

Daepa Price analysis

agriculture price analysis term-project

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I. Introduction

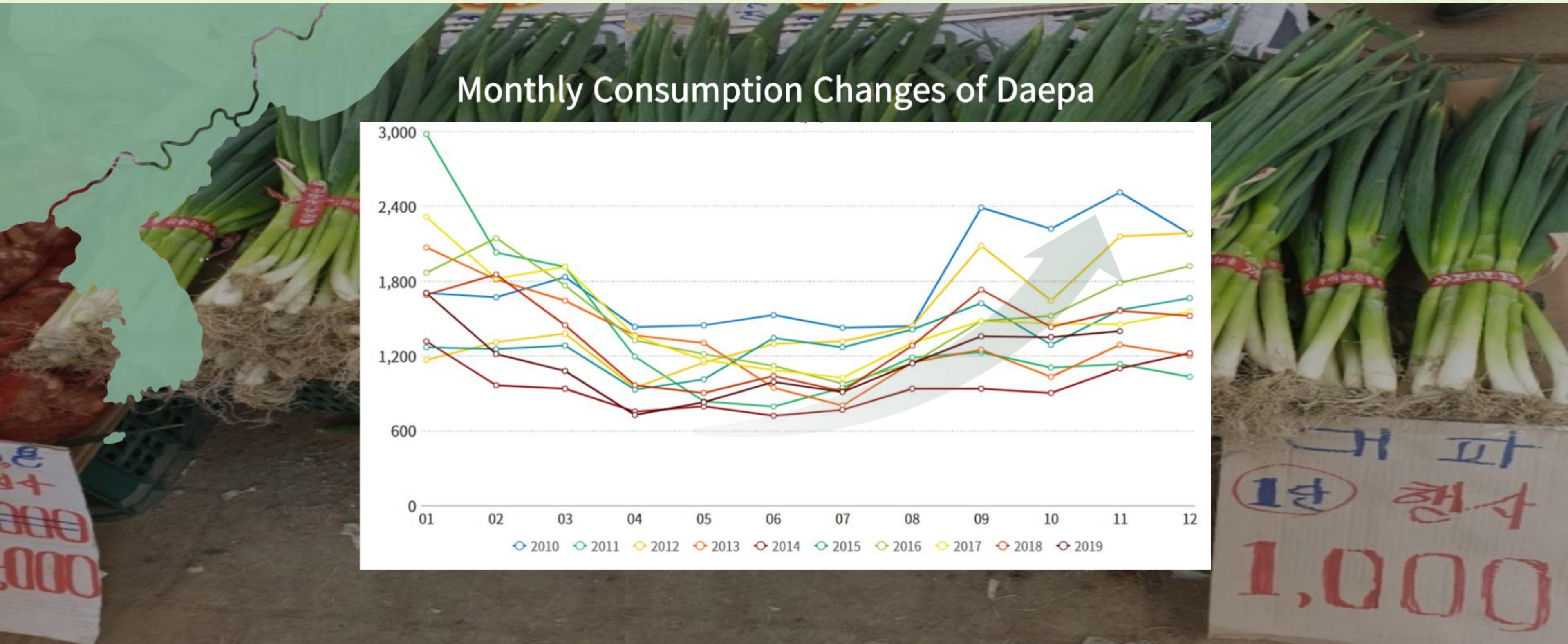
01 Characteristics of 'Daepa'

02 Reason for topic 'Daepa' selection

03 Factors Affecting 'Daepa' Prices

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01

Characteristics of 'Daepa'



The demand for Daepa has shown **steady growth** in the South Korean market.

I. Introduction

—
02

Reason for topic 'Daepa' selection



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03

Factors Affecting 'Daepa' Prices

dynamics of competitive goods

health benefits
associated with daepa

crop failures

increasing popularity
of Korean cuisine

seasonal variations

vibrations in production volumes

weather conditions



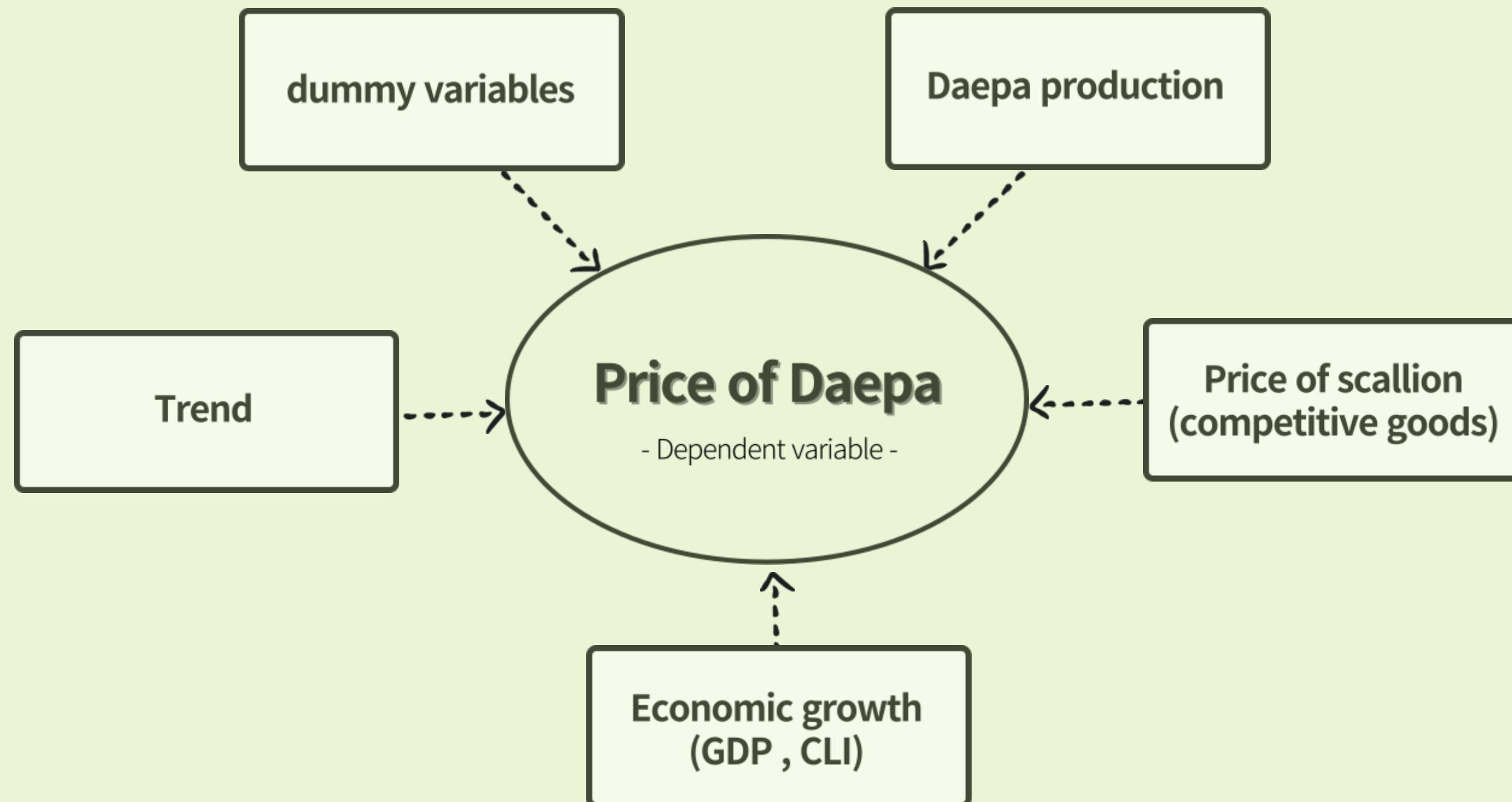
Analyzing these factors through **regression analysis** will provide further insights into the **price behavior of Daepa** and its market conditions in South Korea.

