Global Timber Investing: Benchmarking Returns with Land and Environmental Costs

Presented at the:
4th IQPC Timberland Investing Latin America Summit 2011
29-31 March 2011
São Paulo, Brasil
<table>
<thead>
<tr>
<th>Authors and Affiliations</th>
<th>Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fred Cubbage, NC State U, USA</td>
<td>Gustavo Balmelli, INIA, Uruguay</td>
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<tr>
<td>Virginia Morales Olmos, Weyco, Uruguay</td>
<td>Adriana Bussoni, UdelaR, Uruguay</td>
</tr>
<tr>
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</tr>
<tr>
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<td></td>
</tr>
</tbody>
</table>
Outline

- Forest areas
- Factors affecting global timber investments
  - Macro and Economic
  - Institutional
  - Forestry sector
- Land, transportation, & management
- Conclusions
Macro & Economic Factors Affecting Investments

- General economy
  - Gross Domestic Product (GDP)
  - Growth
- Domestic and foreign capital
- Exchange rate / stability
- Taxes
  - Rates
  - Complexity
  - Administration
- Trade / openness
- Political risk
- Personal risk and security

Adapted from IADB, 2010
Institutional Factors Affecting Investments

- Infrastructure
  - Economic, physical, social
  - Transportation costs

- Business environment
  - Contracts and rule of law
  - Credit access
  - Licenses, permits
  - Opening and closing a business
  - Labor availability and relations

- Legal environment
  - Agriculture policies
  - Land use and ownership laws

Adapted from IADB, 2010
Forestry Sector Factors Affecting Investments

- Markets
  - Domestic
  - Export

- Forests and plantations
  - Inventory, growth, removals, land change
  - Productivity and input costs
  - Timber prices & marketing

- Regulations & Certification
  - Reserves, harvesting, planting, biodiversity, etc.
  - Rigor, enforcement, and predictability

- Incentives and subsidies
  - Amount, rate
  - Availability

Adapted from IADB, 2010
Total World Forest Area By Region, 2010

FAO 2011; 4.033 billion ha total
FAO 2005; 109.6 million ha productive (78%); 30.1 million ha protective (22%); 140.1 million ha total
Total Productive Plantation Area
For Major Countries in the World, 2005

China: 28,530
U.S.A.: 17,061
Russian Fed: 11,888
Brazil: 5,384
Indonesia: 3,399
Chile: 2,661
Thailand: 1,997
New Zealand: 1,968
Viet Nam: 1,832
Australia: 1,792
Malaysia: 1,766

FAO 2007
Total Productive Plantation Area
For Major Countries in the World, 2005

FAO 2007, Asoplant 2007 for Venezuela
Industrial Roundwood Harvest from Plantations

Total = 635 million m³; ~40% of production of 1 542 million m³ in 2000s

FAO 2006; country reports; Brown (1999); DANA; SOUTHEM, Siry et al. 2005
Macro, Economic, and Institutional Factors Affecting Investments
## Gross Domestic Product (GDP) and Growth, 2008

<table>
<thead>
<tr>
<th>Country</th>
<th>Population (000)</th>
<th>GDP 2008 (Billion $US)</th>
<th>GDP 2008 per capita (000 $US)</th>
<th>GDP Growth, 2008 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>40</td>
<td>570</td>
<td>14.3</td>
<td>6.8</td>
</tr>
<tr>
<td>Brazil</td>
<td>192</td>
<td>1 978</td>
<td>10.3</td>
<td>5.1</td>
</tr>
<tr>
<td>Chile</td>
<td>17</td>
<td>242</td>
<td>14.4</td>
<td>3.2</td>
</tr>
<tr>
<td>Colombia</td>
<td>45</td>
<td>395</td>
<td>8.7</td>
<td>2.5</td>
</tr>
<tr>
<td>Paraguay</td>
<td>6</td>
<td>19</td>
<td>4.7</td>
<td>5.8</td>
</tr>
<tr>
<td>Peru</td>
<td>29</td>
<td>245</td>
<td>8.5</td>
<td>9.8</td>
</tr>
<tr>
<td>Uruguay</td>
<td>3</td>
<td>43</td>
<td>12.7</td>
<td>8.9</td>
</tr>
<tr>
<td>Venezuela</td>
<td>28</td>
<td>360</td>
<td>12.8</td>
<td>4.8</td>
</tr>
<tr>
<td>S America Total</td>
<td>384</td>
<td>4 020</td>
<td>10.4</td>
<td>5.4</td>
</tr>
<tr>
<td>Mexico</td>
<td>109</td>
<td>1 601</td>
<td>14.6</td>
<td>1.8</td>
</tr>
<tr>
<td>USA</td>
<td>312</td>
<td>14 445</td>
<td>37</td>
<td>2.4</td>
</tr>
<tr>
<td>Africa</td>
<td>987</td>
<td>2 753</td>
<td>2.8</td>
<td>5.2</td>
</tr>
<tr>
<td>World</td>
<td>6 750</td>
<td>70 097</td>
<td>10.4</td>
<td>1.7</td>
</tr>
</tbody>
</table>

FAO SWF 2011
## Selected Country Investment Classification, 2011

<table>
<thead>
<tr>
<th>Classification</th>
<th>Foreign Rating</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Investment Grade</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AAA</td>
<td>Australia, Canada, Finland, USA</td>
<td></td>
</tr>
<tr>
<td>AA+</td>
<td>New Zealand</td>
<td></td>
</tr>
<tr>
<td>AA-</td>
<td>China</td>
<td></td>
</tr>
<tr>
<td>A+</td>
<td>Chile</td>
<td></td>
</tr>
<tr>
<td>BBB/+</td>
<td>Mexico / South Africa</td>
<td></td>
</tr>
<tr>
<td>BBB-</td>
<td>Brazil, Colombia, India, Peru</td>
<td></td>
</tr>
<tr>
<td><strong>Speculative Grade</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BB+</td>
<td>Costa Rica</td>
<td></td>
</tr>
<tr>
<td>BB</td>
<td>Indonesia, Turkey, Uruguay</td>
<td></td>
</tr>
<tr>
<td>BB-</td>
<td>Venezuela</td>
<td></td>
</tr>
<tr>
<td>B+</td>
<td>Paraguay</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Argentina, Bolivia, Honduras</td>
<td></td>
</tr>
<tr>
<td>B-</td>
<td>Ecuador</td>
<td></td>
</tr>
</tbody>
</table>

