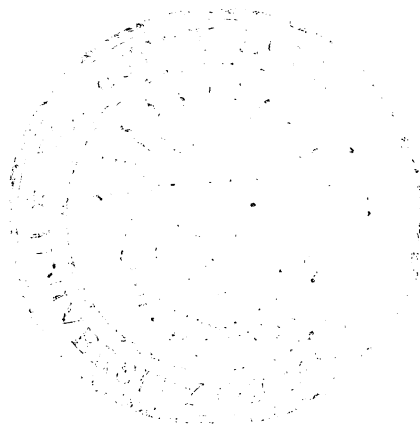Shames, Lee M. *
   Analysis of lumber prices
in the U.S.   Dec.,1942

name now
officially changed
      to James, Lee

AN ANALYSIS OF LUMBER PRICES

IN THE UNITED STATES

by

Lee M. Shames

A Thesis Submitted in Partial Fulfillment of the
Requirements for the Degree of Master of
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Preface

Lumber consumption in the United States expanded rapidly as the nation developed until in 1906 a peak consumption of 45 billion ft. b.m. was reached. Subsequent to 1906 the trend of consumption turned downward, reaching 34 billion ft. b.m. in 1929 and a depression low point of 13 billion in 1932.

The causes of the long historical decline in lumber consumption lie in changes among important influences such as the structure and location of population, consumer preferences, competition of other materials and price factors. This study has singled out price factors for close analysis. Its purpose is to analyze the significant influences on lumber prices and to point out the effect of the resultant prices upon lumber consumption.

In pursuing the latter objective, the writer has emphasized the most important category of the lumber group, i.e., lumber used in construction. The Copeland Report estimated that in 1912, 74 percent of all lumber consumed went into construction; the remainder was utilized for boxes and crates, cars and vehicles, furniture and miscellaneous factory products. In 1928, more

than 70 percent of all lumber was still used for construction. Thus it becomes evident that conclusions regarding the influence of prices on all lumber consumption can be determined chiefly from an analysis of the influence of prices on the consumption of construction lumber alone.

While limiting his thinking largely to construction lumber, the writer recognizes that even this category is too broad for the most satisfactory type of price study. Lumber consists of a multitude of species, sizes and grades coming from most regions and going to all regions; consequently there is a multitude of prices, price policies and effects on consumption to be considered. In attempting to average many diverse patterns into one pattern and speaking usually of lumber rather than each kind of lumber, certain errors have been undoubtedly introduced into the analysis. Nevertheless, in considering the relationships between lumber prices and general and competitive-materials prices, the writer believes it is possible to consider averages rather than particular kinds of lumber and still be able to draw conclusions suitable for wide application.

The writer wishes to acknowledge his deep appreciation to Dean S. T. Dana of the School of Forestry and Conservation for guidance and helpful criticism throughout this study. Acknowledgments for suggestions and

criticisms are also due Prof. O. W. Blackett of the School of Business Administration, W. B. Palmer of the Economics Department and to many other individuals who contributed freely of their time and knowledge.

Contents

List of tables

List of tables (Continued)

List of charts

Chart

Demand, supply and equilibrium price

In a freely competitive market, it has become axiomatic to say prices are determined by supply and demand. Properly understood, this axiom is sound. Producers supply goods to the market, but not often without considering price; nor do consumers generally demand definite amounts of goods without reference to the prices asked for them. Supply and demand determine prices; but prices also are among the factors determining supply and demand.

The demand for a good may be defined as a resultant of the combined subjective valuations of different consumers for that good as modified by purchasing power. Although wants in general are insatiable, any particular want can be satisfied. The more complete the satisfaction of a consumer's wants, the less urgent will be his desire for an additional unit of a particular good. Thus the consumer, by buying the things he wants most, tends to keep the subjective values or marginal dollar's worth of all the goods he consumes equal to each other.

Of course mere desire for a commodity is not demand for it. To be effective, desire must be coupled with

ability to pay. Money income or purchasing power thus has an obvious control over demand. Increased incomes mean more potential consumers and hence the possibility of increased consumption. A lowering of the price of a particular commodity acts in the same way; the number of those able to buy increases, and as a consequence, consumption may increase.

Demand may change independent of price relationships, for consumer wants are subject to influence from changing whims, changing social tastes, the development of new competitive products or the improvement of old competitive products. The exit of buggies and the advent of automobiles on the American scene furnish a classic example of change in demand. Lumber is not so good an illustration, yet its long downward trend in consumption also reflects a change in demand. Much of lumber's market has been lost to competitive materials, and much has been simply lost through changing social habits.

Demand may also change in response to price changes. If the price of a commodity rises, whether due to increases in the cost of production or to arbitrary monopolistic policies, submarginal buyers drop out of the market and a decrease in consumption takes place. On the other hand a lowering of price usually results in the increased consumption of a commodity. Thus there is a relationship between price and the amount of goods purchased which can

be visualized as a demand schedule or curve. The extent to which the amount of goods purchased responds to price changes measures the elasticity of this demand schedule or curve. If the total selling value is less when price is low than when price is high, demand is said to be relatively inelastic. If a lowering of price is attended by a greater total selling value, demand is termed elastic.

The concept of elasticity of demand is useful and most important, but difficult of measurement. Buyer willingness in a given market is expressed at only one price, the market price, and what amount of goods could have been sold at higher or lower prices is not known. This problem cannot be resolved entirely by comparing the quantity of a good sold at one price and time with the quantity sold at another price and time. Demand may have changed in the interim. In this respect as in others, lumber shows itself a complex subject for analysis. No assumption of unvarying demand can be made, for such an assumption would be far from the truth. The problem becomes one of discovering what proportion of a change in lumber consumption reflects the elasticity of demand and what proportion is due to an actual change in demand.

How elastic is the demand for lumber? This is a very difficult question to answer. Strictly speaking, there is not one demand for lumber but thousands of demands. Lumber comprises many species and grades and has many uses.

Consequently lumber has many elasticities, and if these could be added, weighted, and averaged, the result could be properly termed the elasticity of demand for lumber. Such a procedure is manifestly impossible, and it will be necessary in this study to make more general assumptions.

Generally speaking demand is more elastic when the unit of purchase is large and results in a high cost, when the good is a luxury rather than a necessity, when the purchase is made as a result of conscious decision rather than from habit, and when adequate substitutes are available.

Lumber partly meets the above conditions for an elastic demand. Certainly a house is a necessity, but a new one is not, and before a family invests in a new house the total cost (including lumber) will be considered carefully. Much of the consumption of lumber seems habitual, but for some decades lumber purchases have been becoming less habitual, and in many uses, they have been replaced by conscious decision in favor of new, if not better, rival materials.

The amount of goods that will be supplied in a given market at a given time depends, like the amount demanded, on the price. Supply is thought of as a schedule of the number of units of a good that would be offered for sale at different prices. At a given price every seller has the option of selling or waiting for possibly higher

prices--an option which is limited by the perishability of goods and the urgency of the seller's need for money. In connection with lumber, perishability is not usually a pressing factor, but the need for money is. Generally speaking, the financial ability to hold lumber off the market for a hoped-for price rise is not characteristic of the lumber industry.

Current price and estimates of future price condition the rate of lumber manufacture. However, once lumber is ready for the market, it usually goes to market irrespective of price. If demand will not absorb the supply at a price that will pay the costs of production, the lumber will usually be sold at a loss.

Laissez-faire theory assumes that if goods are sold at a loss (in this case lumber), the market will bring about a readjustment in price. Submarginal producers will withdraw from production, thus reducing market supply. If demand remains unchanged, market price will be forced up to a point where it covers the costs of the marginal producer. Similarly, if market price yields high returns to producers, new capital and labor will be drawn into production; supply will increase and, demand remaining unchanged, bring about a fall in price. Laissez-faire theory assumes perfect mobility in the economic system: that capital, labor and enterprise will move freely into more profitable industry and will abandon industry as soon as

it becomes unprofitable. If the factors of production move freely, market price cannot long remain above or below normal price (the price which tends to be established over a period of time and which just covers the cost of production of the marginal producer).

Under actual conditions, the supply of lumber does not adapt itself to price variations as perfectly as laissez-faire theory would visualize. There is a strong tendency to lag in the upward adjustment of market price to normal price. When prices have been high and favorable for profits, new units, particularly of the small portable type, have been quick to come into production and swell the supply of lumber on the market. For this reason prolonged periods of large profits in the lumber industry are difficult to locate. But on the other hand, when profits are low or actual losses are common (and the lumber industry claims this has been the usual state of the industry in recent decades), supply has been slow to adjust itself to declining demand.

Adjustment is secured in the supply of lumber from the small portable mills; their owners may go back to farming or some other occupation. The large mills, however, cannot adapt themselves so readily to market conditions. They are frequently burdened with excessive overhead costs-- big investments in mill and standing timber. Even when unprofitable they have frequently continued at a loss to

supply lumber to a depressed market. Their lack of
capital makes it necessary for them to sell lumber to
obtain funds with which to meet their obligations. It is
likewise necessary for them to operate continuously for
the same reason. Some mills have found it cheaper to con-
tinue operation, though probably at a reduced rate, in
order to maintain their organizations. The effect of
such cumulating lumber stocks in the face of declining
demand has been inevitably to force prices downward.

The overload of timber dates back to the speculative
timber purchases made when it was supposed a national
timber famine was approaching. The famine never material-
ized, but the big blocks of timber acquired in anticipa-
tion of the event still require annual expenditures for
interest, fire protection and taxes. Fixed charges are
also swelled by the excess capacity of the industry.
Owing partly to the migrations of the industry and
partly to the expectations of a large sustained demand
for lumber, the physical capacity of the industry has been
enlarged for an output far beyond the demand even in peak
years of production. Accepting the National Lumber Manu-
facturers' Association[1] rating of 1929 capacity at over
53 billion ft. b.m., the lumber industry operated at
only two-thirds capacity in 1929.

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[1]National Lumber Manufacturers' Association. Chart-
ing the American Lumber Industry, p. 13, Washington. 1937.

These factors--the large investment in mill equipment, the heavy overload of standing timber and the excess capacity of the industry--explain the lag in the downward adjustment of lumber supply to falling prices. They create a heavy fixed charge which can be met only with a large output. Operating costs remain fairly constant per unit of output in the lumber industry. Fixed costs, however, remain the same in total amount regardless of output, and the share of fixed cost that must be borne by each unit of product decreases as the total output of the mill is expanded.

If lumber prices drop without a corresponding decrease in manufacturing costs, a formerly profitable mill may become submarginal. According to the workings of a perfectly competitive system, this mill would drop out of production. Its capital would seek other employment. But a mill and its timber holdings represent an investment of a highly specific nature. It is suited only to the production of lumber. If the attempt to liquidate such an enterprise were made to salvage the capital for other types of production, huge losses would be inevitable. Therefore, unless financial failure forces the end of operations, production will be continued at a loss.

From the viewpoint of the producer it is better to cut prices than to shut down as long as the price received is more than the unit operating cost of manufacture. For

as long as the unit operating cost is exceeded, some
contribution to fixed expense is made which could not be
obtained by shutting down. The effect on the industry as
a whole, however, is the depression of prices and the
consequent extension to normally supermarginal producers
of the pressure to liquidate.

This description of the supply of lumber to the market
emphasizing the tendency toward depression of prices should
not convey the impression that lumber prices remain pre-
dominantly low. Other factors in supply which will be de-
scribed in subsequent discussion tend to raise prices, and
their influence is greater, for the historical trend in
lumber prices relative to other commodities has been up-
ward for nearly a century.

No brief describing huge profits in the lumber industry
is intended. Lumber prices can and do rise without being
reflected in greater profits. The costs of production have
been swelled by such items as greater inaccessiblity of
timber and larger transportation charges to markets; and
inefficiencies in the distributive system have been re-
sponsible for further price increments without necessarily
being reflected in profits.

It is evident that a discussion of the free operation
of supply, demand and price adjustments in a perfectly com-
petitive market can serve only as an introduction to a price
study of the lumber industry. In actual operation there are

many modifying and limiting factors. In the following sections, an attempt is made to analyze the important influences on the price of lumber and to describe the reciprocal influence of price on the consumption of lumber.

The trend of prices

Index prices of lumber, all-building materials and all commodities since 1860 are shown graphically in chart 1 (values are listed in table A-1). Price indexes are all expressed in terms of 1860 prices.[1]

It will be observed that throughout the period under study the movements of the prices of building materials approximate general prices much more closely than do lumber prices. In fact, if lumber were eliminated from "all-building materials," the prices of the latter would approximate general prices much more closely than is evident from the diagram, and correspondingly, would display an even greater divergence from the trend of lumber prices.

The fall from Civil War peak prices to 1879 left lumber at a considerably higher level relative to 1860 prices than in the case of all-building materials prices and general prices. From 1879 to 1897, lumber prices showed practically

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[1]In the U. S. Senate Finance Committee Report on Wholesale Prices, Wages and Transportation, 2d Sess., 52d Cong., Vol. 3, p. 28, is found the following quotation: "The year 1860 presents all the aspects of a normal year, while in the following year some prices already manifested the disturbances due to the unsettled state of national affairs. . . . These considerations have led us to the belief that the year 1860 is perfectly adapted to serve as base of the analysis."
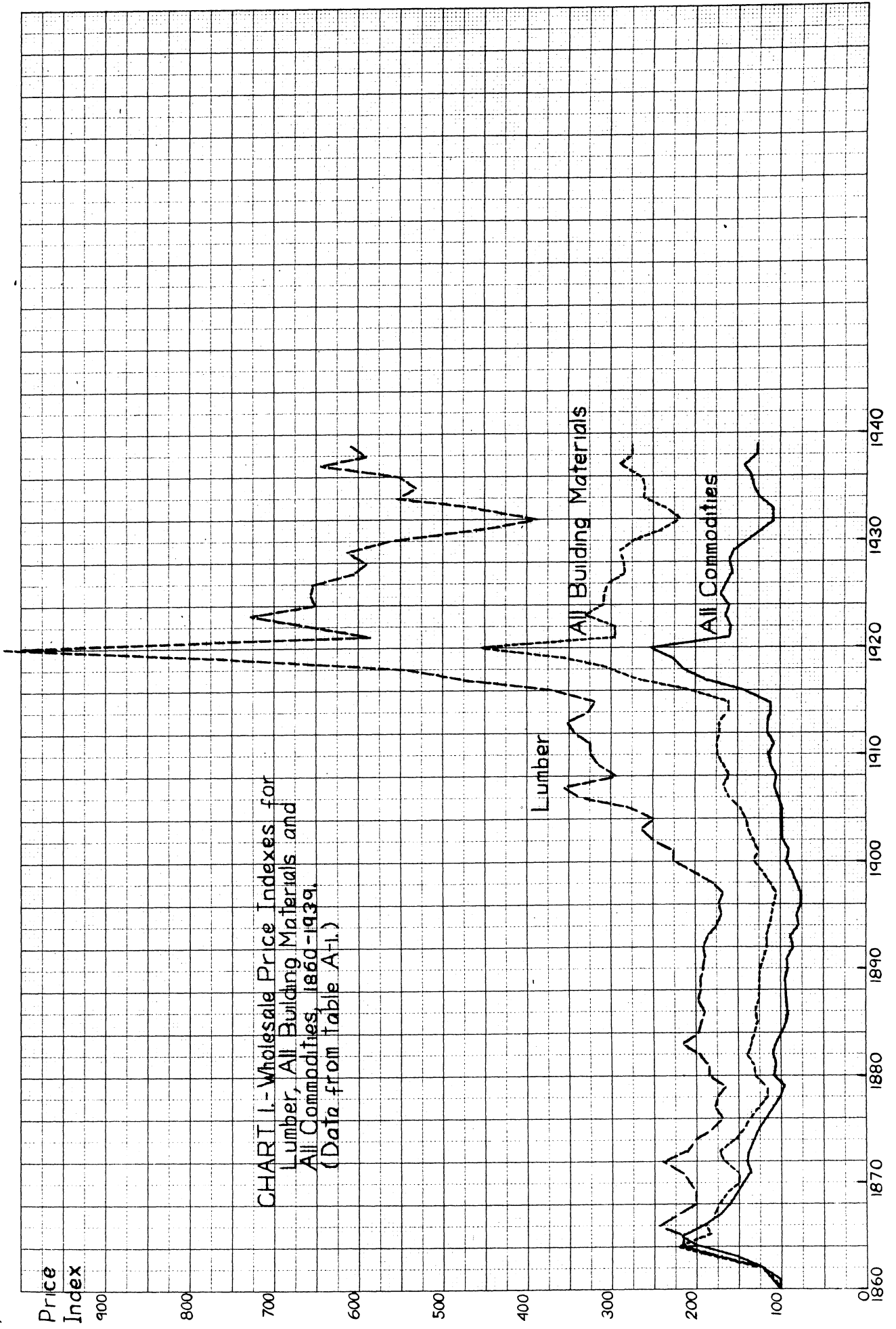
CHART I.- Wholesale Price Indexes for Lumber, All Building Materials and All Commodities, 1860-1939. (Data from Table A-1.)

Price Index

Lumber

All Building Materials

All Commodities

900
800
700
600
500
400
300
200
100
0

1860 1870 1880 1890 1900 1910 1920 1930 1940

no net gain, and in fact declined through most of the period; but during this same period, building material and general prices dropped in a more marked degree. The resulting relative rise in lumber prices is more easily seen in chart 2 where the ratios of lumber price indexes to all-building materials are shown (values are listed in table A-2).

The subsequent record of price indexes not only shows a startling continued increase of lumber prices relative to 1860, but it shows a constant upward trend of increasing divergence from all-building materials prices. Again, this is more easily seen by reference to chart 2 where it is shown that by 1920 lumber prices had risen nearly 2.4 times more than all-building materials prices. This great relative increase in lumber prices becomes much more significant when it is recalled that lumber comprises a prominent proportion of the group of items termed "all-building materials."

