Forest €conometri¢$

Financial Puzzle of Timber Price Predictions

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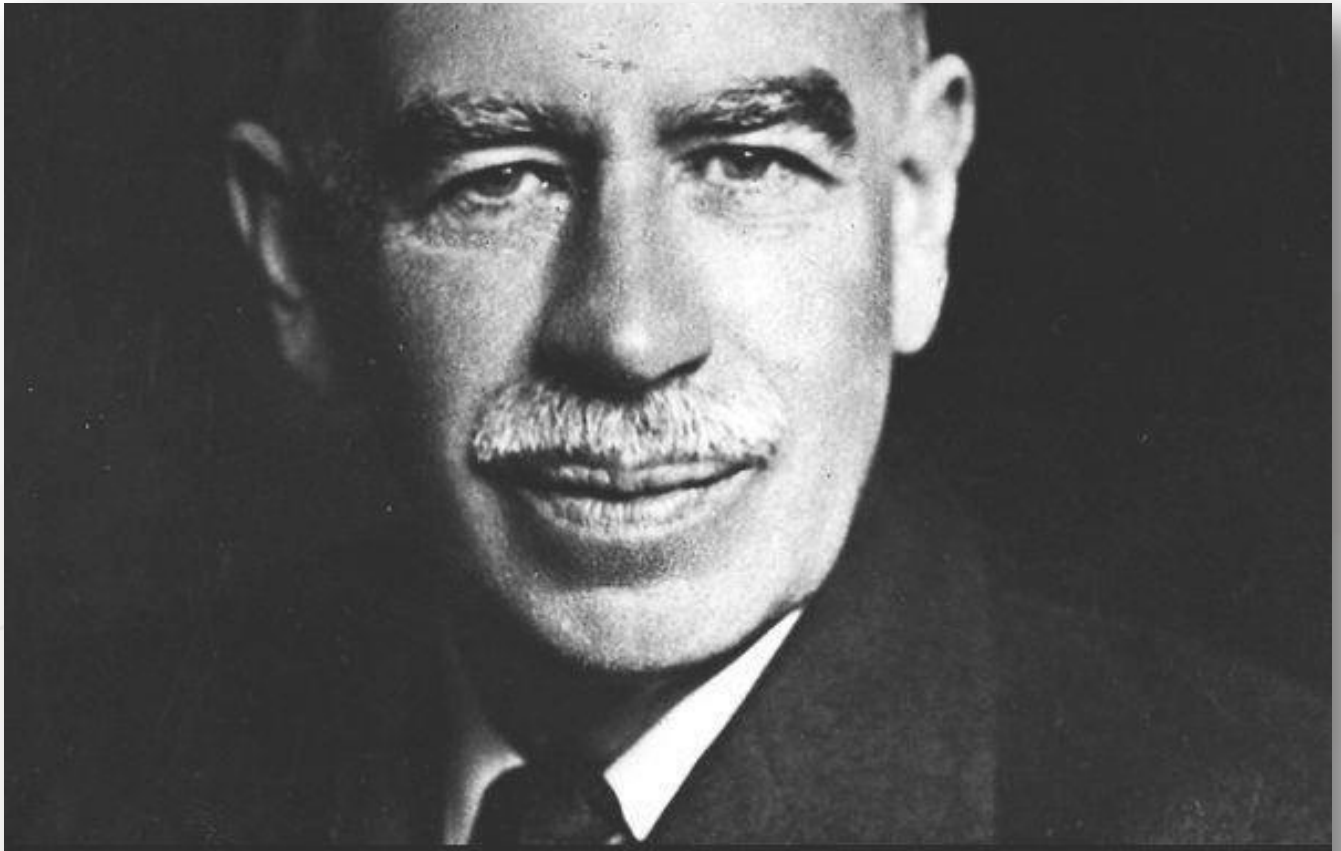


The difficulty lies not so much
in developing new ideas
as in escaping from old ones.
– John Maynard Keynes

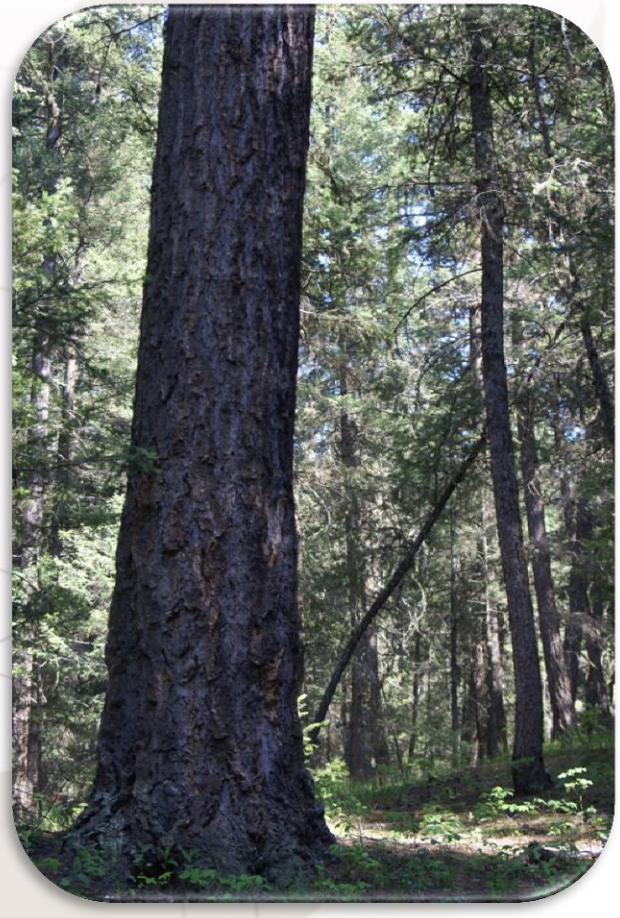
Price Forecasting

Forest Growth & Yield Linked to economically accurate Price and Cost Forecasting

Forest Biometricians: make volume predictions through time with meaningful accuracy – sort and grade specific.

Forest Economists: make price predictions to accompany these G&Y forecasts – sort and grade specific.

Introducing the Real Price Appreciation Forecast Tool



Real Price Appreciation Forecast Tool

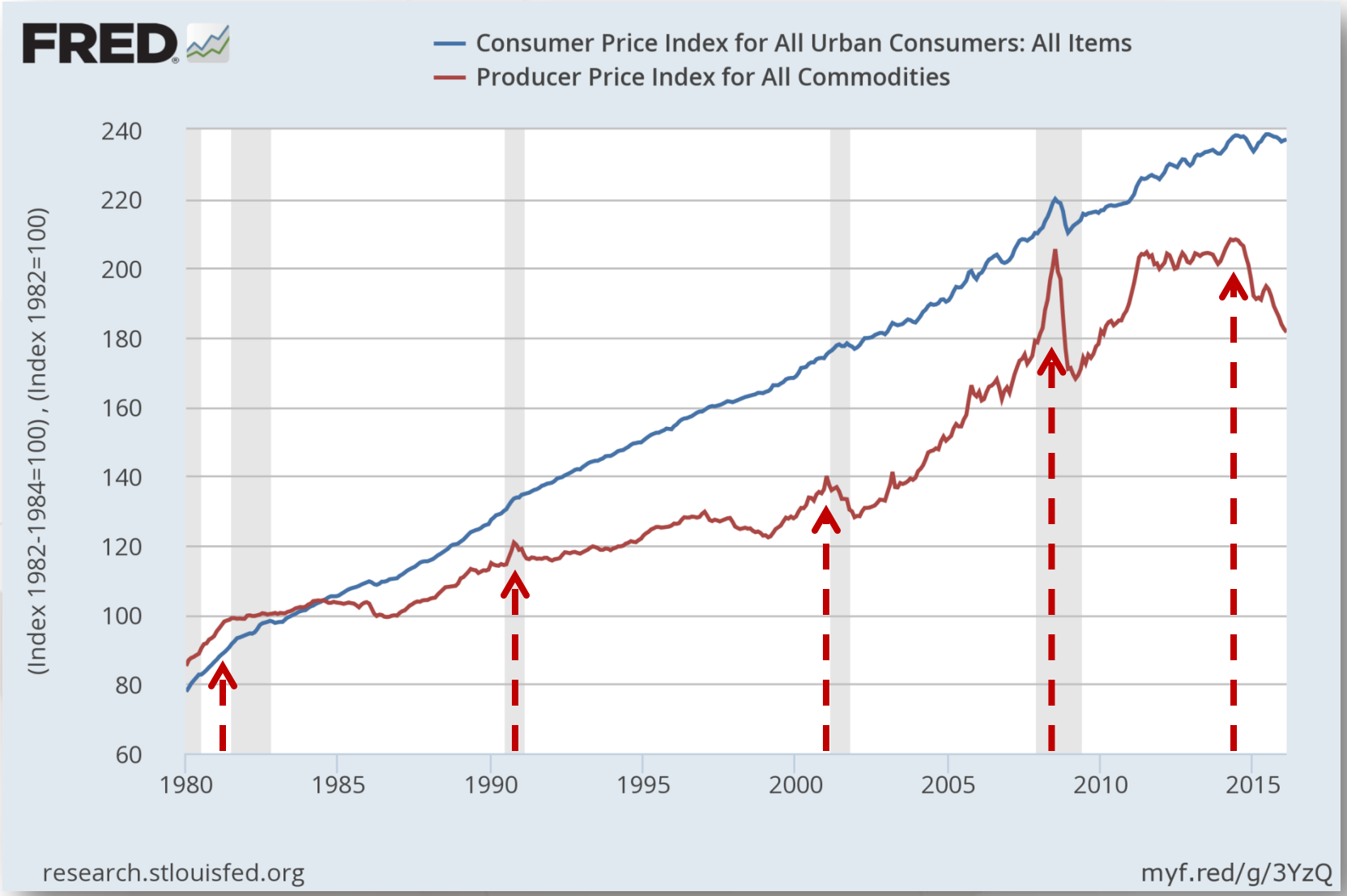
Why did I make it into this reality?

- Timber Grows in products expressed as Sorts.

