**Soo-Eun KIM* and Jun Ho SEOK****

# Impact of consumer confidence on pork prices in Korea, taking into account the quality difference: a comparison between imported frozen and domestic chilled pork belly

This study empirically explores the impact of consumer confidence on frozen and chilled pork belly prices in Korea, taking the quality difference into account. For our analysis, we utilise the vector error correction model (VECM) and impulse-response function. Based on the weak exogenous test results, we find that consumer confidence has a long-run causality on frozen and chilled pork belly prices in Korea. The cointegration vector from VECM also shows that consumer confidence has a positive and negative effect on high- (chilled pork belly) and low-quality food (frozen pork belly) prices, respectively. Impulse-response function results reveal that chilled pork belly prices are affected by consumer confidence more frozen pork belly prices. Our findings have implications for Korean pig meat farmers as well as importers. First, consumer confidence, a leading composite index for the future, is important for high-quality pork, particularly chilled pork belly. In turn, pig-raising farmers that produce chilled pork belly may improve their profits by setting the number of pigs they raise based on the consumer confidence index. Second, importers of frozen pork belly can enhance their profits by choosing their import volume based on the consumer confidence index. Our results confirm that consumer confidence affects the demand for both high- and low-quality pig meat (chilled and frozen pork belly, respectively).

**Keywords:** consumer confidence, food quality, price, impulse-response function, vector error correction model

**JEL classification:** Q13

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## Introduction

Keynesian economists have emphasised the role of demand on economic growth rather than the role of supply (Barbosa-Filho, 2001). Thus, consumption behaviour can be considered an important factor for short- and long-run macroeconomic policies based on the Keynesian framework. Juhro and Iyke (2020) suggest two possible explanations for the crucial role of consumption behaviour in macroeconomic policies. First, business cycles are highly affected by consumption, thereby affecting short-run macroeconomic policies (Juhro and Iyke, 2020). Second, savings, which are highly related to investment, are largely determined by consumption decisions, given that savings are part of the income not allocated to consumption according to Keynesian economics. In turn, macroeconomic policies for sustainable economic growth are affected by consumption. In other words, consumption is expected to have an impact on macroeconomic activities in terms of the government and individual spheres. In these contexts, determining the important factors for the future household consumption level is one of the crucial issues for macroeconomic policymaking (Juhro and Iyke, 2020).

Households' decisions concerning future consumption have been analysed mainly according to two views. The first is the so-called animal spirits view, which explains future consumption by connecting consumer confidence with macroeconomic performance (Ahmed and Cassou 2016). Notably, consumer confidence effects based on animal spirits cause only temporary consumer spending (Ahmed and Cassou, 2016). The second view is related to the permanent income hypothesis, which also links consumer confidence and future consumption. According to this hypothesis, the uncertainty in future incomes is highly related to the prediction of future consumption (Dees and Soares Brinca, 2013).

Many studies have examined the relationship between consumer confidence and macroeconomics from an empirical perspective. Dees and Soares Brinca (2013) explore the linkage between consumer sentiment and consumption expenditures using the consumer index of the US and the Euro area. Their findings show that the consumer confidence index has a strong predictive power on consumption under certain conditions. Ahmed and Cassou (2016) report that consumer confidence in the US has a different effect on spending according to bad and good economic times as well as types of purchase. Kilic and Cankaya (2016) also present that consumer confidence index in the US has a strong relation with personal consumption expenditure and housing market factors. Juhro and Iyke (2020) find that consumer and business confidence indexes have a prediction power on consumption expenditure in Indonesia.

Meanwhile, few studies have examined consumer confidence in the agricultural sector. Garcia-Fuentes *et al*. (2014) show that a reduction in the consumer confidence level for food safety has a negative effect on food companies' stock price. The results of Sønderskov and Daugbjerg (2011) demonstrate that consumer confidence in eco-labelling is highly related to countries' participation in eco-labelling according to survey data from the US, the UK, Denmark, and Sweden. However, the present authors have found no empirical study for consumer confidence and agricultural prices.

Given the possibly high correlation between consumer confidence and expenditure (Dees and Soares Brinca 2013), consumer confidence is expected to have an impact on c

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ommodity prices via changes in demand. The prices of manufacturing and service products may not easily change with respect to changes in consumer confidence due to menu prices. In contrast, the prices of fresh agricultural products can be easily changed by a change in consumer confidence; agricultural prices are determined daily. The prices for agricultural products are important to three players: the government, consumers, and farmers. The main objective of the central bank is to ensure the stability of the consumer price level. In turn, agricultural prices are important to the government. As the consumer price level is related to the real income of consumers, agricultural prices are crucial to consumers. To farmers, agricultural prices are directly related to their farm income. In this sense, agricultural prices are important to farmers.

