

Price and Volume Dynamics of Securitized Timberlands

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Securitizing timberlands

There has been a growing **trend of securitizing timberlands** and making them available as a distinct investment vehicle in the equity market.

In the 1980s, Master Limited Partnerships (**MLPs**) were the major form employed for timberland securitization.

In recent years, Real Estate Investment Trusts (**REITs**) have emerged as the leading business form. The first one is Plum Creek in 1999.

Advantages of securitized timberlands

The primary advantage is that it provides investors **greater liquidity** than private ownership of timberlands.

Private real assets are assessed through **appraisal-based valuations**. In contrast, the valuation of securitized assets occurs **constantly in the market**, is more regular, simpler, and less costly than traditional appraisals.

Interest in price-volume relation

Markets can differ in their sizes, the rate of information flow, or the way of information dissemination.

Insights about the price-volume relation can help assess the underlying financial **market structure**. Correctly identifying price-volume relation is useful to understand the mechanism of information flow transmission.

Interest in price-volume relation

The price-volume relation under **extreme price movement** and high trading volume can provide additional information about the distribution of asset returns and the performance of securities under financial crises.

Global financial crisis since 2008

Theoretical models of price-volume relation

The **mixture of distribution** hypothesis states that price changes and trading volume are governed by the same stochastic process. Both are jointly dependent on a common underlying variable, or the rate of **information flow** to the market.

In response to new information in the market, price variability and trading volume should be **positively correlated**.

Study need

The risk of extreme market movements for individual **timberland-related stocks** may be different from that of overall markets.

A separate study on price-volume relation using data of individual timberland securities is warranted.

Objectives

The objective of this study was to evaluate the **price-volume relation** for individual timberland securities.

Three MLPs and three REITs

This design allowed a cross-sectional comparison of the return-volume relation by **MLPs and REITs** over **1989–2010**.

Method – Volume adjustment

In using the volume data to represent the information flow, the trading volume is adjusted to derive a **stationary uncorrelated** series.

The volume data were first transformed by taking **natural logarithm**. It was then treated with the procedure proposed by **Hodrick and Prescott** (1997) to remove the stochastic time trend. Finally, the time-series dependence structure of the abnormal logarithmic volume series was removed within an **ARMA model** with seasonal weekday dummy variables.

Method – GARCH models

A Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model was used to examine if trading volume could explain the **conditional variance of returns** for individual timberland securities.

The model was augmented with the adjusted volume as a variable in the conditional variance equation.

Method – Extreme value models

A **bivariate extreme value model** was employed to assess the price-volume relation during extreme price and volume movements. The relation under both market stresses and booms was analyzed and compared.

Stress – left tail; boom – right tail

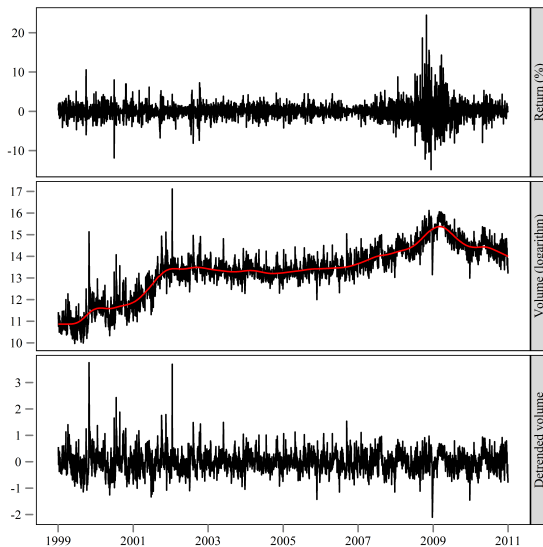
Data

MLPs: Plum Creek (PLU), US Timberlands (TIM), and Crown Pacific (CRO); **REITs**: Plum Creek (PCL), Rayonier (RYN), and Potlatch (PCH).

The **daily returns** and **trading volume** in share for each firm were downloaded from the equity database of the Center for Research in Security Prices (CRSP 2011).

The period covered by these firms was between **1989 and 2010**.

