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Impacts of the Building Permit Area Change on the Forest Products Import Quantities in Korea[1]

Dong-Jun Kim[2*]

建築許可面積의 變化가 林産物 輸入에 미치는 影響[1]

金 東 俊[2*]

ABSTRACT

This study estimated the impacts of the building permit area change on the forest products import quantities in Korea. The first objective of this dissertation is to analyze whether there is any causal relationship between change in the building permit area and changes in the import quantities of forest products in Korea. Assuming that there is any causal relationship, the second objective is to evaluate the dynamics of the impacts of the building permit area change on the forest products import quantities in Korea. The relationship between the building permit area and the import quantity was represented by bivariate vector autoregressive or vector error correction model. Whether there is any causal relationship between change in the building permit area and changes in the import quantities of forest products was analyzed by the causality test of Granger. And the dynamics of the impacts of the building permit area change on the forest products import quantities were evaluated by variance decomposition analysis and impulse response analysis.

The import quantity of forest products can be explained by the lagged building permit area variables and the lagged import quantity variables in Korea. Change in the building permit area causes change in the high-density fiberboard import quantity in Korea. In the bivariate model of the high-density fiberboard import quantity, after six months, the building permit area change accounts for about ten percent of variation in the import quantity, and its own change accounts for about ninety percent of variation in the import quantity. On the other hand, the impact of a shock to the building permit area is significant for about six months on the import quantity of high-density fiberboard in Korea. That is, if the building permit area change indeed had an impact on the import quantity of high-density fiberboard in Korea, it was only of a short-term nature.

Keywords : Forest products market; Causality test; Variance decomposition analysis; Impulse response analysis

要 約

이 연구는 건축허가면적의 변화가 임산물수입량에 미치는 영향을 우리나라 시장을 대상으로 분석하였다. 첫번째 목적은 건축허가면적의 변화가 임산물수입량 변화의 원인이 되는지, 즉 인과관계를 파악하는 것이고, 두번째 목적은 건축허가면적의 변화가 임산물수입량에 얼마만큼 얼마동안 영

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[2] Researcher, College of Agriculture and Life Sciences, Seoul National University, Suwon 441-744, Korea 서울대학교 농업생명과학대학.
* Corresponding author : djkim63@snu.ac.kr

향을 미치는지, 즉 동태적 영향을 추정하는 것이다. 건축허가면적과 임산물수입량의 관계는 자기회귀모형이나 오차수정모형에 의해 만들어졌다. 인과관계 파악은 Granger가 고안한 인과성검정을 이용하였고, 동태분석은 분산분해분석과 충격반응분석을 이용하였다.

결과에 의하면 건축허가면적의 변화는 임산물 중에서 고밀도섬유판수입량 변화의 원인이 되었다. 고밀도섬유판의 경우에 어느 시기의 수입량은 그 시기 이전의 건축허가면적에 의해 10%, 그 시기 이전의 수입량에 의해 90% 가량 설명되었다. 또한 건축허가면적의 변화는 고밀도섬유판수입량에 6개월까지 영향을 미쳤다. 즉 건축허가면적의 변화가 고밀도섬유판수입량에 영향을 미쳤더라도 단기간에 불과했다.

INTRODUCTION

Korea recently experienced an economic crisis. The economic crisis impacts the forest products sector. The impact is on the demand for forest products. Because forest products are intermediate inputs consumed in producing final products, the demand for forest products is a derived demand for final products. The economic crisis decreases the domestic consumption of final products that use forest products as raw material, and it decreases the demand for forest products (Klemperer, 1996).

So, changes in the demand for end uses of forest products may be crucial in explaining the responses of forest products import quantities. Accordingly, the end-use sector activity for forest products should be considered as an explanatory variable of forest products import quantities.

Actually, in 1998 when Korea experienced an economic crisis, the import quantity of forest products decreased 17% from 1997.

