Food for Specified Health Uses (FOSHU) dan Foods with Function Claims (FFC): Mitigasi untuk Produsen dan Pemerintah

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P3FNI

Research Background

CONSUMER

Increasing interest in health products

GOVERNMENT

Improve people's health

Manufacturer

Increase profit by providing health products

STORE

Increase profit by selling high margin products

Introduction of FOSHU

The food market was full of products with unreliable health claims.

Consumers have limited ability to evaluate product quality.

There was a need to facilitate consumers to make a judgment about the healthiness of a product.

The adoption of government-supported health symbol in 1991.

Food for Specified Health Uses (FOSHU)

Introduction of FFC

機能性表示食品

It takes 2 to 3 years for the approval of FOSHU symbol.

The costs are very high.

It created a barrier for small and medium enterprises to enter the market.

The adoption of Foods with Function Claims (FFC) in 2015.

FOSHU and FFC Products

FOSHU Products

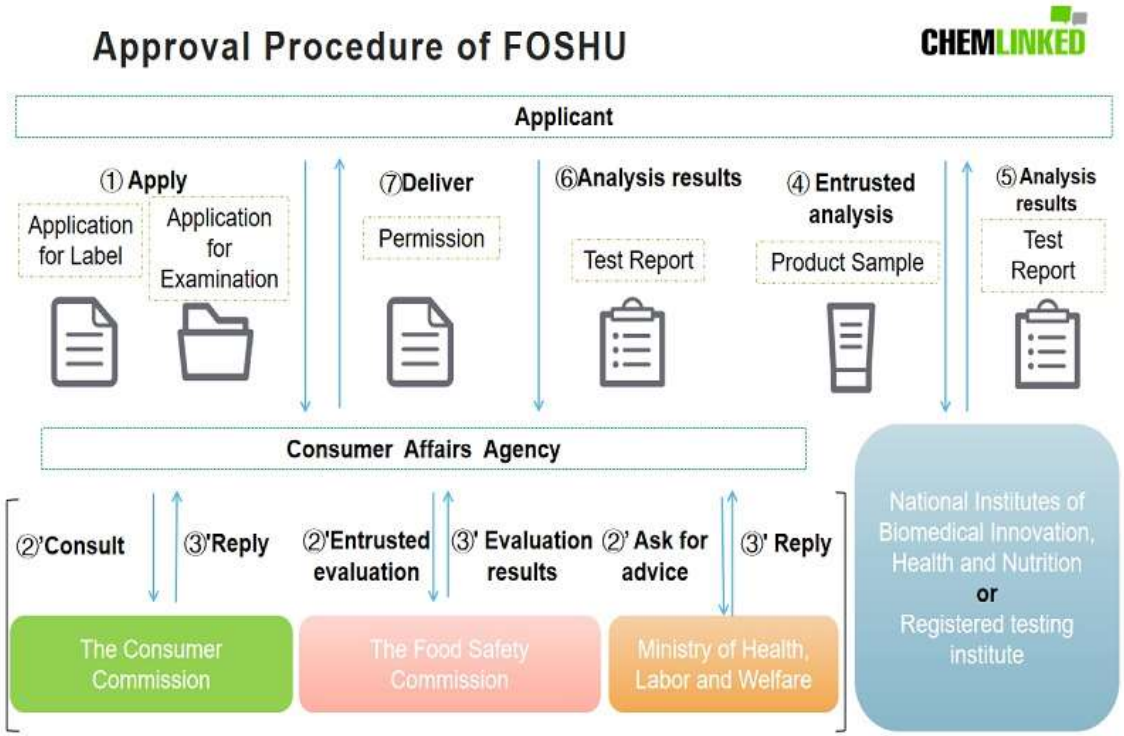
FFC Products

機能性表示食品

24本入り

Dual Health Claim Certification

FOSHU



FFC

Step 1: Preparation → Step 2: Evidence for the claimed function

Step 3: Application Check → Step 4: Submit the application to the Consumer Affairs Agency

Step 5: Approval

Research Questions

- Has the health food market been successfully created?
- Do firms benefit from the dual certification policy?
- Are they able to charge a higher price for FOSHU products than for FFC products?
- Did the introduction of FFC affect the performance of FOSHU products?
- Do consumers perceive FOSHU products as having a better quality than FFC products?

Data Description

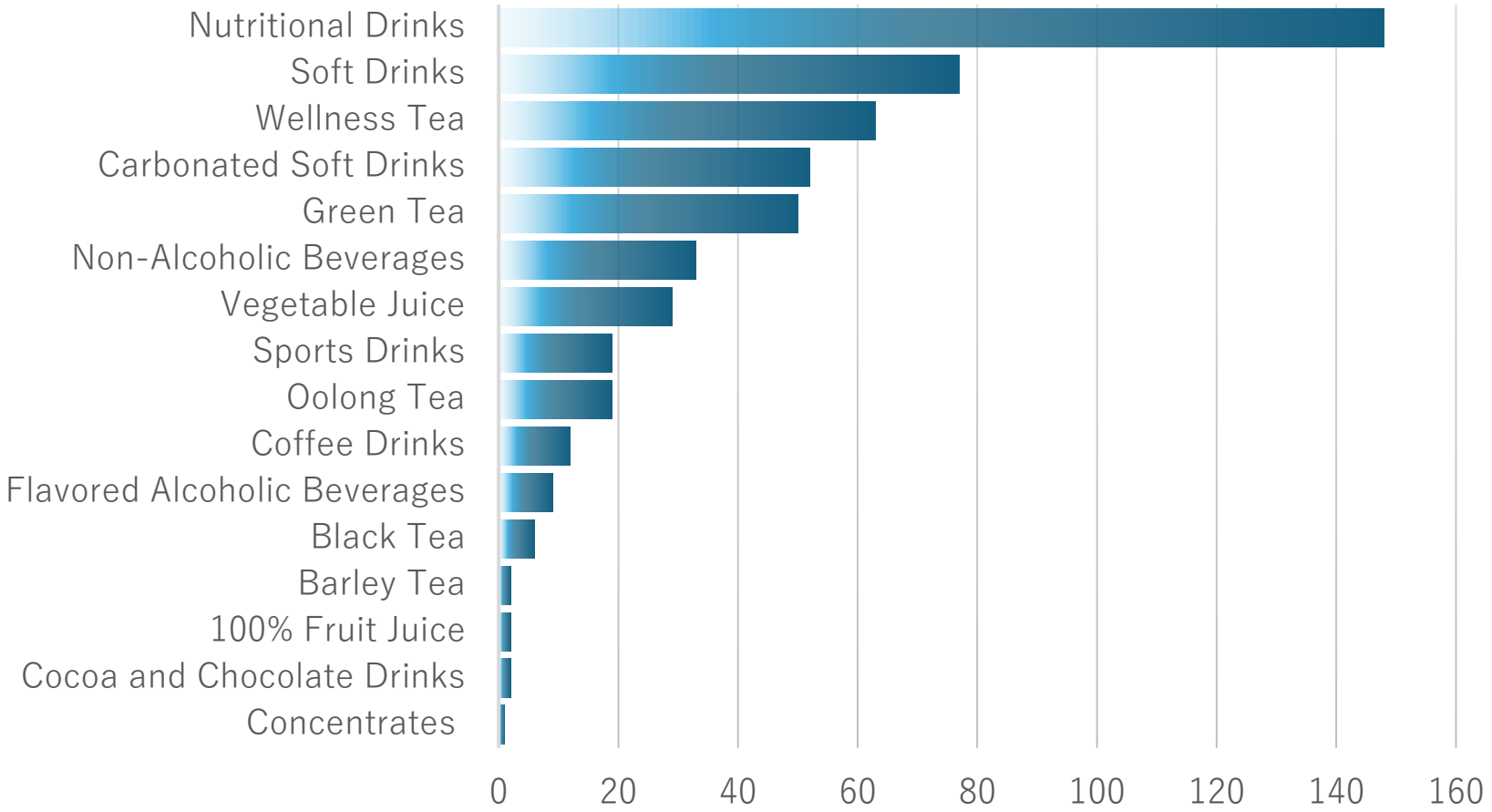
Nikkei POS data provided by the Joint Association Study Group of Management Science in Japan.

