A detailed overview of monetary policy rules in Modelbase

The MMB 3.0 offers nine pre-programmed monetary policy rules from Taylor (1993), Gerdesmeier and Roffia (2004), Levin et al. (2003), Smets and Wouters (2007), Christiano et al. (2005), Orphanides and Wieland (2008), Orphanides and Wieland (2013), Christiano et al. (2014) and Coenen et al. (2012), along with an option for the users to specify their own rule. Table 1 shows the equation of the nine-plus-one policy rules in MMB 3.0.

Table 1: MONETARY POLICY RULES IN MODELBASE

Taylor (1993)	$i_t^z = \sum_{j=0}^{3} 0.375 p_{t-j}^z + 0.50 q_t^z + \eta_t^i$
Gerdesmeier and Roffia (2004)	$i_t^z = 0.66 i_{t-1}^z + \sum_{j=0}^{3} 0.17 p_{t-j}^z + 0.10 q_t^z + \eta_t^i$
Levin et al. (2003)	$i_t^z = 0.76 i_{t-1}^z + \sum_{j=0}^{3} 0.15 p_{t-j}^z + 1.18 q_t^z - 0.97 q_{t-1}^z + \eta_t^i$
Smets and Wouters (2007)	$i_t^z = 0.81 i_{t-1}^z + 0.39 p_t^z + 0.97 q_t^z - 0.90 q_{t-1}^z + \eta_t^i$
Christiano et al. (2005)	$i_t^z = 0.8 i_{t-1}^z + 0.3 E_t p_{t+1}^z + 0.08 q_t^z + \eta_t^i$
Orphanides and Wieland (2008)	$i_t^z = 2.34 E_t \pi_{t+3}^z + 0.765 E_t q_{t+3}^z + \eta_t^i$
Orphanides and Wieland (2013)	$i_t^z = i_{t-1}^z + 0.5 \pi_t^z + 0.5 (q_t^z - q_{t-4}^z) + \eta_t^i$
Christiano et al. (2014)	$i_t^z = 0.85 i_{t-1}^z + 0.36 p_t^z + 0.05 y_t^z - 0.05 y_{t-1}^z + \eta_t^i$
Coenen et al. (2012)	$i_t^z = 0.7 i_{t-1}^z + 1.25 (p_t^z + p_{t+4}^z)$
User-specified rule	$i_t^z = \sum_{j=1}^{j=4} \rho_{i,j} i_{t-j}^z + \sum_{j=-4}^{j=4} \rho_{\pi,j} p_{t+j}^z + \sum_{j=-4}^{j=4} \rho_{q,j} q_{t+j}^z + \sum_{j=-4}^{j=4} \rho_{y,j} y_{t+j}^z + \eta_t^i$

In all rules, i_t^z denotes the annualized quarterly money market rate; π_t^z refers to the year-on-year rate of inflation; p_t^z is the annualized quarter-to-quarter rate of inflation; y_t^z denotes the quarterly real GDP; q_t^z refers to the quarterly output gap, defined as the deviation of actual output from the level of output that would be realized if prices were flexible; η_t^i is the common monetary policy shock.

- The Taylor (1993) rule has drawn much attention due to its precise description of the Federal ReserveâĂŹs interest rate decision. A significant amount of Taylor-type rules have been developed since the 1990s.

- The Gerdesmeier and Roffia (2004) rule is an augmented Taylor rule with the interest-rate smoothing term. Kuester and Wieland (2010) use the rule to compare four euro-area models, which are included in MMB 3.0.

- The Levin et al. (2003) rule allows for interest-rate smoothing and reacts to lagged output gap, in addition to current output gap and current inflation. Estimation of the rule is based on the U.S. data in Orphanides and Wieland (1998). Levin et al. (2003) employ the rule to compare five U.S. models, which are included in MMB 3.0.

- The Smets and Wouters (2007) rule is one of the best-known rules among medium-scale new-Keynesian models. The rule, with estimation based on Bayesian techniques, includes lagged interest rate, current inflation, as well as lagged and current output similar to the Levin et al. (2003) rule.

- The Christiano et al. (2005) rule, unlike the first four rules, is forward-looking and responds to inflation forecast one period ahead. The rule is an extension of Clarida et al. (1999).

