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Economic Policy Uncertainty and Korean Economy : Focusing on Distribution Industry Stock Market

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Abstract

Purpose - This study proposes the impact of the US and Korean economic policy uncertainty on macroeconomy, and its effect on Korea. The economic policy uncertainty index of the US and Korea is used to represent the economic policy uncertainty on Korean economy.

Research design, data, and methodology – In this paper, we collect the eight variables to find out the interrelationship among the US and Korean economic policy uncertainty index of the US and macroeconomic indicators during 1990 to 2016, and use Vector Error Correction Model.

Result – The distribution industry stock index in Korea is influenced by the economic policy uncertainty index of the US rather than of Korea. All variables are related negatively to the economic policy uncertainty index of the US and Korea from Vector Error Correction Model. This study shows that the economic policy uncertainty index of the US and Korea has the dynamic relationships on the Korean economy.

Conclusions – A higher economic policy uncertainty shows a greater economy recession of a country. Finally, the economic policy uncertainty of the Korea has an intensive impact on Korea economy. Particularly, the economic policy uncertainty of the US has a strong impact on distribution industry stock market in Korea.

Keywords: Distribution Industry Stock, EPU, CPI, IPI, PPI.

JEL Classifications: C32, D80, E63, E66.

1. Introduction

How can the economic uncertainty of one country affect the economy of another? We have always questioned how the economic policy uncertainty (EPU) of the US affects Korea's economy. Since the USA is one of the largest trading partners of Korea, its influence on Korean economy is undeniable. Therefore, the EPU of the US and its relationship to the Korean economy has interesting characteristics and it is worthy of research. In this study, we analyze empirically the effects of EPU of the US on the Korean economy using EPU index.

We use the EPU index by Baker et al. (2016) to apply EPU to the analysis of this study. The US EPU index is being used as a predictor of the economy, such as investment and employment. Specifically, Baker et al. (2016) mention that as EPU deepens, the stock market fluctuates more widely and reduces investment in sectors sensitively to policies such as defense and social infrastructure construction, and reduces jobs. The impact of macroeconomic uncertainty on the macroeconomy of the country is significant. On the contrary, it may be seen from the past global financial crisis that the impact of the macroeconomy on the uncertainty of the national economic policy has increased. In addition, Abaidoo (2016) finds that the impact of China's economic situation on the world is less than that of the US in its study of the impact from the US and Chinese economic conditions on the world. Based on this, this study attempts to analyze the effect of EPU of the US on the Korean economy rather than that of China. To do this, we use empirically US EPU to estimate the effects of the

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macroeconomic variables on Korea's economy.

This study examines the effects of economic uncertainty in Korea and the US on Korea 's trade with the US and the distribution industry in Korea. The distribution industry has grown tremendously since 1990s. In 1996, distribution technology and product purchasing are broadly improved fully with the opening of the distribution market, and the distribution industry is developing day by day with the increase of large discount stores. Also owing to the rapid development of inventory, sales, and customer management based on IT technology, the distribution industry is becoming an indispensable industry across all industries. Until recently, the share of the distribution industry in Korea's GDP has continued to increase, and it is an industry that is heavily influenced by national policies, such as restrictions on openings. This study empirically analyzes the uncertainty of economic policy on the effect of the distribution industry by using the economic policy uncertainty index and the distribution industry stock index of Korea and US as the main variables.

The macroeconomic variables are used to analyze the relationship to economic policy uncertainty in Korea and the US. The variables for empirical analysis are the distribution industry stock index, the KOSPI, the Consumer Price Index (CPI), the Industrial Production Index (IPI), the Producer Price Index (PPI), Dubai oil price, and EPU index in Korea and the US. Empirical data were collected from January 1990 to December 2016 and reviewed using the Vector Error Correction Model (VECM).

Empirical analysis of the VECM reveals that the distribution industry stock index is more affected by the US economic uncertainty index than by Korea. On the other hand, the KOSPI is affected by Korea's EPU index. As a macroeconomic indicator, Korea's CPI, IPI and PPI are affected by Korea's EPU index. In particular, all the variables have a negative correlation with the EPU index of Korea and the US. Namely, the higher the uncertainty of economic policy in Korea and the US, the more likely it is that Korea's economy will deteriorate.

This study shows differentiation from previous studies. First, unlike previous studies which compared relationship between EPU Index of US or European countries and GDP, IPI, etc, this study compares relationship between US and Korean EPU indices and Korea's economic indicators such as CPI, IPI, and PPI. Second, the distribution industry stock index is more correlated with US EPU index than Korea. This study shows that the close observation in US EPU index is beneficial to the trend of distribution industry economy along with the distribution industry stock index in Korea.

Following the introduction, we review the theoretical background used in this study and previous domestic and international studies in Chapter 2. We present data and models for empirical analysis in Chapter 3. Chapter 4 explains the empirical results and Chapter 5 shows the conclusions.

2. Theoretical Background and Literature Review

Generally, there are previous literatures of the distribution policy and economy (Choi & Lee, 2012; Su, 2013; Sun & Yang, 2016). But this study compare and analyze the impacts of EPU in Korea and the US on the Korean economy. Namely, we use the Korean CPI, IPI, and PPI. In addition, we conduct an empirical analysis including KOSPI and the distribution industry stock index, which can quickly catch up with economic changes, and Dubai oil price, which Korea consumes the most among international oil prices, which can bring about changes in domestic real economy.

