



**Peering into the Black Box:**  
Describing 4Cast Methodology

4 June 2009

Timber and mill owners know their local markets. They know who’s selling and who’s on quota. They know who is scrambling to meet payroll and who has too much inventory on the yard. While historical stumpage market data on recent market activity helps to make today’s and tomorrow’s business decisions, it has limits – it’s tough to drive forward while looking only in the rear-view mirror. An even larger issue is that national and global economic factors increasingly shape local stumpage markets. Stumpage Price 4Cast connects those national and global factors to your local market to provide you with insight to make today’s and tomorrow’s business decisions.

Stumpage Price 4Cast is the result of an alliance between Forest2Market® and Delphi Advisors™ LLC. Marketed by Forest2Market®, it was developed by Delphi Advisors to provide an in-depth market perspective on local timber markets by using Delphi Advisors’ Economic Outlook (also available for sale through Forest2Market®) to project stumpage prices based on Forest2Markets’ stumpage and delivered price transaction data.

Stumpage Price 4Cast relies upon a series of econometric models (Figure A); an econometric model is a mathematical representation of relationships in an economy – in this case a local stumpage market economy – expressed as equations. The equations explain how one economic variable could change as a result of changes in other key factors. Econometric models are developed using statistical techniques to identify key factors and describe their relationships to other variables. The models

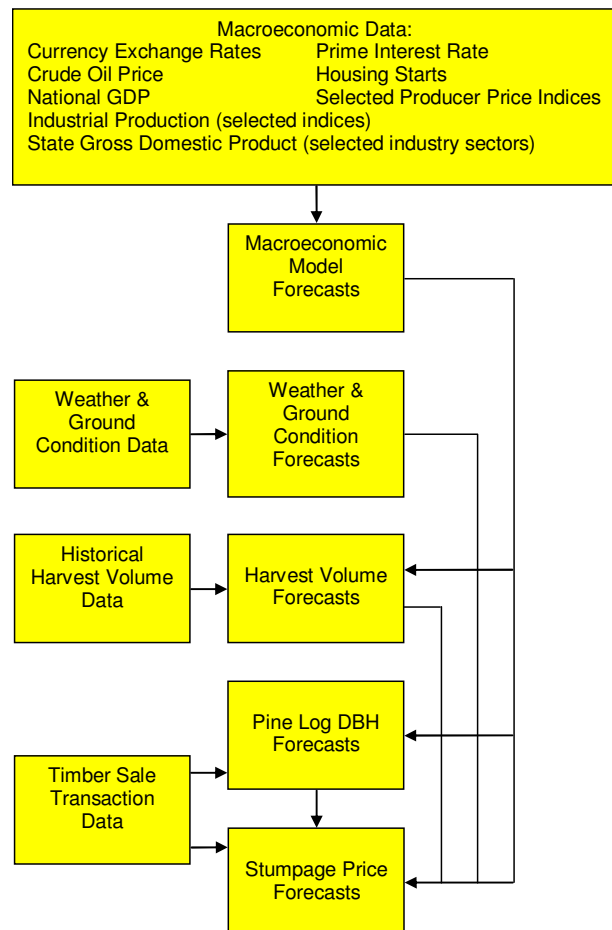


Figure A. 4cast modeling schematic



are built looking at past data and relationships between selected economic factors. To describe models and their likely changes we group factors into one of four effects: a general economy effect, a local market effect, an industry sector effect, and a seasonal and momentum effect (Table A). We strive to have an individual model “balanced” among these four classes of effects.

**Table A. Model factors, by major effect**

<b>General Economy Effects</b>	<b>Local Market Effects</b>	<b>Industry Sector Effects</b>	<b>Seasonal &amp; Momentum Effects</b>
Currency Exchange Rates	Weather conditions	Housing Starts	Univariate forecasts
Interest Rates	Ground conditions	Selected Industrial Production Indices	Annual seasonal and trend variables
Real GDP	Product harvest levels in regional market	Selected Producer Price Indices (“inflation” at producer level)	Proprietary woodyard inventory variable
Crude Oil	Other product prices and log size in regional market	State GDP by industry sector	Expected weather and logging condition variables

Econometric models are frequently criticized for using the past to predict the future. But we have observed that experience is one of the more valuable elements in decision making. In essence these types of statistical models are a way to summarize “experience” and apply that experience to future situations. As is the case with any model, econometric models are not perfect, but they can deliver useful insights when forecasting changes in the economy.

