
6	0.037300	3.842128	89.80996	6.347910
7	0.038016	5.521751	88.00365	6.474604
8	0.038339	5.668664	87.85873	6.472603
9	0.038777	7.516235	86.13629	6.347476
10	0.040073	12.19054	81.38155	6.427915
Variance Decomposition of DLNGDP:				
Period	S.E.	HA_HONG...	TO_HON...	DLNGDP
1	0.002717	0.066170	0.023720	99.91011
2	0.004117	0.198601	2.083626	97.71777
3	0.005093	0.148675	1.664635	98.18669
4	0.005374	0.137187	1.495697	98.36712
5	0.005404	0.684263	1.812369	97.50337
6	0.005435	1.694862	1.920308	96.38483
7	0.005530	4.767283	2.090741	93.14198
8	0.005600	6.984458	2.042630	90.97291
9	0.005687	9.067169	2.274392	88.65844
10	0.005809	9.902551	4.362398	85.73505

Cholesky Ordering: HA_HONGKONG TO_HONGKONG DLNGDP

Table 8.61. *Hong Kong_Variance Decomposition*

Variance Decomposition of HA_INDONESIA:				
Period	S.E.	HA_INDO...	TO_INDO...	DLNGDP
1	0.042249	100.0000	0.000000	0.000000
2	0.061087	99.91537	0.074798	0.009828
3	0.077285	99.34180	0.358195	0.300000
4	0.085554	97.39071	1.061999	1.547292
5	0.089855	93.86401	2.010501	4.125494
6	0.092275	89.48886	2.935293	7.575844
7	0.094250	85.96155	3.461669	10.57678
8	0.095858	84.13217	3.608337	12.25949
9	0.096768	83.65609	3.578999	12.76491
10	0.097052	83.67593	3.561061	12.76301
Variance Decomposition of TO_INDONESIA:				
Period	S.E.	HA_INDO...	TO_INDO...	DLNGDP
1	0.040348	0.003402	99.99660	0.000000
2	0.043287	1.984452	97.87763	0.137915
3	0.044167	1.906825	97.17851	0.914660
4	0.046284	2.334349	96.72718	0.938466
5	0.047378	2.232095	96.86112	0.906788
6	0.048213	2.376575	96.35113	1.272297
7	0.048341	2.364376	95.92804	1.707583
8	0.048526	2.353167	95.67319	1.973642
9	0.048707	2.370706	95.62526	2.004031
10	0.048713	2.379756	95.61671	2.003537
Variance Decomposition of DLNGDP:				
Period	S.E.	HA_INDO...	TO_INDO...	DLNGDP
1	0.003147	7.017149	0.158458	92.82439
2	0.004516	14.79794	2.011146	83.19091
3	0.005454	15.71174	6.146363	78.14190
4	0.006109	19.46461	9.218067	71.31732
5	0.006517	22.93282	10.40099	66.66619
6	0.006784	26.75165	10.10516	63.14319
7	0.006951	29.46344	9.663222	60.87334
8	0.007047	30.99745	9.402068	59.60048
9	0.007089	31.53869	9.300913	59.16040
10	0.007107	31.56182	9.324542	59.11364
Cholesky Ordering: HA_INDONESIA TO_INDONESIA DLNGDP				

Table 8.62. *Japan_Variance Decomposition*

Variance Decomposition of HA_JAPAN:				
Period	S.E.	HA_JAPAN	TO_JAPAN	DLNGDP
1	0.030841	100.0000	0.000000	0.000000
2	0.045785	99.81574	0.019127	0.165135
3	0.053941	99.68110	0.042682	0.276217
4	0.058142	99.61063	0.072825	0.316547
5	0.060224	99.56812	0.109816	0.322062
6	0.061228	99.53397	0.148473	0.317555
7	0.061702	99.50498	0.181868	0.313153
8	0.061921	99.48310	0.205860	0.311044
9	0.062019	99.46887	0.220412	0.310716
10	0.062061	99.46073	0.227976	0.311291
Variance Decomposition of TO_JAPAN:				
Period	S.E.	HA_JAPAN	TO_JAPAN	DLNGDP
1	0.021238	0.556587	99.44341	0.000000
2	0.032609	4.250232	95.64002	0.109750
3	0.038396	7.914194	91.52400	0.561811
4	0.040733	10.46665	88.22464	1.308710
5	0.041507	11.75455	86.13149	2.113954
6	0.041772	12.18369	85.06323	2.753076
7	0.041907	12.24470	84.60037	3.154929
8	0.041993	12.21887	84.41099	3.370133
9	0.042039	12.19577	84.32840	3.475833
10	0.042060	12.18611	84.28701	3.526880
Variance Decomposition of DLNGDP:				
Period	S.E.	HA_JAPAN	TO_JAPAN	DLNGDP
1	0.003227	0.175855	2.001156	97.82299
2	0.004721	1.205322	7.728671	91.06601
3	0.005606	2.117620	11.64590	86.23648
4	0.006103	3.053991	13.29170	83.65431
5	0.006375	4.137356	13.52869	82.33395
6	0.006535	5.344984	13.21904	81.43598
7	0.006640	6.554025	12.84351	80.60246
8	0.006715	7.628886	12.55743	79.81368
9	0.006769	8.487115	12.36566	79.14722
10	0.006807	9.113334	12.23982	78.64684
Cholesky Ordering: HA_JAPAN TO_JAPAN DLNGDP				

Table 8.63. *Malaysia_Variance Decomposition*

Variance Decomposition of D(HA_MALAYSIA):

Period	S.E.	D(HA_MA...	D(TO_MA...	DLNGDP
1	0.036252	100.0000	0.000000	0.000000
2	0.040471	92.54816	0.819172	6.632672
3	0.040892	90.78175	1.276640	7.941608
4	0.041298	89.01632	3.180516	7.803167
5	0.044983	79.79519	4.192223	16.01258
6	0.046680	75.79120	9.220447	14.98835
7	0.047340	76.37873	9.047684	14.57358
8	0.047432	76.18330	9.132216	14.68448
9	0.047967	74.82297	10.55342	14.62361
10	0.048488	75.06624	10.46272	14.47104

Variance Decomposition of D(TO_MALAYSIA):

Period	S.E.	D(HA_MA...	D(TO_MA...	DLNGDP
1	0.021700	1.683517	98.31648	0.000000
2	0.025401	27.00687	72.99233	0.000801
3	0.025770	28.04857	71.05585	0.895577
4	0.025834	27.91598	70.94042	1.143597
5	0.027032	27.32930	71.26913	1.401577
6	0.027598	29.30502	69.28558	1.409401
7	0.027987	31.16603	67.40897	1.425002
8	0.028518	32.05819	66.30050	1.641316
9	0.028679	31.87641	65.94324	2.180348
10	0.028805	31.83911	65.62424	2.536654

Variance Decomposition of DLNGDP:

Period	S.E.	D(HA_MA...	D(TO_MA...	DLNGDP
1	0.002611	0.305464	0.359695	99.33484
2	0.003962	0.368491	1.055269	98.57624
3	0.004984	0.232840	0.806228	98.96093
4	0.005319	0.205319	0.708206	99.08647
5	0.005410	0.215243	1.420582	98.36418
6	0.005559	4.125904	1.553369	94.32073
7	0.005792	11.29011	1.452662	87.25723
8	0.006096	18.28277	1.675913	80.04132
9	0.006295	21.58550	1.937646	76.47685
10	0.006407	21.52271	2.073724	76.40356

Cholesky Ordering: D(HA_MALAYSIA) D(TO_MALAYSIA) DLNGDP

Table 8.64. *Philippines_Variance Decomposition*

Variance Decomposition of HA_PHLIPPINES:				
Period	S.E.	HA_PHLIP...	TO_PHILI...	DLNGDP
1	0.036283	100.0000	0.000000	0.000000
2	0.051785	99.67750	0.276129	0.046375
3	0.063087	99.56826	0.280271	0.151467
4	0.069154	98.66025	0.928447	0.411306
5	0.070566	97.87689	1.564367	0.558740
6	0.070847	97.60050	1.702426	0.697071
7	0.071063	97.01748	1.692205	1.290316
8	0.071116	96.88870	1.689684	1.421619
9	0.071181	96.80886	1.686759	1.504377
10	0.071467	96.46671	1.685680	1.847606
Variance Decomposition of TO_PHILIPPINES:				
Period	S.E.	HA_PHLIP...	TO_PHILI...	DLNGDP
1	0.116743	0.001093	99.99891	0.000000
2	0.127435	0.058270	99.93107	0.010656
3	0.129422	0.782248	98.39063	0.827123
4	0.133067	1.320084	97.21988	1.460031
5	0.150910	8.583338	88.59281	2.823857
6	0.156081	8.208555	89.09757	2.693871
7	0.157212	8.347024	88.74471	2.908261
8	0.160798	9.429575	87.01620	3.554224
9	0.164732	9.394610	86.32727	4.278121
10	0.167684	9.728230	85.97545	4.296317
Variance Decomposition of DLNGDP:				
Period	S.E.	HA_PHLIP...	TO_PHILI...	DLNGDP
1	0.003199	3.216316	0.073251	96.71043
2	0.004423	6.544653	0.099231	93.35612
3	0.005428	10.54688	0.258814	89.19430
4	0.005944	17.39136	0.427873	82.18077
5	0.006101	20.62617	0.839281	78.53455
6	0.006172	21.90772	1.228764	76.86352
7	0.006184	22.07571	1.245006	76.67929
8	0.006216	21.85792	1.236566	76.90551
9	0.006298	21.50887	1.205241	77.28589
10	0.006397	21.67286	1.182212	77.14493
Cholesky Ordering: HA_PHLIPPINES TO_PHILIPPINES DLNGDP				

Table 8.65. *Russia_Variance Decomposition*

Variance Decomposition of HA_RUSSIA:				
Period	S.E.	HA_RUSSIA	TO_RUSSIA	DLNGDP
1	0.232296	100.0000	0.000000	0.000000
2	0.234074	99.17670	0.758843	0.064454
3	0.235791	98.57053	0.832771	0.596700
4	0.236481	97.99663	0.830755	1.172611
5	0.237122	97.48371	0.883486	1.632803
6	0.237606	97.14173	0.927594	1.930671
7	0.237905	96.95749	0.935949	2.106557
8	0.238090	96.86060	0.934796	2.204601
9	0.238213	96.80019	0.942170	2.257636
10	0.238293	96.76052	0.953541	2.285938
Variance Decomposition of TO_RUSSIA:				
Period	S.E.	HA_RUSSIA	TO_RUSSIA	DLNGDP
1	0.016969	0.771626	99.22837	0.000000
2	0.025976	2.388556	97.56461	0.046837
3	0.029189	2.534366	97.30254	0.163097
4	0.029643	2.569355	97.12699	0.303653
5	0.029679	2.563384	97.02587	0.410749
6	0.029922	2.542827	96.99846	0.458717
7	0.030147	2.520966	97.00696	0.472079
8	0.030228	2.509480	97.01524	0.475284
9	0.030234	2.509687	97.01380	0.476510
10	0.030238	2.514963	97.00819	0.476852
Variance Decomposition of DLNGDP:				
Period	S.E.	HA_RUSSIA	TO_RUSSIA	DLNGDP
1	0.003232	0.105408	0.389404	99.50519
2	0.004651	2.739388	0.194835	97.06578
3	0.005566	7.681748	0.417631	91.90062
4	0.006137	11.18135	0.811455	88.00720
5	0.006483	13.44607	1.177900	85.37603
6	0.006681	14.78421	1.418025	83.79776
7	0.006789	15.54214	1.535491	82.92237
8	0.006847	15.95589	1.577803	82.46631
9	0.006876	16.17596	1.588111	82.23593
10	0.006891	16.29109	1.589165	82.11975
Cholesky Ordering: HA_RUSSIA TO_RUSSIA DLNGDP				

Table 8.66. *Singapore_Variance Decomposition*

Variance Decomposition of D(HA_SINGAPORE):

Period	S.E.	D(HA_SIN...	TO_SING...	DLNGDP
1	0.023077	100.0000	0.000000	0.000000
2	0.024861	86.53151	8.636740	4.831745
3	0.025640	85.64820	9.599317	4.752482
4	0.025697	85.34338	9.763731	4.892886
5	0.025984	84.31394	9.961480	5.724579
6	0.026209	82.88559	10.33335	6.781055
7	0.026275	82.47192	10.28491	7.243168
8	0.026339	82.09291	10.40007	7.507019
9	0.026408	81.72078	10.77178	7.507442
10	0.026454	81.43653	11.08056	7.482910

Variance Decomposition of TO_SINGAPORE:

Period	S.E.	D(HA_SIN...	TO_SING...	DLNGDP
1	0.019490	0.101262	99.89874	0.000000
2	0.022914	0.142309	99.75959	0.098106
3	0.024125	0.216694	99.55005	0.233256
4	0.024266	1.211548	98.53116	0.257288
5	0.024558	2.425048	96.20884	1.366117
6	0.024889	2.560302	93.68387	3.755824
7	0.025413	2.471744	90.68843	6.839822
8	0.025689	2.459929	89.11415	8.425921
9	0.025843	2.439334	88.64698	8.913689
10	0.025935	2.422061	88.57297	9.004972

Variance Decomposition of DLNGDP:

Period	S.E.	D(HA_SIN...	TO_SING...	DLNGDP
1	0.002806	3.195677	0.942258	95.86207
2	0.004140	1.473870	0.810798	97.71533
3	0.004974	1.520123	0.576515	97.90336
4	0.005281	2.050177	0.739022	97.21080
5	0.005473	2.293192	5.335220	92.37159
6	0.005717	2.153592	12.74741	85.09900
7	0.005958	2.010638	19.29468	78.69468
8	0.006095	2.215460	21.85361	75.93093
9	0.006181	2.506781	22.30964	75.18357
10	0.006256	2.690347	22.09707	75.21258

Cholesky Ordering: D(HA_SINGAPORE) TO_SINGAPORE DLNGDP

Table 8.67. *Taiwan_Variance Decomposition*

Variance Decomposition of D(HA_TAIWAN):

Period	S.E.	D(HA_TAI...	TO_TAIWAN	DLNGDP
1	0.045052	100.0000	0.000000	0.000000
2	0.045831	96.63260	0.966083	2.401315
3	0.047262	95.46267	1.015316	3.522012
4	0.050109	94.03812	2.793569	3.168312
5	0.053119	86.13226	2.924659	10.94308
6	0.053374	85.51652	3.033753	11.44973
7	0.053698	84.54169	3.007291	12.45102
8	0.054311	82.80064	4.875671	12.32369
9	0.054470	82.68351	4.984063	12.33242
10	0.054970	81.96189	4.904759	13.13335

Variance Decomposition of TO_TAIWAN:

Period	S.E.	D(HA_TAI...	TO_TAIWAN	DLNGDP
1	0.031488	0.522414	99.47759	0.000000
2	0.035683	0.445753	98.09193	1.462318
3	0.042356	0.593669	94.05873	5.347598
4	0.044494	0.608927	90.80259	8.588485
5	0.044997	1.150137	89.28765	9.562210
6	0.045491	1.282627	89.36152	9.355856
7	0.045589	1.345739	89.17203	9.482233
8	0.045772	1.574859	88.58007	9.845074
9	0.045852	1.580806	88.32126	10.09793
10	0.046002	1.577715	88.21146	10.21083

Variance Decomposition of DLNGDP:

Period	S.E.	D(HA_TAI...	TO_TAIWAN	DLNGDP
1	0.002384	3.821659	1.010997	95.16734
2	0.003770	9.810275	1.980706	88.20902
3	0.005197	17.85568	3.570693	78.57362
4	0.005708	18.46374	3.299386	78.23687
5	0.005817	18.03119	3.371489	78.59732
6	0.005888	18.73527	3.974016	77.29072
7	0.005906	18.65987	4.427002	76.91313
8	0.005913	18.65131	4.475346	76.87335
9	0.005942	18.77474	4.438590	76.78667
10	0.006033	18.45229	4.322372	77.22534

Cholesky Ordering: D(HA_TAIWAN) TO_TAIWAN DLNGDP

Table 8.68. *Thailand_Variance Decomposition*

Variance Decomposition of HA_THAILAND:				
Period	S.E.	HA_THAIL...	TO_THAIL...	DLNGDP
1	0.038920	100.0000	0.000000	0.000000
2	0.056257	99.84892	0.132294	0.018784
3	0.064081	96.25581	0.651359	3.092832
4	0.068195	87.09032	1.672714	11.23696
5	0.070823	82.40185	1.551064	16.04709
6	0.073403	79.60425	1.837160	18.55859
7	0.074088	79.18960	2.209877	18.60053
8	0.074181	79.18400	2.258948	18.55706
9	0.075084	79.63212	2.205228	18.16265
10	0.076580	79.88319	2.181577	17.93523

Variance Decomposition of TO_THAILAND:				
Period	S.E.	HA_THAIL...	TO_THAIL...	DLNGDP
1	0.188090	0.561772	99.43823	0.000000
2	0.212289	0.746453	99.24993	0.003619
3	0.222158	4.166803	95.82303	0.010166
4	0.224081	4.615925	95.29793	0.086145
5	0.260747	3.561326	96.19036	0.248318
6	0.272296	4.885557	94.88211	0.232335
7	0.273523	4.879540	94.77041	0.350050
8	0.275355	4.814815	94.68106	0.504126
9	0.290085	4.394915	95.14389	0.461196
10	0.293965	4.302058	95.24839	0.449556