Mei and Guo (2004) study a political uncertainty shows an important factor in financial crisis. They find that eight out of nine financial crises occur during political elections and transitions based on emerging markets. Bloom (2009) studies that the company stops investment and employment when uncertainty increases. The resulting volatility causes overshoot in output, employment and productivity. As a result, the shock of uncertainty leads to a short-term sharp downturn or recovery. Bloom (2014) documents that the world economy is facing uncertainty. Uncertainty is a broad concept that also implies macroeconomic uncertainty. Also, it includes uneconomic events such as war and climate change. There are also uncertainties from future possibilities, and uncertainties vary from country to country. Uncertainty increases due to shocks such as rising oil prices, wars and recessions, and uncertainty increases as the economic growth rate decreases. Hartzmark (2016) states that economic uncertainties and risk-free interest rates are closely related. Thus, when excluding interest rate uncertainty, we regard it as an incomplete analysis. We find evidence in the preceding research that there has been a vigorous study of the EPU of the state and the economy in relation to this study.

2.1. EPU index

Baker et al. (2016) create and develop the index of economic policy uncertainty, and it has used as a variable on a country by country to examine the role of EPU. Specifically, since 1985, the US EPU has indexed by aggregating monthly articles containing words related to Economy, Uncertainty, and Policy from the top 10 newspapers in the US, including the Miami Herald, Washington Post and the New York Times, etc. They document that a high US EPU index has led to a reduction in investment and employment, an increase of volatility in corporate stock prices, and a decline in employment, production, and investment in certain industries with high policy sensitivity. Since 1990, Korea's EPU index has

indexed by the words "Blue House", "congress" and so on related to economy, uncertainty and policy in six major newspapers such as Dong-a Ilbo, Hankyoreh, Hankook Ilbo, etc. Specifically, we explain how to calculate the index for Korea's EPU. First of all, we collect articles from major newspapers about the economy, policy, and uncertainty of the total number of articles per month. Then, the weight is calculated and standardized using the mean and standard deviation, and individual indices are created for each newspaper company. In addition, the composite index on EPU is obtained by averaging the individual indices of six newspapers averaged over a period of 100 per month. In this way, Baker et al. (2016) have created an index of EPU about 20 countries, and then researchers have been using it in their academic journals.

2.2. EPU and Its Relation to Economic Index

In many literatures, EPU has been used in various studies related to the economy. And we briefly review the relationship between EPU and economic indicators such as stock prices and oil prices. Nandha and Faff (2008) state that as oil prices rise, production costs with raw materials rise and consumer prices increase, eventually leading to deterioration in profitability. Kang and Ratti (2013) state that economic uncertainty and international oil prices are found to be correlated. They find that stock market returns are affected. Uncertainty in economic policy has led to a 19% change in a long-term volatility of stock price returns, and demand shocks by oil market have fluctuated by 12%. Antonakakis et al. (2014) show the relation between EPU index and oil price fluctuations in petroleum exporting countries and oil importing countries. As a result, they find that EPU had a negative impact on oil prices. The same result is also obtained by Jeon (2017a). Namely, the EPU index, the oil price of Korea as an oil importing country, and the US as an oil exporting country, both of two countries show significant causal relations in both directions. Also, the EPU index in Korea and the US has a negative relation with the international oil price in the VECM.

Sung et al. (2014) state that the CPI is an indicator that directly reflects changes in inflation in everyday life from economic indicators closely related to EPU. In addition, the CPI is an index that shows the prices paid for the 480 items, such as goods and services, and it reflects the consumption pattern of consumers in the entire urban household, compared with the average price at the base time. The CPI reflects the real economy. Namely, when the economy rises, the index rises due to the increase in demand, and on the contrary, the index tends to fall owing to the decrease in demand. In addition, Han et al. (2015) state that the stock valuation model shows that if prices rise, the CPI rises and the stock price leads to decline.

Liu and Zhang (2015) document the forecasting ability of stock market fluctuation due to EPU. As a result, the volatility of the stock market increases as the uncertainty in economic policy becomes higher. In addition, EPU is added to the existing volatility forecasting model as a result of which the forecasting ability is improved. Antonakakis et al. (2015) show the relationships between US housing market returns and US EPU index. As a result, they find negative correlation between US housing market returns and US EPU index from 1987 to 2014.

The IPI changes in the same direction as the economy. Han et al. (2015) examine that an increase in production means the economy is enhancing, whereas a decrease in production means the economy is lagging. Namely, if the uncertainty of the economy grows, it means that the economy is shrinking, production is reduced, and industrial production is lowered. Ultimately, industrial production is proportional to the share price, which means that if the industrial production increases, the stock price rises.

Jeon (2017a) finds that the PPI is an indicator of economic trends, which is influenced by the oil price of raw materials, and EPU has a ripple effect on the PPI following oil price. The rise in the PPI puts the burden on the company, so the production cost increases and the profit of the enterprise decreases. In addition, it can be predicted that stock prices will decline due to the decrease in corporate profits when the PPI rises. Jeon (2017b) also shows the relationship between the US purchasing manager index and the PPI. As a result, the US purchasing manager index has a positive relationship with the PPI in Korea and the US.

2.3. EPU by Country and Its Relation to the Economy

Lee (2010) examines that the Korean financial market has been influencing the international financial market due to market opening since the 1990s. In 1998, the Korean stock market was in sync with international stock prices due to the full opening of the stock market. This is because foreign investors who have invested in international investment portfolios are heavily influenced by foreign investors. As a result, the Korean financial market has more influence on the volatility resulting from the yen dollar exchange rate and the Dow Jones stock price index than the volatility caused by the won dollar exchange rate and the KOSPI. Foreign news related to economic uncertainty has given more volatility to the stock market or foreign exchange market than to interest rates.

