Timberland Investment Options

in

The North, South and Between

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Abstract.—Seven timberland investments — three from the Lake States, two in the Southeast, and two in the Central States are compared. Black walnut and loblolly pine plantation investments had the highest net present worths (NPW), followed by oak-hickory, northern hardwoods, aspen, red pine, and southern upland hardwoods. The mixed species investments have greater recreational use value than the monoculture investments. Management practices and yield forecasts are better for the monoculture investments than for the mixed species types.

The risk of each investment is discussed with the general conclusion that the mixed species investments have slightly less risk due to species diversification. Stumpage markets and timber markets are slightly better for the monoculture investments when nontimber uses are excluded. However, the northern hardwoods and oak-hickory types are in demand for recreational use and thus have good land markets.

Keywords: Net present worth, investments, risk, non-timber use.

INTRODUCTION

There are substantial differences in the climate for timberland investments in various regions of the United States. Potential timberland investments in the South — southern pine plantations and upland hardwoods; in the North — aspen, red pine, and northern hardwoods, and the Central region — black walnut and central upland hardwoods are compared. Differences and similarities in timber markets, cultural practices, non-market goods, riskiness, and social and institutional constraints are presented. The impact of different conditions on the potential profits and investment suitability is discussed.

Investments are compared in terms of financial return as measured by net present worth (NPW) excluding land costs, timber and timberland market conditions, demand for non-market use, riskiness, and availability of technical forestry knowledge. The analysis of each investment alternative assumed typical cultural practices and high sites for each timber type. A real annual discount rate of 4% was used in the financial calculations. The NPW was

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computed for constant 1985 dollars and for various real price increases which will be indicated below. Inflation and state and federal income taxes were not included in the analysis. Details of each investment alternative are provided next. Stumpage prices for central investments came from the Indiana Forest Products Marketing and Wood Utilization Report (Hoover and Parks 1985), for the northern investments from Timber Mart-North (Norris 1985), and for the southern investments from Timber Mart-South (Norris 1985).

Aspen

A coppice system of aspen management is simulated on site index 80 land using Schlaeger's (1971) growth and yield model assuming thinning at year 20 back to a basal area of 95 square feet, and clear cutting at year 35. Annual costs which include both property taxes and management costs are $2.50 per acre per year. Stumpage prices are $8 per cord and $30 per thousand board feet (MBF) (International 1/4 inch). A real price increase of 0.5% per year for sawtimber is also considered. The investment horizon is 105 years or three rotations.

Red Pine Plantation

The red pine investment is an even-aged management system which includes pre-commercial thinning at age 10 and 20, followed by commercial thinnings every 10 years until clear cutting at age 120. Assuming site 60, growth and yield estimates are derived from Bassett (1984). Annual costs are $3.00, establishment costs are $150 per acre, and stumpage prices are $12 per cord and $75 per MBF (Int. 1/4). A real annual price increase for sawtimber of 1% is assumed. The investment horizon is 120 years or one rotation.

Northern Hardwoods

Prediction of the investment returns for northern hardwoods assumes an uneven-aged stand with an initial stocking of 4 MBF (Doyle). Due to the lack of a growth and yield model, annual growth of 200 board feet is used to estimate future yield. Timber harvests assume a cutting cycle of 15 years with a residual growing stock of 4 MBF per acre. Annual costs are $3.00, the establishment cost for the purchase of the initial growing stock is $300 per acre, and stumpage prices are $6 per cord, $100 for sawtimber, and $250 for veneer quality timber. Annual real price increases for cords is 0.5% and 1% for sawtimber. The investment horizon is 120 years or one rotation.

Black Walnut Plantation

The black walnut plantation was established by planting 350 tree per acre at a cost of $1,200 per acre. Cultural activities include initial pruning at 4 years, a pre-commercial thin at 15 years, commercial thinnings at years 20, 45, 60, and 70, and clear cutting at 80. Additional pruning of crop trees and other intensive management activities increased the annual costs to $5.00 per acre. Stumpage prices varied between $425 and $1,600/MBF depending on the quality and size of the timber. Annual real price increases of 0.8% and 1.9% for sawtimber and veneer respectively are incorporated in the analysis. The investment horizon is 80 years or one rotation.
Oak-Hickory

The oak-hickory investment is based on the projection of a typical mixed hardwood stand which would occur in south central Indiana. The initial basal area is 136 square feet per acre, with a sawtimber stocking of 7.343 MBF (Doyle) per acre. Assuming a black oak site index of 85 and using Central States version of TWIGS (Miner et. al. 1987), growth and yield estimates are obtained for a cutting cycle of 10 years, residual basal area of 95 sq. ft./acre, Q-factor of 1.3 and an upper diameter limit of 20" DBH. Establishment costs to purchase the initial growing stock total $650 per acre. Annual costs are $2.50 per acre. Stumpage prices varied from $28 to $925/MBF (Doyle) due to species and quality differences. An average real price increase of 0.5% for sawtimber is considered. The investment horizon is 100 years or ten cutting cycles.