Variance Decomposition of DLNGDP:				
Period	S.E.	HA_THAIL...	TO_THAIL...	DLNGDP
1	0.002992	0.000891	1.101316	98.89779
2	0.004189	0.088078	4.241327	95.67060
3	0.005137	2.333681	4.155618	93.51070
4	0.005495	2.489643	3.770876	93.73948
5	0.005583	2.472161	4.752793	92.77505
6	0.005614	2.449983	5.241992	92.30803
7	0.005627	2.635734	5.485026	91.87924
8	0.005646	2.717018	5.450153	91.83283
9	0.005709	3.433789	5.332727	91.23348
10	0.005857	5.169676	5.331079	89.49925

Cholesky Ordering: HA_THAILAND TO_THAILAND DLNGDP

Table 8.69. *Turkey_Variance Decomposition*

Variance Decomposition of HA_TURKEY:				
Period	S.E.	HA_TURKEY	TO_TURK...	DLNGDP
1	0.061453	100.0000	0.000000	0.000000
2	0.106052	98.71033	1.039948	0.249722
3	0.145023	95.18503	4.276062	0.538910
4	0.165896	90.60728	8.274543	1.118181
5	0.174945	87.33229	11.51579	1.151920
6	0.178341	85.09770	13.79073	1.111566
7	0.179076	84.52096	14.27553	1.203516
8	0.179669	84.05462	14.19220	1.753172
9	0.181735	82.23308	14.50461	3.262312
10	0.184232	80.01928	15.10811	4.872613
Variance Decomposition of TO_TURKEY:				
Period	S.E.	HA_TURKEY	TO_TURK...	DLNGDP
1	0.020079	4.072136	95.92786	0.000000
2	0.025920	2.456308	97.54100	0.002692
3	0.027709	3.697159	91.40969	4.893149
4	0.028695	5.719481	85.56592	8.714602
5	0.029186	6.621294	84.90239	8.476317
6	0.030111	7.385768	80.04399	12.57024
7	0.031665	11.02205	72.64742	16.33054
8	0.033048	17.65875	67.09182	15.24943
9	0.033274	18.45785	66.41732	15.12483
10	0.033348	18.37586	66.37191	15.25223
Variance Decomposition of DLNGDP:				
Period	S.E.	HA_TURKEY	TO_TURK...	DLNGDP
1	0.002093	2.317780	3.997505	93.68471
2	0.003342	7.949798	2.772296	89.27791
3	0.004402	18.18869	1.602939	80.20838
4	0.004899	15.37619	3.540546	81.08327
5	0.005102	14.17656	6.443012	79.38043
6	0.005414	18.30857	8.691065	73.00036
7	0.005603	18.59949	12.81373	68.58679
8	0.005699	18.04977	14.73631	67.21392
9	0.005753	17.87763	14.74741	67.37496
10	0.005828	18.05787	14.44306	67.49907
Cholesky Ordering: HA_TURKEY TO_TURKEY DLNGDP				

Table 8.70. *UK_Variance Decomposition*

Period	S.E.	HA_UK	TO_UK	DLNGDP
Variance Decomposition of HA_UK:				
1	0.027198	100.0000	0.000000	0.000000
2	0.041251	99.19045	0.013416	0.796133
3	0.048777	98.58293	0.011266	1.405805
4	0.052241	98.27366	0.011636	1.714699
5	0.053628	98.15370	0.022179	1.824123
6	0.054115	98.11083	0.048351	1.840821
7	0.054264	98.08763	0.078111	1.834257
8	0.054303	98.07029	0.096170	1.833540
9	0.054311	98.05627	0.101149	1.842578
10	0.054315	98.04268	0.101199	1.856123
Variance Decomposition of TO_UK:				
1	0.007893	0.456542	99.54346	0.000000
2	0.011533	2.309198	97.23353	0.457277
3	0.012762	2.907481	95.73436	1.358155
4	0.012958	2.820156	94.55013	2.629714
5	0.013112	3.570243	92.60551	3.824252
6	0.013393	5.114271	90.31329	4.572441
7	0.013627	6.383408	88.68209	4.934499
8	0.013739	6.962998	87.94561	5.091387
9	0.013770	7.089439	87.75683	5.153732
10	0.013773	7.088758	87.73781	5.173437
Variance Decomposition of DLNGDP:				
1	0.003259	5.220483	0.203248	94.57627
2	0.004669	6.167364	0.746644	93.08599
3	0.005471	6.085012	0.564130	93.35086
4	0.005972	5.840259	1.780410	92.37933
5	0.006319	5.569747	4.430397	89.99986
6	0.006549	5.302782	7.096718	87.60050
7	0.006681	5.099273	8.876323	86.02440
8	0.006747	5.041548	9.747620	85.21083
9	0.006779	5.161549	10.05967	84.77878
10	0.006798	5.402302	10.12797	84.46973

Cholesky Ordering: HA_UK TO_UK DLNGDP

Table 8.71. *USA_Variance Decomposition*

Variance Decomposition of HA_USA:				
Period	S.E.	HA_USA	TO_USA	DLNGDP
1	0.014203	100.0000	0.000000	0.000000
2	0.020498	97.29218	0.175512	2.532304
3	0.025263	87.94091	0.278770	11.78032
4	0.028051	78.40317	5.859153	15.73768
5	0.030766	66.60935	16.65150	16.73915
6	0.032110	62.66148	21.85367	15.48486
7	0.032507	61.38195	23.36233	15.25572
8	0.032623	61.57874	23.21420	15.20706
9	0.033177	62.79384	22.44575	14.76042
10	0.033667	63.62383	21.81994	14.55624
Variance Decomposition of TO_USA:				
Period	S.E.	HA_USA	TO_USA	DLNGDP
1	0.007654	5.725430	94.27457	0.000000
2	0.009465	4.595121	95.05797	0.346909
3	0.010149	5.535634	94.12487	0.339497
4	0.010271	5.529634	93.12285	1.347518
5	0.011566	14.72769	77.72601	7.546306
6	0.012115	16.05125	76.56237	7.386379
7	0.012235	15.75716	75.68158	8.561262
8	0.012487	19.08092	72.66304	8.256040
9	0.012952	21.90957	70.40109	7.689338
10	0.013393	22.85536	69.91380	7.230836
Variance Decomposition of DLNGDP:				
Period	S.E.	HA_USA	TO_USA	DLNGDP
1	0.003013	0.141715	0.121487	99.73680
2	0.004259	0.551419	4.911537	94.53704
3	0.005313	1.228774	8.893727	89.87750
4	0.005949	1.565999	16.60805	81.82595
5	0.006301	1.741856	24.00947	74.24867
6	0.006481	2.339221	26.97747	70.68330
7	0.006556	2.959915	27.86368	69.17641
8	0.006611	3.196721	27.53861	69.26467
9	0.006695	3.161746	27.11253	69.72573
10	0.006786	3.105540	27.24396	69.65050
Cholesky Ordering: HA_USA TO_USA DLNGDP				

Table 8.72. *Vietnam_Variance Decomposition*

Variance Decomposition of HA_VIETNAM:				
Period	S.E.	HA_VIETN...	TO_VIETN...	DLNGDP
1	0.206480	100.0000	0.000000	0.000000
2	0.217304	93.72184	0.127059	6.151104
3	0.223962	93.40013	0.262349	6.337520
4	0.227372	90.63560	3.189553	6.174846
5	0.236067	84.31529	9.833166	5.851548
6	0.237204	83.51127	10.51733	5.971396
7	0.243165	83.93656	10.33059	5.732851
8	0.245413	84.10087	10.21111	5.688017
9	0.255320	81.47022	13.00733	5.522453
10	0.256455	81.56805	12.95825	5.473700
Variance Decomposition of TO_VIETNAM:				
Period	S.E.	HA_VIETN...	TO_VIETN...	DLNGDP
1	0.148244	1.113411	98.88659	0.000000
2	0.162326	1.117333	98.85702	0.025644
3	0.165162	1.105529	97.24315	1.651316
4	0.165752	1.506728	96.63298	1.860297
5	0.173893	1.706127	96.30103	1.992847
6	0.180600	1.587895	96.52584	1.886261
7	0.181573	1.990439	96.12959	1.879974
8	0.182569	2.582931	95.48614	1.930924
9	0.187994	2.465155	95.67997	1.854877
10	0.190113	2.578193	95.53965	1.882157
Variance Decomposition of DLNGDP:				
Period	S.E.	HA_VIETN...	TO_VIETN...	DLNGDP
1	0.002623	7.869283	0.805486	91.32523
2	0.004014	5.459547	0.765960	93.77449
3	0.005095	7.690171	1.400419	90.90941
4	0.005478	7.588121	3.323913	89.08797
5	0.005624	7.201588	7.314934	85.48348
6	0.005686	7.502667	8.597049	83.90028
7	0.005695	7.764939	8.571157	83.66390
8	0.005773	8.192720	9.417991	82.38929
9	0.005868	8.157693	11.05938	80.78293
10	0.005951	7.961851	12.19614	79.84201
Cholesky Ordering: HA_VIETNAM TO_VIETNAM DLNGDP				

