9 The Dornbusch Model

The Dornbusch model (Dornbusch 1976) has the mixed features of the Mundell-Fleming model and the monetary model, though it stems from the former and, is sometimes called the Mundell-Fleming-Dornbusch model. The Dornbusch model is prominently featured by the sticky price assumption and overshooting. The sticky price assumption suggests that prices are neither totally flexible nor totally fixed. With this assumption, the aggregate supply curve is flat in the short-term, the slope of the aggregate supply curve gradually becomes steeper and steeper with the time horizon, and the curve is vertical in the long-run. In the short-term, increases in output are induced by shifts in aggregate demand; in the medium term, increases in output are caused by shifts in aggregate demand or shifts in aggregate supply or both; and in the long-run, only a shift in aggregate supply changes output. Other assumptions of the Dornbusch model include that the exchange rate is flexible, agents have perfect foresight and uncovered interest rate parity (UIRP) holds.

This chapter first presents the building blocks of the Dornbusch model and demonstrates the evolution paths of the exchange rate in conjunction with the price, followed by an examination of exchange rate dynamics and overshooting of the exchange rate. The chapter then argues that exchange rate dynamics and the evolution path of the exchange rate are sensitive to changes in the setting and parameter assumptions – not only undershooting, but also reverse shooting, may take place. Finally the real interest rate differential model by Frankel (1979) is introduced as an attempt to bridge the opposite results and conflicting policy implications often produced by the flexible monetary model and the Dornbusch model.

9.1 The Building Blocks of the Model and the Evolution Paths of the Exchange Rate and the Price

The model proposed by Dornbusch (1976) has three basic building blocks: uncovered interest rate parity and expectations, demand for money or the money market equilibrium and aggregate demand the goods market equilibrium. The model is for a small open economy, so the foreign interest rate is exogenous and the long-run equilibrium interest rate for the domestic interest rate. The exchange rate and ex-
change rate expectations involve the interest rate differential between the foreign country and the domestic country, or in other words for an open small economy, between the long-run equilibrium interest rate and the domestic interest rate prevailing at the time. The exchange rate and exchange rate expectations therefore enter the demand for money equation where the domestic interest rate is determined by the conditions for the domestic money market to be in equilibrium or to clear. Further, the aggregate demand for domestic goods depends on the relative price of domestic goods, a relativity of the exchange rate, the foreign price and the domestic price, so the exchange rate and exchange rate expectations enter the aggregate demand equation where the relative price of domestic goods is determined by the conditions for the domestic goods market to be in equilibrium or to clear.

The first relationship in the model is UIRP, that the expected change in the foreign exchange rate is equal to the interest rate differential between the domestic country and the foreign country. In the case of a small open economy, the expected change in the foreign exchange rate is equal to the difference between the prevailing domestic interest rate and its long-run equilibrium rate:

\[ E_t(\Delta e_{t+1}) = r_t - r^* \]  

(9.1)

where \( e_t \) is the exchange rate in logarithms, \( \Delta(e_{t+1}) = e_{t+1} - e_t \), \( r_t \) is the domestic interest rate, and \( r^* \) is the long-run equilibrium interest rate where a time subscript is not relevant.

The second building block of the model, the demand for money equation, is the standard version:

\[ m_t - p_t = \phi y_t - \lambda r_t \]  

(9.2)

where \( m_t \) is demand for money, \( p_t \) is the price level, \( y_t \) is real income, all are domestic variables and are in logarithms; and \( \phi > 0 \) and \( \lambda > 0 \) are coefficients representing the income elasticity of demand for money, and the interest rate semielasticity of money demand respectively.

The third element of the model is the price adjustment process through analysing aggregate demand and excess demand\(^1\). If we leave this part out and let the

\(^1\) A simpler way proceeds as follows. Aggregate demand is:

\[ y_t' = \bar{y} + \delta(e_t + p^* - p_t) - (\bar{e} + p^* - \bar{p}) - \sigma(r_t - r^*) \]

i.e., aggregate demand is its long-run equilibrium level plus the effects caused by the discrepancy between the real exchange rate and the long-run real exchange rate and the discrepancy between the prevailing interest rate and the long-run equilibrium interest rate. The price adjusts in proportion to the discrepancy between aggregate demand and its long-run equilibrium level:

\[ \Delta p_{t+1} = \pi(y_t' - \bar{y}) = \pi \delta[(e_t + p^* - p_t) - (\bar{e} + p^* - \bar{p})] - \pi \sigma(r_t - r^*) \]

which is equation (9.11). The last term \( \pi \sigma(r_t - r^*) \), can also be removed without having an effect on the outcome qualitatively, e.g., when equation (9.11) progresses to equation (9.12).