The Oregon Wood Products Labor Force: Job Rationing and Worker Adaptations in a Declining Industry

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THE OREGON WOOD PRODUCTS LABOR FORCE:

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ABSTRACT

A 45 percent decline in wood products employment, caused by capital substitution and declining private timber supplies, has been forecast for Oregon by the year 2000. This report attempts to look at the human side of that problem, particularly the distributional consequences of the employment decline and the consistency of worker adaptations to labor market signals.

The Oregon wood products labor force is made up of two types of workers. The "core" labor force (60,000 older, more experienced workers) has an income position which compares favorably with others in the Oregon economy. As employment levels decline in wood products, these workers generally will be most likely to hold or capture the remaining jobs because of their work seniority. If several mills were to close in a community, however, earnings of this group might be reduced considerably; most of them now earn from $100 to $250 per month more than they could earn outside the industry.

The "peripheral" labor force (especially some 25,000 younger, full-time workers) increasingly will become excess to the needs of the wood products industry. Although their past unemployment rate has been no greater than that of the average Oregon worker, this is largely because of their own adaptability. Their work histories have been divided between wood products jobs and other jobs, usually of short duration (one year, on the average). This mode of

adaptation, however, is penalized by wood products employers; job-changers are labeled as "unstable" and are less likely to find jobs in the future. Remaining with a particular wood products employer, on the other hand, usually benefits the worker only slightly because of the low value of firm-specific experience; many tasks are about the same in different mills. To change jobs frequently appears quite a rational adaptation to labor market signals; the present value of future income streams is shown to be greater for a "job-changing" strategy than for a "staying" strategy, at least up to a five-year planning horizon.

There appear to be three alternative policy options with respect to the impending employment decline. These are, (1) denying that a problem exists, (2) changing some major dimension which gives rise to the problem (e.g., expanding the public timber harvest), or (3) social sensitivity and preparation for the decline. The second option no doubt will be debated through political and legal processes. Within the third option is the realization that loss of economic viability by a worker may be caused by the structure of economic incentives rather than by personal inadequacies of the worker.

I. INTRODUCTION

The history of the labor force in the Pacific Northwest, as in many regions, has been closely linked to the natural resource base of that region. Natural resources and the lure of wealth provided the historical incentive for westward migration, a pull that has ebbed and flowed as a consequence of resource development and exhaustion, technological change, and changes in product demand. In some instances, the outcome has been rather picturesque; an old mining town may wait patiently for silver prices to rise. In other instances, the outcome has been rather spectacular. A prime example is the vast technological revolution in U.S. agriculture which has drastically reduced the need for manpower over the last three decades.

A similar phenomenon is underway today in the wood products industry, the mainstay of many rural regions in the Pacific Northwest. Long a viable industry in the region, post-World War II demands for housing accelerated the demand for labor and drew substantial migrants to the region. Small sawmills proliferated, and small farms became "farm woodlots" with the advent of higher prices for stumpage and processed lumber. Wood products employment in Oregon rose to a peak of more than 84,000 workers in 1951 and about one in seven workers in the state were employed in the industry (Figure 1). Since that time, a series of forces has substantially affected the labor force. Technological change has diminished the labor input per unit of output, although it has also expanded total output by allowing more complete utilization of raw materials. Economies of size have been exploited to take advantage of new technologies, with high-cost (and often the more rural) mills the losers. Shifts in locational advantage were felt in the late Fifties and early Sixties as Southern plywood production accom-

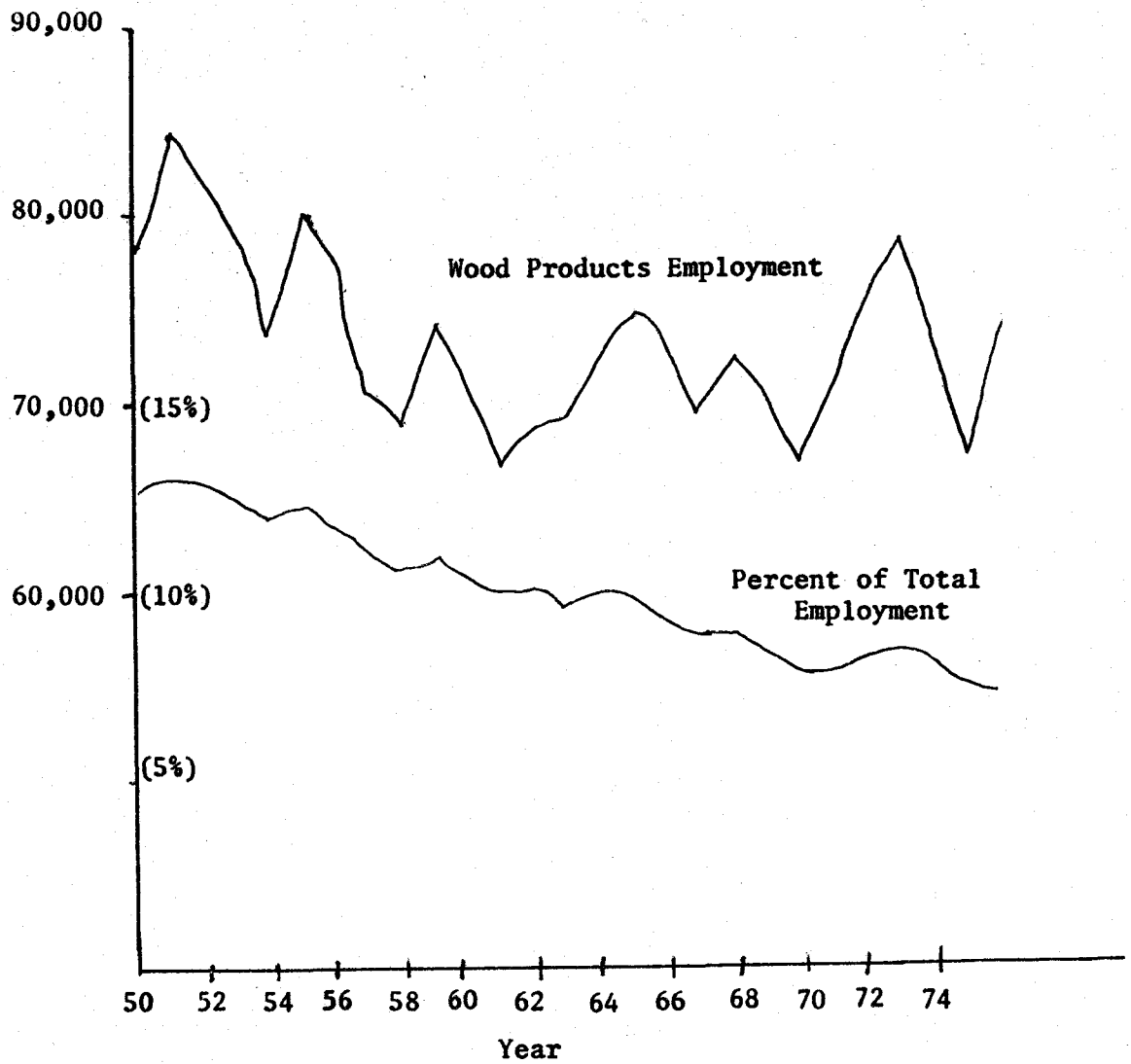

Figure 1. Wood Product Employment in Oregon, 1950-1976.[1/]

[1/] SIC 24 (Excludes Paper and Allied Products).

SOURCE: Employment Division, State of Oregon.

modated itself to smaller dimension timber and lower cost labor. As a result, employment since the end of the Korean War has fluctuated from year to year but usually within the range from 68,000 to 74,000. As other segments of the Oregon economy have grown, the wood products industry has declined from 13 percent of total employment in 1950 to about 7 percent at present.

Looking forward over the rest of the century, it is quite apparent that two forces in particular will continue to impinge on the wood products labor force. One is the substitution of capital for labor, the other is the level of timber supply. Although most of the public attention has been focused on the timber supply issue, mechanization is probably far more important in terms of the long-term impact on employment levels. In Western Oregon, for example, the number of employees per million board feet of lumber processed in sawmills and planing mills dropped from 7.8 in 1950 to about 4.0 in 1970.[1/] In veneer and plywood plants, this ratio declined from 14.4 in 1950 to about 7.0 in 1970. It is generally agreed that much of this decline was caused by closures of less efficient mills and the emergence of larger, integrated mills, and that these rates of decline will diminish over time. Nevertheless, capital substitution loomed as a dominant force in a 1973 Forest Service projection that there would be a net decline of about 55,000 wood products jobs in Western Oregon and Western Washington by the year 2000, or a reduction of about 45 percent of current employment.[2/] This report indicated that even if wood products output (and

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1/ Wall, Brian R. and Daniel D. Oswald, A Technique and Relationships for Projections of Employment in the Pacific Coast Forest Products Industries, USDA Forest Service Research Paper PNW-189, Pacific Northwest Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service, 1975.

2/ Wall, Brian R., Employment Implications of Projected Timber Output in the Douglas-Fir Region, 1970-2000, Research Note PNW-211, Pacific Northwest Forest and Range Experiment Station, U.S. Forest Service, November 1973.

implicitly, timber supply) were held constant at 1970 levels through the year 2000, employment would still decline by 36 percent because of capital substitution and increased labor productivity.

The virtual certainty of a decline in private timber supply between now and the year 2000 further will reduce employment needs in the wood products industry. This "shortfall" arises largely from the liquidation of old-growth stands of timber by private industry; the extent of this has been documented in two recent studies of particular interest. The first, done by the Forest Service in 1975 and assuming continuation of current forest management practices, projected a 48.6 percent decline in timber supply from private ownerships in Western Oregon between 1970 and 2000 (Table 1).[1/] Even with a projected 20.1 percent increase in public timber supply, total timber supply in Western Oregon would fall by 17.3 percent by the year 2000.

The second study, a widely circulated O.S.U. document known as the "Beuter Report," basically seemed to verify earlier Forest Service projections.[2/] For our purposes here, its substance can be condensed into the following:

1. Private timber supply will be unable to fill the gap between <u>public</u> harvest (current allowable cut) and <u>current</u> harvest between now and the year 2000. For Western Oregon, this deficit would be 22 percent of current harvest by the year 2000.

1/ Gedney, D. R., D. D. Oswald, and R. D. Fight, <u>Two Projections of Timber Supply in the Pacific Coast States</u>, Resource Bulletin PNW-60, Pacific Northwest Forest and Range Experiment Station, U.S. Forest Service, 1975 (Tables 4 through 8).

2/ Beuter, John H. K. Norman Johnson, and H. Lynn Scheurman, <u>Timber for Oregon's Tomorrow: An Analysis of Reasonably Possible Occurrences</u>, Research Bulletin 19, Forest Research Laboratory, School of Forestry, Oregon State University, Corvalli January 1976.

Table 1. Past and Projected Trends in Timber Supply, 1952 to 2000[1/]

				Projected[2/]	
	1952	1962	1970	2000	% change 1970 - 2000
Oregon, Washington, and California					
Public ownership[3/]	5.187	9.332	10.853	11.499	+ 5.9%
Private ownership[4/]	17.133	12.433	13.305	8.162	- 38.6%
Total	22.320	21.765	24.158	19.661	- 18.6%
Percent from public lands	23.2%	42.9%	44.9%	58.5%	--
Western Oregon and Western Washington					
Public ownership[3/]	3.458	5.810	5.858	6.876	+ 17.4%
Private ownership[4/]	10.087	7.437	9.542	5.188	- 45.6%
Total	13.545	13.247	15.400	12.064	- 21.7%
Percent from public lands	25.5%	43.8%	38.0%	57.0%	--
Western Oregon					
Public ownership[3/]	2.250	3.915	3.666	4.402	+ 20.1%
Private ownership[4/]	7.016	4.428	4.369	2.245	- 48.6%
Total	9.266	8.343	8.035	6.647	- 17.3%
Percent from public lands	24.3%	46.9%	45.6%	66.2%	--

1/ Billion board feet of softwood saw timber, which is the net utilizable roundwood volume removed from the forest.

2/ Assumes continuation of current forest management practices.

3/ National Forests, B.L.M., B.I.A., and State Forests.

4/ Industrial and other private ownerships.

SOURCE: Gedney, D. R., D. D. Oswald, and R. D. Fight, Two Projections of Timber Supply in the Pacific Coast States, Resource Bulletin PNW-60, Pacific Northwest Forest and Range Experiment Station, U.S. Forest Service, 1975 (Tables 4 through 8).

2. Declines in harvest would be expected as early as 1985 in some timbersheds, particularly the Eugene area. In the North Coast area and Eastern Oregon, on the other hand, timber supply has the capability of actually increasing between now and the year 2000.

3. The general decline in timber supply in Western Oregon cannot be averted by increases in the intensity of timber management.

4. If the National Forest system were not constrained on allowable cut, the level of total timber harvest over the next 100 years would have the capability of never falling below the current level of harvest.

5. Timber supplies after the year 2000 might actually increase over current levels in Western Oregon, even assuming the continuance of current policies on public timber harvest.

Thus, the scene is apparently set for a substantial decline in manpower needs in Oregon's wood products industry. The decline promises to be irregular, because of a marked sensitivity to cyclical changes in the national economy, particularly to fluctuations in interest rates and housing starts. The long-term employment picture, then, can be seen rather clearly as "up and down, but mostly down." The cyclical nature of the industry will mask to some degree the secular or long-term direction, which will depend on both public timber policy and on decisions made by the wood products industry. While modern firms may have a sense of social responsibility compared to the "cut and get out" operations of old, the multi-state and increasingly multi-national character of many

industrial forestry firms makes it clear that their investment opportunities are diverse and are not limited to Oregon or the Pacific Northwest.

Opinions vary on whether social responsibility of firms should include sacrificing some profit to avoid economic decline in timber-dependent communities or regions. For example, additional public control may be sought with respect to private rates of harvest, rates of reforestation, and/or rates of technological change. Proponents of this approach essentially would attempt to impose costs on wood products firms to ameliorate the employment decline and thus lessen the impact on timber-dependent communities, postpone the day of reckoning, or both. Another topic, now under discussion, is the extent to which timber on public lands should be used to fill the "shortfall" in private timber supply. An immediate manifestation of this is the question of whether the allowable cut on National Forests should be increased. Although the likelihood of this alternative seems to have been lessened by the National Forest Management Act of 1976, the actual interpretation of the Act by the Forest Service and by the courts remains to be seen.

This report does not address these policy issues in a comprehensive manner. Instead, it focuses on what might happen in terms of income distribution if present public and private policies are continued. That is, what are the implications for the labor force if capital substitution continues to increase labor productivity, if private timber supply declines substantially, and if allowable cut levels on National Forests are held constant? To answer this question, an attempt is made to learn something about dynamic processes which affect workers in the wood products industry. For example, considerable attention is devoted to the question of access to economic opportunity. If employment declines occur, as appears inevitable, what types of workers will be most affected

and by what process will they be affected? Beyond this, but very much related to it, attention is devoted to why personal incomes vary among wood products workers and why some workers are occupationally mobile when others are not. By addressing these and related issues, some approximate answers to the following questions can be gained:

1. What are the likely distributional consequences of the impending employment decline in wood products?

2. How consistent with labor market signals are the work strategies or adaptations by workers, particularly job-changing?

It was in the above context that this study was initiated in 1971. The general hypothesis was that the rural location of the wood products industry, the apparent low skill level of the labor force,and the lack of employment alternatives would lead to a rather severe human and community adjustment problem. Underlying this concern was an assumption about institutional lags. Although labor shortages and high wages induced migration into the region and the industry in the late Forties, the tide appears to have turned toward a situation of labor surplus. In the interim, local institutions have become increasingly oriented to provide a continuing stream of labor into the wood products industry, including both formal institutions (the educational system, in particular) and informal institutions (e.g., inter-generational work patterns).

Although depressed labor markets will encourage occupational and geographic mobility, it was suspected that these institutional lags would cause the adjustments to be rather slow and painful. Given these assumptions, a variety of data was brought to bear on the issues, often in a fairly inductive manner. The remainder of this report, it is hoped, will make some semblance of order out of these data.

Section II is a cursory description of wood products workers in Oregon, based on census data which are far from adequate for answering the questions that need to be answered. To correct this deficiency, Section III contains the results of a Statewide Survey of Oregon's wood products workers in 1972. Section IV is addressed to the question of why incomes vary among wood products workers, and how the mechanics of this process may give rise to different adaptations on the part of different workers. In Section V, the question of access to economic opportunity is investigated in some detail: the outcome gives some insight into how the remaining jobs will be allocated in the future. Section VI looks at the monetary incentive framework as it relate to job-changing by workers. Finally, the report is summarized in Section VII and conclusions and policy implications are drawn.

With respect to the manner of presentation, the emphasis throughout will be on communicating with the informed layman, including industry executives, union officials, agency administrators, local government officials and planners, educators, political leaders, and interested residents. In keeping with this focus, technical terms and statistical subtleties largely will be confined to footnotes.[1/]

1/ So further research can be cumulative in nature, on the other hand, it is essential that communication be maintained with other economists. For this reason, the economist-reader is urged to read Appendix A before continuing with the remainder of the report.

Although the report is lengthy, each section is summarized rather concisely and Section VII (Summary, Conclusions, and Policy Implications) provides an overview of the entire report.

II. CHARACTERISTICS OF OREGON'S WOOD PRODUCTS LABOR FORCE: A LOOK AT CENSUS DATA

As a prelude to the remainder of the report, this brief section is devoted to an examination of census data on characteristics and trends in Oregon's wood products labor force. First, a note of caution: a "wood products worker" is identified for census purposes as one whose primary work activity in the week prior to the Census was in the wood products industry.[1/] The data are not inclusive; people whose primary work activity is not in wood products may work in that industry from time to time. Also, people who are out of the labor force most of the time (students, for example) probably would not be classified as wood products workers even though they may work in the woods or in a mill during the summer.

The census data can be expected to describe primarily the "core" wood products labor force--those who have a substantial involvement in that industry. To the extent that there may be a sizable "peripheral" labor force, census data may not reflect accurately the nature of the total wood products labor force.[2/] In anticipation of Section III, the reader is warned that a sizable peripheral labor force does in fact exist in the Oregon wood products industry--approximately 40 percent of the total number of workers.

1/ "Census data" refers to the Census of Population, 1970. "Wood products", as used throughout this section, includes SIC 24 (Lumber and Wood Products, except furniture) and SIC 26 (Paper and Allied Products).

2/ The terms "core" and "peripheral", which will be explicitly defined in Section III, are often used in the dual labor market literature which has arisen as a new way to explain how labor markets operate. This approach is more heavily flavored with sociological and institutional factors than has been the case with most economic models in the past. For a non-technical summary, see: Zell, Stephen P., "Recent Developments in the Theory of Unemployment", Monthly Review, Federal Reserve Bank of Kansas City, September-October, 1975.

Although the census data are likely to be more descriptive of the core labor force than of the total labor force, they do reveal some general characteristics and trends with respect to the former. What we find is a large work force which is declining in both absolute and relative size (Table 2). The numerical decline in the Lumber and Wood Products work force (-11,280 between 1960 and 1970) has been offset only partially by growth in Paper and Allied Products (+2,018). Over the entire industry, the work force decreased in net size by about one percent annually during the Sixties.

Table 2. Experienced Civilian Labor Force, 1960 and 1970

	1960	1970	Change	Percent change
Lumber & wood products	79,559	68,279	- 11,280	- 14.2%
Paper & allied products	7,083	9,101	+ 2,018	+ 28.5%
All wood products	86,642	7,730	- 9,262	- 10.7%

Lumber and wood products workers are largely Caucasian males who have rural non-farm residences or live in small towns; only a few live on farms (Tables 3 and 4). In general, the distribution of income among these workers is somewhat more concentrated in the middle-income classes than is the distribution of income among all manufacturing workers (Table 5). The median income of Paper and Allied Products workers was higher than that for the entire work force in 1969 (+1,278 for males), but the median income of mill workers was somewhat less than that of the work force generally (-$196 for males) (Table 6).

Table 3. Employed Persons, by Sex and Race, 1969[1/]

	Lumber and Wood Products	Paper and Allied Products
Total	61,578	8,843
Female	4,285	1,079
(%)	(7.0%)	(12.2%)
Black	69	119
(%)	(0.1%)	(1.3%)
Spanish language	841	144
(%)	(1.4%)	(1.6%)

1/ Ethnic and female categories may overlap, e.g., Black females are counted in both categories.

Table 4. Size of Place of Residents, Lumber and Wood Products Workers, 1970[1/]

	Percent
Urban	45.8
> 50,000	(18.3)
10,000 - 50,000	(12.3)
2,500 - 10,000	(15.2)
Rural non-farm	49.3
Rural farm	4.9

1/ Includes furniture workers, but not Paper and Allied Products.

Table 5. Distribution of Income by Industry Group, 1969

	Percent				
	< $4,000	$4,000 to $6,999	$7,000 to $9,999	$10,000 to $15,000	> $15,000
All manufacturing	21.6	26.1	31.8	16.2	4.3
Lumber & wood products	14.2	28.7	36.4	16.4	4.3
Logging	13.5	23.4	34.5	21.3	6.9
Mills	13.9	30.1	37.2	15.2	3.7
Misc. wood products	20.6	28.2	31.3	16.3	3.7
Paper and allied products	10.9	19.1	39.5	25.8	4.7

Table 6. Median Earnings by Industry Group and Sex, 1959 and 1969

	Male			Female		
	1959	1969	Percent change	1959	1969	Percent change
OREGON: All workers	$4,971	$7,732	+ 55.5%	$2,135	$3,318	+ 55.4%
All manufacturing	5,153	7,912	54.1	2,614	3,822	46.2
Lumber & wood products						
Logging	5,219	8,186	56.8	2,688	4,396	63.5
Mills	4,921	7,536	53.1	3,243	4,396	35.6
Misc. wood products	--	7,468	--	--	3,494	--
Paper & allied products	5,601	9,010	60.9	3,252	5,011	54.1

The general impression gained from census data is that while the core labor force in Lumber and Wood Products declined in numbers during the Sixties (at the rate of about 1½ percent per year), no serious problem exists in terms of income disparity. The increase in median incomes in this industry was roughly the same as for the entire work force between 1959 and 1969; median incomes increased at an undeflated rate of about five to six percent per year for wood products workers and for the work force generally.

On the other hand, there are three other areas of concern which should be recognized, given the impending decline in manpower needs. One is whether the core labor force can withstand the impending decline with the same resiliency as in the Sixties. The second is the fate of timber-dependent communities; the decline in manpower needs likely will be felt quite unevenly across different geographic areas. Timber-dependency ratios run up to nearly 30 percent for lumber towns like Roseburg and Coos Bay, Oregon (Table 7); even moderate declines in private timber supply will test the capability of these economies to absorb the excess wood products workers. The third area of concern is the nature of the peripheral labor force; this issue is addressed in the following section.

Table 7. The Twelve Leading Wood Products Counties in the Western U.S., 1969[1/]

	No. of wood products workers	Dependence on wood products[2/]
Coos Co., Oregon (Coos Bay)	5,483	27.6%
Douglas Co., Oregon (Roseburg)	6,321	26.2
Greys Harbor Co., Washington (Aberdeen-Hoquiam)	4,210	20.4
Linn Co., Oregon (Albany-Lebanon-Sweet Home)	4,755	19.6
Humboldt Co., California (Eureka-Arcata)	6,481	19.3
Cowlitz Co., Washington (Longview-Kelso)	4,477	18.6
Lane Co., Oregon (Eugene-Springfield)	12,336	16.0
Jackson Co., Oregon (Medford)	4,110	12.6
Pierce Co., Washington (Tacoma)	4,862	3.9
Multnomah Co., Oregon (Portland)	4,242	1.9
King Co., Washington (Seattle)	4,628	1.0
Los Angeles Co., California (Los Angeles)	28,586	1.0

1/ Includes furniture manufacturing.

2/ Wood products workers (including furniture) as percent of total county employment

III. THE STATEWIDE SURVEY OF OREGON'S WOOD PRODUCTS LABOR FORCE

As observed above, census data are not adequate to discern some of the more important characteristics of Oregon's wood products labor force. For this reason, a Statewide Survey of mill workers and loggers was conducted by the Oregon Agricultural Experiment Station in the spring of 1974. A total of 189 randomly selected production workers were interviewed (Table 8). Each worker had received wage or salary payment in the wood products industry (logging, sawmills, or plywood)[1/] at some time during 1972, the most recent year for which a sampling frame could be obtained from the Employment Division, State of Oregon.[2/]

The Statewide Survey, thought to be the first of its kind in this particular Oregon industry, differed from census data in a number of important respects. Basically, it was much more comprehensive in many respects, particularly in identifying the work histories of workers.[3/] Most importantly, it allowed in-

1/ Particle board and pulp and paper workers were excluded from the sample. Thus, the definition of "wood products workers" in this section corresponds closely to that of Lumber and Wood Products in Section II.

2/ The need for better social accounting systems was quickly revealed at this step in the research. Even the highly cooperative Employment Division could not readily tell us how many different people had been employed in wood products, although they had a vast amount of data on number of jobs. Substantial effort in terms of computer programming was required to overcome this deficiency.

3/ There are several reasons for believing that the results of the survey can be generalized to the statewide population of wood products workers that existed in 1972. In brief, a large initial sample of 2,453 workers was randomly drawn from Employment Division records. This stratified sample was tested (chi-square) against known characteristics of the industry, and found to be representative by industry sector and by county. A stratified sub-sample of 189 workers was then drawn for personal interviewing. An exhaustive search was made to locate these workers; about six man-months were devoted to contacting employers, union agents and searching phone books and city directories. The internal estimate of total man-years of employment in the industry in 1972, based on the sampling procedure and on work history data, was adjusted to equal the average monthly employment for that year, as recorded by the Employment Division. Additional detail on the sampling procedure can be found in Appendix B and in the following dissertation: Ervin, David E. An Economic Analysis of Income Determination for Production Workers in Oregon's Wood Products Industry: A Human Capital Approach, Unpublished Ph.D. Dissertation, Oregon State University, September 1974.

Table 8. Sample Sizes, Statewide Survey

Category	Industry sector: Logging	Industry sector: Sawmills & plywood	Total
Core[1/]	47	52	99
Peripheral	22	68	90
(Mobile workers)[2/]	---	---	(46)
(Students)[3/]	---	---	(26)
(Disabled, etc.)[4/]	---	---	(8)
(Status unknown)[5/]	---	---	(10)
Total	69	120	189

1/ In the labor force throughout 1972, and worked only in wood products (although not necessarily for a single employer).

2/ In the labor force throughout 1972; worked outside wood products for part of the year.

3/ Out of the labor market for part of 1972 (primarily college students).

4/ Out of the civilian labor market for part of 1972. Includes disability (4), retirement (2), and military service (2).

5/ Includes those with some time unaccounted for during 1972 (average, 5.1 months). This could be due to withdrawal from the labor market or faulty interviewing.

ferences to be made about the size and characteristics of the total wood products labor force, rather than just those workers who reported to the census interviewer that their primary job was in wood products.

A. Core and Peripheral Workers: A Dual Labor Market Approach:

As suggested in Section II, the dual labor market literature is based on the view that the labor force in many industries consists of a primary and a secondary sector. To cite Zell,

> "The primary sector is characterized by good jobs, high wages, satisfactory working conditions, employment stability, and prospects for advancement. The secondary sector, its antithesis, is characterized by bad jobs, low wages, poor working conditions, layoffs, little chance for advancement, and high turnover."1/

Moreover, the proponents of this approach contend that these sectors are kept separate by the nature of the jobs and by the structure of incentives, rather than by inherent characteristics of the workers themselves. To cite Zell further:

> ". . . because secondary firms provide little specific on-the-job training, because there is only a limited chance for advancement, and because a worker's current wage is unlikely to differ widely from that available in a great number of other similar jobs, a worker finds little incentive to perform particularly well at it. Hence, once a worker is in the seondary sector, the unstable work environment encourages the adoption of certain poor work habits: casual devotion to job, reporting for work late or not at all on some days, and quitting without good reason often within months of taking the job. It is these habits which most clearly distinguish the primary and secondary sectors and which make movement into the primary sector so much more difficult. In addition, this vicious circle is reinforced as secondary-sector employers are unwilling to invest heavily in the training of a work

1/ Zell, op. cit., p. 8.

> force which is prone to high turnover, and simultaneously, are less reluctant to fire a worker in whom they have little invested. These factors thus tend to result in entrapment in the secondary sector."[1]

Although the dual labor market approach had its shortcomings,[2] the notion of primary and secondary sectors has an intuitive appeal when applied to the wood products industry. In particular, the focus on jobs, rather than workers, seems promising in an industry which has an abundance of unskilled jobs, where seniority is seen as protection against layoffs, and where labor turnover is viewed by employers as extremely high. Put simply, some jobs are viewed as a lot better than other jobs.

The approach taken in this section and throughout the remainder of the report is to adopt a dual labor market approach, but to do so in a somewhat critical sense. The approach taken here has the following major dimensions.

1. Classification of Workers:

Workers in the Statewide Survey were classified as "core" or "peripheral", depending on the nature of their participation in the industry during 1972. Core workers are defined as those who (1) were in the labor market throughout that year, and (2) worked exclusively in wood products, although not necessarily for just one employer. This is analogous to the "primary sector" of the dual labor market literature in that these workers were evidently not dissatisfied (with wages, jobs, working conditions, stability, and advancement) to such an extent that they left the industry in that year.

1/ Zell, op. cit., p. 8.

2/ For a thorough critique, see: Wachter, Michael L., "Primary and Secondary Labor Markets: A Critique of the Dual Approach", Brookings Papers on Economic Activity, The Brookings Institution, 1974, pp. 637-680.

