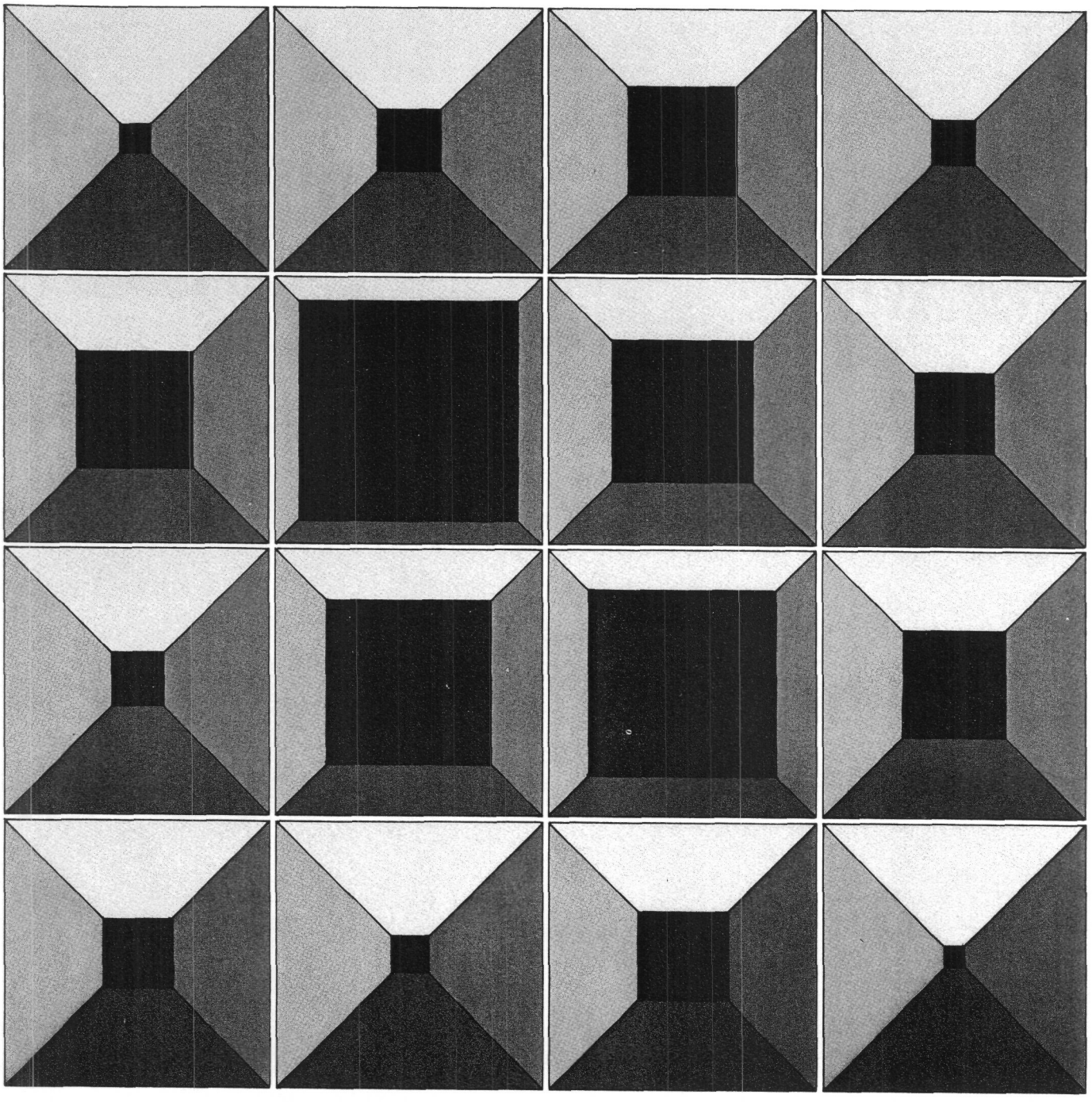
BACKGROUND
PAPER

Forest Service Timber Sales: Their Effect on Wood Product Prices

MAY 1980

Congress of the United States
Congressional Budget Office



FOREST SERVICE TIMBER SALES: THEIR EFFECT ON WOOD PRODUCT PRICES

The Congress of the United States
Congressional Budget Office

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NOTE

Unless otherwise indicated, all years referred to in this report are calendar years, timber volume is measured by local scales, and all dollars are in current dollars.

PREFACE

Because of the rapid escalation of wood product prices, the Congress has considered a number of options that would either increase the supply of timber or decrease the demand for wood products. One option, which is under the direct control of the Congress, is to increase the sale of timber from the National Forest System. This paper, prepared at the request of the Subcommittee on Forests of the House Committee on Agriculture, evaluates the effects of several alternative levels of timber sales during the 1980s. Specifically, it compares the effects of increased sales on prices of wood products, on the sustainability of the increases, and on the economic health of the affected regions. In keeping with the mandate of the Congressional Budget Office (CBO) to provide objective analysis, this report contains no recommendations.

Lawrence H. Oppenheimer prepared the report under the supervision of Raymond C. Scheppach of CBO's Natural Resources and Commerce Division. Patricia H. Johnston edited the manuscript and prepared it for publication; Deborah Vogt typed the many drafts.

Alice M. Rivlin
Director

May 1980

CONTENTS

TABLES

APPENDIX TABLES

FIGURES

63-130 O - 80 - 2

SUMMARY

During the 1970s, prices of wood products escalated rapidly and contributed to the recent high rate of inflation. Since 1970, the Producer Price Index (PPI) for lumber has increased at an average rate of about 14 percent annually, almost double the PPI rate for all commodities during the same period. Although wood product prices have been falling since the beginning of 1980, most observers believe that prices will resume their upward trend as soon as the housing market recovers.

The price escalation of wood products affects the prices of a wide variety of industrial products because of the widespread use of wood in many manufacturing processes. Furthermore, since wood products represent about 14 percent of the costs of new housing, their price increases have contributed to the rapid rise in housing prices during the last several years.

Since between 20 and 25 percent of the national production of timber comes from sales of standing timber in the National Forests, the federal government has some direct control over the supply and price of timber. The recent price increases have brought pressure on the Congress to increase the supply of timber from the National Forests, and thereby moderate the price escalation.

If the Congress decides to increase the supply of timber from National Forests, it could do so by:

- Increasing Forest Service investment in improvement of growing stock which would enable sales of older growth timber to be increased.
- Departing from current legislative guidelines on the maximum allowable sale level.
- Amending current law to allow expanded timber sales.

The Forest Service is preparing a plan of alternative program strategies as required by the Resources Planning Act (RPA). This report provides information through which the Congress can assess the effects of different policies and funding levels. The Congress then implements its desired strategy for resource management in the National Forests by appropriating funds each year. Most funds for timber management are used for road construction, environmental protection, reforestation, and administration.

Two laws govern timber sale strategies. The National Forest Management Act of 1976 specifies that sales or harvests of timber cannot exceed that level "which can be removed annually in perpetuity on a sustained-yield basis." 1/ The act does permit the Forest Service to exceed, or "depart" from, this constraint for up to 10 years if the increase is consistent with multiple use management objectives. The Multiple Use Act of 1960 instructs the Forest Service that no single use of the National Forests should dominate other potential uses but rather that resources should be used "in the combination that will best meet the needs of the American people" considering the "relative values of various resources in particular areas."

In June 1979, the Administration directed the Forest Service to examine a number of forests to determine whether new data and more sophisticated planning would enable timber sales to be increased above the maximum sustainable levels. The President instructed the Secretaries of Interior and Agriculture to take steps consistent with existing law and environmental considerations to increase timber supplies by limited and temporary departures from the current non-declining even-flow policy. This effort has therefore been called the "departure" policy. The examination of the first forests will not be complete until mid-1980.

ALTERNATIVE POLICIES

This study analyzes the major costs and benefits of alternative levels of timber sales from National Forests during the 1980-1990 period. The scope of the study is limited to these alternatives. Many other short- or long-term alternatives are available to the Congress, and some of them might have greater effects in some respects than increased sales. For example, timber sale procedures and accounting methods could be altered. Taxation of private timber holdings could be changed. Investment in public timber stands could be increased. This paper, however, addresses only timber sale levels and assumes that all other policies remain relatively constant.

Three alternative timber sale policies are evaluated and compared to a Base Case which assumes that current policies are continued. Under the Base Case annual production of softwood sawtimber from the National Forests would increase from its 1979 level of 10.1 billion board feet to 10.7

1/ This constraint is defined in terms of a "non-declining even-flow," which measures the quantity of timber that can be offered for sale and harvested in any decade.

billion board feet in 1985 and would remain at that level through 1990. 2/ The alternatives to the Base Case are:

Case I--General Expansion. Sales of softwood sawtimber would increase so that annual production in 1985 through 1990 would be 12.2 billion board feet per year, an increase of 1.5 billion board feet per year (14 percent) over the Base Case level. The expansion would be balanced among the several regions of the nation.

Case II--Expansion in the Pacific Northwest. Sales and production would increase at the same rate as Case I, but would be concentrated in the Pacific Northwest region.

Case III--Maximum Expansion. Timber sales would expand as rapidly as procedures within the Forest Service permit, so that production from 1985 to 1990 would be about 13.7 billion board feet per year of softwood sawtimber. Annual production would be 3.0 billion board feet per year (28 percent) more than the Base Case level. Production would increase in all regions, but the largest increase would be in the Pacific Northwest. Timber production under Case III would exceed that of the options presented in the Forest Service's report under the Resources Planning Act.

EVALUATION OF THE ALTERNATIVE POLICIES

The primary benefit of increased production would be the restraint on future price increases. The major cost would be that the increased level of timber sales might not be sustainable; that is, the increases could temporarily reduce the potential production of timber from the National Forests in the future. Other important considerations are the effects of increased sales on regional economies, the environment, import reductions, federal budgetary costs, and manpower requirements.

This analysis assumes that all current Forest Service policies are continued, with the exception of timber sale levels. Specifically, it is assumed that sale procedures, investment in growing stock, internal accounting procedures, and priorities for nontimber resources are continued.

2/ This report is primarily concerned with softwood sawtimber, which is the type of wood most widely used to produce lumber and plywood. National Forest sales of all types of timber in 1979 were about 12.4 billion board feet. Most of this was softwood sawtimber. About 10.1 billion board feet of softwood sawtimber was harvested in 1979. Most of the harvested material had been sold in previous years.

If these policies were changed, many of the estimates of this paper would be altered. The estimates are particularly sensitive to changes in investment. A large increase in investment could increase the maximum sustainable yield of many forests by about 10 percent by 1990, and perhaps by 30 to 50 percent by the time the next generation of trees is ready for harvest.

Price Effects

Wood product prices will escalate rapidly during the next 10 years, regardless of public policy, because of increasing demand for wood products. An increase in timber sales from National Forests would tend to retard price increases, but not to a substantial extent. This study estimates that the Producer Price Index for softwood lumber will increase an average of about 13.3 percent annually through 1990 if current policies for timber sales are continued. This rate is equivalent to a 7 percent increase in real terms and is approximately the same as the rates that occurred through the 1970s. A moderate expansion in National Forest timber sales--Cases I or II--would retard price escalation to an average of about 12.7 percent per year. A larger expansion--Case III--could retard price escalation to an average of about 12.5 percent per year.

Prices are relatively unresponsive to Forest Service timber sale policy for several reasons:

- Wood product prices are influenced as much by processing and transportation costs as by costs of standing timber.
- The National Forests provide 20 to 25 percent of domestic supply. A 20 percent increase in National Forest production is equivalent to a 4.5 percent increase in total domestic production.
- Industries in the Pacific Northwest are reluctant to expand their capacity to process timber because harvests from private land are expected to decline. If public timber sales were increased, industry would likely decrease its production from private land. As a result, the total domestic increase in production would probably be 40 to 60 percent of the increase in National Forest production.
- Similarly, another 20 to 30 percent of the increase in National Forest production would likely be offset by a decrease in imports.

As a result of these factors, total domestic production would increase by about 0.4 billion board feet per year, or less than 1 percent. An increase in production of this magnitude will affect local prices of standing timber,

but is unlikely to change the fundamental conditions that will drive wood product prices upward. A continuation of the recent price escalation, therefore, seems inevitable as soon as the housing market recovers.

About 14 percent of the cost of new housing is attributable to the cost of wood products, including transportation to the building site. If the average new house costs $65,000 in 1980, the cost of the wood products in it is roughly $9,100. In 10 years, the cost of wood products is projected to be about $31,800 if current policies and construction practices are continued. (The typical new house in 1990 is likely to cost $210,000 to $220,000 if housing costs escalate at rates similar to those of the 1970s.) If sales are expanded by 1.5 billion board feet per year, as in Cases I or II, the cost of wood products in 1990 would be in the range of about $29,900 to $30,400. The homebuyers would save about $1,400 to $1,900. If sales are expanded by 3.0 billion board feet per year, the homebuyers in 1990 could save $2,300 to $2,400--equivalent to about 1 percent of the total value of a new house.

The savings to buyers of new homes would be small in the early 1980s, but would exceed $2 billion per year at the end of the decade. Although consumers of wood products would benefit from increased timber sales, this benefit would come at the expense of timber producers. Increased National Forest sales would mean that the value of timberland and standing timber would not increase as fast as in the Base Case so that the value of their sales would be reduced by about as much each year as consumers would gain.

Resource Sustainability

The primary trade-off for the benefit of price retardation is the risk that an increase in harvests could not be sustained. In the National Forest Management Act of 1976, the Congress required the Forest Service to adopt the relatively conservative policy of sustainability as a general guideline for timber sales, although it realized that a somewhat more rapid harvest policy could have greater economic benefits. Several of the reasons for selection of sustainability over a policy more oriented toward economic objectives were:

- It preserves options for the future.
- It makes some provision for error or for natural disaster.
- It ensures that the present stock of old growth and its non-economic and intangible benefits are depleted at a relatively slow rate.

Forest Service data indicate that present sale and harvest levels are sustainable. In fact, a slight margin exists for expansion of sales in the Rocky Mountain regions where economic factors and available markets have limited timber sales. Virtually no capability for expansion exists in the Pacific Northwest region.

The Base Case of this study assumes that production would increase by 0.6 billion board feet of softwood sawtimber by 1985. This increase is expected to absorb most of the unutilized capacity that is now available. Consequently, increases in timber sales and harvests of 1.5 billion board feet--as in Cases I or II--would exceed sustainable limits and would require use of the departure provision, or an amendment of current laws. It is not clear at this point whether adequate capacity for departure exists to attain these production levels without causing future production to dip temporarily below the long-term sustainable yield levels.