From 1920 to 1939, the secular trend of lumber prices no longer appears upward, but this period has been marked by two severe post-war depressions which serve to distort and obscure the normal trends. However, whether the ratio is increasing or not, there is no obscuring the fact that lumber prices have remained very high relative to all-building materials and general prices. Even allowing for errors involved in the construction of price indexes over
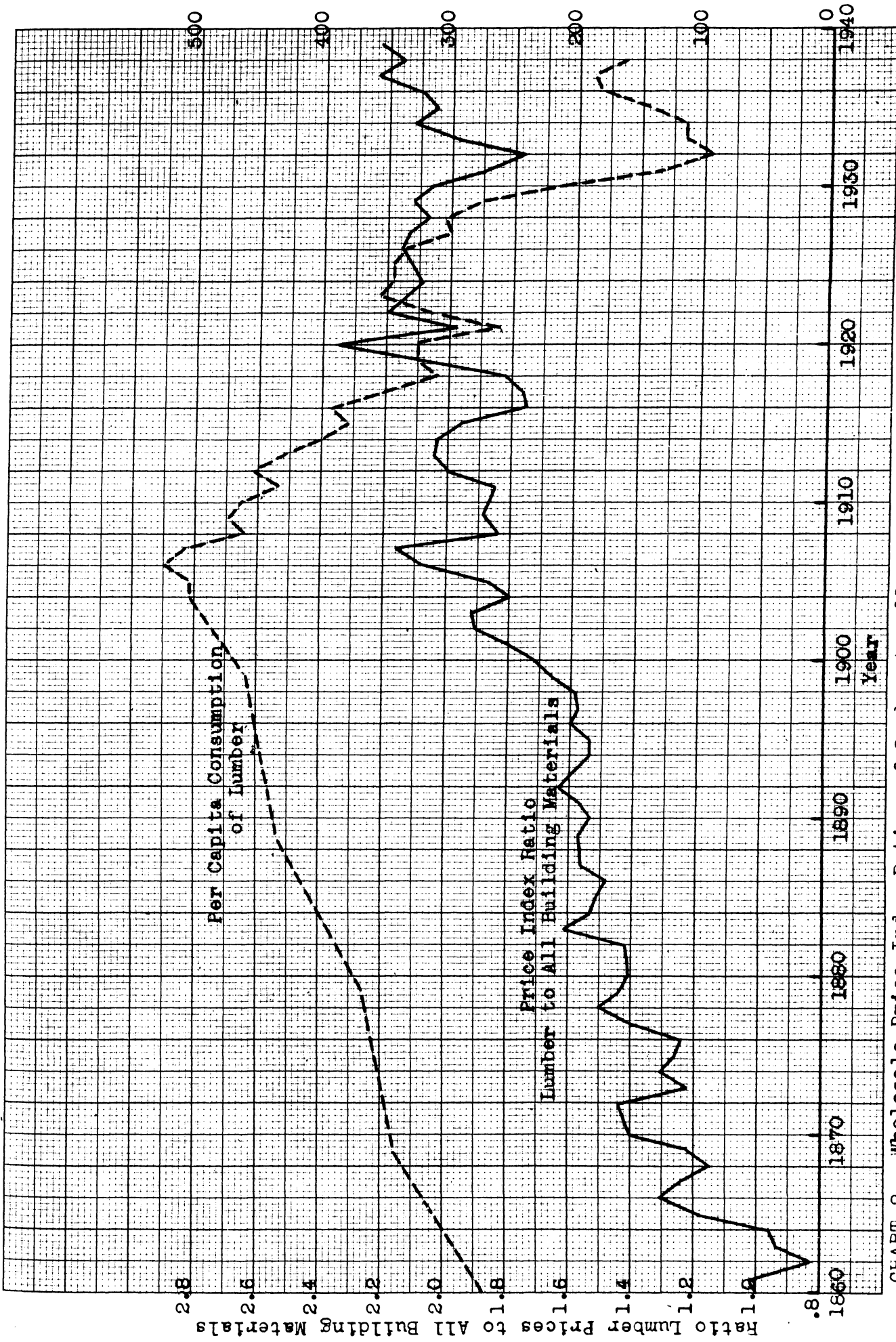
CHART 2.- Wholesale Price Index Ratios of Lumber to All Building Materials and Per Capita Consumption of Lumber, 1860-1939. (Data from table A-2).

a long period of years, the differences between lumber
and other materials are unmistakable. In 1939 general
prices were 26 percent higher than in 1860, all-building
materials (including lumber) were 174 percent higher;
and lumber prices alone were 511 percent higher.

Factors influencing lumber prices

Costs of production

Historically, the unfavorable earnings record of the
lumber industry suggests little immediate relationship
between costs and prices. As pointed out in the intro-
ductory discussion, market price frequently does not cover
the total cost of production, and mills will continue to
produce lumber even if only a partial contribution can be
made to fixed costs. On the other hand, normal price,
which is the price that tends to be established over a
long period of time, must pay all the costs of production
of the marginal producer. For if the costs cannot be met,
a number of producers will drop out until equilibrium is
established again at a higher price for a smaller output
of the industry.

Tables A-3 and A-4 present detailed vertical cross-
sections of the costs incurred in lumber production from
the stump to the consumer. While the data apply to par-
ticular markets, for particular species and a particular
time, they are indicative of the general structure of the
costs met in the manufacture and sale of lumber. By far,
the most important costs of production in the wholesale

price of lumber are transportation and logging and milling.
In the following sections, these items and standing timber
will be analyzed for their probable effect in causing the
relative rise in lumber prices since 1860.

Transportation costs

In analyzing the role of transportation costs as a
factor in the price of lumber, two aspects must be con-
sidered--freight rates and hauling distance.

The structure of freight rates has grown up haphaz-
ardly; it is complex and exhibits many incongruities and
inconsistencies. However illogical it may be, this struc-
ture is so fundamental to the industries that have grown
up around it that even slight changes may seriously upset
the existing industrial pattern. For example, a rise in
freight rates applied relatively alike to all regions would
tend to shut out lumber from the distant sources whose
price contains a large element of transportation costs; a
fall in such rates would tend to act to the disadvantage
of lumber from the near sources whose price contains a
small element of transportation costs. The effect of an
advance in Southern pine rates to Midwestern markets,
while Douglas fir rates to the same markets remained
constant, would react to the benefit of Douglas fir pro-
ducers in meeting and besting Southern pine competition;
on the other hand, if the Douglas fir rates were advanced

and Southern pine rates held constant, the advantage
would obviously go to the Southern pine producers.

While the lumber industry is greatly interested in
the relationships of the freight rate structure, this
study is concerned more with pointing out the influence
of the whole rate structure upon the average price of
lumber.

Goodman[1] stated that advances in transportation costs
of lumber up to 1920 were due to increases in rates more
than to the increase in the distance from mill to consumer.
He cited the sharp advances in freight rates from 1918 to
1920. The transportation rate on Southern pine to the
Chicago market was advanced from $6.50 per M ft. b.m. to
$7.50 to $10. Similarly the rate on Douglas fir to Chicago
went from $16.50 per M ft. b.m. to $18 to $24. While rate
advances have undoubtedly been an important element in the
costs of lumber transportation, it appears that Goodman
overstated the case.

The trend in lumber freight rates since 1887 (the
year the Interstate Commerce Commission was established)
is well illustrated in the following data which give the

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[1]Goodman, Robert G. The Price of Lumber, pp. 15-16,
Yale University, School of Forestry, Lumber Industry Series
No. 1. 1921.

rates from Seattle to Chicago (Douglas fir) and from

Alexandria, Louisiana, to Chicago (Southern pine):[1]

<div align="center">

Lumber rates
(cents per 100 pounds)

To Chicago, Illinois, from

</div>

Year	Seattle Washington	Alexandria Louisiana
1887	60	22
1893	50	..
1899	..	23
1900	..	24
1903	..	26
1908	55	..
1917	..	$26\frac{1}{2}$
1918	60	$31\frac{1}{2}$
1919	..	$32\frac{1}{2}$
1920	80	44
1921	73	..
1922	72	$39\frac{1}{2}$
1936	78	..

The above tabulation shows that the largest spread

in rates occurred between 1893 and 1920. The Seattle rate

advanced 60 percent while the Alexandria rate advanced 100

percent. During the same period, 1893-1920, general com-

modity prices rose 186 percent. It is obvious, then,

that lumber freight rates have not kept pace with the

[1]Moore, A. G. T. Transportation as a Factor in Forest
Conservation and Lumber Distribution, pp. 18-19, 26, Yale
University, School of Forestry, Lumber Industry Series No.
12, 1937.

advance of general prices. Compton[1] has pointed out that the transportation costs per ton on lumber are greater than on any of its principal competitors. While this condition is true, the reason should be sought in the increasing hauling distances for lumber, not in freight rate advances.

Furthermore, changes in freight rates are not reflected wholly in lumber prices, but in part and conversely they are reflected in stumpage prices.[2] For example, if lumber rates should be advanced generally and relatively alike over the whole country, the immediate effect would be a decrease of manufacturing profit, a contraction of output and a decreased demand for stumpage. The slack in stumpage demand would result in a decline of stumpage prices, and coincidentally, the contraction in lumber output would force market price upward. The margin of the advance in rates, which appeared first as a manufacturers' loss, would tend to be divided between the lumber buyer in higher lumber prices and the timber seller in lower stumpage prices.

[1]Compton, Wilson. Statement in Ex Parte 103 Before the Interstate Commerce Commission in the Matter of Increased Rates and Charges, p. 12, National Lumber Manufacturers' Association. 1931.

Compton analyzed the freight revenues per ton for lumber and its principal competitors for the years 1928, 1929 and 1930. He found the transportation costs on lumber "from two to four times the cost on steel; two and one-half times the cost on cement; three and one-half times the cost on common brick; twenty-five percent greater per ton than on competing pulp boards and wall boards."

[2]Stephens, George A. Determinants of Lumber Prices, p. 292, The American Economic Review, vol. 7, no. 2. June, 1917.

Although freight rate advances must be dismissed in seeking causes of the divergence of lumber prices from general prices, hauling distance, the other element in transportation costs, appears as the factor which most clearly explains the divergence.

In this connection it is difficult to understand the conclusion of the Bureau of Railway Economics' report, Commodity Prices in Their Relation to Transportation Costs, that because average mill prices of lumber changed irregularly from month to month in the period 1924-1926 between species, grades and sizes and within the same species, while freight rates remained substantially the same, "it seems reasonable to conclude, therefore, that other factors affecting f.o.b. mill prices of lumber are of greater importance than transportation costs."[1]

The transportation costs referred to are part of the wholesale or retail price, and not necessarily the mill price. But aside from this technicality, it is not reasonable to conclude that other factors are more important than transportation costs in affecting prices. The great diversity and divergence of lumber prices result from a composite of many factors, and even if transportation costs were the most important factor in this composite, it could not not be presumed that prices of all lumber species, sizes

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[1]Bur. Railway Economics. Commodity Prices in Their Relation to Transportation Costs, p. 5, Bul. No. 30. June, 1928.

and grades would move in the same direction and by the
same amount as transportation costs.

The actual great importance of transportation costs
as an element of price can be surmised from the close
historical correlation between shifts in the regional pro-
duction of lumber (see chart 3) and changes in lumber price
levels.

The first great rise in lumber prices relative to
general prices took place between 1860 and 1872. Lumber
prices made a net gain of 140 percent while all commodities
advanced only 39 percent. This occurred at a time when
lumbering was losing its local character and becoming a
national industry. The centers of production of the North-
eastern states failed to meet the new demands made upon them
and the lumber industry, in the course of its expansion,
began to move to more distant interior points.

In the "seventies" the center of lumber production
moved into the pineries of the Lake States. The constantly
increasing transportation costs were reflected in the growing
divergence of lumber and general prices. An ameliorating
factor was the spread of population westward. This resulted
in a reduced haul to market for the lumber used by a larger
part of the consuming public. The westward movement of the
center of population also meant that other commodities faced
longer hauls, and hence, increased transportation costs.

Perhaps this early period should not be used for close

CHART 3.— Lumber Production by Regions, 1869-1937.
(Data from A. H. Pierson, Lumber Production, 1869-1934, U. S. Forest Service, 1936;
and U. S. Bur. Census, Forest Products: Lumber, Lath and Shingles, 1935-1939.)

Million
Board
Feet

16

14

12

10

8

6

4

2

0

Note: After 1904 production
figures are 5-year averages
plotted at midpoints of periods.

Southern

Pacific

Lake

Northeastern

1870   1880   1890   1900   1910   1920   1930
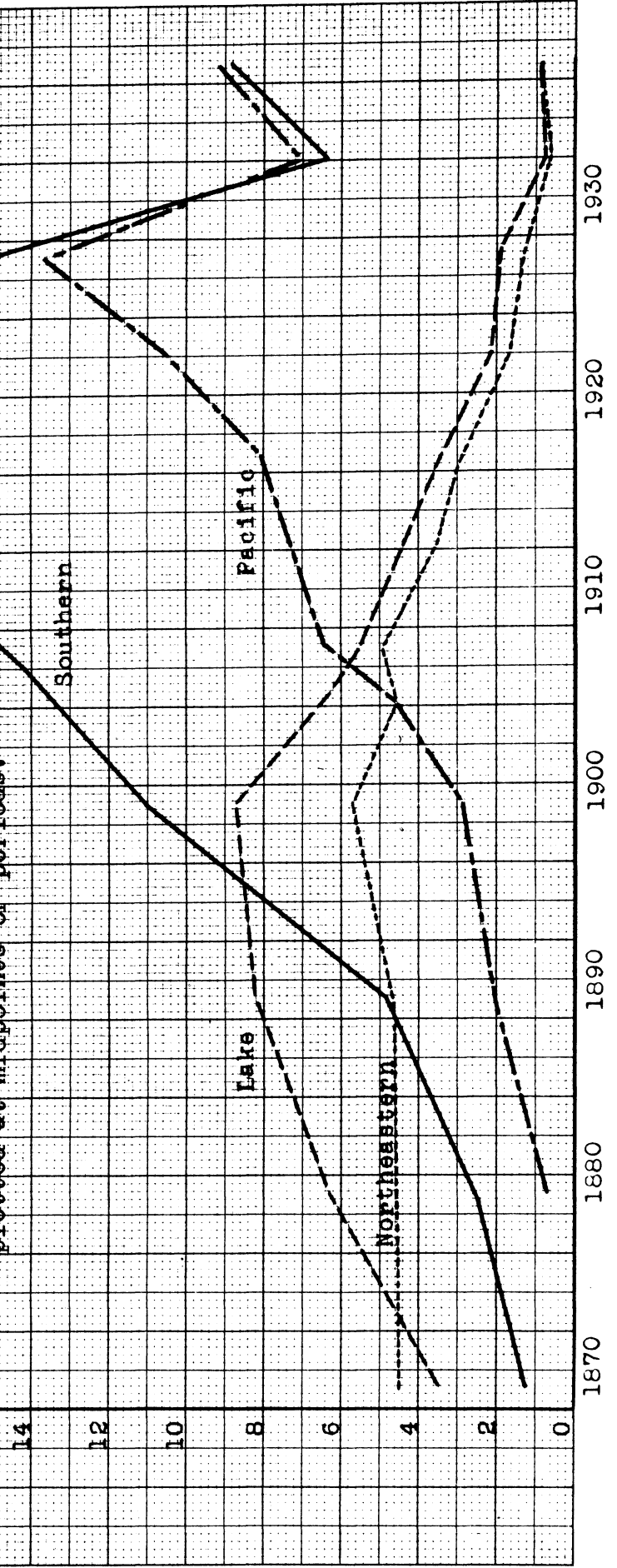
analysis of lumber prices due to the abnormality of the post-Civil War years. Nevertheless the coincidence of a sharp relative gain in lumber prices and the first great shift in the central source of lumber supply involving much-increased transportation costs suggests a close correlation between the two processes.

The rapid expansion of the lumber industry during the "eighties," both in the Lake States and the South, with continued production in the Northeast provided a sharp degree of interregional competition which served to lessen the increasing divergence of lumber prices from general prices. But during the "nineties," the center of production moved definitely to the South. With this shift, lumber prices began another rapid rise to a new level. Significantly, the greatest relative rise in pre-World War lumber prices took place about 1897 to 1907, the period in which the center of lumber production was shifting most rapidly to the South and partly to the Pacific Coast.

The third great rise in lumber prices both relatively and absolutely began with the World War. Lumber prices rose phenomenally far beyond the point necessitated by the costs of production, but when the bubble broke in 1921, lumber prices still remained at a new high level which reflected the vastly increased transportation costs of the lumber production which was shifting to the West Coast. In the early "thirties," partially as a result of the

exhaustion of the more accessible timber supplies in the South, West Coast production caught up and edged into the lead.

Actual trends in transportation costs are not readily available for illustrating the full price significance of shifting source of lumber supply. Some data can be presented, however, which are indicative of the role shifting source of supply has played in the price of lumber.

In the Eastern markets, between 1840 and 1860 when the Northeast still had abundant supplies of timber, freight cost averaged about $1 per M ft.b.m. Subsequent supplies which came from the Lake States to the Eastern market in increasing volume faced a freight charge of about $5 per M. After 1900 pine from the Gulf States expanded in the New York market although transported at a cost of $6 to $9 per M.[1] Western lumber arrived in volume during the "twenties" at a freight cost of $10 to $20 per M. By 1934 the freight charges on the principal Western and Southern species to the New York market formed a substantial part of the final retail prices:

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[1]U. S. Forest Service. Timber Depletion, Lumber Prices, Lumber Exports, and Concentration of Timber Ownership, pp. 40-43, Rept. on Sen. Resolution 311. June 1920.

Lumber in New York market, 1934[1]

	Douglas fir water	Southern pine	Western pine	Oak
Freight cost	$10.20	$11.10	$16.79	$17.75
Retail price	43.24	54.21	60.00	71.95
Percentage retail price absorbed by freight	24	20	28	25

In the Midwestern markets, freight costs have played a similarly important role. Before 1900 the Middle West supplied its own markets. Freight costs were low; lake rates to Chicago, for example, ranged from $1 to $2 per M ft. b. m. But as an increasing volume of lumber had to come from the South and later from the West, costs rose steadily. This is well illustrated by table 1 which summarizes data collected by the U. S. Forest Service from the purchase records of a number of large line yards in Southern Minnesota.

Summarizing wholesale price data in Midwestern city markets for the period 1908-1915, Butler[2] reported an average selling price of $23.94, of which freight took $6.78 or 28 percent. As supply centers to the Middle West continued to move South and West, freight costs

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[1]Derived from table A-3.

[2]Butler, O. M. The Distribution of Softwood Lumber in the Middle West, p. 29, U. S. D. A. Rpt. No. 115, Studies of the Lumber Industry, Pt. VIII, Wholesale Distribution. 1917.

