Forestry Investment Decisions

As an investment, timberlands offer:

- Value Growth – timberland value has risen faster than S&P 500
- Low volatility – in Great Depression, while stocks fell >70%, timber gained 233% in the same time period. In 2008, when S&P lost 38%, the Timberland Index gained 9.5%
- Portfolio diversification – very low correlation with most other asset classes
- There is a high demand for wood products - Average American uses one 100' tree per year. UN predicting world wood demand to double by 2040.
- World's wood supply is shrinking
- Hedge against inflation
- ...regardless of the economy, trees grow.

Forestry is a Business and all about Investment Decisions...
Forestry Investment Decisions

The Forestry Business provides good returns

Timberland Returns come from:
- Biological Tree Growth (60%)
- Timber Price Change (25-30%)
- Land Value (2.5%)

Annualized Returns

1991–2010
- US Timberland 11.5%
- Large Cap Equity 8.3%
- Global Equities 6.7%
- Gold 3.5%
- US Real Estate 7.2%
- Commodities 6.6%

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Forestry Investment Decisions

What decisions in forestry are investment decisions....

Harvest
Reforestation
Mid-Rotation
Harvest
Acquisition & Disposition
Management Choices
Certification
Easements
Carbon
Intangibles

Harvest Decision
Mature Stand
Riparian Detention
Fertilization
Seeding Program
Planting
Establishment
Intermediate Harvest
Density Management
Vegetation Control

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What’s involved in a typical decision...

- Project Definition
- Data
- Verification Process
- Growth
- Costs & Revenue
- Other
- Assimilation
- Decision

What’s being valued, timeframe, etc.
- Finding it
- Moving it around
### What’s involved in a typical decision...

<table>
<thead>
<tr>
<th>Project Definition</th>
<th>Does it make sense</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data</td>
<td>Where is it weak?</td>
</tr>
<tr>
<td>Verification Process</td>
<td>Field work</td>
</tr>
<tr>
<td>Growth</td>
<td>What can be done to fix it?</td>
</tr>
<tr>
<td>Costs &amp; Revenue</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>Assimilation</td>
<td></td>
</tr>
<tr>
<td>Decision</td>
<td></td>
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</tbody>
</table>

Find a model
Identify assumptions & conditions
Run
Run
Verify, Evaluate, and Fix
What’s involved in a typical decision...

- Project Definition
- Data
- Verification Process
- Growth
- Costs & Revenue
- Other
- Assimilation
- Decision

- Logging Costs
- Transportation Costs
- Regulatory Costs
- Management Costs
- Taxes
- Etc.

- Animals
- Birds
- Fish
- Steep slopes
- Disease
- ???
What’s involved in a typical decision...

- Project Definition
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- Costs & Revenue
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Who is Involved?

Many Disciplines and Many Tools

- Biometrics
  - Inventory
  - Growth & Yield Models
- Economics
  - Product Distribution Models (Species, Grade)
- Forestry
  - Price Forecasting
- Operations
  - Cost/Value Models
- Spatial Systems
  - Removals & Constraints
- Integration
  - Alternative Uses
  - Harvest Planning – Optimization
  - Sustained Yield Analysis
  - Spatial Analyses of Many Kinds
Biometricians

Expertise or Tools in

- Inventory Design & Implementation
- Growth Models
- Silvicultural Response
- Product Composition
- Wood Quality Models
- Verification and Validation

and Economist’s

Expertise or Tools in

- Financial Analysis
- Price forecasting
- Supply/Demand
- Optimization and Simulation
**Biometricians and Economists**

**Similarities** –

Quantitative Skills across a range of topics – mathematics, statistics, computer programming, financial analysis...like our counterparts in other industries.

Qualitative understanding of biology, botany, soil science, and other underlying parts of the forest ecosystem.

Over-analyze (issues, variables, functions, etc) that have little or no impact on the final outcome.

