



Calculating Pre-Historic and Futuristic Timberland Returns¹

Institutional investment in timberland began in earnest in the early 1980s. There are now twenty years of timberland returns available for analysis. But what would timberland returns have been before 1980? How can we compare 50 years of stock or bond returns with timberland returns if there are only 20 years of timberland data?

HISTORIC TIMBERLAND RETURNS

Two published indexes exist, the Timberland Performance Index (TPI) and the National Council of Real Estate Investment Fiduciaries (NCREIF) Timberland Index.² There is some overlap in the data used in calculating the indexes, but each also has unique data. Both indices have limitations, perhaps the most important of which is their limited historical range. The TPI published returns for 1981 through 1999. NCREIF publishes returns for 1987 through the present. But many investors want to compare returns among asset classes over longer periods of time than 20 years. To provide an indication of timberland returns prior to 1981, some method is needed to backcast returns.

"PRE-HISTORIC" TIMBERLAND RETURNS

As the institutional timberland investment industry developed in the early 1980's, several TIMOs developed timberland return models based on theoretical timberland investments. Forest Investment Associates, Hancock Timber, Prudential Timber and Wachovia Timberland each had such a model. The models were designed to provide an indication of expected timberland returns in the absence of published historical data. Most of these early timber indices relied to a great extent on timber prices to provide an indication of timberland returns. None was widely accepted by the investment industry.

However, we can compare these theoretical models to the TPI and NCREIF Index to see if they could be used to backcast timberland returns. If a model produces returns similar to published returns for the past twenty years, we might expect the historical returns that would have been reported by the published indexes (if they had existed prior to 1981 or 1987) would be similar to those calculated by the model for those earlier years.

The John Hancock Timber Index (JHTI) was developed in the early 1990s by the Hancock Timber Resource Group (HTRG) to provide an indication of timberland returns for its clients and prospective clients. We use the JHTI because the index is described and reported in a research note (*Historical*

¹ Adapted and updated from a presentation at the 2001 Southern Forest Economics Workers meeting in Atlanta, GA.

² For a more complete explanation of these two indices, see Volume 1, Number 4 of *The Timberland Report: Measuring Timberland Performance*, available on our web site at www.jws.com.

Returns for Timberland) available on the HTRG web site (www.HTRG.com). The research note formerly reported returns for the US South, Pacific Northwest, and Northeast, but now also includes returns for British Columbia and New Zealand.

The JHTI uses timber prices to calculate a return for timberland according to the following formula:

$$\text{Rate of Return}_t = [(\text{Net Income}_t + \text{Capital Value}_t) / \text{Capital Value}_{t-1}] - 1$$

where:

- Net Income_t is an index of the net revenue produced by the forest during quarter t and is the current price multiplied by an income rate of 1.00% for the South
- Capital Value_t is an index of the value of the forest land and timber growing stock during quarter t, based on an eight-quarter weighted average of timber prices with the weights declining linearly from the current quarter.

Figure 1 shows the returns calculated by the JHTI model for the US South.

