Risk Implication of Unemployment and Underemployment

2016 CAS ERM for the P&C Actuary

Kailan Shang **CFA, FSA, PRM, SCJP**

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Business Intelligence and Risk Management

Agenda

1. Background
2. Unemployment/Underemployment
3. Insurance
4. Predictive Model
5. Unemployment and New Business Volume
6. Labor Market Stress Scenarios

Background

Background

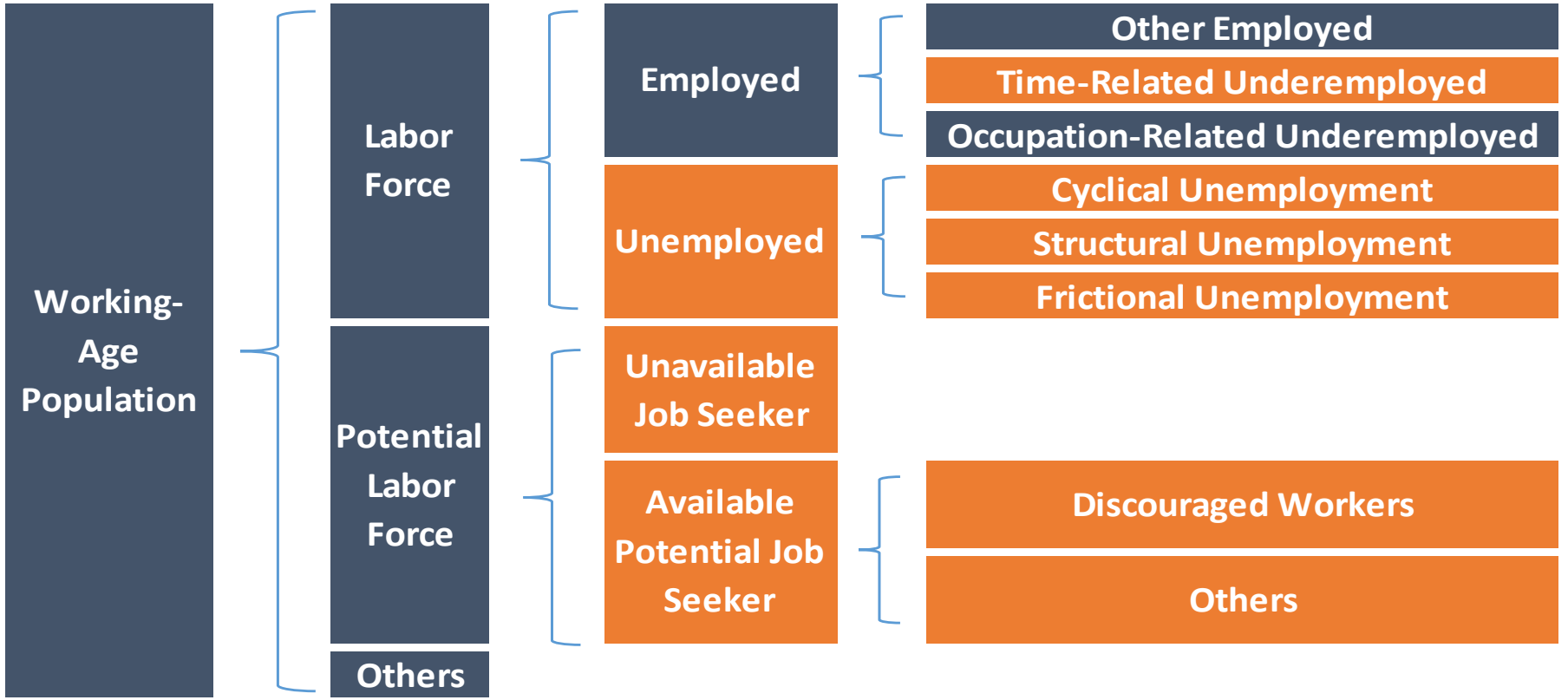
The research “Risk Implications of Unemployment and Underemployment”, is sponsored by the Joint Risk Management Section of the CAS, the CIA, and the SOA.

6 POG members

The report is accessible at https://www.soa.org/Research/Research-Projects/Risk-Management/2015-risk-implications-unemployment-underemployment.aspx

Unemployment and Underemployment

Working-Age Population



Unemployment rate = Unemployed / Labor Force

Labor force participation rate = labor force / working-age population

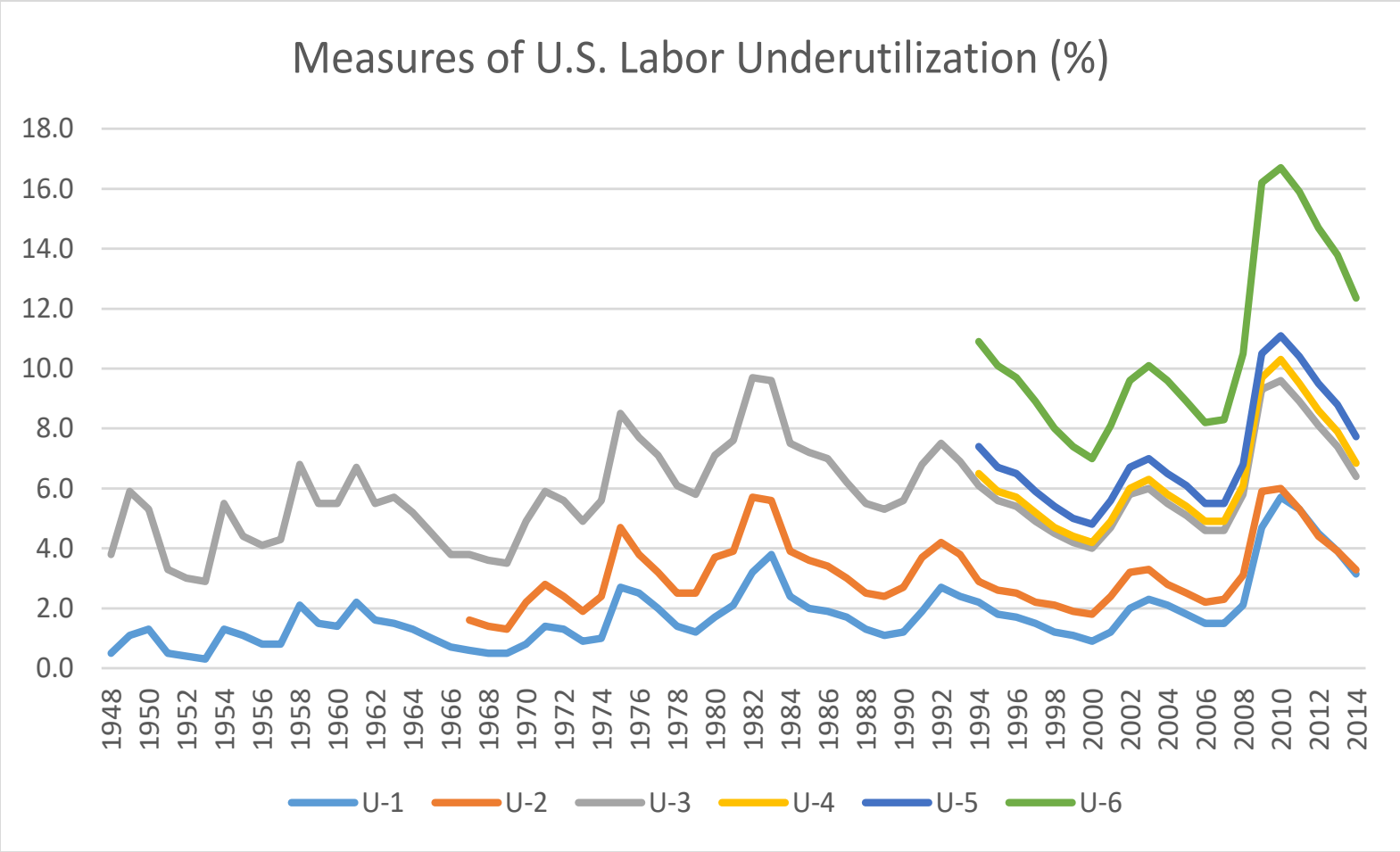
Alternative Measures

Bureau of Labor Statistics (BLS) publishes six different measures of labor underutilization on a monthly basis:

1. U-1 Rate: $\frac{\text{Persons unemployed 15 weeks or longer}}{\text{Labor force}}$
2. U-2 Rate: $\frac{\text{Persons who lost jobs+Persons who completed temporary jobs}}{\text{Labor force}}$
3. **U-3 Rate: $\frac{\textbf{Unemployed}}{\textbf{Labor } \boldsymbol{force}}$, the official unemployment rate**
4. U-4 Rate: $\frac{\text{Unemployed+}\mathbf{\text{Discouraged workers}}}{\text{Labor force+Discouraged workers}}$
5. U-5 Rate: $\frac{\text{Unemployed+}\mathbf{\text{Marginally attached workers}}}{\text{Labor force+Marginally attached workers}}$
6. U-6 Rate: $\frac{\text{Unemployed+Marginally attached workers+}\mathbf{\text{Involuntary part time workers}}}{\text{Labor force+Marginally attached workers}}$

Underemployed, which is not included in the standard unemployment rate, refers to involuntary part-time workers or overqualified workers.