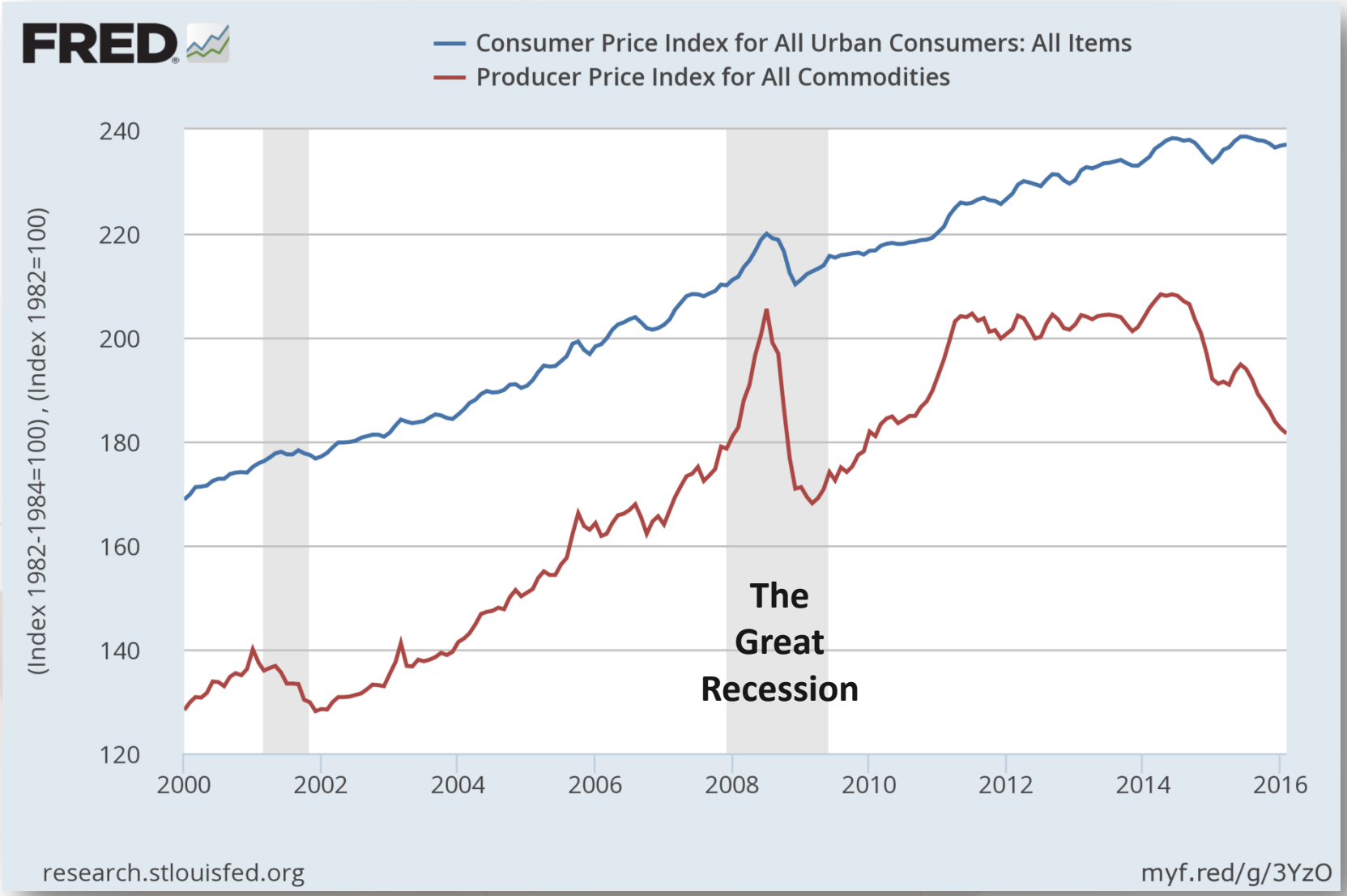
- Timber prices change in complex reactions to Aggregate Supply & Demand, Inflation & Interest rates.

- I want predictions that are Efficient & Accurate, sensitive to the factor of time.

