

# Data Interpretation

Andy Bauer  
Regional Economist



THE FEDERAL RESERVE BANK OF RICHMOND

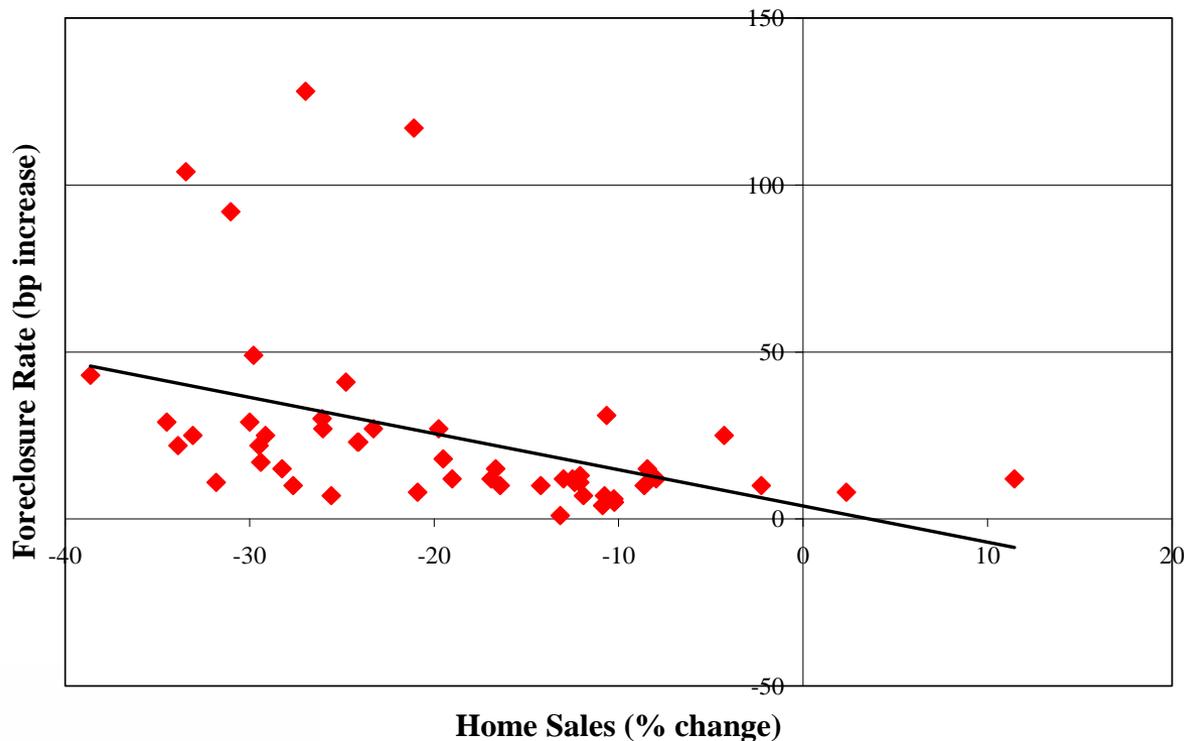
RICHMOND ■ BALTIMORE ■ CHARLOTTE



# Correlation vs. Causation

- Correlation: Two variables are positively (negatively) correlated if high (high) values of one are likely to be associated with high (low) values of the other.