*Note: Major LAC upgrades since 2008*
## Export and Direct Investment Risk, 2009

<table>
<thead>
<tr>
<th>Country</th>
<th>OECD Export Credit Risk</th>
<th>ONDD Export Polit. Risk</th>
<th>ONDD Direct Investments Risk</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Short Term</td>
<td>Long Term</td>
</tr>
<tr>
<td>Argentina</td>
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<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Brazil</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Chile</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>China</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Colombia</td>
<td>4</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Mexico</td>
<td>3</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>N Zealand</td>
<td>0</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Paraguay</td>
<td>5</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Peru</td>
<td>3</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>S Africa</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Uruguay</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Venezuela</td>
<td>7</td>
<td>5</td>
<td>7</td>
</tr>
</tbody>
</table>

OECD, ONDD 2011; Range of 1-7; Lowest number is least risky
# Ease of Doing Business, 2010

<table>
<thead>
<tr>
<th>Country</th>
<th>Overall</th>
<th>Start Business</th>
<th>Register Property</th>
<th>Protect Investors</th>
<th>Paying Taxes</th>
<th>Trade w Borders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>115</td>
<td>142</td>
<td>118</td>
<td>109</td>
<td>143</td>
<td>115</td>
</tr>
<tr>
<td>Brazil</td>
<td>127</td>
<td>128</td>
<td>122</td>
<td>74</td>
<td>152</td>
<td>114</td>
</tr>
<tr>
<td>Chile</td>
<td>43</td>
<td>62</td>
<td>45</td>
<td>28</td>
<td>46</td>
<td>68</td>
</tr>
<tr>
<td>China</td>
<td>79</td>
<td>151</td>
<td>38</td>
<td>93</td>
<td>114</td>
<td>50</td>
</tr>
<tr>
<td>Colombia</td>
<td>39</td>
<td>73</td>
<td>55</td>
<td>5</td>
<td>118</td>
<td>99</td>
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<td>Mexico</td>
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<td>67</td>
<td>105</td>
<td>44</td>
<td>107</td>
<td>58</td>
</tr>
<tr>
<td>New Zealand</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>26</td>
<td>28</td>
</tr>
<tr>
<td>Paraguay</td>
<td>106</td>
<td>102</td>
<td>60</td>
<td>59</td>
<td>110</td>
<td>152</td>
</tr>
<tr>
<td>Peru</td>
<td>36</td>
<td>54</td>
<td>24</td>
<td>20</td>
<td>86</td>
<td>53</td>
</tr>
<tr>
<td>South Africa</td>
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<td>75</td>
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<td>10</td>
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<tr>
<td>United States</td>
<td>5</td>
<td>9</td>
<td>12</td>
<td>5</td>
<td>62</td>
<td>20</td>
</tr>
<tr>
<td>Uruguay</td>
<td>124</td>
<td>139</td>
<td>159</td>
<td>93</td>
<td>155</td>
<td>132</td>
</tr>
<tr>
<td>Venezuela</td>
<td>172</td>
<td>144</td>
<td>101</td>
<td>179</td>
<td>178</td>
<td>167</td>
</tr>
</tbody>
</table>

World Bank 2011. 1 is best, easiest.
<table>
<thead>
<tr>
<th>Country</th>
<th>Procedures (number)</th>
<th>Time (days)</th>
<th>Cost (% of Income/Capita)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>14</td>
<td>26</td>
<td>14</td>
</tr>
<tr>
<td>Brazil</td>
<td>15</td>
<td>120</td>
<td>7</td>
</tr>
<tr>
<td>Chile</td>
<td>8</td>
<td>22</td>
<td>7</td>
</tr>
<tr>
<td>China</td>
<td>14</td>
<td>38</td>
<td>5</td>
</tr>
<tr>
<td>Colombia</td>
<td>9</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>Mexico</td>
<td>6</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>New Zealand</td>
<td>1</td>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td>Paraguay</td>
<td>7</td>
<td>35</td>
<td>55</td>
</tr>
<tr>
<td>Peru</td>
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<td>27</td>
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</tr>
<tr>
<td>South Africa</td>
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<td>22</td>
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</tr>
<tr>
<td>United States</td>
<td>6</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Uruguay</td>
<td>11</td>
<td>65</td>
<td>42</td>
</tr>
<tr>
<td>Venezuela</td>
<td>17</td>
<td>141</td>
<td>30</td>
</tr>
</tbody>
</table>
## Brazil Taxes - Presumido Tax Regime

<table>
<thead>
<tr>
<th>Tax Type</th>
<th>Tax Rate-Profits</th>
<th>Effective Rate on Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRPJ (Presumed Profit of 8%, no surtax)</td>
<td>15%</td>
<td>1.2%</td>
</tr>
<tr>
<td>CSLL (Social Contribution, on 12% Profit)</td>
<td>9%</td>
<td>1.08%</td>
</tr>
<tr>
<td>COFINS</td>
<td></td>
<td>3%</td>
</tr>
<tr>
<td>PIS (Social Development)</td>
<td></td>
<td>0.65%</td>
</tr>
<tr>
<td>INSS (Rural Fund)</td>
<td></td>
<td>2.85%</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>26%</strong></td>
<td><strong>7.7108%</strong></td>
</tr>
<tr>
<td>ITR (property, productive land only)</td>
<td></td>
<td>3% of land value</td>
</tr>
<tr>
<td>ICMS (tax if logs sold to business in another state)</td>
<td></td>
<td>12%</td>
</tr>
<tr>
<td>IOF (federal transactions tax)</td>
<td></td>
<td>?</td>
</tr>
</tbody>
</table>

Or may use Real tax regime – pay tax on profits like U.S. timber basis calculation, but always pay “SS”: PIS, INSS, COFINs, ITR

Source: King, RMS 2010
Global Trade in Forest Products expanded since 1980, at about 4.5% per year...
Trade: Timber Supply Trends

Supply from S America the Rest of the World will grow; N Hemisphere supplies have difficulty expanding.

