

How to Construct a Seasonal Index

Methods of Constructing a Seasonal Index

- There are several ways to construct a seasonal index. The simplest is to produce a graph with the factor being studied (i.e., price) on the vertical (Y) axis and time (i.e., days, weeks, or months) on the horizontal (X) axis.
- For a seasonal to have any significance, a number of years' worth of data need to be accumulated. In addition, these charts are most appropriate for periods of relative market stability. They can be plotted on a chart (Fig. 1) or an average of the data can be plotted (Fig. 2).

Figure 1. Monthly U.S. Wheat Price, \$/bushel

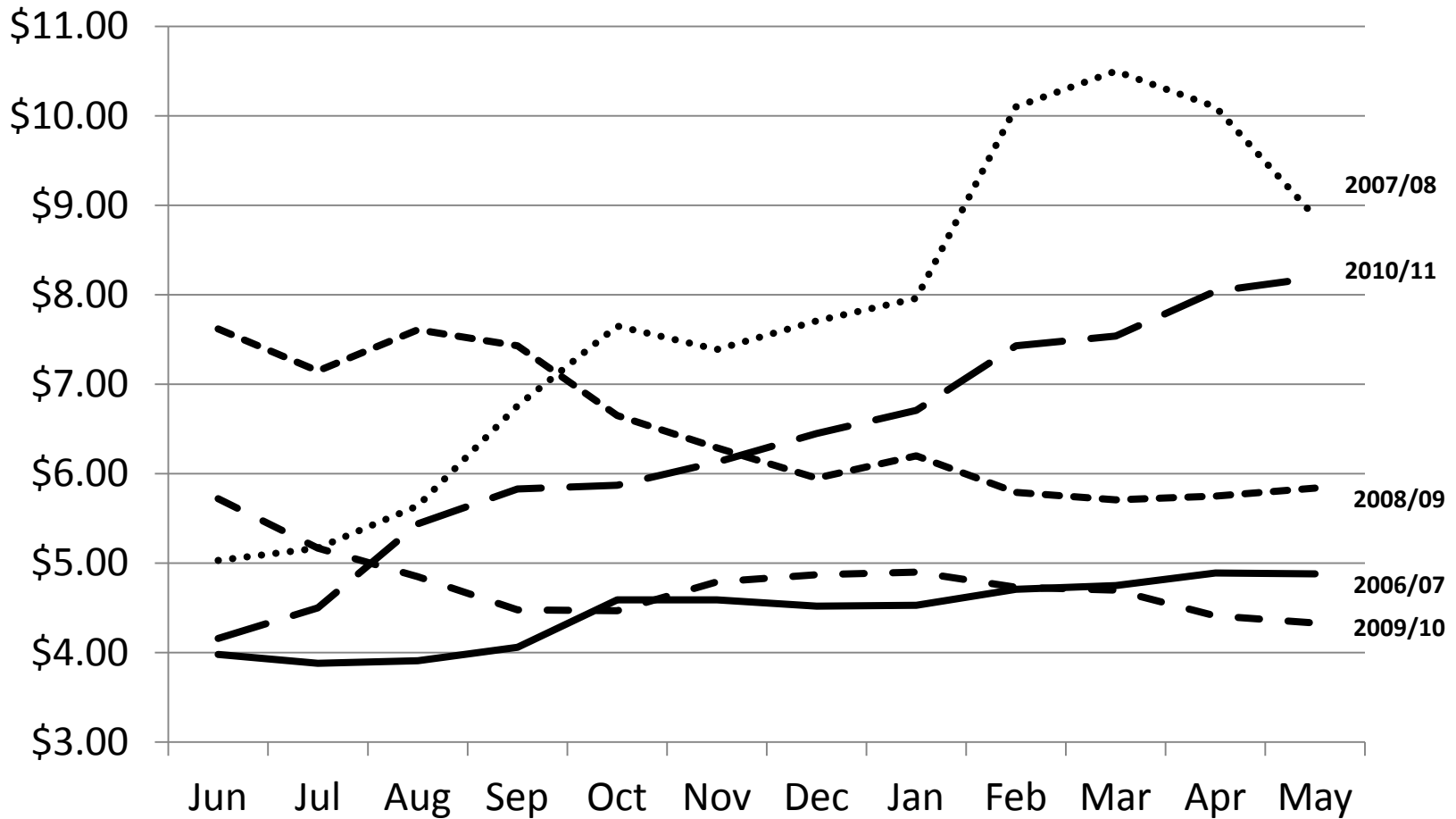
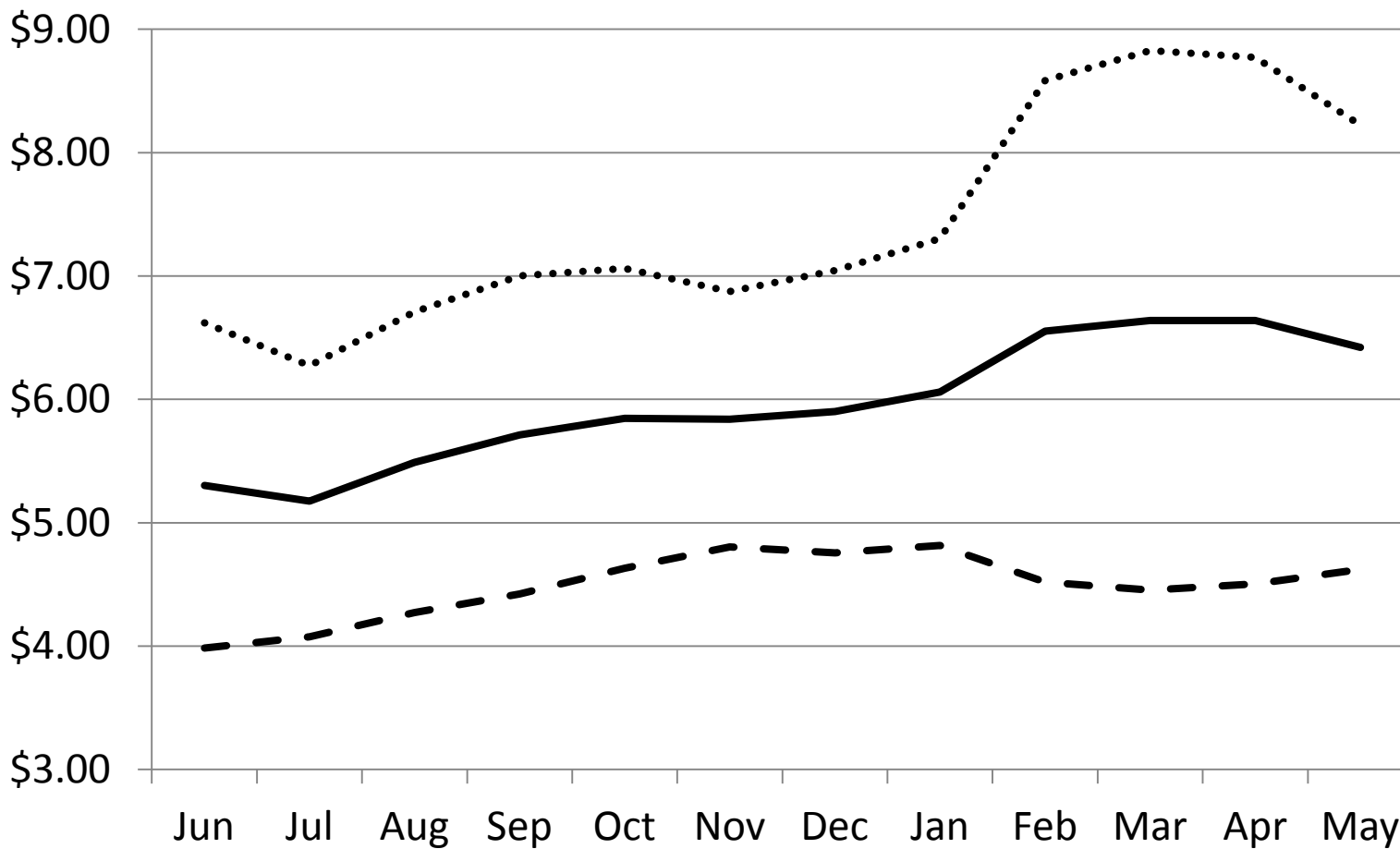


