Nominal Rigidities, Exchange Rate Policy, and Unemployment

International Macroeconomics
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Introduction: In this chapter, we examine economies where some prices, especially wages, are nominally rigid. In such environments, monetary policy can influence real variables—like consumption, employment, real wages, and the current account. For instance, a terms-of-trade deterioration reduces aggregate demand and labor demand. If nominal wages cannot decline, real wages stay high unless prices rise. Expansionary monetary policy can raise prices, lower real wages, and restore employment. Thus, with downward nominal wage rigidity, monetary policy has powerful real effects on relative prices and welfare.

1. An Open Economy with Downward Nominal Wage Rigidity

1.1. The Supply Schedule

The economy produces two goods: an exogenous tradable endowment Q_t^T and a nontradable good produced with labor h_t:

$$Q_t^N = F(h_t), \quad F' > 0,\ F'' < 0.$$

Firms in the nontradable sector choose labor to maximize nominal profit:

$$\max_{h_t} \left(P_t^N F(h_t) - W_t h_t\right).$$

The first-order condition implies:

$$P_t^N F'(h_t) = W_t.$$

Expressed in tradable-goods terms, and using $P_t^T = E_t$, this becomes:

$$p_t \equiv \frac{P_t^N}{E_t} = \frac{W_t/E_t}{F'(h_t)}.$$

Intuitively, a higher relative price p_t (real revenue per worker) raises labor demand. Since wages are sticky in nominal terms, W_t/E_t may be rigid, so firms must increase h_t until the marginal product equates the effective real wage.

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1.2. The Demand Schedule

We now turn to the behavior of households. The representative household lives for two periods and derives utility from consumption in each period. Preferences are given by:

$$U = \ln C_1 + \beta \ln C_2,$$

where $\beta \in (0,1)$ is the subjective discount factor and C_t is a composite consumption good, defined as a Cobb-Douglas aggregator of tradables C_t^T and nontradables C_t^N:

$$C_t = (C_t^T)^{\gamma}(C_t^N)^{1-\gamma}, \quad \gamma \in (0,1), \quad t = 1, 2.$$

Let P_t^T and P_t^N denote the nominal prices of tradable and nontradable goods, respectively. The nominal exchange rate E_t is defined as the domestic price of one unit of foreign currency, and we assume the law of one price holds for tradables:

$$P_t^T = E_t.$$

The household faces a sequence of nominal budget constraints. In period 1:

$$E_1 C_1^T + P_1^N C_1^N + E_1 B_1 = E_1(1 + r_0)B_0 + E_1 Q_1^T + W_1 h_1 + \Pi_1,$$

In period 2:

$$E_2 C_2^T + P_2^N C_2^N = E_2 Q_2^T + W_2 h_2 + \Pi_2 + (1 + r^*)E_2 B_1,$$

where r^* is the world interest rate. Dividing both constraints by the corresponding exchange rate E_t, and recalling $p_t \equiv \frac{P_t^N}{E_t}$, we rewrite the constraints in terms of tradable goods:

$$C_1^T + p_1 C_1^N + B_1 = (1 + r_0)B_0 + Q_1^T + \frac{W_1 h_1 + \Pi_1}{E_1},$$

$$C_2^T + p_2 C_2^N = Q_2^T + \frac{W_2 h_2 + \Pi_2}{E_2} + (1 + r^*)B_1.$$

Adding both and eliminating B_1, we obtain the intertemporal budget constraint:

$$C_1^T + p_1 C_1^N + \frac{C_2^T + p_2 C_2^N}{1 + r^*} = (1 + r_0)B_0 + Q_1^T + \frac{Q_2^T}{1 + r^*} + \frac{W_1 h_1 + \Pi_1}{E_1} + \frac{W_2 h_2 + \Pi_2}{(1 + r^*)E_2}.$$

