Comments on Rosenfeld

Shawn Bushway
University at Albany (SUNY)
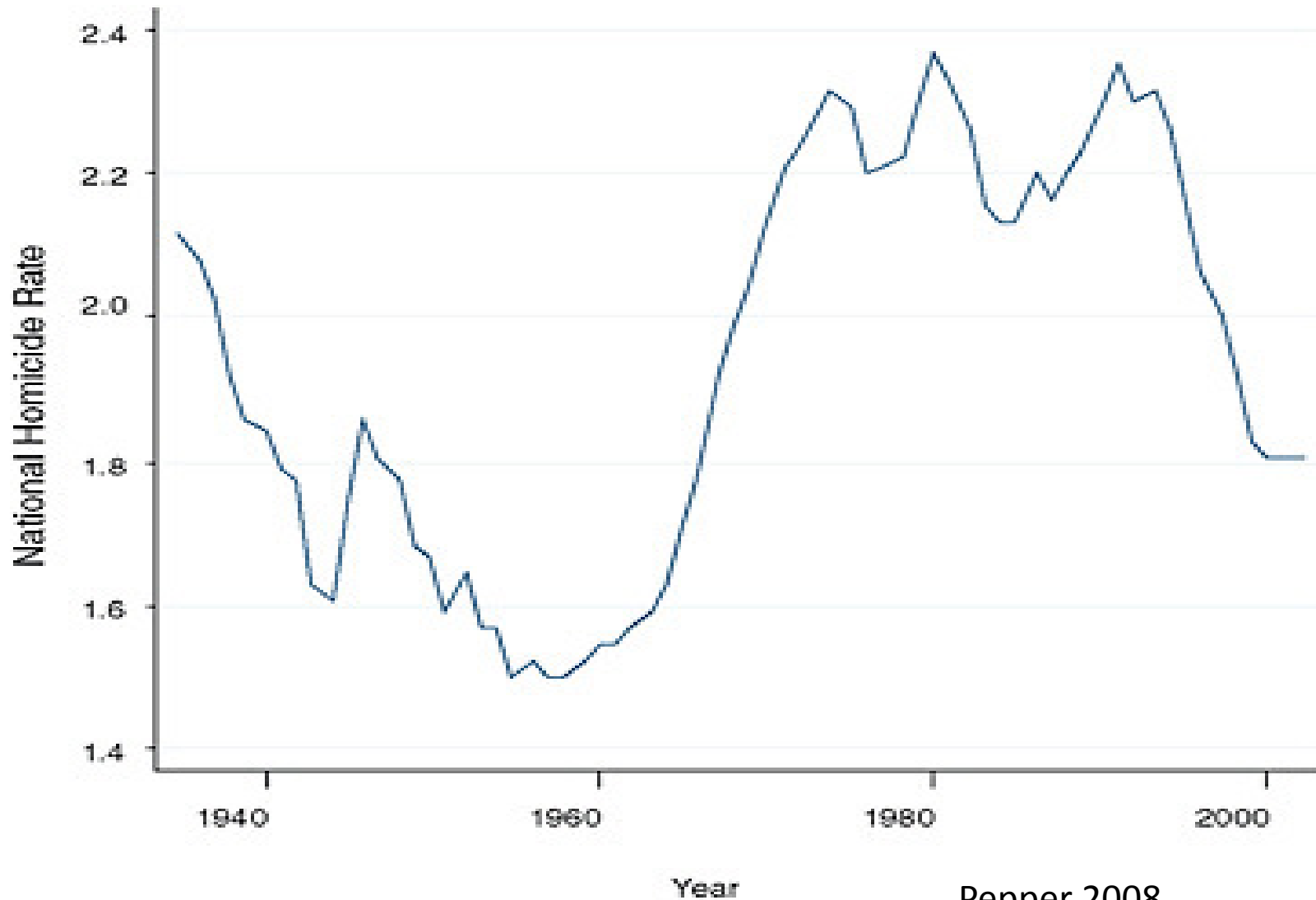Prepared for NRC Crime Trends Roundtable
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Types of Time Series Processes

