Hancock Timber
RESEARCH Report

Publication Reference R-00-1

Taking Advantage of the Wholesale Discount for Large Timberland Transactions

February 2000

The per-acre cost of larger timberland parcels is systematically lower than that for smaller ones. This relationship, known as the 'wholesale discount,' reflects both the thicker markets for smaller parcels and their typically higher transaction costs. The Hancock Timber Resource Group's (HTRG's) investment strategy takes advantage of this relationship by favoring the purchase of larger parcels, dividing them among several investors and, when the time comes, selling smaller parcels. While the actual benefits of this strategy depend on specific circumstances and will differ among investment plans, analysis of the empirical data suggests that this one strategy alone can add more than 100 basis points of annual return over a 10-year investment horizon.

Introduction

One of HTRG's key investment strategies is the purchase of large timberland properties (generally from forest products companies that have made a strategic decision to sell a portion of their timberland base) for division among several investors. This parcelization strategy creates value for our investors for two primary reasons. First, the per-acre cost of evaluating investment opportunities decreases with investment size. As a result, investors enjoy lower per-acre transaction costs for large properties than for small acquisitions, even after the costs of parcelization are considered. Second, there is a wholesale discount for large timberland properties. That is, all else equal, there is an inverse relationship between per-acre timberland price and transaction size. Both of these factors decrease timberland acquisition costs and increase investor returns on large, parcelized properties.

This report discusses the relationship between per-acre price and property size, and describes how we take advantage of this relationship in our investment strategy. The first section below presents the empirical evidence showing the inverse relationship between the per-acre price of timberland and transaction size. This section concludes with a brief discussion of the economic forces that cause such a relationship. The next section describes how we exploit this relationship to add value to our investors' timberland portfolios.

Empirical Evidence that the Wholesale Discount Exists

Conventional wisdom has long held that there is an inverse relationship between the per-acre sales price and the size of timberland properties. Three kinds of empirical evidence support this claim. The first is published, generally peer-reviewed analysis appearing in the economics literature. The second is the opinion and data from forestland appraisers expert in determining the value of forest land with differing characteristics, including parcel size. The third is information from Hancock Timber's own transactions: 50 acquisitions and 532 dispositions. This empirical evidence provides a substantial basis for accepting the concept of the 'wholesale' or large-transaction discount.

Hancock Timber Resource Group®

Clark S. Binkley, Ph.D.
cbinkley@hnrg.com

Courtland L. Washburn, Ph.D.
cwashburn@hnrg.com

Mary Ellen Aronow
maronow@hnrg.com

Published Research. During the last decade, the wholesale discount hypothesis has been supported by a substantial body of rigorous empirical research. Four recent studies have analyzed actual timberland transactions to measure the relationship between per-acre market value and sale acreage. Turner, Newton and Dennis (1991) examined sales of timberland in Vermont; Washburn and Romm (1992) in California; and Palmquist and Danielson (1989) in North Carolina. In the most extensive study of this kind to date, Washburn (1992) analyzed more than 2,500 timberland sales in Alabama, Florida, Georgia and Mississippi. All of these studies found that per-acre sale prices of timberland decrease as the sale acreage increases.

To illustrate the magnitude of the wholesale discounts that these analyses identified, we calculated, over a range of property sizes, the estimated sale price of the typical acre of timberland that each study examined (Table 1). The ranges vary among the studies to reflect differences in the parcel sizes included in each study's data base. The prices calculated from the Turner, Newton and Dennis (1991) and Palmquist and Danielson (1989) results include the value of both timberland and timber growing stock. The Washburn and Romm (1992) and Washburn (1992) estimates are for the value of bare land only.

Consider Washburn's (1992) estimates from transactions in Alabama, Florida, Georgia and Mississippi. The sale price of a typical acre of southern pine timberland sold as part of a 50,000-acre property ($338) was 6 percent lower than the price of the same acre sold as part of a 10,000-acre ownership ($359). It was 14 percent lower than the price of the same acre sold as part of a 1,000-acre transaction ($391). In this study, each 1 percent increase in the size of a property decreased the per-acre value by 0.037 percent.

It is also noteworthy that the inverse relationship between per-acre sale price and sale acreage is not limited to timberland. Analyses of actual farmland sales by Hushak and Sadr (1979) and Chicoine (1981) have produced similar results.