The USA Economy since 1980



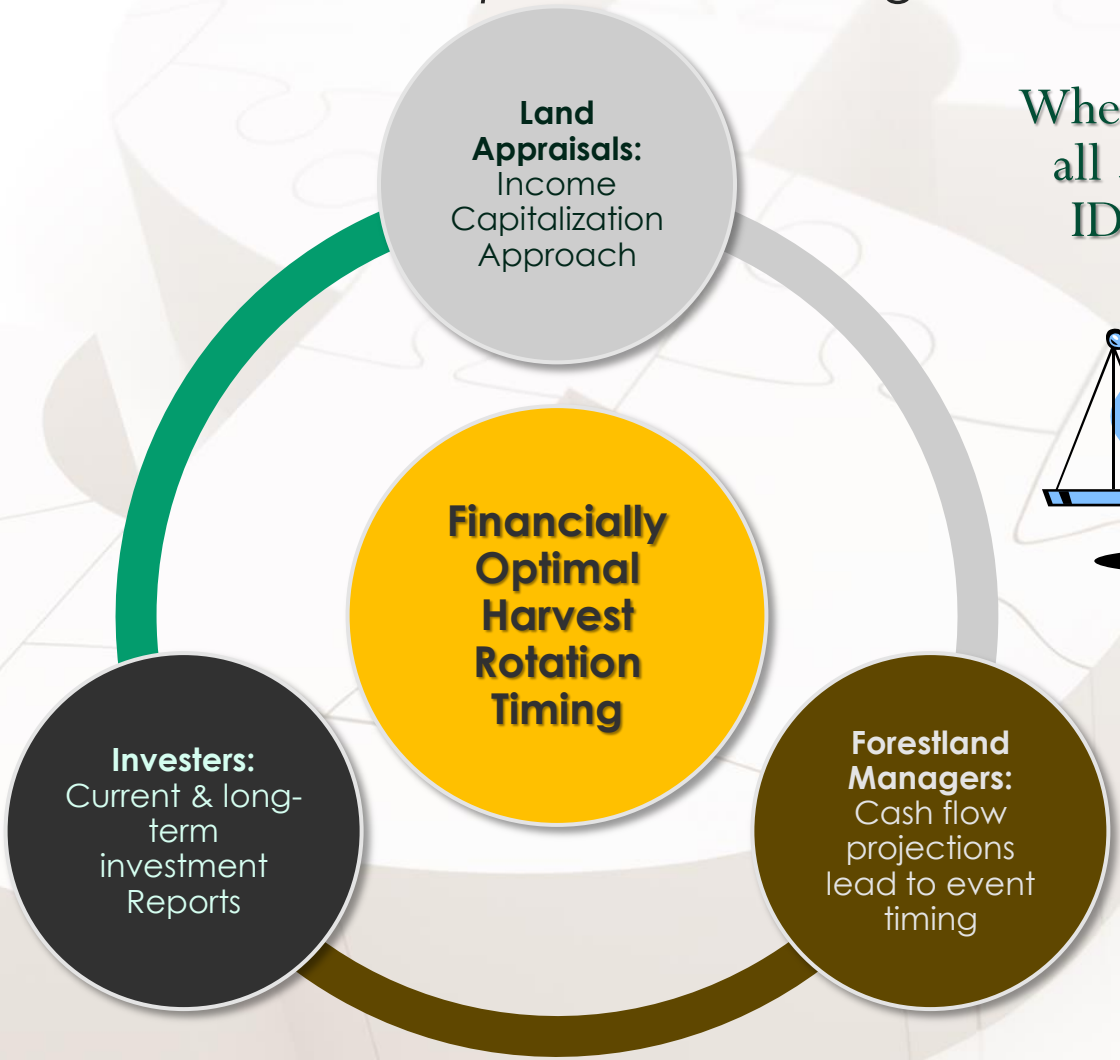
The USA Economy since 2000



Financially Optimal Harvest Rotation Timing

Timing is EVERYTHING – on all fronts

Repeatable & Accurate price forecasting

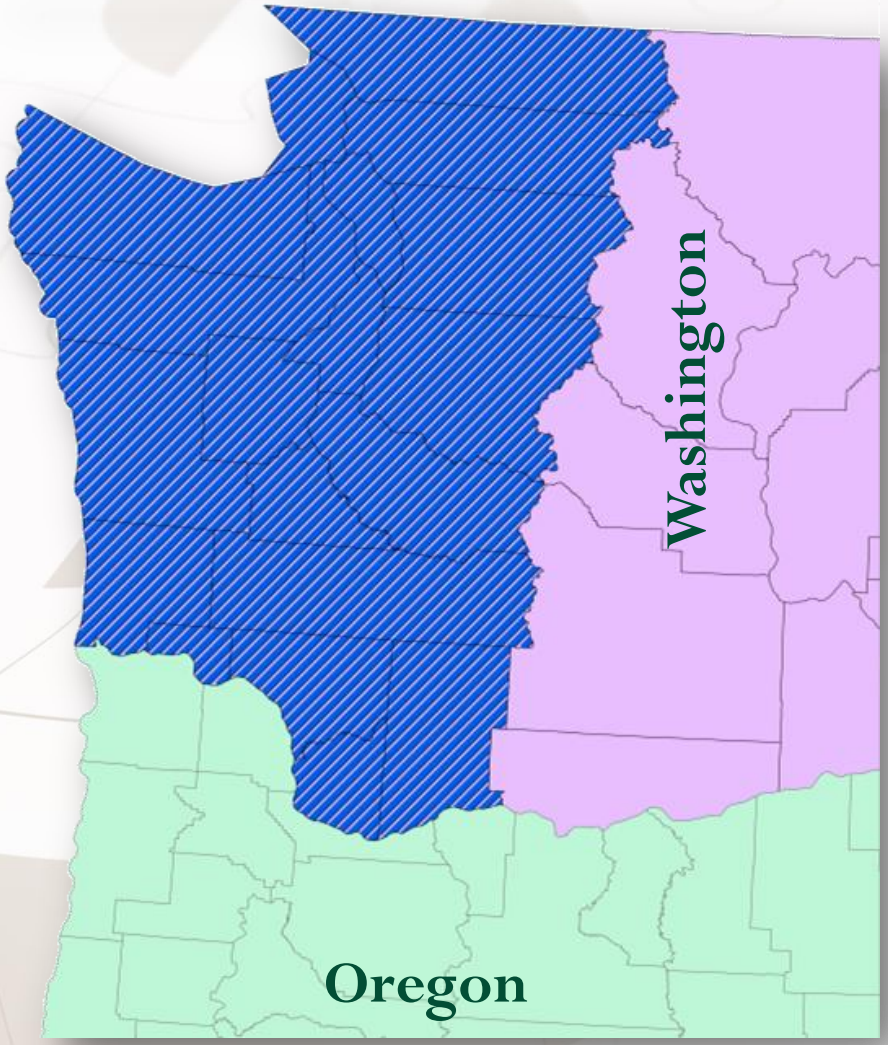


When done right, all 3 Values are IDENTICAL

Puget Sound Log Marketing Area

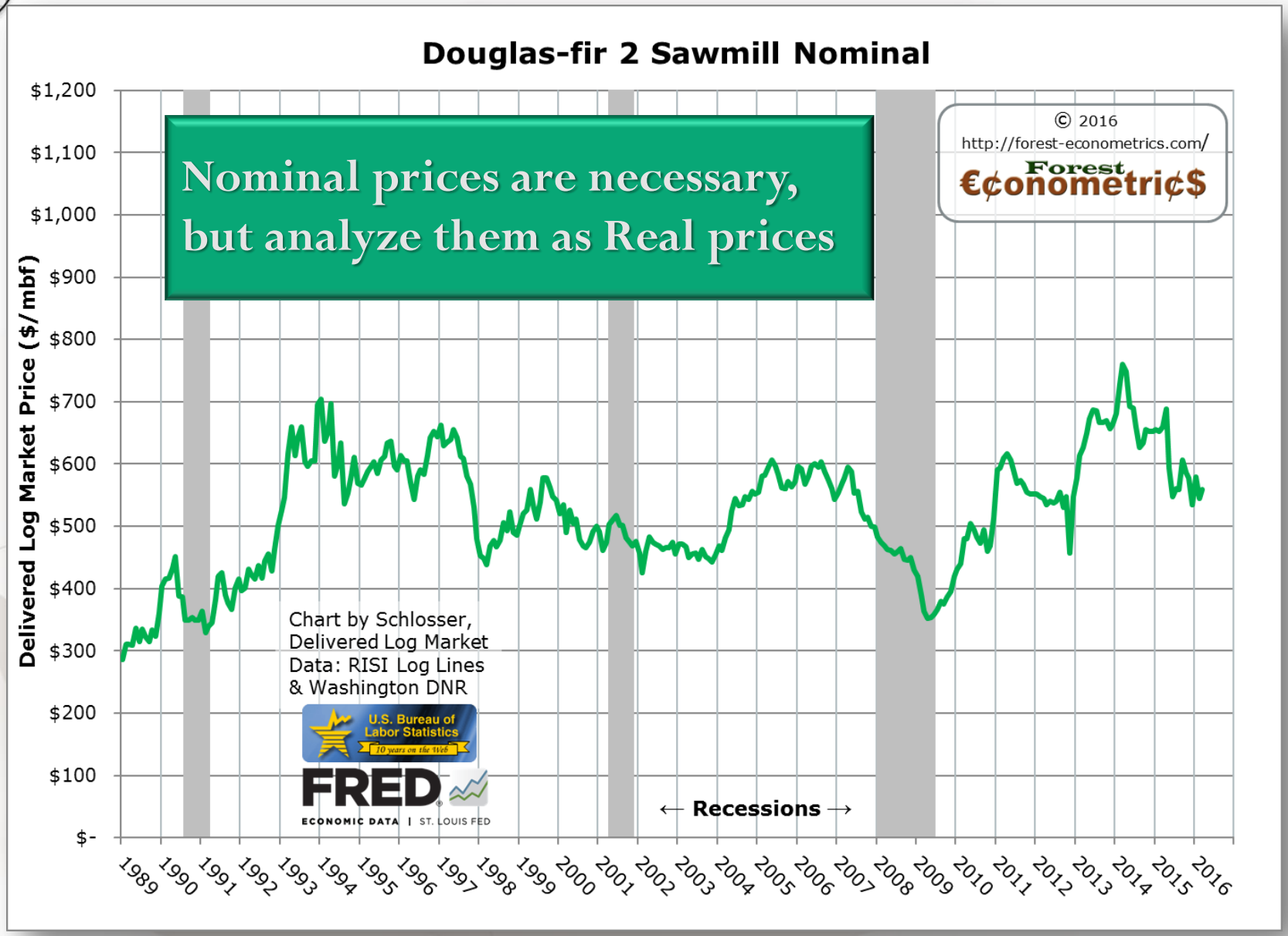
Domestic and International Markets

Predicting Delivered Log Prices for 7 species in 25 sorts within this market area.

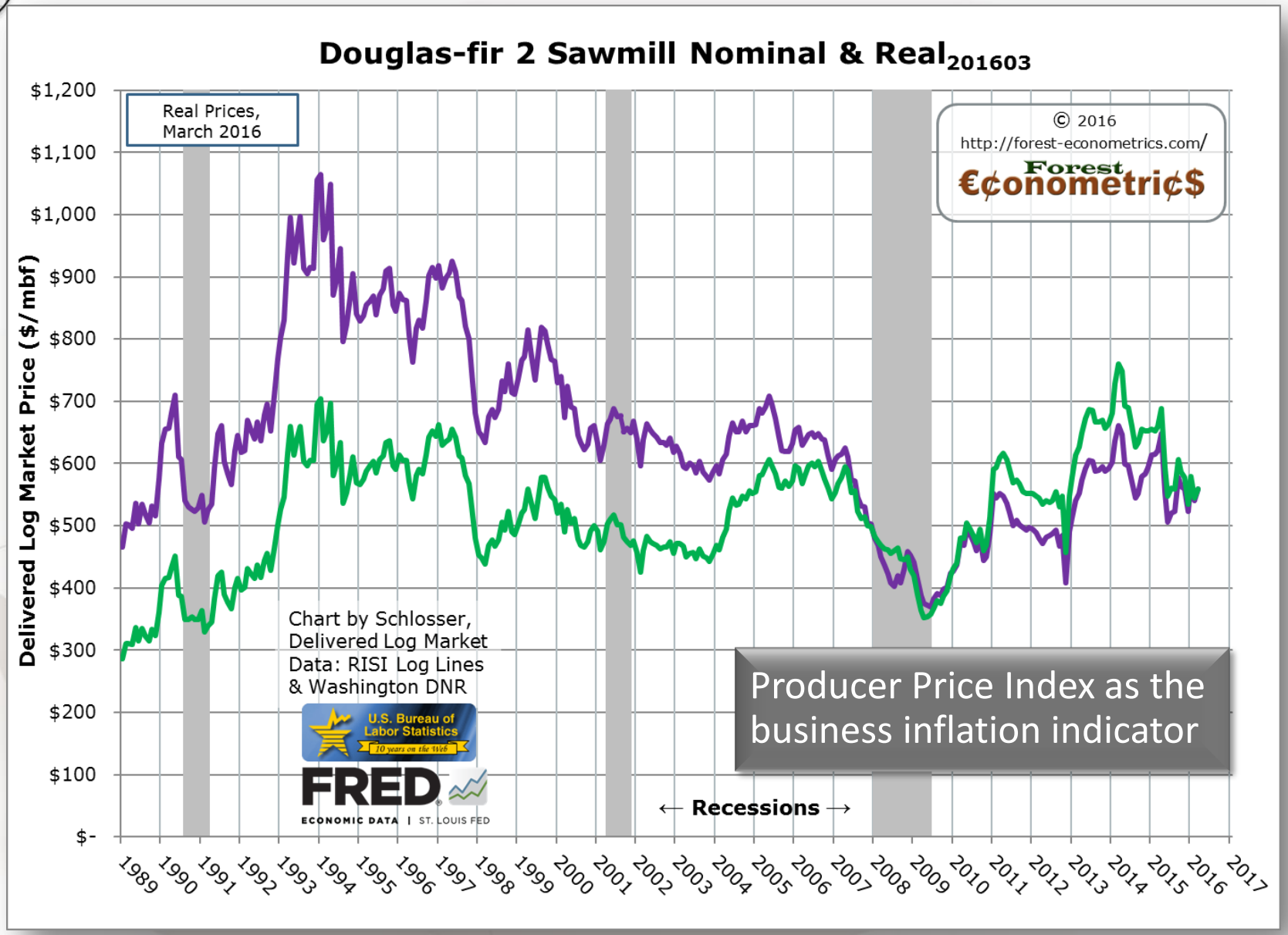


This tool can be applied anywhere historic open market prices are available.

Puget Sound Log Marketing Area, Washington



Puget Sound Log Marketing Area, Washington



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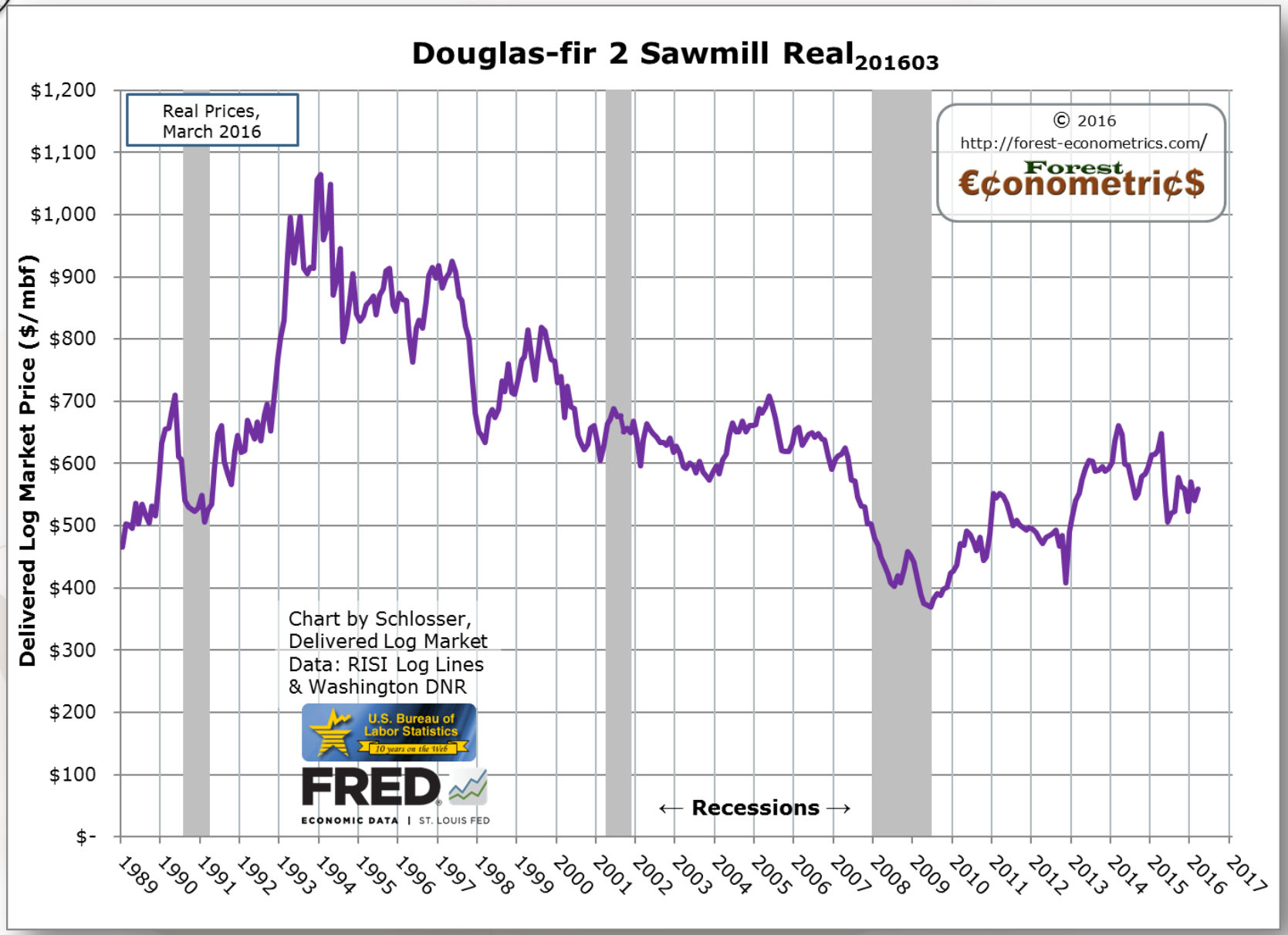