Sohngen 2010
Annual Increase in Production by Region, 1961-2005 (%)

Source: Gonzalez et al. 2008, NCSU, from FAO 2007

FAO 2007, Gonzalez et al. 2008
Production and Consumption of Wood
South America, 1961-2005

FAO 2007, Gonzalez et al. 2008
Production and Consumption of Industrial Roundwood in South America, 2003

FAO 2007, Gonzalez et al. 2008; Total production, 2008=185 billion m³; 12% world
Global Leader in Market Pulp

Production capacity of the world’s leading pulp producers in 2009 (‘000 tons)

- Fibria
- Arauco
- April
- Sodra
- Suzano
- Stora Enso
- Weyerhaeuser
- CMPC
- APP
- Domtar
- Ilim Pulp
- Mercer
- Georgia Pacific
- IP
- Ence
- West Fraser
- Cenibra
- Metsa Botnia
- Abitibibowater

Source: Hawkins Wright; Fibria 2010
Trade and Development: Debate as Well as Progress

Evangelina Corrazzo, 2006 Carnival Queen of Gauleguaychu, Entre Rios, Argentina
at the EU-Latinoamerica Summitt, Vienna, Austria, 13 May 2006

Photo of Protest Here
Next Life: Scouring the Forest for the Trees

Private equity player Harald Orneberg sold his fund, then headed for Brazil to form The Forest Co. and grow (money on) trees

By Alexandra Wolfe

Bloomberg Businessweek  Next Life  July 15, 2010

When Harald Orneberg sold his private equity fund, ORN Capital, to British insurance giant Aviva in 2006, he became an indentured servant of sorts. As part of the deal, Orneberg was contracted to work for Aviva for a year, which turned out to be the longest year of his life. "Working for a large company," he says, "was like wading in molasses."

After fulfilling his contractual obligations, Orneberg, 47, decided to return to the business he had grown up around as a boy in Sweden: forestry. It was a decision facilitated by the rise of the Chinese paper industry, which was boosting pulp prices. Much more important, it was a field that had nothing to do with his previous career. "The rate of tree growing is independent of the financial markets," he says. "The tree doesn't know what is written in The Wall Street Journal. It doesn't even know that one day it may become The Wall Street Journal."

After hiring a consulting firm to find out which country had the best forests available for industrial use, Orneberg settled on Brazil, which had the highest tree growth rate and the most available land. In 2007 he formed The Forest Co. and, the next year, purchased two farms 560 miles north of São Paulo. Orneberg started planting pine and eucalyptus to supply the pig iron industry. The trees are used to make wood-based charcoal and are also sold as raw material to China, Russia, and the Middle East.

By spring of 2009, Orneberg had raised $50 million in investments—including $8 million of his own money—mainly from Nordic insurance companies and pension funds. This spring he closed on the next round: $126 million from European investors and church foundations.

Despite having only six employees, Orneberg is preparing for a $500 million initial public offering in Stockholm. In the meantime he's developing a resort community near one of his farms. After three years of almost constant travel, he's finally taking up residence in São Paulo. Although his life has hardly slowed down. "Things are so intense in São Paulo that I have to go to New York to chill out," he says.
El presidente Mujica pone límites a la industria celulósica en Uruguay

En declaraciones recogidas por la página de Internet del diario El Observador, el presidente de Uruguay, José Mujica, consideró que el país debe apostar "a la diversidad porque es lo que sirve cuando viene la crisis", pero advirtió que hay que "ponerle un tope al desarrollo de la industria de la celulosa". Uruguay, un país de origen eminentemente agropecuario, desarrolló la industria forestal y la celulosa, particularmente, a partir de la presencia de la planta de finlandesa UPM que exporta miles de toneladas anuales desde 2007 tras una inversión de 1.200 millones de dólares. A su vez, Uruguay tiene en marcha la instalación de una segunda planta, Montes del Plata, de un consorcio integrado por la empresa sueco-finlandesa Stora Enso Oyj y la chilena Arauco que invertirán USD $1.900 millones de dólares. El comienzo de operaciones se prevé para 2013. Esta segunda planta recibió en enero los permisos ambientales de parte del gobierno uruguayo y estará instalada en Punta Pereira, en el departamento de Colonia, sobre el Río de la Plata. Va a producir hasta 1,3 millón de toneladas al año.
Más información en www.maderamen.com.ar
Welcome to UGA’s 2011 Timberland Investment Conference

March 23-25, 2011
The Ritz-Carlton Lodge at Reynolds Plantation, Lake Oconee, GA

Global Wood Markets & Trade and Timberland Investments are the focus of our 2011 conference as emerging markets have placed a large demand on all commodities including wood products. Attendees will learn of the current market participants and how to meet the needs of these emerging markets. With domestic consumption of wood fiber at historically low levels, international trade is key to continued growth. Participants at the 2011 conference will include public and private pension funds, private investors, family offices, fund of funds, REITs, private consultants, large landowners, TIMOs, and forest product companies. This diverse attendance base offers participants the ability to learn about every facet of the timberland business and network with representatives...
Bem-vindo(a) ao portal de Timberland Investing Latin America 2011!

Mais uma vez, o IQPC realizará a Timberland Investing Latin America. Pelo 4º ano consecutivo, o Timberland Investing Latin America será o evento de elite para os executivos interessados em investimentos florestais.

A 4ª edição de Timberland Investing Latin America continuará com sua tradição de reunir os maiores experts do mercado de investimento florestal mundial, investidores e grandes empresas para mostrar quão lucrativa esta ferramenta de asset class pode ser, se combinada com fortes parceiras, estratégia e cautela.

Com a combinação de apresentações de casos práticos, round tables, painéis de discussão e workshops exclusivos, o Timberland Investing Latin America 2011 irá atrair um público de alto nível, interessado em oportunidades sólidas de investimentos, com menor volatilidade e menor correlação com o mercado de ações.

Welcome to Timberland Investing Latin America 2011!

Once again, IQPC is organizing the conference Timberland Investing Latin America. On its fourth consecutive year, the Timberland Investing Latin America will be the elite event for executives interested in timberland investments.

