

# Analysis of the Impact of Local Currency on Sales by Small Businesses in Gyeonggi-do

Q1, Q2, Q3, Q4/2019





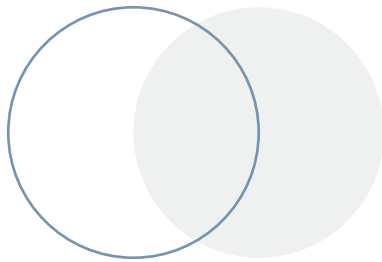
# Summary

- The Gyeonggi local currency was implemented on April 1, 2019, and the use and issuance of the currency are gradually rising.
  - The rate of distribution of the local currency varies by district. At the beginning, the use and issuance of the local currency was high in the central inland zone, and then rose in the northeastern zone and northern zone.
  
- The use of local currency has boosted sales done by small businesses in Gyeonggi-do.
  - Sales rose by KRW 2.06 million (with a significance level of 1%).
  - [Comparison within the same store] Sales increased by KRW 1.15 million a month, compared to sales recorded prior to the introduction of the local currency, suggesting that the local currency prompted an increase in sales by small businesses.
  - [Comparison with other stores] There was a gap in sales of KRW 4.75 million a month between stores accepting the local currency and stores not accepting it, indicating that the local currency encouraged consumers to shop at local stores.
  
- Payments made in local currency led to an increase in sales by small businesses.
  - The increase of payments made using the local currency (per unit amount) is associated with the rise of sales by small businesses of 45% at a significance level of 1%.
  - [Comparison within the same store] The increase in local currency payments (per unit amount) led to a sales increase of 57% by small businesses. Part of the total amount of payments made using the local currency replaced existing consumption (43%), and part created additional consumption (57%).
  - [Comparison between stores] There was a gap of KRW 5.35 million between stores that experienced an increase in local currency payments (KRW 1 million) and stores that did not experience this.
  
- The impact of the introduction of the local currency needs to be assessed in the long term, instead of in the short term.

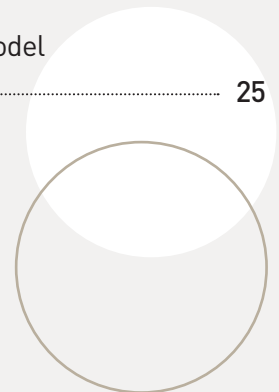
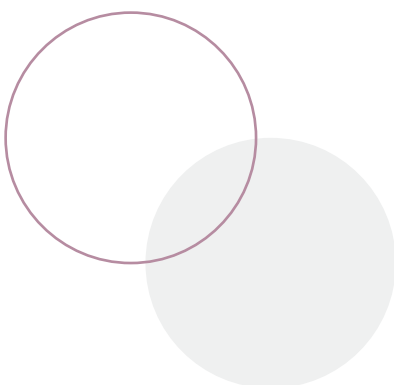
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by Small Businesses in Gyeonggi-do



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# Issue and Use of The Gyeonggi Local Currency (KONA I platform DB)



Analysis of the Impact of Local Currency on Sales  
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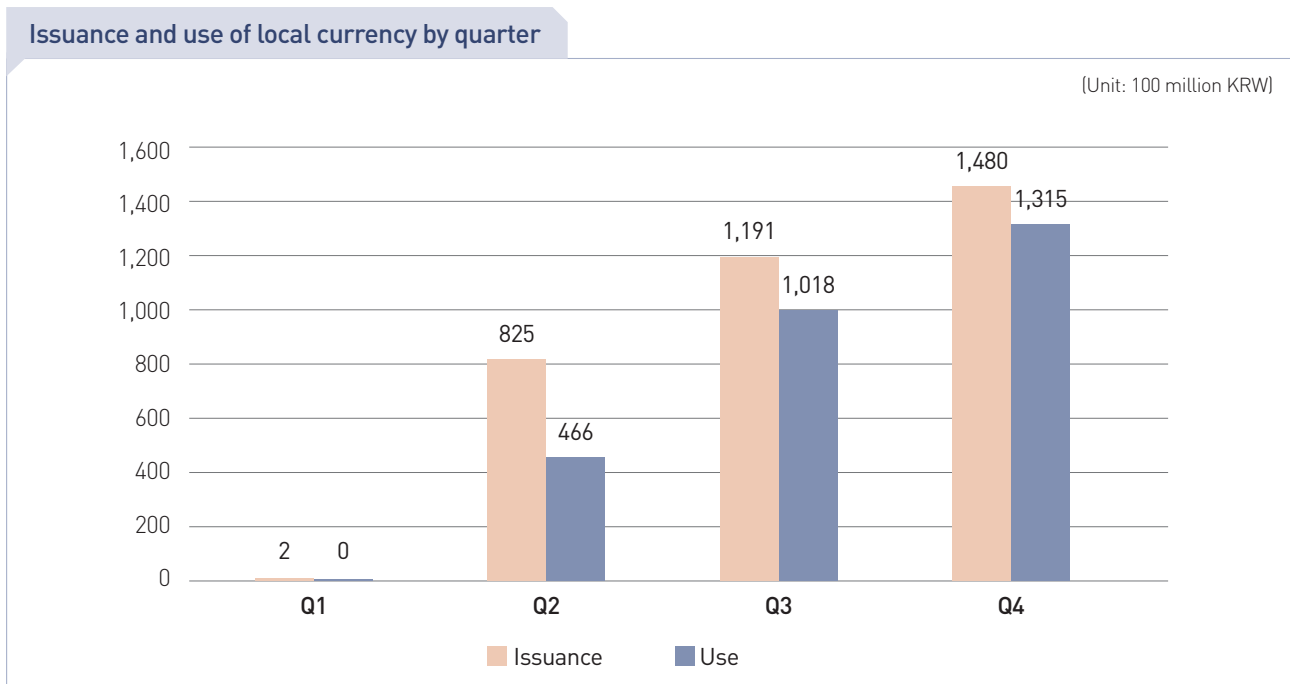
# I

## Issue and Use of The Gyeonggi Local Currency (KONA I platform DB)<sup>1</sup>

■ The Gyeonggi local currency was implemented in April 2019 with both its issuance and use steadily increasing.

The Gyeonggi local currency is divided into general issue (for spending/purchases) and policy issue to deliver welfare allowances such as youth basic income and postnatal care expense.

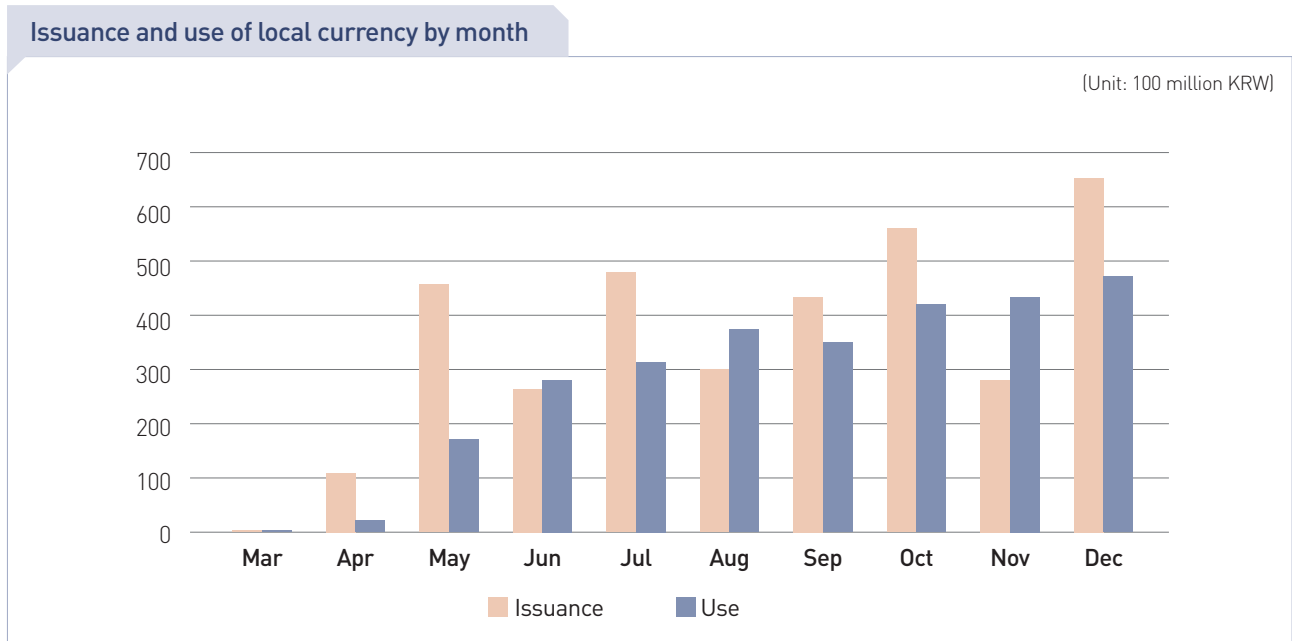
- The sum of issuance of the currency by quarter has grown steadily: KRW 82.5 billion (Q2), KRW119.1 billion (Q3), KRW148.0 billion (Q4).
- The use of the currency by quarter also continued to rise: KRW46.6 billion (Q2), KRW 101.8 billion (Q3), KRW 131.5 billion (Q4)
- The ratio of use to issuance of the currency gradually climbed too: 56.5% (Q2), 85.5% (Q3), and 88.9% (Q4).