Table 1

Average retail lumber prices and transportation
costs in southern Minnesota, 1905-1919[a]

Year	Average retail selling price		Average transportation cost		Percent of retail price absorbed by transportation
	Dollars per M	Percent increase	Dollars per M	Percent increase	
1905	$26.03	0.0	$ 3.25	0.0	12.5
1906	31.68	21.6	4.25	30.8	13.4
1907	34.64	33.0	4.00	23.0	11.5
1908	31.85	22.3	4.00	23.0	12.6
1909	30.43	16.9	4.50	38.5	14.7
1910	31.71	21.8	4.75	46.0	15.0
1911	31.17	19.6	4.75	46.0	15.2
1912	30.75	18.1	5.75	77.0	18.7
1913	32.28	23.9	6.75	107.8	20.9
1914	31.83	22.2	8.00	146.0	25.1
1915	30.44	16.9	8.50	161.5	27.9
1916	31.43	20.7	7.50	130.5	23.9
1917	38.58	48.0	8.00	146.0	20.8
1918	46.51	78.6	10.75	231.0	23.1
1919	54.42	109.0	11.75	262.0	21.6

[a]Determined from purchase records of a number of
large line retail yards.

Source: U. S. Forest Service. Timber Depletion, Lumber
Prices, Lumber Exports and Concentration of Timber
Ownership, p. 53, Rpt. on Sen. Resolution 311. June
1920.

continued their rise. By 1934 these costs and their

share of the final retail prices of the principal

species on the Chicago market could be summarized as

follows:

Lumber in Chicago market, 1934[1]

	Douglas fir	Southern pine	Western pine	Oak
Freight cost	$20.16	$11.40	$11.73	$12.75
Retail price	55.69	53.33	51.17	62.91
Percentage retail price absorbed by freight	36	21	23	20

Average transportation costs rising at least 1,000 percent in both the East and the Middle West during the periods recorded above are obviously a very important element in the trend of lumber costs. That this element in the cost of lumber production has been closely correlated with the divergence of lumber prices from general prices has also been demonstrated. However, a word of caution is necessary. It must not be assumed that a change in transportation costs is transferred wholly to lumber prices. As was pointed out in the discussion of freight rates, a change in transportation costs is transferred in part and conversely to stumpage prices. The margin of the cost advance or decline tends to be divided between lumber prices and stumpage prices.

It may be that the long trend of advancing freight costs due to the shifting of production to centers more remote from the big consuming markets is at an end. As

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[1]Derived from table A-4.

second-growth Southern pine enables the South to further
its advantage over the West in supplying closer Eastern
and Midwestern markets, the average transportation cost
may be decreased. Table 2, showing the domestic distribu-
tion of lumber from producing centers to markets in 1928,

Table 2

Domestic lumber distribution, 1928, 1934 and 1936

Class of movement	Percentage of total lumber		
	1928	1934	1936
Intrastate	32.5	40.6	45.0
Short hauls[a]	17.6	18.1	15.5
Long hauls[b]	30.8	24.3	20.5
Transcontinental[c]	19.1	17.0	19.0
Total	100.0	100.0	100.0
Total volume in million ft. b.m.	33,887	14,177	22,904

[a]To adjoining states and interstate within groups.

[b]South to Northeast, Central, Lake and Prairie;
Pacific to Rocky Mountain; Central to Northeast and Lake.

[c]Pacific and Rocky Mountain to Northeast, Central
and Lake; Pacific to Prairie.

Source: National Lumber Manufacturers Association. Lumber
Industry Facts, p. 25, Washington, 1939.

1934 and 1936, does not reflect the expected gain of
Southern production at the expense of the Far West, but
it does show a considerable gain in the percentage of

lumber production for local markets. This latter develop-
ment was important enough to bring the 1936 lumber freight
bill per M ft.b.m. below that of 1934.

Logging and milling costs

National Recovery Administration statistics in 1934
showed logging and milling costs per M ft.b.m. divided
almost equally between labor and all other items. These
data are summarized from table A-3:

	Douglas fir	Southern pine	Western pine	Oak
Logging and milling				
Labor	$ 5.11	$ 7.58	$ 6.35	$ 9.27
Other costs	6.58	6.13	7.77	6.91
Total	$11.69	$13.71	$14.12	$16.18

In the past, labor was probably of even greater rela-
tive importance; nevertheless it is doubtful that wage
rises have been a factor contributing to the relative in-
crease in lumber prices. Statistics from the U. S.
Department of Labor show that wages for chopping and sawing
in the woods have tended to lag behind wage increases in
sawmills and that both have tended to lag behind general
wage increases. From 1890 to 1912, the Department indi-
cated an index rise from 101.9 to 131.5 for logging and
milling wages and an index rise from 99.3 to 145.9 for
general wages (see table A-5).

The efficiency and productiveness of woods and mill labor is more difficult to evaluate. Bryant[1] stated that during the last 3 decades the efficiency of woods and mill labor decreased from one-third to one-half, chiefly as a result of a decreasing percentage of skilled workers and an increasing indifference toward doing skilled work. But whether lumber manufacture has suffered more in this respect than other industries is a matter of conjecture. In the absence of supporting data, it cannot be assumed safely that the efficiency of labor in lumber manufacture has declined to a greater extent than in other industries.

To attempt to approximate logging and milling cost trends by subtracting average stumpage prices from mill prices of lumber is an almost hopeless task. This method would be quite useful if profits followed a known or regular course, but mill prices have fluctuated widely in response to varying market conditions (see table A-7). Periods of large profits have alternated with periods of no profits or actual loss, but little is known regarding the actual magnitude of these industry profits or losses.

However, after allowing for stumpage and alternating profits and losses, the upward trend of mill prices since 1889 has obviously been steeper than the upward trend of general prices. It is reasonable to conclude, therefore,

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[1]Bryant, Ralph C. Lumber, p. 162, New York, John Wiley and Sons. 1938.

that logging and milling costs taken together have had an
influence similar to transportation in contributing to the
relative rise of lumber prices.

Separate statistics for logging and milling costs
are not available except for recent years and are insuf-
ficient to provide a basis for determining historical
trends. A rough analysis only can be made. Table A-8
attempts to approximate logging costs by subtracting
stumpage prices from log prices and milling costs by
subtracting log prices from the mill prices of lumber.
The resulting trends from 1900 to 1934, as might be ex-
pected, are very erratic. Their most striking feature is
their fluctuation. Cost fluctuations are diminished
somewhat by adjusting them for the purchasing value of
the dollar. The resulting trends must still be interpreted
with reservations, but they do indicate a large rise in
logging costs and a slight decline in milling costs.

That logging costs have risen rapidly is not surpris-
ing. Logging has moved progressively into areas of
greater inacessibility, rougher topography and smaller and
more defective bodies of timber. For example, in a report
of logging costs in the Pacific Northwest in 1923, the
U. S. Tariff Commission[1] listed the average costs of

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[1]U. S. Tariff Commission. Logs of Fir, Spruce, Cedar,
or Western Hemlock, p. 15, Report to the President of the
United States. 1929.

falling and bucking at $1.55 per M ft.b.m., yarding and loading at $3.66 and railroad haul to tidewater at $4.56. It is interesting to note that while earlier logging took place almost exclusively in the immediate vicinity of the mills, in 1923 the average cost of hauling to mill was nearly as much as the total for falling, bucking, yarding and loading logs.

Stumpage costs

Stumpage or standing timber represents a cost to the owner. To the original purchase price are added carrying costs such as taxes and fire protection, all compounded at a standard rate of interest to the present. The total cost thus computed represents the price below which the owner does not wish to sell, but theoretically it does not express the realization value of stumpage at least not in the case of virgin timber. If the owner is forced to sell for less than his computed total cost, he is not necessarily receiving less than the economic value. He has simply made a poor investment.

The value of virgin timber is distinct from that of recognized costs of production. The wages of logging and milling, the return to working capital and the reward to management are in the long run fixed by competition between industries and therefore in the long run these shares cannot differ greatly between industries competing for

labor, capital and management. The value of steel
equipment, for example, depends only in very small part
upon the use of steel equipment in lumber manufacture.
But the value of virgin timber is derived from the value
of the products into which it is converted; it represents
the margin between the price of the final product and the
costs required to make this product. If the product is
lumber, the costs include logging, transportation, sawing,
finishing and piling, and a fair percentage for risk. Sub-
tracting these costs from the anticipated price of lumber
establishes the theoretical value of stumpage.

The foregoing analysis would indicate that since the
cost of virgin timber is derived from the price of lumber,
the cost of virgin timber does not influence the price of
lumber. Such a conception would be true if it is assumed
that cost and speculative values have no influence in
determining the supply of stumpage. This is the assump-
tion made by Marquis in his Economics of Private Forestry[1]
where in discussing the value of free gifts of nature like
land and virgin timber, he states that they "are made
available without the expenditure of effort or cost, and
cost has no part in determining their supply or value."

Marquis' view conforms with accepted economic theory
and no serious quarrel with it is sought. However, an

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[1]Marquis, R. W. Economics of Private Forestry,
p. 27, New York, McGraw-Hill, 1939.

examination of stumpage prices in the past suggests more than a completely passive role in their relationship to lumber prices. The price paid for stumpage has frequently exceeded the margin indicated by costs of production and the price of lumber.

Speculation has had an important place in the development of our natural resources. Vast fortunes have been made in America by buying natural resources when they were cheap and holding them until they had increased in value. Standing timber has been only one among many resources treated in this manner.

Kirkland[1] showed Douglas fir stumpage values increasing from $0.10 to $2.50 per M. ft.b.m. in the 25-year period preceding 1916. Part of the rise reflected an actual increase in value; part reflected speculative influences. A good case can be made for claiming that part of the price rise due to speculation had some beneficial effect. Kirkland summarized it as follows:[2]

> Low value means lack of care of the resource and wastefulness in its use. Timber, magnificent as it is in the Pacific Northwest was not considered worth protecting till after the rapid rise of values ending about 1907. Since that time the present splendid protective system has been built up. . . . So long

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[1]Kirkland, Burt P. Continuous Forest Production of Privately Owned Timberlands as a Solution of the Economic Difficulties of the Lumber Industry, Jour. Forestry, p. 35, vol. 15, no. 1. Jan. 1917.

[2]Ibid., p. 31.

as timber is cheap only the cream of it is taken from the woods. The rest remains to be destroyed by fire.

But while it no doubt served useful purposes, speculation had other aspects not entirely beneficial. Most important was the encouragement it gave to the withholding of timber supplies from the market. This is understandable, for as long as it was believed a timber famine would develop, lumber prices were expected to soar and stumpage prices to follow a similar trend. Thus, stumpage that would have been supplied to the market in the absence of speculation was held back from immediate use in anticipation of further price rises. Such withholding of timber from the market had the effect of advancing the price of lumber.

In recent decades, with the dispelling of the theory of timber famine, the effect of speculative stumpage values on the price of lumber has changed. Stumpage, bought at speculative prices, could no longer be disposed of on the same basis. Owners who had paid too much for standing timber simply had to recognize another element in their burden of overcapitalization. As Compton[1] states it:

> prices as high as $2.00 to $2.50 a thousand feet have been actually paid for western timber which cannot economically be cut for forty or fifty years to come.

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[1]Compton, Wilson. Price Problem in the Lumber Industry, American Economic Review, p. 596, vol. 7, no. 3. September 1917.

Many speculators sold out while stumpage prices were high, leaving an overcapitalized fixed investment for later owners to struggle with.

Excessive fixed costs to the lumber industry have resulted from several factors--heavy investment in mill equipment, excess capacity of the industry and overload of standing timber. Speculative stumpage values and consequent higher taxes may not loom as the most significant elements in the total overhead of the industry, but insofar as they have added to excessive overhead, they have exerted pressure to increase lumber production. This pressure has been particularly strong in periods of depression.

Where speculative stumpage values have exerted some pressure toward liquidation, the supply of lumber on the market has been increased, and hence, the price of lumber forced downward. This influence of stumpage value on lumber price in the past should not be overestimated, but at least since the dispelling of the theory of timber famine, it has grown in importance.

As Marquis[1] points out, the value of stumpage produced consciously is a true cost of production. To the timber farmer the forest is not a free gift but the result of measurable cost. The value of lumber is still the most important determinant of the demand for stumpage, but cost affects the supply of timber on the market, and

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[1]Marquis, R. W. op. cit., p. 28.

through its influence on supply, cost affects the price of
lumber.

Second-growth has not been the important part of
stumpage supply in the past. As long as virgin forests
supplied the bulk of timber, the value of stumpage cor-
responded to the value of virgin timber. As a very minor
source of supply, stumpage grown at a cost could not com-
mand a higher price than virgin timber. The situation
may be expected to change in the future since timber farm-
ing will eventually provide the bulk of stumpage. But in
analyzing the influence of stumpage prices in the past,
the influence of timber grown at a cost can be almost com-
pletely discounted.

Most second-growth timber has been volunteer growth.
Like virgin timber it has been a free gift of nature, and
the cost of retaining ownership has included taxes, interest
and protection just as in the case of virgin timber.
There has been no cost other than that required to preserve
the investment. It might be argued that if stumpage prices
failed to cover such minimum costs of ownership, timberlands
would be abandoned to public ownership. Such timberlands
would not disappear. They would continue their growth
indifferent to their ownership, and when sold, their value
would be determined in the same way as that of virgin
timber, as the margin between lumber prices and the costs
of production.

Table 3 lists the average annual prices of the sales of stumpage in the United States for the period 1900-1934. Averaging broad differences between regions and species, the trend of actual prices was upward until 1927 and then declined to pre-World War levels. When stumpage prices are adjusted for the purchasing power of the dollar, the trend appears in a somewhat different light. Stumpage prices rose rapidly to 1911, declined subsequently to 1920 and rose again to 1934.

Viewing the period broadly, stumpage prices rose more rapidly than general prices. The relative rise of stumpage prices was even greater than that indicated since the process of removing the highest quality timber first has meant a declining average quality of standing timber through the years. The sharpest rise in stumpage values took place between 1900 and 1911. Even when prices in this brief 11-year period are adjusted for the purchasing value of the dollar, they indicate a remarkable rise of nearly 300 percent. Part of this rise, perhaps a large part, was due to speculative influences. Its significance, from the viewpoint of this study, lies in the fact that while stumpage prices were rising speculatively, timber was withheld from the market in the hope of obtaining still higher prices; as a consequence, through the competition of demand, the price of lumber was bid upward.

Table 3

Actual and adjusted[a] average annual prices of

stumpage in the United States,1900-1934

Year	Price per M ft.b.m.		Year	Price per M ft.b.m.	
	Actual	Adjusted		Actual	Adjusted
1900	$0.79	$0.96	1920	$3.18	$1.41
1901	.86	1.07	1921	3.22	2.26
1902	----	----	1922	3.11	2.20
1903	.93	1.07	1923	4.08	2.78
1904	.85	.97	1924	3.56	2.48
1905	1.88	2.14	1925	3.79	2.51
1906	2.43	2.69	1926	4.13	2.83
1907	2.32	2.44	1927	4.70	3.37
1908	2.30	2.50	1928	3.69	2.61
1909	2.11	2.14	1929	3.64	2.62
1910	3.17	3.08	1930	3.27	2.59
1911	3.57	3.77	1931	3.13	2.94
1912	2.93	2.90	1932	2.88	3.04
1913	2.94	2.88	1933	2.57	2.67
1914	3.91	3.93	1934	2.87	2.63
1915	2.26	2.23			
1916	2.78	2.23			
1917	2.93	1.71			
1918	3.03	1.58			
1919	3.70	1.83			

[a]On basis of purchasing power of the dollar as
determined by the U. S. Bur. Labor Statistics. It is the
reciprocal of the all-commodity index which is based on
the price level of a large number of commodities weighted
according to importance.

Source: Steer, Henry B. Stumpage Prices of Privately
Owned Timber in the United States, U.S.D.A. Tech. Bul.
No. 626, p. 27. July 1938.

Effective lumber supply

The theory of supply-demand-price interrelationships
was treated at length at the beginning of this study.
With a given market demand, fluctuations in the supply of
lumber to the market cause fluctuations in price. In-
crease in supply relative to demand forces price downward,
for once lumber is produced it will usually seek a market
at whatever price can be obtained. Conversely, if supply
decreases relative to demand, the competition of buyers
for a limited supply forces the price upward.

Such supply-demand relationships in affecting prices
are almost axiomatic. They are illustrated to a substan-
tial degree in chart 4 which shows variations in produc-
tion, shipments and stocks of lumber from 1923 to the end
of 1937. The scissors effect in production and stocks,
both in 1923 and 1927, should be noted particularly. In
both years lumber prices reached high peaks. Subsequent
widening of the gap from accumulating stocks impelled
lumber prices to weaken.

CHART 4.- Softwood Production, Shipments and Stocks, 1923-1938.

(Data from National Lumber Manufacturers Association.)

Billions
of
Board
Feet

Stocks

Shipments

Production

Stocks

Production

Shipments

| 1923 | 1924 | 1925 | 1926 | 1927 | 1928 |

| M J S D M J S D M J S D M J S D M J S D M J S D M J S D M J S D M J S D M J S L |
| 1929 | 1930 | 1931 | 1932 | 1933 | 1934 | 1935 | 1936 | 1937 | 1938 |

Industrial activity

Lumber prices are a sensitive barometer of industrial activity. Comparison of chart 1 with any chart showing general business conditions over a period of years[1] shows that lumber prices fluctuate markedly, often violently, in response to changes in industrial activity.

In periods of favorable industrial activity, building expands and immediately the price of lumber moves upward sharply. Chart 1 records a number of such price movements. On the other hand, lumber prices are seen to drop more violently than general prices during periods of depressed market conditions. Particularly noteworthy are the sharp lumber price declines in 1907, 1920 and 1929. These declines are accentuated by the tendency of the industry to continue production in the face of decreasing demand.

Organization of the lumber industry

Educative activities

After the Civil War, when the centers of lumber production steadily withdrew from the consuming markets,

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[1]A suitable comparison can be made with the chart American Business Activity Since 1790, Leonard P. Ayres, The Cleveland Trust Company, Cleveland, Ohio, 1940.

it was believed that mill prices of lumber lagged behind
the current fluctuations in retail prices. Custom was then
an important price determinant, an inheritance from the
era, then disappearing, of local manufacture for local
use. The lumber manufacturer was primarily interested
in the achievement of maximum efficiency in the technology
of production. To him the lumber industry was to be found
in the logging camp and in the sawmill. The study of
market conditions, of the competition of other species
and of methods of extending markets was the function of
the distributing agents. It was of minor concern to the
lumber manufacturer.

Educative activities of the lumber associations and
trade journals have had an important effect in changing
the attitude of the industry toward production and prices.
They have aimed at the elimination of speculation and
the achieving of greater stability and uniformity in the
production and pricing policies of the industry. These
activities have been comparatively recent. Permanent
organizations of lumber manufacturers were unknown be-
fore the early "eighties" when the relative exhaustion
of the northern forests first appeared. Nor did the
trade journals play a prominent part in the industry until
much later. They have been partly the result and partly
the cause of the historical influence which has resulted

in greater uniformity of all prices of lumber.[1] Probably the actual level of prices has been raised through this influence, although it cannot be isolated and measured.