Because Korea recently experienced instability in its economy, and the Korean forest products sector depends on imports, it is important to estimate the impacts of the building permit area change on the forest products import quantities in Korea. The impact provides an indication of how the forest products sector responds to the economic problem. The results of this dissertation may contribute to an improved understanding of sector linkage and, hence, forest products sector model specification. And, the results can be used to establish the policy or planning of the forestry sector.

OBJECTIVES AND SCOPE

The first objective of this dissertation is to analyze whether there is any causal relationship between change in the building permit area and changes in the import quantities of forest products in Korea. Assuming that there is any causal relationship, the second objective is to evaluate the dynamics of the impacts of the building permit area change on the forest products import quantities in Korea.

Eight forest products commodities were considered : hardwood roundwood, softwood roundwood, hardwood lumber, softwood lumber, plywood, particleboard, high-density fiberboard, and medium-density fiberboard.

DATA COLLECTION

Data collected are as follows :

1) Korean building permit area

2) Korean forest products import quantities for hardwood roundwood, softwood roundwood, hardwood lumber, softwood lumber, plywood, particleboard, high-density fiberboard, and medium-density fiberboard

Data for the period of twelve years from 1988 to 1999 were used. The data used are at the monthly level. This produced 144 observations for the building permit area and each commodity. The monthly level is at the most disaggregated level available in terms of time unit. This is judged crucial to model the dynamic impact of a variable as unstable as building permit area.

METHODS

1. Unit root test

An implicit assumption underlying regession analysis involving time series data is that such data are stationary. A time series is said to be stationary if the mean and autocovariances of the series do not depend on time. It means that the series does not have an upward or downward trend over time. Standard estimation procedures cannot be applied to the model that contains a nonstationary dependent variable or explanatory variables (Hamilton, 1994). Also, the nonstationary time series has the possibility of spurious regression. Therefore, we should check whether a series is stationary or not before using it in a model.

The formal method of testing the stationarity of a series is the unit root test.

$$y_t = c + \sum_{i=1}^{n} \alpha_i y_{t-i} + u_t \quad (1)$$

where y_t is a time series, α_i is the parameter, and u_t is the error term, is an autoregressive equation. If the absolute value of α_i is equal to one, y_t is a nonstationary series, that is, y_t has a unit root. If the absolute value of α_i is less than one, y_t is a stationary series. If the absolute value of α_i is greater than one, the series is explosive.

Therefore, the stationarity can be evaluated by testing whether the absolute value of α_i is equal to one. This test is known as the Dickey-Fuller test. The Dickey-Fuller test takes the unit root as the null hypothesis $H_0 : \alpha_i = 1$. Since an explosive series does not make economic sense, this null hypothesis is tested against the one-sided alternative hypothesis $H_1 : \alpha_i < 1$ (Hall *et al.*, 1999).

To find out if the building permit area or any import quantity is stationary, the regression was run on

$$y_t = c + \sum_{i=1}^{n} \alpha_i y_{t-i} + u_t \quad (2)$$

$$x_t = c + \sum_{i=1}^{n} \beta_i x_{t-i} + v_t \quad (3)$$

where y_t is the Korean import quantity of forest products, x_t is the Korean building permit area, α_i and β_i are the parameters, and u_t and v_t are the error terms. And, we found out if the absolute value of any α_i or β_i is statistically equal to one on the basis of t-statistic. The estimated coefficient was divided by its standard error to compute the statistic, and referred to the Dickey-Fuller table. If the absolute computed value exceeded the Dickey-Fuller absolute critical value, then the hypothesis that the given time series is nonstationary was rejected. If, on the other hand, it was less than the absolute critical value, the time series was found to be nonstationary.

If the series was nonstationary, it was transformed by taking the first differences over one month. The above process was repeated until a stationary series was achieved.