Therefore, consumer confidence is expected to have an impact on agricultural prices via changes in demand. Agricultural prices are important to all market players. However, previous studies have not covered this topic empirically. In our study, we investigate the causal relationship between the consumer confidence index, the domestic chilled pork belly price, and the imported frozen pork belly price in Korea. To explore these causal relations, we utilise the vector error correction model (VECM) and impulse-response function.

We focus on Korea given that agricultural prices in Korea are expected to be highly affected by changes in demand. Korea is one of the net agricultural importers, according to the data of the Korea Agro-Fisheries & Food Trade Corporation, and is one of the small open-economy countries (Chung *et al*., 2007), which implies that change in domestic agricultural prices attributable to domestic demand shock may not be easily adjusted by domestic supply management. Our study also concentrates on pork prices since Korea's livestock share of agricultural GDP was 39.4% in 2018 according to Statistic Korea. Moreover, pork's share of livestock production was the largest, representing 44.4% in 2018 according to the same source.

We analyse pork belly prices, taking into consideration the high share of pork belly among pork products. According to the 2019 Food Consumption Behaviour Survey Statistics Report that is published by the Korea Rural Economic Institute, the pork belly share in pork sold for roasting was 70.5% in 2018. In addition, we divide prices of pork belly into chilled and frozen pork belly under the assumption that the impact of consumer confidence on high- and low-quality pork belly prices would be different. We can consider chilled pork belly as a high-quality product compared with frozen pork belly for two reasons. First, chilled pork belly has a higher price, which is a possible proxy variable for quality. In 2020, the average price per 100 g for domestic chilled pork belly is 2,122 KRW, whereas that for imported frozen pork belly is 1,078 KRW according to the Korea Agro-Fisheries & Food Trade Corporation. While most chilled pork belly that is distributed in Korea is domestically produced, most frozen pork belly that is distributed in Korea is imported. Second, the distribution time for chilled meat is expected to be lower than that for frozen meat. According to Zhang *et al*. (2003), food quality decreases over time. In turn, the quality of chilled pork belly is expected to be higher compared with frozen pork belly. Our hypothesis is that higher consumer confidence leads to an increase in demand for chilled pork belly over frozen pork belly. In other words, an increase in consumer confidence may have a positive effect on chilled pork belly prices. Meanwhile, an increase in consumer confidence is negatively associated with frozen pork belly prices: a decrease in demand for frozen pork belly would be reversed by an increase in demand for chilled pork belly.

Our approach is expected to contribute to the literature on consumer confidence and macroeconomic consequences in several ways. First, this study is the first to clarify the linkage between consumer confidence and agricultural prices. Second, we test whether agricultural quality affects the impact of consumer confidence on agricultural prices. Lastly, we derive policy implications based on our findings. Given that the consumer confidence index is a leading composite indicator, policymakers may formulate corresponding policies to manage the agricultural price level by determining the impact of the consumer confidence index on pork belly prices. Furthermore, pig farmers might derive optimal breeding data to maximise their profits in line with market prices.

## How the consumer confidence index affects agricultural prices

According to the Organisation for Economic Co-operation and Development (OECD), the consumer confidence index provides information for future consumption as well as the savings of households. The consumer confidence index is measured by factors such as households' expected financial status, unemployment, capability for saving, and belief regarding general economic conditions. If the consumer confidence index is higher than 100, then consumers are expected to spend more on their main purchase in the following year. This scenario indicates an optimistic view of consumers on the future economic situation. However, if the consumer confidence index is less than 100, then consumers have a negative view on the future economic status. In turn, consumers are inclined to spend less in the following year.

In other words, the consumer confidence index can be classified as a leading composite indicator in terms of the consumer side. In turn, the improvement or deterioration of the consumer confidence index can be expected to be associated with future consumer expenditures. Experts have deemed it trivial, since the propensity to consume is affected by consumer trust regarding the future. Desroches and Gosselin (2002) have reported on the usefulness of the consumer confidence index on consumption. Other studies have focused on the impact of the consumer confidence index on expenditures. Dees and Soares Brinca (2013) explore the effect of consumer confidence on consumption expenditures in the US and Euro area. Kilic and Cankaya (2016) find that consumer confidence has a critical effect on consumer expenditure per person in the US. Similarly, Juhro and Iyke (2020) show the predictive power of consumer and business confidence on consumption expenditure in Indonesia. In turn, we conclude that the consumer confidence index is associated with demand shift.