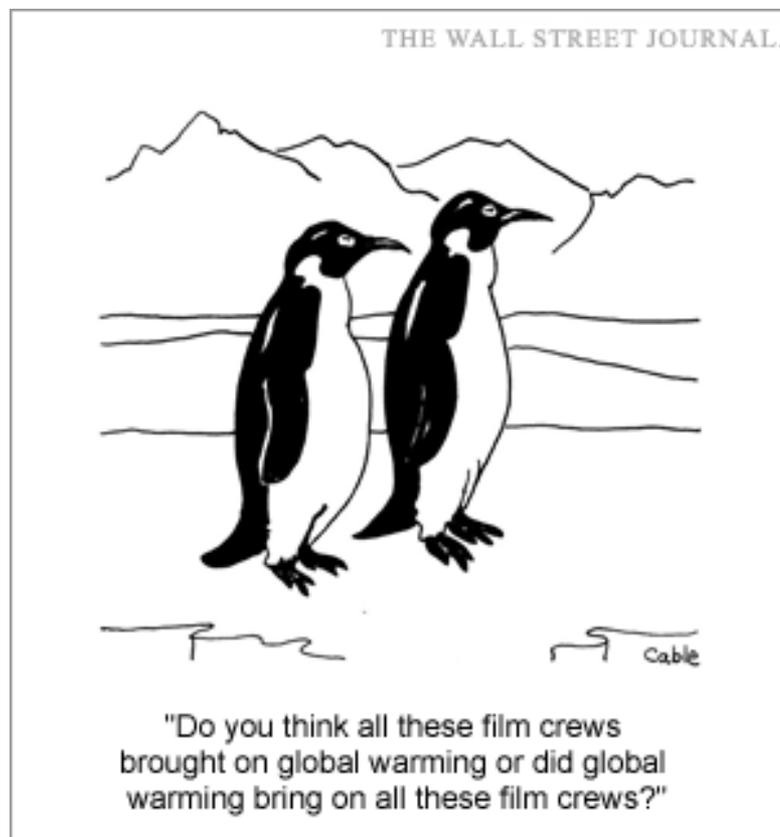
Home Sales & Foreclosures Over Past Four Quarters





# Correlation vs. Causation

- Correlation does not mean causation





## Correlation vs. Causation

- To illustrate that correlation does not imply causation, some interesting correlations:
  - Ice cream sales and shark attacks on swimmers
  - Skirt lengths and stock prices
  - Number of cavities and children's vocabulary



## Level vs. Change

- To get a good understanding of the magnitude and significance of a change in a variable we will look at a variable in levels, change, or both
  - Particularly important if making comparisons



## Level vs. Change

- For example:
  - North Carolina employment fell 3,800
  - South Carolina employment fell 3,100
  - U.S. employment fell 62,000
- Which is most significant in terms of magnitude?
  - In terms of percent change, annualized
    - N.C. = -1.1%    ||    S.C.= -1.9%    ||    U.S= -0.5%
- Are these big changes?
  - Average change over the last 5 years
    - N.C. = 6,200 (1.9%)
    - S.C. = 2,460 (1.7%)
    - U.S. = 129,00 (1.2%)