We had to specify the number of lagged terms to add to the regression. The lag length of VAR or VEC model is often selected somewhat arbitrarily, with a standard recommendation suggesting that we set it long enough to remove any serial correlation in the error terms. However, if we choose the lag length too long, the estimates become imprecise (Hall, *et al.* 1999). Unless sample size is large, estima-ting many parameters consumes a lot of degrees of freedom (Gujarati, 1995). In this study, a lag length of five was found to be sufficient.

2. Cointegration test

The finding that many economic time series may contain a unit root led to the development of the theory of nonstationary time series analysis. Even if both time series are nonstationary, the linear combination of those two series[1] may be

[1] The two series should be integrated of the same order. A differenced stationary series is said to be integrated, and is denoted as I(d), where d is the order of

stationary.

If such a stationary linear combination exists, the two nonstationary time series are called cointegrated. The stationary linear combination is called cointegrating equation and may be interpreted as a long-run equilibrium relationship between the variables (Hall *et al.*, 1999). Therefore, given a group of nonstationary time series, we should determine whether any combination of the series is cointegrated.

If we write

$$u_t = y_t - c - \sum_{i=1}^{n} \alpha_i y_{t-i} - \sum_{i=1}^{n} \beta_i x_{t-i} \quad (4)$$

where x_t is a time series, y_t is a time series, and u_t is the error term, and find that the error term, u_t, is stationary, then we say that the two variables, x_t and y_t, are cointegrated. To find out if the error term is stationary, the error term is subjected to the unit root test. That is, the regression is run on

$$u_t = c + \sum_{i=1}^{n} \gamma_i u_{t-i} + v_t \quad (5)$$

where u_t is the error term from equation (4), γ_i is the parameter, and v_t is the error term(Gujarati, 1995).

To find out if the building permit area and any import quantity are cointegrated, the regression was run on

$$u_t = y_t - c - \sum_{i=1}^{n} \alpha_i y_{t-i} - \sum_{i=1}^{n} \beta_i x_{t-i} \quad (6)$$

where y_t is the Korean import quantity of forest products, x_t is the Korean building permit area, and u_t is the error term. If we find that the error term, u_t, is stationary, then we say that the building permit area and the import quantity are cointegrated.

To find out if the error term is stationary, the error term was subjected to the unit root test. That is, the regression was run on

$$u_t = c + \sum_{i=1}^{n} \gamma_i u_{t-i} + v_t \quad (7)$$

where u_t is the error term from equation (6), γ_i is the parameter, and v_t is the error term.

And we found out if the absolute value of any γ_i is statistically equal to one on the basis of t-statistic. The estimated coefficient was divided by its standard error to compute the statistic, and referred to the Dickey-Fuller table. If the absolute estimated value exceeded the absolute critical value, the conclusion was that the estimated error term is stationary, that is, the building permit area and any import quantity, despite being individually nonstationary, are cointegrated. The lag length was set at five.

If the two variables are not cointegrated, vector autoregressive model can be specified using differenced data. If, instead, the two variables are cointegrated, vector error correction model should be used.

3. Model specification and estamation

Our goal is to estimate the impacts of the Korean building permit area change on the Korean forest products import quantities using bivariate vector autoregressive (VAR) or vector error correction (VEC) model.

The relationship between the Korean building permit area and the Korean import quantity of forest products, both treated as endogenous variables, can be represented by bivariate vector autoregressive or vector error correction model.

The vector autoregressive model of this study is

(continued) integration. The order of integration is the number of unit root contained in the series, or the number of differencing operation it takes to make the series stationary (Gujarati, 1995). In this study, all the variables were I(1).

$$y_t = c + \sum_{i=1}^{n} \alpha_i y_{t-i} + \sum_{i=1}^{n} \beta_i x_{t-i} + u_t \quad (8)$$

where y_t is the Korean import quantity of forest products, x_t is the Korean building permit area, u_t is the error term, t is current time, and i is each time period. u_t is uncorrelated with its own lagged values and all of the right-hand side variables. Equation (8) captures the impact of the building permit area change on the import quantity.

