

Timber Appraisal

Net Present Value Vs. Current Marketable Value

By Mike Matre, President, Matre Forestry Consulting, Inc.

We get the question all of the time: What is my timber worth? To answer and comprehend the question and the answer, there must be a basic understanding of timber Net Present Value (NPV) and timber Current Marketable Value (CMV).

If the timber in question is financially mature such as a pine plantation full of sawtimber and poles, or mature natural timber, then CMV is the true timber value. CMV is the current marketable value of timber if clearcut now at fair market prices. CMV can be obtained with a basic timber cruise and knowledge of local fair market stumpage prices.

On the other hand, if the timber is a young fast growing financially immature stand then the NPV is the true timber value. NPV is the present value of discounted future revenues minus discounted future costs. The projected revenues and costs are discounted to present at a particular discount rate.

With young stands CMV is still a very important number to know, but CMV will undervalue financially immature stands while NPV reflects the true value. This point is illustrated by the following line graph that shows how NPV and CMV grow overtime and eventually merge during a typical no-thin planted pine rotation. A thinning was not simulated to keep the study as simple as pos-

sible, but it is important to note that most timber investments can be maximized by thinning.

As mentioned earlier, a basic timber cruise and knowledge of local fair market stumpage prices is required to estimate CMV. NPV estimation requires much more, and following is a summary of the minimum inputs to accurately estimate NPV:

Timber/Stand Data

1. **Current Stocking** – Trees per acre at least, but a stand table showing trees per acre by Dbh (Diameter at breast Height) is preferable for stands +/-10 years old or older. Determined by a cruise.
2. **Age** – Determined by core samples and/or management records.
3. **Site Index** – A measure of how well land grows trees. Determined during the cruise by sub-sampling the age and total height of co-dominant and dominant site trees. Site Index can also be estimated by NRCS (Natural Resource Conservation Service) soil data, but actual stand specific estimation is preferred.
4. **Stand Conditions** – General infor-

mation such as competition and tree quality; and silvicultural treatments such as thinnings, fertilization, and competition control that will affect future timber growth and quality.

5. **Growth Rates** – Can be estimated by growth and yield software, and/or sub-sampling core samples for growth rates across the Dbh range during the cruise.
6. **Acres** – Acres is an essential ingredient in all aspects of timber management, and unfortunately careful attention to this vital input is often overlooked. Every effort must be made to estimate accurate net timber acres.

Timber Market Assumptions

1. **Stumpage Prices** – Current fair market stumpage prices for major forest products must be determined, which can be done through local market knowledge and timber market reporting journals such as Timber Mart-South and Forest2Market.
2. **Product Specifications** – Local product size and quality specifications must be known, and specifications can vary from one local market to another.
3. **Market Trends** – Where is the market going? Unless you have a crystal ball, you do not know. We, and many foresters and timber investors we work with, assume current prices or the current 3 to 5 year average prices will remain the same throughout the rotation when estimating NPV. Some assume that market prices and management costs will increase with inflation. Assuming prices will remain the same will estimate a more conservative NPV than assuming prices will improve over time.

Mason's Master Turf™ and Pine Straw PLANTATION™

LOCALLY GROWN * LOCALLY KNOWN FOR OVER 46 YEARS

Turf

Designer Pine Straw

Colored and especially treated to last one year or longer

Regular Long Needle Pine Straw

And Chopped (Colored) Pine Straw for Bedding Plants

803-827-0331

905 Sand Bar Ferry Rd (SC side of Sand Bar Ferry Rd) * Beech Island, SC

Cashflows

1. **Revenues** – Based on current stand conditions, site index, and the timber market expectations, future revenues from timber sales and secondary revenues such as hunting leases, pine straw leases, mineral leases and carbon credits must be estimated.
2. **Costs** – Basic regular cost include timber sale commissions, management fees, property taxes, timber severance taxes, and reforestation costs. Other costs that may be incurred are prescribed burning, intensive forest management practices, and occa-

sional capital expenditures such as road building. Often, to simplify cost calculations, foresters will use a flat management fee of maybe \$5 per acre per year. Like timber prices, a common approach for cost projections is to assume that current costs will remain the same throughout the rotation.