The household chooses $\{C_1^T, C_1^N, C_2^T, C_2^N\}$ to maximize utility subject to this constraint. We set up the Lagrangian:

$$\mathcal{L} = \ln\left((C_1^T)^\gamma (C_1^N)^{1-\gamma}\right) + \beta \ln\left((C_2^T)^\gamma (C_2^N)^{1-\gamma}\right) - \lambda \left[C_1^T + p_1 C_1^N + \frac{C_2^T + p_2 C_2^N}{1+r^*} - \Omega\right],$$

where Ω denotes the right-hand side of the intertemporal budget constraint (i.e., present value of income and wealth). Taking first-order conditions:

$$\begin{aligned}
\frac{\partial \mathcal{L}}{\partial C_1^T} &= \frac{\gamma}{C_1^T} - \lambda = 0 \Rightarrow \lambda = \frac{\gamma}{C_1^T}, \\
\frac{\partial \mathcal{L}}{\partial C_1^N} &= \frac{1-\gamma}{C_1^N} - \lambda p_1 = 0 \Rightarrow \frac{1-\gamma}{C_1^N} = \frac{\gamma p_1}{C_1^T}, \\
\frac{\partial \mathcal{L}}{\partial C_2^T} &= \frac{\beta\gamma}{C_2^T} - \lambda \frac{1}{1+r^*} = 0 \Rightarrow \frac{\beta\gamma}{C_2^T} = \frac{\gamma}{C_1^T} \cdot \frac{1}{1+r^*}, \\
\frac{\partial \mathcal{L}}{\partial C_2^N} &= \frac{\beta(1-\gamma)}{C_2^N} - \lambda \frac{p_2}{1+r^*} = 0 \Rightarrow \frac{\beta(1-\gamma)}{C_2^N} = \frac{\gamma p_2}{C_1^T(1+r^*)}.
\end{aligned}$$

From these, we derive the optimality conditions:

1. **Euler equation for tradables:**

$$C_2^T = \beta(1+r^*)C_1^T.$$

2. **Intratemporal conditions for nontradables:**

$$C_1^N = \frac{1-\gamma}{\gamma} \cdot \frac{C_1^T}{p_1}, \quad C_2^N = \frac{1-\gamma}{\gamma} \cdot \frac{C_2^T}{p_2}.$$

From the market-clearing in the Nontradable Sector, Nontradable goods must be produced and consumed domestically:

$$C_t^N = F(h_t) \quad \text{for } t = 1, 2.$$

Substituting into the intertemporal budget constraint:

$$C_1^T + \frac{C_2^T}{1+r^*} = (1+r_0)B_0 + Q_1^T + \frac{Q_2^T}{1+r^*}.$$

Now, using the Euler equation to eliminate C_2^T, we solve for consumption of tradables in period 1:

$$C_1^T = \frac{1}{1+\beta}\left[(1+r_0)B_0 + Q_1^T + \frac{Q_2^T}{1+r^*}\right].$$

It follows that:

$$C_1^T = C^T(r^{*-}, Q_1^{T+}, Q_2^{T+}, (1+r_0)B_0{}^+).$$

Using the intratemporal optimality condition and the market-clearing condition $C_1^N = F(h_1)$, we obtain the equilibrium relative price of nontradables:

$$F(h_1) = \frac{1-\gamma}{\gamma} \cdot \frac{C_1^T}{p_1} \Rightarrow p_1 = \frac{1-\gamma}{\gamma} \cdot \frac{C_1^T}{F(h_1)}.$$

This is the *demand schedule*. It describes how households' demand for nontradables—and hence labor—depends on their income and the relative price p_1. An increase in p_1 reduces the quantity demanded of nontradables, and thus reduces h_1, the level of employment in the nontradable sector.

This completes the derivation of the demand side of the economy. In the next section, we will combine this with the supply schedule to characterize full equilibrium under downward nominal wage rigidity.

1.3. The Labor-Market Slackness Condition

Note that in our previous derivations, we did not include the choice of labor supply h_t in the household's maximization problem. The reason is straightforward: labor does not enter the utility function and produces no disutility. As a result, the household is willing to supply as much labor as possible inelastically, since more hours worked translate directly into higher income and consumption.

We assume that in each period the household attempts to supply a constant number of hours $\bar{h}$ to the labor market. However, the realized level of employment h_t may fall short of this due to rationing in the labor market:

$$h_t \leq \bar{h}.$$

In equilibrium, firms choose how much labor to hire based on their profit maximization problem. If labor demand is low, not all of the household's desired labor supply will be used, and employment will fall below its potential level: $h_t < \bar{h}$. This is a situation of *involuntary unemployment.*

The central friction in this model is that nominal wages cannot fall freely: there is downward nominal wage rigidity. Formally, we impose the constraint:

$$W_t \geq W_{t-1}.$$

That is, nominal wages cannot decline from one period to the next. We now make two key assumptions that define the functioning of the labor market under this friction:

1. When there is involuntary unemployment, $h_t < \bar{h}$, the nominal wage constraint binds: $W_t = W_{t-1}$. Intuitively, excess supply of labor puts downward pressure on wages, but since they cannot fall, they are driven to the minimum admissible level.
2. When the wage constraint is not binding, i.e., $W_t > W_{t-1}$, we assume the labor market clears and the economy operates at full employment: $h_t = \bar{h}$. This is natural—if nominal wages can rise and there is excess labor supply, wages would fall, contradicting $W_t > W_{t-1}$.

