Are You Trading

Mean Reversion or Oscillation?

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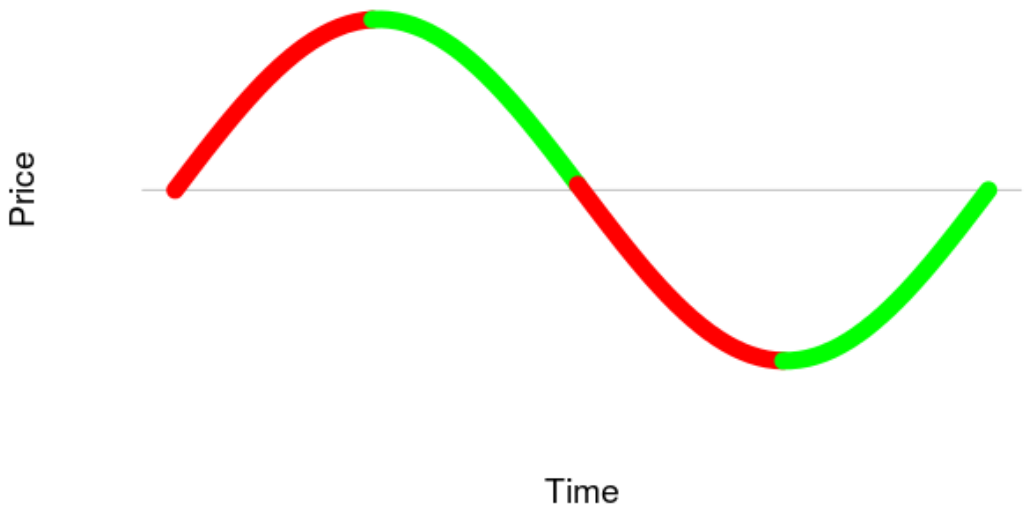
Don't think *mean reverting*. Think *oscillating*.

- Traders like to say markets are "mean reverting."
- Markets alternate between mean *diverting* and mean *reverting*.
- *Oscillating* markets create trading opportunities.



This is what mean reversion looks like.