Source: KONA I platform DB

<sup>1</sup> The analysis is based on the KONA I platform DB and thus the issuance and use of local currency in Gimpo City, Seongnam City, and Siheung City, that do not operate under the KONA I system, were not included. KONA I DB focuses only on cards out of the various types of available local currency (paper, plastic card, mobile)

- The amount of issuance by month rose significantly in May, July, October, and December when policy issue of the currency was implemented, while the use of the currency continued to rise steadily.



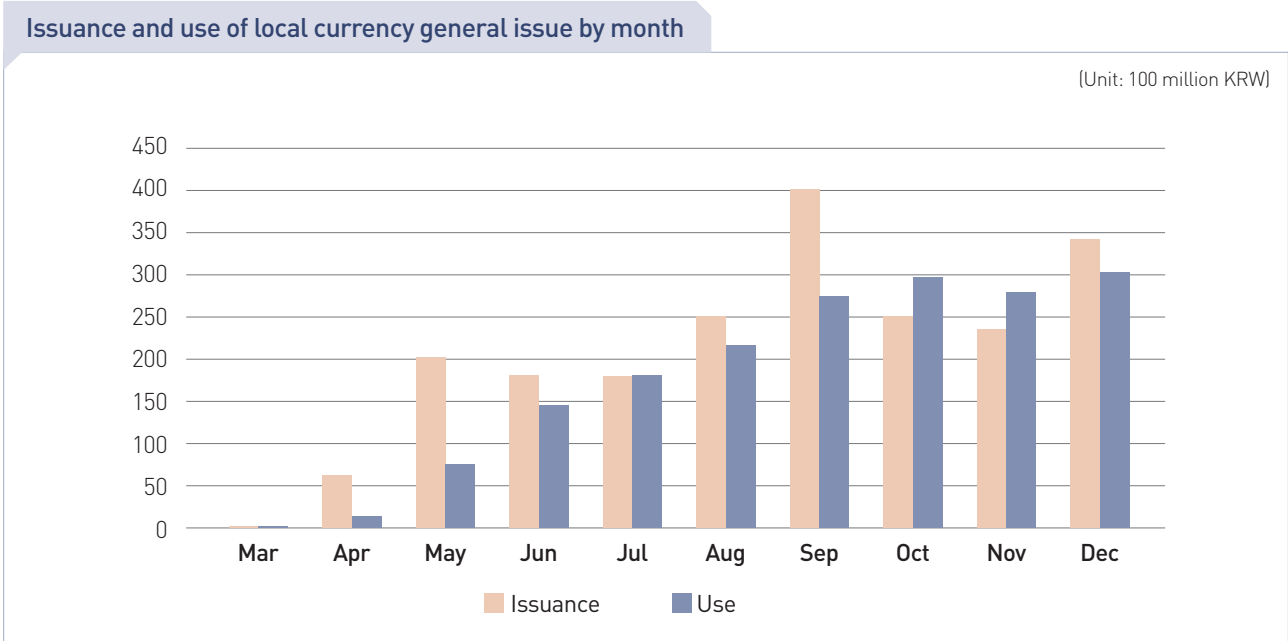
Source: KONA I platform DB

**Local currency issuance and use by type and month**

(Unit: 100 million KRW, %)

Month	General issue			Policy issue			Total		
	Issue (A)	Use (B)	% (B/A)	Issue (C)	Use (D)	% (D/C)	Issue (E)	Use (F)	% (F/E)
March	0.3	0.0	0.0	1.7	0.1	5.9	2.0	0.1	5.0
April	61.0	12.4	20.3	52.8	11.8	22.3	113.8	24.2	21.3
May	198.1	69.4	35.0	266.2	105.3	39.6	464.3	174.7	37.6
June	178.6	140.2	78.5	68.1	127.1	186.6	246.7	267.3	108.4
July	173.6	174.5	100.5	295.7	133.4	45.1	469.3	307.9	65.6
Aug	247.2	208.7	84.4	48.8	161.7	331.4	296.0	370.4	125.1
Sept	395.9	266.1	67.2	29.8	73.4	246.3	425.7	339.6	79.8
Oct	252.5	290.3	115.0	304.6	123.5	40.5	557.0	413.8	74.3
Nov	235.6	273.0	115.9	43.4	156.2	359.9	278.9	429.2	153.9
Dec	339.9	306.5	90.2	303.9	165.9	54.6	643.8	472.4	73.4

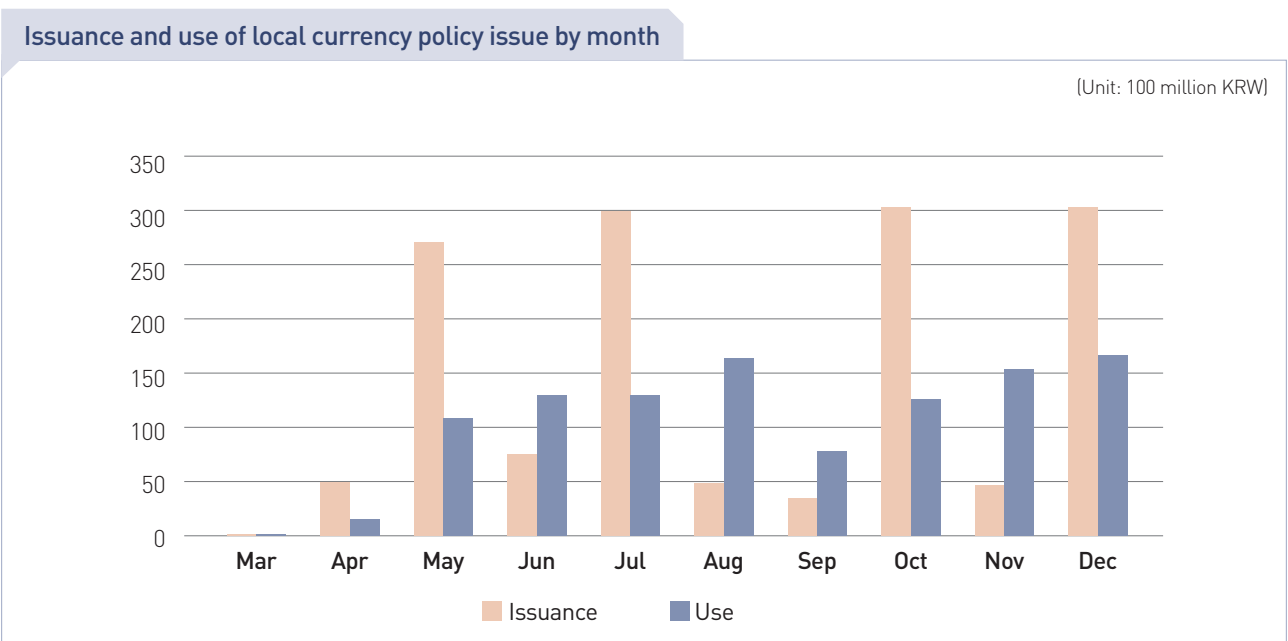
- The distribution of general issue rises as much as 3.2 times each month in April and May, and thereafter showed a gradual increase except in September when the issue amounted to KRW 39.5 billion.
- The use of general issue rose, and the pace of growth was the steepest in the second quarter, but slightly more moderate in other quarters.



Source: KONA I platform DB

■ Policy issue is provided to beneficiaries on predetermined dates, and most of these seem to be used within one or two months after receipt.

- Provision of policy issue of local currency to beneficiaries was concentrated in May, July, October, and December which include predetermined dates for provision.
- The use of policy issue was evenly distributed across months, but the use dropped sharply in September, which is about three months after the respective dates of receipt. Most of policy issue of local currency seems to be used within one to two months after receipt.

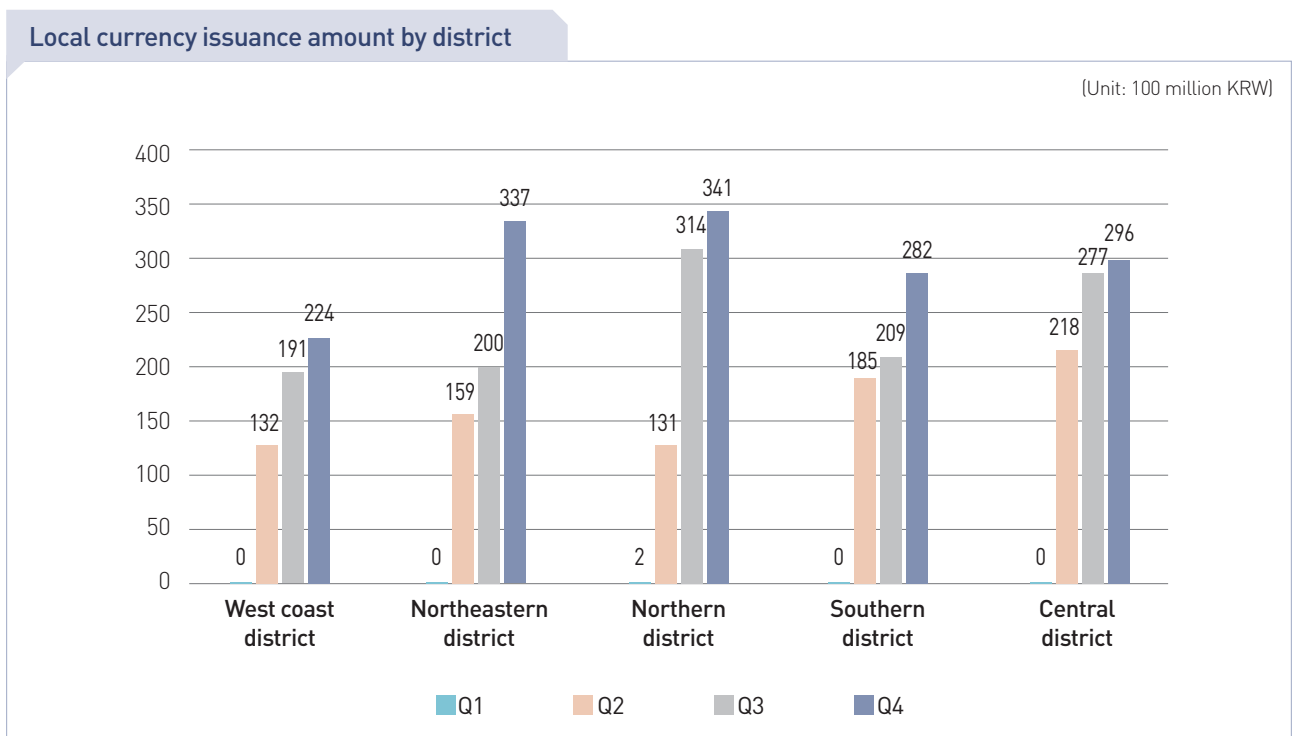


Source: KONA I platform DB



■ The analysis of the issuance and use of local currency by district<sup>2</sup> showed that growth is observed in all districts, but with some variance in terms of the pace of penetration.