Industry control of prices

The lumber industry has frequently been accused of controlling the prices of its products. More than 30 years ago, Congressional resolutions inquiring about high prices and combinations in the lumber industry ordered the Bureau of Corporations of the Department of Commerce to conduct an investigation which lasted from 1907 to 1910, the results of which, entitled The Lumber Industry, were published in 1913 and 1914.[2]

There is no doubt that many attempts at price maintenance have been made within the industry. The question is: How successful have been these attempts? Before answering, it is helpful to recall a few well-known facts about the industry. Some lumber is manufactured in practically every state of the Union, and it is both imported and exported, often from and to the same foreign country. Within the industry there are really several different types of businesses. Moreover there

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[1]Compton, Wilson. The Organization of the Lumber Industry, p. 112, Chicago, American Lumberman. 1916.

[2]U. S. Bur. Corporations. The Lumber Industry, Pt. 4, p. 12, Dept. of Commerce. 1914.

are over 17,000 sawmills, even more retail lumber yards
and several thousand wholesalers. Among these exist a
variety of manufacturing, distributing and selling
policies.

As Kreps[1] points out in his article on housing:

> It is at once the industry of small cross-roads
> enterprises and gigantic corporations. Numerous
> competitive complications exist: Competition with
> lumber substitutes; unequal freight rates between
> manufacturers and consumers equally distanced; com-
> petition of various grades; smaller manufacturers
> compelled to undersell large manufacturers to offset
> the advantages the latter have in more economical
> and extensive distribution facilities in a product
> of superior quality and of a greater degree of
> refinement (such as drying methods, use of preserva-
> tive treatments, the production of completed items);
> competition created by the disorganization in the
> channels of trade; and finally, the effect of var-
> ious transportation methods and fluctuation in water
> rates.

Faced with such varied and intensive types of
competition in conjunction with a record of unfavorable
earnings, it is not surprising that many lumbermen have
aspired to a type of cooperation sufficient to dominate
the industry. But the difficulties to such control in a
scattered industry of thousands of competing firms should
be obvious. To the ordinary difficulties must be added
a psychological one--the traditional rugged individualism
of lumbermen and their mutual distrust created by past
violations of principles of trade ethics.

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[1]Kreps, Theodore J. Building Materials and The Cost
of Housing, Housing Monograph Series No. 3, Land,
Materials, and Labor Costs, p. 65, National Resources
Committee, 1939.

The greatest difficulty to effective combination comes from the small mill operators. The competition of these operators, who in all probability would not be signatory to any restrictive agreement, would tend to reduce the effectiveness of production control. The small mills are a marginal element in the lumber industry. Their methods are inefficient, their product is normally inferior, and their costs are frequently high. But their investment in mill equipment is small, and many of them do not own any timber at all. During a depression in the industry their operators go back to farming or other employment, and their production is withdrawn from the market. But as soon as profits appear the small mill owner resumes operations. A restriction of output to maintain higher prices would induce an increased and un-controlled production by these migratory and impermanent units, and their combined production could do much to destroy the effect of reduced production on the part of the members of the associations.[1]

These difficulties do not hold for the entire industry. In certain segments as in the case of the Southern cypress operators, where ownership is concen-trated and the product has special uses not meeting strong competition, industry control is quite possible.

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[1]Marquis, R. W. Economics of Private Forestry, p. 40. New York, McGraw-Hill. 1939.

The Bureau of Corporations was emphatic in its report in pointing out the monopolistic intent of the lumber associations. A great mass of data was presented to illustrate continuous efforts by the lumber industry to control prices, and certainly, the evidence in this respect can hardly be refuted. However, the important issue is whether or not these efforts to increase the market price of lumber were successful.

The report of the Bureau concluded that "as a result of attempts at artificial control, prices have been higher than they would have otherwise been. Indeed this was asserted by officers of some associations prior to 1906 and used as an inducement for their support and increasing their membership."[1]

Compton[2] referred to the latter claims of lumber officials as "extravagant fanciful claims." He attacked the Bureau's report vigorously, concluding:

> Greater uniformity of lumber prices and less wide
> temporary fluctuations have indeed resulted from
> association activities. The effect, however, upon
> the general level and upon the historical movements
> of wholesale lumber prices, of association activity
> in promotion of higher prices, has not been impor-
> tant. The attribution to efforts at organized
> restraint, of a substantial influence upon lumber
> prices in the United States, finds warrant neither

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[1] U. S. Bur. Corporations, op. cit., p. 11.

[2] Compton, Wilson. The Organization of the Lumber Industry, p. 131, Chicago, American Lumberman. 1916.

in the conditions of the industrial organization of
lumber manufacture nor in the statistical evidence
descriptive of its recent history.[1]

In regard to list prices published by the lumber

associations, Compton states that "list prices have been

almost invariably, and often greatly, higher than the

prices at which actual sales have been made. List prices

have prevented actual prices neither from falling lower nor

from rising higher."[2] Yet it should be pointed out, that

to be effective, list prices need not agree with actual

prices. Discount sheets can be, and in fact it was main-

tained by the Bureau that they were in many instances,

used in conjunction with the price lists issued by the

associations. Furthermore, the Bureau presented many charts

covering the period 1889-1910 in which a close correspon-

dence between list prices and actual prices was shown,

particularly in the case of white pine, hemlock and West

Virginia spruce. Scattered among these charts is a

noticeable "staircase" structure to the price trend, a

characteristic of industries under monopolistic control.

This is most marked in species where ownership is strong

and centralized and the species has special uses not

meeting strong competition.

Out of the Bureau's welter of evidence, several

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[1]Ibid., p. 143.

[2]Ibid., p. 133.

conclusions appear justified. The various segments of the lumber industry have repeatedly sought to control prices. Many of these ventures were unsuccessful at the outset. Some appear to have been successful at price maintenance, but usually for short periods only. In general, the evidence seems to warrant the conclusion that the lumber industry had exerted some control over the actual sales prices of lumber even if not to a pronounced degree.

In 1922 the Federal Trade Commission[1] completed an investigation of the Southern Pine Association, the Douglas Fir Lumber Manufacturers and Loggers Association and the Western Pine Association made at the request of the Department of Justice. In its report on the Southern Pine Association, the Commission maintained that the Association was the medium for direct and concerted action on prices. The trade barometer, a device showing orders, production and shipments which was issued weekly to the membership of the association, was used to regulate production and thereby to increase the price of lumber; a large correspondence was carried on between the members stressing the idea of decreasing production; and finally, it was alleged that representatives of the leading concerns held frequent meetings at which market conditions, including the supply and demand as reflected in the

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[1] U. S. Federal Trade Commission. Report on Lumber Manufacturers Trade Associations. 1922.

barometers, were discussed, and harmonious action on prices arrived at.[1]

The Commission took a similar attitude toward the Douglas Fir Manufacturers and Loggers Association. A trade barometer, like that used by the Southern Pine Association, was the device for production control. Basic price lists fixing the relative values of the various lumber items were issued openly in the name of the Association, and standard discount sheets were issued by the manufacturers ordinarily just after general conferences of the manufacturers called by officers of the Association.[2]

Regarding the activities of the Western Pine Manufacturers Association, the Commission stated:[3]

> Since their organization in 1905, the association members have given united and uninterrupted attention to the control of prices and production. The most undisguised efforts of that character were indulged in by this group shortly following exposure of lumber manufacturers' association methods by the Bureau of Corporations in 1914. The exigencies of the World War merely strengthened the efficiency of their collusion, and there is reason to believe that the Commission's investigation in 1920 has had no deterrent effect.

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[1]Ibid., pp. 57-60.

[2]Ibid., pp. 70-77.

[3]Ibid., p. 93.

A Supreme Court decision[1] in 1921 in the Sherman
anti-trust case against the American Hardwood Manufacturers
Association involved types of activities common to most
lumbermen's associations. In this case, the Association
had adopted what was known as the open-competition plan.
Its purpose was stated to be the dissemination among mem-
bers of accurate knowledge of production and market condi-
tions so that each member might gauge the market intelli-
gently instead of guessing at it. It proposed a system
of cooperation among the members, consisting of the
interchange of reports of sales, prices, production and
practices, and including meetings of the members for
discussion with the avowed purpose of substituting
"cooperative competition" for "cutthroat competition," of
keeping "prices at reasonably stable and normal levels,"
and of improving the "human relations" among the members.

The Supreme Court held that this plan, as it was
actually operated, constituted a combination and conspiracy
in restraint of interstate commerce within the meaning of
the antitrust act. Evidently the Court believed that the
desire to agree upon prices or to curtail production was
an actuating motive to the plan.

The verdict in the hardwood case threw doubt on the

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[1]U. S. Federal Trade Commission. Open-Price Trade
Associations, pp. 17-18, Sen. Doc. 226, 70th Cong.,
2nd Sess. 1929.

legality of all "open-competition" activities. This was
cleared in an important decision handed down in 1925
in a case against the Maple Flooring Manufacturers
Association.[1] The Court decided:

> that trade association or combinations of persons
> or corporations which openly and fairly gather and
> disseminate information as to the cost of their
> product, the volume of production, the actual price
> which the product has brought in past transactions,
> stocks of merchandise on hand, approximate cost of
> transportation from the principal point of shipment
> to the points of consumption, as did these defen-
> dants, and who, as they did, meet and discuss such
> information and statistics, without, however, reach-
> ing or attempting to reach any agreement or any con-
> certed action with respect to prices or production
> or restraining competition, do not thereby engage
> in unlawful restraint of commerce.

Although the earlier hardwood decision criticized
the activities developed under the "open-competition"
plan in that they were used to restrict competition and
therefore constituted combination and conspiracy in
restraint of interstate commerce within the meaning of
the Sherman antitrust act, the maple flooring decision
held that the same activities were legal if properly
conducted without any agreement or concerted action as
to prices or production or restraint of competition.

The Federal Trade Commission[2] made another inquiry

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[1]U. S. Courts. Federal Anti-Trust Decisions,
vol. 10, pp. 188-209. 1923-1927.

[2]U. S. Federal Trade Commission. Open-Price Trade
Associations, pp. 315-341, Sen. Doc. 226, 70th Cong.,
2d Sess. 1929.

into the activities of lumber trade associations. The
results of this investigation, which included the Southern
Pine Association, the West Coast Lumbermen's Association,
the Western Pine Manufacturers Association, the North
Carolina Pine Association and the California White and
Sugar Pine Association, were published in 1929. The con-
clusions can be summarized briefly:

> The Commission believes that there is keen competition
> in the manufacture and sale of the lumber produced by
> members of the five associations. . . . It is also
> of the opinion that prices of these kinds of lumber
> are generally the result of competition, and that
> restraints of trade affecting such prices have been
> much less common than formerly and of little effect.
>
> As to the statistical activities of the associations,
> the commission is of the opinion that they have at
> least some influence upon lumber prices--possibly
> best described as a stabilizing influence. This is
> another point that is difficult of proof, if indeed
> it can be proved at all. It seems logical, however,
> that some effect must follow the wide distribution
> and use made of statistical publications.
>
> It is believed that the decisions of the U. S.
> Supreme Court in the maple flooring case covers the
> statistical activities of these five associations
> and that, in view of this decision, the activities
> mentioned above are not illegal. This is only true,
> however, so long as the members of the associations
> refrain from concerted action based upon these
> statistical data.

A supplemental investigation of all the above
associations except the Northern Carolina Pine Association
was made by the Department of Justice in 1925.[1] The

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[1]Ibid., pp. 316-319.

Department failed to discover current activities justifying prosecution under the antitrust laws.

Further light on the issue of recent industry control of prices may be gained from chart 5 in which monthly variations in the prices of lumber and its principal competitors are shown for the 10-year period 1928 to 1937. Steel and cement exhibit those peculiar "staircase" movements which are characteristic of industries in which prices are administered or managed. Their movements indicate infrequent and sluggish response to changes in demand and curious ability to stick at high levels and to resist the impact of even so severe a depression as that of 1932. On the other hand, it will be seen that lumber prices fluctuated from month to month throughout this period. This could hardly be true if attempts at control of prices by the industry had been very successful.

Government policy.

It will be seen from the whole discussion of industry control of prices that the types of activities by the industry affecting production and prices have changed since their inception under the early trade associations. At least until after World War I, if the evidence of the government prosecutions is to be accepted, the industry relied heavily on direct efforts at production and price control. Not only were these
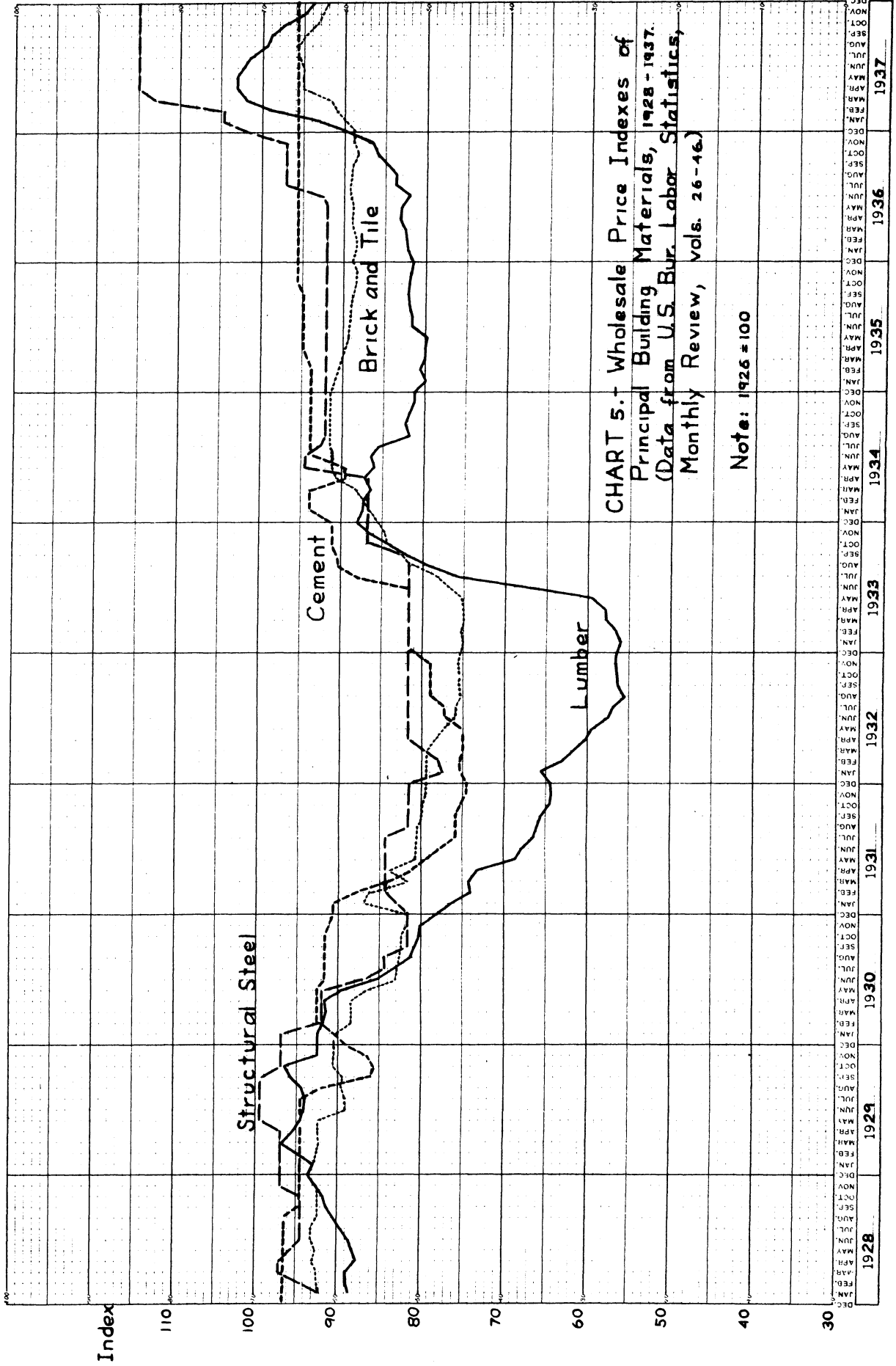
CHART 5.- Wholesale Price Indexes of Principal Building Materials, 1928 - 1937. (Data from U.S. Bur. Labor Statistics, Monthly Review, vols. 26-46.)

Note: 1926 = 100

Structural Steel

Cement

Brick and Tile

Lumber

Index

110

100

90

80

70

60

50

40

30

1928 1929 1930 1931 1932 1933 1934 1935 1936 1937

attempts made by members of the industry, but at various times and places some success in controlling prices was thus achieved.

Government inquiries and prosecutions into the legality of the price activities of the lumber industry served as a definite check to open attempts at the control of production or prices. But in the maple flooring decision the government established the principle that the exchange of information and the discussion of statistics by members of the trade associations were legal activities provided they were conducted without any agreement or concerted action as to prices or production.

Following the maple flooring decision, government investigations failed to uncover many attempts at production and price control such as might come within the meaning of antitrust legislation. The lumber industry was content to rely on the publication of pertinent statistics to its membership and to educate the membership to use these statistics for the best interests of the trade associations or the industry as a whole. Concerted action in price control cannot be safely attempted, but individual action based on the knowledge of market conditions and education in interpreting these conditions comes within the range of lawful activities. Not only was the government acquiescent in the industry's

employment of the latter types of activities, but beginning
in 1930, it took an active hand in furthering them.

In 1930 President Hoover, complying with a request
by the directors of the National Lumber Manufacturers
Association, created a Timber Conservation Board for the
purpose, among other things, of dealing with the problem
of the "consequences of overproduction in the forest
industries."[1] One of the committees of this Board, the
Lumber Survey Committee, still reports quarterly to the
Department of Commerce. Recommendations could be made
by this committee "without the industry being charged
with collusion or conspiracy to violate any statute, and
that if the Board found that among the difficulties of the
industry was that of overproduction, they could so state
and set forth the remedy in a much more authoritative way
than could any other organization."[2]

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[1]Dixon, A. C. Economic Problems of the Lumber and
Timber Products Industry, p. 248, U. S. National Recovery
Administration, Div. of Review, Work Materials No. 79.
March 1936.

[2]Ibid., p. 248. The Lumber Survey Committee of the
Timber Conservation Board, which is the statistical and
fact-finding part of the organization, was appointed in
1931 and is still serving. The original membership con-
sists of the following: Thomas S. Holden, vice-president
of the F. W. Dodge Corporation, New York; H. W. Stark,
economist of Chicago; Calvin Fentress, chairman of the
Board of Baker and Fentress and Company, Chicago; Phil-
lips A. Hayward, Chief, Forest Products Division of the
Department of Commerce; and Wilson Compton, Secretary-
manager of the National Lumber Manufacturers Association,
Washington, D. C.

