Discussion of “Real-time forward-looking skewness over the business cycle”

James D. Hamilton, UCSD

Summarizing conditional distribution

Conditional mean $E_t y_{t+1}$

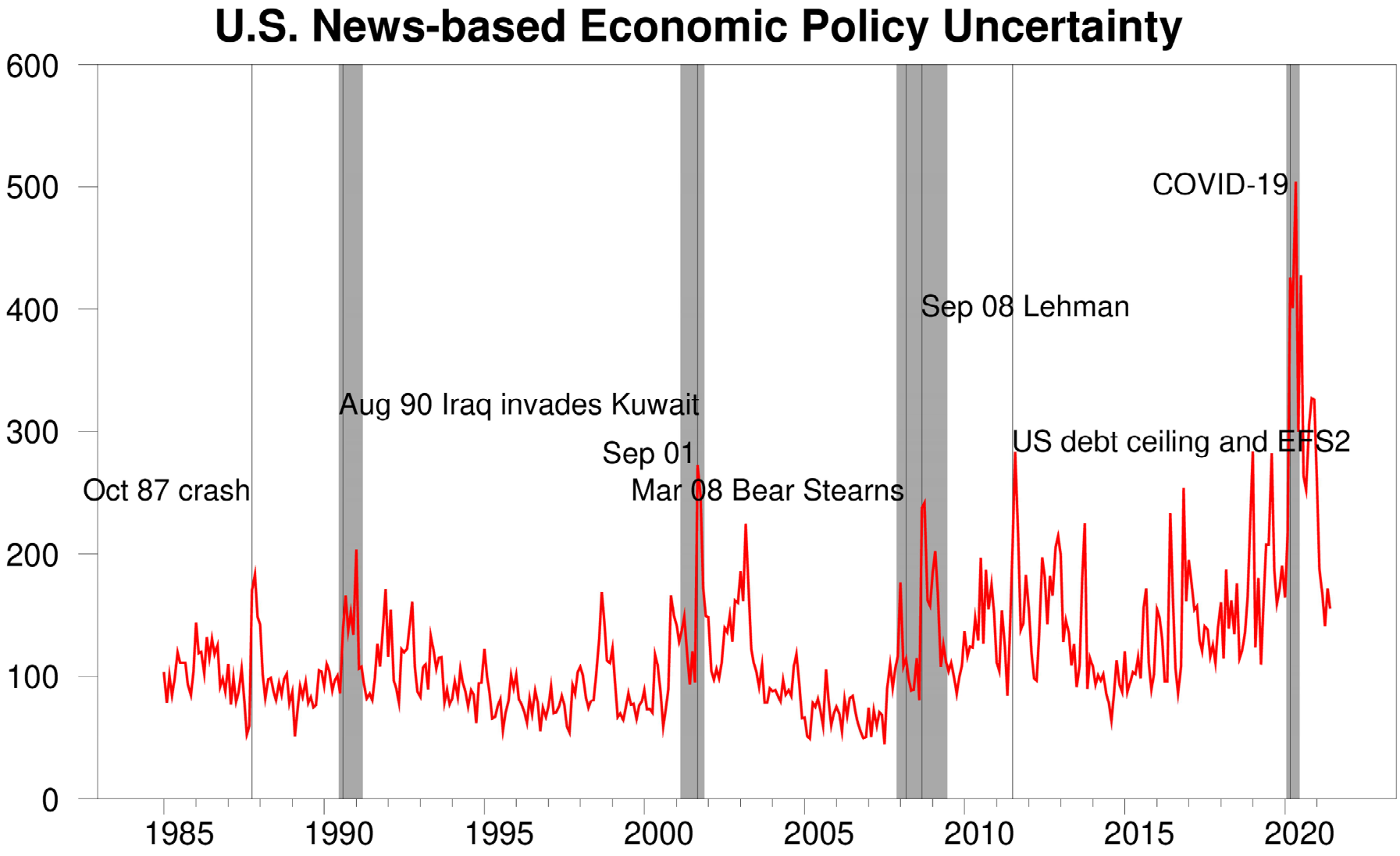
($\downarrow$ says distribution center of mass shifted left)

Conditional variance $E_t(y_{t+1} - E_t y_{t+1})^2$

($\uparrow$ says something big may happen)