Regional Effects

In the short term, an increase in timber sales would stimulate local economies in the Pacific Northwest and Rocky Mountains. The effect is likely to be small because private industry is expected to substitute new sales of public timber for some of its own timber. The basic reason for this substitution is that private timber reserves are limited and industry would prefer to defer harvests of its own timber until second growth forests are more mature. As a result of this substitution, total production would not be increased substantially. Furthermore, because of gains in productivity, employment per unit harvested is likely to decline.

Employment by the wood products industry in the Rocky Mountains would increase over 1979 levels by less than 1 percent in 1985 as a result of Cases I and II. Although Case II would increase National Forest production in the Pacific Northwest by 38 percent, employment in that region is estimated to be about 4 percent lower in 1985 than it was in 1979. Employment in the Base Case would be about 9 percent below 1979 levels.

In the longer term, a temporary increase in timber sales could adversely affect the economy of the Pacific Northwest. That region faces a major reduction in harvests from private lands during the mid to late 1980s. The timing and degree of this reduction is of paramount importance to the economic and social health of the region because the wood products industry is by far the largest employer in the region. Although most analysts agree that the reduction in private harvests will occur, the extent and the effects are unpredictable. Until recently, the general assumption has been that, whenever the regional economy is greatly affected by a decline in private

harvests, the Forest Service could compensate by expanding timber sales. Expansion through departure, however, is a 10-year measure, and this analysis indicates that National Forest inventories are unlikely to support repeated departures unless the departures are relatively small. An increase in National Forest sales in the early 1980s would therefore reduce the National Forests' ability to compensate for a decline in private harvests in the longer term. Accordingly, the key issue is whether it might be preferable to hold whatever additional capacity is available for use at a later time when it could be more effective.

Other Considerations

Environmental Effects. Expansions of timber sales and harvests are expected to have greater adverse environmental effects per incremental unit harvested because they would tend to be in areas that are more ecologically fragile and have high recreational, watershed, and other non-timber values. Water quality, in particular, would be adversely affected by increased harvests.

Budgetary Effects. Any expansion of timber sales and harvests would require proportionately large federal budget increases in comparison to a continuation of current policies, because the marginal costs of sale preparation seem to be several times higher than average costs. The amount of increase, however, depends on the region. Generally, costs per incremental board foot to prepare sales, construct roads, and mitigate adverse environmental effects are high in the Rocky Mountains, Alaska, and the Sierras. They are relatively lower in the Pacific Northwest and the South. The Forest Service estimates that budget costs would increase by $120 million to $900 million per year for annual expansions of 1.5 to 3.0 billion board feet in timber sales. A large, but unpredictable, proportion of these costs would be offset by sale receipts. The Forest Service estimates that the costs of Cases I or III would exceed sale receipts. It is possible that marginal receipts from Case II would exceed marginal costs.

CONCLUSION

This year, both the Congress and the Administration will consider alternative policies to increase National Forest timber sales. An expansion would tend to retard increases in wood product prices and have some short-term regional economic benefits, but it would also have clear adverse effects. An expansion contains a risk that future harvests would temporarily fall below present or sustainable levels, and an expansion now could adversely affect the long-term economic health of the Pacific Northwest.

63-130 O - 80 - 3

An expansion would have a net adverse environmental effect, and Cases I and III would entail an increase in net cost to the federal budget.

On balance, this analysis concludes that current Forest Service timber sale policies are reasonable. An expansion has both beneficial and adverse consequences that affect different interest groups and sectors of the public. As a result, it is difficult to compare the effects. Several alternative policies are available to the Congress that might attain similar beneficial effects. Since the scope of this study was restricted, it does not attempt to assess whether other approaches could have the desired beneficial effects at less cost.

CHAPTER I. INTRODUCTION

From 1955 through 1970, wholesale prices for lumber and other wood products rose at an average annual rate of only 0.3 percent. This was considerably below wholesale price increases for all commodities, which rose at an average annual rate of about 1 percent during the same period. Since 1970, however, wood product prices have risen sharply--at an average rate of about 14 percent per year, almost double that experienced for the aggregate of all commodities.

This increase in wood product prices has resulted from a combination of factors that have caused demand to increase faster than supply. On the demand side, the housing construction industry, which consumes somewhat more than half of the softwood harvest, has expanded its use of wood products by an average of about 6 percent annually. When demand by the housing industry is combined with that by other industries, transportation, and the international market, total demand for U.S. wood products has increased by 3 to 4 percent per year since 1970. In contrast, the supply of domestic timber from both public and private sources has remained relatively constant. Domestic supply, therefore, has been insufficient to meet demand. As a result, buyers have bid up prices in their efforts to obtain supplies, and imports from Canada have increased sharply.

The current imbalance between domestic supply and demand had been anticipated for 20 years or more. By the mid-1960s, private lands could no longer increase production to accommodate growth in demand. Prices for wood products remained stable because sales of timber from the National Forests were doubled, and because mill productivity increased. 1/ After 1970, however, National Forest timber sales were limited because of market constraints, limits on sustainable yields, and diversion of land to other uses.

Typically, prices have climbed very rapidly during the peaks of new housing construction and, have declined somewhat between these surges. Although most wood product prices are now declining, it is feared that prices will climb by perhaps 20 to 35 percent per year as soon as the housing market recovers.

These price increases are disruptive, but are not necessarily detrimental in an economic sense. Increases in prices are a symptom of

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1/ U.S. Department of Agriculture (USDA), Forest Service, Forest Statistics of the United States, 1977 (draft, 1978).

scarcities--when supplies cannot meet demand, the market allocates supplies according to consumers' ability and willingness to pay. Price increases, however, may transfer income inequitably among social groups and adversely affect the U.S. international economic position.

As a rule, economic analyses of shortages in supply recognize that prices must increase in order to encourage investments to ensure that future supplies will be sufficient. With respect to timber, however, growth periods are so long that the effect of prices on supply is minimal for many years. Accordingly, the Congress has shown interest in policies that could mitigate the effects of the wood products shortage. Several alternatives policies could affect supply or demand for wood products, in either the short or the long run:

- o Short-run supply alternatives
  - —increase sales of public timber
  - —restrict exports of timber
  - —increase utilization requirements
  - —provide tax incentives to encourage private harvests
  - —subsidize substitution of hardwood for softwood
  - —alter sale procedures and accounting conventions
- o Short-run demand alternatives
  - —tax wood products
  - —provide federal encouragement for changes in local construction requirements
- o Long-run supply alternatives
  - —increase investment in public growing stock
  - —provide tax incentives for private owners to invest in their forests
- o Long-run demand alternative
  - --provide research on better utilization of timber or on substitutes for wood products

To mitigate the short-run price effects, one of the most pertinent options for Congressional consideration is to increase sales of public timber. Because the National Forests are the largest source of public timber and because the Congress has direct control over National Forest timber sales, this option is the focus of this paper. This is not to say that other options

are either infeasible or unimportant; in fact, it is probable that the Congress will ultimately use a number of the options.

This paper evaluates the degree to which an increase in the levels of timber sales from the National Forests would moderate the rate of increase in timber prices. Compared to a continuation of current sale policies, the alternatives would expand sales by between 14 and 28 percent and would either allocate sales evenly among several regions or concentrate the increase on the Pacific Northwest. Sales would be expanded through 1985 and then would be held constant through 1990. The benefit, in terms of price moderation, is then evaluated relative to the potential costs, which include the risk of depletion of timber inventory below levels necessary to sustain production, regional economic effects, environmental impacts, and federal budget costs.

The focus of this paper on this one option should not be interpreted as assuming either that timber production is the most important resource of the National Forests or that other means of increasing the supply of or decreasing demand for timber are less attractive options. Furthermore, the means of increasing timber sales--either by departure from the long-term sustainable yields or by modifying current laws--is not important to the analysis. The analysis assumes that the Congress will select a particular policy and appropriate enough funds to prepare and implement timber sales in order to achieve the desired production target.

Chapter II describes the wood products industry and recent price trends. The issues and trade-offs that affect management of the National Forests are explained in Chapter III. In Chapter IV, alternative policies that increase National Forest timber sales are compared with each other and with a continuation of current policies with respect to the trade-offs described in Chapter III. A technical appendix includes a description of the methodology used to compute price effects and patterns of investment.

CHAPTER II. TIMBER SUPPLY, THE WOOD PRODUCTS INDUSTRY, AND RECENT PRICE BEHAVIOR

This chapter provides background information on timber supply and the wood products industry. It also examines the demand for wood products and their price trends in recent years.

TIMBER INVENTORY

Because statistics and descriptive terms for timber and wood products are complicated, a brief overview of some salient information and data is necessary. In the simplest terms, the inventory of standing timber is categorized by:

- o Type (hardwood or softwood). This study is focused on softwood because it is the superior material for most construction purposes.

- o Size (roundwood and sawtimber). Roundwood includes all sawtimber and other trees capable of providing logs, bolts, or other round sections. Sawtimber is relatively mature timber that is capable of producing logs of a specified size. This study addresses sawtimber only.

- o Ownership (National Forests, other public lands, private industry, private nonindustrial). This study considers only the National Forests, which are larger than the other public sources of softwood sawtimber. The wood products industry owns extensive timberland and the remainder is owned by a large number of farmers and a wide variety of other nonindustrial owners.

- o Location. The three major regions considered in this study are the Pacific Northwest, the Rocky Mountains, and the South. Other regions, including Alaska, the Southwest, and the Northeast (including the Great Lakes region), are of less importance to this study.

- o Cost (commercial and noncommercial). The wood products industry and the Forest Service categorize their land by various levels of commercial attractiveness based on slope, soil, precipitation, harvest method, and transport to mills and markets, all of which affect the total cost of harvested timber. Some of what is called commercial timberland does not contain economically marketable timber at this time.

- o Wood Products (lumber, plywood, pulp, and others). Sawtimber is harvested and processed into a wide variety of products, of which lumber and plywood are the most important in terms of value and volume. Some sawtimber is converted into pulpwood or chips and used to make various types of paper or specialty products. The term "wood products," as used in this study, does not include pulp and paper products.

The nation's inventory of commercial growing stock equals about 3,900 billion board feet (local scale), of which 1,665 billion board feet is softwood sawtimber. About 37 percent of the softwood sawtimber is located in the Pacific Northwest. 1/ Most of the remainder is divided fairly evenly between the Rocky Mountain region and the South. The National Forests contain 51 percent of the softwood sawtimber inventory, although a portion of that inventory cannot be harvested at current prices. Most of the National Forest softwood sawtimber inventory is in the Pacific Northwest and Rocky Mountains. Privately owned timber is concentrated in the South. 2/ Inventory and annual production are summarized by ownership and region in Table 1.

The most economically attractive and productive softwood inventory is the old-growth timber in the Pacific Northwest. The Rocky Mountains also have large quantities of old-growth sawtimber, but production there is usually more expensive than that in the Pacific Northwest because of short harvest seasons, difficult terrain, low volume of timber per acre, and distant markets. Although the South has only a small supply of old-growth timber, net annual growth of timber in the South is more rapid than in other regions.

SUPPLY OF SAWTIMBER

In 1976 domestic softwood sawtimber production was approximately 43.5 billion board feet. Of that, about 23 percent was supplied from

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1/ The term Pacific Northwest is used in this study to mean only the states of Washington and Oregon.

2/ USDA, Forest Service, Assessment of the Forest and Range Land Situation in the United States (review draft, 1979), pp. 308-11.

TABLE 1. INVENTORY AND PRODUCTION OF SOFTWOOD SAWTIMBER
(In billions of board feet, international ¼-inch log rule) a/

	Pacific Northwest b/	Rocky Mountains	South	Other b/	Total
National Forests					
Inventory	387.0	261.0	34.0	326.0	1,008.0
Production	5.1	2.7	1.4	2.8	12.0
Other Public Lands					
Inventory	140.0	43.0	14.0	39.0	236.0
Production	3.7	0.5	0.5	0.5	5.1
Industrial Owners					
Inventory	135.0	23.0	87.0	65.0	310.0
Production	8.6	1.0	6.5	3.2	19.3
Non-Industrial Owners					
Inventory	64.0	54.0	204.0	108.0	430.0
Production	1.8	0.6	10.5	2.4	15.3
Total Inventory	725.0	380.0	340.0	537.0	1,983.0
Total Production	19.1	4.8	18.9	8.7	51.6

SOURCES: USDA, Forest Service, Forest Statistics of the United States, 1977 (review draft, 1978), pp. 40, 85, and 86, and An Assessment of the Forest and Range Land Situation in the United States (review draft, 1979).

a/ Inventory is for 1977 and production (removals) is for 1976. Numbers may not add to totals because of rounding.

b/ Pacific Northwest is defined as the states of Washington and Oregon only. Alaska and the coastal region of California are in the "other" category.

63-130 O - 80 - 4

National Forests and 37 percent from the forest industry's land. 3/ 4/ The Pacific Northwest and the South provided roughly equal shares of softwood sawtimber production. While the National Forests supplied about 30 percent of the Pacific Northwest production, they were not an important source of timber in the South. 5/

The Forest Service estimates that domestic production of softwood sawtimber will increase by about 4 billion board feet by 1990. 6/ The contribution from the National Forests depends on the policy and budget alternatives selected by the Congress, and could vary between roughly 20

3/ Caution must be used when interpreting measurements of timber because of different units and measurement scales. Standing timber is usually measured in either cubic feet or board feet. This analysis uses only board feet for simplicity. Finished products are measured in a wide variety of units which are designed to meet the conditions of the various products. Lumber, which is the largest single use of sawtimber, is measured in board feet, as is standing timber. However, measurements of "lumber tally" are not necessarily the same as the units of timber which were consumed to produce the lumber. Furthermore, more than 50 different scales are used to measure timber or logs. These various scales, sometimes called local scales, often differ by 20 to 30 percent from each other, or from the "lumber tally" which measures their finished products of lumber. For example, in the Rocky Mountains, the local scale of timber and log measurement can be 35 percent lower than ultimate "lumber tally." Very frequently, statistics using different scales are combined or compared. Except where otherwise noted, this analysis uses local scales to measure timber and logs and is therefore consistent with most statistics used in Forest Service budget reports including the Resources Planning Act Alternative Program Directions (draft). Some data in this report, however, are based on the international ¼-inch rule because many national statistics are so compiled. The international ¼-inch rule is about 15 to 20 percent greater than the local scales. Frank Freese, USDA, Forest Service, A Collection of Log Rules (1974).

4/ USDA, Forest Service, Forest Statistics of the United States, 1977 (draft, 1978), p. 86.

5/ Forest Statistics, pp. 85-86.

6/ USDA, Forest Service, Assessment of the Forest and Range Land Situation in the United States (draft, February 1980), p. 337.

percent and 26 percent of total supply. The Forest Service expects that the regional contribution of public and private suppliers in the Pacific Northwest (and the Northeast) will decline, but that production from other regions will remain the same or increase. The largest increase in production will be from the South. 7/

The National Forests provide timber through sales or auctions that the Forest Service holds periodically in most of the individual forests. A timber sale usually includes the right to harvest specified timber in a certain area under specific conditions. The process of preparing and holding a sale of timber is lengthy and complicated because of the necessity of evaluating the effect of alternative harvest levels and procedures on the environment, the local economy, other resources from the area, and future production of timber.