During the decline in demand in the fall of 1937, the Committee said:

> Although the Committee recommends that further increases in lumber stocks should follow, but not anticipate, revival in demand, it finds that the weakness in the lumber manufacturing industry in most regions is not in its stocks but in the low point to which unfilled orders have now declined and the continuing general decline in new business. Due consideration should be given . . . to the combined effects of large stocks, lower volume of unfilled orders, lower expected demand during the next quarter and the momentum of current production schedules. Effort to adjust current production more closely to current demand should be continued in both the lumber and plywood manufacturing industries."[1]

The reasoning behind such recommendations ran as follows:

> Price stability in the lumber industry is preeminently desirable. In some regions fluctuations in the past three months have been small. More dependable price levels will aid building revival. The record of the past few years indicates that building does not increase in an era of declining prices and costs; rather the contrary, as evidenced by the boom years of 1925-29 and the low years of 1932-34."[2]

The recommendation was continued in February 1938:

> The current effort to reduce stocks and build up order files is bringing the industry to a more balanced condition. The present determined efforts to reduce heavy surpluses should be continued.[3]

In early 1937 the Committee warned against rapidly rising lumber prices:

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[1]Lumber Survey Committee. Release of Nov. 15, accompanying report of Nov. 8, 1937, to the Dept. of Commerce.

[2]Ibid., report of Nov. 8, p. 1.

[3]Ibid., report of Feb. 12, 1938, p. 1.

The available reserve producing capacity of the
lumber manufacturing industry is ample to meet all
present and prospective demands for lumber. The
nationwide restoration of larger volume consumption
of lumber may be expected only at moderate price
levels commensurate with prices of competitive
materials and with public purchasing power. The
lumber industry should discourage 'lumber famine'
propaganda and should resist artificial pricing
of its products.[1]

Not too much weight should be assigned to the

recommendations of such a committee as a factor influenc-

ing prices. Even when supported by information collected

and distributed by the various lumber manufacturers asso-

ciations, the control by such activities can be over-

estimated. Probably the advice would result more easily

in price rises during periods of favorable demand than in

holding prices up during periods of declining demand. But

since the ultimate control of price lies in the control of

production, these attempts at supply control cannot be

discounted completely in a discussion of price increases.

Substitution of competing materials

Substitution of competing materials for lumber has

grown to be a serious problem to the lumber industry,

one of which lumbermen are most conscious. This problem

will be explained more fully later when the probable in-

fluence of price on the amount of substitution will be

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[1]Ibid., report of Feb. 10, 1937, p. 2.

considered. At this point, however, note should be made
of a reciprocal influence, i.e., the influence of
substitution on price.

Great variations in lumber prices between localities
cannot be accounted for solely by differences in trans-
portation costs, and in some cases not even chiefly by
this factor. Other determinants of price must be sought
in explanation, and one of the most important of these
is intensity of competition. Competition between lumber
and other building materials affects the total demand
for lumber as balanced against the total offering of
lumber upon the market and therefore affects its price.

That this competitive effect upon the price of
lumber has existed for some time may be presumed from the
recognition given the problem by the lumber industry for
a number of years. Undoubtedly the still greater potential
increase in substitution has been a deterrent influence
upon the prices of lumber for certain specific uses in
which the slack permitted by the competition of other
materials has been absorbed.

Retail distribution

The discussion of lumber thus far has dealt almost
exclusively with wholesale prices. This is an obvious
defect in the study, for in most instances the wholesale

price does not represent price to the final consumer. As Butler[1] defines it, the wholesale price of lumber is

> the delivered price made to large consumers and retail dealers who buy more or less continuously in carload lots. This price is made up of the net amount received by the mill, the freight to the locality where delivered, and the gross wholesaling margin. It includes, therefore, all costs and profits incident to manufacture, transportation, and wholesale merchandising.

The remaining step in the usual distribution process, from retailer to consumer, results in a substantial price increment, and is therefore of considerable interest, if not essential, to this price study.

That retail prices have hitherto been avoided is tribute to the complexity of the subject. Data are not only more difficult to obtain but they lead one into an intricate maze of prices and price policies which it is difficult to evaluate with any certainty. It would not be possible, for example, to compare the long-time trends of retail prices for lumber, building materials and all commodities and to draw as reasonable conclusions as can be done in a comparison of the wholesale price trends. Nevertheless, as a supplement to the analysis of wholesale prices, a brief treatment of retail prices will provide some conclusions of value.

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[1]Butler, O. M. The Distribution of Softwood Lumber in the Middle West, p. 65, U.S.D.A. Rpt. No. 115, Studies of the Lumber Industry, Pt. VIII, Wholesale Distribution. 1917.

When lumber passes from the wholesaler to the retailer,
costs accumulate rapidly. These costs vary a great deal
from place to place, from store to store, and for different
items and different times within the same store. Yet
despite their great range, these costs are almost invariably
large and result in substantial price mark-ups.

A Forest Service study of the costs of retail distribu-
tion in the Middle West for the period 1912-1914 showed
that more than a fifth of the final consumer price was
absorbed at the retail stage.

Table 4

Distribution of the retail price of lumber in
the Middle West, 1912-1914

	City trade[a]		Country trade[b]	
	Per M ft.b.m.	Percent	Per M ft.b.m.	Percent
To manufacturer	$13.95	53	$15.94	52
To wholesaler	.92	3	1.06	3
To railroad	5.77	22	6.60	22
To retailer	5.80	22	7.15	23
Price to consumer	$26.44	100	$30.75	100

[a]Averages determined from 95 city yards in Chicago,
Kansas City and Minneapolis.

[b]Averages determined from 2,443 country yards
throughout the Middle West.

Source: Butler, O. M. The Distribution of Softwood Lum-
ber in the Middle West, p. 53, U.S.D.A. Rpt. No. 116,
Studies of the Lumber Industry, Pt. IX, Retail Distribu-
tion. 1918.

Retail costs rose absolutely and at least held even
relatively until in 1934 the average total expense in
retail lumber prices for the United States was reported
to be nearly 40 percent of the cost of goods sold, broken
down as follows:[1]

	Percentage to total cost of goods sold
Gross mark-up realized................	38.39
Rework mill expense....................	1.04
Handling and delivery expense.........	9.85
Selling and administrative expense....	23.64
Interest and bad debts expense........	4.53
Total expense.........................	39.06
Loss..................................	- 0.67

In the immediately preceding statistics, several
interesting facts stand out. The total expense is very
high, and selling and administration expense form about
60 percent of the total. Interest and bad debts are rela-
tively high indicating the efforts of retailers to encourage
homebuilding through financing builders. Finally, despite
the large mark-up in prices in 1934, retail lumber dealers
as a whole lost money.

The high retail costs were also shown in tables A-3
and A-4 which presented vertical cross-sections of 1934
lumber prices from stump to consumer in the New York and

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[1]U. S. National Recovery Administration. Economic
Problems of the Lumber and Timber Products Industry,
p. 320, Work Materials No. 79, Div. of Review, 1936.

Chicago markets. For the species and markets shown, retail cost was about one-third the total cost to the consumer.

The National Recovery Administration[1] estimate of the retail price mark-up on materials other than lumber used in building and construction checks very closely with the estimate made for the lumber industry. "The average mark-up on warehouse items is 50 percent of cost; on carload items, 12 1/2 percent; and the average mark-up on all items is 40 percent."

The editors of Fortune[2] in their book, Housing America, eloquently summarize the behavior of the prices paid by consumers for building materials. This applies to lumber as well as to other materials.

> Since so much material is, or has been in the past, ordered in special lots and special quantities and special sizes selling necessarily at special prices, the material men have come to think of their products universally in those terms. Nothing else explains the notorious price spread in building materials, certainly averaging 100 percent, nor the fact that a man finds himself in a completely new and different world of values, a sort of fairyland of prices, the moment he undertakes to buy anything having to do with a house. A brass bowl which applied to another use might possibly cost $25 will cost $200 if he wishes to attach it to his ceiling for the purpose of diffusing light, and 15 cents worth of metal and enamel may in an extreme case

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[1]Howard, R. H. The Builder's Supplies Industry, p. 17, Evidence Study No. 4, U. S. National Recovery Administration, Div. of Review. Sept. 1935.

[2]Fortune. Housing America, pp. 52-53, by the editors of Fortune Magazine, New York, Harcourt, Brace and Co. 1932.

cost him $15 by the time it has been applied as a
replacement to the top of his water-closet
reservoir.

Obviously, then, the man of means who wishes a house
after his own heart, although he may justly demand
of the building industry that it find some means of
selling him his materials and his labor and his
financing at prices commensurate with the prices
holding in other industries, has no right to compare
housing costs with, say, automobile costs, for if
he built his $2,000 car as he builds his house, it
would cost him for parts alone upward of $5,000.

In accepting these statistics of high retail costs

together with the inability of retailers as a whole to

make net profits, it becomes obvious that a serious

distributive problem exists for lumber and other building

materials. A clue to some of the difficulties lies in

figures furnished by the U. S. Bureau of the Census.[1] In

1935 there were more than 73,000 retail dealers in the

lumber-building-hardware group with an average volume of

sales of only $24,000. Only 139 dealers in the United

States sold more than $300,000 worth of product, and they

made only one-eleventh of all sales. Bemis,[2] in his

Economics of Shelter, illustrates why such a multiplicity

of dealers is possible. He lists 59 miscellaneous

purchases involving a total of some $560 made in 2 selected

months by a skilled, experienced general contractor in

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[1]U. S. Bur. Census. Census of Business, Retail
Distribution, vol. 1, pp. 1-8 and 2-17. 1935.

[2]Bemis, Albert F. The Evolving House, vol. 2, The
Economics of Shelter, p. 187. Cambridge, The Technology
Press. 1934.

building a single-family house. In the majority of cases each item represented a purchase from a separate dealer.

The pattern of distribution in the building materials industries is very complex. Some materials are ordinarily delivered direct to the customer. Some are obtained from general stores, some from hardware stores, and some from the manufacturer, wholesaler, or retailer. Lumber yards frequently handle oil, coal and other products.

This pattern has been greatly influenced by the development of trade associations. Both the associations of manufacturers and retailers have served a useful purpose in looking after the legitimate interests of their members. One effect of their efforts, however, has been to check the development of new and more economical methods of distribution.

Activities of the latter type were inhibited by the U. S. Federal Trade Commission[1] in a cease and desist order issued in December 1937 against 41 federated local and sectional associations of dealers in building materials in 32 states. The commission held that these associations indulged in activities which constituted combination and conspiracy to engage in and further unfair methods of competition in interstate commerce.

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[1]U. S. Federal Trade Commission. Decisions, vol. 26, pp. 142-144, Dec. 1, 1937, to May 31, 1938.

These included the following activities by the trade associations:

> Prepared, published, and circulated among manufacturers and producers of building materials and builders' supplies, lists, or directories containing names of recognized dealers, with intent and effect of indicating that persons or concerns thus specified were entitled to buy direct from such manufacturers and producers, and that others were not thus entitled;

> Made use of boycott and threats thereof to persuade, induce or compell manufacturers and producers to refrain from so selling, except on unfairly discriminatory or prohibitive terms and conditions fixed by them;

> Took concerted and cooperative action to prevent manufacturers and producers of materials and supplies involved from selling freely to consumers, contractors, U. S. Government, State government, or political subdivisions thereof, or other irregular dealers or retailers, and to prevent such consumers, contractors, U. S. Government, etc., from purchasing freely from manufacturers and producers involved;

> Fixed and established uniform prices at which members and others should sell their materials and supplies in particular communities.

Regardless of the legality of these activities by trade associations, they undoubtedly create rigidities in the pricing of building materials. They result not only in more inflexible prices but also in higher prices. This latter conclusion was summarized by the Commission[1] as follows:

> Costs to consuming public were increased by issuance and observance of price lists by aforesaid associations . . . in certain communities, and by their

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[1]Ibid., p. 144.

policy of exclusive dealer distribution, through thereby denying consuming public advantages in price which it otherwise would have obtained from natural flow of commerce under conditions of free competition.

As will be demonstrated in another section of this study, building materials as a whole face an elastic demand. When they rise far above general prices, the volume of building is likely to diminish and the consumption of building materials consequently decline. Large increments to building materials prices at the retail level result in a corresponding decrease in the total demand for building materials. This is an effect felt by all commodities comprising the building materials group.

But in addition to the joint demand for building materials which is dependent upon the total volume of construction, each of the principal building materials may increase or diminish its sales through its relative price position with its competitors. The role of such price competition in diminishing the consumption of lumber will be treated in some detail later. It can be shown that part of the relative decline in lumber consumption is due to the upward increasing divergence of its wholesale price trend from the wholesale price trend of other building materials.

The significance of the large mark-up in the retail price of each of the principal building materials thus

becomes evident. If the total volume of building materials
sales passed through the retail stage before reaching the
final consumer, all the materials would face a substantial
price increment and their relative price positions would
not be greatly altered. Similarly, if only a portion, but
the same proportion of each material's total consumption,
passed through the retail stage, the relative positions of
the price trends would not be seriously affected. How-
ever, if one material reached the final consumer chiefly
at the wholesale stage and another material reached the
final consumer chiefly at the retail stage, the latter
would be at a much greater actual price disadvantage than
would be evident from a comparison of their wholesale
prices alone.

In this connection table 5 which indicates the
percentage of sales of the principal building materials
passing through the various distribution channels, permits
some interesting conclusions.

About one-third of the lumber output shown goes
directly to industrial and other large users, but the
bulk of lumber moves through the wholesale-retail chan-
nels of distribution. In sharp contrast, almost the whole
output of structural iron and steel is sold directly to
large users. Clay and concrete products use wholesale-
retail channels to a greater degree than do iron and
steel, but even in their case well over half the total

Table 5

Primary distribution of sales of building materials in the United States, 1935

| Channels of primary distribution | Percent distributed sales | | | | Lumber | |
	Clay products[a] (other than pottery)	Concrete Products	Cement	Iron and Steel[b]	Independent planing mill[c] products	Other lumber and timber[d] products
Total for industry	100	100	100	100	100	100
To industrial and other large users	54	65	25	82	38	34
To own wholesale branches	9	3	24	12	4	8
To wholesalers and jobbers	23	11	25	3	23	42
To own retail stores	--	--	--	--	2	1
To retailers (including chain stores)	11	10	26	2	19	12
To household consumers	3	11	--	1	14	3
Amount of net sales (millions of dollars)	116	49	118	186	222	567

[a]Brick, tile, terra-cotta products and other refractories.

[b]Structural and ornamental metal work for buildings, bridges, etc.

[c]2,561 planing mills not operated in conjunction with sawmills.

[d]5,773 logging camps producing rough timber products and sawmills producing rough lumber. (Planing mills operated in conjunction with sawmills are covered by this classification.)

Source: U. S. Bur. Census. Census of Business, Distribution of Manufacturers' Sales. April 1937.

output goes directly to industrial and other large users.
Of the principal building materials, only cement uses
the direct-to-large-user channel of distribution to a
lesser extent than does lumber.

It appears then that in most sales of clay products,
concrete products and particularly of structural iron and
steel, the price to the final consumer is the wholesale
price. Wholesale-retail channels of distribution intervene
between producer and consumer to cause additional incre-
ments to the final price of less than half the total volume
sold. Lumber's position is not so favorable; a substan-
tially larger proportion of its total sales includes
retail price mark-up before reaching the final consumer.
Cement is the only important building material whose final
price contains a retail price increment in a larger
percentage of sales than is the case with lumber.

One more conclusion appears permissible. Wholesale
price trends of lumber and all-building materials have
been illustrated and analyzed in previous discussions.
The large and increasing divergence between these price
trends has been noted. Yet if one considers final costs
to consumers, the actual divergence between lumber prices
and all-building materials prices is even greater than
that indicated by a study of wholesale prices alone.

Effect of prices on consumption of lumber

Lumber prices contrasted with all-building materials prices

Rolf Thelen,[1] writing in 1917, reported the substitu-

tion of other building materials for lumber as follows:

> Lumber consumption in the United States reached its
> maximum in 1907 and has since fallen off about 15
> percent. Brick is the only competing material whose
> consumption has fallen off. . . . The general in-
> crease in steel consumption was probably about 45
> percent between 1907 and 1914. The increase in cement
> consumption from 1907 to 1915 was 48 percent and that
> from 1900, 290 percent. The increased consumption of
> clay building products during the same periods was
> 20 percent and 170 percent respectively. The use of
> nails, which reached its highest point in 1909, in-
> dicates that lumber consumption has fallen off 20
> percent. Building permits in 20 cities, consider-
> ing the increase in labor costs and the substitution
> of stucco for wooden siding, indicate a falling off
> in the construction of wooden buildings. At the
> best the wooden building is no more than holding its
> own, while the total building curve is rising.

Except for brick, all of the principal competing building

materials expanded their consumption in this early period,

and much of the expansion was at the expense of lumber.

Retail lumber dealers estimated the decrease in sales

of lumber for construction purposes, due to substitution,

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[1]Thelen, Rolf. The Substitution of Other Materials
for Wood, p. 27, Studies of the Lumber Industry, Pt. 11,
Rpt. No. 117, U. S. Dept. Agriculture. 1917.

to have been in the neighborhood of 13 percent between 1907 and 1914 alone.[1]

Chart 6 shows the continuance of the relative displacement of lumber by other construction materials from 1919 to 1932. It is evident that although they have a long way to go to supplant lumber, other materials are slowly but surely whittling away lumber's predominant place as a building material.[2]

This displacement of lumber reflects in part an actual change in demand; in part it reflects the elasticity of demand, i.e., changes in the quantity demanded as a result of price changes. It is only the displacement of lumber due to the elasticity of demand which is the concern of this price study.

The best statistical evidence that can be employed in attempting to discover if elasticity has been a cause of the shift to substitutes is a comparison of price and consumption trends for lumber and competing products. Chart 7 presents graphically the index prices for lumber,

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[1]Compiled by the U. S. Forest Service from 1,198 reports submitted by representative lumber dealers throughout the Middle West in response to a Forest Service questionnaire.

[2]U. S. National Recovery Administration. The Economic Problems of the Lumber and Timber Products Industry, p. 203, Work Materials No. 79, Industry Studies Section, 1936. Based on an unpublished report by Victor Perlo, Div. of Research and Planning, U. S. National Recovery Administration, Feb. 20, 1934.