"Peripheral workers," on the other hand, are defined as all workers other than core workers. This is not to say that the earlier characterizations of secondary workers are necessarily appropriate, but the fact remains that they did not participate full-time in the wood products industry, for one reason or another, during 1972.

2. Identification of Incentive Frameworks:

The second facet of the core/peripheral distinction is that it invites the research analyst to identify the incentive structure faced by wood products workers, and thereby test some of the hypothesis in Zell's second quotation, above. Rather than develop these notions further at this point, suffice it to point out that this is the basic content of Sections IV through VI with their focus on income determination, job rationing, and job-changing.

B. Size of the Labor Force in 1972:

One immediate result of the Statewide Survey was documentation that the total work force is much larger than indicated by census data alone (Table 9 and Figure 2). Whereas, census data indicated there were about 68,000 persons in the experienced wood products labor force in 1969, the Statewide Survey revealed that about 110,000 workers received some wage or salary payment in the industry during 1972.[1/] About 50,000 were in the peripheral labor force. The documentation of this rather large group can be expressed in several ways:

1/ Total employment in the industry was somewhat different in these two years (70,959 in 1969 and 75,200 in 1972, from Figure 1), but this accounts for only a small share of the discrepancy.

Table 9. Estimated Number of Wood Products Workers, 1972[1/]

Category	Industry sector		
	Logging	Sawmills & plywood[2/]	Total
Core	16,000	44,000	60,000
(Single employer)	(10,300)	(39,700)	(50,000)
(Multiple employers)	(5,700)	(4,300)	(10,000)
Peripheral	9,700	40,300	50,000
(Mobile workers)	--	--	(25,500)
(Students)	--	--	(14,500)
(Disabled, etc.)	--	--	(4,500)
(Status unknown)	--	--	(5,500)
Total	25,700	84,300	110,000
Percent peripheral	37.7%	47.8%	45.4%
Average monthly employment, 1972	12,479	62,721	75,200
Ratio of workers to jobs	2.06 to 1	1.34 to 1	1.46 to 1

1/ For definition of categories, see Table 8. For estimation procedures, see Appendix B.

2/ Pooled because of problems posed by self-supporting by workers versus classification of employers by the Employment Division (e.g., sawmill workers who worked for integrated plywood mills).

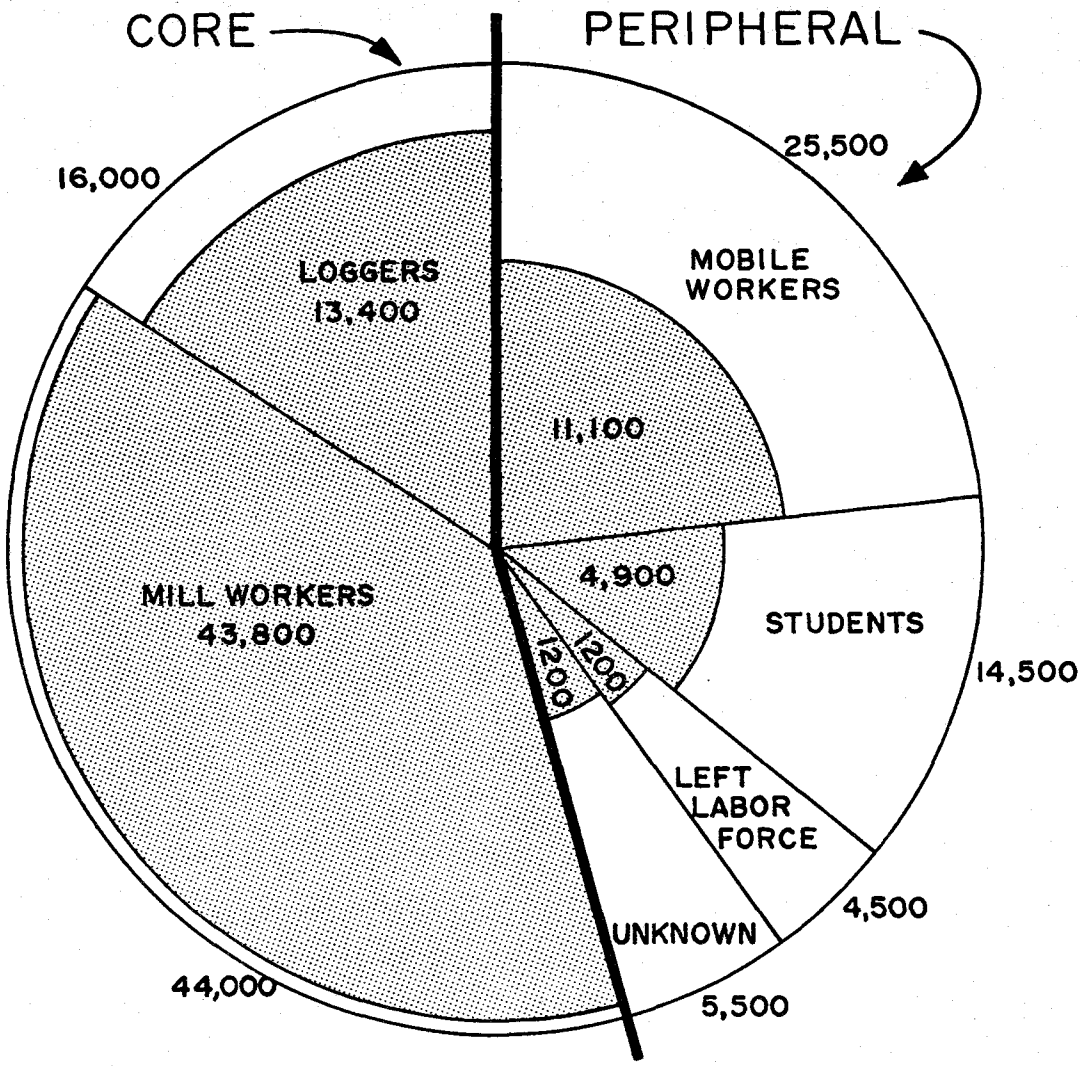

Figure 2. Number of Workers and Man-Years Worked for Others in Wood Products, 1972.

Note: The numbers outside each slice are the estimates of total numbers of people in a certain category (e.g., 16,000 core loggers). The numbers in the shaded areas are the estimates of man-years worked for others in wood products (e.g., 13,400 man-years by core loggers). The difference between the two numbers includes employment in other industries, self-employment (including wood products), unemployment, and time not in the labor force (see Appendix Table B-3).

(a) There were about three workers for every two wood products jobs in 1972, since average monthly employment was only about 75,200 jobs.

(b) The number of workers per job was considerably higher in wood products than in the overall Oregon economy; the total number of workers exceeded the average number of jobs (at any one time) by 46 percent in wood products, but by only 30 percent in the entire work force.[1/]

(c) Logging, in particular, was characterized by high labor turnover; there were more than two workers for every job in that sector.

(d) Even among core loggers, there was substantial job-changing within the industry in 1972. More than one-third of these workers changed employers during 1972, compared to about ten percent of the core mill workers.

(e) The distribution of man-years in wood products was quite disproportionate between core and peripheral workers. As shown in Figure 2, the core labor force relied much more heavily on wood products jobs than did the peripheral labor force.

Of particular importance, the sampling scheme revealed that one segment of the peripheral labor force is fully committed to the labor market,

1/ Unpublished data, Employment Division.

but not necessarily to the wood products industry. These 25,500 workers are identified here and in the remainder of this report as "mobile workers". Whether substantial unemployment exists among this group cannot be discerned simply by knowing the distribution of man-years. It has been established, on the other hand, that there are many more full-time workers available than the wood products industry is able to employ at any one time. This fact raises the question of how access to economic opportunity is determined among these workers, how existing wood products jobs are rationed, and to what extent these questions are resolved in a manner that allows all workers a fair share of the economic pie. Some answers to the questions, but not all, can be gleaned from the data on labor force characteristics.

C. Characteristics of the Labor Force:

A considerable volume of data was generated by the Statewide Survey, including social and demographic characteristics, work histories, incomes and earnings in 1972, and characteristics of past and present jobs and unemployment periods. The remainder of this section primarily will be devoted to these topics. Three major groupings are used: core loggers, core mill workers (sawmill and plywood, together), and all peripheral workers. Later in this section, the "mobile worker" subset of the peripheral group is singled out for special attention since this group is in the labor market on a full-time basis.

1. Social and Demographic Characteristics:

The notion that there is a marked difference among the different groups of workers is supported by data on age and education of workers (Table 10). Peripheral workers are predominantly in their twenties, while core loggers and mill workers averaged in their early forties. About two-thirds of the peripheral workers are 28 years old or less; about 60 percent of the core workers are older than forty. Accordingly, far more of the core workers are married and have children.

The extent of formal education is highly related to age, and is thus greater for the peripheral (younger) workers. Nearly 80 percent of these workers finished high school; this proportion drops to about 60 percent for the core group. About 30 percent of the peripheral workers have spent some time in a four-year college and 22 percent have attended community college. This contrasts sharply with the core groups, where less then ten percent have had post-secondary education. Peripheral workers also have had the most high school vocational training, although a clear majority of the entire labor force (61 percent) had no vocational training in high school.

Peripheral workers are also the most urban of the three groups; core loggers tend to be the most rural. Nearly half of the peripheral workers live in communities of 10,000 or larger, while two-thirds of the core loggers live in communities of 2,500 or less. The median size community for core workers is quite small--1,000 for loggers and 3,000 for mill workers. Although the core workers tend to live in small towns, they do not necessarily live in remote areas; their work often is in adjacent larger towns.

Table 10. Social and Demographic Characteristics ([ ] = modal group)

	Core		
	Loggers	Mill workers	Peripheral
Age			
19-28 yrs.	17.0%	13.4%	[67.8%]
29-38 yrs.	21.3	[26.9]	20.0
39-48 yrs.	21.3	23.1	5.6
49-58 yrs.	[29.8]	23.1	3.3
59-68 yrs.	10.6	13.5	3.3
mean	43.2	43.0	28.6
Education			
< 12 years	36.2%	42.3%	21.1%
12 years	[55.3]	[48.1]	[41.1]
> 12 years	8.5	9.6	37.8
mean	10.7	10.6	12.5
Community college			
Attended	6.4%	7.7%	22.2%
Did not attend	[93.6]	[92.3]	[77.8]
Four-year college			
Attended	8.5%	1.9%	30.0%
Did not attend	[91.5]	[98.1]	[70.0]
Vocational training in high school			
0	[71.7%]	[78.4%]	[47.7%]
< 24 months	15.2	17.7	34.1
≥ 24 months	13.1	3.9	18.2
mean	6.0	3.5	10.5
Marital status			
Married	[91.5%]	[84.6%]	[60.0%]
Single	8.5	15.4	40.0
Number of children			
0	31.9%	34.6%	[57.8%]
1 - 2	[44.7]	[40.4]	26.7
> 2	23.4	25.0	15.5
mean	1.5	1.5	1.0
Size of community			
< 2,500	[63.0%]	[40.4%]	[31.0%]
2,500 - 4,999	17.4	19.2	11.5
5,000 - 9,999	4.4	7.7	11.5
10,000 - 19,999	15.2	21.2	16.1
20,000 - 49,999	--	9.6	16.1
≥ 50,000	--	1.9	13.8
median	1,000	3,000	8,000

2. Work Histories:

The data in this section were obtained by having the workers identify all the different jobs held during their lifetime, up through the time of the interview in 1974.[1/] This information can be used to throw light on several related issues, including:

(a) extent of dependence on wood products jobs,

(b) frequency of job changing,

(c) extremes in job length, and

(d) extent of unemployment.

Since the groups have been stratified on the basis of job mobility, it is self-evident that peripheral workers change jobs more frequently (Table 11). Both the core and peripheral groups have averaged about six jobs to this point in their lifetime, although the latter are some 15 years younger. Since they are younger, they have had less work experience (6 versus 18 years) and their average length of job is significantly shorter (1 year versus 3 to 5 years for core workers).

Peripheral workers are also considerably less reliant on wood products work; less than half of their total jobs (2.7 of 6.1) have been in wood products. Although these workers do change jobs more frequently, the absolute number of wood products jobs held by the average worker is not large. Despite popular allegations to the contrary, only a small percentage (6.6 percent) of the peripheral group have held a large number of

1/ The definition of a "job" was left to the worker; most of them considered moving from one employer to another as a job change. Major changes in job duties for the same employer were generally not considered a new job.

Table 11. Work History Characteristics[1/] (▭ = modal group)

	Core		
	Loggers	Mill workers	Peripheral
Number of Jobs			
All jobs:			
1 - 2	8.5%	13.5%	7.8%
3 - 5	▭38.3	▭51.9	▭46.7
6 - 8	25.5	19.2	25.5
≥ 9	27.7	15.4	20.0
mean	6.3 jobs	5.3 jobs	6.1 jobs
Wood products:			
1 - 2	19.1%	42.3%	▭57.8%
3 - 5	▭53.2	▭46.2	35.6
6 - 8	21.3	9.6	6.6
≥ 9	6.4	1.9	---
mean	4.5 jobs	3.1 jobs	2.7 jobs
Non-wood products:			
0	42.6%	26.9%	16.7%
1 - 3	▭48.9	▭51.9	▭46.7
4 - 6	8.5	19.3	30.0
7 - 9	---	1.9	4.6
mean	1.2 jobs	1.8 jobs	3.0 jobs
Self-employment:			
0	▭55.3%	▭78.8%	▭81.1%
1 - 2 jobs	42.6	15.4	15.6
> 2 jobs	2.1	5.8	3.3
mean	0.6 jobs	0.4 jobs	0.4 jobs
mean for those reporting	1.4 jobs	1.7 jobs	2.0 jobs
Years Worked			
All jobs:			
< 5 years	16.2%	5.8%	▭59.5%
5 - 10 years	20.9	15.4	22.5
10 - 15 years	14.0	19.2	9.0
15 - 20 years	14.0	15.4	2.2
> 20 years	▭34.9	▭44.2	6.8
mean	17.7	18.4	6.2

Table 11. Work History Characteristics (continued)

	Core		
	Loggers	Mill workers	Peripheral
Wood products:			
0 - 5 years	25.0%	19.2%	92.2%
5 - 10 years	20.5	25.0	3.4
10 - 15 years	15.9	9.6	1.1
15 - 20 years	15.9	23.1	1.1
> 20 years	22.7	23.1	2.2
mean	13.1 years	13.5 years	2.4 years
Non-wood products:			
0 years	43.5%	26.9%	16.9%
< 5 years	39.1	44.2	64.0
5 - 10 years	10.9	19.2	10.1
10 - 15 years	2.1	2.0	5.6
> 15 years	4.4	7.7	3.4
mean	2.7 years	3.6 years	3.4 years
Self-employment:			
0	55.3%	78.8%	81.1%
< 2 years	19.1	7.7	13.3
> 2 years	25.6	13.5	5.6
mean	1.6 years	1.4 years	0.4 years
mean for those with self-employment	3.5 years	6.3 years	0.5 years
Unemployment			
Number of unemployed periods:			
0	44.7%	50.0%	50.0%
1 - 2	34.0	40.4	36.7
≥ 3	21.3	9.6	13.3
mean	1.4	0.8	1.0
Total length of unemployment:			
0	44.7%	50.0%	50.0%
< 6 mo.	29.8	42.3	28.9
6 mo. - 1 year	17.0	1.9	10.0
1 - 2 years	8.5	5.8	6.7
≥ 2 years	---	---	4.4
mean	0.3 years	0.2 years	0.3 years

Table 11. Work History Characteristics (continued)

	Core		Peripheral
	Loggers	Mill workers	
Percent of time unemployed:			
0	39.5%	50.0%	50.0%
< 5%	44.2	42.3	13.3
5 - 10%	4.6	---	13.3
10 - 15%	7.0	3.9	8.9
15 - 20%	---	3.8	3.3
20 - 25%	4.6	---	3.3
> 25%	---	---	7.9
mean	3.1%	1.8%	8.0%
Average Job Length			
All jobs:			
< 2 years	41.9%	25.0%	87.7%
2 - 4 years	32.6	23.1	5.6
4 - 6 years	16.3	28.8	4.5
6 - 8 years	4.6	13.5	1.1
> 8 years	4.6	9.6	1.1
mean	3.0 years	4.5 years	1.2 years
Wood products jobs:			
< 2 years	38.6%	23.1%	93.3%
2 - 4 years	38.6	21.1	1.1
4 - 6 years	9.1	15.4	2.3
6 - 8 years	6.8	21.2	2.2
> 8 years	6.9	19.2	1.1
mean	3.4 years	5.5 years	1.0 year
Length of Longest Job			
All jobs:			
< 3 years	21.3%	11.5%	71.1%
3 - 6 years	29.8	21.2	17.8
6 - 9 years	17.0	21.1	2.2
9 - 12 years	17.0	23.1	3.3
> 12 years	14.9	23.1	5.6
mean	7.7 years	8.7 years	3.0 years
Wood products jobs:			
< 3 years	25.5%	19.2%	88.9%
3 - 6 years	29.8	17.3	6.7
6 - 9 years	14.9	25.0	1.1
9 - 12 years	17.0	17.3	2.2
> 12 years	12.8	21.2	1.1
mean	7.2 years	8.1 years	1.4 years

Table 11. Work History Characteristics (continued)

	Core		
	Loggers	Mill workers	Peripheral
Length of Shortest Job			
All jobs:			
< 1 year	83.0%	65.4%	93.4%
1 - 2 years	8.5	7.7	5.5
> 2 years	8.5	26.9	1.1
mean	0.8 years	2.0 years	0.3 years
Wood products jobs:			
< 1 year	68.1%	40.4%	84.4%
1 - 2 years	10.6	9.6	8.9
> 2 years	21.3	50.0	6.7
mean	1.5 years	3.4 years	0.6 years
Length of Wood Products Job Held at Time of Interview			
< 1 year	29.8%	7.7%	81.1%
1 - 2 years	12.8	5.8	6.7
2 - 3 years	12.8	17.3	3.3
3 - 6 years	23.4	23.1	8.9
6 - 12 years	10.6	30.7	
> 12 years	10.6	15.4	
mean	4.7 years	6.5 years	1.0 year

1/ To illustrate the use of this table, core loggers have averaged 4.5 wood products jobs, 1.2 non-wood products jobs and 0.6 self-employment periods, for a total of 6.3 jobs thus far in their work history. On the average, 13.1 of their 17.7 years of work experience have been spent in the wood products industry. Nearly half of these workers (44.7%) have never been unemployed; the shortest job ever held by most of them (68.1%) has been 1 year or less in length.

wood products jobs (6 or more);[1/] the majority have held only one or two jobs.

While the number of logging or mill jobs held by peripheral workers is not large, they are fairly short jobs (1 year, on the average). The longest wood products job ever held by the peripheral group, on the average, was 1.4 years, while the shortest job ever held averaged less than eight months. This is a relatively short period of time, and, no doubt, reinforces employers' perceptions that a large contingent of "drifters" or "floaters" exists in the labor force. This perception, however, seems to be inconsistent with the estimate that the average number of mill jobs ever held by peripheral workers (2.7) is fairly low. The view, however, does tend to be more nearly consistent with the total work history of the peripheral group, where 6.1 jobs with an average length of 1.2 years, is the average.

One interesting point is that fewer core workers (relative to peripheral workers) have had very short jobs during their lifetime, in spite of the fact that they have had more opportunity to do so. That is, the core group is older and has had more work experience; somewhere along the way, one might suppose that a very high percentage of them would have had at least one very short job. One explanation may simply be that the data for the two groups are not comparable. That is, in tracing out their work histories for us, many of the older workers may have failed to mention their shorter jobs.

1/ Applying this percentage to the total number of peripheral workers, it turns out that only about 3,300 workers (three percent of the labor force) would fall in this category.

A third explanation is that the structure of the labor market has changed over time, and that there is simply not as much opportunity today for younger workers to advance within a plant. This possibility will be addressed more fully in the following sections.

On the average, unemployment has not been a serious problem for the core labor force.[1/] Core mill workers report a very low historical unemployment rate (1.8 percent); half of them have never been unemployed. Core loggers have fared almost as well with a historical unemployment rate of 3.1 percent; 39.5 percent have never been unemployed. The historical unemployment rate for peripheral workers (8.0 percent), on the other hand, is higher than for core workers, and is somewhat higher than the 7.0 percent rate for the State of Oregon over the 1970-74 period. Although half of the peripheral workers have never been unemployed,[2/] about one in seven had what might be called a high unemployment rate (greater than 15 percent) during a lifetime.

3. Incomes and Earnings in 1972:

The data in Table 12 show that core workers made more money in 1972 than did peripheral workers, and by a substantial margin. The average amount earned by core loggers and mill workers was in excess of $10,000; total family income in these groups averaged more than $12,000. The peripheral group, as a whole, averaged only $7,923 in family income, their wages were generally lower, and their median labor earnings were half that of the

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1/ Time spent in school is not counted as unemployment. Unemployment rates are computed by dividing time unemployed by the sum of years worked and time unemployed.

2/ Memory bias does not appear crucial here since the lifetime work history is fairly short (an average of 6.2 years).

Table 12. Incomes and Earnings in 1972 (▭ = modal group).

	Core		
	Loggers	Mill workers	Peripheral
Family income			
< $3,000	--	--	12.5%
$3,000 - 5,999	4.3%	4.0%	▭ 25.0
6,000 - 8,999	17.0	10.0	23.9
9,000 - 11,999	▭ 34.0	24.0	21.6
12,000 - 14,999	19.2	▭ 36.0	10.2
15,000 - 17,999	14.9	18.0	2.3
≥ 18,000	10.6	8.0	4.5
mean	$12,005	$12,911	$7,923
median	$11,500	$12,500	--
Earnings by worker			
< $3,000	--	1.9%	24.7%
$3,000 - 5,999	4.3%	5.8	▭ 30.3
5,000 - 8,999	28.3	25.0	21.4
9,000 - 11,999	▭ 34.8	26.9	19.1
12,000 - 14,999	21.7	▭ 32.7	4.5
≥ 15,000	10.9	7.7	--
mean	$10,656	$10,763	$5,862
median	$10,000	$10,500	$5,500
Unemployment compensation			
0	▭ 71.1%	▭ 96.2%	▭ 91.0%
< $400	17.8	3.8	1.1
> $400	11.1	--	7.9
mean	$143	$8	$86
(mean for those drawing)	($517)	($205)	($959)
Unemployment compensation as percent of worker's labor income			
0	▭ 72.3%	▭ 96.2%	▭ 91.0%
1 - 10%	21.3	3.8	3.4
10 - 20%	6.4	--	3.4
> 20%	--	--	2.2
mean	1.5%	0.1%	1.9%

Table 12. Incomes and Earnings in 1972 (continued)

	Core		
	Loggers	Mill workers	Peripheral
Hourly wood products wage			
< $3.00	--	1.9%	4.5%
$3.00 - $3.49	--	5.8	14.6
$3.50 - $3.99	4.5%	23.1	43.8
$4.00 - $4.49	15.9	34.6	19.1
$4.50 - $4.99	9.1	28.9	6.8
$5.00 - $5.49	18.3	3.8	5.6
≥ $5.50	52.3	1.9	5.6
mean	$6.23	$4.20	$4.04
median	$5.50	$4.18	$3.90
Overtime hours per week			
None	44.7%	23.1%	34.8%
0 - 4	8.5	7.7	9.0
4 - 8	14.9	38.5	27.0
≥ 8	31.9	30.7	29.2
mean	6.6 hrs.	7.0 hrs.	6.3 hrs.
Employment status of spouse			
Not employed or not married	72.3%	61.5%	73.3%
Employed full-time	8.5	23.1	18.9
Employed part-time	19.2	15.4	7.8
Self-employment income			
0	93.6%	96.2%	94.4%
$1 - $499	--	1.9	1.1
$500 - $999	--	--	--
> $1,000	6.4	1.9	4.5
mean for those reporting income	$6,833	$6,437	$4,810
Non-labor income (interest, dividends, business investments)			
0	95.7%	88.5%	84.3%
$1 - $200	--	3.8	2.2
$200 - $999	4.3	--	10.1
> $1,000	--	7.7	3.4
mean for those reporting income	$290	$2,021	$1,076
Income from rental properties			
0	95.7%	88.6%	96.7%
$1 - $399	--	3.8	--
$400 - $999	--	3.8	1.1
> $1,000	4.3	3.8	2.2
mean for those reporting income	$962	$755	$1,265

workers ($5,500 versus $10,500). These figures reflect the fact that a substantial number of seasonal workers are in this category.

The predominance of wage income as a source of support for wood products workers is apparent in Table 12. Only a small proportion (perhaps five percent) receive any income at all from self-employment or from business investments such as rental properties. Core mill workers tend to receive the most non-labor income but even for that group, only about ten percent received more than $1,000 in 1972 from those sources. Aside from the earnings by the worker, wages received by the spouse are the most important source of family income among all three groups of workers. From 25 to 40 percent of the workers had spouses who worked for pay in 1972; this added, on the average, from $1,500 to $2,000 to family income.

At first sight, the data on unemployment compensation would appear to support the earlier observation that, on the average, unemployment is not a serious problem for the peripheral group. Only nine percent of these workers drew any unemployment compensation during 1972, and only two percent drew more than 20 percent of their total income in the form of unemployment compensation. The possibility does exist, however, that not all periods of unemployment were eligible for coverage.

4. Characteristics of Jobs:

Collection of detailed data on work histories of the 189 workers makes it possible to look at the characteristics of jobs which have been held by those in the sample. In this case, data on 632 wood products jobs and 371 non-wood products jobs were available.

(a) Industry and occupation

The non-wood products jobs held by the various groups differed significantly with respect to both industrial and occupational classification (Table 13). Relative to core workers, peripheral workers have held more jobs in retail and wholesale trade and public administration, and they have worked more frequently as managers and professionals. Core loggers have worked more frequently in agriculture and transportation and as farmers and craftsmen. The jobs of core mill workers more frequently have been in manufacturing and construction.

Those peripheral workers who were in the labor force throughout 1972 (i.e., mobile workers) also differed substantially from the overall Oregon labor force (20 to 29 age bracket) in terms of types of jobs held. These mobile workers tend to have had more jobs in public administration and in agriculture, and have had far fewer jobs in service industries. Occupationally, they have worked more frequently as unskilled laborers and less frequently as craftsmen, sales workers, and clerical workers.

More than half of the core loggers reported that they have never been employed outside the wood products industry. About this same percentage of mill workers reported that they had held jobs outside the industry within the last ten years, although another one-third had never worked outside the industry.

(b) Job information

Sources of job information for both wood products and other jobs were analyzed with respect to (1) relative degrees of in-

Table 13. Industry and Occupation of Non-Wood Products Jobs Held in the Past

	Core		Peripheral		White males in Oregon, age 20-29 in 1969
	Loggers	Mill workers	All	Mobile workers only	
Industry					
Manufacturing (excluding wood products)	17.6%	33.3%	25.2%	24.3%	22.8%
Wholesale and retail trade	17.6	20.7	23.6	22.5	24.6
Agriculture	23.5	17.2	10.5	11.2	5.7
Construction	11.8	14.9	8.9	9.5	8.2
Transportation & communication	14.7	5.7	8.5	9.5	8.7
Services	11.8	5.7	5.3	6.5	25.4
Public administration	2.9	2.2	17.9	16.6	4.6
Occupation					
Craftsmen (skilled)	20.6%	12.8%	9.2%	13.0%	17.9%
Operatives (semi-skilled)	14.7	23.3	23.8	24.1	23.0
Laborers (unskilled)	38.2	34.9	28.3	23.5	11.0
Managers & professional	2.9	2.3	17.9	19.7	23.9
Farmers & farm laborers	14.7	12.8	7.5	8.6	3.1
Service workers	0.0	5.8	6.7	4.3	7.0
Sales & clerical	8.8	8.1	6.6	6.8	14.1
Years since worked at non-wood product job					
Less than 5	14.9%	25.0%	--	--	--
5 - 10	6.4	22.9	--	--	--
10 - 20	14.9	12.4	--	--	--
More than 20	8.5	8.4	--	--	--
Never	55.3	31.3	--	--	--

formal versus formal sources of information, and (2) modes of applying for and securing jobs (Table 14). Core loggers tended to rely more heavily on "knowing people" as a source of information about wood products jobs. Core mill workers and peripheral workers, on the other hand, more frequently found wood products jobs by the more formal, less personal mode of simply applying for jobs, without any substantial "inside track."

The three groups tend to be quite alike with respect to securing non-wood products jobs, relying about equally on informal and formal modes of getting jobs. Another similarity among groups is their very infrequent use of public or private employment agencies or labor unions in locating jobs, especially wood products jobs. Less than three percent of such jobs were secured through these sources.

(c) Frequency of training

These data probably reflect the routine nature of many wood products jobs (Table 14). For example, three-fourths of the core group reported that their wood products "training" was, at most, at yearly intervals, compared to more frequent training in their non-wood products jobs. Peripheral workers, on the other hand, appear to be receiving substantial daily and weekly attention in all types of work, but the extent to which this is actually "training" as opposed to simply being supervised is not at all clear.