III. Data

01 Daepa production

02 Price of daepa

03 Price of scallion & Economic growth

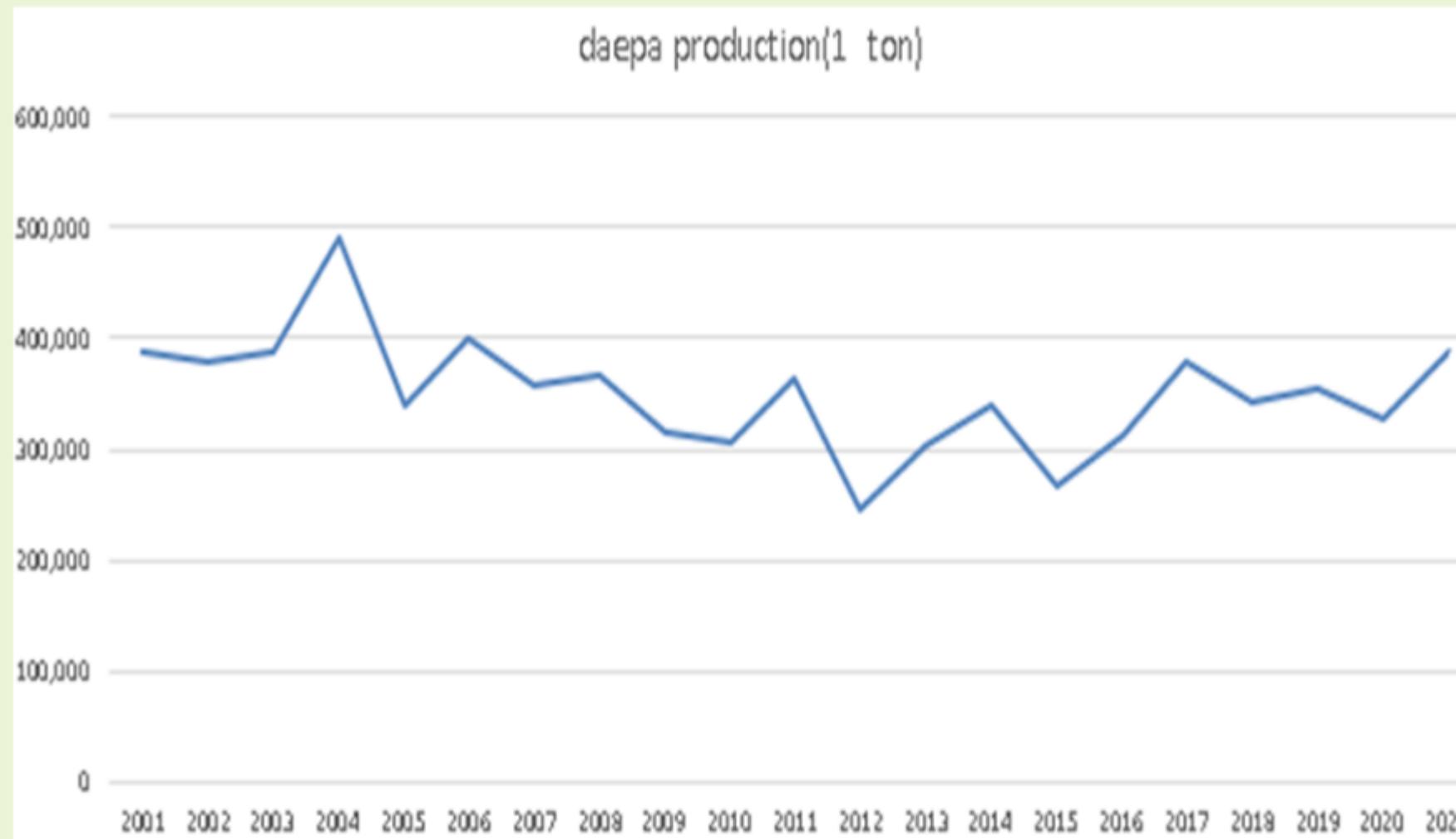


To analyze the price of daepas, variables were set based on the **supply model**.

01

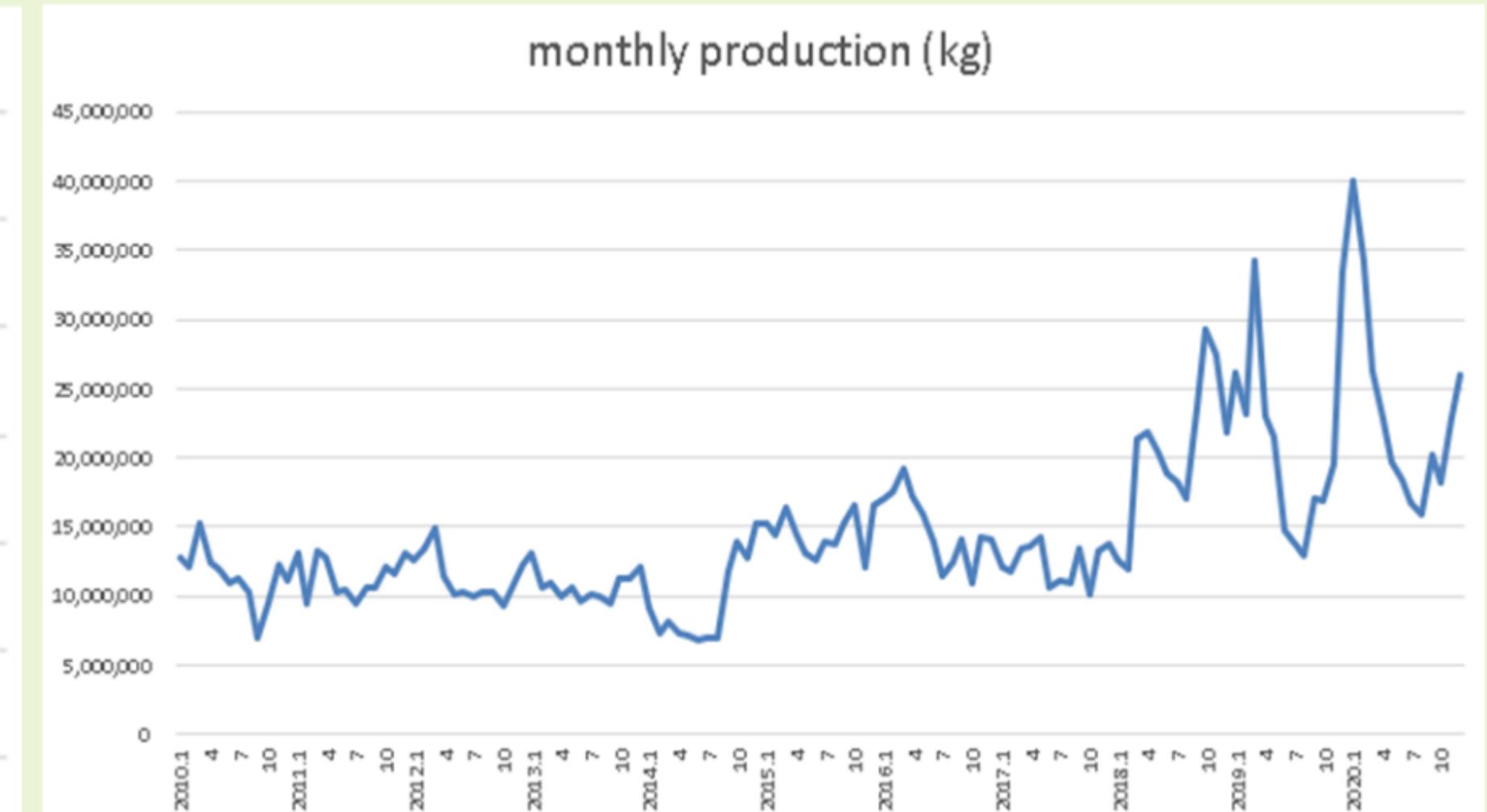
Daepa production

Yearly data Daepa production (ton)