- Both issuance and use amounts rose in all districts.
- Issuance amount by district shows that in the second quarter, the central district had the highest issuance amount, in the third quarter, the northern district, and in the fourth quarter the northeastern district had the highest issuance amount - displaying different trends of penetration by district.

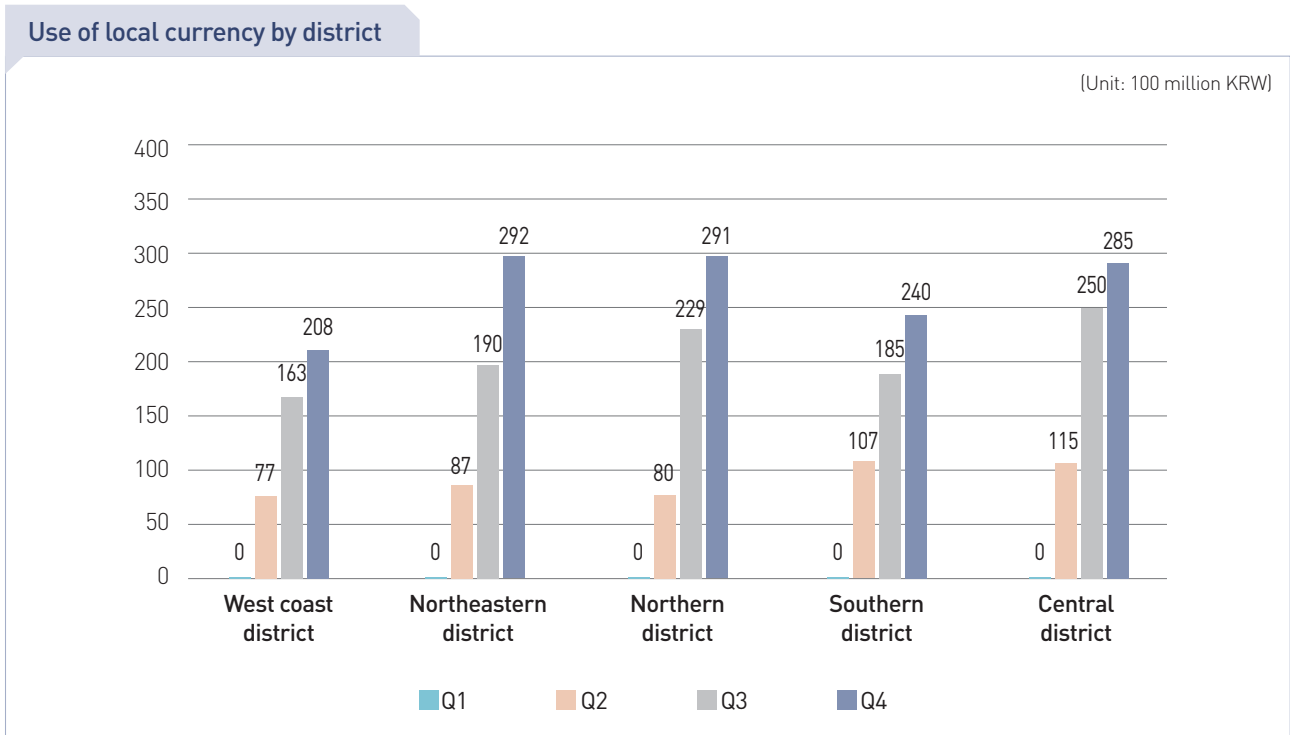


Source: KONA I platform DB

<sup>2</sup> By referring to Gyeonggi Central District Development Plan (2018-2030), 31 cities and counties of Gyeonggi-do were divided into five districts: Central district (Gwacheon, Gwangmyeong, Gunpo, Bucheon, Anyang, Uiwang), West coast district (Gimpo, Siheung, Ansan, Pyeongtaek, Hwaseong), Northeastern district (Gapyeong, Gwangju, Guri, Namyangju, Yangpyeong, Yeosu, Icheon, Hanam), Northern district (Goyang, Dongducheon, Yangju, Yeoncheon, Uijeongbu, Paju, Pocheon), and Nambu district (Seongnam, Suwon, Anseong, Osan, Yongin).



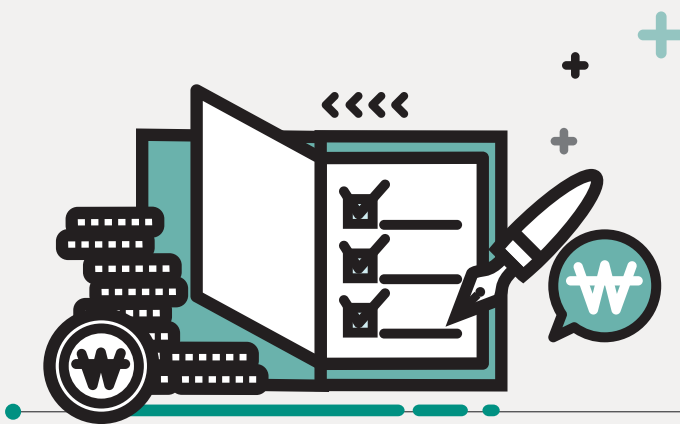
- Local currency was used over time difference with its issuance. In the second and third quarters, the use was heavy in the central district, and in the fourth quarter, the use was relatively prominent in the northeastern district and the northern district.



Source: KONA I platform DB



# Results of Survey on the Impact of The Gyeonggi Local Currency on Sales by Small Businesses



Analysis of the Impact of Local Currency on Sales  
by Small Businesses in Gyeonggi-do



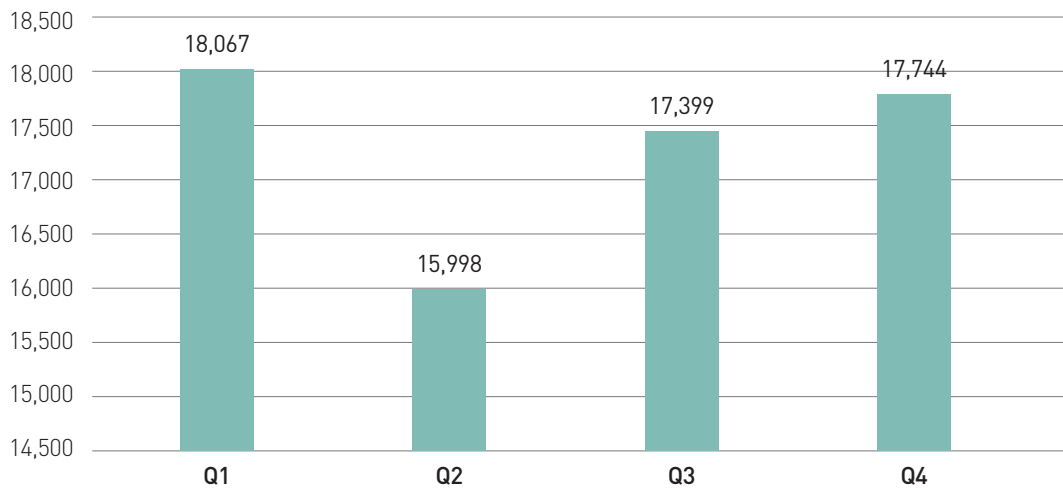
## III

# Results of Survey<sup>3</sup> on the Impact of The Gyeonggi Local Currency on Sales by Small Businesses

■ The survey found that monthly average per-store sales by small businesses picked up after having declined since the second quarter of 2019.

- Monthly average per-store sales stood at between KRW 16 million and KRW 18 million.

Per-store monthly sales by small businesses in Gyeonggi-do by quarter (1,000 KRW)



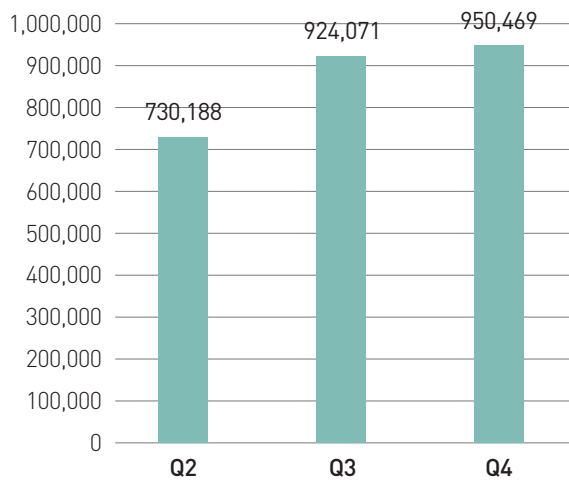
Source: Survey of the impact of Gyeonggi local currency issuance on sales

■ The aggregate payment value of the Gyeonggi local currency continuously expanded, and the number of stores that experienced payment by local currency also rose, proving that the local currency use is gaining traction in terms of quantity and quality.