Considerable inventory data exist regarding the amount of standing timber and the potential productivity of forest land, but little information exists that indicates how much timber on specific types of land has already been harvested. Nor has the inventory of commercial timber been categorized by the expected costs of harvests. In general, most National Forest land is on less productive and more remote sites than private land. Furthermore, the National Forests are managed under different objectives than private land. Therefore, the National Forests, with half the stock of standing timber, provide less than a quarter of the annual domestic production. 8/ As the more accessible stocks of private timber have been harvested, the level of private inventory has declined, and in some areas private harvests have also declined.

Interregional Trends

The share of timber produced by the South, and especially private owners in the South, has been expanding, and is expected to continue to expand. Production from the Rocky Mountain regions has been declining slightly, because timber extraction in that region has become relatively

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7/ USDA, Forest Service, Assessment (1979), p. 336.

8/ All commercial forest land is categorized by "productive capacity," meaning the growth potential of the land. These data do not indicate, however, whether the land has been cut-over or is inaccessible. The data do show, however, that National Forest land is less productive than industrial land but more productive than nonindustrial private land. Report of the President's Advisory Panel on Timber and the Environment (April 1973), p. 36.

expensive and the area is far from markets. 9/ While total production from public and private lands in the Pacific Northwest has been increasing in absolute terms, this region's share of the national total has been decreasing. In its most recent assessment, the Forest Service predicts that total production in the Pacific Northwest is likely to decline between 5 and 15 percent by 1990 because of inventory depletion on private lands. 10/ Other reports predict declines ranging from 2 to 11 percent for the Pacific Northwest by 1990 and a further 25 percent decline by 2000. 11/

There are several reasons for these trends. First, production from National Forests in the Pacific Northwest is limited by non-declining even-flow to about 4.8 billion board feet per year of sawtimber at current investment levels. 12/ Timber sales in the Pacific Northwest are at that maximum level and therefore cannot be increased in the next 10 years without either departure from non-declining even-flow or a major increase in investment levels. National Forest timber sales in most other regions are not at their maximum levels.

Second, much of the timber on land belonging to the forest industry in the Pacific Northwest has already been harvested. Production from industrial land in the Pacific Northwest will almost certainly decline, while that in the South will probably increase. Third, softwood timber grows rapidly in the South, so industry has been inclined to invest more in the South than in other regions.

9/ Other explanations for the decline are that the privately owned inventory of timber in the Rocky Mountains is very small and that harvest methods and program objectives for timber on public lands have changed.

10/ This projection assumes that National Forest production increases somewhat and partially counterbalances the decline from private lands, but the report does not specify Forest Service harvest levels. Assessment (1979), p. 336.

11/ John H. Beuter, K. Norman Johnson, H. Lynn Scheurman, Timber for Oregon's Tomorrow (Forest Research Laboratory, Oregon State University, January 1976); Oregon Department of Forestry, Forestry Program for Oregon (April 1977); General Accounting Office, Projected Timber Scarcities in the Pacific Northwest: A Critique of 11 Studies (December 12, 1978).

12/ Conversation with Robert Van Aken, Office of Timber Management, U.S. Forest Service, January 18, 1980.

For many years, the wood products industry has been characterized by a boom or bust syndrome resulting from price fluctuations and sequential exploitation of new areas. Although interregional change is now somewhat slower than in previous decades, a strong trend exists in which new industrial investment is concentrated in the South rather than the Pacific Northwest. More recently, however, net new investment in facilities in the South has increased by about $50 to $100 million each year whereas net investment in the Northwest has been negative. 13/ For example, between 1972 and 1977 the number of southern mills increased from 508 to 687. 14/

The Forest Service has often attempted to moderate some of the effects of interregional change, and thus stabilize local employment, by selling timber in areas where private stocks have been depleted. This policy has been criticized on the grounds that it provides a disincentive for private owners to invest in reforestation and management. The Forest Service has never before faced, however, a private inventory shortfall of the magnitude now projected for the Pacific Northwest.

Exports and Imports

Domestic sources of timber supply cannot satisfy all domestic demand; furthermore all domestic production is not sold within the country. In 1979, the equivalent of about 3.8 billion board feet of softwood sawtimber was exported. Most exports are logs sent to Japan from the Pacific Northwest.

Net imports of softwood lumber in 1979 were estimated to be about 9.6 billion board feet. 15/ Most imports come from Canada and are used in the Midwest or along the East Coast. The import markets are relatively volatile compared to the domestic markets. Import fluctuations are influenced by economic conditions and timber policies in Canada, the availability and cost of transportation, and, most importantly, the price of lumber in the consuming areas. Typically, the industry increases imports when demand for wood products is high, and reduces imports when demand decreases.

13/ Estimated from data supplied by Data Resources, Inc., February 28, 1979.

14/ Miller Freeman Publications, Annual Lumber Review (1972-1977).

15/ Robert Phelps, USDA, Forest Service, Outlook for Timber Products (speech delivered at 1980 Agricultural Outlook Conference, November 1979).

DEMAND FOR SAWTIMBER

Lumber constitutes about 65 percent of the demand for softwood sawtimber, with the remaining 35 percent split between plywood, pulpwood, and various fiberboards. 16/ Consumption of wood products in 1970 was balanced fairly evenly between residential housing and industrial-commercial uses. Since 1970, however, demand in the residential sector has increased at an average of about 4.5 percent per year, while the industrial-commercial sector has increased at an average of only 0.9 percent annually. For example, Table 2 displays the various uses of lumber in 1970, and shows how those uses had changed by 1976.

Because new housing construction depends greatly on money markets and tax incentives, the demand for wood products in the residential sector is strongly cyclical. Furthermore, since the housing sector is among the first to feel the effects of both economic downturns and recoveries, its cycles run somewhat ahead of those of overall business. The industrial-commercial sector is somewhat less volatile and varies in phase with the economy. Because demand by the housing sector is so much more variable than that of the industrial sector, and because housing and manufacturing are often at different points in their cycles, net national demand for wood products is quite volatile. For example, in early 1980, demand for wood products for new housing construction is falling rapidly, while consumption by the industrial sector still seems to remain relatively high.

Demand for Wood Products for Residential Housing

Over the long term, the demand for wood products for new housing is influenced by three factors:

- Family Formation. In the next 10 years, new families will probably be formed at least as rapidly as in the last 10 years because of the present age distribution of the population.

- Type of New Homes Being Bought. The proportion of new, single-family detached structures has increased from 55 percent of all homes in 1970 to about 68 percent in 1979. 17/ Detached structures require much more wood products per home than multifamily

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16/ USDA, Forest Service, Assessment (1979), p. 275.

17/ Department of Commerce, Bureau of the Census, Housing Starts (March 1980).

TABLE 2. CONSUMPTION OF LUMBER, 1970 AND 1976

	1970	1976
Total Consumption (billions of board feet, international ¼-inch log rule)	39.5	43.3
Per capita average (board feet per year)	193.0	201.0
Percentage softwood	81.0	85.0
End Use (billions of board feet, international ¼-inch log rule)		
New housing	12.3	16.2
Renovation	4.7	5.7
Nonresidential construction	4.7	4.2
Manufacturing	4.7	5.0
Transportation	5.7	6.8
Other	7.5	5.4

SOURCE: USDA, Forest Service, An Assesssment of the Forest and Range Land Situation in the United States (draft, 1979), p. 276.

homes. In the future, it is likely that this relationship will change due to increases in energy, transportation, and interest costs.

- Amount of Wood per Home. Many analysts have predicted that the amount of wood per square foot in new detached homes would decline as wood became more expensive. Because substitute materials have also become more expensive, in part because of increases in energy prices, builders have been reluctant to use less wood per square foot. Similarly, analysts have often underestimated the increases in average size of new housing units. Since

1970, the average size of one- and two-family units has increased by 14 percent.

The consensus of projections seems to indicate that demand for construction of new housing units will continue to be strong through the next decade because of the rapid formation of new families as a result of the post-World War II baby boom. Projections seem to differ, however, with respect to the composition of new housing. Some believe that the trends of the 1970s will continue, and that demand for wood products will increase rapidly. Others believe that increases in prices and mortgage rates will lead to more reliance on new multifamily housing units and, therefore, a less than proportionate increase in demand for wood products.

Demand for Wood Products for Industrial and Commercial Use

About 10 percent of wood products is used in nonresidential construction, and another 12 percent is used in the manufacturing of a wide range of consumer goods, such as furniture. About 16 percent of all lumber is used to produce pallets and containers for transportation. The transportation industry also uses a small percentage of plywood and other wood products. Miscellaneous uses of wood products, including housing repairs, advertising, and a variety of made-at-home products, account for about 15 percent of all demand for wood products.

The Forest Service expects that demand for wood products for nonresidential construction and miscellaneous uses will continue to grow at a moderate pace, but that demand in other industrial sectors might be fairly stable. As a result, total demand for wood products from the nonresidential sector will increase at a much slower rate than that of the housing sector. 18/

Projection of Total Demand for Wood Products

The Forest Service predicts that total demand for wood products will probably expand by between 1.5 and 3 percent annually for the next 10 years. Some private estimates expect demand to grow at even greater rates. Domestic supply, however, is likely to expand by only 0.5 percent per year. 19/ The Service has not published a projection of the cycles of

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18/ USDA, Forest Service, Assessment (1979), pp. 272-78.

19/ USDA, Forest Service, Assessment (1979), pp. 276-78.

demand, however. In a separate study, Data Resources, Incorporated (DRI) has predicted that consumption of lumber, for example, would expand by about 1.5 percent per year on the average, but that the housing cycle will cause significant fluctuations in demand. 20/ Total demand for lumber is projected to increase by about 5 percent or more per year when the housing market revives. DRI did not estimate the demand for wood products other than lumber.

PRICES

Standing Timber Prices

Two types of prices exist in the timber/wood products industry: stumpage prices pertain to standing timber, and product prices pertain to finished products as they leave the mills. Stumpage prices usually represent between 40 and 50 percent of the value of lumber, and about 10 to 30 percent of the value of other wood products. The balance consists of labor, transportation, capital cost recovery, and profits. Stumpage prices for a given quality of timber in a given location are largely a function of supply and demand, and they often fluctuate over a relatively wide range as economic conditions change. Between 1950 and 1970, stumpage prices for National Forest timber in the Rocky Mountains and the Pacific Northwest increased at an average of 2.5 to 5.0 percent per year. 21/ Since 1970, National Forest stumpage prices for Douglas Fir--the most important source of timber in the Pacific Northwest--have increased at about 22 percent per year and prices for Ponderosa Pine have increased at about 12 percent per year. 22/

20/ Data Resources, Inc., unpublished study for the Congressional Budget Office (March 1979).

21/ USDA, Forest Service, Assessment (1979), p. 334; and USDA, Forest Service, The Demand and Price Situation for Forest Products (December 1977), p. 43.

22/ USDA, Forest Service, The Demand and Price Situation for Forest Products (December 1977), p. 43; and Data Resources, Inc., unpublished study.

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The Forest Service estimates that stumpage prices will increase at an annual average rate of about 12.3 percent between 1976 and 1990. 23/ The Service projects that price increases will vary among regions as they have through history. For example, in the next 10 years, stumpage prices in the Pacific Northwest and South will increase at average rates of 10 to 12 percent per year, but prices in the Rocky Mountain region are expected to increase by 16 to 17 percent per year. DRI's projections of stumpage price increases are somewhat lower than those of the Forest Service for the Pacific Northwest because the DRI base year is 1979. DRI's base stumpage prices therefore include the large increases in prices which have occurred in that region since 1976. For prices in the Rocky Mountains, DRI does not forecast as large an increase as does the Forest Service because DRI is more pessimistic about the access to markets for Rocky Mountain wood products. DRI's projection of stumpage prices in the South is slightly greater than that of the Forest Service. All the projections, however, depend on estimates that demand will increase at 1.5 to 3 percent per year and that Canadian imports will be available. If demand growth exceeds 3.0 percent per year or if Canadian imports decline substantially, price increases could be much higher than these projections.

Lumber and Other Product Prices

Before the 1970s, prices of wood products were relatively stable, typically increasing at lower rates than the Producer Price Index for all commodities. 24/ Since 1970, however, lumber and plywood prices have increased at average annual rates of over 14 percent. 25/ These increases are significantly above the Producer Price Index for all commodities, which rose at rates just below 7 percent (see Figure 1).

23/ USDA, Forest Service, Assessment (1979), Table 6. This estimate is a volume-weighted average. It combines the 5.3 percent real annual average rate projected by the Assessment with a projected inflation rate of 7 percent to arrive at an annual current dollar rate of 12.3 percent.

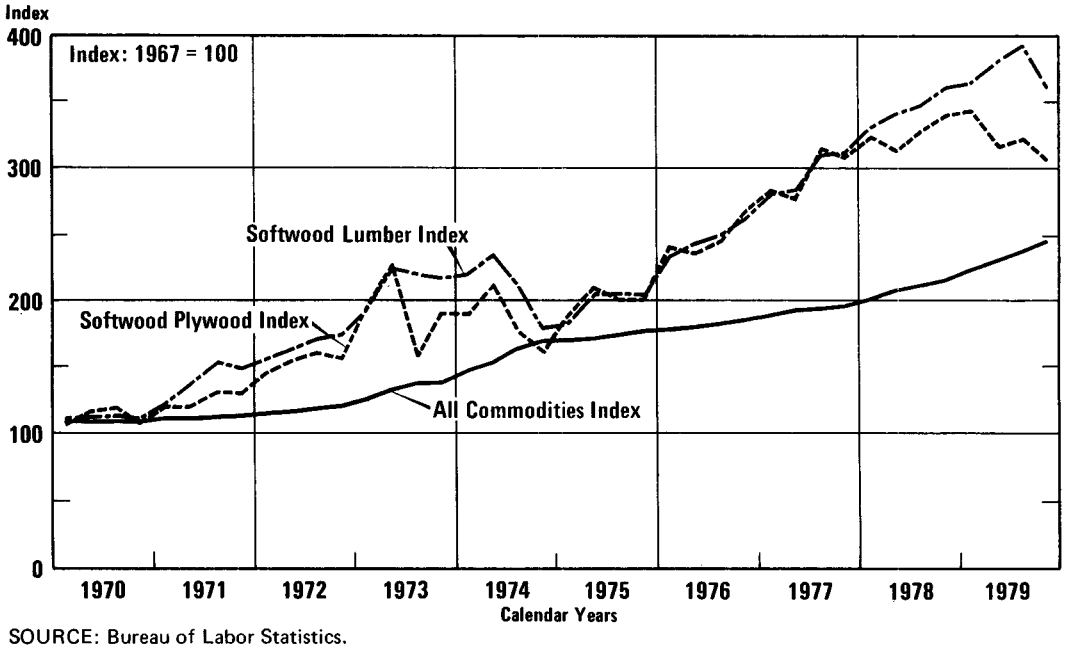
24/ Information on prices at the wholesale levels is now reported in the Producer Price Index, which was formerly called the Wholesale Price Index.