KOSIS's annual daepa production data

Monthly data Daepa production (kg)

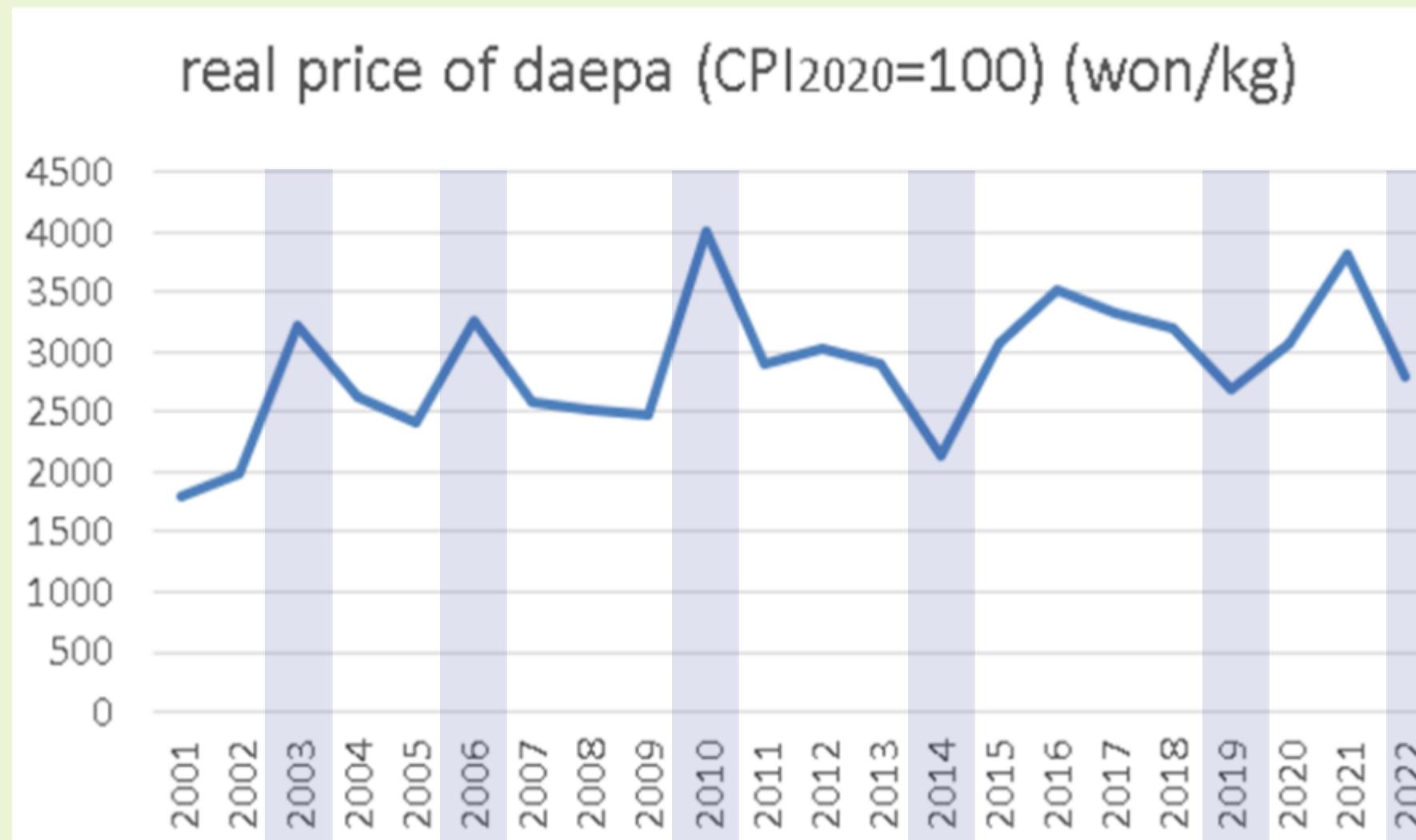


OASIS's monthly daepa production data

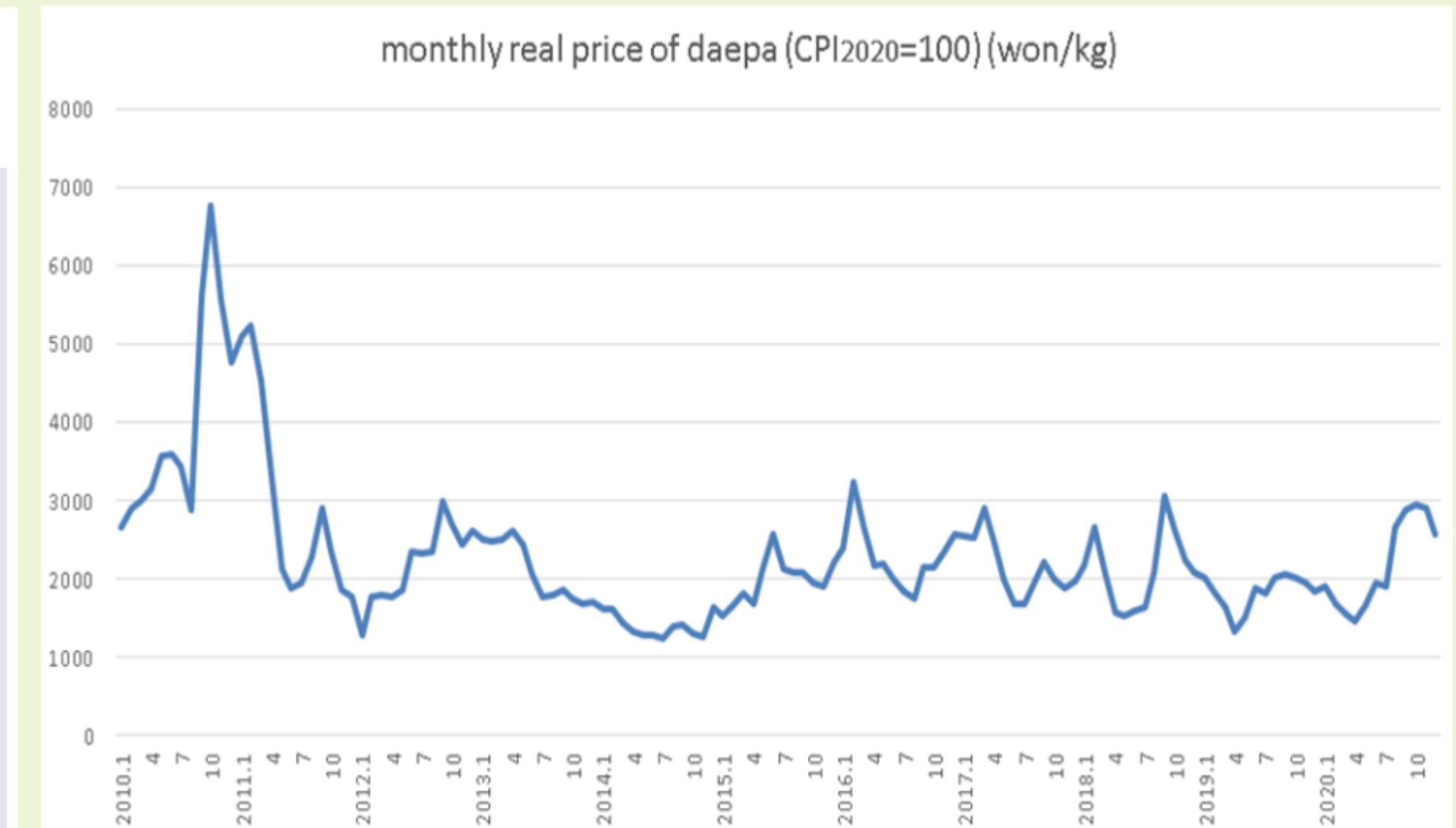
02

Price of Daepa

Yearly data Real price of Daepa (won/kg)