482 beverage products from 16 categories were selected from the POS data for analysis.

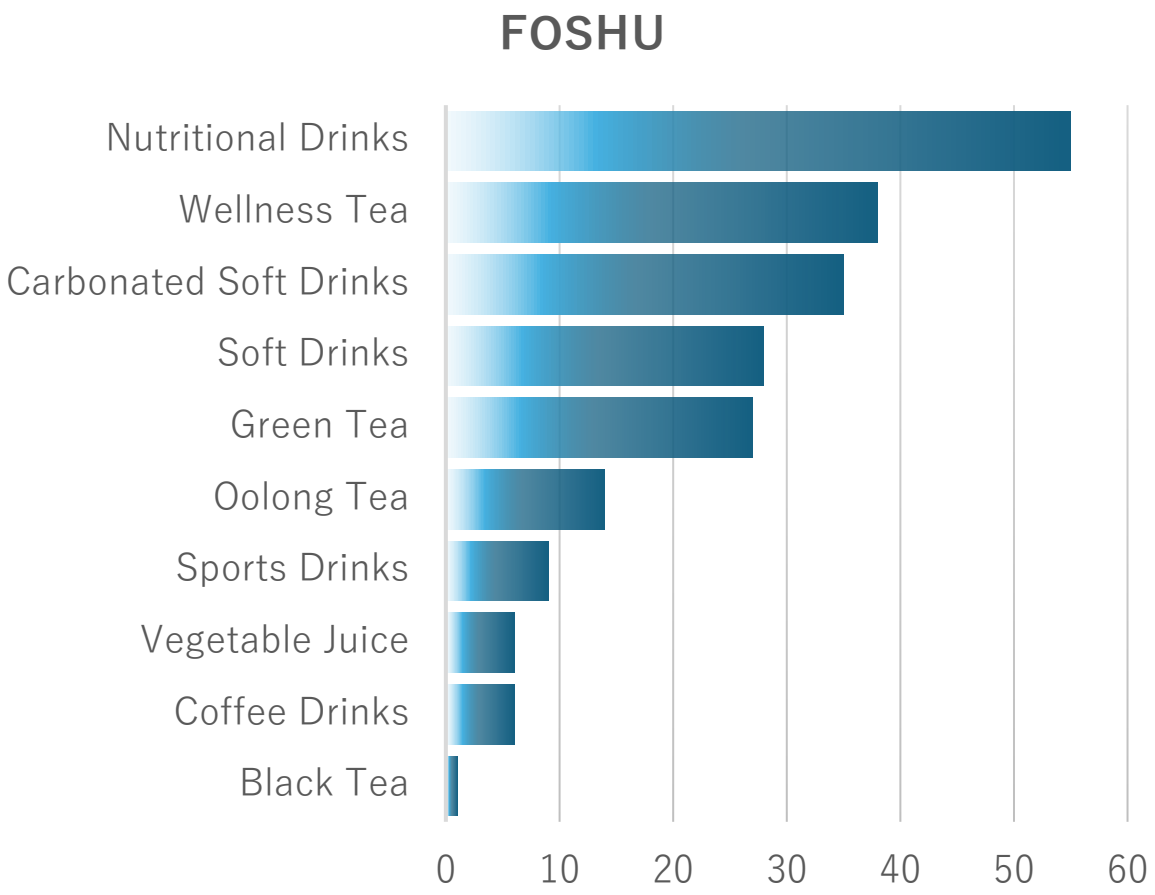
Weekly sales data from July 2013 to July 2022.

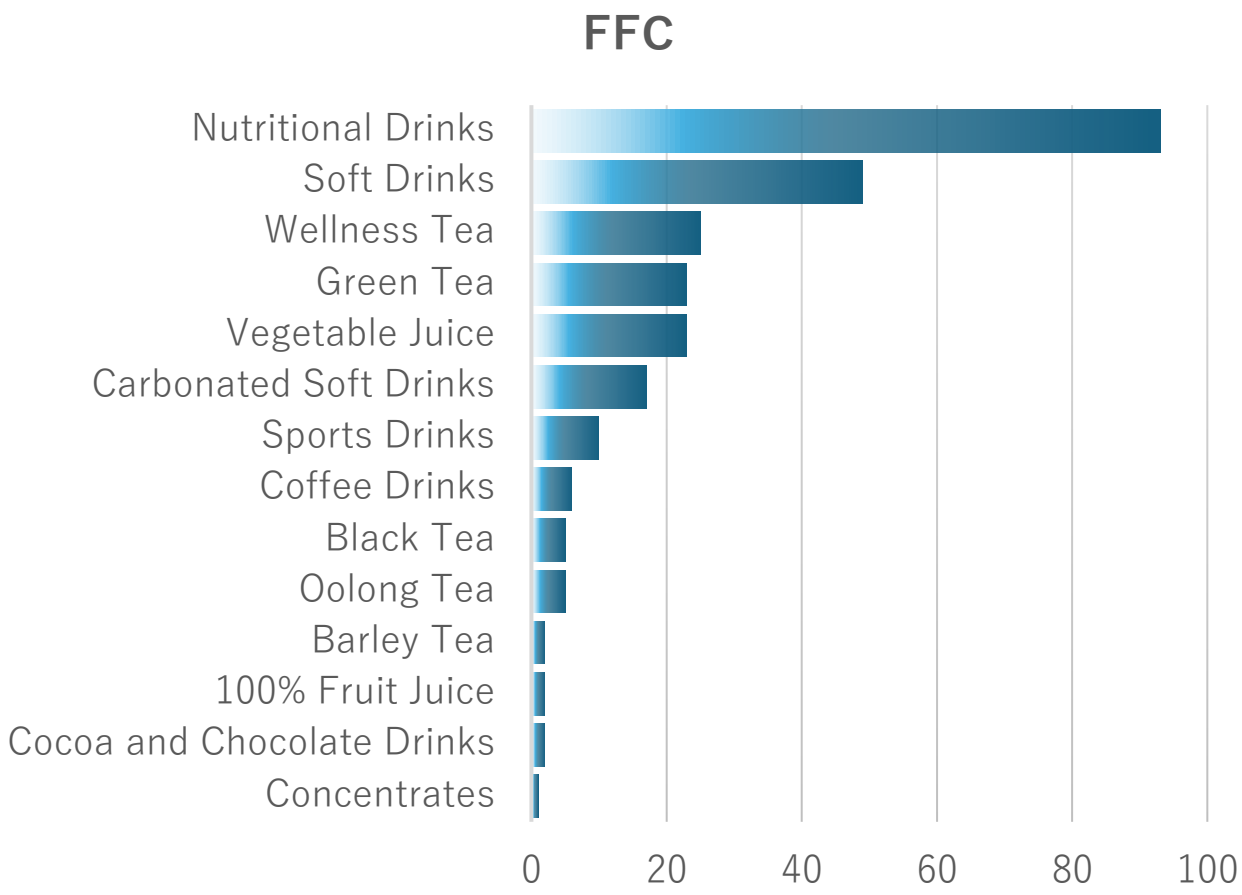
FOSHU (219 products), FFC (263 products).