The vector error correction model is a restricted vector autoregressive model that has cointegration restrictions built into the specification, so that it is designed for use with nonstationary series that are known to be cointegrated. The vector error correction specification restricts the long-run behavior of the endogenous variables to converge to their cointegrating relationships while allowing a wide range of short-run dynamics. So, in the presence of cointegration, the error correction term should be added to equation (8).

All variables are in the form of natural logarithm. The logarithmic transformation decreases the impact of any residual heteroscedasticity (Uusivuori and Buongiorno, 1990).

The lag length of the model was set at five months.

Equation (8) was estimated for each commodity (hardwood roundwood, softwood roundwood, hardwood lumber, softwood lumber, plywood, particleboard, high-density fiberboard, and medium-density fiberboard) using monthly data on the Korean building permit area and the Korean forest products import quantities.

Equation (8) was estimated by ordinary least squares (OLS) method using the software EViews 3.1. The lagged values of endogenous variables appeared only on the right-hand side of each equation. So, there was no simultaneity. Therefore, the OLS estimation can produce efficient estimates.

The following simplifying assumptions were made. First, Korea is a price taker in the international market. And second, the Korean market and foreign country's market are in competition with each other.

4. Impact analysis

In empirical application, the main uses of VAR or VEC model are the causality test, the variance decomposition analysis, and the impulse response analysis.

1) Causality test

Although regression analysis deals with the relationship of one variable to others, it does not necessarily imply causality. The causality test of Granger was done to test the presence of causal relationship between change in the Korean building permit area and changes in the Korean forest products import quantities. An F test of the hypothesis that the building permit area change does not cause the import quantity change was performed as follows :

First, the current import quantity was regressed on all the lagged import quantity variables, but not on the lagged building permit area variables. This is the restricted regression. From this regression, we obtained the restricted residual sum of squares, RSS_R.

Second, the current import quantity was regressed on all the lagged import quantity variables plus the lagged building permit area variables. This is the unrestricted regression. From this regression, we obtained the unrestricted residual sum of squares, RSS_{UR}.

Third, the null hypothesis is "The building permit area change does not cause the import quantity change." The value of $[(RSS_R\text{-}RSS_{UR})/m] \,/\, [RSS_{UR}/(n\text{-}k)]$ was calculated, which follows the F-distribution with m and (n-k) df, where n is the number of observations, m is the number of the building permit area variables, and k is the number of parameters estimated in the unrestricted regression (Gujarati, 1995).

If the calculated value was greater than the critical value at the chosen level of significance, then the hypothesis that the building permit area change does not cause the import quantity change was rejected. That is, if the calculated value was sufficiently large, we concluded that the building permit area change causes the import quantity change.

2) Variance decomposition analysis

The analysis using VAR or VEC model often centers on the variance decomposition, which estimates the impact of an economic shock through the model. Interpreted together with the impulse response, the variance decomposition can provide valuable insight into the dynamics of the model under investigation (Jennings *et al.*, 1991).

The error variance of the model includes the variation in dependent variable to the shock in explanatory variable. It provides a measure of the explanatory strength of each explanatory variable at different horizon. Also, it gives information about the relative importance of each explanatory variable to dependent variable (Hall *et al.*, 1999).

In this study, the variance decomposition provides the relative importance of the lagged building permit area variable and the lagged import quantity variable to the current import quantity at different horizons.

The autoregressive representation can be written as

$$y_t = c + \sum_{i=1}^{n} \alpha_i y_{t-i} + u_t \quad (9)$$

where y_t is vector of the import quantity and the building permit area, and u_t is vector of the error terms. It is not possible to divide the impact of the building permit area on the import quantity using the autoregressive representation.

However, the moving-average representation expresses the levels of the import quantity as a function of the error terms. Inverting the autoregressive representation into the moving-average representation resulted in

$$y_t = c + \sum_{i=1}^{n} \alpha_i u_{t-i} \quad (10)$$

where y_t is vector of the import quantity and the building permit area, and u_t is vector of the error terms.