Monthly data Real price of Daepa (won/kg)



- The trend appears to have a 4-5 year base cycle

Data source : AT KAMIS's **annual and monthly price** data for the price of daepa
The price will be converted to **real prices** based on **CPI(2020=100)**.

03 Price of Scallion (competitive goods) & Economic growth

Price of Scallion (competitive)

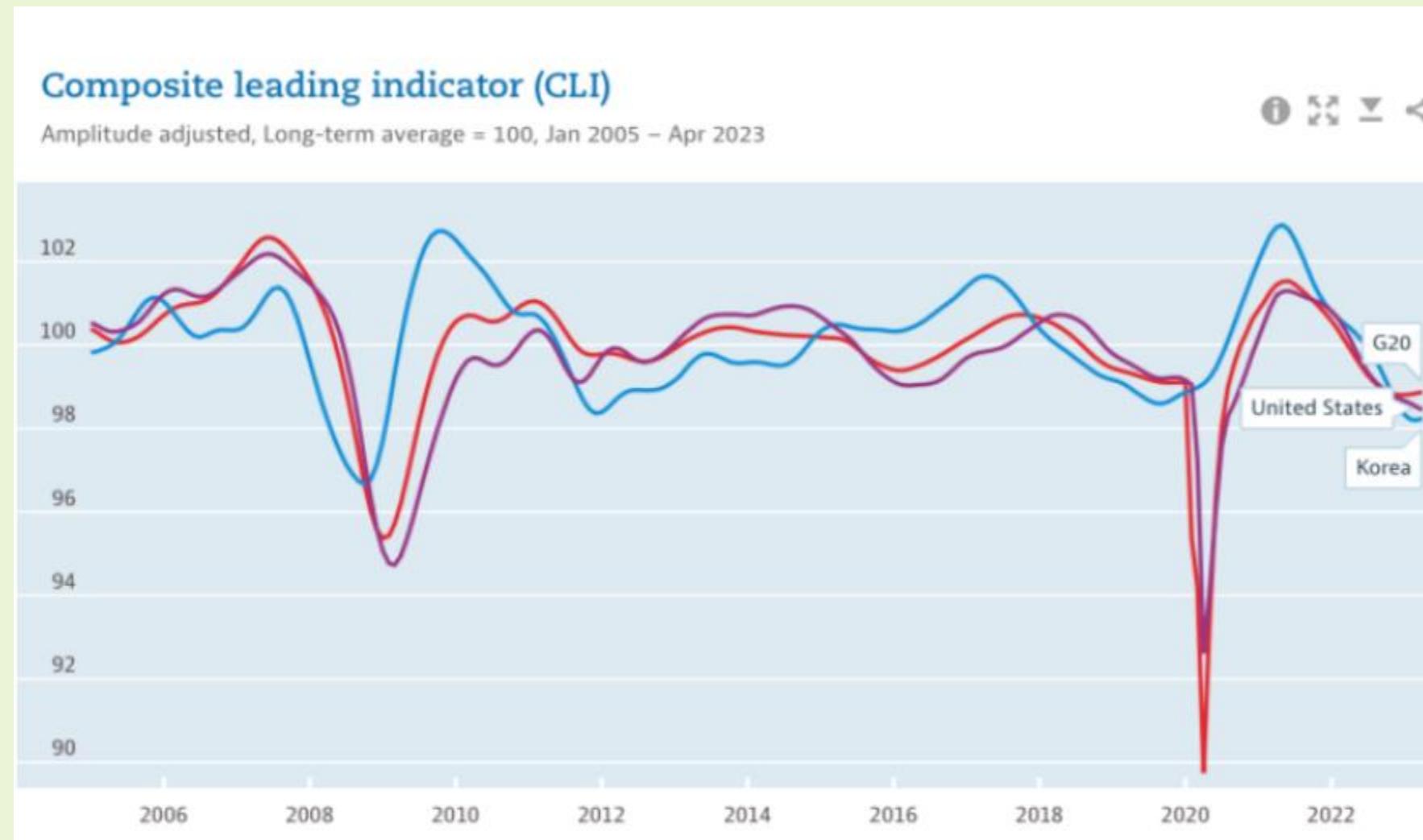
Data source : AT KAMIS's *annual and monthly price* data for the price of scallion
The price will be converted to *real prices* based on *CPI (2020=100)*.

Yearly economic growth

Data source: KOSIS's *GDP per capita* (unit:10,000won)

Montly economic growth

Data source: KOSIS's *CLI* (composite leading indicator)



The Composite Leading Index (CLI)
= an economic indicator that is used to predict the *future direction of economic activity* in a country or region.

It is designed to provide early signals of the economic flow in *three to six months*.

III. Long-term inverse supply model

01 Regression result

02 Forecasting Price

III. Long-term inverse supply model

$$P = b_0 + b_1 Q + b_2 P_s + b_3 E + t + t^2 + e$$

P : Price of Daepa (won/kg) **b0** : intercept **Q** : supply production of Daepa(1 ton)

P_s : price of scallions(:competitive goods)(won/kg) **E** : GDP per capita (10,000won) **t** : trend

We analyzed which model was the best model through regression analysis with the trend variables in several orders, and finally decided to make the trend variable second.

III. Long-term inverse supply model

요약 출력								
회귀분석 통계량								
다중 상관계수	0.86076							
결정계수	0.74091							
조정된 결정계수	0.64838							
표준 오차	319.548							
관측수	20							
분산 분석								
	자유도	제곱합	제곱 평균	F 비	유의한 F			
회귀	5	4088088	817618	8.00713	0.00095			
잔차	14	1429556	102111					
계	19	5517643						
	계수	표준 오차	t 통계량	P-값	하위 95%	상위 95%	5%하위 95.0%	상위 95.0%
Y 절편	-3135	2509.23	-1.2494	0.23201	-8516.7	2246.78	-8516.7	2246.78
production(1 ton)	0.00038	0.00179	0.21092	0.83599	-0.0035	0.00422	-0.0035	0.00422
쪽파(scallion real price)	0.4408	0.09574	4.60397	0.00041	0.23545	0.64615	0.23545	0.64615
GDP per capita, Economic growth	2.25862	1.7071	1.32307	0.20702	-1.4028	5.91999	-1.4028	5.91999
t	-237.01	231.636	-1.0232	0.32357	-733.82	259.803	-733.82	259.803
t^2	-2.3702	2.73161	-0.8677	0.4002	-8.2289	3.48857	-8.2289	3.48857

Long term Inverse Supply Model(2001~2020)

coefficient (intercept) p-value > 0.05
= not significant

Production of Daepa p-value > 0.05
= not significant

★ Price of Scallion p-value < 0.05
= significant

'when the price of scallion increases by 1won/kg,
the price of Daepa increases by 0.4408 won/kg'

GDP (economic growth) p-value > 0.05
= not significant

T and T^2 p-value > 0.05
= not significant

$$P = -3135 + 0.00038Q + 0.4408Ps + 2.25862E - 237.01t - 2.3702t^2$$

stdev (2509.23) (0.00179) (0.09574*) (1.7071) (231.636) (2.3702)

III. Long-term inverse supply model

—
02

Forecasting price

The average value of production / price of scallion / GDP Per Capita / and use the value of the trend variable.