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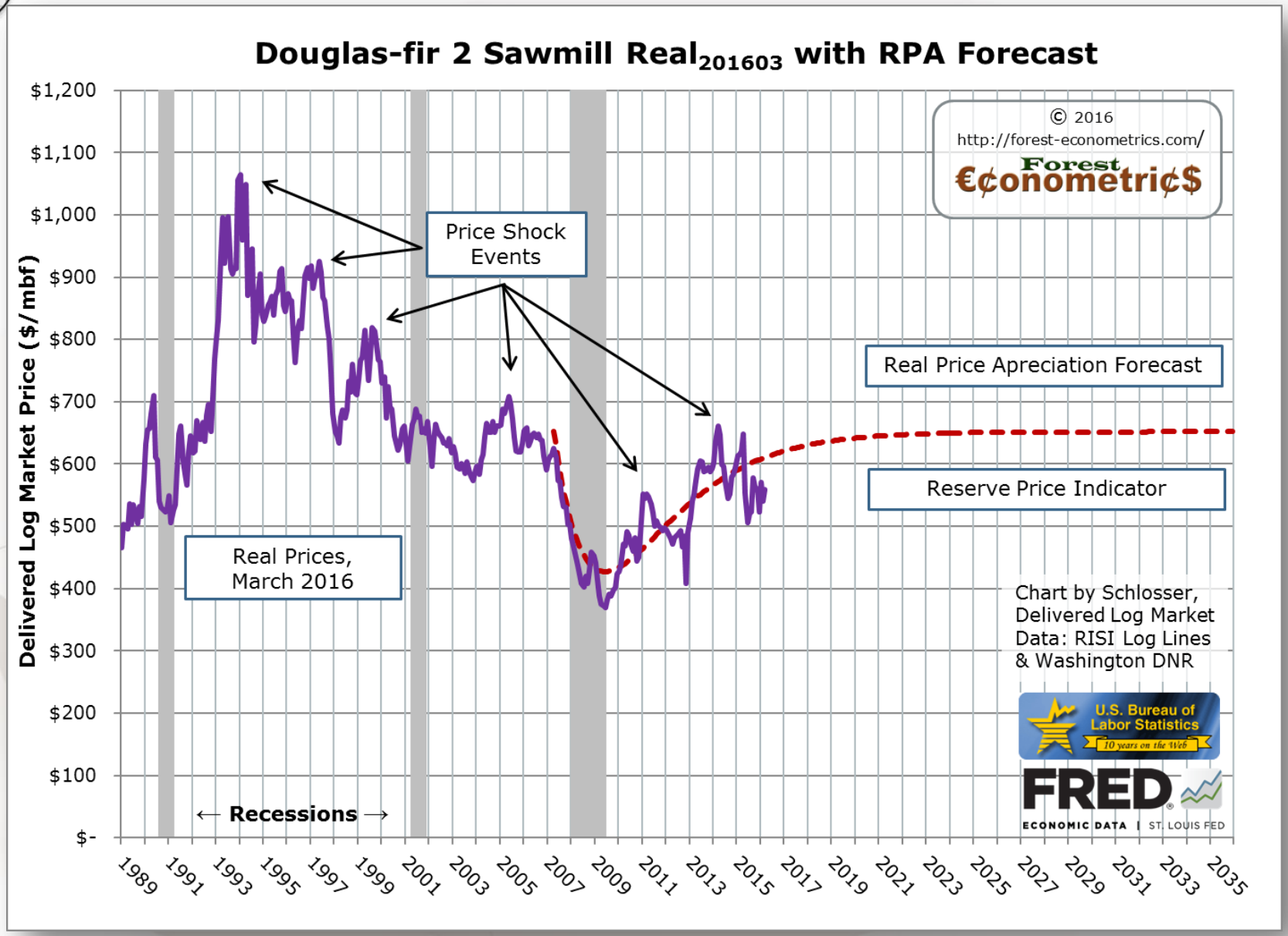
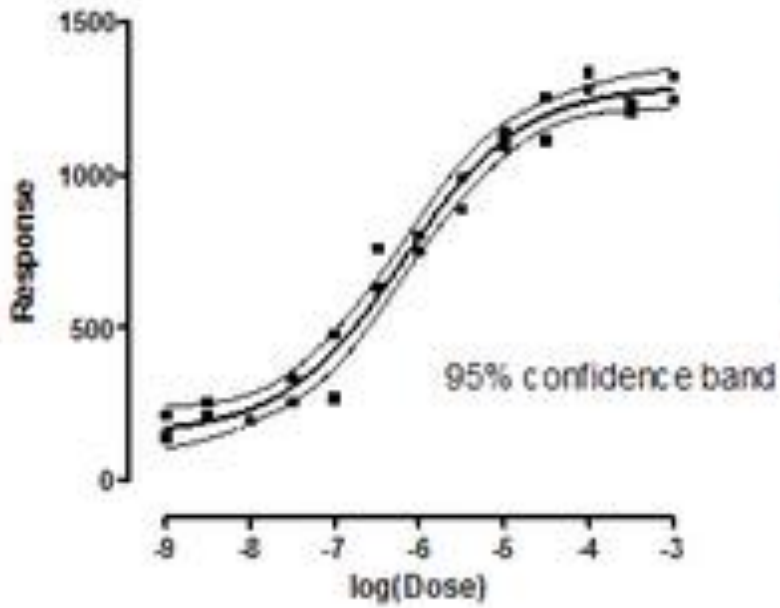
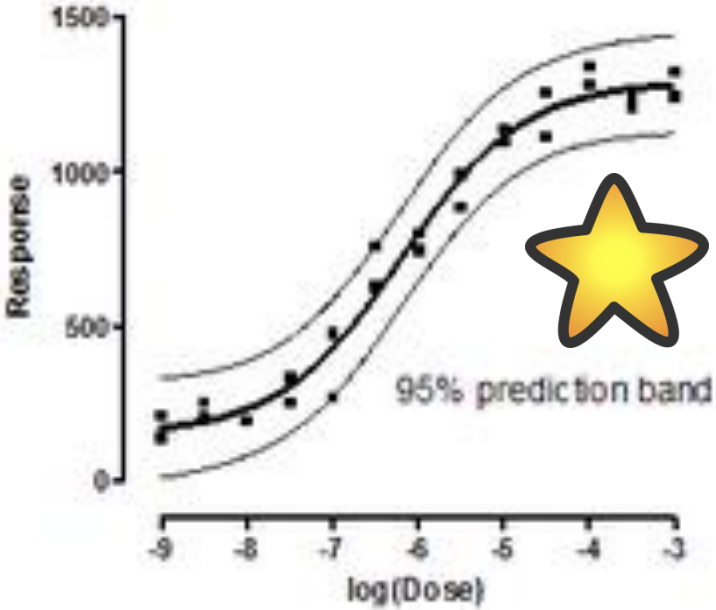


RPA Forecast Tool Performance

Statistics of the Measurements





Real Price Appreciation Forecast Tool

Multiple Evolving Variables

- Vector Autoregression (VAR) Modelling
- Markov-Chain Continuous Time with Memory Model

Linear interdependencies within multiple time series events.

Real Price Appreciation Forecast Tool

Multiple Evolving Variables

- **<u>Vector Autoregression (VAR) Modelling</u>**
- Markov-Chain Continuous Time with Memory Model

Linear interdependencies within multiple time series events.

- **VAR modeling** requires less emphasis on forces influencing variables.
  - The only prior knowledge required is a list of variables which can be hypothesized to affect each other intertemporally.
- **VAR models** have proven to be especially useful for describing the dynamic behavior of economic and financial time series and forecasting.

Real Price Appreciation Forecast Tool

Multiple Evolving Variables

- Vector Autoregression (VAR) Modelling
- **Markov-Chain Continuous Time with Memory Model**

Linear interdependencies within multiple time series events.

- **Markov chains** are used in describing path-dependent arguments, where current structural configurations condition future outcomes.
- **Markov chains** are used to exogenously model commodity prices to attain a general equilibrium setting.

How to make RPA Forecast Tool Projections?

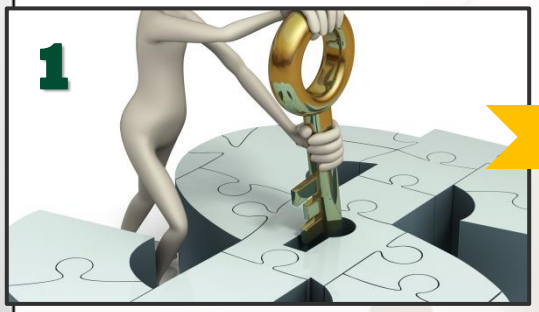
- Spreadsheet program of choice,
- SQL database & programming skills,
- R-Statistics,
- Or,
- FRASS subscription

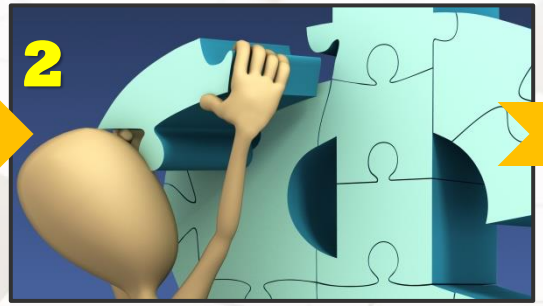
Or maybe all the above…

Forecasting Steps

One size DOES NOT fit all.

Each log sort & each cost are seperately evaluated.





- **Examine** price history through a "sufficiently long time horizon".