These assumptions can be compactly expressed by the following condition:

$$(W_t - W_{t-1})(\bar{h} - h_t) = 0.$$

This is called the **labor-market slackness condition**. It is a *complementarity condition*, meaning that either the wage constraint is binding and there is unemployment, or the constraint is slack and the economy is at full employment.

In this model, the labor market does not necessarily clear every period. Instead, due to downward nominal wage rigidity, it is possible for the equilibrium to display *excess labor supply* or *involuntary unemployment*. That is, employment can be rationed if wages cannot adjust downward to equate demand and supply.

Such situations are characteristic of **non-Walrasian models**—models in which not all markets clear through price adjustment and some goods or factors are rationed in equilibrium. In our case, the labor market is the source of rationing. This marks a sharp contrast with the standard TNT model studied previously.

Role of Monetary Policy. In the standard TNT model, monetary policy is neutral: it has no effect on real allocations. However, once we introduce nominal rigidities, monetary policy can have real effects. In particular, changes in the nominal exchange rate E_t, which affect the domestic price of tradables and hence the real wage $\frac{W_t}{E_t}$, can influence labor demand, employment, output, consumption, and the real exchange rate. We explore these effects in the next sections.

2. Shocks with a Fixed Exchange Rate

Having derived the supply and demand schedules, we now analyze how the economy adjusts to shocks in the presence of nominal rigidities. A central feature of this analysis is the role played by the nominal exchange rate, which, under certain monetary arrangements, ceases to be a flexible policy instrument.

In this section, we consider a **fixed exchange rate regime**, also known as a currency peg. Under this regime, the central bank commits to maintaining the nominal exchange rate E_t constant over time, at a value $\bar{E}$. To enforce the peg, the central bank stands ready to buy or sell any quantity of foreign currency at this fixed rate. We wish to understand how the economy reacts to shocks when such a fixed exchange-rate arrangement is in place.

2.1. An Increase in the World Interest Rate

Consider the impact of an increase in the world interest rate r^*. Suppose that prior to this shock the economy is at full employment and wages are stable: $h_1 = \bar{h}$ and $W_1 = W_0$.

Now assume that the world interest rate increases from r^* to $r^{*'} > r^*$. According to the Euler equation:

$$\frac{C_2^T}{C_1^T} = \beta(1 + r^*),$$

the higher interest rate induces households to increase savings and reduce current consumption. As a result, demand for both tradable and nontradable goods in period 1 falls.

The tradable sector can absorb this shock by exporting the excess supply. However, in the nontradable sector, this adjustment is not possible: nontradable goods must be consumed domestically. Thus, the contraction in demand causes an excess supply in the nontradable market, which puts downward pressure on the relative price p_1.

With **absent nominal rigidities**, the relative price p_1 would fall enough to induce an expenditure switch from tradables to nontradables. This would restore demand, production, and employment in the nontradable sector, keeping the economy at full employment.

But with nominal wage rigidity and a fixed exchange rate, this mechanism breaks down. Recall that:

$$p_1 = \frac{W_1/\bar{E}}{F'(h_1)}.$$

If wages are rigid downward (i.e., $W_1 = W_0$), and the nominal exchange rate is fixed ($E_1 = \bar{E}$), then the numerator $W_1/\bar{E}$ remains constant. In order for p_1 to fall, the marginal product of labor $F'(h_1)$ must increase, which requires a fall in employment h_1. But this means firms must cut employment, as they are unable to reduce costs by lowering wages or allowing the currency to depreciate.

Thus, **firms respond to the fall in demand by reducing output and laying off workers**. Employment falls below full employment:

$$h_1 < \bar{h},$$

and the labor-market slackness condition

$$(W_1 - W_0)(\bar{h} - h_1) = 0$$

implies that the wage constraint is binding.