As a result of predicting the price of Daepa in 2021,
the average of the last 5 years / 20 years

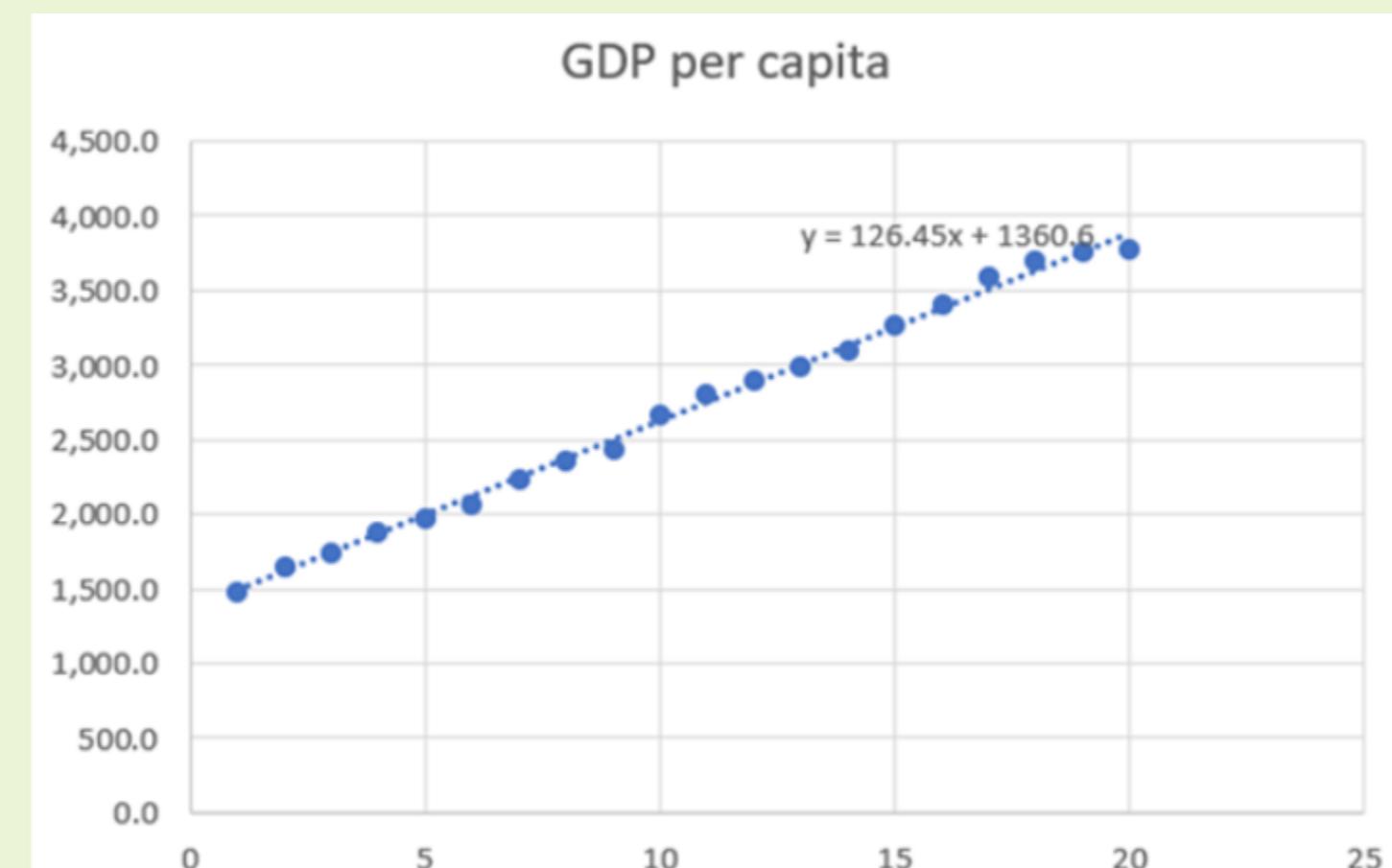
	Daepa real price	t^2	GDP Per Capita	scallion real price	production
2016~2020	2976.380197	20	400	4016.05	5896.639894
2001~ 2020	2690.215346	20	400	4016.05	5243.257688



Considering the **real price of Daepa in 2021 was 3807won/kg**
the predicted price **differed greatly from the real price.**

GDP Per Capita value = $(126.45 X + 1360.6)$

↑
 $X=21$



III. Long-term inverse supply model

요약 출력								
회귀분석 통계량								
다중 상관	0.85924							
결정계수	0.73829							
조정된 결	0.63763							
표준 오차	331.528							
관측수	19							
분산 분석								
	자유도	제곱합	제곱 평균	F 비	유의한 F			
회귀	5	4030769	806154	7.33461	0.00181			
잔차	13	1428842	109911					
계	18	5459611						
	계수	표준 오차	t 통계량	P-값	하위 95%	상위 95%	5.0% 하위 95%	5.0% 상위 95%
Y 절편	-2910.6	3812.64	-0.7634	0.45886	-11147	5326.15	-11147	5326.15
t	-219.34	325.341	-0.6742	0.512	-922.2	483.516	-922.2	483.516
t^2	-2.2003	3.53193	-0.623	0.54407	-9.8306	5.42994	-9.8306	5.42994
GDP per c	2.09589	2.68638	0.78019	0.44925	-3.7077	7.89946	-3.7077	7.89946
쪽파(scalii	0.44593	0.11795	3.78069	0.00229	0.19111	0.70074	0.19111	0.70074
productio	0.00038	0.00186	0.2034	0.84197	-0.0036	0.00439	-0.0036	0.00439

Long term Inverse Supply Model (2001~2019)

coefficient (intercept) p-value > 0.05
= not significant

Production of Daepa p-value > 0.05
= not significant

★ Price of Scallion p-value < 0.05
= significant

'when the price of scallion increases by 1won/kg,
the price of Daepa increases by 0.44593 won/kg'

GDP (economic growth) p-value > 0.05
= not significant

T and T^2 p-value > 0.05
= not significant

$$P = -2910.6 + 0.00038Q + 0.44593Ps + 2.09589E - 219.34t - 2.2003t^2$$

stdev (3812.64) (0.00186) (0.11795*) (2.68638) (325.341) (3.53193)

III. Long-term inverse supply model

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02

Forecasting price

The average value of production / price of scallion / GDP Per Capita / and use the value of the trend variable.

As a result of predicting the price of Daepa in 2020,
the average of the last 5 years / 19 years

	Daepa real price	t	t^2	GDP Per Capita	scallion real price	production
대파 가격(2001~2019)	2717.263462	19	361	3889.6	5170.113356	349466.8
대파 가격(2015~2019)	2904.5492	19	361	3889.6	5605.238764	331595.8

price of Daepa in 2020 was 3070 won



Significant results were obtained as the difference between
the real price of Daepa in 2020 and the price of Daepa
as a result of prediction was small.

