OUTPUT MEASURES
Growth in State Real GDP

Source: US Bureau of Economic Analysis, Interactive Data, Real GDP in Chained Dollars
Growth in State Real Manufacturing Output

Source: US Bureau of Economic Analysis, Interactive Data, Real GDP in Chained Dollars
Nonfarm Payrolls

Private Nonfarm Payrolls

Relative Private Nonfarm Payroll Growth

Source: US. Bureau of Labor Statistics, All Employees: Total Private, retrieved from FRED, Federal Reserve Bank of St. Louis (Various Series)
Average Weekly Earnings

Source: US. Bureau of Labor Statistics, State and Area Employment, Hours and Earnings, Series SMU20000000500000011
INCOME MEASURES

SOURCE FOR ALL MEASURES IS US BUREAU OF ECONOMIC ANALYSIS, INTERACTIVE DATA, QUARTERLY STATE PERSONAL INCOME, TABLES SQ4, SQ5, SQ35.
Nonfarm Personal Income Growth
Manufacturing Earnings Growth
Personal Income Growth by Sector

- Information
- Farm earnings
- Military
- Utilities
- Nondurable goods manufacturing
- Wholesale trade
- Mining
- Federal government, civilian
- Administrative and waste management services
- State and local government
- Durable goods manufacturing
- Retail trade
- Transportation and warehousing
- Other services, except public administration
- Health care and social assistance
- Finance and insurance
- Arts, entertainment, and recreation
- Real estate and rental and leasing
- Accommodation and food services
- Educational services
- Construction
- Professional, scientific, and technical services
- Management of companies and enterprises
- Forestry, fishing, and related activities

Personal Income Growth, 2012Q4 - Present (Annualized Percent Change)
Growth in Retail Sales

Taxable Retail Sales ($ Millions, Seasonally Adjusted)

Source: Kansas Department of Revenue, State Sales Tax Collections by County
Growth in Commercial/Industrial Electrical Sales

Comm/Ind Electrical Sales (MWh, Seasonally Adjusted)

Source: US Energy Information Administration, Form EIA-826, Tables 5.4 & 5.5
INDICES OF ECONOMIC CONDITION
Philadelphia Federal Reserve Bank State Coincident Indices

  – Nonfarm payroll employment, Average hours worked in manufacturing, Unemployment rate, Real wage and salary disbursements

• Dynamic Factor Analysis
  – Methodology developed by James Stock and Mark Watson from Harvard University to predict inflation, adopted by many others to predict economic activity
  – Examines “co-movements” in various time series
August 2015 State Leading Indexes
(Expected 6-Month Change in State Coincident Indexes)

Source: Federal Reserve Bank of Philadelphia
# Kansas Coincident Economic Index

<table>
<thead>
<tr>
<th>Variable</th>
<th>Data Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Nonfarm Payrolls</td>
<td>US Bureau of Labor Statistics, Regional and State Employment and Unemployment, Table 5</td>
</tr>
<tr>
<td>Retail Sales of Electricity for Commercial Users (Million kWh)</td>
<td>US Energy Information Administration, Form EIA-826 Data, Table 5.4</td>
</tr>
<tr>
<td>Retail Sales of Electricity for Industrial Users (Million kWh)</td>
<td>US Energy Information Administration, Form EIA-826 Data, Table 5.5</td>
</tr>
<tr>
<td>Retail Sales of Electricity for Commercial and Industrial Users (Million kWh)</td>
<td>Calculated Field (Commercial + Industrial)</td>
</tr>
<tr>
<td>Taxable Retail Sales</td>
<td>Calculated from Kansas Department of Revenue, State Sales Tax Collections by County, <a href="http://ksrevenue.org/salesreports.html#state">http://ksrevenue.org/salesreports.html#state</a></td>
</tr>
<tr>
<td>Privately Owned Housing Starts Authorized by Building Permits: 1-Unit Structures</td>
<td>US Bureau of Census, Housing Units Authorized By Building Permits</td>
</tr>
<tr>
<td>Average Weekly Earnings of All Employees, Total Private Sector</td>
<td>US Bureau of Labor Statistics, State and Metro Employment, Hours, and Earnings</td>
</tr>
</tbody>
</table>
Coincident Economic Index, 2007 - Present
Nonfarm Proprietor’s Income Growth
Medicaid Benefits Growth
Dynamic Factor Analysis

- Simultaneous model of time-series relationships among
  - Observed variables
  - Unobserved “factor(s)"
    - Estimated using Kalman filter
    - For our purpose, 1st factor of observed economic variables is economic condition (Stock & Watson, 1989, 1991)

\[
\begin{align*}
  f_t &= \phi_1 f_{t-1} + \phi_2 f_{t-2} + \eta_t \\
  f_{t-1} &= f_{t-1} \\
  \mu_t &= \Psi \mu_{t-1} + \epsilon_t \\
  y_t &= bf_t + \mu_t
\end{align*}
\]