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THE INSULATION BOARD INDUSTRY — AN ECONOMETRIC ANALYSIS

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Abstract

An econometric model of the domestic insulation board industry was developed to identify and quantify the major factors affecting quantity consumed and price. The factors identified were housing starts, residential improvement activity, disposable personal income, productivity, pulpwood and residue prices, and power costs. Disposable personal income was the most important of these factors, affecting both quantity and price. Annual projections of quantity and price show quantity increasing by 30 percent and price by 106 percent by the year 1990.

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INTRODUCTION

SPIRALING ENERGY COSTS have had a significant impact on the insulation materials industry. Insulation prices rose approximately 15 percent in 1977 alone, and there are growing shortages of insulation materials. Quantitative market information is needed to help stabilize these markets.

The insulation board industry is an integral part of the insulation materials market. Insulation board sheathing is the most widely used sheathing material for America's frame homes. Acoustical ceiling tile is a basic product for sound conditioning of homes, apartments, and other structures. Building board is a general purpose insulation board used for ceilings and walls in farm buildings and in attic and basement remodeling. Roof insulation board is used for flat roof construction.

The insulation board industry comprises 12 plants that produce primarily insulation board and another 6 plants that produce both insulation board and hardboard. These plants have a combined annual capacity of approximately 3.2 billion square feet (on a ½-inch basis).

A basic problem the industry shares with many other wood products industries is a lack of quantitative price-quantity information describing the markets in which it operates. This presents difficulties for the industry and its individual members in both short-term and long-term planning.

Short-term planning (year to year) requires a knowledge of the important factors affecting consumption and price of insulation board. For example, if the industry knew that consumption of insulation products were very sensitive to housing starts, they could monitor projections of that index and alter production levels accordingly. Quantification of the relationships between these exogenous variables and consumption or price levels of insulation board would enable the industry to respond quickly to shifts in market conditions by altering production schedules and pricing policies, to the mutual benefit of consumer and producer.

In any competitive industry, sound long-term planning (10 to 15 years) is necessary to the survival of individual firms and the industry itself. This type of planning requires knowledge of future consumption and market price levels. Long-term planning determines what investments will be required for new plant and equipment, for example. Should plant capacity be expanded to meet anticipated demand? Firms in the industry must make decisions now about future plant development and expansion, because it takes time to raise the necessary capital and build plants.

The consumer benefits indirectly from sound planning by industry. For example, insulation products such as mineral batts, fiberglass batts, and foam are in short supply. The surge in demand was not anticipated and has resulted in consumer inconvenience and higher prices. Because of the shortage, housing construction has been unnecessarily delayed. In addition, producers of these products have lost potential profits on lost sales.

Consumption projections of all forest-related products, including insulation board, are also needed by forest planners to evaluate current forest programs, establish timber-growth goals, and aid in formulating forest policies and proposed programs.

An econometric model of the insulation board industry was developed in this study to provide needed market information. Specific objectives of the study were: (1) to identify and quantify the variables affecting the quantity of insulation board consumed and its price; and (2) to project equilibrium quantity and price levels to the year 1990. A related objective was to determine the feasibility of using econometric models to help the forest planners determine future forest resource requirements from a knowledge of industry needs. The Forest Service has been given the responsibility of periodically assessing forest resource requirements by the Resources Planning Act and the National Forest Management Act of 1976.

FRAMEWORK OF ANALYSIS AND METHODOLOGY

An equilibrium model consisting of a demand and supply equation and an identity was developed to study the insulation board market. The identity is necessary for demand-supply equilibrium. The general form of the hypothetical linear model is:

$$q_d = \alpha_d P_d + \beta_o + \beta_1 X_{d1} + \ldots + \beta_p X_{dp} + e_d$$
$$q_s = \alpha_s P_s + \gamma_o + \gamma_1 X_{s1} + \ldots + \gamma_q X_{sq} + e_s$$
$$q_d = q_s$$

where:

q_d =	quantity demanded
q_s =	quantity supplied
$P_d = P_s$ =	price of insulation board
$X_{d1} \ldots X_{dp}$ =	demand variables
$X_{s1} \ldots X_{sq}$ =	supply variables
α_d, α_s =	regression coefficients for price
$\beta_1 \ldots \beta_p$ =	regression coefficients for independent demand variables
$\gamma_1 \ldots \gamma_q$ =	regression coefficients for independent supply variables
e_d =	demand error term
e_s =	supply error term
β_o, γ_o =	intercept terms for demand and supply equations, respectively