Figure 2. Seasonal (Monthly) Average Wheat Price, 2006/07-2010/2011, \$/bushel



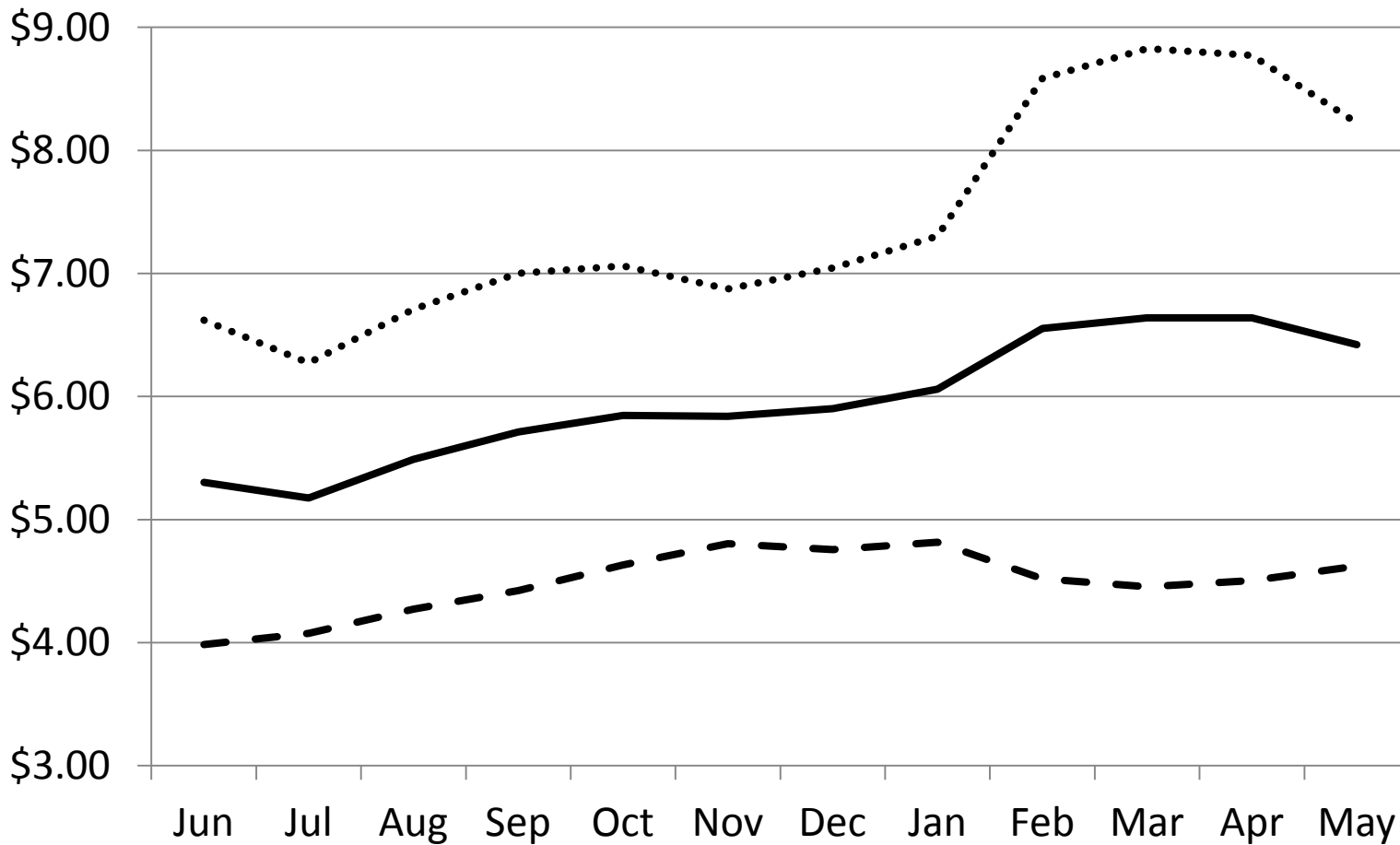
Methods of Constructing a Seasonal Index cont.