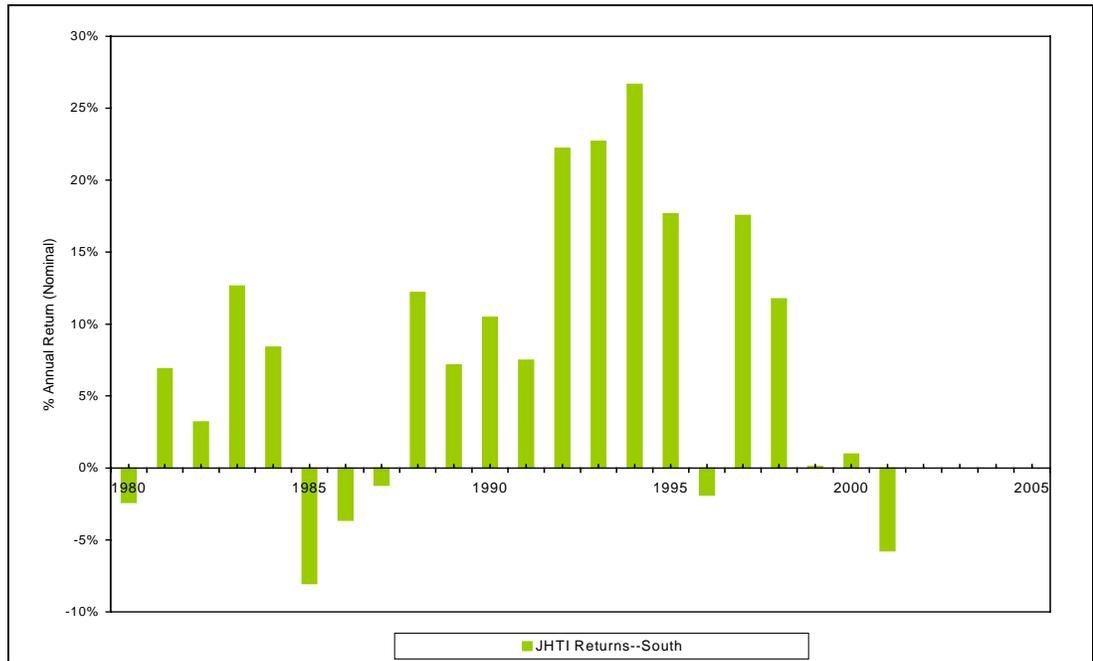


Figure 1 Timberland Returns for the US South as Indicated by the John Hancock Timber Index

For this analysis, we focus on returns for the US South for several reasons. The TPI is heavily (though not *entirely*) weighted to the South. The historic price series used in the JHTI for the US South is the easiest to reproduce: it is simply the southwide average price reported by Timber Mart-South. The historic price series for the Pacific Northwest is a weighted average of prices for several log grades where the weights are not detailed in the HTRG Research Note. Finally, the historic price series for the Northeast is from the Maine Forest Service and was discontinued at about the time the NCREIF Index began publication, so a different price series would have to be used for comparison with the index.

Figure 2 shows all three indices. No index appears to be significantly different than the other two. For example, each spikes above the others at different times, but no index appears consistently higher or lower than the others do.

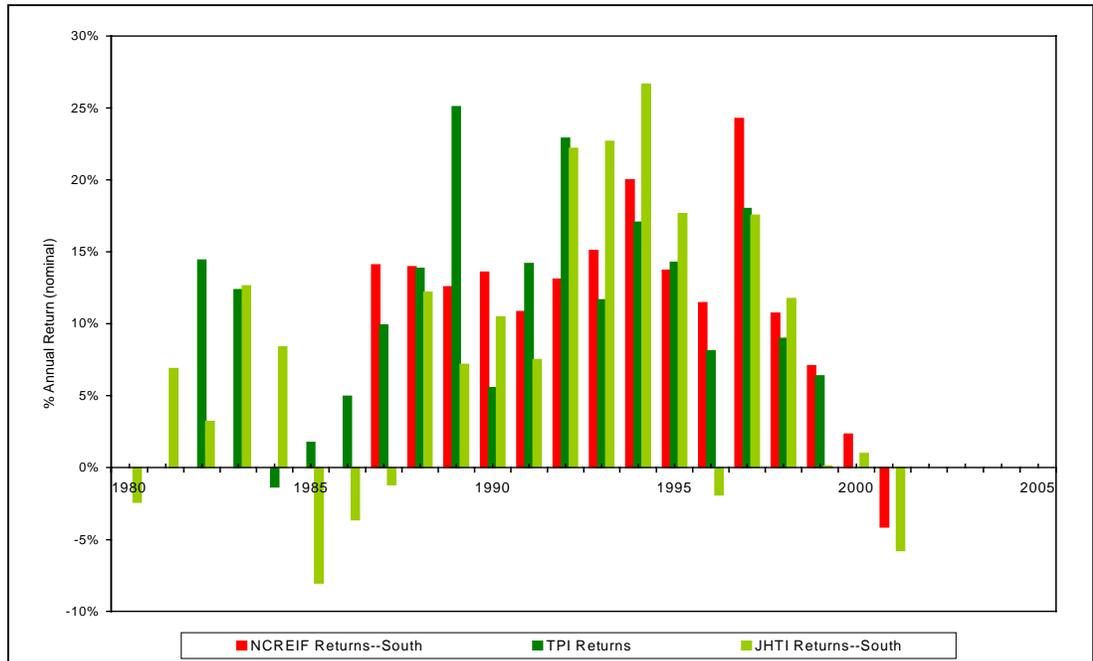


Figure 2. TPI, NCREIF South and JHTI South Total Returns

Table 1 compares returns from the three indices over the period 1987-1999, the period when all three indices overlap. The JHTI reported lower returns and higher volatility than the other two indices, which reported similar returns and volatility.

Table 1. A Comparison of Returns from the TPI, NCREIF Timberland Index and JHTI

| Index | ACR* | Std Dev |
|---------------|--------|---------|
| JHTI—South | 10.62% | 9.44% |
| NCREIF--South | 12.95% | 5.15% |
| TPI | 13.39% | 6.03% |

*Annually Compounded Return

Table 2. presents correlation coefficients for the three indices. The correlation between the JHTI and NCREIF and the JHTI and TPI are fairly strong. The correlations are stronger over longer time periods (e.g., 1981-1999 vs. 1987-1999). JHTI is more closely correlated with both indices than the indices are correlated with each other.

