STRUCTURAL CHANGE IN THE FOREST PRODUCTS INDUSTRY AND THE REGIONAL SHIFT IN PRODUCTION BETWEEN THE PACIFIC NORTHWEST AND THE SOUTHERN U. S.

by

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Abstract

The solid wood sector of the forest products industry has dominated the economy of the Pacific Northwest for 50 years. However, during the last 10 years, the State of Oregon has lost a third of its lumber mills. The results of a shift share analysis of employment in the Southern U.S. and the Pacific Northwest, between 1970 and 1980, indicate that the Northwest's regional share of national employment in the forest products industry has declined and the South's regional share has increased. This shift in employment between the Northwest and the South is confirmed by production figures. Over the last 10 years, the South has increased its market share in lumber and plywood until, in 1982, plywood production in the South surpassed plywood production in the Northwest.

There are cost differentials between the two regions, which partially explain the shift in production. However, these cost differentials have always existed between the South and the Northwest. Therefore, it is important to analyze the structure of the forest products industry to see why costs became important in the location of production during the late 1970's.

The lumber and plywood sector has become increasingly dominated by large corporations since the 1950's. To maintain profitability, the major firms (Weyerhauser, Georgia-Pacific, Champion, and Boise Cascade) expanded into pulp and paper, vertically integrated their product lines, and diversified into unrelated sectors.

When the macroeconomic shocks of the 1970's hit (e.g. inflation, the oil supply embargo, and rising interest rates), the forest products companies were ill-prepared. They were highly leveraged, very diversified, and had many large, inefficient, multi-plant lumber and plywood operations, especially in the Northwest. Their profits went up one year and dropped drastically the next. However most of the
companies kept expanding. Then two exogenous events forced them to be more cost-conscious. Increasing competition from Canada took an increasing share of the lumber and plywood market. And there was a decline in the supply of timber in the Northwest due to wilderness redesignation.

Consequently, the forest products companies were forced to cut costs. Their key strategy was to develop and expand their pulp and paper operations (predominantly located in the South), because the demand was more stable and the industry more profitable. At the same time, the South was the fastest growing home building market in the U.S. Therefore, because of factor costs and the location of markets, most of the large companies integrated their lumber and plywood operations with existing pulp and paper facilities. Thus, the Pacific Northwest continues to lose employment and production dominance in the lumber and plywood industry, while the South continues to gain.

Thesis supervisor: Dr. Bennett Harrison & Dr. Merrie Klapp
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CHAPTER ONE

INTRODUCTION

The forest products industry is undergoing changes whose consequences have been felt dramatically by communities throughout Oregon and Washington, culminating in a recent wave of plant closings that have left thousands of workers without jobs. While plant closings are nothing new to the industry, the most recent closings are taking place during an upswing in the economy. After dominating the domestic lumber and plywood industry for 40 years, the Pacific Northwest's position appears to be eroding in favor of renewed economic activity in forest products from the Southern United States.

Currently the forest products industry includes solid wood (lumber and wood products) and pulp and paper. Although both are wood based, they have significantly different characteristics and performances:

- The solid wood sector is labor intensive while pulp and paper is capital intensive.

- Demand for paper products is dependent on general economic conditions—tracking changes in GNP, while the solid wood sector is dependent on highly cyclical new home construction which consumes about 40% of lumber and plywood.

- Pulp and paper is more concentrated than the solid wood
sector, which has historically been considered a very competitive industry (especially lumber).

Thus solid wood and pulp and paper have been considered as two separate industries. But, in the last twenty years the same major forest products firms have increasingly dominated both industries, producing pulp and paper and solid wood products; therefore, what was always considered two separate industries is now considered together as the forest products industry.

The primary focus of this paper will be on the solid wood side of the industry, specifically lumber and plywood. The Pacific Northwest is my primary interest, and particularly Oregon, because Oregon has been the largest solid wood producing state in the U.S. for at least 60 years. Although my initial point of inquiry will be the solid wood sector, I will later consider how pulp and paper has influenced the recent changes in the solid wood sector.

For the past two hundred years the central location of the U.S. lumber industry has moved with the migration of populations. First in New England, then in the Great Lakes region and later into the South, lumber companies traditionally have begun with a flourish of activity, exploited the natural resource, and then moved on. Finally around 1900, the lumber industry located in the Pacific Northwest, where it has dominated that region's economy ever

1. Office of Technology Assessment, p. 7
since.

Between 1900 and 1950 the lumber industry was fiercely competitive. After World War II the industry began to grow as the postwar building boom demanded more lumber and plywood. Because several of the largest companies owned their own timber, in those good economic times, they were able to earn excess profits. These excess profits allowed them to expand timber resources and to increase production capacity.

Around 1950, the industry began to concentrate economically (the largest firms accounted for an increasing share of total production). By the late 1950s, two of the three largest lumber and plywood companies expanded into the pulp and paper industry. From this position they developed a corporate structure which they hoped would insulate them against business cycles, because pulp and paper was countercyclical to the highly cyclical lumber and plywood industry. As the large companies went "public", this became increasingly important, because they had to maintain the price/earnings ratios of their stock to satisfy their shareholders. Their dual strategy was 1) to vertically integrate from timber to finished products in lumber, plywood, and pulp and paper, and 2) to diversify into other industries, some wood-related and some not.

During the 1950's and 1960's, employment was slowly, but steadily, declining in the industry, an indication that this was a mature, if not declining industry. In contrast to
employment, demand continued to grow for lumber, pulp and paper. Consequently, many of the large companies made healthy profits and continued to grow. However, the industry went through a period of profit squeeze from 1957-1963. During that time forest products companies expanded their operations in an attempt to restore previously high profits. One of the results of this expansion was that production and markets became nation-wide. Finally in the late 1960s profits began to rise again for the major forest products companies.

By 1970, most of the major companies were conglomerates and most were highly leveraged with debt. They anticipated continued growth in demand for paper and wood products. But, when the national economy experienced several major recessions during the 1970s, the profits of forest product companies declined sharply.

During the seventies production and employment grew in the lumber and plywood industry, but not as fast as the total economy grew during this same period. Forest products employment in the South was growing faster than the national average in the industry, and the Northwest was growing much slower and experiencing large scale plant closings by major firms. Between 1976-1982 the number of lumber mills dropped by 36% in Oregon alone. The lumber and plywood industry in the Northwest has yet to recover from the 1981-1982 recession.

The goal of my thesis is to demonstrate that there has been
a regional shift in production taking place between the South and the Northwest. This shift helps explain why the Northwest has experienced so many plant closings in the last several years. Production and employment are growing faster in the South than in the Northwest. Much of this change is directly attributable to the actions of large forest products firms which have opened new plants or acquired existing ones in the South and closed plants in the Northwest. The relationship is one of gradual investment in the South and gradual disinvestment in the Northwest; it is not that plants close in one region, move, and then reopen in another.

This thesis is organized into four chapters. Chapter One gives the history of the industry and establishes the basic structure and operation of lumber and plywood firms. Chapter Two documents the regional shift through the use of comparative production figures between 1950 and 1984. A shift share analysis is used to explain how employment changed between the two regions. Chapter three examines why this regional shift is taking place, with an emphasis on how the firms changed in the 1950s and 1960s. Chapter Three also explains how and why cost factors became important in the 1970s and how these factors influenced corporate strategies to shift production. Finally the conclusion, Chapter Four analyzes the affect the regional shift has had on communities in the Northwest and speculates on some possible strategies for preventing massive dislocation due to relocation of industries.
HISTORY OF LUMBER MILLING

Lumber milling is one of America's oldest industries. The earliest pioneers began clearing the forests on the eastern seaboard to build their first communities. During the 1800's, wood provided the basic material on which the built environment in the United States was based. Its main uses were for houses, ships, wagons, roads, and fuel. Lumber milling became a large-scale operation during the 1800's in New England. However, by 1840, growth in population, the westward movement, and the depletion of the forests had moved the industry inland, and to the abundant Yellow Pine forests of the South. (Early development of the South had stalled because of the destruction of rail transportation during the Civil War). With the opening of the Erie Canal, the Michigan woods became accessible to the eastern market. The industry flourished there until the 1890's. By the late 1800's the Great Lakes area was cut over, and the locus of the industry moved South again. Most of the lumber barons from the Great Lakes area moved South, where the industry was well-established. Some of them went west, most notably Frederick Weyerhauser, founder of the Weyerhauser empire. Production peaked in the South in 1909; by 1930 it had been mostly cut over.

Although there was pressure to move to the West for an inexpensive, plentiful supply of softwood, most of the labor and even the mill owners did not move out of the South as they
had the Northeast and the Great Lakes. Lumber milling was different in the South. Because the South had been settled long before lumber milling became a dominant industry, most of the Southern timberlands were small parcels. (Only in Mississippi, Louisiana, and East Texas were there large tracts of timber.) Many of the loggers and sawmill owners would process nearby trees and go back to farming. Labor was very cheap in the South, largely because of the large number of poor, rural blacks, previously tied to subsistence agriculture. The paternalistic company town organization, characteristic of the larger operators, adapted well to the indigenous population. When areas were cut over, the workers stayed and continued their subsistence. Land and mill owners knew the Southern Pine would grow back within 20 to 30 years, so most of them stayed in the area also, instead of heading west. Therefore, the infrastructure was already in place when the industry returned 30 years later.

West of the Cascade Mountains in Oregon, Washington, and Northern California, there existed a plentiful new resource, the Douglas Fir, a softwood with the same strength characteristics as pine. These fir trees were much bigger and the timber stands denser, making them economical to log--once the logging and sawmill equipment had been adapted to the larger trees and more rugged terrain. When the railroads were completed from the East to the Northwest, the area was accessible, and development began in earnest.
The earliest mills in the Northwest had been along the Columbia and Willamette Rivers in Oregon and in the Puget Sound area of Washington. By 1880, Oregon had 228 lumber establishments and Washington had 37 (the total number of mills in the Northwest peaked at about 1,850 in 1947). Seattle had a deep water port, therefore, at an early date, Washington became the exporter of logs to the California markets. Since the Douglas Fir timberlands were more plentiful and accessible in Oregon, the industry grew more rapidly there, once the eastern markets were opened up by rail transportation.

Output of the national lumber industry peaked in 1909 at 46 million board feet with 715,000 employees. During the next 25 years, output declined by 10%, the number of workers by 23%, and the number of mills by 50%, primarily due to the quality, availability, and price of substitutes such as brick, concrete, and steel. Although the industry has been declining nationally in terms of output and employment, the Pacific Northwest has continued to gain market share and remained the premier lumber producer in the nation until the late 1970's.

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4. IBID.
STRUCTURE OF THE INDUSTRY--A COMPETITIVE MODEL

The lumber and wood products industry has always been considered very competitive, and is often used as a classic model of pure competition. However, there are actually three market levels of the industry: timberland ownership, lumber production, and wholesale lumber distribution. Each one performs differently. Understanding their differences is an important foundation for understanding how structural changes at each market level have contributed to structural changes in the large companies. This analysis, in turn, helps explain the regional shift in production.

Ownership of Timber Resources

Together, the South and the Northwest have 70% of the U.S. softwood timber species, such as Fir, Pine and Redwood. About 50% of the softwood volume of America is found in the Pacific Coast region (Northern California, Oregon, and Washington) while the South has about 20%. The trees in the South grow nearly twice as fast as the Northwest, so they account for more than half of the annual growth. The softwoods are in the greatest demand commercially because their strength makes them preferable for structural applications, and their cell structure makes them ideal for pulp. Fir and redwood are the

most often used species for lumber and plywood. Because they are taller and bigger around, they have more value as lumber or plywood than as pulp, when prices are equal. Pine on the other hand is faster growing, but is a much smaller tree. Traditionally, pine costs less, and so it is preferable for pulp and paper since it takes about two tons of wood to make 1 ton of paper. (Biologically, both trees can be used for either lumber or pulp.)