Kang and Ratti (2015) show the Chinese EPU and oil markets and the Chinese stock market using the vector autoregressive (VAR) model. As a result, China's EPU has had a negative impact on the Chinese stock market and the international oil market.

Abaidoo (2016) studies the impact of US and Chinese EPU on the global economy and examined the paradigm shift in the effect of external macroeconomic uncertainties on the growth of a particular gross national product, but found no significant paradigm change. However, despite the growth

of the Chinese economy, US EPU has had a greater impact on the macroeconomic situation of the world.

Antonakakis et al. (2016) show that as EPU increases, not only has the US economy changed significantly, but it also affected stock markets, housing returns, industrial production, and inflation. Antonakakis and Floros (2016) argue that the UK also experienced economic fluctuations as EPU increased. In particular, they find that uncertainty in economic policy has a large impact on monetary policy, economic growth, inflation, the stock market and the housing market. Kang et al. (2017) show that US EPU has a negative impact on the profits of major oil and gas companies around the world. Chi and Li (2017) have used Chinese commercial bank data from 2000 to 2014. China's economic uncertainty increases the credit risk of banks and negatively affects the size of loans. In the US, uncertainty in economic policy has a negative impact on stock price returns.

3. Research Design

3.1. Data

Time series data used for empirical analysis are composed of monthly data from 1990 to 2016. The main variables are the EPU of Korea and the US and the macroeconomic indicators of Korea such as the distribution industry stock index, the KOSPI, CPI, IPI, PPI, and Dubai oil price, and then the total 8 variables were used for the empirical analysis. First of all, the EPU indices of Korea and USA, as major variables was made by Baker et al. (2016) are used for this study. The CPI and the IPI in Korea are obtained from the Statistics Korea and the PPI is collected from the Bank of Korea. The KOSPI and the distribution industry stock index are obtained from Fnguide in Korea and Dubai oil prices are collected from the World Bank. <Table 1> indicates the descriptive statistics of variables.

<Table 1> Descriptive Statistics

	Korean EPUI	US EPUI	Dubai Oil Price	KOSPI	DISI	CPI	IPI	PPI
Mean	104.24	111.03	45.21	1170.62	432.17	80.90	65.60	83.09
Median	92.87	100.94	28.00	933.20	460.18	80.88	61.15	80.34
Min.	22.63	44.78	10.05	312.15	113.23	42.80	20.01	55.00
Max.	393.56	283.66	131.22	2153.13	854.32	111.48	117.40	108.97
S.D.	57.70	42.12	33.53	556.92	164.37	20.33	30.68	16.08
N	324	324	324	324	324	324	324	324

Note: EPUI, DISI, CPI, IPI, PPI denote separately Economic Policy Uncertainty Index, Distribution Industry Stock Index, Consumer Price Index, Industrial Production Index, Producer Price Index.

First of all, we examine the status of the distribution industry. <Table 2> shows the total amount of foreign direct investment from 2009 to 2015 and the amount of direct investment in the US by year. The trend of total direct investment shows that the amount is gradually increasing, and that the amount of investment in the US, one of the countries with the largest investment in Korea, is also rising. In addition, the share of the distribution industry in GDP is steadily increasing. It shows that the role of distribution industry in Korea gradually is increasing and becoming important in the Korean industry.

<Table 2> Foreign Direct Investment (FDI) and Distribution Industry-to-GDP (2009-2015)

(Unit: one hundred million USD, %)

	2009	2010	2011	2012	2013	2014	2015
Total FDI amount	114.8	130.7	136.7	162.9	145.5	190.0	209.1
US FDI amount	14.9	19.7	23.7	36.7	35.3	36.1	54.8
Distribution industry rate-to-GDP	7.2	7.4	7.5	8.3	8.3	8.3	8.3

Source: Ministry of Trade, Industry and Energy (2016).

<Table 3> shows that the effects of economic policy uncertainty on the distribution industry economy of both countries can be deduced from the export amount of both countries and their export proportions of exporting countries to Korea and the US. In Korea, the US is the second largest export market after China, and its exports to the US are increasing gradually. Therefore, Korea is highly dependent on the US economy, so it has a great influence on US EPU. In the case of the US, Korea is included in the top ten exporting countries of the US, but the export proportions of Korea to the US is very small, about 3% of the total exports from 2009 to present. Namely, it can be indirectly deduced that Korea's economic uncertainty has little impact on the US distribution market economy.

<Table 3> Export comparison both Korea and the US (2009-2015)

	Unit	2009	2010	2011	2012	2013	2014	2015
Korea	$ million	37,650	49,816	56,208	58,525	62,052	70,285	69,832
	%	10.4	10.7	10.1	10.7	11.1	12.3	13.3
US	$ million	28,640	38,821	43,400	42,284	41,555	44,544	43,499
	%	2.7	3.0	2.9	2.7	2.6	2.7	2.9

Source: Ministry of Trade, Industry and Energy (2016).