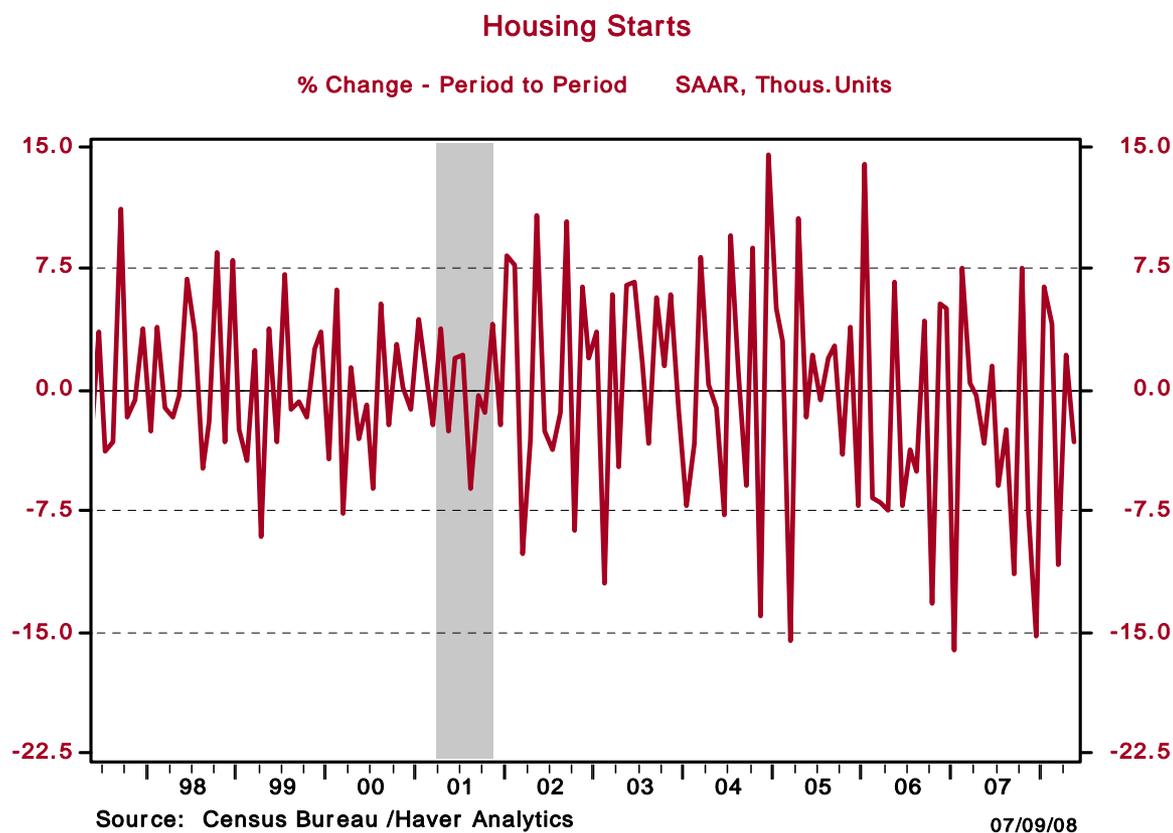
## Level vs. Change

- Another example:
  - North Carolina housing starts fell 10% in April
  - South Carolina starts grew 14%
  - U.S. starts grew 2%
- What do these changes mean in terms of levels?
  - In terms of levels
    - N.C. = -6,480    ||        S.C.=4,180        ||        U.S.=20,000
- Are these big changes? Average change over past 2 yrs:
  - N.C. = -1,700 (-1.5%)
  - S.C. = -500 (-0.5%)
  - U.S. = -34,000 (-2.2%)



# Level vs. Change

- To really gauge whether the most recent data is meaningful, it is sometimes easier to look at the series