GDP Per Capita value = $(126.45 X + 1360.6)$

↑
 $X=20$



III. Short-term inverse supply model

01 Seasonal index

02 Regression result

03 Forecasting Price

Short-term inverse supply model (monthly)

$$P = b_0 + b_1 Q + b_2 P_s + b_3 E + b_4 t + a_1 D_1 + \dots + a_{11} D_{11} + e$$

P : Price of Daepa (won/kg) **b0** : intercept **Q** : supply production of Daepa(1 kg)

P_S : price of scallions(:competitive goods)(won/kg) **E** : CLI **t** : trend **D** : dummy variables (0 or 1)

In this model, the **presence or absence of seasonality** of daepa prices will be identified
For this purpose, a monthly seasonality analysis from 2010 to 2020 will be conducted.

The seasonality index = the degree of variation in prices from the average for each month

Seasonality Price index	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2010	0,886	0,963	0,956	0,919	0,965	0,916	0,834	0,669	1,263	1,493	1,236	1,092	
2011	1,219	1,281	1,147	0,903	0,637	0,615	0,700	0,931	1,313	1,152	0,941	0,901	
2012	0,636	0,872	0,888	0,865	0,885	1,090	1,031	1,012	1,263	1,105	0,975	1,036	
2013	1,016	1,027	1,062	1,147	1,103	0,958	0,857	0,908	0,983	0,971	0,977	1,044	
2014	1,028	1,056	0,965	0,916	0,900	0,915	0,891	0,992	1,000	0,903	0,846	1,034	
2015	0,916	0,958	1,009	0,906	1,113	1,320	1,058	0,983	0,936	0,854	0,824	0,976	
2016	1,067	1,468	1,207	0,985	0,980	0,876	0,801	0,763	0,955	0,944	1,027	1,139	
2017	1,148	1,134	1,291	1,084	0,902	0,768	0,790	0,934	1,060	0,988	0,946	1,010	
2018	1,110	1,376	1,047	0,765	0,737	0,752	0,777	1,015	1,538	1,330	1,133	1,046	
2019	1,001	0,907	0,829	0,703	0,818	1,031	0,991	1,111	1,146	1,118	1,075	1,010	
2020	1,048	0,902	0,811	0,732	0,795	0,908	0,853	1,103	1,071	0,989	0,917	0,794	
2021	1,020	1,538	1,655	1,477	1,151	0,669	0,559	0,655	0,794	0,893	1,044	1,052	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
average	1,008	1,123	1,072	0,950	0,916	0,902	0,845	0,923	1,110	1,062	0,995	1,011	11,917
adjusted (SI)	1,015	1,131	1,080	0,957	0,922	0,908	0,851	0,929	1,118	1,069	1,002	1,018	12,000
stdev	0,148	0,234	0,234	0,212	0,157	0,193	0,140	0,152	0,204	0,191	0,117	0,090	
index+sd	1,163	1,366	1,314	1,168	1,079	1,100	0,991	1,082	1,322	1,260	1,119	1,108	
index-sd	0,867	0,897	0,846	0,745	0,765	0,715	0,711	0,777	0,914	0,878	0,885	0,929	

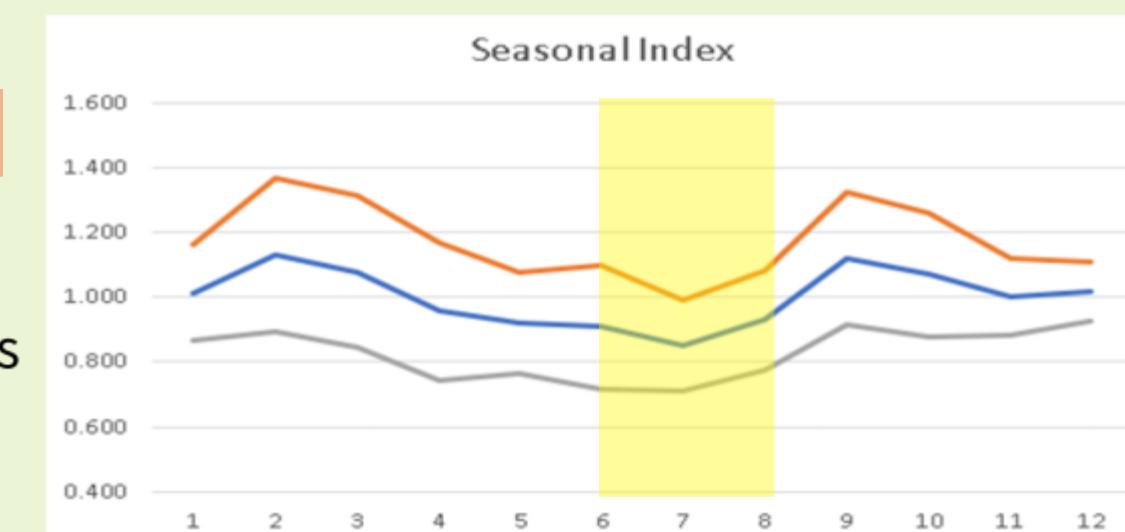
February prices are 13% higher than average prices

July prices are 15% lower than average prices.

-The highest seasonality index values -The lowest seasonality index values

February : 1.131

July : 0.851



► From the data, we can infer that the harvest months are: June, July and August.

IV. Short-term inverse supply model

02

Regression result

회귀분석 통계량								
다중 상관	0.814584197							
결정계수	0.663547413							
조정된 결	0.620040613							
표준 오차	561.3077485							
관측수	132							
분산 분석								
자유도	제곱합	제곱 평균	F 비	유의한 F				
회귀	15	72078900.46	4805260.03	15.25157937	6.22588E-21			
잔차	116	36547701.07	315066.389					
계	131	108626601.5						
계수	표준 오차	t 통계량	P-값	하위 95%	상위 95%	하위 95.0%	상위 95.0%	
Y 절편	-20057.39289	3199.518096	-6.2688793	6.42257E-09	-26394.44162	-13720.34415	-26394.44162	-13720.34415
production	7.20969E-06	1.24069E-05	0.58110398	0.562297759	-1.73637E-05	3.17831E-05	-1.73637E-05	3.17831E-05
scallion pr	0.367388199	0.041853919	8.77786858	1.70778E-14	0.284491239	0.450285159	0.284491239	0.450285159
CLI	307.6020086	48.005069	6.4076985	3.29033E-09	212.5219207	402.6820965	212.5219207	402.6820965
t	-87.29791231	12.0563735	-7.2408102	5.25694E-11	-111.1770792	-63.41874546	-111.1770792	-63.41874546
D1	-548.7614705	244.2460514	-2.2467568	0.026547646	-1032.521551	-65.00139013	-1032.521551	-65.00139013
D2	-334.2257038	243.9102124	-1.3702817	0.173245076	-817.3206126	148.8692051	-817.3206126	148.8692051
D3	57.51652141	240.8702774	0.2387863	0.811692644	-419.5574133	534.5904561	-419.5574133	534.5904561
D4	148.7488632	246.4238568	0.60363012	0.547268158	-339.3246353	636.8223617	-339.3246353	636.8223617
D5	-82.67937588	243.2603679	-0.3398802	0.734561411	-564.4871859	399.1284342	-564.4871859	399.1284342
D6	-253.6184001	244.8031247	-1.0360097	0.302352526	-738.4818344	231.2450342	-738.4818344	231.2450342
D7	-638.872352	248.1971777	-2.5740516	0.011310673	-1130.458136	-147.2865681	-1130.458136	-147.2865681
D8	-428.3308924	248.1459	-1.7261252	0.086987365	-919.8151144	63.15332963	-919.8151144	63.15332963
D9	-25.18253808	245.6736948	-0.102504	0.918533621	-511.7702462	461.40517	-511.7702462	461.40517
D10	355.5645435	241.7152243	1.47100599	0.143997027	-123.1829151	834.312002	-123.1829151	834.312002
D11	344.2969108	242.9032488	1.41742407	0.159039411	-136.8035798	825.3974014	-136.8035798	825.3974014