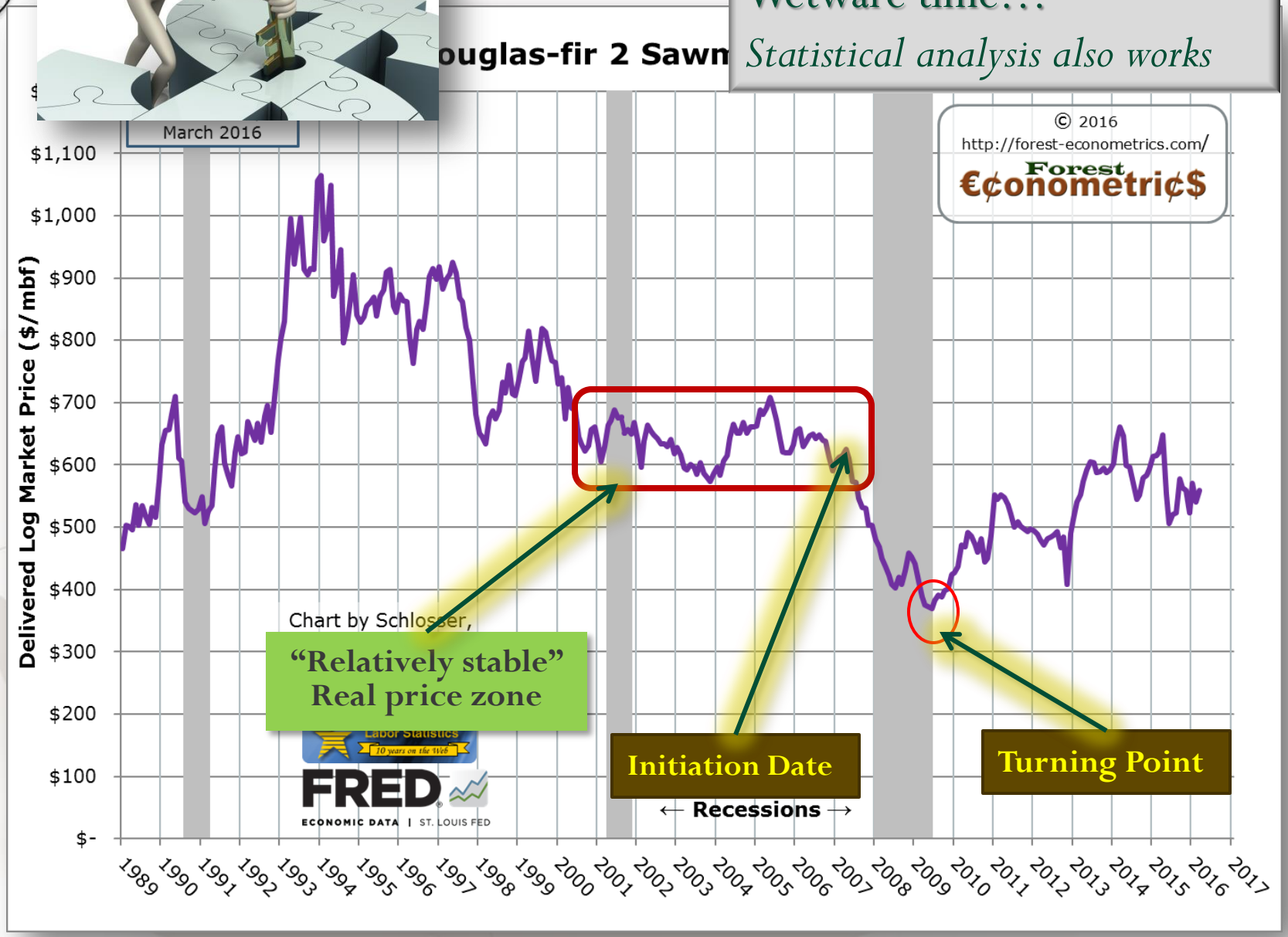
- **Identify** period of *Real price stability*:
- (A) "trend initiation date and Real value"
- (B) "turning point date and Real value"

- **Convert** values into Real price projections using the **Real Price Appreciation Forecast Tool**

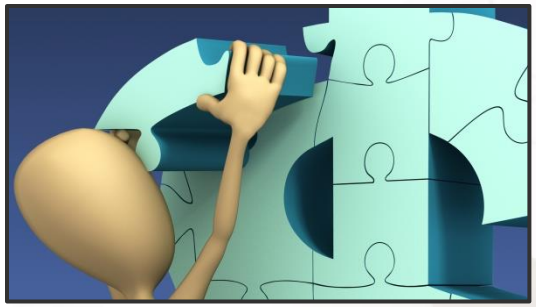
d Log Marketing Area, Washington

Wetware time…

Statistical analysis also works



Step 2



- **Real Price Appreciation Rate** for your commodity of interest.

$$RPA_r = \left[\sqrt[\Delta nm]{\frac{TPVal_{nm}}{IDVal_{nm}}} - 1 \right]$$

Identify:

A. Trend Initiation Date and Real value

B. Turning Point date and Real value

- **Where:**

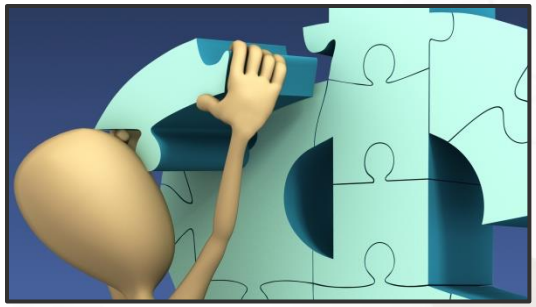
$\boldsymbol{RPA_r}$ = Real Price Appreciation Rate

Δnm = Change in time between initiation and turning point

TPVal$_{nm}$ = Turning Point Date's Real Price

IDVal$_{nm}$ = Initiation Date's Real Price

Step 2



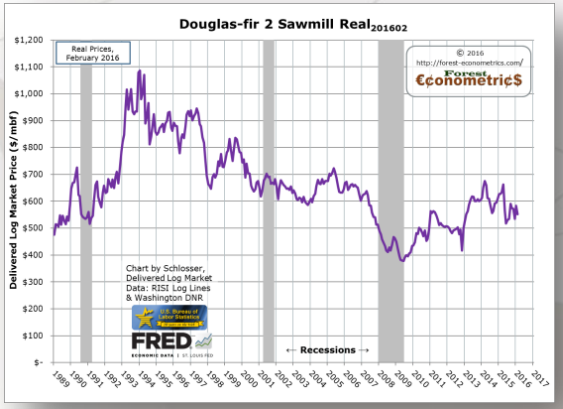
- **Real Price Appreciation Rate** for your commodity of interest.

$$RPA_r = \left[\sqrt[\Delta nm]{\frac{TPVal_{nm}}{IDVal_{nm}}} - 1 \right]$$

$$RPA_r = \left[\sqrt[2.17]{\frac{\$386.10}{\$660.18}} - 1 \right] = -0.2193$$

ID: April 2007

TP: June 2009



- **Where:**

$\boldsymbol{RPA_r}$	=	Real Price Appreciation Rate
Δnm	=	Change in time between initiation and turning point
$\mathbf{TPVal_{nm}}$	=	Turning Point Date's Real Price
$\mathbf{IDVal_{nm}}$	=	Initiation Date's Real Price

Step 3

Convert values into price forecasts using the
Real Price Appreciation Forecast Tool
(Schlosser & Wandschneider)

$$\boldsymbol{RPA_t^P} = IPVal_{tm} \times \left\{1 + \left(RPA_r \times t \times 2^{\left[1-[t/(LNV \times ln\langle 2\rangle)]\right]}\right)\right\}$$

where:

$\boldsymbol{RPA_t^P}$ = RPA Price forecast for year "t"

$IPVal_{tm}$ = Trend initiation price in current Real Terms

RPA_r = RPA rate from starting point to turning point

t = Number in years from RPA Initiation Date to Forecast Date

LNV = Longevity duration: Number of years, and fractions of a year, from the **"Initiation Date"** to the **"Turning Point"**

Step 3

Try it on for size… **Douglas-fir 2 Sawmill**

1) Commodity RPA

$$RPA_r = \left[\sqrt[\Delta nm]{\frac{TPVal_{nm}}{IPVal_{nm}}} - 1\right]$$

$$RPA_r = \left[\sqrt[2.17]{\frac{\$386.10}{\$660.18}} - 1\right] = -0.2193$$

2) RPA Forecast Tool

$$\boldsymbol{RPA_t^P} = IPVal_{tm} \times \left\{1 + \left(RPA_r \times t \times 2^{\left[1-\left[t/(LNV \times ln\langle 2\rangle)\right]\right]}\right)\right\}$$

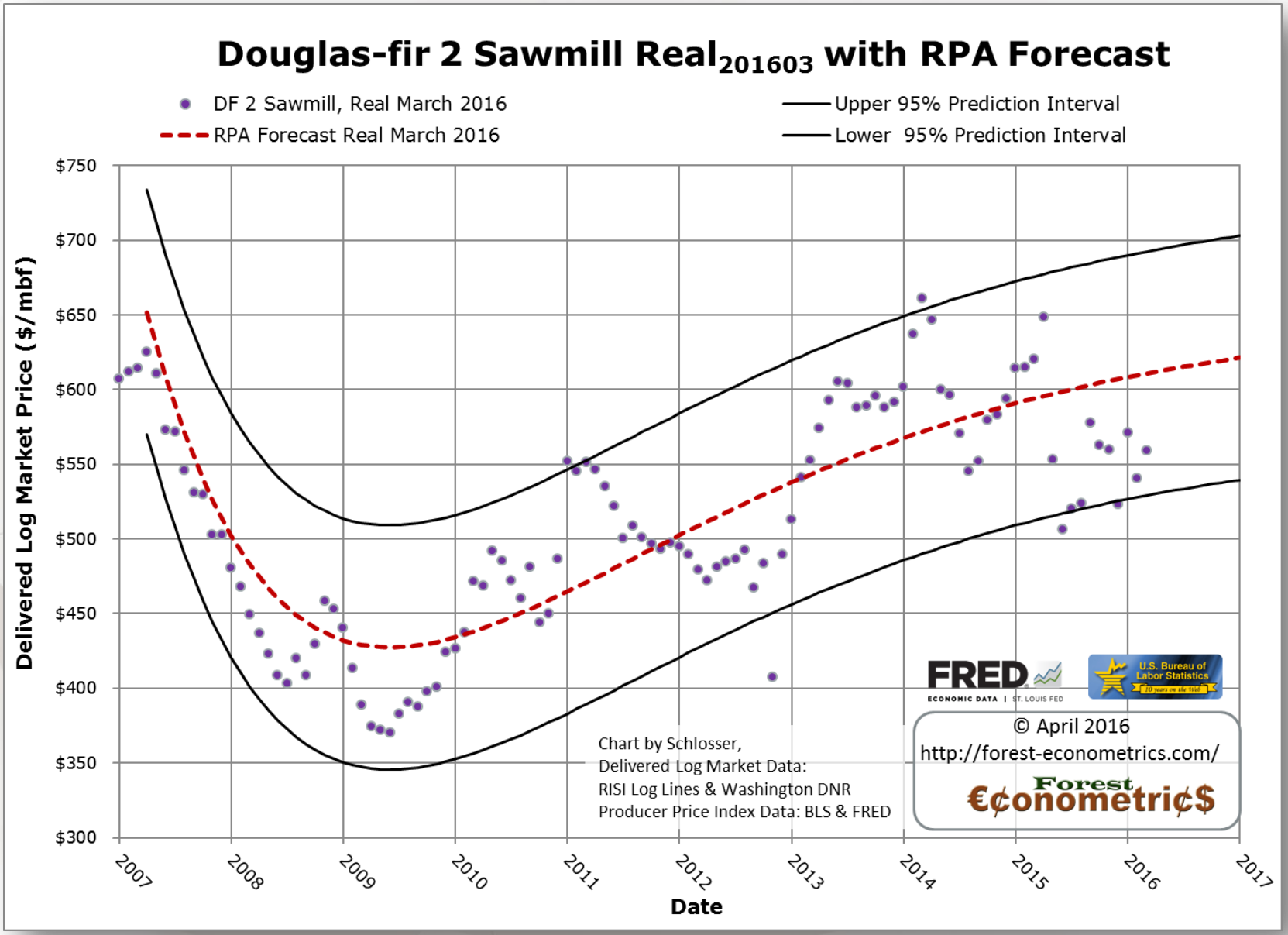
What would be projected price in May 2016 (today)?

$$\boldsymbol{RPA_t^P} = \$660.18 \times \left\{1 + \left(-0.2193 \times 9.91 \times 2^{\left[1-\left[9.91/(2.17 \times ln\langle 2\rangle)\right]\right]}\right)\right\}$$

$$\boldsymbol{RPA_t^P} = \boldsymbol{\$630.36}$$

These Prices are stated in Real$_{201603}$ terms

What about performance?