CHART 6.- Percentage Consumption of Major Building Materials, 1919-1932.
(Data from U. S. National Recovery Administration.)

Percentage
Consumption

50

40

30

20

10

0

1919   1921   1923   1925   1927   1929   1931

Lumber

Cement

Brick

Steel

Stone
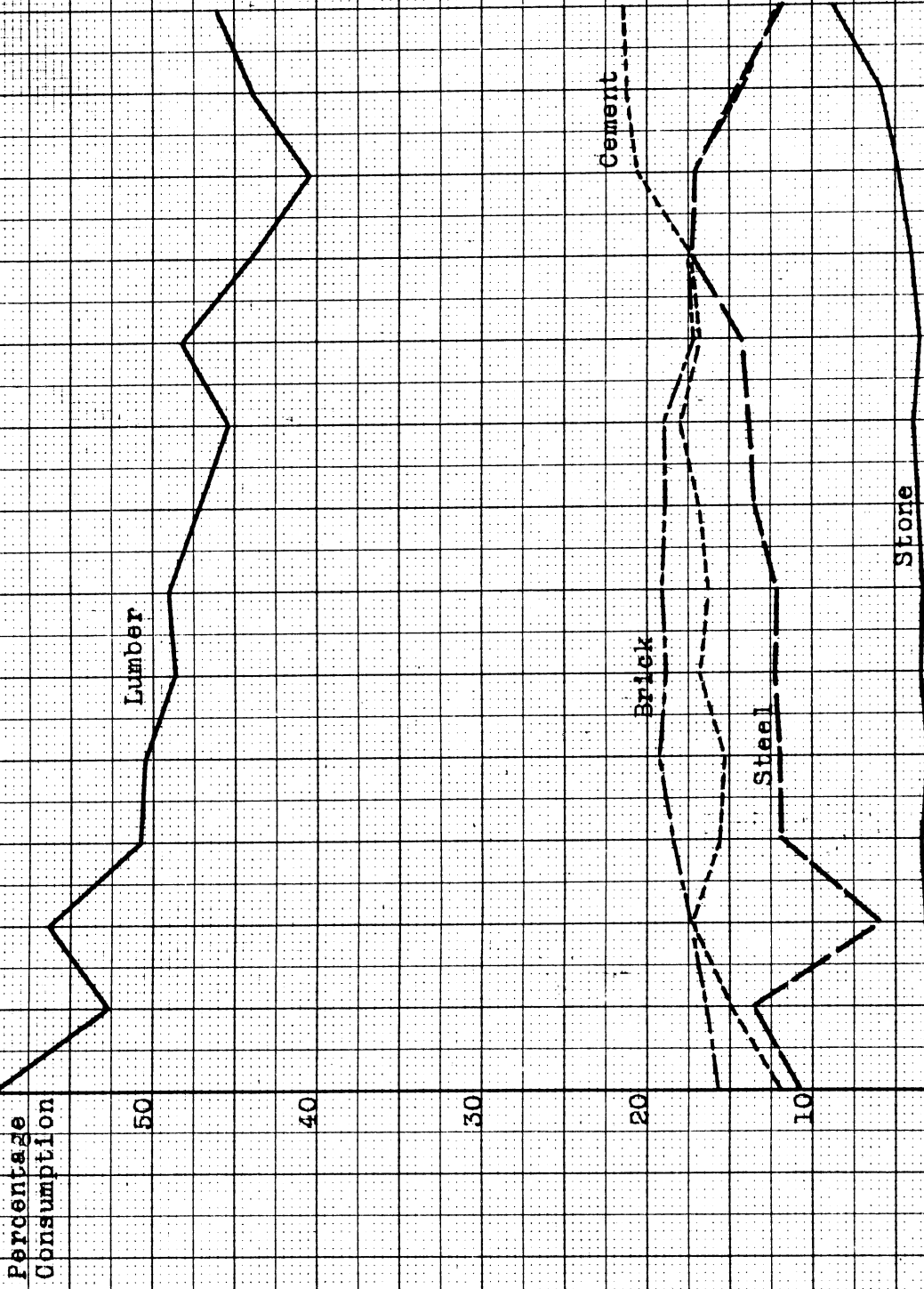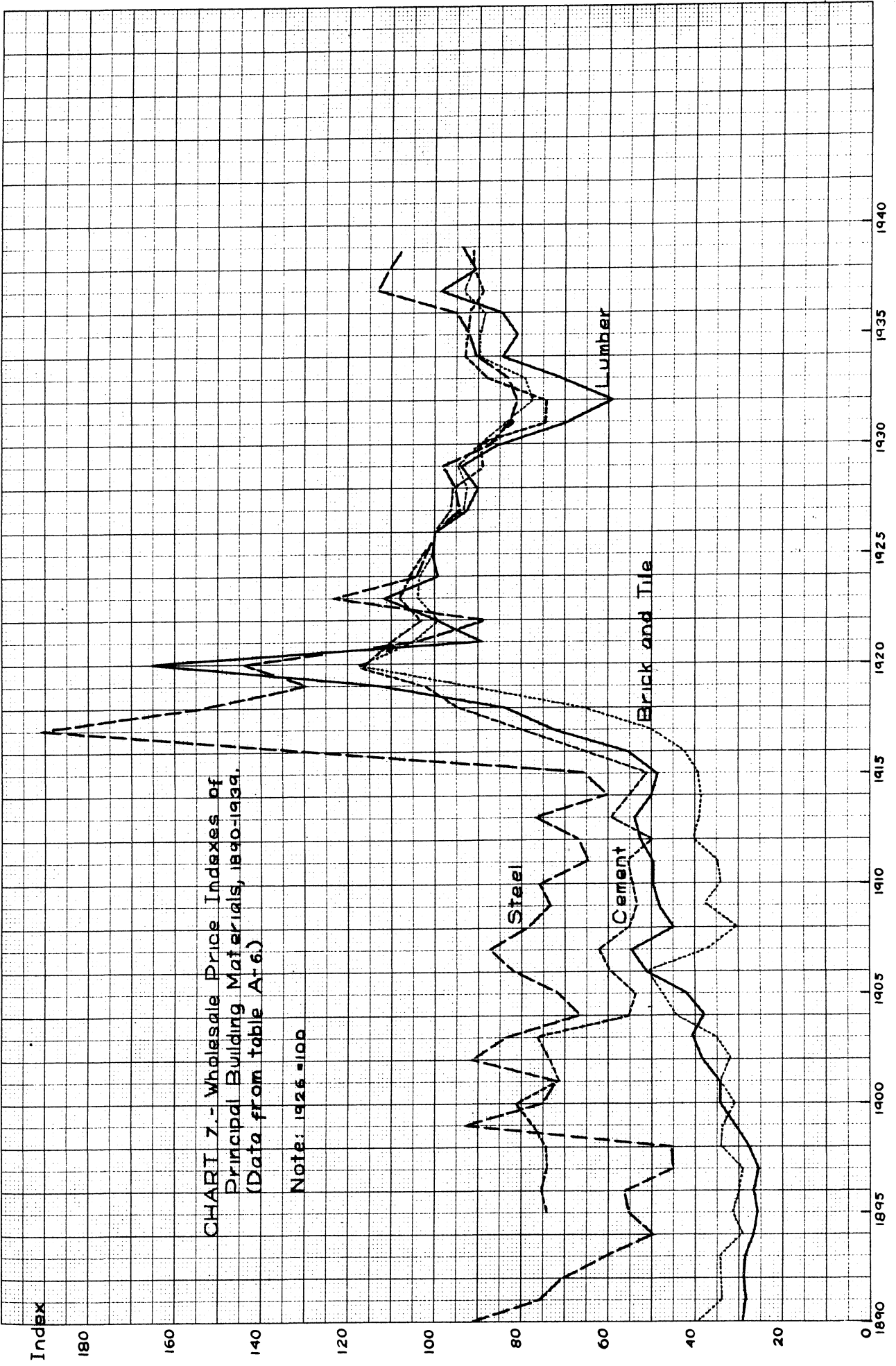
CHART 7. – Wholesale Price Indexes of Principal Building Materials, 1890-1939. (Data from table A-6)

Note: 1926 = 100

Index

Lumber

Brick and Tile

Steel

Cement

brick, cement and steel during the period 1890-1939 (values are listed in table A-6).

Using these same data for the period 1913-1937, Marquis[1] in his Economics of Private Forestry states: "With some variations the prices have moved together during this period, and there seems to be no relative cheapening of substitute materials such as would account for the great increase in their use." Marquis emphasizes the same conclusion at another place in his book.

> An increasing cost of lumber has not been the reason, as is often supposed, for the growing use of substitutes in construction. It is true that the wholesale price of lumber doubled between 1913 and 1926, but it is the price of lumber in relation to the prices of substitutes that must be considered in seeking the cause of substitution. The Bureau of Labor wholesale price index shows that the price of lumber increased at the same rate as the all-building materials index, a little more than the prices for cement and steel, and less than the price of brick, between 1913 and 1936.[2]

Marquis' general conclusion that a real change in demand has taken place can hardly be disputed. But it does seem that he has been too hasty in dismissing the effect of price on the consumption of lumber. In justice to him it must be stated that at another place in his book he states the following:

> That some relation exists between price and consumption is apparent. Very high prices of lumber

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[1]Marquis, Ralph W. Economics of Private Forestry, p. 57, New York, McGraw-Hill. 1939.

[2]Ibid., p. 79.

continuing for long periods of time would unquestion-
ably lead to a greater use of substitutes. Within
narrow price ranges other factors may be more
important than price, and, for short periods of time,
differences in price do not produce a decided shift
in consumption. Machinery constructed for the
fabrication of wood products cannot be discarded
immediately. The use of materials is often habitual
rather than rational, and in many uses wood is
superior to any substitute that has been devised.
A violent or long-continued increase in lumber prices
would be necessary before price differences could
dislodge wood from many of its present uses, and
very low prices would be necessary to stimulate
purely on a basis of price competition the consump-
tion of wood in many of its uses.[1]

The interesting feature about his analysis is that
while Marquis admits some relation between price and
lumber consumption as a theoretical principle, he has
failed to note the operation of this relationship between
price and consumption as a matter of historical record.

Even in the brief period of years which Marquis
studied, 1913-1936, he failed to note some highly sug-
gestive price-consumption coincidences. Chart 6 shows
a secular downward trend of relative lumber consumption
through the period of study. But there are 3 marked
temporary reversals of the trend, from 1920 to 1921,
from 1927 to 1928 and particularly from 1930 to 1932.
Reference to chart 7 suggests that these reversals of
trend were not accidental. In each of these periods the
price of lumber dropped to a greater degree than did its

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[1] _Ibid._, p. 58.

competitors. This was especially true during the depression
of the early "thirties," when lumber prices dropped very
sharply and its competitors only moderately.

The most serious mistake Marquis made was in not
searching for price data previous to 1913. For it may be
recalled from charts 1 and 2 that while the ratio of
lumber prices to all-building materials has been flatten-
ing out in recent years, the trend has nevertheless been
upward for nearly a century. Per capita consumption of
lumber increased from 1860 to 1906 in the face of a large
relative increase in lumber prices. But the price of
lumber was very low in 1860, and a large subsequent price
increase was possible in the period of great national
expansion and development without injuring demand. However,
the cumulative effect of continued lumber price increases
and the growing strength of competing materials had
their inevitable effect. After 1906 continued rises in
the price of lumber met continued decreases in per capita
lumber consumption and corresponding increases in the
consumption of substitute materials.

One further point should be mentioned which illustrates
the probable effect of price on the consumption of other
building materials as well as of lumber. Chart 7 shows
that of the principal competing materials only brick
has had a price trend rising nearly as rapidly as that
of lumber from 1890 to 1939. At the same time, brick is

the only one of the major building materials that has faced a stationary or declining demand over most of this period.

Prices of all building materials

The price of lumber in relation to the price of other building materials has been shown to be a significant determinant of the proportion of the total building-material demand that goes to lumber.

There is still another way in which price acts to determine the amount of lumber consumption. The principal building materials do not compete on a price basis alone. In the building of any one structure, all of them may be used, and their price relationships affect the relative amounts used. But a cheapening of one will not mean a total elimination of its competitors. This is significant because it points out a complementary relationship in which the demand for each of the materials is affected by the prices and demand for the group as a whole. Thus there is a complementary demand for lumber partially conditioned by the prices of cement, brick, steel, stone and other building materials.

Building materials costs bulk large in the final costs of construction. This is always true despite large variations between localities, within the same locality

and between different periods of time. For example, in 1931-1932, the Bureau of Labor Statistics[1] made a study of the distribution of residential construction costs between materials and labor in 15 cities. The materials costs averaged 63 percent but ranged from 74 percent in Dallas, Texas, to 57 percent in Boston, Massachusetts. Even within the same city, the cost of materials varied usually about 10 points or roughly 16 percent.

Kreps,[2] in the National Resources Committee Housing Monograph, summarized data collected in 1936 and 1937 by the Federal Home Loan Bank Board giving the materials and labor costs to produce a standard wood-frame 6-room house in 26 cities. The costs due to materials grouped largely in the interval between 65 and 70 percent, though ranging from 57 percent in Chicago to 76 percent in Wichita, Kansas. In the same article, Kreps[3] reported on a number of public multifamily-house projects in which the cost of materials varied from 51 to 63 percent of the combined materials and labor costs.

These data indicate that building materials comprise

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[1]U. S. Bur. Labor Statistics. Monthly Review, pp. 764-765. Oct. 1932.

[2]Kreps, Theodore J. Building Materials and the Cost of Housing, Pt. 4 of Land, Materials, and Labor Costs, p. 54, U. S. National Resources Committee, Housing Monograph Series No. 3. 1939.

[3]Ibid., p. 55.

roughly from 50 to 70 percent of the combined cost of labor and materials in home construction.

The proportion of total cost due to land was studied by Whitten and Adams[1] who summarized information from builders in 25 cities and found that the average ratio of improved lot cost to total cost of house and lot was 20 percent. Thus, building materials comprise about half of the capital costs of a home.

Chart 8 shows monthly variations in the prices of all-building materials and all commodities from 1929 to 1939. The building materials index declined only 28 points between February 1929 and February 1933, while the index of general prices declined 37 points. This represented a gain in the real worth of building materials in exchange of some 15 percent. According to F. C. Mills:[2]

> here was an important barrier to the resumption of normal activities in the heavy industries. . . .
> The physical volume of construction, as measured by indexes of the National Bureau of Economic Research (during this period), declined approximately 52 percent. This drastic decline in the volume of construction is related, of course, to the lagging adjustment of construction costs to changing monetary values and to the concurrent drop in total national income. . . . Even if no other factors had been operative, the discrepancy between

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[1]Whitten, Robert and Thomas Adams. Neighborhoods of Small Homes, Economic Density of Low-Cost Housing in America and England, Cambridge, Harvard University Press. 1931.

[2]Mills, Frederick C. Prices in Recession and Recovery, pp. 141, 144, 145, New York, National Bur. Econ. Research. 1936.

CHART 8.— Wholesale Price Indexes All Building Materials and All Commodities and Value
Construction Contracts Awarded, 1929-1939. (Data from U. S. Bur. Labor Statistics,
Monthly Review, and U. S. Bur. Census, Statistical Abstract of the United States.)

Price Index (1926=100)

Construction Index (Average 1923-25 =100)

All Building Materials

All Commodities

Value Construction Contracts Awarded

| 1929 | 1930 | 1931 | 1932 | 1933 | 1934 | 1935 | 1936 | 1937 | 1938 | 1939 |
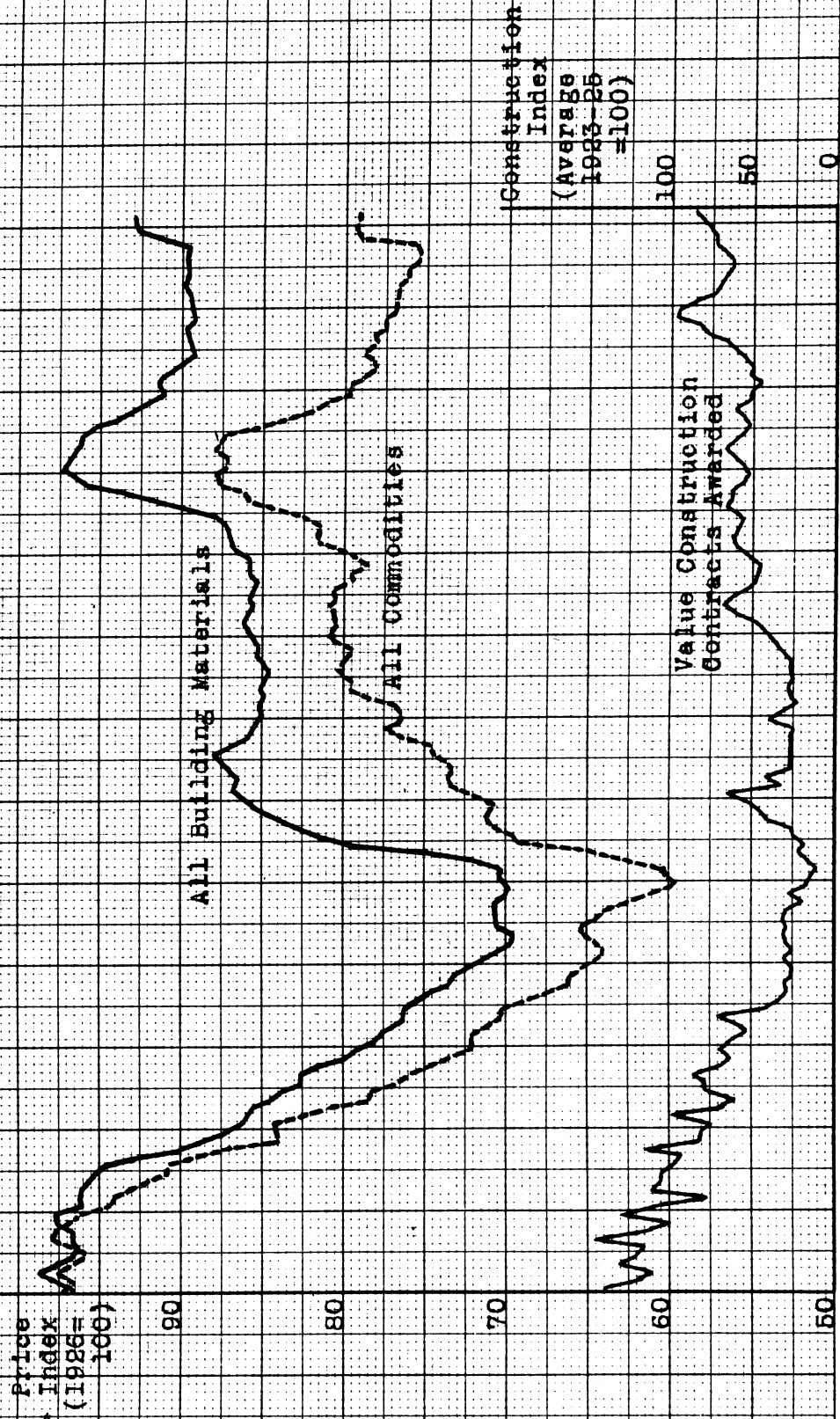
the declines in national income and in construction costs would have entailed a reduction in volume of construction. Added to this, of course, is the notable elasticity of demand for the capital equipment and durable consumption goods that make up the total volume of construction. Economic stress always brings intensified declines among these goods.

