Here are the full derivations to formulas 49 and 50 in Graham & Wright's linearized model (2007, p.29):

For the first equation, which comes from the optimization problem for the nominal value Z_{t+1} of a new credit contract in a financial institution, linearized around the steady state, one gets

$$z_{t+1} - E_t p_{t+1} = E_t \left\{ \frac{[1-B(1)]F}{B(F)} \pi_{t+1} \right\}$$

where F is the forwardshift operator (that is, $F^i x_t = x_{t+i}$) and $B(F) = 1 - \beta_1(1-\phi)F$, for parameters β_1 and ϕ.

From this, one sees that

$$\begin{aligned} B(1) &= 1 - \beta_1(1-\phi)(1) \\ &= 1 - \beta_1 + \beta_1\phi \end{aligned}$$

so that

$$\begin{aligned} 1 - B(1) &= 1 - (1 - \beta_1 + \beta_1\phi) \\ &= \beta_1 - \beta_1\phi \\ &= \beta_1(1-\phi) \end{aligned}$$

Hence, multiplying both sides of the original equation by $B(F)$ –as indicated to us by Graham himself– and, using the previous result,

$$\begin{aligned} B(F)[z_{t+1} - E_t p_{t+1}] &= E_t\{([1-B(1)]F)\pi_{t+1}\} \\ (1-\beta_1(1-\phi)F)[z_{t+1} - E_t p_{t+1}] &= E_t\{[\beta_1(1-\phi)F]\pi_{t+1}\} \\ &= E_t\{\beta_1(1-\phi)\pi_{t+2}\} \\ (1-\beta_1[1-\phi]F)z_{t+1} - (1-\beta_1[1-\phi]F)E_t p_{t+1} &= E_t\{\beta_1(1-\phi)[p_{t+2} - p_{t+1}]\} \\ (1-\beta_1[1-\phi]F)z_{t+1} - E_t p_{t+1} + \beta_1[1-\phi]E_t p_{t+2} &= E_t\{\beta_1(1-\phi)[p_{t+2} - p_{t+1}]\} \\ (1-\beta_1[1-\phi]F)z_{t+1} - E_t p_{t+1} &= E_t\{-\beta_1(1-\phi)p_{t+1}\} \\ (1-\beta_1[1-\phi]F)z_{t+1} &= E_t\{[1-\beta_1(1-\phi)]p_{t+1}\} \\ z_{t+1} - \beta_1[1-\phi]z_{t+2} &= E_t\{[1-\beta_1(1-\phi)][\pi_{t+1} - \pi_t]\} \end{aligned}$$

This last result is the one we used while solving the model in Dynare.

One can proceed analogously in deriving the second equation, which gives the aggregate value D_t of debt in terms of the individual debt contracts and the price level P_t, also linearized around the steady state:

$$d_{t+1} + p_{t+1} = \frac{A(1)}{A(L)} z_{t+1}$$

where L is the backshift operator (that is, $L^i x_t = x_{t-i}$) y $A(L) = 1 - (1-\phi)L$.

From this, one sees that

$$\begin{aligned} A(1) &= 1 - (1-\phi)(1) \\ &= \phi \end{aligned}$$

so that, multiplying both sides by $A(L)$, and using this last result,

$$\begin{aligned} A(L)[d_{t+1} + p_{t+1}] &= A(1) z_{t+1} \\ (1 - (1-\phi)L)[d_{t+1} + p_{t+1}] &= \phi z_{t+1} \\ (1 - (1-\phi)L) d_{t+1} + (1 - (1-\phi)L) p_{t+1} &= \phi z_{t+1} \\ d_{t+1} - (1-\phi) d_t + p_{t+1} - (1-\phi) p_t &= \phi z_{t+1} \\ d_{t+1} - (1-\phi) d_t + \pi_{t+1} + \phi(\pi_t - \pi_{t-1}) &= \phi z_{t+1} \end{aligned}$$

This last result is the one we used in Dynare.

In summary,

$$z_{t+1} - E_t p_{t+1} = E_t \left\{ \frac{[1 - B(1)]F}{B(F)} \pi_{t+1} \right\} \iff z_{t+1} - \beta_1 [1-\phi] z_{t+2} = E_t \{ [1 - \beta_1 (1-\phi)][\pi_{t+1} - \pi_t] \}$$

and

$$d_{t+1} + p_{t+1} = \frac{A(1)}{A(L)} z_{t+1} \iff d_{t+1} - (1-\phi) d_t + \pi_{t+1} + \phi(\pi_t - \pi_{t-1}) = \phi z_{t+1}$$