Table 1.
Price of Timberland Properties
by Sale Acreage ($ per acre)

Sale Acreage	Palmquist and Danielson (1989)	Turner, Newton and Dennis (1991)	Washburn and Romm (1992)	Washburn (1992)
50	$473	$396	...	$437
100	443	362	$288	426
500	259	295	285	401
1,000	133	270	282	391
5,000	...	...	257	368
10,000	...	...	229	359
50,000	...	...	...	338

Treatment by Professional Forest Appraisers. These empirical findings are consistent with the opinions of professional forest appraisers. Mason, Bruce and Girard, Inc., a consulting firm that appraises the market value of timberlands in the U.S. West, has developed the schedule shown in Table 2 between property size (expressed in terms of merchantable timber volume) and discount to 'full-retail' price.

Table 2.
Discount to Full-Retail
Timberland Price in U.S. West

Total Sale Quantity of Merchantable Timber (billion board feet)	Approximate Sale Acreage[a]	Percentage Discount	Approximate Sale Price ($/thousand board feet)[b]
0.25	25,000	35%	$163
0.50	50,000	40	150
1.00	100,000	45	138
2.00	200,000	48	130

Source: Mason, Bruce and Girard, Inc.

[a] Assumes stocking level of 10,000 board feet per acre.
[b] Assumes full-retail stumpage price of $250 per thousand board feet.

Forest appraisers in the U.S. South apply a similar discount to full-retail timberland values. Table 3 shows the discount factors utilized by Forest Resource Consultants, Inc., a forestry consulting firm headquartered in Macon, Georgia.

Table 3.
Discount to Full-Retail
Timberland Price in U.S. South

Sale Acreage	Percentage Discount for Timber	Percentage Discount for Land
Less than 2,000	0%	0%
10,000 - 20,000	0-5	0-10
25,000 +	10-30	10-30

Source: Forest Resource Consultants, Inc.

The international forestry consulting firm Jaakko Pöyry has assembled data on timberland transactions from around the world, and generously provided them to us for this analysis. Figure 1 shows this information for the three key timberland regions in the United States (South, Pacific Northwest and Northeast) and Oceania (Australia and New Zealand).

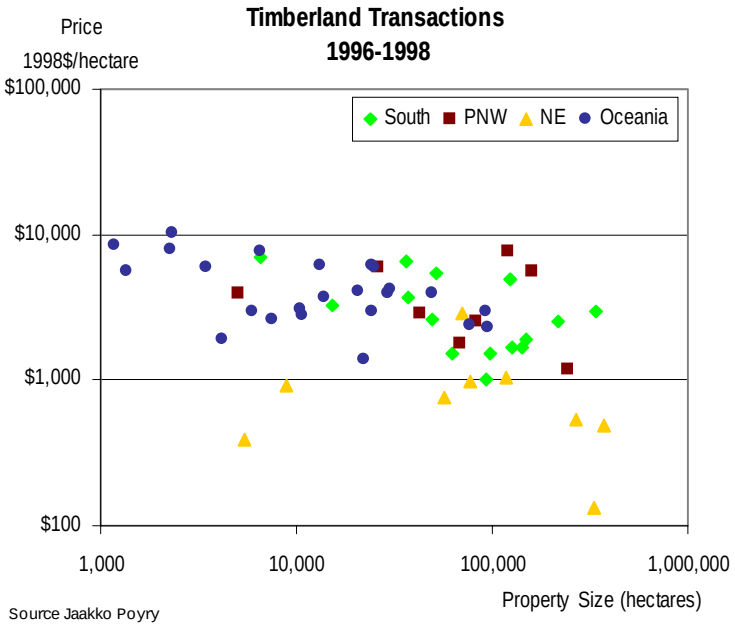


Figure 1.
Recent timberland transactions in the United States, Australia and New Zealand show declining value per hectare with increasing sale size

Statistical analysis of these data finds that, for the United States regions, a 1 percent increase in the size of a timberland property reduced its per-acre value by 0.226 percent. In Oceania, a 1 percent increase in property size reduced unit values by 0.141 percent. (More complete statistical results are presented in the Appendix.) The effect of property size on value is far greater in these data than in the Washburn's (1992) study cited. The differences may arise due to the fact that (i) Washburn's (1992) study measured the value of timberland alone, whereas the Jaakko Pöyry data are for timber and timberland, and (ii) the Washburn's (1992) study carefully accounted for other factors that influence timberland value (for example, timber prices and timber stocking) that might be confounded with property size. For the evaluation of our parcelization strategy in the next section, we use the more conservative Washburn's (1992) estimate.