(d) Value of experience

These data are no doubt highly subjective assessments, and may reflect the worker's degree of job satisfaction as

Table 14. Job Characteristics[1/] (▭ = modal group)

	Core		
	Loggers	Mill workers	Peripheral
Source of Job Information			
Wood products jobs	(n=226)	(n=164)	(n=242)
Know people (friends, relative, previous employers)	59.6%	39.6%	47.4%
Looked for job (made application)	38.9	52.8	49.6
Used an agency (public or private employment service, labor union)	1.5	1.4	3.0
Bought ownership share (coop mill)	0.0	6.2	0.0
Other jobs	(n=34)	(n=87)	(n=250)
Knew people (friends, relative, previous employers)	48.5%	48.8%	47.3%
Looked for job (made application)	48.5	43.0	45.2
Used an agency (public or private employment service, labor union)	3.0	8.2	7.5
Frequency of Training			
Wood products jobs			
Never (or yearly)	74.2%	73.3%	40.7%
Monthly	5.4	5.3	11.7
Weekly	9.1	9.3	21.2
Daily	11.3	12.0	26.4
Other jobs			
Never (or yearly)	37.5%	45.2%	29.6%
Monthly	4.2	16.7	17.1
Weekly	8.3	22.6	19.0
Daily	50.0	15.5	34.3
Value of Experience Gained			
Wood products jobs			
None	26.4%	26.6%	31.6%
A little	17.6	23.1	30.2
A lot	55.9	50.3	38.2

Table 14. Job Characteristics[1/] (continued)

	Core		
	Loggers	Mill workers	Peripheral
Other jobs			
None	45.5%	47.0%	28.7%
A little	30.3	28.9	33.5
A lot	24.2	24.1	37.8
Union Membership			
Wood products jobs			
Yes	17.4%	39.9%	23.4%
No	82.6	60.1	76.6
Wood products jobs (1972)			
Yes	12.7%	36.8%	32.7%
No	87.3	63.2	67.3
Other jobs			
Yes	24.2%	20.7%	15.7%
No	75.8	79.3	84.3
Reason for Leaving Job			
Wood products jobs	(n=166)	(n=100)	(n=212)
Involuntary (job ended, laid off)	49.1%	40.0%	25.5%
Left civilian labor force	6.7%	5.0%	31.6%
-return to school	(0.6)	(0.0)	(20.3)
-other (military, medical)	(6.1)	(5.0)	(11.3)
Voluntary	44.1%	55.0%	43.0%
-unspecified	(13.3)	(23.0)	(21.2)
-make more money	(9.1)	(8.0)	(5.7)
-return to old job	(3.0)	(20.0)	(7.1)
-work closer to home	(4.2)	(1.0)	(2.4)
-more secure job	(0.6)	(1.0)	(1.4)
-better working conditions	(3.6)	(1.0)	(5.2)
-self employment	(10.3)	(1.0)	(0.0)
Voluntary reasons as % of total, excluding those leaving civilian labor force	47.3%	57.9%	62.8%

Table 14. Job Characteristics[1/] (continued)

	Core		
	Loggers	Mill workers	Peripheral
Other jobs	(n=31)	(n=77)	(n=199)
Involuntary (job ended, laid off)	22.6%	40.3%	28.6%
Left labor force	6.4%	3.9%	19.6%
-return to school	(3.2)	(1.3)	(15.1)
-other (military, medical, etc.)	(3.2)	(2.6)	(4.5)
Voluntary	70.8%	55.9%	51.7%
-unspecified	(35.5)	(24.7)	(28.6)
-make more money	(16.1)	(16.9)	(12.6)
-return to old job	(6.4)	(1.3)	(3.0)
-work closer to home	(3.2)	(6.5)	(3.0)
-more secure job	(3.2)	(2.6)	(2.0)
-better working condition	(3.2)	(1.3)	(2.0)
-self employment	(3.2)	(2.6)	(0.5)
Voluntary as % of total, excluding those leaving civilian labor force	75.8%	58.1%	64.4%

1/ Number of observations (n) refer to number of jobs held by that group. Frequency of training, value of experience gained, and union member have same n's as source of job information.

well as the degree to which he has actually learned skills which may be salable elsewhere. About half of the core workers reported that their wood products experience has helped them "a lot," but another one-fourth reported that the experience was not at all valuable. In their non-wood products jobs, half reported that the experience was of no value to them. Peripheral workers divided their responses about equally among degrees of experience gained, and did so for both types of work.

(e) Union membership

A higher percentage of core mill workers (36.8 percent) belonged to labor unions in 1972 than did core loggers (12.7 percent). About one-third of the peripheral workers were union members in that year (Table 14). Applying these percentages to the estimated total numbers in each of these groups (Table 9), an estimate can be made that 34,574 of the 110,000 workers in 1972 (or about 31 percent) belonged to a national or company labor union. Union membership was generally more common in wood products jobs than in other jobs for these workers.

(f) Reason for leaving job

A job can be terminated for a variety of reasons, by either the employee or the employer (Table 14). The extent of employee-initiated terminations and the reasons for these terminations are examined here. Of particular note is the fact that about two-thirds of the "within labor force" terminations of the peri-

pheral labor force have been initiated by the workers themselves. This, coupled with the fact that the average job length for this group is only about 1.2 years (Table 11), is quite consistent with the general concept of a peripheral labor force, as found in the literature on dual labor markets.

Although core mill workers have maintained an average job length of 5.5 years (and thus have left fewer jobs), they are much like the peripheral group in terms of their propensity to leave jobs voluntarily rather than involuntarily. Core loggers, on the other hand, are slightly more prone to involuntary than the voluntary terminations from their wood products jobs. Their high rate of voluntary termination of non-wood products jobs, on the other hand, is consistent with the notion that many of them have strong preferences for working in the woods.

5. Characteristics of Unemployment Periods:

Additional insights into labor market behavior can be drawn from the data on unemployment. In general, most periods of unemployment have resulted from situations where workers have been laid off, rather than where they have quit the job. In other words, most unemployment is involuntary rather than voluntary.

If one considers only involuntary terminations, about half of these were followed by a period of unemployment (Table 15). Voluntary job terminations, on the other hand, were generally not followed by a period of unemployment. Core loggers were the least likely to opt for voluntary

Table 15. Likelihood of Unemployment Following Involuntary and Voluntary Job Terminations

Group	Reason for leaving job[1]	No. of jobs left	Reason for unemployment[2]	Likelihood of unemployment[3]
Core loggers	Involuntary	88	58	65.9%
	Voluntary	78	4	5.1%
Core mill workers	Involuntary	71	32	45.1%
	Voluntary	95	9	9.5%
Peripheral	Involuntary	111	60	54.0%
	Voluntary	193	25	13.0%

1/ See Table 14 for types of voluntary reasons.

2/ Relates to whether last job was left voluntarily or involuntarily.

3/ For example, 5.1 percent of all jobs left voluntarily by loggers were followed by a period of unemployment. Among those jobs left involuntarily by loggers, 65.9 percent were followed by a period of unemployment.

unemployment; only 5.1 percent of their voluntary job terminations were followed by a period of unemployment. (In other words, they were highly disposed to remain employed until another job could be found.) Peripheral workers were somewhat more inclined to quit without having another job lined up, but even among this group, only 13 percent of all voluntary job terminations were followed by a period of unemployment. Although these workers change jobs quite frequently, the worker who is willing to quit one job without having another one lined up is, by far, the exception rather than the rule.

The general pattern that emerges for core workers is that what little unemployment they have had in the past has been largely involuntary, with the general expectation that they will be called back to work by their previous employer (Table 16). While unemployed, only about one-third were actively looking for work. Almost all of their unemployment periods were less than five months, with a mean length of between two and three months.[1/]

Peripheral workers, on the other hand, were less likely to be waiting for callback while unemployed; most were actively looking for work. The mean unemployment length for peripheral workers was 4.3 months, although the mean length for those workers <u>not</u> waiting for callback and <u>not</u> looking for work was 9.1 months. This latter group accounted for 11.8 percent of the unemployment periods and 25.1 percent of the total unemployment time within the mobile group.

1/ A regression analysis of lengths of unemployment among those looking for work can be found in Section V.

Table 16. Characteristics of Unemployment Periods[1/] (□ = modal group).

	Core		
	Loggers	Mill workers	Peripheral
	(n = 65)	(n = 41)	(n = 83)
Type of job prior to unemployment			
Wood products	95.2%	70.0%	56.7%
Non-wood products	4.8	30.0	43.3
Waiting for callback			
Yes	87.0%	62.9%	47.1%
No	13.0	37.1	52.9
Looking for work			
Yes	33.3%	38.9%	62.0%
No	66.7	61.1	38.0
Length of unemployment			
< 1 mo.	20.0%	34.1%	32.2%
1 - 3 mo.	27.7	34.1	18.3
3 - 5 mo.	43.1	26.8	27.6
5 - 7 mo.	7.7	2.5	4.6
7 - 12 mo.	1.5	0.0	6.9
> 12 mo.	0.0	2.5	10.4
mean (mo.)	2.7	2.2	4.3
Unemployment compensation			
None	26.7%	44.4%	58.2%
< $40/wk.	8.4	11.1	5.0
$40 - $60/wk.	18.3	25.0	15.2
> $60/wk.	46.6	19.5	21.6
mean (for those drawing)	$77.66	$56.60	$57.16
Length received unemployment compensation			
None	31.1%	44.7%	59.3%
< 2 mo.	41.0	50.0	18.5
2 - 4 mo.	19.7	2.7	17.3
> 4 mo.	8.2	2.6	4.9
mean for those drawing (mo.)	2.4	1.3	2.4
Type of job subsequent to unemployment			
Wood products	98.1%	69.4%	51.3%
Non-wood products	1.9	30.6	48.7
Moved to another county			
Yes	3.1%	9.8%	11.5%
No	96.9	90.2	88.5

1/ Compiled from individual work histories. Number of observation (n) refer to numbe of unemployed periods.

A key characteristic of the peripheral group is that the majority of their unemployment periods (58.2 percent) were not covered by unemployment compensation. Voluntary terminations would presumably not be subject to coverage, but these accounted for only a small portion of the total. This implies that the remainder of the non-covered periods may have come from involuntary terminations of jobs where the workers had not worked long enough to be eligible for unemployment compensation.

A final dimension of the unemployment data is whether migration occurred at the end of the unemployment period. Among peripheral workers, 11.5 percent moved to another county to secure employment. Core loggers were least likely to migrate; only 3.1 percent migrated as an adaptation to unemployment.

6. Characteristics of Mobile Workers:

Although the data and discussion above have shown substantial differences between core and peripheral workers, the latter group of 50,000 workers is, itself, quite heterogenous. The basic source of this heterogeneity is that of labor force participation, and consequently, labor earnings. About half of this group (25,500 workers) were in the labor market throughout 1972; they have been labeled "mobile workers." Three other types of peripheral workers (students, disabled, etc., and status unknown) were identified earlier in Table 8; these workers were out of the labor force for at least part of 1972.

When differences among these four types of peripheral workers are examined, a clearer view is gained with respect to characteristics, including economic status of mobile workers (Tables 17, 18, and 19). These can be summarized as follows:

(a) Mobile workers average 30.1 years old; only one in seven exceeds 38 years of age.

(b) Their mean level of education is 12.2 years, but nearly one-fourth have not completed high school.

(c) Like the peripheral group in general, mobile workers have already had several jobs (6.8, average) in a fairly short career (7.1 years, average). Thus, their average job length is quite short (1.3 years).

(d) The majority of their work history has actually been outside the wood products industry (4.3 of 7.1 years, on the average).

(e) The mean historical unemployment rate for mobile workers is 7.9 percent, a rate which is not greatly different from the overall state rate of about 7.0 percent for the 1970-74 period. One-third have never been unemployed, but another one-fourth have been out of work more than ten percent of the time.

(f) About one-third of the mobile workers had labor earnings of less than $6,000 in 1972; the median within the entire group

Table 17. Earnings, Unemployment Rates, Age, and Education of Four Types of Peripheral Workers (☐ = modal group).

		Others		
	Mobile workers	Students	Disabled, etc.	Status unknown
Age				
19-28 years	☐56.5%	☐96.2%	☐25.0%	☐80.0%
29-38 years	30.4	3.8	12.5	20.0
39-48 years	8.7	--	12.5	--
49-58 years	2.2	--	☐25.0	--
59-68 years	2.2	--	☐25.0	--
mean	30.1 yrs.	22.6 yrs.	43.9 yrs.	25.1 yrs.
Education				
< 12 years	23.9%	3.8%	37.5%	☐40.0%
12 years	☐50.0	23.1	☐50.0	☐40.0
> 12 years	26.1	☐73.1	12.5	20.0
mean	12.2 yrs.	13.8 yrs.	11.1 yrs.	11.9 yrs.
Historical unemployment rates				
0	32.6%	☐65.4%	☐87.5%	☐55.6%
< 10%	☐39.1	19.2	--	11.1
10 - 20%	17.4	7.7	--	11.1
> 20%	10.9	7.7	12.5	22.2
mean	7.9%	5.3%	9.1%	15.1%
Labor earnings in 1972				
0 - $3,000	10.9%	☐57.7%	12.5%	10.0%
3,000 - 6,000	21.8	26.9	☐50.0	☐60.0
6,000 - 9,000	☐30.4	11.5	12.5	20.0
9,000 - 12,000	☐30.4	3.9	12.5	10.0
12,000 - 15,000	6.5	--	12.5	--
mean	$7,411	$3,221	$6,283	$5,270
median	$7,938	$2,500	$5,510	$4,975

Table 18. Work History Characteristics of Peripheral Workers[1/]

	Mobile workers (n = 46)	Others[2/] (n = 44)
Number of jobs		
All jobs	6.8	5.3
Wood products	2.7	2.7
Non-wood products	3.7	2.4
Self-employment	0.4	0.3
Years worked		
All jobs	7.1	5.3
Wood products	2.5	2.3
Non-wood products	4.3	2.4
Self-employment	0.3	0.5
Unemployment		
Number of periods	1.4	0.5
Total length (years)	0.4	0.3
Average job length (years)		
All jobs	1.3	1.2
Wood products jobs	1.1	0.8
Length of longest job (years)		
All jobs	3.3	2.7
Wood products jobs	1.6	1.3
Length of shortest job (years)		
All jobs	0.3	0.4
Wood products jobs	0.8	0.5

1/ Mean values

2/ Includes students, disabled, etc., and those with status unknown (see Table 8).

Table 19. Median Incomes in 1972 for the Experienced Male Civilian Labor Force in Oregon, by Industry, Occupation, and Age[1/]

Industry	
Transportation & communications	$10,749
Finance, insurance, & real estate	10,655
Public administration	10,396
Wholesale trade	10,302
Construction	9,914
Professional services	9,709
Manufacturing	9,502
ALL MALE WORKERS	9,278
Business & repair services	8,006
MOBILE WORKERS	7,938
Retail trade	7,448
Agriculture, forestry, & fisheries	4,987
Occupation	
Managers & administrators	$12,782
Professional & technical	11,665
Craftsmen (skilled)	10,116
Sales	9,947
Transportation operatives (semi-skilled)	9,500
ALL MALE WORKERS	9,278
Clerical	9,106
Operatives (semi-skilled), except transport	8,497
MOBILE WORKERS	7,938
Laborers (unskilled), except farm	7,110
Service	5,594
Farm laborers	2,781
Age	
30 - 34 years	$10,547
25 - 29 years	8,985

1/ Census data on median incomes in several industries could be adjusted upward from 1969 to 1972 levels on the basis of the following changes in average weekly earnings in Oregon over that time period (Employment Division data):

Wholesale trade	+21.1%
Transportation & communication	+20.8%
Manufacturing	+20.1%
Construction	+19.0%
Retail trade	+16.2%

Medians for occupations, age groups, and all other industries were adjusted upward by an arbitrary 20 percent, since specific data series were not available. As a reference point, the change in average gross weekly earnings in all U.S. private non-agricultural employment was computed at 18.8 percent over this time period (Economic Report of the President, 1975).

was $7,938 in that year. This figure is $2,000 to $2,500 less than the median for core workers, $1,340 less than the median for male workers in Oregon, and $1,047 less than the median 25 to 29 year old male workers in Oregon. By any of these standards, the mobile workers in wood products suffer in comparison

(g) The principal alternative industries for these workers are retail trade (median, $490 below mobile workers), manufacturing ($1,564 above) and public administration ($2,458 above), although it is unlikely that they can command median earnings in the latter two industries. Principal occupational alternatives are as unskilled laborers ($828 below mobile workers) and semi-skilled laborers ($559 above). In other words, mobile workers fall somewhere in between unskilled and semi-skilled workers in terms of labor earnings.

7. Post-1974 Status of Mobile Workers:

As the research progressed, the crucial role of the mobile worker group was recognized and a follow-up survey was initiated in October 1976 to identify the post-1974 employment status of this group. A brief mail questionnaire was sent to this group of 42, and phone follow-ups were made when possible.[1/] The completion rate was 32 of 42, or 76.2 percent. Two years had elapsed since the Statewide Survey, so this is a reasonably high completion rate. The possibility of

1/ Addresses were not available for four workers in the group of 46.

bias must be recognized, on the other hand, since the ten who could not be contacted may have been either more or less successful in the labor market (and perhaps more geographically mobile) than those who could be contacted.

The results of the follow-up survey indicate that mobile workers fared reasonable well during the 1974-1976 period (Table 20). Over this entire period, their average unemployment rate (7.3 percent) was somewhat lower than the state rate (9.0 percent). This same result held even during the 1975 recession when this group could have been particularly vulnerable.

The key to this outcome appears to have been the fact that more than half of those contacted (17 of 32) left the wood products industry and have not returned. The mean unemployment rate among this group was only 2.5 percent; 13 of these workers were never unemployed subsequent to the Statewide Survey. A substantial number is now in "solid" occupations, including professional, technical, and craft trades; several others are in less attractive occupations (Table 21).

Those who remained in wood products after 1974 (9 of 32) appear to have had unemployment rates which were close to the state average.[1/] The problem group, on the other hand, appears to be those mobile workers (6 of 32) who continued to go back and forth between wood products and other jobs. For this group, the mean unemployment rate was 18.1 percent for the entire period and 26.4 percent in the 1975 recession.[2/]

1/ Their lower rate during the 1975 recession (8.6 percent versus a state rate of 11.4 percent) may well be understated because many mills went to three and four-day work-weeks during this period. This adjustment did not show up in unemployment rates since the worker was still employed.

2/ The temptation to generalize is strong, but the sample size (6) is so small that one must resist; even one extreme observation could greatly affect the computed mean.

Table 20. Mean Unemployment Rates of Mobile Workers, Subsequent to 1974 Interview

	Post-interview period (1/74-6/76)	1975 recession (1/75-6/75)
I. All mobile workers (n=32)	7.3%	8.9%
A. Those leaving wood products[1/] (n=17)	2.5%	2.9%
B. Those remaining in wood products[2/] (n=9)	9.4%	8.6%
C. Other[3/] (n=6)	18.1%	26.4%
II. State of Oregon	9.0%	11.4%

1/ Did not work in wood products after 1/74 (13 of the 17 had no unemployment)

2/ Did not work outside wood products after 1/74 (4 of 9 had no unemployment)

3/ Worked both in and outside wood products during the period from 1/74 through 6/76.

Table 21. Occupations of Mobile Workers Who Left Wood Products After 1974

Professional and Technical: (5)

- Bank administrator
- Minister
- Radio disc jockey
- Teacher
- Biologist

Blue collar: (8)

- Lineman for power company
- Truck driver
- Mechanic
- Electrician (2)
- Carpenter
- Unspecified (2)

Sales: (1)

- Retail clerk

Agriculture: (3)

- Canning plant worker
- Fruit pickers (2)

Unemployment rates varied substantially among the different types of mobile workers; the question is why this is so. Data on two of the groups (those leaving and those remaining in wood products) were analyzed statistically to find out what characteristics or variables differed between the two groups (Table 22).[1/] No significant differences between groups were found in terms of education, experience (wood products or other), vocational training, employment stability, or skill level in wood products. Those who left wood products, however, were four years younger, on the average, and had higher labor earnings in 1972. The results are relatively inconclusive, but they do identify age (especially) as a factor to be considered in later sections of this report. Basically, the results indicate that the two groups are quite alike, and that differentiating factors beyond those considered in Table 22 need to be identified.

D. Summary:

In marked contrast to the census report that there were about 68,000 wood products workers in Oregon, the Statewide Study revealed that there were actually about 110,000 workers. This results from taking a more comprehensive view of a "wood product worker", that is, from including the peripheral labor force of about 50,000 workers as well as the core labor force of about 60,000 workers. Average monthly employment in wood products in 1972 was only about 75,200 jobs; thus, there were about three workers for every two jobs.

1/ The statistical technique which was used is called discriminant analysis (BMD-07M). This particular technique utilizes information on variability within groups as well as between groups, considering all characteristics simultaneously. Technically, those variables are selected which have the greatest differences (between groups) in mean values, per unit of pooled variance.

Table 22. Discriminant Analysis: Mobile Workers Leaving Wood Products Versus Workers Remaining in Wood Products[1/]

Variable	Left wood products (n=17)		Remained in wood products (n=9)
Percent of time employed in wood products, 1972		.52	
Age	27.94	*	31.89
Education		12.20	
Labor earnings (1972)	$10,066	**	$8,099
Longest job (years)		3.44	
Wood products experience (years)		2.96	
Non-wood products experience (years)		3.86	
Percent of time unemployed, 1972		.08	
High school vocational training (mo.)		10.48	
Last wood products job skilled[2/]		.72	

1/ Means are shown separately only when variable discriminated significantly between groups (** = .05, * = .10).

2/ Skilled jobs were assigned a value of 1; unskilled jobs were assigned a value of 0. (Skilled jobs were defined, through cooperation of several personnel managers, as non-entry level jobs.)

The core labor force is relatively homogeneous and easy to describe. In general, these workers are white, male, in their early forties, have at least some high school education, are married, and live in small towns. They have worked a dozen years or more in wood products. Mill workers have probably worked at their current job for the last six years; loggers change employers more frequently. In 1972, the median income of the core labor force was about $12,000, nearly all derived from labor earnings. Unemployment rates are minimal within the core labor force, especially for mill workers. Even loggers, subjected to more weather problems, draw far less unemployment compensation than is attributed to the false stereotype who "sits all winter."

The peripheral labor force is a more heterogeneous group, especially in terms of their labor force participation. One significant sub-group is about 14,500 seasonal student workers. This group is in the labor market for only part of the year, earns a modest income ($2,500 median), and has had a low historical unemployment rate (5.3 percent). The bulk of the remainder of the peripheral category, about 25,500 mobile workers, participate in the labor market on a year-around basis, but not necessarily just in the wood products labor market. These workers are predominantly young (30 years old, on the average) and have typically spent more time in non-wood products jobs than in wood products jobs. They have changed jobs frequently, averaging only 1.3 years per job, but only infrequently (13 percent of the time) do they quit one job without having another one lined up. While their historica unemployment rate is comparable to the statewide average, their median labor earnings ($7,938 in 1972) are about $1,000 less than other Oregon (male) workers in their general age class (25 to 29 years). Many mobile workers appear to be reasonably successful in their labor market adaptations; more than half of them left wood products subsequent to 1974 and have suffered very little unemployment

since that time. Others, however, have not fared as well; between one-fourth and one-third of them (7,000 to 8,000 workers) have had historical unemployment rates in excess of 10 percent and labor earnings (in 1972) of $6,000 or less, in spite of being in the labor market on a full-time basis.

IV. DETERMINANTS OF LABOR INCOMES AMONG WOOD PRODUCTS WORKERS[1/]

This section focuses on the question, "Why does income vary among wood products workers?." This is a critical question, since one might suspect that the lack of opportunity to advance financially is a principal reason for the existence of a peripheral labor force. In addition, if we can identify those factors which cause incomes to be higher (or lower), then perhaps selective policies can be identified to enhance (or reduce) the provision of those factors.

As a matter of definition, labor incomes vary among wood products workers because wage rates vary and because some workers are unemployed more often than others. To analyze income variation, one must therefore analyze variations in both components of income, i.e., wage rates and degree of unemployment. This section is addressed to this task. It is assumed that there are systematic explanations of income determination which are more complex than those which are often presumed to exist. For example, since firms and labor unions usually negotiate wage agreements through industrywide bargaining, one might surmise that wage rates are determined solely in this manner. It is maintained here, however, that market forces (including the personal attributes of the workers) define the range within which bargaining takes place.

Furthermore, there are many wage rates within the industry, not just one. While these are usually defined for specific jobs via union-management negotiations, plant by plant, choices have to be made as to <u>which</u> particular worker fills a slot. This is a management decision, although custom or union contract may determine who is eligible to "bid" on in-plant openings. Management, on the other hand, has fewer restrictions on hiring workers from the open market.

1/ This Section draws heavily on a Ph.D. dissertation by Dr. David Ervin (cited in Section III) and on continuing consultation with Dr. Ervin.

In any event, wage rates are not simply "set" by negotiation. Rather, there are market forces, principally the supply and demand for labor in various uses, which provide a foundation and bargaining range within which labor negotiations take place. To explain variations in wages and time worked, then, we must look more closely at the supply and demand for labor.

A. Human Capital Attributes as Income Determinants:

At the root of an explanation of individual differences in wages and unemployment is the fact that "labor" is quite heterogeneous. Individuals differ from birth in their physical traits and differ from early childhood days in personal and psychological traits. More importantly for our purposes here, people differ in traits and attributes, the products of past decisions on education, job training, and choice of work. These attributes we can call "human capital," since they are a form of capital embodied in people. By having made different decisions in the past, wood products workers differ from each other in work experience, job skills, and degree of formal education. While "experience" and "skill" are often difficult to describe or measure in an exact sense,[1/] it was our supposition that an individual's work history would provide valuable information to current and potential employers. Further, it was expected that there would be different rewards (i.e., higher wages and more stable employment) associated with different types and levels of human

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1/ An attempt to define an objective measure of "skill level" was largely unsuccessful in explaining variation in wage rates. This involved synthesizing government job descriptions and awarding points for specific attributes in various sawmill jobs (e.g., spatial perception and manual dexterity). Subjective measures of skill were also tried, with little success. These were derived from judgments, on the part of personnel managers, as to which jobs were "skilled" and which were "unskilled".

capital attributes. These rewards would not be arbitrary, but rather objective; a more "skilled" worker would be more productive from the employer's point of view, and hence could command a higher wage and more secure employment. The question, pursued below, as to which particular human capital attributes are most valuable seems essentially to be an empirical question.

B. A General Model for Estimating the Productivity of Human Capital Attributes:[1/]

Among workers, the level of weekly earnings (W) and the number of weeks worked in a year (Q) are hypothesized to be determined by those variables which embody human capital attributes of workers (X_i) and by other variables affecting either the supply of or demand for labor (Z_i).[2/]

That is,

$$W = f_1(X_i, Z_i) \qquad (1)$$

$$\text{and } Q = f_2(X_i, Z_i) \qquad (2)$$

1/ Causal relationships will not be entirely clear since these are reduced-form equations. That is, weekly earnings and level of unemployment depend on both demand and supply conditions, and reflect the extent to which a worker has advanced through the pyramid of job skills and pay levels within a firm. This depends on both the productivity of his human capital attributes and his willingness to advance. Industry observers state a general reluctance of many older workers to "bid" on new job openings. Thus, the question of interpretation becomes crucial and is dealt with on a case-by-case basis. Two possible ways to lessen the reduced-form problem (appropriate variable specification and careful definition of data sets) are discussed in: Stevens, Joe B. and David E. Ervin, "An Income Determination Model With Implications for Occupational Mobilit in a Rural Labor Force," Contributed Paper, American Agricultural Economics Association Meetings, 1977.

2/ Two factors in the latter category (Z_i) are the capital-intensity of the firm and union membership of the worker. More capital-intensive firms may have higher-than-average labor productivity, due to mechanization, and hence may be able to pay workers a higher wage and prolong their work year. Union membership may result in higher wages if the bargaining strength of unions can result in negotiated wages which are higher than those which prevail in non-union plants.

Since yearly income (I) is the product of weeks worked (Q) and weekly earnings (W), then,

$$I = W \cdot Q \tag{3}$$

$$\text{or } I = [f_1(X_i, Z_i)] \cdot [f_2(X_i, Z_i)] \tag{4}$$

If both equations (1) and (2) can be empirically estimated, it is then possible to derive "marginal income coefficients" ($\frac{\partial I}{\partial X_i}$) which would show the relationship between income and a particular human capital attribute (X_i). That is,

$$\frac{\partial I}{\partial X_i} = \frac{\partial f_1}{\partial X_i} \cdot Q + \frac{\partial f_2}{\partial X_i} \cdot W, \tag{5}$$

$$\text{or } \frac{\partial I}{\partial X_i} = \frac{\partial W}{\partial X_i} \cdot Q + \frac{\partial Q}{\partial X_i} \cdot W, \tag{6}$$

where $\frac{\partial W}{\partial X_i}$ and $\frac{\partial Q}{\partial X_i}$ are partial regression coefficients from equations (1) and (2), and Q and W are selected values for appropriate groups of workers.

The above relationships can be given economic interpretations, as follows:

Symbol	Interpretation	Example
$\frac{\partial I}{\partial X_i}$	Expected increment in annual income from a one-unit increase in a human capital attribute	The amount by which expected income would be greater for a worker with ten years of mill experience than for a worker with nine years of mill experience, assuming that the workers were the same in all other respects.
$\frac{\partial W}{\partial X_i} \cdot Q$	Expected income increment due to higher weekly earnings,	The amount by which weekly earnings would be greater

Symbol	Interpretation	Example
	holding constant the number of weeks worked.	for the former worker, if they both worked the same length of time during a year
$\frac{\partial Q}{\partial X_i} \cdot W$	Expected income increment due to an increase in number of weeks worked, holding weekly earnings constant.	The extra income which is due to less frequent unemployment, if both workers had the same weekly earnings.

Thus, equations (5) and (6) express the expected change in income, associate with a small change in some human capital attribute, as the sum of two component i.e., that derived from higher weekly earnings and that derived from less freque unemployment. In the following pages, the data from the Statewide Survey are us to arrive at empirical estimates of the "marginal income coefficients" for the various human capital attributes.