Alternative Measures

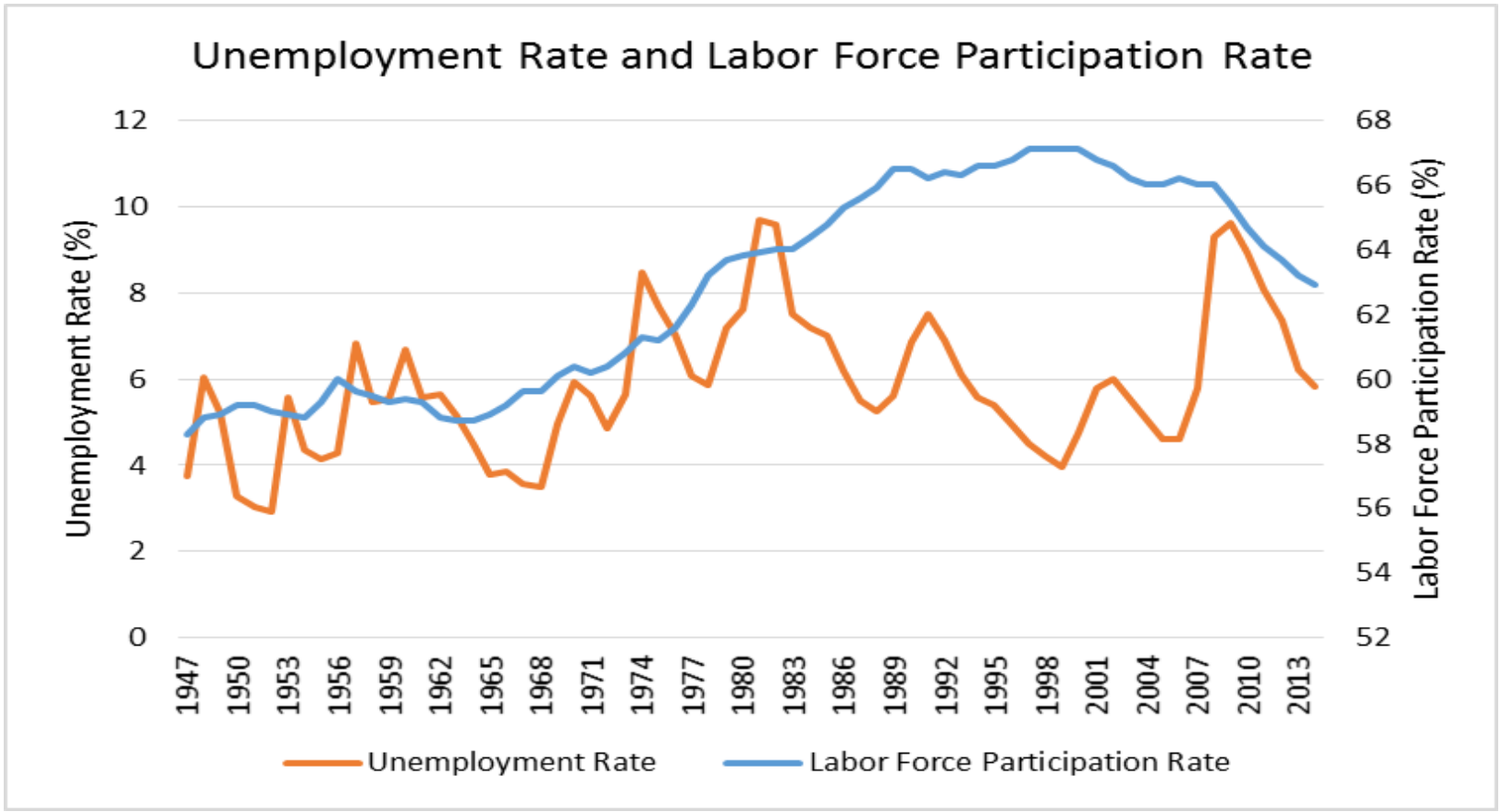


Correlation	Unemployed
Discouraged Workers	0.936
Marginally Attached Workers	0.91
Involuntary Part-Time Workers	0.958

Source: Bureau of Labor Statistics.

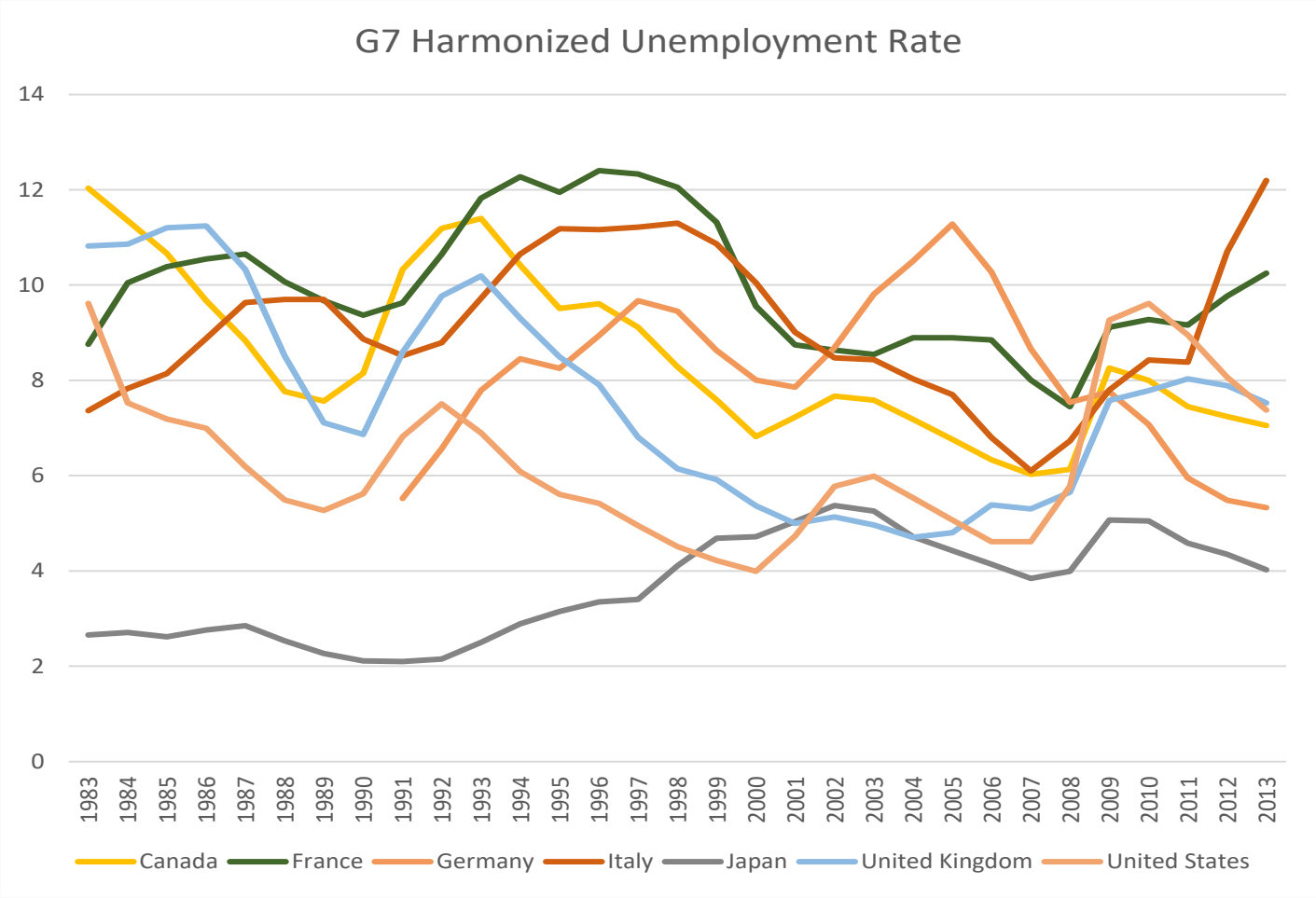
Labor Force Participation Rate

U.S. Unemployment Rate and Labor Force Participation Rate (1947 to 2014)



Source: Bureau of Labor Statistics.

G7 Unemployment Rates



Factors could have an impact on the local unemployment rate:

1. Economic development level
2. Major industries in the local economy
3. Import competition
4. Unemployment insurance benefits
5. The power of unions
6. Economic policies
7. Immigration policies
8. Geopolitical factors
9. Demographic characteristics

Source: OECD.

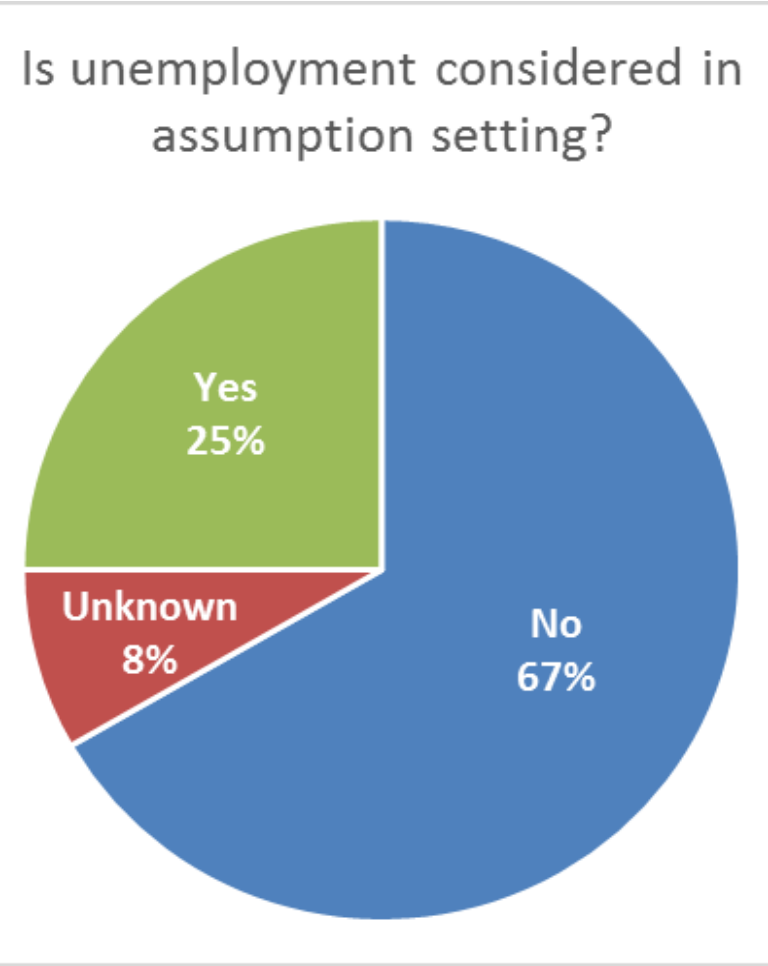
Swin Solutions

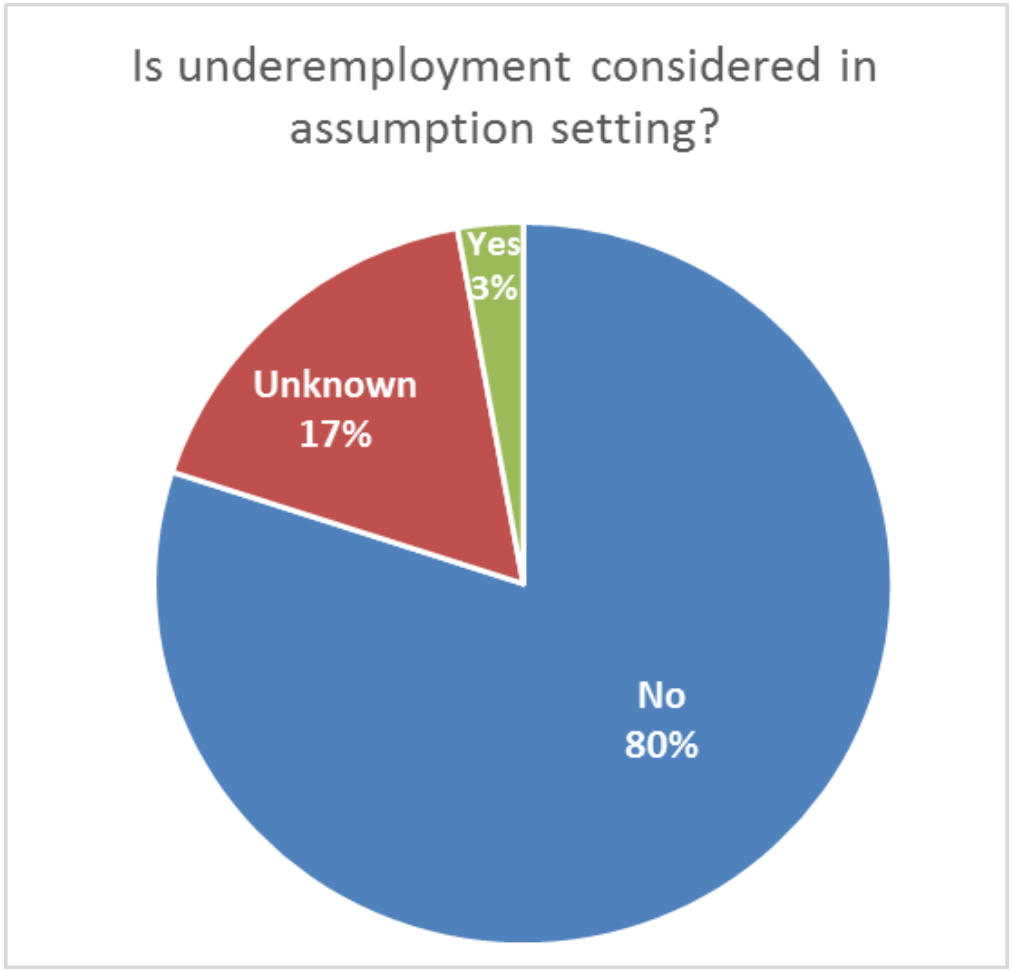
Economic Policies

Macroeconomic Policy	Microeconomic Policy
• Low interest rate and • High money supply (QE) • Tax cut • Government spending	• Education • Employment subsidy • Reduced unemployment benefits • Lighter regulation of the labor market • Weakening the power of unions • Reducing location mismatch • Improving job market information sharing