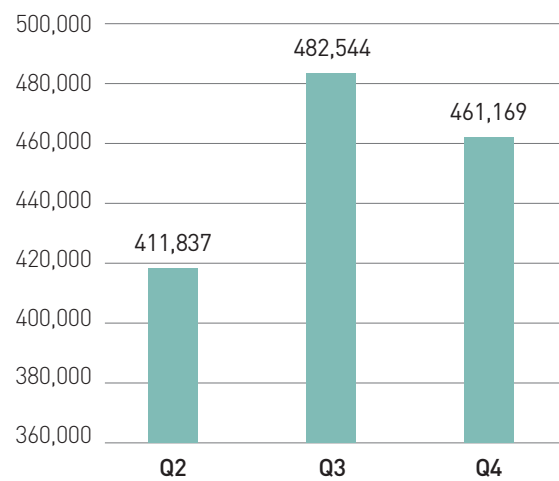
- The aggregate payment using the Gyeonggi local currency steadily rose with the pace of growth moderating slightly.
- Monthly average payment per store amounted to KRW 400,000 to 500,000, showing a slight decline after peaking in the third quarter.
  - Despite the rise of aggregate payment, the per-store payment is limited due to the increase in the number of stores receiving local currency.

<sup>3</sup> To analyze the impact of Gyeonggi local currency issuance on sales, about 3,800 companies were surveyed for each of the four quarters of 2019.

### Aggregate payment using the Gyeonggi local currency (1,000 KRW)



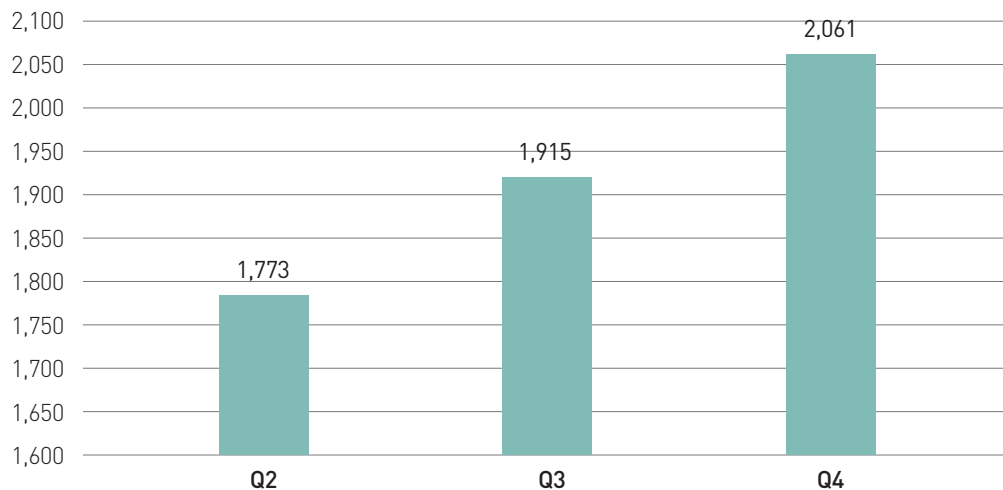
### Per-store payment using the Gyeonggi local currency (KRW)



Source: Survey of the impact of Gyeonggi local currency issuance on sales

- The number of stores visited by customers using the Gyeonggi local currency continued to rise.

### Number of stores visited by customers of the Gyeonggi local currency



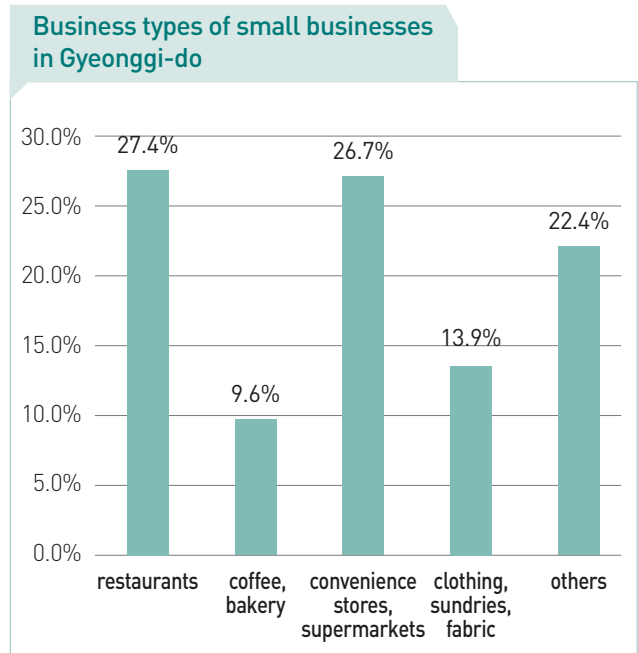
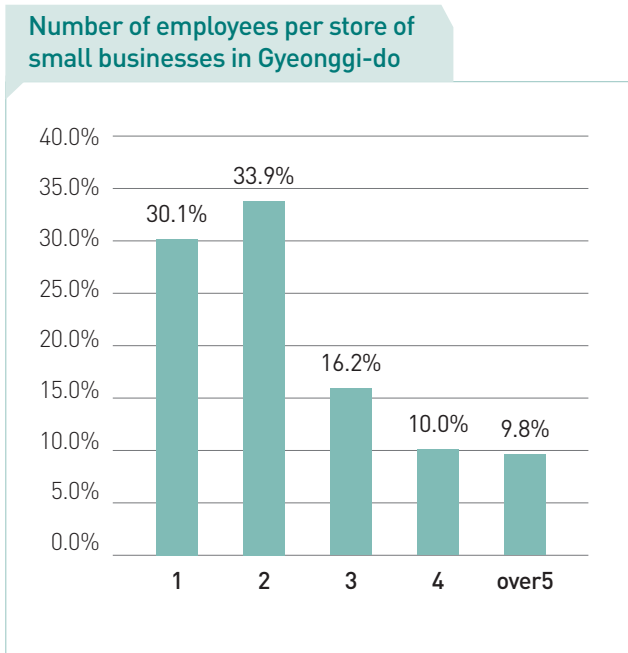
Source: Survey of the impact of Gyeonggi local currency issuance on sales

- The average number of employees of stores subject to survey was 2.52, the most frequented business type was restaurants (27.4%), the most frequented type of commercial districts was shopping district (63.0%), and the most frequented type of stores was general stores (67.5%).

- The number of employees per store subject to survey was one person (30.1%), and two persons (33.9%), suggesting that most of them are on a small scale.

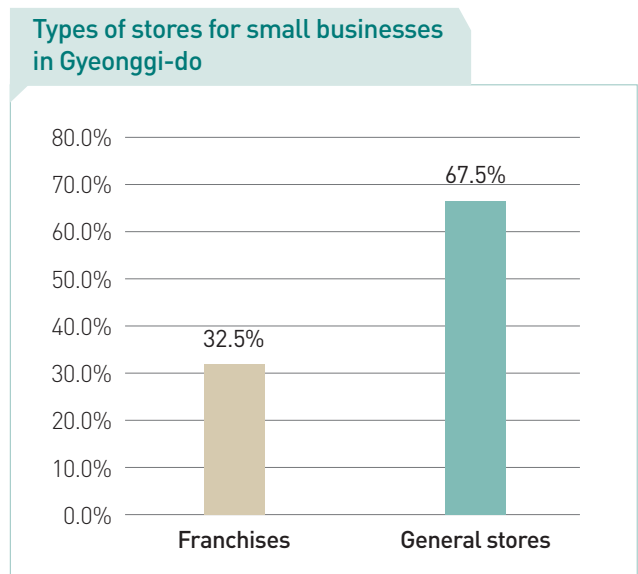
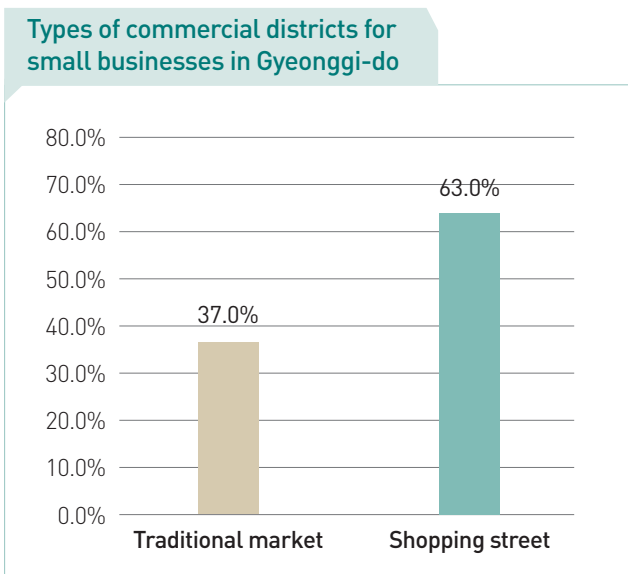


- Major business types of stores included restaurants (27.4%), and convenience stores and supermarkets (26.7%).