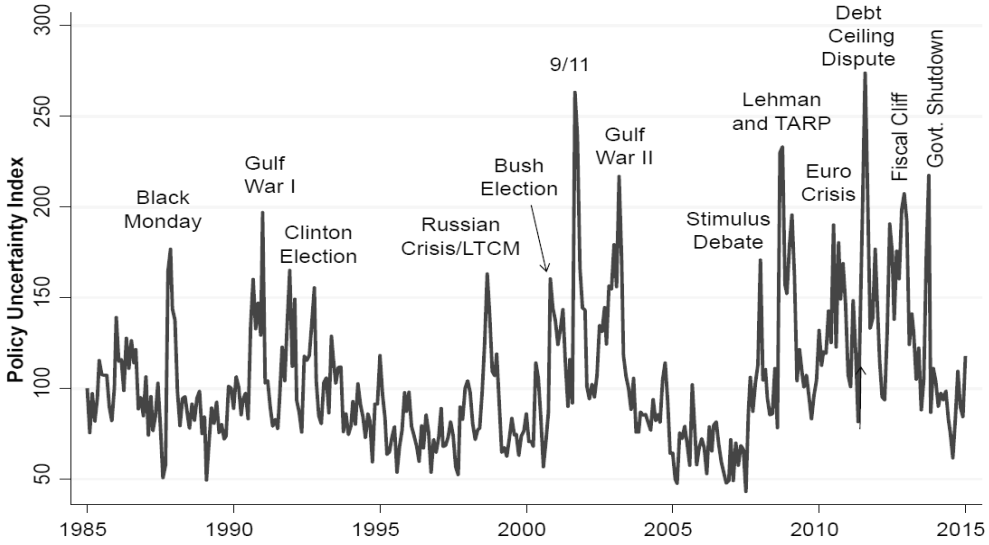
In addition, changes in distribution logistics may be indirectly seen through the distribution industry stock index as shown in <Figure 1>. After the 1997 financial crisis, the distribution industry stock index had sharply declined. After the complete opening of the distribution market in 1998, multinational large discount stores as Walmart entered the Korean market, which had also boosted the distribution industry stock index. The distribution industry stock index had fallen as the global financial crisis in 2008 and stock

prices had recovered as the global financial crisis broke out. Thus, economic uncertainty has a great impact on the distribution industry stock index.

<Figure 2> shows the trend of US EPU. In particular, the 9/11 terrorist incident in 2001, the bankruptcy of Lehman Brothers in 2009, and the upside debt dispute in 2013 showed a sharp rise in the EPU index due to the heightened economic uncertainty. Through these facts, we know the relationship between economic uncertainty and economy in a fragmentary way.

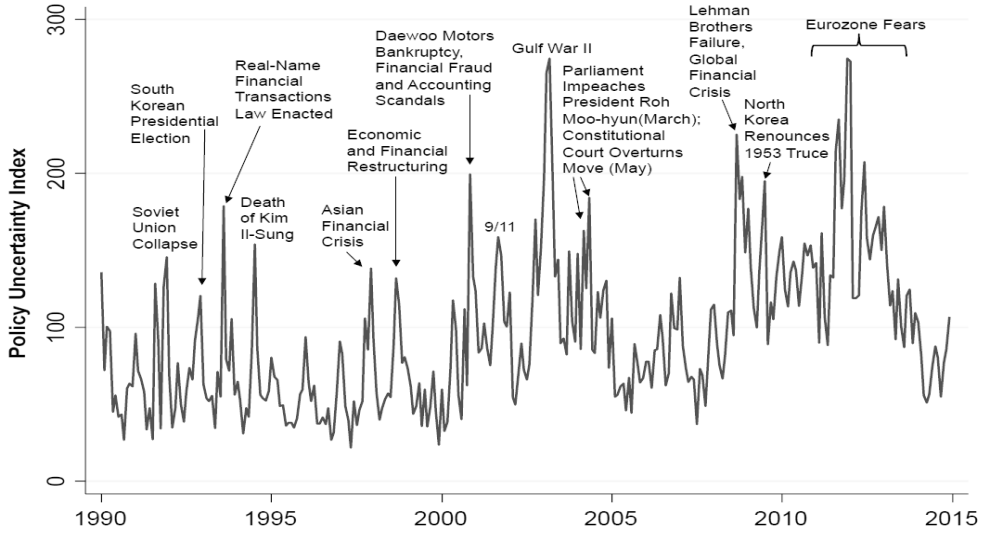
<Figure 3> shows the trend of uncertainty in Korean economic policy. Above all, the characteristic features are the cases of the Daewoo bankruptcy, the second Gulf War, and the eurozone crisis, including Greece and Italy, which have caused a sharp increase in the economic uncertainty in Korea.

<Figure 1> Distribution industry stock index (1990-2016)



Source: Baker, Bloom, and Davis (2016).

<Figure 2> Trend of EPU Index for the US



Source: Baker, Bloom, and Davis (2016).