Ownership characteristics of forest lands have changed substantially over the last 85 years. Between 1910 and 1953, there was a substantial decline in ownership concentration at the national level. This trend was in large part due to the fact that the railroads, large landholders since the 1800's, began divesting much of their land in the early 20th Century. Much of their timberland was sold in smaller parcels to private owners, some of whom were lumber companies. For example, Weyerhauser bought his initial 900,000 acres in the Northwest from the railroad. But, most of the railroad timberlands were revested to the U.S. Bureau of Land Management.

In 1977, 28% of the commercial timberland in the U.S. was owned by public agencies (mostly the U.S. Forest Service and the Bureau of Land Management), 14% was owned by the forest product industry, and 58% was owned by non-industrial private

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owners. However, regional distribution of ownership varies widely. In the Northwest, 58% of the commercial timberland is either federal or state-owned, 23% is owned by the forest products industry, and only 19% is privately-owned. By contrast, in the South, only 9% of the commercial timberland is federally or state-owned, 21% is owned by the forest products industry, and 70% by non-industrial private owners.

To understand how timberland ownership affects the structure of the forest products industry, it is important to look at how concentrated the ownership of timber is among the forest products companies. Although the production of lumber and plywood is competitive, the ownership of timber is much more concentrated.

Of the commercial timberland owned by the forest products companies, concentration in ownership has been increasing since 1953. The concentration ratio of ownership by the top four companies went from 22.4% in 1953 to 30% in 1979. Ownership by the top eight firms increased from 14.4% in 1953 to 45% in 1979. I have no figures for ownership concentration of the top 20 firms in 1953, but by 1977, it was 69% of total forest industry timberland ownership. Also by 1977, the top fifty companies owned over 90% of all industry owned

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8. A concentration ratio is the percentage of production or ownership of a given number of companies divided by the total production or ownership of the industry.
In the Northwest timberland ownership was even more concentrated. By 1960, the top four companies owned 48% of the forest industry timberland, and the top eight owned 62%. The Weyerhauser Co. owned more than one-half of all the land owned by the top four, and these figures have increased since 1960.

The increasing concentration parallels the increasing stumpage (trees still on the stump) prices in the national forest. The privately owned resource base is limited, because the only way the amount of available commercial timberland can be increased is to shift it from other uses. The ownership of timber (fee-owned) obviously gives a company some security against rising prices of public stumpage. It also enables companies to assume a longer range planning horizon, by giving them a preferred position in the bidding process for federal timber. Hence, most of the major companies buy federal timber in the Northwest, as a way to expand their supply of timber. But if competition forces the prices of stumpage too high, their fee-owned timber protects them from having to pay high prices for public timber. In other words, they have a choice, based on price, whether or not to buy public timber. Since stumpage prices go up when lumber prices go up, firms with

10. Interviews: O'Laughlin, Ehinger.
their own timber are at a cost advantage. In addition to these short term economic reasons, Ellefson and O'Laughlin claim that the increasing concentration ratios in timber ownership are an explicit part of corporate strategy to own and manage timberland in order to guarantee future availability of raw materials.

It is important to note here that most of the large tracts of available timberland in the Northwest are already controlled by the forest products industry. Therefore, there is little chance of most companies expanding their owned resource except by buying land from one another. The South, however, is very different; most land is privately held and offers more future potential for ownership. This potential is important to companies who don't want to rely solely on public timber.

PRODUCTION OF LUMBER AND PLYWOOD

It is the production and distribution of lumber and plywood which have always been considered the competitive portion of the industry. In analyzing the competitiveness of an industry there are two key concepts which are relevant: economic concentration of the industry and the conditions of entry. By using these criteria to determine competitiveness; a picture of the structure of the solid wood industry emerges. From an

11. Ellefson and O'Laughlin, Strategies for Corporate Timberland Ownership and Management, p. 4.
understanding of the structure, we can begin to see how and why current changes are taking place in the industry, changes that have hastened, if not caused, a regional shift in production.

Conditions of Entry

The conditions of entry into the industry are one critical element which distinguishes a competitive market. As of 1963, Mead and Zaremba both found very low barriers to entry in the lumber industry. The ease of entry and exit from the industry helps explain the high drop-out rate among smaller firms. I consider three elements of entry which define the industry as competitive: production requirements, capital requirements, and ownership of timber resources.

By as late as 1970, the production techniques used in lumber and plywood milling had changed little since the turn of the century. Major improvements in the sawmill operations have been in the area of safety, energy sources for machinery, speed of operation, and lumber handling methods. The lumber industry has been among the most labor intensive of manufacturing industries in the U.S. New machinery was easy to reproduce, because it was not very technically sophisticated. There was always an active market for used sawmill machinery, especially in the Northwest, therefore, the production methods requirements were not a barrier to entry.

The capital requirements of starting a lumber or plywood
mill do not present a significant barrier to entry either. Capital requirements are relatively low--even for an optimum size plant. From a survey conducted in 1963, Mead estimated that an entrepreneur could get into the sawmill business with a medium sized plant for about $2 million. An even more compelling argument, however, is that it is viable to run a less than optimum size plant, especially when lumber prices are up and/or rising. Smaller, less efficient plants could be started up in the Northwest for about $70,000 equity investment (in 1963), based on the ease of getting credit and establishing a business. So when there are favorable profit-margin conditions, entry of small, marginal firms is prevalent. In fact, Mead showed a direct relationship between the price of lumber and the number of mills up until the mid-fifties. He notes that, after 1948 lumber prices varied with construction cycles, and the number of mills expanded and contracted with the cycles, but with a persistent pressure for exit among the smaller mills. What was behind the pressure to exit?

As lumber prices rise, firms enter the business of milling lumber. The non-timber owning mills compete at federal auction for publicly-owned timber. Consequently, there is increased demand on public timber, and the price of stumpage (trees still on the stump) rises. Historically, there was a lag time between rising lumber prices and rising stumpage

prices. As the prices for public stumpage went up, profits were reduced and the least efficient mills suffered losses, and eventually, many of them went out of business. Therefore, the "entry and exit of small mills (less than 40,000 board feet per 8-hour shift) provide much of the necessary adaptation to changing lumber demand."  

In brief, the small mills operate when lumber prices are up and before stumpage prices catch up with lumber prices, thus, narrowing profit margins. As these small mills enter production, supply increases. As supply increases there is less upward pressure on prices, and eventually prices even out or start dropping, as do profits. At this point, many of the smaller firms go out of business which, in turn, reduces supply, which, everything else remaining constant, should keep prices from dropping too far. For these reasons profit rates in the lumber industry tend toward the minimum postulated in economic theory. In fact, lumber and wood product's rates of return, on both sales and stockholder equity, ran consistently lower than the average manufacturing rate during this period of time.  

Although this is the industry-wide trend, further analysis shows some discrepancy between companies who own and those who

15. Ibid., p. 89.
do not own their own timber. The companies who own their own stumpage are not subject to the rising public stumpage prices, unless they ration their own timber or have already cut it. So during a period of rising prices they make capital gains on their operations. We can assume that during the 1947-1963 period, when prices were steadily rising, these companies were making profits above the industry wide trend towards minimum profits.

**Economic Concentration**

A common indicator of competitiveness is the level of economic concentration within an industry, determined by concentration ratios; an analytical tool which shows the share of a total market accounted for by the largest producers. The assumption is that the more concentrated the industry, the more likely there is to be collusion in price and production levels among companies, and therefore an impediment to competition.

Lumber milling had always been very competitive, characterized by thousands of small firms who were price takers and did not earn excessive profits. By 1947, at the national level, even though the number of firms had steadily declined over the last 50 years, the largest four producers in Standard Industrial Classification (SIC) 2421, sawmills and planing mills, only accounted for 5% of the sales. The eight
largest producers accounted for 7% and the twenty largest only 16
11%. Only five out of 426 four-digit SIC codes had lower concentration ratios for the four largest firms. For the eight and twenty largest firms, only two SIC codes had lower concentration ratios--fur goods and women's suits, coats, and skirts. In contrast the plywood sector (SIC 2436) was more concentrated. The largest four firms accounted for 22% of sales, the largest eight accounted for 34%, and the largest twenty accounted for 56% of sales.

Nationally, between 1947 and 1963, there was clearly increasing concentration in the lumber industry. By 1963, the four largest producers accounted for 9.2% of sales, the largest eight accounted for 12.4%, and the largest twenty accounted for 18% of sales. (See Table 1) Most of this change occurred between 1954 and 1960. It is generally attributed to a national merger movement in American industry, which was taking place at the time.

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TABLE 1
Economic Concentration in the Lumber Industry

<table>
<thead>
<tr>
<th>Year</th>
<th>Four Largest</th>
<th>Eight Largest</th>
<th>Twenty Largest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Douglas fir region)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1947</td>
<td>15.9</td>
<td>20.6</td>
<td>30.0</td>
</tr>
<tr>
<td>1954</td>
<td>16.6</td>
<td>22.1</td>
<td>31.6</td>
</tr>
<tr>
<td>1960</td>
<td>23.9</td>
<td>29.4</td>
<td>40.6</td>
</tr>
<tr>
<td>1963</td>
<td>19.7</td>
<td>25.7</td>
<td>37.2</td>
</tr>
<tr>
<td></td>
<td>(United States)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1947</td>
<td>4.8</td>
<td>6.4</td>
<td>9.8</td>
</tr>
<tr>
<td>1954</td>
<td>5.1</td>
<td>7.0</td>
<td>10.7</td>
</tr>
<tr>
<td>1960</td>
<td>9.2</td>
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</tr>
<tr>
<td>1963</td>
<td>9.2</td>
<td>12.4</td>
<td>17.9</td>
</tr>
</tbody>
</table>

Turning to the regional figures for the Northwest, the lumber industry was almost twice as concentrated as it was in the nation as a whole. Mead gives an account of the 20 largest firms in the Northwest in 1947. By 1963, eight were absorbed by other firms, four closed down as their timber was cut, two dropped from the top twenty completely. Thus by 1963, leaving only six of those who were on the top twenty in 1947. For example, between 1944 and 1960, Georgia Pacific absorbed 21 formerly independent firms, U.S. Plywood absorbed 28 firms, and Weyerhauser acquired 18 other firms. Throughout this period Weyerhauser clearly dominated production, both in the region and in the nation, producing seven times as much as the second largest regional producer, and twice as much as the second largest national producer.

20. Mead, p. 105
Georgia Pacific. And yet, Weyerhauser only produced 3.7% of the total national production and 14.6% of the regional production. (Of the top twenty regional firms in 1978 only Georgia Pacific, Weyerhauser, St. Regis, and International Paper remain).

The previous section on conditions of entry established why there were large numbers of small firms in lumber milling, and why there was persistent pressure to exit. Having smaller firms go out of business is another way in which an industry can become more concentrated, thus, leaving room within a given level of demand for the larger firms to expand production. In a competitive market, the only way firms can make more money is to increase their production without increasing overall supply. If they increase supply, prices drop, and erase the potential for more profits. But when firms drop out, those left can expand production without increasing overall supply. In the lumber and plywood sectors, production can be increased up to a point simply by adding another production shift and doubling logging efforts.

In fact, between 1947 and 1963, 71% of the total producing units disappeared in the Northwest. Ninety-five percent of these were small mills that went out of business. At the same time, there was a 33% decrease in the number of medium-small

21. Note that the drop in concentration between 1958 and 1960 shown on Table 1 can be accounted for by Georgia Pacific and U.S. Plywood closing some of their larger mills acquired during the earlier mergers.
mills, a 17% decrease in the largest mills, and a 45% increase in medium-large mills. While there was a considerable amount of closing and opening activity, production only declined by about 10%. These figures indicate that a high dropout rate among small firms most likely contributed to the increasing concentration ratios of the lumber industry between 1947 and 1963, especially in the Douglas fir region of Western Oregon and Western Washington.