The impact of consumer confidence on expenditure for agricultural products is different from that of other manufacturing goods. The reason is the upper limit on the food or nutrition intake per person. In turn, changes in consumer confidence are expected to have an impact on the proportional effect on food expenditure according to food quality. For example, if consumer confidence improves, then consumers may buy more higher-quality foods that are expensive compared with lower-quality foods. Figure 1 clearly shows that the demand change being caused by consumer confidence enhancement may have different effects on food prices according to food quality. While demand for high-quality food increases, demand for low-quality food decreases after the improvement of consumer confidence. The prices of high-quality food price thus increase from $P_1$ to $P_2$, whereas those of low-quality food decrease from $P_3$ to $P_4$. In other words, although a person's food volume intake does not change with the improvement or deterioration of consumer confidence, the share of high- and low-quality foods in their expenditure can be affected by the consumer confidence. Huang and Gale (2009) show that food unit value has increased with the increase in incomes in China. Kim *et al*. (2018) also support the proportional effect of the consumer confidence index on food expenditures – higher-income groups in the US consume more organic foods with higher unit prices. Alviola and Capps (2010) also find that organic and conventional milk are substitutable based on their estimated cross-price elasticities.

Therefore, changes in consumer confidence may have different effects on food prices based on food quality by the path of demand or expenditure change. This point is crucial to consider, given that agricultural prices determine farm income levels. Assuming a stable cost function, a change in price determines the profit margins of farmers. In turn, determining the impact of consumer confidence on prices of high- and low-quality agricultural products is helpful to the selection of the optimal agricultural production level according to product types based on quality. Moreover, exploring the impact of consumer confidence on the prices of different-quality agricultural products may contribute to farmers' profit maximisation.

## Data and Methods

This study collects data on the consumer confidence index from the OECD. The price data for chilled pork belly are based on domestic values, whereas those for frozen pork belly are from imported price values. Nearly all (95.6%) of the imported pork in Korea was frozen pork in 2018 according to the Ministry of Agriculture, Food and Rural Affairs. In addition, domestically produced pork in Korea is distributed as chilled pork rather than as frozen pork owing to high price of chilled pork. Specifically, we collect the data for chilled and frozen pork belly from the Korea Agro-Fisheries & Food Trade Corporation. Detailed information on our data for the analysis is presented in Table 1.

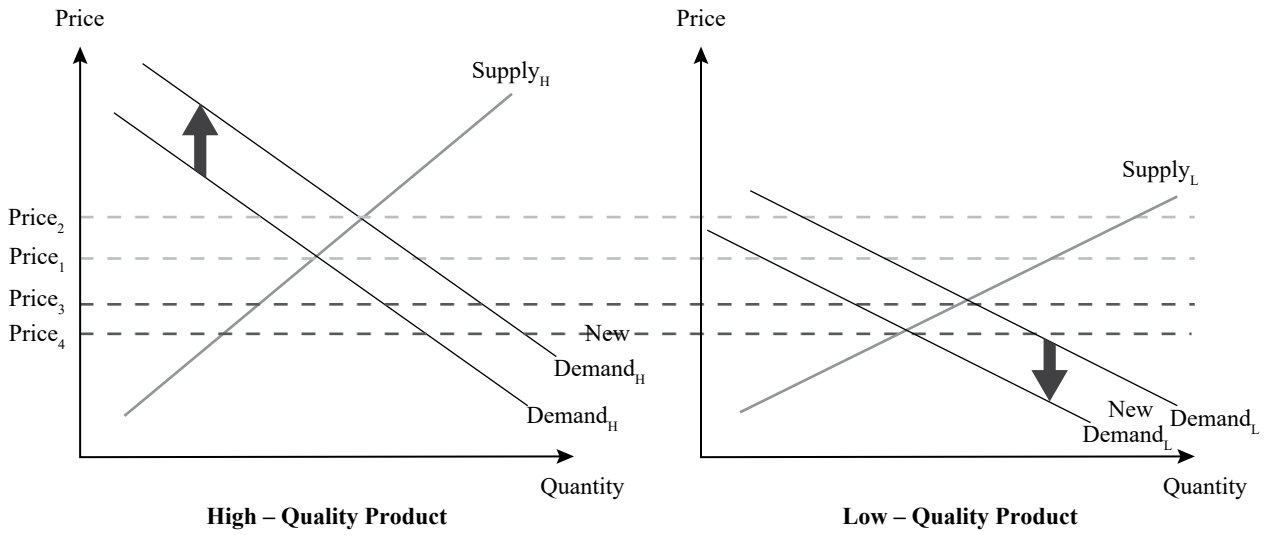


**Figure 1:** Possible different price effects of consumer confidence improvement on high- and low-quality food.
Source: Own composition

**Table 1:** Detailed information for data.

| Variable | Data period | Data source | Explanation |
|---|---|---|---|
| Consumer confidence | 2012–2020 (Monthly) | OECD | Consumer confidence index |
| Chilled Pork | 2012–2020 (Monthly) | Korea Agro-Fisheries & Food Trade Corporation | Domestic chilled pork belly price (KRW/100 g) |
| Frozen Pork | 2012–2020 (Monthly) | Korea Agro-Fisheries & Food Trade Corporation | Imported frozen pork belly price (KRW/100 g) |

Source: Own composition

Figure 2 presents the trend of our variables. The volatility of imported pork belly prices is small, whereas the variation of domestic pork belly prices is large. Considering the relatively high variation in the consumer confidence index, the effect of demand factors on the prices of pork belly is expected to be relatively high for domestic pork belly. Table 2 reports the descriptive statistics for our variables using natural logarithms.