This leads to involuntary unemployment. Workers are willing to work $\bar{h}$ hours at the prevailing wage, but firms hire only h_1 due to reduced profitability at the fixed real wage $W_0/\bar{E}$. The real wage does not adjust because:

- Wages are downwardly rigid: $W_1 \geq W_0$,

- The nominal exchange rate is fixed: $E_1 = \bar{E}$.

Therefore, two nominal rigidities (wage and exchange rate) imply a **real rigidity** in the real wage, preventing labor market clearing. This has a welfare implication, as the contraction in employment leads to a fall in output of nontradables, from $F(\bar{h})$ to $F(h_1)$, and therefore a decline in nontradable consumption:

$$C_1^N = F(h_1) < F(\bar{h}).$$

Since utility depends on both tradables and nontradables, household welfare declines.

The real exchange rate e_t is defined as the relative price of the domestic consumption basket in terms of the foreign one. In this model, where the tradable good's price is the same across countries (by the law of one price), movements in p_t drive changes in e_t. A fall in p_1 implies a real depreciation:

$$p_1 \downarrow \Rightarrow e_1 \uparrow .$$

However, **the real depreciation is insufficient** to restore full employment. The rigidity in the nominal wage and fixed exchange rate prevents a sufficient fall in the real wage. As a result, the shift in expenditure toward nontradables is too small to sustain production at $\bar{h}$.

Conclusion: Under a fixed exchange rate, the economy cannot adjust through a nominal depreciation. If wages are also rigid downward, then the real adjustment is incomplete. The result is a fall in output, consumption, and employment—i.e., a recession. This contrasts sharply with a scenario in which wages are flexible, where monetary rigidity does not prevent real adjustment.

2.2. A Decrease in the World Interest Rate

The model features an important asymmetry: while nominal wages are downwardly rigid (they cannot fall below the previous period's level), they are fully flexible upward. This implies that the economy's adjustment to positive and negative shocks is not symmetric. Consider a fall in the world interest rate r^*. According to the Euler equation, a lower interest rate induces households to reduce saving and increase current consumption. This increase in demand shifts the demand schedule upward: for any given relative price p_1, households want to consume more of both tradable and nontradable goods. Since tradables can be imported, their market clears without issue. However, the increase in demand for nontradables raises the demand for labor. Because the nominal wage is upwardly flexible, firms respond to this excess demand for labor by bidding up the nominal wage. The higher nominal wage increases labor costs, shifting the supply schedule upward. A new equilibrium is reached with full employment ($h_1 = \bar{h}$) and a higher nominal wage, $W_1 > W_0$. This implies that the real wage, $W_1/\bar{E}$, also rises. The relative price of nontradables p_1 increases due to both higher demand and higher labor costs, which in turn leads to a real exchange rate appreciation. That is, the domestic economy becomes more expensive relative to the rest of the world.

2.3. Output and Terms-of-Trade Shocks

Suppose now that the economy suffers a negative shock to the endowment of tradable goods in period 1, such that Q_1^T falls to $Q_1^{T'} < Q_1^T$. This reduction in available resources makes households poorer, prompting them to cut consumption of both tradable and nontradable goods. The fall in demand shifts the demand schedule downward. Because neither the nominal wage nor the exchange rate can adjust downward (the wage is rigid and the exchange rate is fixed), the supply schedule remains unchanged. The economy moves to a new equilibrium characterized by a lower level of employment, $h_1 < \bar{h}$, and involuntary unemployment arises. The fall in demand for nontradables reduces the demand for labor, and market clearing would require a fall in the real wage. However, downward nominal wage rigidity and the fixed exchange rate prevent such adjustment. As a result, labor demand falls short of supply, and employment is rationed. Additionally, the relative price of nontradables p_1 falls, leading to a real exchange rate depreciation—i.e., the economy becomes cheaper relative to the rest of the world. Still, this real depreciation is not sufficient to fully absorb the shock, and the economy contracts.

3. Shocks with a Floating Exchange Rate

We now consider an alternative policy regime in which the central bank allows the nominal exchange rate to adjust freely over time, a *floating exchange rate regime*. Under this arrangement, the nominal exchange rate E_t is no longer fixed but determined endogenously, and can fluctuate in response to shocks. The monetary authority in this regime conducts policy with the objective of achieving full employment and maintaining price stability. In practice, central banks around the world often pursue these dual objectives, typically by targeting *core inflation*, a price index that excludes the most volatile components such as food and energy. These items, largely composed of tradable goods in the model, represented by C_t^T and Q_t^T, tend to exhibit temporary fluctuations and are primarily determined by world market prices. As a result, stabilizing core inflation in this model translates into stabilizing the price of nontradables, P_t^N, which are influenced by domestic labor costs and demand.

