Notes on Fundamental Analysis

Fundamental analysis is based on the notion that the underlying supply/demand conditions in a given market ultimately determine price. Since the futures market is attempting to discover prices that will balance supply and demand in some future time period, there is uncertainty in initially establishing an equilibrium price. The market may be "shocked" by new information, resulting in traders' changing their assessments of what the equilibrium price will be in the future. Fundamental analysis is an attempt to both anticipate changes in supply/demand information, and to evaluate the direction and range of price movement resulting from new information.

Fundamental analysis may be simple (intuitive), or complicated (using quantitative statistical or mathematical models), In both cases, analysts are attempting to asses price implications of economic variables including:

1) seasonal use patterns
2) seasonal supply patterns
3) prices of substitute goods
4) prices of compliment goods
5) market structure

Intuitive analysis uses a basic understanding of economic principles to hypothesize about price changes. Quantitative analysis combines knowledge of economic theory with mathematics and statistics to establish explicit relationships between economic variables and price.

An example of a rather simple approach to quantitative fundamental analysis is the use of leading indicator models. Leading indicator models assume that there is a single economic variable so dominant in influencing a particular commodity's price that it alone can provide information on the speed and direction of futures price movement. Potential indicators include

Indicator	Market
Corporate Earnings	S&P 500 Stock Index Futures
Deficit Projections	Interest Rate Futures
USDA Crop Production Reports	Soybean, Corn, and Wheat Futures
USDA Cattle on Feed Reports	Live Cattle Futures

To use a leading indicator model a market researcher must find a time-lagged relationship between an asset's price and the economic indicator.

For example, the United States Department of Commerce publishes monthly data on applications for building permits. It might be reasonable to assume that an increase in building permits indicates a future increase in construction, and as a result an increase in the demand for lumber. If this is the case, then an increase in building permits may result in an increase in the price of futures contracts for lumber.

Suppose we believe that the price of lumber is influenced by the number of building permits issued. To profit from this information, we would need to find out exactly how much the price for lumber changes as the number of building permits issued changes, and how long it takes for the price to completely respond to the new building permits information.

We could set up a simple regression model of the form:

Price of Lumber = $\alpha + \beta$*(change in building permits relative to last month)

This is a simple univariate statistical model like those presented in introductory statistics classes. By estimating the model with Ordinary Least Squares regression analysis, an estimate of α and β can be generated.

The model may be solved several times, with each solution providing a different estimate of the price change on different days resulting from a change in the number of building permits on a specific day. For example, we might regress the price of lumber on the day the building permits data is released on the change in building permits for the last 10 months. This would give one estimate of α and β, reflecting the price change one might expect as soon as the building permit data is released.

We then might regress the price of lumber the day after a building permit report on the change in the number of building permits. This would let us estimate how much the price would change the day after a building permit report as the result of some change in the number of building permits issued.

α is referred to as the intercept term in statistics, and simply tells us, on average, how much the price of lumber could be expected to change even if there is no change in number of building permits issued. β is called a price flexibility, and shows how much, on average, we would expect the price of lumber to change as the number of building permits changes from one report to the next. More specifically, it measures the expected percentage change in price resulting from a 1 percent change in the number of building permits.

By regressing the prices for several days following the release of the building permits reports, we can estimate expected price changes for several days, and determine how long it takes for the full price effect to be realized in the market (once β is found to be equal to zero, the full price effect has been realized).

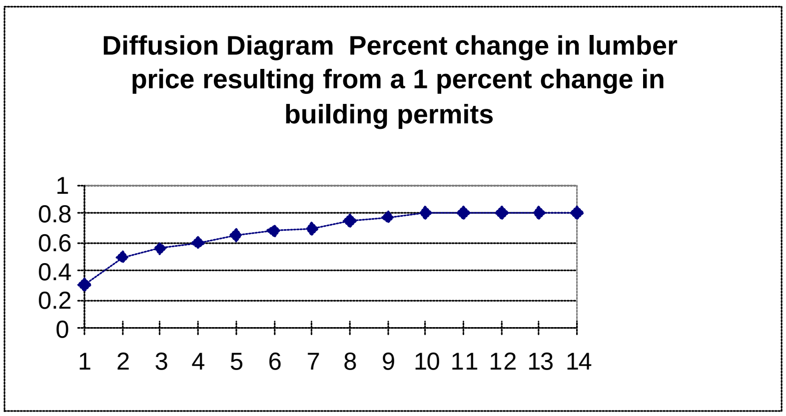
Assume we do this using data for the last 10 months and the following results are generated:

Day	β	Fraction of Total Expected Price Change
1	0.3	0.375 (0.3/0.8)
2	0.5	0.625 (0.5/0.8)
5	0.7	0.875

10	0.8	1.00
20	0.8	1.00

These results suggest the price of lumber changes 0.3 percent for every 1 percent change in the number of building permits on the day the building permits data is released (day 1). By day 2, there is an addition 0.2 percent change in the lumber price for every percent change in the number of building permits (0.5 percent total change in price minus the 0.3 percent that occurred on day 1). By day 10, the entire price impact from a change in building permits has been realized. The full price impact is a 0.8 percent change in price for every 1 percent change in the number of building permits.

The price movement between day 1 and day 10 is called the diffusion pattern, and can be used to plot a diffusion diagram.



So, if the initial price of lumber is $10, then a 5 percent increase in the number of building permits will result in a 40 cent increase in the price of lumber (0.8 percent change in price times a 5 percent change in building permits times $10)

Because some of the price change happens immediately (0.375 of the total price change happens on day 1), a trader would expect to make 25 cents if a position is taken by Day two and held until day 10.

Critical Assumption:

Getting the full 25 cents assumes nothing else happens to affect the price over the ten day investment period (highly unlikely)

This is a very simple model. Diffusion and lag structures are often quite complex.