The model can be written in matrix notation as:

$$\mathbf{Y} = \alpha\mathbf{P} + \beta X + \mathbf{e}$$

where:

$$\mathbf{Y} = \begin{bmatrix} q_d \\ q_s \end{bmatrix} \quad \alpha = \begin{bmatrix} \alpha_d & O \\ O & \alpha_s \end{bmatrix} \quad \mathbf{P} = \begin{bmatrix} P_d \\ P_s \end{bmatrix}$$

$$\beta = \begin{bmatrix} \beta_o\, \beta_1 \ldots \beta_p\, O\, O \ldots O \\ O\, O \ldots O\, \gamma_o\, \gamma_1 \ldots \gamma_q \end{bmatrix} \qquad \mathbf{e} = \begin{bmatrix} e_d \\ e_s \end{bmatrix}$$

and

$$\mathbf{X} = [1\, X_{d1} \ldots X_{dp}\, 1\, X_{s1} \ldots X_{sq}]'$$

The model depicted is an equilibrium model that accounts for the interaction between demand and supply and the interdependence of prices and quantities. It is based on annual observations of each variable over the sample period 1950 to 1974. The data sources used were: housing starts, value of residential improvements, disposable personal income, and power costs (U.S. Bureau of Census 1950-1974); productivity (U.S. Bureau of Census 1954-1972); pulpwood and residue prices, insulation board consumption, and insulation board price (Phelps 1975).

Ordinary least squares (OLS) analysis has been used in the past to estimate parameters in demand and supply equations. However, demand and supply forces interact to determine market clearing levels of price and quantity. Under such a simultaneous system, OLS will yield biased and inconsistent estimators of the parameters of the demand and supply relationships, because the dependent variable (price) on the right hand side of the demand and supply equations is correlated with the error terms. The estimators are inconsistent because the bias persists for even infinitely large samples.

Consequently, the two-stage least squares (2SLS) procedure was used to estimate the parameters in the demand and supply equations. It yields estimators that are consistent. Also, there is evidence suggesting that the bias is reduced (relative to OLS) depending on the degree to which the system is overidentified (Christ 1966). In fact, this estimating procedure was specifically designed for use with overidentified simultaneous systems. Two-stage least squares was selected over other simultaneous equation procedures because it reduces computation. Computer algorithms such as the SYSREG routine in SAS-76 (Barr et al. 1976) are readily accessible and inexpensive to use.

SPECIFICATION OF INSULATION BOARD MARKET MODEL

Demand for insulation board is closely correlated with activity in the building construction industry. In fact, 95 percent of insulation board is consumed by the construction industry in one form or another. The residential construction industry is by far the major consumer of insulation board, so housing starts and home improvement and remodeling activity were expected to affect demand.

Disposable personal income is postulated to affect insulation board demand in several ways. Real personal income is a major determinant of headship—the proportion of the population that head separate households (Marcin 1972). As such, it indirectly affects housing demand. Income levels also affect remodeling and home improvement activity. Construction activity is necessarily correlated with the economic health of the Nation and personal income levels are a good measure of economic health.

Economic theory suggests that prices of substitutes will be directly related to demand. In the exterior sheathing market, the major substitute over the past 20 years has been softwood plywood. However, plywood is now used primarily at the corners of frame houses for additional strength and is, therefore, not a direct competitor for sheathing purposes. Insulation batt, both mineral-based and fiberglass, is used for interior sheathing to provide additional insulation for walls, attics, and floors. As such, it is not considered a direct substitute for insulation board sheathing. Gypsum wallboard is a substitute for building-grade insulation board, but this is a relatively minor market (in proportion of total insulation board sales), and it was felt that it should not significantly affect overall demand for insulation board. For these reasons, I decided that substitutes do not play a significant role in determining overall demand for insulation board. This may not be the case, however, for market models for individual insulation board products such as sheathing or building board.

