

The Prospect and Transmission Dynamics of China's Inflation to Korea

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Summary ● ● ●

- ▶ Korea's consumer prices have increased beyond the inflation target ($3.0\pm 1\%$), which has resulted in growing concerns over inflation.
 - The increase is attributable to price run-ups in agricultural and livestock products, driven by a sharp increase in global commodity prices, extreme weather, and the spread of foot and mouth disease.
- ▶ The upward trend of major price indices in China, Korea's largest trading partner, is heightening worries over price instability.
 - The significant rise in Chinese consumer prices is due to surges in housing rents and food expenses (agricultural and livestock products).
 - In addition, increases in the prices of international raw materials and in the wages of Chinese workers are adding to supply-side inflationary pressure.
- ▶ Given the large amount of Korea's imports from China, a rise in production costs in China can result in inflation in Korea.
 - Higher production costs in China, stemming from accelerated commodity prices and the policy to raise minimum wages, will push up the price of imported goods to Korea, and thus affect Korea's consumer prices.
 - The appreciation of the yuan is also driving up Chinese export prices.
- ▶ It is found that Chinese inflation in 2010 preceded inflation in Korea by about seven months.
 - China entered a high inflation phase in February 2010; Korea began experiencing a high inflation regime in September of the same year.
- ▶ Empirical analysis reveals that Chinese inflation had no significant impact on Korea's inflation rate in the 1990s, while it became one of the main external causes of Korea's inflation along with oil prices in the 2000s.
 - A 1 percent rise in Chinese inflation results in a 0.13 to 0.15 percent increase in Korea's inflation rate after three months and has persistent effects in Korea.
- ▶ As other emerging economies have also been suffering from rising prices since the second half of 2010, measures to ward off global inflation are necessary.
 - When there are signs of price instability, micro-policy measures targeting specific markets are required to curb inflation expectations and contingency plans should be devised to stabilize prices as well.

1. Background of Concerns over “Chinaflation”

A. Recent price movements in Korea

- Korea's consumer prices rose 2.9 percent in 2010, but fears over price instability are growing recently due to supply-side factors.

- Prices of agricultural and livestock products have risen because of unusual weather conditions and the spread of foot and mouth disease. Oil product prices have increased due to run-ups in international oil prices.

Table 1. Average Annual Increases in Consumer Prices in 2010

(Unit: % point, %, year-on-year)

	Consumer price	Agricultural & livestock products			Industrial products		Services			
			Agricultural products	Fisheries products		Oils		Rentals for housing	Public services	Personal services
Growth	2.9	10.0	13.5	11.3	3.1	9.2	1.9	1.8	1.2	2.2
Level of contribution	2.93	0.85	0.67	0.16	0.98	0.52	1.12	0.16	0.19	0.76

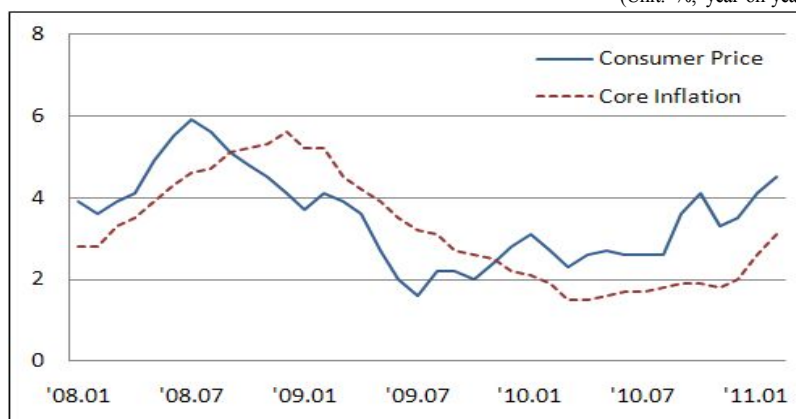
Source: Statistics Korea.

- Core inflation, which excludes agricultural and oil products, rose significantly this year, attributed in part to high expected inflation and a rise in import prices.