**DISTRIBUTION OF LUMBER AND PLYWOOD**

In contrast to the increasing concentration at the production level, the wholesale distribution level of the lumber industry was surprisingly unconcentrated. Eighty-five percent of all the Douglas fir region lumber production was handled by independent wholesalers. Although there were few statistics on this side of the industry, it is fair to say that since firms were not yet in the distribution business, there was little domination by any one seller or group of sellers. This situation has changed significantly since 1960 as the largest companies entered the distribution business themselves, creating complete vertical monopolies from timberland ownership to the retail outlet.

In summary, there were two main reasons why the industry began to concentrate fairly quickly in the 1950's. One is that major companies were able to expand production by acquiring

22. Mead, p. 107, 108
existing firms. Because their timber holdings gave them an opportunity to make capital gains (or excess profits) during this period of generally rising prices, they had the cash to acquire and/or merge with existing firms, increasing production and adding to their timber reserve. Second, the high dropout rate by small firms gave major firms an opportunity to expand production without negatively affecting supply, and subsequently price. I have argued that it is essentially these two factors working together that set the foundation for the future oligopolization of the industry which in turn has allowed it to undertake corporate strategies of diversification and vertical integration to maintain profits.
CHAPTER TWO

THE REGIONAL SHIFT

With a basic understanding of how the lumber and plywood industry is structured, the next step in this thesis is to establish the regional shift in production, taking place between the Northwest and the South. The aggregate statistics indicate that the lumber and plywood industry is leaving the Northwest. The statistics are startling. In 1985 alone, 5,000 people in Western Oregon and Washington have or are scheduled to lose their jobs. In the State of Oregon, between 1976 and 1982, there was a 36% decline in the number of sawmills and a 24% decline in the number of plywood and veneer mills. According to the Western Wood Products Association, the number of sawmills declined another 8% between 1982 and 1984. A similar trend is taking place in Washington State, although not as extreme. The Oregon Employment Division statistics show that employment in the forest products industry (lumber, plywood, pulp and paper) dropped 17.4% between 1978 and 1984. These statistics indicate that the forest products industry in Oregon suffered tremendous losses during the 1981-82 recession, and apparently has not benefitted from the

subsequent recovery enjoyed by most of the nation. I suggest there are two reasons for this. One is that there is a regional shift in production that was already underway years before the 1981 recession, but was speeded up during the recession. The other is that the shift occurred because the industry was dominated by large, private firms whose production location decisions were based on corporate strategies aimed at maintaining the price/earnings ratios of their publically-held stock. These strategies resulted in large multi-plants operations in the Northwest which could not meet cost standards when the industry was subjected to the repeated recessions of the seventies, coupled with two exogenous factors: Canadian competition and a supply constraint in public timber. Consequently, these large companies made decisions about capacity that affected a larger number of plants and workers simultaneously. For example, Champion International in one move closed down eight plants in Oregon, Washington, and Northern California in February, 1985.

This chapter documents the regional shift in production by comparing production and employment figures for the two regions. Because most of the displacement in the Northwest has been in lumber and plywood industries, they are the focus of this analysis. However, as mentioned in Chapter One, most of the large lumber and plywood firms were also in the pulp and paper industry. In the last 10 years most of these companies have been expanding more in the pulp and paper area than in solid wood products. Some of this regional shift can
be explained by the large firms moving more into the manufacture of pulp and paper to offset the cyclical lumber and wood products industry.

While the lumber and wood products component of the forest products industry in the Northwest seems to be in a state of decline, or at least significant change, the Southern U.S. is enjoying a resurgence of activity. Production of lumber doubled in the South from 1960 to 1983 and plywood production went from nothing in 1963 to 10 billion square feet in 1983. Employment in lumber and wood products in the South increased by 8% from 1970 to 1983. Some of this increase is due to the fact that since the early 1970's the South has been the fastest growing homebuilding market in the U.S. Other factors are also relevant as I will discuss later.

Is the Northwest's experience part of an overall decline in the national forest products industry? Or, is there a regional shift in production taking place between the Northwest and the South? For this thesis, a regional shift is defined as a significant change (10% or more) in production and employment between two regions. Accepting this definition, we can hypothesize that there is a relationship between the decline in one region relative to the resurgence in another. This relationship is generally one of a gradual disinvestment in one area by major firms and a reinvestment in another. Based on the work of Harrison and Bluestone (1982), a regional shift does not imply that plants close down in one
area, move and reopen in another. Nor does it mean that people who lose their jobs in one area move and get a job in the growing region. The large firms are the major focus, because they have the ability to shift production, being multi-plant, multi-location firms, as opposed to smaller independently owned firms which just go out of business under similar conditions.

It is this phenomenon of regional shift which I will document in this chapter. There are three parts to this analysis. First, I will analyze annual production figures in the two regions and interpret the changes over the last 25 years. The figures clearly show that in plywood, the South has been steadily gaining on the West, and in lumber a similar, but not so striking trend is taking place. Second, I will use the results of a shift-share analysis of changes in employment, for the South and the Northwest between 1970 and 1980, to show that the South has been gaining in employment and the Northwest, particularly Oregon has been declining. Finally, I will use anecdotal evidence from interviews and corporate publications to illustrate that the major companies have been shifting their investment in timberland and productive capacity from the Northwest to the South.

**CHANGES IN PRODUCTION**

There are two major commodities produced from trees: solid wood products, such as lumber and plywood; and pulp, which, when mechanically combined with chemicals, can be manufactured
into a variety of products.

In Graph 1 on softwood lumber production, it is obvious that the South has been slowly increasing production over the last 26 years. As mentioned in Chapter 1, the South was mostly cut over by the 1930's. By the early 1960's, second growth trees had reached maturity, giving the South a harvestable resource. The South had always retained some productive capacity, but it had been dominated by small independent operators or integrated with pulp and paper plants. Then in 1963, Georgia Pacific built the first plywood mill using Southern pine in Fordyce, Arkansas. This marked the entry of the large forest products corporations into plywood production in the South. From this date, as shown in Graph 2, production in plywood began a steady climb. Its outstanding performance in the South was due to its competitive price.

To understand how the forest products industry in the South has been able to catch up to and in some cases overtake the West, it is important to compare production statistics of the South versus the West. In softwood lumber, from 1960 to 1973, Southern production slowly but steadily increased, with occasional dips in production. This growth pattern is attributed to lower costs of production in the South, a topic which will be addressed later. Given that the South had lower priced lumber and plywood than the Northwest, ceteris paribus, it is possible to explain how the South could have increased its production during downturns (tied to homebuilding slumps)
Graph 1
SOFTWOOD PLYWOOD PRODUCTION

(Billions of square feet)

Graph 2
by explaining the differences in the peaks and valleys of each region. Nationwide, when demand was high, prices went up and most of the productive capacity was in use (even though some of it, especially in the West, was producing at a slightly higher cost). As demand slackened, the lower priced product was preferred by buyers. Hence, the higher priced product was the first to lose its market. When demand picks up again as the economy pulls out of the recession, the lower priced product was the first to feel the increased demand. This is precisely how the price mechanism rations different priced commodities and helps explain why Southern production did not suffer as much during recessions.

Beginning with the 1974-75 recession, the South began to experience more severe drops in lumber production than it had historically during national recessions. Still, the South's drop in production was not as severe as that of the Pacific Northwest (the West-Coast and West-Inland on Graph 1), and the South's recovery was consistently sooner, with the next peak relatively higher, than the previous one, especially compared to the trend of peaks and troughs in the West. For example, during the 1974-75 recession, softwood lumber production dropped off by only 12.3% in the South compared to 14.3% for the West-Coast and 15.1% for West-Inland production. The trend was much more exaggerated in the 1980-82 recession when Southern production dropped off 13% compared to the total West production decline of 35%. In 1980, lumber production in the South finally passed both the West Coast and West Inland
(although still smaller than Coast and Inland combined). Then in 1981 the South's total plywood production was more than the total Western production for the first time ever. The reasons for this are explained in Chapter Three.

Conversely, lumber production in the West has experienced much more cyclical fluctuation with a decidedly downward trend since the early seventies. The troughs of production corresponded to the slump in residential construction since 1967. There were several factors which make the troughs increasingly deeper. The two most important were interest rates and increased costs of construction. As interest rates rose, which they did in 1970, 1975, and 1980, mortgage financing for new home construction became more expensive; so demand for housing dropped. The other factor which influenced the level of production of both lumber and plywood was the cost of housing construction (as opposed to financing costs). Throughout the 1970's, the cost of housing rose steadily (almost doubling since 1969). This was partly due to inflation, but also to real price increases. The price of lumber and plywood rose along with everything else. As shown in Chapter One, this was due primarily to rising stumpage prices, but labor costs were also rising. Thus, during the 1970's, the West became the high priced production region. As explained above, during slumps in homebuilding, the Western product lost the market sooner, longer and the drop was much deeper. Again we can assume, ceteris paribus, that after each recession in homebuilding, the West lost some of its market
share to the lower cost South.

Now that we have an idea of how and why production seems to be changing between the two regions, what are some of the reasons for these changes? The cost factors are often cited as a critical element in the South's increasing share. Carl Lindberg of the Southern Forest Products Association claims that framing lumber (2 x 4 and 2 x 6's) has always been cheaper in the South, and dimension lumber, while higher priced in the South, has enjoyed a slight edge in delivered price because of their proximity to the major markets (Eastern and Southern U.S.). Also, because of continued production growth, the South has been adding new capacity in the form of more efficient mills which helps keep costs competitive. Another factor affecting costs is that many of the lumber and plywood mills in the South are integrated with pulp and paper facilities—bark & milling residue can be used as raw material in the pulp mills. These cost factors are even more relevant given the generally competitive nature of the industry in which small differences in price influence buyers greatly. However as Chapter Three will explain, costs became increasingly important as the industry changed and exogeneous events affected their ability to be competitive.

Another factor which is influencing the South's ability to

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2. Facilities can be integrated in the West also, but there is so much more pulping in the South that its more prevalent there.
maintain its competitiveness during national recessions, (periods that are particularly hard on the homebuilding industry) is the invention of 'treated' Southern Pine. The wood is chemically treated with a copper sulfate solution which makes it particularly useful for outdoor applications like decks, fences, hot tubs, etc. The southern pine is the most widely used species in this treatment process, because it has the best retention qualities. Only two other species can compare--Ponderosa and Red Pine--neither of which is as plentiful or as accessible to the mill capacity and the major markets as Southern Pine. Since the residential applications of treated pine tend to be counter-cyclical, (i.e. during recessions, people tend to add improvements to existing residences, instead of building new homes) its production does not suffer as much as the rest of the softwood lumber market. Consequently, the staying power of the treated pine market keeps southern production from falling off as drastically during recessions and helps it rebound more quickly (i.e. when coming out of a recession, people tend to increase investment slowly)

Thus the South gained an increasing share of the production of lumber and plywood at the expense of the West. Costs were a key factor which became relevant as the industry structure changed over time.