The 4th edition of Timberland Investing Latin America will continue its tradition of reuniting the most important experts in the global timberland market, investors and leading industry companies to present how lucrative this asset class tool
Conclusions: Latin America
Macro, Institutional, Economic Factors

- General economy
  - Large increases in GDP and per capita
  - More growth in past and future than N America

- Financial and Political Risk
  - Remains higher than more developed countries
  - But large risk declines in most countries; investment grade
  - With 2 exceptions – Argentina, Venezuela

- Trade & Production
  - Global increases in trade
  - Largest production increases in Latin America

- Differences between developed and developing narrowing
Forestry Sector Factors Affecting Investments
Global Timber Investments
Benchmarking, 2011
Research in Progress

Reference Article:
Methods

- Select countries
  - Major world plantation timber producers
  - Argentina, Brazil, Uruguay, Chile, Mexico, US S / W
  - New Zealand, S Africa, Indonesia, China
  - Colombia, Paraguay, Venezuela

- Select principal commercial timber species or prospects

- Authors’ estimates of:
  - Growth rates, typical current practices, genetics
  - Factor costs and output prices

- Develop cash flow analyses / spreadsheets
- Capital budgeting analyses

- Iterative review by authors and foresters in each country
Assumptions

- Capital Budgeting/Discounted Cash Flow Analysis
  - Net Present Value (NPV)
  - Expand to Land Expectation Value (LEV) for “infinity”
- Real (constant) input costs and timber prices
  - No inflation
  - Real discount rate of 8%
- No land costs in base case
- Before tax
- Representative sites
- Good plantation and natural stand practices
- LEV becomes proxy for land value
Plantation Returns, Brasil, 2011

8% discount rate; no land cost
Plantation Returns, Uruguay, 2011

<table>
<thead>
<tr>
<th>Product</th>
<th>Land Expectation Value ($000/ha)</th>
<th>Internal Rate of Return (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pinus taeda sawtimber</td>
<td>13.7</td>
<td>1.2</td>
</tr>
<tr>
<td>Eucalyptus globulus pulpwood</td>
<td>2.6</td>
<td>1.3</td>
</tr>
<tr>
<td>Eucalyptus grandis pulpwood</td>
<td>14.8</td>
<td>1.3</td>
</tr>
<tr>
<td>Eucalyptus grandis sawtimber</td>
<td>17.7</td>
<td>1.8</td>
</tr>
</tbody>
</table>

8% discount rate; no land cost
Plantation Returns, Mexico and Costa Rica, 2011

<table>
<thead>
<tr>
<th>Country</th>
<th>Species</th>
<th>Land Expectation Value ($000/ha)</th>
<th>Internal Rate of Return (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico</td>
<td>Pinus gregii</td>
<td>1.7</td>
<td>0.9</td>
</tr>
<tr>
<td>Mexico</td>
<td>Eucalyptus grandis</td>
<td>2.1</td>
<td>1.9</td>
</tr>
<tr>
<td>Costa</td>
<td>Gmelina arborea</td>
<td>4.3</td>
<td>5.8</td>
</tr>
</tbody>
</table>

8% discount rate; no land cost
Plantation Returns, New Zealand and Australia, 2011

- New Zealand, Pinus radiata, with pruning: Land Expectation Value -1.4
- New Zealand, Pinus radiata, no pruning: Land Expectation Value 0
- Australia, Pinus sawlog: Land Expectation Value 8
- Australia, Eucalyptus sawlog: Land Expectation Value 6.7
- Australia, Eucalyptus pulpwood: Land Expectation Value 1.1

8% discount rate; no land cost
Plantation Returns, USA, 2011

- Pinus taeda, low intensity: $5.3$ or $5.4$
- Pinus taeda, high intensity: $8.2$
- Pinus taeda, high yield: $6.9$
- Douglas fir, low site: $7.7$

8% discount rate; no land cost
Plantation Returns, Argentina, 2011

Net Present Value  Land Expectation Value  Internal Rate of Return

8% discount rate; no land cost
Plantation Returns, Chile, 2008

8% discount rate; no land cost
Land Expectation Value (Land $000/ha) or Internal Rate of Return (%)

8% discount rate; no land cost
Plantation Returns, Venezuela, 2008

Venezuela Eucalyptus: 22.4
Venezuela Melina: 18.7
Venezuela P. Caribea: 15
Venezuela Tectona grandis: 21.2

Land Expectation Value ($000/ha) or Internal Rate of Return (%)

8% discount rate; no land cost
Plantation Returns, Paraguay, 2008

- **Paraguay P taeda**: Land Expectation Value ($000/ha) = 1.6, Internal Rate of Return (%) = 4.2
- **Paraguay Euc grandis**: Land Expectation Value ($000/ha) = 21.4, Internal Rate of Return (%) = 12
- **Paraguay Euc camuldensis**: Land Expectation Value ($000/ha) = 15.4, Internal Rate of Return (%) = 2

8% discount rate; no land
Plantation Returns, South Africa, China, & Indonesia, 2008

Land Expectation Value ($000/ha) or Internal Rate of Return (%)