Analysis of Hancock Timber Resource Group Transactions. During the period 1989 through 1999, Hancock Timber made 50 acquisitions and 532 dispositions of timberland in the United States. These data, shown in Figure 2, provide additional evidence on the wholesale discount.

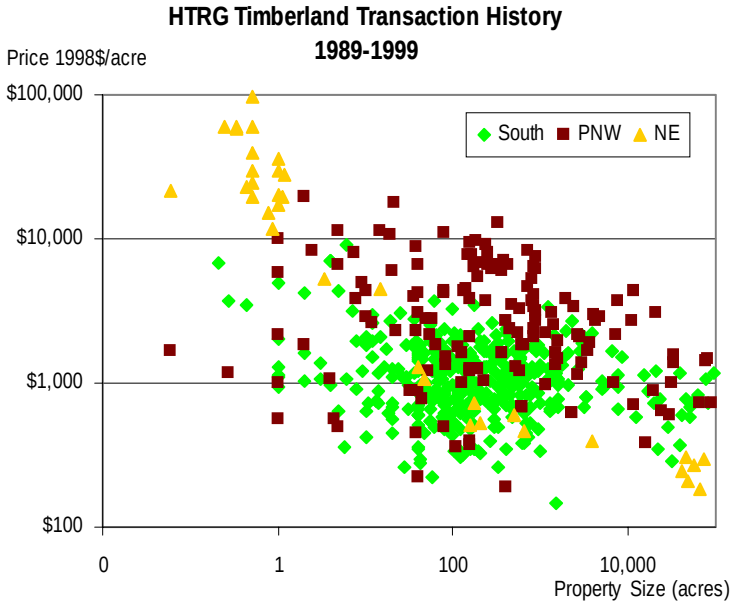


Figure 2.
HTRG acquisitions and dispositions show that per-acre values fall as property size increases

Statistical analysis of these data shows that each 1 percent increase in property size reduced the per-acre price by 0.145 percent.

Several of the dispositions have been one acre or smaller parcels that have sold for more than $10,000 per acre. These parcels have presumably been purchased as residential lots. If we exclude them from the statistical analysis, our estimated per-acre price elasticity declines from 0.145 to 0.064. The relationship between value and property size also differs among regions in the United States. (See the Appendix for a more complete presentation of our statistical results).

Economic Rationale. Why does the per-acre sale price of timberland properties decrease with property size? What economic forces allow the wholesale discount to persist?

There are several economic factors that, in combination, may be responsible for the wholesale effect. First, the possibility of land-use conversion to homesites or farmland adds a larger premium to the per-acre price of small timberland properties than large ones. Zinkhan (1991) estimates, for example, that the value of the option to convert southern pine timberland to farmland at some future date, if conditions merit, can contribute more than $50 per acre to the timberland's market value. In fact, on most large ownerships, these non-timber values are relatively unimportant.

Second, large timberland parcels are less liquid than small tracts. There are two principal sources of illiquidity for large timberland ownerships. First, both economic and regulatory considerations dictate that the harvest of extant merchantable timber on a large property must be spread over a longer period of time than the harvest of merchantable timber on a small ownership. Harvest revenues expected at distant periods must be discounted. Also, timber prices are less certain in the future than in the present. Both of these factors reduce the value of merchantable timber on large holdings.

Additionally, the market for timberland thins as the sale acreage increases. This is because fewer buyers have access to the capital needed to purchase large timberland tracts. Larger transactions frequently require complex deal structures to accommodate sellers' tax circumstances or facilitate the use of leverage, and deal complexity reduces the number of potential purchasers. Fewer potential buyers put less pressure on prices of large timberland properties. Also, if sellers of large parcels are impatient, it is less likely that they will encounter the buyer who is willing to pay 'top dollar' for the property.

Given that a wholesale discount exists, why do owners sell their large acreages intact? Why don't they simply divide their large properties and sell the individual pieces for a higher total price? The probable answer is that the process of division and sale is not without cost, and that there are often benefits to selling large properties that are not reflected in the purchase price.

To illustrate these points, consider a seller of a large timberland property who has a solid offer for the entire holding. She must decide whether to accept the offer or take the alternative tack of dividing the property and marketing the smaller pieces. The decision is not straightforward. The seller might expect to receive a higher total price for the pieces, but substantial amounts of time and effort would have to be expended to complete the marketing and sale process. And the outcome of the process is far from certain.