- Core inflation remained at a 2 percent level until December 2010 but rose to 3.1 percent in February 2011, stoking concerns over demand-side inflation.

Figure 1. Growth in Korea's Consumer Price

(Unit: %, year-on-year)



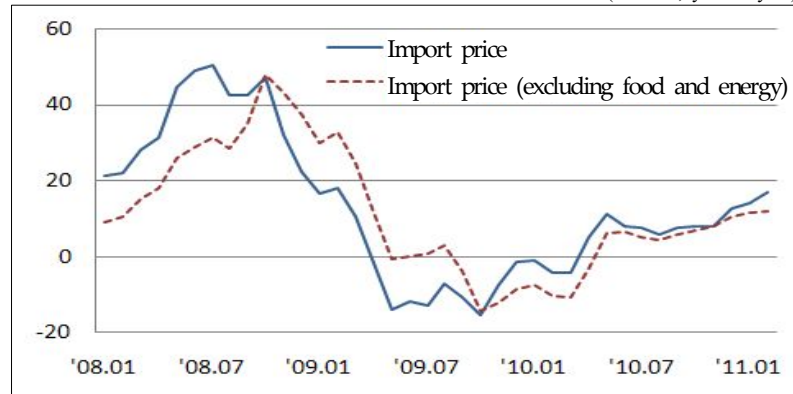
Source: Bank of Korea.

- Import prices grew 16.9 percent in February of this year, and the import prices of goods (excluding food and energy) rose as high as 15.6 percent.

- The import prices of industrial goods increased 8.8 percent in February 2011.
- Increases in import prices are likely to affect domestic consumer prices with a time lag.

Figure 2. Rate of Increase in Korea's Import Prices

(Unit: %, year-on-year)



Source: Bank of Korea.

- Anxiety is deepening over so-called “Chinaflation,” the phenomenon in which China’s inflation is raising consumer prices in Korea through the higher prices of imported products from China.

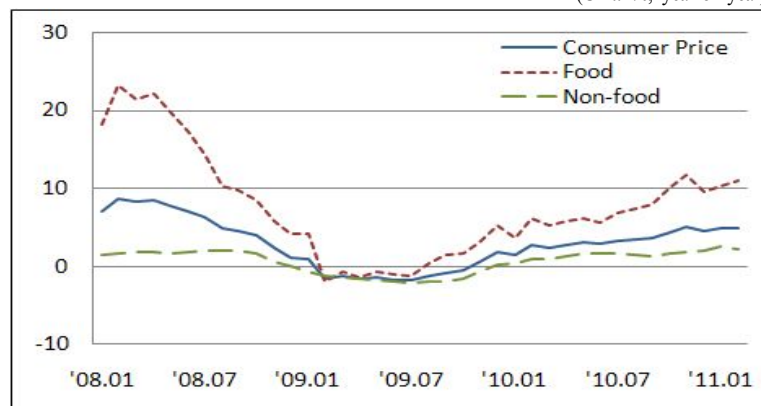
B. Main causes of price instability in China

- Major price indices in China continue to grow.

- China’s consumer prices rose 3.3 percent in 2010, surpassing its government target of 3.0 percent, and prices continue to rise with the consumer price index climbing 4.9 percent in February of this year.
- While non-food product prices are increasing at a slow pace, food product prices are rising rapidly.

Figure 3. Increases in China's Consumer Price

(Unit: %, year-on-year)

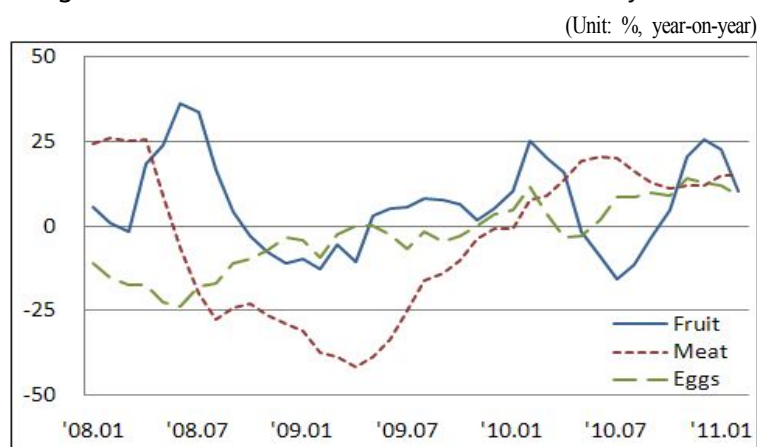


Source: Bloomberg.