- The Orphanides and Wieland (2008) rule is forward-looking as it includes forecasts for inflation and unemployment rate three quarters ahead. Estimation of the rule is based on the FOMC's projection on inflation and unemployment rate, considering the release time of the semiannual monetary policy report to the U.S. Congress. A rule without interest-rate smoothing (the fourth column in Table 3 in Orphanides and Wieland (2008))is included in MMB 3.0. The unemployment rate in the original rule is replaced by the output gap that uses Okun's law: $-2(u - \bar{u}) \approx (y - \bar{y})$.

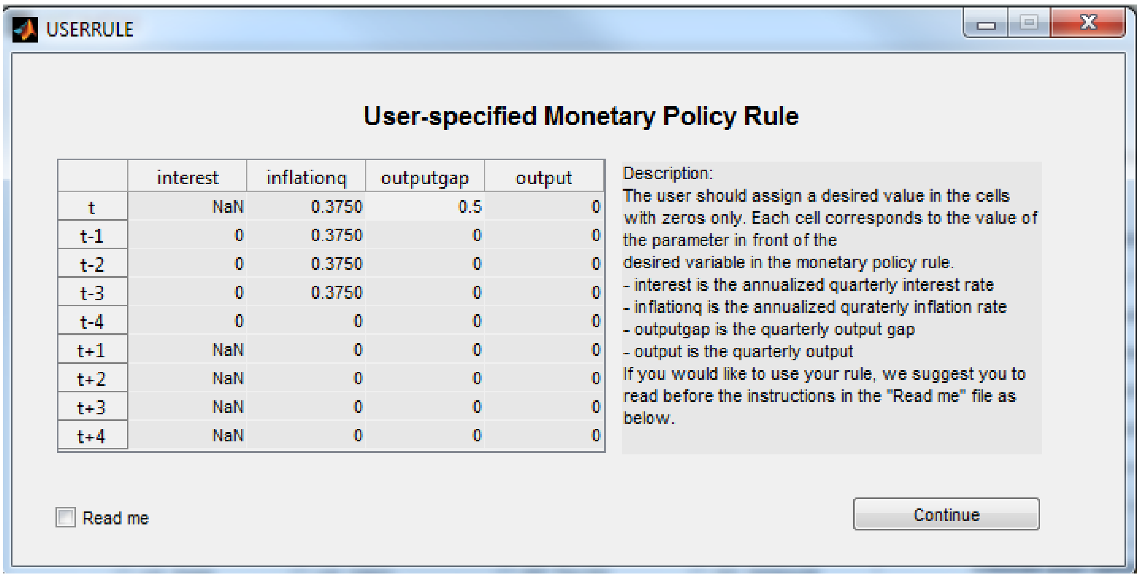
- The Orphanides and Wieland (2013) rule is an outcome-based simple policy rule. Change in the policy rate responds equally to the growth rate of current inflation and output gap over the last four quarters. The rule delivers fairly robust stabilization performance across 11 euro-area models, which are included in MMB 3.0.

- The Christiano et al. (2014) ruleâĂŹs estimation is based on a model featuring wage and price rigidities, as well as financial frictions à la Bernanke et al. (1999).

- The Coenen et al. (2012) rule is the standardized interest rate reaction function used in Figure 1 of the paper. Coefficients were set by calibration to satisfy the requirement for dynamic stability in the seven policy models in the paper. (see Coenen et al. (2012), footnote 17).

- The User-specified rule allows you to set desired coefficients of variables in a generalized interest rate rule. To use this option based on, for instance, the Taylor (1993) rule, as Figure 1 shows , the coefficients should be set as: $\rho_{\pi,0} = \rho_{\pi,-1} = \rho_{\pi,-2} = \rho_{\pi,-3} = 0.375$, $\rho_{q,0} = 0.5$, with the rest at zero. Note that a model might not be simulated given certain calibration. The system of a proposed monetary policy rule and other model equations may violate the Blanchard-Kahn condition such that they cannot yield a unique stationary rational expectation equilibrium. There is no a hard guideline for determinacy, but Levin et al. (2003) suggest several characteristics of rules that deliver a unique equilibrium: a relatively short inflation forecast horizon, a moderate degree of responsiveness to the inflation forecast, an explicit response to the current output gap and a substantial degree of policy inertia.

Figure 1: TAYLOR (1993) RULE USING THE OPTION OF USER-SPECIFIC RULE



The Model-specific rules are those developed exclusively for the corresponding models in each paper. They are available for 92 models in MMB 3.0, with specification listed in the âĂIJMSR_COEFFS.mâĂİ file.

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