Data properties and adjustment

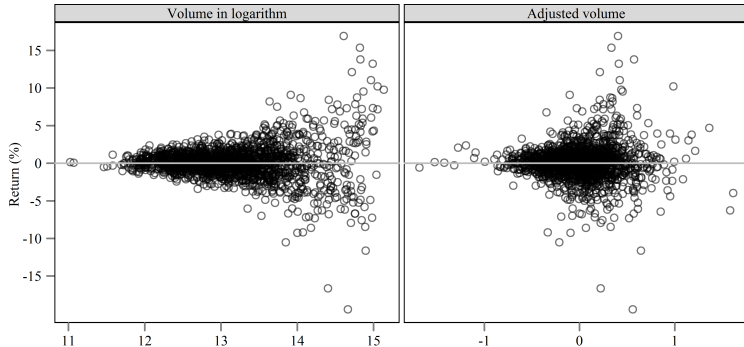


Data properties and adjustment

The **return series** were **stationary**. This was supported by the mean reverting fluctuations of return series and also confirmed by the ADF test.

The trends for the MLPs were not as strong as these for the timber REITs. Given the presence of trends in the trading volume data, the **volume** series were **detrended**.

Association between returns and volume



Association for Plum Creek (MLP)

Kendall's tau is a rank-based measure of association.

0.032 = raw return v. volume

0.212 = absolute return v. volume

0.250 = absolute return v. volume when the return was positive

0.197 = absolute return v. volume when the return was negative

After the data adjustment, the correlation between the two focal variables was largely kept.

Results from GARCH models

The adjusted volume coefficient in the GARCH model was significant and positive.

This provided empirical evidence that conditional volatility of asset returns and abnormal trading volume were **positively correlated**. This was consistent with the justifications from the mixture of distribution hypothesis.

Results from bivariate extreme value statistics

There were strong evidences to support a positive return-volume relation.

During extreme market movements, the **MLPs had more stable** return-volume relation, while timber **REITs** experienced a much **weaker** positive return-volume association.

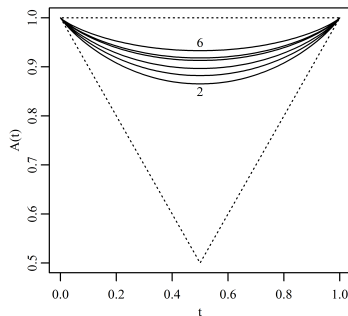
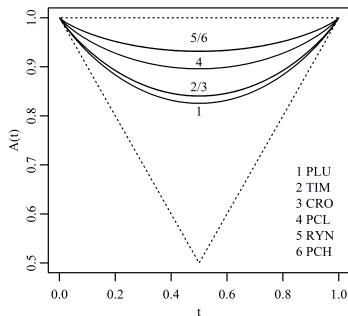
Results from bivariate extreme value statistics

For the MLPs at the three exceedance rates, the average of the dependence measures at the lower tail was 0.332 and the averages at the upper tail was 0.210.

Timber REITs, 0.153 lower, 0.162 upper.

Asymmetric return-volume relation existed for the **MLPs** while the relation was quite symmetric for the timber REITs.

Pickands dependence for lower and upper tails



Conclusions – liquidity

The MLPs and REITs provide great **liquidity** with increasing transaction amounts.

The total **standing shares** and daily trading volume for the MLPs was much smaller than that for the timber REITs. Similarly, the average **daily turnover rate** was also smaller for the MLPs than that for the timber REITs.

Conclusions – positive relation

The presence of a **positive relation** between the absolute values of return and trading volume was found.

During extreme market movements, the MLPs had **more stable, stronger** return-volume relation than the REITs.

The return-volume relation was **asymmetric for the MLPs**.

Discussions

The return-volume relation differed by business form, degree of market movements, and direction of market changes.

Noisiness — Trading volume is a noisy proxy for the information process, especially for timberland firms less actively traded.

Infrequent management — Management activities on timberlands are infrequent and information for firms may be limited.

Business forms — It may reflect the different structure of business forms and the time periods covered in this study.

Future studies

Real Estate Investment Trusts have been exploited to bridge the demand and supply of timberland assets as an investment vehicle.

Future studies are needed to further evaluate their **market risk** and **liquidity risk** that are unique to timberlands as a type of asset.

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