- Stationary
  - Constant means, variance and covariance
  - Easy to forecast

- Non-stationary
  - Trends
  - Structural breaks (more than 1 process)
  - Random walk (t structural breaks)

Crime - Random Walk, Not Cyclical

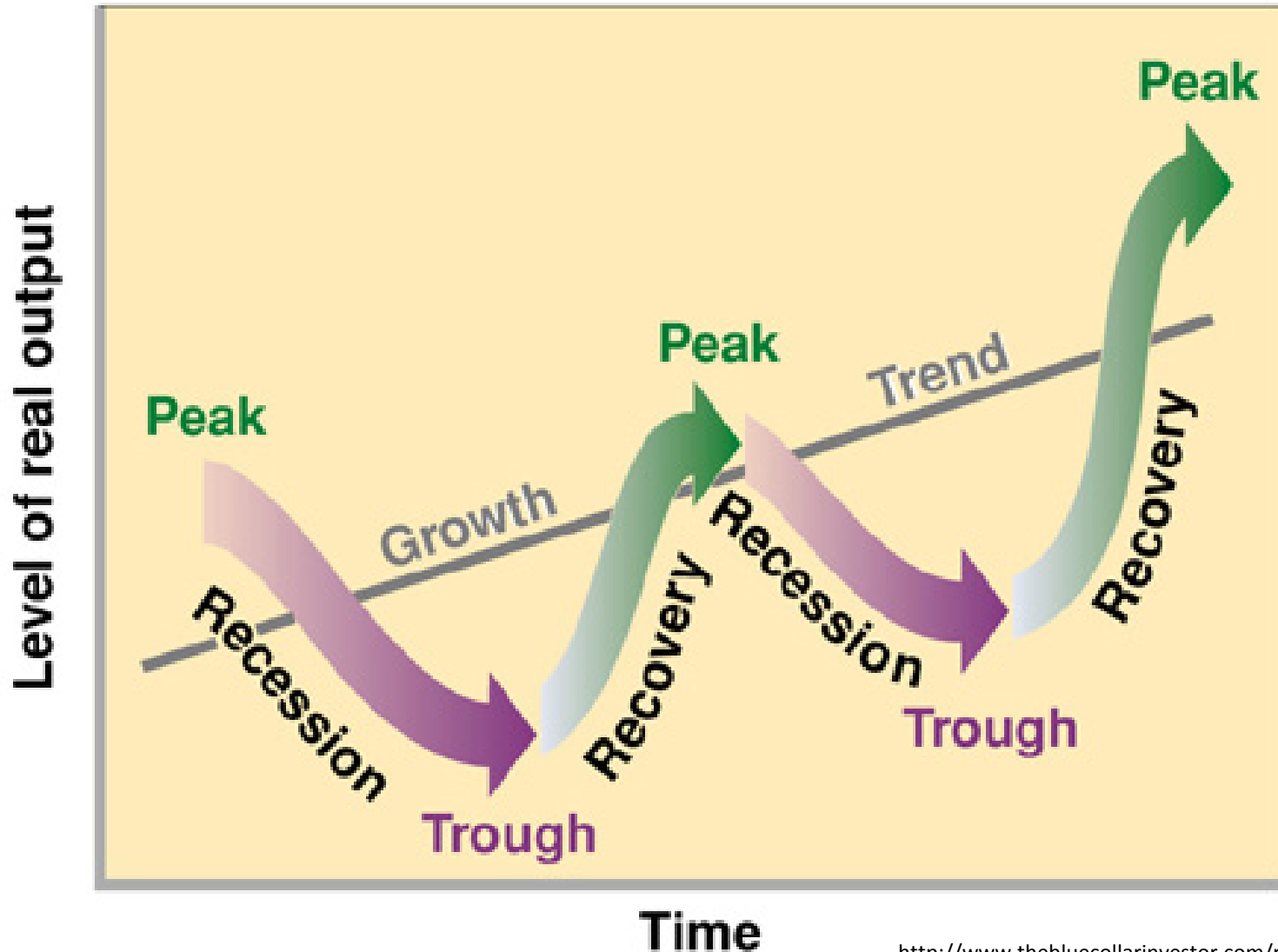Pepper 2008

What is a Random Walk

- $Crime_t = Crime_{t-1} + \varepsilon_t$
- Memoryless

- Best we can do is predict short term change
  - Model the error term (first differences)