Insurance

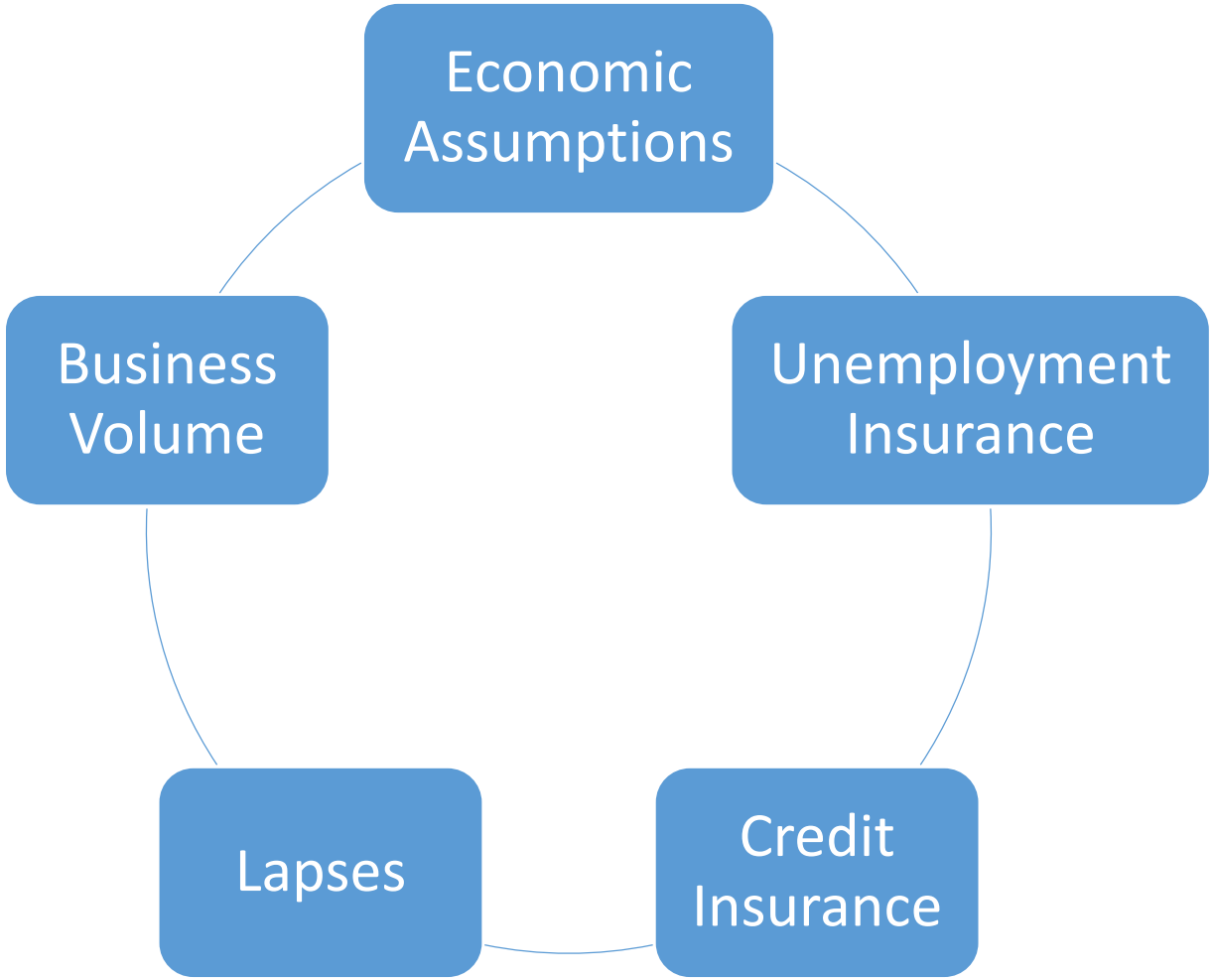
Current Modeling Practice





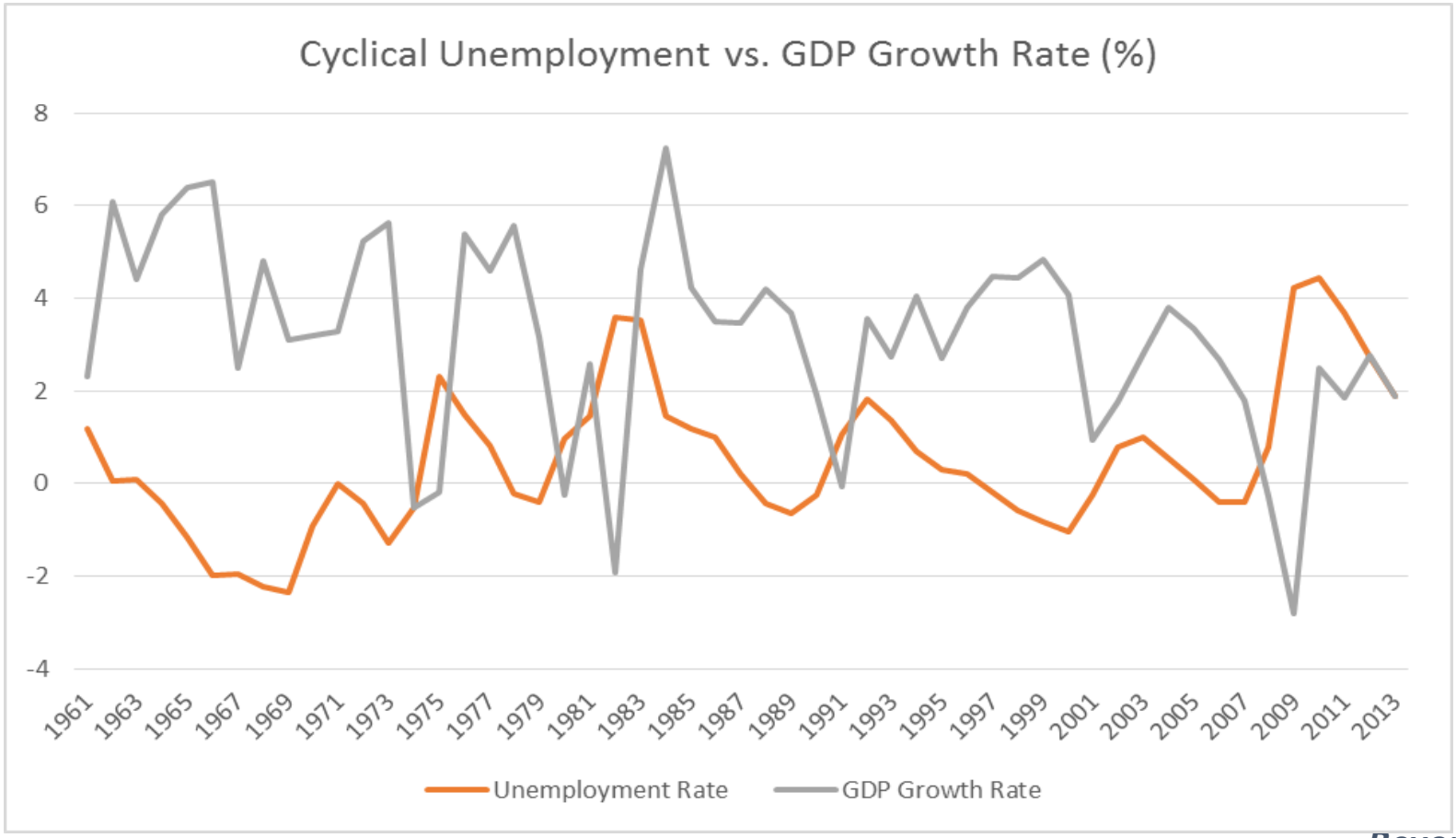
Based on a survey of unemployment and underemployment modeling practices in the actuarial community with 36 responses.

Impact on Insurance



Economic Assumptions

U.S. Cyclical Unemployment versus GDP Growth Rate

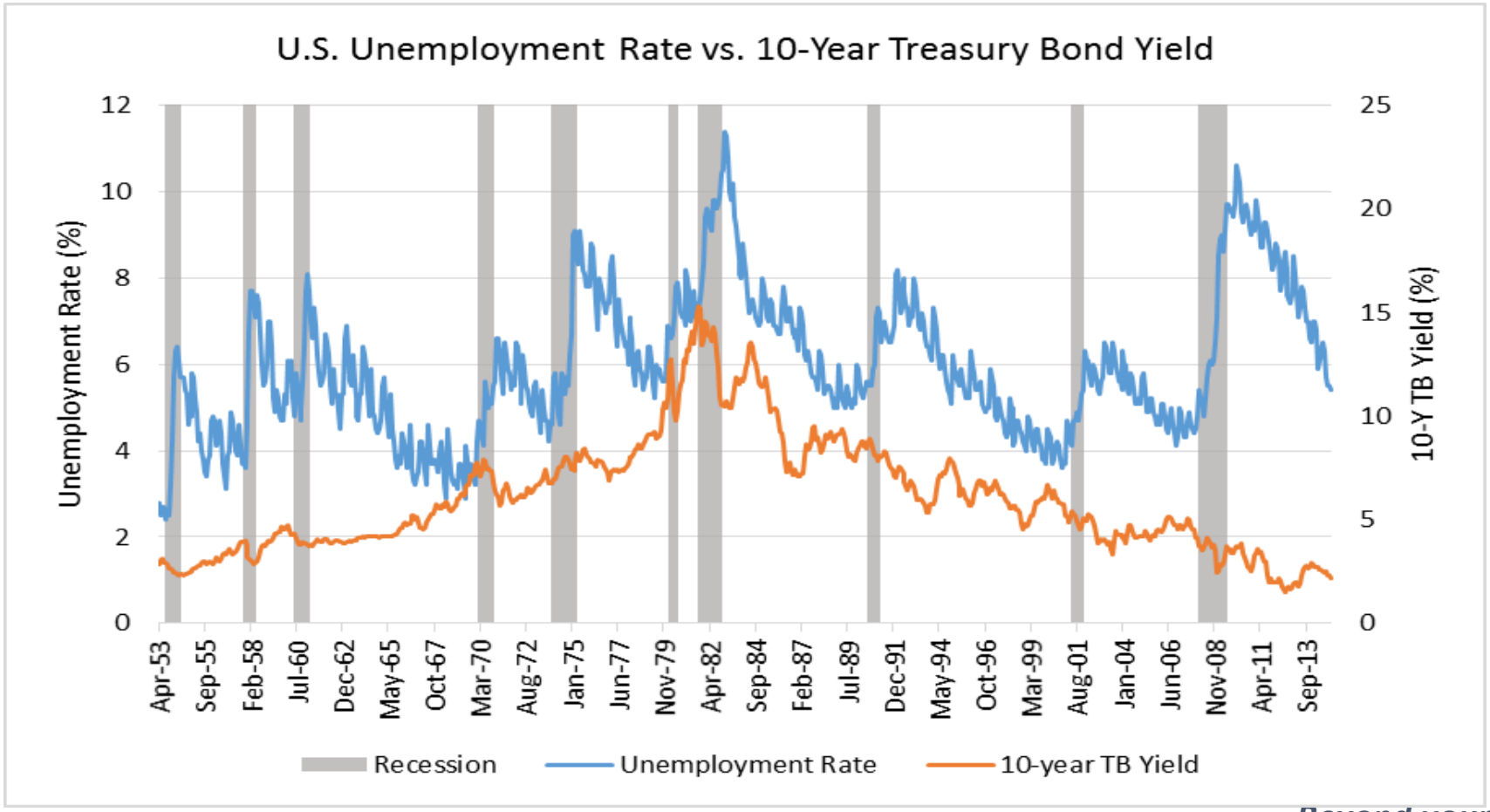


Cyclical unemployment rate = actual unemployment rate - natural unemployment rate estimated by the Fed

Sources:
Unemployment Rate: Bureau of Labor Statistics.
GDP Growth Rate: World Bank.