Source: Survey of the effect of Gyeonggi local currency issuance on sales

- In terms of the type of commercial districts, more stores surveyed were on shopping streets (63%) than in traditional markets (37.0%).
- In terms of the type of store, the share of general stores (67.5%) exceeded that of franchises (32.5%).



Source: Survey of the effect of Gyeonggi local currency issuance on sales



# The Impact of Local Currency Use on the Sales by Small Businesses (Econometric Analysis)



Analysis of the Impact of Local Currency on Sales  
by Small Businesses in Gyeonggi-do



### III

## The Impact of Local Currency Use on the Sales by Small Businesses (Econometric Analysis)

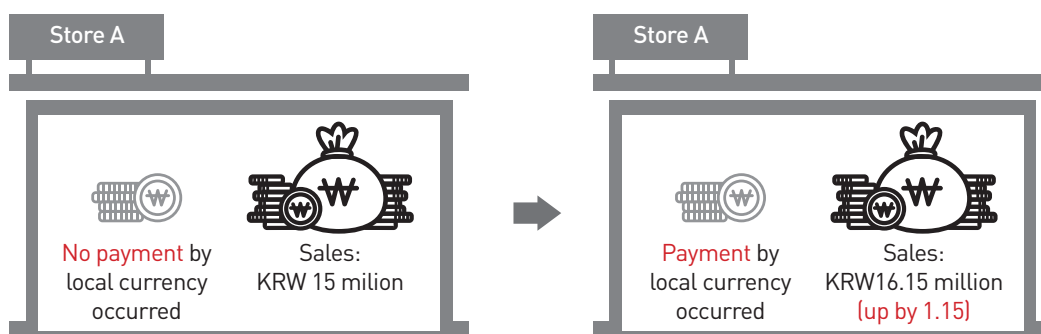
■ The use of local currency brought about increased sales of KRW 2.06 million.

- The data on the effect of the Gyeonggi local currency on increased sales during all four quarters of 2019 was analyzed.
- By using a random effects model for panel analysis of the impact on increased sales, it is found that a store with customers using local currency saw an increase of sales of KRW 2.06 million relative to a store without such customers (at a significance level of 1%) (for details, see Appendix Model 2-4).
- Meanwhile, the effect of local currency use on sales varied by district. The sales by stores with customers using local currency increased by KRW 4.87 million in the northern district, KRW 2.78 million in the central district, KRW 1.82 million in the southern district, KRW 0.89 million in the west coast district, and KRW 0.79 million in the northeastern district (for details, see Appendix Model 2-5).

■ With regard to analysis of within effects of using local currency for the same store, sales by stores with customers of local currency increased by KRW 1.15 million, compared with sales when they did not have such customers.

- According to the analysis of within effects, using a fixed effects model for panel analysis for the same store, sales increased by KRW 1.15 million compared with sales when payment was not made using local currency (with a significance level of 1%) (for details, see Appendix Model 2-3).

#### Within effects of the use of local currency

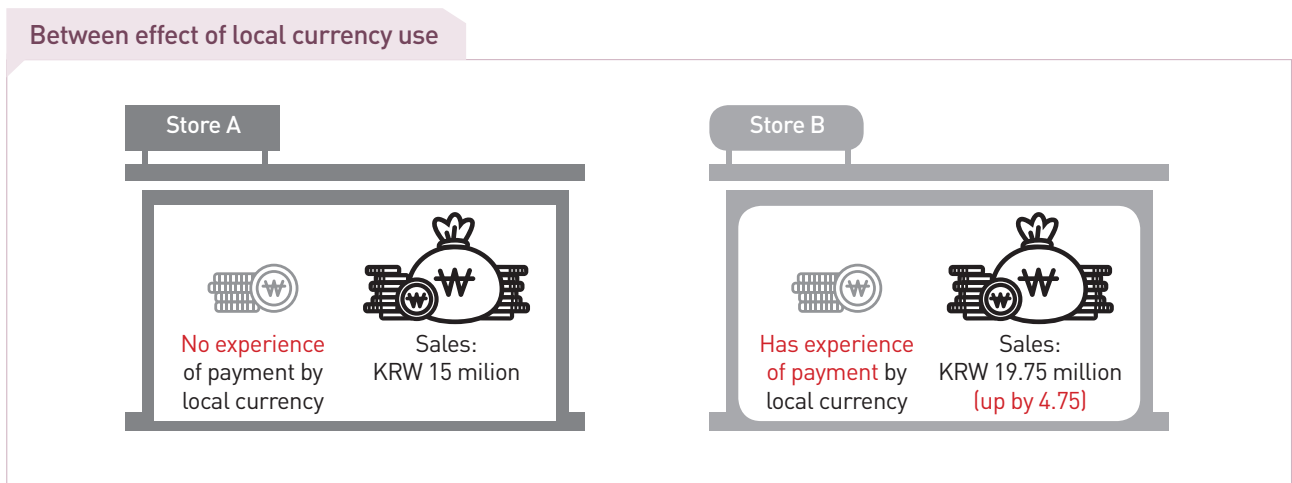


Note: Sales of KRW 15 million for store A were set as an example.





- This suggests that the use of local currency goes further than just replacing existing consumption to trigger additional consumption.
- Stores with experience of payment by local currency saw KRW 4.75 million more in sales than stores without payment by local currency.
- According to the between effect of using local currency for the same sample, sales at stores that accepted payment in local currency were KRW 4.75 million higher compared to those stores who did not accept such payment (at a significance level of 1%) (for details, see Appendix Model 2-1)



Note: Sales of KRW 15 million for store A were set as an example.

- Considering the local currency targets at local neighborhood stores, the use of local currency helped residents explore local stores near their places of residence, which led to an increase of sales.



IV

# The Impact of Local Currency Payment Value on the Sales by Small Businesses (Econometric Analysis)



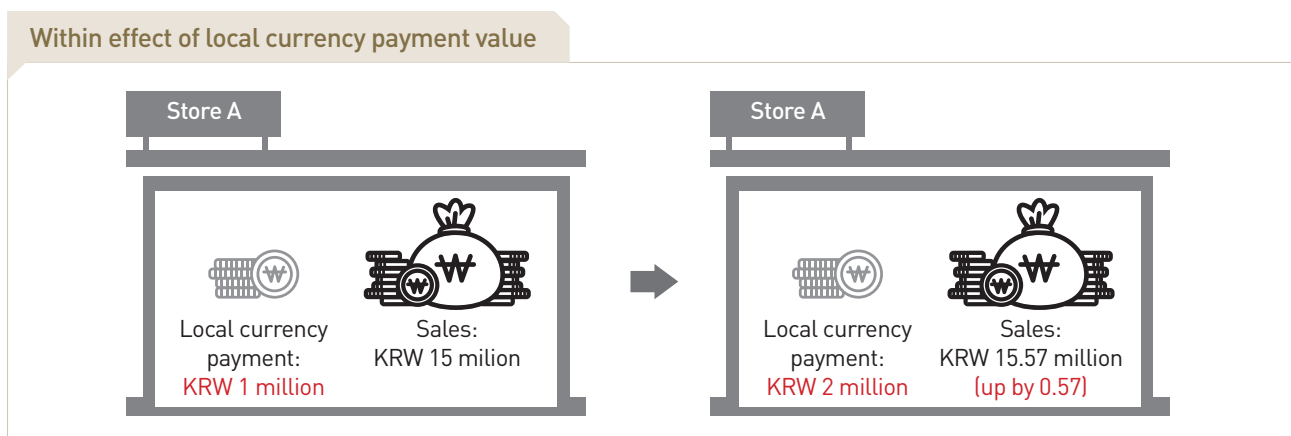
Analysis of the Impact of Local Currency on Sales  
by Small Businesses in Gyeonggi-do

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# IV

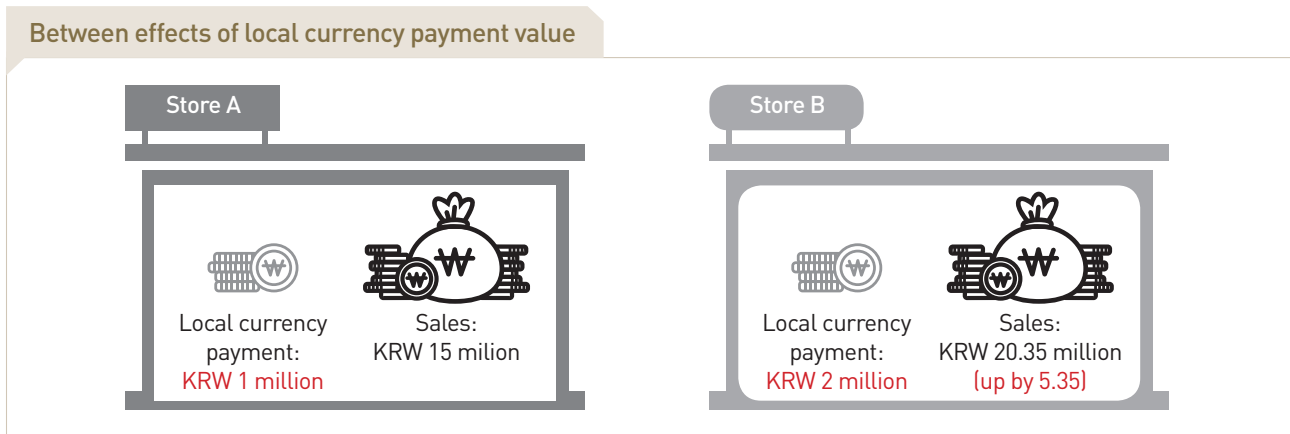
## The Impact of Local Currency Payment Value on the Sales by Small Businesses (Econometric Analysis)

- The increase of local currency payment led to an increase of sales with statistical significance, with an increase of local currency payment by KRW 1 million resulting in an increase of sales by KRW 1.45 million (+45%).
  - The analysis results of 2019 quarterly data showed that an increase of local currency payment by KRW 1 million drove up sales by KRW 1.45 million (with a significance level of 1%), or a 45% increase of sales (for details, see Appendix Model 3-4).
  - The effect of local currency payment value on sales varied by district with statistical significance (with a significance level of 1%).
    - An increase of local currency payment value of KRW 1 million led to an increase of sales by KRW 5.78 million in the west coast district, by KRW 5.36 million in the northern district, by KRW 4.23 million in the northeastern district, by KRW 3.55 million in the southern district, and by KRW 0.96 million in the central district (for details, see Appendix Model 3-5).
- With regard to within effects of local currency payment value increase for the same store, an increase of local currency payment by KRW 1 million resulted in an increase of sales by KRW 0.57 million.
  - The analysis of within effects of the same data by using panel analysis found that an increase of local currency payment by KRW 1 million drove up sales by KRW 0.57 million (for details, see Appendix Model 3-3).
  - This suggests that, though local currency payment replaces some portion of existing consumption (43%), it creates additional consumption (57%), increasing sales.