Product Categories

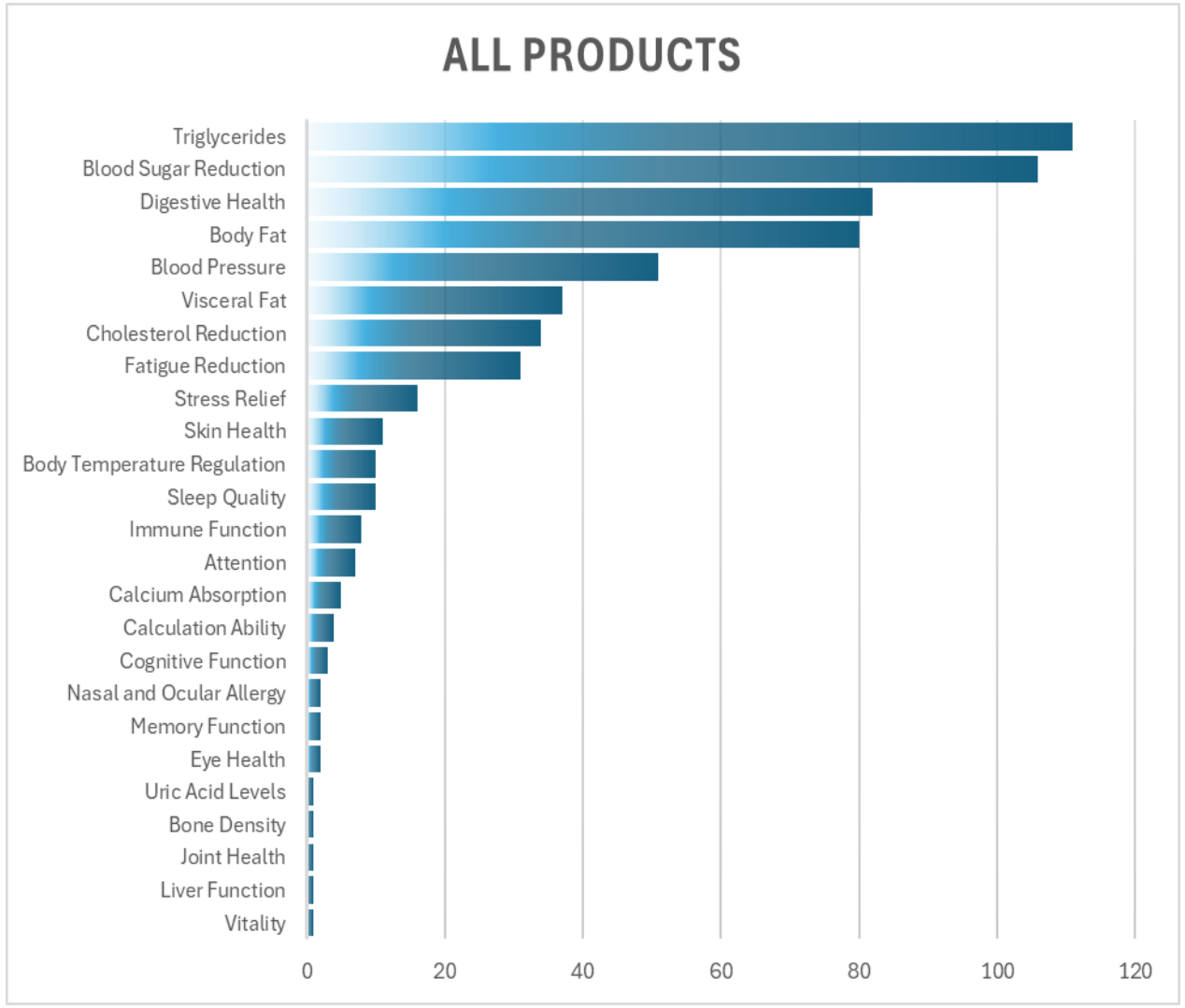


Product Categories of FOSHU and FFC



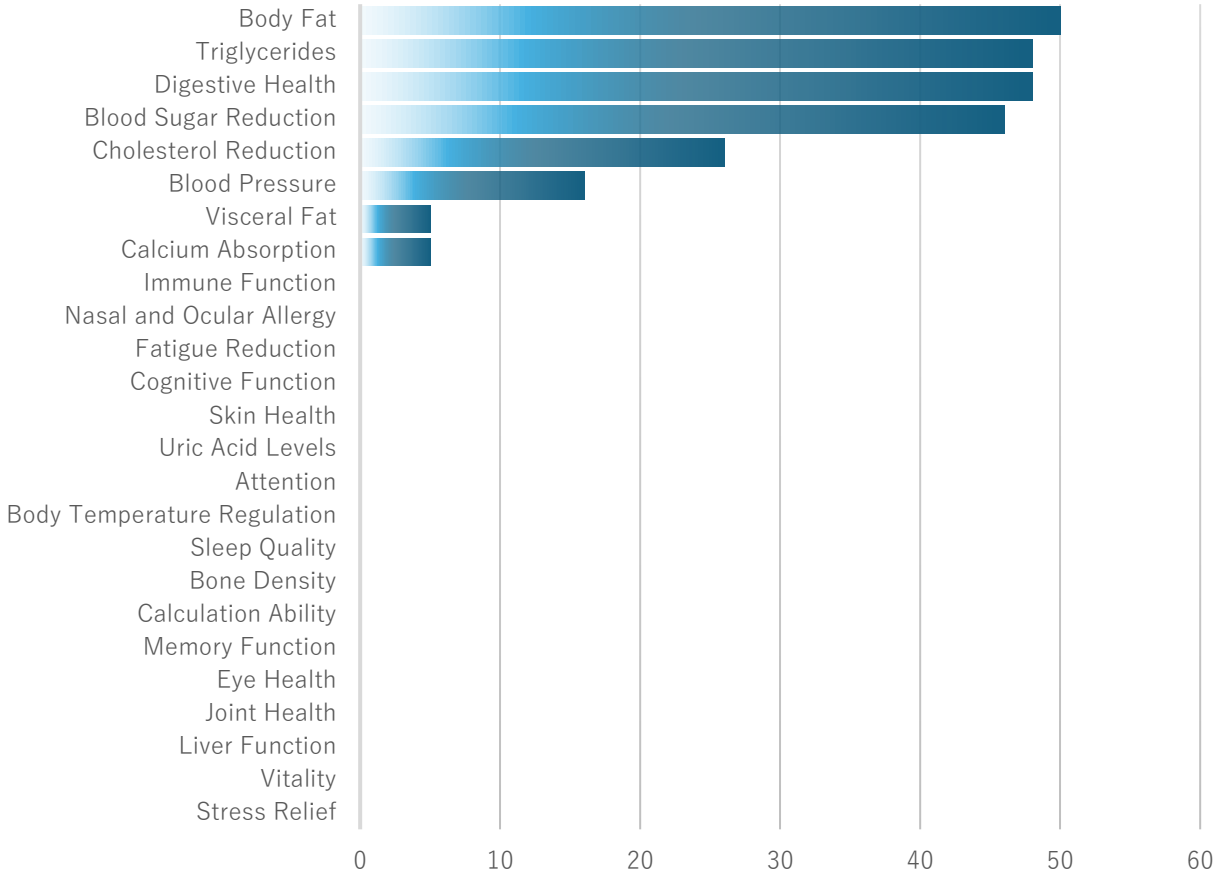


Health Claims

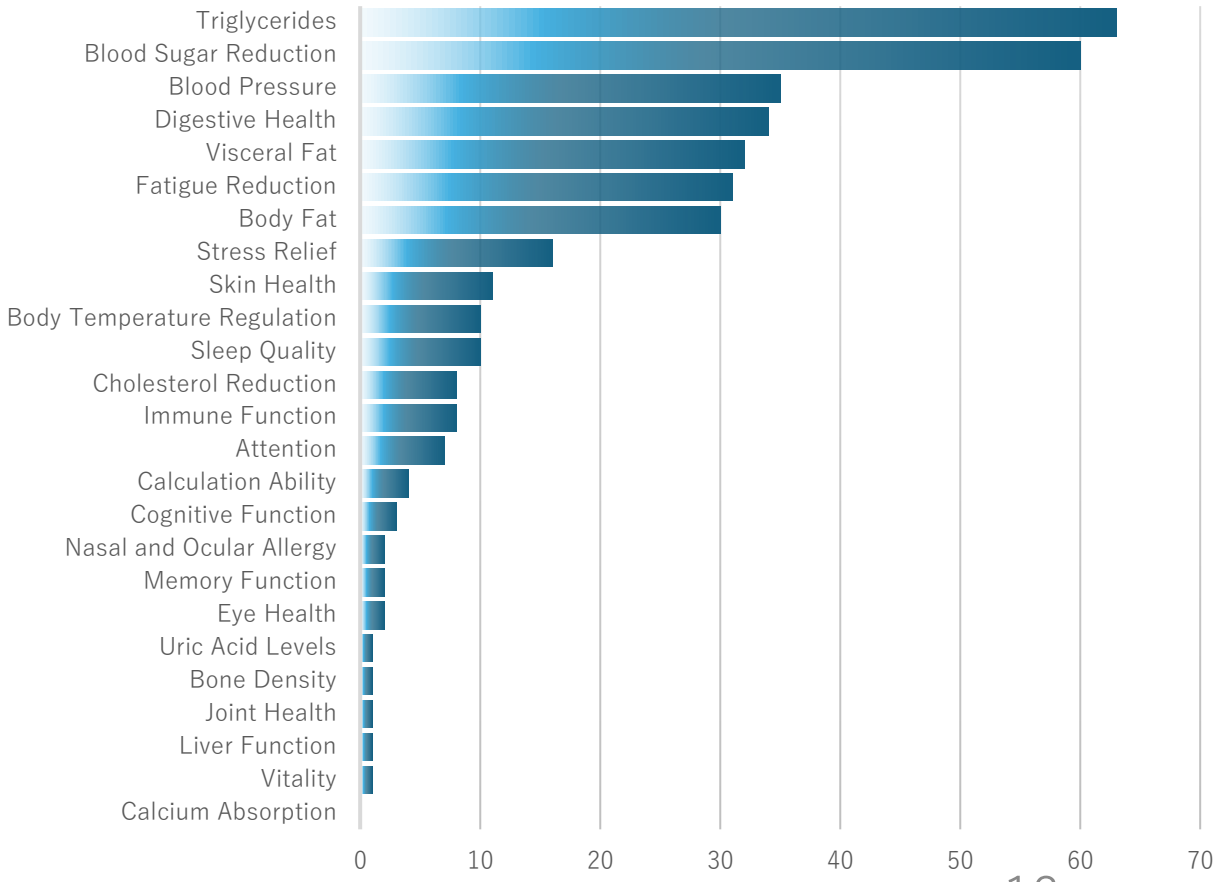


Health Claim of FOSHU and FFC

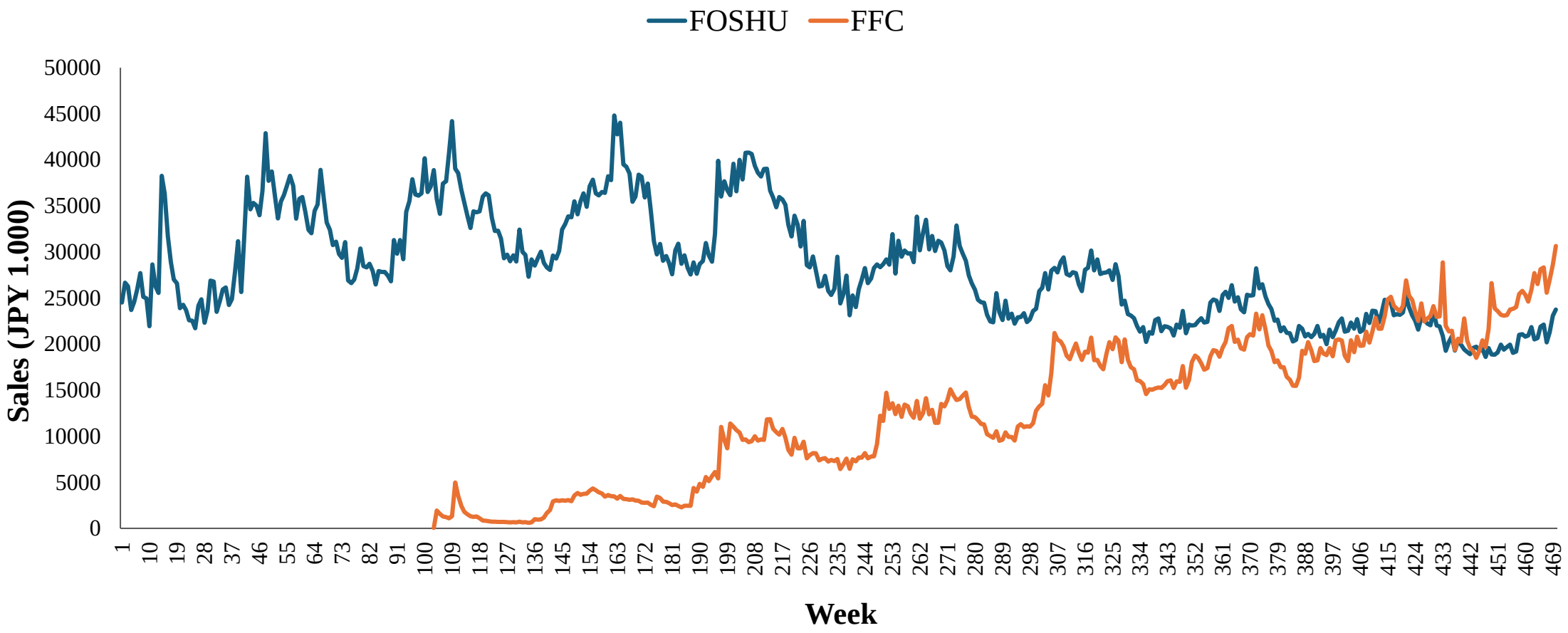
FOSHU



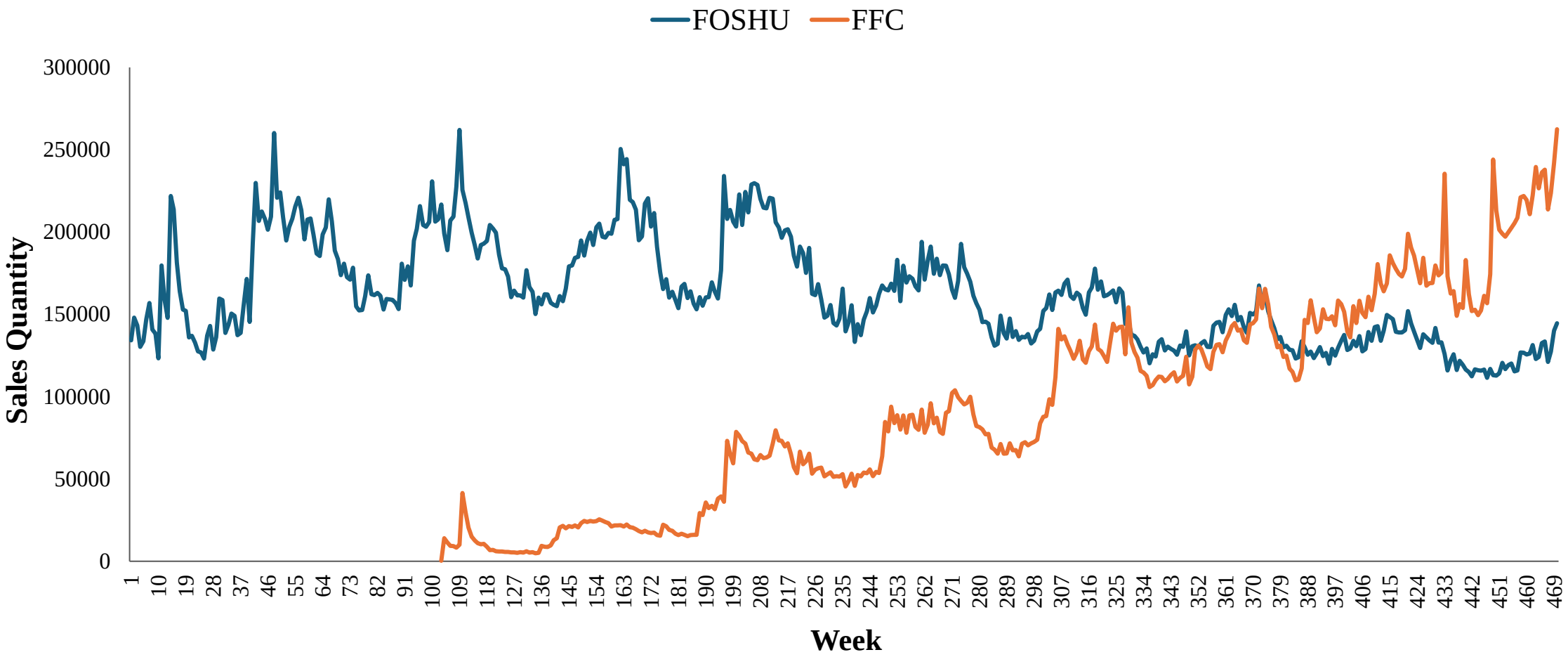
FFC



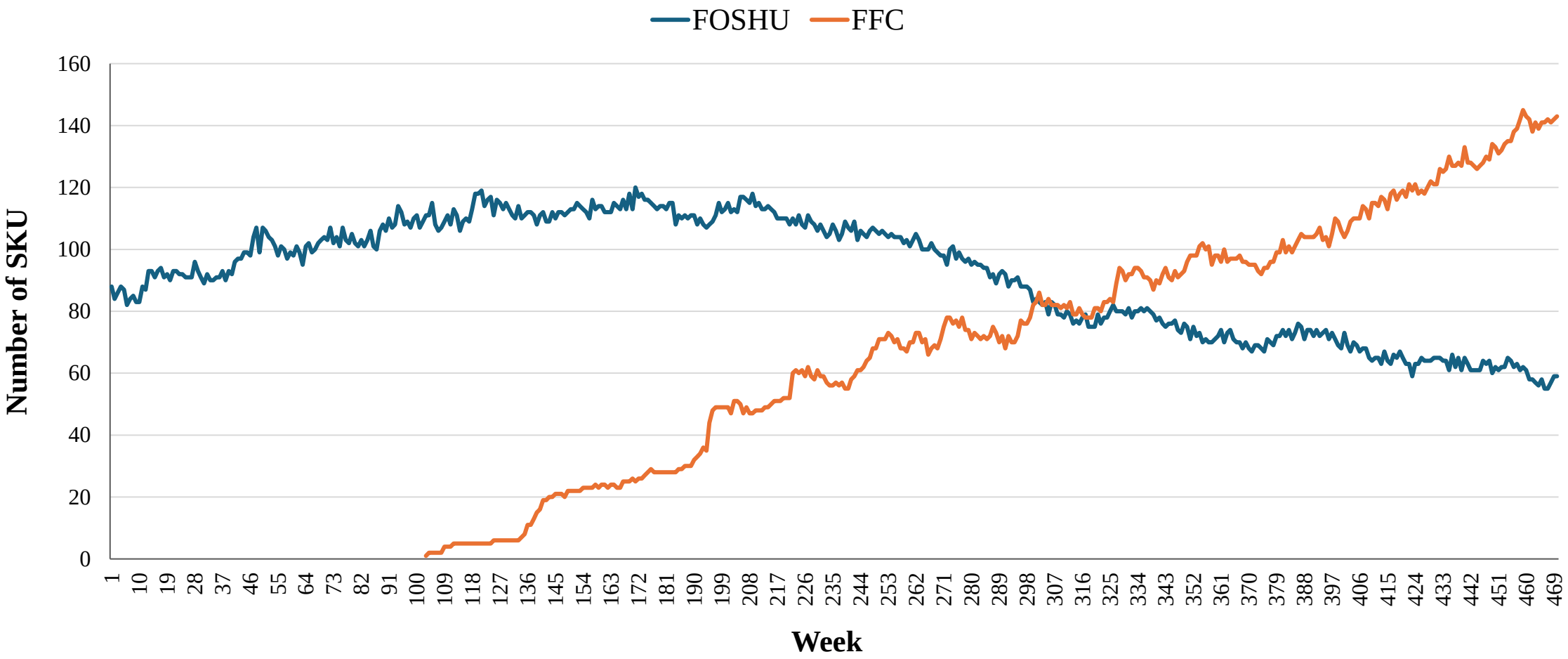