Economic Assumptions

U.S. Unemployment Rate versus 10-Year Treasury Bond Yield (1953 to 2014)



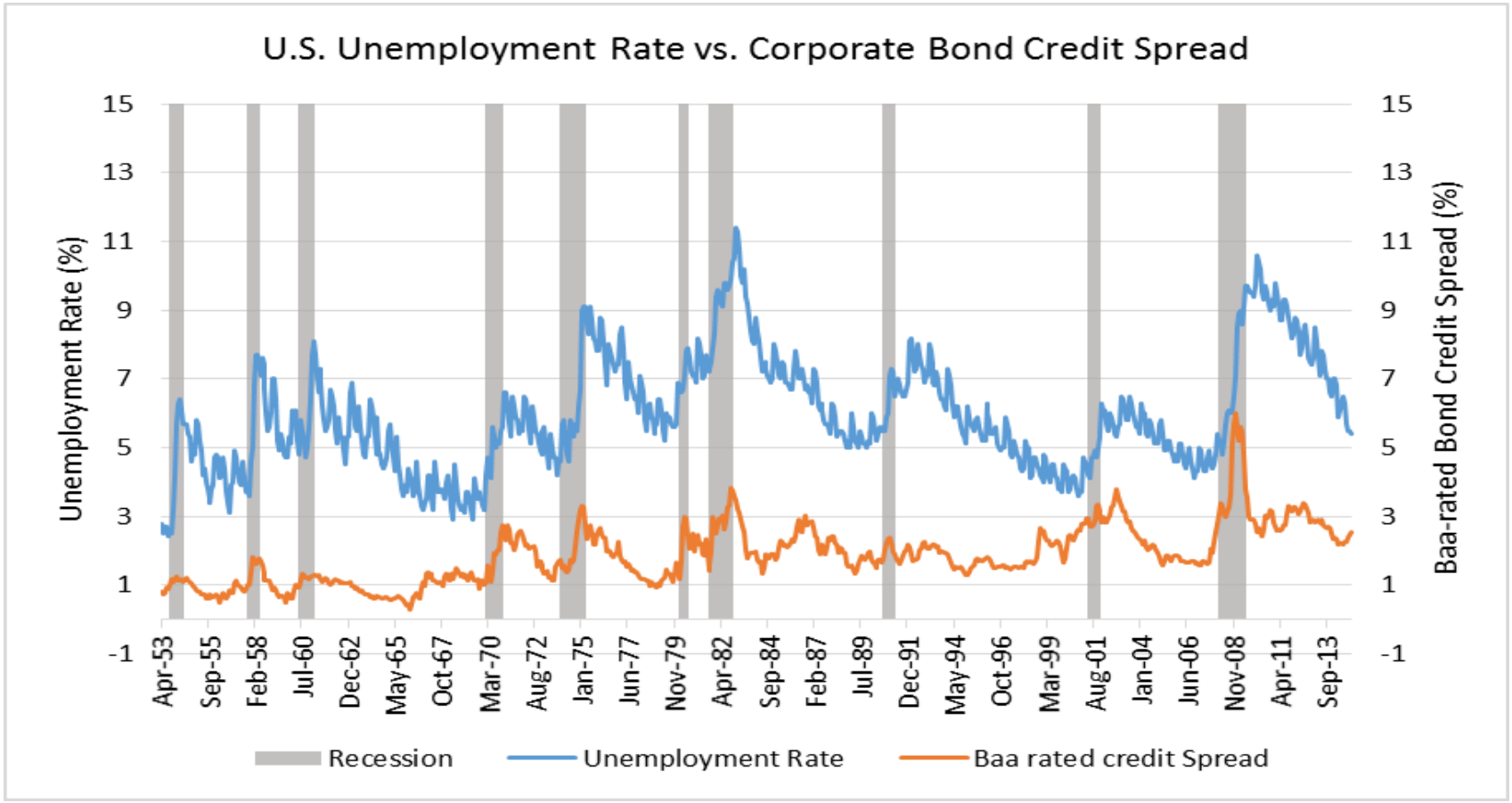
Unemployment Rate: Bureau of Labor Statistics.

10-Year Treasury Bond Yield: Federal Reserve Bank Economic Data.

Recession periods: NBER.

Economic Assumptions

Unemployment Rate versus Baa-Rated Bond Credit Spread (1953 to 2014)



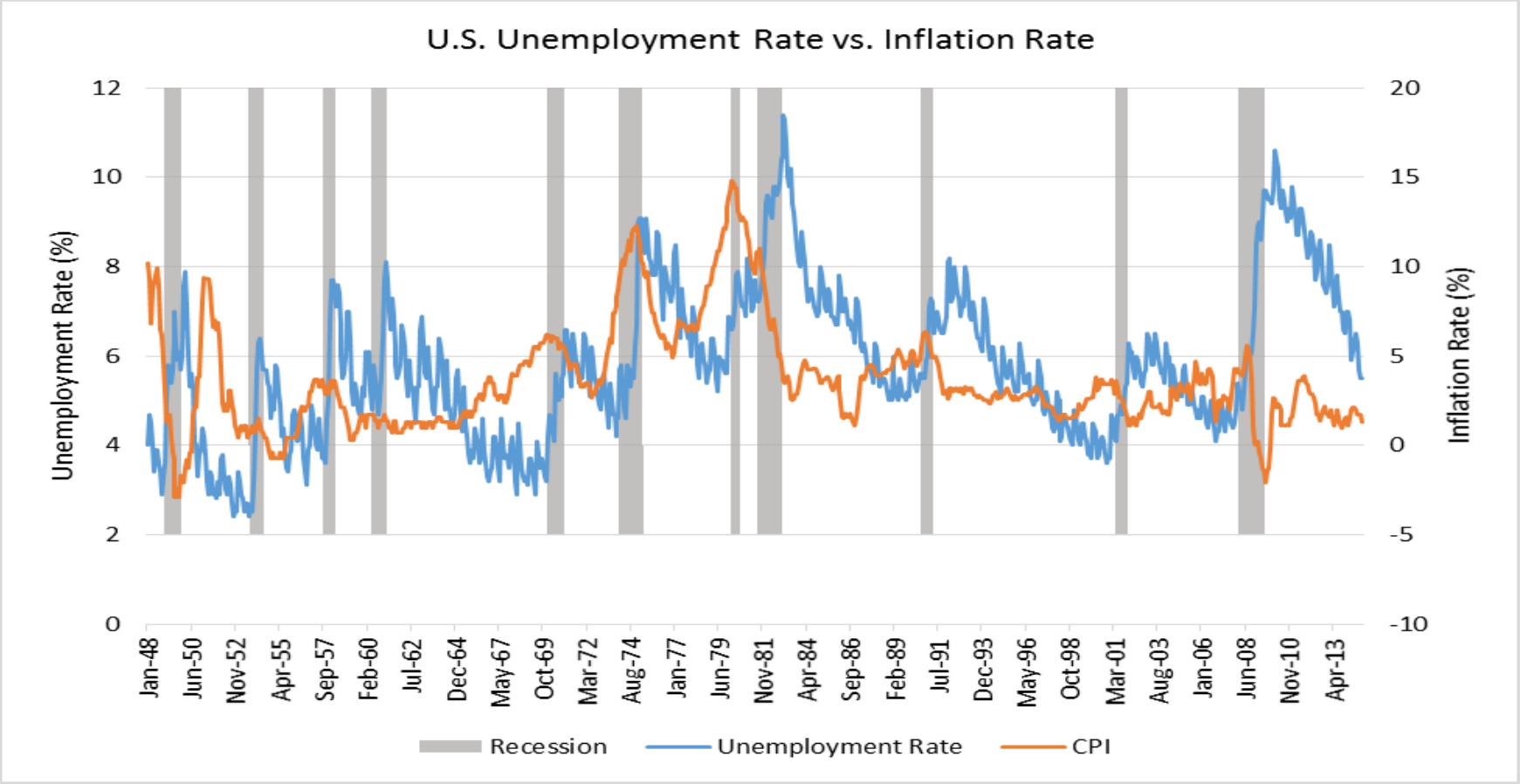
Unemployment Rate: Bureau of Labor Statistics.

Moody's Baa-Rated Corporate Bond Credit Spread: Federal Reserve Bank Economic Data.

Recession periods: NBER.