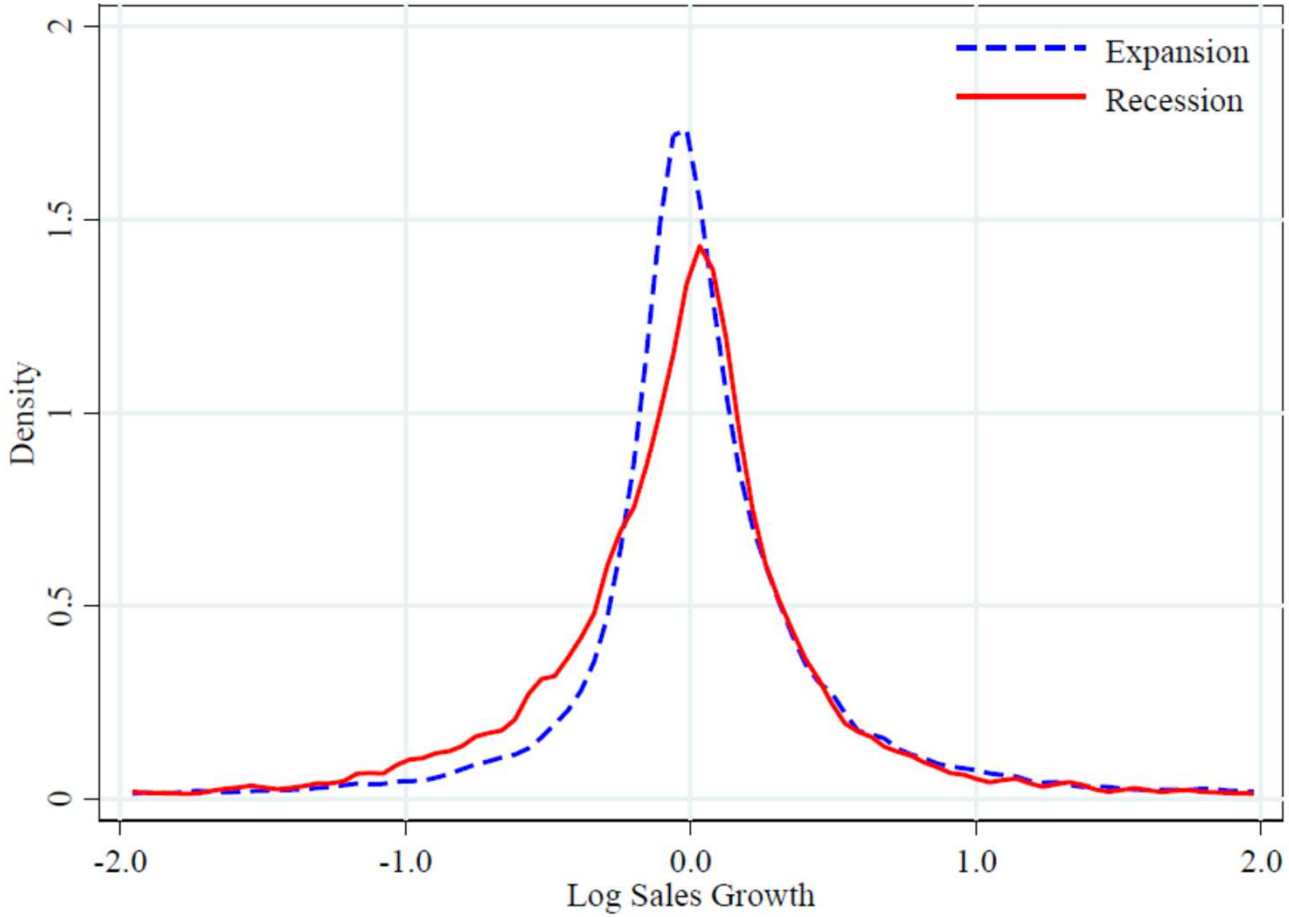
Conditional skew $E_t(y_{t+1} - E_t y_{t+1})^3 / [E_t(y_{t+1} - E_t y_{t+1})^2]^{3/2}$

($\downarrow$ says higher probability of left-tail event)



Data source: Baker, Bloom and Davis, QJE 2016
www.PolicyUncertainty.com

Distribution of annual sales growth across U.S. firms



Source: Salgado, Guvenen, and Bloom, "Skewed business cycles"