■ Hikes in Chinese consumer prices were caused by increases in the prices of housing and food products (agricultural and livestock products).

- Last year's consumer price hikes were driven by agricultural product price increases that comprise the largest overall percentage rise, at 32.8 percent.
- Among food products, meat products rose the most at 15.1 percent, followed by fruit at 10.2 percent, and eggs at 8.9 percent (February 2011).
- A rise in demand for meat driven by growing incomes has resulted in meat product price increases. The supply shortages of agricultural goods stemming from abnormal weather conditions and high international grain prices have also contributed to the recent price hikes.
- Vegetable prices that had grown at a rapid pace recently stabilized thanks to the Chinese government's strong measures to fight inflation.

Figure 4. Price Increases of Chinese Food Products by Item



Source: CEIC.

- As for non-food items, housing expenses continue to rise (6.1 percent as of February 2011) and medical costs grew more than 3 percent from 2010.

Table 2. Weight and Growth of Chinese CPI by Item (February 2011)

(Unit: %, year-on-year)

Item	Food	Housing	Culture	Transportation/ Communications	Medicine	Clothing	Household items	Cigarettes/ alcoholic beverages
Weight	32.8	14.7	13.9	10.2	9.8	8.9	5.9	3.8
Growth	11.0	6.1	0.3	-0.3	3.0	0.4	1.4	1.9

Source: Bloomberg.

■ In addition, producer price hikes driven by soaring global commodity prices stand out.

- Increases in the prices of oil (stemming from the recent turmoil in the Middle East) and

non-ferrous metal items (on the back of global economic recovery) are putting more upward pressure on producer prices.

■ Continuous wage increases are also adding strain to inflation pressure on the supply side.

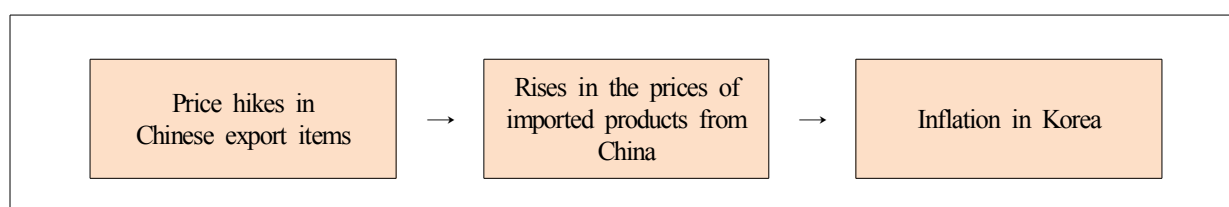
- China's minimum wages grew 24 percent in 2010, and six Chinese provinces increased their legal minimum wages this year.

■ Inflation in China will likely continue for a considerable time given that both supply-side factors, including wage increases, and demand-side factors, such as fast economic recovery, are driving up consumer prices.

2. China's Inflation Transmission Channel to Korea

■ As Korea is highly dependent on China for imports, China's inflation, which will result in increases in the prices of imported product from China, will push up Korea's consumer prices.

Figure 5. China's Inflation Transmission Mechanism to Korea



- China's share in global trade is constantly growing: the country now stands as Korea's largest trade partner.

Table 3. Changes in China's Share in Global Export and Import

(Unit: %, year-on-year)

	2004	2005	2006	2007	2008	2009
Export	6.5	7.3	8.0	8.8	8.9	9.6
Import	6.0	6.2	6.5	6.8	7.0	8.1

Note: China's share in global trade.