CHANGES IN EMPLOYMENT

Changes in employment patterns are the other indicator of a
regional shift between the Northwest and the South. These changes substantiate that the difference in production levels between the two regions are not merely the result of technological differences. To do this, I have adapted a data base which used County Business Patterns census data to develop a shift share analysis of employment changes between the South and the Northwest from 1970 to 1980. What data was not available from County Business Patterns was made available through special arrangements with the Tennessee Valley Authority. The data is for SIC 24, lumber and wood products. The category for mobile homes and wood buildings, which was added into the classification as of 1972, has been taken out of the data so the employment figures would be comparable between 1970 and 1980. This two digit data is a problem, because it is impossible to isolate specific parts of the industry which are changing. But, for both the Southern and the Pacific Northwest States, a spotcheck of other employment data sources indicates that employment in lumber and plywood

3. I had originally hoped to do a time series on employment changes between the Northwest and the South over the last 20 years at the 4 digit SIC level. Based on the production figures discussed earlier it would have been enlightening to compare the employment statistics in softwood lumber and plywood for the same time period. I could have seen exactly how employment tracked production. It may also have been possible to determine if there were increases in productivity because employment was going down or staying steady as production increased. Unfortunately this was not possible. There was not consistent enough data at this level for all the southern states.

manufacture, by far, make up the majority of employment in SIC 24, lumber and wood products, and the relationship has stayed stable since 1970.

Shift-share is an economic analysis technique which describes how local employment in a specific industry, in a particular region, has changed over time, relative to changes in national employment. The changes in local employment are composed of three elements: What the employment change would have been in the state if the industry had changed at the all-industry national rate (national growth affect), what the employment change would have been had the local industry changed at the same rate as that industry nationally (industrial mix affect), and what part of the change in local employment is the result of that area's increasing or decreasing share of an industry (competitive or regional share). For my purposes, the competitive share is the key indicator. It indicates whether the production of lumber and plywood might be shifting between the Northwest and the South. Within the differences in the competitive share, I shall examine how the three products (pulp and paper, lumber

5. For the shift share analysis, the Pacific Northwest is the states of Oregon and Washington. California is not included because their primary wood resource is redwood trees which has unique end uses, not always comparable to pine and fir. The South refers to the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, Virginia, and Oklahoma.

6. Wood furniture is included only because in some states it accounts for a large part of SIC 24.
and wood products, and wood furniture) account for the differences in competitive share. These figures show how the industry in each region is changing relative to industry performance on a national level. Comparing regions explains how regions are doing relative to each other. However, from this analysis we can not conclude that there is a causal relationship between the decline in one region and the increase in another. To make this connection, I will draw anecdotal evidence from the interviews.

Results of the Shift-Share Analysis

The results of the shift-share analysis indicate that employment in the national forest products industry (made up of pulp and paper, lumber and wood products, and wood furniture) grew only slightly: by 3.6% between 1970 and 1980. At the same time, total employment in the U.S. grew by 23.1%. Employment in pulp and paper declined by 1.6%, lumber and wood products increased by 10.3%, and wood furniture employment increased by 2.6%. Therefore, we can say that the forest products industry is a slow growth industry, noting that this is the first significant employment growth in the industry in over 40 years. At this point, it is impossible to tell why this might be the case; it is a phenomenon which requires further research. Some possible explanations will be presented in the next chapter.
TABLE 3---SUMMARY OF THE SHIFT SHARE RESULTS

<table>
<thead>
<tr>
<th>COMPONENTS OF EMPLOYMENT</th>
<th>1970</th>
<th>1980</th>
<th>%</th>
<th>Nat Growth</th>
<th>Ind Mix</th>
<th>Comp Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Employment</td>
<td>1970</td>
<td>1980</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northwest</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P&amp;P</td>
<td>29,220</td>
<td>27,863</td>
<td>-4.6</td>
<td>6,529</td>
<td>-6,987</td>
<td>-899</td>
</tr>
<tr>
<td>L&amp;WP</td>
<td>110,516</td>
<td>112,833</td>
<td>2.1</td>
<td>24,695</td>
<td>-13,339</td>
<td>-9,038</td>
</tr>
<tr>
<td>WFurn</td>
<td>4,834</td>
<td>3,723</td>
<td>-22.9</td>
<td>1,088</td>
<td>-963</td>
<td>-1,270</td>
</tr>
<tr>
<td>Total</td>
<td>144,570</td>
<td>144,423</td>
<td>-.1</td>
<td>32,312</td>
<td>-21,289</td>
<td>-11,207</td>
</tr>
<tr>
<td>South</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P&amp;P</td>
<td>174,853</td>
<td>197,780</td>
<td>13.1</td>
<td>39,072</td>
<td>-41,811</td>
<td>25,665</td>
</tr>
<tr>
<td>L&amp;WP</td>
<td>236,173</td>
<td>255,083</td>
<td>8.0</td>
<td>52,774</td>
<td>-28,505</td>
<td>-5,358</td>
</tr>
<tr>
<td>WFurn</td>
<td>149,674</td>
<td>167,704</td>
<td>12.0</td>
<td>33,440</td>
<td>-29,604</td>
<td>14,192</td>
</tr>
<tr>
<td>Total</td>
<td>550,700</td>
<td>620,567</td>
<td>10.7</td>
<td>125,286</td>
<td>-99,920</td>
<td>34,499</td>
</tr>
<tr>
<td>Rest of U.S.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P&amp;P</td>
<td>497,927</td>
<td>465,357</td>
<td>-6.5</td>
<td>111,263</td>
<td>-119,065</td>
<td>-24,768</td>
</tr>
<tr>
<td>L&amp;WP</td>
<td>241,311</td>
<td>280,502</td>
<td>16.2</td>
<td>53,921</td>
<td>-29,126</td>
<td>14,396</td>
</tr>
<tr>
<td>WFurn</td>
<td>133,062</td>
<td>123,522</td>
<td>-7.2</td>
<td>29,733</td>
<td>-26,317</td>
<td>-12,956</td>
</tr>
<tr>
<td>Total</td>
<td>872,300</td>
<td>869,381</td>
<td>-.3</td>
<td>194,917</td>
<td>-174,508</td>
<td>-23,328</td>
</tr>
<tr>
<td>Oregon</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P&amp;P</td>
<td>9,400</td>
<td>10,356</td>
<td>10.2</td>
<td>2,100</td>
<td>-2,248</td>
<td>1,103</td>
</tr>
<tr>
<td>L&amp;WP</td>
<td>67,709</td>
<td>67,269</td>
<td>-.6</td>
<td>15,130</td>
<td>-8,172</td>
<td>-7,397</td>
</tr>
<tr>
<td>WFurn</td>
<td>2,677</td>
<td>1,725</td>
<td>-35.6</td>
<td>598</td>
<td>-529</td>
<td>-1,021</td>
</tr>
<tr>
<td>Total</td>
<td>79,786</td>
<td>79,350</td>
<td>-.5</td>
<td>17,828</td>
<td>-10,949</td>
<td>-7,315</td>
</tr>
</tbody>
</table>

These national figures disguise some major regional differences in employment growth and decline. The differences in competitive share between regions are the first indication that there may be a regional shift taking place. First, we consider the aggregate figures. (Table 3) If all three

sectors of the forest products industry had grown at the national rate for all industries between 1970 and 1980, the South would have gained 125,286 employees and the Northwest 32,312. However, since the industry had a growth rate so much lower than the national growth rate, the industrial mix factor for each region was negative (Table 3). Holding other factors constant, the South would have increased its share of national employment in forest products by 34,499 jobs. When the national growth and industry mix effects are taken into account the South's actual net job growth was even greater: 59,867 jobs. The Northwest, by contrast, would have decreased its share of national employment by 11,207 jobs, but when national growth and industrial mix effects are added in, the actual net decline was only 147 jobs. The rest of the nation also experienced a precipitous decline in competitive share of the forest products industry, resulting in actual loss of 2,919 jobs. These figures indicate that although the industry was growing slowly at the national level, the South was gaining an increasing share of the industry, while the Pacific Northwest experienced a decreasing share, as did the rest of the nation. The difference between the declining share of the Pacific Northwest and the increasing share of the South was an indication of a possible regional shift. This is supported by Forest Economist Jay O'Laughlin who states that "...the industry is not going to die in the Northwest, it's just that

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8. Interview, O'Laughlin.
future growth will take place in the South." To really understand what is going on between and within regions, the data must be disaggregated by regions and by sectors within the forest products industry.

When we break down the forest products industry into its component industries, it becomes evident that most of the discrepancy between regional shares was in pulp and paper (see Figure 2). Looking at the Northwest's competitive share in pulp and paper, there would have been a relative loss of 899 jobs, but when you add in national growth and industrial mix effects, their net loss was even more: 1357 jobs, i.e. the reason they lost more jobs was because the industry nationally was experiencing negative growth. In the South, pulp and paper accounted for 74% of the total increasing share in the South. Holding other factors constant, their increasing competitive share of the national pulp and paper industry would have given the South 25,665 jobs, but with the national growth and industrial mix factors added in, job growth was only 22,927 jobs. This shows that the Northwest was losing its competitive share of the pulp and paper industry while the South was gaining. Without the benefit of national growth and industrial mix effects, their respective gain and loss of competitive shares would have been even greater. This is confirmed in the case studies which show Georgia-Pacific, Boise Cascade and Weyerhauser doing most of their expansion of pulp and paper in the South, during the seventies.
Lumber and wood products operations, accounted for 81% of the Northwest's declining share of national employment in the forest products industry. (Figure 3) They would have lost 9038 jobs, but due to the national growth and industrial mix effects, they gained 2,317 jobs. Thus, although they gained employees during this period they were losing competitive share in lumber and wood products. Interestingly, the South was also losing share in lumber and wood products. Their loss in competitive share would have meant a loss of 5,358 jobs, but because of national growth and industrial mix effects, they had an actual net job gain of 18,910 jobs. The gain in employees in both regions, even while losing competitive share, is due to the fact that both national growth and industry growth are positive. As Figure 2 indicates, the rest of the nation is increasing its share of national employment in lumber and wood products, a phenomenon which amounted to a net job increase of 39,191 jobs, the bulk of the growth coming in lumber and wood products.

Based on my research, this trend is corroborated by the increased production in the Great Lakes area of plywood substitutes, waferboard, and oriented strand board, and by the production of the other wood products included in SIC 24 (other than softwood lumber and plywood). A cursory look at three and four digit level employment data suggest that 85% of the employment in lumber and plywood has been in the Northwest and the South, while the rest of the nation produces most of the kitchen cabinets, hardwood flooring, hardwood plywood
Figure 3
etc. which make up the rest of SIC 24.

In other words, it is more difficult to see evidence of a shift between the Northwest and the South, because of what is happening in the rest of the nation. However, given the dominance of softwood lumber and plywood in their respective employment figures in SIC 24, we can assume that the differences between the Northwest and the South's competitive shares were related. The differences in competitive shares between the Northwest and the South do show up when the Mid-Southern states (Mississippi, Louisiana, and Arkansas) are separated from the rest of the South. The Mid-South had a decreasing regional share in lumber and wood products which was larger than the Northwest's. (The explanation for this is detailed below when I disaggregate the regions.) When you take out the Mid-South (as in Figure 4), the South's share of national employment would be increasing by 4,834 jobs in lumber and wood products; when national growth and industrial mix effects are added in, the South actually gained 22,851 net jobs.

Another factor which enters into this analysis of competitive shares is the direction of the movement in competitive shares. For example, is the Northwest's loss in competitive share getting greater, while the South's is getting smaller? Or, are they both losing to or gaining from the competitive share of the rest of the nation? This shift share analysis can not answer these questions. Although
LUMBER & WOOD PRODUCTS
Competitive Shares 1970-1980

Figure 4
beyond the scope of this research, in Chapter Three some ideas about future trends will be explored. Based on sketchy employment data from 1980 to 1984, it appears that the Northwest is currently losing employment much faster than it did between 1970 and 1980 both in actual jobs and relative shares.