- To calculate the average used for each month in figure 2, add the price of wheat in June for each year from 2006 to 2010, then divide by the number of years in the study (in this case, 5). The result is the June average price. If you do the same for July through May, you can then plot the average series.
- If a seasonal chart consists only of an average (and not all of the original data), it is often accompanied by a plotted confidence interval of plus or minus one standard deviation. The standard deviation is a measure of the variability of the historical data from the calculated average. It is useful for showing how reliable the average may be as an indicator of the expected price in a particular year.

Methods of Constructing a Seasonal Index cont.

- If the standard deviation is large, the average is not a very dependable indicator of prices; however, if it is small, it is reasonable to place more confidence in the average as a forecasting tool.
- Another technique is to construct a seasonal index (Fig. 3). The base or denominator for the index is generally the average for the time period being examined. Consequently, each time period's price (or other factor, such as exports) is expressed as a percentage of the season's average and will have a value equal to, greater than, or less than 100.

Figure 3. Seasonal Price Index for Wheat, 2006/07-2010/2011



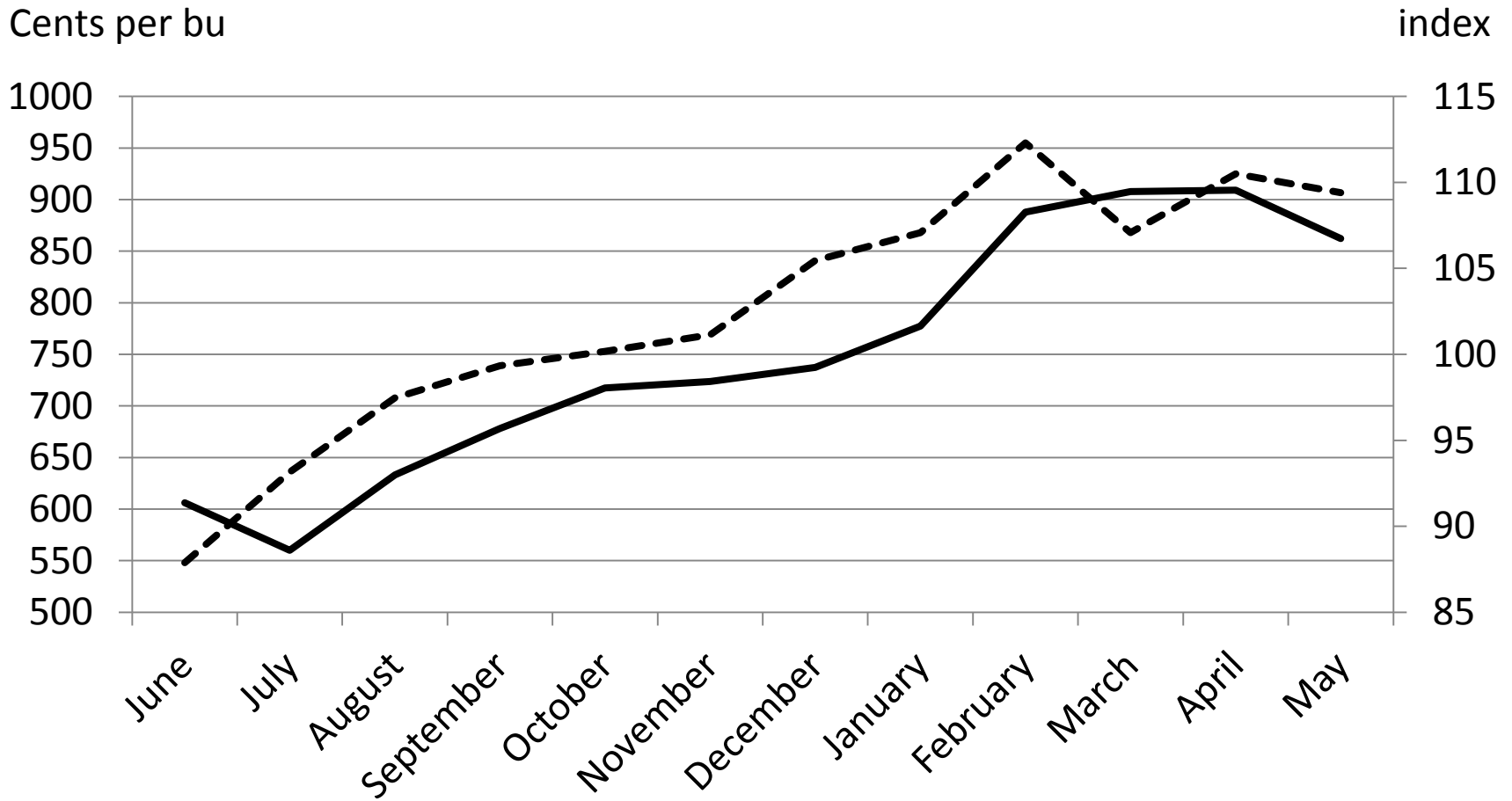
Methods of Constructing a Seasonal Index cont.

