CBER-DETR NEVADA COINCIDENT AND LEADING

EMPLOYMENT INDEXES:

Construction Method

1. General Method

The following text describes the method of constructing the Nevada Coincident and Leading Employment Indexes. Given the raw series that will appear in the index, we first seasonably adjust each series. Finally, some series are inverted, that is, multiplied by minus one, since a peak in the series really captures a trough for the index. For example, when computing an employment index, higher employment associates with lower unemployment rate, other things constant. Thus, adding the unemployment rate to the employment index requires that we invert the unemployment series. The construction proceeds with the following eight steps.

Step 1

We begin by computing the monthly *symmetrical* percentage changes. This conversion gives the same weight to positive and negative changes in the series. For level series, we compute the difference in the monthly level divided by the average of the two monthly levels and then multiply the outcome by 100 to generate a percentage changes. The general formula is as follows:

$$c_{it} = \frac{200(x_{it} - x_{it-1})}{x_{it} + x_{it-1}}, \tag{1}$$

where x_{it} is the data for month t of component (series) *i*. If a series already comes as a percentage change, then the first step takes the difference in the series to calculate the monthly *symmetrical* percentage change as follows:

$$c_{it} = x_{it} - x_{it-1} \tag{2}$$

Step 2

This adjustment normalizes the adjustments for each series so that no one series dominates the index because it experiences more volatile movement than the other series in the index. We compute the average of the long-run absolute values of the percentage changes calculated in *step 1*. In other words, we divide equation (1) by the long run average of their absolute values. Thus, the standardized monthly symmetric percentage changes (s_{it}) is given as follows:

$$s_{it} = \frac{c_{it}}{A_i}, \text{ where } A_i = \left(\sum_{c=2}^{n} |c_{it}|\right) \Big/ (n-1). \tag{3}$$

Step 3

We next average the standardized monthly symmetrical percentages with equal weights across all components (series) in the index, which we define as r_t. as the average of the standardized components, then the formula becomes;

$$r_t = \left(\sum_{i=1}^{M} s_{it}\right) \Big/ M, \tag{4}$$

where M is the number of the components (series) in the index.

Step 4

We solve for the “raw” index with value 100 for the initial month as follows. The series r_t measures the monthly symmetrical percentage changes in the index. Thus, we can think of the r_t coming from the solution to equation (1) where the index, which we do not know, substitutes into the right hand side of equation (1) and r_t substitutes into the left-hand side. As a result, we get the following:

$$r_t = \frac{200(I_t - I_{t-1})}{I_t + I_{t-1}}. \tag{5}$$

Next, we solve for I_t as follows:

$$I_t = \frac{I_{t-1}(200 + r_t)}{200 - r_t}. \tag{6}$$

To calculate I_t each period, we must know both I_{t-1} and r_t. We just calculated the series for r_t. We begin the calculations by assuming that the index equals 100 in the first period.

Step 5

We implement the reverse trend adjustment process to limit the possibility of false turning-point signals in the index. We choose a target series such as non-farm employment and identify the first and last peaks of that series in the sample period. Then we calculate the average growth rate from peak to peak of the target series. The trend adjustment factor then equals the difference in the average trend growth rate of the target series minus the average trend growth rate in the "raw" index. So we also need to identify the first and last peaks in the raw index to calculate the average growth rate from peak to peak of the raw index series.

Step 6

We add the trend adjustment factor into the average standardized components series r_t calculated in *step 3* to produce the adjusted average standardized components series, r_t^{adj}.

Step 7

We now repeat *step 4* to generate the trend adjusted index, I_t^{adj}. The adjusted equations to generate the trend adjusted index are given as follows:

$$r_t^{adj} = \frac{200(I_t^{adj} - I_{t-1}^{adj})}{I_t^{adj} + I_{t-1}^{adj}} \text{ and} \tag{7}$$

$$I_t^{adj} = \frac{I_{t-1}^{adj}(200 + r_t^{adj})}{200 - r_t^{adj}}. \tag{8}$$

Step 8

Finally, we choose a base year for the index. We divide the trend adjusted index by its value in the base year and multiply by 100.

2. Nevada Coincident Employment Index

The variables chosen for the Nevada Coincident Employment Index are given as follows:

1.	Household employment	1976:1 to 2007:12
2.	Non-Farm Employment	1976:1 to 2007:12
3.	Unemployment Rate (inverted)	1976:1 to 2007:12
4.	Insured Unemployment Rate (inverted)	1987:4 to 2007:12

The Nevada Department of Employment, Training and Rehabilitation (DETR) provides data on non-farm employment from the Current Employment Statistics (CES) data as well as household employment, the labor force, and the unemployment rate from the Current Population Survey (CPS) data. In addition, DETR also provides the weekly insured unemployment rate from the U.S. Department of Labor, Employment & Training Administration. We convert the weekly data into a monthly series.

3. Nevada Leading Employment Index

The variables chosen for the Nevada Leading Employment Index are given as follows:

1.	Initial Claims (inverted)	1976:1 to 2007:12
2.	Real Moody's BAA (inverted)	1976:1 to 2007:12
3.	Housing permits	1980:1 to 2007:12
4.	Commercial Permits	1988:1 to 2007:12
5.	Construction Employment	1990:1 to 2007:12
6.	Short-Duration Unemployment Rate (inverted)	2001:1 to 2007:12

DETR provides data on initial claims for unemployment insurance as well as the number people drawing unemployment insurance for 15 weeks or less and the covered level of employment from the U.S. Department of Labor, Employment & Training Administration. We calculate the short-duration unemployment rate as the ratio of the number of people drawing unemployment insurance for 15 weeks or less to the covered level of employment times 100 to convert into a percentage. DETR also provides the information on the level of construction employment from the Current Employment Statistics (CES) data. The Center for Business and Economic Research (CBER) provides the monthly data on housing permits and commercial building permits for Clark and Washoe Counties. We aggregate the numbers for Clark and Washoe Counties to compute a proxy for housing and commercial building permits for Nevada. Finally, data on the Moody's Baa interest rate and the consumer price index come from the Federal Reserve Bank of St. Louis FRED® data base. We calculate the year-over-year inflation rate from the CPI and subtract that from the Moody's Baa interest rate to compute the real Moody's Baa interest rate.