25/ The Producer Price Index for softwood lumber in 1970 was 113.3. In 1979, it was 379.9. The compounded annual rate of increase was 14.39 percent. (DRI file WP10811NS, which uses data from U.S. Department of Labor, Bureau of Labor Statistics.)

Figure 1.

Producer Price Indexes of Softwood Lumber, Softwood Plywood, and All Commodities, 1970-1979

(Quarterly averages)



SOURCE: Bureau of Labor Statistics.

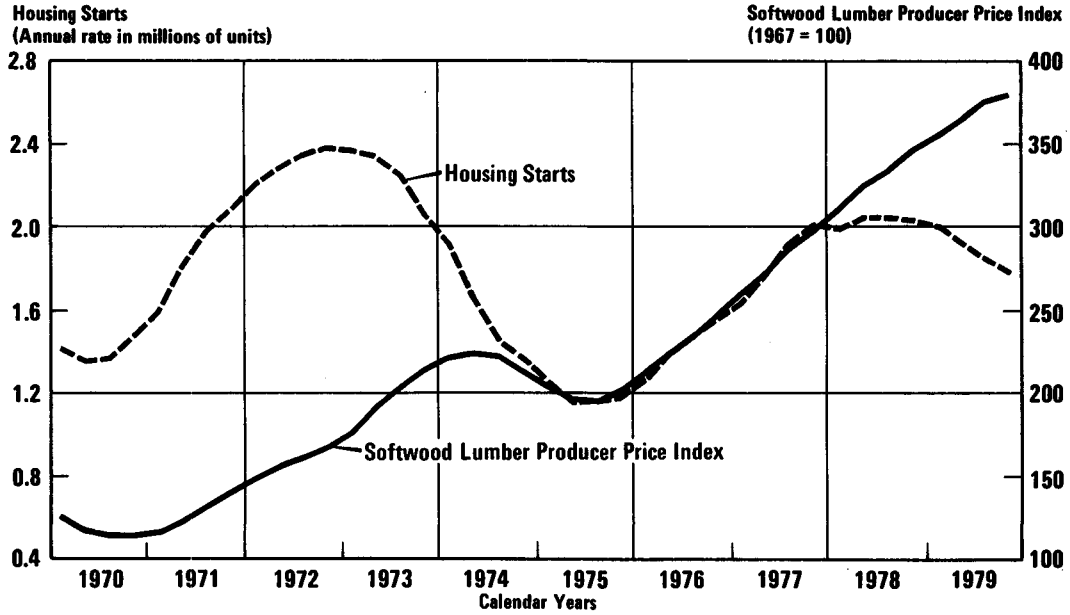
Random Lengths, a publisher of mill prices for wholesalers, offers similar information. The range in average annual lumber price increases since 1970 is 10 to 15 percent. Until last year, when the housing market declined, Douglas Fir lumber prices had increased at more than 15 percent a year. 26/ Table 3 details the actual unadjusted percentage increase in prices from 1970 to 1979 for lumber studs, the type of wood used most often in housing construction. In addition to the long-term trend, Figure 2 shows that lumber prices are strongly influenced by the housing cycle.

26/ Random Lengths Publications, Random Lengths (Eugene, Oregon, 1978).

Figure 2.

Softwood Lumber Prices and Housing Starts, 1970-1979

(Four quarter moving averages)



SOURCES: Producer Price Index -- Bureau of Labor Statistics;
Housing Starts -- *Construction Reports,* Bureau of Census, C-20 Series.

TABLE 3. AVERAGE ANNUAL PERCENTAGE PRICE INCREASES FOR SOFTWOOD LUMBER, JULY 1970 TO JULY 1979

Type of Lumber	Average Annual Percentage Increase
Unseasoned Studs	
Douglas Fir	
Portland Rate	13.2
Eureka Rate	12.8
Fir and Larch	12.8
Dried Studs	
Douglas Fir	11.9
Hemlock Fir (Coastal)	11.9

SOURCE: Random Lengths Publications, Random Lengths (Eugene, Oregon, telephone conversation, March 5, 1980).

Production and Transportation Costs

Stumpage prices seem to be the largest of several contributors to product price escalation, but other cost components have also increased at roughly comparable rates. Production, transportation, and financial costs seem at least equally responsible for price escalation. Accordingly, the effect of a policy that addresses only stumpage prices will not affect these other contributors to price escalation.

Table 4 lists nationwide production costs of lumber and other wood products, exclusive of transport and stumpage prices. These factors of production have increased at average annual rates of 12.4 percent since 1970. The costs in Table 4 represent about 40 to 60 percent of the total costs of the wood products as the products leave the mill. Transportation costs (exclusive of road construction) for wood products have also increased. The rail rate from the Pacific Northwest to the East increased by 8 percent per year between 1970 and 1978. 27/

Effects on the Price of New Housing

The effect on total housing costs by changes in product prices are modest. The National Association of Home Builders estimates that wood product costs are approximately 31 percent of the actual construction costs, and 14 percent of the total sales prices for new homes. These relationships have remained fairly constant for the past 10 years. Table 5 compares lumber, wood materials, and overall construction costs of new homes with the other major cost components. These data indicate that wood product costs were no more responsible than other factors for cost escalation. Profits, land costs, financing, and overhead have escalated faster than the costs of wood products or construction since 1970. 28/ However, to some extent, the data in Table 5 might underestimate the actual increases in wood product costs because of the substitution of other materials by builders.

27/ Data Resources, Inc., unpublished study.

28/ National Association of Homebuilders data, as provided by Robert Sheehan, June 1979. These data must be used with caution because the definitions of prices and goods are different from those used earlier in this chapter. Also, the composition of several of the elements has changed during the decade.

TABLE 4. WOOD PRODUCT PRODUCTION COSTS, 1970-1977 (In current dollars per thousand board feet) a/

	1970	1971	1972	1973	1974	1975	1976	1977	Average Rate of Increase
Logging	33.42	36.77	42.33	47.40	53.54	60.62	68.39	77.84	12.84
Road Construction	7.11	7.24	9.71	11.43	14.17	15.75	16.64	16.50	12.78
Manufacturing	46.97	51.96	56.19	57.65	64.04	77.85	96.70	104.16	12.05
Total	87.50	95.97	108.23	116.48	131.75	154.22	181.73	198.50	12.41

a/ Compiled by CBO, from regional data used to determine minimum bid prices for timber sales. Data are national weighted averages. Raw data were submitted by the Timber Management Division, Forest Service, July-August 1978.

SUMMARY

The previous sections have shown that demand for wood products will probably continue to increase at rates that are comparable to the rates of the 1970s. If current policies are continued, production of timber from the National Forests will not increase substantially. Production from private land will increase slightly, particularly in the South, and stumpage prices will increase at rates comparable to those of the 1970s. In the 1970s, prices of wood products were forced upward in roughly equal measure by the price of the raw materials--stumpage--and by increases in production and transportation costs. Both stumpage and production costs will be affected by the policy selected by the Congress to provide timber sales from the National Forest.

TABLE 5. ESTIMATED MEDIAN COSTS OF A NEW SINGLE-FAMILY HOUSE, 1970 AND 1978

	1970	1978	Average Annual Increase (percent)	Percent of Total Sale Price in 1978
Total Construction, Including Labor and Wood Materials	12,700	26,100	9.5	46.9
Lumber	a/	4,100	9.4 a/	7.3
Total Wood Materials, Including Lumber	a/	7,700	9.4 a/	13.8
Land	4,700	12,800	13.3	23.0
Financing	1,500	6,100	19.2	11.0
Overhead, Profit, and Other	4,450	10,600	10.7	19.1
Total Sales Price	23,400	55,600	11.4	---
Average Home Size (in square feet)	1,566	1,691	1.0	

SOURCE: National Association of Homebuilders.

a/ The average annual increase in costs for lumber and wood materials has been calculated for the 1973-1978 period.

CHAPTER III. ALTERNATIVE USES OF NATIONAL FOREST TIMBER AND CRITERIA TO EVALUATE POLICY CHANGES

Under present law, the Forest Service has a limited capability to increase timber sales from the National Forests through the departure provision. Similarly, the Congress can adjust the level of sales through the budget appropriations process. The issue now facing the Congress is whether recent and projected price increases of wood products warrant a change in strategy for management of the National Forests to allow increased sales to ameliorate price increases. This chapter discusses the current debate about the use of National Forest timber and criteria for evaluating the alternative policies.

THE ROLE OF NATIONAL FOREST TIMBER

The debate about National Forest timber is influenced by different views about whether commercial harvest of this timber is the most important use of the National Forests, or whether it is only one of several important uses. Industry considers the Forest Service as the custodian of a vast amount of valuable timber which cannot be harvested at optimal economic rates under current policies and laws. Several independent studies have shown that alternative harvesting policies could increase the economic returns from this timber. 1/ On the other hand, it is clear that such alternative policies would sacrifice some benefits from other uses of National Forest resources. 2/ Environmental groups contend that, even under current law, timber production dominates National Forest policy and that much timber now being sold in some regions is actually uneconomic to

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1/ Yvonne Levy, "An Economic Alternative to Current Public Forest Policy," Economic Review (Federal Reserve Bank of San Francisco, Winter 1978); Thomas Lenard, Lumber Prices and the Lumber Products Industry (Council on Wage and Price Stability, October 1977); Marion Clawson, "The National Forests," Science (February 20, 1976); John L. Walker, "Economic Efficiency and the National Forest Managment Act of 1976," Journal of Forestry (November 1977), pp. 715-18; Peter Berck, "The Economics of Timber: A Renewable Resource in the Long-run, The Bell Journal of Economics (Autumn 1979), pp. 447-62.

2/ USDA, Forest Service, A Recommended Renewable Resource Program (March 2, 1976).

sell, but is being supported by timber in other regions. 3/ These issues have escalated in importance because of price increases and the depletion of private inventories. Industry argues that harvests from the National Forests should be increased.

The debate hinges on the role of old-growth timber--that is, mostly over 150 years in age--in western National Forests. The general guidance expressed by the National Forest Management Act is that the harvest rate in the National Forests should be more moderate than that on lands owned by private industry in order to preserve the forests' recreational potential and the maximum number of their optional uses. Many in the Congress believe that the intangible benefits of a moderate harvest policy are important, although not very easily quantified. For that reason, the Congress has designated millions of acres as wilderness and the Forest Service has stipulated harvest procedures that attempt to maintain many of the benefits of old-growth timber. Furthermore, during consideration of the National Forest Management Act in 1976, the Congress rejected an amendment under which timber production could dominate other uses on National Forest land. Accordingly, management continues to use multiple-use as a guideline.

Current Law. Current federal policy is embodied in two pieces of legislation: the Multiple Use-Sustained Yield Act of 1960 and the National Forest Management Act (NFMA) of 1976. The Multiple Use Act states that the forests "shall be administered for outdoor recreation, range, timber, watershed, wildlife and fish purposes" and directs that the resources should be developed for "multiple use" and "sustained yield." 4/

In the National Forest Management Act, the policy guideline for timber harvest scheduling is specified in Section 13(a): "The Secretary of Agriculture shall limit the sale of timber from each national forest to a quantity equal to or less than a quantity which can be removed from such forest annually in perpetuity on a sustained-yield basis. . . ."

This policy is known as the non-declining even-flow policy (NDEF). It limits the permissible harvest in any given year to the "allowable sale quantity." This allowable sale quantity cannot exceed the long-term sustained yield capacity of a forest. This quantity is determined by the

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3/ Natural Resources Defense Council, "Sales Below Cost: A Summary of NRDC Analysis of Forest Service Sales Below Cost" (unpublished, April 23, 1980).

4/ Public Law 86-517, 14 U.S.C. 528-531.

Forest Service's estimate of what level can be sustained through harvest of second-growth or "managed" timber after all old-growth and unmanaged stands have been cut, given the amount and quality of land available, the intensity of management (investment in reforestation and timber stand improvement), the utilization of growing stock, and conflicting uses of land, such as the necessity to preserve water quality.

A provision in the NFMA allows the Secretary of Agriculture some freedom to "depart" from NDEF constraints. Specifically, the law states:

> That in order to meet overall multiple-use objectives, the Secretary may establish an allowable sale quantity for any decade which departs from the projected long-term average sale quantity that would otherwise be established. Provided further, that any such planned departure must be consistent with the multiple-use management objectives of the land management plan. 5/

The legislative history of this provision indicates that the Congress intended it to permit some flexibility in timber sales without altering the overall goals of sustainability. This flexibility could capture some of the potential economic benefits of short-term departures from policy. Departures could be made in special circumstances, such as local economic hardships or unusual conditions in the forest.

On June 11, 1979, the President asked the Forest Service to examine several forests in the Pacific Northwest and northern Rocky Mountains to determine whether, when, and to what extent a departure would be warranted. Since the Service will not complete any of its examinations until the middle of 1980 at the earliest, an increase in timber sales would not be possible until late 1981 or early 1982. The Service has not estimated the aggregate increase for the National Forest System because it cannot foresee the results of its examinations. The only indication of the possible scope of an increase in sales was contained in a 1981 proposed budget summary. That document stated that it may be possible to prepare and offer additional sales for any reason of 0.3 billion board feet in fiscal year 1983 and 1.3 billion board feet in fiscal year 1985. 6/ Although at this time it is impossible to project the likely increase in sales as a result of departures, if any are developed and adopted, this paper examines two increases in timber

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5/ Public Law 94-588, Section 13, 16 U.S.C. 1611.

6/ USDA, Executive Summary, Forest Service Budget Estimate, 1981 (January 25, 1980).

sales that approximate the maximum level mentioned in the budget summary, and one option that increases sales to twice the projected maximum level. It is not important to this paper whether the increases are secured by a change in legislation, or an increase in appropriations to accomplish administrative departures.

CRITERIA TO EVALUATE POLICY CHANGES

If the Congress wishes to retard price increases of wood products through larger sales of National Forest timber, the principal trade-offs of such a policy are that the timber sales would exceed sustainable levels and that the long-term economic health of certain regions of the country might possibly be adversely affected. Other considerations are environmental effects, budget costs, receipts to county governments, and effects on international trade. The balance of this chapter describes the intended benefits and the projected costs.