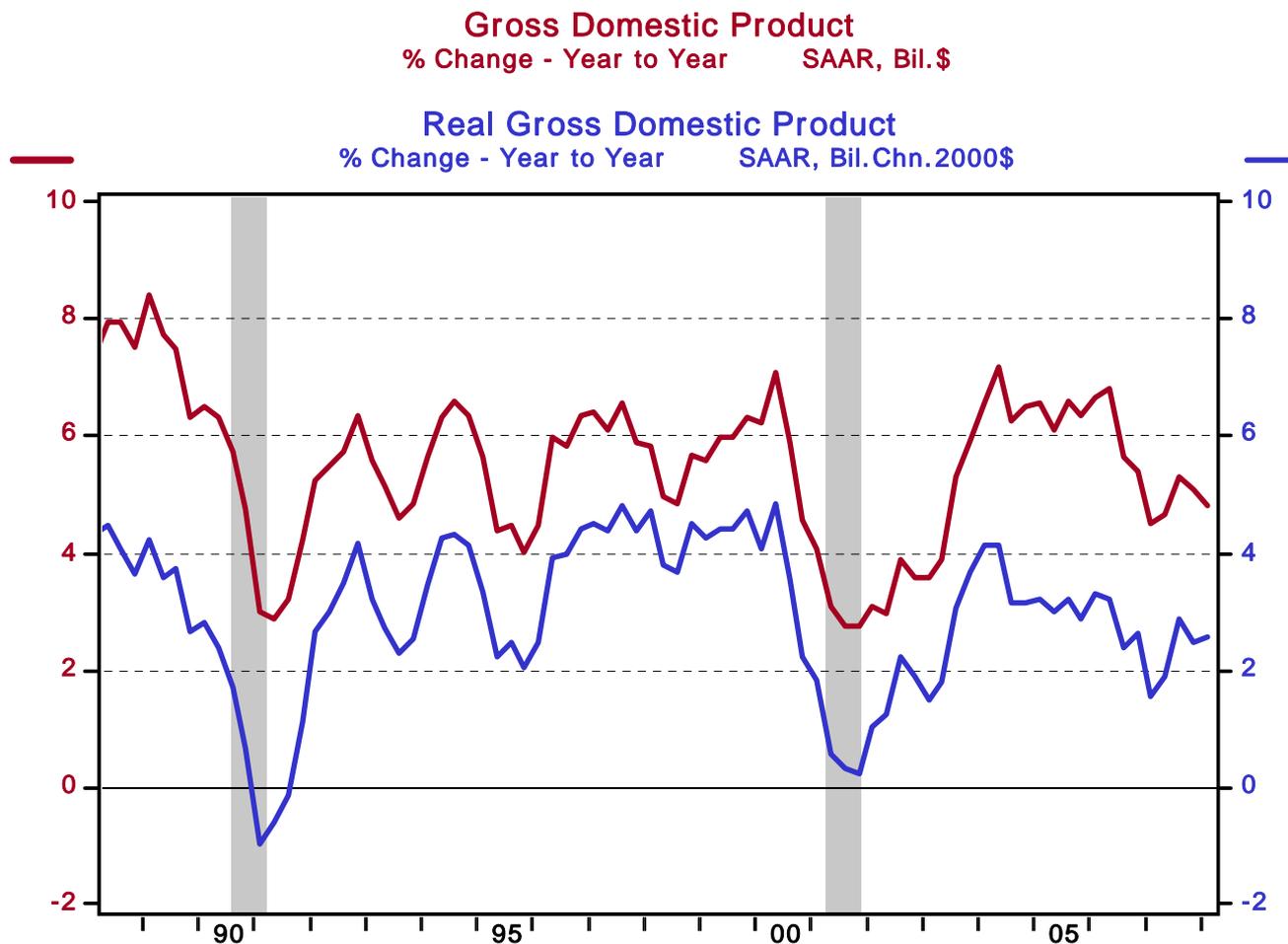


# Real vs. Nominal Values

- Time value of money:
  - A dollar today is worth more than a dollar tomorrow
- When looking at economic data, we frequently look at inflation-adjusted or “real” values
  - We are interested in changes in quantities without fluctuations in prices
  - Allows for comparisons across time
  - Hence, real GDP is the measure we focus upon for measuring the economy & economic growth



# Real vs. Nominal Values



Source: Bureau of Economic Analysis /Haver Analytics

07/08/08





## Real vs. Nominal Values

- Nominal interest rates are closely followed and reported in the financial press
- However, decisions by economic agents are driven by real returns and real interest rates
  - Businesses/investors are concerned about the return on their investment after accounting for inflation (the “real” return)
  - Households are concerned about how their nominal wage can be negatively affected by higher inflation (i.e. they are concerned about their real wage)

