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Steven H. Bullard

Stephen F. Austin State University, Arthur Temple College of Forestry and Agriculture, bullardsh@sfasu.edu

Tom Monaghan

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What's the Monetary Value of Your Premerchantable Timber?

Steve Bullard and Tom Monaghan, Mississippi State University

"Premerchantable" timber is not yet merchantable—in most cases this means the trees are too small to be sold for pulpwood or other commercial products. Sometimes referred to as "precommercial" or "immature," timber stands with average tree diameters less than five inches occupy over 50 million acres in the South—an area roughly the size of North and South Carolina combined.

Premerchantable timber stands may be highly valuable for commercial uses in the future, but what is their monetary value *today*? This important question often arises in buying and selling land that has premerchantable timber, in making damage estimates, and in allocating value between land and timber for tax purposes.

There are two broad types of monetary value—*market value* and *investment value*. Market value is the price for which an asset would sell on a competitive basis, and investment value is the value of an asset to a particular investor. Appraisers use various methods to estimate these values. Market value, for example, can be estimated using: the cost approach—an estimate of the cost

of replacing the asset; the income approach—an estimate of the value today of the asset's projected income; and comparable sales—information on prices paid for similar properties.

Most appraisers prefer to use comparable sales information to estimate the value of an asset, particularly when estimating market value. In some cases, however, sales information isn't readily available for properties with "comparable" site and stand characteristics.

In this article we describe a few of the methods used to estimate the value of premerchantable timber stands. The methods estimate investment value, and they can help in estimating the market value of premerchantable timber where comparable sales information



Landowners may find that their young pine stands are worth hundreds of dollars per acre more than just a few years ago.

is not available. Note that these methods estimate the value of the premerchutable timber *only*. To estimate the total value of a forested tract, land value should be added to the value of the premerchutable timber.

Traditional Methods

Two traditional methods of estimating premerchutable timber value are: (1) Compounded Costs, and (2) Discounted Revenues. Because these methods are often used, forest landowners should understand their basic rationale and application. Both of them ignore some important parts of premerchutable timber value, however, so they are not recommended for use in estimating investment value.

Compounded Costs

A common method of estimating premerchutable stand value is to "compound" all of the timber's production costs to the stand's current age. "Compounding" is the process of accounting for the time value of the money that has been invested in the stand. To do this, compound interest formulas are applied to site preparation, planting and other costs incurred in establishing and maintaining the stand.

Example. Consider a pine plantation that was established for \$150/acre eight years ago, and assume that 7% interest is the owner's guiding rate of return. Using the compounded cost approach, the investment value of the eight-year old stand is:

$$\$150 \times 1.07^8 = \$257.73/\text{ac.}$$

The compound interest formula used to calculate the \$257.73 is the same formula used by banks to determine account value. That is, if the \$150 had earned 7% each year in an interest-bearing account, the account would have \$257.73 after eight years.

Compounded costs are sometimes referred to as "seller's value," in this case reasoning that \$257.73 is the minimum amount a seller would accept for the trees if he wanted to earn 7% interest on the site preparation and planting investment. Others, however, prefer to call compounded costs "buyer's value," reasoning that \$257.73 is a relatively low estimate of value, and thus the amount a buyer would offer as appropriate using 7% interest.

In this example, note that the



\$257.73/acre estimated stand value does not include the value of the land. The estimated value is for the premerchtable timber only.

In general, the younger the stand, the more accurate the investment value estimate will be using compounded costs. This method, however, typically yields relatively low estimates of stand value because it underestimates the actual costs involved in producing a stand. The money tied up in land, for example, is part of a landowner's cost of producing timber, yet this cost is ignored in the compounded cost estimate of premerchtable timber value.

Discounted Revenues

Another method of estimating the investment value of premerchtable timber is to "discount" the timber's projected (future) revenues to the stand's current age. "Discounting" is the process of accounting for the time value of the money that is expected from the timber in the future. To do this, compound interest formulas are applied to the expected timber harvest revenues.