3.1. Adjustment to External Shocks

Consider the case in which the world interest rate r^* increases from r^* to $r^{*'} > r^*$. As we have seen, such a shock reduces present-period consumption by incentivizing households to postpone consumption to the future. This lowers demand for both tradables and nontradables, causing the *demand schedule* to shift downward. If the central bank maintained a fixed exchange rate, this would result in involuntary unemployment: the decline in nontradable demand would lower the marginal product of labor, but the nominal wage could not fall due to downward rigidity, nor could the real wage adjust via exchange rate depreciation. Firms would therefore reduce employment, and the economy would operate below full employment.

However, under a floating exchange rate regime, the central bank responds by allowing the nominal exchange rate E_1 to depreciate. A higher E_1 reduces the real wage, W_0/E_1, given the rigidity of W_0, and shifts the *supply schedule* downward. The fall in the real wage reduces marginal costs for firms, thereby encouraging them to expand employment and production of nontradables. As a result, the labor market returns to equilibrium at full employment, $h_1 = \bar{h}$, and involuntary unemployment is avoided.

At the same time, the depreciation allows the central bank to meet its second objective: price stability. Recall that in this model, the central bank stabilizes the price of nontradables, P_1^N, which are a proxy for core inflation. When the shock causes a contraction in the demand for nontradables, there is downward pressure on their relative price, $p_1 = P_1^N/P_1^T$. In a fixed exchange rate regime, since $P_1^T = \bar{E}$, a fall in p_1 directly implies a fall in P_1^N, generating deflation. However, under a floating exchange rate regime, the central bank allows the currency to depreciate, increasing E_1 and hence P_1^T. This depreciation makes tradable goods more expensive, prompting households to switch consumption toward nontradables. The resulting increase in demand for nontradables offsets the initial fall in p_1, until equilibrium is restored at a relative price level consistent with full employment. As a result, although p_1 may fall temporarily, the rise in E_1 ensures that the domestic price of nontradables remains stable. Thus, the floating exchange rate serves as an effective adjustment mechanism: it enables real wages to fall despite downward nominal wage rigidity, restores full employment, and stabilizes domestic prices.

3.2. Supply Shocks and the Inflation-Unemployment Tradeoff

Up to this point, we have analyzed shocks that shift the *demand schedule*. In those cases, we saw that a floating exchange rate regime allows the central bank to simultaneously achieve both objectives: price stability (defined as stability in the price of nontradables) and full employment. In this section, we analyze a different kind of disturbance — *supply shocks* — and show that these can generate a policy dilemma: the central bank may not be able to stabilize both employment and prices at the same time.

Specifically, consider a negative productivity shock in the nontradable sector. Suppose that the production function of nontradables is given by:

$$Q_t^N = A_t F(h_t),$$

where A_t is total factor productivity in period t, and $F(\cdot)$ is increasing and concave. For analytical convenience, suppose that the production function takes the form $F(h_t) = h_t^\alpha$ with $\alpha \in (0, 1)$. Then we have:

$$Q_t^N = A_t h_t^\alpha.$$

This production technology exhibits diminishing returns to labor and implies that marginal productivity decreases as h_t rises.

Firms in the nontradable sector hire labor to maximize profits. Their first-order condition is:

$$P_1^N \cdot \alpha A_1 h_1^{\alpha-1} = W_0,$$

where W_0 is the nominal wage in period 1, which is predetermined and downwardly rigid.

Now consider a negative productivity shock in period 1, i.e., a fall in A_1. Suppose initially the economy was at full employment with $h_1 = \bar{h}$. Then the firm condition becomes:

$$P_1^N \cdot \alpha A_1 \bar{h}^{\alpha-1} = W_0.$$

From this expression, we see that, if the central bank wants to maintain P_1^N constant (price stability), a fall in A_1 must be absorbed by a decline in h_1 — that is, by a reduction in labor demand and an increase in unemployment. This occurs because W_0 cannot fall (due to downward nominal wage rigidity), and the fall in marginal productivity cannot be offset through a lower wage. Therefore, maintaining price stability forces a fall in employment.