C. Empirical Analyses:

The Statewide Survey of 189 workers yielded a considerable volume of data on 711 individual jobs which have been held by these workers during their work histories. These data are analyzed here to explain variations in (1) weekly earnings, and (2) frequency of unemployment. Since relevant data sets differ for the various analyses, attention is focused first on weekly earnings.

1. Determinants of Weekly Earnings:

Two broad types of human capital attributes which might influence weekly earnings can be identified. The first is a general category,

including age, education, vocational training, and disability. The second category includes different forms of work experience, including the following:

(a) "firm seniority", or length of experience with that particular mill or logging firm,

(b) all other wood products experience,

(c) all wood products experience, or the sum of (a) and (b),

(d) non-wood products experience.

It is presumed that higher levels of experience and education would contribute to higher weekly earnings, and that disability would contribute to lower earnings. The effect of age is essentially an empirical question, although its contribution to earnings might be expected to taper off (or even decline) at higher age levels.

Although those workers with more experience and education might be able to command higher earnings in wood products jobs, they might also be able to command higher earnings in non-wood products jobs. In view of this possibility, some measure of opportunity earnings outside wood products was needed.[1/]

(a) Opportunity Earnings

To predict opportunity earnings, a regression equation was estimated for weekly earnings in 264 non-wood

1/ Technically, the purpose was to allow supply considerations to surface via the opportunity cost variable, and thus better isolate the demand effects via the human capital variables. No claim is made that the reduced-form problem is entirely eliminated.

products jobs held in the work histories of those in the Statewide Survey (Table 23). Approximately half of the cross-sectional variation in weekly earnings could be explained statistically. Twelve different variables had significant effects on earnings; these are grouped in categories and discussed below.

(1) Job characteristics

Weekly earnings are known to differ among industries and occupational groups; the coefficients in Table 23 reflect this fact. Other things equal, a construction job added $70.79 to average weekly earnings, while a job as a craftsman or manager added $54.49 per week.

(2) Work experience

As might be expected, a year of non-wood experience added more to non-wood earnings ($5.82 per week) than did wood products experience ($.60 per week). Experience in durable goods manufacturing was especially valuable; an additional year's experience added $10.45 per week to earnings. The contribution to earnings of total non-wood experience was positive through 6.8 years of experience, after which it became negative. The mean level of non-wood experience for this group was less than three years; thus, the contribution of this factor was generally positive.

Table 23. Regression Analysis of Weekly Earnings in Non-Wood Products Jobs[1/]

	Mean value	Regression coefficient[2/]
General:		
Age	24.9	9.63***
(Age) squared	--	- .14***
Education	12.2	-26.45**
(Education) squared	--	.95*
Vocational training	8.7	.95***
Disability (D)	.04	-52.28***
Non-wood products experience:		
Total	2.60	9.41***
(Total) squared	--	- .69***
Durable goods mfg. (industry)	.32	10.45*
Unskilled labor (occupation)	.68	- 5.37*
Wood products experience:		
Total	1.36	n.s.
(Total) squared	--	.22***
Job characteristics:		
Years since job ended[3/]	5.67	- 3.59***
Construction (D)	.13	70.79***
Durable goods mfg. (D)	.17	24.72**
Craftsman or manager (D)	.25	54.49***
Unskilled labor (D)	.36	10.58#

1/ Vocational training measured in months (high school). Variables with (D) are dummy variables; all others are in years. R^2 = .505; constant = 128.45; n = 264; mean of weekly earnings = 121.55; *** = .01, ** = .05, * = .10, # = .20.

2/ $\frac{\partial W}{\partial X_i}$, evaluated at means, are as follows: age = 2.66, education = -3.27, non-wood products experience = 5.82; wood products experience = 0.60.

3/ Measured prior to June 1974 (i.e., the mean ending date was November 1968). The interpretation of this coefficient is that nominal weekly earnings have risen by $3.59 per year, holding worker characteristics constant.

(3) General human capital

Age contributed positively to earnings through 34.4 years, after which negative increments could be expected. Somewhat surprisingly, the marginal contribution of education was negative through 13.9 years of education. This result is hard to reconcile with the standard view that education adds to worker productivity. Rather than contradicting that view, an alternative interpretation might be that these estimates reveal a self-selection process in which those workers with more education have to take the less highly-paid jobs because they have spent time in school at the expense of gaining work experience.[1/]

Having obtained an equation for non-wood earnings, this equation could then be used to predict the opportunity earnings of workers (i.e., outside wood products) at the time of each wood products job. The mean values in Table 24 indicate that actual wood product earnings exceed the opportunity earnings, on the average, by about $25 per week for mill workers and by $60 per week for loggers.

(b) Wood Products Earnings:[2/]

The regression results for weekly earnings in wood products indicate that a significant amount of the variation in earnings

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1/ Although this result might occur in a poorly specified model, Table 23 does contain 12 significant coefficients, including those for work experience. In short, the result is somewhat of a puzzle.

2/ The data sub-set (Table 24) included all wood products jobs where the worker was employed by others nd worked on an hourly basis. The latter restriction excluded those jobs where earnings were reported on a monthly or piece rate basis and resulted in a sample size of 447 jobs. It should be noted that the unit of observation is an individual job, and that many workers have held more than one job.

Table 24. Mean Values: Analysis of Weekly Wood Products Earnings, Work History Data[1/]

Variable	Logging (n=164)	Sawmills (n=130)	Plywood (n=153)
General:			
Age	33.46	29.78	32.20
Education	11.51	11.95	11.32
Vocational training[2/]	8.20	8.92	7.09
Percent disabled	.03	.03	.05
Work experience (years):			
Firm seniority	2.46	2.46	2.96
Other wood products	5.59	2.06	3.41
All wood products	8.05	4.52	6.37
Non-wood products	1.41	1.89	1.45
Job-specific:			
Years since job ended	4.31	4.35	3.72
Frequency of training[3/]	.35	.38	.31
Percent entry-level jobs[4/]	.12	.41	.30
Opportunity earnings[5/]	$159.07	$144.57	$149.62
Actual weekly earnings[6/]	$222.33	$169.17	$172.15

1/ Age, accumulated work experience, and earnings are as of (a) the end of that particular job, or (b) March 1974 if still employed at that time.

2/ Months of vocational training in high school.

3/ Percentage of jobs where supervision was received on at least a weekly basis.

4/ As defined by industry personnel managers.

5/ Predicted earnings in non-wood products employment at time of wood products job. See Table 23.

6/ Includes overtime hours evaluated at regular hourly wage (overtime wage levels were not available).

can be explained by the set of human capital attributes, although the equations differed among the three wood products sectors (Table 25).[1/] Several inferences can be drawn from these estimates, as follows:

(1) The variable which reflected opportunity earnings was significant for mill workers, but not for loggers. This is consistent with the earlier documentation that mill workers have spent more time in non-wood products jobs than have loggers (Table 11).

(2) Age and work experience made separate contributions to weekly earnings for loggers. Age is evidently an asset to a logger until about 45 years of age; after this, it becomes a liability. These estimates may reflect both supply and demand dimensions; it is possible that increased age may be accompanied by a reduced willingness to "bid" for higher-paying jobs, an employer-perceived but non-existent reduction in ability to do the hard physical labor which is required in logging, and/or an actual reduction in ability.

1/ A priori expectations included the following:

(a) diminishing returns to age, education, and total wood products work experience,

(b) positive returns to the individual forms of work experience, with a negative interaction term between firm seniority and other wood products experience (i.e., that the repetitive nature of many wood products jobs would cause the two forms of work experience to be quite substitutable for each other).

Table 25. Regression Analysis of Weekly Earnings in Wood Products Jobs: Work History Data[1/]

Variable[2/]	Logging (n=164)	Sawmills (n=130)	Plywood (n=153)
General:			
Age	10.61***	n.s.	n.s.
(Age) squared	- .119***	n.s.	n.s.
Education	n.s.	20.97**	n.s.
(Education) squared	n.s.	- .72**	n.s.
Vocational training	n.s.	- .99***	n.s.
Disabled	n.s.	46.44**	n.s.
Work experience:			
Firm seniority	n.s.	n.s.	5.53***[3/]
Other wood products	n.s.	3.73***	4.49***[3/]
(Firm sen.)(other wood prod.)	- .40**	n.s.	n.s.
(All wood products) squared	.086***	n.s.	- .193***
Non-wood products	- 2.99#	2.78**	4.52***[3/]
Job-specific:			
Years since job ended[4/]	- 5.93***	- 2.15***	- 6.23***
Frequency of training	28.41**	n.s.	n.s.
Opportunity earnings	n.s.	.32**	.157*
Constant term	31.81	-14.68	151.59
R^2	.372	.478	.552

1/ *** = .01, ** = .05, * = .10, # = .20, n.s. = not significant.

2/ See Table 24 for definition of variables.

3/ Not significantly different from each other at $\alpha = .05$.

4/ Measured prior to June 1974 (see Table 23 for interpretation).

(3) Work experience in wood products was clearly important in determining earnings, but the nature of that experience was different among sectors. Whereas, one would suppose that firm-specific experience would yield a higher return than experience with other firms, this was the case only in plywood jobs. Experience with other wood products firms was clearly more important than firm seniority in sawmill jobs, while firm-specific and general experience were quite substitutable for each other in logging.

(4) Non-wood products experience is an asset in mill jobs, but a detriment to earnings in logging. This is not unexpected since logging is much less "like" other types of work in terms of relevant human capital.

(5) Education is associated with higher earnings in sawmill jobs, but vocational training in high school is associated with a slight reduction in earnings.[1/]

(6) The other variables are more speculative in terms of providing clues as to income determinants.[2/] That

1/ Subsequent analyses of earnings in 1972 jobs revealed that when vocational training was defined to include post-secondary as well as high school training, the coefficients were positive and significant for both mill categories (Ervin, op. cit.). One can conclude, then, that post-secondary vocational training has a higher pay-off than high school vocational training.

2/ Additional analyses of weekly earnings for jobs held in 1972 was revealed that neither of the non-human capital variables mentioned earlier was significant in influencing earnings. That is, neither the capital/worker ratio of the employing firm nor union membership of the employee resulted in higher earnings. For the latter variable, weekly earnings were defined as average weekly wages including overtime pay but not including the money value of fringe benefits. Had the latter been included, it is possible that union membership would have significantly increased labor income. See Ervin, op. cit..

is, the few disabled workers in sawmills may hold higher-paying jobs in spite of being disabled. Also, those with more frequent training in logging may earn more because their employers may be more progressive, offer more training, and pay higher wages.

The regressions of Table 25 make it possible, then, to compute the expected increment in earnings from one-unit changes in human capital attributes, or the $(\frac{\partial W}{\partial X_i})$ (Q) term of Equation 6 (page 65). An additional year of non-wood products experience, for example, would add $2.78 to weekly earnings in sawmills (Table 26). Viewed another way, this extra experience would enable an individual to hold a job which would pay an extra seven cents per hour. If that individual could look forward to full-time employment, this expected increment in income would add up to $144.56 per year.

Prior to making inferences from Table 26, it is important to note that human capital attributes may also contribute to income by providing more stable employment for the worker. This is reflected through the $(\frac{\partial Q}{\partial X_i})(W)$ term of Equation (6), which will be estimated later in this section. Nevertheless, the estimates in Table 26 do provide some explanation of the structure of weekly earnings, and implicitly, wage rates, in the different sectors.

The most obvious conclusion from Table 26 is that firm seniority is rewarded in plywood mills, but not in logging or sawmills. Assuming year-around work, an additional year's seniority in plywood would add $159.70 to yearly income, or about eight cents per hour. In other words, a worker is this much more valuable to an employer,

Table 26. Expected Increments in Annual Wood Products Income Due to Higher Weekly Earnings[1/]

Variable[2/]	Logging	Sawmills	Plywood
General:			
Age	$ 137.80	$ 0	$ 0
Education	0	195.62	0
Vocational training	0	- 51.48	0
Disability	0	2,414.88	0
Work experience:[3/]			
Firm seniority	- 44.20	0	159.70
Other wood products	20.80	193.96	105.62
Non-wood products	-155.38	144.56	235.04

1/ $\frac{\partial W}{\partial X_i} \cdot Q$, where $\frac{\partial W}{\partial X_i}$ is derived from Table 25 and evaluated at the means of X_i for the respective groups (Table 24). Q is assumed to be 52 weeks (full-time) employment.

2/ See Table 24 for definitions.

3/ For sectors where the squared wood products experience term (WP) was significant in Table 25, $\frac{\partial W}{\partial X_i}$ for firm seniority (FS) and other wood products experience (OWP) can be derived as follows (e.g.,):

$$W = \hat{b}_0 + \hat{b}_1 FS - \hat{b}_2 (FS)(OWP) + b_3(WP)^2 + \ldots$$

$$W = \hat{b}_0 + \hat{b}_1 FS - \hat{b}_2 (FS)(OWP) + b_3(FS + OWP)^2 + \ldots$$

$$\frac{\partial W}{\partial FS} = \hat{b}_1 - \hat{b}_2 (OWP) + b_3 (2 \cdot FS + 2 \cdot OWP)$$

$$\frac{\partial W}{\partial FS} = \hat{b}_1 - \hat{b}_2 (OWP) + b_3 (2 \cdot WP)$$

on the average, because of his knowledge of that particular plant and its production process.

Experience with a particular plywood firm, however, is rewarded only slightly more than experience gained in other wood products jobs ($105.62 per year). This differential paid for firm-specific experience is only $54.08 per year, or about 2.6 cents per hour. Thus, while firm-specific experience is rewarded in terms of access to better-paying jobs, the rewards are very small.

The returns to work experience in logging and sawmills suggest that (1) firm seniority is less valuable than experience in other sector jobs, and (2) firm seniority is negatively related to earnings advancement in logging. Several interpretations of these results are possible; more than one may be "correct". One is that they reflect a substantial amount of self-selection for job advancement through the "bidding" process for filling in-plant vacancies. More senior workers may choose to remain in their current jobs rather than be considered for new openings. Another is that experience elsewhere in wood products allows workers to be better prepared to cope with new problems which arise on the production line or in the woods. In any event, the inference must be that firm-specific experience is not terribly important in explaining job (and wage) advancement in either of these sectors. Moreover, except for logging, non-wood products experience is more nearly related to advancement than is firm seniority.

The conclusion which is starting to emerge, then, is that unless firm seniority contributes substantially more to employment stability than it does to weekly earnings, staying with one's current employer is not a very robust means of making more money.

2. Determinants of Employment Stability:

The task within this section is to estimate the contributions to employment stability of the various human capital attributes. Stability of employment could be measured in a variety of ways having to do with frequency of unemployment among those who prefer to remain on the job. Rather than attempt to devise such a measure from work history data, the year 1972 was selected for study (Table 27). Only those (core) workers who attempted to work full-time for a single wood products employer were considered in the analysis. Those with voluntary unemployment periods were excluded, as were those who worked for another employer at any time. The interpretation of results, then, must be that they reflect expected outcomes for workers who attempted to stay with a single employer.[1/]

The results of the regression analysis of weeks worked in 1972 are shown in Table 28. Despite the rather low explanatory power of these equations, one immediate inference is that the structure of "lay-offs" appears quite different between loggers, on one hand, and mill workers, on the other. Part of this difference may be attributable to the fact that mill workers (35 percent) are more heavily unionized than loggers (17 percent); hence, logging firms may have more discretion as to which workers will be laid off. This argument is consistent with the evidence that increased age, rather than firm seniority or other experience, is associated with less frequent unemployment in logging. Logging firms, especially smaller ones, may "protect" older workers, an option which

1/ The robustness of the analysis must proceed on the asumption that the structure as revealed by the largely immobile workers with more seniority is also valid for the less senior, mobile group. The empirical results seem to be plausible.

Table 27. Mean Values: Analysis of Weeks Worked in Wood Products, 1972[1/]

Variable[2/]	Logging (n=35)	Sawmills & plywood (n=57)
General:		
Age	40.48	42.05
Education	11.28	10.39
Vocational training[3/]	.93	2.16
Disabled (D)	.06	.10
Work experience (years):		
Firm seniority	7.00	7.76
Other wood products	9.71	5.26
All wood products	16.71	13.02
Non-wood products	5.51	10.53
Job-specific:		
Capital/labor ratio [4/]		$10.95
Union membership (D)	.17	.35
Plywood (D)		.60
Weeks worked	49.47	51.81

1/ Age and accumulated work experience are as of December 1972. Observations include only those who worked for a single wood products employer in 1972.

2/ (D) designates dummy variables (e.g., six percent of loggers had some degree of physical disability).

3/ Includes both secondary and post-secondary vocational and on-the-job training.

4/ Capital measured in thousands of dollars. Data not available for logging.

Table 28. Regression Analysis of Weeks Worked in Wood Products, 1972[1/]

Variable[2/]	Logging (n=35)	Sawmills & plywood[3/] (n=57)
General:		
Age	n.s.	n.s.
(Age) squared	.01**	n.s.
Education	n.s.	n.s.
(Education) squared	n.s.	.008#
Vocational training	n.s.	- .073#
Disability	n.s.	n.s.
Work experience:		
Firm seniority	- .87**	.054*
Other wood products	- .72*	n.s.
(Firm sen.)(other wood Products)	n.s.	n.s.
(All wood products) squared	n.s.	n.s.
Non-wood products	- .72#	n.s.
Job-specific:		
Capital/labor ratio		.062**
Union membership	- 3.45#	n.s.
Plywood		.69#
Constant term	49.51	49.57
R^2	.194	.220

1/ *** = .01, ** = .05, * = .10, # = .20, n.s. = not significant.

2/ See Table 27 for definition of variables.

3/ Sectors were pooled to conserve degrees of freedom, especially given the *a priori* importance of seniority in determining lay-offs.

unionized mills may not have open to them.

Among mill workers, an additional year's seniority would lead to an additional .054 week's work, on the average. Although this increment is not large, the outcome is consistent with the widely held view that lay-offs depend on one's seniority. One other outcome of Table 28 is that more capital-intensive firms provide more stable employment for workers, at least for those who are not displaced by the process of becoming capital-intensive.

The regression equations in Table 28 make it possible to compute the expected increment in income from an increase in weeks worked, or the $(\frac{\partial Q}{\partial X_i})(W)$ term of Equation 6. For mill workers, the rewards for additional firm seniority are quite low, at $10.62 per year (Table 29). A logger, on the other hand, could expect to make an additional $224.91 simply by becoming one year older. This, as discussed above, may be attributable to the protection of older workers by their employers. Work experience, surprisingly, appears to be a detriment to employment stability, since these increments are negative. In reality, people work and age at the same time. In other words, a logger who acquires both one more year of age and one more year of firm seniority is actually reducing his income by $16.78 per year, or the difference between the two coefficients. Had the year's experience been with another firm in the industry or with a non-wood products firm, his income would have been increased by $24.89 per year.

3. Determinants of Yearly Income:

To recap the methodology to this point, three points need to be made. First, the estimates above are fairly complex statistical re-

Table 29. Expected Increments in Annual Wood Products Income From More Stable Employment[1/]

Variable[2/]	Logging	Sawmills & plywood
General:		
Age	$224.91	$ 0
Education	0	32.70
Vocational training	0	- 14.36
Disability	0	0
Work experience:		
Firm seniority	- 241.69	10.62
Other wood products	- 200.02	0
Non-wood products	- 200.02	0
Job-specific:		
Capital/labor ratio	---	12.20
Union membership	- 958.44	0

1/ $\frac{\partial Q}{\partial X_i} \cdot \bar{W}$, where $\frac{\partial Q}{\partial X_i}$ is derived from Table 28 and evaluated at the means of X_i for the respective groups. Average weekly earnings in 1972 ($\bar{W}$): logging, $277.81; sawmills and plywood, $196.76. See Table 26 for derivation of coefficients for work experience.

2/ See Table 27 for definition of variables.

lationships. That is, they indicate how various forms of human capital contribute to economic well-being (weekly earnings and frequency of unemployment), taken one at a time. In reality, these attributes are not independent; people age as they work, regardless of the type of work. Second, some of the human capital attributes are not subject to future control by workers. Age is an obvious example. Other attributes can be controlled by the worker's choice of occupation, and more narrowly, by his choice of employer.

Finally, the question must be raised as to how the effects of these separate variables are actually perceived by workers and by employers. It may be that age and experience are perceived to have different effects, as in the statistical models above. It seems more likely, however, that the general inseparability of aging and gaining experience lead the two to be viewed as simultaneous. Statistical models like the above are useful for disentangling closely related factors, but this is not to say that they represent reality as perceived by workers and employers.

In light of this, the marginal income coefficients in Table 30 show the expected increments for each of the work experience variables, including the effect of age. In other words, the effects of age and work experience are added together; the rationale is that these effects are perceived as inseparable.

D. Conclusions:

The substantive conclusions which can be drawn from this section are the following:

Table 30. Marginal Income Coefficients in Wood Products Employment[1/]

	From higher weekly earnings			From more stable employment			Sum		
	Logging	Sawmills	Plywood	Logging	Sawmills	Plywood	Logging	Sawmills	Plywood
General:									
Education	0	195.62	0	0	32.70	32.70	0	228.32	32.70
Vocational training	0	- 51.48	0	0	14.36	14.36	0	- 37.12	14.36
Work experience:									
Firm seniority[2/]	93.60	0	159.70	- 16.78	10.62	10.62	76.82	10.62	170.32
Other wood products	158.60	193.96	105.62	24.89	0	0	183.49	193.96	105.62
Non-wood products	- 17.68	144.56	235.04	24.89	0	0	7.21	144.56	235.04

1/ Work experience coefficients reflect the combined effects of age and experience.

2/ For example, an additional year's firm seniority in a plywood mill would add $170.32 to expected annual income for a worker. Most of this amount ($159.70) would come from to higher weekly earnings; only a small portion ($10.62) would come from less frequent unemployment. Zeros indicate lack of statistical significance at conventional levels.

(1) Earnings by wood products workers are neither randomly determined nor determined solely by wage negotiations. Instead, a variety of forms of human capital are important in determining labor earnings, both within wood products and outside the industry.

(2) A worker's experience with his current employer, as reflected through firm seniority, is rewarded by only minor increases in expected yearly income (about $170 for plywood workers, $77 for loggers, and $10 for sawmill workers). Furthermore, these are the expected gains over an entire group of workers; individuals who fail to advance through the process of "bidding" for in-plant job openings might have an income gain of zero.

(3) The expected gain from an additional year of firm seniority may be less than if that year's experience had been with another wood products employer. This is clearly the case for loggers and sawmill workers. Among sawmill workers, an additional year's experience outside the industry would even generate an even larger increment in income than would an additional year of experience with the current employer.

(4) Only in the case of plywood workers is firm seniority rewarded more highly than is other wood products experience, and then only to the extent of $65 per year or about three cents per hour. In this type of work, as in sawmilling, an additional year of non-wood experience would have a higher expected return than additional firm seniority.

The principal conclusion which emerges from this section is that job-changing by workers, an adaptation which clearly defines the peripheral labor force, appears to be encouraged by the monetary incentive structure in the wood products industry. In short, staying with one's current employer is not a very attractive option because of the lack of rewards for firm-specific work experience. Hence, it may not be surprising to find considerable job-changing. There is the possibility, however, that a worker's other options may be equally unattractive. This possibility is examined in the following two sections.

V. ACCESS TO JOB OPPORTUNITIES IN THE WOOD PRODUCTS INDUSTRY[1/]

The previous sections have documented two items which may be useful to recap at this point. The first is the existence of a dual labor force from which employers can draw to meet their manpower needs. The second is that human capital attributes, which differ substantially between the "core" and "peripheral" segments of this dual labor force, play a significant role in determining how labor incomes are determined. A limitation of the analysis in Section IV is that it dealt only with the determination of earnings once access to a job has been gained. Gaining access to that job and even wanting to have access to it are related but somewhat separate questions which are explored in this section. As in Section IV, the key concepts are the supply of and demand for human capital

1/ A significant portion of the research described in this section was done as part of the Social Marginalization (Regional) Project at the Western Rural Development Center, Oregon State University. John Young, Jan Newton, Harland Padfield, and Bill Pierson each made significant contributions to the research. A summary report on that project is now being finalized by Young and Newton. Previous publications on the Oregon portion include the following:

Stevens, Joe B., William W. Pierson, and David E. Ervin. "On the Processs and Consequences of Job Rationing in Oregon's Declining Wood Products Industry". Paper delivered at the Annual Meeting, American Anthropology Association, November 1974.

Stevens, Joe B., William W. Pierson, and David E. Ervin. "On the Process and Consequences of Job Rationing in Declining Extractive Industries." Proceedings of the WAERC Natural Resources Committee and Community and Human Resource Development Committee, January 1975.

Stevens, Joe B., William W. Pierson, and David E. Ervin. "On the Process and Consequences of Job Rationing in Oregon's Declining Wood Products Industry". WRDC Discussion Paper No. 4, Western Rural Development Center, Oregon State University, January 1975.

Stevens, Joe B. "Worker Strategies for Adapting to Economic Decline in Oregon's Wood Products Industries". Paper delivered at the Annual Meetings, American Anthropology Association, December 1975.

Young, John A. and Joe B. Stevens. "Job Rationing, Human Capital, and Normative Behavior: An Example from Oregon's Wood Products Industry." Human Organization, Spring, 1978, pp. 29-37.

attributes, but now the focus has changed to job rationing rather than financial rewards from whatever jobs are held.[1/]

A. Supply and Demand for Human Capital Attributes:

The supply side of the market for human capital attributes comes from the individual decisions of mill workers and loggers. Each has a variety of work options which might conceivably be selected. Among those in the core labor force, the option most frequently selected is that of continuing to work for one's current employer. The result is an accumulation of seniority which causes the workers to be more experienced, slightly higher paid, and to some extent, less vulnerable to lay-offs caused by seasonal factors or fluctuations in the economy. Peripheral workers, on the other hand, alter their set of human capital attributes when they elect to be occupationally mobile. They acquire some new attributes by gaining experience at a variety of jobs. At the same time, they also change some other attributes. By changing employers, for example, they sacrifice what seniority they may have with the firm they are leaving. They also run the risk of being labeled as "unstable" in terms of not staying with a particular employer. This, then, leads directly to the demand side of the market for human capital attributes. Fairly complex equipment has to be operated to produce lumber and plywood, and human skills and abilities are required to operate and maintain this equipment. Many other jobs in the industry require fewer skills; in the words of one worker, "Anyone can work logs for that outfit!."

1/ The term "job rationing" is a demand-oriented term which was adopted early in the research to denote the rather obvious fact that some workers are selected for jobs while other workers are not selected. As the research progressed, it became increasingly evident that supply considerations were also quite important; this point is further developed in Section VI.

Just as Section IV identified a systematic explanation for how the frequency of unemployment and wage rates of employed workers are influenced by human capital attributes, there would also seem to be a systematic explanation of the process by which jobs are rationed. Employers surely do not hire workers randomly; neither do workers seek jobs on a random basis. Instead, there must be some systematic structure to this process. It is the basic contention of this section that human capital attributes play an important part in the process of job rationing.

B. Why Study Mill Closures?

This section explores the job rationing process through analysis of data on workers affected by the hiring decisions of firms. The process would be worthy of exploration solely because it involves phenomena which are not well understood by economists. In this case, however, the need for research is rather immediate in light of impending decline in manpower needs.

The basis for this assertion rests on an expectation of how employment levels in wood products will actually decline in the future. Rather than occurring through normal attrition and non-replacement of retiring workers, the reductions most likely will come about through permanent closures of mills or through extensive reorganizations of production lines within mills. The factors which will determine what types of mills will close, when, and where, obviously need to be studied. Technological obsolescence, dependence on a diminishing supply of private timber, increased competition and prices for public timber, and stricter environmental standards seem to be the foremost considerations. Our subjective experience

with mill closures strongly suggests that workers generally have insufficient information to make very accurate assessments of how long a particular mill will remain economically viable. Older mills are sometimes quite efficient ones, and workers as well as laymen generally are often befuddled by media analysis of the likely effects of new environmental standards.

When mill closures do occur, the affected workers will probably resemble the heterogeneous nature of the Statewide Sample, i.e., a cross-section varying from core workers with long seniority to peripheral workers with less experience in the wood products industry. Each time a permanent mill closure or indefinite lay-off is announced, most of the workers in this cross-section are faced with going again to the labor market. If the outcomes of this process were predictable, public policies could be better shaped to lessen the human suffering brought about by unemployment.

C. Sketches of the Mills:

The mills which were studied represent a fairly typical cross-section of those which will be under the most economic stress in the future. The first, a 150-man sawmill, announced a permanent closure in 1971, citing a conflict between air quality standards and their obsolescing facilities. The other three were 250 to 300-man plywood mills of varying age which were caught in the economic recession of late 1974 and early 1975. One announced a permanent closure, attributing air quality standards as the primary reason. The other two announced indefinite lay-offs, pending resumption of normalcy in the lumber market. Two of the mills were owned by well-known local lumber entrepreneurs, the third was one of several plants owned by a large

in-state corporation, and the fourth was owned by a multi-state corporation based outside Oregon.

The plants were also dispersed geographically and by city size. One was in a large urban area; the others were in three cities ranging from 1,000 to 10,000 population. These mills will be referred to as the Coos, Josephine, Lane, and Benton plants, corresponding to the counties in which they were located.

In addition to studying mill closures to document the fate of affected workers, an analysis was also made of hirings by four other wood products firms in Lane County. None of these four had been affected recently by indefinite lay-offs or closures. Instead, they were used to help identify relationships between various human capital attributes and a worker's likelihood of becoming re-employed, if and when a closure should occur. These firms included large integrated plants of two multi-state corporations, one medium-size plywood mill which is locally owned, and one smaller-size plant of another multi-state corporation. These plants will be referred to as Plants A, B, C, and D.