To analyse the causal relationship between the consumer confidence index and prices of domestic chilled pork belly and imported frozen pork belly in Korea, this study utilises several tests and model estimations. First, we perform the stationary test for our three variables with the Augmented Dicky Fuller (ADF) test (Dickey and Fuller, 1979) and the KPSS test (Kwiatkowski *et al*., 1992). We use these two unit root test methods that are complementary based on the their opposite null hypotheses (Chen and Saghaian, 2016). The null hypothesis for the ADF test is non-stationary in time-series data, whereas that for the KPSS test is stationary in timeseries data. Next, we utilise the Johansen cointegration test (Johansen, 1988). We apply the VECM in the case of a long-term relation among consumer confidence index, domestic chilled pork belly price, and imported frozen pork belly price. Moreover, we also adapt the impulse-response function to analyse the detailed relationship between the consumer confidence index and the prices of domestic chilled and imported frozen pork belly.

To examine for long-term relations based on the Johansen cointegration test, we begin with a vector auto regressive (VAR) model, given as the following equation:

$$Y_t = \mu + \sum_{n=1}^{k} \Pi_n Y_{t-n} + \varepsilon_t \quad (1)$$

where $Y_t$ is a 3×1 vector of ln(*Confidence*), ln(*Chilled*), and ln(*Frozen*); $\mu$ represents a 3×1 constant vector; 3×1 parameter matrices are presented as Π; $k$ indicates the number of lags; and $\varepsilon_t$ follows i.i.d. $N(0,\delta^2)$. Equation (1) can be transformed with the error correction form to the following:

$$\Delta Y_t = \mu + \Pi Y_{t-1} + \sum_{n=1}^{k-1} \Gamma_n \Delta Y_{t-n} + \varepsilon_t \quad (2)$$

where Δ is the first difference, $t$ indicates the time dimension, Π is defined as $\Pi_1 + \Pi_2 + \cdots + \Pi_{k-1} - I$, and $\Gamma_k$ is defined as $-\sum_{j=k}^{p} \Pi_j$. Π, the long-term matrix, can be decomposed to an adjustment vector ($\alpha$) and cointegration vector ($\beta$). Specifically, $\alpha$ is the 3×$r$ vector that presents the speed of adjustment of ln(*Confidence*), ln(*Chilled*), and ln(*Frozen*) towards long-term equilibrium. $\beta$ is the $r$×3 cointegration vector that represents a linear relation between ln(*Confidence*), ln(*Chilled*), and ln(*Frozen*) in the long-term equilibrium.

To perform the Johansen cointegration test for finding rank $r$, we utilise likelihood ratio (LR) test statistics. We