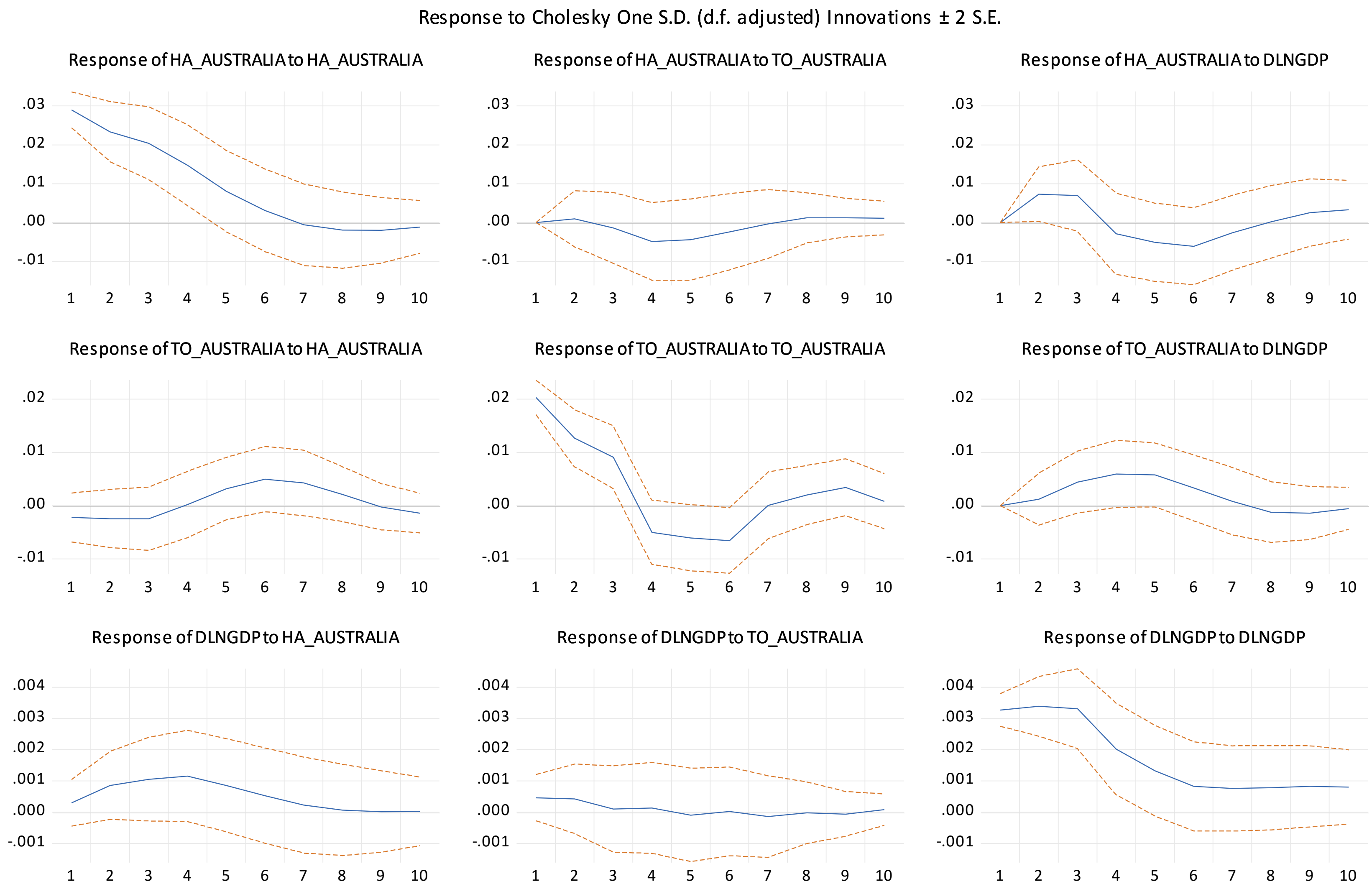

Figure 8.1. *Australia_The Result of the IRFs*

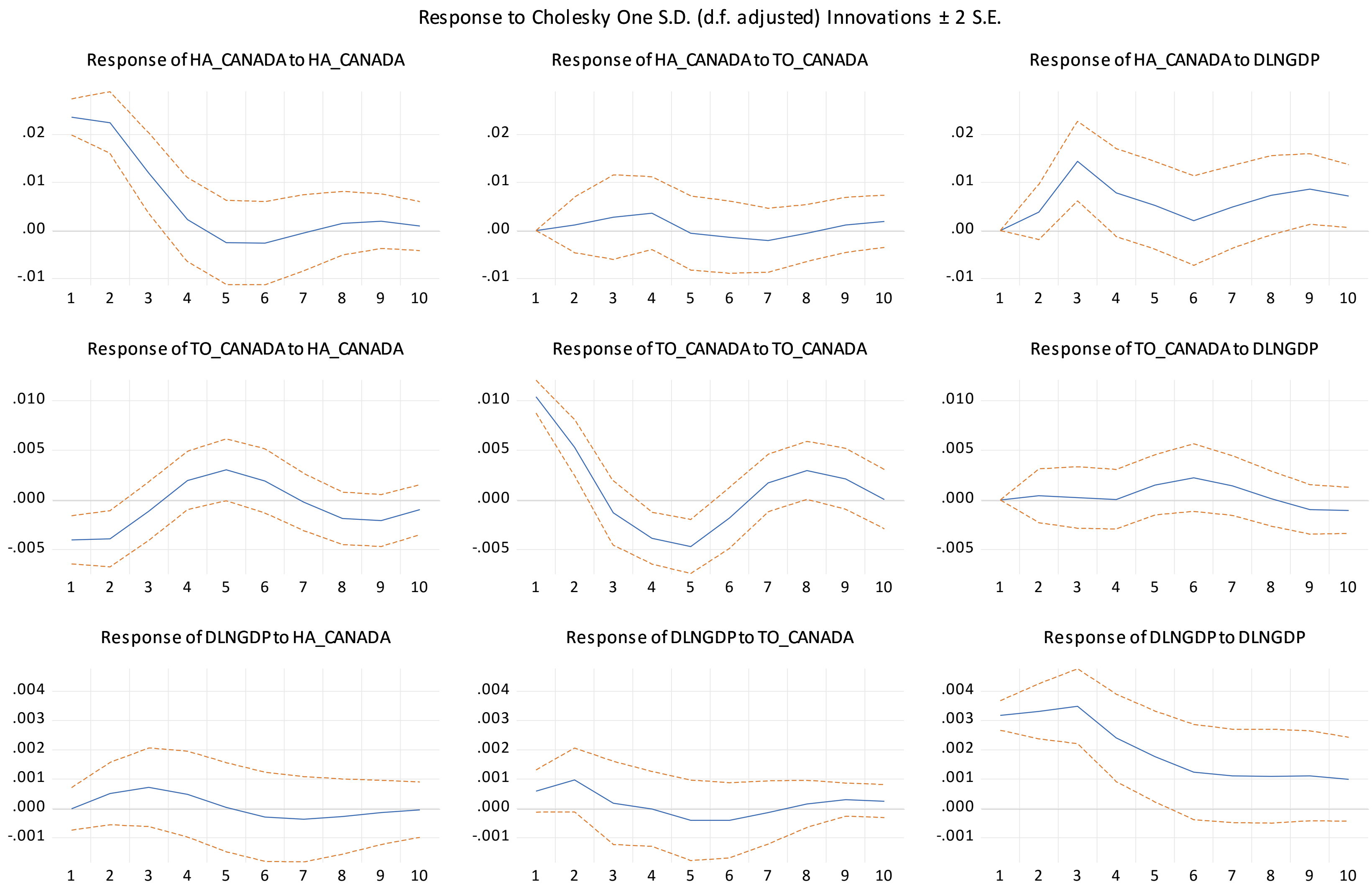

Figure 8.2. *Canada_The Result of the IRFs*

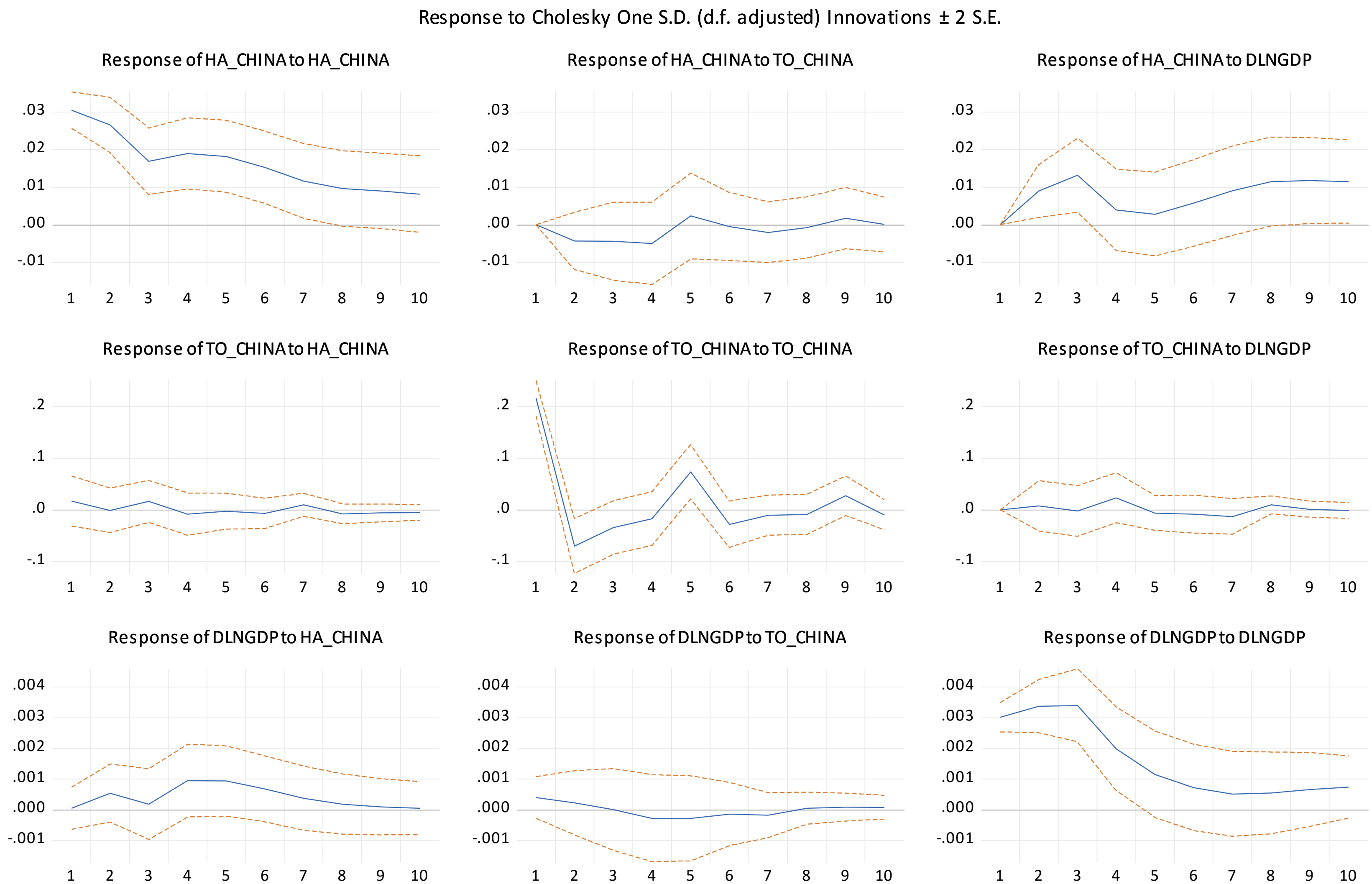

Figure 8.3. *China_The Result of the IRFs*

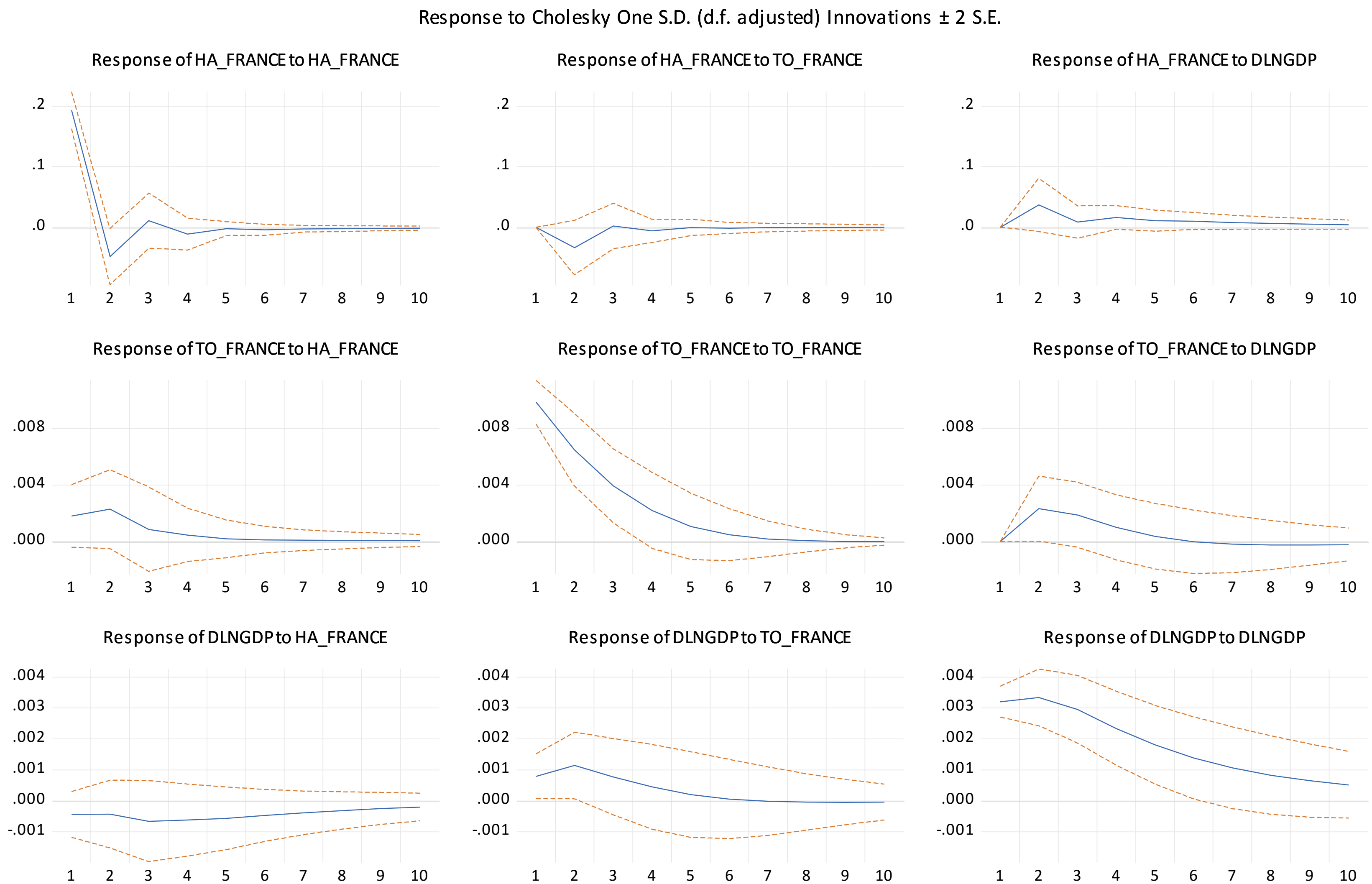

Figure 8.4. *France_The Result of the IRFs*

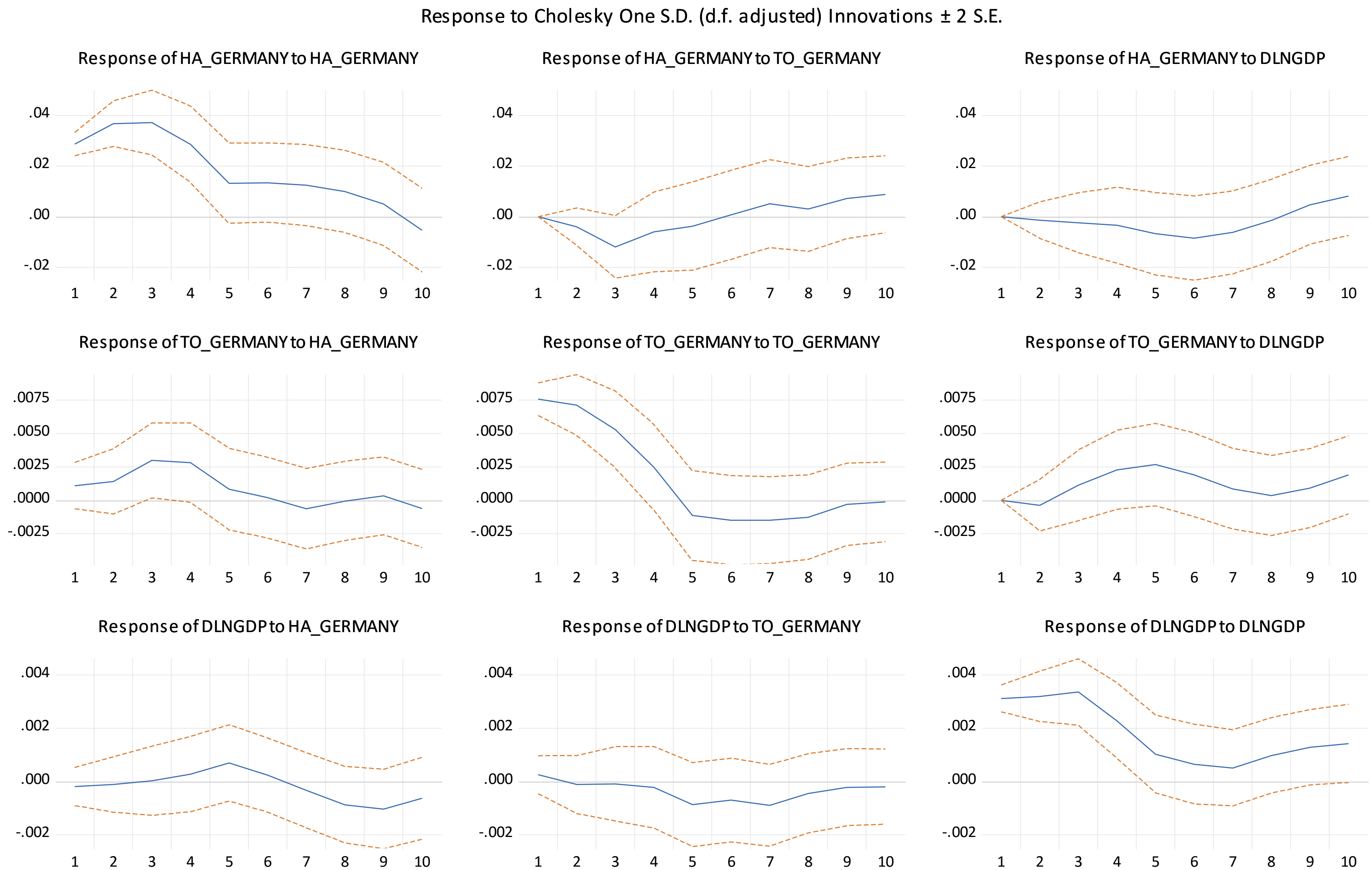

Figure 8.5. *Germany_The Result of the IRFs*

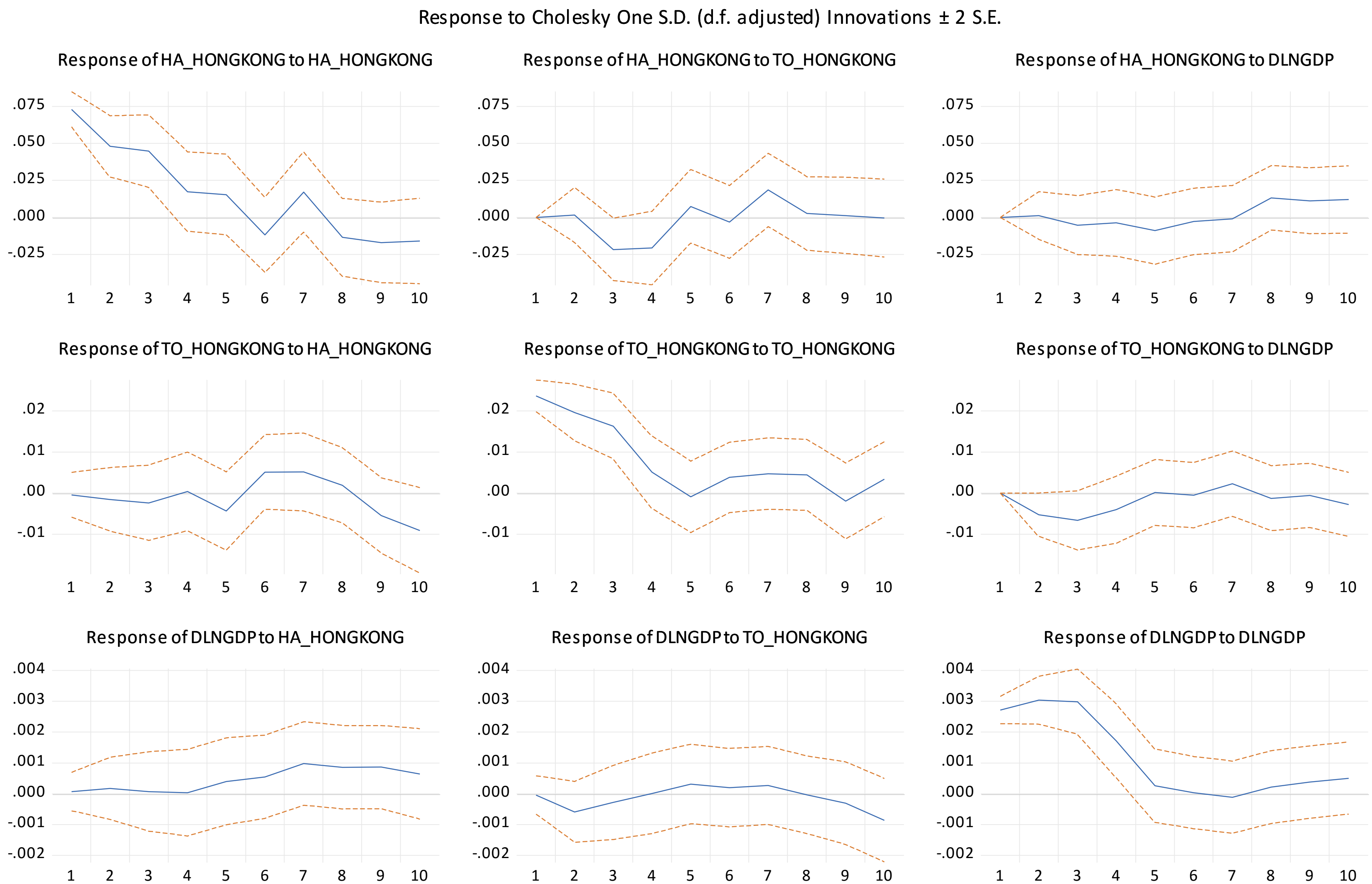

Figure 8.6. *Hong Kong_The Result of the IRFs*

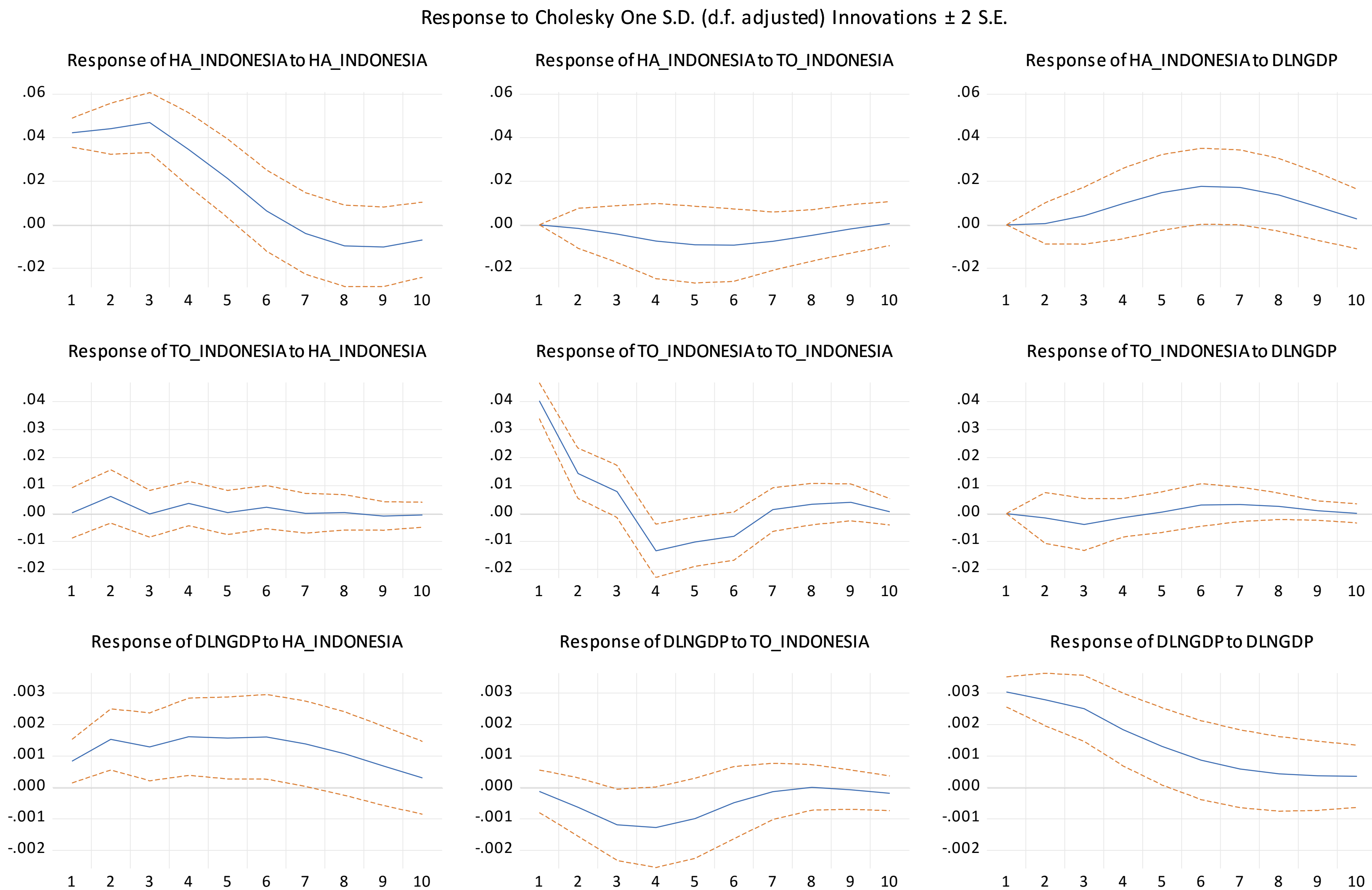

Figure 8.7. *Indonesia_The Result of the IRFs*

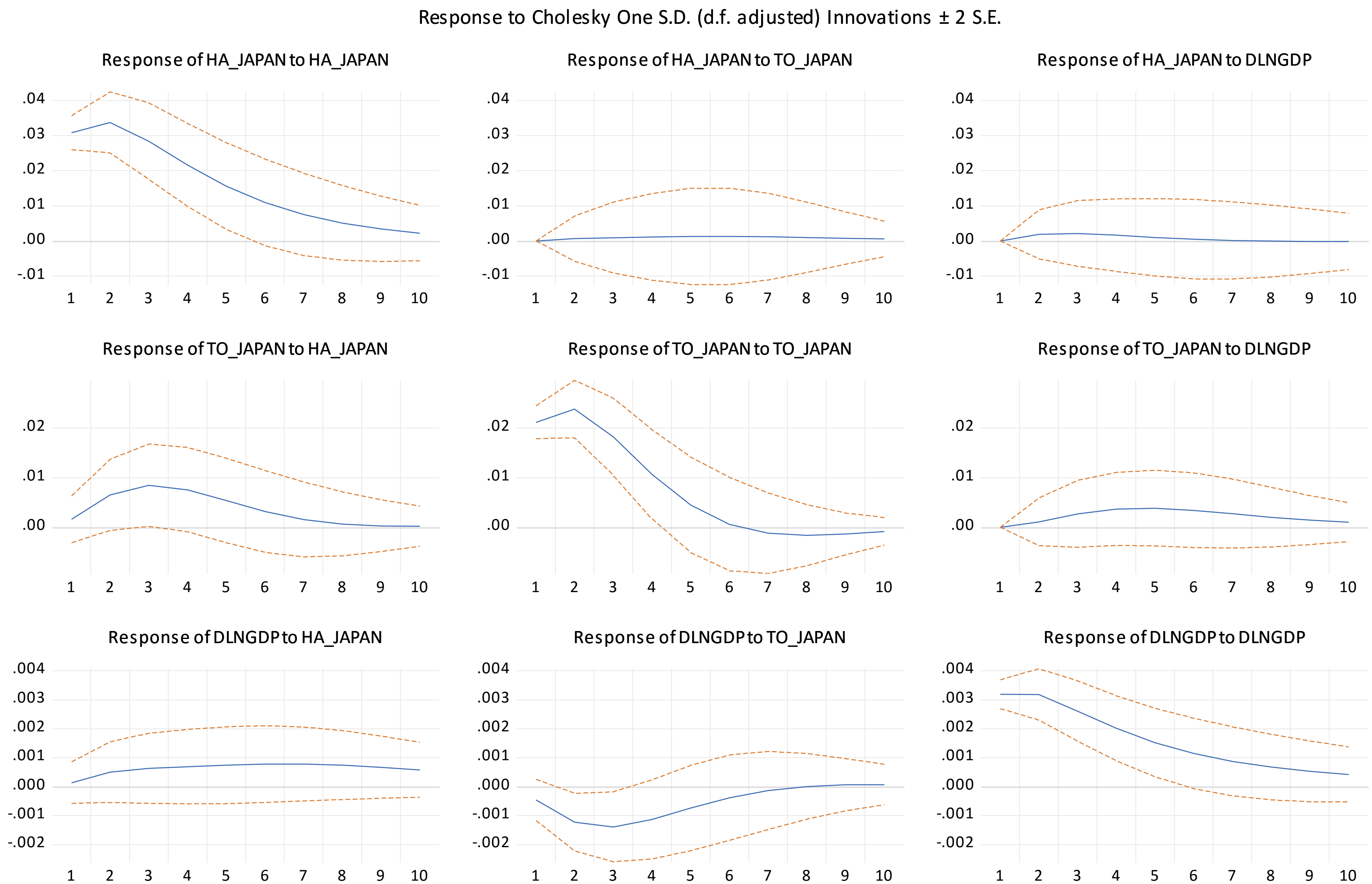

Figure 8.8. *Japan_The Result of the IRFs*

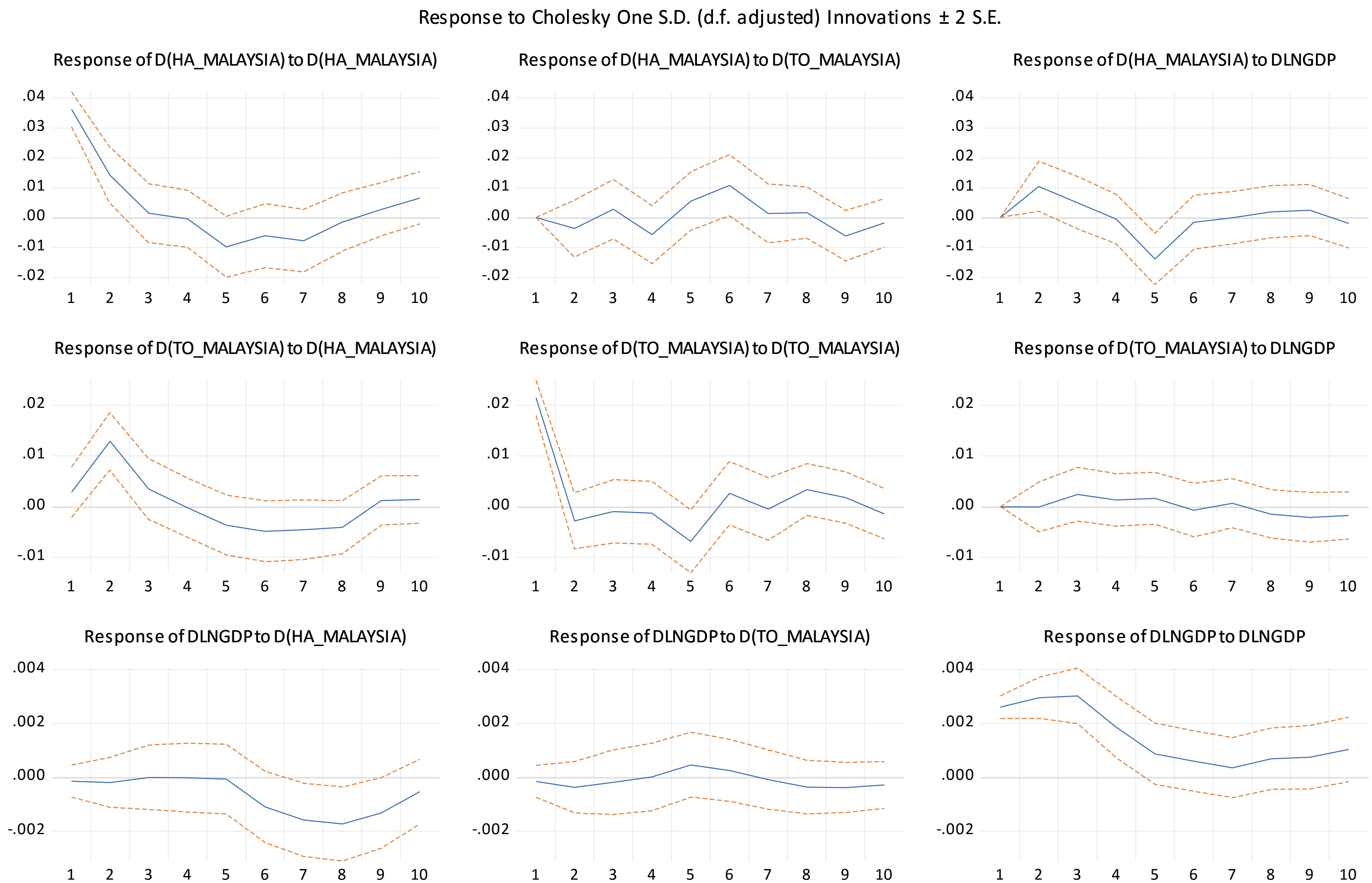

Figure 8.9. *Malaysia_The Result of the IRFs*

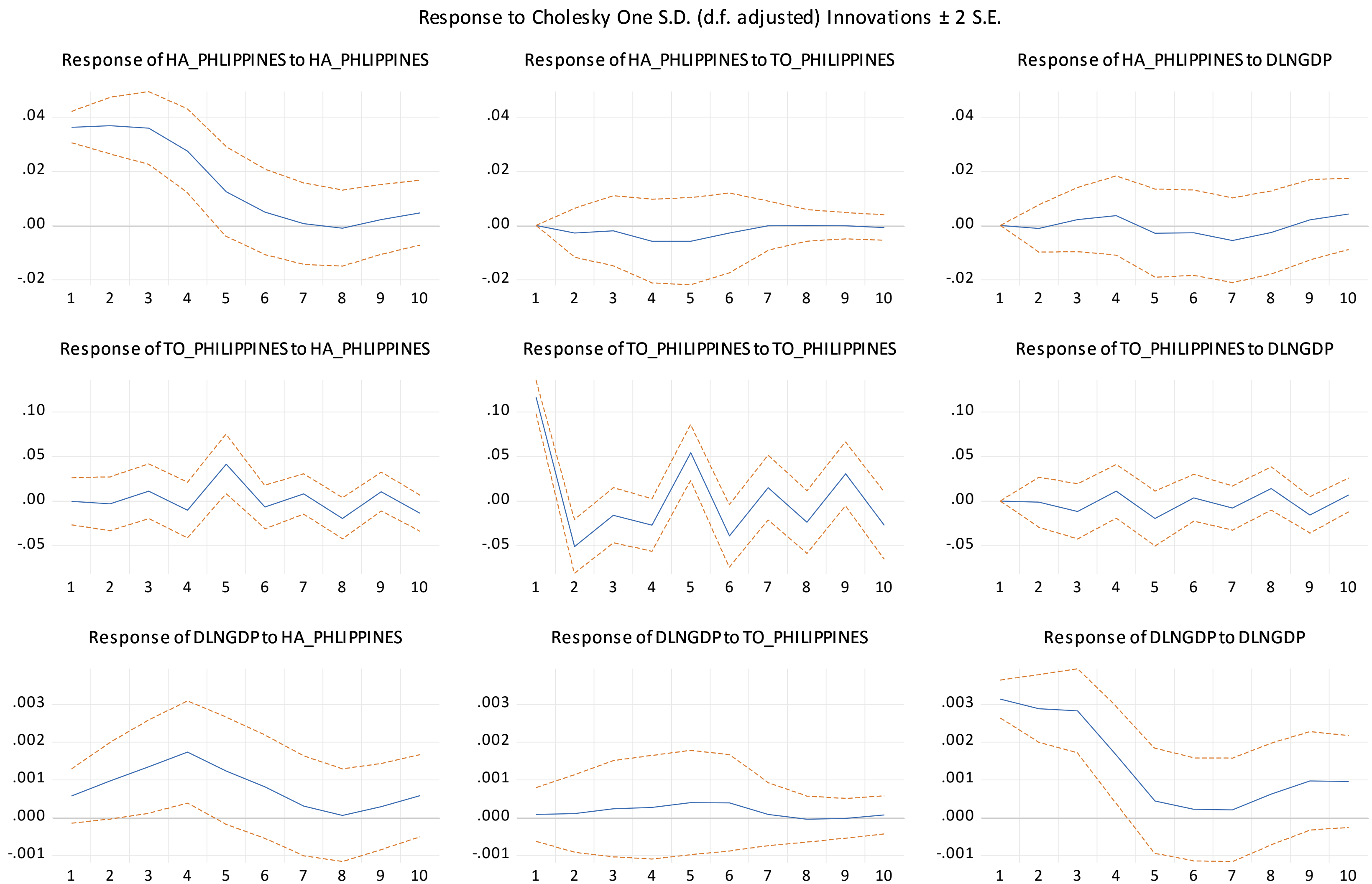

Figure 8.10. *Philippines_The Result of the IRFs*

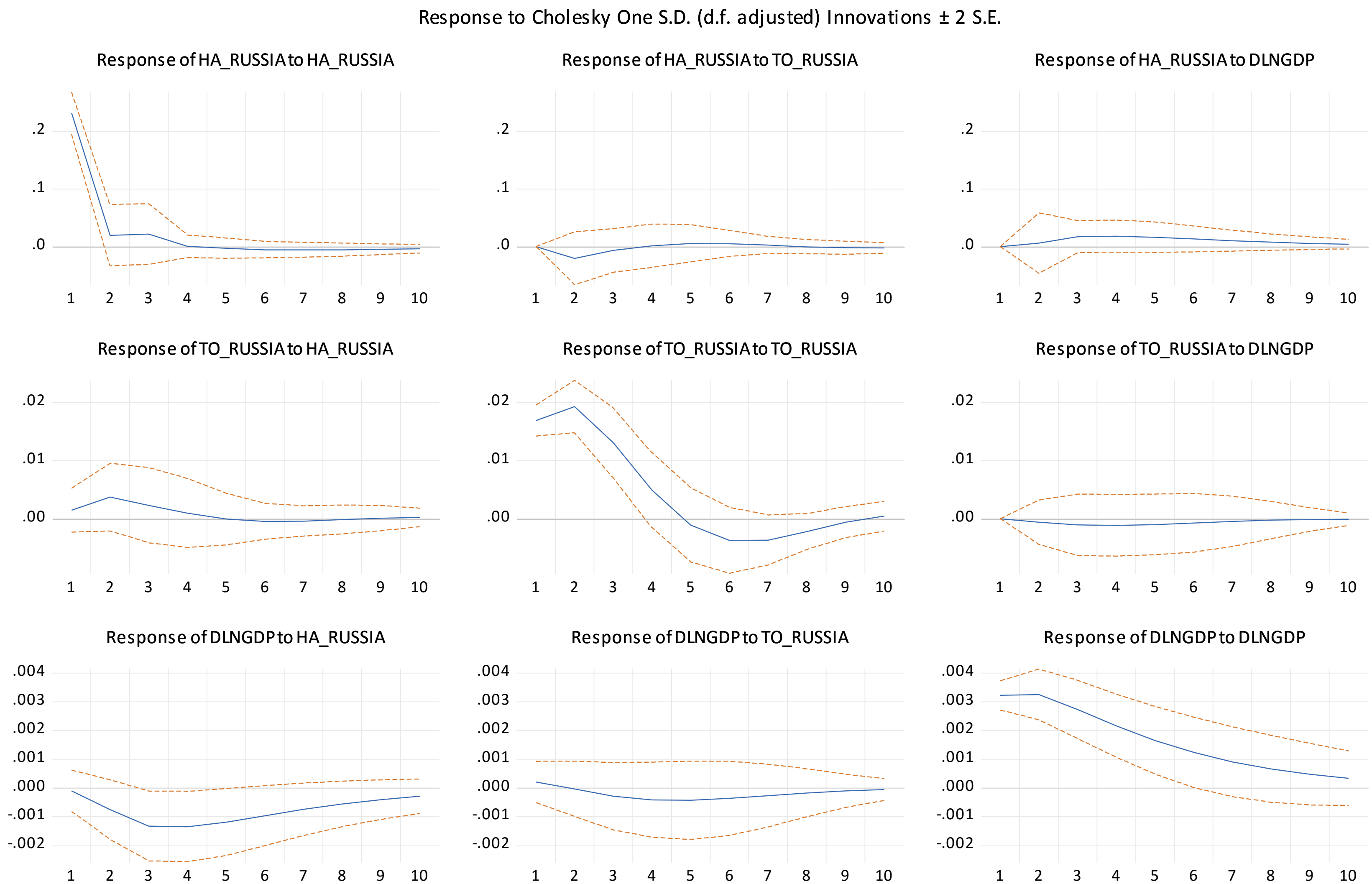

Figure 8.11. *Russia_The Result of the IRFs*

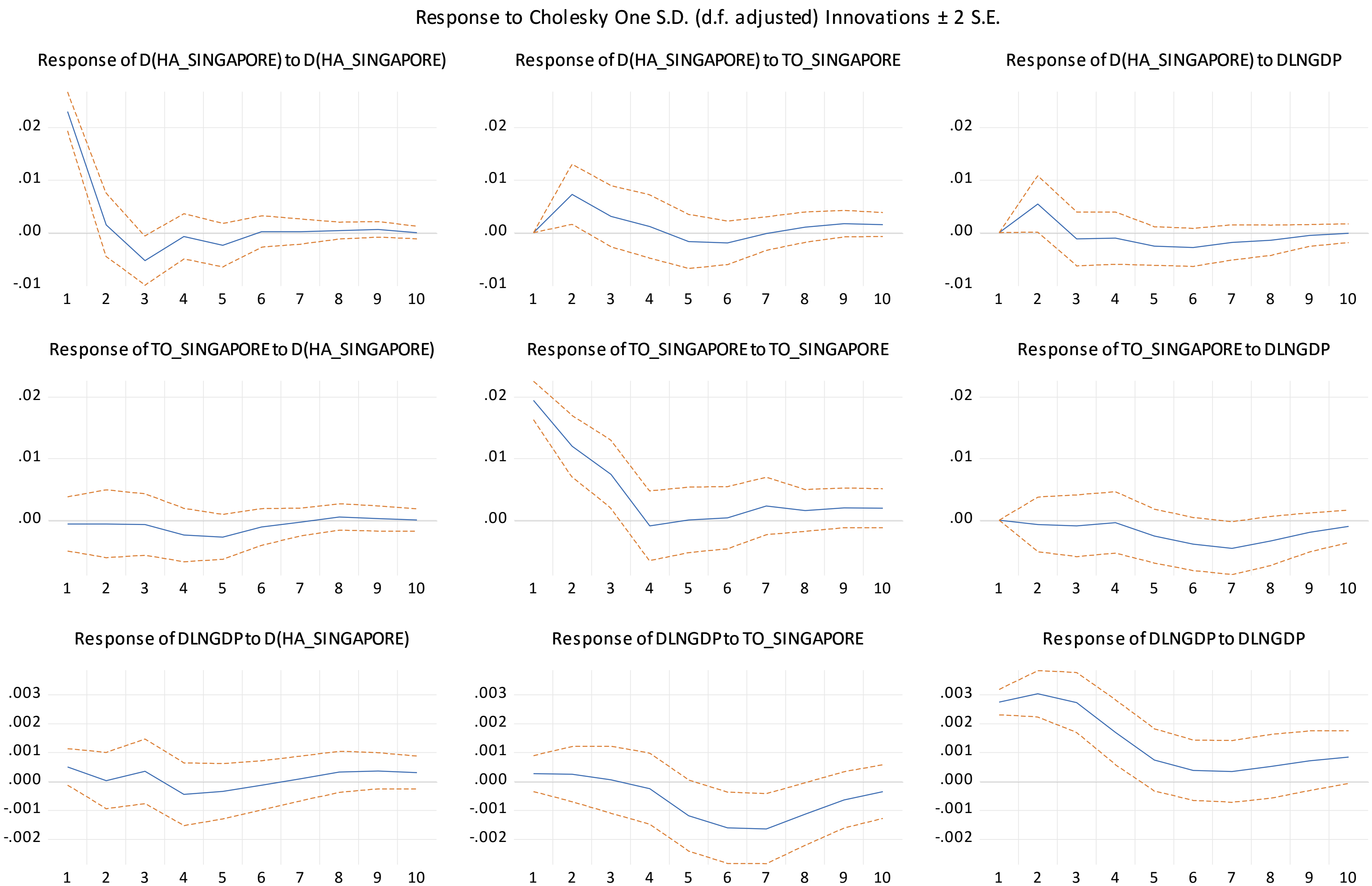

Figure 8.12. *Singapore_The Result of the IRFs*

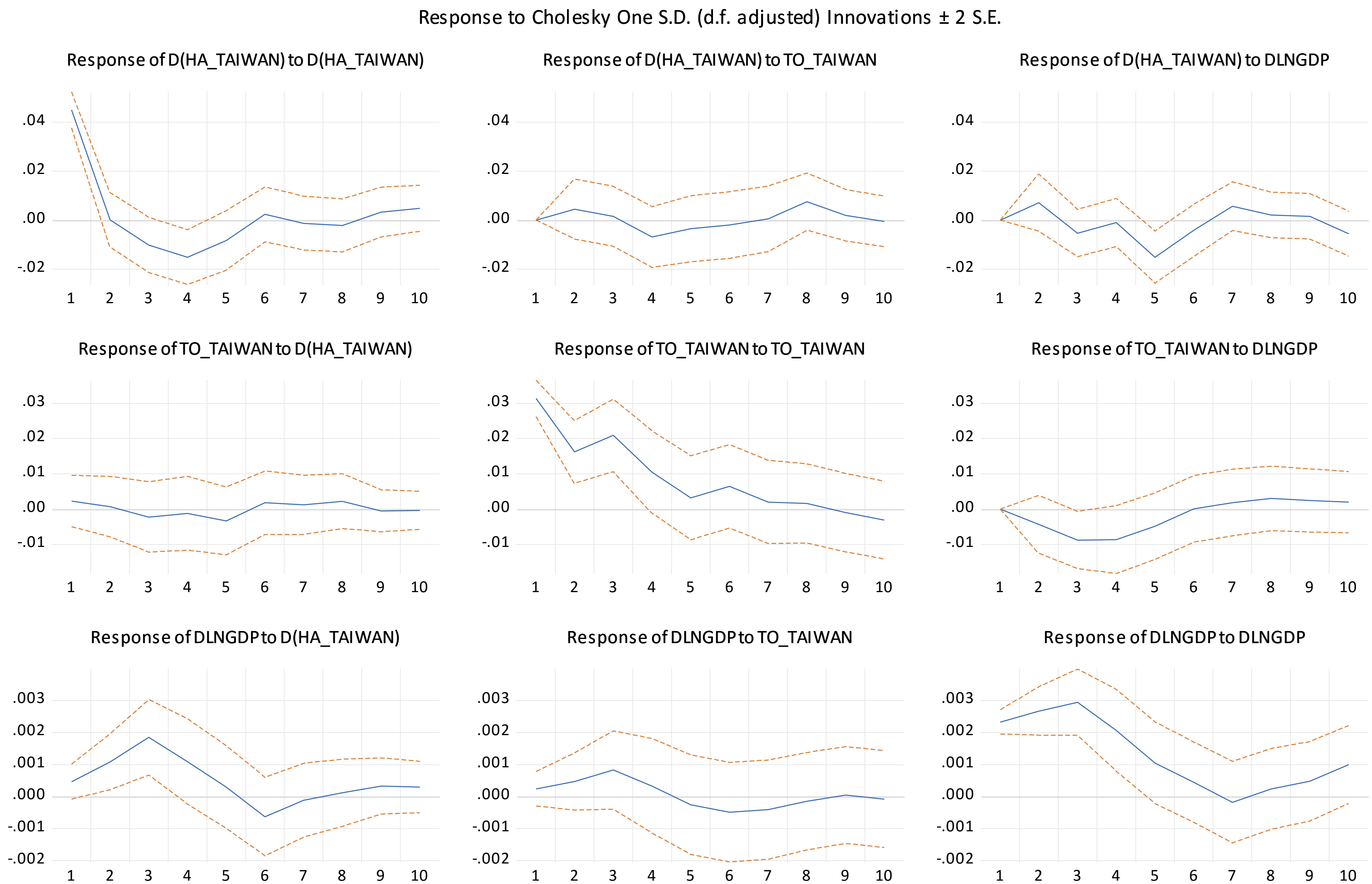

Figure 8.13. *Taiwan_The Result of the IRFs*

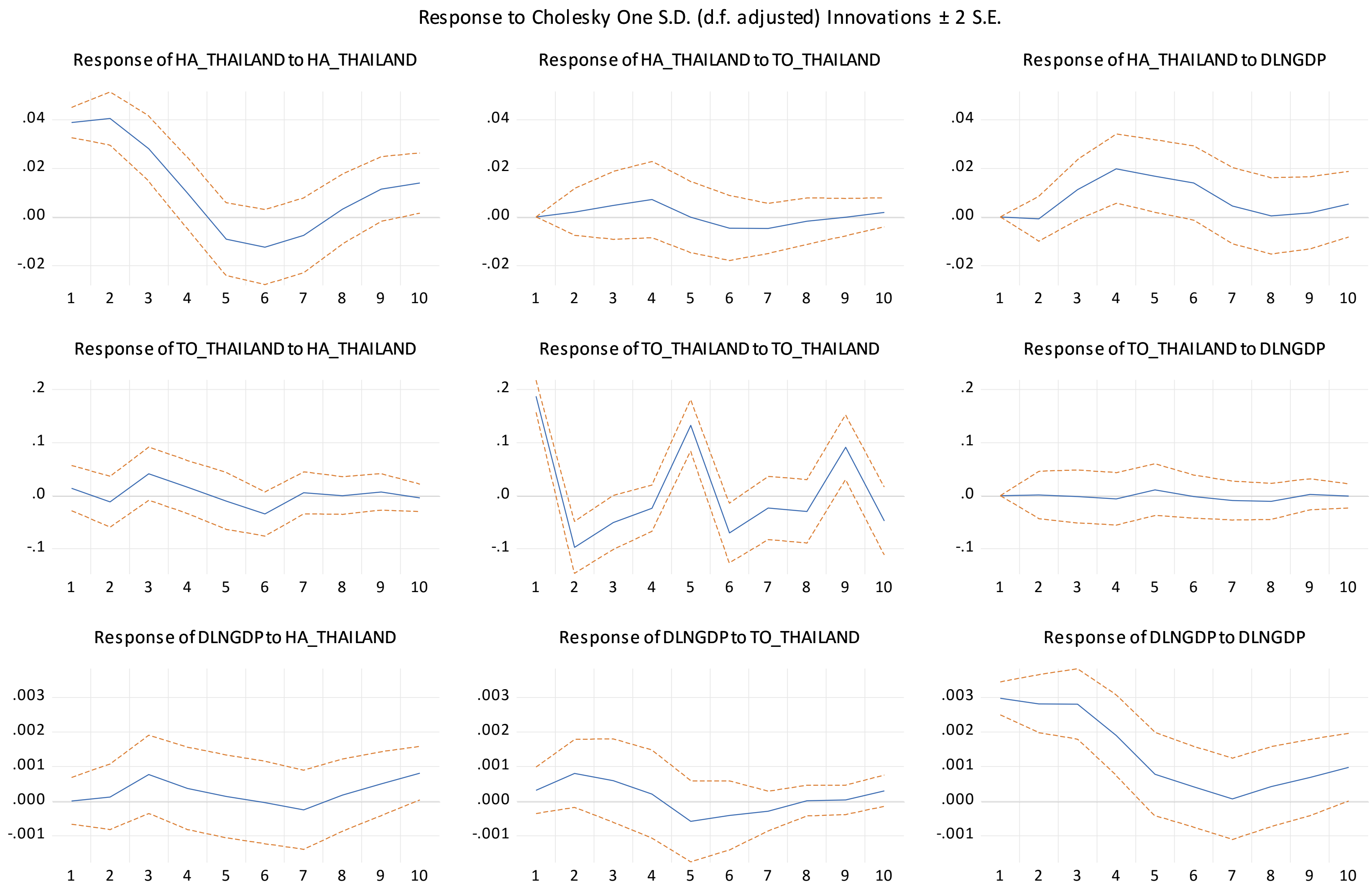

Figure 8.14. *Thailand_The Result of the IRFs*

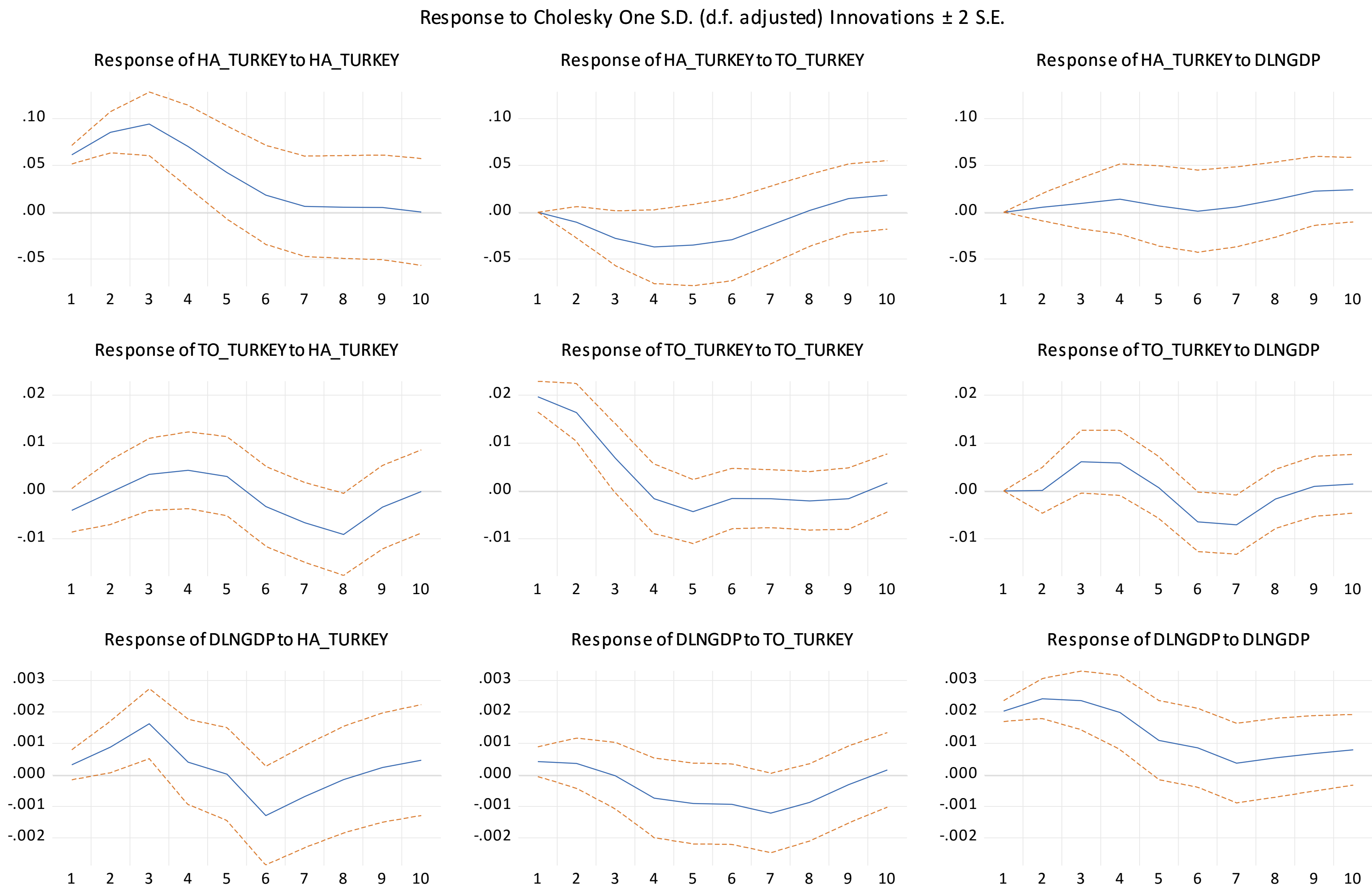

Figure 8.15. *Turkey_The Result of the IRFs*

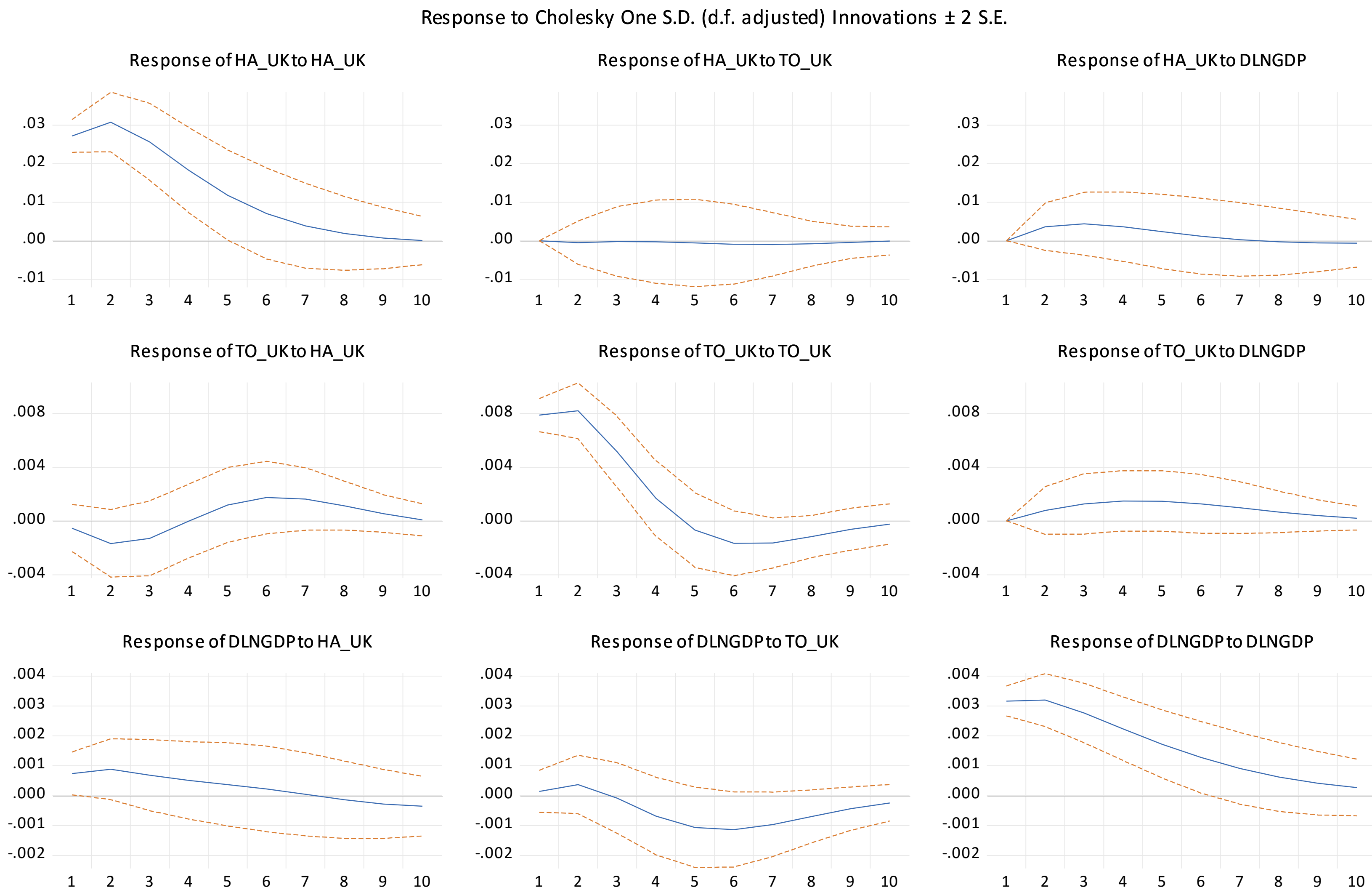

Figure 8.16. *UK_The Result of the IRFs*

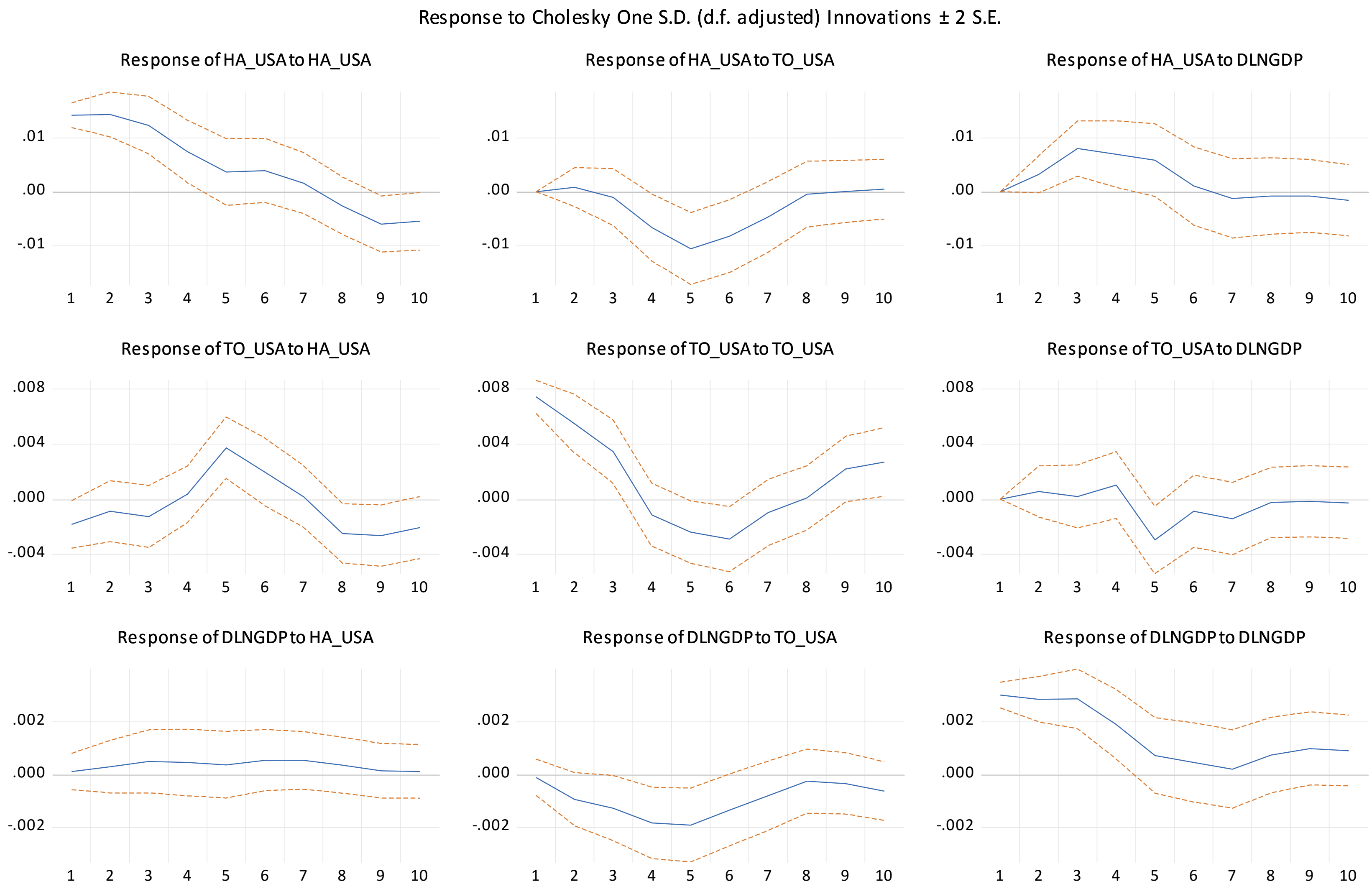

Figure 8.17. *USA_The Result of the IRFs*

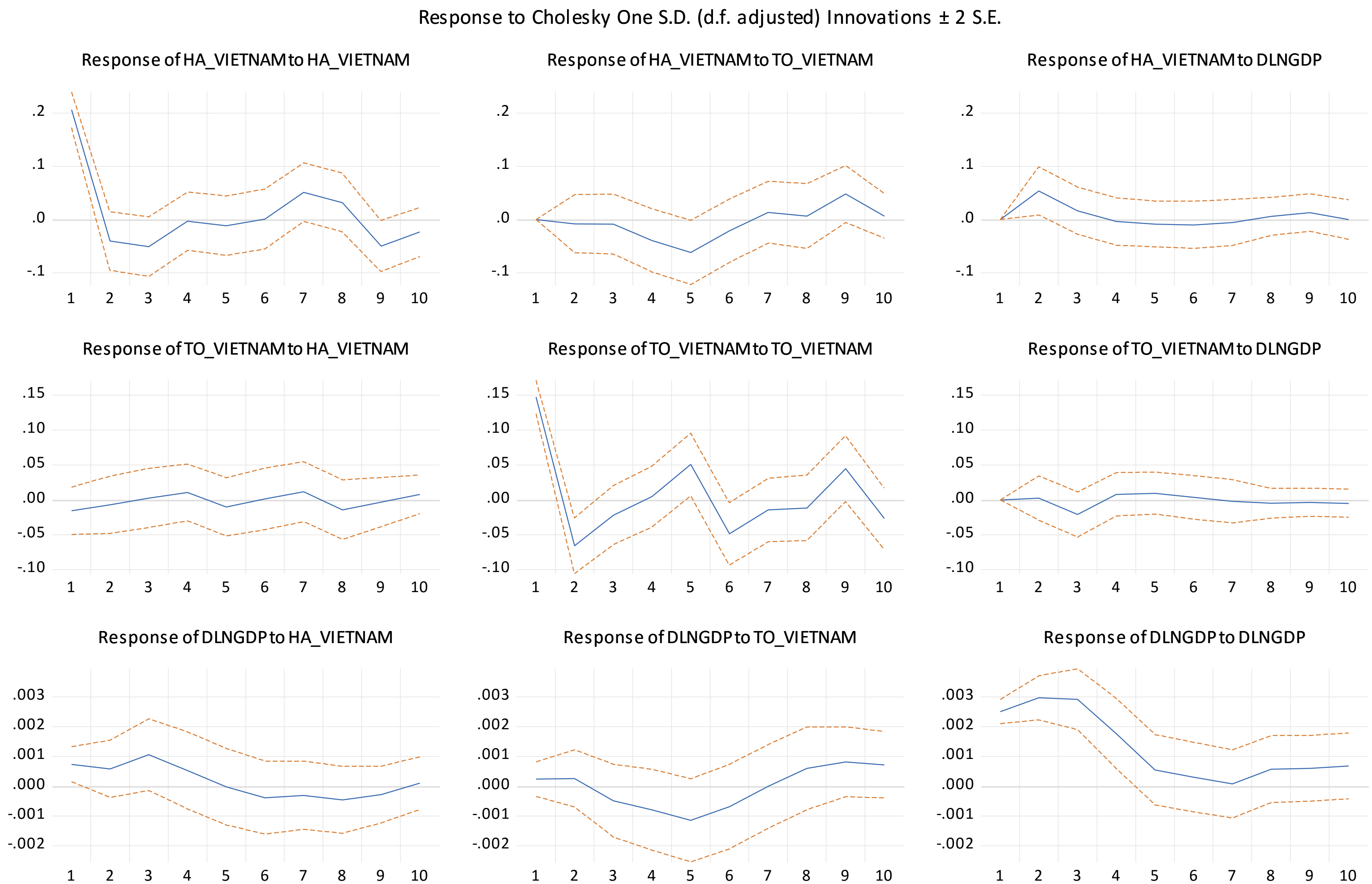

Figure 8.18. *Vietnam_The Result of the IRFs*

Table 8.73. *East Asia_the ADF Test*

Null Hypothesis: HA_EASIA has a unit root
Exogenous: None
Lag Length: 2 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.298502	0.0012
Test critical values:	1% level	-2.594189	
	5% level	-1.944915	
	10% level	-1.614114	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HA_EASIA)
Method: Least Squares
Date: 09/30/20 Time: 22:05
Sample (adjusted): 1999Q1 2018Q4
Included observations: 80 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HA_EASIA(-1)	-0.236231	0.071618	-3.298502	0.0015