Alternatively, if the central bank were to attempt to maintain full employment ($h_1 = \bar{h}$), then the fall in A_1 would require an increase in the price of nontradables, P_1^N, in order for the firm's optimality condition to continue to hold. This would imply a loss of price stability.

We can better understand this tradeoff through the equilibrium condition derived from the household's optimization and the market-clearing condition for nontradables:

$$\frac{P_1^N}{E_1} = \frac{1-\gamma}{\gamma} \cdot \frac{C_1^T(r^*, Q_1^T, Q_2^T)}{A_1 h_1^\alpha}.$$

Assuming that tradable consumption C_1^T and other terms remain constant in the short run, we see that a fall in productivity A_1 pushes the right-hand side upward. To prevent the relative price of nontradables from rising (to maintain price stability), one of two things must occur:

- Either employment h_1 must fall (i.e., firms hire less labor, which causes unemployment), thereby increasing h_1^α and keeping the denominator from shrinking too much.
- Or the central bank must allow an appreciation of the nominal exchange rate ($E_1 \downarrow$), which reduces P_1^N given p_1, and offsets the inflationary pressure.

A negative supply shock in the nontradable sector reduces the productivity of labor, so firms face a higher cost per unit of output. Since nominal wages cannot fall, they must reduce labor hiring to stay profitable unless output prices rise. The economy then faces a tradeoff: either allow P_1^N to rise (higher inflation) to sustain employment, or contain inflation and accept involuntary unemployment. This represents a classic inflation-unemployment tradeoff, where the central bank cannot achieve both targets simultaneously.

Finally, the central bank can choose to allow a partial adjustment of the exchange rate, achieving a range of intermediate outcomes. In such scenarios, the nominal exchange rate appreciates, but not sufficiently to fully stabilize prices. As a result, the economy experiences both some degree of inflation (due to a rise in the price of nontradables) and some unemployment (due to reduced labor demand). These outcomes reflect a compromise between the central bank's two objectives: price stability and full employment. When an economy simultaneously suffers from inflation and unemployment, this situation is referred to as *stagflation*.

4. The Monetary Policy Trilemma

The monetary policy trilemma highlights the fundamental trade-off faced by central banks in open economies: they can simultaneously achieve only two out of the following three objectives: (1) a fixed exchange rate; (2) monetary policy autonomy; and (3) free capital mobility.

In our model, we have assumed *free capital mobility*, which means households can borrow or lend freely in international markets. This condition enforces the *interest parity condition*, which ensures that domestic and foreign assets yield the same return once exchange rate changes are taken into account:

$$1 + i = \frac{E_2}{E_1}(1 + r^*)$$

where i is the domestic nominal interest rate and r^* is the world interest rate. If this condition did not hold, arbitrage opportunities would exist. Suppose the central bank wants to fix the exchange rate at a level $\bar{E}$. Then, plugging into the parity condition, we get:

$$i = r^*$$

This result means that the domestic interest rate is pinned to the world interest rate, so *monetary autonomy*, defined as a central bank's ability to set its own interest rate and conduct monetary policy independently, is lost. In other words, if free capital mobility is allowed and the exchange rate is fixed, the central bank is obliged to follow the international interest rate.

Alternatively, suppose the central bank wants to **set its own interest rate** i and still allows for capital mobility. In that case, the interest parity condition implies:

$$\frac{E_2}{E_1} = \frac{1 + i}{1 + r^*}$$

so the nominal exchange rate must adjust. The central bank can no longer fix it: it loses *exchange rate stability.*

Finally, if the central bank **imposes capital controls**, for instance, through a tax τ on international borrowing, the modified parity condition becomes:

$$1 + i = \frac{E_2}{E_1}(1 + r^* + \tau)$$

With capital controls in place, the central bank regains the ability to independently set both the interest rate and the exchange rate. For example, if the exchange rate is fixed (so $E_2/E_1 = 1$), the central bank can raise i as long as it adjusts $\tau = i - r^*$.

In short, the trilemma implies that a country must give up one of the three goals: if it wants free capital flows and a fixed exchange rate, it cannot have monetary autonomy. If it wants monetary autonomy and capital mobility, the exchange rate must float. And if it wants monetary autonomy and a fixed exchange rate, it must restrict capital flows.