

The Stock/Watson Dynamic Single Factor Model for Estimating the Current State of the State or Regional Economy

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Why build current and
leading indexes?

What is the S/W DSFM
model?

How do you build it?

Why build a current index model of the state of the economy? Problems with alternatives.

- State GDP lags 6 months after end of the year, and is only annual.
- State quarterly personal income lags 3 months after the end of the quarter.
- Payroll employment lags only one month, and is monthly, but is not reliable at business cycle turning points, and doesn't take into account changes in intensity (average weekly hours) or productivity.
- Other data, e.g., tax revenues, are noisy, making monthly changes difficult to interpret.

Why build a current index model of the state of the economy? Advantages:

- The state space model filters out the noise, extracting the signal from noisy data.
- Advantages over the BEA/TCB methodology of index construction:
 - Gives a smoother index due to superior noise reduction.
 - Makes effective use of indicators with high frequency noise but good business cycle behavior. The BEA/TCB methodology severely discounts such series.
- The state of the economy in a S/W DSFM is unobservable, which is exactly the situation encountered in state and regional economies.
- Why not use the Philadelphia Fed consistent index for your state? Because you can build a better index by using the best data available in your state.

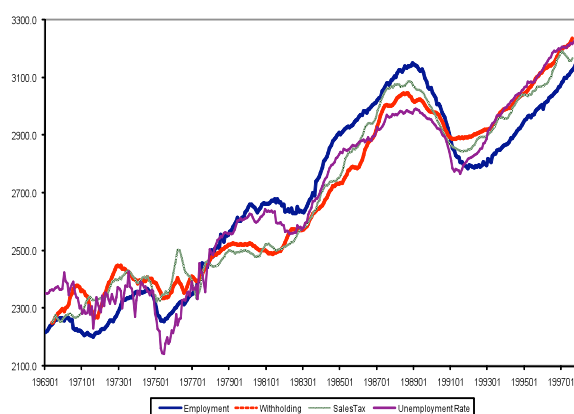
Why build a current index model of the state of the economy? More reasons.

- The current index can be the dependent variable in a leading index model estimated by “conventional” econometric techniques.
- The current and leading indexes provide an early warning system of downturns (and upturns) in the economy, and therefore revenues.
- The information that tax revenues provide on the state of the economy can be fully exploited.
- They give you respect (because they work).

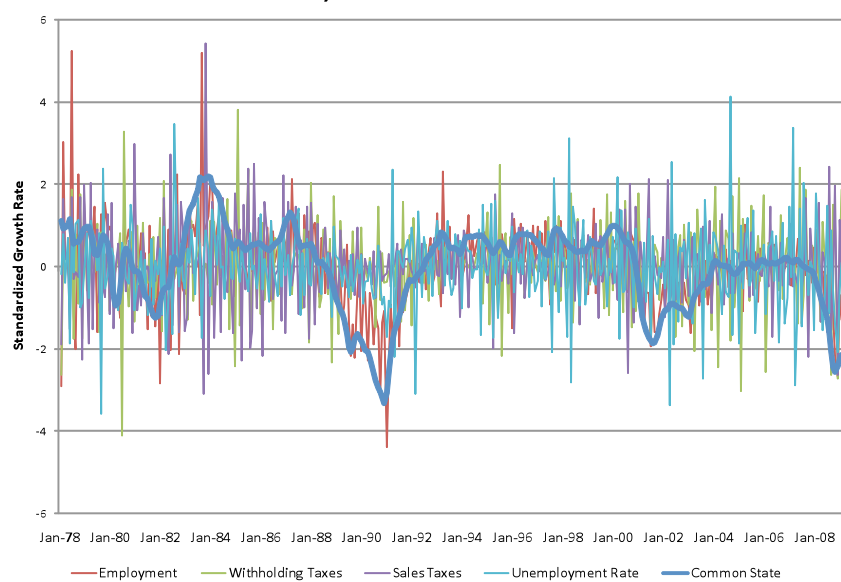
What is the S/W DSFM model?

Basic Idea of the S/W DSFM: The state of the economy is reflected in observed aggregate economic indicators.

Figure 6
Coincident Indicators, Retrended and Scaled to Employment



The Latent Dynamic Factor: The Common State



The Dynamic Single Factor Model

$$(1) \quad \Delta \mathbf{x}_t = \gamma(L) \Delta c_t + \mu_t$$

$$(2) \quad \mathbf{D}(L) \mu_t = \varepsilon_t$$

$$(3) \quad \phi(L) = \eta_t$$

The Dynamic Single Factor Model: Iowa

$$\begin{aligned}
 & Emp_t = .600 \Delta c_t + \mu_{Emp,t} \\
 (1) \quad & Unrate_t = -.379 \Delta c_t + \mu_{Unrate,t} \\
 & Hours_t = .084 \Delta c_t + \mu_{Hours,t} \\
 & WSD_t = .059 \Delta c_t + \mu_{WSD,t} \\
 (2) \quad & \mu_{Emp,t} = .306 \mu_{Emp,t-1} + \varepsilon_t \\
 & etc. \\
 (3) \quad & \Delta c_t = .425 \Delta c_{t-1} + .373 \Delta c_{t-2} + \eta_t
 \end{aligned}$$

How do you build it?

Select good indicators. Important characteristics:

- Valid, i.e., reflect overall economic activity.
- Reliable, i.e., are accurate.
- High frequency, e.g., monthly.
- Timely, available soon after activity they measure.
- Long historical record.

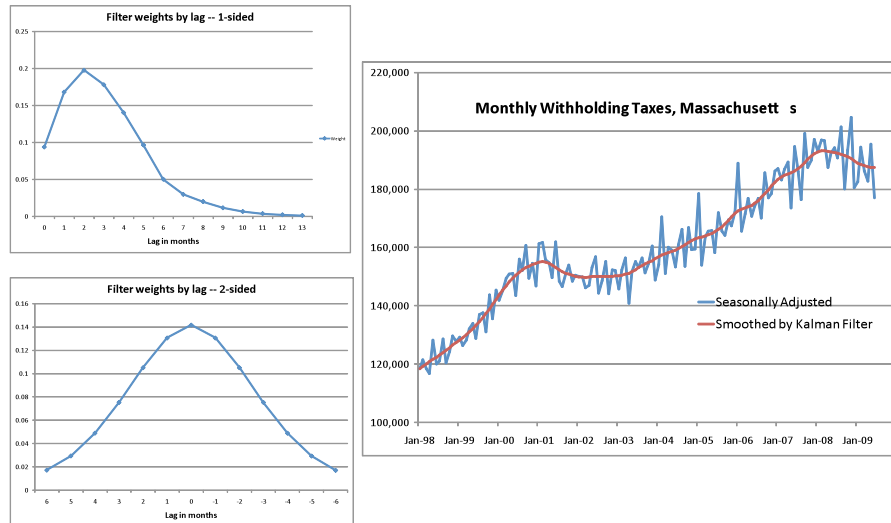
Estimating a current index: Specification issues.

- Identification. Need at least 3 indicators.
- Is there a *single* common state? The whiteness diagnostic test.
- Is the common state smooth?
- Does each indicator contribute significantly to the index?
 - Statistical significance
 - Significant share of total contribution to the index.
- Are the filters reasonable?
- Does the resulting index conform with expert knowledge of the region's economic history?

Other issues

- Calibrating the index to trend at the same rate as regional product (state gross domestic product) or income. Easy to do.
- Using the filters output by the model.

Filter example: withholding taxes, Massachusetts



The next step: Constructing a leading index to predict the coincident index.

- Using conventional econometric techniques, select indicators that predict (lead) the current index.