Sales Value (July 2013 – July 2022)



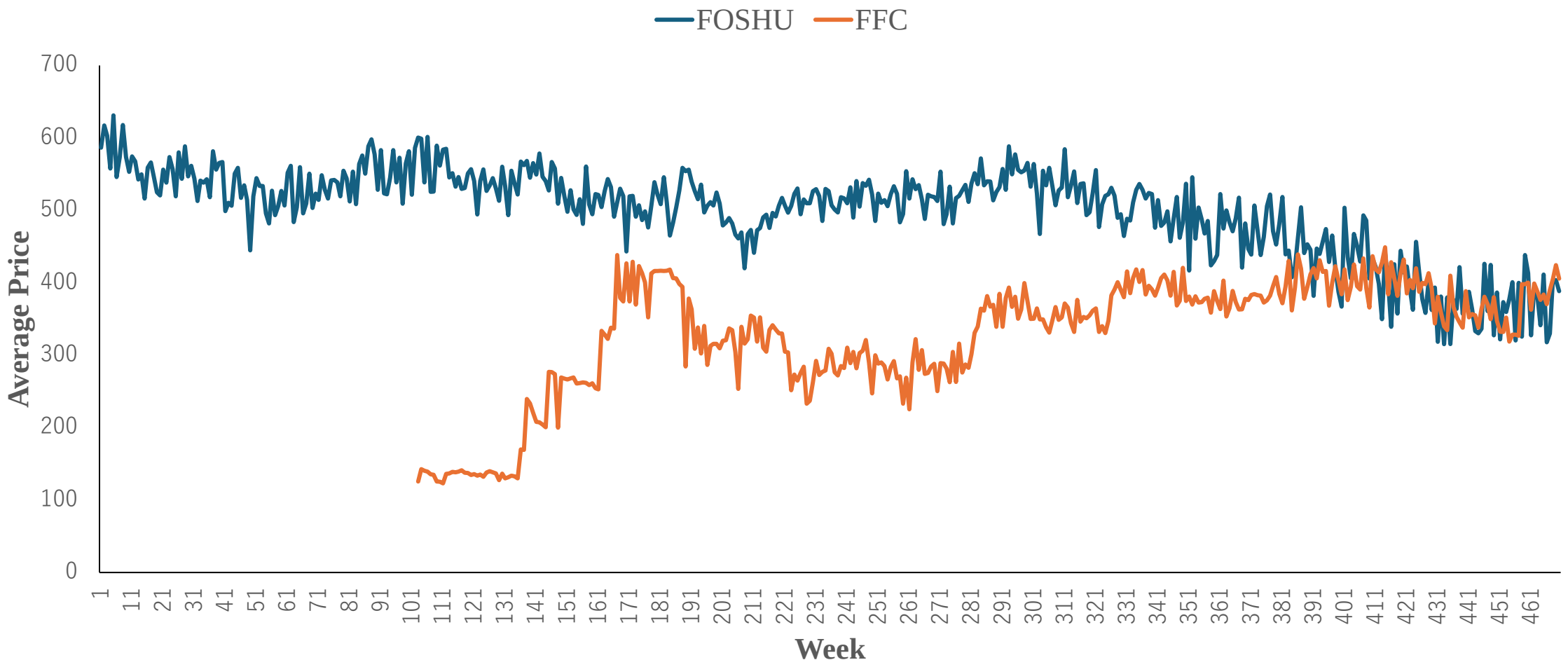
Sales Volume (July 2013 – July 2022)



Number of SKU

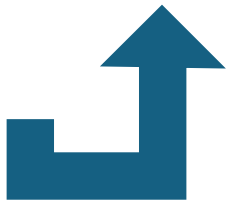


Average Price of FOSHU and FFC



Important Questions

Why is the sales of FOSHU decreasing after the adoption of FFC?



Why is the number of FOSHU products decreasing after the adoption of FFC?

What is the role of both prices in determining the change?

Theoretical Model

- Firms' decision of whether to use FOSHU or FFC depends on the expected profit from using either label.
- π_{FO} = expected profit from using FOSHU.
- π_{FF} = expected profit from using FFC.
- Choose FOSHU if $\pi_{FO} > \pi_{FF}$.
- Choose FOSHU if $\pi_{FO} < \pi_{FF}$.