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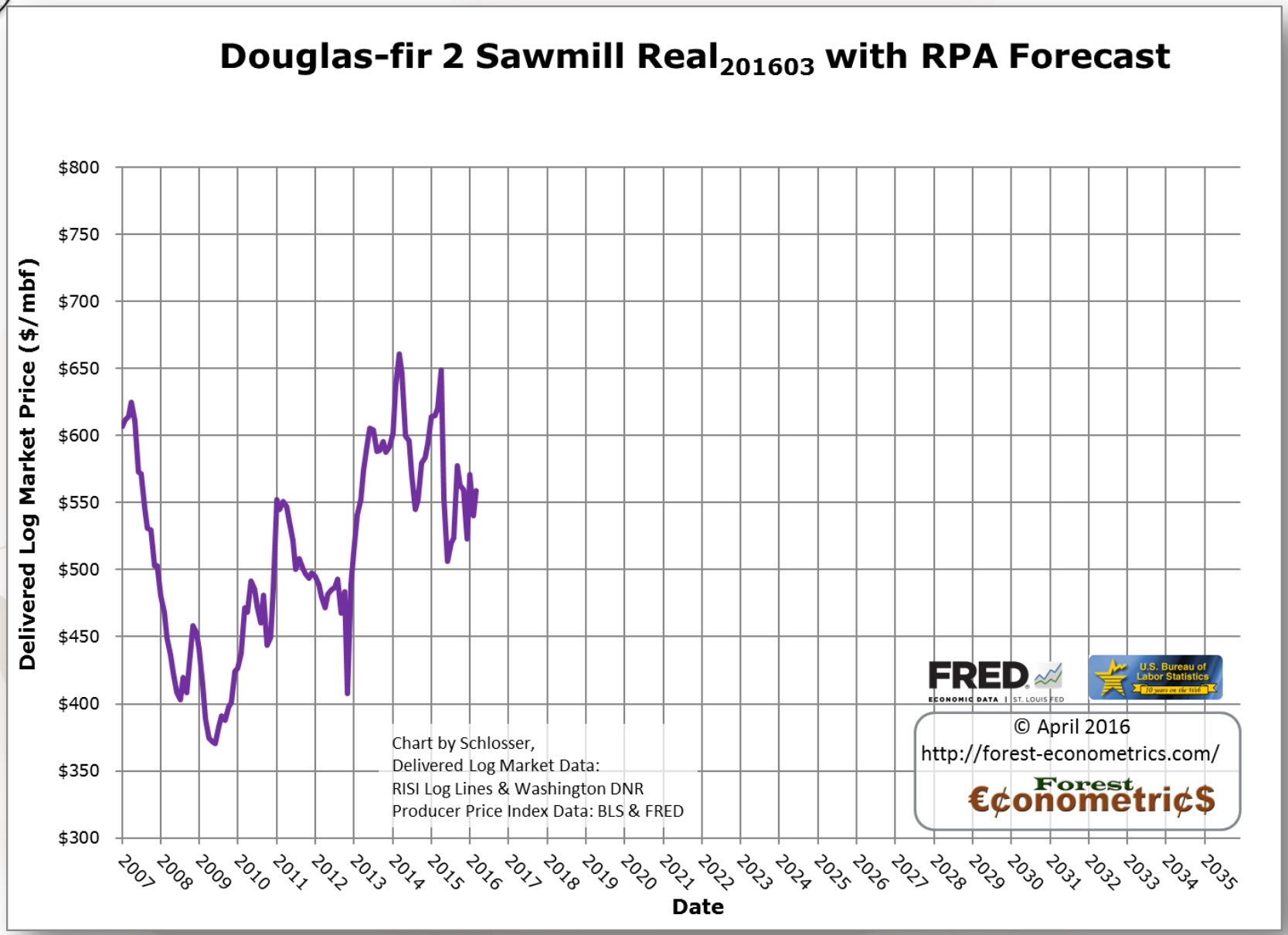

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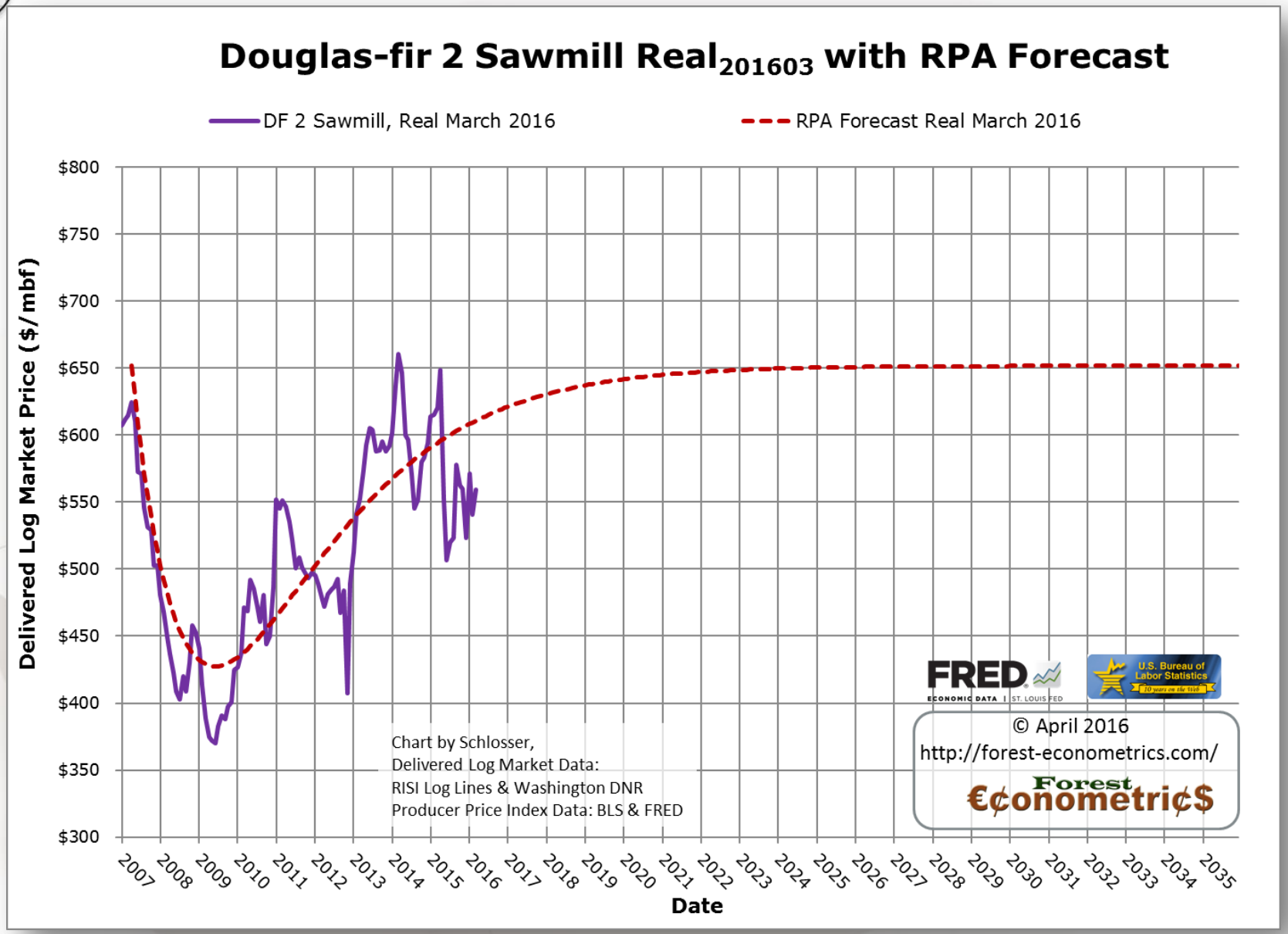

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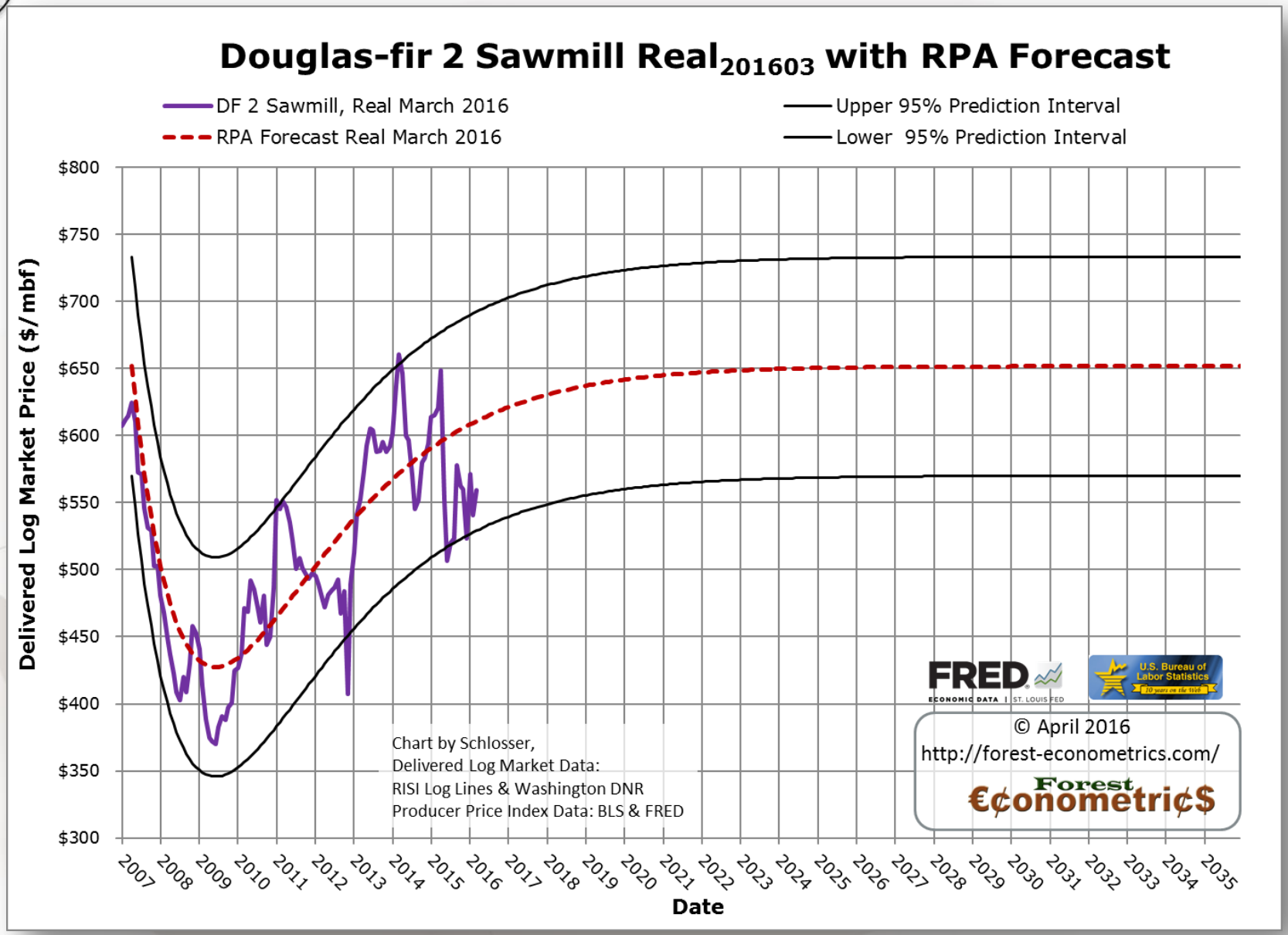