Example. If the pine plantation in the previous example is expected to be harvested at age 20 for pulpwood, what is the value of the stand at age eight to an investor who would like to earn 7% interest? If we assume the stand will yield 45 cords/acre of timber at age 20, and if we assume a future price of \$50/cord, the expected harvest value is (45 cds./ac.) x (\$50/cd.) = \$2,250/acre. Using the discounted revenue approach, the investment value of the eight-year old stand is:

$$\frac{\$2,250}{1.07^{12}} = \$999.03/\text{ac}$$

The formula above simply "discounts" the \$2,250/acre projected revenue for a 12-year period using 7% as the expected rate of return on the investment. Why was 12 years used? Because if the timber is purchased *today* (at age eight), revenue from selling timber won't be received for 12 years, when the stand is 20 years old. This approach calculates "present value" (value today) by "discounting" the value expected for the timber 12 years in the future. Note that if other harvest options are considered, their discounted value can also be calculated. The value of the premerchtable timber to a particular investor would be the highest value he obtains using his expected rate of return as the interest rate.

Again, this method uses the same formula used by banks to calculate account value—if you placed \$999.03 in a 7% interest-bearing account, after 12 years the account would have \$2,250. Discounted revenues are sometimes referred to as "buyer's value," reasoning that \$999.03/acre is the most a buyer would be willing to pay for the trees today if he wanted to earn 7% on the timber investment, and if \$2,250/acre in 12 years is a reasonable expectation of future revenues. Others use the phrase "seller's value" for discounted revenues, however, because the estimate is relatively high.

As with the other methods for estimating stand value, note that the \$999.03/acre estimated value is for timber only. Land value would need to be

added to estimate the value of land and timber together.

In general, the older the stand, the more accurate the investment value estimate will be using discounted revenues. As noted above, however, the discounted revenue method often yields relatively high estimates of the investment value of premerchtable timber. Trees grow on land, and the cost of the money tied up in land is not accounted for in the above calculation of discounted revenues.

The ROI Method

The "ROI" method for estimating premerchtable stand value involves calculating and using the overall return on investment (ROI) for the land and timber combined. This annual interest rate represents the owner's rate of return on the money invested in land and timber during the life of a stand. The ROI method for estimating premerchtable stand value is more involved than most forest landowners can calculate "by hand," but computer programs and other aids are available for those with further interest in this important issue. [See the inset box titled "For More Information." on page 14]

The ROI method has three steps:

1. Calculate ROI for the land and timber investment.

ROI is the average annual rate of return on the investment, considering all costs and all projected revenues for the stand, including the value of the underlying land.

2. Calculate annual "land rent" using the land value and the calculated ROI.

This "rent" reflects the annual cost of using the land to produce a timber stand.

3. Compound all timber production costs to the stand's current age, using ROI as the interest rate.

"Compound" means to use compound

The "Time Value" of Money—

An Important Concept in Estimating the Monetary Value of Premerchtable Timber

Premerchtable timber is expected to produce revenue in the future – perhaps in five, ten, or twenty years – but each dollar of revenue to be received in the future doesn't have the same "value" a dollar has today. Because a dollar today is not the same as a dollar tomorrow, money is said to have a "time value"—it has "value" with respect to a specific point in time. To estimate the investment value of premerchtable timber stands, one must account for the time value of costs and revenues, including those that are expected in the future. Compound interest is used to account for the time value of money.



interest formulas—formulas that account for the time value of money. The land rent calculated in step 2 should be included as an annual cost.

Example. If \$150/acre was invested in stand establishment, and a final harvest revenue of \$2,250/acre is projected at stand age 20, what is the stand's investment value at age eight using the ROI method? For this example we'll assume the value of the land was \$400/acre when the stand was established eight years ago, and we'll assume the land value is expected to be \$600/acre when final harvest of the timber occurs.

For this example, the three steps in the ROI method are:

1. Calculate ROI:

The owner of the timber stand invested \$150 + \$400 = \$550/acre at the beginning of the stand's life (site preparation and planting costs plus land value). When the timber is harvest-

ed at age 20, the total value of the land and timber asset is expected to be \$2,250 + \$600 = \$2,850/acre (timber harvest value plus land value in the future).

If you invest \$550 and 20 years later you have an asset worth \$2,850, what is the annual rate of return on your investment? This can be calculated using an investment calculator, or using a computer program designed to account for the time value of money.

In this case, the ROI is approximately 8.57% per year. If you invested \$550 at a compound annual interest rate of 8.57%, after 20 years you would have about \$2,850.