Price Effects

The primary benefit of the policy options in this paper is constraint of the current rate of wood product price increases. Although price escalation is generally undesirable, it also is a valid market signal of a product's increasing scarcity. If the value of a diminishing resource is increasing due to a shortage in supply, then attempts to combat the price escalation without either increasing supply or reducing demand are probably doomed to failure. Additionally, if changes in public policy are used to influence the market operations, they may only distort a market that might be working and adjusting fairly well without them.

A steady increase in prices provides positive signals to private landowners to increase investment for future supply and, at the same time, encourages conservation among consumers. If private owners of timberland expect substantially higher real prices in the future, they will tend to regenerate and reforest cut-over lands and improve growing stock by cutting, thinning, and selective harvesting. Furthermore, tree purchasers and harvesters will better use existing inventory to minimize waste if their material costs rise. The Forest Service projects that a 12 to 13 percent annual increase in stumpage prices would increase supply by about 5.5 billion board feet per year in 1990 over the level it would be if prices increased by 9 to 10 percent per year. 7/

7/ USDA, Forest Service, An Assessment of the Forest and Range Land Situation in the United States (draft, February 1980).

With respect to consumption, higher prices, relative to competing materials, will encourage more conservative use of wood products for residential construction and industrial purposes. The Forest Service Assessment concludes that, under the higher price projection mentioned above, demand by 1990 would be 4.7 billion board feet less than under the lower-priced projection. 8/

The study by the Council on Wage and Price Stability concluded that prices were being bid up because of scarcities, but that the degree of scarcity was unnecessary. 9/ It argued that the Forest Service could increase production, and thereby reduce price escalation, without substantially adverse consequences. The study also stated that a feasible increase in sales might be sustained with reasonable levels of investment in growing stock. Its recommendation, therefore, was to depart from NDEF (or perhaps to redefine NDEF).

The direction of the price effect is not controversial: if public forest harvests are increased, more supply will lead to lower prices. The controversy arises over the extent of new production and the resultant price effect. Industry and the Council on Wage and Price Stability believe that sales of National Forest timber can be increased and that the downward effect on price escalation would be substantial. 10/ The Forest Service believes that the effect of increased sales would be limited for several reasons: 11/

- o Since the National Forests provide only about 20 to 25 percent of total domestic supply, a 30 percent increase in National Forest sales would result in a domestic supply increase of only 6 to 7.5 percent, assuming no change in imports.

- o Whenever the Forest Service increases its sales, private industry tends to reduce its harvests because it cannot easily or cheaply

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8/ Ibid.

9/ Lenard, Lumber Prices and the Lumber Products Industry.

10/ Levy, An Economic Alternative to Current Public Forest Policy; John Walker and John Keane, "Why Timber Scarcity and Plenty," Forest Industries (September 1974); H.R. Josephson, "Economics and National Forest Timber Harvests," Journal of Forestry (September 1976); Lenard, Lumber Prices and the Lumber Products Industry.

11/ Enoch Bell, Expanding Softwood Production from the National Forest System Lands, USDA, Forest Service (draft, October 1979).

expand mill capacity and because the value of its own growing stock appreciates as it grows. This substitution is expected to erode the net potential increase by 40 to 60 percent. 12/

- Some multinational companies can reduce their imports from Canada when National Forest sales are increased, depending on their internal supply situation. The decrease in imports could offset 20 to 30 percent of increased National Forest production. 13/

The Forest Service estimates, for example, that, if its sales and harvests increased by 1 billion board feet per year, private harvests would decline by 528 million board feet and imports would decline by 280 million board feet. Thus, the net increase in supply would be only 192 million board feet per year, or 19 percent of the increase in National Forest sales. Because of these counteracting factors, an increase in National Forest timber sales would not appear to be an effective policy to increase domestic timber supply. It would, however, have a positive effect on the balance of trade by indirectly stimulating exports and reducing imports. On the other hand, the increase in employment from incremental sales would be counteracted to some degree by a decrease in private employment on private lands as industry substitutes public timber for its own. 14/

To the extent that stumpage prices are affected by a change in supply, prices of wood products to the consumer would decline. This benefit to the consumer, however, is offset by a loss to owners of timberland due to a reduction in the value of their stumpage.

Sustainability of Harvest Levels

Perhaps the most controversial issue facing the Forest Service is whether current production levels can be sustained after the inventory of old-growth timber is depleted. In the past, private industry has, in succeeding regions of the country, harvested without adequate reforestation. Only in very recent years has reforestation become accepted practice,

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12/ USDA, Forest Service, Forest Service Analysis of Sierra Club Budget White Paper, (unpublished, July 1979).

13/ Ibid.

14/ Conversation with John Sessions, Timber Management, Forest Service, regarding analysis to support the Forest Service Analysis of Sierra Club Budget White Paper.

and some observers fear that the industry still does not do enough. The Forest Service itself has a backlog of unreforested land. Although many forests regenerate naturally, much cut-over land has reverted to hardwoods or brush.

The National Forests are composed of old-growth and second-growth timber. Old-growth timber has never been cut and has a low rate of net growth. Although only a small percentage of National Forest timberland contains second growth, its volume is expanding as more old growth is cut and the land reforested.

Gradually, the proportion of each year's harvest that is supplied by old growth will decline and that provided by second growth will increase. In time, annual harvests are planned to equal annual growth. That can be accomplished by a forest which is virtually all second growth and which has an even distribution of age classes. Most commercial timberland in the National Forests today is, however, stocked with old growth. The objective of timber management is to phase out this inventory (subject to many land-use constraints and to environmental and social considerations) and restock in a way in which age distributions are as nearly even as possible.

Current law stipulates non-declining even-flow (NDEF) as a policy criterion. This policy is somewhat more conservative than necessary to achieve a smooth transition to managed forests. The legislative history of the National Forest Management Act of 1976 indicates that NDEF was adopted in order to preserve options for the future, particularly with respect to allocation of land to uses other than that of providing timber.

The Forest Service has used the Timber Resources Allocation Method (Timber RAM) to compute the maximum sustained yield, or "allowable sale quantity," for each forest. This model computed the volume of second growth that will be available under various conditions and then allocated from the stock of old growth in order to establish the largest possible sustainable level of harvest. In other words, the old-growth harvests are programmed to "fill up" any production troughs due to age gaps of second growth. The resulting harvest schedule provides the allowable sale quantity for the first decade.

Scheduling timber sales is inherently complicated and difficult because of a large number of variables and uncertainties. Different species of trees require various growth periods in different regions to attain maturity. Reforestation can fail because of drought or can be retarded by the growth of brush or hardwoods. Fires or insect infestation can destroy timber. Inaccurate data and withdrawals of land in the timber base can also upset harvest schedules.

One sensitive issue is whether the amount of land available for timber operations will be adequate to maintain either present or increased sale levels. A second issue is whether volumes of second growth will attain their projected quantities, and a third is whether the costs or investment requirements for future harvests will be so high that production will not be able to achieve its planned level. Because of limitations in data, these issues cannot be resolved in this analysis, but examination of them places some perspective on the larger question of whether increases in sale levels can be sustained.

The Land Base. The Forest Service is in the process of developing new Land and Resource Management Plans for all National Forests as required by the National Forest Management Act of 1976. Many of these new plans could reduce the land available for timber sales, or could constrain the amount that can be harvested from available land. The difference in potential annual harvest can be significant (see Table 6).

Although the National Forests contain 183 million acres, only about 78 million acres are commercial timberland and can actually be used to provide timber. 15/ The balance of land is mainly rangeland, as is forest that is either unproductive or has been allocated to uses that are incompatible with timber harvesting. Even the 78 million acres of commercial timberland are divided into categories that affect production. About 48 million acres are considered standard commercial timberland, of which only 36 million are stocked in softwoods. This 36 million acres provides 70 percent of all National Forest softwood sawtimber. The balance of commercial land is categorized either as special or marginal and requires specific harvest techniques that both raise the cost of the timber and reduce the output of timber per acre. 16/ The effect of the new Land and Resource Management

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15/ The Forest Service definition of commercial timberland includes some land that this analysis does not consider and so their estimate of commercial acreage is slightly higher than that used here. This land component, called "unregulated land," sometimes contains sellable timber, but is not organized for timber production. It includes land such as experimental forests, or sites for recreation or administrative use.

16/ Special land requires specially designed treatment of the timber in order to protect values such as water quality or recreation. Yields of timber on some special land can be maintained; on others, they cannot. Marginal areas include those with "excessive development cost, low product values, or resource protection constraints." See Forest Service Manual, Title 2400.

TABLE 6. POTENTIAL ANNUAL PRODUCTION AND AVAILABLE LAND IN THE NATIONAL FORESTS a/

Type of Timberland	Acreage (millions of acres) 1977	1980	Potential Yield (billions of board feet per year) b/ 1977	1980
Standard	57.3	48.1	10.1	9.2
Special	8.4	10.3	0.9	1.4
Marginal	20.2	20.2	2.3	2.3
Total	85.9	78.4	13.4 c/	12.9 c/

SOURCE: 1977 statistics were prepared from Timber Management Information System, USDA, Forest Service, Report 24.21A (TM-LUC-Area), (August 5, 1977, unpublished); 1980 statistics were compiled on February 2, 1980, by Robert Van Aken, Timber Management, Forest Service.

a/ These land adjustments include those made for wilderness classification. USDA, Forest Service, Roadless Area Review and Evaluation, Final Environmental Statement (January 1979).

b/ "Potential yield" is a term that is being phased out of Forest Service terminology, but it is still in frequent use. It is a measure of the maximum harvest that could be obtained and sustained from a forest assuming certain management intensities, markets, and technology were available. The primary difference between potential yield and allowable sale quantity is the extent of investment required. Potential yield assumes an investment level far higher than that of current policies, and therefore it exceeds estimates of allowable sale quantity (or maximum sustainable levels).

c/ The average yield per acre in 1977 was 156 board feet per acre per year. In 1980, it is 165 board feet per acre per year.

plans, including land set aside for wilderness, has not only been to decrease the total amount of commercial forest but to increase the proportions of commercial forest that have special harvest requirements or are marginally economic. As a result, the amount of land in the standard category has declined by 16 percent since 1977 (see Table 6). 17/

The overall statistics actually may understate the amount of disruption to sale schedules that may be caused by the new plans. The scale of the revisions poses two questions: whether the reduction of the land base will continue and whether estimates of potential yields and maximum sustainable harvest levels (allowable sale quantity) have been sufficiently adjusted to reflect the changes in the land base. It is probably prudent to plan as if more land will be allocated away from timber production as recreational demands increase. One estimate projects a 9 percent additional loss of commercial timberland in the West by 1985 as a result of trends in land allocation for forests with approved land use plans. 18/ Allocation away from timber use can be reversed or investment in remaining timberland could be increased. Allocation toward timber use is to some extent irreversible, because once the timber is harvested the land cannot be used for some recreational purposes.

It cannot be determined whether the Forest Service has sufficiently adjusted the timber sale planning schedules to reflect the new, decreased land base. During the same time that new plans were reducing the availability of land, the Service made a number of changes in accounting procedures and assumptions about future investment levels. These changes, combined with increases in the value of timber, have led to an increase in the estimate of recoverable volumes per acre of 4.5 percent. As a result, although the land base has shrunk, the estimates of potential yield (and probably the allowable sale quantity) have not declined proportionally. It is not at all clear at this time which trend will dominate--that is, whether future aggregate yields will be greater or less than current ones.

17/ Bell, Expanding Softwood Production, p. 29; USDA, Forest Service, Timber Management Information System, Report 24.21A (TM-LUC-Area), (August 5, 1977, unpublished); personal conversation with Robert Van Aken, Timber Management, Forest Service, February 9, 1980, from data of February 2, 1980.

18/ Carl Newport, "Commercial Forest Lands on Six Western Regions, Exhibit B" (undated, unpublished).

The difference between the potential yield and the maximum sustainable yield (allowable sale quantity) is important. 19/ Potential yield means the maximum sustainable level that may be harvested with intensive forestry methods taking into account conventional logging technology and interrelationships with other resources. 20/ The key difference between the allowable sale quantity and the potential yield is the assumption about intensive forestry and the investment levels that such forestry requires. If investments were increased by a large (but feasible) amount, the allowable sale quantity would equal the potential yield. In the Pacific Northwest, the level of timber sales is limited by the allowable sale quantity, which in turn is limited by the level of investments that the Service, OMB, and the Congress judge to be appropriate. The Forest Service projects that through 1990 the allowable sale quantity in the Pacific Northwest will be 90 percent of the potential yield. 21/ If the ratio between allowable sale quantity and potential yield that exists in the Pacific Northwest is assumed to be approximately representative of the entire National Forest System, the allowable sale quantity of the entire system would be about 11.5 to 11.7 billion board feet per year for hardwood and softwood sawtimber. In 1979, about 11.1 billion board feet of hardwood and softwood sawtimber were sold, and between 10.8 and 11.0 billion board feet are expected to be sold in 1980. 22/ Therefore, some margin for increases in sales remains. This

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19/ "Allowable sale quantity" is the term used in the National Forest Management Act to represent the maximum sustainable yield. The allowable sale quantity for one decade can change for the next decade.

20/ The technical definition from the Forest Service Manual is: "Potential yield for the next ten years is the maximum harvest that could be planned to achieve the optimum perpetual sustained yield harvesting level attainable with intensive forestry in regulated areas considering the productivity of the land, conventional logging technology, standard cultural treatments and interrelationships with other resources and the environment."

21/ The potential yield for future decades at high investment levels is greater than that through 1990 because some time is required for investment to take effect.

22/ In 1979, 12.4 billion board feet were offered for sale. About 0.8 billion board feet were not bought by industry, and 0.5 billion board feet are not chargeable against the allowable sale quantity. All these estimates include hardwood and the chargeable components of long term (Alaskan), mortality, and salvage sales. Robert Van Aken, Timber Management, Forest Service, phone conversation, February 4, 1980.

margin, however, is limited and probably does not exceed 0.5 to 0.9 billion board feet per year including hardwood. As a result, the issue of sustainability will be a factor in any debate regarding an expansion of timber sales.

The region most affected by the new Land and Resource Management Plans is the Pacific Northwest. Acreage in the standard category has declined by 2.7 million acres since 1977. Yet, as a result of a number of adjustments, estimates of the potential yield for the region has actually increased from 4.8 billion board feet per year in 1977 to 5.3 billion board feet in 1980. 23/ The present level of sales in the Pacific Northwest is 4.8 billion board feet of chargeable sawtimber per year. Sales in this region are already at the allowable sale quantity, and therefore cannot be increased without use of the departure provision of the NFMA. As a result, the excess capacity to increase sales within sustainable yields exists only in regions, such as the Rocky Mountains, where the market for timber is relatively weak and additional sales have been uneconomic.