Note: Sales of KRW 15 million for store A were set as an example.

- The analysis of between effect of local currency payment value increase indicated that a store whose local currency payment was higher by KRW 1 million saw a sales increase of KRW 5.35 million.
- Using panel analysis for the same data, the analysis of between effects suggested that stores receiving KRW 1 million more in sales done using local currency achieved KRW 5.35 million more in total sales (at a significance level of 1%) (for details, see Appendix Model 3-1)



Note: Sales of KRW 15 million for store A were set as an example.





# The Impact of Local Currency System Introduction on Sales by Small Businesses (Econometric Analysis)



Analysis of the Impact of Local Currency on Sales by Small Businesses in Gyeonggi-do





# V

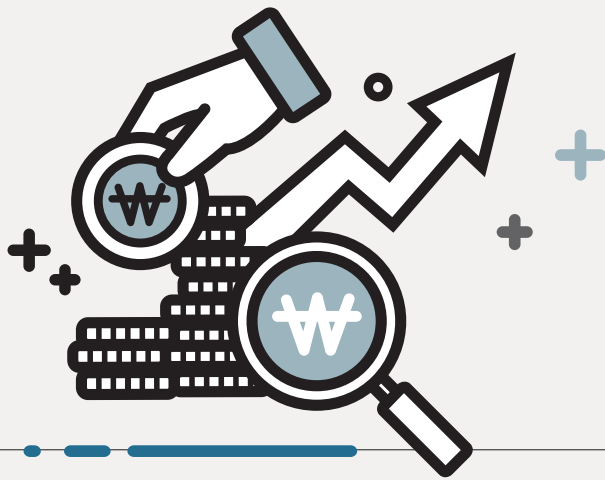
## The Impact of Local Currency System Introduction on Sales by Small Businesses (Econometric Analysis)

■ The introduction of local currency did not produce an increase in sales in the short term.

- Unlike the overall results of analysis for the entire year of 2019, the effect of local currency introduction was not significant when sales of the first quarter of 2019 (prior to the introduction of local currency) is compared to that of the second quarter (when the system had just been introduced (for details, see Appendix).
- The effect of local currency appears to depend on actual penetration that builds over time, rather than the introduction of the system itself (as was proved by the results listed in Sections II and III above, which considered the third and fourth quarters, and not just the second quarter), assessment of the effect of the system introduction in the short-term is found to be premature.



# Appendix: Econometric Analysis Model and Estimation Results



Analysis of the Impact of Local Currency on Sales  
by Small Businesses in Gyeonggi-do

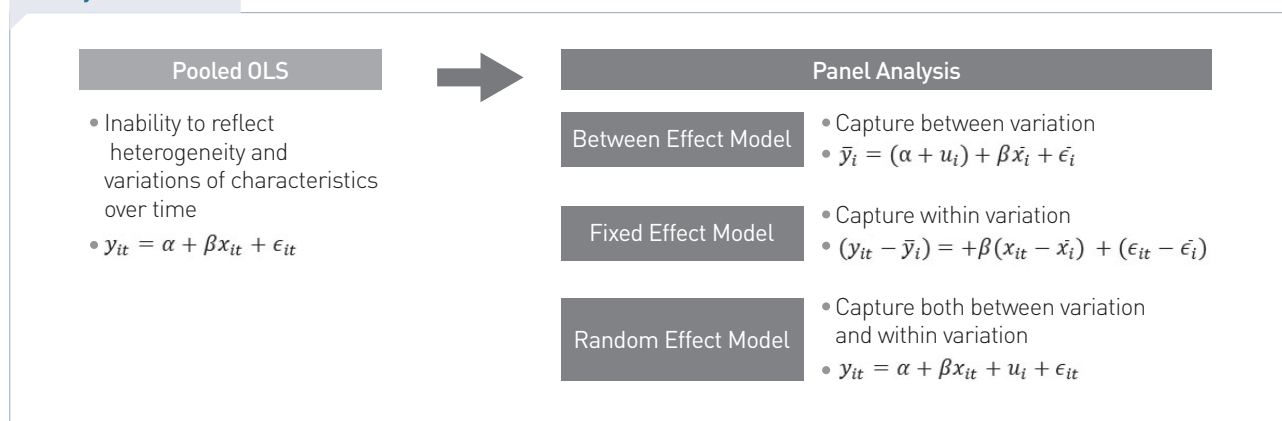
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## 1. Overview of analytical model

- To analyze the effect of local currency on sales, a panel data set of 3,800 companies spanning the four quarters of 2019 was collected.
  - To identify the effect of local currency introduction, an ex-ante survey (prior to policy issue and use) in the first quarter of 2019 was conducted, and in the 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> quarter, an ex-post survey (after policy issue and use) was conducted.
  - The survey of the first and second quarters of 2019 was implemented by small businesses, 31 cities, and counties in Gyeonggi-do. The survey for the third and fourth quarters was conducted by the research company, Athena Company, as appointed by the Gyeonggi-do Market Revitalization Agency.
  - Due to reasons related to stores and the survey itself, there were some panel attritions, and replenishment and analysis was finally made for 3,650 stores after considering missing values of variables.
  
- To understand the relationship between local currency issue and sales by small businesses, the analysis was divided into two categories: 'experience of local currency use' and 'payment value'.
  - First, with the dummy independent variable being "whether a certain store received customers using local currency in a certain quarter, and sales as dependent variable, panel data was analyzed".
  - Second, with the independent variable being the local currency payment value (monthly average by quarter) of a certain store in a certain quarter and sales (monthly average by quarter) fixed as the dependent variable, panel data was analyzed.
  
- Analytical data is panel data that allows consideration of both the characteristics of stores and the change of characteristics over time.
  - Pooled OLS is limited in that it is unable to consider heterogeneity of samples and change of characteristics over time, and results of the F-test and LM test confirmed the necessity of panel analysis.
  - According to the results of the F-test that compared the results of Pooled OLS and the fixed effects model, estimates of the fixed effects model were relatively superior at a significance level of 1%.
  - According to the results of the LM test (Breusch and Pagan Lagrangian Multiplier Test) that compared the results of Pooled OLS and results of the random effects model, the estimates of the random effects model were found to be relatively superior at a significance level of 1% in all models.

## Analysis Flows



- The random effect model can measure between variation and within variation at the same time to identify the effect of an independent variable.
  - As the random effects model uses between group information, which is the strength of panel analysis, as well as within group time series information, it is efficient and allows us to identify both between variation and within variation effects.
  - However, the model of this research did not pass the Hausman test and thus it was difficult to adopt the results of the random effects model as they were. Instead, results of both the fixed effects model and the between effect model were reviewed so that the between effect and within effect could be separately examined.
- Using the fixed effects model, the effect of the use of local currency and the effect of change of payment value in the same store over time were analyzed.
  - Within variation in this study refers to variation that occurs over time in the same store.
- Using the between effect model, stores that had customers using local currency and stores that did not have such customers were compared at the same point in time.
  - Between variation refers to difference between stores.
- By considering the characteristics of models (between effects model, fixed effects model, random effects model) and necessity for an interaction term, a model was finally established.
  - The fixed effects model analyzes only within variation and thus does not consider values that do not change over time, such as locations of stores.
  - The number of employees, business type, type of market, type of store, and location were chosen as control variables, and continuous variables, except number of employees, were treated as dummy variables.
  - An interaction term was created by multiplying “whether a shop has customers using local currency or not” by dummy variables for a district to analyze the impact of major independent variables by district.



## 2. Estimation results of the impact of use of local currency on sales by small businesses

- Aggregate monthly average sales by quarter (1 million KRW) were treated as the dependent variable. The dummy variable regarding whether there were customers using local currency in a relevant quarter or not was chosen as the independent variable. This model generated statistical significance.
  
- The effect of local currency use on sales as was seen in Model 2-4 was found to be KRW 2.06 million, and if interaction term is used to analyze effects by district, as in Model 2-5, the impact was an increase of sales by KRW 4.87 million in the northern district, KRW 2.78 million in the central district, KRW 1.82 million in the southern district, KRW 0.89 million in the west coast district, and KRW 0.79 million in the eastern district.
  - Model 2-5 analyzed the impact by district with a focus on the central district and found that all districts except the southern district exhibited significant difference. If the analysis is made with a focus on the northern district, all districts including the southern district showed significance difference, confirming the significance of a varying impact by district.
  - This study presented results from the central district as a base in order to ensure consistency with the analysis of the impact on sales increase.
  