Source: Korean International Trade Association.

Table 4. Changes in Korea's Export/Import Dependence on Major Trade Partners

(Unit: %)

	Exports				Imports			
	2000		2010		2000		2010	
1	U.S.	21.8	China	25.1	Japan	19.8	Middle East	19.0
2	EU	13.6	South East Asia	20.0	U.S.	18.2	China	16.8
3	Japan	11.9	EU	11.5	Middle East	16.1	Japan	15.1
4	South East Asia	11.7	U.S.	10.7	EU	9.8	South East Asia	14.0
5	China	10.7	Japan	6.0	China	7.9	U.S.	9.5

Source: Korean International Trade Association.

■ Upward pressure on China's production costs and the appreciation of the yuan are pushing up Chinese export prices.

- Commodity price increases and labor shortages have led to measures to raise minimum wages in China. This has driven up export prices by increasing production costs.
- Hikes in export prices were caused in part by greater exchange rate flexibility driven by reform of China's exchange rate system carried out in 2010. The appreciation of the yuan due to China's huge current account surplus has also added pressure to China's already high export prices.
- The yuan appreciated by 0.56 percent from the end of 2010, as of March 30, 2011.

■ China's export price increases have transmitted inflationary pressure to Korea through rises in import prices.

- Table 5 shows import items for which Korea is highly dependent on China.

Table 5. Proportion of Imports from China by Item

(Unit: %)

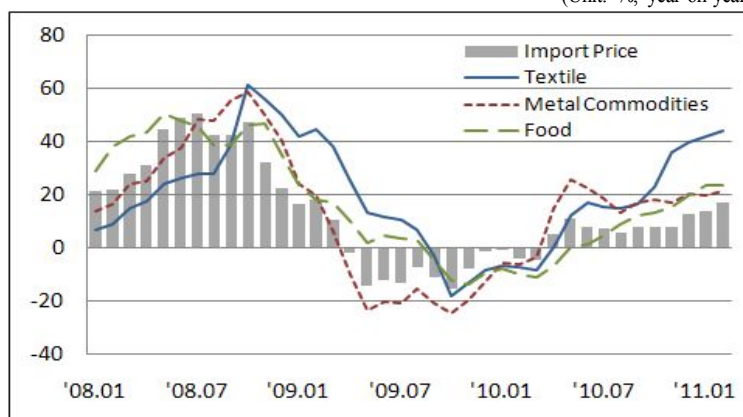
Item	Proportion of imports
Household items	54.8
Textiles	54.2
Electronics and electric products	36.0
Steel and metal products	24.1
Chemical products	15.6
Food products	15.3

Note: Items are classified in accordance with the MTI code for classifications, from January to December, 2010.
Source: Korean International Trade Association.

- Table 5 shows that the rates of increase in the import prices of textiles, metal products and food are higher than those for entire imported items.

Figure 6. Increases in Korea's Import Prices by Item

(Unit: %, year-on-year)



Source: Bank of Korea.

- With Korea's import prices climbing in correlation with increases in Chinese producer prices from mid-2009, there are growing concerns that China's inflation can stoke inflation in Korea.

Figure 7. Changes in Chinese Export Prices and Korea's Import / Consumer Prices

(Unit: %, year-on-year)



Source: Bloomberg.

3. Empirical Analysis

A. Recent Inflation in China precedes that in Korea

- The Markov regime switching model¹⁾ was used to analyze the possibility of Chinese inflation transmission to Korea.

1) The Markov regime switching model is a measuring tool that analyzes the state-dependent features of economic time-series data.

- The empirical analysis considers two regimes: high inflation ($S_t = 1$) and low inflation ($S_t = 2$).
- Using monthly data from January 2000 to December 2010, we run the following regression equation.

$$y_t = \sum_{i=1}^k \beta_{i,S_t} x_{i,t} + \epsilon_t, \quad \epsilon_t \sim N(0, \sigma_{S_t}^2) \quad (1)$$

- In equation (1), $S_t (=1,2)$ denotes the state at time t , $\sigma_{S_t}^2$ denotes the variance of the innovation at state S_t , and β_{i,S_t} denotes the coefficient for explanatory variable in the state S_t .²⁾

■ Figures 8 and 9 show that the high inflation regime in China in 2010 preceded inflation in Korea by about seven months.