In the latter part of 1933, building activity showed strong beginnings of a recovery (see chart 8). But immediately building materials prices rose so much more rapidly than general prices that their real cost became prohibitive. In 1934 and 1935 the gap lessened considerably. As the relative dearness of building materials diminished, building activity turned upward again.

The trend of costs and the volume of building from 1937 through 1939 is more difficult to interpret. Materials prices steadily moved farther out of line. Yet building activity rose substantially in the latter part of 1938. This may seem incongruous and is not readily explained. However, all deviations of materials prices from general prices are not attended by inverse variations in building activity. Other factors may be exerting strong opposing influences. For example building materials prices were out of line with general prices during the whole post-war era. Yet favorable circumstances made possible a rapid expansion of construction in spite of high costs. When these conditions ceased to

prevail in 1929, a heavy reduction in the volume of construction was inevitable.[1]

As a general conclusion it may be stated that construction costs face an elastic demand. When building materials move far above general prices, the business urge to build is seriously impaired. When, on the other hand, materials prices decline relative to general prices, (in the absence of strong opposing factors) building activity increases.

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[1] Ibid., p. 146.

Summary

Lumber prices have increased with few interruptions since 1860 and have exhibited a remarkable upward divergence from general and all-building materials prices. In 1939 general wholesale prices were 26 percent higher than in 1860, all-building materials (including lumber) were 174 percent higher and lumber prices alone were 511 percent higher.

A number of factors have been responsible for the historical movements of lumber prices. These include primarily the various costs of production (transportation charges, logging and milling costs and some elements of standing timber costs), costs of retail distribution, activities of the lumber industry leading to control of prices, effective lumber supply on the market, industrial activity and the substitution of competing materials.

Lumber freight rates have not kept pace with the advance of general prices, but the increasing lengths of haul have made transportation the most obvious, if not the most important, factor in the lumber price trend. With each regional shift in lumber production to centers more remote from markets, transportation costs have jumped sharply, and it has been demonstrated that historical

shifts in the regional production of lumber have been closely correlated with advances in lumber price levels. There are indications that as second-growth timber rejuvenates old production centers closer to markets, the period of advancing freight costs due to distance may have come to an end. Between 1928 and 1936, the percentage of lumber production for local markets made a large gain at the expense of long hauls.

Few data can be found to illustrate the trends in logging and milling costs. By use of indirect methods of calculation, the trend of milling costs from 1900 to 1934 was found to be slightly downward, while logging costs rose much more than general prices during the same period. These results lead to the conclusion that milling costs have not been a factor contributing to the relative rise of lumber prices, but that logging costs have had some influence on lumber's upward price trend. Logging costs have not advanced relatively as a result of wage increases, since wage rates for both logging and milling have tended to lag behind general wage increases. Logging costs, however, have been driven up by the progressive movement of lumbering operations into areas of greater inaccessibility, rougher topography and smaller and more inferior bodies of timber.

The value of virgin timber is usually determined as a residual between the price of lumber and the costs of

production. Theoretically it has no influence on the
price of lumber. Nevertheless, throughout the period in
which the belief in an approaching timber famine prevailed,
speculation resulted in stumpage prices which exceeded the
margin between the costs of production and the price of
lumber. As stumpage prices rose, standing timber was
withheld in anticipation of further price rises. The re-
sulting limitation of supply had some influence in causing
a relative rise of lumber prices. Later, when the theory
of timber famine was dispelled, lumbermen were left with
a burdensome overhead pressing for liquidation. The lat-
ter condition has resulted in a pressure of supply to ex-
ceed demand, particularly in periods of depression, with
the consequent effect of depressing lumber prices. Timber
grown at a cost, through its influence on supply, has a
direct bearing on lumber prices, but since it comprised a
very small fraction of the total supply in the past, the
influence of such timber has been almost negligible.

A highly complicated distributive system at the retail
level, involving an excessive number of small dealers
duplicating services and costs and attempting to protect
themselves through frequent combination and restraint of
trade, has resulted in a retail price mark-up estimated
by the National Recovery Administration in 1934 to be
nearly 40 percent of the cost of lumber sold. Competing
building materials are handicapped similarly by excessive

retail costs, but usually a smaller percentage of these materials passes through retail channels of distribution than is true of lumber. Therefore, in considering final costs to consumers, the actual divergence of lumber prices from all-building materials prices is even greater than that indicated by a study of wholesale prices alone.

Control of prices by the industry as a factor in causing the relative rise of lumber prices is exceedingly difficult to evaluate. The mass of evidence on this subject is conflicting and leads to no clear-cut decision. In recent years, at least since World War I, governmental investigations have concluded keener competition and less restraint of trade than previously existed, but in the long period preceding the war, when lumber prices steadily diverged upward from general prices, government prosecutions insisted that the lumber industry had consciously and repeatedly violated the antitrust laws. Some of the claims made by these prosecutions appear exaggerated from bias, but for different species at different times and places, the evidence does point to some success in efforts by the industry to control lumber production and prices.

Other factors, like effective supply, industrial activity and the substitution of competing materials have an important bearing on lumber prices. Nevertheless, these are general factors producing similar influences on the prices of other comodities, and it is not evident that

they have been elements contributing to the relative rise of lumber prices.

A large part of the decline in lumber consumption since 1907 has been due to substitution by competing materials. Between 1907 and 1914 lumber dealers estimated a decrease in sales of lumber for construction purposes, due to substitution, of about 13 percent. The National Recovery Administration found a similar displacement of lumber between 1919 and 1932.

A comparison of price trends from 1890 to 1939 of lumber and its principal competitors--structural steel, cement and brick--indicates a considerable relative rise of lumber prices over steel and cement and closely similar price trends for lumber and brick. Structural steel and cement expanded their share of total building materials consumption during this period, while the demand for lumber and brick declined. This indicates in general an inverse relationship between the relative prices of lumber and other building materials and their consumption. Furthermore, during the 3 temporary upward reversals of the trend of relative lumber consumption from 1919 to 1932, the price of lumber dropped to a greater degree than did the prices of its competitors.

Price has another important influence on the consumption of lumber through its effect on joint demand. Building materials are not entirely competitive, and a

cheapening of one does not mean a total elimination of the others. To some extent the demand for one depends on the demand for the group. If materials prices bulk large, and ordinarily they comprise about half the capital costs of a home including land, demand is elastic. When materials prices have declined relative to general prices (in the absence of strong opposing factors), building activity has increased. When, on the other hand, materials prices have moved far above general prices, the business urge to build has been seriously impaired. Since materials prices have moved away from more often than toward general prices, the influence of price on joint demand has been predominantly to decrease the demand for building materials.

The evidence of elasticity in the demand for lumber is substantial. It should caution those who have assumed that the decline in lumber consumption has been due to an actual change in demand to recognize that past declines in consumption have been produced by price factors also. Rising costs of production or policies of management may cause relative increases in lumber prices, and in the latter case, temporary profits, but such price rises are succeeded by declines in lumber consumption and in the long run are injurious to the profitable operation of the lumber industry.

Bibliography

*Publications not cited but containing information of interest to this study.

Ayres, Leonard P. American Business Activity Since 1790, The Cleveland Trust Company, Cleveland, Ohio. 1940.

Bemis, Albert F. The Evolving House, vol. 2, The Economics of Shelter, Cambridge, The Technology Press. 1934.

*Brown, Nelson C. The American Lumber Industry, New York, John Wiley and Sons. 1923.

Bryant, Ralph C. Lumber, New York, John Wiley and Sons. 1938.

*_____. Lumber Prices, Annals Amer. Acad. Polit. and Soc. Science, Philadelphia. May 1920.

*_____. Prices of Lumber, U. S. War Industries Board, Price Bul. 43, Washington. 1919.

Bur. Railway Economics. Commodity Prices in Their Relation to Transportation Costs, Bul. No. 30. June 1928.

*Burns, Arthur R. Decline of Competition, New York, McGraw-Hill. 1936.

Butler, Ovid M. The Distribution of Softwood Lumber in the Middle West, U.S.D.A. Rpt. No. 116, Studies of the Lumber Industry, Pt. 9, Retail Distribution. 1918.

_____. The Distribution of Softwood Lumber in the Middle West, U.S.D.A. Rpt. No. 115, Studies of the Lumber Industry, Pt. 8, Wholesale Distribution. 1917.

*Carbone, Mario G. Economic Difficulties of the Lumber Industry of the United States, 1850-1932, New York, Columbia University. May 1937.

Compton, Wilson. The Organization of the Lumber Industry, Chicago, American Lumberman. 1916.

Compton, Wilson. Price Problem in the Lumber Industry, American Economic Review, vol. 7, no. 3. Sept. 1917.

_____. Statement in Ex Parte 103 Before the Interstate Commerce Commission in the Matter of Increased Rates and Charges, National Lumber Manufacturers Association. 1931.

Douglas, Paul H. and Frances Lamberson. The Movement of Real Wages, 1890-1918, American Economic Review, vol. 11, no. 3, Sept. 1921.

Fortune. Housing America, by the editors of Fortune Magazine, New York, Harcourt, Brace and Co. 1932.

Goodman, Robert G. The Price of Lumber, Yale Univ., School of Forestry, Lumber Industry Series No. 1. 1921.

*Greeley, William B. Some Public and Economic Aspects of the Lumber Industry, U.S.D.A. Rpt. No. 114, Studies of the Lumber Industry, Pt. 1. 1917.

* Haynie, Southgate. The Construction Industry, Evidence Study No. 7, U. S. National Recovery Administration, Div. of Review, June 1935.

Howard, R. H. The Builders Supplies Industry, Evidence Study No. 4, U. S. National Recovery Administration, Div. of Review, Sept. 1935.

Kirkland, Burt P. Continuous Forest Production of Privately Owned Timberlands as a Solution of the Economic Difficulties of the Lumber Industry, Jour. Forestry, vol. 15, no. 1, 1917.

Kreps, Theodore J. Building Materials and the Cost of Housing, Pt. 4 of Land, Materials and Labor Costs, U. S. National Resources Committee, Housing Monograph Series No. 3. 1939.

Marquis, Ralph W. Economics of Private Forestry, New York, McGraw-Hill. 1939.

Mills, Frederick C. Prices in Recession and Recovery, New York, National Bur. Econ. Research. 1936.

Moore, A. G. T. Transportation as a Factor in Forest Conservation and Lumber Distribution, Yale Univ., School of Forestry, Lumber Industry Series No. 12, 1937.

National Lumber Manufacturers Association. Charting the
American Lumber Industry, Washington. 1937.

_____. Lumber Industry
Facts, Washington. 1939.

Pierson, A. H. Lumber Production, 1869-1934, U. S.
Forest Service, Div. Forest Economics. 1936.

*Reynolds, R. V. and A. H. Pierson. Lumber Cut of the
United States, 1870-1920, U.S.D.A. Bul. No. 1119.
1923.

_____. Lumber Distribution
and Consumption, U. S. Forest Service, Misc. Publ.
No. 413. 1941.

*Rubinow, I. M. The Recent Trend of Real Wages, The
American Economic Review, vol. 4, no. 4, Dec. 1914.

*Steer, Henry B. Forest Economics: with Special Reference
to Stumpage, Log and Lumber Prices, Jour. Forestry,
vol. 30, no. 7. Nov. 1932.

_____. Stumpage Prices of Privately Owned
Timber in the United States, U. S. D.A. Tech. Bul.
No. 626. July 1938.

Stephens, George A. Determinants of Lumber Prices, The
American Economic Review, vol. 7, no. 2. June 1917.

*Stewart, Ethelbert. Labor Efficiency and Productiveness
in Sawmills, Monthly Review, vol. 16, no. 1, U. S.
Bur. Labor Statistics. Jan. 1923.

Thelen, Rolf. The Substitution of Other Materials for
Wood, U.S.D.A. Rpt. No. 117, Pt. 11, Studies of the
Lumber Industry. 1917.

*U. S. Bur. Census. Census of Business, Construction
Industry, vol. 1, U. S. Dept. Commerce. 1935.

_____. Census of Business, Distribution of
Manufacturers Sales, U. S. Dept. Commerce. April
1937.

_____. Census of Business, Retail Distribution,
vol. 1, U. S. Dept. Commerce. 1935.

_____. Forest Products: Lumber, Lath and
Shingles, U. S. Dept. Commerce. 1935-1939.

U. S. Bur. Census. Statistical Abstract of the United States, U. S. Dept. Commerce. 1940 and 1941.

U. S. Bur. Corporations. The Lumber Industry, Pt. 4, U. S. Dept. Commerce. 1914.

* U. S. Bur. Foreign and Domestic Commerce. Survey of Current Business, U. S. Dept. Commerce, vol. 19, no. 11. Nov. 1939.

U. S. Bur. Labor Statistics. Monthly Review, vols. 26-46. 1928-1937; vol. 50, no. 2, 1940.

_____. Wages and Hours of Labor in the Lumber, Millwork, and Furniture Industries, 1890 to 1912, Bul. No. 129, U. S. Dept. Labor. Aug. 1913.

* _____. Wages and Hours of Labor in the Lumber, Millwork, and Furniture Industries, U. S. Dept. Labor, Bul. No. 153, May 1914; Bul. No. 225, Feb. 1918; Bul. No. 317, Jan. 1923; Bul. No. 413, June 1926.

_____. Wholesale Prices, U. S. Dept. Labor, Bul. No. 181, 1890-1914; Bul. No. 493, 1913-1928.

* _____. Wholesale Prices, U. S. Dept. Labor, Bul. No. 99, 1890-1911; Bul. No. 114, 1890-1912; Bul. No. 149, 1890-1913; Bul. No. 390, 1890-1924.

U. S. Courts. Federal Anti-Trust Decisions, vol. 10. 1923-1927.

U. S. Dept. Agriculture. Agriculture Yearbook. 1923.

_____. American Forests and Forest Products, Statistical Bul. No. 21. 1927.

U. S. Dept. Commerce. Statistical Abstract of the United States. 1941.

U. S. Federal Trade Commission. Decisions, vol. 26, Dec. 1937 to May 1938.

_____. Open-Price Trade Associations, Sen. Doc. 226, 70th Cong., 2d Sess. 1929.

_____. Report on Lumber Manufacturers Trade Associations. 1922.

* U. S. Federal Trade Commission. Report on Northern Hemlock and Hardwood Manufacturers Association. May 1923.

* _____. Report on Wartime Costs and Profits of Southern Pine Lumber Companies. May 1922.

* _____. Report on Western Red Cedar Association, Lifetime Post Association, Western Red Cedarmen's Information Bureau. 1923.

U. S. Forest Service. A National Plan for American Forestry, Sen. Doc. No. 12, 73d Cong., 1st Sess. 1933.

_____. Timber Depletion, Lumber Prices, Lumber Exports, and Concentration of Timber Ownership, Report on Sen. Res. 311. June 1920.

U. S. National Recovery Administration. Economic Problems of the Lumber and Timber Products Industry, Work Materials No. 79, Div. of Review, Industries Studies Section. March 1936.

U. S. Senate Finance Committee. Report on Wholesale Prices, Wages and Transportation, vol. 3, pt. 1, 2d Sess., 52d Cong. 1893.

U. S. Tariff Commission. Logs of Fir, Spruce, Cedar, or Western Hemlock, Report to the President of the United States. 1929.

* _____. Report on Lumber to the President of the United States, Report No. 32, 2d Series. 1931.

U. S. Timber Conservation Board. Reports of Lumber Survey Committee to U. S. Dept. Commerce. 1932-1938.

Whitten, Robert and Thomas Adams. Neighborhoods of Small Homes, Economic Density of Low-Cost Housing in America and England, Cambridge, Harvard University Press. 1931.

* Yost, W. E. The Retail Lumber Industry, Evidence Study No. 32, U. S. National Recovery Administration, Div. of Review. June 1935.

APPENDIX

Table A-1

Wholesale price indexes for all commodities, all building

materials and lumber, 1860-1939

Year	All Commodities[a]	All building materials[a]	Lumber[b]	Year	All commodities	All building materials	Lumber
			Base year 1860 = 100[c]				
1860	100.0	100.0	100.0	1900	90.6	130.5	224.9
1861	100.6	108.9	111.8	1901	89.8	124.8	224.9
1862	117.8	149.2	123	1902	96.5	131.7	251.1
1863	148.6	177.1	166.7	1903	97.3	137.4	264.2
1864	190.5	221.3	215.3	1904	97.3	138.6	248.6
1865	216.8	182.1	216	1905	97.3	146.6	275.0
1866	191.0	186.9	245.4	1906	100.6	161.4	336.0
1867	172.2	178.8	222	1907	106.4	166.0	358.0
1868	160.5	174.3	200.7	1908	103.9	159.2	292.3
1869	153.5	165.9	203.2	1909	110.6	167.2	315.0
1870	142.3	148.3	207.2	1910	113.1	172.9	323.9
1871	136.0	151.4	216.8	1911	108.1	174.0	322.9
1872	138.8	166.9	240.2	1912	114.7	170.6	342.2
1873	137.5	171.9	210.1	1913	113.9	171.8	353.2
1874	133.0	154.9	203.5	1914	111.1	159.7	326.4
1875	127.6	143.7	181.7	1915	113.4	162.1	318.5
1876	118.2	137.3	169.9	1916	139.5	204.8	360.4
1877	110.9	125.8	176.8	1917	191.8	267.2	472.3
1878	101.3	116.8	175.5	1918	214.3	298.8	546.2
1879	96.6	115.1	165.4	1919	226.2	350.3	739.1
1880	106.9	130.9	184.2	1920	252.0	454.8	1080.6
1881	105.7	131.3	185.2	1921	159.3	295.1	581.5
1882	108.5	137.5	195.5	1922	157.8	294.8	648.2
1883	106.0	134.3	217.3	1923	164.2	329.4	731.3
1884	99.4	129.5	197.5	1924	160.1	310.0	649.5
1885	93.0	126.6	191.6	1925	168.9	308.2	658.0
1886	91.9	128.5	189.9	1926	163.2	303.0	654.1
1887	92.6	126.5	197.5	1927	155.7	282.7	605.0
1888	94.2	124.8	196.3	1928	159.4	283.9	589.3
1889	94.2	124.0	195.3	1929	155.5	289.1	613.5
1890	92.3	123.7	190.1	1930	141.0	272.4	561.2
1891	92.3	120.2	188.4	1931	119.1	240.0	454.6
1892	85.6	115.7	189.6	1932	105.8	216.3	382.6
1893	88.1	116.8	185.7	1933	107.5	233.3	462.4
1894	79.0	113.4	174.3	1934	122.2	261.2	552.7
1895	79.8	109.9	169.4	1935	130.6	258.5	530.5
1896	75.7	107.6	171.8	1936	131.9	262.7	552.7
1897	75.7	105.3	166.7	1937	140.8	288.5	647.6
1898	79.0	112.2	179.0	1938	128.3	273.6	591.3
1899	84.8	121.4	203.0	1939	125.8	274.2	610.9

[a]Data for All commodities and All building materials during period 1860 to 1889 from Report on Wholesale Prices, on Wages, and on Transportation, U. S. Senate, 2d Sess., 52d Cong., vol. 3, 1893. All commodities represents a simple average of 223 articles. All building materials represents a simple average of 37 articles. The attempt was made to select representative articles "in such a manner as to make them, to a large extent, weight themselves."