Loblolly Pine Plantation

Timber yields were taken from empirical yield tables developed by McClure and Knight (1984) as revised for use in the South's Fourth Forest study (1986). The base stumpage rates used were $15 per cord for pine pulpwood, $140 per thousand board feet, Scribner scale for pine sawtimber, $5 per cord for hardwood pulpwood and $75 per thousand board feet, Doyle rule for hardwood sawtimber. Available yields were expressed in total cubic feet and converted at the rate of 80 cubic feet per cord for all pulpwood, 200 cubic feet per MBF, Scribner for pine sawtimber, and 225 cubic feet per MBF, Doyle for hardwood sawtimber. The real stumpage price increase assumed for pine pulpwood was 0.75 percent per year. Real pine sawtimber prices were set to rise at 1.5 percent per annum. For all investments, hardwood prices were held constant at the 1986 prices.

The investment considered here is the conversion of upland hardwoods to loblolly pine. Extensive site preparation is needed for these sites to minimize hardwood encroachment on the planted stand resulting in an establishment cost of $152 per acre. A stand establishment cost of $105 per acre was used for rotations following the initial conversion from hardwood. The resulting pine plantations were managed on a 30 year rotation and yielded 108 cubic feet per acre annually. The investment horizon is 150 years or five rotations.

Upland Hardwood

Regeneration of upland hardwood sites is an option not often practiced in the South. However, regeneration from sprouts and seed-in-place is possible. An initial establishment cost of $50 was used for deadening or felling undesirable residuals. Timber stand improvement to favor potential crop trees at $45 per acre was also included at year 20. These stands were managed on 55 year rotations and produced an average of 52 cubic feet of merchantable timber. Yields are mostly hardwoods, 93 percent, with 65 percent sawtimber and only a minor pine component. Stumpage prices are the same as described for hardwood in the loblolly section. The investment horizon is 165 years or three rotations.

RESULTS

Net present worths in constant prices and with real price increases are
shown in Table 1. In constant dollar terms the investments are surprisingly similar with the exception of red pine and upland hardwoods. Loblolly pine is higher due to more complete utilization of the resource. Pulpwood markets are limited in many of the northern and central forest investments; thus, only pre-commercial thinning or no thinning is possible. With the inclusion of real price increases, the black walnut and loblolly pine investments increase greatly and dominate NPWs. However, even modest real price increases (i.e. 0.5%) made all the investments (except upland hardwoods where no price increases are assumed) very attractive investment options. Clearly, loblolly pine and black walnut plantation on high sites appears to be profitable.

Table 1. Net present worth per acre assuming constant 1985 stumpage prices and real stumpage price increases for seven forest investments.

<table>
<thead>
<tr>
<th>Investments</th>
<th>Net Present Worth/Acre ($)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Constant 1985</td>
</tr>
<tr>
<td>Aspen</td>
<td>110</td>
</tr>
<tr>
<td>Red Pine</td>
<td>33</td>
</tr>
<tr>
<td>Northern Hardwoods</td>
<td>223</td>
</tr>
<tr>
<td>Black Walnut</td>
<td>227</td>
</tr>
<tr>
<td>Oak-Hickory</td>
<td>264</td>
</tr>
<tr>
<td>Loblolly Pine</td>
<td>441</td>
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<tr>
<td>Upland Hardwoods</td>
<td>-24</td>
</tr>
</tbody>
</table>

