An Integrated Macro Model

**Taylor Rule**

\[ r_i = \pi_i + \beta \hat{Y}_t + \delta (\pi_t - \pi^*_t) + R^*_t \]  
(16.1)

\[ r_i = (1 + \delta) \pi_i + \beta \hat{Y}_t + R^*_t - \delta \pi^*_t \]  
(16.2)

**IS Curve Revisited**

\[ R_i = s_0 - s_1 Y_i + s_2 G_i \]  
(16.3), IS curve

\[ R^*_i = s_0 - s_1 Y^* + s_2 G_i \]  
(16.4); equilibrium real interest rate. Subtract (16.4) from (16.3) to get

\[ R_i - R^*_i = -s_1 (Y_i - Y^*) \]  
(16.5); divide and multiply by \( Y^* \) to obtain

\[ R_i - R^*_i = -s_1 Y^* \left( \frac{Y_i - Y^*}{Y^*} \right) \]  
(16.6)

\[ R_i - R^*_i = -\sigma \hat{Y}_t \]  
(16.7)

Macro Policy Curve

Subtract inflation and equilibrium real interest rate R* from Taylor rule (16.1):

\[ r_t = \pi_t + \beta \hat{Y}_t + \delta (\pi_t - \pi_t^*) + R^* \]  \hspace{1cm} (16.1)
\[ r_t - \pi_t - R_t^* = \beta \hat{Y}_t + \delta (\pi_t - \pi_t^*) \]  \hspace{1cm} (16.8); recall definition of R
\[ R_t - R_t^* = \beta \hat{Y}_t + \delta (\pi_t - \pi_t^*) \]  \hspace{1cm} (16.9); combine with IS curve (16.7)
\[ -\sigma \hat{Y}_t = \beta \hat{Y}_t + \delta (\pi_t - \pi_t^*) \]  \hspace{1cm} (16.10) which can also be written:
\[ \hat{Y}_t = -\frac{\delta}{(\beta + \sigma)} (\pi_t - \pi_t^*) \]  \hspace{1cm} (16.11)

Notice when \( \delta \) increases (i.e., the weight on inflation increases), the slope of the Macro Policy curve becomes flatter (when drawn in a graph with inflation on the vertical axis and the output gap on the horizontal).

Price Adjustment Revisited

\[ \pi_t = \pi_{t-1} + f \hat{Y}_{t-1} + Z_t \]  \hspace{1cm} (16.12)