D(HA_EASIA(-1))	0.199572	0.111148	1.795556	0.0765
D(HA_EASIA(-2))	0.074615	0.113362	0.658198	0.5124

R-squared	0.131852	Mean dependent var	-0.001419
Adjusted R-squared	0.109302	S.D. dependent var	0.034167
S.E. of regression	0.032246	Akaike info criterion	-3.994076
Sum squared resid	0.080064	Schwarz criterion	-3.904750
Log likelihood	162.7631	Hannan-Quinn criter.	-3.958263
Durbin-Watson stat	1.939606		

Null Hypothesis: TO_EASIA has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.136928	0.0000
Test critical values:	1% level	-3.512290	
	5% level	-2.897223	
	10% level	-2.585861	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO_EASIA)
Method: Least Squares
Date: 09/30/20 Time: 22:08
Sample (adjusted): 1998Q3 2018Q4
Included observations: 82 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TO_EASIA(-1)	-0.502717	0.097863	-5.136928	0.0000
C	0.008822	0.003684	2.394987	0.0190

R-squared	0.248036	Mean dependent var	0.000257
Adjusted R-squared	0.238636	S.D. dependent var	0.034088
S.E. of regression	0.029744	Akaike info criterion	-4.168292
Sum squared resid	0.070776	Schwarz criterion	-4.109591
Log likelihood	172.9000	Hannan-Quinn criter.	-4.144724
F-statistic	26.38803	Durbin-Watson stat	2.037380
Prob(F-statistic)	0.000002		

Table 8.74. *Southeast Asia_the ADF Test*

Null Hypothesis: HA_SEASIA has a unit root
Exogenous: None
Lag Length: 6 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.176565	0.0018
Test critical values:	1% level	-2.595745	
	5% level	-1.945139	
	10% level	-1.613983	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HA_SEASIA)
Method: Least Squares
Date: 09/30/20 Time: 22:08
Sample (adjusted): 2000Q1 2018Q4
Included observations: 76 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HA_SEASIA(-1)	-0.135063	0.042519	-3.176565	0.0022
D(HA_SEASIA(-1))	0.713473	0.105400	6.769219	0.0000
D(HA_SEASIA(-2))	-0.088381	0.116451	-0.758953	0.4505
D(HA_SEASIA(-3))	-0.063981	0.099883	-0.640560	0.5239
D(HA_SEASIA(-4))	-0.480194	0.099229	-4.839257	0.0000
D(HA_SEASIA(-5))	0.587240	0.112974	5.198015	0.0000