The variance decomposition of the import quantity was calculated from the parameters of equation (10).

The decomposition was done for the horizon of 24 months. This is judged sufficiently long to capture most of the dynamics of building permit area change impact.

3) Impulse response analysis

Although the variance decomposition measures the explanatory strength of each explanatory variable at different horizon, it does not indicate the expected time path of dependent variable's response to the shock to explanatory variables. The impulse response function estimates the impact of one single shock to explanatory variable on dependent variable for several periods in the future (Alavalapati *et al.*, 1996).

In this study, the impulse response function provides the response of the import quantity to a standardized one-unit shock in the building permit area.

To assess the impact of a shock over a 24-month period, the impulse response was obtained from

$$y_t = c + \sum_{i=1}^{n} \alpha_i u_{t-i} \quad (11)$$

where y_t is vector of the import quantity and the building permit area, and u_t is vector of the error terms, called impulse in the language of VAR or VEC.

The error term was supposed to increase by a value of one standard deviation. Such an increase changed the building permit area and the import quantity in the current as well as future periods through the dynamic structure of the VAR or VEC model. The mean responses and variances of the import quantity were obtained for 24 future months.

Changing the order of variables can change the impulse responses. The economic reasoning for the ordering of variables is not unique. Alternative explanations can be provided to change the places of variables (Alavalapati *et al.*, 1996). Therefore, the impulse responses were obtained with the alternative ordering of the variables to see whether the results changed significantly.

RESULTS AND DISCUSSION

Table 1 shows the result of unit root tests. All the absolute estimated values in the second column did not exceed the absolute critical value at 5% significance level. That is, all the time series are nonstationary, and therefore have systematic trends, which may be eliminated using differenced values.

For the first differenced data, the third column shows that all the absolute estimated values exceeded the absolute critical value at 5% significance level. That is, all the time series are stationary in the first differenced level. It means that stationary series were obtained by using month-to-month differencing in the original level.

Table 1. Result of unit root tests.

Variable	Original data	First differenced data
Building permit area	2.5554	7.0093**
Hardwood roundwood	1.2089	7.6282**
Softwood roundwood	2.5186	6.6232**
Hardwood lumber	2.6780	6.3924**
Softwood lumber	2.2200	9.7210**
Plywood	1.1352	6.2082**
Particleboard	1.8040	6.2569**
High-density fiberboard	0.0359	6.6873**
Medium-density fiberboard	1.9149	5.8125**

The values represent Augmented Dickey-Fuller test statistics.
The critical value at 5% significance level is -2.88.
** Reject the null hypothesis that the time series is nonstationary at 5% significance level

Table 2 shows the result of cointegration tests of the import quantities with the building permit area. All the absolute estimated values except the softwood roundwood import quantity and the medium-density fiberboard import quantity did not exceed the absolute critical value at 5% significance level. That is, all the import quantity variables except the softwood roundwood import quantity and the medium-density fiberboard import quantity do not have cointegration with the building permit area. So, vector autoregressive model can be used with differenced data of the import quantity variables except the softwood roundwood import quantity and the medium-density fiberboard import quantity. And, vector error correction model should be used with differenced data of the softwood roundwood import quantity and the medium-density fiberboard import quantity.

Table 2. Result of cointegration tests of the import quantities with the building permit area.

Variable	
Hardwood roundwood	10.4519
Softwood roundwood	23.8954**
Hardwood lumber	15.0760
Softwood lumber	15.0343
Plywood	9.2049
Particleboard	13.4175
High-density fiberboard	14.8561
Medium-density fiberboard	20.4860**

The values represent likelihood ratio test statistics.
The critical value at 5% significance level is 19.96.
** Reject the null hypothesis of no cointegration of the import quantity with the building permit area at 5% significance level

Table 3 shows the result of model estimation. The structural model places strict interpretation on the parameters of the equation, while the vector autoregressive or vector error correction model interprets the system as a whole. With several lags

Table 3. Result of model estimation.