Dwell on minute matters.....perhaps to the point that the statistical variance makes their importance trivial, relative to the impact on the final number.

**Biometricians and Economists**

**We deal in long time frames...**

Economists often look at 10-50 year DCF models.

Biometricians look at 10-100-year growth models.

From 1989 to 2010, the amount of capital invested in timberland grew from several hundred million $ to ~$55Billion in the US. Since 1992, this investment has expanded to the rest of the globe. One could argue that it is perhaps the most influential ownership types.

Average ownership period for institutional timberland is 7-10yrs

We effectively taking a 20-year econometric model, marrying it with a 50-year growth and removal model and presenting the highest NPV result to a 5 to 10 year oriented investor?
Forestry Investment Decisions

Sidebar - The motivation for investing in timberland has changed

Prior to 1986, most privately held timberland was owned by forest products companies – fiber source which offered strategic and competitive advantages.

1986 – lost of favorable capital gains tax rates on timber harvest revenue.

Advantageous to sell holdings to tax-advantaged investors (pension funds, foundations, endowments).

Additional tax rulings strengthened the view of tax-exempt organizations that owning and managing timberlands was a solid investment.

Forestry Investment Decisions

A good way to look at timberland investing now might be as...

A portfolio of options contracts

- Consider an Option Contract – basically, a contract to buy or sell a product/good/service/etc.
- The key here is that you have the right to buy/sell...not that you do either.
- In the financial options markets, something like 6% of all options are exercised, 20% just expire unused, and the remainder are sold.
Forestry Investment Decisions

**The Portfolio?**
- Harvest
- Reforestation
- Mid-Rotation
- Harvest
- Acquisition & Disposition
- Management Choices
- Certification
- HBU
- Easements
- Carbon
- Intensity

- Merchantable Timber – options often executed
- Pre-Merchantable Timber – sometimes executed
- Regeneration – rarely executed

**What does this view mean to us?**

- The key to a healthy options market is valuation transparency and liquidity.
- The key to these two items is accurate prediction of future premerch value.
- Our long term view fits very well.

- Valuing premerch and younger plantations is exactly what the marriage of economics and biometrics is good at.
**That all sounds good, what else?**

**Recap**

- Investment decisions involve the assimilation of many technical matters over a time scale that we are well suited for.
- Each play an important role
- Need to be adaptable
- Not get overly bogged down in the details

---

**What else can we bring to the table?**

**Investment Team**

- Biometricians, Economists
That all sounds good - what else?

The Investment team

Biometricians, Economists
Foresters
Operations
That all sounds good - what else?

The Investment team

Biometricians, Economists
Foresters
Operations
...spatial team

That all sounds good - what else?

The Investment team

Biometricians, Economists
Foresters
Operations
...spatial team
The "ologists"
We have the team...what else?

**Tools!**

- Biometricians, Economists
- Foresters
- Operations
- ...spatial team
- The "ologists"

State of the Art...comprehensive decision support systems, right!

**Well, No**

- Spreadsheets
- Complicated Spreadsheets
- Integrated Systems
- Back of the envelope ad hoc

What else does the team need?

- Data professionals
- Computer models
- A solid marriage of professions
What else does the team need?

**leadership**

- Data professionals
- Computer models
- A solid marriage of professions
- Need someone to lead and guide the process.
- This often isn’t “us”.

Closing thoughts on how to grow in relevance

**Things to do...**

- Keep our technical skills but learn to be better
  - Communicators
  - Integrator’s
  - Generalists

- Produce
  - Simple tools that can be used
  - Tools that work well together
  - Tools that can be explained

- Learn...cross-train
  - operations, spatial analysis, biology, finance

- Business Education
- Leadership
Thank you

“Aunque todo lo demás falle, siempre podemos asegurarnos la inmortalidad cometiendo algún error espectacular” — John Gailbrath

It is better to be roughly right than precisely wrong... John Keynes