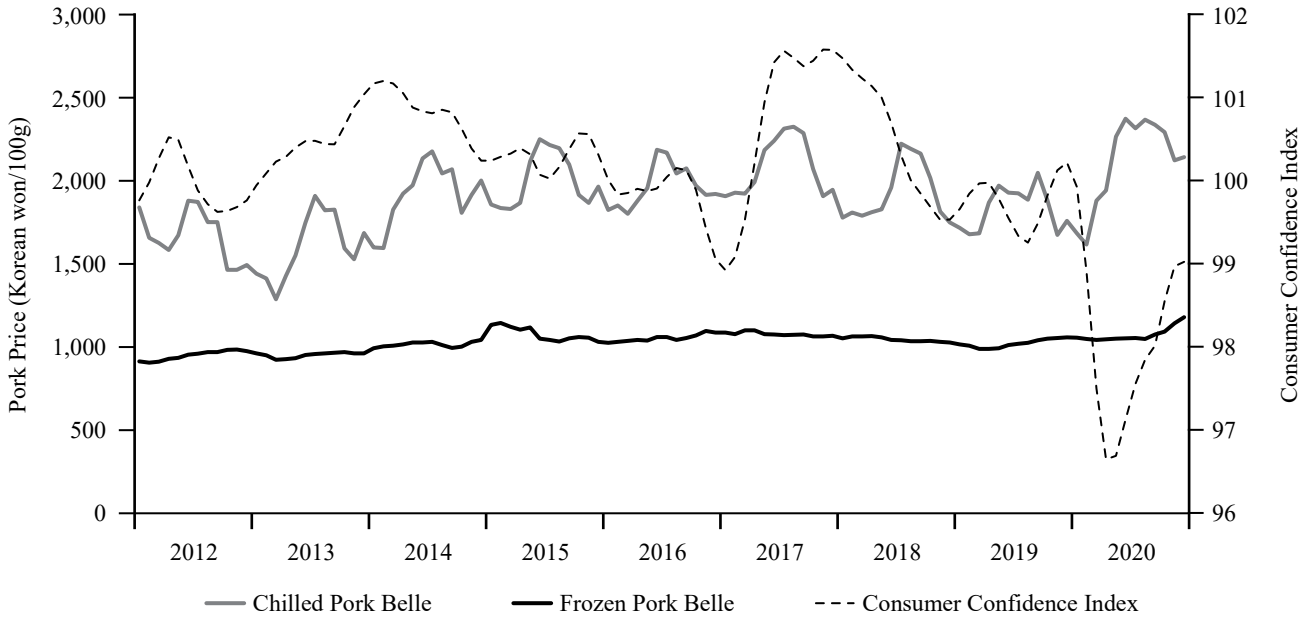


**Figure 2:** Trends in the variables (level data).
Source: OECD and Korea Agro-Fisheries & Food Trade Corporation

**Table 2:** Descriptive statistics.

| Variable | Observations | Mean | Std. dev. | Min | Max |
|---|---|---|---|---|---|
| ln(*Confidence*) | 108 | 4.606 | 0.010 | 4.571 | 4.621 |
| ln(*Chilled*) | 108 | 7.547 | 0.128 | 7.164 | 7.776 |
| ln(*Frozen*) | 108 | 6.939 | 0.053 | 6.812 | 7.077 |

Source: Own composition

employ the trace test ($LR(\lambda_{trace}) = -T\sum_{i=r+1}^{k} \ln(1-\lambda_i)$). The null hypothesis of rank *r* for the cointegration equations is rejected if the LR test statistics is higher than the critical value suggested by Osterwald-Lenum (1992). If the variables show a cointegration relation, then $\Pi Y_{t-1}$ can be represented as $\alpha\beta' Y_{t-1}$. Furthermore, we can define $\beta' Y_{t-1}$ as the error correction term ($ECT_{t-1}$) that indicates the deviation from the long-term equilibrium at time *t-1*. We can derive the long-term causality based on the *t*-test for the coefficients of adjustment vector $\alpha$. This long-term causality test is also called the weak exogeneity test (Chen and Saghaian, 2016).

## Empirical Results

The results of the stationary test based on the ADF and KPSS are reported in Table 3. Our three variables, namely, ln(*Confidence*), ln(*Chilled*), and ln(*Frozen*), are not stationary for the level data used in both unit root tests. The first difference of ln(*Confidence*), ln(*Chilled*), and ln(*Frozen*) do not have an unit root according to the ADF and KPSS tests at the 10% significance level. In other words, ln(*Confidence*), ln(*Chilled*), and ln(*Frozen*) are shown to be *I*(1) in the level data and *I*(0) in the first difference data according to both unit root tests. In turn, we can apply the Johansen cointegration test on our three variables.

The results of the tri-variate (ln(*Confidence*), ln(*Chilled*), and ln(*Frozen*)) Johansen cointegration tests based on the trace statistics are given in Table 4. The null hypothesis that the three variables are not cointegrated is rejected at the 1% significance level. The null hypothesis that the rank of ln(*Confidence*), ln(*Chilled*), and ln(*Frozen*) is, at most, 1 is not rejected at the 5% significance level. In turn, we can conclude that ln(*Confidence*), ln(*Chilled*), and ln(*Frozen*) have a long-term relation with one cointegration vector.

The results of the tri-variate VECM are presented in Table 5. The coefficient of the speed of adjustment for the equation Δln(*Confidence*) is not significant at the 10% significance level. In turn, we can interpret this result as

**Table 3:** Stationary tests results.

| Tests | Variables | With trend | Without tend |
|---|---|---|---|
| ADF | ln(*Confidence*) | -2.267 | -1.624 |
| | ln(*Chilled*) | -1.571 | -1.326 |
| | ln(*Frozen*) | -2.756 | -2.014 |
| | Δln(*Confidence*) | -5.044*** | -4.638*** |
| | Δln(*Chilled*) | -4.618*** | -4.638*** |
| | Δln(*Frozen*) | -4.095*** | -4.204*** |
| KPSS | ln(*Confidence*) | 0.222*** | 0.603** |
| | ln(*Chilled*) | 0.174** | 0.774*** |
| | ln(*Frozen*) | 0.331*** | 1.130*** |
| | Δln(*Confidence*) | 0.030 | 0.060 |
| | Δln(*Chilled*) | 0.027 | 0.028 |
| | Δln(*Frozen*) | 0.092 | 0.089 |

Note: *P<0.1, **P<0.05, ***P<0.01. The optimal lag of ADF is chosen based on the Akaike information criterion.
Source: Own composition