- The within variation showed sales increase by KRW 1.15 million as in Model 2-3.
  - For the same store, local currency generated an increase of sales over time by KRW 1.15 million compared with sales when it did not have local currency payment.
  
- The between variation showed sales increase by KRW 4.75 million in Gyeonggi-do as in Model 2-1 and did not produce differences by district when using interaction term as in Model 2-2.
  - Stores with payments by local currency saw their sales being higher by KRW 4.75 million than those without payment by local currency.

## Estimation results of the effect of local currency use on sales by small businesses

[Unit: 1 million KRW]

Description		Model 2-1 Between Effects	Model 2-2 Between Effects	Model 2-3 Between Effects	Model 2-4 Between Effects	Model 2-5 Between Effects
Constant term		8.205***	8.067***	9.278***	10.349***	9.898***
Whether stores have customers using local currency or not (0= Not have. 1= Have.)		4.749***	4.934***	1.145***	2.055***	2.780***
Number of store employees		4.101***	4.103***	2.798***	3.566***	3.553***
Business type (0=Others)	Restaurants	-1.711**	-1.705**	0.383	-0.875	-0.755
	Coffee, bakery	-5.572***	-5.565***	-0.048	-4.317***	-4.196***
	Convenience store, supermarket, agricultural & livestock stores	6.751***	6.748***	0.262	6.993***	7.063***
	Clothing, sundries, fabric	-1.534*	-1.516***	0.045	-1.728**	-1.673**
Market type (0=Traditional market, 1=Shopping street)		1.694***	1.785***	3.159	2.122***	2.172***
Store type (0=Franchise, 1=General store)		-3.338***	-3.365***	-1.480*	-3.053***	-3.090***
Location of stores (0=Central district)	West coast district	-2.947***	-1.458	-	-2.943***	-1.757*
	Northeastern district	-5.405***	-4.372***	-	-5.527***	-4.004***
	Northern district	-2.565***	-2.480*	-	-3.317***	-3.680***
	Southern district	-1.463**	-2.778**	-	-1.870**	-1.360
Interaction term (whether to have customers of local currency x district)	West coast district	-	-2.261	-	-	-1.891**
	Northeastern district	-	-1.839	-	-	-2.701***
	Northern district	-	-0.188	-	-	2.093**
	Southern district	-	2.804	-	-	-0.959
Number of observations		10,517	10,517	10,517	10,517	10,517
Number of groups		3,650	3,650	3,650	3,650	3,650
R-square	within	0.045	0.044	0.050	0.048	0.052
	between	0.324	0.326	0.247	0.320	0.319
	overall	0.264	0.266	0.213	0.265	0.266

Note: \*\*\*, \*\*, \* indicate a significance level of 1%, 5%, 10% respectively.



### 3. Estimation results of the effect of local currency payment value on sales by small businesses

- Models with aggregate monthly average sales by quarter (1 million KRW) as the dependent variable and monthly local currency payment value (1 million KRW) as the independent variable showed statistical significance.
- The impact of local currency payment value on sales was found to be KRW 1.45 million as shown in Model 3-4, and the analysis of effects by district using interaction terms as in Model 3-5 showed that sales increased by KRW 5.78 million in the west coast district, KRW 5.36 million in the northern district, KRW 4.23 million in the northeastern district, KRW 3.55 million in the southern district, and KRW 0.96 million in the central district.
- The within variation was an increase of sales by KRW 0.57 as in Model 3-3.
  - For the same store, an increase of local currency payment by KRW 1 million over time led to an increase of sales by KRW 0.57 million (+57%).
  - KRW 0.43 million out of the local currency payment (KRW 1 million) replaced existing consumption (43%) while the rest (KRW 0.57 million) generated additional consumption (57%).
- The between group variation was increased sales of KRW 5.35 million in Gyeonggi-do as in Model 3-1, and if we analyze the impact by district by using an interaction term as in the Model 3-2, statistically significant differences in all districts except the northern district were noticed.
  - The difference of sales between stores due to difference of local currency payment of KRW 1 million was estimated at KRW 5.35 million.

### Estimation results of the effect of local currency payment value on sales by small businesses

Description		Model 3-1 Between Effects	Model 3-2 Between Effects	Model 3-3 Between Effects	Model 3-4 Between Effects	Model 3-5 Between Effects
Constant term		9.183***	9.927***	9.696***	10.917***	11.298***
Local currency sales (million KRW)		5.354***	4.198***	0.565***	1.453***	0.959***
Number of employees (persons)		3.846***	3.784***	2.772***	3.544***	3.480***
Business type (0=Others)	Restaurants	-1.168**	-1.302*	0.335	-0.729	-0.833
	Coffee, bakery	-4.684***	-4.869***	0.027	-4.015***	-4.160***
	Convenience store, supermarket, agricultural & livestock stores	6.988***	6.779***	0.059	7.093***	6.859***
	Clothing, sundries, fabric	-1.265	-1.310	-0.064	-1.685**	-1.728**
Market type (0=Traditional market, 1=Shopping street)		1.414***	1.471***	3.429	2.018***	2.111***
Store type (0=Franchise, 1=General store)		-3.386***	-3.412***	-1.490*	-3.038***	-2.967***
Location of stores (0=Central inland district)	West coast district	-1.260	-3.328***	-	-2.399***	-3.445***
	Northeastern district	-4.511***	-5.119***	-	-5.285***	-6.208***
	Northern district	-2.238***	-2.709***	-	-3.448***	-4.041***
	Southern district	-0.788	-2.158***	-	-1.754**	-2.401***
Interaction term (whether to have customers of local currency x district)	West coast district	-	9.649***	-	-	4.820***
	Northeastern district	-	1.594**	-	-	3.271***
	Northern district	-	1.086	-	-	4.397***
	Southern district	-	5.463***	-	-	2.591***
Number of observations		10,517	10,517	10,517	10,517	10,517
Number of groups		3,650	3,650	3,650	3,650	3,650
R-square	within	0.028	0.032	0.037	0.035	0.044
	between	0.391	0.394	0.267	0.379	0.384
	overall	0.298	0.305	0.231	0.305	0.310

Note: \*\*\*, \*\*, \* indicate a significance level of 1%, 5%, 10% respectively.

## 4. Estimation results of local currency system introduction on sales by small businesses

Based on results of the survey (ex-ante) in the first quarter of 2019, which was before the introduction of local currency, and the survey (ex-post) in the second quarter of 2019, the regression equation with the difference-in-differences method  $Y_i = \alpha + \beta_1 D_{treatment} + \beta_2 D_{treattime} + \beta_3 (D_{treatment} \cdot D_{treattime}) + \epsilon_i$  was estimated.

-  $Y_i$  is aggregate sales,  $D_{treatment}$  is a dummy variable of “whether stores have customers using local currency or not”,  $D_{treattime}$  is a dummy variable distinguishing time prior to local currency introduction (first quarter) from the time after local currency introduction (second quarter).

- With 1,654 stores using local currency in the second quarter as the treatment group, and 746 stores not using local currency as the control group, the difference-in-differences method was used.

-  $\beta_3$  indicates the impact of local currency introduction on sales;  $\beta_1$ , regardless of real effects, refers to the impact of whether treatment group and control group are included on sales;  $\beta_2$  is a trend impact over time, i.e., before and after local currency introduction.

The value of  $\beta_3$  was 1,043,155, but without statistical significance. Thus, it is difficult to say that the sales increased from before until after the introduction of local currency.

- It is found that any immediate increase of sales did not take place as a direct result of local currency introduction.

### Estimation results of the impact of local currency system introduction, using difference-in-differences method

```
. xi: reg q3_1 i.treat_g*i.time_12
i.treat_g      _Itreat_g_0-1      (naturally coded; _Itreat_g_0 omitted)
i.time_12      _Itime_12_1-2      (naturally coded; _Itime_12_1 omitted)
i.treat_g*i.time_12  _ItreXtim_#_#      (coded as above)
```

Source	SS	df	MS	Number of obs = 4386		
Model	4.5097e+16	3	1.5032e+16	F( 3, 4382) =	31.95	
Residual	2.0620e+18	4382	4.7056e+14	Prob > F	= 0.0000	
Total	2.1071e+18	4385	4.8053e+14	R-squared	= 0.0214	
				Adj R-squared	= 0.0207	
				Root MSE	= 2.2e+07	

q3_1	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
_Itreat_g_1	6374680	979058.9	6.51	0.000	4455230	8294130
_Itime_12_2	-687721.8	1165838	-0.59	0.555	-2973353	1597909
_ItreXtim_1_2	1043155	1410039	0.74	0.459	-1721234	3807544
_cons	1.40e+07	812389	17.23	0.000	1.24e+07	1.56e+07



## 5. Issuance and use of local currency by city and county and by quarter<sup>4</sup>

### ▣ Gapyeong County

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Q2	1.7	1.7	98.0	0.9	0.8	96.3	2.6	2.5	97.4
Q3	5.4	5.3	99.8	3.9	3.0	76.8	9.2	8.3	90.1
Q4	4.8	5.2	106.7	3.5	2.7	77.7	8.3	7.9	94.5

### ▣ Goyang City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Q2	20.1	20.0	99.6	10.0	10.0	100.0	30.1	30.1	99.7
Q3	248.9	227.8	91.5	133.2	115.0	86.4	382.1	342.8	89.7
Q4	165.8	181.1	109.3	101.4	80.8	79.7	267.2	261.9	98.0

### ▣ Gwacheon City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Q2	12.8	12.6	98.5	6.4	6.3	99.2	19.2	18.9	98.7
Q3	21.3	22.0	103.2	11.5	10.5	92.0	32.8	32.6	99.3
Q4	17.7	17.0	96.3	7.4	6.3	85.7	25.1	23.4	93.2

### ▣ Gwangmyeong City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0
Q2	12.0	8.4	69.9	4.6	3.9	83.6	16.6	12.2	73.7
Q3	26.3	22.5	85.6	17.6	13.2	74.9	43.9	35.7	81.3
Q4	20.7	21.3	103.0	17.4	11.9	68.5	38.1	33.2	87.2

<sup>4</sup> This result is based on KONA I platform DB and focused only on cards out of the various types of available local currency (paper, plastic card, mobile). The data from Gimpo City, Seongnam City and Siheung City, which was not under the KONA I system, was excluded.