Furthermore, the potential buyer of the large, intact property might have the capacity to structure the transaction to meet particular needs of the seller. This might include a staged 'take-down' process for the property, third-party exchanges and other structures to defer taxes, the capacity to consummate the transaction prior to some reporting deadline, and the like.

For these reasons, owners of large tracts may be willing to sell them for less than the expected value of the proceeds from the sale of several smaller pieces.

Investment Strategy to Take Advantage of the Wholesale Discount

Both in our acquisitions and in our dispositions, Hancock Timber's investors take advantage of the wholesale discount discussed above.

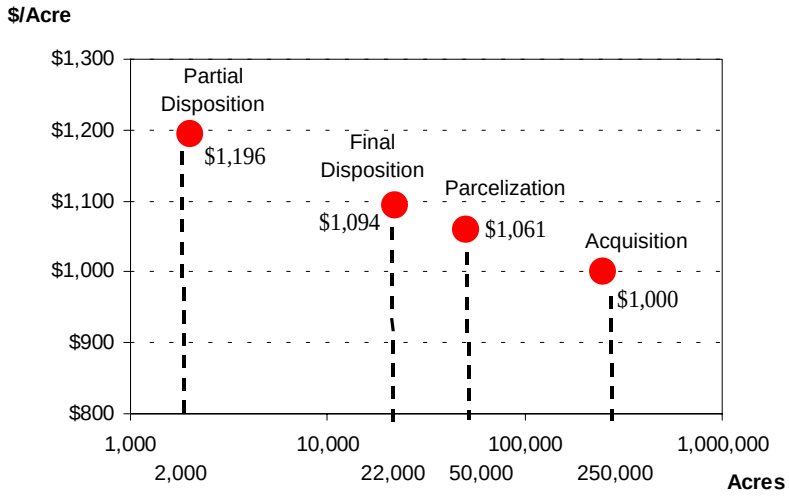
Since the per-acre cost of timberland is lower in large transactions than in smaller ones, it is generally more profitable to buy timberland in large transactions. However, the capacity of any one investor to do so is limited by (i) overall allocations to timberland as an asset class, and (ii) the desirability of diversification of timberland holdings both among and within regions.

To overcome these difficulties, Hancock Timber employs a strategy of pooling investors' funds to acquire large timberland transactions, and then parceling the deals among several investors.

This strategy permits each individual investor to obtain high-quality timberland at a discounted price, and then to realize an immediate gain by moving up the value-size curve. Using this strategy we can further enhance value in the disposition phase of the investment process, both in partial dispositions during the life of the investment and when we finally liquidate an entire property.

Figure 3 illustrates the process for an example investment. This curve is drawn using the Washburn (1992) results, as we regard this study as the most reliable of the empirical analyses presented above.

Figure 3.
An example of Hancock Timber's parcelization strategy



Imagine that a 250,000-acre transaction is purchased at $1,000 per acre, and is parceled evenly among five investors. The parcelization increases the value of the property to $1,061 per acre. This results in a 6.1 percent appreciation return on the investment in its first year, reflecting the fact that the smaller parcel we have created is worth more than the original one. Now, imagine that we sell 2,000-acre tracts carved off this larger parcel in years 3, 6 and 9. As seen in the figure, under the assumptions stated above, these tracts would transact at $1,196 per acre or at a 19.6 percent markup above the original purchase price. Suppose further that the remaining 44,000-acre tract (the original 50,000-acre parcel less the 6,000 acres of partial dispositions) is sold in two 22,000-acre transactions in Year 10 for $1,094 per acre.

What are the financial benefits of such strategies? Of course, the return to any actual timberland investment will depend on many factors, with parcelization being only one. As a consequence, it is difficult to estimate precisely the impact of such a strategy on overall returns. However, the example above can illustrate the potential magnitude of the effect. The cashflows are summarized in Table 4 (assuming no real change in overall property prices).

Table 4.
Illustration of the Incremental Returns from Hancock Timber's Parcelization Strategy for a 50,000-Acre Property Purchased in Year 0 for $50 Million

Year	1	2	3	4	5	6	7	8	9	10
Area Sold (acres)	0	0	2,000	0	0	2,000	0	0	2,000	44,000
Value Sold ($ million)	0	0	2.391	0	0	2.391	0	0	2.391	48.140

See text for assumptions.