Profit from FOSHU and FFC

- S_{FO} = FOSHU sales, S_{FF} = FFC sales.
- C_{FO} = FOSHU cost, C_{FF} = FFC cost.
- Profit from FOSHU:

$$\pi_{FO} = S_{FO} - C_{FO}$$

- Profit from FFC:

$$\pi_{FF} = S_{FF} - C_{FF}$$

FOSHU and FFC Cost

- It is plausible to assume that

$$C_{FO} > C_{FF}$$

- C_{FO} = R&D costs + procedural costs + production costs + marketing costs + **opportunity costs**

- C_{FF} = R&D costs + procedural costs + production costs + marketing costs

FOSHU and FFC Sales

$$S_{FO} = Q_{FO} \times P_{FO}$$

$$S_{FF} = Q_{FF} \times P_{FF}$$

Where:

- Q_{FO} = FOSHU quantity
- Q_{FF} = FFC quantity
- P_{FO} = FOSHU price
- P_{FF} = FFC price

FOSHU and FFC sales quantity

$$Q_{FO} = f(P_{FO}, P_{FF}, Q_{FF}, N_{FO}, N_{FF}, \dots)$$

$$Q_{FF} = f(P_{FO}, P_{FF}, Q_{FO}, N_{FO}, N_{FF}, \dots)$$

- N_{FO} = The number of FOSHU products
- N_{FF} = The number of FFC products

FOSHU and FFC Price

$$P_{FO} = f(Q_{FO}, Q_{FF}, P_{FF}, C_{FO}, N_{FO}, N_{FF}, \dots)$$

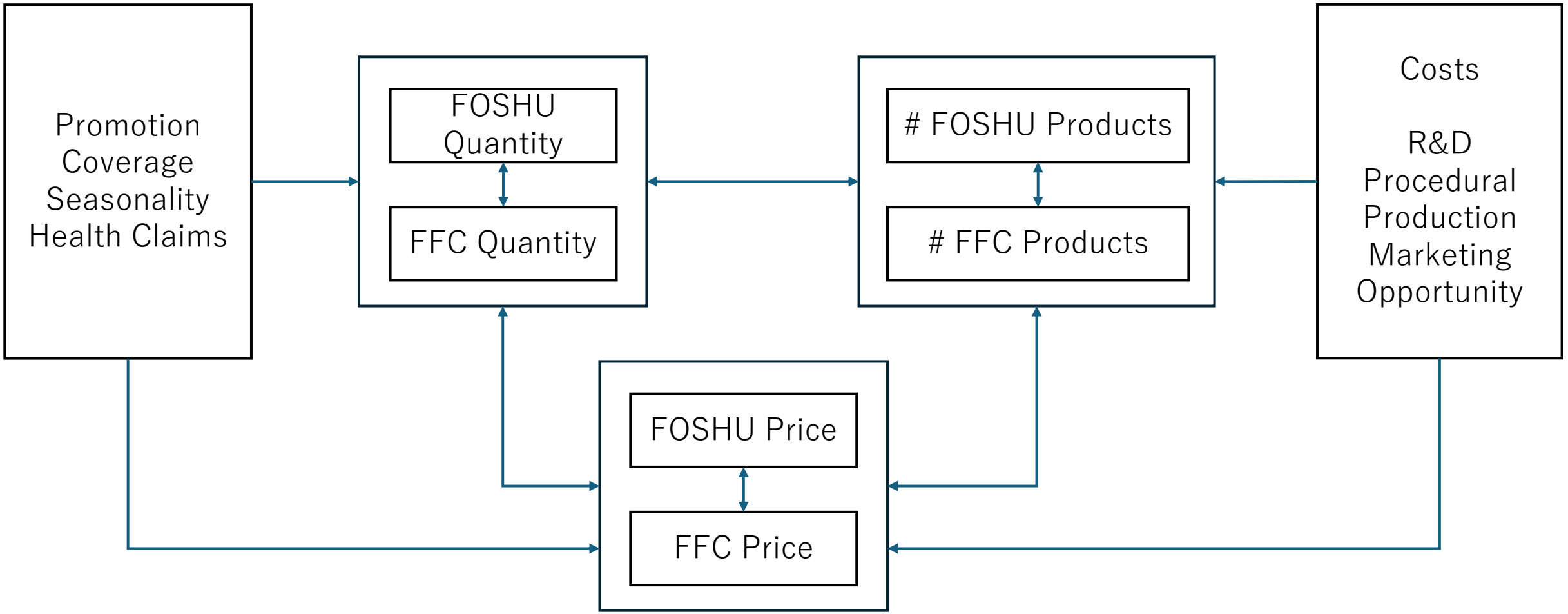
$$P_{FF} = f(Q_{FO}, Q_{FF}, P_{FO}, C_{FF}, N_{FO}, N_{FF}, \dots)$$

The number of FOSHU and FFC products

$$N_{FO} = f(Q_{FO}, Q_{FF}, P_{FO}, P_{FF}, C_{FO}, C_{FF})$$

$$N_{FF} = f(Q_{FO}, Q_{FF}, P_{FO}, P_{FF}, C_{FO}, C_{FF})$$

Conceptual Model



Statistical Model (Sales Quantity)

- Model for FOSHU sales quantity

$$Q_{FO,t} = \beta_0 + \beta_1 P_{FO,t} + \beta_2 P_{FF,t} + \beta_3 Q_{FF,t-1} + \beta_4 N_{FF,t-1} + \beta_5 N_{FO,t-1} + \beta_6 Rain_t + \beta_t Temp_t + \varepsilon_{1t}$$

- Model for FFC sales quantity

$$Q_{FF,t} = \gamma_0 + \gamma_1 P_{FO,t} + \gamma_2 P_{FF,t} + \gamma_3 Q_{FO,t-1} + \gamma_4 N_{FF,t-1} + \gamma_5 N_{FO,t-1} + \gamma_6 Rain_t + \gamma_t Temp_t + \varepsilon_{2t}$$

Statistical Model (Number of Products)

- Model for the number of FOSHU products

$$N_{FO,t} = \delta_0 + \delta_1 Q_{FO,t-1} + \delta_2 Q_{FF,t-1} + \delta_3 P_{FF,t-1} + \delta_4 P_{FO,t-1} + \varepsilon_{3t}$$

- Model for the number of FFC products

$$N_{FF,t} = \eta_0 + \eta_1 Q_{FO,t-1} + \eta_2 Q_{FF,t-1} + \eta_3 P_{FF,t-1} + \eta_4 P_{FO,t-1} + \varepsilon_{4t}$$

Statistical Model (Price)

- Model for FOSHU price

$$P_{FO,t} = \theta_0 + \theta_1 Q_{FO,t-1} + \theta_2 Q_{FF,t-1} + \theta_3 P_{FF,t-1} + \varepsilon_{5t}$$

- Model for FFC price

$$P_{FF,t} = \lambda_0 + \lambda_1 Q_{FO,t-1} + \lambda_2 Q_{FF,t-1} + \lambda_3 P_{F0,t-1} + \varepsilon_{6t}$$

Seemingly Unrelated Regression (SUR)

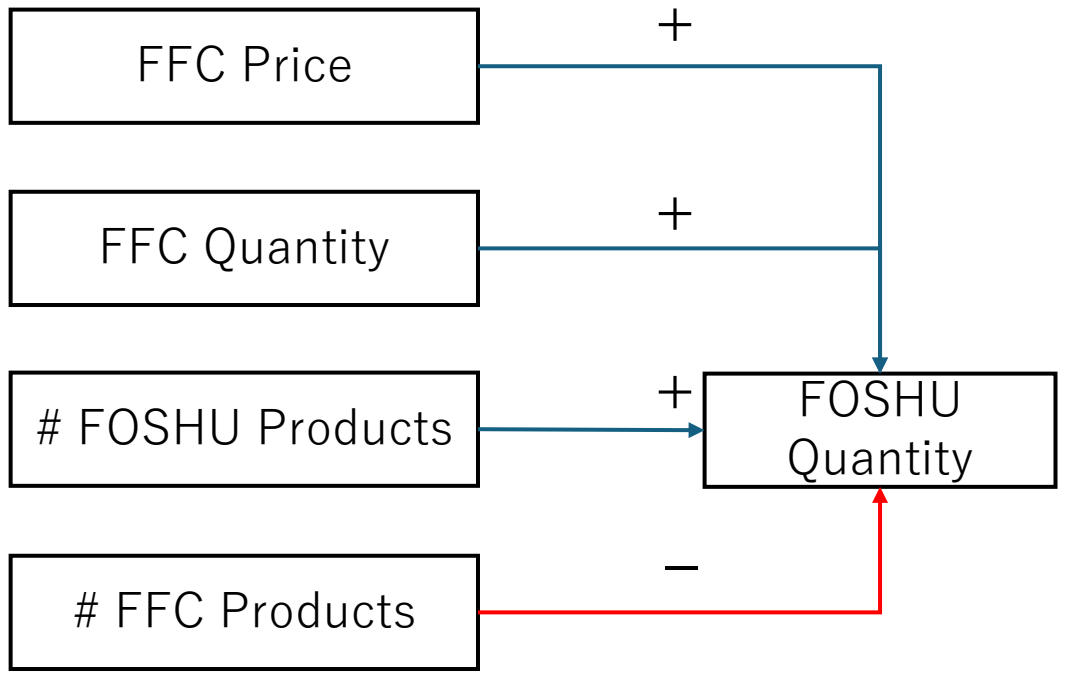
- All dependent variables follow a multivariate normal distribution.