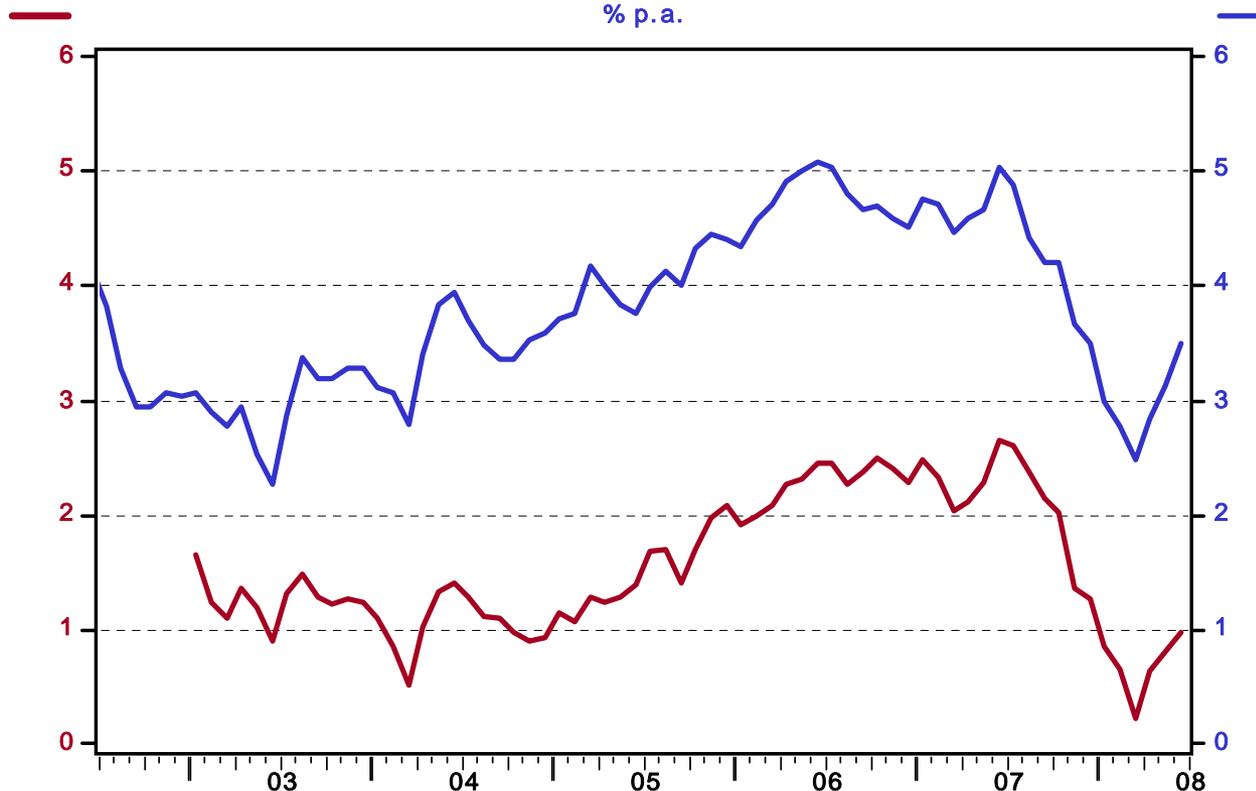




# Real vs. Nominal Values

5-Year Inflation Indexed Treasury Note Yield at Constant Maturity  
% p.a.

5-Year Treasury Note Yield at Constant Maturity  
% p.a.



Source: Federal Reserve Board /Haver Analytics

07/08/08





# Samples, Weights and Noise

- With many data series knowing the details of the methodology is important
- For example: labor market surveys
  - Household survey: roughly 60,000 households
    - Unemployment rate, labor force, number employed, etc...
    - Number employed, unemployed, labor force (very volatile)
    - Data is not revised
  - Establishment survey: 400,000 establishments
    - Payroll employment, hours, earnings
    - Payrolls revised several times (twice initially & then annually)
    - Revisions to previous months' data important