Distribution of real GDP quarterly growth (at annual rates) in NBER expansions and contractions (1947:Q2-2019:Q4)

	Expansions	Contractions
Mean	4.0	-1.4
Standard deviation	3.0	3.5
Skew	0.9	-1.6

Growth in expansions: $N(\mu_1, \sigma^2)$

Growth in recessions: $N(\mu_2, \sigma^2)$

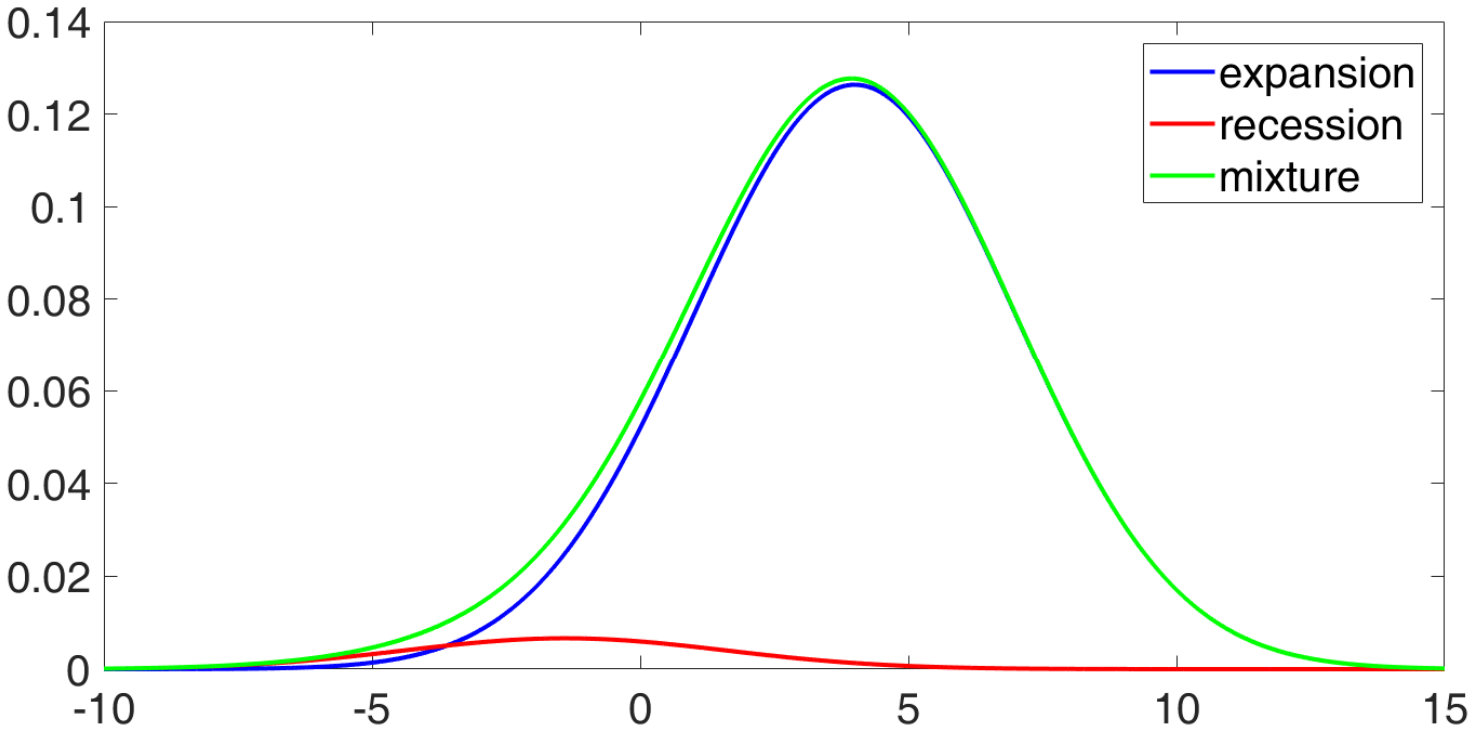
$$\mu_1 = 4.0,\ \mu_2 = -1.4,\ \sigma = 3.0$$

Probability of recession: π

Density of next quarter's growth:

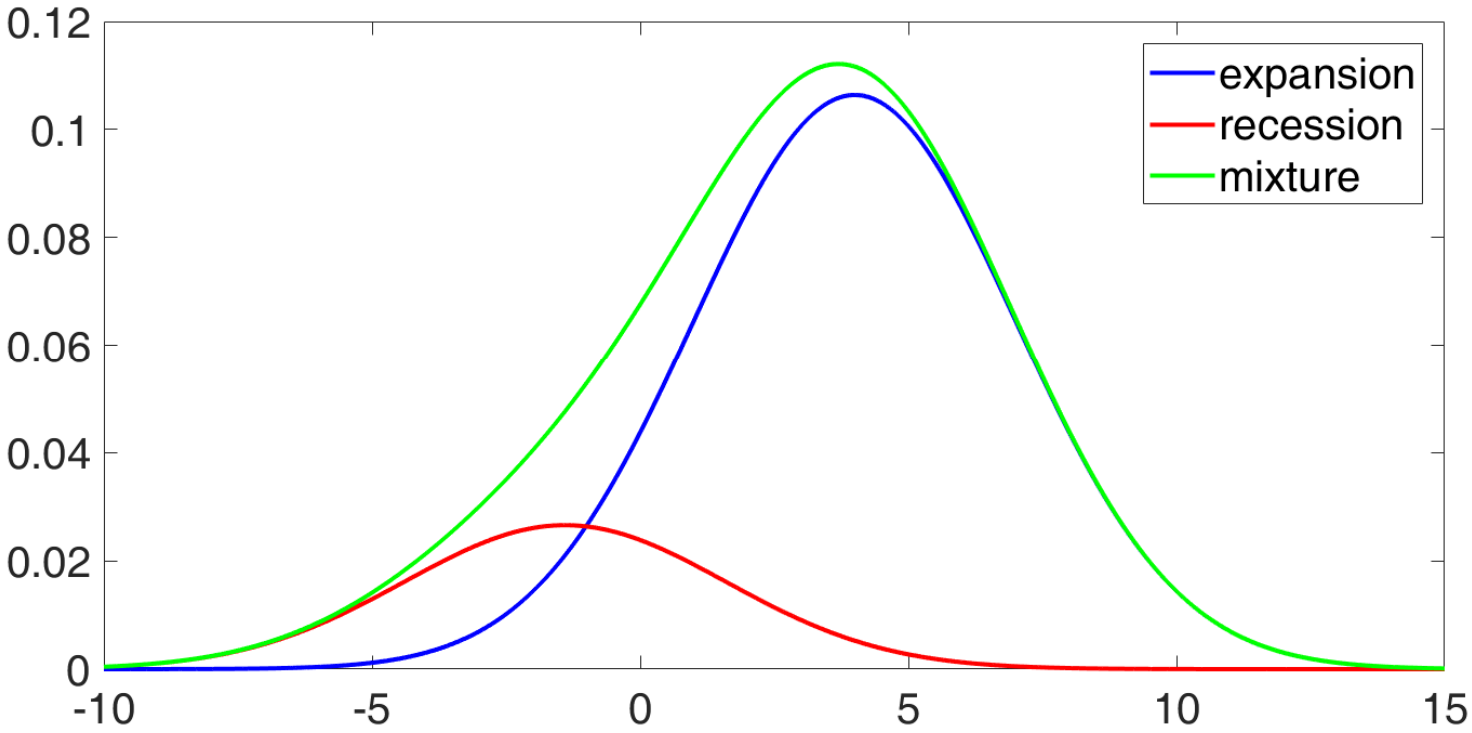
$$\pi \cdot N(\mu_2, \sigma^2) + (1 - \pi) \cdot N(\mu_1, \sigma^2)$$