Economic Assumptions

Unemployment Rate versus Inflation Rate (1948 to 2014)

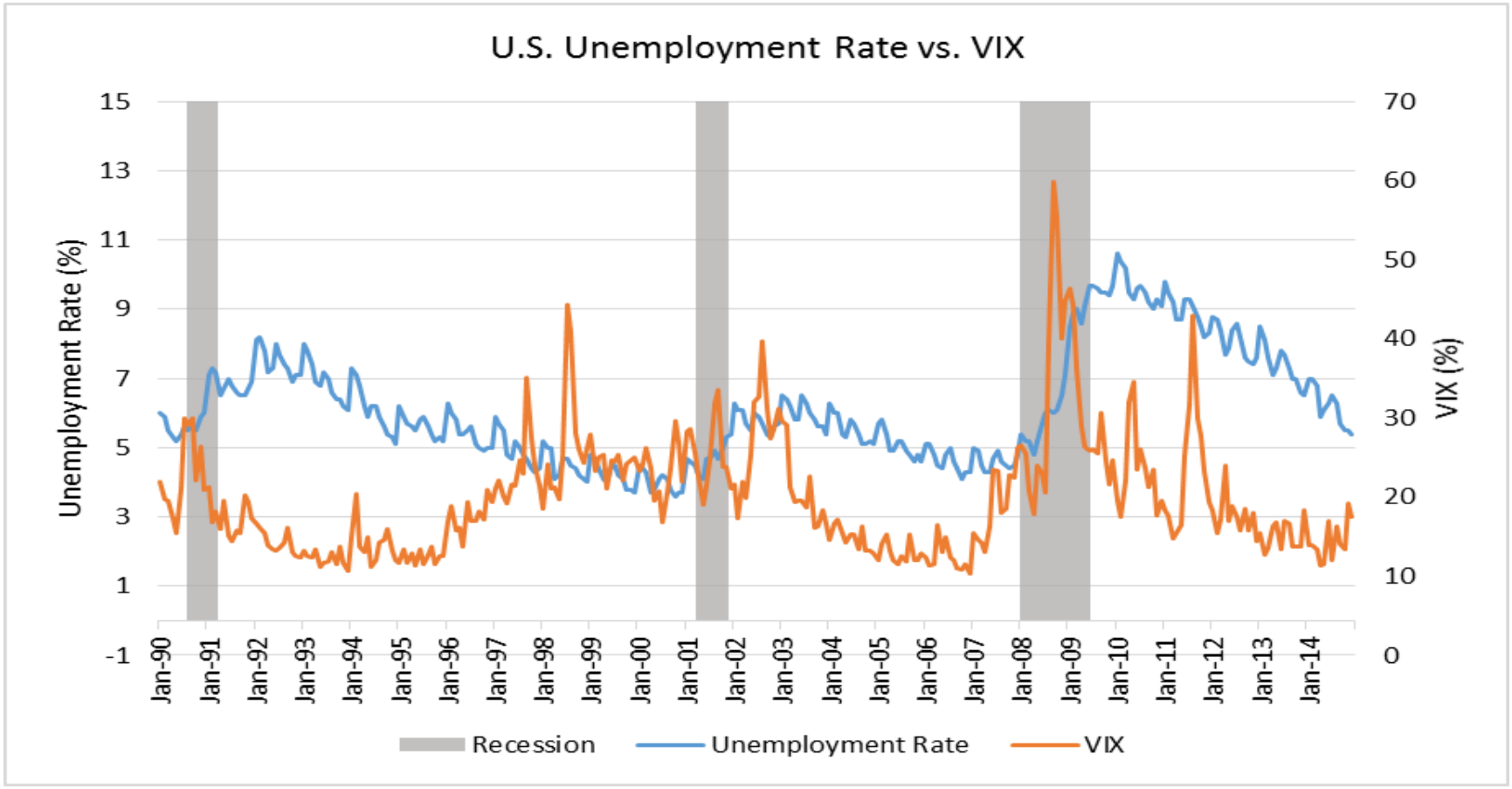


Unemployment Rate and Inflation Rate: Bureau of Labor Statistics.

Recession periods: NBER.

Economic Assumptions

U.S. Unemployment Rate versus S&P 500 Volatility Index (1990 to 2014)



Unemployment Rate: Bureau of Labor Statistics.

VIX: Yahoo! Finance.

Recession periods: NBER.

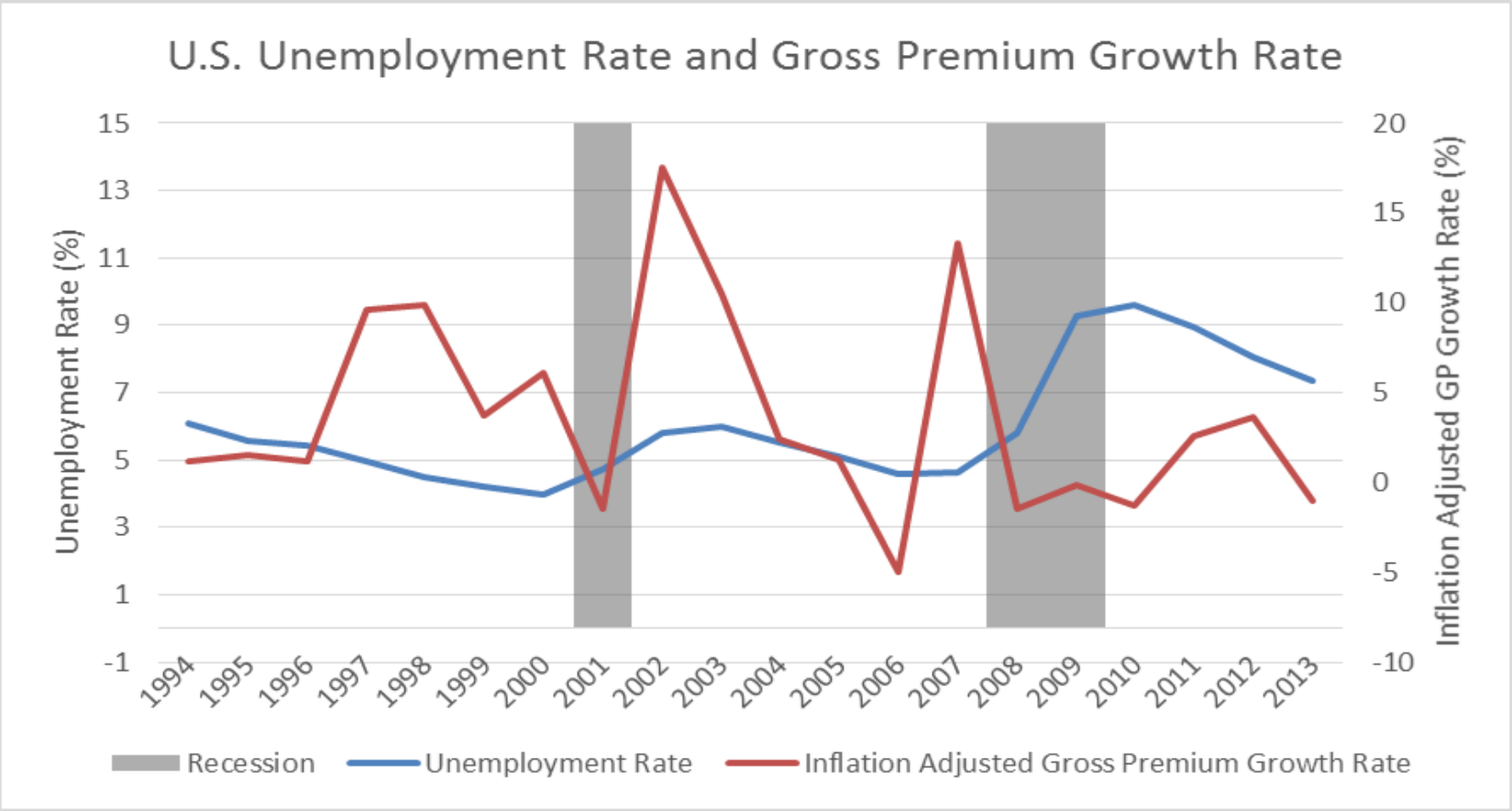
Economic Assumptions

During a **recession**, **an increase in unemployment** normally happens with **widening credit spreads, decreasing interest rates and inflation rate, and increased stock market volatility**.

During an economic expansion, the relationship is unclear.

Business Volume

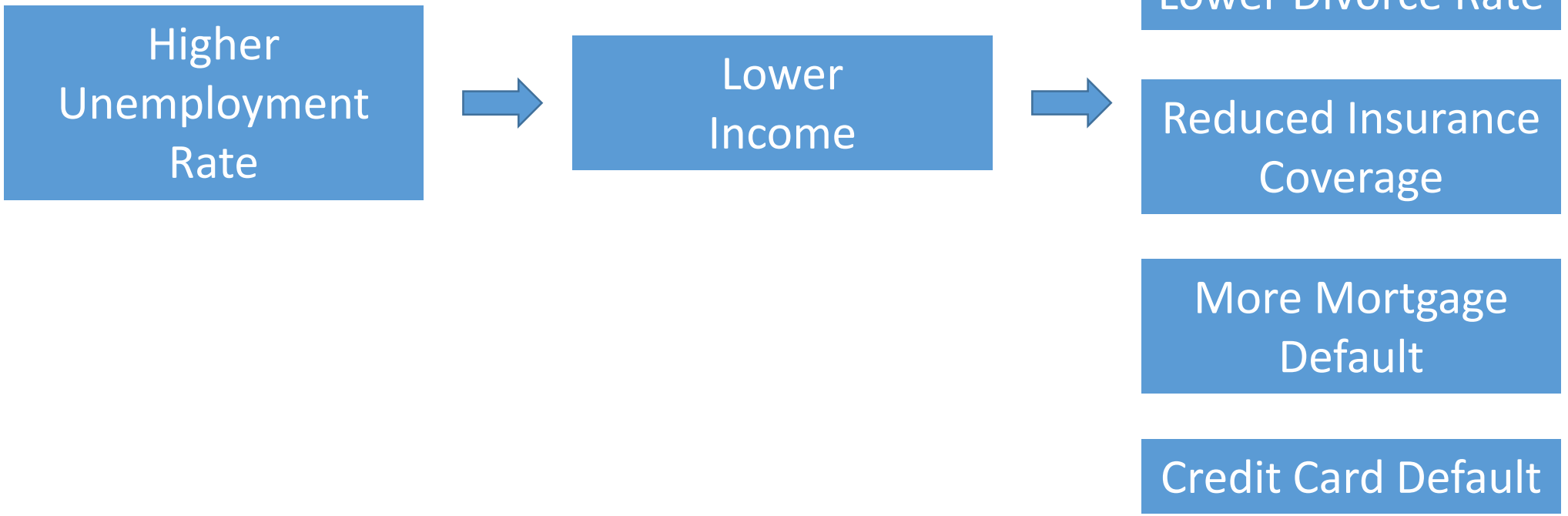
U.S. Unemployment Rate and Inflation-Adjusted Gross Premium Growth Rate



Unemployment Rate: Bureau of Labor Statistics.

Gross Premium (both P&C and Life): OECD.