Economic theory suggests that price is inversely related to demand. My first preference was to use actual insulation board prices, but there are four major products listed in *Wholesale Prices and Price Indexes.* Calculating a weighted average price for each year over the sample period proved extremely cumbersome because the relative weights of these products change periodically. Consequently, I decided to use the insulation board price index (1967 = 100) in lieu of actual prices.

The demand relationships thus specified are:

Variable	*Expected relationship to demand*
Insulation board price index (1967 = 100)	Negative
Housing starts (1000 units)	Positive
Remodeling and home improvement activity (millions of \$, 1967)	Positive
Disposable personal income (billions of \$, 1967)	Positive

The supply of insulation board is affected by several major variables. Raw material costs will naturally affect production costs. Insulation board plants utilize either roundwood or residues, depending on relative prices and availability. Firms in the Northwest, for example, rely almost entirely on softwood plant residues. Firms in the North and South use varying amounts of plant residue and roundwood. Because this study was national in scope, a weighted average price of plant residues and roundwood was used in the supply relationship. Weights used were determined by regional shipment patterns.

Another major cost item is fuel and power. Both electricity and natural gas are used to heat plants and run various machines. Therefore, an average price index (1967 = 100) for electricity and natural gas was used in the supply relationship.

Productivity will affect the efficiency with which the industry combines production inputs, and thus influences the supply of insulation board. Productivity will also provide a measure of technological change, which also affects supply.

Economic theory postulates that price will affect supply in a positive direction. There is no reason to believe that this would not be true for the insulation board industry.

Hardboard prices were assumed to influence insulation board supply because some of the newer plants are capable of producing either product. They can shift a percentage of production from one product to another in response to current market conditions. For example, if hardboard prices are strong, these plants will shift a greater percentage of their production to hardboard. Although one-third of the insulation board is produced in these plants, they produce only 15 percent of the total hardboard production. Therefore, although hardboard prices may affect insulation board supply, activity in the insulation board industry should not affect hardboard prices— hence hardboard prices were treated as an independent variable in this study. This conclusion is important because if hardboard prices were affected by the insulation board industry, the model would have to be expanded to include a demand- supply relationship for the hardboard market.

Since imports averaged less than 3 percent annually over the sample period, I decided that imports could be ignored without seriously distorting the supply-demand relationships.

The supply relationships thus specified are:

Variable	Expected relationship to supply
Insulation board price index (1967 = 100)	Positive
Productivity (value of shipment in $, 1967, per man-hour of production workers)	Positive
Pulpwood and residue prices	Negative
Power and fuel price index (1967 = 100)	Negative
Hardboard price index (1967 = 100)	Negative

ESTIMATED DEMAND AND SUPPLY EQUATIONS

Three major statistical criteria were used to decide whether to retain postulated variables in the demand and supply equations. One criterion was that the beta coefficient be greater than its standard error. This is a commonly accepted level for use in econometric models dealing with simultaneous equation systems. The Durbin-Watson D Statistic was used to test for serial correlation in the residuals in the model. Serial correlation is often caused by the omission of important independent variables and/or misspecification of the functional form of the equation. If the equation passes the Durbin-Watson test, this is a partial indication that the important variables are included and the functional form is correct.

The estimated model also had to be identified. This means that the specified demand relationship includes only variables that affect demand and the supply relationship includes only ones that affect supply. Statistical requirements for identification had to be met in order to determine accurately the parameters in the projection equations for quantity consumed and price of insulation board.

A major economic criterion used was that the parameters in the estimated equations have the correct sign.

Estimated model

The following model was estimated using the 2SLS estimating procedure. The standard errors of estimates are in parentheses.

Demand
$$q_d^* = -759980 - \underset{(8371)}{26266.27}\text{ (Price)}^* + \underset{(166)}{636.51}\text{ (Housing Starts)} + \underset{(53)}{226.10}\text{ (Residential Improvements)} + \underset{(796)}{5947.81}\text{ (Disposable Personal Income)}$$

Durbin-Watson D Statistic = 2.11

Supply
$$q_s^* = 434386 + \underset{(8597)}{34340.18}\text{ (Price)}^* + \underset{(24046)}{163248.35}\text{ (Productivity)} - \underset{(58781)}{101250.87}\text{ (Pulpwood and Residue Prices)} - \underset{(11647)}{14637.49}\text{ (Power and Fuel Prices)}$$

Durbin-Watson D Statistic = 1.55

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*Dependent variable.