- Error terms

$$(\varepsilon_{1t}, \varepsilon_{2t}, \cdots, \varepsilon_{6t})' \sim MVN(0, \Sigma)$$

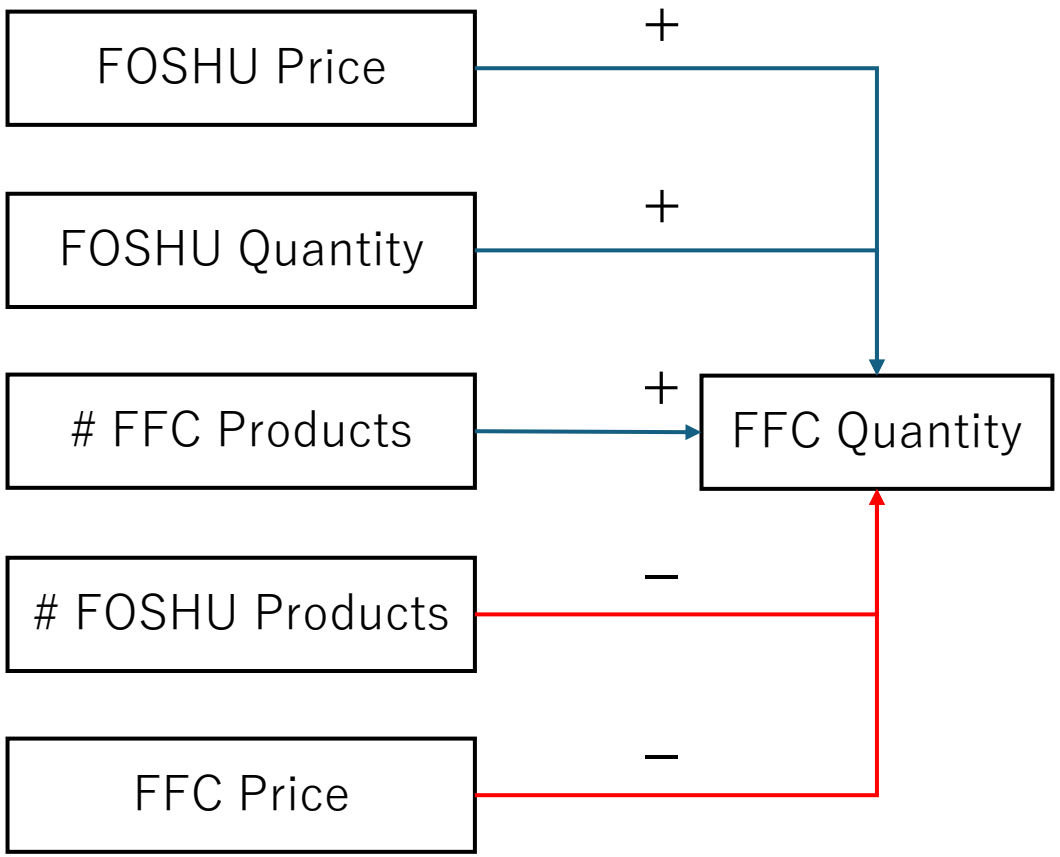
SUR Results: FOSHU Sales Quantity

	Estimate	P-Value
(Intercept)	7.892	0.000
price.foshu	-0.012	0.738
price.ffc	**0.132**	**0.000**
lagged_quant_ffc	**0.069**	**0.000**
lagged_nprod_foshu	**0.644**	**0.000**
lagged_nprod_ffc	**-0.111**	**0.000**
rain	0.000	0.963
temp	**0.010**	**0.000**
Adjusted R2	0.855	



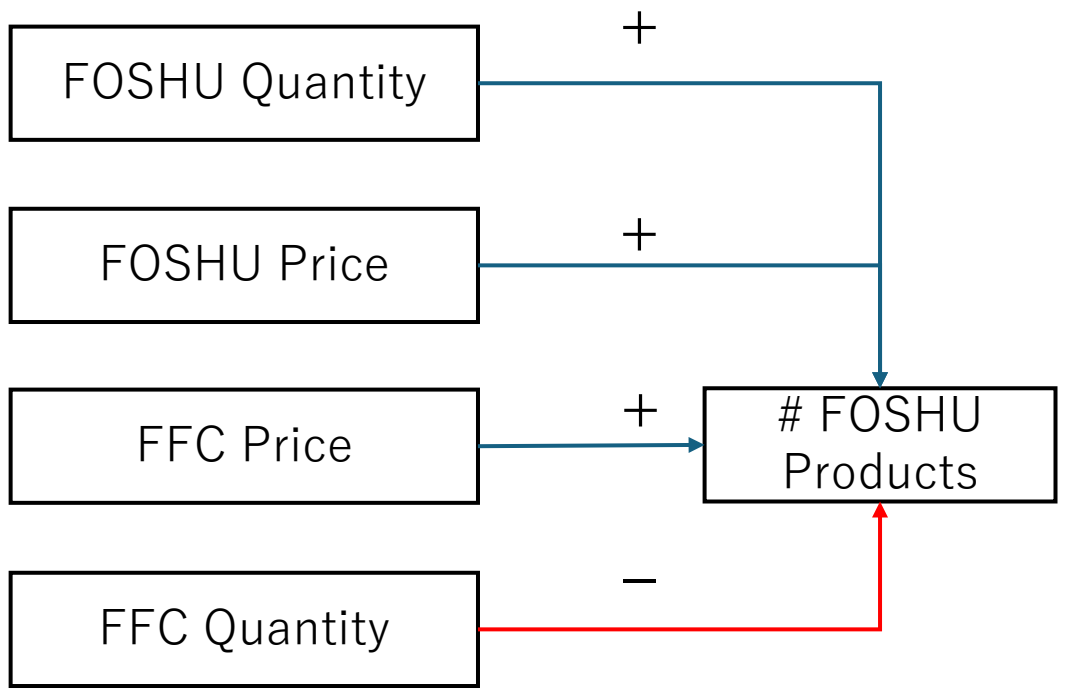
SUR Results: FFC Sales Quantity

	Estimate	P-Value
(Intercept)	1.546	0.471
price.foshu	**0.285**	**0.025**
price.ffc	**-0.328**	**0.000**
Lagged_quant_foshu	**1.223**	**0.000**
lagged_nprod_foshu	**-1.927**	**0.000**
lagged_nprod_ffc	**0.907**	**0.000**
rain	-0.000	0.544
temp	0.005	0.111
Adjusted R2	0.935	