Others

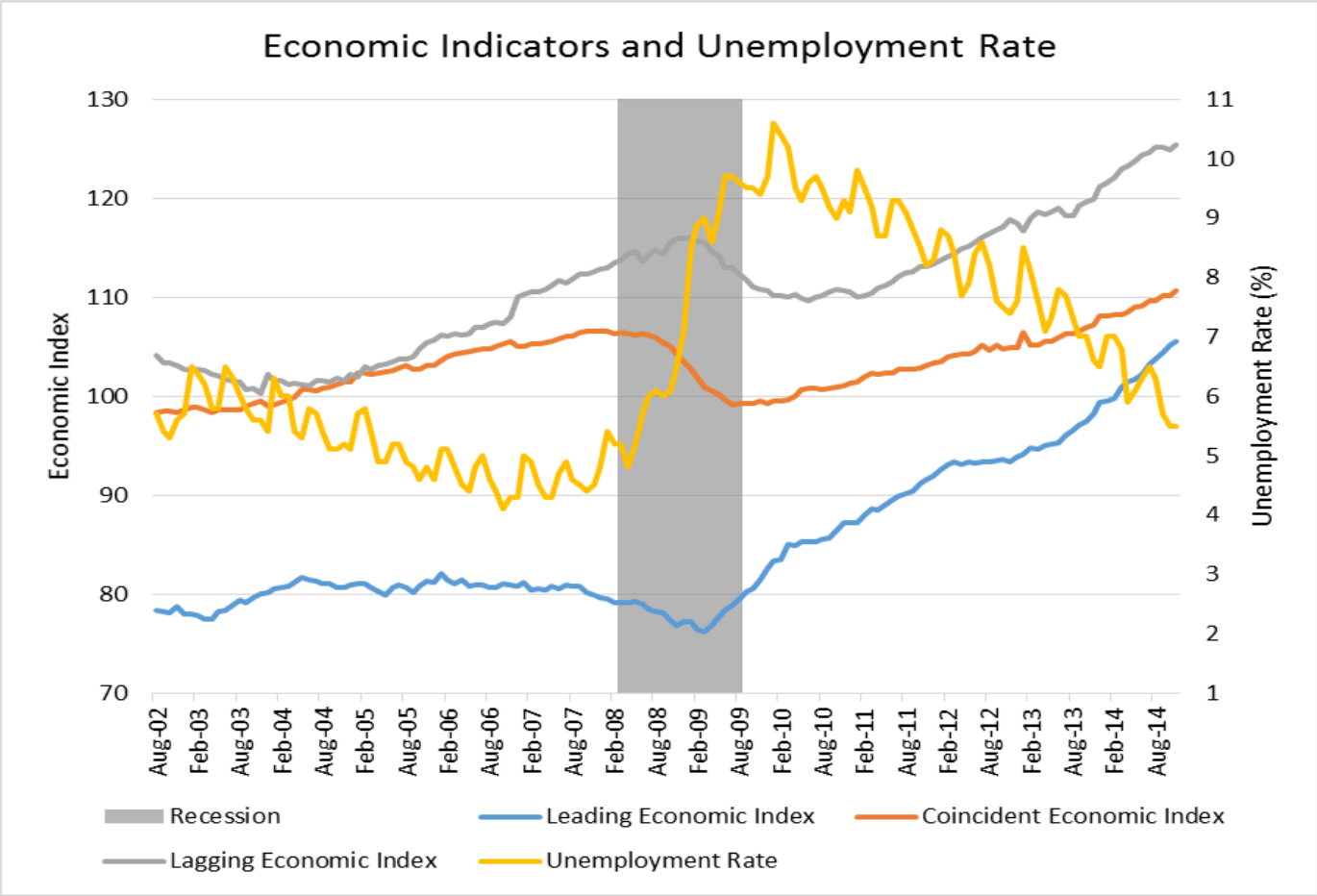

Higher Unemployment Rate
Lower Income
High Lapse Rate
Lower Divorce Rate
Reduced Insurance Coverage
More Mortgage Default
Credit Card Default

Predictive Model

Model Type

Economic Indicator	• Conference Board Economic Index • Weekly Initial Unemployment Insurance Claims • Average Weekly Hours: Manufacturing
Econometric Model	• Time Series Models: ARIMA, GARCH and their extensions • Nonparametric Models • Factor-Based Models
Web-Based Job Search Index	• Google Job Index

Economic Indicators



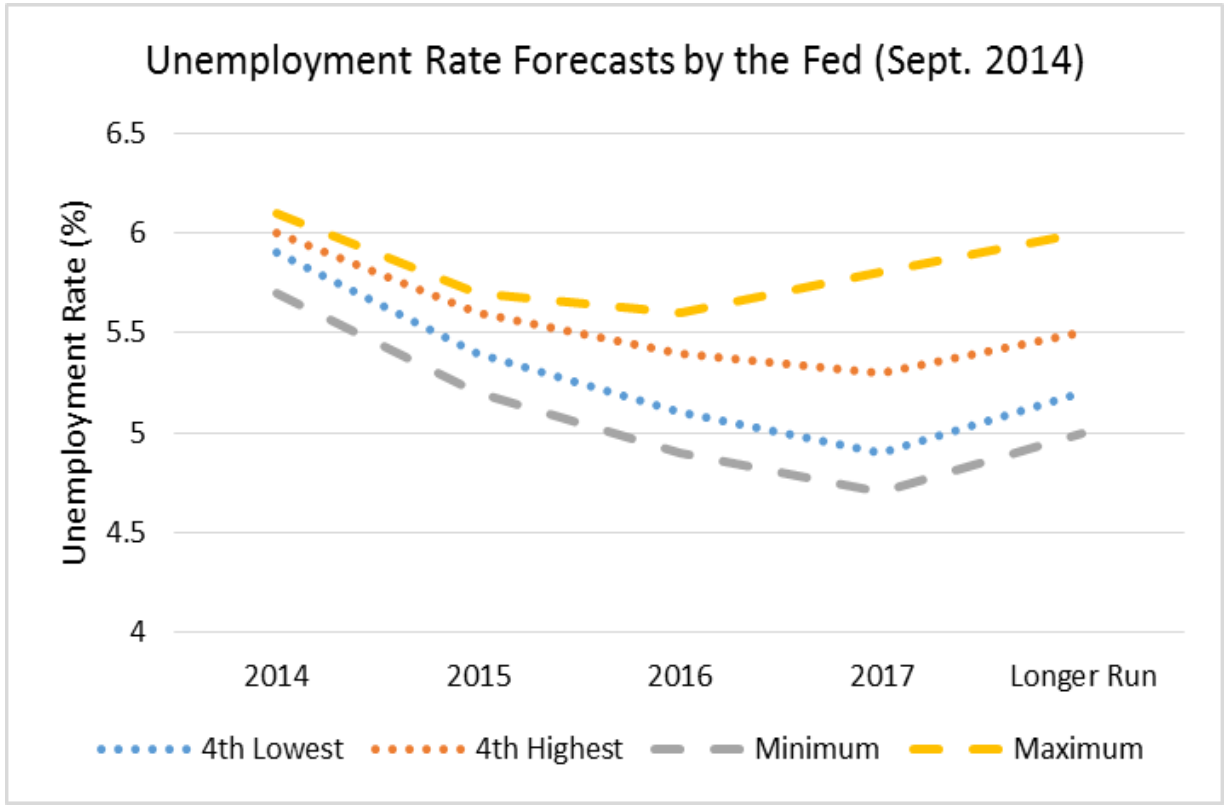
Unemployment Rate: Bureau of Labor Statistics.
Economic Indexes: Conference Board. Some index values are adjusted to have the same base.

Conference Board Leading Economic Index (2014) :

1. Average weekly hours, manufacturing
2. Average weekly initial claims for unemployment insurance
3. Manufacturers' new orders, consumer goods, and materials
4. ISM Index of New Orders
5. Manufacturers' new orders, nondefense capital goods excluding aircraft orders
6. Building permits, new private housing units
7. Stock prices, 500 common stocks
8. Leading Credit Index
9. Interest rate spread, 10-year Treasury bonds less federal funds
10. Average consumer expectations for business conditions

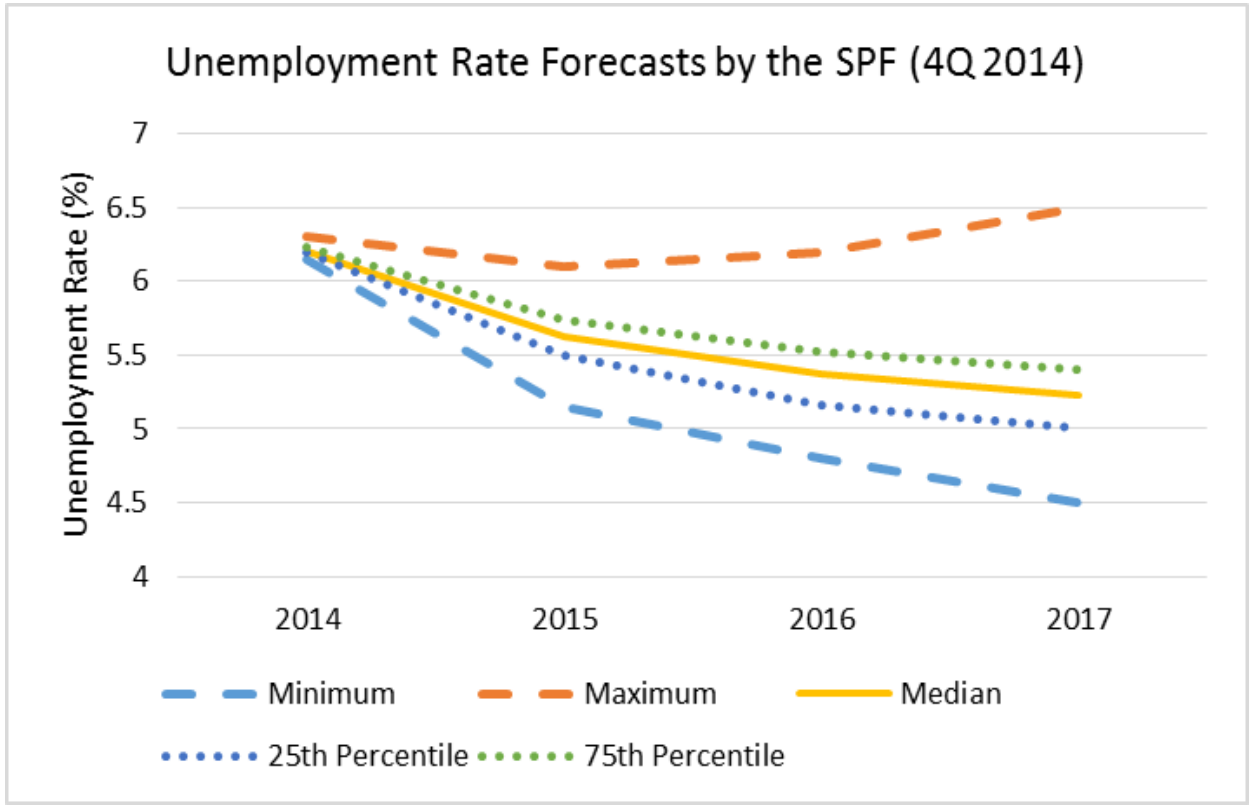
Econometric Models

Unemployment Rate Forecast by the Fed (Sept. 2014)