The estimated demand equation was judged satisfactory in that the relationships specified met our statistical and economic criteria. Each variable had a beta coefficient not less than its standard error; the Durbin-Watson D Statistic was in the nonsignificant range; and each variable had the anticipated sign.

The estimated supply equation was not as satisfactory because hardboard prices did not appear to be as important as originally assumed. Its beta coefficient was approximately one-half its standard error and did not have the expected sign. Inclusion of hardboard prices in the supply equation also reduced the Durbin-Watson D Statistic to a level approaching significance. Therefore, hardboard prices were not retained in the final estimated supply equation.

One possible reason for the poor performance of hardboard prices is that only a few of the newer plants have the capability to shift efficiently from hardboard to insulation board production and vice versa. Therefore, this capability is probably not adequately reflected in the data base used to estimate the supply equation.

The remainder of the specified relationships were retained in the final estimated supply equation. Each of these variables had a beta coefficient greater than its standard error and had the correct sign.

PRICE AND QUANTITY PROJECTIONS

The estimated demand and supply equations were solved simultaneously to yield reduced form (solved structural) equations for projecting insulation board price and quantity.

The projection equations for insulation board price and quantity are:

Quantity = −242354 + 360.65 (Housing Starts) + 128.11 (Remodeling Activity) + 3370.09 (Disposable Personal Income) + 70750 (Productivity) − 43881.11 (Pulpwood and Residue Prices) − 6343.52 (Power Costs)

Price = −19.71 + .0105 (Housing Starts) + .0037 (Remodeling Activity) + .0981 (Disposable Personal Income) − 2.6936 (Productivity) + 1.6706 (Pulpwood and Residue Prices) + .2415 (Power Costs)

Elasticity measures

A measure of the relative importance of the variables affecting quantity or price can be determined by their respective elasticities. Elasticity is simply the percent change in the dependent variable associated with a 1 percent change in one of the predetermined variables, holding everything else constant. Elasticities can be calculated as follows:

$$\xi_i = \frac{dY}{dX_i} \cdot \frac{X_i}{Y} \qquad (2)$$

where:

Y = dependent variable (price or quantity)

X_i = predetermined variable

ξ_i = elasticity

The reader should be cautioned that elasticity is only a partial measure of impact. The effect that predetermined variables have on price or quantity can be either offset or amplified by other variables—both those included in the model and those outside the model.

The following elasticities were calculated for quantity and price of insulation board at 1974 levels for all variables.

Quantity	
Disposable personal income	.71
Productivity	.50
Remodeling activity	.48
Pulpwood and residue prices	−.41
Power costs	−.32
Housing starts	.16
Price	
Disposable personal income	.49
Productivity	−.45
Pulpwood and residue prices	.37
Remodeling activity	.33
Power costs	.29
Housing starts	.11

All of the quantity and price elasticities were inelastic (≤ 1), meaning that a 1 percent change in any one variable will result in less than a 1 percent change in quantity or price.

To illustrate the use of these elasticities, the effect of changes in disposable personal income on quantity is used. An elasticity of .71 means that an increase of 1 percent in income will increase quantity by .71 percent or 22,542,485 square feet (based on 1974 levels). Remembering that this is only a partial effect, one must also consider whether an increase in income affects housing starts, remodeling activity, or any other variable that affects quantity.

Elasticity measures can provide the insulation board industry with useful insights into the sensitivity of quantity or price to changes in housing starts, income levels, power costs, etc. Knowledge of these effects should help industry leaders cope more effectively with changing market conditions. Assessment of predictive ability

Assessment of predictive ability

A major objective of the study was to make projections to the year 1990 for insulation board quantity and price. Before this was done, the equations were evaluated for predictive ability. The best measure of predictive ability would be to compare projections with observed values. Unfortunately, sufficient observations could not be reserved from the available time series because the sample was already small. Therefore, Theil's

Table 1.—Turning point predictions.

