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Open Economy and the Exchange Rate

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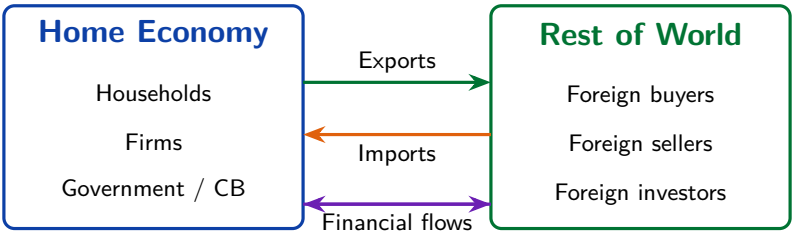
What Changes in an Open Economy?



- In a closed economy, aggregate demand is $AD = C + I + G$.
- In an open economy, aggregate demand is

$$AD = C + I + G + NX$$

- Net exports are exports minus imports:

$$NX = X - M$$

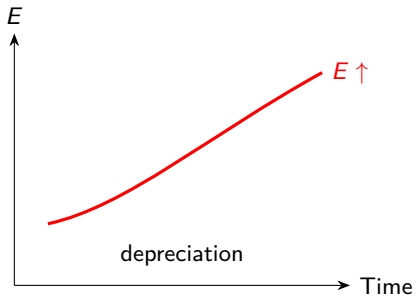
- The exchange rate affects NX by changing relative prices.

Nominal Exchange Rate

E = domestic currency price of 1 unit of foreign currency

For Turkey, think of:

E = TL per US dollar



- If E increases, foreign currency becomes more expensive.
- Domestic currency **depreciates**.
- Imports become more expensive for home residents.
- Exports become cheaper for foreigners.

A Very Simple Price Example

Suppose a phone costs:

$$\$1000$$

Exchange rate	TL price	Meaning
$E = 20$ TL/\$	20,000 TL	baseline
$E = 30$ TL/\$	30,000 TL	TL depreciates
$E = 15$ TL/\$	15,000 TL	TL appreciates

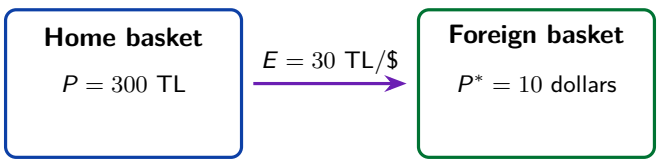
$$\text{TL price of import} = E \times \text{foreign-currency price}$$

- Depreciation raises the domestic price of imported goods.
- Appreciation lowers the domestic price of imported goods.

Purchasing Power Parity (PPP)

$$\boxed{E = \frac{P}{P^*}}$$

- PPP says: in the long run, the exchange rate adjusts so similar baskets of goods cost similar amounts across countries.
- If the same basket costs more at home than abroad, home currency should depreciate.
- This is a **long-run anchor**, not a perfect short-run prediction.



PPP and Inflation Differentials

Starting from PPP:

$$E = \frac{P}{P^*}$$

Taking growth rates gives the key long-run idea:

$$\boxed{\frac{\Delta E}{E} \approx \pi - \pi^*}$$

- π = domestic inflation
- π^* = foreign inflation
- If domestic inflation is higher than foreign inflation, domestic currency tends to depreciate in the long run.

$$\pi > \pi^* \quad \Rightarrow \quad E \uparrow \quad \Rightarrow \quad \text{depreciation}$$

What Should We See in the Data?

PPP gives two related long-run predictions:

1. The exchange rate should move with relative price levels:

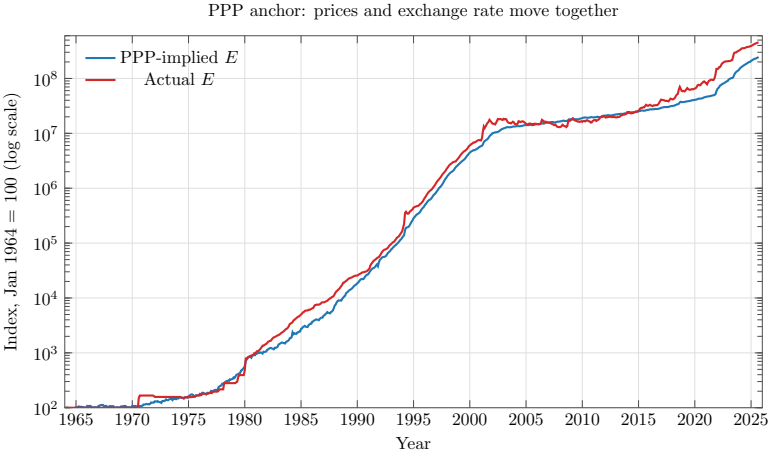
$$E \approx \frac{P}{P^*}$$

2. Exchange-rate depreciation should move with the inflation differential:

$$\frac{\Delta E}{E} \approx \pi - \pi^*$$

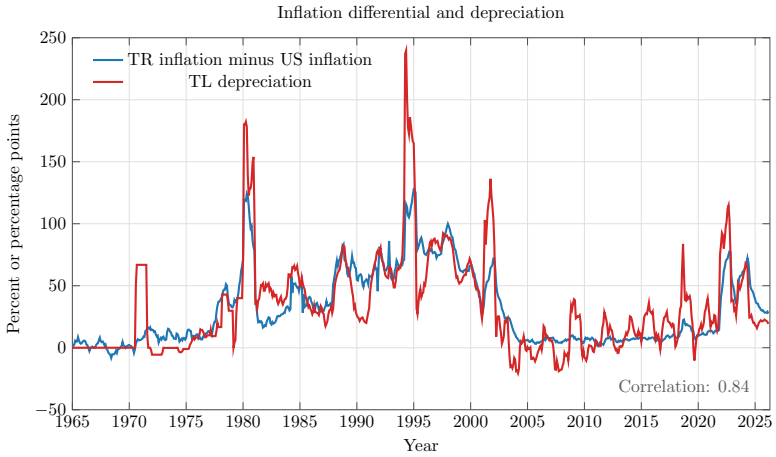
- We should not expect a perfect month-to-month match.
- But over long periods, countries with higher inflation tend to have depreciating currencies.