- China entered the high inflation regime in February 2010, and Korea followed in September of the same year.

Figure 8. Smooth Regime Probabilities of China's Inflation Rates

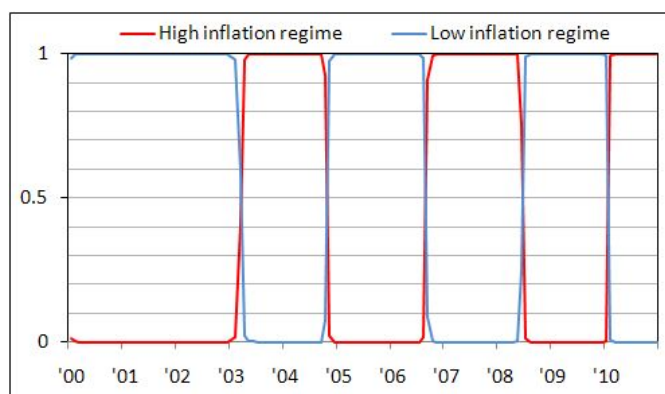
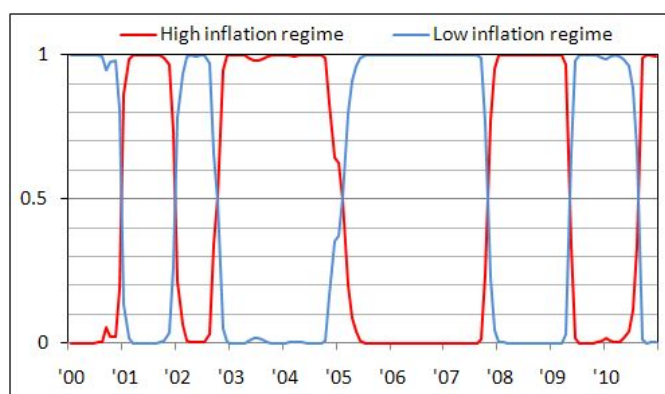


Figure 9. Smooth Regime Probabilities of Korea's Inflation Rates



2) When the rate of inflation in Korea is the dependent variable, explanatory variables include a constant term and the rates of inflation in China, the U.S. and Japan. When China's inflation rate is the dependent variable, explanatory variables include a constant term and the rates of inflation in the U.S. and Japan.

■ Once Korea shifted to the high inflation regime, Korea's inflation lasted longer than that of China.

- In the Markov regime switching model, the continuation of a regime over a certain period is called the "duration" of the regime.
- The expected duration of the high inflation regime in Korea is 19.4 months, while it is 16 months in China.

B. China's inflation transmission dynamics to Korea

■ The vector autoregressive model with exogenous variables (VARX) is used to analyze the effects of external shocks on Korea's CPI, a country with a small open economy.

- The advantage of the VARX model is that it examines the effects of external shocks by treating external variables as exogenous processes that behave independently of domestic endogenous variables within the model.

Box 1. VARX Model

■ The following VARX model is estimated by using monthly data.

$$X_t = C_0 + C_1 X_{t-1} + \dots + C_q X_{t-q} + U_t \quad (2)$$

$$Y_t = A_0 + A_1 Y_{t-1} + \dots + A_p Y_{t-p} + B_1 X_{t-1} + \dots + B_q X_{t-q} + U_t \quad (3)$$

- In equation (2), X_t is a vector of exogenous variables and follows an autocorrelated process.
 - The exogenous variable vector X_t consists of the rate of increase in the price of Dubai oil and rates of inflation in China, the U.S. and Japan.
 - Each country's inflation variable uses the rate of increase in the Consumer Price Index for that country.
- In equation (3), the Y_t is a vector of endogenous variables in an autocorrelated structure, and also is affected by exogenous variables.
 - The endogenous variable vector Y_t consists of the output gap, the rate of increase in the nominal effective exchange rate, and the rate of inflation in Korea.
 - As Korea is a small open economy, the domestic variable (Y_t) is affected by the external variable (X_t). However, the VARX model imposes restrictions so that external variables will not be affected by domestic variables.
 - Monthly data were used and the optimal lag of the VARX model was set as $p = q = 3$ by Akaike Information Criterion (AIC).