Finally, because I am particularly interested in why Oregon seems to be experiencing so many plant closings during the last 10 years, it seems relevant to look at how Oregon and Washington are doing relative to the South. As mentioned, not all of the southern region enjoyed the same increase in regional share. The Mid-South (Arkansas, Louisiana and Mississippi) suffered a decreasing share of the forest products industry due primarily to a significant decrease in lumber and wood products. Schallau asserts that the Mid-South's decreasing share was the result of the initial resurgence of lumber and plywood being in the mid-South, marked by the first Southern Pine plywood mill in Fordyce, Arkansas in 1963, built by Georgia Pacific. There were large blocks of fee-ownership timber available at the time and they were quickly bought up by the large forest products companies. Consequently, the Mid-South became the initial center of renewed corporate activity in forest products. Existing sawmills had to compete with new plywood mills for

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sawtimber. Most of the existing sawmills were older and more labor intensive in their production techniques. Thus these mills had to pay a higher price for the resource, putting them at a distinct disadvantage. Subsequently, the decline in the number of sawmill employees and number of mills increased in the Mid-South relative to the rest of the South. Schallau also states that delivered prices were higher from 1977 to 1979, in the Mid-South. Consequently, most of the Southern Pine plywood mills constructed during the 1970's were located outside the Mid-South. In fact, some plywood mills had closed in the Mid-South during the same time. This indicates that the Mid-South matured ahead of the rest of the South and had begun to decline.

Texas had a particularly large portion of the increasing share in forest products. Texas' increasing share of national employment in both pulp and paper and lumber and wood products, would have amounted to an increase of 11,479 jobs, but with national growth and industrial mix effects actually amounted to an increase of 13,432 jobs. This was 33% of the South's total increasing competitive share and 28% of the South's increasing share of pulp and paper and lumber and wood products. In part, this difference was due to Texas being the fastest growing market in the South. In fact, Jay O'Laughlin,

a forest economist at Texas A. & M., states that the Texas market is now growing faster than the locally available resource and soon Texas will be importing lumber and plywood from other areas in the South.

Turning to the Northwest, the overall competitive share in pulp and paper declined by a relative value of 899 jobs, which would have been an increase of 1,103 jobs in Oregon and a decrease of 2002 jobs in Washington. But, when national growth and industrial mix effects are included, Washington actually lost a net 2313 jobs and Oregon gained a net 956 jobs.

In lumber and wood products, 82% of the decreasing national share in the Northwest is accounted for by the Oregon decrease. In fact, in the shift share analysis, Oregon would have lost 7397 jobs, but due to national growth and industry mix, Oregon only lost 440 jobs. This decreasing share seems especially important in light of the fact that in 1980, lumber and wood products accounted for 37% of all manufacturing (in constant 1972 dollars) and 8.5% of Oregon's Gross State Product. Although lumber and plywood were a significant portion of the manufacturing economy of the state, they have been declining as a percentage of manufacturing, from 45% in 1970 to 36% in 1983. These figures appear to reinforce the inferences from the shift share analysis that the industry in

Oregon is losing competitive share even though there was only a net loss of 440 jobs. This decline was most strongly felt when Georgia-Pacific moved their corporate headquarters from Portland, Oregon to Atlanta, Georgia in 1982. Although founded in Georgia, its largest base of solid wood operations had been in the Northwest since 1954. To quote Georgia Pacific's 1982 annual report:

"As a small company, Georgia-Pacific moved its headquarters from Georgia to the Pacific Northwest in the 1950's just as that region's plywood industry began its steep growth curve...In 1982, this commitment to growth brought our corporate headquarters back to Georgia, to the focal point of today's growth sectors. The Sunbelt has truly become our company's new growth area as well as our country's most rapidly expanding region."

Washington's loss of competitive share in lumber and wood products was not nearly as great as Oregon's. Although Washington's declining share would have meant a decrease of 1641 jobs, the national growth and industrial mix effects gave them an absolute net gain of 2,757 jobs. This could be partly attributed to the presence of Weyerhauser's corporate headquarters in Washington State, which expanded significantly during the 1970's, including a new technology center employing 800 people and a $400 million capital expansion program in Washington which began in 1974. It included 11 sawmills and four wood products manufacturing facilities. The other explanation of increased employment in Washington is Weyerhauser's dominance in the log export business. Between 1976 and 1980 the number of log export operations in Washington grew from 81 to 134. Log exports tend to sustain
employment during downturns, because when the price of lumber drops domestically, so does the price of logs and the Japanese (the main importer) buy more when the price is down.

Although not conclusive, I think the results of this shift-share analysis support my hypothesis that there was a regional shift in employment between the Northwest and the South. This is based primarily on comparing the competitive shares of each region. The most pronounced change was taking place in the pulp and paper industry. The South has long been the center of pulp and paper manufacturing in the U.S. accounting for 50% of the national production. Between 1970 and 1980, it increased its employment by 13%. It also increased its share of national employment from 25% to 28%. Even though employment in pulp and paper was slow growing, there was a shift in employment to the South. By comparing competitive shares between regions, we can conclude that the South's growth was at the expense of other regions.

In the lumber and wood products areas, the national industry was growing, albeit slower than the average growth for all industries from 1970 to 1980. Therefore, employment increased in absolute numbers in all regions. But the competitive shares indicate that the Northwest was losing a large chunk of its regional share. Although the South was gaining competitive shares, when you divide the South by geographical regions, the Mid-South was declining faster than the Northwest. When we exclude the Mid-South from the analysis, it
becomes apparent that the rest of the South was actually increasing its competitive share. Because the South and the Northwest both have softwoods, which can be used interchangeably for pulp and paper and lumber and plywood, I can conclude that the South gained shares at the expense of the Northwest.

In summary, although the national forest products industry is growing slowly at the national level, the Pacific Northwest is losing its competitive share, especially in lumber and wood products. Considering how dominant the industry has been in the economy of Oregon and Washington for the last 40 years, there is much cause for concern. Within these overall trends are significant differences between regions and especially between sectors of the forest products industry. Although the shift share analysis tells us what trends were taking place over time, it does not tell us why the observed changes are taking place. However, I believe that when you put together the results of the shift share and the production figures over time, you do get a good 'snapshot' of what changes are occurring.

These findings were reinforced by my interviews (see page 97) with industry representatives. The interviews confirm two things: 1) The companies are changing their product mix, emphasizing pulp and paper over lumber and wood products. 2) They are shifting their operations out of the Pacific Northwest and into the South, largely because of recent cost
reduction measures to keep earnings up.
CHAPTER THREE

INDUSTRY STRUCTURE AND COSTS

In this Chapter I will examine why the production shift established in Chapter Two is taking place. The most often cited reasons for this shift are costs. Lower labor, resource and transportation costs in the South were unanimously cited by the industry representatives as the reason why they are shifting production to the South. However, these costs have been significantly lower in the South than in the Northwest for 20 years. Indeed, Southern costs are now rising quickly so that the differential between regions is actually narrowing. So why, during the late 1970's do we see evidence of major plant closures in the West, simultaneous with expansion of capacity in the South? I contend that while cost factors are very influential on management behavior, especially in regards to maintaining profitability, they alone do not explain the regional shift. To do this we must understand the long-range structural change occurring in the forest products industry, why it suddenly makes cost factors important, and how it influences the spatial distribution of production of lumber and plywood.

In establishing the significance of corporate structural change on location behavior of firms, I draw heavily on Ann

1. Interviews: Corey, Ewert, Elling.
Markusen's theory of the profit cycle evolution of industrial sectors. Each sector progresses through a profit cycle. After a period of normal profits, individual firms within the sector make decisions that determine whether they enter a period of normal-plus profits or normal-minus profits. Markusen contends that oligopolization is a strategy that commonly restores normal-plus profits. Individual firms make strategic decisions about how to increase their company's profitability, and these decisions have specific spatial manifestations in the location of production.

After a long period of 'less-than-normal profits', due to fierce competition among thousands of small firms, the lumber and plywood industry began to concentrate. The growth of these new firms in the postwar years led to specific strategies to keep their profitability increasing: horizontal integration or product line expansion, vertical integration, and diversification into related and unrelated sectors. These strategies have profoundly changed the structure of the lumber and plywood industries in the last 35 years and hence the rural communities throughout the Pacific Northwest where most of the mills were located.

In other words, the structural change in the lumber and plywood industries was dominated by the emergence of large forest products companies who produced a variety of wood related products, the most important being pulp and paper. As these companies expanded their operations and product lines
during the sixties and early seventies, their profits increased steadily (after a low period during the early sixties). However, their much expanded operations, which classified them as conglomerates by 1970, left the major companies ill-prepared for the macroeconomic shocks to the economy during the 1970's. During the seventies, several recessions, with their predictable construction slumps, caused profits to fluctuate wildly. The extreme case was represented by Boise Cascade. Too widely diversified and highly leveraged, by 1972, they required a major reorganization and divestiture to stay in business.

Simultaneous with the turbulence of the seventies were two key exogenous events that influenced the speed and timing of the regional shift. Increased competition from Canada (exacerbated by favorable exchange rates in recent years) and a constraint on timber supply in the Northwest increased the concern over costs during a period of profit squeeze for the large corporations. Also, the explosive economic growth of the Southern markets in the last 15 years gave the Southern lumber and plywood plants a transportation cost advantage over the Northwest.

Due to their conglomerate structure and the volatility of profits, minimizing costs became increasingly important as a way to stabilize operations and increase profitability. Two major strategies emerge. One was to increase marketing efforts and investment in the pulp, paper and paper products
side of their operations. The other was to improve productivity, through what Massey calls intensification and technical changes in production. The two strategies resulted in the closer integration of lumber and plywood with pulp and paper operations in the South, and the closing down of marginal or unprofitable operations, which were located mainly in the Northwest.

Because over 55 percent of lumber mill jobs were concentrated in multiplant firms by 1977, corporate decisions to cut back production or close mills in the Northwest has had devastating effects on the rural communities dominated by a lumber economy. The most extreme example of this was the razing of the entire town of Valsetz, Oregon by the Boise Cascade Corporation in 1984, when they decided to close their plywood plant because it was unprofitable. The same company is currently making major investments in the South.

In this chapter, I will chronologically document the long run structural changes that took place in the forest products companies. Then by looking at profits, employment and output figures, I will argue that the industry was in a state of crisis during the 1970's which resulted in another restructuring of the industry. This restructuring led to cost minimization by way of integrating production facilities in the South, and closing down older facilities in the Northwest, and hence are why a regional shift in production occurred in the 1970's. Finally, I will show how the strength of the
unions in the Northwest, competition from Canada, the environmental movement in the Northwest and the new market in the South influenced the speed and timing of the regional shift.

STRUCTURAL CHANGE IN THE FOREST PRODUCTS INDUSTRY

The 1950's

Although there is no direct information on lumber company profits during the early 1900's, we can assume that the industry was in the marginal profits stage for a long period, because of the level of competitiveness of the industry and the large number of firms.

Following World War II, the homebuilding industry enjoyed a prolonged period of growth. As the country began to suburbanize, the trend was to build single-family dwellings and shopping centers. Sales of lumber and plywood, basic components in residential and light commercial construction, obviously benefitted from this boom. As demand increased, so did the price of lumber and plywood. The number of firms reached a peak in the Northwest around 1947. By the late 1940's, some firms were multi-plant, and the three largest firms, Georgia Pacific, Weyerhauser and U.S. Plywood, began to disperse production to take advantage of high growth markets and the plentiful Northwest timber resource. Venturing from its southern origins, Georgia Pacific purchased its first plywood plant in Bellingham, Washington in 1947.
U.S. Plywood, originally a New York City company, expanded to the West Coast in 1937, and into South Carolina and Wisconsin during the thirties. Weyerhauser, founded in the Northwest, purchased southern timberland in 1956. Plywood was the fastest growing commodity, replacing lumber in many construction uses; but it could only be produced in the Northwest because the machines that peeled the logs only utilized the large straight Douglas Fir. This was an added incentive for firms to move to the Northwest.