8% discount rate; no land
## Wood Costs at Rotation, Selected Countries, 2008

<table>
<thead>
<tr>
<th>Country/Species</th>
<th>At 8% Discount Rate ($/m³)</th>
<th>At Stumpage Prices ($/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina – Pinus taeda</td>
<td>4.43</td>
<td>20.18</td>
</tr>
<tr>
<td>Argentina – Euc grandis</td>
<td>6.48</td>
<td>24.25</td>
</tr>
<tr>
<td>Brazil – Pinus taeda</td>
<td>8.90</td>
<td>34.21</td>
</tr>
<tr>
<td>Brazil – Euc grandis</td>
<td>6.60</td>
<td>36.69</td>
</tr>
<tr>
<td>Chile – Pinus radiata sawtimber</td>
<td>10.91</td>
<td>30.91</td>
</tr>
<tr>
<td>China – Pinus massoniana</td>
<td>23.64</td>
<td>30.92</td>
</tr>
<tr>
<td>Colombia – Eucalyptus</td>
<td>21.64</td>
<td>52.82</td>
</tr>
<tr>
<td>Colombia – Pinus tecunumanii</td>
<td>20.81</td>
<td>51.41</td>
</tr>
<tr>
<td>Indonesia – Tectona grandis</td>
<td>8.22</td>
<td>19.82</td>
</tr>
<tr>
<td>New Zealand – Pinus radiata</td>
<td>36.87</td>
<td>33.20</td>
</tr>
<tr>
<td>Country/Species</td>
<td>At 8% Discount Rate ($/m3)</td>
<td>At Stumpage Prices ($/m3)</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>----------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>Paraguay – Pinus taeda</td>
<td>22.45</td>
<td>31.87</td>
</tr>
<tr>
<td>Paraguay – Eucalyptus camuldensis</td>
<td>21.41</td>
<td>30.46</td>
</tr>
<tr>
<td>South Africa – Pinus patula</td>
<td>60.36</td>
<td>92.44</td>
</tr>
<tr>
<td>South Africa – Eucalyptus grandis</td>
<td>21.86</td>
<td>38.36</td>
</tr>
<tr>
<td>Uruguay – Eucalyptus globulus</td>
<td>6.10</td>
<td>18.00</td>
</tr>
<tr>
<td>Uruguay – Pinus taeda</td>
<td>12.85</td>
<td>25.02</td>
</tr>
<tr>
<td>USA – South – Pinus taeda</td>
<td>31.05</td>
<td>34.16</td>
</tr>
<tr>
<td>USA – West – Douglas fir, Site I</td>
<td>52.98</td>
<td>52.13</td>
</tr>
<tr>
<td>Venezuela – Eucalyptus</td>
<td>14.23</td>
<td>20.00</td>
</tr>
<tr>
<td>Venezuela – Gmelina arborea</td>
<td>12.20</td>
<td>20.00</td>
</tr>
</tbody>
</table>
Effects of Land Costs and Environmental Protection
Recap: Maximum LEV / VAN Land Price/Ha to Achieve a 8% Real IRR, 2011 (US$)

- Argentina P taeda: -621
- Argentina E grandis: -842
- Brazil P taeda: 1224
- Brazil E urophylla pulp: 1962
- Costa Rica Gmelina: 2137
- Mexico P gregii: 1616
- Mexico E grandis: 4561
- New Zealand P radiata: 4833
- Uruguay P taeda: 5818
- Uruguay E grandis Sawt: 6344
- Uruguay E grandis Pulp: -23
- USA P taeda: 1745
- USA Douglas Fir: 1816
- USA P taeda: -842
- USA P taeda: -621
## Land & Regulation Sensitivity Analysis – 25 Year Span

<table>
<thead>
<tr>
<th>Country/Species</th>
<th>Growth Rate (M3/ha/yr)</th>
<th>Rotation Age</th>
<th>Harvest Years</th>
<th>Total Harvest Volume (m3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil Pinus taeda</td>
<td>30</td>
<td>15</td>
<td>8, 12, 15</td>
<td>450</td>
</tr>
<tr>
<td>Brazil Eucalypts europhylla</td>
<td>40</td>
<td>6</td>
<td>6</td>
<td>240</td>
</tr>
<tr>
<td>Uruguay Eucalyptus grandis</td>
<td>30</td>
<td>16</td>
<td>10, 16</td>
<td>480</td>
</tr>
<tr>
<td>USA Pinus taeda</td>
<td>12.75</td>
<td>25</td>
<td>16, 25</td>
<td>319</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country/Species</th>
<th>Establishment Costs Year 0-5 ($)</th>
<th>Price/m3 per Size Class ($)</th>
<th>Total Undiscounted Returns ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil Pinus taeda</td>
<td>900</td>
<td>18, 26, 39, 59</td>
<td>16 925</td>
</tr>
<tr>
<td>Brazil Eucalypts europhylla</td>
<td>1553</td>
<td>26.52</td>
<td>6 365</td>
</tr>
<tr>
<td>Uruguay Eucalyptus grandis</td>
<td>937</td>
<td>7, 8, 17</td>
<td>7 260</td>
</tr>
<tr>
<td>USA Pinus taeda</td>
<td>1345</td>
<td>3, 10, 16, 27, 38</td>
<td>7 388</td>
</tr>
<tr>
<td>Country/Species</td>
<td>Envtl: Net Planted Area (%)</td>
<td>Land Costs ($/ha)</td>
<td>Higher MAI (m³/ha/yr)</td>
</tr>
<tr>
<td>---------------------</td>
<td>----------------------------</td>
<td>-------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Brazil P. taeda</td>
<td>50</td>
<td>4500</td>
<td>35</td>
</tr>
<tr>
<td>Brazil E. urophylla</td>
<td>50</td>
<td>6000</td>
<td>50</td>
</tr>
<tr>
<td>Uruguay E. grandis</td>
<td>70</td>
<td>3000</td>
<td>35</td>
</tr>
<tr>
<td>USA P. taeda</td>
<td>65</td>
<td>3000</td>
<td>15</td>
</tr>
</tbody>
</table>
Sensitivity Analysis of Separate Scenarios
Eucalyptus urophylla pulpwood, Brazil, 2011

Net Present Value ($000/ha) or Internal Rate of Return (%)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Net Present Value</th>
<th>Internal Rate of Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base, No Land Cost or Envt Regs</td>
<td>2.4</td>
<td>8%</td>
</tr>
<tr>
<td>Base, Only 50% Net Plantable Area</td>
<td>1.1</td>
<td>8%</td>
</tr>
<tr>
<td>Base With Land Cost</td>
<td>0.2</td>
<td>8%</td>
</tr>
<tr>
<td>Base With Land Cost, 50% Net Plantable Area</td>
<td>-2.6</td>
<td>8%</td>
</tr>
<tr>
<td>High Yield &amp; High Price, No Land Cost</td>
<td>4.6</td>
<td>8%</td>
</tr>
<tr>
<td>High Yield &amp; High Price, w/Land, 50% Plantable</td>
<td>-1.5</td>
<td>8%</td>
</tr>
</tbody>
</table>

8% discount rate; $6000/ha land cost; 25 year span with land sale
Sensitivity Analysis of Separate Scenarios
Pinus taeda, Santa Catarina, Brazil, 2011