D(HA_SEASIA(-6))	-0.274834	0.108182	-2.540473	0.0133

R-squared	0.640056	Mean dependent var	-0.002547
Adjusted R-squared	0.608756	S.D. dependent var	0.033467
S.E. of regression	0.020933	Akaike info criterion	-4.807381
Sum squared resid	0.030236	Schwarz criterion	-4.592708
Log likelihood	189.6805	Hannan-Quinn criter.	-4.721587
Durbin-Watson stat	2.133805		

Null Hypothesis: TO_SEASIA has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.277935	0.0000
Test critical values:	1% level	-3.513344	
	5% level	-2.897678	
	10% level	-2.586103	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO_SEASIA)
Method: Least Squares
Date: 09/30/20 Time: 22:10
Sample (adjusted): 1998Q4 2018Q4
Included observations: 81 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TO_SEASIA(-1)	-0.383869	0.072731	-5.277935	0.0000
D(TO_SEASIA(-1))	0.471677	0.100448	4.695759	0.0000
C	0.009546	0.002454	3.890939	0.0002

R-squared	0.319515	Mean dependent var	0.000156
Adjusted R-squared	0.302067	S.D. dependent var	0.018089
S.E. of regression	0.015112	Akaike info criterion	-5.510335
Sum squared resid	0.017813	Schwarz criterion	-5.421652
Log likelihood	226.1686	Hannan-Quinn criter.	-5.474754
F-statistic	18.31210	Durbin-Watson stat	2.219754
Prob(F-statistic)	0.000000		

Table 8.75. *Anglosphere_the ADF Test*

Null Hypothesis: HA_ENGLISH has a unit root
Exogenous: Constant
Lag Length: 4 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.566203	0.0004
Test critical values:	1% level	-3.516676	
	5% level	-2.899115	
	10% level	-2.586866	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HA_ENGLISH)
Method: Least Squares
Date: 09/30/20 Time: 22:06
Sample (adjusted): 1999Q3 2018Q4
Included observations: 78 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HA_ENGLISH(-1)	-0.311714	0.068265	-4.566203	0.0000
D(HA_ENGLISH(-1))	0.297968	0.105958	2.812140	0.0063
D(HA_ENGLISH(-2))	0.259229	0.094825	2.733752	0.0079
D(HA_ENGLISH(-3))	-0.295101	0.099376	-2.969535	0.0040
D(HA_ENGLISH(-4))	0.141593	0.103765	1.364554	0.1766
C	0.002835	0.002123	1.335598	0.1859

R-squared	0.420523	Mean dependent var	-0.001737