For reasons cited extensively in Chapter One, there was growing concentration in the industry between 1954 and 1960. During this period three lumber and plywood leaders emerged who dominated the forest products industry for the next three decades—Georgia Pacific, Weyerhauser, and U.S. Plywood (U.S.P. merged with Champion Papers in 1966 to become Champion International). During this same time, these firms also established their dominance in the Northwest. By 1960, they became the top three producers. They concentrated most of their lumber and plywood production in the Northwest, because most of the firms they were acquiring were located there. The Northwest was also where the major companies expanded their timber holdings.

During the 1950's, Georgia Pacific was the success story of the industry. Even though a quarter the size of giant Weyerhauser, Georgia Pacific had the highest profits. In 1959, they had a 58% higher return on equity than U.S. Plywood.
and an 80% higher return than Weyerhauser. In fact, Georgia Pacific was one of the most profitable companies in American industry during the late 1950's. Popular business magazines characterized Georgia Pacific President Owen Cheatham as a non-conformist. In a financially conservative industry, he borrowed heavily to buy timber which in turn generated a cash flow used to acquire or build at least 43 manufacturing or distribution facilities during the 1950's.

A significant step in the changing structure of the lumber and plywood industry was the expansion of Georgia-Pacific and Weyerhauser into the manufacture of pulp and paper in the late 1950's. The pulp and paper industry had grown rapidly during the post war years, especially with the expansion of distribution systems like supermarkets which increased demand for packaging. In 1956, sales and profits in pulp and paper reached an all time high. Paper was considered one of the most profitable American industries. Consequently, most of the existing companies like International Paper, Crown Zellerbach, St. Regis, Champion, Mead, West Virginia Pulp and Paper, and Union Bag-Camp, began to expand capacity in anticipation of continued growth in the industry. Because of the profit potential, other wood based companies also entered the industry. In 1957, Georgia Pacific built a kraft paper plant in Toledo, Oregon. Weyerhauser, although already into pulp, went into paperboard, wood-fiber (rayon), and packaging during the 1950's.
Simultaneously, some of the larger paper companies expanded into solid wood. International Paper purchased Long-Bell Lumber, the Pacific Coast's second largest producer in 1956, expanding their timber base, extending their market to the West, and beginning the production lumber and plywood. Another example: between 1955 and 1961, St. Regis acquired 20 new companies, several of which were lumber and plywood operations in the Northwest.

Integrating pulp and paper operations with lumber and plywood production was a successful strategy for at least two reasons. First, it increased the efficiency of wood use. Pulping utilized a much smaller tree than lumber or plywood, and most importantly pulping utilized the parts of the tree, the top, branches, and sawdust, which are "leftover" from lumber and plywood production. Second, the demand for paper products is countercyclical, offsetting the cyclical nature of lumber and plywood, and thereby giving companies a product mix which could insulate them against business cycles. Historically this had been the case, and it continued to be so through the 1970's.

By the late 1950's, the pulp and paper industry was plagued by overcapacity due to new entrants and the increasing capacity of the major paper companies. After a slight dip in 1957 and 1958, demand for paper continued to grow, but not fast enough to keep up with all the new capacity. A similar situation occurred in lumber and plywood manufacturing.
Banking on a continued building boom, the major firms expanded their lumber and plywood capacity, but not at the rate that they had in pulp and paper. Overcapacity was especially critical for the paper industry; because its capital intensiveness required that plants run at 90% of capacity in order to be minimally profitable. Production over 90% is highly profitable and consequently slack demand or overcapacity (or both) causes severe price competition as companies struggle to maintain profitable levels of production. Historically, the industry has initiated investment in new plant and equipment during the peak of business cycles. However, construction lead time resulted in the additional capacity coming on line at the nadir of the cycle, causing price competition, which in turn exacerbated the decline in profits during economic recessions. This was essentially what happened during the late 1950's except that demand continued to increase as predicted, but not enough to keep up with capacity expansion.

There are distinct spatial manifestations to the integration of pulp and paper and lumber and plywood manufacturing. Pulp and paper had always been centered in the South, because the Southern Pine was perfect pulping wood. When companies like Georgia Pacific and Weyerhauser entered the pulp and paper industry, however, their first plants were in the Northwest because that was where their most extensive timberlands were. The Northwest location also gave them an edge in serving the Western market. However, the South remained the largest.
producer. In 1966, the South produced 80% of all U.S. pulp, paper and paperboard, and three times as much as any other region in the U.S.

At the same time, the paper companies who were concentrated in the South, expanded their operations to the Northwest, mostly in lumber and plywood, putting them closer to the Western lumber markets. So by the end of the 1950's a situation existed where most of the major forest products companies that produce both pulp and paper and solid wood products had operations in both the Northwest and the South. The South specialized in pulp and paper and the Northwest in lumber and plywood.

Theoretical Analysis of Integration into Pulp and Paper

Based on Markusen's theory of profit cycle, the lumber industry was in a period of decline during the 1950's, because employment was steadily declining. Mead found no technical improvements in the basic milling operation between 1947 and 1963, to account for job loss through changes in production techniques. Part of this employment loss was probably caused by the high dropout rate of small firms. However some employment loss was due to intensification of production, i.e., where production is reorganized to be more efficient without any major technical innovations. Unfortunately I have

no documentation of this except that unions were well established in the Northwest by 1954. Generally as unions keep pressure on wages and effectively organized new plants, employers find ways to use fewer employees. Hence in lumber and plywood, although output was growing steadily, fewer people were producing more lumber due to intensification of the production process.

Markusen's theory would predict that during a period of decline, managers would employ strategies to bolster their profits. Usually this would happen through the formation of oligopolies. In lumber and plywood, oligopolies, in the pure sense, did not form. This was mainly due to the continued existence of independent mills, (for reasons cited in chapter 1), and the inability to product differentiate with a homogeneous commodity. However, during the fifties, the large firms did exhibit specific oligopoly-like behavior. Firms did not compete on the basis of price because if they had, others would have followed suit. Because supply and demand in the lumber and plywood industry were so volatile, prices changed rapidly and firms found themselves price takers in most markets. They fought for market shares by competing to acquire existing firms and by building new capacity. At this point the role of business strategies became crucial in distinguishing the companies as industry leaders, because of their ability to maneuver and maintain profitability. First, these firms increased their market share within the industry. Then, because of the profits they made from doing so, they
were able to expand into pulp and paper in an effort to increase profits.

**The 1960's--Diversification**

By the early 1960's, there was tremendous overcapacity in both lumber and plywood, and pulp and paper. Accordingly, profits, particularly in paper, suffered as firms ruthlessly cut prices to keep operating capacity up. (See Graph 3) Because of the length of time during which these firms experienced reduced profits, it is fair to call this a "profit squeeze". Although they were not actually losing money, these firms had relatively low returns on equity. Corporate managers must increase returns in order to attract investment in their stock, which in turn gives them funds for continued expansion and growth. Consequently, these managers usually are forced to consider short-term strategies to increase their price/earnings ratios.

The major strategy of the forest products companies was to increase their earnings by vertically integrating. The reason for this was to provide a market for the output of their pulp and paper operations. With price competition as severe as it was in the early sixties, it certainly made sense for firms to acquire major markets, assuring that they could maintain operating capacity. In this way corporations attempted to enhance control over their economic environment.

The basic method of expansion was through acquisition.
Theories of market structure and economic performance cite two reasons why firms choose to expand by acquisition. First, if another firm's plant becomes available at a reasonable price, acquiring it may be cheaper than building a new plant. Second, acquiring existing plants does not contribute to an already serious situation of overcapacity. For forest products companies, the profit squeeze undoubtedly depressed the value of both pulp and paper, and lumber and plywood firms, making their purchase prices reasonable; new capacity would have exacerbated the existing problem of overcapacity. In the case of expansion on the paper side (like paper converting), acquisition was a quick and easy way to guarantee markets.

Although Weyerhauser, Georgia Pacific, and Boise Cascade continued to acquire lumber and plywood mills, the focus turned to vertically integrating on the paper side. Because of the tremendous variety of end products in paper, many companies sought to carve out market niches in specialty paper products. Forbes Magazine suggested in 1962 that "production-minded papermen" plagued with overcapacity should put more emphasis on sales and marketing. "You have to help your customers find new uses for paper and create new markets". This strategy was especially attractive, since

Scott Paper and Kimberly-Clark were the only companies that had continued to earn good profits during this five-year profit squeeze. Scott Paper had done so by effectively marketing and distributing their well-known trademarked "Scott Tissue". Their market niche kept earnings high even though the commodity part of the industry suffered from overcapacity.

Consequently, during the 1960's there was a strong expansion by forest products firms into paper product converting facilities. Weyerhauser entered the packaging business. Georgia-Pacific acquired corrugated container plants, a grocery bag and sack plant, and several other specialty paper operations. Boise Cascade acquired an envelope manufacturing facility and soon after, began to manufacture and distribute office products. Boise also got into composite cans and packaging ventures.

In lumber and plywood production, vertical integration had been going on for some time. Georgia Pacific and Boise Cascade had been expanding their building products distribution network. By 1965, Georgia Pacific had 84 retail distribution centers where they sold their own products, along with building materials of other companies. Likewise, Boise Cascade built a distribution network in the West, including both retail lumber yards and wholesale warehouses. This strategy gave the companies a guaranteed market for some of their output, and also got them into the profitable retail and wholesale business.
As the major companies acquired new enterprises to capture opportunities for increased profits, they also continued to expand their basic pulp and paper capacity. During the early 1960's, they concentrated on expansion and modernization of existing facilities, while still making major acquisitions. Because of their dependence on the timber resource, all of the major firms continued to acquire timberlands. Neither Boise Cascade nor U.S. Plywood had the resource base of Georgia Pacific and Weyerhauser. So Boise Cascade and U.S. Plywood added substantially to their timber holdings. Between 1959 and 1966, U.S. Plywood tripled their acreage. Stumpage prices were rising in the Northwest, where most of the lumber and plywood production was still concentrated. Thus, particularly for their pulp and paper operations, companies turned increasingly to the South where timberlands were cheap and plentiful. Boise Cascade made its first purchase of southern timberland in 1966. Subsequently, they formed a joint venture with Southern Natural Resources to develop a pulp and paper complex in Louisiana. (In 1983, Boise Cascade acquired the assets of Southern Natural Resources, solidifying their southern operations)

At the same time, several of the companies, especially Weyerhauser, Boise Cascade, and Champion International acquired timberland or cutting rights abroad. Weyerhauser was the most aggressive in this strategy. By 1966, they owned land or were involved in joint ventures in Canada, Belgium, Venezuela, Guatemala, Japan, France, South Africa and
Southeast Asia. Champion International acquired substantial holdings in Brazil. Western Canada, with a tremendous softwood resource, became a prime area for expansion of American corporations. Several firms located pulp, paper and sawmill operations in Canada during the 1960's.

The motivation to acquire timberlands in the South was primarily to feed the pulping operations there. The lumber and plywood industries had stayed pretty much concentrated in the Northwest, because that was the only place where plywood, which was the fastest growing component of the solid wood industry, could be produced. Finally, in 1963, Georgia Pacific built the first Southern Pine plywood mill in Fordyce, Arkansas. They had developed machinery to continuously peel the smaller Southern Pine trees. Several of my interviewees remarked that this breakthrough in Southern pine plywood production marked the entry of the corporate forest products firms with solid wood operations into the South.