- Changing dynamic model
  - Maybe many structural breaks
  - Many theories

- Is this surprising?
  - Small number of people need to change behavior
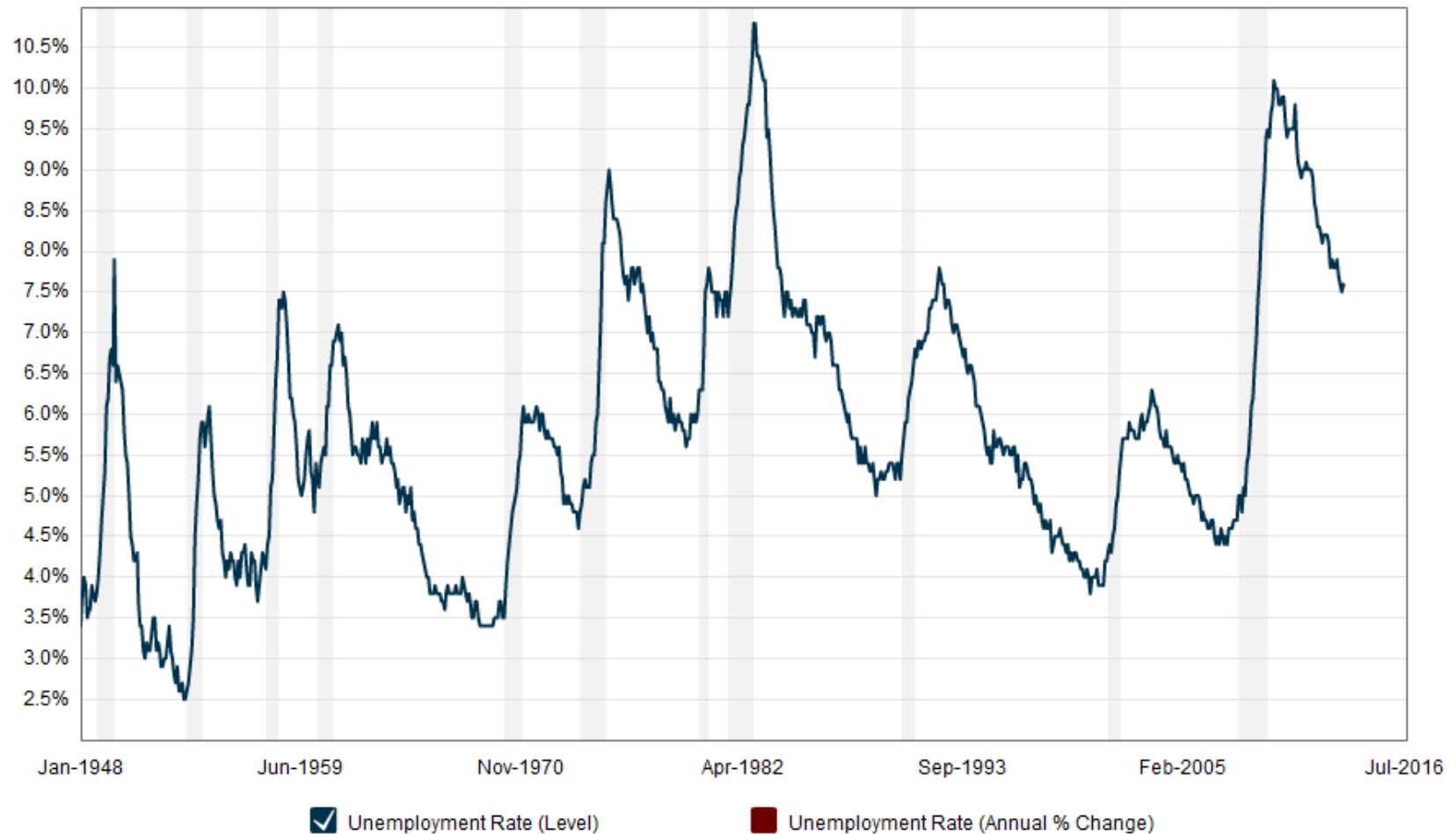
Understanding Crime Trends