A simple IRR calculation shows that, in this example, Hancock Timber's parcelization strategy adds 107 basis points to the investment return. Remember that we have used a conservative estimate of the impact of parcel size on value; estimates consistent with the Jaakko Pöyry and Hancock Timber timberland transaction database would give far higher estimates of the gain from this strategy. Other examples give different results, but we believe this is representative of the incremental returns investors can expect from this aspect of Hancock Timber's investment strategy.

Literature Cited

Chicoine, D.L. 1981. "Farmland Values at the Urban Fringe: An Analysis of Sale Prices." *Land Economics* 57:353-362.

Hushak, L.J. and K. Sadr. 1979. "A Spatial Model of Land Market Behavior." *American Journal of Agricultural Economics* 61:697-702.

Palmquist, R.B. and L.E. Danielson. 1989. "A Hedonic Study of the Effects of Erosion Control and Drainage on Farmland Values." *American Journal of Agricultural Economics* 71:55-62.

Washburn, C.L. 1992. "The Determinants of Forest Value in the U.S. South." Unpublished ms.

Washburn, C.L. and J. Romm. 1992. "Land Market Incentives for Forestry Investment in California." Unpublished ms.

Zinkhan, F.C. 1991. "Option Pricing and Timberland's Land-Use Conversion Option." *Land Economics* 67:317-325.

Appendix: Statistical Results

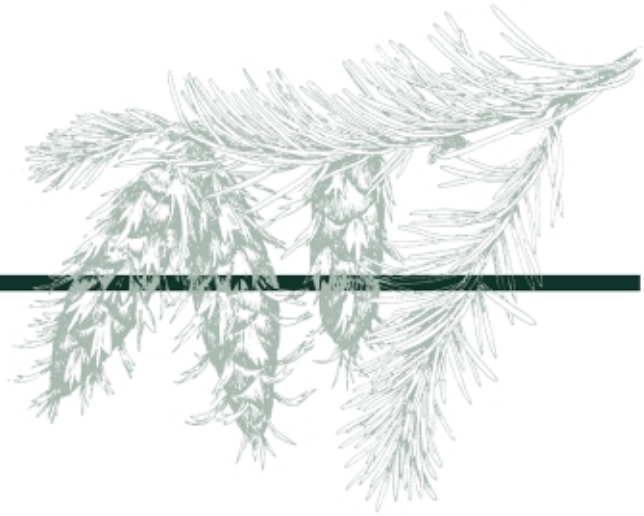
All models were estimated in the form:
$\ln (V) = \alpha + \beta * \ln (A) + \varepsilon$

where V = price in $1998
α, β = regression parameters
A = property size
ε = error term

Dummy variables were used in the analysis of HTRG transactions to allow for different intercept coefficients in individual regions:
$\ln (V) = \alpha + \beta * \ln (A) + \beta_2 *$ (1 if Northeast, 0 otherwise) + $\beta_3 *$ (1 if Pacific Northwest, 0 otherwise) + ε

Sample	# of observations	α	β	β_2	β_3	R^2
HTRG Data						
All Transactions	582	7.681 (0.077)	-0.145 (0.013)	1.165 (0.138)	0.894 (0.077)	0.36
>10 acres	519	7.228 (0.089)	-0.064 (0.015)	-0.752 (0.174)	0.915 (0.071)	0.30
Northeast	18	7.665 (0.315)	-0.182 (0.035)	…	…	0.62
South	366	7.021 (0.878)	-0.026 (0.015)	…	…	0.01
Pacific Northwest	134	8.505 (0.241)	-0.123 (0.037)	…	…	0.08
Jaakko Poyry Data						
All U.S. transactions	31	10.049 (1.567)	-0.226 (0.140)	…	…	0.08
All Oceania transactions	27	9.597 (0.488)	-0.141 (0.053)	…	…	0.22

Note: standard errors in parenthesis



Research Publications from the Hancock Timber Resource Group

Title	Date Published	Reference #
Taking Advantage of the Wholesale Discount for Large Timberland Transactions	2/00	R-00-1
Levering Timberland Investments: Consequences for Equity Returns	2/00	N-00-1
Dueling Views of Timberland in P&I: What's the Real Story?	2/00	B-00-1
Hancock Timberland Investor	Quarterly	

Hancock Timber Resource Group
99 High Street, 26th Floor
Boston, MA 02110-2320
617-747-1600
www.htrg.com