Dependent variable	Observation number	Lag length	F-statistic	P>F	Adj. R^2	Q	P>Q
Hardwood roundwood	123	5	6.23**	0.00	0.30	1.00	0.96
Softwood roundwood	120	5	5.98**	0.00	0.30	0.35	1.00
Hardwood lumber	123	5	9.50**	0.00	0.41	3.10	0.69
Softwood lumber	130	5	6.98**	0.00	0.32	0.73	0.98
Plywood	130	5	4.59**	0.00	0.22	0.85	0.97
Particleboard	125	5	3.86**	0.00	0.19	0.99	0.96
High-density fiberboard	106	5	5.91**	0.00	0.32	1.77	0.88
Medium-densityfiberboard	130	5	0.41**	0.00	0.16	0.24	1.00

** Reject the null hypothesis that all coefficients are zero at 5% significance level

of the same variables, each estimated coefficient may not be statistically significant, possibly due to multicollinearity (Gujarati, 1995). The significance levels of F-statistics in all equations rejected the hypothesis that all coefficients are zero. So, we concluded that the import quantity of forest products can be explained by the lagged building permit area variables and the lagged import quantity variables in Korea.

The Q values in the seventh column are from Ljung-Box Q test to test the presence of serial correlation. Durbin-Watson statistic cannot be used in the model when lagged dependent variable is used as explanatory variable. If there is no serial correlation in the residuals, all Q-statistics at all lags should be insignificant with large p-values (Gujarati, 1995). The results suggested that the error terms in all the equations appeared free of serial correlation.

Table 4 shows the result of the causality tests between change in the building permit area and changes in the forest products import quantities in Korea. There appeared to be evidence of the causal relationship between change in the building permit area and change in the import quantity of high-density fiberboard in Korea. That is, change in the building permit area causes change in the high-density fiberboard import quantity in Korea.

However, change in the Korean building permit area does not cause change in the medium-density fiberboard import quantity. One possible explanation for such a result may be that the imported medium-density fiberboard is not a good substitute for the domestic medium-density fiberboard. That is, the imported medium-density fiberboard may be different in quality from the domestic medium-density fiberboard in Korea.

Also, change in the building permit area does not cause changes in the import quantities of hardwood roundwood, softwood roundwood, hardwood lumber, softwood lumber, plywood, and particleboard in Korea.

Table 4. Result of the causality tests between change in the building permit area and changes in the import quantities.

Dependent variable		P>F
Hardwood roundwood	0.06	1.00
Softwood roundwood	1.41	0.23
Hardwood lumber	0.84	0.52
Softwood lumber	0.32	0.90
Plywood	0.58	0.71
Particleboard	1.47	0.21
High-density fiberboard	1.97*	0.09
Medium-density fiberboard	0.61	0.69

The values in the second column represent F test statistics.

* Reject the null hypothesis that the building permit area change does not cause the import quantity change at 10% significance level

Table 5 shows the result of the variance decomposition of the high-density fiberboard import quantity for the horizon of 24 months. The decomposition divided the variance into parts explained by each explanatory variable in the model.

The standard error in the second column is the forecast error of the high-density fiberboard import quantity for each forecast horizon. The source of this forecast error is the variation in the future values of the high-density fiberboard import quantity to a shock in the model. The remaining columns give the percentages of the variances of the high-density fiberboard import quantity due to each explanatory variable. The values in the third column represent the percentages of the variances of the high-density fiberboard import quantity explained by the building permit area. And, the values in the fourth column represent the percentages of the variances of the high-density fiberboard import quantity explained by its own. The third column and the fourth column of each row add up to 100.

Table 5. Result of the variance decomposition analysis of the high-density fiberboard import quantity.