# Samples, Weights and Noise

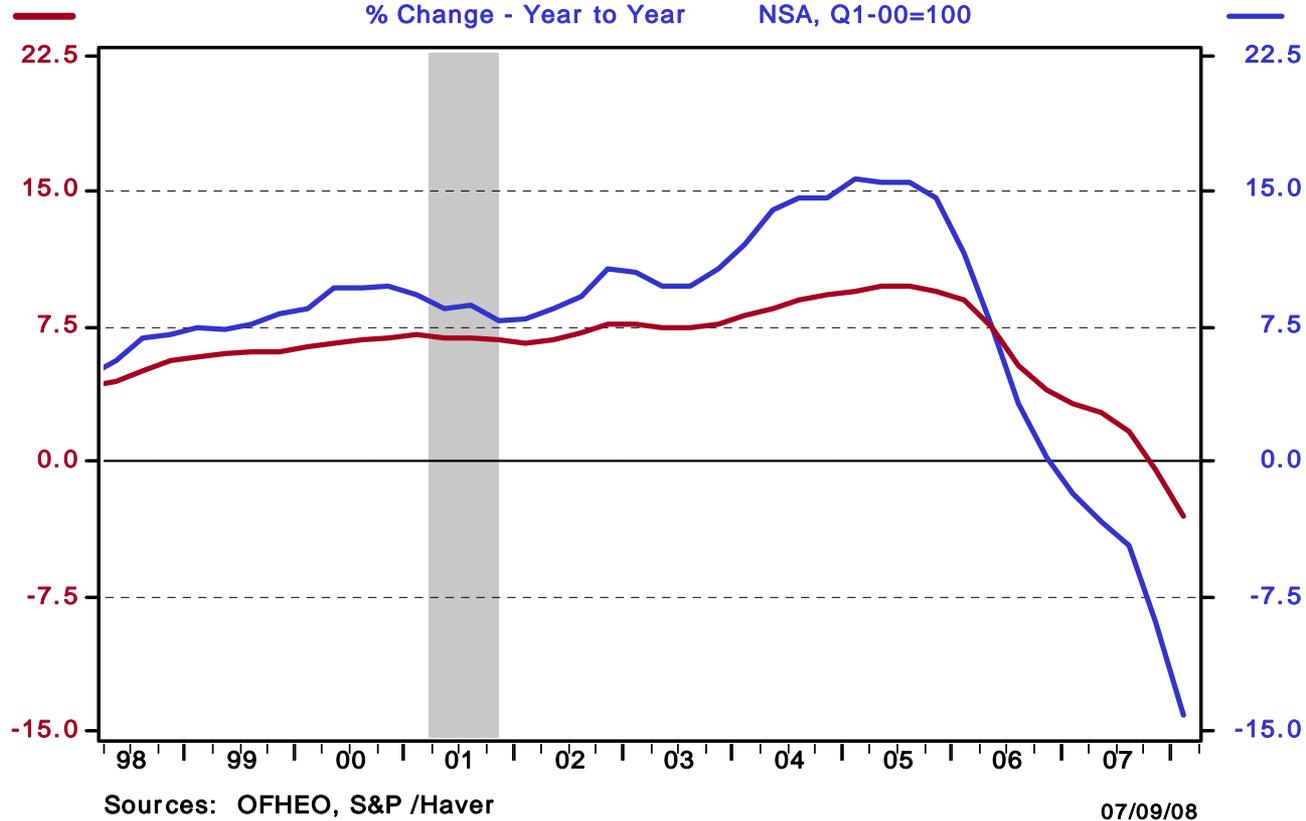
- Another example: house price indexes
- OFHEO home price index
  - Weighted repeat sales index
  - Includes conforming, conventional mortgages purchased or securitized by Fannie Mae or Freddie Mac
  - Only mortgage transactions on single family properties are included
- Case-Shiller home price index
  - Also a repeat sales index
  - Also only includes single family properties
  - But includes non-conforming mortgages (subprime/jumbo)



# Samples, Weights and Noise

OFHEO House Price Index: Purchase Only, United States  
% Change - Year to Year SA, Q1-91=100

S&P/Case-Shiller Home Price Index: U.S. National  
% Change - Year to Year NSA, Q1-00=100





# Samples, Weights and Noise

- One data point does not make a trend
  - Important to consider the distribution of changes of a particular series & gauge whether the most recent data is significantly different (some data is just noisy)
    - Recall housing starts
- Seasonal factors (even with seasonally adjusted data) can be very important
  - Especially with smaller sample sizes
  - Example: housing data