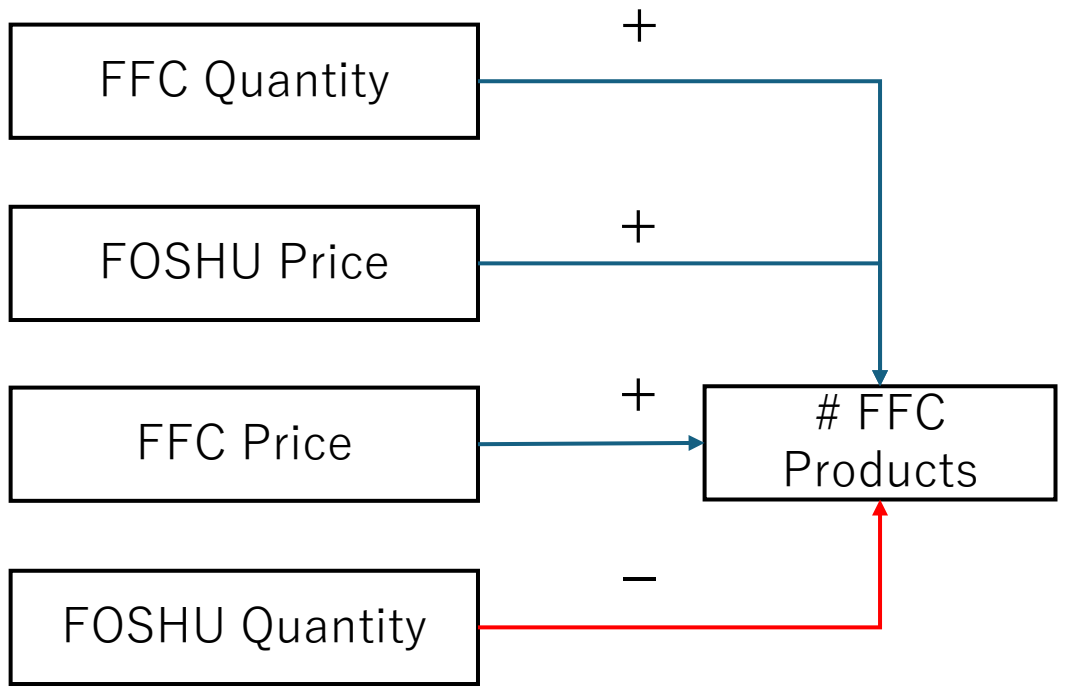
SUR Results: # FOSHU Products

	Estimate	P-Value
(Intercept)	**-3.513**	**0.000**
lagged_quant_foshu	**0.569**	**0.000**
lagged_quant_ffc	**-0.124**	**0.000**
lagged_price_foshu	**0.301**	**0.000**
lagged_price_ffc	**0.120**	**0.000**
Adjusted R2	0.818	



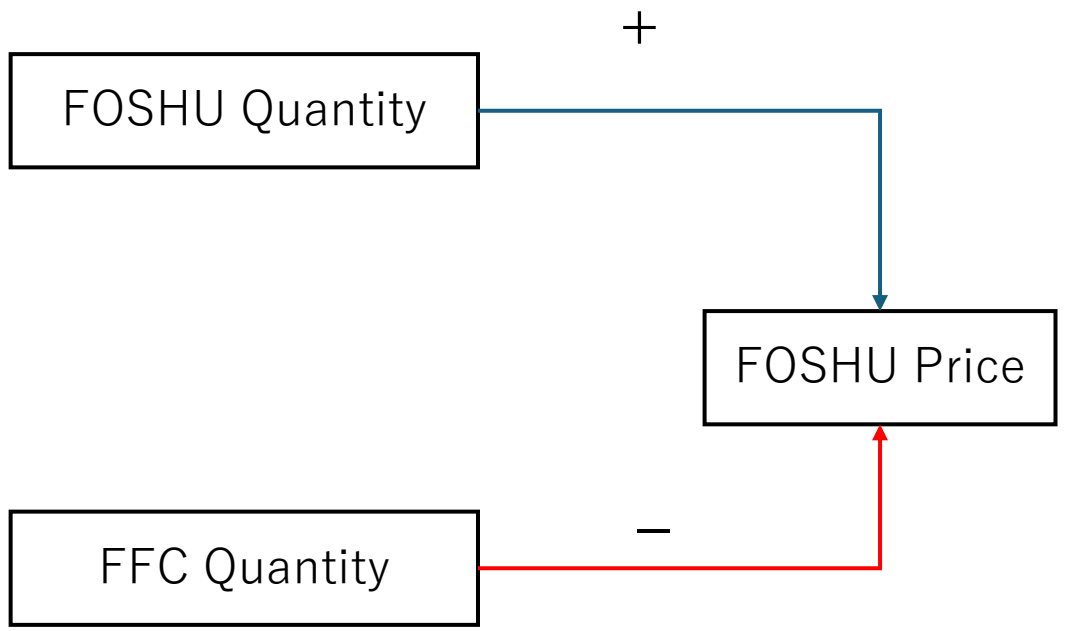
SUR Results: # FFC Products

	Estimate	P-Value
(Intercept)	-1.521	0.108
lagged_quant_foshu	**-0.674**	**0.000**
lagged_quant_ffc	**0.603**	**0.000**
lagged_price_foshu	**0.271**	**0.020**
lagged_price_ffc	**0.907**	**0.000**
Adjusted R2	0.929	



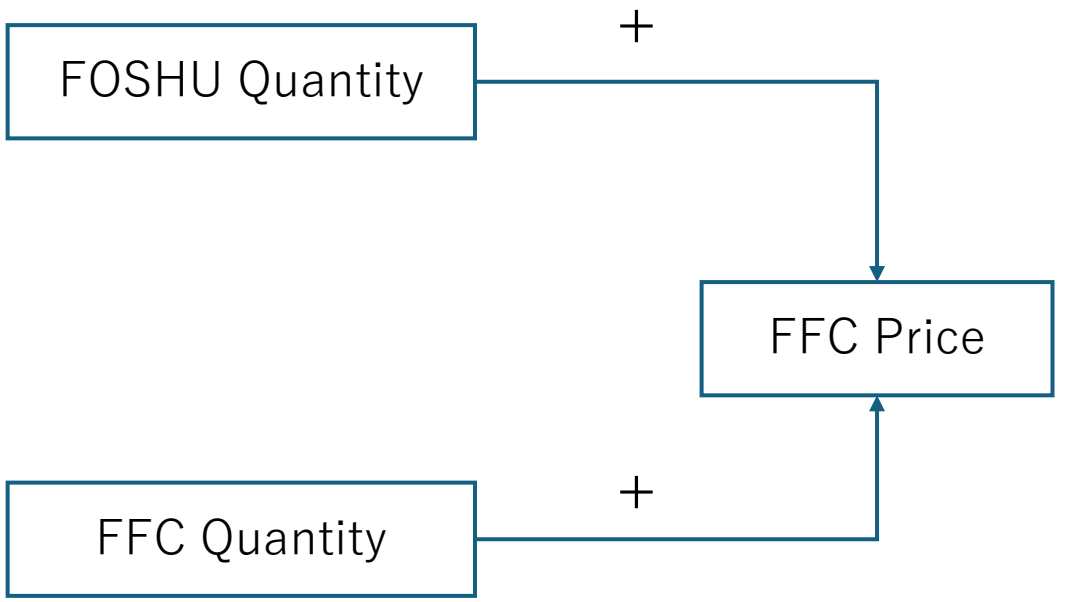
SUR Results: FOSHU Price

	Estimate	P-Value
(Intercept)	2.671	0.000
lagged_quant_foshu	**0.344**	**0.000**
lagged_quant_ffc	**-0.041**	**0.000**
lagged_price_ffc	0.000	0.985
temp	-0.003	0.000
Adjusted R2	0.394	



SUR Results: FFC Price

	Estimate	P-Value
(Intercept)	-1.604	0.069
lagged_quant_foshu	**0.416**	**0.000**
lagged_quant_ffc	**0.273**	**0.000**
lagged_price_foshu	-0.070	0.324
temp	-0.013	0.000
Adjusted R2	0.550	



Discussions

The causes of the decline in FOSHU sales quantity:

The increase in the number of FFC products.

The decrease in the number of FOSHU products.

The causes of the increase in the number of FFC products:

The increase in FFC sales quantity and price.

The decrease in FOSHU sales quantity.

The increase in FFC price is caused by the increase in FFC sales quantity.

Key Findings

- Has the health food market been successfully created? *No*
- Do firms benefit from the dual certification policy? *Probably No*
- Are they able to charge a higher price for FOSHU products than for FFC products? *No*
- Did the introduction of FFC affect the performance of FOSHU products? *Yes*
- Do consumers perceive FOSHU products as having a better quality than FFC products? *No*

Conclusion

- Dual certification can be detrimental to the functional food market.
- Products with low-cost labels tend to drive away those with high-cost ones (Lemon Market).
- The phenomenon seems attributable to the low ability of consumers to make quality judgments of products with different labels.
- Government should reconsider the regulation to protect the functional food market.