Adjusted R-squared	0.380281	S.D. dependent var	0.020751
S.E. of regression	0.016335	Akaike info criterion	-5.317156
Sum squared resid	0.019213	Schwarz criterion	-5.135870
Log likelihood	213.3691	Hannan-Quinn criter.	-5.244584
F-statistic	10.44999	Durbin-Watson stat	2.019165
Prob(F-statistic)	0.000000		

Null Hypothesis: TO_ENGLISH has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.149134	0.0000
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO_ENGLISH)
Method: Least Squares
Date: 09/30/20 Time: 22:09
Sample (adjusted): 1999Q1 2018Q4
Included observations: 80 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TO_ENGLISH(-1)	-0.677186	0.083099	-8.149134	0.0000
D(TO_ENGLISH(-1))	0.677401	0.078205	8.661885	0.0000
D(TO_ENGLISH(-2))	0.261105	0.109580	2.382788	0.0197
C	0.008553	0.001200	7.126488	0.0000

R-squared	0.636889	Mean dependent var	0.000329
Adjusted R-squared	0.622556	S.D. dependent var	0.009158
S.E. of regression	0.005626	Akaike info criterion	-7.474037
Sum squared resid	0.002406	Schwarz criterion	-7.354936
Log likelihood	302.9615	Hannan-Quinn criter.	-7.426286
F-statistic	44.43414	Durbin-Watson stat	2.001818
Prob(F-statistic)	0.000000		

Table 8.76. *Europe_the ADF Test*

Null Hypothesis: HA_EUROPE has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.584621	0.0003
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HA_EUROPE)
Method: Least Squares
Date: 09/30/20 Time: 22:07
Sample (adjusted): 1999Q1 2018Q4
Included observations: 80 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HA_EUROPE(-1)	-0.175868	0.038360	-4.584621	0.0000
D(HA_EUROPE(-1))	0.517376	0.101636	5.090482	0.0000
D(HA_EUROPE(-2))	0.257890	0.111093	2.321398	0.0229
C	0.001866	0.002610	0.715235	0.4767

R-squared	0.478289	Mean dependent var	-0.000210
Adjusted R-squared	0.457696	S.D. dependent var	0.031257
S.E. of regression	0.023018	Akaike info criterion	-4.656380
Sum squared resid	0.040267	Schwarz criterion	-4.537278
Log likelihood	190.2552	Hannan-Quinn criter.	-4.608629
F-statistic	23.22488	Durbin-Watson stat	1.919924
Prob(F-statistic)	0.000000		