Net Present Value ($000/ha) or Internal Rate of Return (%)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Net Present Value</th>
<th>Internal Rate of Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base, No Land Cost or Envt Regs</td>
<td>19.2</td>
<td>4.1</td>
</tr>
<tr>
<td>Base, Only 50% Net Plantable Area</td>
<td>17.8</td>
<td>1.9</td>
</tr>
<tr>
<td>Base With Land Cost</td>
<td>8.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Base With Land Cost, 50% Net Plantable</td>
<td>-1.9</td>
<td>5.4</td>
</tr>
<tr>
<td>High Yield &amp; High Price, No Land Cost</td>
<td>21.9</td>
<td>5.7</td>
</tr>
<tr>
<td>High Yield &amp; High Price, w/Land, 50% Plantable</td>
<td>5.8</td>
<td>-1.7</td>
</tr>
</tbody>
</table>

8% discount rate; $4500/ha land cost; 25 year span with land sale
Sensitivity Analysis of Separate Scenarios
Eucalyptus grandis, Uruguay, 2011

8% discount rate; $3000/ha land cost; 16 year span with land sale
Sensitivity Analysis of Separate Scenarios
Pinus taeda, U.S. South, 2011

Net Present Value ($000/ha) or Internal Rate of Return (%)

-5 0 5 10

Base, No Land Cost or Envt Regs
Base, 65% Net Plantable Area
Base With Land Cost
Base With Land Costs + 65% Plantable
High Yield & Price, No Land Cost
High Yield & Price, Land Costs + 65% Plantable

Net Present Value
8% discount rate; $3000/ha land cost; 25 year span with land sale
Sensitivity Analysis of Separate Scenarios to Land and Environmental Costs, 2011

- Base, No Land Cost or Environmental Regulations
- Base With Land Cost, Environmental Regulations
- Base with Land,Regs, High Yields, High Prices

Internal Rate of Return (%)

- Brasil Eucs
- Brasil P taeda
- Uruguay Eucs
- US P taeda
### Brazil, Uruguay, and U.S. Plantation Investment Returns, 2011
25 Year Investment Span – Summary, 8% Discount Rate

<table>
<thead>
<tr>
<th>Criteria/ Scenario</th>
<th>Brazil E urophylla</th>
<th>Brazil P taeda</th>
<th>Uruguay E grandis</th>
<th>USA P taeda</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Base Case, no Land or Regulations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPV ($/ha)</td>
<td>2 346</td>
<td>4 127</td>
<td>1 745</td>
<td>-719</td>
</tr>
<tr>
<td>IRR (%)</td>
<td>26.6</td>
<td>19.2</td>
<td>14.5</td>
<td>5.4</td>
</tr>
<tr>
<td><strong>Base+Land+Regulations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPV ($/ha)</td>
<td>-2 638</td>
<td>-1 954</td>
<td>-988</td>
<td>-3 144</td>
</tr>
<tr>
<td>IRR (%)</td>
<td>4.7</td>
<td>5.4</td>
<td>6.0</td>
<td>2.1</td>
</tr>
<tr>
<td><strong>Base+L+R+Hi Yield/Price</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPV ($/ha)</td>
<td>-1 497</td>
<td>-1 684</td>
<td>-405</td>
<td>-2 894</td>
</tr>
<tr>
<td>IRR (%)</td>
<td>6.2</td>
<td>5.8</td>
<td>7.2</td>
<td>3.0</td>
</tr>
</tbody>
</table>
Effect of Land Price ($/Ha) on IRR, 2011

Note: Assumes same productivity and market price, regardless of location
Effect of Land Price ($/Ha) and Regulations on IRR, 2011

Note: Assumes same productivity and market price, regardless of location
Summary: Global Timber Investments

- Most achieve 8% IRR without land prices
  - Much greater in Latin America (LAC); ~12%-20%+
  - IRRs lower in more developed, but less risky, countries
- Land price and environmental regulations
  - Bring net returns much closer for new investors
  - Drop real IRRs to ~5-6% for LAC
  - Drop real IRRs to ~2% for U.S. South
  - Land costs much worse than regulations per se
  - Regulations hurt low return species/areas more
- Can buy cheaper land to achieve higher returns
  - In new, less developed or undeveloped markets
  - But are betting that industry and prices will develop
Effect of Land Prices, Transportation Costs, and Site Productivity on Timber Investment Returns for Pine Plantations in Colombia

Reference Article:

Lopez, Juan, Rafael De la Torre, and Frederick Cubbage. 2010. Effect of land prices, transportation costs, and site productivity in timber investment returns for pine plantations in Colombia. New Forests 39:313-338.
Colombia Analysis

- Developed representative pine regime
  - 20 year rotation
  - Pre-commercial thinning and pruning
- Varied input factors in reasonable range
  - Land cost: $600 - $1800 / ha
  - Transportation: 0 – 200 km to mill
  - Site Quality: 20 – 40 m3/ha/yr
- Estimated NPVs with spreadsheet
- Monte Carlo simulation
NPV at 10% discount rate & land value $1,000/ha

Distance range plantation to the mill (km)
NPV ($/ha)

-2,000 -1,000 0 1,000 2,000

0 - 50 50 - 100 100 - 150 150 - 200

MAI 20 m³/ha/yr
MAI 30 m³/ha/yr
MAI 40 m³/ha/yr
NPV at 10% discount rate and distance to the mill 50 to 100 kms
### Proportional Effects at Median Value

<table>
<thead>
<tr>
<th>Discount Rate</th>
<th>Land Price (@ $1200/ha)</th>
<th>Transportation Distance (@100 km)</th>
<th>Mean Annual Increment (@ 30 m3/ha/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8%</td>
<td>-985</td>
<td>-1050</td>
<td>5238</td>
</tr>
<tr>
<td>10%</td>
<td>-1051</td>
<td>-785</td>
<td>3875</td>
</tr>
<tr>
<td>12%</td>
<td>-1096</td>
<td>-594</td>
<td>2893</td>
</tr>
</tbody>
</table>
Colombia Case Conclusions

- Good sites/forest management most important driver of investment returns

- Results at i=10%
  - Lower productivity – negative NPVs in all cases
  - Higher productivity – always positive NPV
  - Medium productivity – positive in most cases

- Partial response at the mean
  - MAI/Site quality ~ 2-4 times more important than land price
  - MAI/Site quality ~ 5 times more important than transport cost
Business, Environmental, and Social Investment Requirements

Regulations, Certification, and Doing Business in Brazil
# Amount of Regulations for SFM by Country in the Americas, 2008

