

Econ 714: Handout 6 ¹

1 Log-linearization²

Approximation of non-linear equations in x_t with linear equations in deviations \hat{x}_t from steady state x . Based on algebraic manipulations and first-order Taylor expansion.

$$\hat{x}_t \equiv \ln x_t - \ln x \approx \frac{x_t - x}{x}$$

1.1 Substitution

Straightforward and works for many simpler equations.

$$x_t \approx x(1 + \hat{x}_t) \quad x_t = xe^{\hat{x}_t} \approx x(1 + \hat{x}_t)$$

1.2 Taylor approximation

More general.

1. Take logs. Not always - typically to turn products into sums. Not with \mathbb{E} .
2. Use first-order Taylor expansion: $f(x_t, y_t) \approx f(x, y) + f_x(x, y)(x_t - x) + f_y(x, y)(y_t - y)$.
3. Simplify to “hats”. Often substitute out original equation evaluated at steady state.

¹The most useful handout by Anton Babkin. This version: March 4, 2016.

²Check these for detailed explanations and examples: one and two.