Second-Growth Inventory. About 13 percent of the wood harvested from the National Forests is second growth. 24/ Much of this is either hardwood or timber that is not suitable for lumber or plywood. In future years, the Forest Service plans to increase the proportion of total harvest supplied by second growth until ultimately it will provide the entire harvest. The transition will be slow, however. In 1983, for example, only about 15 percent of the harvest will be second growth.

Two different viewpoints about second growth in the National Forests have been argued for many years. On the one hand, some evidence indicates that reforestation of cut-over land usually is behind projections and expectations. Much land that contained softwood has reverted to less useful hardwoods or is overrun with brush. In other cases, softwood seedlings have failed or been set back because of drought, frost, animals, or other causes, and this has led to poorly stocked areas. On the other hand, growth on some young stands has exceeded projections.

Both sides probably contain some truth. The problem is that no comprehensive attempt has been made to inventory and evalute second growth on a national scale. Such an evaluation could perhaps put this issue

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23/ Yield estimates were provided by phone conversation with Robert Van Aken, Timber Management, Forest Service, January 23, 1980.

24 Letter from Max Peterson, Deputy Chief, Forest Service, August 18, 1978.

to rest. Until that data is available, it cannot be determined whether the contribution from second growth can support an increase in harvests or whether it will constrain future harvest levels.

Costs of Future Harvests. The costs of harvested timber are likely to escalate in real terms because of four factors: inaccessibility, lower volume per acre, more stringent requirements for harvest methods, and greater investment required to manage second-growth stands.

Over the years, the Forest Service has tended to sell the best timber first. Although 29 percent of National Forest commercial timberland is in the least productive classification of commercial forest land, little of that category has been logged, because of inaccessibility and attendant high cost of harvesting. Most timber production has been provided by the higher site classifications. As a result, a disproportionate percentage of the remaining harvestable timber is on land that is less productive and more difficult to reforest, and has higher costs per unit removed than that being harvested now. 25/ Much of the land in lower site classifications is of questionable economic value and is assigned to the marginal category because of its inaccessibility and low volume per acre. Clearly, timber harvested from this land will on average be more costly than that now harvested, but it is difficult to estimate the level of real cost increases.

Future requirements on utilization, extraction, and valuation are much more likely to raise the cost of harvesting than to reduce it. Furthermore, much of the land in the special classification will require restrictive procedures to maintain water quality and a number of environmental requirements. Often the harvests of the future will be on land that is more vulnerable or sensitive to environmental effects than that now being harvested.

The last factor contributing to increased costs is that, as the land base is reduced, the level of investment needed to maintain production levels increases very fast. This additional investment ultimately is reflected in the cost of the harvested timber.

The Forest Service has computed the effects on its budget from a reduction in the land base available for timber production in one National Forest. In this case, a 10 percent decrease in land required a 10 percent decrease in maximum production unless budget costs were increased. In order to limit the reduction in harvest to about 5 percent, the Service

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25/ Report of the Advisory Panel, p. 34.

increased its management costs for this forest from $3 million to $7 million a year. As a result, output per dollar decreased by 56 percent. 26/

In a separate study, the Forest Service calculated the decrease in value, in terms of stumpage prices, that the increased costs of inaccessible areas are expected to have. Using an average of seven western forests, this study expected that increased costs of harvest would decrease the stumpage value of the resource to potential bidders by about 14 percent in real terms. 27/ These prices did not reflect specially restrictive procedures or more intensive management but simply the value of resources in more remote areas, assuming that purchasers are reimbursed for specified road costs and that reforestation will be done by the Forest Service. As a result of two effects--the reduction of the land base and use of more inaccessible areas--the real cost of future timber should be expected to increase, although no comprehensive estimates have been made that predict the extent of increase.

Overall Effect on Sustainability. This section has evaluated the conditions under which an increase in timber sales could be sustained. The analysis determined that a significant increase would require a departure from non-declining even-flow guidelines or an amendment of current laws. The Forest Service has not been able to market additional timber from the Rocky Mountains, where sales are not at their maximum allowable sale quantity, and the Pacific Northwest is already at its maximum sustainable levels. Since additional investment would not increase sales through 1990 by more than 0.2 to 0.4 billion board feet per year, departures or changes in the law, plus increased investments, would be required to increase sales by 1.5 to 3.0 billion board feet per year.

Regional Effects

For the last 10 years, private investment in processing facilities has decreased in the Pacific Northwest and increased in the South, because of the foreseen reduction in timber supplies in the former area. If the trend accelerates, and if an increase in National Forest sales is only temporary,

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26/ USDA, Forest Service, Alternative Policies for Timber Harvesting on the Western National Forests (November 1977), p. 26.

27/ Roger Fight, Norman Johnson, Kent Connaughton, and Robert Sassaman, Roadless Areas--Intensive Management Tradeoffs on Western National Forests, USDA, Forest Service (revised, October 1978), p. 35.

production could decline rapidly in about 10 years. In that event, regional employment could be rapidly and seriously affected.

The Pacific Northwest has a large inventory of old-growth timber in the National Forests and a relatively small inventory remaining on private lands. Several studies have concluded that the stock of second-growth timber will be too small to replace the decline of old-growth inventories and maintain production levels from private lands through the next 5 to 20 years. Consequently, allocation of a larger portion of the present inventory of National Forest old growth to sales during the 1980s would greatly increase the possibility of regional shortages in 10 to 30 years, if the increase in National Forest sales cannot be sustained. 28/ The Forest Service has projected that, under their base level assumptions, the decline in Pacific Northwest production by 1990 could be about 3.0 billion board feet per year--roughly a 15 percent decrease. 29/ After 1990, projections become more speculative, and there is little agreement whether the decline would accelerate or moderate.

Employment in the wood products industry has been at high levels both nationally and in the Pacific Northwest until recent months. Increases in productivity that have reduced employment per unit processed in some facilities have been balanced by the manufacture of more sophisticated and specialized products that has required more workers. In the future, it is expected that employment in the Pacific Northwest will decline slowly as that in the South expands.

If harvests in the Pacific Northwest decline precipitously, the effect on employment will of course be exacerbated. In 1978, employment in the wood products industries in the Pacific Northwest was 162,000 out of a total

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28/ John Beuter, K.M. Johnson, and H.L. Scheurmann, Timber for Oregon's Tomorrow, Oregon State University, Research Bulletin #19 (1976); Oregon Department of Forestry, Forestry Progam for Oregon (submitted to the State Board of Forestry, April 1977); General Accounting Office, Projected Timber Scarcities in the Pacific Northwest (December 12, 1978); D.R. Gedney, D.D. Oswald, and R.D. Fight, Two Projections of Timber Supply in the Pacific Coast States, USDA, Forest Service, PNW-60 (1975).

29/ Forest Service, Assessment, pp. 325 and 326.

workforce of 3.1 million. 30/ In 27 counties, the industry provided over 20 percent of the total employment directly and another 30 percent indirectly. 31/ The wood products industry employs more people in Oregon than any other industry, except retail trade and government. One study projects a decline in employment in the wood products industry in Oregon of about 35 to 45 percent by the year 2000 from productivity gains if production is constant. 32/

Although the government has little direct responsibility for maintenance of labor patterns, its policy on timber sales can cause a disproportionate impact in the Pacific Northwest. An accelerated harvest from National Forests in that region could temporarily retard the flow of new capital investment from the Pacific Northwest to the South, but the effect on employment would last for only 2 to 4 years. Under a continuation of current sale policies, southern lumber production would more than double in 20 years. 33/

On balance, an increase in timber sales in the Pacific Northwest could have some short-term beneficial effects on the regional economy. The potential problem lies not in the short-run, however, but in the next 10 to 30 years. If a capability exists to depart from non-declining even-flow, the issue is when should that capability be used. This analysis indicates that a need for departure will probably be greater in the future than it is now. Virtually all projections indicate that harvests in the Pacific Northwest will decline by several percent annually by 1990. Departures last for only 10 years, and can consume whatever excess capacity exists. It might therefore be more useful to begin a departure in 1990 than to end one then.

30/ Florence K. Ruderman, Production, Prices, Employment and Trade, USDA, Forest Service (1979), p. 15. U.S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings, vol. 26, no. 12 (December 1979). About 7.5 percent of total employment in Oregon is directly employed by the forest products industry.

31/ Enoch Bell, Estimating Effect of Timber Harvesting on Employment, USDA, Forest Service Research Note, INT-237 (1977). The employment multiplier for secondary employment usually varied from 2.5 to 3.3.

32/ B.R. Wall, Employment Implications of Projected Timber Output in the Douglas Fir Region, USDA, Forest Service, PNW-211 (1973).

33/ D.M. Adams, R.W. Haynes, and D.R. Darr, "A Welfare Analysis of Long-Term Forest Products Price Stabilization," American Journal of Agricultural Economics (November 1977), p. 669.

Other Considerations

An increase in timber sales would have some additional effects. For example, an increased harvest should be expected to affect the environment adversely, require more net federal budget expenditures, and possibly adversely affect private investments in reforestation or timber stand improvement. On the other hand, acceleration would stimulate employment in the short run, transfer more income in the form of receipts to local governments, and provide some positive influence on the balance of payments.

The Forest Service projects that the environmental effects from an increased harvest would be declining water quality, additional stress on certain threatened or endangered species, and degredation of the scenery. An acceleration in the Rocky Mountain region would adversely affect soil productivity and big game habitats. In the Pacific Northwest, air quality and fish habitats would also be affected. In a draft report, the Forest Service has concluded that the environmental "impacts would generally become intolerable at an increase of 30 percent in harvest level above the level of the mid-1970s (approximately 10 billion board feet of softwood sawtimber per year). On some forests, any acceleration of harvest would have unacceptable impacts on non-timber resources." 34/

Expanded timber sales would require increased federal budget costs for more personnel to prepare and administer sales. They would also lead to increased receipts from industry. By law, 25 percent of all receipts are transferred to the local counties. These receipts are the primary source of revenue for many of the affected counties. Projections of costs and receipts for incremental sales above current levels have often been proved inaccurate, but generally, future receipts to the Forest Service and local governments would be greater than budget costs for incremental sales in the Pacific Northwest region. Benefits would be less than incremental costs in the Rocky Mountains. 35/

34/ Expanding Softwood Production, p. 66.

35/ Letter from Donald L. Funking, Assistant Director, Timber Management, Forest Service, January 11, 1980.

CHAPTER IV. ALTERNATIVE POLICIES

This chapter compares the effects of a continuation of current levels of timber sales from the National Forests to the effects of three alternative sale schedules that were designed to make more timber available to the domestic market. Because the scope of this study is restricted to timber sales by the Forest Service, the alternatives do not include other policies affecting private industry, international trade, other public agencies, or Forest Service programs dealing with nonindustrial private lands. Also excluded are options that would alter current sale procedures and utilization requirements for Forest Service harvests, or that would substantially increase public investment in National Forest timber. Furthermore, the options do not consider alternatives that would provide tax incentives to encourage better utilization of harvested timber or to encourage investment in timber stand improvement. These exclusions do not imply that such options are unimportant--on the contrary, they could have substantial effects; they are simply beyond the scope of this study.

The alternatives are compared to a Base Case which represents a continuation of current sales policy, and are evaluated by the criteria described in Chapter III. The three alternative sales schedules are:

- Case I--General Expansion: Increase of 1.5 billion board feet a year over the Base Case.
- Case II--Expansion with Emphasis on the Pacific Northwest: Increase of 1.5 billion board feet a year over the Base Case.
- Case III--Intensive Expansion: Increase of 3.0 billion board feet a year over the Base Case.

The Congressional Budget Office contracted with Data Resources, Inc. (DRI), to use its FORSIM model to project the likely results of the alternative sales schedules. The FORSIM model combines DRI's macroeconomic forecasts with a detailed model of the wood product and pulp/paper industries. The FORSIM model has several advantages for use in this study. It can incorporate the alternative sales schedules and compute their effects on production from private land, Canadian production, and investment in new facilities for each region. It can also calculate regional stumpage prices, lumber production, and the effect on the Producer Price Index. The model is described in the Appendix.

DESCRIPTION OF ALTERNATIVES

Several assumptions underlie all the alternatives:

- o No substantial changes will be made in existing legislation or regulations affecting the Forest Service or the industry.
- o The Congress will appropriate sufficient funds to cover the additional costs of preparing and implementing the increased timber sales.
- o Withdrawals of land for wilderness under the Roadless Area Review and Evaluation process have been incorporated into the inventory data. It is assumed no additional withdrawals will be made. Litigation over wilderness is assumed not to delay timber sales or harvests.
- o Total ultimate harvest will be between 2 and 5 percent less than the amount offered for sale in each year. Timber is harvested on an average of two and one-half to three years after sale.
- o Herbicides will be permitted beyond 200 feet from watercourses in order to retard hardwood intrusion.
- o Neither Canada, Japan, nor the domestic industry will change its import or export policies.

Base Case

The Base Case represents a continuation of current policies. It incorporates CBO's judgment of what is reasonable, given no major outside shocks or changes in Congressional or Administration policy. It assumes that between 85 and 95 percent of the recommended Resource Planning Act (RPA) program would be funded, but it does not assume that all timber offered for sale would be either sold or harvested. 1/ In Table 7, production by region under the Base Case for calendar years 1985 through 1990 is compared to that of 1979.

1/ The Resources Planning Act of 1974 directed the Forest Service to prepare comprehensive analyses of the requirements for an implication of a variety of alternative program outputs. The RPA program refers to the recommended harvest levels established in 1975. The Congress has usually funded about 80 to 90 percent of that program. A new report with new recommendations will be issued in 1980.

TABLE 7. BASE CASE PRODUCTION FROM NATIONAL FORESTS, 1985-1990 COMPARED TO 1979 FOR ALL HARDWOOD AND SOFTWOOD SAWTIMBER HARVEST BY REGION (In billions of board feet per year)

	1979 (Forest Service estimate)	Base Case 1985 through 1990 (CBO projection, annual average)
Hardwood and Softwood		
Maximum Sustainable Production	15.1	15.1
RPA Recommended Sale Level a/	13.5	14.7
Offered for Sale a/	12.3 b/	13.2
Total Harvest from Past Sales c/	11.5	12.3
Softwood Sawtimber Harvest d/		
Rocky Mountain (Regions 1, 2, 4)	1.7	2.3
Pacific Northwest (Region 6)	4.5	4.4
South (Region 8)	0.9	0.7
California (Region 5)	1.8	1.9
Alaska & Other (Regions 3, 9, 10)	1.2	1.4
Total	10.1	10.7

a/ If fully implemented, the Resources Planning Act recommended program would have 14.75 billion board feet of timber prepared and offered for sale in 1985. A continuation of current law, however, would actually lead to somewhat less timber being offered than the original RPA program recommendation because the Congress has not appropriated funds for the full RPA program.

b/ In fiscal year 1980, approximately 12.2 billion board feet will be prepared and offered for sale. The President's budget proposes 11.9 billion board feet for fiscal year 1981. Because of this, the Base Case might be somewhat too high.

c/ Harvests take place on an average of 2.7 years after the sale. The delay is mostly due to road construction.

d/ Softwood sawtimber is the largest portion of timber sold; however, some roundwood and hardwood is also sold.

