

## Summary of Some Methods on Phase Identification

Jinkai Zhang  
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	Market	Number and Phases	Indicators and Data	Methods
<b>Vliet and Blitz (2011)</b>	U.S. (1948-2007)	Four: Expansion, Peak (slowdown), Recession, Recovery.	1. <b>U.S. Credit Spread (Baa-Aaa);</b> 2. <b>ISM factor (ISM manufacturers' survey production index);</b> 3. <b>U.S. Unemployment rate;</b> 4. <b>Earning yield (E/P ratio of S&amp;P500).</b>	E.g. Expansion is defined as that the combination of 4 economic indicators is both positive and rising. (See appendix of the paper for the way of combination.)
<i>Hodges et al. (2017)</i>	<i>U.S. (1988-2016)</i>	<i>Four: Expansion, slowdown, Recession, Recovery.</i>	<i>1. Citi U.S. Leading Indicator for Consensus Economic Forecasts and forecasts from Consensus Economics; 2. Chicago Fed National Activity Index.</i>	<i>1. Acceleration is defined as increases in growth in excess of one standard deviation; 2. Probability of recession is the likelihood of a recession in the subsequent period by regressing the three-month-ahead coincident economic indicator on the current level. E.g. Expansion is defined with low probability of recession and acceleration.</i>
<b>Scherer and Apel (2020)</b>	U.S. (2002-2018) <sup>1</sup>	Four: Expansion, Peak (slowdown), Recession, Recovery.	1. U.S. unemployment rate; 2. Producer sentiment: <b>Markit Global Manufacturing PMI (MPMIGLMA Index)</b> and ISM Non-Manufacturing NMI (NAPMNMI Index); 3. Consumer sentiment: <b>The Conference Board Consumer Confidence Index (CONCCONF Index, PURCHASE NEEDED)</b> and <b>the University of</b>	1. The approach is an enhancement of the economic model developed by Vliet and Blitz (2011) as the methodology is intuitive, robust, and easily applicable. 2. Aggregated Z-scores calculated from different series. E.g. Expansion: Z-score positive and increasing.

<sup>1</sup> Scherer and Apel (2020) use monthly data from March 1998 as they represent the longest available common data history of the used macroeconomic variables.

			Michigan Consumer Sentiment Index (CONSENT Index); 4. Financial market stress : Kansas City Financial Stress Index (KCFSINDX Index)	
Arnott et al. (2017)	U.S. (1880-2016) and other developed countries	25 phases: 5 Regimes for Inflation * 5 Regimes for Real Rate	1. U.S. inflation rate; 2. U.S. real rate.	1. Classify inflation into 5 regimes based on quantiles; 2. Classify real rate into 5 regimes based on quantiles; 3. Create 5*5 regimes.

#### Data Source:

The Conference Board Consumer Confidence Index (**Subscription NEEDED**): <https://conference-board.org/data/consumerdata.cfm>

Kansas City Financial Stress Index (KCFSINDX Index): <https://fred.stlouisfed.org/series/KCFSI>

Michigan Consumer Sentiment Index: <https://data.sca.isr.umich.edu/data-archive/mine.php>

#### Reference

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