Source: Federal Reserve Bank

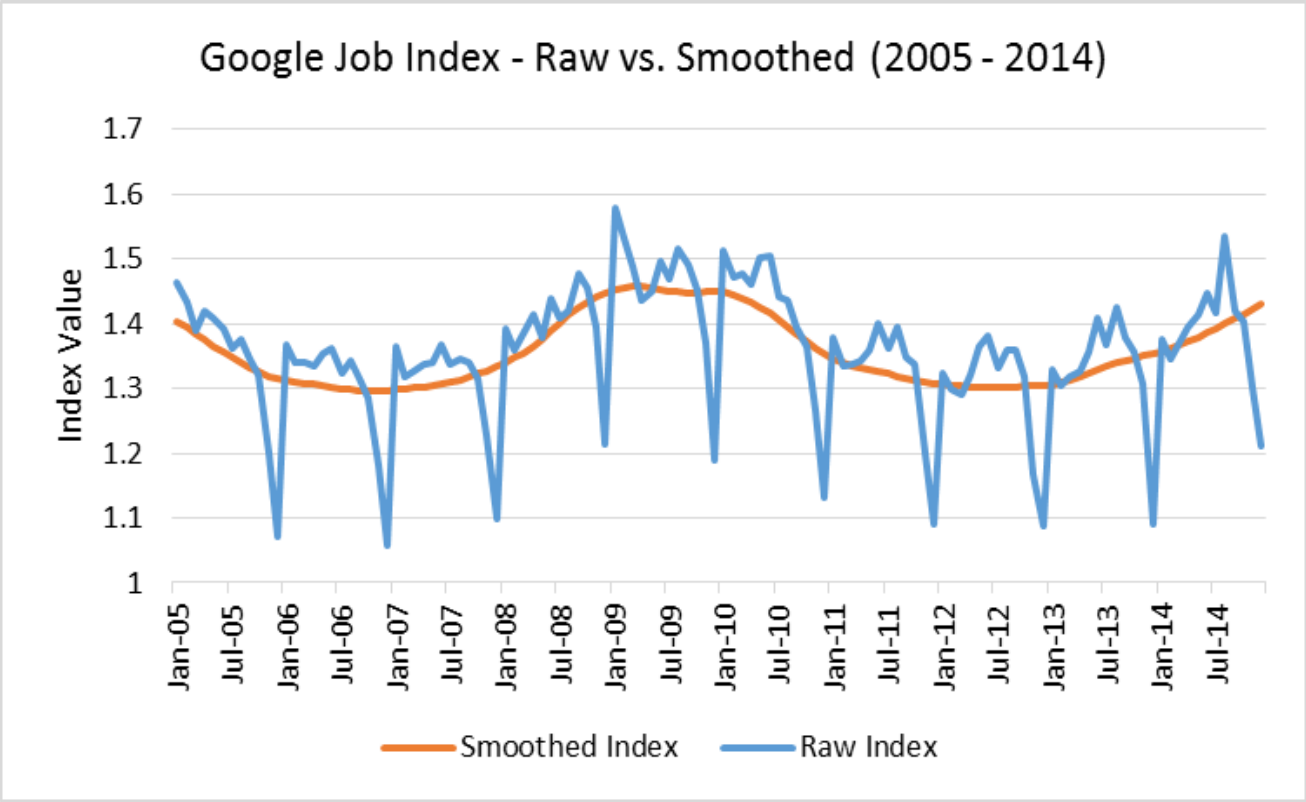
Unemployment Rate Forecast by the SPF (Fourth Quarter 2014)

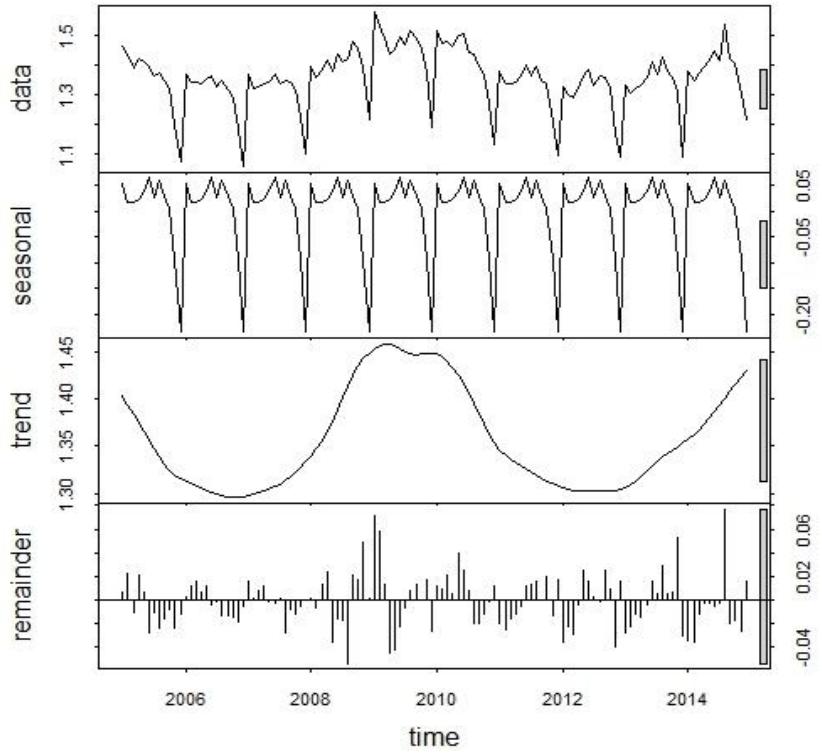


Source: Federal Reserve Bank Survey of Professional Forecasters.

Web-Based Job Search Index

Google Job Index: Raw versus Smoothed Values (2005 to 2014)

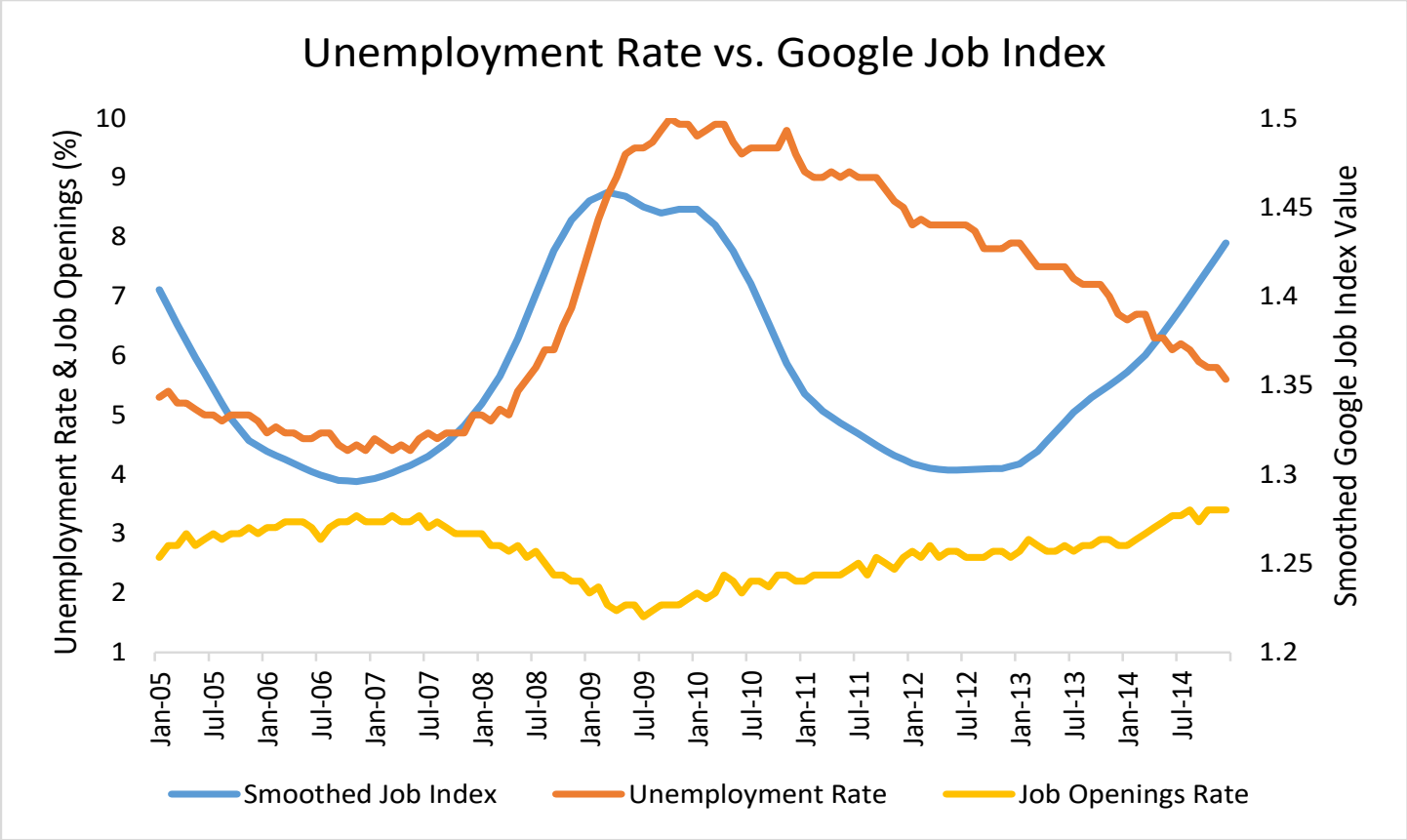




Google Job Index: https://www.google.com/finance?cid=8770308

Web-Based Job Search Index

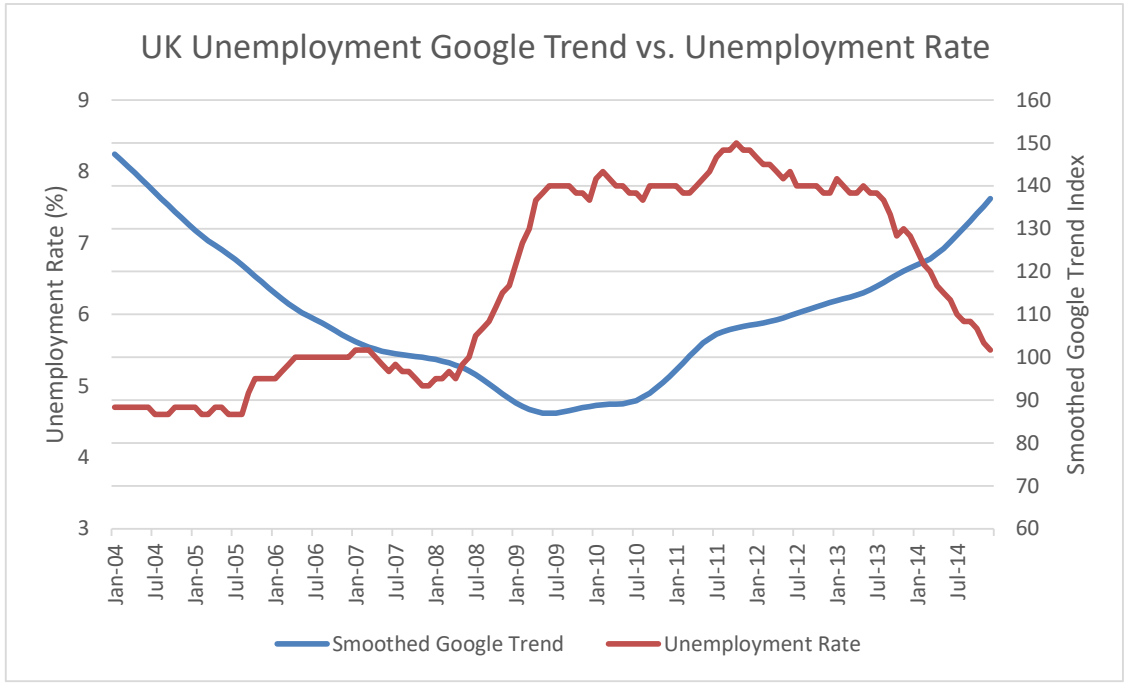
Unemployment Rate versus Google Job Index