Prediction	Quantity	Price
Proportion of predicted turning points that were correct	0.64	0.17
Proportion of actual turning points predicted	.64	.50

Turning points are changes in trend direction.

(1975) inequality coefficient[1] was used to evaluate predictive ability for projecting levels and changes in levels over the sample period. The coefficients for level projections were determined to be .05 for quantity and .03 for price, with values near zero implying perfect prediction. However, predictive ability for projecting changes in levels was not as satisfactory as indicated by coefficient values of .84 and .78 for quantity and price, respectively.

To further assess predictive ability, predicted turning points were compared with observed points over the sample period (Table 1). The values in Table 1 indicate that the turning point predictions for quantity were much more satisfactory than those for price. This is understandable because prices usually fluctuate more than quantity.

On the whole, validation results are good and provide support for the hypotheses underlying the model. Validation results indicate that the model is better suited for projecting quantity and price levels rather than changes in levels.

Projections for predetermined variables

Before projections could be made for quantity and price, forecasts had to be obtained for each of the predetermined variables over the projection period. Wherever possible, projections by other sources were utilized; housing start projections by Marcin[2] are a case in point. Disposable personal income is projected by many government and private sources, with the concensus in the neighborhood of 3 percent real annual increase. Projections for power costs, pulpwood and residue prices, and productivity were based on the assumption that they would continue the rate of increase established over the period 1963 to 1974. Real rates established for these variables were 6.18 percent, 4.09 percent, and 3.58 percent, respectively. Remodeling activity has picked up considerable momentum since 1972, due in part to the rapid increase in new home construction costs and mortgage financing. Therefore, the real average annual rate of increase between 1972 and 1975 (approximately 5 percent) is expected to continue. It may increase, because new home construction costs and financing are expected to continue increasing.

These figures provided the basis for the medium-level projections for insulation board price and quantity. But to provide flexibility to the projections, quantity and price were also projected under somewhat more optimistic (high-level) and pessimistic (low-level) economic conditions. The independent variables in the system can fluctuate considerably from their norms; values of plus or minus 15 percent are not unusual. Therefore, the high-level projections are based on the assumption that the independent variables will increase at a rate 15 percent greater than the medium-level rate. For example, it was assumed real disposable personal income would increase at a 3.45 percent annual rate, instead of the medium level of 3 percent. The low-level projections are based on the assumption that the independent variables will increase, but at a rate 15 percent less than the medium-level rate. The corresponding rate used for personal income, for example, was 2.55 percent. Similar assumptions were made for the remaining independent variables in the system for both the high-level and low-level projections.

Projections for quantity and price

Tables 2 and 3 present projections for insulation board quantity and price to the year 1990. Although quantity is expected to increase by only 30 percent (medium level), price is projected to increase by 106 percent (over 1976 observed levels) by the year 1990. These figures can be translated into average annual rates of increase of 2.18 and 7.7 percent, respectively, for quantity and price. The projected rate for quantity is somewhat less

[1] The inequality coefficient compares predicted with actual values via the following relationship:

$$U = (\Sigma(P-A)^2/N)^{1/2}/(\Sigma A^2/N)^{1/2}$$

where:

P = predicted values (P_i) or changes ($P_i - P_{i-1}$)

A = actual values or changes

N = sample size

[2] Unpublished paper titled "The outlook for housing by type of unit and region: 1978 to 2020" by Thomas Marcin. For. Products Lab., Madison, Wis.

Table 2.—Quantity projections for insulation board in thousand square feet, ½-inch basis.

Year	High	Medium	Low
1977	3599051	3444026	3319650
1978	3753199	3537544	3397172
1979	3903312	3705164	3527122
1980	4061364	3848708	3637825
1985	4513892	4252712	3941013
1990	4913886	4571411	4183080

Quantity = domestic production + imports − exports.

Table 3.—Insulation board price index projections (1967 = 100)

Year	High	Medium	Low
1977	180.6	175.9	172.0
1978	191.0	183.7	178.6
1979	201.7	194.0	187.0
1980	213.0	204.0	195.1
1985	279.8	260.1	239.9
1990	368.7	330.3	294.0

than the 2.4 percent growth rate experienced by the industry over the past 10 years. However, future price increases are expected to be much greater than the relatively stable annual rate of .81 percent recorded over the past 10 years. Rapidly escalating energy costs are a major factor in this development.