Financial Assumptions

1. **Discount Rate (DR)** – This input is critical in calculating NPV. Moving DR slightly greatly changes NPV. The DR selected should be a reasonable interest rate that could be earned in

an available alternative investment that is similar in length of time and risks. A DR of 5% to 10% is commonly used in timber appraisals. It is important to understand that the lower the DR, the higher the NPV will be. Conversely, the higher the DR, the lower the NPV will be. This is because if Mr. Smith wants to earn 15% on his money, he of course will have to purchase low. On the other hand, if Mr. Jones is satisfied with earning 4% on his money, then simply put, he can pay much more for the same investment that Mr. Smith is considering.

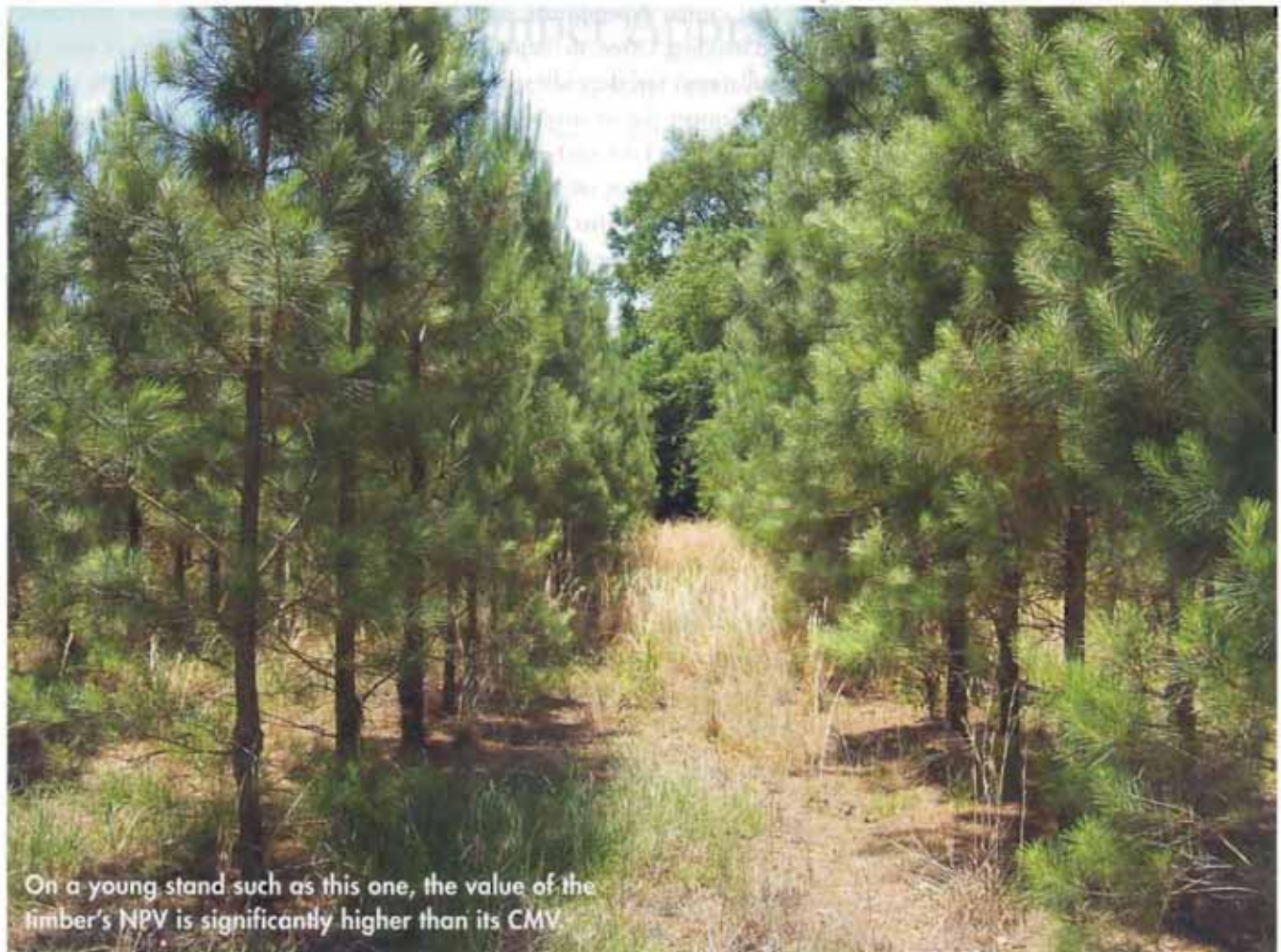
Planted Pine NPV Vs. CMV

Purposes:	To compare the Net Present Value (NPV) of a pine plantation to the Current Marketable Value (CMV) at a given age to better understand timber appraisal methods.
Assumptions:	
Site Index:	67' @ Age 25 (Cutover Piedmont Site)
Timber Prices per Ton:	\$8.50 Pulpwood; \$17 Chip-N-Saw \$30 Sawtimber
Harvest Expense:	8% of Gross (Commission and Severance Tax)
Misc. Management:	(\$3)/Acre/Year
Property Taxes:	(\$6)/Acre/Year
Hunt Lease Revenues:	\$8/Acre/Year
Discount Rate:	7%
NPV Definition:	The Net Present Value of all future revenues and costs, discounted to the present age.
CMV Definition:	The Current Marketable Value at a given age if clearcut at that age.

Age	Trees/Acre	NPV	Gross CMV	Net CMV	
3	600	\$311	\$0	\$0	
6	590	\$382	\$0	\$0	
9	580	\$470	\$0	\$0	
12	574	\$584	\$0	\$0	
15	545	\$719	\$566	\$521	
18	504	\$882	\$822	\$756	
21	456	\$1,083		\$1,130	\$1,040
24	406	\$1,330		\$1,452	\$1,336

*Projections calculated using Winyield software.