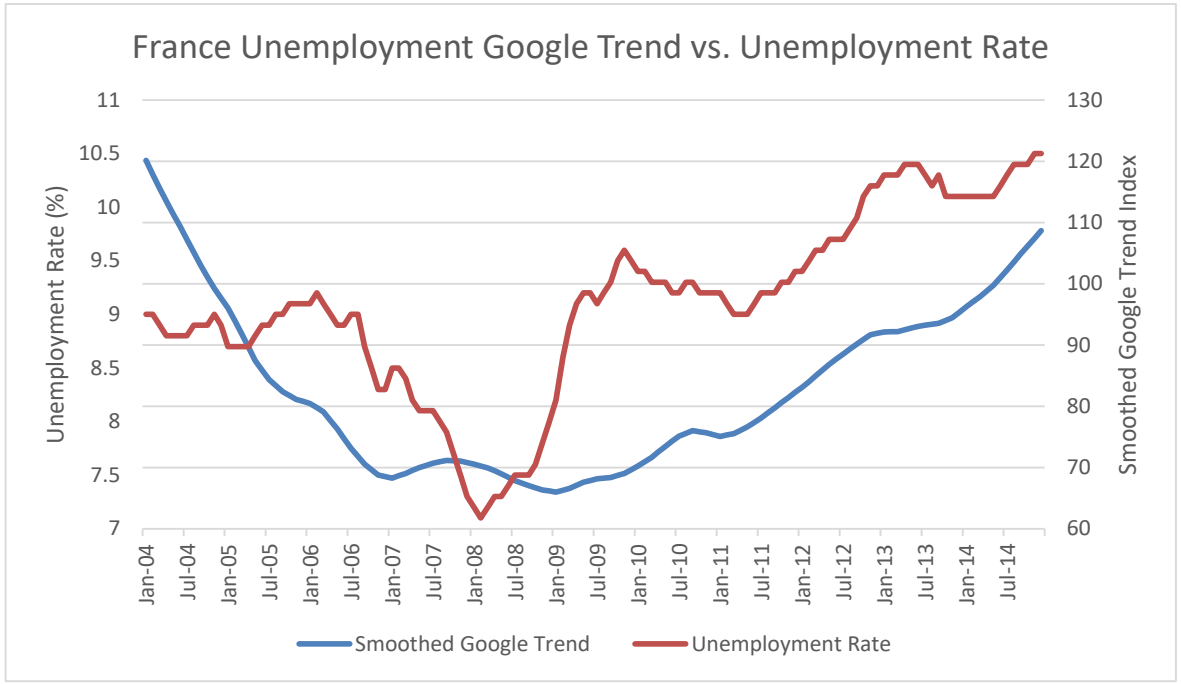
Sources:
Unemployment Rate and Job Openings Rate: Bureau of Labor Statistics.
Google Job Index: https://www.google.com/finance?cid=8770308

Web-Based Job Search Index

U.K. Google Trends Index versus Unemployment Rate



France Google Trends Index versus Unemployment Rate



Sources:

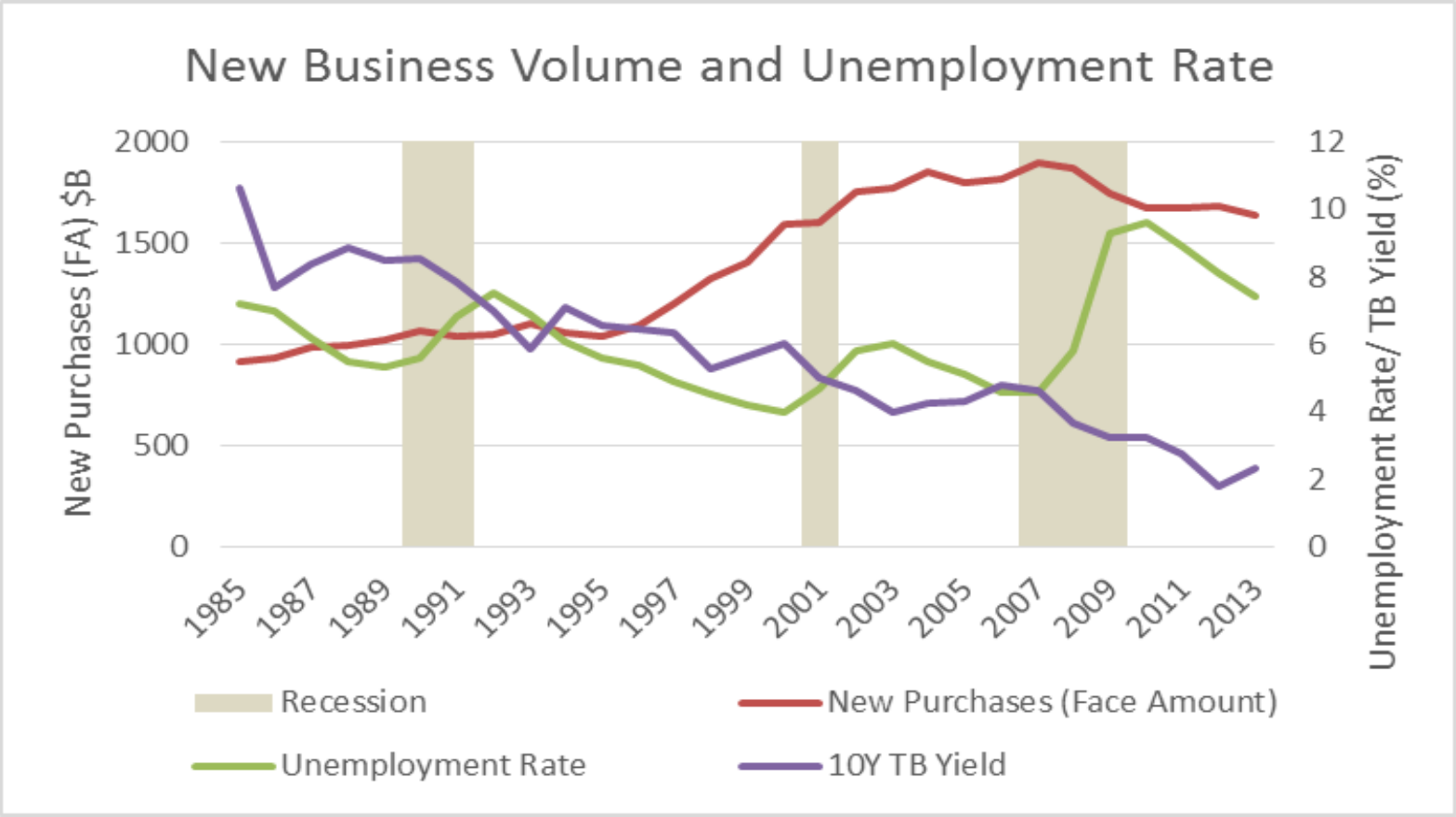
Unemployment Rate: OECD.
Google Trends.

Cautious! Only a factor to improve accuracy.

Unemployment and New Business Volume

New Business Volume

U.S. Individual Life Insurance New Business Volume (Face Amount)



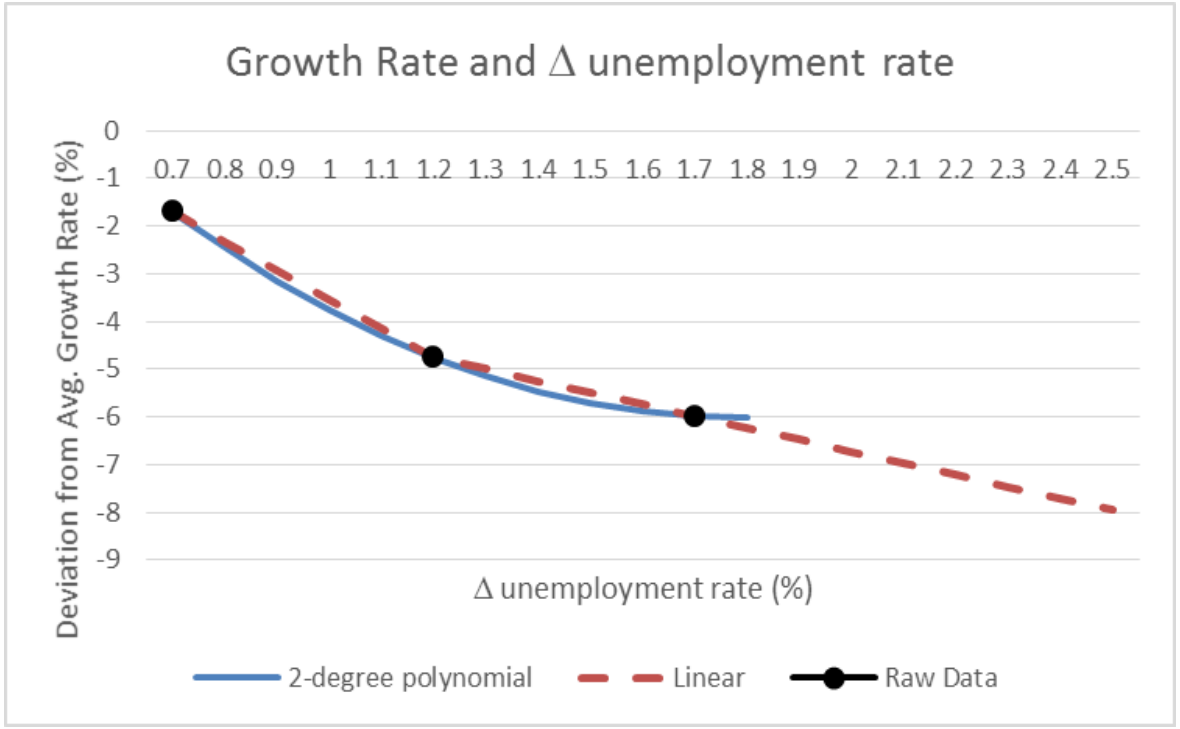
Business Growth During Recession

U.S. Individual Life Insurance New Business Growth during Recession

Time Period	New Business Growth Rate (Face Amount)	Change in Unemployment Rate	Change in 10-year TB Yield
1991	-2.6%	1.2%	-0.7%
2001	0.4%	0.7%	-1.0%
2008-2010*	-11.5%	5.0%	-1.4%

*The rate and changes are not annualized for the entire 3-year period.

A good exercise for P&C insurance new business growth rate analysis as well?



Unemployment Rate Usage

1. An increase in the unemployment rate normally triggered a Fed rate reduction, not the other way around.
2. An increase in the unemployment rate always triggered a slowdown of business growth. It is not the case for interest rates.
3. The size of change in the unemployment rate can help predict the size of change in business growth.
4. The TB yield is less useful for predicting new business growth at the current low level.

Labor Market Stress Scenario

Current Situation

- **Unemployment rate** dropped from 9.6% in 2010 to 5.3% in July 2015.
- **Labor force participation rate** dropped from 66% in 2006 to 62.6% in July 2015. 1% due to aging population, 2.4% due to discouraged worker.
- Average length of **economic cycle** (from trough to peak) after WWII is seven years.
- **Near-zero Fed rate**, with negative rates in some other economies.
- Bear commodity market keeps the **inflation rate low**.

Stress Scenario

A surprising jump in the unemployment rate.

Half of the 2.4% of discouraged workers return to job market.

→

Unemployment rate increases from 5.3% to 7.1%.

→

- Lower New Business Volume
- Higher Lapse Rate
- Low Interest Rate
- Longer Recovery Period (5 years)

Plausible Stress Scenarios

Scenario	Impact
High unemployment/ underemployment rate and low interest rates	lower investment returns, fewer sales, a higher lapse rate, higher capital requirements, and a much longer recession.
High unemployment/ underemployment rate and social unrest	a smaller market of young customers, a higher claim rate for property damage, and a prolonged period of economic slowdown.
Shortage of labor supply	a smaller market, a low growth rate, and a higher cost of human capital.

Recap

Recap

Unemployment/Underemployment

- Is useful for economic assumption setting
- Affects income level and therefore policyholder behavior and business volume.
- Is useful but need to be used with other factors.
- Stress scenarios are useful for testing plausible economic crisis.

Thank you!

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Swin Solutions is a strategy consulting firm located in Ontario, Canada focusing on business intelligence and risk management.

The presenter can be contacted at kailan.shang@swinsolutions.com.