Short term Inverse Supply Model (montly)

Production of Daepa p-value > 0.05
= not significant

Coefficient (intercept) p-value 6.42257E-09 < 0.05

Price of Scallion p-value 170778E-14 < 0.05
'when the price of scallion increases by 1won/kg,
the price of Daepa increases by 0.3674 won/kg'

CLI (economic growth) p-value 3.29033E-09 < 0.05

'If the CLI increases by 1% compared to 2020,
the price of Daepa increases by 307.6 won/kg'

T trend p-value 5.25694E-11 < 0.05

'The price of daepa decreases by 87.298 won/kg as 1month passes'

D1 , D7 dummy variables

'Daepa prices show seasonality in January and July'

= significant

$$P = -20057.4 + 0.000007Q + 0.3674Ps + 307.6E - 87.3t - 548.76D1 - 334.23D2 + 57.52D3 + 148.75D4$$

stdev (3199.52*) (0.0000012) (0.04185*) (48.005*) (12.056*) (244.246*) (243.910) (240.870) (246.424)

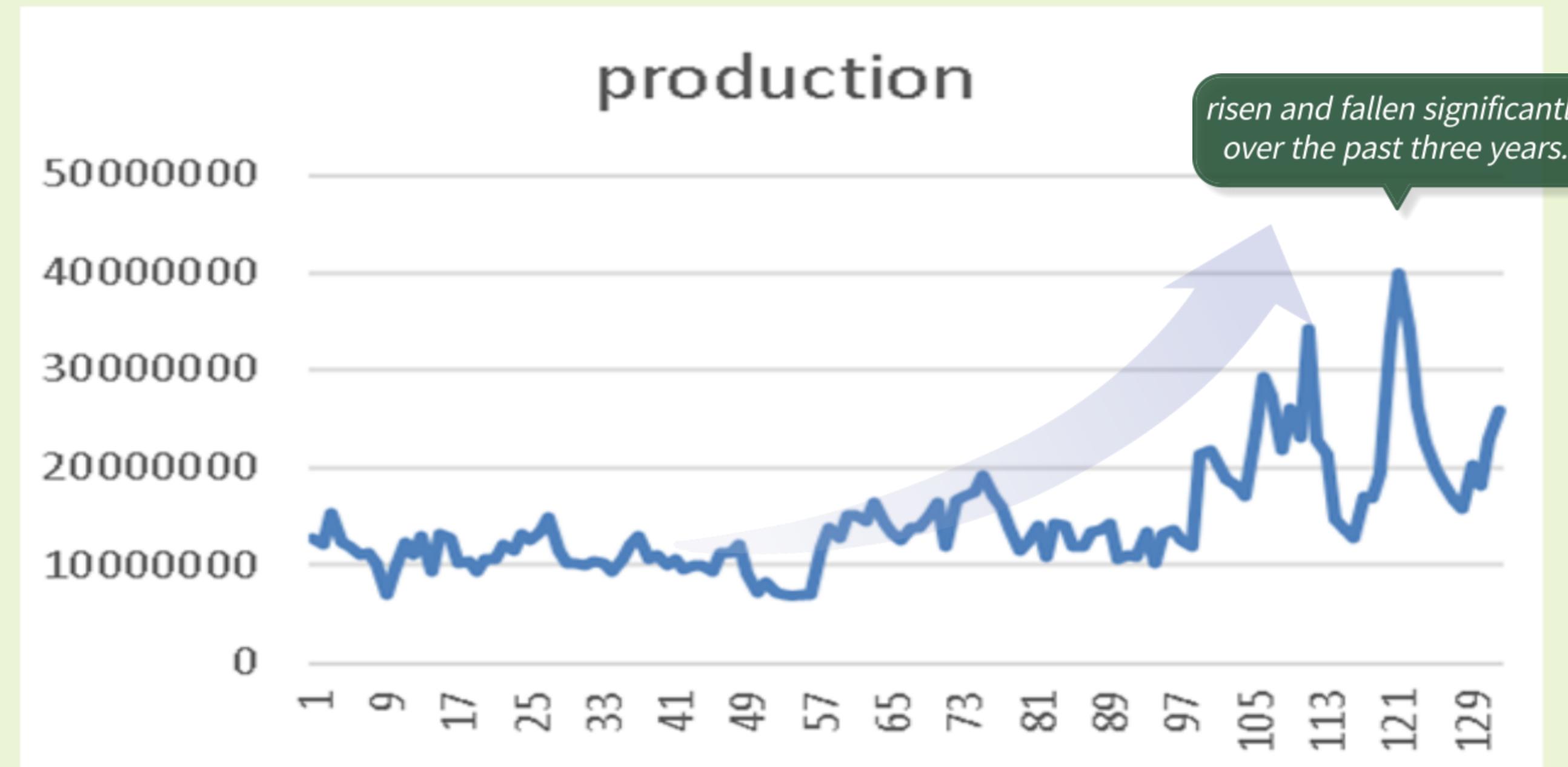
- 82.68D5 - 253.62D6 - 638.87D7 - 428.33D8 - 25.18D9 + 355.56D10 + 344.3D11

(243.260) (244.803) (248.197*) (248.146) (245.674) (241.715) (242.903)

IV. Short-term inverse supply model

—
03

Forecasting price



Data from January 2010 to December 2020 were used, The price was predicted in July 2021.

- > the method of using the average (2010 - 2020)
- > the method of using the average (2018 - 2020)

IV. Short-term inverse supply model

03 Forecasting price

▪ Result of Forecasting price

	Daepa real price	production(kg)	scallion real price	CLI(Economic growth)t	D7
2010~2020	2462.514188	14643789.89	5785.1037	107.2	138
2018~2020	2500.616293	21700620.08	5750.33	107.2	138

Forecasting price
2462.51(won/kg)
2500.62(won/kg)



real price
2020.34(won/kg)

July 2021 Real price
★ 2020.34 (won/kg)

The real price was about 480won/kg lower than the predicted Daepa price.
The biggest reason is that the actual production in July 2021 is lower than the average of past years.

The actual production of Daepas is 885,7376kg.
An error occurs because the average of past years is much less than the actual value.

