An Integrated Macro Model  

**Taylor Rule**

\[
\begin{align*}
    r_t &= \pi_t + \beta \hat{Y}_t + \delta (\pi_t - \pi_t^*) + R_t^* \quad \text{(16.1)}
\end{align*}
\]

\[
\begin{align*}
    r_t &= (1 + \delta) \pi_t + \beta \hat{Y}_t + R_t^* - \delta \pi_t \quad \text{(16.2)}
\end{align*}
\]

**IS Curve Revisited**

\[
\begin{align*}
    R_t &= s_0 - s_1 Y_t + s_2 G_t \quad \text{(16.3), IS curve}
\end{align*}
\]

\[
\begin{align*}
    R_t^* &= s_0 - s_1 Y_t^* + s_2 G_t \quad \text{(16.4); equilibrium real interest rate. Subtract (16.4) from (16.3) to get}
\end{align*}
\]

\[
\begin{align*}
    R_t - R_t^* &= -s_1(Y_t - Y_t^*) \quad \text{(16.5); divide and multiply by } Y_t^* \text{ to obtain}
\end{align*}
\]

\[
\begin{align*}
    R_t - R_t^* &= -s_1 Y_t^* \left( \frac{Y_t - Y_t^*}{Y_t^*} \right) \quad \text{(16.6)}
\end{align*}
\]

\[
\begin{align*}
    R_t - R_t^* &= -\sigma \hat{Y}_t \quad \text{(16.7)}
\end{align*}
\]
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)