When describing probable forecasted changes it’s convenient to speak of one factor “causing” another to react in a certain way. The reality is most econometric models are correlative in nature, not causative; 4Cast is no exception. A correlative model means two factors show a certain tendency to move in a definable pattern with respect to each other. This relationship could be because one factor directly bears on the other or it could be both factors are responding to yet another primary “cause” in the system.

In developing 4Cast models, our emphasis is on forecasting. In contrast, academic economists who use techniques similar to those we employ often focus on isolating the primary factors that are correlated with, and may account for, past changes in the variable being described by the model. The percentage of historical variability (both above and below the historical average) explained is a commonly used measurement of how well a statistical model performs (Figure B).

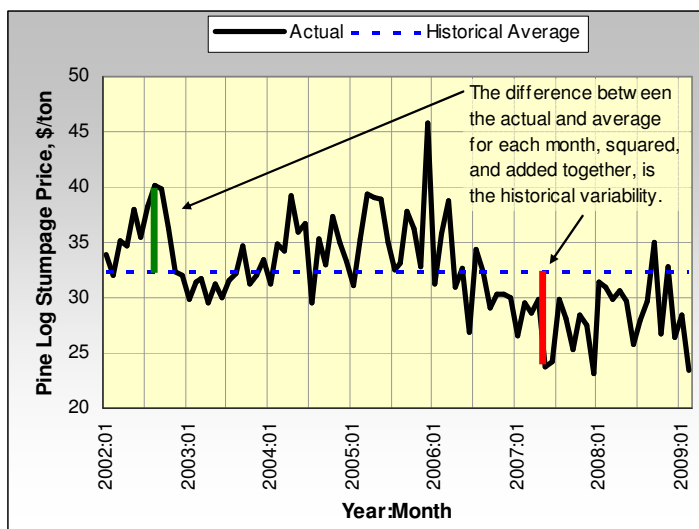


Figure B. Historical variability

While a few key factors may explain a large share of the historical variability, it's unusual for that explanatory share to rise above 70%. That result may be sufficient if the purpose is to understand how economies work, but it's not very good if one is trying to forecast future direction and price levels for supply chain applications. Our modeling efforts are focused on including factors that collectively:

- explain a high degree of the historical variation seen in wood fiber product pricing in the local market;
- behave within the model in a logical fashion;
- are consistent with single variable correlations to the dependent variable, and,
- offer reasonable opportunities for making accurate forecasts (Figures C and D).

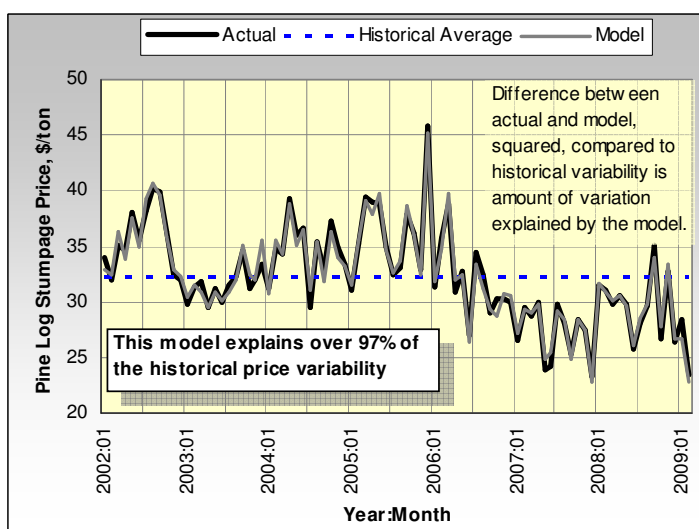


Figure C. Model's explanatory power

Many forecasting firms provide no indication of how well their models fit the historical data; by contrast, one can see how well 4Cast models fare in that regard on every published 4cast.