Null Hypothesis: TO_EUROPE has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.946069	0.0000
Test critical values:	1% level	-3.513344	
	5% level	-2.897678	
	10% level	-2.586103	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO_EUROPE)
Method: Least Squares
Date: 09/30/20 Time: 22:09
Sample (adjusted): 1998Q4 2018Q4
Included observations: 81 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TO_EUROPE(-1)	-0.420319	0.060512	-6.946069	0.0000
D(TO_EUROPE(-1))	0.659142	0.085057	7.749405	0.0000
C	0.004946	0.001215	4.069853	0.0001

R-squared	0.506900	Mean dependent var	-6.45E-05
Adjusted R-squared	0.494257	S.D. dependent var	0.012399
S.E. of regression	0.008818	Akaike info criterion	-6.587787
Sum squared resid	0.006065	Schwarz criterion	-6.499104
Log likelihood	269.8054	Hannan-Quinn criter.	-6.552207
F-statistic	40.09154	Durbin-Watson stat	2.244677
Prob(F-statistic)	0.000000		

Table 8.77. *East Asia_VAR Lag Order Selection*

VAR Lag Order Selection Criteria
Endogenous variables: HA_EASIA TO_EASIA DLNGDP
Exogenous variables: C
Date: 09/30/20 Time: 22:11
Sample: 1998Q1 2018Q4
Included observations: 76

Lag	LogL	LR	FPE	AIC	SC	HQ
0	560.5605	NA	8.52e-11	-14.67264	-14.58064	-14.63588
1	654.0005	177.0442	9.23e-12	-16.89475	-16.52674*	-16.74767*
2	666.9372	23.49036	8.34e-12	-16.99835	-16.35433	-16.74097
3	672.6652	9.948664	9.11e-12	-16.91224	-15.99222	-16.54456
4	687.4543	24.51882	7.87e-12*	-17.06459*	-15.86855	-16.58659
5	694.4844	11.10007	8.36e-12	-17.01275	-15.54070	-16.42445
6	698.1305	5.469183	9.76e-12	-16.87186	-15.12381	-16.17325
7	711.6697	19.23994*	8.82e-12	-16.99131	-14.96725	-16.18240

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 8.78. *Southeast Asia_VAR Lag Order Selection*

VAR Lag Order Selection Criteria
Endogenous variables: HA_SEASIA TO_SEASIA DLNGDP
Exogenous variables: C
Date: 09/30/20 Time: 22:28
Sample: 1998Q1 2018Q4
Included observations: 76

Lag	LogL	LR	FPE	AIC	SC	HQ
0	579.5006	NA	5.17e-11	-15.17107	-15.07906	-15.13430
1	702.2498	232.5776	2.59e-12	-18.16447	-17.79646	-18.01739
2	733.2315	56.25624	1.46e-12	-18.74293	-18.09892*	-18.48555*
3	741.0552	13.58846	1.51e-12	-18.71198	-17.79195	-18.34429
4	751.7054	17.65701	1.45e-12	-18.75541	-17.55937	-18.27741
5	763.5248	18.66217	1.36e-12	-18.82960	-17.35756	-18.24130
6	781.5635	27.05805*	1.09e-12*	-19.06746*	-17.31941	-18.36886
7	786.2641	6.679813	1.24e-12	-18.95432	-16.93026	-18.14541

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 8.79. Anglosphere_VAR Lag Order Selection

VAR Lag Order Selection Criteria
Endogenous variables: HA_ENGLISH TO_ENGLISH DLNGDP
Exogenous variables: C
Date: 09/30/20 Time: 22:18
Sample: 1998Q1 2018Q4
Included observations: 76

Lag	LogL	LR	FPE	AIC	SC	HQ
0	678.0098	NA	3.87e-12	-17.76342	-17.67141	-17.72665
1	796.1673	223.8774	2.19e-13	-20.63598	-20.26797	-20.48891
2	839.0099	77.79311	9.00e-14	-21.52658	-20.88256*	-21.26920
3	854.8466	27.50584	7.54e-14	-21.70649	-20.78646	-21.33880*
4	865.2423	17.23491	7.31e-14	-21.74322	-20.54718	-21.26522
5	875.1489	15.64206	7.20e-14	-21.76708	-20.29503	-21.17878
6	888.1656	19.52513	6.57e-14	-21.87278	-20.12473	-21.17417
7	903.0722	21.18300*	5.73e-14*	-22.02822*	-20.00416	-21.21930

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 8.80. *Europe_VAR Lag Order Selection*

VAR Lag Order Selection Criteria
Endogenous variables: HA_EUROPE TO_EUROPE DLNGDP
Exogenous variables: C
Date: 09/30/20 Time: 22:23
Sample: 1998Q1 2018Q4
Included observations: 76

Lag	LogL	LR	FPE	AIC	SC	HQ
0	566.2964	NA	7.32e-11	-14.82359	-14.73159	-14.78682
1	727.5659	305.5632	1.33e-12	-18.83068	-18.46267	-18.68361
2	781.5664	98.05354	4.08e-13	-20.01491	-19.37089*	-19.75752*
3	793.5594	20.82991	3.78e-13	-20.09367	-19.17364	-19.72598
4	798.5035	8.196802	4.23e-13	-19.98693	-18.79090	-19.50894
5	810.5561	19.03042*	3.94e-13	-20.06727	-18.59522	-19.47897
6	820.0802	14.28611	3.94e-13	-20.08106	-18.33301	-19.38245
7	831.5590	16.31210	3.76e-13*	-20.14629*	-18.12223	-19.33738

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 8.81. *East Asia_Structural VAR Estimates*

Structural VAR Estimates
Date: 09/30/20 Time: 22:13
Sample (adjusted): 1999Q2 2018Q4
Included observations: 79 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)
Convergence achieved after 9 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I

A =

1	0	0
C(1)	1	0
C(2)	C(3)	1

B =

C(4)	0	0
0	C(5)	0
0	0	C(6)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.147803	0.115692	1.277563	0.2014
C(2)	0.002787	0.012932	0.215525	0.8294
C(3)	0.003993	0.012448	0.320743	0.7484
C(4)	0.027903	0.002220	12.56980	0.0000
C(5)	0.028693	0.002283	12.56980	0.0000
C(6)	0.003174	0.000253	12.56980	0.0000
Log likelihood	681.4482			

Estimated A matrix:

1.000000	0.000000	0.000000
0.147803	1.000000	0.000000
0.002787	0.003993	1.000000

Estimated B matrix:

0.027903	0.000000	0.000000
0.000000	0.028693	0.000000
0.000000	0.000000	0.003174

Estimated S matrix:

0.027903	0.000000	0.000000
-0.004124	0.028693	0.000000
-6.13E-05	-0.000115	0.003174

Estimated F matrix:

0.125783	0.020910	0.094312
0.004800	0.040215	-0.013191
0.009957	0.005067	0.020546

Table 8.82. *Southeast Asia_Structural VAR Estimates*

Structural VAR Estimates
Date: 09/30/20 Time: 22:29
Sample (adjusted): 1999Q4 2018Q4
Included observations: 77 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)
Convergence achieved after 10 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I

A =

1	0	0
C(1)	1	0
C(2)	C(3)	1

B =

C(4)	0	0
0	C(5)	0
0	0	C(6)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.003275	0.076142	-0.043008	0.9657
C(2)	-0.062851	0.014180	-4.432490	0.0000
C(3)	-0.011819	0.021222	-0.556930	0.5776
C(4)	0.021472	0.001730	12.40967	0.0000
C(5)	0.014347	0.001156	12.40968	0.0000
C(6)	0.002672	0.000215	12.40968	0.0000
Log likelihood	751.0156			

Estimated A matrix:

1.000000	0.000000	0.000000
-0.003275	1.000000	0.000000
-0.062851	-0.011819	1.000000

Estimated B matrix:

0.021472	0.000000	0.000000
0.000000	0.014347	0.000000
0.000000	0.000000	0.002672

Estimated S matrix:

0.021472	0.000000	0.000000
7.03E-05	0.014347	0.000000
0.001350	0.000170	0.002672

Estimated F matrix:

0.153765	-0.032707	0.025298
-0.006673	0.030227	-0.016852
0.020359	-0.002406	0.016240

Table 8.83. Anglosphere_Structural VAR Estimates

Structural VAR Estimates
Date: 09/30/20 Time: 22:19
Sample (adjusted): 2000Q1 2018Q4
Included observations: 76 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)
Convergence achieved after 13 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I

A =				
1	0	0		
C(1)	1	0		
C(2)	C(3)	1		
B =				
C(4)	0	0		
0	C(5)	0		
0	0	C(6)		

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.141965	0.039251	3.616813	0.0003
C(2)	-0.046417	0.021662	-2.142762	0.0321
C(3)	-0.020412	0.058473	-0.349076	0.7270
C(4)	0.013991	0.001135	12.32883	0.0000
C(5)	0.004787	0.000388	12.32883	0.0000
C(6)	0.002440	0.000198	12.32883	0.0000
Log likelihood	864.1128			

Estimated A matrix:		
1.000000	0.000000	0.000000
0.141965	1.000000	0.000000
-0.046417	-0.020412	1.000000
Estimated B matrix:		
0.013991	0.000000	0.000000
0.000000	0.004787	0.000000
0.000000	0.000000	0.002440
Estimated S matrix:		
0.013991	0.000000	0.000000
-0.001986	0.004787	0.000000
0.000609	9.77E-05	0.002440
Estimated F matrix:		
0.052559	-0.005976	0.032936
-0.003115	0.004848	-0.000444
0.003197	0.000748	0.017607

Table 8.84. Europe_Structural VAR Estimates

Structural VAR Estimates
Date: 09/30/20 Time: 22:25
Sample (adjusted): 2000Q1 2018Q4
Included observations: 76 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)
Convergence achieved after 11 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I

A =

1	0	0
C(1)	1	0
C(2)	C(3)	1

B =

C(4)	0	0
0	C(5)	0
0	0	C(6)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.060854	0.037659	1.615928	0.1061
C(2)	-0.011207	0.014166	-0.791151	0.4289
C(3)	0.031090	0.042426	0.732819	0.4637
C(4)	0.021902	0.001777	12.32883	0.0000
C(5)	0.007191	0.000583	12.32883	0.0000
C(6)	0.002659	0.000216	12.32883	0.0000
Log likelihood	792.5996			

Estimated A matrix:

1.000000	0.000000	0.000000
0.060854	1.000000	0.000000
-0.011207	0.031090	1.000000

Estimated B matrix:

0.021902	0.000000	0.000000
0.000000	0.007191	0.000000
0.000000	0.000000	0.002659

Estimated S matrix:

0.021902	0.000000	0.000000
-0.001333	0.007191	0.000000
0.000287	-0.000224	0.002659

Estimated F matrix:

0.150771	0.001916	0.064877
-0.012375	0.011395	-0.018174
-0.001350	-0.000898	0.020256