2. Calculate annual land rent:

In this example the value of the land is projected to increase from \$400/acre when the stand was established, to \$600/acre when the final harvest is projected. The land and timber investment is projected to earn 8.57% per year, so in the first year the land cost or "rent" is \$400 x .0857 = \$34.28/acre. This value increases each year, however, as the land value increases. In this example, the land increases in value by about 2% per year, so the land rent increases at a similar rate.

Table 1 shows the estimated land rent for each of the stand's first eight years (assuming land value starts at \$400/acre and increases at 2% per year). In step 3, each of the land rent values in Table 1 is carried forward to the stand's current age using compound interest to account for the money's time value.

3. Compound all timber production costs to the stand's current age, using ROI as the interest rate.

"Compounding" involves using specific compound interest formulas to carry all costs incurred in establishing and maintaining the stand forward to the stand's current age. As stated above, this includes the annual "rent" calculated in step 2. Using the 8.57% ROI for the example stand, at age eight the stand's

establishment cost has a compounded value of \$289.58/acre, and the annual land rent has a compounded value of \$395.96/acre. Adding these amounts yields a premerchantable timber investment value of \$685.54/acre. Again, this value is for the trees only. The combined value of land and timber is estimated by adding the land value to the value of the premerchantable timber. Current land value is estimated as \$468.66/acre (Table 1), so the land and timber together have an investment value of:

$$\begin{aligned} & \$468.66 + \$685.54 = \\ & \text{(Land) + (Timber)} \\ & \$1,154.20 \text{ per acre.} \end{aligned}$$

Summary

Many things affect the investment value of premerchantable timber. Revenues projected from the future sale of timber, for example, are affected by expected prices and estimated yields of merchantable products.

Traditional methods of estimating premerchantable timber value may understate or overstate investment value because they leave out some important costs. Table 2 shows the value estimates for land and timber that resulted using these approaches in our example. The ROI method accounts for expected costs and revenues from the timber, and it considers the "time value" of the money invested in planting and management practices, as well as the money invested in the underlying land.

Table 2. Example estimates of the investment value of land and timber combined.

Considering the "time value" of

Compounded Costs:	\$468.66 + \$257.73 = \$726.39/acre. (Land) + (Timber)
Discounted Revenues:	\$468.66 + \$999.03 = \$1,467.69/acre. (Land) + (Timber)
ROI:	\$468.66 + \$685.54 = \$1,154.20/acre. (Land) + (Timber)

Table 1. Land rent for each of the stand's first eight years.

Year	Land Value ¹ (\$/ac)	Land Rent (\$/ac)
0	400.00	
1	408.00 ²	34.28 ³
2	416.16	34.97
3	424.48	35.66
4	432.97	36.38
5	441.63	37.11
6	450.46	37.85
7	459.47	38.60
8	468.66	39.38

¹ Land value assumes a 2% per year rate of increase

² \$408.00 = \$400.00 x 1.02

(the 2% rate of increase is applied yearly)

³ \$34.28 = 400 x 0.0857

(ROI is used to calculate annual rent)



money involves the use of compound interest formulas, and the ROI approach is most easily applied by using a computer program prepared for that purpose. One program that is available to forest landowners is FORVAL for Windows. This program was developed at the Forest and Wildlife Research Center at Mississippi State University for evaluating forestry investments in general. It has a section that applies the ROI method for estimating the investment value of premerchantable timber.

Forest landowners may find that their premerchantable timber has a relatively high value. This is particularly true for pine stands in areas with relatively high prices and good yields. In most cases, a professional forester should be consulted in estimating volumes and values of timber stands. In cases where total tract value is being estimated (land and timber combined), forest landowners should be sure to add the value of their land to the investment value of premerchantable timber. ❁

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The following articles have information that relates specifically to estimating the value of premerchantable timber:

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Dr. Steve Bullard is a Professor in

the Department of Forestry at Mississippi State University.

Dr. Tom Monaghan is the Leader of Extension Forestry in the Department of Forestry at Mississippi State University.

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For More Information

Dr. Steve Bullard of Mississippi State University and Dr. Tom Straka of Clemson University have written a 270-page workbook titled "Basic Concepts in Forest Valuation and Investment Analysis." The book has many examples and details of forestry investment analysis, including the important question of premerchantable timber value. Computer software titled FORVAL for Windows is distributed with the workbook by P R E C E D A Education & Training in Auburn, AL (334-821-9222 • info@preceda.com). This software includes the ROI approach for estimating the investment value of premerchantable stands.



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