Table 2. Correlation Among Returns from the TPI, NCREIF Timberland Index and JHTI

| | | 87-99 |
|----------------------------|------|-------|
| NCREIF vs. JHTI--1987-2001 | 0.71 | 0.59 |
| TPI vs. JHTI--1981-1999 | 0.54 | 0.47 |
| NCREIF vs. TPI--1987-1999 | 0.38 | 0.38 |

The comparison shows that the JHTI provides a reasonable picture of timberland returns when compared to the published timberland indices. This means that the JHTI can be used to provide reasonable estimates of “prehistoric” timberland returns.

“FUTURISTIC” TIMBERLAND RETURNS

It is also possible to use a theoretical model to forecast timberland returns.³ All one needs is a forecast of timber prices. Ideally, the forecast would provide timber prices by quarter.

For this analysis, we use a very simplistic, hypothetical forecast: southern pine sawtimber stumpage prices will increase at 4% per year (roughly 1% per quarter) through 2010 and southern pine pulpwood prices will remain flat for the period. These are nominal rates. Assuming an inflation rate of 3%, this results in a real price appreciation rate of about 1% per year for the sawtimber and a declining real price for pulpwood. Figure 3 shows the results of plugging these forecast prices into the JHTI model. Returns jumps to 7.9% in 2004 and remains steady at that about level 7.8% through 2010.

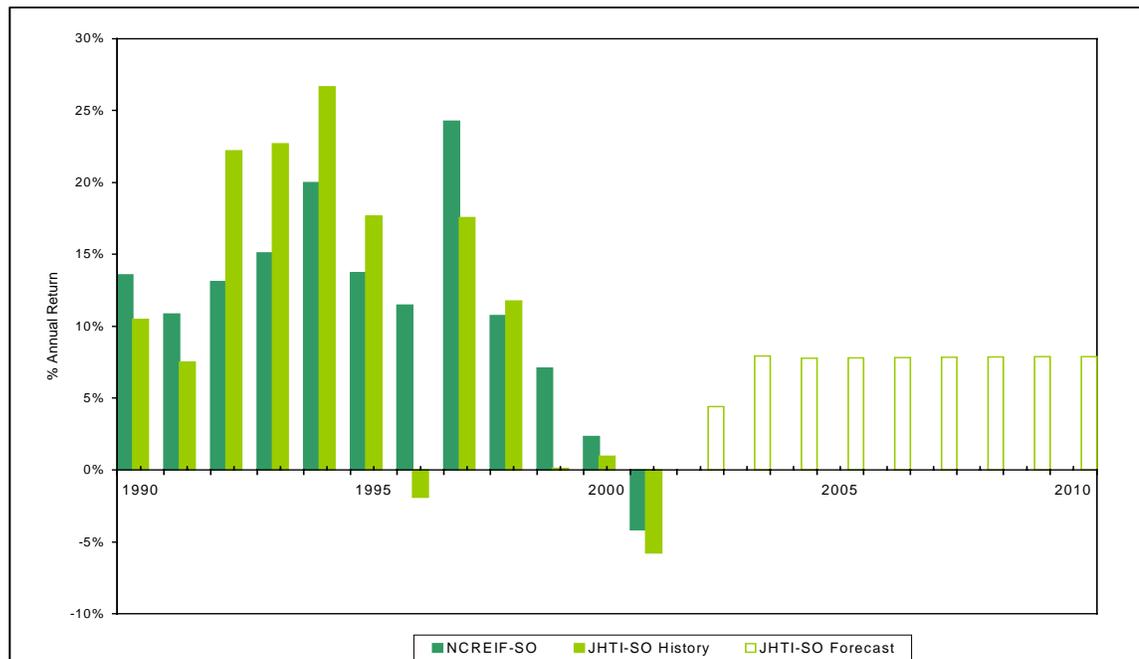


Figure 3. Forecast of Timberland Returns Using JHTI Methodology

The results indicate that timberland returns of 7.8-7.9% can be expected *if* sawtimber stumpage prices rise at an annual real rate of 1% even when pulpwood prices remain flat (nominally). In a sensitivity analysis, we found that the returns range from 9.7% to 10.0% *if* sawtimber prices increase at a 3% annual real rate and pulpwood prices remain flat.

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³ Note that this model forecasts timberland *returns*, not timberland *values*