**Table 4:** Results of the Johansen cointegration test.

| Null hypothesis | Trace statistics | Critical value | |
|---|---|---|---|
| | | 5% | 1% |
| $H_0: r = 0$ | 59.274 | 29.68 | 35.65 |
| $H_0: r \leq 1$ | 10.177 | 15.41 | 20.04 |
| $H_0: r \leq 2$ | 1.057 | 3.76 | 6.65 |

Note: The optimal lag is selected based on the Akaike information criterion.
Source: Own composition

**Table 5:** Results of VECM.

| Variables | Δln(*Confidence*) | Δln(*Chilled*) | Δln(*Frozen*) |
|---|---|---|---|
| $ECT_{t-1}$ | -0.0005 | 0.0944*** | -0.0159*** |
| | (0.0004) | (0.0172) | (0.0043) |
| Intercept | 0.0000 | 0.0944*** | 0.0023 |
| | (0.0001) | (0.0172) | (0.0015) |
| $\Delta\ln(Confidence)_{t-1}$ | 1.5462*** | -2.8387 | 1.2528 |
| | (0.0995) | (4.6524) | (1.1614) |
| $\Delta\ln(Confidence)_{t-2}$ | -1.1286*** | 2.5214 | -2.3549 |
| | (0.1488) | (6.9590) | (1.7372) |
| $\Delta\ln(Confidence)_{t-3}$ | 0.2803 | 0.6654 | 1.5627 |
| | (0.1004) | (4.6965) | (1.1724) |
| $\Delta\ln(Chilled)_{t-1}$ | 0.0018 | 0.3405*** | -0.0319 |
| | (0.0021) | (0.0968) | (0.0242) |
| $\Delta\ln(Chilled)_{t-2}$ | -0.0014 | 0.2361** | -0.0154 |
| | (0.0022) | (0.1013) | (0.0253) |
| $\Delta\ln(Chilled)_{t-3}$ | -0.0007 | 0.2905*** | -0.0805*** |
| | (0.0022) | (0.1009) | (0.0252) |
| $\Delta\ln(Frozen)_{t-1}$ | -0.0012 | -0.2867 | 0.2862*** |
| | (0.0081) | (0.3776) | (0.0943) |
| $\Delta\ln(Frozen)_{t-2}$ | -0.0008 | -0.4170 | 0.1566 |
| | (0.0085) | (0.3988) | (0.0995) |
| $\Delta\ln(Frozen)_{t-2}$ | 0.0044 | -0.3612 | -0.0381* |
| | (0.0085) | (0.3966) | (0.0990) |
| Cointegration Vector | | (1 -4.45 8.36) | |

Note: *P<0.1, **P<0.05, ***P<0.01. Numbers in parentheses indicate standard error values.
Source: Own composition

follows: frozen and chilled pork belly prices do not have a long-term causality with respect to the consumer confidence index based on the weak exogeneity test. However, the coefficients of the speed of adjustment for the equations Δln(*Chilled*) and Δln(*Frozen*) are significant at the 1% significance level. In other words, the consumer confidence index has a long-term causation on chilled and frozen pork belly prices according to the weak exogeneity test. In addition, chilled and frozen pork belly prices have a bi-directional long-term causality based on the weak exogeneity test. The sign for the coefficients of the speed of adjustment for the equations Δln(*Chilled*) and Δln(*Frozen*) are opposite, with the former being positive and the latter, negative. In turn, the exogenous shock of the consumer price index has a deviation effect from the and an adjustment effect towards long-term equilibrium on chilled and frozen pork belly prices, respectively.

Our estimated cointegration vector gives more important information. The consumer confidence index has a positive effect on chilled pork belly prices and a negative effect on frozen pork belly prices according to the cointegration vector. The cointegration vector implies that consumers' positive view on future economic situation has a positive effect on the price of chilled pork belly but a negative one the price frozen pork belly. This result supports our hypothesis that enhanced consumer confidence has a positive effect on high-quality food prices and a negative effect on low-quality food prices.

To validate that the number of cointegrating equations is correctly specified, this study also examines the stability condition. If all characteristic roots are located in the unit circle, then the stability condition is satisfied (Asgari *et al*., 2020). To check that all characteristic roots are in the unit circle, we plot the roots of the companion matrix. Figure 3 reports that all characteristic roots are within the unit circle, indicating satisfactory stability.