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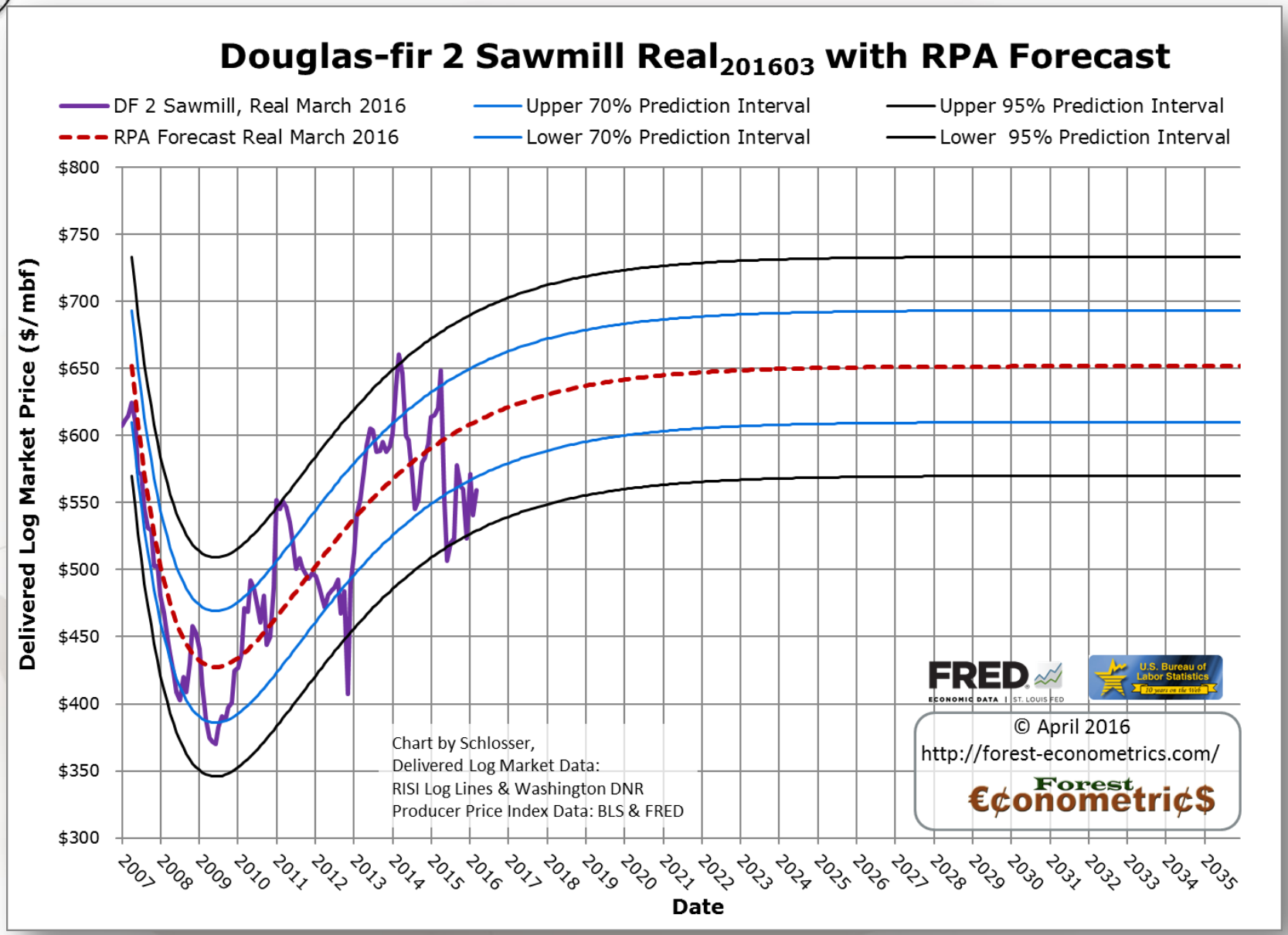

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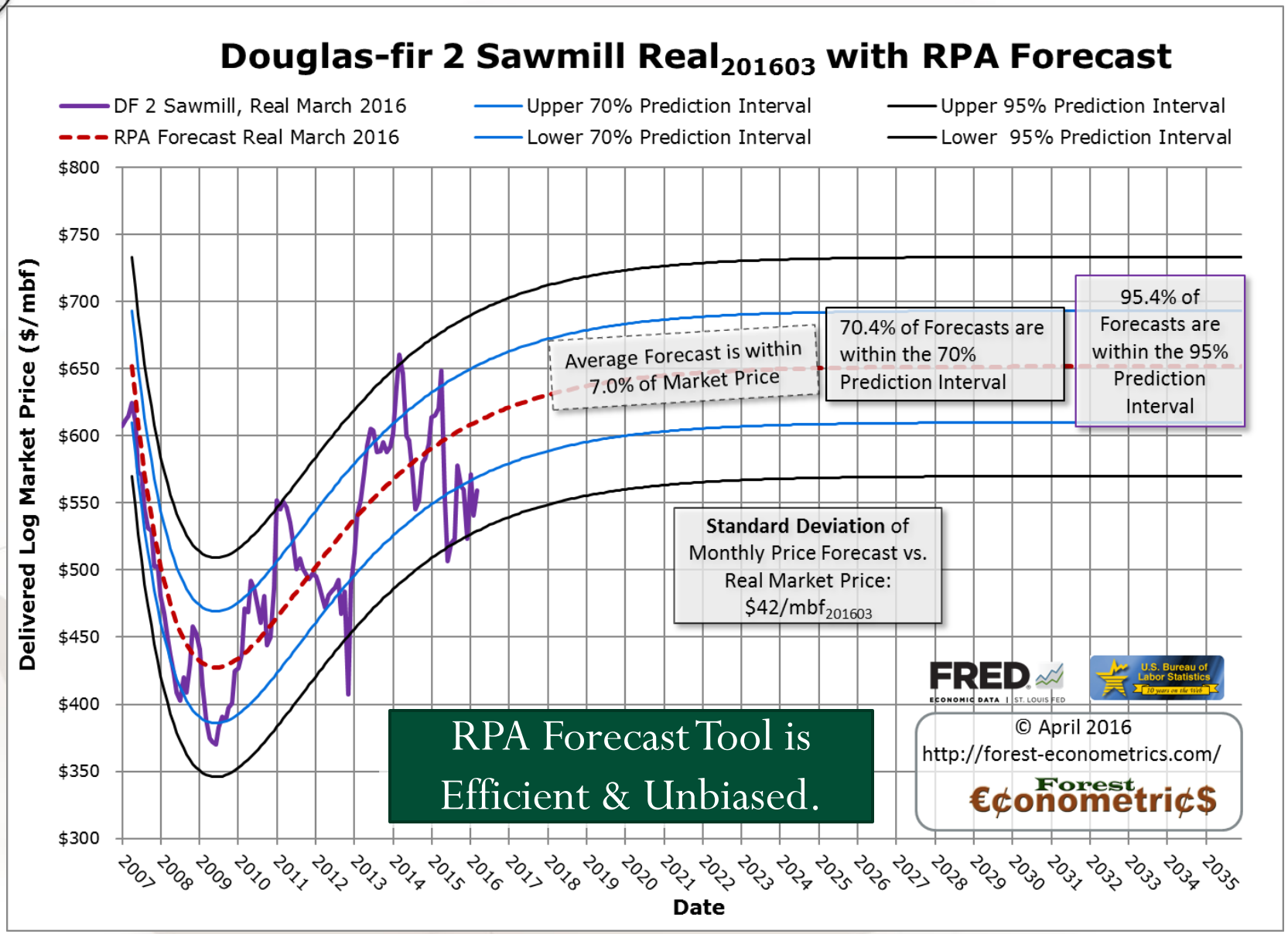

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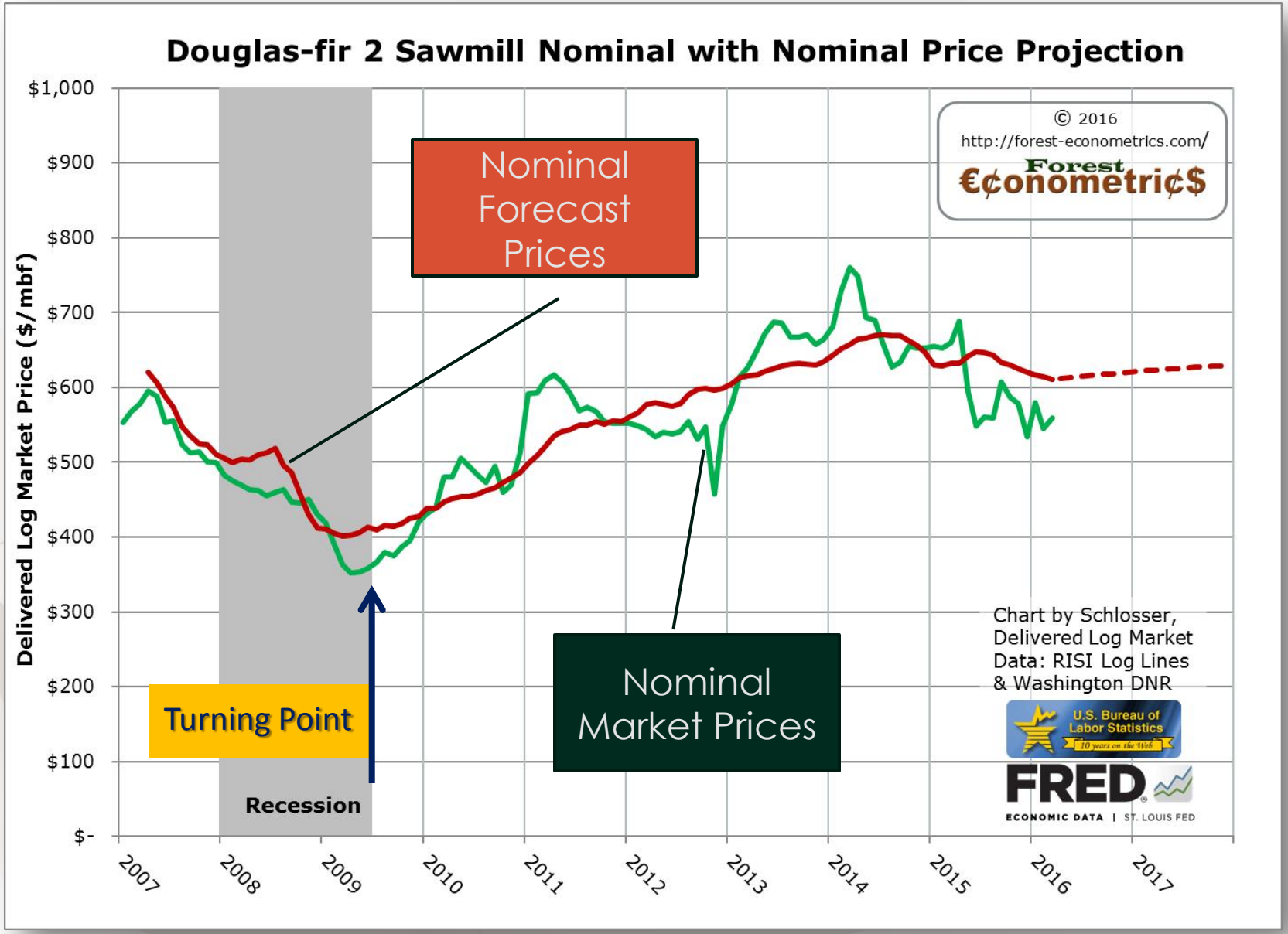