D. Empirical Results:

The analysis of Section IV indicates that several human capital attributes of workers are important in explaining wage rates and frequency of unemployment. At first thought, one might suspect that this same set of variables would also explain why some workers are selected for jobs and others are not. Our first experience in studying mill closures, described below, indicated that the matter of who gets a job is both more subjective and more complex than the system of rewards which exists for employed workers. Since the research procedures were largely inductive (fact-

finding) rather than deductive (arising from theory), the various segments of the research on job rationing will be described in order of occurrence.

1. The Benton Plant (1971):

Two types of workers were identified when the random sample of 40 workers were interviewed ten months after the mill closure. The largest group (26) had been unemployed for varying lengths of time, ranging from 2 to 44 weeks and averaging about 15 weeks. The remainder were never unemployed at all after the closure; a majority of these workers found jobs in other mills. If one examines only the mean values of several variables which might be expected to explain this variation in re-employability, there appears to be substantial similarity between the groups. For example, both groups averaged about 42 years old, 10.6 years of education, 9 years of firm seniority, and 16 years of sawmill experience (Table 31).

Some of these apparent similarities were confirmed when the data on these two groups were subjected to discriminant analysis. For example, neither wage rate (as a proxy for skill level) nor length of sawmill experience was significantly different between groups, although there was a slight difference in firm seniority.[1/]

1/ The regression equation for the entire set of workers (t-values in parentheses) was:

$$\text{Wks Unemployed} = 13.60 + .29\ \text{Age} + 1.38\ \text{Education} \quad (R^2=.28) \qquad (1.31) \quad (1.05)$$

$$-7.92\ \text{Evaluation of Community} \quad (-2.92)$$

$$-3.70\ \text{Number Children} \quad (-2.11) \qquad -.31\ \text{Firm Seniority} \quad (-.95)$$

These results are somewhat different (than those in Table 31) with respect to seniority and age, which appear here to have opposite and off-setting effects.

Table 31. Discriminant Analysis: Two Types of Workers Displaced From the Benton Plant, 1971[1/]

	Variable	No unemployment (n=14)	Some unemployment (n=26)
	Age	41.86	42.00
**	Formal education (yrs.)	10.64	10.65
	Disability (percent with)	7%	31%
***	Evaluation of community[2/]	3.43	2.96
	Interaction with relatives (4 = a lot, 3 = quite a bit, 2 = a little, 1 = not at all)	3.00	2.69
	Years lived in community	18.14	23.77
***	Number of dependent children (under 18 years)	1.57	.50
	Vocational or other job training (months)	8.50	7.61
	Wife's income in 1970 (year prior to closure)	$589	$583
**	Firm seniority (years)	8.61	9.10
	Years experience in sawmills	16.64	15.57
	Hourly wage rate	$3.91	$3.87
	Weeks of prior unemployment (between Jan. 1, 1968 and mill closure)	3.14	5.23
	Weeks unemployed after closure[3/] (through June, 1972)	.00	14.96

1/ *** = .01, ** = .05, all others non-significant.

2/ Wording of question: All in all, how would you rate this community as a place to live--as excellent, good, only fair, or poor? (4 = Excellent; 3 = Good; 2 = Only Fair; 1 = Poor or Undecided.)

3/ Not included as variable in discriminant analysis.

On the other hand, those workers with more children or with a higher evaluation of the local community as a place to live were more likely to have found re-employment after the mill closed. The meaning of these variables is somewhat ambiguous. It could be that they reflect supply dimensions; e.g., workers with larger families surely have more incentive to avoid being unemployed. On the other hand, demand phenomena could be present if employers view workers with family responsibilities as being more stable workers. Evaluation of the community by workers is much more speculative in its meaning; one hypothesis is that an attitude has been tapped which indicates a perceived lack of control over the worker's own destiny.[1/]

Only limited inferences can be drawn from the Benton Plant analysis. One is that the human capital attributes which are important in explaining income variation among employed workers (experience, vocational training, education, and disability) are of little value in explaining why some workers find jobs following a mill closure, but others do not. Instead, the evidence pointed to the possibility that employers may be using a different set of criteria in resolving the job rationing problem. If so, it seemed that these criteria could best be identified by doing additional inductive explorations with personnel managers of firms and with workers themselves.

2. Analysis of Hirings in Lane County:

The methodology for expanding the study of job rationing included the following steps, based on joint research with the Western Rural

1/ Further discriminant analysis revealed that the worker's scores on this variable were not caused by the length of time they had already been unemployed at the time of the interview.

Development Center:

(1) use of anthropological field techniques to identify hiring criteria for entry-level jobs in sawmills and plywood mills.[1/]

(2) eliciting rank orderings of these criteria from nine workers and eight personnel managers in Lane County,

(3) statistical analysis of these rank orderings, and

(4) independent verification of the criteria through statistical analysis of a random sample of workers hired and workers not hired by Plants A, B, C, and D in Lane County.

In other words, workers and employers were asked about characteristics which they thought were favored in hiring for entry-level jobs, then we cross-checked this with a statistical analysis of actual hirings.

(a) Identification and Testing of Hiring Criteria

Several conclusions can be drawn from analysis of the perceptions of workers and employers (Tables 32 and 33). First, the "relevant" set of human capital attributes used for selection of new workers clearly ranged beyond a narrow set of economic variables. In particular, both employers and workers perceived that applicants should

1/ Most jobs above entry-level are filled by in-plant workers through a "bidding" process; thus, many displaced workers might have to start at the entry-level with a new firm, in spite of their own higher skill levels.

Table 32. Identification of Important Job Rationing Criteria[1/]

A. Judged "important" by a majority of employers and workers:

- Experience in a particular job
- Name of last employer
- Length of time worked for last employer
- Reason for leaving last job
- Previous work experience with company
- Whether fired by a previous employer
- Auto or industrial accident history
- Whether person has special medical problems (e.g., back, ulcers, asthma, seizures)

B. Judged "important" by nearly a majority of employers and workers:

- Number of employers in the last five years
- Number of times a person has reported to update his application
- Completeness of application form
- Whether person has minor medical problems (e.g., hernia, eye trouble)
- Whether person has a physical disability (e.g., loss of finger, hearing loss)

C. Judged "important" by workers but not ranked by employers:

- Age
- Military history and type of discharge
- Marital status
- Education history
- Number of dependents
- Length of time person has lived in community
- Sufficient references given

D. Judged "not important" by employers and workers:

- Height and weight
- Length of time person has lived at his current address
- Whether person has close relatives working for company
- The distance a person lives from the plant

1/ Those criteria are underlined which would appear to reflect the "stability" of a worker, as perceived by employers.

Table 33. Composite Rankings of Important Job Rationing Criteria By Lane County Employers and Workers[1/]

	Perceptions		Analysis of Actual Hirings[4/]
	Ranked by Employers[2/]	Ranked by Workers[3/]	
Previous work experience with company	1	--	--
Experience in a particular job	2	1	NS
Completeness of application form	3	--	SIG
Name of last employer	4	9	--
Length of time worked for last employer	5	2	NS
Whether person has special medical problems (e.g., back, ulcers, asthma, seizures)	6	7	NS
Reason for leaving last job	7	4	NS
Auto or industrial accident history	8	12	--
Whether person has minor medical problems (e.g., hernia, eye trouble)	9	10	--
Number of times a person has reported to up-date his application	10	8	--
Whether fired by a previous employer	11	--	NS
Number of employers in the last five years	12	3	SIG
Whether person has a physical disability (e.g., loss of finger, hearing loss)	13	6	NS
Age	--	5	SIG
Education history	--	11	NS
Marital status	--	13	NS
Number of dependents	--	14	NS
Military history and type of discharge	--	15	SIG

1/ --: not ranked or measured. "Stability criteria" are underlined.

2/ Coefficient of concordance = .228, $\alpha < .10$.

3/ Coefficient of concordance = .237, $\alpha < .20$. Coefficient of concordance when workers and employers were pooled = 0.083, $\alpha \leq .40$.

4/ SIG = significant in discriminant analysis at $\alpha < .20$. (See Table 34.)
NS = not significant in discriminant analysis at $\alpha < .20$. (See Table 34.)

be "stable" and "dependable". Second, workers felt that job applicants are rated on a larger set of attributes than that claimed by employers. Part of this may have been due caused by the employers' uneasiness about using criteria which may run contrary to Equal Opportunity guidelines (e.g., age and marital status), even though these may (or may not) be useful predictors of a worker's length of service for the firm. Third, there was considerably more agreement among employers and among workers than there was within the entire group of workers and employers. All in all, there seemed to be a modest degree of shared perception of the job rationing process. Workers especially felt that frequent job changing might reduce their chances of getting a job, while employers ranked stability considerations somewhat lower than did the workers.

When data on actual hirings were subjected to discriminant analysis, the statistical outcome diverged substantially from the perceptions of both workers and employers (Table 34).[1/] A number of criteria with high rankings on the basis on perceptions were not statistically different between the "hired" and "not hired" groups. These included:

(a) whether the worker had experience at a particular job,

(b) physical disability or major health impairment,

(c) reason for leaving last job, including being fired, and

(d) total wood products experience.

1/ Data were collected from the application forms of 46 workers who had recently been hired for entry-level jobs by Plants A, B, C, or D. Data were also collected for 89 workers whose applications had been on file for a substantial period of time. The latter group is a surrogate for those considered but not hired for entry-level jobs.

Table 34. Mean Values for Job Rationing Criteria[1/]

Criterion	With wood products experience			Without wood products experience		
	Hired		Not hired	Hired		Not hired
	(n=27)		(n=52)	(n=19)		(n=37)
Shortest period of employment (yrs.)[2/]	2.22	***	.82	1.38		
Longest period of employment (yrs.)	3.62			2.86		
Completeness application form	85%	**	71%	68%		
Number of wood products jobs listed on application	1.72			0		
Age	29.60			23.5	***	28.4
Number of employers during past five years	2.64			1.79	**	2.59
Number of non-wood products jobs listed on application	1.25			2.05	#	2.68
Height	5'11"			5'10"		
Weight	175			172		
Years of education	12.11			12.48		
Years worked for last employer	2.26			1.72		
Physical or health impairment	5%			9%		
Dubious reason for leaving last job[3/]	27%			27%		
Number of dependents	.95			.82		
Veteran	41%	***	58%	21%	#	43%
Experienced at job	85%			0		
Years worked in non-wood products jobs	1.44			4.09		
Years worked in wood products jobs	3.47			0		

1/ Means for "hired" and "not hired" are shown separately only if the variable was significant in the discriminant analysis for that group (*** = .01, ** = .05, # = .20). "Stability" criteria are underlined.

2/ In other words, the longer the shortest period of employment in the applicant's work history, the more likely he would be hired (or at least for those with wood products experience).

3/ Quit, fired, injury, illness, disagreement, wanted to move, dissatisfied, or no reason given.

Those criteria which were statistically significant, however, indicated that the perceptions of workers were somewhat closer to the "truth" than were perceptions of personnel managers.[1] In particular, the employment stability (and to a lesser extent, the age) of workers was quite important statistically; this is a view more nearly shared by workers than (perhaps admitted) by personnel managers.

Substantial variation in actual hiring criteria did exist, however, when the hiring procedures in the four plants were analyzed individually (Table 35). To a large extent, this may account for the rather modest level of agreement on perceived criteria among workers and employers. In other words, the labor market may be differentiated and segmented to a considerable degree, and the participants in the market may have fairly accurate perceptions of this differentiation. No single criterion was a significant discriminator for all four plants.[2] At least two plants "agreed" on the importance of seven of the criteria, but four of these seven had conflicting directional effects (i.e., job experience, height, veteran status, and shortest period of employment). Each firm did reveal, however, that at least one dimension of instability was penaliz (e.g., very short jobs, many jobs held, many past employers, or having a dubious reason for leaving the previous job). While the labor market may be differentiated, there seems to be general agreement that job changing does involve some penalties in terms of future re-employment.

1/ One significant exception is the degree of completeness of the application form. Personnel managers ranked this quite high, which was consistent with the statistical analysis of actual hirings.

2/ On the other hand, several of the variables may have been measuring very nearly the same thing.

Table 35. Mean Values for Job Rationing Criteria In Four Lane County Plants[1/]

	Plant A			Plant B			Plant C			Plant D	
	Hired		Not hired	Hired		Not hired	Hired		Not hired	Hired	Not hire
Age	26.2	***	32.7	30.1			28.9	***	29.5	24.5	
Height	6.05	#	5.86	5.73	#	5.94	5.88			5.87	
Weight	186	***	177	172			174			166	
Years of education	11.8			12.8			12.8			12.1	
Years worked for last employer	1.92			2.42			3.12			1.86	
Number of employers during last five years	2.64			2.42			2.96			1.66	*** 2.36
Experienced at job	60%	***	45%	33%	***	71%	60%			40%	
Complete application form	82%			62%			100%	***	80%	60%	
Number of non-wood products jobs	2.00			1.42			1.00	*	2.47	1.62	
Number of wood products jobs	.93	***	1.14	1.15			1.40			.62	
Years worked in non-wood products jobs	2.60	***	3.76	1.33	#	1.47	2.28			2.52	
Years worked in wood products jobs	1.64			3.61			2.48			1.20	
Longest period of employment (yrs.)	3.55			3.98			3.61			2.41	
Shortest period of employment (yrs.)	2.36	***	1.29	2.14	#	.99	1.67			.53	* .81
Physical or health impairment	14%			11%	*	0%	8%			0%	
Dubious reason for leaving last job	27%	*	48%	11%			20%			25%	
Number of dependents	1.54			1.38			.30	***	.93	--	
Veteran	40%	***	86%	42%			50%	#	40%	--	
Married	73%	#	83%	92%			60%			--	
Number of references	1.77			2.38			1.90	**	2.87	--	

1/ Means for "hired" and "not hired" are shown separately only if the variable was significant in the discriminant analysis for that plant (*** = .01, ** = .05, * = .10, # = .20). Applicants with and without wood products experience were pooled in this analysis. "Stability" criteria are underlined.

(b) Extent of Penalties for Job-Changing

The importance of employment stability as a criterion for selection of new workers is rather clearly documented above, although the exact definition of the term varies from plant to plant. In view of this finding, regression analysis was used to quantify the effects of instability on the future employability of workers (Table 36). The effects of the various hiring criteria are shown there as percentage changes in the probability of being hired, holding everything else constant. For example, each additional wood products job would (by itself) reduce the chances of re-employment by seven percent for those workers with wood products experience.

While the exact set of criteria found to be important depends on categorization of the worker, the importance of job stability is quite evident from Table 36. In particular, the frequency of negative effects indicates that the general consequence of job changing is to reduce the future employability of mobile workers.[1/] If a worker quits one job to take another firm's offer, for example, there are no immediate negative consequences. Should he then look for another job, however, the inference in Table 36 is that his chances for re-employment are lessened. Moreover, the total effect could be the sum of several individual effects, since a job change would involve more than one variable. For example, consider the alternative of changing wood products jobs now versus staying with

1/ The substantial positive effect of a complete application form (+ 25 percent) is the one exception.

Table 36. Regression Analysis of Worker Characteristics Affecting the Probability of Being Hired[1/2/]

Group		Shortest period of employment	Longest period of employment	Complete application form	Number of wood products jobs	Last job was in wood products	Age	Number of employers in last 5 years	Number of non-wood products jobs	R^2
With wood products experience	All (n=79)	** -5% per year		** +25% if complete	# -7% per job	*** -33% if not				.21
	Shortest job less than one year (n=53)				* -11% per job	** -36% if not				.13
	Shortest job one year or more (n=26)	*** -12% per year	*** -8% per year			*** -64% if not	-1.4% per year			.82
Without wood products experience	All (n=56)						** -2.4% per year	** -23% per employer	# +12% per job	.23

1/ For a worker with wood products experience, a completed application would increase the probability of being hired by 25%. Decreases in the shortest period of employment (e.g., through job changing) would decrease the probability of being hired at the rate of 5% per year of reduced job length.

2/ *** = .01, ** = .05, * = .10, # = .20, blank = not significant. Variables not included in the equation are crossed out. Dependent variable was measured as a dummy variable (1 = hired, 0 = not hired).

the current employer for another year. A decision to become mobile would imply a seven percent reduction because of the job change and it would shorten the current period of employment by one year, thus adding another five percent reduction. The total effect of this alternative, then, is that the worker's probability of re-employment in the future would be reduced by 12 percent.[1/]

The largest single penalty due to job-changing, however, is incurred if a mobile worker leaves the wood products industry and then attempts to return. In this case, the reduction in his chances of re-employment is at least 33 percent in addition to the 12 percent reduction mentioned above. The reasons for this rather stiff penalty are not clear. The implications are quite important, however, in that the large peripheral labor force derives its economic livelihood from jobs in both the wood products and non-wood products sectors. The results of Table 36 suggest that those who tap both job sources are being rationed out of wood products even though they may be fully employed at present. Whether similar penalties exist in other sectors is not known; if they do, then a vicious circle exists.

The extent of penalties for job changing also varied according to the characteristics of the workers. Those Lane County applicants whose shortest job had been under one year were much like the peripheral workers in the Statewide Study; both groups were basically in their late twenties and had changed jobs almost every year (Table 37). On the other hand, those Lane County applicants whose shortest

1/ This assumes that the current job is also the shortest job in the person's work history. Another way to reach the same conclusion, however, is that workers with a shortest job of one year or less would be penalized 11 percent per job change. Most peripheral workers would fall in this category (see Table 11).

Table 37. Mean Values for Lane County Job Applicants, as Contrasted to Statewide Sample[1/]

	Lane Co: shortest job over 1 yr.	Statewide: core mill workers	Lane Co: shortest job under 1 yr.	Statewide: peripheral
Age	33.0	43.0	27.9	28.6
Length of last job[2/]	3.8	4.5	1.5	1.0
Length of longest job[3/]	5.9	7.7	2.5	1.4
Length of shortest job[3/]	3.3	2.5	0.3	0.6
Last job was outside wood products	19%	---	38%	---

1/ All data in years. All Lane County applicants had wood products experience.

2/ Data on average length of wood product jobs were used for Statewide sample.

3/ Data on longest and shortest wood products jobs were used for Statewide sample.

job lasted longer than one year were much more like the core mill workers in terms of age and job stability. It appears that some of the penalties are even more stringent for this older, more stable group. Again, the reasons for this are speculative, but leaving wood products and then attempting to return would reduce an older worker's chance of re-employability by 64 percent.[1/] This is a substantial penalty and appears to reinforce the apparent rationality of the core labor force in pursuing its general strategy of remaining non-mobile and maintaining seniority with a viable firm.

These penalties, in the form of reduced chances of re-employment, clearly point to an emerging labor surplus in the wood products industry. Although this surplus is not yet manifested in low incomes and widespread unemployment, it is apparent that employers have the latitude to select from a large number of workers. Hence, Table 36 generally reveals penalties for having the "wrong" human capital attributes, rather than rewards for having the "right" attributes. The latter situation could be expected to prevail in a labor-deficit industry where particular skills are in short supply, but it apparently does not prevail in the wood products industry today.

3. Closures During the 1974-75 Recession:

Since the research on mill closures proceeded in a sequential fashion, a brief recap may be useful at this point. First, the analysis

1/ In addition to this penalty, some discounting is made for what might be called "excess seniority" (eight percent per year) and age (1.4 percent per year). This illustrates the economic dilemma faced by at least some members of the core labor force. That is, they are faced with (i) low returns to additional firm seniority (Section IV), (ii) substantial penalties for inter-industry mobility, and (iii) at least some penalty for intra-industry mobility.

of Benton Plant workers revealed that any explanation of re-employability following a closure must take account of "human capital" in the broadest possible sense, including social as well as economic attributes. Secondly, the analysis of perceived and actual job rationing in Lane County revealed that job changing, as a worker strategy, reduces the chance of re-employability in the future.

With these ideas in mind, data were collected from 72 workers who had been laid off by Lane, Josephine, and Coos Plant closures during the 1974-75 recession.[1/] Three objectives were paramount at this stage:

(a) to further investigate whether those factors which determine incomes of employed workers also determine their ability to cope with lay-offs,

(b) to further verify that job changing has negative consequences in terms of future re-employability, and

(c) to investigate attitudes and behavioral patterns which are correlated with the different work strategies adopted by workers.[2/]

The sample included representation from four groups.[3/] These included:

1/ The effects of this recession were quite severe in Oregon. Within the timber region, unemployment soared above 18 percent in Josephine County and reached about 25 percent within the Oregon wood products industry.

2/ The latter objective was addressed primarily by other social scientists at the Western Rural Development Center as part of the Social Marginalization Project.

3/ Current status of the workers was identified by union business agents and/or personnel managers.

(a) workers who found new jobs, most of which were in the local community,

(b) workers who had been recalled by the firm (only the Lane Plant was a permanent closure),

(c) workers who were still unemployed, and

(d) workers whose current status was unknown.

In other words, a heterogeneous cross-section of workers was selected to enhance the likelihood of being able to estimate relationships between human capital attributes and adaptations by the workers. The sample was not randomly drawn; thus, no inferences can be drawn as to the extent of prolonged unemployment.

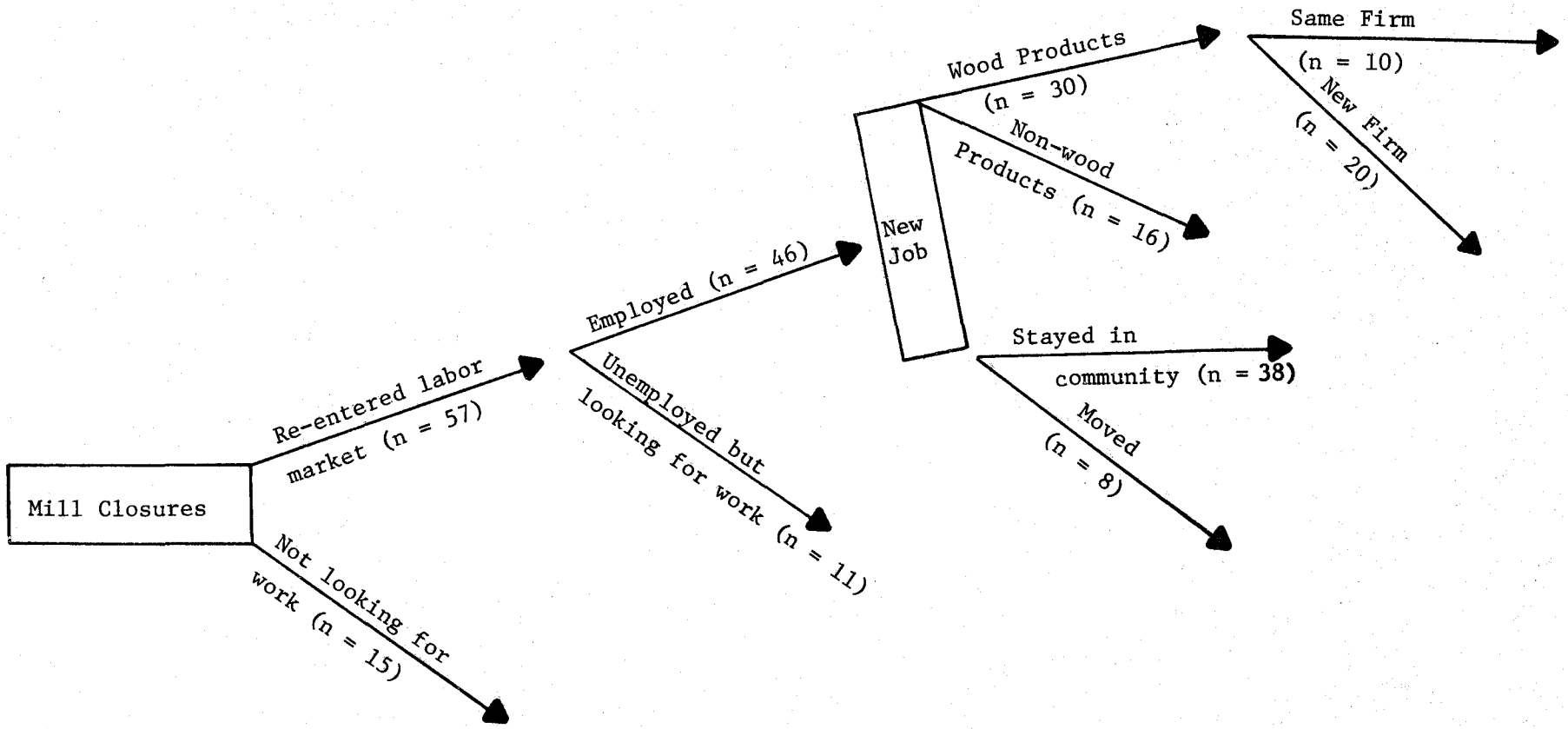
The workers at the three plants differed considerably, thus enabling a wide range of attributes to be observed (Table 38). The workers at the Josephine Plant averaged 50 years old and had the most seniority (16.7 years). The Coos Plant workers were the youngest (30 years), had the most education (12 years), and the least seniority (4.6 years). The Lane Plant workers, located in the most urban setting, occupied an intermediate position in terms of age, seniority, and other variables.

The disposition of the sample at the time of interview, approximately six to eight months after the closures, is shown in Figure 3. A total of 41.7 percent had gone back to work in wood products, 22.2 percent had found other types of work, 15.3 percent were still unemployed but looking for work, and 20.8 percent were not looking for work. The next few pages are devoted to identifying how various human capital attributes were related to the work strategies adopted by these workers.

Table 38. Mean Values for the Three Samples

	Lane Plant (n=15)	Coos Plant (n=29)	Josephine Plant (n=28)
Years of seniority	9.5	4.6	16.7
Age	41.1	30.2	50.1
Number of jobs, last five years	1.5	2.0	1.0
Longest job in work history	9.6	4.4	16.7
Shortest job in work history	9.1	3.5	16.7
Wage rate at termination	$4.73	$4.60	$4.82
Years of education	10.7	12.0	10.8
Number of job applications	4.6	2.4	0.9
Percent making job applications outside community	40%	34%	11%
Percent employed at time of interview	60%	76%	54%
Percent unemployed but looking for work	40%	14%	4%
Percent unemployed and not looking for work	0%	10%	42%

Figure 3. Adaptations to Closures by the Sample of 72 Workers



(a) Re-entry Into the Labor Market

Over the entire sample, the key variable at this decision point was the worker's seniority at the plant. Those opting not to re-enter the labor market averaged nearly 16 years of seniority, compared with less than 9 years for those who re-entered the labor market (Table 39). For the Josephine sample alone, where most of the "not looking" were located, age was the most important variable (Table 40). Those not looking for work were nearly six years older than those looking for work. These results agree with one's intuition; the more senior (and usually older) workers would have higher expectations of being called back to work, and thus would "wait out" the closure.

Two popular impressions prevail about those who are not looking for work. That is, they most likely have wives who are working, and they may be drawing substantially on savings. Neither claim is substantiated by the analysis in Table 41. To the contrary, it was found that:

(1) the decision to re-enter the labor market was not related to whether the spouse was employed, and

(2) those not looking for work did not have to take more money out of savings or borrow more money than those who re-entered the labor market.

The picture that emerges of the core worker who chooses to wait for the plant to reopen is that he has more seniority, is older,

Table 39. Discriminant Analysis: Those Re-entering and Not Re-entering the Labor Market[1/]

Variable	Re-entered labor market (n=57)		Not looking for work (n=15)
Number of job applications		2.25	
Years seniority	8.91	***	15.59
Number of job applications outside community		.90	
Age		40.19	
Number of jobs, last five years		1.49	
Longest job	8.91	***	15.47
Shortest job	8.28	***	15.47
Wage rate		$4.72	
Years education		11.26	
Lane Plant (dummy)	.26	**	.00
Coos Plant (dummy)		.40	

1/ Mean values are shown separately only when the variable discriminated significantly between groups (*** = .01, ** = .05). In this case, the three variables representing work length were very highly correlated, and the significance levels are partial F values. Any one of the variables, taken alone, would still be significan at $\alpha < .01$.

Table 40. Discriminant Analysis: Those Re-entering and Not Re-entering Labor Market, Josephine Plant[1/]

Variable	Re-entered (n=15)		Not looking (n=12)
Number of job applications	1.3	**	.2
Years seniority		16.95	
Number of job applications outside community		0.1	
Age	48.3	*	53.7
Number of jobs, last five years[2/]			
Longest job		16.92	
Shortest job		16.92	
Wage rate		$4.81	
Years education		10.70	

1/ Mean values shown separately only if variable discriminated significantly between groups (** = .05, * = .10).

2/ Not included in analysis since all had worked at the Josephine Plant for 5 years or longer.

Table 41. Discriminant Analysis: Those Re-entering and Not Re-entering Labor Market, Considering Supplemental Income Sources[1/]

Variable	Re-entered (n=43)		Not looking (n=10)
Number of job applications	3.21	***	.20
Years seniority		10.22	
Number of job applications outside community	.93	**	.20
Age	38.33	#	50.10
Number of jobs, last five years	1.72	#	1.00
Longest job	8.74	**	16.80
Shortest job		9.60	
Wage rate		$4.74	
Years education		11.43	
Lane Plant (dummy)	.23	*	.00
Coos Plant (dummy)	.48	**	.10
Weeks received unemployment compensation	14.67	***	17.00
Amount borrowed		$90.85	
Amount withdrawn from savings		$212.64	
Percent with working wife		23%	

1/ Means shown separately only if variable discriminated significantly between groups (*** = .01, ** = .05, * = .10, # = .20).

and probably has less pressing financial commitments than younger workers.[1/] At 50 years of age, he is perhaps more likely to own his home debt-free and less likely to still have children living at home. Thus, he is less financially pressed to find a new job, and feels he has a better chance of being recalled than a worker with less seniority. Moreover, his predicted earnings outside wood products are considerably less than his mill job would pay (Table 24), his age is a liability in generating earnings outside wood products (Table 23), and his chances of being able to return to wood products would be substantially reduced if he accepted a job outside the industry (Table 36). If the mill should not reopen, the long-term viability of this type of worker could easily be threatened.