If the NPWs of the investments are similar, are the markets for timber and timberland similar? Timber markets are characterized in terms of number of buyers and sellers and the number of stumpage products traded. The market for loblolly pine in the Southeast clearly is the most active in terms of both product types (pulpwood, chip-N-saw, sawtimber, peelers, poles) and buyers and sellers. The market for black walnut is equally active, but the total market is much smaller, and the product types are primarily sawtimber and sliced veneer. However, almost any walnut tree over 10" DBH can be sold. The other forest types have weaker markets. The hardwood markets are complicated by species and quality differentiation which reduces the actual number of buyers for a particular product in what appears to be a very competitive market. The aspen and red pine markets are small in comparison to the total resource available in the Northern Lake States. Use of this raw material is increasing with waferboard and new pulp processes. However, pulp imports are impacting negatively.
The timberland market is defined as the ability to sale or liquidate the forest property - land and timber. The author's relative ranking of timberland markets places loblolly pine plantations first, followed by oak-hickory, northern hardwoods, upland hardwoods, aspen, red pine, and black walnut. Loblolly pine is first because of the general market activity in the Southeast. However, large tracts (greater than 1000 acres) of loblolly may be difficult to sell due to large capital requirements. The mixed hardwood stands are placed next because they are in demand for recreation sites in the north and north central regions. These stands are generally sold in smaller units (less than 200 acres) and have many multiple use attributes. Timber production may be one of the least significant to many buyers. Aspen and red pine stands are considered less attractive for multiple use and frequently occur in larger units. Thus, until timber markets improve for these species, the timberland market will continue to be relatively weak. Since few acres of black walnut plantation are or have been on the market, the market characteristics are unknown. The high initial cost of the plantations will place a high reserve price on these acres which might make them relatively difficult to liquidate in early years of the rotation.

As was mentioned above, nontimber use of forest land investments is important. Demand for recreational use for summer homes, hunting and fishing, hiking, nonconsumptive wildlife use, and camping is increasing. This demand is well established in the Lake States and North Central regions. Similar use with perhaps greater emphasis on hunting and fishing is noted in the Southeast. Although difficult to evaluate, recreational uses of forest resources significantly influence timberland markets. The impact of nontimber resources such as watershed in the eastern United States is small. For the investments considered, those in the Lake States have the greatest portion of value associated with nontimber uses, followed by those in the Central region, and those in the Southeast.

Risk is an important consideration in any investment. Risk is the chance that an investment's capital will be lost and/or earnings will be less than expected. A simple statement of risk might be things are not going as planned. The perception of risk is, however, very personal. Many factors including an investor's total wealth, diversification of his/her investment portfolio, and his/her personal risk preference or attitude toward risk (Mills 1987). Assuming that growth and yield estimates are reasonable, the probability of loss of forest capital is small. Rarely is a tract of timberland completely destroyed by fire, wind, insects, or disease. The more diverse the investment is terms of age class, geographic, and species distribution the lower the physical loss percentage will be. However, the situation for many small timberland investors is an investment in one location with small acreage and a single species. Unless the investor's non-timber investments provide diversification, the risk perception is high.

Another aspect of timberland risk is market or price risk. Defining price risk as fluctuations or the variance in prices, loblolly pine, aspen, and red pine stumpage markets have greater risk than the hardwoods. This is due to two factors. First the conifer species are used to produce a commodity good which varies with the business cycle. Secondly, these timberland investments are for single species and there are no offsetting price changes. In the mixed hardwood investments, changes at the stumpage level are smaller and occur slower, and the decline in stumpage for one species is often offset by
an increase in another. Mixed stands are simply more diversified and less subject to the business cycle. The actual impact of stumpage price fluctuation is usually very small. Because timber is a durable commodity, smart investors will not market timber in depressed markets, but hold the timber until stumpage prices increase. Thus, the true impact of stumpage price changes may be minor.

The amount of technological forestry knowledge available varies widely by species and location. More is known about even-aged, monoculture systems such as loblolly pine, aspen, and red pine than about uneven-aged systems or even-aged mixed species systems. Therefore, investors are more likely to invest in loblolly pine, aspen, red pine and black walnut plantations than in the mixed species investments because management practices are established and growth and yield estimates can be made. More research is needed in the mixed species types to establish management practices and yield estimates. These timber types offer diversification in small units and usually more multiple use opportunities.

CONCLUSIONS

No single forest investment dominates the investment characteristics considered in this paper. Loblolly pine has a high return potential, well understood cultural practices, but for small investors may be relatively risky and provides few nontimber benefits. The mixed hardwoods in the north and central region provide a good return in dollars and nontimber uses, but management practices and growth and yield relationships are poorly understood. Red pine and aspen have relatively poor stumpage markets, slightly poorer multiple use potential than the other investments, but a lot is known about the management of these forest types. A black walnut plantation investment can be considered a financial investment with little, if any, multiple use potential. The technology of black walnut production is known, but few rotations have been completed to confirm the research results. The profit potential is large, but so are the investment costs.

LITERATURE CITED