V. Cycle

01

Forecasting price

year	Won per kg				Measuring Cycles: Trough to Trough					YEARS TO TAKE	
	Real Price	CMA3	RP - CMA=	RP - CMA=	Deviations in Period						
			DEV	DEV	1 (trough)	2	3	4	5		
2001	1797.044995										
2002	1979.743537	2331.768098	-352.024562	-352.024562	-352.024562						
2003	3218.515764	2608.686339	609.8294241	609.8294241		609.8294241					
2004	2627.799718	2751.050999	-123.251281	-123.251281			-123.251281			3	
2005	2406.837515	2762.583016	-355.745501	-355.745501	-355.745501						
2006	3253.111815	2747.650503	505.461312	505.461312		505.461312					
2007	2583.002179	2786.70571	-203.703531	-203.703531			-203.703531				
2008	2524.003135	2529.053893	-5.05075815	-5.05075815				-5.05075815		4	
2009	2480.156365	3003.346989	-523.190624	-523.190624	-523.190624						
2010	4005.881468	3128.809124	877.0723439	877.0723439		877.0723439					
2011	2900.389538	3312.455381	-412.065843	-412.065843			-412.065843				
2012	3031.095137	2944.441062	86.6540746	86.6540746				86.6540746			
2013	2901.838512	2689.281279	212.5572332	212.5572332					212.5572332	5	
2014	2134.910187	2699.356667	-564.44648	-564.44648	-564.44648						
2015	3061.321302	2905.215055	156.1062472	156.1062472		156.1062472					
2016	3519.413675	3304.063587	215.350088	215.350088			215.350088				
2017	3331.455784	3345.999943	-14.5441596	-14.5441596				-14.5441596			
2018	3187.130372	3069.650904	117.4794674	117.4794674					117.4794674	5	
2019	2690.366557	2982.498976	-292.132419	-292.132419	-292.132419						
2020	3070	3189.065275	-119.065275	117.4794674		117.4794674					
2021	3806.829268	3223.480582	583.3486862	583.3486862			583.3486862			3	
2022	2793.612478										
		average	-417.507917	453.1897589	11.93562404	22.35305228				4	

Real Price Falls

In 2005, 2009, 2014, 2019
significant decline

Peak in Production

Peaks in Daepa production
in 2004, 2008, 2011, and 2017

Average Cycle Duration

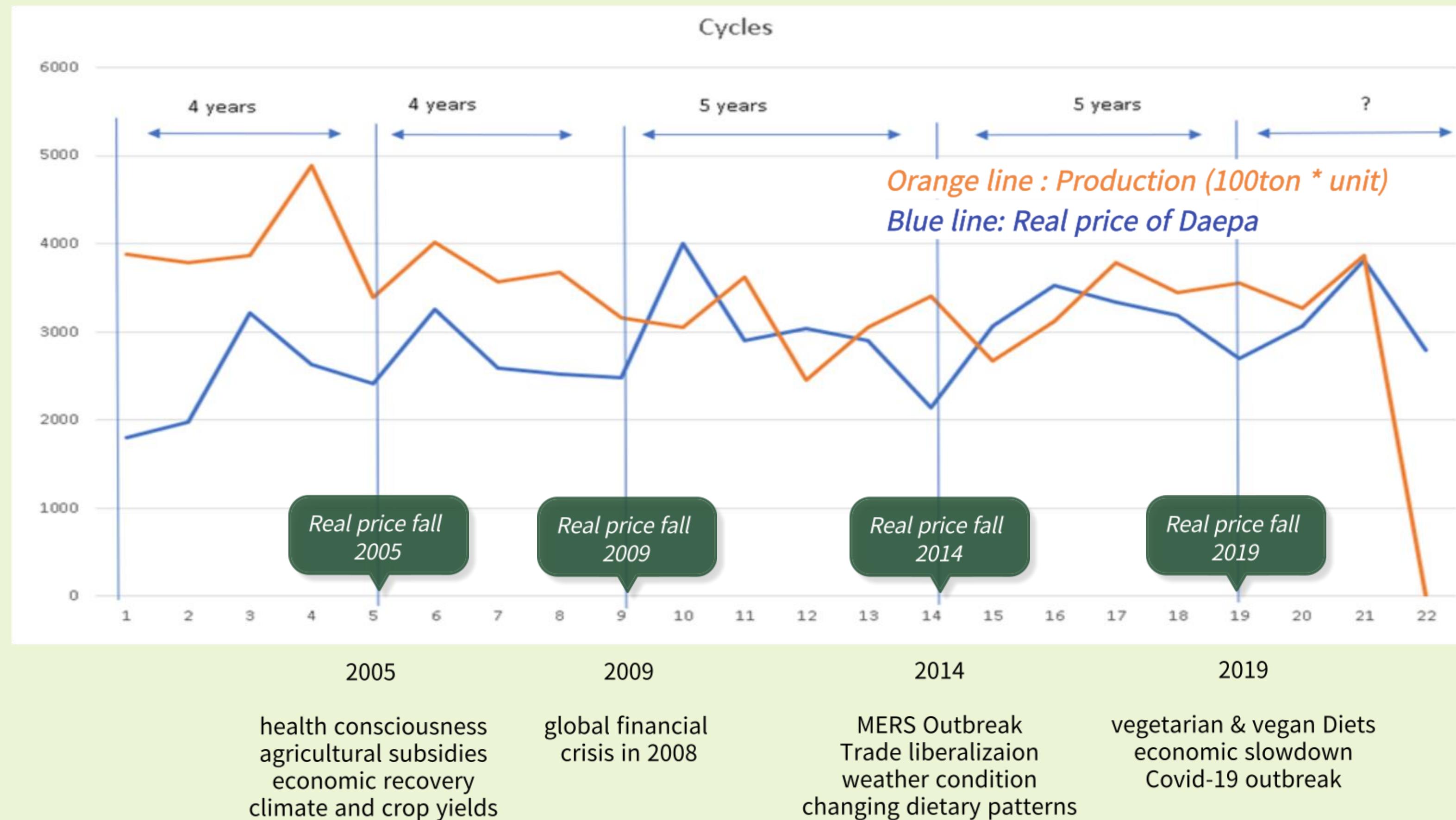
The average cycle duration
: approximately 4 years

Deviations within Cycles

- The first period (trough) shows a significant decrease in the real price of Daepa, averaging at **- 417.5 won/kg**
- The second period sees an average increase of **453.189 won/kg** (indicating a recovery or growth phase in the Daepa market)
- The third period shows a relatively smaller increase of **11.9 won/kg**
- The fourth period exhibits a slightly larger increase of **22.35 won/kg**

01

Result

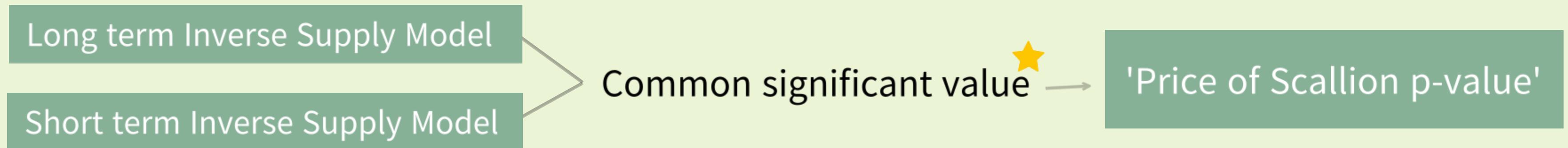


VI. Conclusion

VI. Conclusion

01

Summary



Long term Inverse Supply Model

2020 Real price	Forecasting price
3070 (won/kg)	2717.2~2904 (won/kg)

Difference

[Scallion]
competitive goods



Short term Inverse Supply Model

July 2021 Real price	Forecasting price
2020.34 (won/kg)	2462~2500 (won/kg)

Difference



[heavy snow]

Decrease in production
than last 10years

02

Reasons for using data from 2001 to 2019 in long-term

2020 data shows unprecedented observed

Increased eating at home due to COVID-19



The departure of foreign workers



bad weather



Due to these factors, the price of daepas soared in 2020, resulting in a large difference between the actual and predicted values

—
03

The limits of our project



Small amount of data
due to limited data

Unexpected situation

: climate factors such as heavy snow,
rainy season, and COVID-19

All variables that can affect the Daepa price are reflected in the model,
and if the number of data is sufficient, the Daepa price can be accurately predicted.

Pa-eating



2023.06.14.wednesday

Thank you !