<Figure 3> Trend of EPU Index for Korea

3.2. Methodology

In this study, the model is to investigate the stability of time series data composed of economic data. In this case, if the differential data does not have a unit root and there is a cointegration, then if the VAR model is estimated, the inherent information of time series of the differential data is lost, and the long-term balance relation cannot be shown. Sequentially, it has not a unit root in the first difference, but there is a cointegration relation in the level variable. Therefore, we use VECM that long-term balance relationship and short term dynamic relationship between EPU index and other variables show in Equation (1). We show the dynamic effect of the impulse response function between the EPU index and the economic index, focusing on VECM.

$$\triangle Y_t = \sum_{i=1}^{k-1} \Psi_i \triangle Y_{t-i} + \alpha\beta' Y_{t-k} + \Omega + \epsilon_t \quad (1)$$

$\triangle$: first difference operator
Y_t: $(p \times 1)$ vector as I(1)
i: lag order
k: number of lag order
t: time (period)
Π: $p \times p$ matrix of short-run coefficients
$\alpha\beta' Y_{t-k}$: lagged error correction term
α: adjustment parameters
β': cointegration vectors
Ψ: vector of deterministic components
ϵ_t: $p \times 1$ vector of disturbances
p: Korean Economic Policy Uncertainty Index, US Economic Policy Uncertainty Index, Dubai oil price, KOSPI, Distribution Industry Stock Index, Consumer Price Index, Industrial Production Index, Producer Price Index

4. Empirical Results

4.1. Unit Root Test

<Table 4> Unit Root Tests

		ADF Test		PP Test	
		Level	1st Difference	Level	1st Difference
Korean EPUI	Con.	-3.612	-11.144***	-6.796	-26.546***
	Con. & Trend	-5.343	-11.133***	-9.023	-26.523***
US EPUI	Con.	-3.867	-10.363***	-6.905	-24.580***
	Con. & Trend	-4.128	-10.350***	-7.243	-24.542***
Dubai oil price	Con.	-1.433	-8.941***	-1.437	-12.430***
	Con. & Trend	-2.241	-8.946***	-2.401	-12.408***
KOSPI	Con.	-1.249	-7.203***	-1.188	-12.634***
	Con. & Trend	-2.928	-7.203***	-2.968	-12.626***
DISI	Con.	-2.498	-7.033***	-2.438	-16.550***
	Con. & Trend	-2.497	-7.047***	-2.417	-16.554***
CPI	Con.	-4.915	-7.260***	-5.773	-10.984***
	Con. & Trend	-2.055	-8.728***	-2.526	-11.632***
IPI	Con.	-1.669	-15.183***	-1.657	-33.002***
	Con. & Trend	-1.531	-15.351***	-4.996	-33.299***
PPI	Con.	-1.844	-7.041***	-2.040	-9.391***
	Con. & Trend	-1.242	-7.253***	-1.070	-9.502***

Notes:
1. ADF and PP denote Augmented Dickey-Fuller and Phillips-Perron respectively.
2. EPUI, DISI, CPI, IPI, PPI denote separately Economic Policy Uncertainty Index, Distribution Industry Stock Index, Consumer Price Index, Industrial Production Index, Producer Price Index.
3. Con., Con. & Trend denote constant, and constant and trend separately.
4. ***, **, * mean 1%, 5%, and 10% levels.

Granger and Newbold (1974) show that the interval is small and a strong correlation between adjacent values occurs when the economic time series data is weekly or monthly. Regression analysis using unstable time series data with a unit root causes statistical errors. Namely, it has a strong correlation between the variables without correlation, which causes the problem of spurious regression. The unit root test is performed to confirm the spurious regression phenomenon and the stability of the time series data. In <Table 4>, it has a unit root in the level variable and the time series has no normality. While, the first difference for variables shows that time series have normality because there is no unit root.

4.2. Cointegration Test

Engle and Granger (1987) show that linear combination of abnormal time series variables could be stable. The unit root test is a stable time series through the nth difference. However, in the case of the VAR model with the differential data, the error correction term can be omitted. Namely, the cointegration test should be conducted considering the information loss problem of the time series generated when using the first differential data. It needs to detect the existence of a long-term equilibrium relationship for time series through the Johansen Test. As a result of Johansen test, cointegration relation exists in the time series in <Table 5>. If we consider the error is caused by the vector autoregressive model when the time series is unstable due to the unit root, and the cointegration exists and represents in long term equilibrium relation, this study is analyzed by VECM instead of VAR model.

<Table 5> Cointegration Test

Ho	Trace	5% Critical Value	λmax	5% Critical Value
r=0	270.35	156.00	84.21	51.42
r≤1	186.14	124.24	70.09	45.28
r≤2	116.05	94.15	40.65	39.37
r≤3	75.41	68.52	34.00	33.46
r≤4	41.41*	47.21	17.07	27.07

Note: * means p<0.05.

4.3. Granger Causality Test

We show the causal relationship between EPU index and macroeconomic indicators variables in Korea and the US by Granger causality test by Granger (1980). In <Table 6>, if the null hypothesis (Ho) is significant between the EPU index and the economic index variable, it is rejected, and the alternative hypothesis will be adopted. Namely, if the EPU index affects the economic indicator variable and the null hypothesis is significant, it can be said that "EPU index is related to economic index and Granger causality". Also, the effect of macroeconomic indicators on EPU index can be confirmed in the opposite direction.

Korea's EPU index is significantly related to all domestic economic indicators excluding PPI. Therefore, EPU has a large impact on the economy in Korea. On the contrary, all domestic economic indicators have a causal relationship with EPU in Korea. Therefore, Korea's EPU index and Korea's macroeconomic indicators are closely related. In addition, the US EPU index is significantly related to the KOSPI, the distribution industry stock index, and the IPI among the domestic economic indicators. On the contrary, the KOSPI, the CPI, the IPI excluding the distribution industry stock index have the significant causal relationship with the US EPU index.

And EPU indexes of Korea and the US have causal relations with both the distribution industry stock index and IPI. However, the distribution industry stock index do not show a significant causal relationship with the US EPU index. In addition, Dubai oil prices are in both causal relations with EPU index of Korea and the US in both directions.