RPA Forecast Tool

Applied to Open Market Commodities

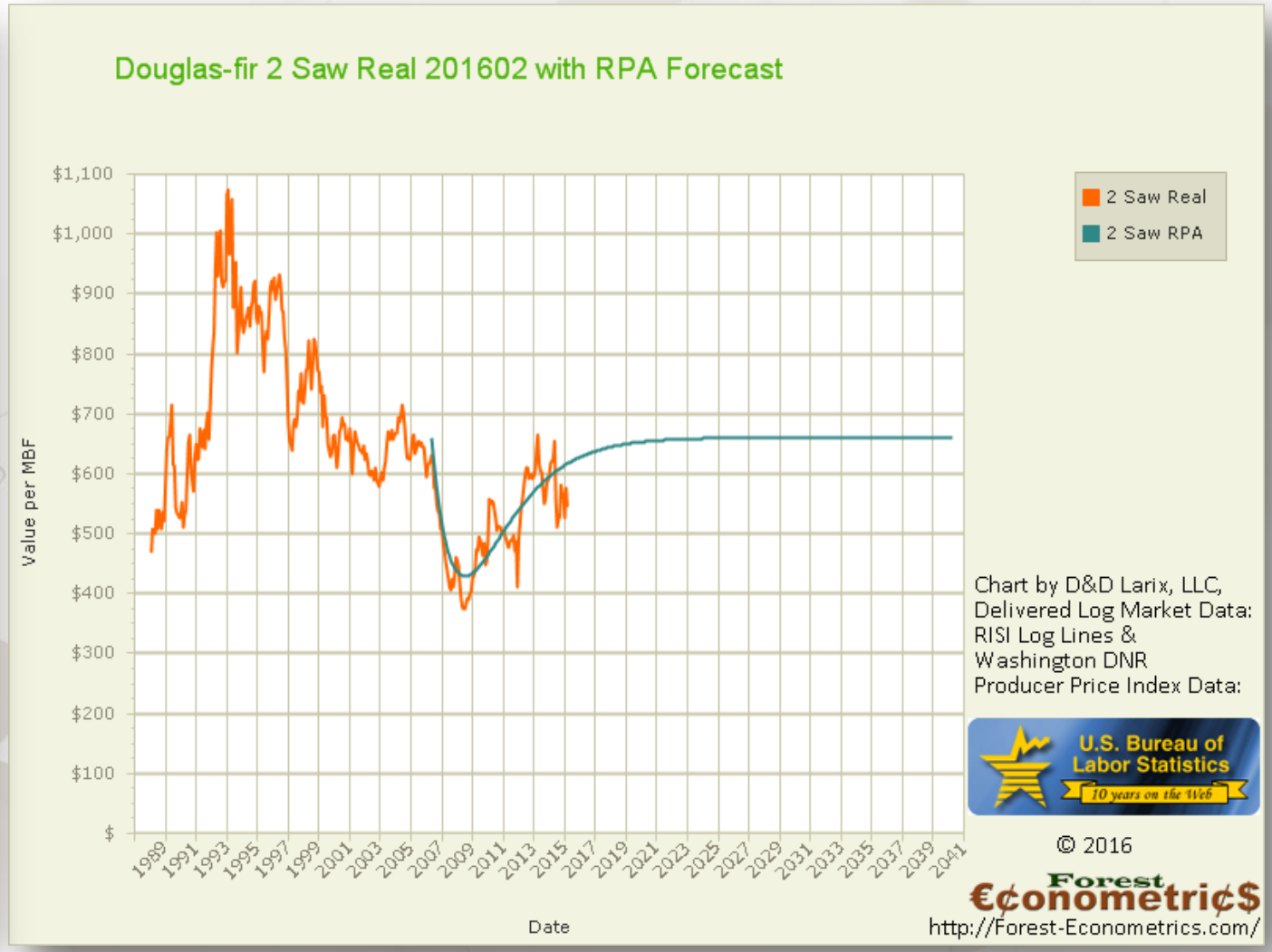
- Delivered Log Sort Prices, Logging, Log Trucking Transportation, Logging Road Building

- Reforestation, Wildfire Control, Forestry Labor

Commercial price trends are captured by BLS Producer Price Index records indicating responses to macroeconomic pressures: Short & Long-Run, Aggregate Supply & Demand.

Delivered Log Price Examples

Puget Sound Delivered Log Market Examples

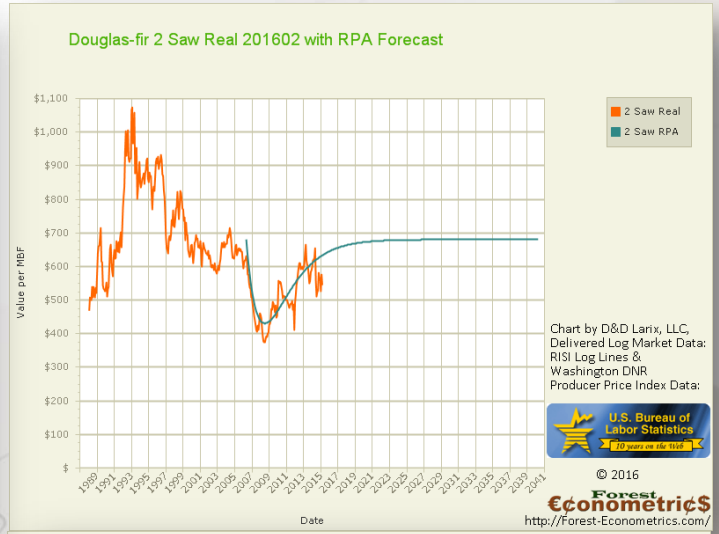


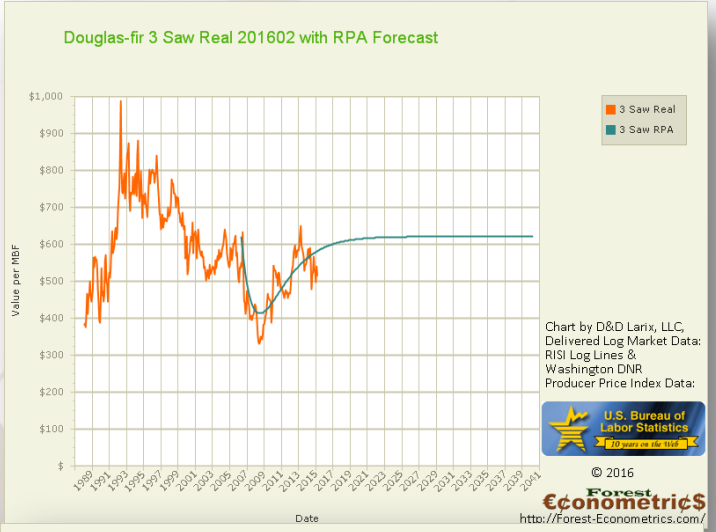
Forest Resource Analysis System Software

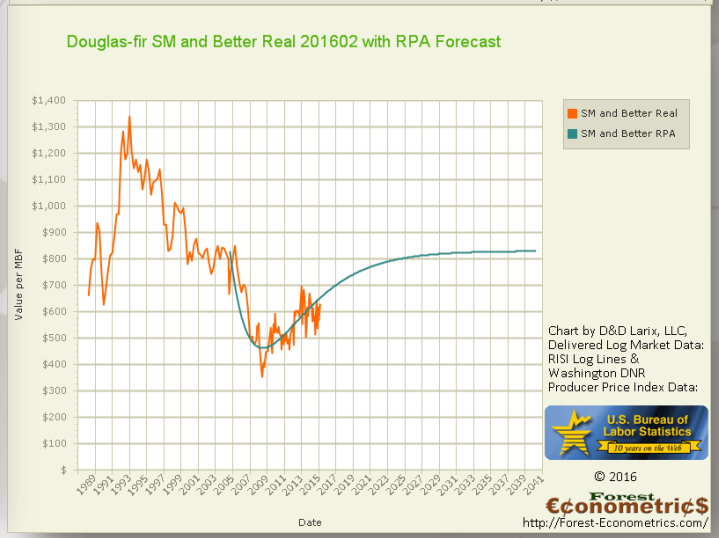
Delivered Log Price Examples

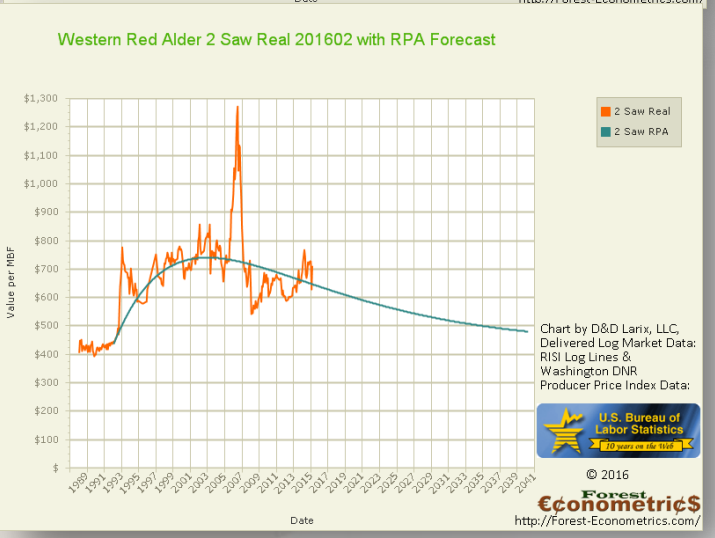
Puget Sound Delivered Log Market Examples

Forest Resource Analysis System Software









Taking it from here

Good price estimates? So what…

- Turn Real Price Predictions into future Nominal Prices
- Combine Prices with forest Growth & Yield volume estimates
- Discount values to today
- Reserve Price Indicator

Forest Econometrics

Forest Resource Analysis System Software

Exemplified in FRASS

Online demonstration site based on University of Washington's Pack Forest

Want into the Demo Site? Ask, you can enter and experiment, no charge!

http://Forest-Econometrics.com

Forest €conometri¢$

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May 3-4, 2016
Seattle, Washington

Credits

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