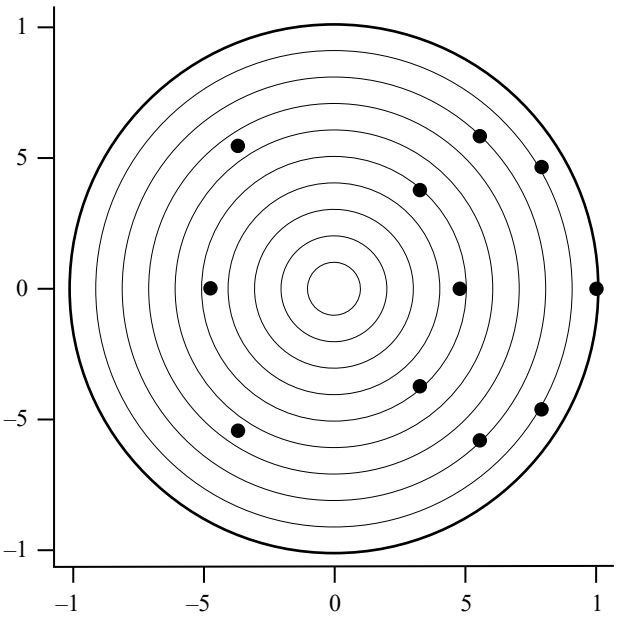


**Figure 3:** Estimated VECM of characteristic roots of the polynomial.
Source: Own composition

We also operate the short-run Granger causality test based on the Wald test. The results of the short-run Granger causality test are presented in Table 6. Only chilled pork belly prices have causal effect on frozen pork belly prices in terms of Granger causality among the three variables. This result indicates that domestic chilled pork belly prices have a price leadership on imported frozen pork belly price in the short run. Given that imported frozen pork belly prices are set by a prior contract between importers and exporters, the short-run price variation source might be attributed to domestic chilled pork belly prices.

Figure 4 reports the results of two causality tests: the weak exogenous test and short-run Granger causality test. In the long term, consumer confidence drives the prices of chilled and frozen pork belly. Meanwhile, consumer confidence does not have a short-run Granger causality on chilled and frozen pork belly prices. The prices of both chilled and frozen pork belly have a bi-directional causality in the long run, whereas only chilled pork belly prices have a uni-directional Granger short-run causality on frozen pork belly prices. Based on these causalities, we also perform the impulse-response function.

We focus on the impulse-response function of the consumer confidence index on pork belly prices and that between chilled and frozen pork belly prices. Specifically, we utilise the orthogonalized impulse-response function for tracing dependent variables' (chilled and frozen pork belly prices) responses in the VECM to shocks to all three variables (chilled pork belly price, frozen pork belly price, and

**Table 6:** Results of the short-term Granger causality test.

| Null hypothesis | Chi-square | P-value |
|---|---|---|
| Confidence ↛ Chilled | 1.32 | 0.73 |
| Frozen ↛ Chilled | 3.37 | 0.34 |
| Confidence ↛ Frozen | 1.96 | 0.58 |
| Chilled ↛ Frozen | 11.15** | 0.01 |
| Chilled ↛ Confidence | 1.34 | 0.72 |
| Frozen ↛ Confidence | 0.29 | 0.96 |