<table>
<thead>
<tr>
<th>SFM Category (Regs Examined)</th>
<th>Number of Required Regulations by Country for Category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Argentina Misiones</td>
</tr>
<tr>
<td>National Laws (3)</td>
<td>3</td>
</tr>
<tr>
<td>Planning &amp; AAC (5)</td>
<td>4</td>
</tr>
<tr>
<td>BMPS &amp; Regen (4)</td>
<td>3</td>
</tr>
<tr>
<td>Environment (4)</td>
<td>4</td>
</tr>
<tr>
<td>Social (3)</td>
<td>3</td>
</tr>
<tr>
<td>Economic (3)</td>
<td>1</td>
</tr>
</tbody>
</table>

MacIntyre, Cubbage, McGinley, and Crawford, NC State University, USA, 2009
<table>
<thead>
<tr>
<th>Country</th>
<th>Forest Area (000 ha)</th>
<th>FSC</th>
<th>SFI</th>
<th>ATFS, CSA, Cerflor, CertFor</th>
<th>Cert as % of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>310 134</td>
<td>27 536</td>
<td>48 019</td>
<td>75 696</td>
<td>48.1</td>
</tr>
<tr>
<td>USA</td>
<td>303 089</td>
<td>11 617</td>
<td>22 1759</td>
<td>10 008</td>
<td>14.6</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>2 391</td>
<td>68</td>
<td>-</td>
<td>-</td>
<td>2.8</td>
</tr>
<tr>
<td>Guatemala</td>
<td>3 938</td>
<td>436</td>
<td>-</td>
<td>-</td>
<td>11.1</td>
</tr>
<tr>
<td>Brazil</td>
<td>477 698</td>
<td>5 464</td>
<td>-</td>
<td>1 181</td>
<td>1.4</td>
</tr>
<tr>
<td>Uruguay</td>
<td>1 506</td>
<td>1 060</td>
<td>-</td>
<td>-</td>
<td>70.3</td>
</tr>
<tr>
<td>Bolivia</td>
<td>58 740</td>
<td>1 730</td>
<td>-</td>
<td>-</td>
<td>2.9</td>
</tr>
<tr>
<td>Argentina</td>
<td>33 021</td>
<td>215</td>
<td>-</td>
<td>-</td>
<td>0.7</td>
</tr>
<tr>
<td>Chile</td>
<td>16 121</td>
<td>413</td>
<td>-</td>
<td>1 911</td>
<td>14.4</td>
</tr>
<tr>
<td>All Americas</td>
<td>3 856 488</td>
<td>50 848</td>
<td>70 778</td>
<td>86 796</td>
<td>5.4</td>
</tr>
</tbody>
</table>

208 422 000 ha in the Americas; Source: FSC, SFI, and PEFC Program Web Sites September 2009
Transactions Costs

What’s a few hundred+ basis points worth?

- **U.S.A.**
  - Open land and timber markets
  - Deeds for title, search, survey, purchase
  - Modest and clear environmental regulations/BMPs
  - Strong private property rights

- **Brazil**
  - Extensive purchase process
  - Complex legal and social environment
  - Strictest / enforced environmental laws in Americas
  - Weak property rights
  - AGU: no foreign investors?
  - And more
Brazil Land Purchase Requirements

Knowledge of the limits from the country boundaries (> 50 or 150 km)
Existence of an economic zoning regulations at city and state levels
Evidence of other foreign ownership at city area level (no more than 25% of accumulated city area may be own by foreigners and no more than 40% of the 25% i.e. 10% of the city area maybe owned by one specific nationality)
Verify these circumstances at the official notary’s office at the specific cities
No limitations for Brazilian owners, unless the economic zoning established such limitations
Verify clear land title ownership for at least the past 20 years, at local notary offices
Currently when transferring ownership of land properties there is a compulsory need for GPS localization for each property on the deeds
Consolidation of land ownership is possible
Obtain agreements of common boundaries with your neighbors, and obtain if possible signature of those owners on boundary maps

Prange 2010
Brazil - Critical Points for a New Firm

Registration at the Central Bank of Brazil
Registration at the Federal –Revenue Service –(Income tax) (IRS)
Registration at state Revenue Service (ICMS)
City license registrations (ISS)
Company statutes registration (At notary office)
Designate official responsible accountant person for company purposes
Designate professional with CREA registration
Registration of the forestry firm at the state forest authority and at the Federal level (Ibama)
Register the forestry firm and official responsible forester / agronomist at the state engineering fiscalization organism –CREA
In the event of the use of tree seedlings nursery, proper registration at the Ministry of Agriculture and Ibama
Other needed registrations accordingly to activities

Prange 2010
Incorporating an Already Established Firm
Verify & Confirm

All previous stated registrations and obtain negative certificate confirming
No outstanding debts especially protests at notary offices
Existing statutes limitations
Keep funds in escrow
Have a good corporate lawyers office at your side, including a local city one
Have testimonies of boundary land owners
Have an Ibama and state forestry offices negative certification

Prange 2010
A very positive act
Less expenses for capital investment
Select proximity and users for costs reduction
Establish mutual interest (including protection)
Socially very positive / responsible
Assurance of mutual interest in the wood/lumber production
Possible management cost reductions
Assure buyer/market for timber
Brazil - Protected Areas Associated with Man Made Plantations

LR – Legal Reserves
APP – Areas with Permanent Protection
RPPN – Private Natural Heritage Reserve

According to Federal Law 7803/89, amending article 2º and 3º of the Brazilian Law nº4771/65 (Forestry code) permanent area is all area:

“covered or not by natural vegetation with environmental function of preserving water resources, landscape, geological stability, biodiversity, and the gene pool of flora and fauna as well soil protection and ensuring the well-being of human populations.

Prange 2010
Brazil Legal Reserves (LR)

Legal Reserves are areas located in a property of rural possession except those of permanent preservation, necessary for the sustainable use of natural resources, preservation and rehabilitation of ecological processes, biodiversity, preservation and sheltering and protection of natural flora and fauna.

Legal reserves must be recorded in the land title ownership and thereby prohibit change of its use in cause of sale for any purpose or dismembering the area.