(b) Success in Finding a Job

It is probably not surprising that workers with more seniority would tend to "wait out" a mill closure, especially when the closure is announced as indefinite rather than permanent. The analysis of who succeeded in the labor market and why, on the other hand, yielded results which are somewhat more surprising. Intuitively, one might expect that those with more experience, seniority, and/or work skills would be the first to find a new job. On the basis of our findings in Lane County, one would also expect that those who had changed jobs most frequently would be less likely to have found jobs.

1/ Considerable "belt-tightening", however, does take place among these workers. The general inclination to reduce consumption rather than borrow money or use savings is evidenced in Table 42.

Table 42. Length of Unemployment and Use of Supplement Income Sources Among the Entire Sample

	Number	Percent
Weeks unemployed after closure		
0 - 8	11	15.3%
8 - 16	16	22.2
16 - 24	24	33.3
24 - 32	16	22.2
32 - 48	5	7.0
	72	100.0%
Amount withdrawn from savings		
0 - $ 200	48	66.7%
$200 - $ 400	9	12.5
$400 - $1,000	9	12.5
> $1,000	6	8.3
	72	100.0%
Amount borrowed		
0 - $ 200	59	81.9%
$200 - $ 400	7	9.7
$400 - $1,000	4	5.6
> $1,000	2	2.8
	72	100.0%

The surprising result from Table 43 is that none of these variables differed significantly between the group of 11 unemployed workers and the group of 46 workers who had found jobs. The two groups were statistically alike in terms of seniority (8.9 years), previous wage rate ($4.70), and job stability (1.6 jobs in the last 5 years).

One difference between the groups, contrary to expectations, was that the unemployed had slightly more education (11.8 years) than those who found jobs (11.4 years). One explanation could be that this is a supply phenomenon, i.e., that the more educated are somewhat more selective about the choice of a new job. This explanation does not seem to characterize this particular sample of workers; all of the unemployed had applied for wood products jobs, and none had turned down a job offer from a mill. An alternative explanation for the apparent negative effect of education is that a demand phenomenon is involved--that the more educated workers are somehow overqualified or destined to leave when a more "fitting" job appears. This may, in fact, occur within the industry, but the rather low educational level of those unemployed in this case (11.8 years) does not seem to support that contention.

A more likely explanation for the negative effect of education is that apparently a rather unexpected selection process was involved within the set of employed mill workers. Among the 46 employed workers, all remained in the wood products labor market; that is, all had applied for mill jobs. Within the group of 30 who found mill jobs, 10 were recalled by their previous old firm and 20 were hired by other firms. When these latter two groups are compared (Table 44), those who were recalled had significantly

Table 43. Discriminant Analysis: Those Employed Versus Those Unemployed But Looking for Work[1/]

Variable	Total employed (n=46)		Total unemployed (n=11)
Number of job applications		2.75	
Years seniority		8.91	
Number of job applications outside community		1.10	
Age		37.82	
Number of jobs, last five years		1.61	
Longest job		8.91	
Shortest job		8.28	
Wage rate		$4.70	
Years education	11.37	#	11.81
Lane Plant (dummy)	.20	**	.54
Coos Plant (dummy)		.46	

1/ Means shown separately only if the variable discriminated significantly between groups (** = .05, # = .20).

Table 44. Discriminant Analysis: Workers Recalled by Mill Versus Workers Finding New Mill Job[1/]

Variable	Employed by another mill (n=20)		Recalled by old employer (n=10)
Number of job applications		2.53	
Years seniority		10.78	
Number of job applications outside community		1.00	
Age		39.17	
Number of jobs, last five years	1.6	#	1.3
Longest job		10.57	
Shortest job		10.00	
Wage rate		$4.71	
Years education	11.70	*	10.60
Lane Plant (dummy)		.10	
Coos Plant (dummy)	.35	**	.60

1/ Mean are shown separately only if the variable discriminated significantly between groups (** = .05, * = .10, # = .20).

less education (10.6 years) than those who were hired by other firms (11.7 years).[1/] When the group of unemployed workers is compared with the group of workers who had found jobs with other mills, education was no longer a negative influence (Table 45). This last comparison appears to be an appropriate context for viewing job rationing in the event of reduced timber harvest and employment levels. That is, the educational level of the mill worker will be neither a positive nor a negative factor in finding a new job. In this particular sample, a few workers with less education tended to be those called back by the plant. Were the mill closure to be permanent, this option would no longer exist for those workers.

A recap may be useful at this point; that is, what explains the difference between those workers who found job and those who did not? The answer is that none of the human capital attributes mattered. Education was apparently irrelevant in explaining success in the labor market; stability and seniority contributed nothing to an explanation of the results. Although frequency of job changing was found to be quite important in the Lane County analysis, that hypothesis could not be tested very rigorously with these data since only 17 percent of the sample had three or more employers in the last five years.

Although the question of overall success in the labor market has not been adequately resolved, the issue of who benefits from job rationing within the wood products industry is more easily resolved. That is, those with more seniority (11 years, in this case)

1/ The reason for this is not clear; one possibility is that the less educated were manning routine maintenance jobs which needed to be done even though the plant was not in operation.

Table 45. Discriminant Analysis: Workers Employed by Another Mill Versus Those Unemployed[1/]

Variable	Employed by another mill (n=20)		Not employed (n=11)
Number of job applications		3.25	
Years seniority		9.86	
Number of job applications outside community		1.10	
Age		39.94	
Number of jobs, last five years		1.61	
Longest job		9.93	
Shortest job		9.52	
Wage rate		$4.68	
Years education		11.74	
Lane Plant (dummy)	.15	***	.54
Coos Plant (dummy)		.35	

1/ Means shown separately only if variable was a significant discriminator between groups (*** = .01).

were the ones who got the jobs rather than those with less seniority (6 years).[1/] This holds true whether one considers all those who found mill jobs (Table 46) or only those who found new mill jobs (Table 47).[2/] The latter analysis offers the strongest evidence yet that job rationing will benefit the core labor force at the expense of the peripheral labor force as total wood products jobs decline in number.[3/] The former, by definition, have levels of seniority which will permit them to compete more successfully for the remaining jobs.

E. Analysis of Unemployment Data from the Statewide Survey:

To this point, the analysis of job rationing has utilized data which relate to hiring processes in four Lane County mills and to disposition of workers

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1/ The length of time unemployed can also be expressed in equation form as a function of several variables. For those re-employed by mills (n=30), the equation is:

$$\underset{(R^2 = .29)}{\text{Weeks Unemployed}} = 53.2 - \underset{(-2.24)}{0.47\ \text{Seniority}} - \underset{(-1.24)}{3.70\ \text{Wage}} - \underset{(-1.70)}{1.48\ \text{Education}}$$

For those re-employed outside wood products (n=16), the equation is:

$$\underset{(R^2 = .50)}{\text{Weeks Unemployed}} = -2.90 - \underset{(-2.27)}{0.40\ \text{Age}} + \underset{(2.62)}{2.52\ \text{Education}}$$

t-values are shown in parentheses. The first equation indicates that each additional year of seniority will reduce unemployment time by about 2 1/2 work days. This is quite similar to the coefficient derived from analysis of the Benton Plant closure.

2/ This does not appear to be because of company transfers to other plants, since only three workers were affected in this manner.

3/ It is noted that seniority was a positive rationing criterion in this case, whereas seniority was penalized in the Lane County analysis. It is argued that qualitatively different sets of workers are involved, and that the analysis of the three closures is the most appropriate data set from which to make inferences about future adjustments. That is, the workers in this data set were displaced by factors outside their control (mill closures), whereas, those in Lane County were voluntarily seeking a job change.

Table 46. Discriminant Analysis: Workers Employed Within and Outside the Wood Products Industry[1/]

Variable	Employed in wood products (n=30)		Employed outside[2/] wood products (n=16)
Number of job applications	2.53	**	2.12
Years seniority	10.78	***	6.00
Number of job applications outside community		.91	
Age		37.37	
Number of jobs, last five years		1.63	
Longest job		9.11	
Shortest job		8.39	
Wage rate		$4.70	
Years education		11.37	
Lane Plant (dummy)	.10	***	.37
Coos Plant (dummy)		.48	

1/ Mean values shown separately only if variable discriminated significantly between groups (*** = .01, ** = .05).

2/ All had applied for wood products jobs but were not selected.

Table 47. Discriminant Analysis: Workers Employed by Other Mills and Those Employed Wood Products[1/]

Variable	Employed by another mill (n=20)		Employed outside wood products[2/] (n=16)
Number of job applications	2.70	**	2.12
Years seniority	10.87	***	6.00
Number of job applications outside community		.69	
Age		37.36	
Number of jobs, last five years		1.72	
Longest job		8.92	
Shortest job		8.19	
Wage rate		$4.68	
Years education		11.58	
Lane Plant (dummy)	.15	**	.37
Coos Plant (dummy)		.44	

1/ Mean values shown separately only if variable discriminated significantly between groups (*** = .01, ** = .05).

2/ All had applied for wood products jobs but were not selected.

laid off by four other mills which are scattered throughout Western Oregon. Three general conclusions have emerged:

(a) Conventional human capital attributes (experience, education, and health) appear to have little to do with why some workers become re-employed more quickly than others,

(b) Those workers with more seniority will have the best chances of finding other mill jobs if and when they lose the ones they now have, and

(c) Job-changing reduces the likelihood of getting another wood products job in the future.

Although appropriate sampling techniques have been followed within each of the eight mills, it is possible that other factors not subject to control are also important. For example, it was noted earlier that sustantial variation existed in actual hiring criteria among the four Lane County mills, even though one or more dimensions of job instability were important in each case. In addition, there was only a modest level of agreement on perceived hiring criteria among Lane County workers and employers. In view of this apparent diversity within the labor market, the data on unemployment periods among workers in the Statewide Sample were also subjected to analysis. This promised to provide a cross-check on the generalizations stated above, since it involves the work histories of a large number of workers (189) who have been exposed to the hiring processes and criteria used by a large number of employers (including non-wood products firms).

The analysis of unemployment periods among the Statewide Sample was through a regression analysis of lengths of unemployment periods. A total of 71 periods were available from the work histories;[1/] three-fourths of these periods were by members of the peripheral labor force. Mean length of unemployment was about 12 weeks; only those workers who reported that they were looking for work while unemployed were included in the analysis.[2/]

The factors which were thought to explain the length of unemployment are shown in Table 48, along with the results of the regression analysis. These factors are divided into those which might affect the demand for labor, including those related to job stability, and factors which might affect the supply of labor. The degree of statistical explanation (R^2) was rather low, although factors within each category emerged as significantly related to length of unemployment.

Within the group of "conventional" demand factors, age and wood products experience appeared to have small but significant effects (Equation 3). Moreover, the two effects were not significantly different from each other in magnitude: wood products experience added to re-employability at the same rate that additional age detracted from re-employability.[3/] Other conventional demand factors, however, did not add significantly to explaining weeks unemployed; these included education, disability, and non-wood products experience. The length of unemployment also appeared to be insensitive to

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1/ These periods followed either wood products jobs (46.8 percent) or other jobs (53.2 percent); they were followed by either wood products jobs (55.6 percent) or other jobs (44.4 percent).

2/ An insufficient number of observations (n=8) precluded an analysis of those peripheral workers who were not looking for work and not waiting to be called back by an employer. The average unemployment period among this sub-set (39.4 weeks) was significantly longer than those analyzed here.

3/ This result is quite similar to that obtained for the Benton Plant and for the closures in the 1974-75 recession.

Table 48. Regression Equations: Weeks Unemployed as Affected by the Supply and Demand for Labor[1/2/]

	Equation 1	Equation 2	Equation 3	Mean Values[3/]
	n = 29	n = 44	n = 71	
Demand (conventional factors):				
City size (000)	n.s.			31.04
Unemployment rate (%)[4/]	n.s.	n.s.		8.01
Wood products experience (yrs.)	n.s.	n.s.	- 0.32**	3.38
Non-wood products experience (yrs.)	n.s.	n.s.	n.s.	2.74
Education (yrs.)	n.s.	n.s.	n.s.	11.24
Vocational training (yrs.)	- 2.81*	n.s.	n.s.	0.68
Disability (D)	n.s.	n.s.	n.s.	0.07
Age (yrs.)	n.s.	+ 0.24**	+ 0.35***	30.68
Demand (stability factors):				
Length of last job (yrs.)	+ 5.10*	n.s.	n.s.	0.76
Dubious reason for leaving last job (D)[5/]	n.s.	+ 7.60**	n.s.	0.15
Average job length (yrs.)	n.s.	n.s.	n.s.	1.47
Number of jobs previous held	n.s.	n.s.	n.s.	4.44
Shortest job held[6/]				0.48
Supply:				
Involuntarily unemployed (D)	n.s.	n.s.	- 4.87**	0.69
Callback expected (D)	n.s.	n.s.	n.s.	0.41
Unemployment compensation	n.s.			$34.45
Migration followed unemployment (D)	- 13.19**	n.s.	n.s.	0.11
Wage rate at last job	n.s.			$ 3.87
Number of information sources used	n.s.	1.44**	n.s.	3.35
Constant (weeks)	12.20	2.80	5.98	
R^2	.268	.242	.217	

1/ Coefficients reflect the change in weeks unemployed, given a one-unit change in those variables which affect unemployment length. An additional year's vocational training for example, would reduce unemployment length by 2.81 weeks.

2/ ***=.01, **=.05, *=.10, #=.20. Mean value of the dependent variable (length of unemployment) was 12.28 weeks. (D) indicates dummy variable (e.g., seven percent were disabled). n.s. = not significant.

3/ From Equation 3. Different number of observations were available for different equations.

4/ Unemployment rate in county in which last employer was located, during the month in which lay-off occurred.

5/ Includes "quit", "fired", "disagreement with employer", or "wanted to move".

6/ Excluded from equations due to high correlation with length of last job (r = .66).

the size of the local labor market (represented by city size) and, more surprisingly, to the unemployment rate in that labor market.

Considering the set of demand factors which reflect job stability, the results of Table 48 offer some limited support for earlier conclusions that "instability" involves penalties with respect to re-employability.[1/] There is some indication that those who left jobs for "dubious" reasons[2/] (as perceived by employers) are unemployed about eight weeks longer than other workers, although it is not entirely clear whether this is a demand factor (i.e., the worker is less attractive from the employer's point of view) or a supply factor (the worker is more selective, for whatever reason, in taking a new job). The length and number of past jobs, on the other hand, did not significantly affect re-employability. In fact, some weak but contrary evidence is offered through analysis of a reduced sample size in Equation 1, where longer jobs actually added to the length of unemployment. Again, it is not clear whether this is a demand factor or a supply factor, since workers who have had longer jobs may possibly be more selective in taking a new job which they plan to keep for some time.

Within the set of supply factors, those who were involuntarily laid off (about 70 percent of the sample) had unemployment lengths which were about five weeks shorter than those who voluntarily chose to leave their

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1/ To recall, those with the shorter job lengths were discriminated against in the overall Lane County analysis (Table 36), while separate analyses of each of the four mills revealed that at least one dimension of job instability (but not always the same dimension) was discriminated against in each case (Table 35).

2/ I.e., being fired or having a vague reason for leaving, leaving to "make more money", "have better working conditions", etc.

job. As with those leaving for "dubious" reasons, those who voluntarily leave jobs may be penalized by employers because of perceived "instability" or they may be more selective about accepting new jobs. Finally, migration appeared to have a substantial effect in reducing the length of unemployment, but only for a limited data set (Equation 1).[1/]

F. Summary:

The research on job rationing was initiated with the idea that human capital attributes are important in determining the re-employability of workers affected by a mill closure. The search for the "right" attributes has been rather long, tedious, and only partially successful. In general, it must be concluded that the question "What determines the incomes of employed workers?" (Section IV) is more easily answered than is the question "Why is it some workers find jobs and others do not?". This outcome is perhaps not surprising; employers have substantially more latitude in deciding whom to hire than they do in deciding how much to pay the worker, once hired. Social institutions, including but not limited to labor unions, would appear to have substantially more influence over wage rate structures than they do over hiring policies.[2/] Hence, the greater the latitude for a variety of hiring policies and actions, the lower the expected (and realized) degree of statistical explanation of job rationing.

1/ The other significant result within the supply set appears to lack real meaning. One could argue that reliance on a broader variety of information sources could speed up the job-finding process; the results here seem to suggest that longer lay-off periods cause the worker to investigate more sources.

2/ Policies relating to in-plant promotions (i.e., "bidding procedures) are highly structured by union contracts and/or custom, but the final selection of the worker is still made by management.

Nevertheless, some insights have been gained in pursuing the question of job rationing. These may have substantial implications for public policy. Also, the workers themselves may benefit by an improved understanding of the job rationing process, and hence, an improved capability to take actions which have personal rewards. This is not to say that everyone can be made better off by taking such actions, since the total set of economic opportunities in wood products is projected to decline substantially.

An assessment of the effect that different human attributes have on the re-employability of a wood products worker is shown in Table 49. It is necessarily subjective, since four data sets have been examined. Also, re-employability has been measured in a variety of ways (length of unemployment until re-employed, hired versus not hired by a particular firm, and employed versus unemployed at time of interview) and in a variety of contexts (longitudinal studies of workers displaced by mill closures, hiring decisions by on-going firms, and analysis of individual work histories). In addition, the composition of the various samples has been such that the different data sets allowed different degrees of insight into the effects of specific variables.

The conclusions that can be drawn with respect to job rationing, then, can be summed up as follows (when appropriate, reference is made in parentheses to a particularly enlightening data set):

(1) Formal education appears not to be related to the fact that some workers are re-employed more quickly than others. While this result may surprise educators, it probably will not surprise wood products workers who perceive that other forms of human capital have more relevance in the job market. Vocational training in the

Table 49. Summary: Effect on Re-Employability of Key Human Capital Attributes[1/2/]

Attribute	Benton plant (n=40)	Lane County (n=135)	1974-75 closures (n=72)	State-wide Survey (n=71)	Subjective assessment
Age	-	-	0	-	-
Disability	0	0		0	0
Education	?	0	0	0	0
Experience	0	0		+	+
Job stability		+		0	+
Firm seniority	-	?	+		+
Vocational training	0			+	?

1/ + = positive effect
0 = no effect
- = negative effect
? = questionable

2/ Blank if not considered.

high schools also appears to have little or no effect on re-employabiity.

(2) The separate effects of experience and age are difficult to untangle, but it appears that these effects are small and offsetting. Experience appears to add to the salable skills of a worker at about the same rate as is deducted by either real physical aging or employers' perceptions that older workers are less capable of doing the job. These rates are small; an additional year of either age or experience appears to change unemployment time by only a few days (Statewide Survey).

(3) The lack of job stability, as evidenced by frequent job-changing, detracts from a worker's prospects for re-employment (Lane County). Moreover, these penalties appear to be well-recognized by the workers themselves. For reasons yet unknown, leaving wood products and then attempting to return carries a substantial penalty, particularly for those workers who have previously had stable employment records in wood products. Job changing within wood products is penalized to a smaller degree, probably on the order of a 10 to 12 percent reduction in re-employment prospects for each year's reduction in prior job length. These penalties for instability could be attributed to either social factors (e.g., supervisors and personnel managers like to hire people who are, like themselves, stable) or economic factors (e.g., it is costly to hire and train workers). Although an economic rationale could be expected to prevail in

some other industries where the costs of labor turnover are high, it is argued that the social rationale predominates in this instance.[1/] Training requirements for entry-level wood products jobs are usually minimal, and the administrative costs of processing an extra employee are also low.[2/]

(4) Workers with substantial seniority are in a good position to get the remaining mill jobs as total employment in the industry declines (1974-75 closures). This result, together with the fact that their opportunity earnings are lower outside wood products, supports the choice of a "waiting" strategy by core workers when their mill closes down. For good reason, they prefer to wait until their mill re-opens or until a job can be found in another mill. This strategy obviously has limitations if mill alternatives are limited.

(5) The rewards for seniority and stability cause the peripheral labor force to be at a considerable disadvantage in competing for the remaining wood products jobs. If a substantial decline in this industry becomes a reality, the job rationing process dictates that the fate of the peripheral labor force must be resolved in the larger economy, rather than within wood products.

(6) A related explanation of job rationing, stated here only as a hypothesis since it was not subjected to analysis, is that the

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1/ For further development of this argument, see: Young, John A. and Joe B. Stevens, op. cit.

2/ Personnel managers estimate that the fixed costs of hiring a new worker (largely administrative costs) are probably no more than $50.

labor market has changed over time from labor-deficit to labor-surplus; what may earlier have been a structured economic process may now have become more of a social process. Demonstrably productive talents are now in ample supply, and employers have the latitude to select from a wide range of applicants, even on idiosyncractic grounds if they so desire. If this hypothesis is correct, workers are now faced with the need to obtain different sorts of human capital attributes if they wish to remain viable in the wood products labor market. Economic attributes and skills would have decreased in importance, and the use of social networks in obtaining and assessing job information (and securing jobs) would have increased in importance.

VI. THE INCENTIVE FRAMEWORK FOR DECISIONS ON JOB-CHANGING

Sections IV and V have addressed two questions: "What determines income levels among wood products workers?", and "What determines how wood products jobs are rationed?." In this section, the answers to these questions are used to cast light on the economic incentive framework as it relates to job-changing by workers. Better understanding of this framework may make it possible to see why workers adopt different labor market strategies with respect to job-changing.

One important fact identified throughout this study is that two basically different types of workers exist in this industry. On one hand, the core labor force has been found to be relatively well-off in terms of current earnings and relatively free from unemployment. Although the returns to additional firm seniority are not high, these workers are fairly secure in their current jobs. Their major concern, in many cases, may be that their employer may not remain in business. If the mill should close, on the other hand, their seniority puts them in a good position to find another mill job in the local area, provided that these mills do not also close down. Also, it was found in Section IV that earnings in non-wood products jobs peak at about age 35, which many core workers have exceeded. In light of these considerations, it probably makes considerable sense for core workers to remain in their current job.

The peripheral labor force, on the other hand, faces a more ambiguous incentive structure. In fact, these workers face an outright dilemma. As demonstrated in Section IV, the returns to staying with their current employer are quite low. Job-changing, on the other hand, may increase their incomes, but at the risk that the worker will be less employable in the future <u>because</u> of frequent job-changing (Section V).

The central purpose of this section is to explore this dilemma. The notion that it is a dilemma suggests that a worker needs to consider the possible gains and losses from two labor market strategies, (1) staying with his current employer, and (2) changing jobs on a rather frequent basis. Later in this section, an economic model is presented for evaluating the present value of future income streams for both "staying" and "job-changing" strategies. For the present, however, the consequences of each strategy will be developed rather intuitively and data requirements for measuring these consequences will be identified.

A. Information Needed to Assess the Consequences of "Staying" Versus "Job-Changing":

Two market signals exist for the peripheral worker. One is the expected return from staying with his current employer. The low values to be expected from this strategy have been documented in Section IV; they range from $11 per year in sawmills to $171 per year in plywood mills. Workers can thus expect to become more valuable over time because of their firm-specific experience, but not much more valuable.

The other signal which the worker faces is the net expected return from job-changing. This strategy involves two values which need to be known. The first is the extent to which job-changing jeopardizes the worker's chance for future employment in the wood products industry. This dimension has been dealt with at length in Section V, where the best estimate was that changing jobs on a yearly basis (roughly the modal behavior for peripheral workers) reduces the chances of future re-employment by about 12 percent per year.

The other value which needs to be discovered is the extent to which a worker might expect to augment his immediate income by changing jobs, i.e.,

the gross dollar value of the gain. Consider a worker, for example, who is able to change jobs at a $.50 per hour increase in his wage rate. At 2,080 hours per (fully employed) work year, his expected increase in earnings would be $1,040 per year. By changing jobs, on the other hand, he has brought about a 12 percent reduction in his chances of getting another job. The net expected increase in yearly income, then, must be somewhat less than $1,040 because of the increasing likelihood that he will be unable to find work later on.

Although an economic model for assessing the consequences of these two strategies is not formalized until later in this section, it is rather clear that more information is needed on the gross returns to job changing. The extent of these gains, their distribution, and their relationship to other variables are clearly important pieces of information in assessing the incentive system facing the peripheral worker.

B. Analysis of Voluntary Job Changes By Workers in the Statewide Survey:

The work history data from individual workers in the Statewide Survey were utilized to gain a better understanding of voluntary job changes by workers. As noted in Section III, many job changes in these work histories were made involuntarily. That is, workers were laid off from jobs for a variety of reasons beyond their control. Disregarding these involuntary terminations, data were available on a total of 148 voluntary job changes.[1/]

1/ In addition to being voluntary, these job changes were also characterized by the following:

(i) The change was from one job to another within the civilian labor force without an intervening period of unemployment.

(ii) Work was done for others on an hourly wage rate basis (i.e., self-employment was excluded).

1. Changes in Weekly Earnings:

Considering the entire set of job changes, it is readily apparent that, on the average, job-changing involves sizable monetary gains (Table 50). The overall mean increase in earnings was $32.57 per week, or about $1,700 per year for a fully employed worker. Three factors, however, preclude this value from being a useful approximation to the expected returns to job changing by wood products workers. First, the data were generated by actual job-changers; these people may have been more capable of augmenting their income than the peripheral labor force as a whole. Second, the data reflect not only the ability of the workers to change jobs, but also their desire to do so. Some workers may have changed jobs to have a shorter work week, a shorter commuting distance, or to escape an unpleasant work environment. Overall, about one-third of the job changes involved lower weekly earnings, ostensibly to gain some of these other features. Third, several different types of job changes are involved in Table 50. In other words, the overall mean increase of $32.57 per week is too highly aggregated to serve as an average value which wood products workers might expect to gain by changing jobs.

To pursue this third point, the most frequent type of job-changing was internal to the wood products industry. Within this group, the mean increase in earnings was $21.21 per week or about $1,100 per year for a fully employed worker. Most of the weekly gains were in the 0 to $50 bracket; this suggests that the most common gain in hourly wage rate was perhaps on the order of $25 per week, or about 50 cents per hour.

Table 50. Distribution of Changes in Weekly Earnings[1/]

Change	Wood products to:		Non-wood products to:	
	Wood products	Non-wood products	Wood products	Non-wood products
- $100 or less	1	2	2	2
- $100 to -$50	1	4	1	2
- $ 50 to 0	15	6	2	7
0 to $ 50	23	5	8	8
+ $ 50 to + $100	10	3	14	8
+ $100 to + $200	2	7	8	5
+ $200 or more	0	0	2	0
(Total)	52	27	37	32
Number (and percent of total changes) made by peripheral workers	10 (19%)	18 (67%)	22 (59%)	21 (66%)
Mean value (Overall mean: $32.57)	+$21.21	+$24.10	+$60.32	+$26.10
Percent positive (Overall percent positive: 69.6%)	67.3%	55.6%	86.5%	65.6%

[1/] Data on weekly earnings at the start of the new job were not available; thus, it was necessary to adjust earnings at the end of new job back to the time of job change. The adjustment factors for new weekly earnings were:

Wood products (-$5.20 per year): Regression of Oregon average weekly wood products earnings on time (1953 through 1974).

Non-wood products (-$3.59 per year): Partial regression coefficient of weekly earnings on time (Table 23, Section IV).

Two other related characteristics stand out in Table 50. One is that job changes out of wood products were most likely to involve income sacrifices. This is consistent with the notion that mill work pays well but is often monotonous and tiring. The second characteristic is that job changes into wood products were most likely to involve larger gains in earnings ($60.32, on the average); these workers were more likely to have had lower incomes prior to moving into wood products jobs (Table 51).

2. Differences Between Types of Job-Changers:

The existence of a fairly substantial set of data on different types of job changes makes it possible to ask whether different types of people were involved in making these changes. In particular, it is possible to shed light on the validity of the notion that wood products workers are often "locked" into that industry by age, location, inadequate education, and/or lack of skills required in other industries.[1/]

This notion appears to have some support from the data in Table 51, where it is shown that internal job-changers (within wood products) are somewhat older and less educated than those leaving the industry. When the data on these two groups were subjected to discriminant analysis, however, the outcome was considerably different than that suggested by popular wisdom (Table 52). That is, a number of factors which might conceivably "lock" workers into the industry are found not to differ between the two groups. These factors include age, education, ex-

1/ Lower opportunity earnings outside the industry (Table 24) and penalties for inter-industry mobility (Table 36) deter core workers from leaving wood products, although one-sixth of them did change jobs within the industry in 1972 (Table 9). Peripheral workers, on the other hand, make both types of job changes.

Table 51. Mean Values of Selected Variables At Time of Job Change[1/]

	Wood products to:		Non-wood products to:	
	Wood products	Non-wood products	Wood products	Non-wood products
Age	32.0	26.1	24.8	23.6
Education	11.0	12.6	11.6	12.1
Wood products experience	6.7	3.3	1.1	0.7
Non-wood products experience	1.1	1.0	2.5	2.2
Length of previous job	2.6	2.2	1.2	1.2
Weekly earnings on previous job[2/]	$159	$164	$108	$111
Date of job change	Mar. '68	Oct. '70	May '68	Jan '67

1/ The first five variables are measured in years.

2/ Unadjusted for date of job change.