The Base Case reflects CBO's assumptions that the Forest Service successfully attained its goals for timber sales in 1979 and that increases in harvests after 1979 will be slow but steady. Under the latter assumption, production of softwood sawtimber in 1985 through 1990 would be 10.7 billion board feet per year, 1.3 billion board feet per year more than the average harvest level since 1970 and 0.6 billion board feet per year more than in 1979. A key assumption is that timber offered for sale in the Rocky Mountain regions could be sold at appraised prices. Moreover, it is possible that the Congress will restrict timber sales in Alaska. New regulations, environmental opposition, and general economic trends might also make this projected increase in sales and production difficult to attain.

The Base Case might be a slightly optimistic scenario. While it is considerably below the RPA schedule recommended by the Forest Service, it does assume that the Service will solve many of its present problems, particularly with deficit sales, and that most Land and Resource Management Plans will be implemented. Some analysts believe that actual production will be 0.5 to 1.0 billion board feet lower in 1985 than this estimate.

Case I--General Expansion

This case would increase sales so that production of softwood sawtimber could increase by 1985 to about 1.5 billion board feet more per year than in the Base Case (see Table 8). For comparison, the 1985 through 1990 level is 2.1 billion board feet per year over production in 1979. This case would produce the maximum feasible amount of softwood sawtimber within all existing constraints--legal, economic, environmental, engineering--and would probably require fewer departures than would the other cases.

This case represents a balanced expansion--that is, increased sales in all regions. Tables 8 and 9 compare the Case I production that would result in 1985 through 1990 to that of 1979 and to that of the other cases. Table 8 shows that all regions (except Alaska and the Northeast) would increase production as a result of increased sales by at least 0.3 billion board feet per year over the Base Case.

It is possible that this scenario could not be attained through increased appropriations alone. The projected sale levels were designed to meet NDEF restrictions, but some other constraints might occur. It is not clear, for instance, that sales, particularly in the Rocky Mountains, could be increased to the projected 1985-1990 level without changes in sale accounting procedures or discount rates.

TABLE 8. SOFTWOOD SAWTIMBER PRODUCTION FROM NATIONAL FORESTS FOR FOUR CASES, 1985-1990 COMPARED TO 1979 BY REGION (In billions of board feet per year) a/ b/

		1985-1990 (CBO projection, annual average)			
	1979 (Forest Service estimate)	Base Case	Case I General Expansion	Case II Expansion Emphasizing Pacific NW	Case III Intensive Expansion
Rocky Mountains (Regions 1, 2, 4)	1.7	2.3	2.8	2.2	2.9
Pacific Northwest (Region 6)	4.5	4.4	4.7	6.1	6.1
South (Region 8)	0.9	0.7	1.0	0.5	1.0
California (Region 5)	1.8	1.9	2.2	2.1	2.2
Alaska & Other (Regions 3, 9, 10)	1.2	1.4	1.5	1.3	1.5
Total	10.1	10.7	12.2	12.2	13.7

a/ These estimates are for harvests that would result from sales of softwood sawtimber. Total sales increase at rates similar to those of harvests. These tables do not imply that what is sold in any given year is also harvested in that year, since harvests actually occur two to three years after the timber is bought. An increase in sales, however, leads to an increase in harvests from past sales, all other things being equal.

b/ These CBO projections were developed as inputs for the DRI FORSIM model so that it could compute prices, total production, and investment rates.

TABLE 9. TOTAL NATIONAL FOREST PRODUCTION OF SOFTWOOD SAWTIMBER FOR FOUR CASES, 1980-1990 (In billions of board feet per year) a/

Calendar Year	Base Case	Case I General Expansion	Case II Expansion Emphasizing Pacific NW	Case III Intensive Expansion
1980	10.1	10.1	10.1	10.1
1981	10.2	10.3	10.3	11.0
1982	10.3	10.7	10.9	12.2
1983	10.5	11.3	11.3	12.8
1984	10.6	11.7	11.7	13.3
1985-1990 (annual average)	10.7	12.2	12.2	13.7

a/ These estimates are for harvests that would result from sales of softwood sawtimber. Total sales of all material increase at rates similar to those of harvests. In actual practice, the industry removes timber in response to market conditions, and so harvests would not accelerate as smoothly as this table indicates.

Case II--Expansion with Emphasis on the Pacific Northwest

This case would not only expand sales and production by the same amount as Case I (1.5 billion board feet per year) but also would respond to some of the market problems existing in Case I. Case II would not rely as heavily as Case I on Rocky Mountain production. Rather, it would expand sales in the Pacific Northwest through departures to the non-declining even-flow constraint. The purpose of this case is to provide sales in the area where sufficient processing capacity and markets exist, and where recent price increases have been greatest.

Under this alternative, production from National Forests in that region would increase by 33 percent from 1980 to 1985. This case represents a 10-year departure of about 25 to 30 percent beyond sustainable yield levels. Litigation might result because of the balanced development constraints of the Multiple Use Act, however, this study assumes that such litigation does not retard the acceleration in sales.

Case III--Intensive Expansion

By 1985, this case would expand total National Forest timber sales by 3.0 billion board feet per year over the Base Case. The increase from 1979 levels would be 36 percent. This case has the single purpose of producing the maximum harvest from all regions that is technically feasible within the time frame. It would require substantial departures in most regions and would probably be challenged in court with respect to balanced development and environmental impact.

EVALUATION OF THE ALTERNATIVES

In this section, the policy alternatives are evaluated in terms of the three criteria proposed in the previous chapter--price effects, sustainability, and regional effects--as well as several other factors, such as the effects on the federal budget, environment, employment, and international markets. The effects of each alternative are compared to those expected in the Base Case.

Effects of the Base Case

Price Effects. Under the Base Case assumptions that current policies and economic conditions will continue, the Producer Price Index for softwood lumber would increase at an average annual rate of 13.34 percent for the next 10 years. Prices of plywood and other wood products would escalate about as fast as lumber. Since 1970, lumber price increases averaged 14.1 percent annually until late 1979.

The post-1970 trend of increasing demand and constrained supply will continue to put strong upward pressure on prices. Although housing construction was declining through 1979, wood product prices remained roughly constant until the beginning of 1980. Since that time, product prices have declined rapidly, but stumpage prices have stayed relatively high. 2/ When the housing market increases its demand for lumber again, prices are estimated to surge by up to 35 percent per year. 3/

Sustainability. The Base Case is designed so that as little pressure as possible is put on NDEF or multiple-use constraints. This analysis concludes that the projected rate of harvest could be sustained without departures.

2/ Random Lengths (March 1980).

3/ Data Resources, Inc. (DRI), unpublished study prepared for CBO (March 1979).

Regional Effects. Under the Base Case, capital investment would decline in the western regions and increase in the South. In the Pacific Northwest, direct employment in wood product industries is estimated to drop from its 1979 level of 162,000 to about 131,000 in 1990. 4/ The annual decline in asset value of industrial facilities in the Pacific Northwest and Rocky Mountains will exceed new investment in virtually every year.

Other Considerations. Opposition to continued increased timber sales from the National Forests has grown in recent years as new sales of old growth gradually intrude into environmentally sensitive areas, in the Rocky and Cascade Mountains. Because the Base Case would expand production in those regions, the potentially adverse effect on the environment might generate even more intense opposition. Public opposition leads to litigation which, in turn, delays sales and restricts production. In areas that are experiencing a decline in private harvests, public support of new sales might exceed the opposition because of the perceived employment benefits of increased sales.

Incremental receipts from increases in sales assumed for the Base Case (600 million board feet per year) are estimated to be less than the Forest Service's incremental costs because stumpage prices in that region are relatively low. In 1985, the incremental costs (which are chargeable to sales in that year) for administration, road construction, and reforestation would be between $50 and $200 million. Receipts from additional sales would be about $50 to $100 million. To attain the Base Case production level in 1985 would require 600 to 700 additional, permanent, full-time employees of the Forest Service. 5/ Sales under the Base Case would slightly stimulate employment and increase receipts to county governments in the Rocky Mountains. In addition, the Base Case could have a small but stimulative effect on exports and a slight dampening effect on imports from Canada.

Effects of Alternative Cases

Price Effects. Generally, the greater the increase in sales and production, the greater the retardation of price escalation. The Producer

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4/ DRI, unpublished study.

5/ USDA, Forest Service, Options for Dampening Softwood Timber Products Price Increases, 1978-1990 (draft, May 28, 1978); Enoch Bell, Expanding Softwood Production, p. 61.

Price Index for softwood lumber is projected to increase at an average rate of 13.34 percent per year from 1979 to 1990 in the Base Case. In the alternatives, the annual average rates would be 12.64 and 12.83 for Cases I and II, respectively, and about 12.47 percent for Case III. 6/

It is possible that actual price increases will exceed these estimates due to a stronger than foreseen reduction in private timber supply. Some new evidence supports a more pessimistic view of future supply. 7/ In that case, price increases could rise faster than these estimates, but it is expected that the differences among the alternative cases would remain almost the same.

Most of the price effects of accelerated production would not take effect until the second half of the decade. For example, under Case II a new house would cost about $85 less in 1982 than it would under the Base Case. By 1985, however, the difference would be about $650 and by 1990, the difference would be about $1,400. 8/

The effect on the overall annual increase in the Consumer Price Index (CPI) would be approximately 0.004 to 0.005 percent per year. If the average increase in the CPI through 1990 is 7 percent per year under current policies, it would be lowered to 6.996 percent per year under Cases I and II, and to about 6.995 percent per year under Case III.

Sustainability. Because of land withdrawals and restrictions under the new Land and Resource Management plans, it is doubtful whether the National Forests could sustain the increases in sales of any of the alternatives. Case I was designed to increase production in those regions that now have some surplus allowable sale quantity. But it appears that the surplus is too small to support increased sales unless the departure provisions are used. Case II is designed to exceed sustainable levels in the Pacific Northwest

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6/ DRI, unpublished study.

7/ Forest Industry Council, Forest Productivity Project, Forest Productivity Reports (1979).

8/ The comparisons are based on a new house that costs $65,000 in 1979, assuming that $9,100 (14 percent) of the cost is wood products, and that the amount of wood products in future new construction is the same as it is today. By 1985, the cost of wood products in that house would be $22,825 under the Base Case, and $22,175 under Case II. The cost of the house, however, would be about $124,365 assuming that 1970-1978 inflation rates continue. The savings from changes in timber policy would be approximately 0.5 to 1.0 percent of the purchase price of the house.

region by over 1 billion board feet per year. This would require very large departures on virtually all Pacific Northwest forests. Case II might require new legislation because of the extent of sale increase. Case III would exceed sustainable levels in most regions.

It is not clear whether departures would be "one-time occurrences" and would thereby lead to sale increases for only 10 years, or whether departures could be successive. It is likely that the National Forest total sale levels will decline after the first decade of departures.

Regional Employment. Three regional trends are expected to reoccur in the wood products industry as soon as the housing market recovers:

- o Production of wood products in the South will increase, while remaining constant or decreasing in other regions.
- o Capital investment will increase in the South, but decrease in the Pacific Northwest.
- o As productivity increases, total employment is projected to decrease, particularly in the Pacific Northwest.

None of the alternatives would reverse any of these trends, but they could affect them to a limited degree. In the short run, employment in the wood products industry in the Rocky Mountains is expected to remain either stable or decline slightly under the Base Case. Employment in the Pacific Northwest is not expected to recover to 1979 levels. Implementation of Case I would stimulate the economy of the Rocky Mountain region, and Case II would support employment in the Pacific Northwest for a short period. By about 1989, however, the decline in private sector production in the Pacific Northwest and moderate increases in productivity would cause employment to fall below 1979 levels in all cases.

By 1990, under the Base Case, employment in the Pacific Northwest is expected to be between 19 and 28 percent below 1979 levels. Cases II or III would increase production from the National Forests in the Pacific Northwest, but because the industry is expected to shift some production from its own land toward National Forest land, the increase in National Forest sales will be eroded by almost 50 percent. As a result, total 1990 production in that region will probably be less than that in 1979. 9/

In the longer term, a great deal depends on whether private harvests decline moderately or severely. If the decline is moderate, by 1990, total

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9/ CBO estimates based on data from DRI, unpublished study.

Pacific Northwest employment in the wood products industry under Cases II and III is estimated to be 13 percent lower than its 1979 level of 162,000. If the decline of private harvests is severe, and particularly if the departures are not sustained through 1990, Pacific Northwest employment could be 27 percent lower than 1979 levels (see Table 10). 10/

This analysis estimates effects only as far as 1990. Since most departures would probably last for 10 years and many might be one-time occurrences, production from National Forests could decline as the departures terminate soon after 1990. Under alternative scenarios, an increase in sales from departure could be apportioned over six to eight years instead of the full decade in order to respond with more flexibility to national demands for wood products in the short term. Those scenarios are exhibited in Table 10 under the heading of "Cases II or III: Temporary Increase in National Forest Production."

Any decision to expand National Forest sales in the Pacific Northwest should consider two uncertainties: whether private production will decline rapidly or slowly, and whether the expanded sales planned under departure will lead to proportionate increases in harvests. No data exist to resolve the first uncertainty, and only some evidence is applicable to the second. For a number of practical reasons the Forest Service often falls short of its sale target, and the backlog of timber that has been sold but remains uncut increased by about 40 percent between 1974 and 1979. 11/ Also, the Service seems consistently more optimistic about goals than subsequent performance warrants. 12/ Accordingly, one should not assume that the goals of Cases II or III can necessarily be attained or, more importantly, maintained.

A major concern for the Pacific Northwest is that production from private forests will decline substantially during the next 15 years. To add to the uncertainty, some feel that employment per thousand board feet may decline faster than that assumed in Table 10 because of increases in productivity. On the other hand, as timber harvesters shift to the smaller

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10/ Ibid.

11/ Written testimony prepared in response to questions from the Committee on Agriculture, Nutrition and Forestry, U.S. Senate (February 21, 1980).

12/ Roger Fight and Enoch Bell, Coping with Uncertainty, A Conceptual Approach for Timber Management Planning, USDA, Forest Service Technical Report PNW-59 (1977).