<Table 6> Granger Causality Tests

	Ho	F-Statistic
Dubail oil price & Korean EPUI	Dubai oil price ⇏ Korean EPUI	21.553***
	Korean EPUI ⇏ Dubai oil price	9.394***
KOSPI & Korea EPUI	KOSPI ⇏ Korean EPUI	8.945***
	Korean EPUI ⇏ KOSPI	3.938**
DISI & Korea EPUI	DISI ⇏ Korean EPUI	1.897*
	Korean EPUI ⇏ DISI	2.268*
CPI & Korea EPUI	CPI ⇏ Korean EPUI	26.801***
	Korean EPUI ⇏ CPI	3.996**
IPI & Korea EPUI	IPI ⇏ Korean EPUI	29.332***
	Korean EPUI ⇏ IPI	5.866***
PPI & Korea EPUI	PPI ⇏ Korean EPUI	25.444***
	Korean EPUI ⇏ PPI	0.156
Dubail oil price & US EPUI	Dubai pil price ⇏ US EPUI	5.063**
	US EPUI ⇏ Dubai oil price	7.103***
KOSPI & US EPUI	KOSPI ⇏ US EPUI	3.954***
	US EPUI ⇏ KOSPI	3.038**
DISI & US EPUI	DISI ⇏ US EPUI	0.644
	US EPUI ⇏ DISI	5.895***
CPI & US EPUI	CPI ⇏ US EPUI	1.752*
	US EPUI ⇏ CPI	0.350
IPI & US EPUI	IPI ⇏ US EPUI	2.466*
	US EPUI ⇏ IPI	2.992***
PPI & US EPUI	PPI ⇏ US EPUI	3.692*
	US EPUI ⇏ PPI	0.837

Note:
1. ⇏ means "does not Granger Cause".
2. ***, **, * mean 1%, 5%, and 10% levels.

4.4. VECM

The optimal lag selection needs be set before executing the VECM, which is the model of this study. <Table 7> shows that lag 4 is set by AIC.

<Table 7> Lag Order Selection

lag	AIC	HQIC	SBIC
0	-6.180	-6.143	-6.086
1	-25.688	-25.350	-24.840
2	-26.547	-25.907	-24.945
3	-26.593	-25.653	-24.238
4	26.633*	-25.391	-23.524

Note:
1. * means the optimal lag order.
2. AIC, HQIC, SBIC denote respectively Akaike Information Criterion, Hannan-Quinn Information Criterion, Schwarz-Bayesian Information Criterion.
3. AIC = -ln L+p (where L is the likelihood with p parameters)

As shown in <Table 8>, Korea's EPU index has a negative relationship with the domestic economic indicators excluding the distribution industry stock index. The US EPU index has a significant negative correlation with Korea's distribution stock index. It means that if the economic uncertainty of Korea rises, the domestic economy will deteriorate and consumption and production will shrink, leading to a decline in the CPI, IPI and PPI. In addition, if US EPU rises, we forecast that Korea's distribution industry market also will fall, leading to a decline in the distribution industry stock index.