- Most indices of this type use a base value of 100 percent. A value of 85 (or .85) for a particular period would mean that period's wheat price was 15 percent below that year's 12-month marketing year average price. Conversely, if the February index value was 115 that would mean that February's price was 15 percent above the marketing year average price.
- This method dampens the variability that may occur from combining data from years with high annual prices with periods of low annual prices, because what it focuses on is the relative movement of prices within the season. These intra-seasonal price movements are more likely to be uniform whether annual average prices were \$3.00 or \$8.00 a bushel.

Methods of Constructing a Seasonal Index cont.

- To calculate the index in Figure 3, begin by calculating the June price index for each year of interest. June wheat price in 2006 ÷ 2006/2007 marketing year annual price x 100. Repeat the procedure for the years 2007 to 2010. The average of all the June wheat price indices is the June index value for the 5 year study. Repeat these steps for July through May.
- A conditioned or segmented seasonal index can be constructed using only years in which a similar feature was exhibited. Using a conditioned index may give a better indication of the seasonal behavior that is likely to occur in a particular year than averaging all years together. A variation on the seasonal index is to attach a second vertical (or Y axis) to the seasonal index and plot this year's values. Depending on how this axis is scaled, superimposing this year's actual prices over the seasonal index can quickly reveal whether this year's price movements are conforming to the expected seasonal pattern (Fig. 4).

Figure 4. July 2011 Kansas City Wheat Futures and the 5-Year Wheat Seasonal Price Index



Methods of Constructing a Seasonal Index cont.

- One problem with using the annual average price as a base for calculating a seasonal index is that this method misses any trend factors that may be affecting prices. This can limit the usefulness of seasonals in periods of significant upward or downward trends. Consequently, some seasonal indices are constructed using a 12-month moving average (Fig. 5).
- Seasonals can be constructed to analyze components of crop supply/demand as well as crop prices.
- Figure 6 is a five year seasonal index of the monthly proportion of marketing year wheat export sales. If there was no seasonal nature in export sales, the average line would be flat at .0833 for each month. However, as Figure 6 demonstrates, about half of U.S. export sales occur in the first four months of the marketing year.
- Seasonals also can help in analyzing other aspects of crop prices such as basis, intercommodity spreads, intramarket spreads, option volatility, etc.