Data for period 1890 to 1913 from Bul. 181, Wholesale Prices, U. S. Bureau Labor Statistics; for period 1914 to 1928 from Bul. 493, Wholesale Prices, U. S. Bureau Labor Statistics; for period 1929 to 1939 from Monthly Labor Review, vol. 50, no. 2, U. S. Bureau Labor Statistics. Since 1890, the Bureau has weighted values by quantity produced to derive price indexes. It should be noted that some error attaches to the weights used because of infrequent adjustment. The quantity ratios between the commodities produced, on the other hand, have shifted constantly.

[b]Lumber prices for period 1860 to 1912 from the Organization of the Lumber Industry, Wilson Compton, Chicago, American Lumberman, 1916. These values are more accurate than those given by the Bureau of Labor Statistics because weights were assigned to each species and frequently changed to conform with "estimates of production and consumption of lumber, in the files of the Forest Service, and based on census figures." Lumber price data for period 1914 to 1928 from Bul. 493, Wholesale Prices, U. S. Bureau Labor Statistics; for period 1929 to 1939 from Monthly Labor Review, vol. 50, no. 2, U. S. Bureau Labor Statistics.

[c]To base all data in this table on 1860 values, it was necessary to make 2 splices for each column, one at 1890, the other at 1913. Although a 2-year overlap for splicing could have been used in some instances, it was not felt that any advantage in exactness would have been gained over the method used.

Table A-2

Wholesale price index ratios of lumber to all building materials
and per capita lumber consumption, 1859-1939

Year	Price index ratios	Per capita lumber consumption	Year	Price index ratios	Per capita lumber consumption
1859	----	260			
1860	1.00		1900	1.72	
1861	1.03		1901	1.80	
1862	.82		1902	1.91	
1863	.94		1903	1.92	
1864	.97		1904	1.79	505
1865	1.19		1905	1.87	505
1866	1.31		1906	2.08	525
1867	1.24		1907	2.16	510
1868	1.15		1908	1.84	460
1869	1.22	340	1909	1.88	475
1870	1.40		1910	1.87	465
1871	1.43		1911	1.85	435
1872	1.44		1912	2.00	455
1873	1.22		1913	2.05	430
1874	1.31		1914	2.04	400
1875	1.26		1915	1.96	380
1876	1.24		1916	1.76	395
1877	1.40		1917	1.77	350
1878	1.50		1918	1.83	310
1879	1.44	365	1919	2.11	325
1880	1.41		1920	2.37	325
1881	1.41		1921	1.97	260
1882	1.42		1922	2.20	315
1883	1.62		1923	2.22	355
1884	1.53		1924	2.09	345
1885	1.51		1925	2.13	345
1886	1.48		1926	2.16	335
1887	1.56		1927	2.14	300
1888	1.57		1928	2.07	305
1889	1.57	435	1929	2.12	275
1890	1.54		1930	2.06	210
1891	1.57		1931	1.89	130
1892	1.64		1932	1.77	94
1893	1.59		1933	1.98	116
1894	1.54		1934	2.12	114
1895	1.54		1935	2.05	146
1896	1.60		1936	2.10	184
1897	1.58		1937	2.24	187
1898	1.59		1938	2.16	164
1899	1.67	460	1939	2.23	

Source: Price index ratios derived from Table A-1. Per capita lumber
consumption through 1931 from U. S. Forest Service, A National Plan
for American Forestry, pp. 247-248, Sen. Doc. No. 12, 73d Cong., 1st
Sess., 1933; period 1932-1938 from R. V. Reynolds and A. H. Pierson,
Lumber Distribution and Consumption, p. 17, U. S. Forest Service, Misc.
Publ. No. 413, 1941.

Table A-3

Lumber cost at New York, January to March 1934

	Douglas Fir water-borne[a]	Southern Pine	Western Pine	Oak
Shipping weight per M ft.b.m. (pounds)........................	3,100	3,000	2,300	4,300
Freight rate per 100 pounds.....		$ 0.37	$ 0.73	$ 0.415
Costs per M ft.b.m.:				
Stumpage.....................	$ 2.42	4.31	2.11	6.31
Logging and milling:				
Labor.....................	5.11	7.58	6.35	9.27
Other costs..............	6.58	6.13	7.77	6.91
Shipping and selling:				
Labor.....................	1.06	1.61	1.90	2.35
Other costs..............	1.21	1.07	1.95	1.53
Overhead and administrative:				
Officers and owners pay...	0.62	1.05	0.76	4.11
Other costs..............	1.80	3.50	2.60	
Total mill cost[b]...............	$18.80	$25.25	$23.44	$30.48
Freight..........................	10.20	11.10	16.79	17.75
Cost to retailer..........	$29.00	$36.35	$40.23	$48.33
Retail costs:[c]				
Labor.........................	6.51	18.16	9.08	10.83
Officers and owners pay......	1.77	2.22	2.46	2.95
Other costs..................	5.96	7.48	8.28	9.94
Total cost to consumer....	$43.24	$54.21	$60.00	$71.95
Recapitulation:	(Percentage of total cost)			
Stumpage.....................	6	8	4	9
Logging and milling..........	27	25	23	22
Selling and administrative...	11	13	12	11
Freight......................	23	21	28	25
Retailers costs.............	33	33	33	33
Total cost to consumer....	100	100	100	100

[a]Water rate is 83% of $12.00 + 25 cents.

[b]Total mill costs derived from industry cost questionnaires.

[c]Retail costs derived from industry cost questionnaires.

Source: U. S. National Recovery Administration. Economic Problems of the Lumber and Timber Products Industry, p. 323, Div. of Review, Industry Studies Section, Work Materials No. 79. March 1936.

Table A-4

Lumber cost at Chicago, January to March 1934

	Douglas Fir	Southern Pine	Western Pine	Oak
Shipping weight per M ft.b.m. (pounds)	2,800	3,000	2,300	4,300
Freight rate per 100 pounds	$ 0.72	$ 0.38	$ 0.51	$ 0.2$ 95
Costs per M ft.b.m.:				
Stumpage	2.42	4.31	2.11	6.31
Logging and milling:				
Labor	5.11	7.58	6.35	9.27
Other costs	6.58	6.13	7.77	6.91
Shipping and selling:				
Labor	1.06	1.61	1.90	2.35
Other costs	1.21	1.07	1.95	1.53
Overhead and administrative:				
Officers and owners pay	0.62	1.05	0.76	4.11
Other costs	1.80	3.50	2.60	
Total mill cost[a]	$18.80	$25.25	$23.44	$30.48
Freight	20.16	11.40	11.73	12.75
Cost to retailer	$38.96	$36.65	$35.17	$43.23
Retail costs:[b]				
Labor	6.89	6.48	6.22	7.64
Officers and owners pay	2.71	2.55	2.44	3.01
Other costs	8.13	7.65	7.34	9.03
Total cost to consumer	$56.69	$53.33	$51.17	$62.91
Recapitulation:	(Percentage of total cost)			
Stumpage	4	8	4	10
Logging and milling	21	26	28	26
Selling and administrative	8	14	14	13
Freight	36	22	23	20
Retailers costs	31	30	31	31
Total cost to consumer	100	100	100	100

[a]Total mill costs derived from industry cost questionnaires.

[b]Retail costs derived from industry cost questionnaires.

Source: U. S. National Recovery Administration. Economic Problems of the Lumber and Timber Products Industry, p. 322, Div. of Review, Industry Studies Section, Work Materials No. 79. March, 1936.

Table A-5

Wage and hour trends for general industry, lumber manufacture, and chopping and sawing in woods, 1890-

Year	Hours per week			Wages per hour		
	General industry	Lumber manufacture[a]	Chopping and sawing in woods	General industry	Lumber manufacture[a]	Chopping and sawing in woods
(Average 1890-1899 = 100 base)						
1890	100.9	100.4	100.4	99.3	101.9	98.6
1891	100.8	100.2	100.4	99.4	101.4	97.8
1892	100.8	100.2	100.0	100.1	101.5	99.3
1893	100.3	100.0	99.9	101.1	99.9	95.9
1894	99.9	100.0	99.9	98.0	96.7	94.7
1895	100.1	99.9	99.8	98.2	97.0	98.5
1896	99.7	100.1	100.0	100.2	97.4	98.3
1897	99.5	99.9	99.8	100.2	97.7	101.0
1898	99.3	99.6	99.6	100.9	101.5	106.5
1899	98.7	99.8	100.2	102.4	104.5	109.4
1900	97.9	99.5	100.0	106.8	105.4	109.5
1901	97.5	99.3	99.9	108.7	108.6	113.2
1902	96.6	98.7	100.0	112.9	112.1	115.7
1903	95.7	98.3	99.8	117.2	114.2	116.3
1904	95.4	97.8	99.4	118.2	112.3	109.9
1905	95.4	97.6	99.4	120.0	116.3	115.4
1906	94.8	96.6	99.3	125.1	124.4	120.8
1907	94.3	96.4	99.4	131.2	129.6	125.7
1908	93.6	96.6		131.6	118.7	
1909	93.4	96.5		133.4	121.6	
1910	92.5	96.5		137.0	130.0	
1911	92.2	96.5		139.8	129.9	
1912	91.1	96.6		145.9	131.5	
1913	90.6			149.6		
1914	90.1			153.1		
1915	89.2			152.5		
1916	89.7			164.5		
1917	88.5			167.0		
1918	88.5			211.3		

[a]Includes all sawing labor. Chopping and sawing in woods included through 1907 and discontinued thereafter.

Source: General industry from Douglas, Paul H. and Frances Lamberson, The Movement of Real Wages, 1890-1918, pp. 413 and 415, The American Economic Review, vol. 11, no. 3, Sept. 1921. Lumber manufacture and chopping and sawing in woods from U. S. Bur. Labor Statistics, Wages and Hours of Labor in the Lumber, Millwork, and Furniture Industries, 1890 to 1912, pp. 8-9, Bul. No. 129, U. S. Dept. Labor Aug. 1913.

Table A-6

Wholesale price indexes for lumber and its principal competitors, 1890-1939

Year	Lumber	Portland cement	Brick[a]	Steel[b]	Year	Lumber	Portland cement	Brick[a]	Steel[b]
				Base year 1926 = 100[c]					
1890	29.1		38.9	91.1	1915	48.7	51.0	39.1	65.3
1891	28.8		33.8	75.8	1916	55.1	65.4	42.4	128.9
1892	29.0		34.2	70.7	1917	72.2	80.3	50.2	190.8
1893	28.4		34.6	61.1	1918	83.5	94.6	66.7	153.2
1894	26.7		29.6	49.6	1919	113.0	102.3	91.9	128.7
1895	25.9	74.3	31.5	55.3	1920	165.2	117.2	118.4	144.4
1896	26.3	75.5	30.0	56.3	1921	88.9	110.8	105.7	104.4
1897	25.5	74.2	29.3	45.1	1922	99.1	103.5	99.4	88.5
1898	27.4	75.4	34.1	45.8	1923	111.8	107.9	103.6	123.7
1899	31.0	77.3	33.7	93.1	1924	99.3	105.7	103.4	114.2
1900	34.4	81.5	31.1	74.9	1925	100.6	102.6	100.1	102.2
1901	34.4	71.4	34.2	72.1	1926	100.0	100.0	100.0	100.0
1902	38.4	73.6	31.9	91.5	1927	92.5	96.7	93.2	94.7
1903	40.4	76.6	35.0	83.5	1928	90.1	95.9	92.7	95.2
1904	38.0	55.2	44.4	66.3	1929	93.8	89.0	94.3	98.1
1905	42.1	53.9	48.0	71.8	1930	85.8	89.8	89.8	87.3
1906	51.4	59.6	50.7	82.1	1931	69.5	74.8	83.6	83.1
1907	54.8	62.1	36.5	87.5	1932	58.5	74.3	77.3	80.9
1908	44.7	55.1	30.3	78.6	1933	70.7	88.1	79.2	83.1
1909	48.2	53.3	37.8	73.6	1934	84.5	93.1	90.2	90.8
1910	49.6	54.6	33.9	75.9	1935	81.1	92.7	89.4	92.0
1911	49.4	55.2	34.8	64.2	1936	84.5	92.2	88.7	95.0
1912	52.3	49.7	40.1	66.9	1937	99.0	89.0	93.5	113.2
1913	54.0	59.6	38.9	77.1	1938	90.4	90.3	91.0	111.0
1914	49.9	55.0	38.8	60.0	1939	93.4	91.3	91.4	107.3

[a]Tile included with brick after 1928.

[b]Index prices for period 1890-1912 are for steel billets; for period 1913-1939, structural steel only.

[c]To base all indexes on 1926, it was necessary to make splices for all materials except lumber at 1913.

Source: All data except lumber, 1890-1913, from U. S. Bur. Labor Statistics; 1890-1912 from Bul. 181, 1913-1928 from Bul. 493; all data 1929-1939 from Monthly Labor Review, vol. 50, no. 2, 1940. Lumber, 1890-1912, from Wilson Compton, The Organization of the Lumber Industry, Chicago, American Lumberman, 1916.

Actual average retail and mill prices of lumber in eastern markets

of the United States, 1860-

Year	Mill prices[a] (All species)	Retail Prices[b]		Year	Mill prices[a] (All species)	Retail Prices[b]	
		Softwoods	Hardwoods			Softwoods	Hardwoods
1860		$11.50		1915	$14.04	$24.68	$35.49
1865		9.25		1916	15.32	26.86	37.64
1870		14.01		1917	20.32	29.09	38.92
1875		13.33		1918	24.79	39.90	46.42
1880		14.00		1919	30.21	44.42	55.54
1885		17.00		1920	38.42	73.26	123.80
1889	$11.41	-----		1921	23.47	58.98	94.89
1890	-----	16.40		1922	26.15	53.13	70.12
1895	-----	16.55	$24.76	1923	31.78		
1899	11.13	-----	-----	1924	28.57		
1900	-----	21.50	27.57	1925	28.02		
1901	-----	21.32	29.32	1926	27.34		
1902	-----	-----	-----	1927	25.80		
1903	-----	20.40	31.75	1928	25.61		
1904	12.76	21.20	33.72	1929	26.94		
1905	-----	22.06	31.80	1930	22.81		
1906	-----	24.99	34.06	1931	18.56		
1907	16.56	27.87	36.94	1932	15.12		
1908	-----	27.14	38.12	1933	18.55		
1909	15.38	25.44	34.72	1934	21.47		
1910	15.30	24.60	35.61	1935	20.43		
1911	15.05	24.52	35.45	1936	22.20		
1912	-----	25.29	35.73	1937	24.25		
1913	-----	27.88	38.61	1938	21.45		
1914	-----	25.19	38.23	1939	21.97		

[a]From U. S. Forest Service and U. S. Bur. Census.

[b]From U. S. Forest Service.

Source: Retail prices from U. S. Dept. Agriculture, Yearbook, p. 1087; 1923. Mill prices from U. S. Dept. Commerce, Statistical Abstract of the United States, p. 786; 1941.

Table A-8

Logging and milling costs[a] in the United States, 1900-1934

Year	Logging costs[b]		Milling costs[c]	
	Actual	Adjusted[d]	Actual	Adjusted[d]
1900	$ 4.89	$ 5.98	$ 5.45	$ 7.66
1901	4.69	5.81	----	----
1902	----	----	----	----
1903	5.51	6.33	----	----
1904	4.90	5.63	7.01	8.04
1905	4.73	5.40	----	----
1906	5.40	5.99	8.71	9.66
1907	6.00	6.30	8.24	8.65
1908	7.91	8.62	5.16	5.62
1909	8.83	8.94	4.44	4.50
1910	7.20	7.01	4.93	4.80
1911	7.99	8.44	3.49	3.68
1912	8.68	8.61	3.74	3.70
1913	10.10	9.91	----	----
1914	8.38	8.43	----	----
1915	10.25	10.09	1.53	1.51
1916	9.81	7.85	2.73	2.19
1917	11.78	6.87	5.61	3.27
1918	13.99	7.30	7.77	4.06
1919	16.06	7.93	10.45	5.16
1920	20.35	9.04	14.89	6.61
1921	14.51	10.19	6.34	4.03
1922	14.20	10.06	8.84	6.25
1923	13.54	9.22	14.16	9.64
1924	15.81	11.04	9.20	6.42
1925	19.14	12.67	5.09	3.37
1926	19.54	13.38	3.67	2.52
1927	16.17	11.61	4.93	3.54
1928	17.06	12.08	4.86	3.44
1929	18.43	13.25	4.87	3.50
1930	16.52	13.10	3.02	2.40
1931	12.81	12.01	2.62	2.46
1932	9.39	9.93	2.85	3.01
1933	9.81	10.21	6.17	6.41
1934	11.14	10.19	7.46	6.83

[a]Include profits and losses in logging and milling operations.
[b]Derived by subtracting stumpage prices from log prices.
[c]Derived by subtracting log prices from mill prices of lumber.
[d]Adjusted for the purchasing value of the dollar.

Source: Steer, Henry B. Stumpage Prices of Privately Owned Timber in the United States, U.S.D.A. Tech. Bul. No. 626. July 1938.

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