Because of the growing labor costs due to unionization in the Northwest and the continually rising stumpage costs, the forest products firms were motivated to develop the technology which could produce plywood from the less expensive Southern Pine. Georgia Pacific not only made the technological breakthrough, but because of their large blocks of fee-owned timber in the South, they were able to expand plywood production quickly. In fact, by 1970 they dominated enough of the Southern Pine plywood production to have the Federal Trade
Commission successfully prosecute them for monopolizing the market. As a settlement, Georgia Pacific agreed to spin off 20% of their assets into a new company, Louisiana Pacific. Eventually other companies gained access to the technology, and there was steady growth in Southern plywood production.

Besides strict vertical integration, forest products companies were also diversifying during the 1960's. The distinction between diversifying and vertical integration is slightly fuzzy, especially in paper converting. I consider diversification to mean involving the firm in a different sector with different production methods and competitors, even though the sector may be related to their primary commodity. The best example of related diversification is expansion into the chemical business. The pulping process produces several chemicals which can be processed and sold for other uses. Pulping also requires chemicals in the production process. Forest product companies developed both chemicals for their own use in pulping and for sale to others. Although initially a form of product line expansion and vertical integration, participation in this industry meant new facilities, processes and competitors. It also eventually led some companies to further expand into unrelated areas like polyvinylchlorides, etc. In Georgia Pacific's case, expansion into the chemical field drew them into other profitable areas like the manufacture of polystyrene insulation and polymers. Geographically this meant acquiring or building facilities in New Jersey, Ohio, and Houston, Texas.
Forest products companies also diversified into unrelated fields. International Paper went into medical supplies; Champion International went into furniture; and Georgia Pacific acquired gypsum manufacturing facilities. Weyerhauser, more than any other company, expanded into foreign ventures and land development. Since 1968, Weyerhauser has become one of the largest housing and commercial development companies in the country. By 1984, its real estate development division had become a wholly owned subsidiary and included a mortgage company and an annuity corporation. They had also entered the wholesale nursery business and salmon ranching.

Historically a financially conservative industry, forest products companies issued preferred stock to finance their acquisitions. Finally during the sixties, they began to take on long term debt to finance continued expansion. Long-term debt is a common method of financing expansion when projections of continually increasing sales give firms the projected ability to pay off their debt.

The economy experienced steady growth during the sixties, and the strategies of vertical integration and diversification began to pay off. Profits began to increase and, thus, their price/earnings ratios went up. The demand for packaging and publishing exploded in the U.S. and abroad. As a result, all

the major companies had record sales and earnings in 1967, 1968, and 1969. In 1969, Forbes Magazine was predicting a possible resource shortage in anticipation of continued growth in the demand for paper and wood in the seventies.

**Spatial Manifestations of Vertical Integration**

The concentration of the forest products industry via vertical integration dispersed production in two ways. First, existing paper conversion plants acquired by the forest products companies were usually located near population centers and markets, mainly in the Northeast. Often when the companies did build new facilities, they tended to be in the South because of their accessibility both to the pulp and paper operations and to the eastern markets. During the 1960's, many paper converting facilities were built in California to take advantage of the growing western market. The pulp to supply these facilities came from the Northwest, but very few paper converting plants were located there. Second, the production of wood-based commodities continually demanded new timberlands. Since stumpage prices were rising in the Northwest, companies sought out the less expensive Southern timber. This meant that by 1970 all the major integrated forest product companies had considerable land holdings in the South and the Northwest. However, the southern timber had little impact on the lumber and plywood industries until the technological breakthrough that allowed them to make plywood from Southern Pine.
Finally, labor must have had a considerable influence on location decisions, but I have no documentation on this period regarding the importance of labor cost differentials between the two regions. However, we can assume that companies that were concerned about stumpage costs were also concerned about labor costs. Decreasing the cost of labor or stumpage has the same effect of increasing the return on equity (all else being equal). The following chart shows the relative importance of the costs of production in lumber and plywood.

<table>
<thead>
<tr>
<th>Factor of Production</th>
<th>Percentage of Costs</th>
<th>Lumber</th>
<th>Plywood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timber</td>
<td>72%</td>
<td>46%</td>
<td></td>
</tr>
<tr>
<td>Labor</td>
<td>15</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Materials</td>
<td>6</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td>4</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Fixed</td>
<td>3</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td></td>
</tr>
</tbody>
</table>

Obviously timber costs are the most important factor, but labor is second and must have been germane to the firms' location decisions, especially when wages were half as much in the South as they were in the Northwest. Most importantly, the Northwest was heavily unionized and the South was not. Labor costs were more a part of plywood production than of lumber, which partly explains why Georgia Pacific was motivated to produce plywood in the South.

Profit cycle theory predicts that increasing concentration will generally slow dispersion of production, but the rate is dependent on the "relative" degree of oligopoly in the industry. "Sectors highly sensitive to natural resource costs
are likely to display greater growth volatility. Their patterns of regional dispersion may show greater unevenness, both spatially and temporally.¹⁶ These tendencies did overconcentrate the industry in the Northwest, because it was there that the companies owned timberlands and the plywood industry was centered. Later when plywood was made in the South, some firms relocated there; because of Georgia Pacific's monopoly, most of the other major forest products companies remained in the Northwest. By cutting their own timber during a time of rising stumpage prices, the Northwest operations could still make a profit on lumber and plywood. Therefore, the cost differences were mitigated by other events.

However, continued expansion put more demand on their Northwest timberlands. Even though companies were replanting the cutover land in the Northwest, given the 40 - 60 years that it takes to grow a Douglas Fir to usable size meant they were cutting faster than the land could replenish. To be assured of future supply many of them began acquiring timber resources elsewhere, especially in the South where land was cheaper and the replacement growth cycle was shorter. Thus, while concentrating production in the West, especially in lumber and plywood, land ownership and production were beginning to disperse, albeit unevenly, to the South.

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⁶ Markusen, p. 4.
ANNUAL PROFITABILITY MEASURES

Forest Products Companies

1 Year Return on Equity

Year


Weyerhauser  □  Georgia-Pacific  ◀  Champion  ◇  Boise-Cascade  △
The 1970's

After profitable years in 1967, 1968, and 1969, the forest products companies were anticipating continued economic expansion and growth. Their optimism was due to rising demand in paper products and packaging and the increasing demand for housing from the "baby boomers", now approaching their home buying years. However, instead of the predicted steady growth, the forest products industry experienced a "roller coaster" effect on earnings. (see graph 3). For example in 1971, housing starts were way down. This predictably depressed the lumber and plywood markets. The next year, homebuilding took off, but pulp and paper suffered losses. These erratic profits seem to confirm Piore and Sabel's conclusion; "The real shortcoming of the conglomerate movement...was that the risks it sought to contain could not be reduced through diversification. For those risks arose not from business accidents, randomly distributed across markets, but from shocks to the economy as a whole."

Besides wildly fluctuating demand, there were structural reasons why the profits of the forest products companies declined during the 1970's. As discussed above, all the major firms had expanded with breakneck speed, diversifying into

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7. Piore and Sabel, p. 197.
many areas, some of which had not proved to be profit centers. Boise Cascade suffered a 52% decline in their average five year earnings within two years; they had been one of the most profitable companies during the 1960's. But Boise-Cascade was exposed through high debt, widely diversified operations, and a low percentage of fee-owned timber. So when prices of stumpage rose sharply in the late sixties and a homebuilding recession hit in 1970 and 1971, their profits plummeted.

In lumber and plywood, the large firms had built large plants in the West to take advantage of economies of scale in production. Furthermore, large plants were easier to manage from a centralized corporate structure than many small plants. Industry analyst, Walter Mead cites a production problem peculiar to lumber and plywood companies. Because of the unique characteristics of each log which is processed, decisions on the most profitable way to cut the log are made by individuals. There are three basic steps, each involving human judgment, which ultimately affect the profitability of the operation. These people are not generally the owners. The ability to supervise these product line decision makers falls as the level of output increases. Mead further states, "If the firm is a large one and consists not only of several lumber manufacturing plants but veneer, plywood, pulp and paper, and other enterprises as well, then communication

8. Forbes, col. 99, #1, p. 150
between the peak coordinator and production-line decision makers is further removed." He concludes, "The above considerations suggest that no obvious economies of large-scale operations are available to offset the deductively indicated diseconomies of multi-plant operations." In the final analysis, Mead backs up this statement with engineering data on optimum plant size and concludes "...that the optimum firm size is not multi-plant, but rather single plant, and that the single plant of optimum size, in turn, is not likely to exceed 140,000 board feet per eight-hour shift."

During the seventies, there were two important exogenous events which profoundly influenced the structure of forest products industry. One was increasing Canadian competition and the other was the ascendancy of the environmental movement in the Pacific Northwest. As graph 4 shows, Canadian imports increased during the 1970's. Ninety-four percent of Canadian timberland is publicly owned. The government sells it to mill owners at extremely low prices to ensure employment in rural areas. In addition, the government assumes the cost of reforestation. As a result, Canadian lumber and plywood is much less expensive than domestic lumber, even after transportation costs. Since the mid-seventies, the currency devaluation has added to the Canadians' cost advantage. In a

10. Ibid.
11. Ibid.
competitive industry like lumber and plywood, this low cost product has forced American firms to produce as cheaply as possible.

The second exogenous event was the increased activity of the environmental movement in the mid-seventies. Environmentalists were successful in getting the use of public timberlands reevaluated to consider additional wilderness areas. This political activity resulted in a moratorium for thousands of acres of timber, particularly in Oregon. This action restricted the supply of public timber available to forest products companies, eventually sparking a bidding panic in 1978 and 1979 which drastically increased the price of stumpage in the Northwest. Although there is no way to easily document this, most observers agreed that the large companies had already cut much of their fee-owned timber and many were caught in the price spiral.

These two major factors put cost pressure on the industry at a time when demand was fluctuating wildly. Many small firms went out of business or cut back dramatically. The large firms were particularly susceptible to cost factors during this time, as the fluctuations in demand affected their profitability. As I have shown, their multi-plant, large scale operations make them particularly vulnerable to exogenous events like Canadian competition and reduced

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supply. The result was that many of the Northwest plants were only marginally profitable. Many were closing. Between 1976 and 1982, there was a 36% decline in lumber mills and a 24% decline in plywood mills in Oregon.

From evidence I have accumulated on the Northwest lumber and plywood industry, there appears to be some other factors which explain why major firms are deindustrializing in the Northwest. First of all, it is obvious that costs were an important variable in the 1970's, affecting firms' behaviors. However, cost differences between the South and the Northwest have always existed, particularly in labor and stumpage. So one can not argue that lower costs in the South were the sole reason for production moving to the South. Costs became crucial to profitability when exogeneous factors impinged on corporate price/earnings ratios. When they were in a profit squeeze situation, they abandoned their marginally profitable Northwest mills in favor of integrated lower cost facilities in the South. Jay O'Laughlin is just completing a study on the location of southern plywood mills by the major forest products companies. He says that the number one reason cited for deciding to locate a plywood plant was the need to be where the firms already had existing production facilities, especially in pulp and paper. Yet another exogeneous event increased the cost benefits of producing lumber and plywood in the South. The fastest growing homebuilding market in the U.S.

13. Interview, O'Laughlin.
has been the Sunbelt States for the last 10 years, thereby giving goods produced in the South a cost advantage in transportation to the major markets.

Another crucial factor was the role of labor. Although these costs were much less in the South, labor did not seem to be a critical factor before the mid-seventies. My research suggests that when firms were experiencing problems with profitability and cost competition in the 1970's, they wanted to flee the unions as much as they wanted to take advantage of lower wages. Unions made it difficult for forest products companies to maneuver their operations for maximum flexibility. In 1983, one company, Louisiana Pacific, was engaged in outright union busting. President Harry Merlo was applying his "Southern strategy": he told millworkers to either accept a lower standard of living or they would continue to lose forest products jobs to the Southeast. Currently, Weyerhauser and Boise Cascade are asking the unions in the Northwest for major wage concessions to keep them operating. In contrast, every Southern state has "right-to-work" laws which effectively undermine many organizing attempts.