Note: *P<0.1, **P<0.05, ***P<0.01.
Source: Own composition

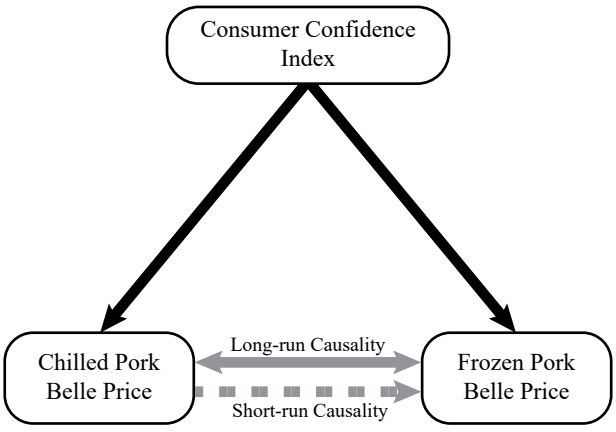


**Figure 4:** Short- and long-term causality (5% significance level).
Source: Own composition

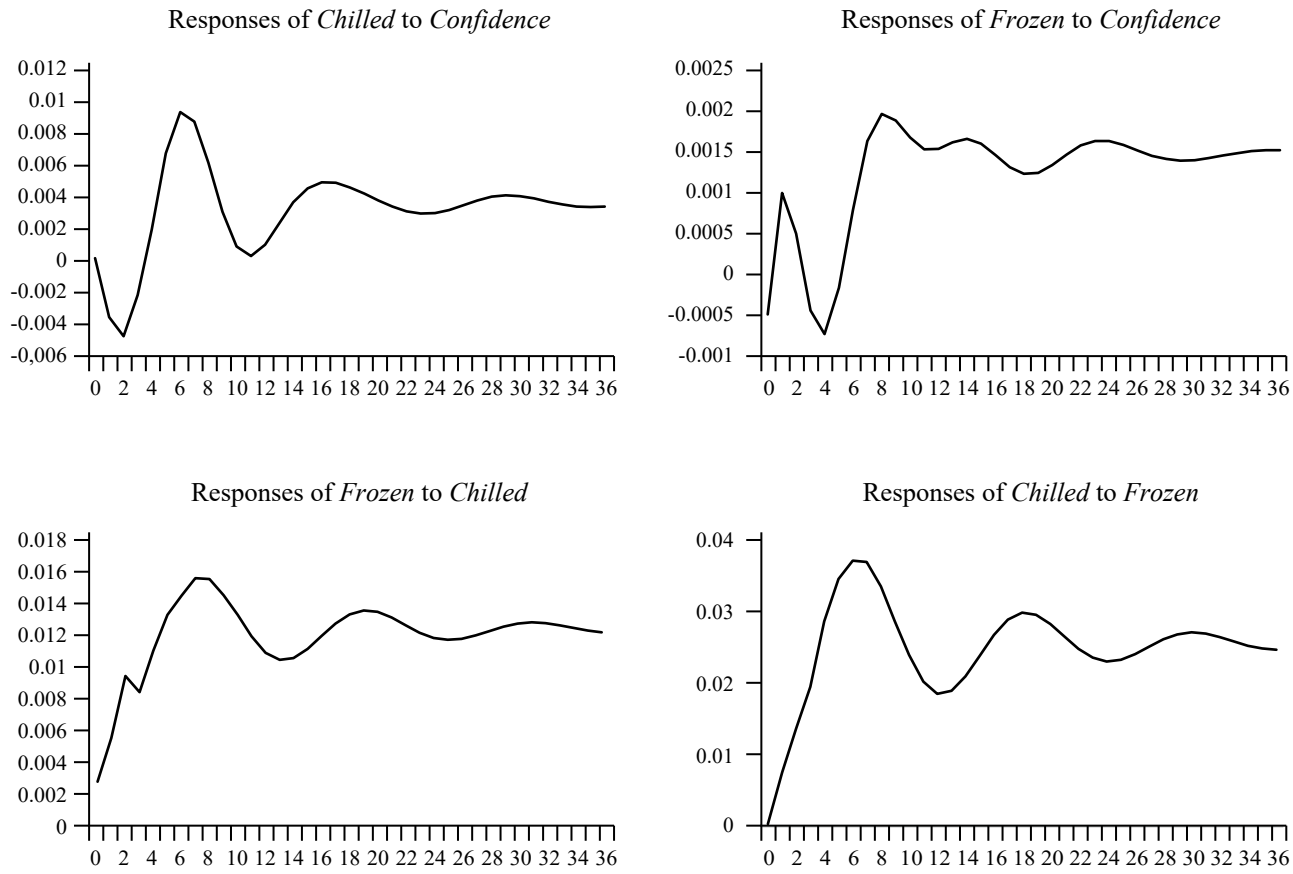


**Figure 5:** Impulse responses of Cholesky 1 SD innovations (36-month horizon).
Source: Own composition

consumer confidence index). The impulse-response function of interest in this study is presented in Figure 5. The impact of the consumer confidence index on chilled pork belly prices is higher compared with frozen pork belly prices. This result supports the idea that high-quality food is highly affected by consumer confidence index shock compared with low-quality food. The innovation shock of frozen pork belly prices on chilled pork belly prices is higher than vice versa.

## Conclusion and Implications

This study empirically investigates the impact of the consumer confidence index on domestic chilled and imported frozen chilled pork belly prices in Korea. By employing VECM and the impulse-response function for exploring the causal relation among consumer confidence, chilled pork belly price, and imported pork belly price, we test the hypothesis that consumer confidence has a different effect on the prices of qualitatively different food considering the limits in the food intake per person. Specifically, this paper assumes that consumer confidence has a positive and a negative effect on high- and low-quality food, respectively.

The VECM results show that consumer confidence has a long-term causality on chilled and frozen pork belly prices based on the weak exogenous test. The cointegration vector presents that consumer confidence has a positive and a negative effect on the prices of chilled and frozen pork belly, respectively. Given that chilled pork is higher-quality food compared with frozen pork, our research hypothesis is supported by our results. We also find a bi-directional long-term causality between chilled and frozen pork belly prices. Results of the short-run Granger causality test indicate a uni-directional causality of chilled pork belly price on frozen pork belly price. Based on these long- and short-term causalities, we perform the impulse-response function. The innovation shock of consumer confidence on pork belly prices is high in the chilled compared with the frozen type. In turn, the impulse-response function results also support the idea that high-quality food prices are more affected by consumer confidence compared with low-quality food.

Our results have the following implications. First, consumer confidence, a leading composite index for the future, is important for high-quality pork, particularly chilled pork belly. In turn, pig-raising farmers that produce chilled pork belly may improve their profits by setting the number of pigs they raise based on the consumer confidence index. Second, importers of frozen pork belly can enhance their profits by choosing their import volume based on the consumer confidence index. Our results confirm that consumer confidence affects the demand of high- and low-quality pig meat (chilled and frozen pork belly, respectively).

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