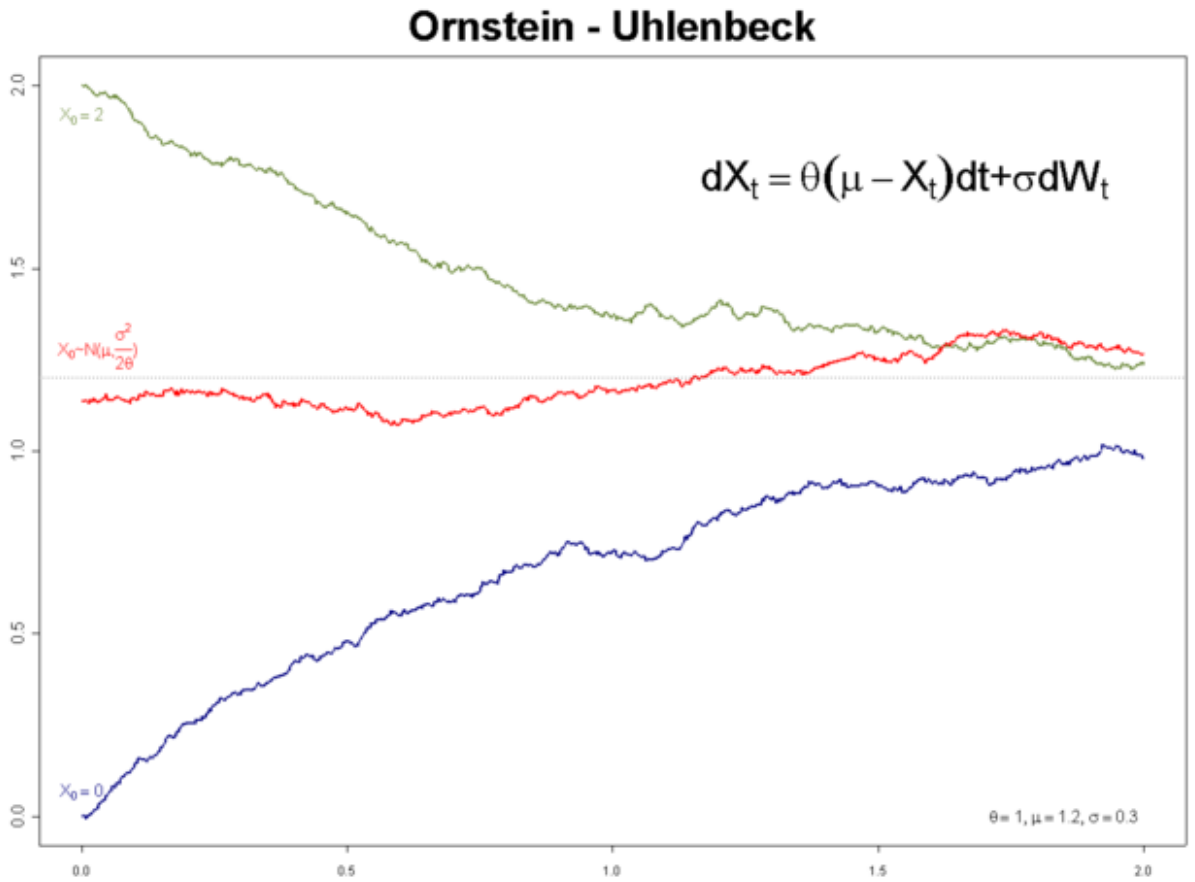
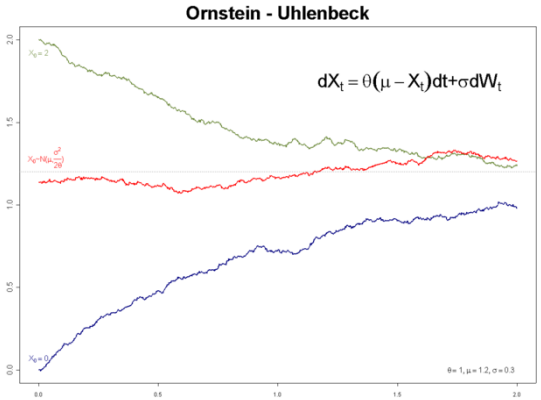


Image courtesy of Wikipedia: https://en.wikipedia.org/wiki/Ornstein%E2%80%93Uhlenbeck_process

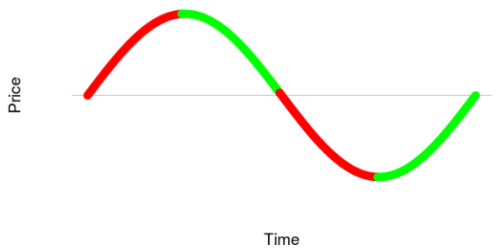
Does the ADF identify *tradable* markets?

- Augmented Dickey-Fuller test (ADF) is common test for mean reversion.
- Tests for O-U process on previous slide.
- If market oscillates, repeated mean diversion forces conclusion that market is not mean reverting.
- Confuses traders (mistakenly) searching for mean reversion.
- *Not* a test for trading opportunities. Beware.



Can we create a statistical test for oscillation?

- Need a test for oscillation to replace *role* of ADF.
- Statistical definition and test for “oscillation” is tricky.
- Complicated by stochastic frequency and stochastic amplitude of real markets.
- Still looking.
- Peter Carl suggests econometric tests for leading indicators.