Distribution of GDP growth when probability of recession = 0.05



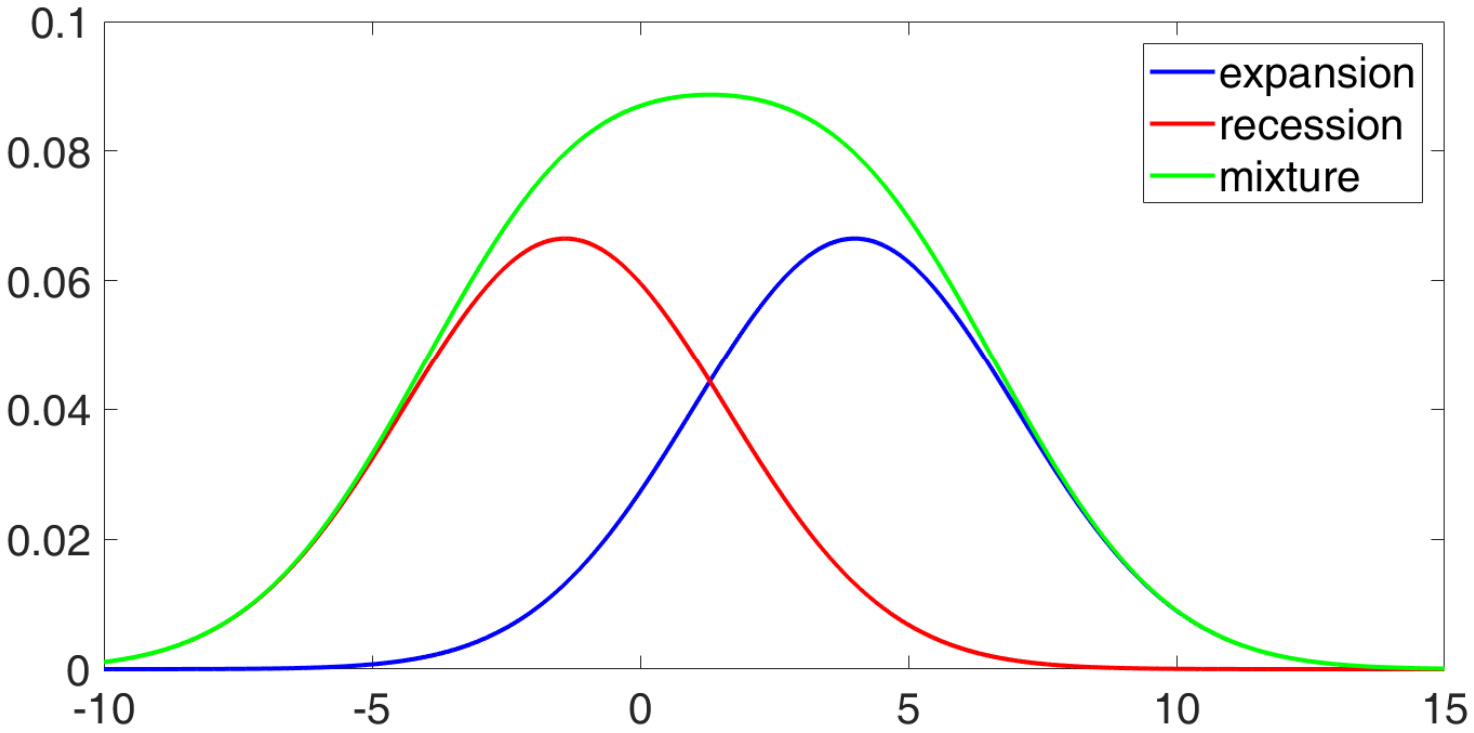
mean = 3.7, std dev = 3.2, skew = -0.2

Distribution of GDP growth when probability of recession = 0.2



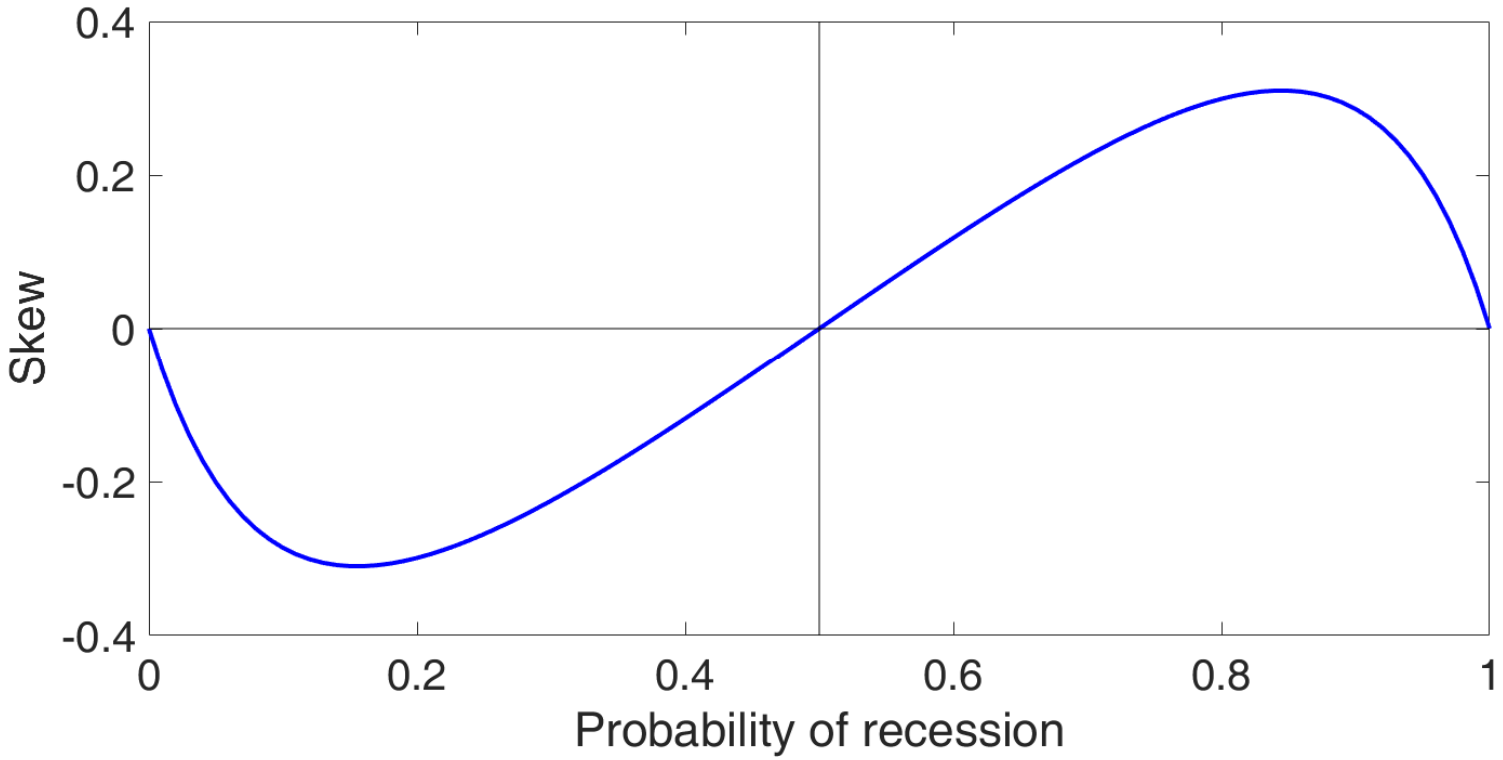
mean = 2.9, std dev = 3.7, skew = -0.3

Distribution of GDP growth when probability of recession = 0.5



mean = 1.3, std dev = 4.0, skew = 0

Skew as a function of the probability that next quarter economy is in recession



Dew-Becker uses stock option prices to calculate

- Firm-level skew
  - Calculate skew for individual stock return, then take weighted average
- Market-level skew
  - Take weighted average of individual stock returns, then calculate skew
- Firm-level skew procyclical, market-level skew acyclical

- Weighted average of individual random variables that satisfy mixing condition would tend toward a Normal distribution (zero skew)
- However, stock returns are not mixing (there is a factor common to all)
- Weighted average uncovers this factor