Table 52. Discriminant Analysis: Workers Leaving Wood Products Jobs[1/]

	To other wood products jobs (n=52)		To non-wood products jobs (n=27)
General			
Age		30.01	
Education		11.54	
Vocational training[2/]		8.72	
Experience (years)			
Wood products		5.52	
Non-wood products		1.07	
Construction		.16	
Durable good mfg.		.11	
Manager or craftsman		.27	
Semi-skilled laborer	.09	**	.38
Job left			
Length		2.50	
City size[3/]		7.37	
Value of experience[4/]	1.02	*	0.74
Skilled job (D)[5/]		.68	
Weekly earnings[6/]		$187.37	
Job taken			
Inter-county migration (D)		.25	
Inter-state migration (D)	.04	***	.30
"Knew people" as source of job information (D)[7/]	.58	***	.15
More valued experience than job left (D)	.13	***	.48
Change in weekly earnings[8/]		+ $22.20	

1/ Mean values shown separately only if variable was significantly different between groups (***=.01, **=.05, *=.10). Variables with (D) are dummy variables (1= yes, 0 = no).

2/ Months in high school.

3/ In thousands.

4/ "How much do you think the experience you gained on this job has helped you since then -- a lot (2), a little (1), or not at all (0)?"

5/ Non-entry level job.

6/ Actual earnings adjusted forward to common year (1974) as described in footnote 1, Table 50.

7/ Friend, relative, or previous employer.

8/ As defined in footnote 1, Table 50.

perience, city size, and job skill level. Among those factors which do differ between groups, two are of primary importance.[1/] For one, those who left the industry indicated that their old (wood products) job was a less valuable work experience than did those who remained in the industry. By the same token, those who left the industry felt that their new job (outside wood products) provided a more valuable work experience than did their old job in wood products.

It is rather clear from Table 52 that those who chose to leave wood products were workers who were able to both increase their job satisfaction and make more money. The internal job-changer, on the other hand, appears to be one who is more nearly satisfied with that type of work, rather than one who has to remain there because of human capital constraints.

A second discriminant analysis involved those taking wood products jobs (Table 53), rather than those leaving them. This analysis indicated that workers coming in from another wood products job were more likely to be older, have remained on the previous job longer, and had higher earnings than those coming from non-wood products jobs. Members of this latter group were more likely to be from larger cities and have increased their earnings by larger amounts than the internal job-changers.

Another set of discriminant analyses focused on differences between those job-changers who moved to another county and those who remained within the same county (Table 54). The characteristics of workers who

1/ One other conclusion which would be erroneous if drawn from Table 52 is that inter-industry mobility is often accompanied by inter-state migration of a permanent nature. What that table does not indicate explicitly is that all of those who left Oregon at some point in their career later returned to the state and were thus available for interviewing. Those who left and did not return were obviously not available for interviewing.

Table 53. Discriminant Analysis: Workers Taking Wood Products Jobs[1/]

	From other wood poducts jobs (n=52)		From non-wood products jobs (n=37)
General			
Age	32.01	*	24.84
Education		11.26	
Vocational training[2/]	7.77	***	7.81
Experience (years)			
Wood products		4.38	
Non-wood products		1.70	
Construction		.23	
Durable good mfg.		.15	
Manager or craftsman	.01	***	.80
Semi-skilled laborer	.09	***	.88
Job left			
Length	2.65	***	1.26
City size[3/]	6.54	***	36.46
Value of experience[4/]		1.01	
Skilled job (D)[5/]		.75	
Weekly earnings[6/]	$189.92	***	$129.39
Job taken			
Inter-county migration (D)		.21	
Inter-state migration (D)		.10	
"Knew people" as source of job information (D)[7/]	.58	***	.11
More valuable experience than job left (D)	.13	*	.30
Change in weekly earnings[8/]	$21.21	***	$60.32

1/ Mean values shown separately only if variable was significantly different between groups (***=.01, **=.05, *=.10). Variables with (D) are dummy variables (1 = yes, 0 = no).

2/ Months in high school.

3/ In thousands.

4/ "How much do you think the experience you gained on this job has helped you since then -- a lot (2), a little (1), or not at all (0)?"

5/ Excludes unskilled laborers.

6/ Actual earnings adjusted forward to common year (1974) as described in footnote 1, Table 50.

7/ Friend, relative, or previous employer.

8/ As defined in footnote 1, Table 50.

Table 54. Discriminant Analysis: Inter-County Migration Concurrent With Job-Change[1/]

	All			Those leaving a wood products job			Those leaving a non-wood products job		
	Migrants (n=43)		Non-migrants (n=105)	Migrants (n=20)		Non-migrants (n=59)	Migrants (n=23)		Non-migrants (n=46)
General									
Age	26.2	*	27.8	30.01			24.26		
Education	11.68			11.54			11.83		
Vocational training[2/]	8.58			8.72			6.61	*	9.35
Experience (years)									
Wood products	3.39			5.52			.95		
Non-wood products	1.69			1.07			3.35	***	1.83
Construction	.77	***	.10	.54	**	.03	.45		
Durable goods mfg.	.21			.11			.32		
Manager or craftsman	.40			.27			.56		
Semi-skilled laborer	.45			.19			.75		
Job left									
Length	2.44	***	1.70	3.30	**	2.23	1.24		
City size[3/]	70.6	***	23.3	7.37			124.5	***	44.3
Value of experience[4/]	.92			.92			.94		
Skilled job (D)[5/]	.68			.68			.68		
Weekly earnings[6/]	$162.11			$187.37			$133.20		
Job taken									
New industry (D)	.53	**	.39	.60	***	.25	.54		
"Knew people" as source of job information (D)[7/]	.28			.43			.12		
More valuable experience than job left (D)	.26			.25			.28		
Change in weekly earnings[8/]	$16.40	**	$39.20	$1.32	**	$29.28	$44.45		

1/ Mean values shown separately only if variable was significantly different between groups (***=.01, **=.05, *=.10). Variables with (D) are dummy variables (1 = yes, 0 = no).

2/ Months in high school.

3/ In thousands.

4/ "How much do you think the experience you gained on this job has helped you since then — a lot (2), a little (1), or not at all (0)?"

5/ Excludes unskilled laborers.

6/ Actual earnings adjusted forward to common year (1974) as described in footnote 1, Table 50.

7/ Friend, relative, or previous employer.

8/ As defined in footnote 1, Table 50.

are geographically as well as occupationally mobile depend greatly on the type of work they are doing at the time of the job-changing decision. Those working in mill jobs are more likely to be geographically mobile if they have had some experience in the construction industry, and if the length of the job which they are leaving has been relatively long for a peripheral worker (3.3 years). Those who are already working in non-wood products jobs are more likely to be geographically mobile if they are already located in a larger city and have more non-wood products experience and less vocational training than the average job-changer.

Although the results of Table 54 are influenced by both supply and demand considerations, it appears that those who follow the general strategy of peripheral workers (yearly "job-changers") are less likely to be geographically mobile than would otherwise be the case, particularly if they live in smaller communities. That is, both short job lengths and small city size appear in Table 54 to impede migration; whether this is due to worker choice or to constraints on worker choice is not clear from the results.

3. Determinants of Changes in Weekly Earnings:

Regression analysis was used to identify what factors affected changes in weekly earnings, and to what extent. An obvious conclusion from Table 55 is that most of the variation among earnings increments could not be explained by seemingly relevant human capital attributes, including age, education, experience, and geographic migration.

One result, however, does emerge as particularly interesting. That is, among job-changers within wood products, it was estimated that an

additional year of wood products experience would add $2.16 to weekly earnings, or $112.32 yearly for a fully employed worker. The likeness of this estimate to the marginal income coefficients derived in Table 30 is noticeable; it was estimated there that an additional year's experience would generally add between $75 and $195 per year to earnings received from the current employer. In other words, workers do become somewhat more valuable as they accumulate wood products experience, but this increment can be captured by job-changing as well as by remaining with the current employer. Taken one step farther, the similarity in estimates confirms that experience gained in this industry is much more nearly "general" than "firm-specific." That is, knowledge gained through experience is readily transferable to other firms in the industry, and one should expect a considerable amount of job-changing.

A related finding from Table 55 is that, for those leaving a wood products job, experience outside the industry appears to be more valuable than wood products experience, regardless of whether it is "marketed" to the current employer or through job-changing. Although the difference between the two is not statistically significant, the coefficient relating experience to increased weekly earnings is greater for non-woods work ($3.18 per week) than for wood products work ($2.16).

One additional piece of information which comes from Table 55 is that the increase in weekly earnings may be more sensitive to characteristics of the job than to those of the job-changer. If the new job was regarded by the job-changer as "more valuable" than the old job, this added $30 to weekly earnings or $1,560 per year for a fully employed worker. Although the explanatory power is still low (R^2 = .11), this coefficient is substantially greater than those for the work experience variables.

Table 55. Regression Analysis of Changes in Weekly Earnings Due to Job Changing[1/]

Variable	From wood products to:			From non-wood products to:	
	Wood products (n=52)	products (n=27)	Either type (n=79)	Wood products (n=37)	Non-wood products (n=32)
Age	n.s.	n.s.	n.s.	n.s.	n.s.
Education	n.s.	n.s.	n.s.	n.s.	n.s.
Vocational training	.63#	n.s.	n.s.	n.s.	1.46#
Wood products experience	2.16***[2/]	n.s.	2.26**	n.s.	n.s.
Non-wood products experience	3.18*[2/]	n.s.	n.s.	-14.19***	n.s.
Inter-county migration	n.s.	-58.35*	-27.23*	n.s.	n.s.
Inter-state migration	n.s.	n.s.	n.s.	n.s.	n.s.
Value of experience: WP job			n.s.		
New job more valuable			30.00*		
To non-wood job			n.s.		
Mean: Change in weekly earnings	$21.21	$24.10	$22.20	$60.32	$26.10
R^2	.19	.11	.11	.24	.06

1/ ***=.01, **=.05, *=.10, #=.20. Blanks indicate that variable was not used in that regression.

2/ Not significantly different at $\alpha = .05$.

4. Characteristics of Job Changes During 1972:

Data on job changes made during 1972 were also available from the Statewide Survey, where 83 workers had either entered, left or changed jobs within the wood products industry during that year. Simple frequency distributions of characteristics related to these job changes are presented in Table 56. Conclusions which can be drawn include the following:

(1) About half of the inter-industry job-changers had previous experience in the new industry prior to the change.

(2) The financial cost of moving from one industry to another (residence, tools, and/or training) was relatively low, although 26 percent of those exiting wood products did change residences for the purpose of taking the new job.

(3) Those entering wood products did so primarily to make more money, although their work satisfaction was not usually increased in the process.

(4) Those leaving wood products did so primarily to gain greater work satisfaction, often at a sacrifice in money income.

(5) Internal job-changers were usually motivated by financial reasons, although most of them also had gains in job satisfaction.

These more detailed data, then, are generally consistent with earlier conclusions, especially those from the discriminant analysis in Table 52. In particular, different types of job-changers appear to be differentiated

Table 56. Characteristics of Job Changes During 1972

	From non-wood products to wood products (n=41)	From wood products to wood products (n=16)	From wood products to non-wood products (n=26)
Had worked at the new type of job before	41.0%	100.0%	53.8%
(Mean length of experience)[1/]	(4.3 yrs.)	--	(5.7 yrs.)
Changed residence for purpose of getting job	9.8%	31.2%	25.9%
(median cost)[1/]	($20)	($150)	($150)
Incurred cost for special training and/or tools	16.1%	31.2%	40.7%
(Median cost)[1/]	($15)	($100)	($200)
Wood products job was better because of:[2/]			
More money[3/]	81.7%	80.0%	58.7%
Stability and advancement[4/]	52.4%	77.3%	30.9%
Personal convenience[5/]	46.6%	60.5%	32.3%
Work satisfaction[6/]	37.3%	69.2%	17.1%
Main reason for job changing:			
More money[3/]	77.0%	63.6%	19.0%
Stability and advancement[4/]	3.8%	0.0%	19.0%
Personal convenience[5/]	7.7%	18.2%	0.0%
Work satisfaction[6/]	11.5%	18.2%	62.0%

1/ Pertains only to those with that characteristic.

2/ Excludes those who perceived no difference between jobs. In the case of internal job-changers, the comparisons are between new and old wood products job (e.g., 80% made more money).

3/ Wages and/or fringe benefits.

4/ Steady job, better training, opportunity for better job in future.

5/ Closer to work, more contact with friends or relatives, better shift, more (or less) overtime.

6/ Less tiring, more pleasant surroundings, more opportunity for indivudal judgment, work for better supervisors.

more by personal motivations and perceptions of work satisfaction than by age, experience, and education. This does not deny the earlier conclusion that job-changers are penalized for "instability". It does, however, indicate that the subjective preferences of peripheral workers (who change jobs often) are more important than objective human capital attributes in determining the direction of their move. In that sense, their human capital is not a constraint on their choice of jobs, although the availability of jobs is outside their control.

C. Present Values of Future Income Streams From "Staying" Versus "Job Changing":

The above data on monetary returns from job-changing can now be used to quantify the dilemma facing peripheral workers. That is, should they become occupationally mobile at the expense of eventually losing their viability in the wood products labor market, or should they remain with their present employer, knowing that the annual gain from this strategy is quite low?

Peripheral workers have, by and large, opted away from becoming "stable" workers. It has been documented earlier that average job lengths are short (1.1 year) and that nearly two-thirds of all job terminations are voluntary on the part of the worker. Widespread selection of a "job-changing" strategy thus characterizes and defines the peripheral worker. The question addressed here is why this is so.

One explanation, offered by many employers, has to do with a lack of personal commitment on the part of the worker. By virtue of his frequent job-changing, the peripheral worker is seen by employers as somewhat unpredictable, at best, and as personally irresponsible, at worst. Hence, employers discriminate against workers with "unstable" work histories, as documented in Section V.

An alternative explanation is simply that peripheral job-changers are acting in accordance with the economic incentive framework which exists within the labor market. This notion can now be tested, using information generated throughout the study.

1. The Present Value Model:

A relatively simple but powerful test of the "rationality" hypothesis above is to compute the present value of future income streams for each of two labor market strategies, i.e., staying with the present employer and job-changing on a yearly basis. The present value is defined as the sum of expected future earnings, where each year's earnings are discounted by an appropriate interest rate. If the present value for "job-changing" is substantially less than that for "staying," then it might be possible to conclude that workers are acting irrationally in an economic sense. On the other hand, if the present value for "job-changing" exceeds that for "staying," we would conclude that workers are acting rationally in an economic sense even though this behavior may be regarded by some as irrational in a cultural or social sense.

An important assumption of the present value model is essentially that workers are "income maximizers." Applying the model to a situation where workers are changing jobs to gain greater work satisfaction, then, would be clearly inappropriate. For this reason, estimates are developed only for internal job-changers, i.e., those who go from one wood products job to another. It was documented earlier that this type of worker generally changes jobs to make more money, rather than to gain greater work satisfaction (Table 56). Moreover, he is likely to feel that his wood products work experience has some value to him. Hence, a present value model seems generally aplicable to this type of job changer.

The present value (PV) model for the "staying" strategy can be defined as follows:

$$PVs = \sum_{n=1}^{j} \left[\frac{Y_0 + n\ (\Delta Ys)}{(1 + r)^n} \right]$$

where:

Y_0 = initial yearly earnings ($8,000)

ΔYs = expected increment from staying another year with the current employer

j = length of planning horizon of the worker

n = year (1, 2, . . . j)

r = interest or discount rate[1/]

In other words, if a worker were to "stay," his initial yearly earnings of $8,000 would be augmented annually (ΔYs) by the rather modest amounts estimated earlier as the marginal income coefficients from additional firm seniority (Table 30). These amounts were $10.62 in sawmills, $76.82

1/ An interest rate of 14.5 percent was computed to represent the (weighted) average rate paid by U.S. consumers in 1972 on installment credit (Federal Reserve Bulletin, October 1972 and September 1973). By source, the creditors were commercial banks (46 percent), finance companies (26 percent), credit unions (13 percent), retailers (13 percent), and miscellaneous (2 percent). Primary types of credit were for auto loans (35 percent), personal loans (30 percent), other consumer goods (30 percent), and repair and modernization loans (5 percent). Interest rates ranged from a high of 16.47 percent (from finance companies for used cars), to a low of 9.96 percent (from commercial banks for new cars). As evidenced later in Table 61, the conclusions do not change if a much lower interest rate (8 percent) is used.

in logging, and $170.32 in plywood mills. Since the "rationality" test is for the industry as a whole, an approximation of $100 per year was used to represent ΔYs.

The model for "job-changing" is somewhat more complex, since it must take into account the effect of the strategy on future employability of the worker. That is,

$$PVc = \sum_{n=1}^{j} \left\{ \frac{(1-d)^{n-1}[Y_0 + n(\Delta Yc)]}{(1 + r)^n} \right\}$$

where:

ΔYc = expected (gross) increase in earnings due to job-changing

d = reduction in probability of being rehired

In this formulation, the expected (gross) gains from job-changing (ΔYc = $860 or approximately 45 cents per hour)[1/] would have to be adjusted for d, or the fact that the worker is picking up a label of being

1/ The magnitude of ΔYc which is used here requires some explanation. Although a mean value of $21.21 was recorded for job-changes within wood products (Table 50), this value was generated largely by core workers who had changed jobs earlie in their careers. The possibility that this value might be less for peripheral workers is verified by the results of Table 57. If one considers all job-changes by peripheral workers, the mean is only $2.50 per week; this figure, however, includes several cases where a worker voluntarily chose to receive a substantially lower wage rate (ostensibly to gain greater work satisfaction in another job) and less overtime. Since the present value analysis is based on the assumption of an income-maximizing labor supplier, only those job-changes with positive increments should be considered in calculating the ΔYc value. The value selected here ($860 per year) is derived by multiplying (i) the mean hourly increment of $.45 for those peripheral job-changers who accepted only positive increments in their wage rate, by (ii) 1915 hours (52 forty-hour work weeks, reduced by a historical unemployment rate of 7.9 percent for peripheral workers). In light of the rather limited information on which this value is based, two alternative ΔYc values ($61 and $1,100 per year) are also calculated; these represent one standard error (in hourly wage rates) above and below the mean value. In spite of the rather limite base on which the $860 value was calculated, it is fortunate that most of these job changes occurred fairly close to the 1972 calendar year, thus facilitating comparisons with the ΔYs value which was derived for 1972.

Table 57. Mean Values of Outcomes for Job-Changes Within Wood Products[1/2/]

	Core workers (n=42)	Peripheral workers (n=10)
Wage rates (per hour)		
All job changes	$.35 ($.11 to $.59)	$ .13
Excluding those with reductions in hourly wage rate	$.87 ($.63 to $1.11)	$ .45 ($.18 to $.72)
Weekly earnings		
All job-changes	$25.68 ($13.72 to $37.64)	$2.50
Excluding those with reductions in weekly earnings	$45.88 ($34.22 to $57.54)	$29.22

1/ Changes in earnings and wage rates were adjusted as described in footnote 1, Table 50.

2/ Values in parentheses are 95 percent confidence limits on the mean values.

"unstable." At least two methods could be used to take this into account.[1/] The method chosen here (partly for simplicity, partly to make the test more powerful) adjusts the numerator to arrive at expected net earnings.[2/]

2. Present Value Comparisons for the Two Strategies:

The effect of a "job-changing" strategy is shown in Figure 4 on an undiscounted basis. Expected earnings from this strategy are higher than from "staying" in early years, but decline over time because of the negative effect of job-changing on re-employability. Between Years 2 and 3, the expected yearly earnings from the two strategies are about equal; after this point, "staying" has the highest expected yearly earnings.

Interpretation of these results clearly depends on how one interprets the decision framework of the individual worker. Inherent in the

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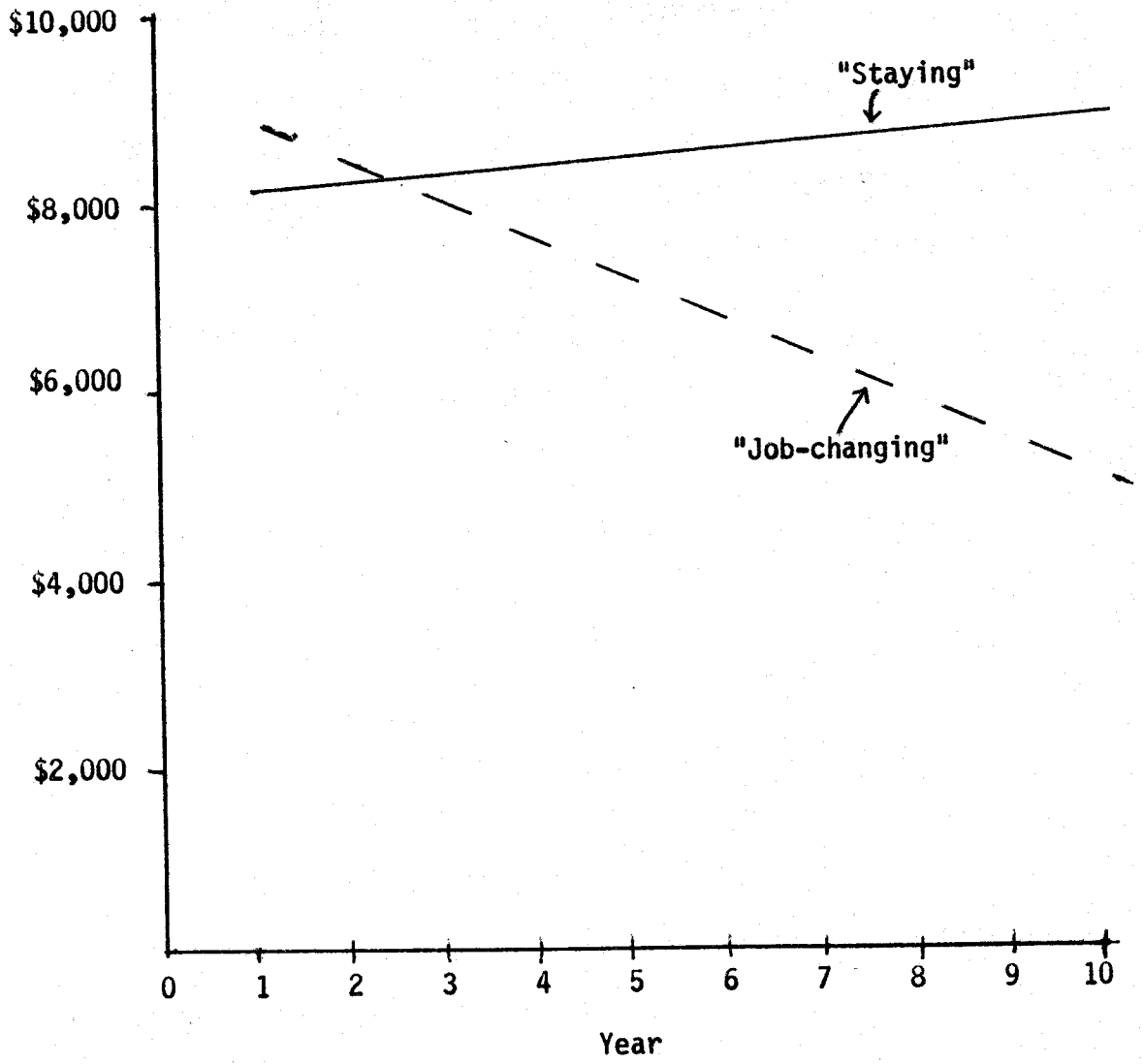
1/ An alternative method is to incorporate d into the denominator as a premium for risk. Here, the equation for "job-changing" would be:

$$PV = \sum_{n=1}^{j} \frac{Y_0 + (n)(\Delta Yc)}{(1+r+d)^n}$$

A precedent for this method exists in the water resource literature, e.g., to reflect the risk that a multiple purpose water development project will become increasingly obsolete as time passes. The results of both methods are shown in Table 60. The method described in this footnote yielded larger present values for job-changing (from 2.6 percent to 9.2 percent, depending on the time horizon). Use of the "numerator" method, as in the text, results in values which make job-changing appear to be a somewhat less attractive strategy and thus increases the power of the rationality test.

2/ It is assumed that d=0 in Year 1 but that d=.12 thereafter. In other words, the worker is able to make the first job change at no penalty but incurs penalties thereafter. Thus, the worker makes the job change at the start of Year 1 at ΔYc = \$860, or [Y + 1 (ΔYc)] = \$8,860. In Year 2, he is capable of making another job change at ΔYc = \$860, but with a 12 percent chance that he will not be able to get that job. Thus, his net expected income for Year 2 is (.88)(\$9,720), or \$8,554. Beyond Year 2, the above situation continues. In Year 3, for example, his expected income would be (.88)(.88)(\$10,580), or \$8,189. In other words, the (gross) dollar earnings build up fairly rapidly, but by Year 3, he has only a 77.4 percent chance of actually realizing those gains.

Figure 4. Expected Incomes, Undiscounted, on Year-by-Year Basis[1/]



1/ $\Delta Ys = \$100$, $\Delta Yc = \$860$, $d = 0$ in Year 1 and .12 thereafter.

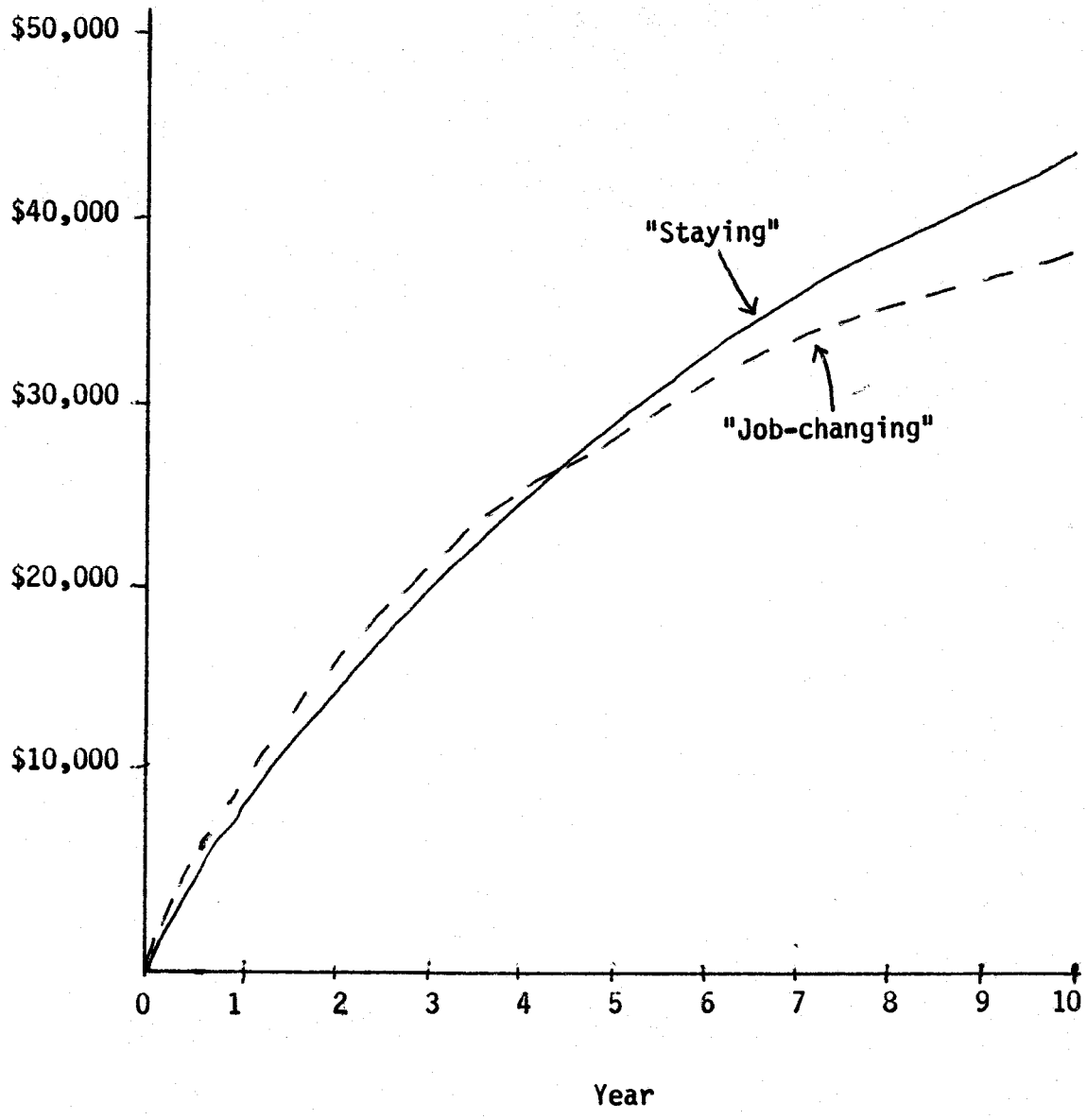
present value model are the notions that (1) the choice of strategy is made at the start of Year 1, (2) the choice of strategy is not reversible, and (3) the strategy is selected which has the highest present value or the largest cumulative (discounted) value over the planning horizon of the worker. In other words, the worker who quits one job and takes another after one year is portrayed as if annual job-changing were his intended mode of activity over some period of time. Once engaged, he cannot turn back. Conversely, the worker who "stays" acts as if he plans to continue this strategy over his planning horizon.

In light of the above, it is clear that expectations of earnings in specific years are important only insofar as they contribute to one present value figure, summed over all years. What is very important, then, is how many years are summed, i.e., the length of planning horizon of the worker. Since this figure is not known, present values are computed here for planning horizons of different lengths, ranging from 3 to 10 years.

From Figure 5, it is apparent that the present value for "job changing" exceeds that for "staying" up to a 5-year planning horizon. The maximum differential between the two occurs if the planning horizon happens to be between two and three years, at which point the yearly earnings from each strategy are equal. If the planning horizon were five years, the (undiscounted) expected earnings from "staying" in that last year would be about $1,120 greater than for "job-changing". The present value over the entire period, however, would be almost exactly equal for the two strategies.