Month	Standard error	Explanation percentage (%)	
		Building permit area	Import quantity
1	0.2612	0.8769	99.1231
2	0.2949	1.2588	98.7412
3	0.2980	7.9143	92.0857
4	0.3043	8.8225	91.1775
5	0.3059	9.0494	90.9506
6	0.3062	10.7388	89.2612
7	0.3088	10.7224	89.2776
8	0.3095	10.7766	89.2234
9	0.3100	10.8173	89.1827
10	0.3102	10.9397	89.0604
11	0.3103	10.9255	89.0745
12	0.3103	11.0323	88.9677
13	0.3104	11.0310	88.9690
14	0.3105	11.0358	88.9642
15	0.3105	11.0427	88.9573
16	0.3105	11.0543	88.9457
17	0.3105	11.0540	88.9460
18	0.3105	11.0615	88.9385
19	0.3105	11.0616	88.9384
20	0.3105	11.0616	88.9384
21	0.3105	11.0620	88.9380
22	0.3105	11.0628	88.9373
23	0.3105	11.0628	88.9372
24	0.3105	11.0631	88.9369

In the bivariate model of the high-density fiberboard import quantitiy, after six months, the building permit area change accounts for about ten percent of variation in the import quantity, and its own change accounts for about ninety percent of variation in the import quantity.

Figure 1 shows the response of the high-density fiberboard import quantity to one standardized impulse equal to one standard deviation of the building permit area estimator for 24 future months. That is, Figure 1 shows the impact of a one time and one standard deviation shock to the building permit area on the import quantity of high-density fiberboard over time.

One hundred draws were made from the parameters of the vector autoregressive model of the high-density fiberboard import quantity to establish the impulse response. The middle line is the mean value of the impulse response, that is, the standardized magnitude of the response. And the dotted lines are the two plus/minus standard deviations of the response.

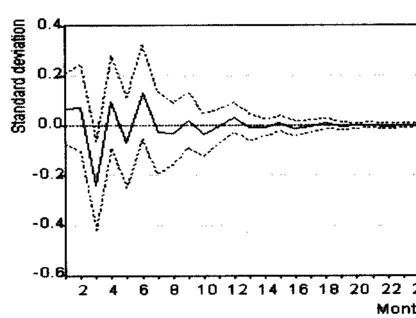

Figure 1. Response of the high-density fiber-board import quantity to one standard deviation shock to the building permit area.

The impact of a shock to the building permit area is significant for about six months on the high-density fiberboard import quantity in Korea. That is, the impact of a shock to the building permit area on the high-density fiberboard import quantity is shown to disappear after about six months. One possible explanation for such a result may be that Korean high-density fiberboard importers have short-term contracts.

Changing the order of variables did not change the impulse response. So, only result with the order of the building permit area and the import quantity was presented.

In the bivariate model of the high-density fiberboard import quantitiy, after six months, the building permit area change accounts for about ten percent of variation in the import quantity, and its own change accounts for about ninety percent of variation in the import quantity.

The impact of a shock to the building permit area is significant for about six months on the high-density fiberboard import quantity in Korea. That is, the impact of a shock to the building permit area on the high-density fiberboard import quantity is shown to disappear after about six months.

CONCLUSION

This study presents a first attempt to estimate the dynamic impacts of the building permit area change on the forest products import quantities in Korea. There appeared to be evidence of a causal relationship between change in the Korean building permit area and change in the Korean import quantity of high-density fiberboard. That is, change in the Korean building permit area causes change in the Korean high-density fiberboard import quantity. However, change in the Korean building permit area does not cause change in the medium-density fiberboard import quantity. One possible explanation for such a result may be that the imported medium-density fiberboard is not a good substitute for the domestic medium-density fiberboard. That is, the imported medium-density fiberboard may be different in quality from the domestic medium-density fiberboard in Korea.

Similarly, changes in the building permit area do not cause changes in the import quantities of hardwood roundwood, softwood roundwood, hardwood lumber, softwood lumber, plywood, and particleboard in Korea.

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