Planted Pine NPV Vs. CMV

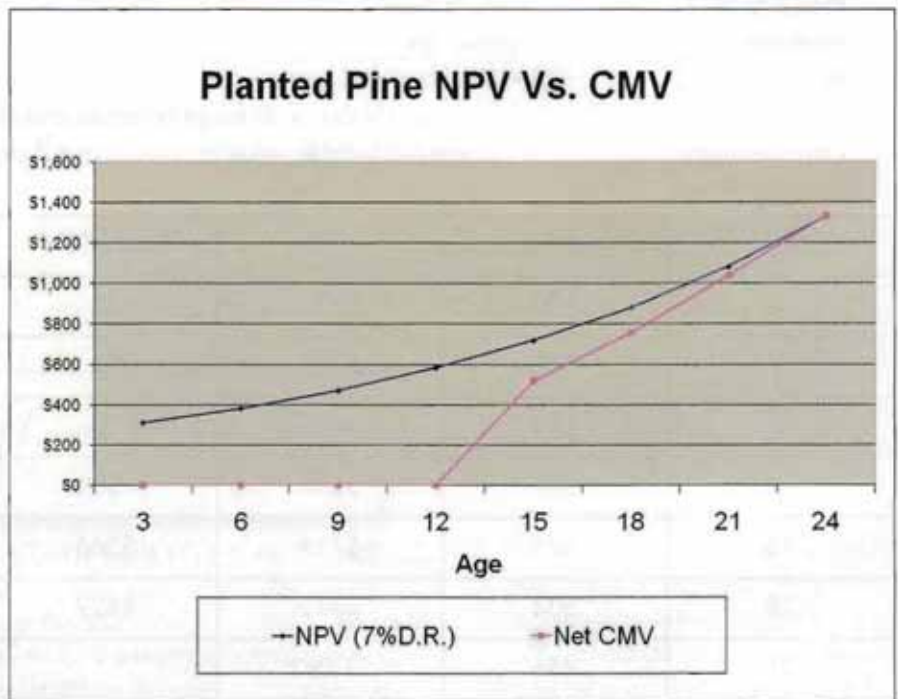


On a young stand such as this one, the value of the timber's NPV is significantly higher than its CMV.

2. **Inflation Rate** – General economic expectations for the length of the rotation. Often foresters will use a conservative approach of using a 0% inflation rate to keep current stumpage prices and management costs the same.
3. **Tax Rates** - Usually foresters estimate before tax NPV. If after tax calculations are needed, then Regular and/or capital Gains Tax Rates will need to be input.

Common Timber Appraisal Financial Calculations

After all the needed information and data is obtained, it is time to calculate some numbers. Most foresters use growth and yield software such as WINYIELD, SIMS, or FVS to perform these calculations. Based on the basic inputs, growth and yield models can quickly and accu-



To maximize the timber Net Present Value, the stand should be thinned at age +14 and age +22, then clearcut at age +28. For simplicity, a clearcut at age 24 with no thinning was simulated.

rately calculate financials; produce reports; manage timber inventory data; assist with harvest scheduling and cashflow projections; simulate and compare various rotation lengths, thinning regimes, and silviculture treatments; etc.

Following are some basic timber appraisal financial calculations:

1. **Current Marketable Value (CMV)** - The current marketable value of tim-

3. **Internal Rate of Return (IRR)** - Also known as the Internal Return on Investment (IROI), IRR is the interest rate at which discounted revenues equal discounted costs. It assumes that all intermediate revenues such as thinning revenues and hunting lease revenues are reinvested into a similar investment. If IRR exceeds the discount rate, then the investment is profitable.

SEV, along with other value associated with bare land such as recreation and speculation, is used to calculate Bare Land Value (BLV).

Conclusion

The next time you are wondering what your timber is worth, take into consideration the Current Marketable Value of mature stands and the Net Present Value of younger stands for the true timber value.



In a mature stand, the NPV and CMV are approximately equal.

ber if clearcut now at fair market prices. CMV is the true value of financially mature timber stands, but CMV will underestimate the value of young financially immature stands.

2. **Net Present Value (NPV)** - Future revenues discounted to present minus future costs discounted to present at a particular discount rate (please see the discount rate explanation above). A NPV of greater than zero indicates that at least the discount rate will be earned. If NPV is greater than CMV, the stand is not financially mature yet. If NPV is less than CMV, the stand is financially overly mature, and should not be grown further in a timber investment.

4. **Composite Rate of Return (CRR)** - Same as IRR, except that CRR assumes all intermediate revenues are reinvested elsewhere at the discount rate rather than reinvestment into a similar investment.
5. **Annual Equivalent Value (AEV)** - NPV expressed as an annuity over the rotation length, computed at the discount rate. Useful in comparing investments of unequal length, and is often used to compare investments with periodic cashflow (forestry) to investments with annual cashflow (agriculture).
6. **Soil Expectation Value (SEV)** - The NPV of perpetual timber rotations.

In most cases, not using NPV and just looking at CMV will underestimate the actual timber value on most any given tract.

You do not have to be an economist, an appraiser, or have a multiple business degrees to understand basic timber appraisal methods. Just remember this: the total timber value on a tract of land is calculated by summing the CMV of all financially mature stands and the NPV of all financially immature stands (both merchantable and pre-merchantable). If NPV is not included, the timber value will be greatly understated for a typical timber tract with various age classes. The only time you can disregard NPV is when a tract has nothing but financially mature timber, and those tracts are few and far between. ❖