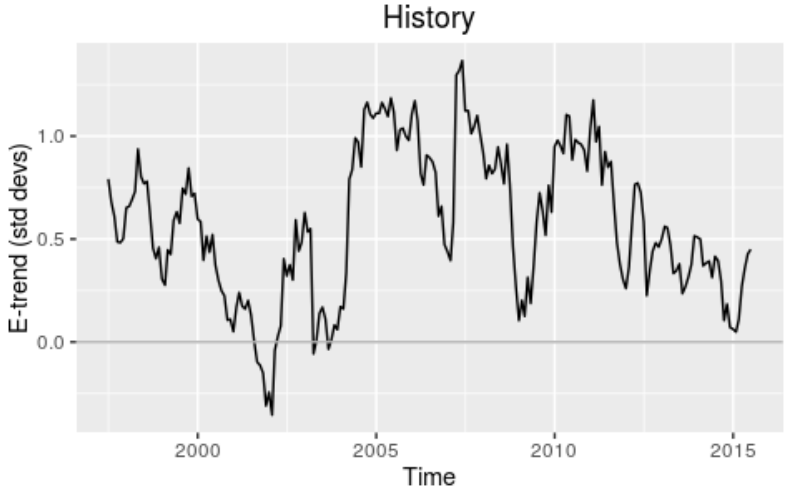


In the meantime, we can identify possible oscillations based on phase relationships.

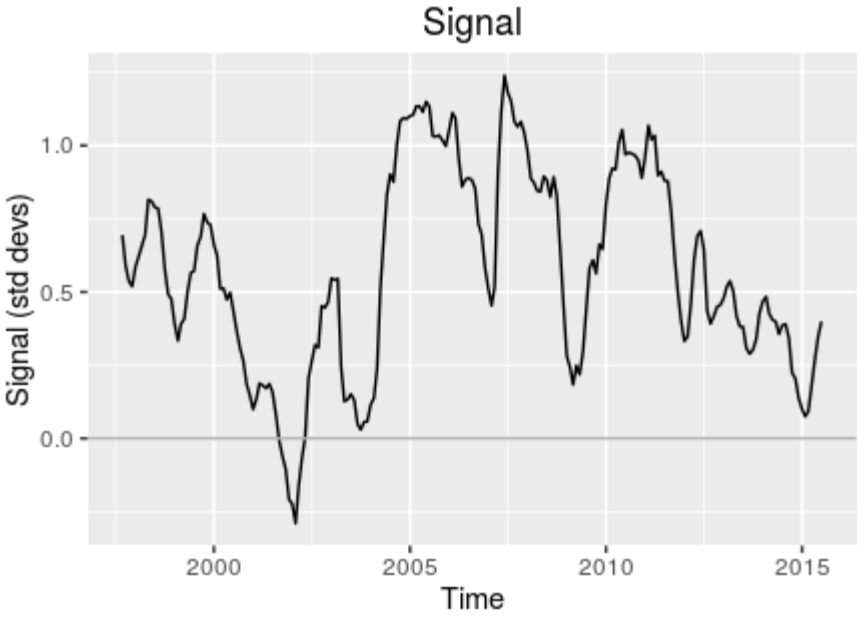
- Regression of forward change on smoothed level and smoothed slope.

$$Fwd\ \Delta y_t = \beta_0 + \beta_1 \times level_t + \beta_2 \times slope_t + \varepsilon_t$$

- Require $\beta_1 < 0$, indicating *reversal* in the future
- Require $\beta_2 > 0$, indicating reversal *after* peak/valley
- If requirements met, use R^2 to rank candidates.



We can search 100+ fundamental factors of 10,000's of stocks, looking for cyclicality.

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Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.25159    0.04034   6.237 2.49e-09 ***
Level       -0.43789    0.05973  -7.331 5.11e-12 ***
Slope        1.61671    0.34769   4.650 5.93e-06 ***
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Multiple R-squared:  0.2841,Adjusted R-squared:  0.2771
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- 3-period MA to erase "micro oscillations" in the noise
- State-space model to extract smooth level and slope (shown)
- Perform regression
- Filter for
  - ✓ $\beta_1 < 0$
  - ✓ $\beta_2 > 0$
- Rank by R^2

Summary

- Get it right: You're trading oscillation, not mean reversion.
- Don't expect the ADF to identify trading opportunities.
- Still looking for a good statistical test to replace ADF.
- The level-slope regression test can rank possibilities, but human judgement is ultimately required.

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