■ While the surge in Chinese consumer prices did not impact Korea significantly in the 1990s, it became one of the major factors affecting Korea's inflation rate, along with oil prices, in the 2000s.

- Table 6 shows the forecast error variance decomposition³⁾ for samples from January 1991 to December 1999. It implies the relative importance of exogenous factors on consumer prices in Korea.
- Table 6 also reveals that exchange rate is a primary factor to account for variations in Korea's inflation rates, and that the effect of China's inflation remained at less than 2 percent.

Table 6. Forecast Error Variance Decomposition: 1991-1999

Horizon	Dubai oil price	China's inflation rate	U.S. inflation rate	Japan inflation rate	Exchange rate
3 months	0.007	0.002	0.104	0.052	0.465
6 months	0.061	0.003	0.090	0.053	0.542
9 months	0.128	0.006	0.088	0.069	0.487
12 months	0.142	0.015	0.082	0.090	0.445
18 months	0.140	0.018	0.084	0.092	0.423
24 months	0.156	0.018	0.095	0.100	0.399

Note: The shaded cells represent external factors that had the biggest impact on Korea's inflation rates over time.

Table 7. Forecast Error Variance Decomposition: 2000-2010

Horizon	Dubai oil price	China's inflation rate	U.S. inflation rate	Japan inflation rate	Exchange rate
3 months	0.264	0.036	0.055	0.013	0.130
6 months	0.254	0.151	0.062	0.019	0.184
9 months	0.227	0.227	0.054	0.034	0.192
12 months	0.204	0.286	0.045	0.052	0.190
18 months	0.166	0.345	0.035	0.090	0.187
24 months	0.148	0.359	0.030	0.112	0.190

Note: The shaded cells represent external factors that had the biggest impact on Korea's inflation rates over time.

- According to Table 7, the price of Dubai oil is the most important external factor that drives up consumer prices in Korea in the short term, while China's inflation is the major external factor in the medium run.
- The price of Dubai oil wielded the greatest impact for six months, but inflation in China exerted the largest effect since then.
- China's consumer price increases show a growing explanatory power over time: they account for 23 percent of Korea's inflation after one year and approximately 36 percent after two years.

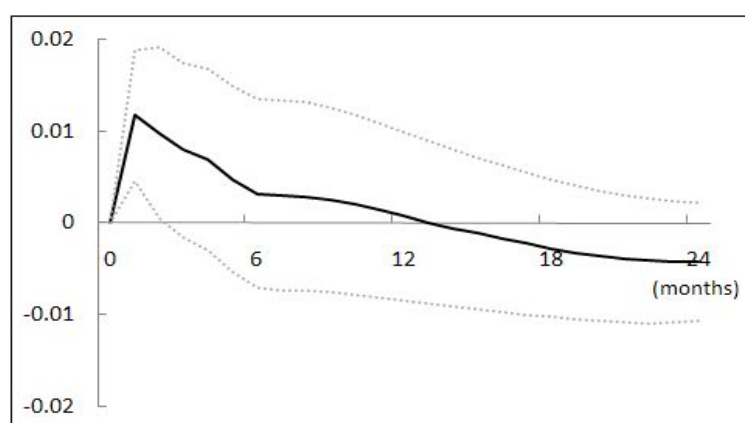
3) The forecast error variance decomposition measures the amount of information each variable contributes to the other variables in a model. It determines how much of the forecast error variance of each variable can be explained by exogenous shocks to the other variables.

- The results of the variance decomposition show that the impact of Chinese consumer price rises on Korea's inflation markedly grew in the 2000s, and emerged as the most important factor to account for Korea's inflation rate in the medium run.