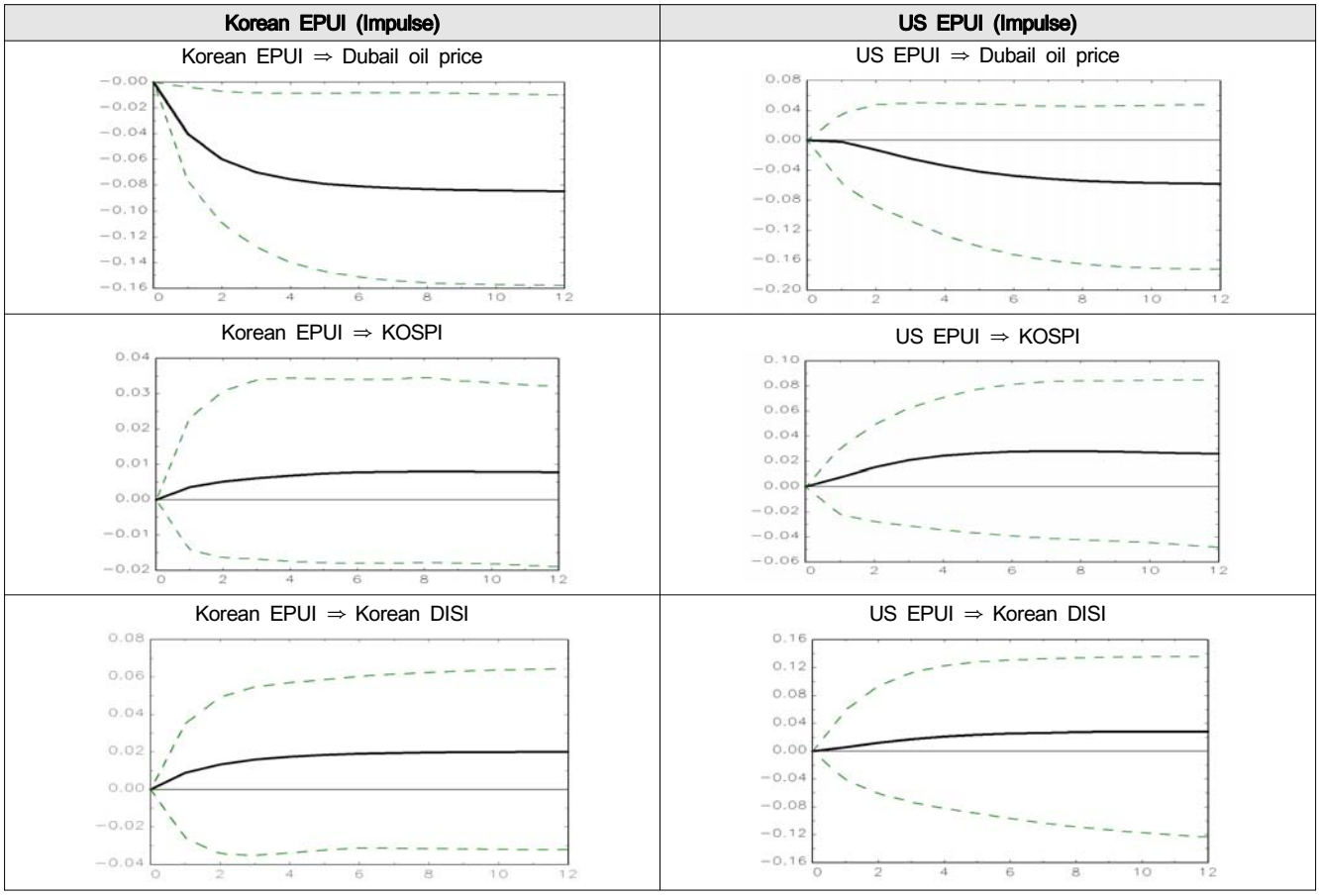
<Table 8> Estimation Results of VECM

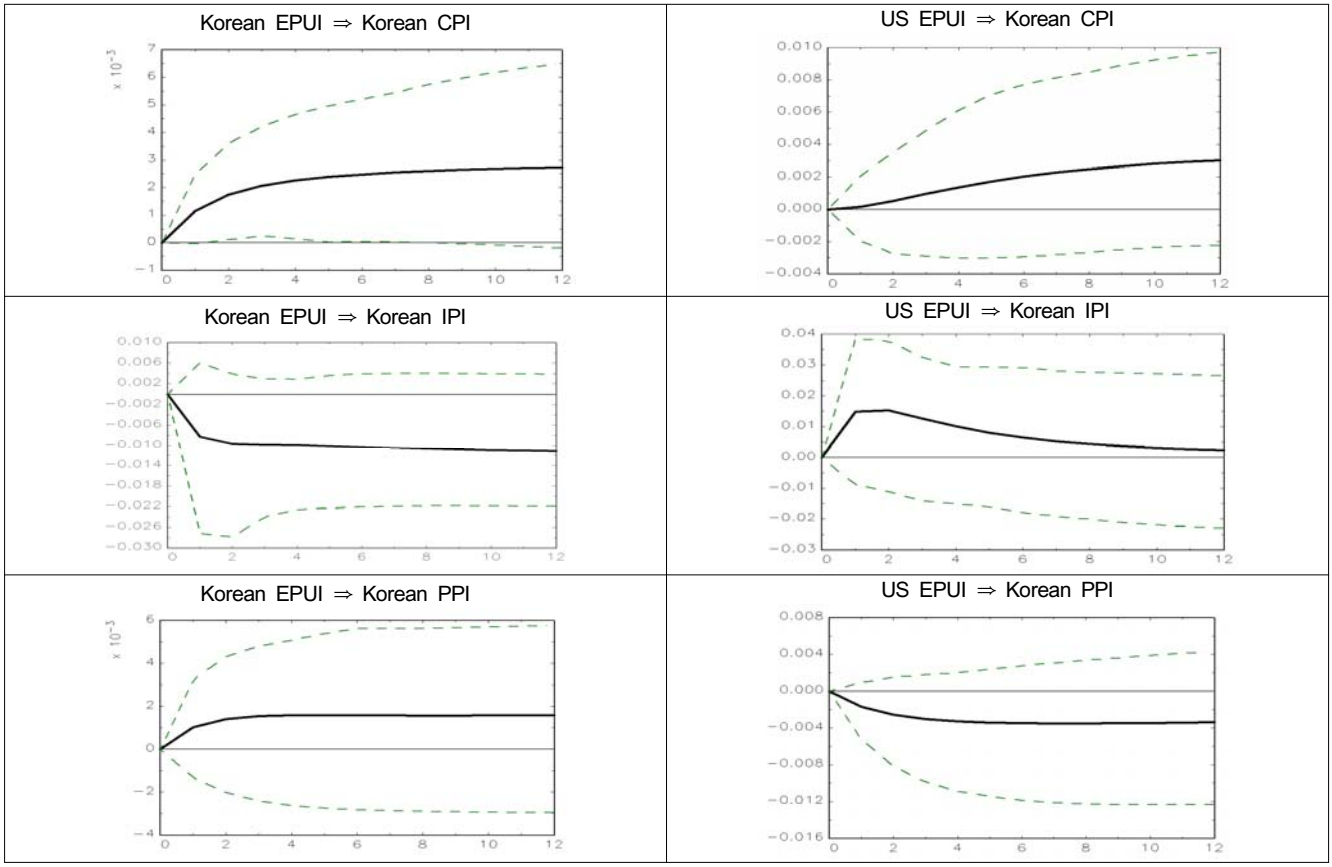
	Korea EPU	US EPU
Dubai Oil Price	-0.010 (0.015)	-0.029 (0.023)
KOPSI	-0.017* (0.010)	-0.004 (0.015)
Distribution Industry Stock Index	-0.011 (0.017)	-0.070*** (0.026)
Consumer Price Index	-0.002** (0.001)	-0.001 (0.001)
Industrial Production Index	-0.026*** (0.009)	-0.003 (0.014)
Producer Price index	-0.002* (0.001)	-0.001 (0.001)

Notes:
1. ***, **, * mean 1%, 5%, and 10% levels.
2. ( ) means standard errors.