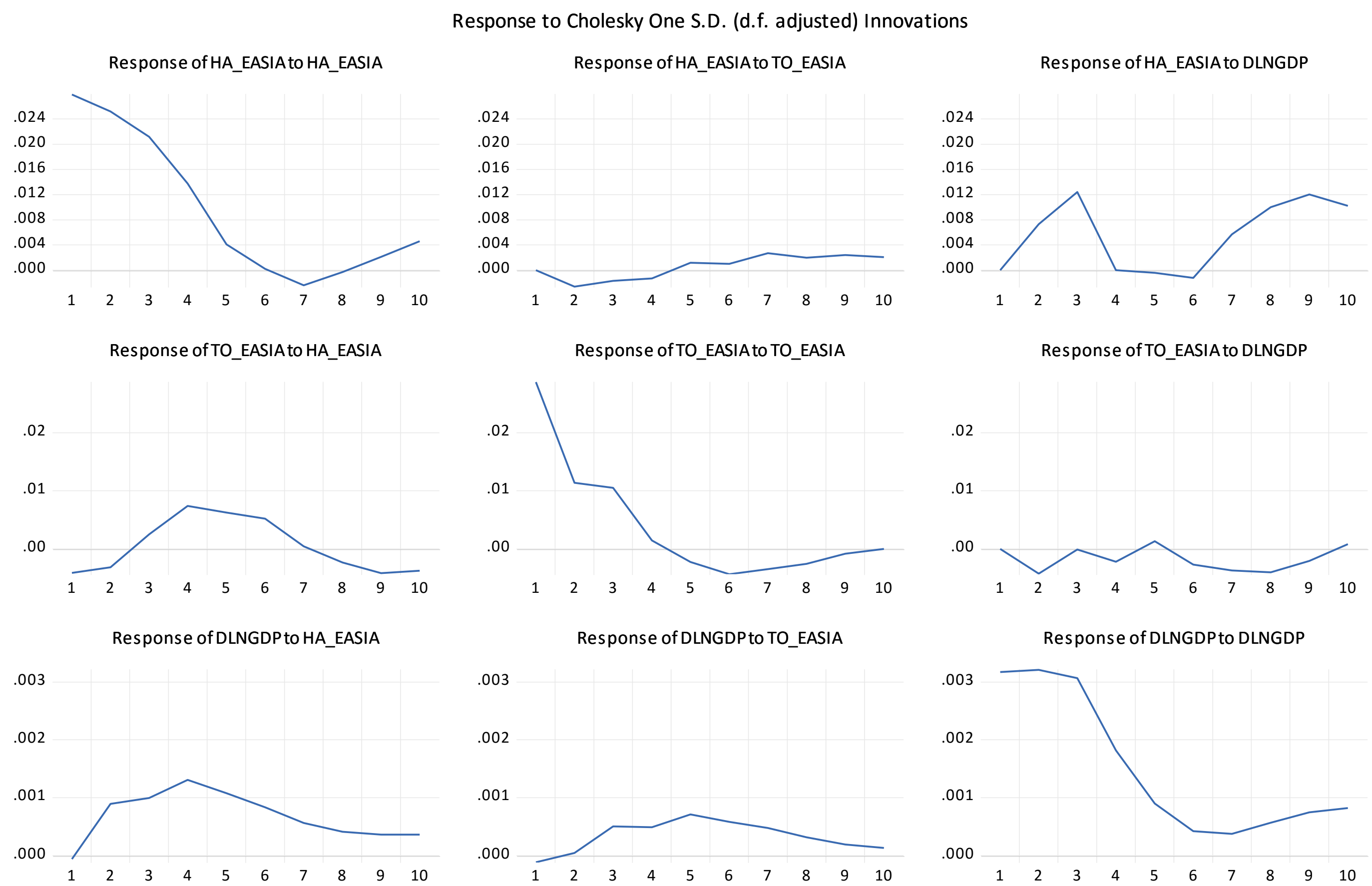

Figure 8.19. East Asia_the Result of the IRFs

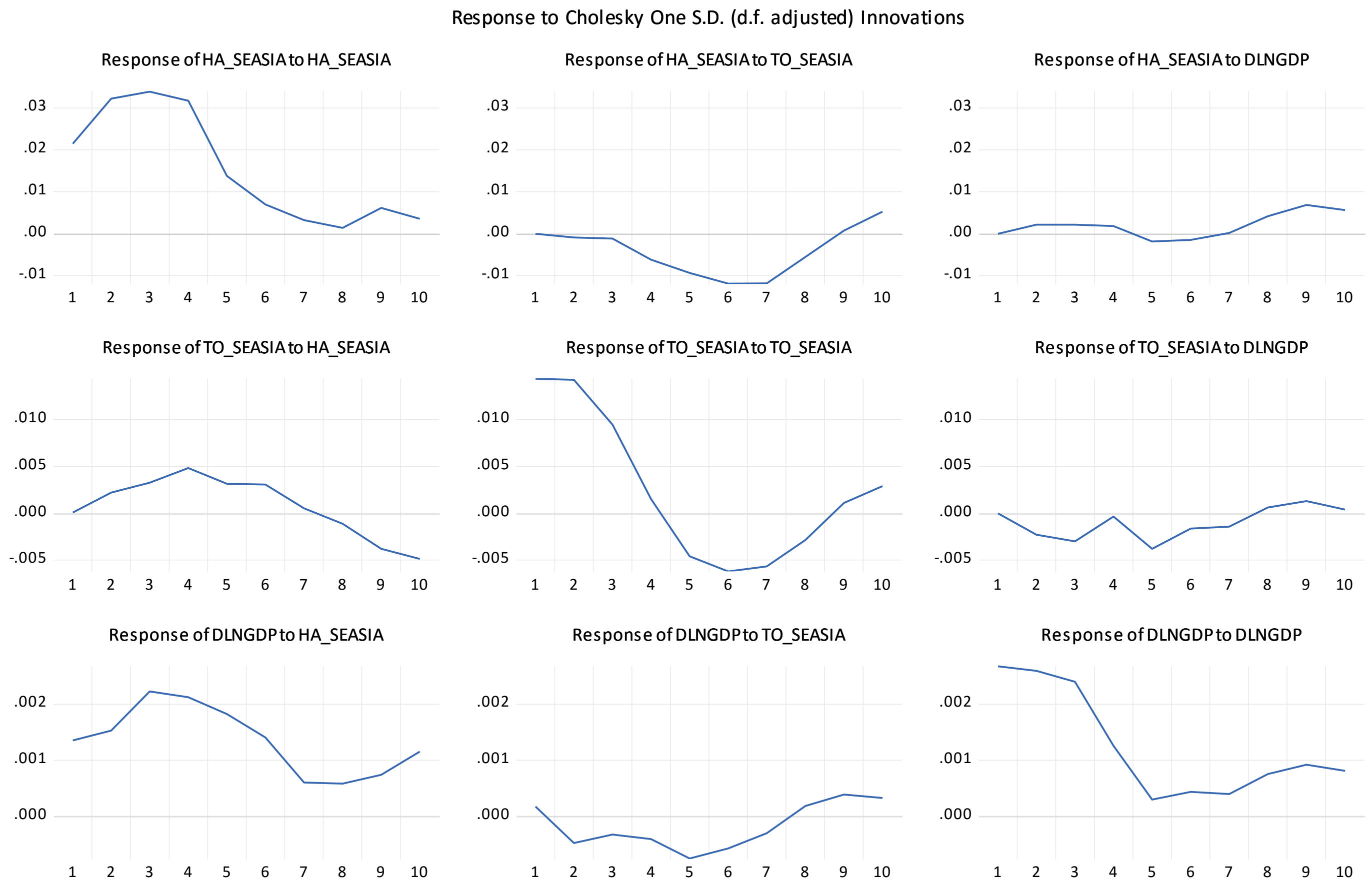

Figure 8.20. Southeast Asia_the Result of the IRFs

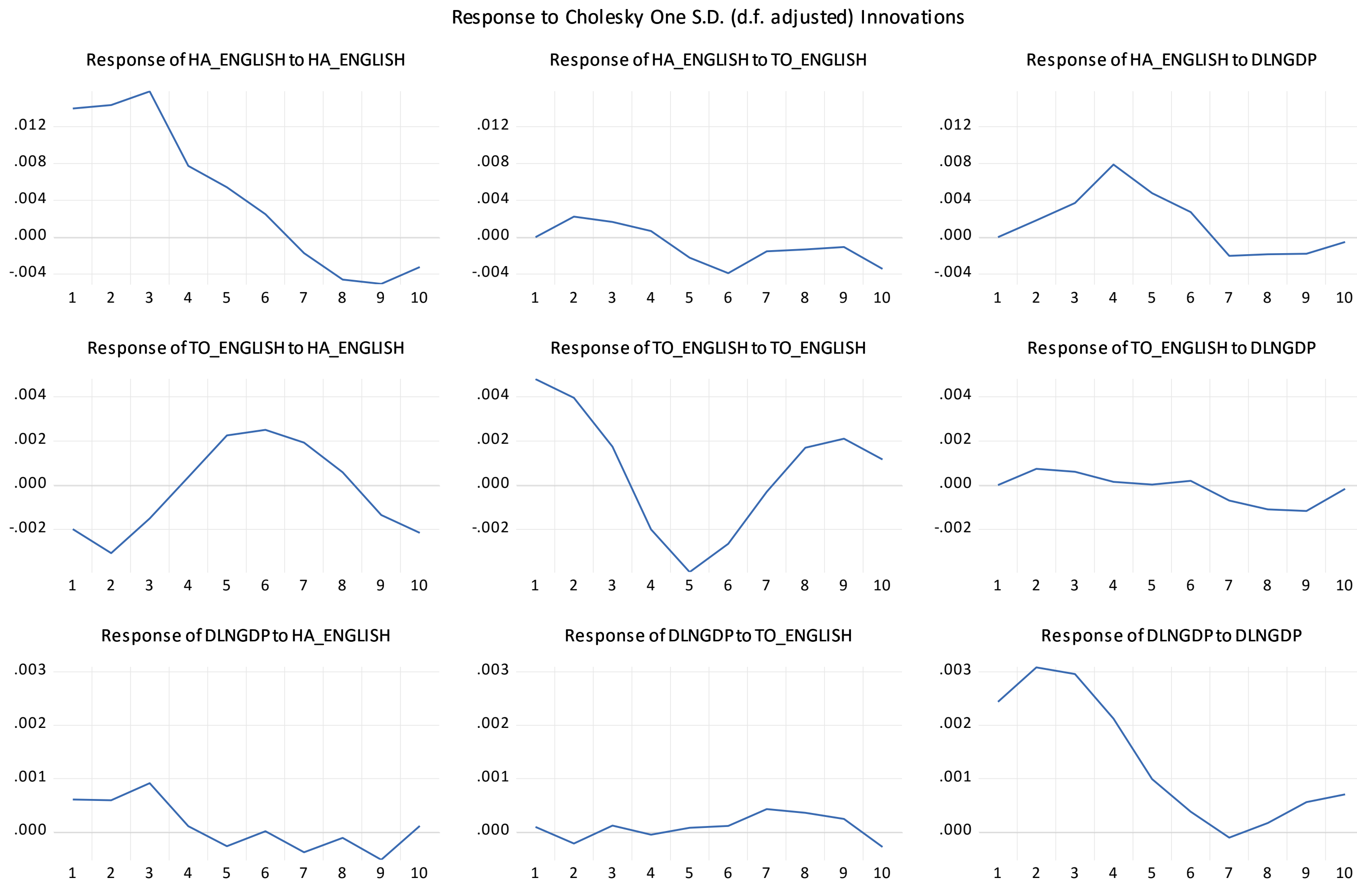

Figure 8.21. Anglosphere_the Result of the IRFs

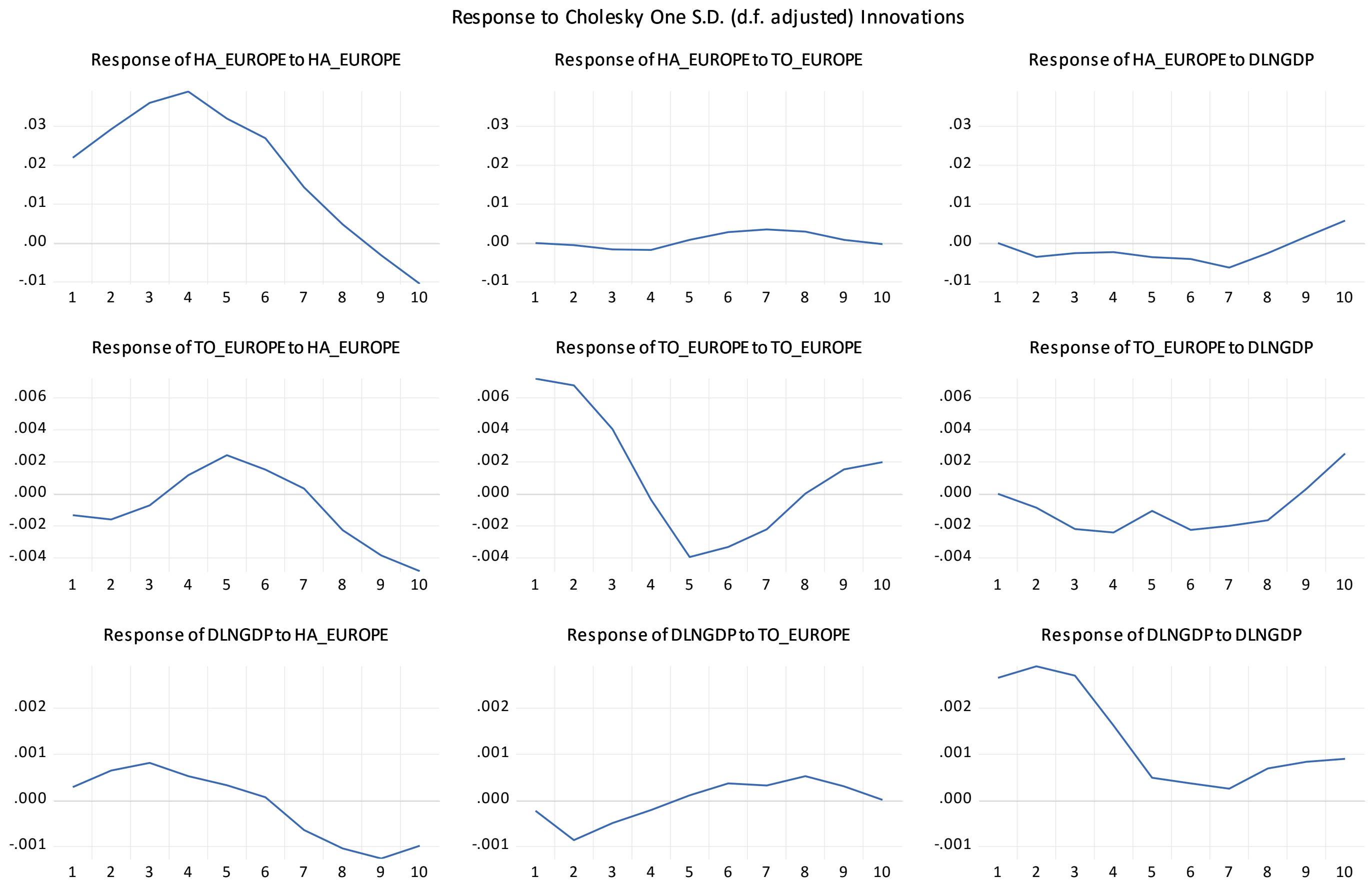

Figure 8.22. Europe_the Result of the IRFs

Table 8.85. East Asia_Variance Decomposition

Variance Decomposition of HA_EASIA:				
Period	S.E.	HA_EASIA	TO_EASIA	DLNGDP
1	0.027903	100.0000	0.000000	0.000000
2	0.038364	95.92603	0.468275	3.605693
3	0.045580	89.55421	0.470287	9.975498
4	0.047625	90.35647	0.506341	9.137187
5	0.047817	90.36204	0.566236	9.071727
6	0.047843	90.26385	0.611565	9.124589
7	0.048316	88.75219	0.912095	10.33572
8	0.049384	84.95767	1.036002	14.00632
9	0.050933	80.04325	1.200061	18.75669
10	0.052193	77.00871	1.299640	21.69165
Variance Decomposition of TO_EASIA:				
Period	S.E.	HA_EASIA	TO_EASIA	DLNGDP
1	0.028987	2.024215	97.97578	0.000000
2	0.031596	2.701615	95.47319	1.825190
3	0.033394	2.979689	95.38563	1.634685
4	0.034302	7.452226	90.58187	1.965902
5	0.034962	10.35677	87.61324	2.029987
6	0.035723	12.05357	85.42441	2.522024
7	0.036086	11.82802	84.63981	3.532170
8	0.036477	11.98303	83.32906	4.687912
9	0.036782	13.07052	82.00577	4.923710
10	0.036983	13.96298	81.11908	4.917938
Variance Decomposition of DLNGDP:				
Period	S.E.	HA_EASIA	TO_EASIA	DLNGDP
1	0.003177	0.037228	0.130005	99.83277
2	0.004607	3.787744	0.071388	96.14087
3	0.005647	5.642965	0.845610	93.51143
4	0.006095	9.449274	1.370476	89.18025
5	0.006295	11.79671	2.557880	85.64541
6	0.006390	13.14637	3.307248	83.54639
7	0.006443	13.69059	3.797390	82.51202
8	0.006489	13.90430	3.981183	82.11451
9	0.006545	13.97568	3.997863	82.02645
10	0.006607	14.01443	3.962783	82.02279
Cholesky Ordering: HA_EASIA TO_EASIA DLNGDP				

Table 8.86. Southeast_Variance Decomposition

Variance Decomposition of HA_SEASIA:

Period	S.E.	HA_SEASIA	TO_SEASIA	DLNGDP
1	0.021472	100.0000	0.000000	0.000000
2	0.038816	99.63681	0.054935	0.308257
3	0.051608	99.57087	0.081618	0.347508
4	0.060933	98.57208	1.088017	0.339900
5	0.063207	96.37506	3.220838	0.404104
6	0.064725	93.08092	6.482647	0.436437
7	0.065881	90.07876	9.499359	0.421880
8	0.066261	89.09202	10.09101	0.816967
9	0.066903	88.24310	9.910756	1.846146
10	0.067435	87.12829	10.35896	2.512756

Variance Decomposition of TO_SEASIA:

Period	S.E.	HA_SEASIA	TO_SEASIA	DLNGDP
1	0.014347	0.002402	99.99760	0.000000
2	0.020460	1.153577	97.58132	1.265102
3	0.022967	2.917312	94.37605	2.706637
4	0.023523	7.012995	90.38389	2.603111
5	0.024468	8.136022	87.05365	4.810327
6	0.025481	8.957993	86.19268	4.849324
7	0.026147	8.546069	86.54954	4.904396
8	0.026334	8.607900	86.50322	4.888877
9	0.026660	10.42331	84.56912	5.007563
10	0.027262	13.17965	82.01174	4.808605

Variance Decomposition of DLNGDP:

Period	S.E.	HA_SEASIA	TO_SEASIA	DLNGDP
1	0.002998	20.28385	0.319823	79.39633
2	0.004276	22.72892	1.441336	75.82975
3	0.005394	31.31484	1.282867	67.40230
4	0.005945	38.53817	1.536562	59.92527
5	0.006271	43.06486	2.853100	54.08204
6	0.006466	45.21684	3.474855	51.30830
7	0.006513	45.41088	3.649404	50.93971
8	0.006584	45.21085	3.644143	51.14501
9	0.006699	44.87448	3.848054	51.27746
10	0.006853	45.70675	3.897895	50.39536

Cholesky Ordering: HA_SEASIA TO_SEASIA DLNGDP

Table 8.87. Anglosphere_Variance Decomposition

Variance Decomposition of HA_ENGLISH:

Period	S.E.	HA_ENGLI...	TO_ENGL...	DLNGDP
1	0.013991	100.0000	0.000000	0.000000
2	0.020242	97.99156	1.212462	0.795979
3	0.026011	96.33166	1.141041	2.527304
4	0.028266	89.05653	1.020952	9.922517
5	0.029257	86.53704	1.543345	11.91962
6	0.029747	84.40508	3.226292	12.36863
7	0.029906	83.84917	3.454518	12.69631
8	0.030347	83.74053	3.552237	12.70724
9	0.030845	83.78970	3.562519	12.64778
10	0.031214	82.91680	4.703296	12.37991

Variance Decomposition of TO_ENGLISH:

Period	S.E.	HA_ENGLI...	TO_ENGL...	DLNGDP
1	0.005183	14.68471	85.31529	0.000000
2	0.007241	25.44225	73.51217	1.045578
3	0.007620	26.85139	71.57676	1.571847
4	0.007889	25.27240	73.22583	1.501770
5	0.009091	25.12929	73.73888	1.131831
6	0.009796	28.15940	70.82502	1.015579
7	0.010009	30.63758	67.91597	1.446454
8	0.010228	29.66694	67.79646	2.536597
9	0.010592	29.27336	67.16032	3.566316
10	0.010872	31.69511	64.89735	3.407542

Variance Decomposition of DLNGDP:

Period	S.E.	HA_ENGLI...	TO_ENGL...	DLNGDP
1	0.002517	5.851080	0.150712	93.99821
2	0.004033	4.445194	0.334316	95.22049
3	0.005088	6.040104	0.268704	93.69119
4	0.005515	5.180744	0.236373	94.58288
5	0.005610	5.226159	0.249850	94.52399
6	0.005625	5.200405	0.291949	94.50765
7	0.005655	5.590201	0.866293	93.54351
8	0.005670	5.596602	1.268874	93.13452
9	0.005726	6.299793	1.430738	92.26947
10	0.005777	6.230784	1.634807	92.13441

Cholesky Ordering: HA_ENGLISH TO_ENGLISH DLNGDP

Table 8.88. Europe_Variance Decomposition

Variance Decomposition of HA_EUROPE:				
Period	S.E.	HA_EURO...	TO_EUR...	DLNGDP
1	0.021902	100.0000	0.000000	0.000000
2	0.036675	99.01038	0.022234	0.967386
3	0.051491	99.13428	0.113019	0.752699
4	0.064602	99.24142	0.151488	0.607090
5	0.072167	99.12473	0.133997	0.741277
6	0.077164	98.81483	0.246506	0.938669
7	0.078800	98.03050	0.427333	1.542163
8	0.079045	97.79138	0.563001	1.645618
9	0.079128	97.74589	0.571448	1.682660
10	0.080022	97.28494	0.559836	2.155220
Variance Decomposition of TO_EUROPE:				
Period	S.E.	HA_EURO...	TO_EUR...	DLNGDP
1	0.007313	3.321691	96.67831	0.000000
2	0.010144	4.229922	95.03272	0.737361
3	0.011161	3.910424	91.60507	4.484507
4	0.011486	4.709603	86.59723	8.693168
5	0.012430	7.802394	84.04431	8.153300
6	0.013146	8.293365	81.49454	10.21210
7	0.013484	7.944230	80.14841	11.90736
8	0.013773	10.32459	76.82387	12.85154
9	0.014388	16.64370	71.52982	11.82649
10	0.015516	24.05990	63.13417	12.80593
Variance Decomposition of DLNGDP:				
Period	S.E.	HA_EURO...	TO_EUR...	DLNGDP
1	0.002684	1.142409	0.693636	98.16395
2	0.004101	2.982272	4.702975	92.31475
3	0.005005	4.642035	4.115356	91.24261
4	0.005293	5.141259	3.833983	91.02476
5	0.005328	5.464441	3.826741	90.70882
6	0.005354	5.429585	4.263265	90.30715
7	0.005408	6.720679	4.534321	88.74500
8	0.005576	9.818867	5.165711	85.01542
9	0.005787	13.88401	5.078950	81.03704
10	0.005939	15.91634	4.822329	79.26133
Cholesky Ordering: HA_EUROPE TO_EUROPE DLNGDP				