■ A 1 percent increase in China's inflation rate has the effect of raising Korea's inflation rate by 0.13 to 0.15 percent with time lags.

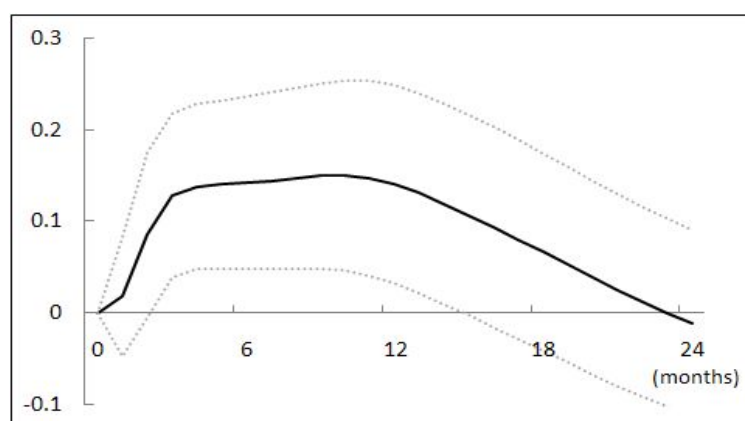
- The following two figures show the impulse response function⁴⁾ of Korea's inflation rate to the shock of a 1 percent increase of the price of Dubai oil and China's inflation, respectively.

Figure 10. Response of Korea's Inflation Rate to Dubai Oil Shock



Note: The dotted line represents a 95 percent confidence interval.

Figure 11. Response of Korea's Inflation Rate to China's Inflation Shock



Note: The dotted line represents a 95 percent confidence interval.

- In terms of the 1990s' sample, the effect of China's inflation on that of Korea is statistically

4) When a shock is given to a variable in a model, the impulse response function calculates its effects on other variables over time.

insignificant.

- Figure 10 shows that a 1 percent increase in the price of Dubai oil immediately raises Korea's inflation by 0.012 percent.
 - However, its statistically significant effect disappears after three months.
- According to Figure 11, China's inflation shock had no immediate impact on Korea, but did increase Korea's consumer price by 0.13 percent after three months and by up to 0.15 percent after 10 months.
 - Effects that occur one year and three months after the shock are not statistically significant.
- In the 2000s, a 1 percent rise in China's inflation began to have the same impact on Korea as a 10 percent increase in the price of Dubai oil, and the effect of China's inflation is shown to last longer than that of Dubai oil price increases.
- Inflation rates in the U.S. and Japan have no statistically significant effect.

4. Concluding Remarks

- China exerts influence on Korea's economy through not only exports and imports, but also its prices, so Korea should devise measures to minimize the effect of China's inflation on the Korean economy.
- Amid expected rising inflation in China due to excess liquidity and asset price hikes, factors such as surges in global commodity prices and wage increases will continue to make prices unstable for the time being.
 - Upward pressure on production costs exist due to wage increases aimed at boosting domestic demand and new labor contract and social insurance laws that took effect in China to enhance workers' welfare.
 - China is self-sufficient in rice and wheat supplies, but a severe wheat supply shortage is expected with eight central and eastern provinces suffering from severe drought. The provinces account for a combined 80 percent of the country's winter wheat production.
 - Given the increasing real estate price bubble in urban areas and ensuing concerns over inflation, close monitoring on China's asset market is necessary down the road.
- As other emerging economies have been suffering from inflation since the latter half of 2010 as well, measures are necessary to cope with global inflation.

- In January, Brazil's consumer prices rose 6.5 percent from the same period last year, Russia's 9.6 percent, and India's 6.0 percent.
- While exerting efforts to identify and monitor the causes of structural changes of global inflation that have developed new aspects in the wake of the global financial crisis, devising preemptive measures are required.
- In particular, when there are signs of price instability, micro-policy measures targeting specific markets are required to curb inflation expectations and contingency plans should be devised to stabilize prices as well. **KIEP**