4.5. Impulse responses

Using the VECM, the impulse response function of each variable on the EPU index of Korea and the US is examined. <Figure 4> indicates differences in the effects of EPU index of Korea and the US on the variables.





Note: The thick line means the impulse response. And the dotted line means 95% confidential interval.

<Figure 4> Impulse Response Functions to Economic Policy Uncertainty Index Shocks of Korea and the US

4.5.1. Impulse response of EPU index in Korea

The KOSPI, the responses of the distribution industry stock index, the CPI, and the PPI to the impulse of Korea's EPU index have remained moderate after climbing in a positive direction. However, the response of the IPI has remained moderate after declining in a negative direction. The results are shown in Baker et al. (2016), the US actually shows that the US IPI fell 1% as the US EPU index rose in 2005 and 2011, respectively. Impulse responses show that the variation of IPI in Korea is similar to that in the US.

4.5.2. Impulse response of EPU index in the US

The responses of the KOSPI, the distribution stock index, and the CPI to the impact of the US EPU index have remained moderate after climbing in a positive direction. However, the response of the IPI has risen in a positive direction, and then sharply declined to its origin. On the other hand, the PPI remains moderate after declining in a negative direction.

4.5.3. Comparison of Impulse response of EPU index in Korea and the US

In summary, KOSPI, the distribution industry stock index, and the CPI show a positive responses in both Korea and the US on the impulse of EPU index in Korea and the US. On the other hand, the IPI and the PPI have the response in opposite directions to the impulse on the EPU index of Korea and the US. In the case of Dubai oil price, both the impulses of the EPU index of Korea and the US have declined in a negative direction and remained moderately. In particular, Korea is receiving more shocking responses to EPU than the US.

5. Conclusions

5.1. Summary of results

In this study, monthly data from 1990 to 2016 are collected to examine the effect of EPU index of Korea and

US on KOSPI, distribution industry stock index, CPI, IPI, PPI and Dubai oil price, and empirical analysis is conducted using VECM.

The Granger causality test supports that the EPU index of Korea and the US is affecting the economic index of Korea. In particular, the EPU index in Korea is significantly related to all domestic economic indicators excluding PPI. The EPU index in Korea and the real economy have a great influence on each other by Granger causality. In addition, among the domestic economic indicators, KOSPI, the distribution industry stock index, and the IPI are characterized by Granger causality with respect to the US EPU index as well as Korea. On the other hand, Dubai oil price is closely related to EPU index of Korea and the US.

We find that Korea's EPU index is negatively correlated with the other domestic economic indicators except for the distribution industry stock index, which we find through empirical analysis of the VECM. In addition, the US EPU index has a very negative relationship with the distribution industry stock index of` Korea's economic indicators. Namely, an increase in Korea's EPU index means that the domestic economy will deteriorate and consumption and production will shrink, leading to a decline in the CPI, IPI and PPI. Furthermore, if US EPU rises, Korea's distribution industry economy also will fall, leading to a decline in the distribution stock index.

5.2. Implications

The results are shown as follows. First, the distribution industry stock index is affected more by the US EPU index than by Korea. One reason is the economic policy of the Korean government. Since the Korean government announced the third phase of opening the distribution market in 1982, the domestic distribution market has fully opened in 1996. Also, foreigners were allowed to own real estate by enactment of the "Foreign Investment Promotion Act." Thus, the legal barriers to entry into the distribution market have been completely eliminated. It has led to the changes in the Korean distribution market (Borro, 2013). Hence, the distribution industry stock index is more influenced by the US EPU index than by Korea due to the liberalization of overseas markets. As a macroeconomic indicator, Korea's CPI, IPI, producer price indices were affected by Korea's EPU index. In particular, the results indicate all variables have a negative correlation with the EPU index of Korea and the US. That is, the higher the uncertainty in economic policy, the more likely it is that Korea's economy will deteriorate. In this study, there are differentiations from previous studies. First, the previous studies have examined the relationship between GDP, IPI, unemployment rate and EPU in the US or European countries, but this study has examined the relationship between EPU index in Korea and the US and the distribution stock index, KOSPI, the CPI, IPI, PPI. Second, the distribution stock index is more closely correlated with the US EPU index than Korea. In this study, it is useful to observe the EPU in the US to grasp the trend of Korean distribution industry stock index.

5.3. Limitations and future studies

It is also possible to predict the economic indicators of Korea other than the macroeconomic variables used for EPU through this study. For example, if we apply empirical analysis to the interest rate or the exchange rate, other results that we do not know can be derived, and the effect of EPU index on the economy can be predicted. In the next period, it is necessary to analyze the effect of the EPU index on the distribution industry stock index in various countries such as the US as well as China, Japan, etc. It is possible to review the relationship between EPU and the housing market through real estate.

Finally, this study is a rare study because it compares the effects of KOSPI, the distribution industry stock index, the CPI, the IPI, the PPI, and the oil price of Dubai oil on the Korean economic index through EPU index of Korea and the US. In this study, we think that if we predict the future of EPU periodically, it is possible to contribute to the management of distribution companies and the establishment of distribution policy of government.

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