Most of the major companies have been emphasizing productivity gains since the mid-seventies. The lumber and plywood industry, in particular, had a production process

14. Peter Damman, "Anatomy of a Strike", In These Times, Feb 6-12, 1985
which virtually had not changed for 50 years. Finally, cost factors and union troubles seem to have prompted companies to invest in numerically controlled machines and laser cutting devices. Bluestone and Harrison contend that technology is introduced, not where it can save money on high cost labor, but in low wage regions where there is no unionization. For example, in 1984, Crown Zellerbach opened a new plywood facility in McComb, Arkansas which only requires five people to run the entire mill, including management.

Finally, there seems to be some disagreement about whether the current mill closings are really affecting capacity in the Northwest. Two interviewees said that the Northwest still maintained the same capacity, but in larger plants, and had increased efficiency both through technology and intensification of the production processes. This issue remains a question for further research.

In summary, to explain the regional shift in production between the Northwest and the South from 1970 to 1980, we had to see how the structure of the industry changed in the years prior to 1970. In an attempt to maintain profitability, companies employed several strategies at different times. Lumber and plywood companies first expanded into the manufacturing of pulp and paper. This proved a successful strategy, because both industries used wood as their major

15. Interviews: Ewert, Hampton, Goetz.
resource, and pulp and paper were countercyclical to lumber and wood products. However, profits did not improve considerably as a result, so companies moved vertically into packaging and distribution of lumber and plywood. Although demand for most products and commodities increased, profits did not keep up. Next we find the major forest products companies diversifying into related and non-related fields. Through all of these strategies, production of the basic commodities stayed concentrated: pulp and paper in the South, lumber and plywood in the Northwest. But increasingly, the major companies had timber holdings and plants in both regions and throughout the U.S. The companies took on tremendous debt to finance this continued expansion.

When the macroeconomic shocks of the 1970's hit (e.g. inflation, oil supply embargo, and rising interest rates), the forest products companies were ill-prepared. The major forest products companies were highly leveraged, very diversified, and had many large, inefficient, multi-plant lumber and plywood operations, especially in the Northwest. Their profits went up one year and dropped drastically the next. However most of the companies kept expanding. Then two exogenous events forced them to be more cost-conscious. One was increasing competition from Canada which has taken an increasing share of the market for lumber and plywood since 1975. The other was a decline in the supply of timber in the Northwest due to wilderness redesignation. The decline in supply was crucial, because these same large companies had
been overcutting their Northwest timberland and were forced to turn to public sale when the prices rose.

The inefficient, multi-plant operations in the Northwest were modernized, but still were not very competitive. Intensification and technological changes helped some, but the strength of the unions in the Northwest hindered the firms' flexibility. Also the fastest growing market in the U.S. was in the South, giving Southern plants transportation cost advantages. Consequently, as a cost cutting measure, they began closing their Northwest plants, in favor of integrating their lumber and plywood operations with the pulp and paper facilities in the South. Markusen states

"...if oligopolies retard decentralization in earlier stages, they may accelerate the process in later periods. Oligopolized sectors as well as competitive ones will be intensely interested in cutting costs, increasing productivity, and tightening control over labor in a profit-squeeze situation...Corporations will thus continue to disperse production to regions where unions are absent and the business climate more favorable...If this occurs hand in hand with cuts in output or with significant new plant scale and technology the aggregate spatial outcome will be relocation."

This is exactly what has happened with the major forest products companies during the 1970's and 1980's. After overconcentrating lumber and plywood production in the Northwest, even after plywood could be produced in the South, the forest products companies began to relocate their production with a vengeance.

16. Markusen, p. 47
CHAPTER FOUR

CONCLUSION AND RECOMMENDATIONS

In concluding this thesis I will do three things: 1) summarize the findings of the previous three chapters, 2) analyze how the structural changes in the forest products industry have affected communities in the Northwest, and 3) recommend actions for the State of Oregon to help communities dependent on the forest products industry deal with the economic problems they have experienced.

First of all, the lumber and plywood industry which had dominated the economy of the Pacific Northwest for 60 years is experiencing a regional shift in production from the Northwest to the South. Between 1970 and 1980, national employment in the lumber and plywood industry grew by 10%. Total production of lumber and plywood grew by 15% and 53%, respectively. However, the growth has been very uneven between regions. In pulp and paper and in lumber and plywood, employment for this period grew four times faster in the South than it did in the Northwest. Finally in the 1980's, production of plywood in the South surpassed production in the Northwest.

This regional shift is a long and complex story of change: changes in industry structure, product emphasis, international competition, labor and technology, and markets and politics.

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1. Production figures were between 1970 and 1984.
The historically competitive lumber industry began to concentrate during the 1950's. By 1959, the large lumber companies also manufactured pulp and paper products. Since 1960, these large forest products companies (e.g. Weyerhauser, Georgia-Pacific, Champion International, and Boise Cascade) have adopted strategies of vertical integration and diversification in an attempt to maintain profits and price/earnings ratios. Their corporate structure became more centralized, with corporate headquarters usually located in a major city and production facilities located in rural areas. In the Northwest, lumber and plywood production was organized in large multi-plant operations which Mead demonstrated were not the most efficient method of production.

As companies acquired other firms, merged or built new plants, they dispersed production to other parts of the country. Pulp and paper concentrated in the South, because the cheap and plentiful Southern Pine made excellent pulpwood. Lumber and plywood concentrated in the Northwest because the large, straight Douglas Fir was ideally suited for lumber and plywood.

In 1963, Georgia-Pacific developed a machine that could make plywood from the smaller Southern Pine tree. Gradually because of the cheaper southern timber and the dwindling supply of privately-owned forest lands in the West, companies began buying southern timber and expanding lumber and plywood production in the South.
In the 1970's, competition from Canada, rising stumpage costs, and macroeconomic shocks wreaked havoc on the profits of the large forest products companies. The companies were forced to cut costs in order to keep price/earnings ratios high. Given their large, multi-plant operations, this was a difficult task to accomplish. They also had previously cut over most of their low cost timber in the Northwest and were forced to buy expensive public timber. In addition, well-established unions in the Northwest made it more difficult to intensify production and introduce new, efficient numerically controlled machines. Coincidentally, in terms of population and income, the South was the fastest growing homebuilding market in the U.S. during the 1970's. For this reason transportation became another important cost variable between the two regions.

Because of their size and structure, many of the large firms were unable to respond to the changing market. The main strategy of the major firms was to emphasize their pulp and paper operations which were not as cyclical as lumber and plywood. Simultaneously, they integrated lumber and plywood production with their existing pulp and paper operations in the South. Largely for these reasons, they began to close their large Northwest plants.

Consequently, the interaction of all these elements, e.g. changes in industry structure, corporate strategies to increase profitability (P/E ratios), and exogenous events like
recessions and Canadian competition, resulted in the companies pursuing technological innovation and intensifying production to help cut costs. Eventually these cost-cutting measures resulted in a major restructuring of the lumber and plywood industry: relocating production to the low-cost, non-union South.

To understand how the restructuring of lumber and plywood production has affected rural communities in the Northwest, it is important to see how the industry has influenced the development of these communities. Many of the rural communities of Oregon and Washington began as timber towns at the turn of the century and have remained dependent on timber as their major source of income. Originally, most of the mills were locally owned and operated. As the industry concentrated in the fifties, many of these local lumber operations were bought by the large companies, e.g. Weyerhauser, Georgia Pacific, etc.

Absentee ownership removed what little control the community had had over their economy. Lumber and plywood had always been a cyclical industry, and mill closures and slowdowns were expected events. When mills were locally owned, community people were closer to the decisions involving closings or slowdowns in production. Often mill owners would keep mills open as long as they could, and once closed mills usually would reopen after a period of time. For example, John Hampton, president of Hampton Lumber in Willamina, Oregon said
he has been losing money since the 1980 recession. But the combination of working closely with his unionized employees to run extremely efficient operations and having reserves left from the late seventies when business was booming, has enabled him to keep his mills open. Hampton hopes to be making money by the end of 1985. Contrast this example to Champion International, who is headquartered in Stamford, Connecticut. In February, 1985, they closed five plywood plants in Western Oregon and Northern California after announcing plans to reorganize the solid wood side of their company, integrating it with their southern pulp and paper facilities. The issue is control. When large corporations restructure production, the community has little or no control over their decisions.

Markusen gives four reasons why having an oligopolistic industry dominate regional production is problematic: 1) the industry dominates the local business climate, usually paying relatively high wages, especially if they are unionized, and thus discouraging other industry from locating there, 2) the preoccupation of entrepreneurs with the dominant industry starves the rest of the community of innovative leadership which could provide alternative economic activity, 3) the dominant industry monopolizes most of the capital available in the community and 4) the prominence of the corporate leadership distorts the local political culture. The timber dependent communities are particularly susceptible to these events, because they are so remote and their labor force is relatively unskilled. Therefore, they are not attractive
locations for other business opportunities.

Because of this dependent situation, communities have little control over their fate. From a regional perspective, if a locally-owned mill closes, 50 to 200 people may lose their jobs. If Champion International closes five mills, 2,000 people lose their jobs, in this case permanently, unless the mill is sold and the new owners hire back laid-off workers.

By understanding the structure of the industry, the structure of the companies, and their spatial configuration in a given region, a regional planner can predict with some accuracy whether there may be dislocation in the future. Profit cycle theory can predict how a region will perform economically, based on the maturity of the industries in the regional economy and their level of oligopolization.

In light of the conclusions reached in this thesis, Oregon's current problems of severe displacement in the forest products industry are not easily solved. First of all, it is unlikely that any financial incentives provided by the State or wage concessions given by the unions are going to bring the industry back to Oregon in the near future.

One obvious step for the State to take is to find a way to help diversify the economies of timber dependent communities. Of course this is not easy for the reasons mentioned above; most community resources are already dominated by the timber industry, and if the large companies returned, it would be
difficult to resist their presence. However, research should begin on other industries which could be developed in place of lumber and plywood with an emphasis on products which are wood-based but more value-added, like cabinets, furniture etc. Another possibility for research is to find new ways to use wood cellulose that would lead to commercialization and possibly, with strategic planning, provide future employment for these communities.

In other words, if corporate ownership has caused many of the problems being experienced in the forest products industry in Oregon today, then it is time to regain control of the resource through local ownership. Many mills and timberlands, currently owned by the large companies who are relocating in the South, are for sale in Oregon. Some are being bought by local entrepreneurs. The State should provide financing to encourage worker or management buy-outs as well as to help local entrepreneurs buy the mills. Worker buy-outs are one of the most exciting options available to guarantee local ownership. There are already successful examples of plywood co-ops in Oregon. But, there are many unsuccessful examples of worker buy-outs in the U.S., however the extensive research done in the field could help avoid the previous pitfalls of worker buy-outs. Any State funded programs should require quid pro quos from the new owners in the form of management and marketing plans. This requirement is crucial because new successful plants in the Northwest will need to develop market niches or new products in order to compete with plants in the
My research assures me that there are future markets for lumber and plywood and new uses for wood. Lumber and plywood are unlikely to be high-growth industries in the future, and they will always be cyclical. However, with good management and creative marketing these industries can still provide jobs and a way of life for many small communities throughout the Pacific Northwest.
INTERVIEWS

Keith Balter, Analyst, Softwood Resources, Data Resources Inc., Lexington, Massachusetts.

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