- Forecasting Crime Trends: A City Level Analysis, John Pepper (2008)

- *In the end, the naïve random walk forecasts that tomorrow will be like today do well relative to the linear time-series models, especially for shorter run forecast horizons.*

- The best forecast for next year is simply what happened this year – reliable and accurate

- Not just that we haven't studied this – crime trends are NOT cyclical/predictable/stable

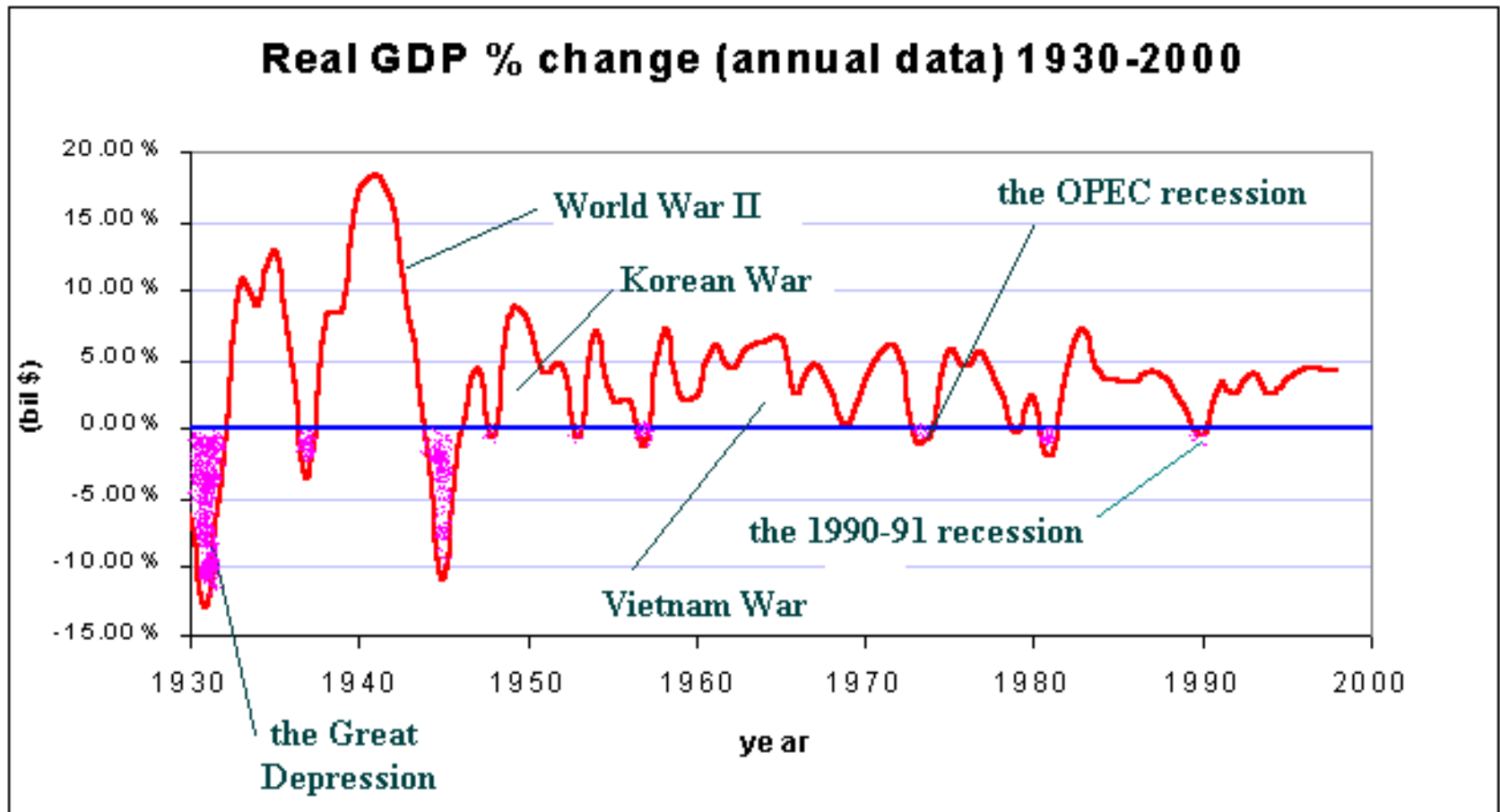# What About Role of Economy?