The estimates of yearly increments used in the above for the two strategies ($\Delta Ys = \$100$, $\Delta Yc = \$860$) are the best estimates available. Even so, they may be somewhat in error; perhaps more importantly, they

Figure 5. Present Value of Future Income Streams[1/]



[1/] r = .145, ΔYs = $100, ΔYc = $860, d = 0 in Year 1 and .12 thereafter.

may be subject to change if the structure of earnings (and incentives) were to change in the wood products industry. Tables 58 and 59 trace the implications of possible values for ΔYc and ΔYs for different planning horizons. These implications can be summarized as follows.

(i) At ΔYc = \$860 (current level), there would still be an advantage to job-changing for a 3-year horizon even if the increment for staying were as high as \$300/year (three times the current level). This advantage deteriorates as the planning horizon is extended beyond 3 years. Thus, even if training and work experience in wood products were more "firm-specific" than at present, one would still expect considerable labor turnover as long as job-changers had fairly short planning horizons and could improve their earnings by 45 cents per hour.

(ii) If ΔYs were to remain constant at \$100/year but the increment for job changing were to decline from \$860/year to \$610/year (e.g., if many more workers were to try this strategy), the attractiveness of the job-changing strategy would be mainly for those with shorter planning horizons (3 years or less).

(iii) The likelihood of marked increases in ΔYs or marked decreases in ΔYc is probably small. Increments to "staying" will perhaps increase somewhat over time (for those workers who are not displaced) as mechanization proceeds in wood products. If all mills adopt the same new technology, however, the training afforded by work experience may remain more general than firm-specific.

Table 58. Present Value of Future Income Streams, Assuming Different Time Horizons and Income Increments[1/]

	Time horizon		
	3 years	5 years	10 years
"Staying"[2/]			
$50/yr.	$18,638	$27,600	$42,056
*$100/yr.	18,859	28,065	43,188
$300/yr.	19,738	29,917	47,706
$500/yr.	20,618	31,770	52,223
"Job Changing"[3/]			
$610/yr.	$18,778	$26,283	$35,591
*$860/yr.	19,718	28,000	38,694
$1110/yr.	20,658	29,717	41,798

1/ r = .145, numerator method, d = 0 in Year 1 and .12 thereafter.

2/ ΔYs

3/ ΔYc

* = most likely increment.

Table 59. Effect of "Job-Changing" on Present Value of Future Income Streams[1/]

3 Year Planning Horizon:

Annual increment for "staying" (ΔYs)	Annual increment for "job changing" (ΔYc) $610/yr.	$860/yr.	$1,100/yr.
$50/yr.	$140 (0.7)	$1,080 (5.8)	$2,020 (10.8)
$100/yr.*	-$81 (0.4)	$ 859 (4.6)	$1,799 (9.5)
$300/yr.	-$960 (-4.9)	-$ 20 (-0.1)	$ 920 (4.7)
$500/yr.	-$1,840 (-8.9)	-$ 900 (-4.4)	$ 40 (0.2)

5 Year Planning Horizon:

Annual increment for "staying" (ΔYs)	Annual increment for "job changing" (ΔYc) $610/yr.	$860/yr.*	$1,100/yr.
$ 50/yr.	-$1,317 (-4.8)	$400 (1.5)	$2,117 (7.7)
$100/yr.*	-$1,782 (-6.3)	-$ 65 (-0.2)	$1,652 (5.9)
$300/yr.	-$3,634 (-12.2)	-$1,917 (-6.4)	-$ 200 (-0.7)
$500/yr.	-$5,487 (-17.3)	-$3,770 (-11.9)	-$2,053 (-6.5)

10 Year Planning Horizon:

Annual increment for "staying" (ΔYs)	Annual increment for "job changing" (ΔYc) $610/yr.	$860/yr.*	$1,100/yr.
$ 50/yr.	-$6,465 (-15.4)	-$3,362 (-8.0)	-$ 258 (-0.6)
$100/yr.*	-$7,597 (-17.6)	-$4,494 (-10.4)	-$1,390 (-3.2)
$300/yr.	-$12,115 (-25.4)	-$9,012 (-18.9)	-$5,908 (-12.4)
$500/yr.	-$16,632 (-31.8)	-$13,529 (-25.9)	-$10,425 (-20.0)

1/ Percentage differences between the two options are shown in parentheses. Positive values indicate that present value for "job changing" exceeds that for "staying".

* = most likely increments.

Table 60. Present Value of Future Income Streams from "Job-Changing," Evaluated by Different Methods[1/]

	Time horizon		
	3 years	5 years	10 years
Numerator method[2/]	$19,718	$28,000	$38,694
Denominator method[3/]	$20,226	$29,356	$42,244
Difference in favor of denominator method	+$ 508 (+2.6%)	$ 1,356 (+4.8%)	+$ 3,550 (+9.2%)

1/ Y_0 = $8,000, ΔYc = $860, r = .145.

2/ $$PV = \sum_{n=1}^{j} \left\{ \frac{(1-d)^{n-1}[Y_0 + n(\Delta Yc)]}{(1 + r)^n} \right\}$$, d = 0 in Year 1, .12 thereafter

3/ $$PV = \sum_{n=1}^{j} \left\{ \frac{Y_0 + n(\Delta Yc)}{(1+r+d)^n} \right\}$$, d = 0 in Year 1, .12 thereafter.

Table 61. Present Value of Future Income Streams, Evaluated at Different Interest Rates[1/]

Effect of "job-changing" compared to "staying"	Time horizon		
	3 years	5 years	10 years
r = .08	+$ 918 (+4.4%)	-$ 291 (-0.1%)	-$7,436 (-13.1%)
r = .145	+$ 859 (+4.6%)	-$ 65 (-0.2%)	-$4,494 (-10.4%)

1/ ΔYs = $100, ΔYc = $860, numerator method, d = 0 in Year 1 and .12 thereafter.

D. The Economic Rationality of Job-Changing

The question asked at the outset of this section was essentially, "Does frequent job-changing by the peripheral labor force make economic sense?." The results indicate that the answer is clearly "Yes," as long as the planning horizon of the worker is five years or less.[1/] In other words, the relative magnitudes of the different signals received by workers are such that their income position generally can be improved by job-changing. This is so despite the negative effect of job-changing on future employability within the industry, an aspect of life which the workers clearly recognize. In short, the propensity for job-changing on the part of the peripheral labor force, and indeed the very nature of its being, has roots firmly imbedded in economic rationality.

As to the relevant length of planning horizon, the experience of these workers suggests that most planning horizons, in fact, can afford to be five years or less. Peripheral workers have, realistically, no great attachment to the industry, as witnessed by the substantial outflow to other industries in the post-1974 period (Table 20). These workers are not generally locked into wood products by limited human capital; those who enter and leave appear to do so primarily on the basis of their feelings about job satisfaction as long as other jobs are available, as they usually have been (Table 52). Clearly, then, even if job-changers do find themselves rationed out of a job in wood products, their experience has been that other employment alternatives are usually available in their home community, even though these other jobs may not be all that great either.

1/ Clearly, what has been tested above is the rationality of job-changing within the wood products industry. This adaptation is much less common than job-changing between industries (Table 50), even though the latter involves even more severe penalties for "instability" (Table 36). Desirable as it might have been to analyze this strategy, the fact that many workers trade off income for greater job satisfaction precluded the use of present value models for inter-industry job-changers.

One substantive reservation to this conclusion may be the possibility that frequent job-changing in wood products also jeopardizes one's employment chances outside the industry. There is no evidence that this is the case; support for the argument that it is not the case can be gained from Table 48 in Section V. There, it was found that the length of unemployment period was not dependent on various factors which might reflect job instability. Most of these data were from the work histories of the peripheral labor force, which has relied primarily on non-wood products jobs. It may be that non-wood products employers expect these workers to have changed jobs frequently since wood products jobs are "unstable," but in contrast to wood products employers, they do not penalize the workers for this behavior.

Finally, these conclusions must be tempered with the realization that declines in wood products output (via reduced timber supplies and associated multiplier effects) also may reduce the availability of non-wood products jobs for peripheral workers. If this happens, "job-changers" may have lost one option (wood products employment) at a time when options are important. While this may happen, the important question is how the workers themselves perceive its likelihood and how these perceptions will affect their labor market behavior. On this point, one can only speculate. On one hand, most peripheral workers have been reasonably successful in the labor market to this point in time (with a 7.9 percent historical unemployment rate, on the average) and may feel generally confident in their ability to compete even in a tight labor market. On the other hand, about one-fourth of the peripheral workers have historical unemployment rates in excess of 10 percent (Section III); that they share this optimism is less likely.

VII. SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

The major contributions of this report have been, first, documentation of the nature of the dual labor force which exists in the Oregon wood products industry, and second, analysis of the incentive structure which confronts that dual labor force.

A. Summary:

The summaries of each section have been relatively detailed; therefore, only the highlights of the entire report are presented here.

1. Characteristics of the Dual Labor Force:

The Statewide Survey for 1972 revealed that far more workers were employed in the industry (about 110,000) than would have been required to man the 75,000 jobs which were available in that year. The core labor force (about 60,000 workers) works only within the wood products industry. Unemployment rates historically have been minimal within this group. Median earnings were in excess of $10,000 in 1972, a level which compares quite favorably with others in the rest of the Oregon economy.

The peripheral labor force is quite heterogeneous. One group, totaling about 14,500 workers, consists of college students who work seasonally in the mills or in the woods. A larger group, about 25,500 mobile workers, participate in the labor market (but not necessarily just in the wood products labor market) on a year-around basis. These workers, a more significant group for policy purposes, are predominantly young and

have held a variety of jobs in the past. Their work histories have been divided between wood products and non-wood products jobs, usually of fairly short duration. Their historical unemployment rate averages 7.9 percent, about the statewide rate of recent years, but one-fourth of them have been unemployed more than 10 percent of the time. Median labor earnings for this entire group of mobile workers in 1972 were $7,938, or about mid-way between that of unskilled and semi-skilled male workers in Oregon. One-third of this group, however, had earnings of less than $6,000 even though they were in the labor market on a full-time basis.

Core and peripheral workers adapt to economic circumstances in quite different ways. The primary adaptation by peripheral workers is quite an active one; they change jobs frequently, although they seldom quit one job without having another one lined up. Core workers adapt more passively; they generally keep on working for the same employer. If that mill should close down, they tend to withdraw from the labor market until the mill re-opens or another mill job can be found. Not only are these manners of adaptation different, they each have a rationale in terms of the incentive structure which confronts these workers, as described below.

2. The Incentive Structure in Wood Products:

The existence of a dual labor market led rather early in the research to investigations of the processes by which incomes and access to jobs are determined. Initially these investigations yielded results which were somewhat surprising. As the research progressed, it was increasingly apparent that what was being discovered was an incentive structure which explained, in large degree, the very existence of the peripheral labor force and which

also helped to understand the labor market behavior of core workers. The basic elements of that incentive structure include the following:

(a) Human capital attributes, including age, are important in explaining income variation among wood products workers, both within and outside the industry. Various forms of work experience generally contribute to higher wage levels and/or less frequent unemployment. Past the age of 35, however, additional age is associated with reduced earnings in non-wood products jobs.

(b) In spite of the fact that work experience does augment earnings, it does so in a manner which encourages job-changing. An additional year's experience with the current wood products employer, on the average, is worth only about $100 per year. The expected returns from experience with another wood products employer or from non-wood products experience, on the other hand, is generally higher than $100 per year.

(c) Although conventional human capital attributes are important in explaining why incomes vary among employed workers, they have little to contribute in explaining differential access to job opportunities among those who are searching for jobs. The level of formal education, in particular, appears to be quite unrelated to the fact that some workers find jobs more quickly than others.

(d) There is one exception to (c), however, which is a very important exception. In the case of mill closures, those displaced workers

with the most seniority with their past employer are definitely favored in the selection process for job openings in other mills. This obviously puts the core labor force at an advantage over peripheral workers, both at present and in the future, in terms of competing for the remaining wood products jobs. This advantage, together with the fact that they are penalized for their age in non-wood products jobs, helps to explain the rather passive behavior of core workers when a mill closes down. Should other mill opportunities not be available in their home communities, these core workers would be hard pressed to maintain their economic viability.

(e) Negative human capital attributes are actually generated by the act of job-changing, which is itself encouraged by the lack of rewards for firm-specific knowledge and experience. Workers who change jobs frequently are labeled as "unstable" and are less likely to find future employment. The modal behavior of the peripheral labor force (i.e., yearly job-changing) reduces their chances for future re-employment in the wood products industry by about 10 to 12 percent per year. The workers themselves are quite aware of these penalties.

(f) A dilemma exists for peripheral workers. Should they stay with their current employer (for a very low annual increment) or should they change jobs to make more money and thereby be labeled as "unstable"? The peripheral labor force, by definition, resolves this dilemma by opting for the latter.

(g) The principal finding of the report is that intra-industry job-changing by the peripheral labor force is, by and large, a rational economic adaptation to market signals. The present value of future income streams is shown to be greater for a "job-changing" strategy for job changes within wood products than for a "staying" strategy as long as the planning horizon of the worker with respect to wood products employment is five years or less. The latter seems to be a reasonable assumption, at least in the context of experience of peripheral workers. Those who have wanted to leave the industry have possessed the human capital to do so as long as jobs were available on the outside, which usually has been the case.

B. Conclusions:

The report has attempted to deal two questions:

What are the likely distributional consequences of the impending employment decline in wood products?

How consistent with labor market signals are the different work strategies or adaptations by workers, particularly job-changing?

The responses to these questions can be summarized as follows.

1. Distributional Consequences:

When marked employment declines begin to materialize, the distributional outcome will be to favor the core labor force at the ex-

pense of the peripheral labor force, at least in terms of competition for wood products jobs. This does not deny that substantial personal stress will occur among core workers when mill closures take place. It does, however, offer some consolation (but still no assurance of a job) to older workers who have made a solid commitment to the industry in the past. Peripheral workers, on the other hand, increasingly will become excess to the needs of the wood products industry. Their future will hinge on the health of the national and regional economy; they could suffer from both layoffs in wood products and reduced job prospects outside the industry. Their immediate fate will depend greatly on the capabilities of local economies to absorb excess labor; this capability may vary substantially among communities.

2. Consistency of Worker Adaptations to Labor Market Signals:

The adaptations by workers appear to be quite consistent with labor market signals. Returns to firm-specific experience are relatively low and often less than that which could be gained by working for other employers. As a result, a high proportion of the work force was job-mobile in 1972, in spite of the fact that job mobility reduces re-employ-ability. Employers often characterize this high degree of mobility as reflecting a form of aberrant behavior, as a lack of stick-to-itiveness on the part of workers. The results of this study are very much to the contrary. Instead of reflecting aberrant behavior, job-changing (at least within the industry) appears to be a rational adaptation to labor market signals.

C. Policy Implications:

The initiation of this research was based on the prospect that, over the coming years, the Oregon wood products labor force will be affected severely by a trio of forces, i.e., declining private timber supplies, continuing increases in labor productivity, and a relatively constant level of timber harvest from public lands. Based on these factors, a net decline of about 55,000 wood products jobs has been forecast for Western Oregon and Western Washington by the end of this century, a 45 percent reduction in wood products employment in these areas. The prospect of a decline of this magnitude in a major industry surely deserves the attention of the public, particularly when it can be forecast some years in advance.

Until now, the research on this problem has focused on timber flows over time. As discussed in Section I, various Forest Service and O.S.U. researchers have documented the likelihood of a "short-fall" in private timber supplies between now and the year 2000. This particular research, on the other hand, has attempted to complement these earlier studies by looking at the human side of the problem. One issue of obvious concern has been that of current economic status of the labor force. This study has provided baseline data for such an assessment. Here, it was found that the labor force, as a whole, is currently much healthier economically than many people may have expected. This, in itself, does not mean that there are no problems. For one thing, not all workers are in good shape economically; there were about 8,000 young workers who attempted to work full-time in 1972 but earned less than $6,000 in that year. Secondly, there are dynamic job-rationing processes at work which penalize these young workers for attempting to improve their income position by job-changing.

In spite of these reservations, it should be recognized that a picture of widespread unemployment and/or low income does not characterize the Oregon wood products labor force. It would be fallacious to conclude from this, however, that there will be no problems in the future. Had reasonably high incomes and low unemployment been observed in a period of significant employment decline, one could perhaps argue that the labor force is quite adaptable in accommodating to economic change. The fact remains, however, that these results were not generated in that context; current employment levels in the industry are still close to those of the mid-Fifties. The hypothesis that workers can and will adapt successfully, then, is still untested.

In view of this inconclusiveness of the baseline data with respect to public policy, there would appear to be three options for facing the future. The first is to deny that a problem exists. This option has at least two problems associated with it. For one thing, the earlier studies (particularly the "Beuter Report") have documented the likelihood of a substantial decline in private timber supplies. The old-growth timber will not last indefinitely and reforestation and intensive management generally will have little effect on private timber supply until after the year 2000. Beyond this, however, even if private timber supplies could be held constant, most of the projected employment decline (-36 percent) has been forecast to eventuate through capital substitution and increased labor productivity rather than insufficient timber supply. While capital substitution is perhaps not inevitable, it has to be viewed as extremely likely, especially as mills face a continuing cost-price squeeze resulting in large part from higher stumpage prices.

The second option for the future is to change some major dimension which gives rise to the prospect of future employment decline. Here, the major alternative would be to expand the level of harvest from public lands to make

up for the decline in private timber supply. While this alternative would appear to be made less likely by the National Forest Management Act of 1976, the actual implementation of the Act is yet to be worked out by the management agencies and in the courts. Indeed, a major legal and political battle can be predicted for this alternative over the coming years. From an economic point of view, it must be recognized that while manpower considerations are important, they are only one dimension of a more inclusive concept of forest policy. In resolving the allowable cut issue, for example, the criterion of economic efficiency would suggest that policy makers consider the broadest possible spectrum of social benefits and costs, environmental as well as economic and social, which would be associated with such a decision. The same can be said for public policies with respect to influencing the rate of capital substitution (and labor displacement), which is another alternative for ameliorating the extent of employment decline. Restrictive measures on capital substitution would impose costs on private firms in order to reduce the employment decline; they might also cause society's resources to be used less efficiently than would otherwise be the case. At the same time, however, even an "efficient" capital substitution process (i.e., where gross social benefits exceed gross social costs) means that these <u>will</u> be "losers" -- some workers will lose their jobs as green chains are automated to protect a mill's profit position. Equity considerations suggest that losers be compensated, insofar as they can be identified.

This leads rather directly to the third option for facing the future, that is, social sensitivity and preparation for the decline. In many respects, the p dictability and especially the timing of the employment decline present a unique challenge to Oregonians to anticipate and plan for a major structural change in the state's economy. How adequately it can be met will depend on the generation

of relevant information and the degree to which a common understanding of the situation can be gained by laymen, planners, and political leaders. For any given area of the state, information on at least five dimensions of the situation seems crucial. These would include (1) the likely time path of private timber supply, (2) the likely time path of public timber supply, (3) the likely time path of capital substitution in wood products, (4) the feasibility of future expansion of non-wood products employment, and (5) the rate of in-migration of new people. While this study has addressed labor force issues from a state-wide perspective, it is essential that further efforts, both in research and in planning, take into account the rather wide regional variation that may exist in some of the above factors. As identified by the "Beuter Report," some areas of the state will be impacted much more severely than others, and at different points in time. Areas with high in-migration, few employment alternatives, public land withdrawals, and dwindling private timber inventories obviously need to respond the most promptly.

Even with perfect information and coherent social decision processes, some communities and individuals are likely to suffer substantial losses as a result of the employment decline. Social sensitivity, in these cases, needs to extend to the question of culpability for community or individual decline. This study has established that both core and peripheral workers have their own modes of adaptation to economic change, and that these are firmly rooted in economic rationality, given the situation of the worker. Economic stress in a timber-dependent region may result in loss of economic viability for an older core worker with many years of experience, as well as for a young worker who has coped by changing jobs frequently. Both appear to have responded "correctly" to market signals; to blame either for personal inadequacies would be contrary to the findings of this study.

APPENDIX A

ADDENDUM FOR ECONOMISTS

The general concept of "good" research methodology is that several well-defined steps are followed - in sequence. First, one defines a problem and identifies a body of theory which has something to contribute with respect to that problem. Hypotheses are then derived from that theory, and empirical data are brought to bear on the hypotheses. Conclusions are then drawn, based on tests of hypotheses.

This study (like most) was not that orderly, and purposely so. For one reason, there was not a very substantial body of literature on which to draw. The initial problem definition was purposely vague, and much of the initial work was inductive. An attempt was made to understand not only the wood products industry and its particular institutions, but also the perceptions of people in the industry--union agents, personnel managers, and the workers themselves. The inductive approach was formalized through employment of an anthropologist field aide to gain in-depth understanding of a small group of workers through anthropological field techniques. Consistent with an inductive approach, discriminant analysis was used extensively in determining what variables best differentiated "unlike" groups, e.g., those finding a job versus those still unemployed. It was a basic contention that while the abstracting virtue of theory may be useful in lessening some of the clutter of the real world, it may also eliminate some "noise" which, in fact, should be heard by the analyst. Whether this is wisdom or nonsense can best be judged by viewing the final product of the research.

Insofar as an a priori theoretical framework did exist for this study, it was that human capital attributes are important in explaining economic behavior on both the supply and the demand side of the labor market. Just what those attributes are and how they are important, however, are largely empirical questions. A substantial and important literature now exists on human capital investment theory. For the purposes at hand, there are deficiencies in that literature. The empirical work that does exist is largely at an aggregate level, based on labor force aggregates rather than particular industries or production processes. It seems premature to expect, based on this literature, that formal education will have a positive and significant rate of return among wood products workers on the grounds that this result generally has obtained in aggregate estimates. It is premature because there are, in fact, alternative forms of human capital which may be of value in the wood products industry. At one extreme, one may hypothesize that only strength and stamina matter. Rather than adopt an expectation that education--or stamina--is a "relevant" form of human capital, our approach was pragmatic. That is, a variety of forms of human capital were identified, both introspectively and inductively through field observation and discussion. Definitions of these forms were made, consistent with obtainable data. The "relevance" of the various forms of human capital was then subjected to statistical test in a variety of contexts. Since the field work involved a number of steps, the inductive outcomes of Step A then became expectations for Step B. In other words, a theory was being developed, rather than drawn upon to specify the empirical work. While this may seem backward to deductively-oriented economists, it is my contention that such a process will ultimately be more productive than the conventional process. In this case, it even turned out to be more fun!

APPENDIX B

PROCEDURES FOR ESTIMATING NUMBERS OF WORKERS

1. Estimates of Total Numbers:

The stratified random sampling was done within the Employment Division's computer file of all workers who had received wage or salary payment in Oregon during 1972. To be included within the sample, a worker must have had wage or salary payments within the wood products industry, and the last two digits of his or her Social Security number must have been 05 or 49. This two digit sample amounted to a two percent sample of all eligible workers, since there would be 100 different two-digit final numbers available from which to sample. A total of 2,453 workers were drawn in this sample; expansion by a factor of 50 enables a population estimate of 122,650 workers.[1/] No confidence limits can be defined. This total was distributed among industry sectors according to the SIC codes of the individual workers, as follows:

S.I.C.	241 (logging)	21,427	
S.I.C.	242 (sawmills)	39,677	110,581
S.I.C.	243 (plywood & veneer)	47,477	
S.I.C.	249 & 26 (other wood products, pulp & paper)	12,069	
TOTAL		122,650	

1/ The validity of the expansion factor (50) depends on the extent to which the number of workers is uniformly distributed over the last two digits of their Social Security numbers. This latter distribution is not actually known.

2. Initial Distribution of the Total Among Industry Sector and Mobility Classes:

The employee records available from the Employment Division included S.I.C. of employer and the quarters of 1972 in which earnings were reported. This allowed both (a) efficiency in identifying mobile workers, and (b) preliminary estimates of cell sizes (Table B-1).[1/] For example, a worker with earnings in S.I.C. 241 in all four quarters was considered to be a core logger. A logger with wood products earnings in the first two quarters, but not in the last two, was considered to be in the "exit" class.

3. Revision of Preliminary Estimates:

Once the workers were interviewed, it then became possible to cross-check their actual industry sector and mobility class against the sampling frame and to revise the estimates of cell size (Table B-2). The most common correction was the S.I.C. class; many workers were actually working in one class (e.g., sawmill workers) but were listed on the sampling frame under the reporting system of their employer (e.g., a plywood firm which also had a sawmill). Also, some workers who were shown to be mobile in the sampling frame were found to be non-mobile when they were actually interviewed.

The general trends in the revision were to increase the number of core workers and to decrease the number of sawmill workers. The greatest possibility

1/ As it turned out, classification by mobility class (exit, entry, etc.) was not very useful except in terms of locating workers who had recently changed jobs. Among the "exits", 27 percent re-entered wood products subsequent to 1972. Among the "entry" group, 44 percent had worked in wood products prior to 1972 (but not during 1972). Among the "other" group, 44 percent had been in wood products prior to 1972 and 53 percent worked in wood products after 1972. In other words, occupational mobility was much less directional than was anticipated.

Table B-1. Preliminary Estimates of Cell Sizes, Based Only on the Sampling Frame

Category[2/]	Industry sector[1/] Logging	Sawmills	Plywood	Total
Core	8,313	23,617	28,756	60,686
Peripheral	13,114	16,060	20,721	49,895
(Exit)	(3,278)	(3,693)	(5,920)	(12,891)
(Entry)	(5,972)	(7,558)	(9,198)	(22,728)
(Other)	(3,864)	(4,809)	(5,603)	(14,276)
Total	21,427	39,677	49,477	110,581

1/ Logging: SIC 2411 (logging camps and logging contractors)

Sawmills: SIC 2421 (sawmills and planing mills)
SIC 2426 (hardwood dimensioning and flooring mills)

Plywood: SIC 2432 (veneer and plywood mills)
SIC 2431 (mill work)
SIC 2433 (prefabricated wooden buildings and structural members).

2/ Core: All work periods during 1972 were in that particular industry sector (e.g., logging).

Peripheral: Not all periods during 1972 were in wood products.

Exit: The first time period during 1972 was work in logging (e.g.,), but the last period was not (could have been working outside wood products, not in the labor force, unemployed, or self-employed).

Entry: The last time period during 1972 was work in logging (e.g.), but the first period was not (could have been working outside wood products, not in the labor force, unemployed, or self-employed).

Other: At least one work period during 1972 was in logging (e.g.,), but both the first and last time periods were not (could have been working outside wood products, not in the labor force, unemployed, or self-employed).

Table B-2. Revised Estimates of Cell Sizes, Based on Cross-Checks with Interviews

Mobility class	Industry sector			Total
	Logging	Sawmills	Plywood	
Core	17,699	14,222	35,189	67,080
Peripheral	8,469	14,753	20,279	43,501
(Exit)	(2,076)	(3,792)	(4,087)	(9,955)
(Entry)	(3,360)	(5,311)	(8,823)	(17,494)
(Both)	(3,033)	(5,650)	(7,369)	(16,052)
Total	26,138	28,975	55,468	110,581

for error in these estimates seems to be the classification problem between sawmill and plywood work, i.e., the reporting system of the firm versus self-reporting by the worker. Thus, it was decided to merge these two sectors in estimating population sizes. That is, the sawmill estimates in Table B-2 are probably low, while the plywood estimates are high.

4. Verification and Final Adjustments of the Population Estimates:

Collection of data on the work histories of the sample, including that for 1972, made it possible to assess the accuracy of the population estimates contained in Table B-2. Based on the calculations of time spent per worker in wood products jobs in 1972, the estimate of 80,114 total man-years in wood products was 6.5 percent in excess of the average monthly employment total of 75,200 workers, as recorded by the Employment Division (Table B-3). Thus, it apeared that the actual size of the peripheral labor force was somewhat larger than the estimate of 43,501 workers. The final adjustment, then, was to increase the total number of peripheral workers and decrease the total number of core workers, holding constant the ratio of core loggers to core mill workers and the time spent per worker in wood products jobs in 1972 by each of the three groups, until the population sizes were consistent with the known data on average monthly employment. The final estimates, rounded off, are 16,000 core loggers, 44,000 core mill workers, and 50,000 peripheral workers. Further allocations of these totals, shown in Table 9, reflect percentage distributions derived from actual interview data (e.g., 26 of the 90 peripheral workers were students, or 28.9 percent of 50,000 workers).

Table B-3. Distribution of the 1972 Year, Based on Survey Data and Reconciliation With Average Monthly Employment

	Core			
	Loggers	Mill workers	Peripheral	Total
Initial Estimate:				
Number of workers	17,669	49,411	43,501	110,581
Time in wood products jobs				
- per worker	.838 yr.	.996 yr.	.370 yr.	---
- total man-years	14,806	49,213	16,095	80,114[1/]
Time in non-wood products jobs				
- per worker	0	0	.262 yr.	---
- total man-years	0	0	11,397	11,397
Time unemployed				
- per worker	.081 yr.	.004 yr.	.084 yr.	---
- total man-years	1,431	190	3,654	5,275
Time self-employed				
- per worker	.045 yr.	0	.017 yr.	---
- total man-years	797	0	725	1,523
Unemployment rate[2/]	8.4%	0.4%	11.5%	---
Final Estimate:				
Number of workers	16,000	44,000	50,000	110,000
Time in wood products jobs				
- per worker	.838 yr.	.996 yr.	.370 yr.	---
- total man-years	13,408	43,824	18,500	75,732[1/]

[1/] The actual average monthly employment in 1972 was 75,200 workers (Employment Division).

[2/] Man-years unemployed divided by the sum of man-years employed plus man-years unemployed.