80% in Amazon; 35% in southern Amazon; 20% in southern Brazil

Prange 2010
Brazil Areas of Permanent Preservation (APP)

According to the Brazilian Forest Code (Law 4771/1965) permanent preservation areas are:

“covered or not by natural vegetation with environmental function of preserving water resources, geological stability, biodiversity and the gene pool of flora and fauna, as well as soil protection and ensuring the well-being of human populations.”

Riparian or gallery APP for being included in the concept of forest and other forms of natural vegetation, located along riverbanks or any water course, including water springs that depend on their whipped, furthermore hilltops, surrounding areas of natural and artificial reservoirs (pond/lakes)

30 m buffer for streams and rivers < 10 m; 50 m buffer for > 10 m - 50 m

Prange 2010
Brazil Reserves of Private Property for Natural Heritage (RPPN)

RPPN is a format by which private property contributes to environmental protection and conservation through voluntary action, with the benefit mean an exemption of Federal rural property taxes (TR) on the RPPN area.

RPPN is a legal conservation instrument that justifies its importance by:
- Increased protected areas Nationwide;
- Ensure ecological corridors around conservation units;
- Promotes private sector participation in a rational conservation efforts;
- Contributes to biodiversity conservation of local biomes;
- Cost reductions of taxes to be paid

Prange 2010
Brazil Miscellaneous Legal and Social Issues

- Limits on the amount of an area, such as 40%, in a given county (municipio) that can be established in tree plantations (can get exceptions with a petition)
- Putting in bridges across an APP may be permitted, but will require an increase in an APP or compensation elsewhere.
- New law that sets a 20,000 ha maximum ownership size per person as a foreigner. Companies can still be larger if they meet the preceding requirements
- A complex set of municipal, state, and federal taxes and laws
- Possible lifetime guarantee of employment for employees
- Must develop private fire fighting, I&D efforts
- Portuguese
Brazil Land Invaders

- Invaders may take private land under the Agricultural Reform Act
- The MSM (Movimento sem Terra) and other less organized and predictable groups sometimes target forest plantations
- Cut down trees that are almost mature and convert to charcoal to sell in the local area
- Or may burn logs left on the landing
- This is probably illegal, but hard to get local police to enforce, and companies want to avoid adverse TV and newspaper publicity
- Some large firms include a 1% write-off per year for losses to forest invaders
- Less of a problem in the South, and some northern states
Conclusions
Key Points

- Developing countries can generate best returns
  - Good timber growth rates, prices, economies
  - Increased domestic and international markets

- Timber returns among countries
  - More similar with land and regulation costs
  - Can be improved with good sites, forest management

- Transaction costs
  - Larger in developing countries
  - But perhaps no more than commercial land deals
## Acknowledgments

### Southern Forest Resource Assessment Consortium

[http://www.cnr.ncsu.edu/sofac/](http://www.cnr.ncsu.edu/sofac/)

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NC State University, Forestry & Environmental Resources; Authors’ Organizations
Recap: Plantation Investments

- World forest plantations
  - Increasing in acreage and production
  - Offsetting decline in natural forest extraction?
- Attractive investment opportunities
  - High rates of return in Latin America
  - With more risk and challenges to do business
  - Moderate returns in U.S., New Zealand, S. Africa, Indonesia
- Less risk, better business climate w/ development
- Substantial regulations everywhere except U.S. S
Conclusions
Brazil Case Study, 2011

- Best returns without land costs in the world
- But land is becoming expensive
- Good timber markets, good prices
- Aggressive government support and forest industry
- However
  - Ranked as 2\textsuperscript{nd} most difficult country to do business in the Americas – laws and bureaucracy
  - Many environmental and social laws, well enforced
  - Best markets have highest priced land
  - New areas with cheap land lack markets now
  - Concerns that the new government will be socialistic
- But the greatest growth – biology and economy – in the Americas, or world - BRIC
Plantation Trends

- All countries - 8% to 28% base IRRs w/o land costs
  - Possibility for much greater returns in S America
  - And good returns in other Southern Hemisphere countries
  - Perhaps 5% to 15% IRRs with land costs in Brazil
  - U.S. returns have dropped, S Hemisphere increased since 2008

- Latin America major increase in forest production
  - 3% to 10% of world production from 1960-2005
  - 20 million m³ → 80 million m³ in same period
  - Based on exotic timber plantations
  - Aggressively seeking new investments
Conclusions

Exotic Plantations Returns

- Good returns in other Southern Hemisphere
- Early investors with cheap land costs have profited most; more difficult now
- But U.S. returns have dropped, S Hemisphere increased since 2008
- Colombia case
  - Site quality / silviculture has largest potential effect on timber investment returns
  - 2-5 times transport, land costs at mean values
Wood Costs versus Investment Returns

- Wood costs often low at cost of capital of 8%, but much higher at stumpage market prices
- Wood costs inversely proportional to investment returns
- So high investment returns in open markets will mean high purchased wood costs
- **However:**
  - Vertically integrated forest products firms capture profits from high priced wood
  - Lower investment returns (less than cost of capital) encourage market purchases, not vertical integration
  - A major advantage for vertical integration in Latin America
  - And better for processors not to own timberland in U.S., maybe New Zealand, other medium return areas
Investments, Market Structure, Risks

- Timber investments all look good on paper
  - But LAC often based on thin and local markets
  - Mills plant & own plantations usually; not vice versa
  - Probably less than 25% open market purchases
  - Temperate forests – better open market investments

- Land price as a key
  - Established markets have higher priced land
  - Agriculture and urban competition
  - New timber markets can offer good returns
  - If open market timber prices develop
Investments, Market Structure, Risks

- Risk and regulation
  - Still inverse risk-return relationships
  - Significant economic and political risks in new markets
  - As much environmental and social regulation in Latin America, and maybe more capricious enforcement

- Ease of doing business (low costs) far better in developed countries – U.S., N.Z., S Africa
  - Perhaps lower returns, but much more assured
  - Chile, Uruguay, Brazil, China, Colombia safest
  - Then Argentina, Indonesia, Paraguay, Venezuela

- Increased demand
  - Traditional forest products commodities
  - Biomass
  - And land as a component of value increase
Global Timber Investing: Benchmarking Returns with Land and Environmental Costs

Presented at the:
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29-31 March 2011
São Paulo, Brasil