### ■ Gwangju City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Q2	7.5	6.8	91.2	3.3	3.3	100.0	10.8	10.1	93.9
Q3	17.5	17.3	99.0	16.2	11.9	73.1	33.7	29.2	86.5
Q4	60.0	57.9	96.6	33.8	29.2	86.3	93.8	87.1	92.9

### ■ Guri City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Q2	11.8	11.8	100.0	5.9	5.9	100.0	17.7	17.7	100.0
Q3	13.6	14.6	107.8	12.4	9.0	72.4	26.0	23.6	90.9
Q4	20.0	19.4	97.1	14.0	10.3	73.7	34.0	29.7	87.4

### ■ Gunpo City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Q2	80.4	76.2	94.7	39.1	37.5	96.1	119.5	113.7	95.2
Q3	93.0	100.9	108.5	50.7	46.8	92.4	143.7	147.8	102.9
Q4	92.6	102.0	110.1	49.6	44.7	90.2	142.2	146.7	103.2

### ■ Namyangju City

(Unit: 1 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Q2	35.6	34.1	95.9	17.4	17.0	98.0	53.0	51.2	96.6
Q3	39.4	41.4	105.0	33.3	24.5	73.6	72.7	65.9	90.6
Q4	84.5	78.6	93.0	49.5	40.3	81.4	134.0	118.8	88.7

### ■ Dongducheon City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Q2	5.8	4.6	78.6	3.3	2.6	78.0	9.1	7.1	78.4
Q3	6.5	6.7	102.9	5.5	4.3	78.1	12.0	11.0	91.6
Q4	9.4	9.3	98.9	6.3	4.8	77.4	15.6	14.1	90.3

### ■ Bucheon City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	33.3	0.0	0.0	-	0.0	0.0	33.3
Q2	117.6	107.7	91.6	56.5	53.0	93.8	174.1	160.7	92.3
Q3	192.7	202.6	105.1	111.2	99.7	89.7	303.9	302.3	99.5
Q4	115.7	130.7	112.9	72.6	57.2	78.9	188.3	188.0	99.8

### ■ Suwon City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0
Q2	63.1	60.7	96.3	35.9	30.5	85.0	99.0	91.2	92.2
Q3	82.1	84.2	102.6	74.1	52.9	71.4	156.2	137.1	87.8
Q4	72.1	70.8	98.2	63.1	41.3	65.5	135.2	112.0	82.9

### ■ Ansan City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0
Q2	41.5	39.4	95.0	22.2	19.6	88.4	63.7	59.0	92.7
Q3	69.4	72.2	104.1	53.4	42.4	79.4	122.8	114.6	93.3
Q4	105.3	109.9	104.4	69.9	57.8	82.7	175.2	167.7	95.7

### ■ Anseong City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.1	0.0	1.3	0.0	0.0	-	0.1	0.0	1.3
Q2	25.7	21.9	85.1	24.5	16.6	68.0	50.2	38.5	76.7
Q3	29.9	32.8	109.6	18.6	17.0	91.7	48.5	49.8	102.7
Q4	46.1	44.7	97.1	22.5	20.9	92.8	68.6	65.6	95.7

### ■ Anyang City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Q2	0.2	0.2	98.2	3.0	0.1	4.5	3.2	0.3	10.1
Q3	0.2	0.2	93.7	18.2	7.6	41.6	18.4	7.8	42.2
Q4	0.3	0.3	97.2	18.1	7.4	40.7	18.4	7.6	41.5

### ■ Yangju City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.2	0.0	1.8	1.7	0.1	5.7	2.0	0.1	5.2
Q2	30.5	26.1	85.7	15.5	14.2	91.7	46.0	40.3	87.7
Q3	35.4	35.4	100.2	20.3	17.3	85.2	55.6	52.7	94.7
Q4	42.1	40.9	97.3	22.3	19.3	86.6	64.4	60.2	93.6

### ■ Yangpyeong County

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Q2	28.7	27.4	95.5	13.4	13.4	100.0	42.1	40.8	96.9
Q3	52.7	52.0	98.6	23.4	22.5	96.3	76.1	74.5	97.9
Q4	54.3	53.6	98.8	22.5	21.5	95.6	76.7	75.1	97.8

### Yeoju City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	14.0	0.0	0.0	-	0.0	0.0	14.0
Q2	8.3	7.0	84.2	3.7	3.2	88.5	12.0	10.3	85.5
Q3	10.0	10.1	100.6	6.6	5.3	81.0	16.6	15.4	92.9
Q4	20.2	20.1	99.7	11.3	9.9	87.8	31.5	30.1	95.4

### Yeoncheon County

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Q2	4.1	4.1	100.0	2.1	2.1	100.0	6.2	6.2	100.0
Q3	15.6	15.0	96.5	7.5	7.2	95.4	23.1	22.2	96.1
Q4	17.8	17.8	100.1	8.3	7.8	93.8	26.0	25.5	98.1

### Osan City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Q2	17.1	15.2	89.0	8.1	7.7	95.5	25.2	22.9	91.1
Q3	26.2	26.7	102.1	17.0	14.3	83.9	43.2	41.0	94.9
Q4	34.1	35.7	104.9	20.5	17.5	85.3	54.5	53.2	97.5

### Yongin City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Q2	34.7	32.8	94.4	20.8	16.7	80.2	55.5	49.5	89.1
Q3	63.0	64.2	101.9	53.6	39.5	73.7	116.6	103.7	89.0
Q4	50.0	55.2	110.4	48.0	32.1	66.9	98.0	87.3	89.1

### Uiwang City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Q2	0.0	0.0	100.0	0.0	0.0	100.0	0.1	0.1	100.0
Q3	0.1	0.1	90.0	4.8	2.0	41.9	4.8	2.1	42.6
Q4	0.0	0.0	110.9	4.9	1.8	37.2	4.9	1.8	37.7

### Uijeongbu City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Q2	23.6	22.3	94.7	11.7	11.1	95.1	35.2	33.4	94.9
Q3	39.5	40.5	102.6	30.2	23.0	76.1	69.7	63.5	91.1
Q4	40.2	43.3	107.7	30.3	21.4	70.7	70.6	64.7	91.8

### Icheon City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Q2	18.7	18.3	97.7	11.4	9.3	82.0	30.1	27.6	91.8
Q3	21.6	20.4	94.3	13.7	11.0	80.0	35.3	31.4	88.8
Q4	25.7	24.4	94.6	14.5	11.6	80.3	40.2	36.0	89.5

### Paju City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Q2	4.5	4.5	99.4	2.3	2.2	98.9	6.8	6.7	99.3
Q3	33.6	27.7	82.6	23.2	17.3	74.4	56.8	45.0	79.3
Q4	52.8	49.4	93.7	30.3	24.4	80.6	83.0	73.8	88.9

### Pyeongtaek City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Q2	0.2	0.2	100.0	0.1	0.1	100.0	0.2	0.2	100.0
Q3	0.1	0.1	92.2	11.1	4.6	41.4	11.2	4.7	41.8
Q4	0.0	0.0	-	11.8	4.4	36.9	11.8	4.4	36.9

### Pocheon City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Q2	0.1	0.1	99.9	0.2	0.0	19.5	0.3	0.1	41.8
Q3	0.1	0.1	98.7	3.4	1.0	29.2	3.5	1.1	31.1
Q4	2.0	2.0	100.1	4.5	2.5	56.0	6.5	4.5	69.3

### Hanam City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Q2	68.7	68.6	99.8	34.3	34.3	100.0	103.0	102.9	99.9
Q3	74.1	79.6	107.5	37.2	34.9	93.7	111.3	114.5	102.9
Q4	86.2	76.6	88.8	31.2	28.6	91.7	117.5	105.2	89.6

### Hwaseong City

(Unit: 100 million KRW)

	General issuance			Policy issuance			Total		
	Issuance (A)	Use (B)	Ratio (B/A)	Issuance (C)	Use (D)	Ratio (D/C)	Issuance (E)	Use (F)	Ratio (F/E)
Q1	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Q2	76.6	70.1	91.6	41.7	35.4	84.9	118.2	105.5	89.2
Q3	142.8	139.1	97.4	77.5	69.4	89.5	220.3	208.5	94.7
Q4	85.4	96.1	112.6	51.8	41.6	80.2	137.2	137.7	100.3



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# Analysis of the Impact of Local Currency on Sales by Small Businesses in Gyeonggi-do (Q1, Q2, Q3, Q4/2019)

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