TABLE 10. PRODUCTION AND EMPLOYMENT IN THE PACIFIC NORTHWEST IN 1990 UNDER DIFFERENT SCENARIOS a/

Harvest Level	National Forest Production (billions of board feet per year)	Private Production (billions of board feet per year)b/	Total Employment (thousands)	Decline from 1979 Levels (thousands)
Base Case National Forest Production (with Moderate Decline in Private Harvests)	4.4	8.9	131	31
Base Case National Forest Production (with Severe Decline in Private Harvests)	4.4	7.5	117	45
Cases II or III: Sustained Increase in National Forest Production (with Moderate Decline in Private Harvests)	6.1	8.2	141	21
Cases II or III: Sustained Increase in National Forest Production (with Severe Decline in Private Harvests)	6.1	6.8	127	35
Cases II or III: Temporary Increase in National Forest Production (with Moderate Decline in Private Harvests)	4.7	8.7	130	32
Cases II or III: Temporary Increase in National Forest Production (with Severe Decline in Private Harvests)	4.7	7.3	118	44

a/ CBO estimates, based on data from DRI, unpublished study.

b/ Private production in 1979 in the Pacific Northwest was about 10.4 billion board feet. A moderate decline is assumed to be about 14 percent by 1990. A severe decline is assumed to be a decline of 28 percent by 1990.

logs of second-growth forests, employment in the woods and in processing might increase. If the decline in private production is substantial, then the short-term increases of Case II or Case III could be risky because they would consume whatever incremental buffer or margin the Forest Service could provide to compensate for the private decline. Under Cases II or III, employment would increase to about 170,000 for two to four years and then decline rapidly to between 115,000 and 145,000. The decline per year under Cases II or III could be about twice that of the Base Case. The rate of change of employment is in some economic and social respects more important than the level.

This study cannot determine which of the scenarios in Table 10 is the most probable. It is plausible that the Pacific Northwest economy could be healthy in 1990 even if the worst alternative in Table 10 happens, because other factors could compensate for the effects evaluated in this study. On the other hand, there is a substantial risk that employment might decline severely. If one believes that this risk should be minimized and that departures provide one method to stimulate employment, then departures might be more useful in the future when the need might be greater.

Other Considerations. Expanded timber sales adversely affect the environment to some degree. By this standard, any of the alternatives would be inferior to the Base Case. The Forest Service has concluded that environmental effects could be controlled by specifying the type of harvest technique or investment level. 13/ If investment levels could be increased substantially, adverse effects could be minimized. Otherwise, the major effects associated with any of the alternatives would be degraded water quality, additional stress on threatened or endangered species, and scenic attractiveness. Case I, which encourages production in the Rocky Mountains, would, according to Forest Service studies, adversely affect soil productivity and big game habitat as well. Case II would degrade air quality and fish habitats in the Pacific Northwest. And Case III would produce problems in both regions. 14/

All the alternatives would require budget and manpower increases in comparison to the Base Case. Generally, costs per incremental board foot to prepare and manage sale programs are high in the Rocky Mountains, Alaska, and the Sierras. They are relatively lower in the Pacific Northwest

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13/ USDA, Forest Service, Timber Harvest Scheduling Issues Study (October 1976).

14/ Enoch Bell, Expanding Softwood Production, USDA, Forest Service, p. 34.

(on the western side of the Cascades), and the South. Receipts for sales are highest in California and the Pacific Northwest and low in sections of the Rockies, Alaska, and the South. It follows, therefore, that Case I, which depends on increased Rocky Mountain production, would have a poor receipt-to-cost ratio. Case II would have a relatively good ratio because it focuses on production from the Pacific Northwest. The ratio for Case III would be relatively poor because of the large increase and high marginal costs. It should be noted that if sale procedures and accounting systems are altered, these effects would change substantially.

Projections of budgetary costs are controversial because of the budget accounting system used. Small production increases in the Pacific Northwest would be inexpensive and very cost-effective, but further increases would involve higher costs as more timber was sold in areas in which new road construction was necessary. In Case I, costs above the Base Case would probably be between $120 and $415 million per year, with incremental receipts of about $150 to $225 million. 15/ Costs of Case II would be somewhat lower than those of Case I, but incremental receipts would probably be greater. Case III would probably not be cost-effective overall because the increased costs in the Rocky Mountains would be larger than the incremental receipts in the Pacific Northwest.

The Forest Service has not made projections of costs and receipts for increases in sales of the scale used in this study, and extrapolations from their data for small increases is hazardous. Neither budgetary costs nor sale receipts tend to increase proportionately to sale increases. Budget costs escalate faster than sales, and sale receipts increase more slowly. A linear extrapolation, however, would indicate that the annual cost/benefit ratio for Case I would be about 0.4 to 0.6; for Case II, about 1.3 to 1.6; and for Case III, about 0.7 to 1.0. 16/ Generally, as sales increase, and stumpage prices decrease, receipts per unit will fall even as costs are increasing.

The additional Forest Service manpower needed to support the expansions would be roughly 1,400 to 3,000 for Cases I and II and 2,500 to 6,000 for Case III. 17/

15/ USDA, Forest Service, Options for Dampening Softwood Timber Products Price Increases, p. 28.

16/ Correspondence from Donald Funking, Assistant Director, Timber Management, Forest Service, January 11, 1980.

17/ USDA, Forest Service, Options for Dampening Softwood Timber Products Price Increases, p. 28.

Any increase in timber sales would slightly affect imports and exports. The net effect on the balance of payments would be positive. Imports from Canada would decline under Cases I and II by about 200 million board feet per year by 1990. Under Case III, imports would decline by almost 600 million board feet per year. 18/ Exports could be indirectly stimulated to a very slight degree.

SUMMARY

The analysis of the options leads to the conclusion that even large increases in sales by the Forest Service would have relatively modest effects on price escalation. The small effect on prices would be caused in large part by the substitution by private owners of public timber for their own stocks. The projected increases would exceed sustainable levels and would require a departure from non-declining even-flow guidelines. Case II, which relies upon an accelerated production in the Pacific Northwest, might be superior to the other alternatives. It does, however, carry the risk that near-term increases could preclude longer-term action to compensate for a decline in private harvests. A general expansion (Case I) would be costly in an economic sense and would be likely to cause environmental problems in the Rocky Mountain regions. Those who feel that the retardation of price escalation is not worth the risks to the resources and to the economy of the Pacific Northwest might prefer a continuation of current policies to the alternatives.

18/ DRI, unpublished study.

APPENDIX

APPENDIX. PRICE PROJECTIONS

This Appendix provides technical information on the price projections made in this paper. The Congressional Budget Office contracted with Data Resources, Inc., (DRI) to use its FORSIM model of the wood products industry so that the projections for the different cases would be internally consistent and would be linked with current macroeconomic conditions.

The FORSIM model is generally considered to be the most a reputable and reliable predictor of market conditions that is available. It is widely used by the industry. It was judged by the Congressional Budget Office to be more than adequate and valid for the purposes of this analysis. The Council on Wage and Price Stability used the FORSIM model for its study of lumber prices. 1/

The Congressional Budget Office requested that DRI supplement FORSIM with a model of stumpage prices called the Timber Assessment Market Model that was developed for the Forest Service. 2/ This Appendix describes the FORSIM model, explains how CBO and DRI used it and the Haynes/Adams model to project prices and investment, and summarizes the results.

THE FORSIM MODEL

The model is designed primarily to estimate future prices of lumber and plywood, as a result of projected market demand for wood products and timber availability. Generally, the model manipulates the demand and supply inputs in order to compute prices and regional effects. Secondarily, the model projects shipments of products and new mill capacity. The model assumes that most demand for products is derived from other demands, such as housing and industrial products. As a result, short-run demand is not greatly affected by changes in prices. In the longer run, demand responds to prices with an elasticity of about -0.2.

1/ Council on Wage and Price Stability, Lumber Prices and the Lumber Products Industry (October 1977).

2/ Darius Adams and Richard Haynes, 1980 The Timber Assessment Market Model, Forest Science Monograph (in press).

DRI establishes a future estimate for demand for lumber and plywood through its macroeconomic model. That model generates housing starts by type and region, expenditures on repairs, nonresidential building, industrial production, index of furniture and fixtures, and the AAA corporate bond rate. These data become inputs for the FORSIM model. The aggregated inputs used in this study for 1979, 1985, and 1990 are shown in Table A-1.

The other major input to the FORSIM model is regional timber availability and log supply. In typical studies for industrial clients, DRI assumes a level of supply and runs the model until supply and demand balance. But in this study, CBO asked DRI to adjust this procedure by assuming three alternative sale schedules for National Forest timber. A summary of the alternative sale schedules and the resultant production from National Forests appears in Tables 7, 8, and 9 of this paper. Because the National Forests provide only 22 to 25 percent of total domestic supply, CBO wanted DRI to estimate the level of production from private land and stumpage prices as a result of the alternative National Forest production levels. DRI used the Timber Assessment Market Model to compute some of the effects on timber production from private land, on lumber imports, and on prices as a result of the alternative National Forest sales.

The FORSIM model includes various "use factors" to translate end-use demand for various goods into projected consumption of wood products. Similarly, it forecasts industry production of wood products through its data on regional mill capacity and production costs. It then merges supply and demand and computes dealer inventories, mill inventories, imports, exports, and the backlog of unfilled orders. Through these factors, the model computes prices of end products, regional production levels, and employment, and then reiterates in order to adjust timber supply and imports/exports. Through the reiterative process, it frees mill capacity constraints and thereby develops estimates of new investment in mill capacity.

IMPLEMENTATION OF THE MODELS

The analysis first determined how stumpage prices and private supply in each of the three major timber regions would be affected by increases in the harvest of timber from the National Forests. DRI used the data on public harvests provided by CBO and the equations and elasticities from the Haynes-Adams model to calculate these effects. Four simulations were run, corresponding to the Base Case and three alternatives considered in this paper. These simulations established stumpage prices and production levels by region.

TABLE A-1. U.S. INDICATORS OF DEMAND FOR LUMBER AND PLYWOOD, 1979, 1985, AND 1990

	1979	1985	1990
Total Housing Starts (in millions of units)	1.95	2.44	1.85
Single-Family Housing Starts (in millions of units)	1.15	1.37	1.05
Repairs and Alterations (in millions of current dollars)	36.55	65.02	105.32
Nonresidential Building Contracts (in millions of current dollars)	41.65	79.04	122.00
Industrial Production Index (1967=100)	149.60	202.30	231.30
Furniture and Fixtures Index (1967=100)	1.62	2.20	2.52
Yield, AAA Corporate Bond (percent)	9.40	9.50	8.80

SOURCE: DRI Macroeconomic Model, March 1979.

These data on supply were then inserted into the quarterly and annual Lumber Product Models of FORSIM in order to assess the effects on prices of wood products by region and for the nation as a whole. The next step in the analysis was to estimate the regional microeconomic effects on the lumber industry resulting from increased timber harvests from the National Forests. The different regions would experience varying market conditions as a result of the scenarios, and the model translated these into capacity ratios and profitability. These in turn were used to project new investment in mill capacity and employment by year for each region.

SUMMARY OF RESULTS

Through the beginning of 1990, the demand for softwood lumber would be relatively inelastic with respect to prices. Although in Case I lumber prices were 5 percent lower than in the Base Case, demand increased by only 1 percent. Because regional demand also would be inelastic, an expanded supply of stumpage in one region could lead to increased mill capacity only if the share of that region's national market could expand. If that share could not expand, industry would have little incentive to expand mill capacity, and constraints on mill capacity would affect the level of timber harvested from private land.

For example, lumber from the Pacific Northwest provides a share of the lumber consumed in the Midwest. If public timber sales in the Pacific Northwest provided increased supply but if the products from that increment did not penetrate the midwestern market, then industry in the Pacific Northwest would have little incentive to increase processing capacity. It would instead use more public timber and less private timber. Stumpage prices in that region would fall, but product prices would not fall proportionally.

This study found that increased sales of public timber in both the Rocky Mountains and the Pacific Northwest would reduce stumpage prices. Harvests of public timber would increase, but harvesting of private stock would decline in all cases. The lower timber costs in certain regions could affect product prices on a proportional basis if regional market shares could be increased. This study, however, found that lower product prices from mills in one region would be matched by changes in prices of imports and of products from the South. The South is able to reduce product costs (as it did in 1974-1975, and might be doing at this time) because its open market stumpage prices are very sensitive to small changes in demand and to pressures by mill owners to reduce costs. Because the South has demonstrated ability to match price reductions in other regions, the study concluded that rather large changes in stumpage prices in the Pacific Northwest or Rocky Mountains as a result of National Forest timber sales would have less than proportional effects on product prices, and market shares, and therefore would lead to rather small effects on regional mill capacity, production, and employment.

For example, the study estimates that in the Pacific Northwest mill closures would outweigh new investment in capacity by an aggregate value of $1.24 billion through 1990 under the Base Case, and by $0.93 billion under Case I. If National Forest sales of timber in the Pacific Northwest were increased by 1.7 billion board feet as in Case II, aggregate new investment

in capacity would outweigh closures by $120 million through 1990. These projections strongly indicate that the trend of new investment capacity toward the South and away from other regions is not likely to be reversed by the level of changes in National Forest timber sales that are evaluated in this study, and that the ability of the South to maintain regional shares would constrain the price effects of these policies.

If regional timber sales in Case II were 1.7 billion board feet over sales under the Base Case, FORSIM projects that the difference in sawmill capacity in 1990 in the Pacific Northwest would be 0.8 billion board feet. Production under Case II would exceed that of 1979 by 0.5 billion board feet, however employment in lumber mills would decline from their present level of 23,600. Employment in lumber mills in the Pacific Northwest would be 20,900 workers in Case II and 19,400 workers in the Base Case. It is clear that much of the increase in public timber sales would be absorbed by decreases in private harvests. As a result, the price effect is estimated to be smaller than it would be if private harvests were maintained.

A summary of selected results appears in Table A-2.

TABLE A-2. COMPARISON OF 1979 AND 1990

	1979	1990 Base Case	1990 Case I	1990 Case II	1990 Case III
Sawmill Capacity and Production (in billions of board feet)					
Northwest					
Capacity	9.4	8.7	8.8	9.5	9.3
Production	8.5	8.3	8.4	9.0	9.0
Rocky Mountains					
Capacity	10.6	11.2	11.4	11.1	11.3
Production	9.6	10.7	10.8	10.5	10.9
South					
Capacity	9.0	9.8	10.0	9.7	9.9
Production	8.2	9.4	9.5	9.3	9.5
Canada					
Capacity	18.5	22.3	22.4	22.0	21.6
Production	16.8	22.0	22.0	21.8	21.5
Producer Price Index for Lumber	3.528	13.988	13.066	13.311	12.851
Average annual rate of increase (percent)	---	13.34	12.64	12.83	12.47
Stumpage Costs (dollars per thousand board feet)					
Northwest	252	573	530	450	424
Rocky Mountains	95	223	192	208	176
South	113	387	373	382	373

SOURCE: DRI FORSIM Model, March 1979. The FORSIM results for 1989 were extrapolated by CBO for 1990.