Business *Cycles*

Unemployment Rate

GDP

Real GDP % change (annual data) 1930-2000

Can Cyclical Series "Cause" Random Walk

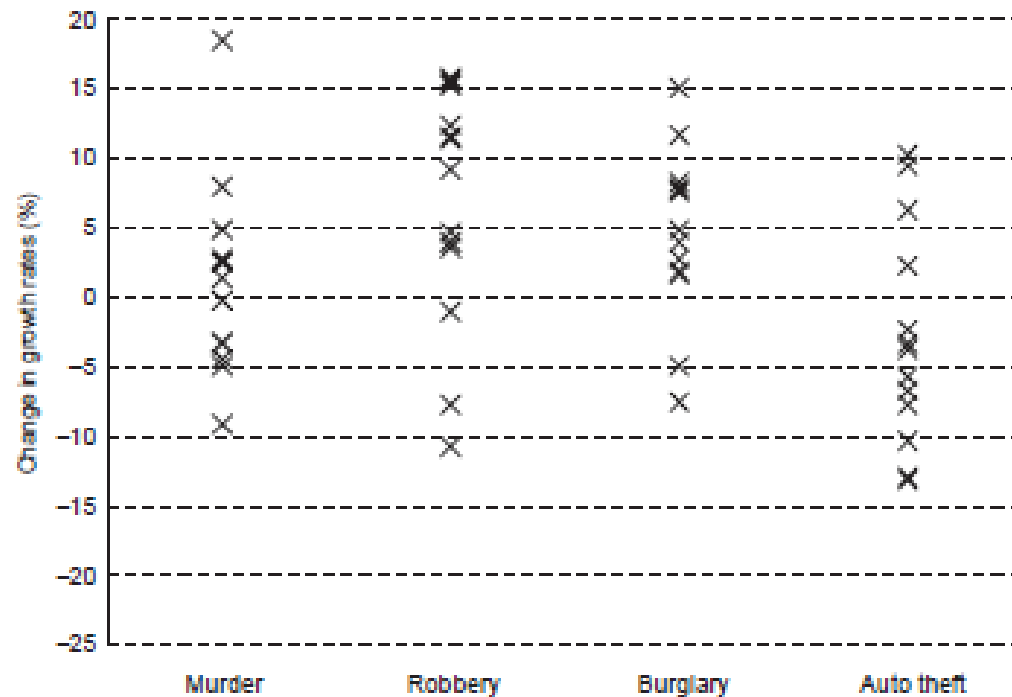The Overall Effect of the Business Cycle on Crime

Figure 1 Change in growth rates in UCR crime rates between expansion and recession over 13 business cycles

Bushway and Cook 2012

- *Of course, any causal connection between a cyclical phenomenon like a business cycle and a random walk process like crime rates must be, almost by necessity, quite complex.*

- Real identification challenges
  - Limited data
  - Bundled processes (inflation/consumer sentiment/employment)

Conclusion

- Never forget that crime is a RANDOM WALK
  - Can explain
    - But worry about identification
  - Hard to predict

- Need to be reactive/responsive/thoughtful