CONCLUSIONS

The market model developed in this study can be quite useful by providing a mechanism for industry planners to assess the impact of important influences such as housing starts, disposable personal income, power costs, etc., on insulation board quantity and price. The elasticity measures developed will indicate partial impacts of changes in these variables. Knowledge of impacts is necessary for planners to cope effectively with fluctuating market conditions and provide the consumer with desired products at the lowest cost. Market models provide information that can be used to help prevent the serious market imbalances that often result in supply shortages and high prices—such as those currently occurring in some segments of the wood products industry.

Quantity projections show the industry continuing to grow, but at a rate somewhat slower than that experienced over the past 10 years. Quantity is projected to increase by 30 percent by the year 1990, necessitating an increase in current plant capacity of 20 to 25 percent. Price is projected to increase at the relatively rapid real annual rate of 7.7 percent, which provides incentives to increase supply.

The projections of this study may be of less use for year-to-year planning because the performance of turning point forecasts over the sample period is questionable. Although 64 percent of the predicted turning points were correct for quantity, only 17 percent of those for price were correct. Another concern is that the model was not tested adequately for predictive ability. Unfortunately, sufficient observations could not be reserved from the available time series.

Results from this study suggest the potential of econometric models to provide forest planners with valuable information on future industry trends. An estimate of future product demand for each wood-using industry, including the insulation board industry, is needed to determine future forest resource requirements. This knowledge is needed to evaluate current and proposed forest programs and to guide forest policy.

The reader is cautioned to remember that when using this or any other econometric model, he must recognize changes which may conflict with the assumptions employed. For instance, rising energy costs are just beginning to have an impact on the national economy and life styles. The energy situation is already bringing about changes in construction with the introduction of new products that emphasize thermal properties. In 1977, there has actually been a decrease in the use of insulation board sheathing because of inroads by other sheathing products such as the polystyrene and polyurethane foams.[3] The analyst using this or any other model must recognize that changes can occur, and that regardless of a model's past predictive accuracy, altered conditions will necessitate a new look at its assumptions and conclusions. The projections developed in this study are simply estimates of what the quantity and price of insulation board may be if assumptions regarding future housing starts, disposable personal income, etc., materialize.

[3] Information obtained from a letter to the author from the Amer. Board Products Assoc., dated Nov. 16, 1977.

Need for future studies

This study is one of several such studies needed to provide better market information for the various industries that use wood products. There is an urgent need for a concentrated effort to analyze the various hardwood markets, including hardwood plywood, veneer, and lumber. There have been several excellent studies of softwood markets (McKillop 1967, Adams 1977), but no similar studies have been completed (to this author's knowledge) on the major hardwood markets.

LITERATURE CITED

Adams, D.
1977. **Effects of National Forest timber harvest on softwood stumpage, lumber, and plywood markets—an econometric analysis.** For. Res. Lab., Res. Bull. 15, Oreg. State Univ., Corvallis. 50 p.

Barr, A. J., J. H. Goodnight, J. P. Sall, and J. T. Helwig.
1976. **A user's guide to SAS-76.** p. 257-274. SAS Inst., Raleigh, N C.

Christ, C. F.
1966. **Econometric models and methods.** p. 464-481. John Wiley & Sons, New York.

Marcin T.
1972. **Projections of demand for housing by type of unit and region.** U.S. Dep. Agric., Agric. Handb. 428, 76 p.

McKillop, W.
1967. **Supply and demand for forest products—an econometric study.** Hilgardia 38(1):1-132.

Phelps, R. B.
1975. **The demand and price situation for forest products, 1974-1975.** U.S. Dep. Agric., Misc. Pub. 1315, p. 35-85.

Theil, H.
1975. **Applied economic forecasting.** North Holland Pub. Co., Amsterdam. 600 p.

U.S. Bureau of Census.
1950-1974. **Statistical abstract of the United States.** U.S. Dep. Commer., Washington, D. C.

U.S. Bureau of Census.
1954-1972. **Census of manufactures: Vol. II, industry statistics.** U.S. Dep. Commer., Washington, D. C.