r_{it} = individual stock return

r_{mt} = market return

Dew-Becker: $r_{it} = r_{mt} + \varepsilon_{it}$

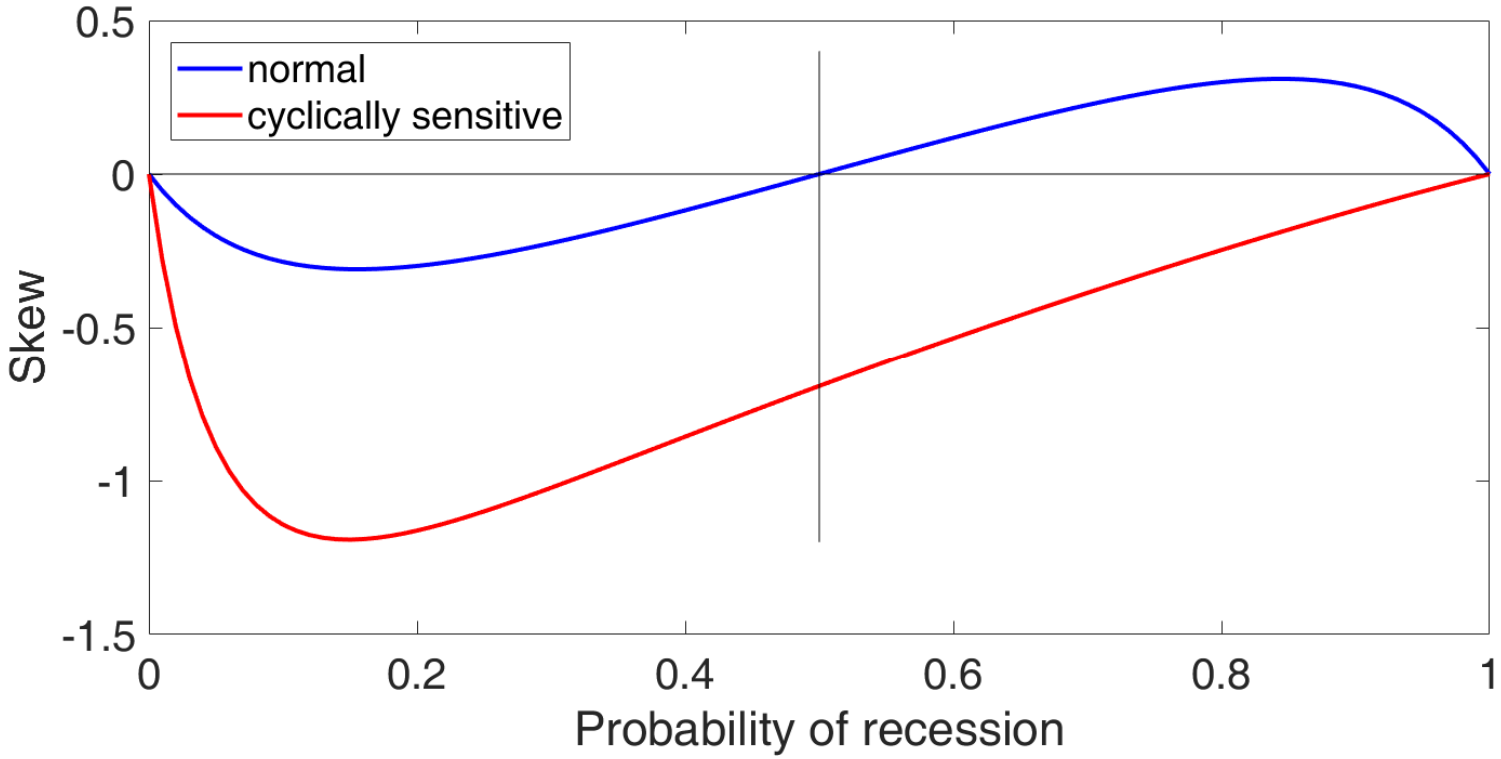
alternative: $r_{it} = \beta_i r_{mt} + \varepsilon_{it}$

Consider an asset that has a factor loading of 2 on the GDP recession factor

$N(\mu_1, \sigma^2)$ in expansion

$2 \cdot N(\mu_2, \sigma^2)$ in recession

Skew as a function of the probability that next quarter economy is in recession



- This might describe cyclical skew of fundamentals
  - Sales or dividend growth
- Cecchetti, Lam and Mark (AER, 1990)
  - If dividend growth shifts between two distributions, then stock returns shift between four distributions
  - In expansion, in recession, or transition up or down

- James Hamilton, “Why you should never use the Hodrick-Prescott Filter,” REStat, 2018

Why you *should* use HP

1. Everybody else does it
2. Main conclusions don't change if I do it the right way
3. I have to do something

   (skew is nonstationary)
4. HP is something

   Conclusion: I have to use HP

- Autocorrelations and cross-autocorrelations of HP-filtered skew are summarizing properties of filter, not properties of skew
- Can easily calculate whether error I make forecasting firm skew 2 years ahead is correlated with error I make forecasting market skew 2 years ahead