Figure 5. Seasonal Price Index: Simple Average and Moving Average Methods

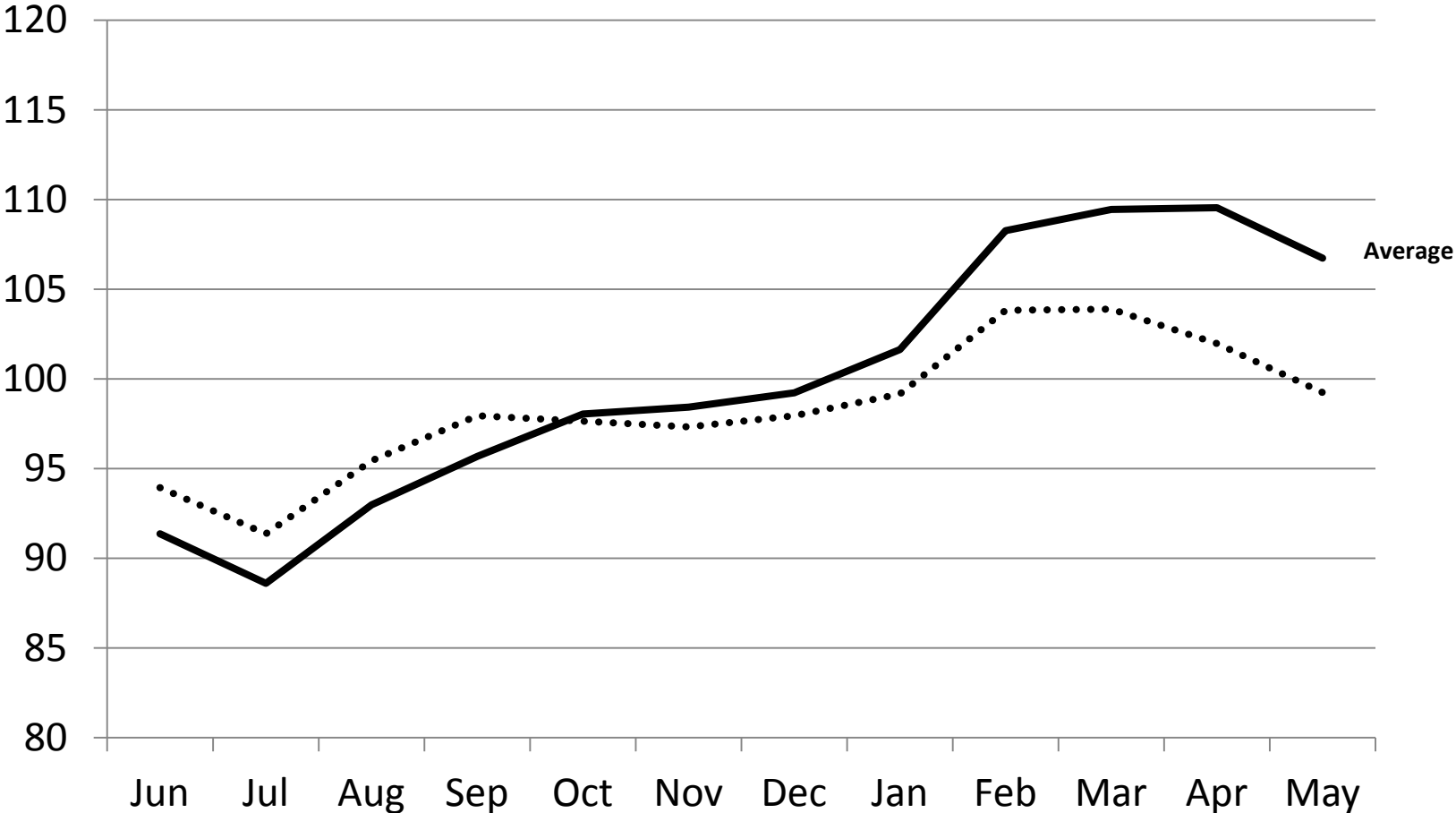
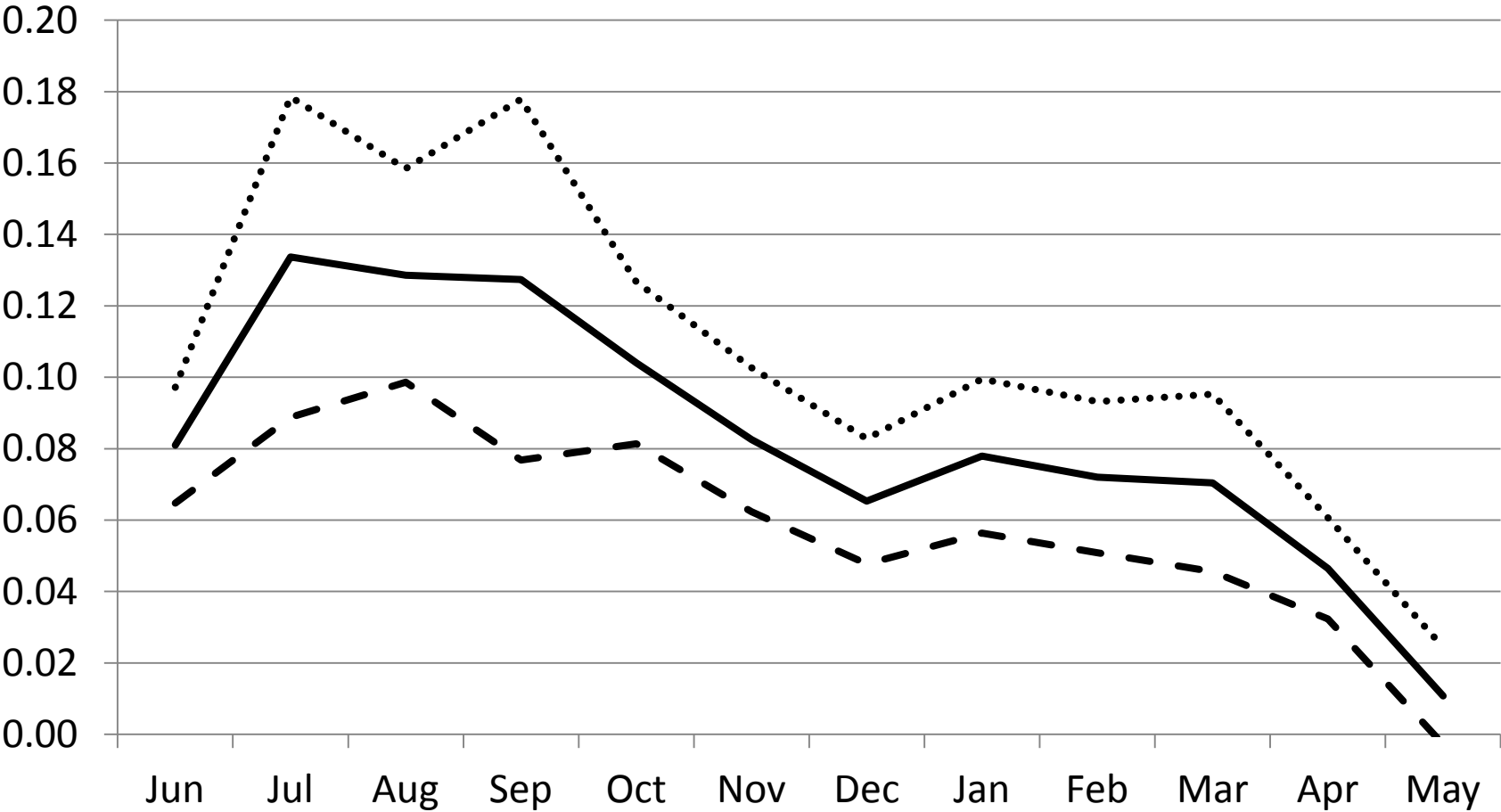


Figure 6. Proportional Monthly Wheat Export Sales Commitments, 5-Year Seasonal Index (2006/07-2010/11)



Summary

- For many of the principal field crops grown in the U.S., seasonality is often the dominant factor influencing crop prices within a single production period.
- Intra-seasonal variations in supply/demand fundamentals also have an important influence on the pattern that is followed by crop prices (as well as basis, spreads, and options volatility).
- Using the appropriate seasonal as a guide, a crop producer should have a better chance to correctly identify both the timing of major market moves as well as absolute price levels. Thus, seasonals can help a producer time pre-harvest sales as well as assess the prospects for profitable post-harvest strategies.