Economic systems operate as many systems do, maintaining balance and having feedback cycles to correct imbalances when they occur. We reflect these elements in our models in a variety of ways:

- We create variables that express interactions among the foundational factors. E.g., trying to explain price behavior via an exchange rate, GDP and housing starts may yield results that are marginally enlightening. But a second-tier factor that incorporates an interaction among those three “base” factors often does a much better job of explaining (and predicting) price behavior;

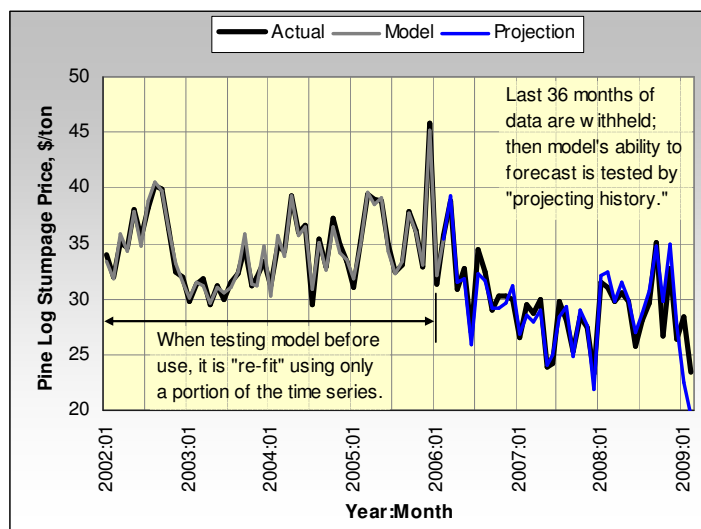


Figure D. Testing the model's ability to project

- We design our model system to reflect that sub-regional markets often trade off relative to one another due to shifting demand pressures;
- Relationships between factors can change depending on their timing in relation to each other. This latter point can be great news when forecasting. For example, if it turns out the price in any given month is correlated with a factor that occurred four months earlier, that mean something that occurred three months ago will indicate where the price is headed next month; what is going on right now is providing insight into prices four months from now.

The complexity of economic systems can mean that models alone sometimes fail to accurately portray feedback mechanisms and responses. As noted earlier, experience is important in human decision-making, but it alone doesn't guarantee a good final decision. For the same reason, having a model that fits historical data doesn't guarantee developing an accurate forecast; consequently, our models' results are tested against a series of logic checks and outcomes are modified when it seems a past relationship is either too robust or inadequate in light of other influences and pressures.

Different markets have different characteristics. Examples of a few distinguishing elements between markets include the types of manufacturing facilities, land ownership patterns, transportation infrastructure, and ground conditions. These differing characteristics give rise to market-specific models even though the same collection of factors is considered for every market's models.

Stumpage Price 4Cast is a unique industry offering with a near-term supply chain application focus – average monthly prices for the next 24 months. The stumpage prices being forecasted are based on F2M’s market transaction data, not market opinions. This means there is a direct benchmark value in the forecast rather than using it as a relative index of market dynamics. The models are local market focused which means 4Cast results relate to actual prices being paid for wood fiber in a real market – not an average for some hypothetical geographic area that does not function as a market. Along with relating the impact of global and national effects on local markets the models consider real world factors, including weather and ground conditions that influence day-to-day operations and decisions. Finally, the models are updated quarterly, reflecting market dynamism that is a reality in today’s globally linked economy.

The bottom-line: Stumpage Price 4Cast offers an impressive value proposition for both timber owners and mill owners. Stumpage Price 4Cast offers timber owners to better manage sales and mill owners to better manage inventory and purchases. For both timber and mill owners this translates into improved profitability. Improving profitability is always a priority but in tough markets it is the difference between success and failure.