PPP in the Data: Relative Prices and Exchange Rate



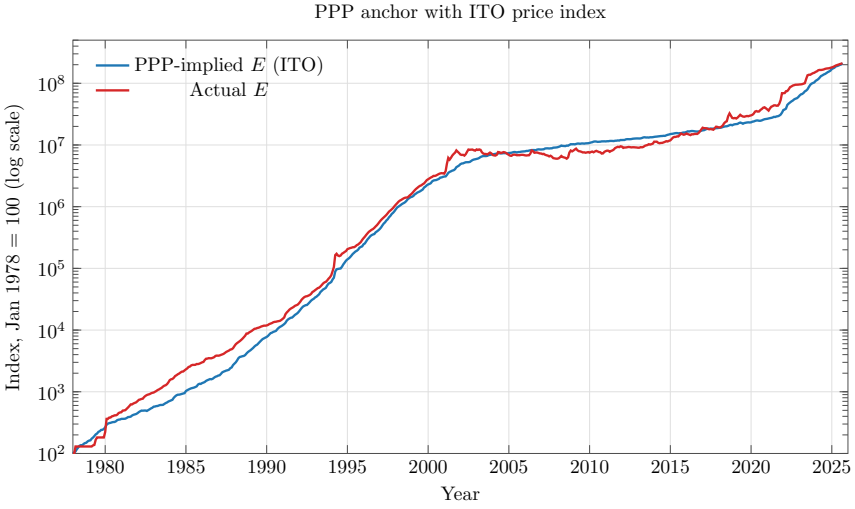
- The exchange rate and PPP-implied exchange rate move together over long horizons.
- This is the long-run anchor idea; short-run deviations are still possible.

PPP in Growth Rates: Inflation Differential and Depreciation



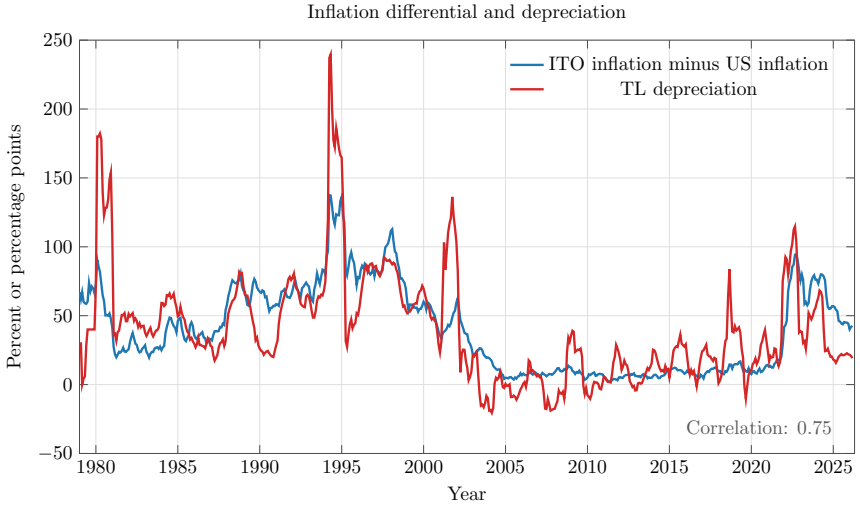
- The inflation differential and TL depreciation co-move strongly.
- PPP is a long-run tendency, not a mechanical short-run rule.

Robustness: Using the ITO Price Index



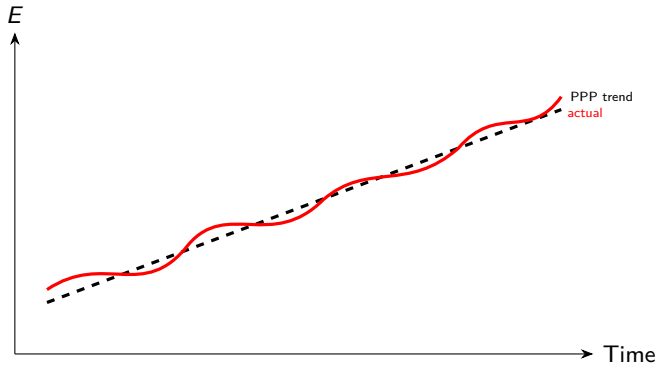
- The same long-run PPP pattern appears with an alternative Turkish price index.

Robustness: Inflation Differential with ITO



- The alternative index changes details, but not the main long-run message.

But PPP Does Not Hold Every Day



- In the short run, exchange rates also respond to interest rates, risk, expectations, capital flows, and central bank intervention.
- Prices of many goods are sticky.
- Non-traded goods, transportation costs, taxes, and market power also create deviations from PPP.

Real Exchange Rate: Relative Prices

$$\boxed{q = \frac{EP^*}{P}}$$

- EP^* = foreign prices converted into domestic currency.
- P = domestic prices.
- q measures the relative price of foreign goods compared with domestic goods.
- A higher q means foreign goods are relatively expensive and home goods are more price competitive.
- A lower q means foreign goods are relatively cheap and home competitiveness is weaker.

$q \uparrow$
foreign goods become
relatively expensive

$q \downarrow$
foreign goods become
relatively cheap

Real Appreciation and Competitiveness

$$q = \frac{EP^*}{P}$$

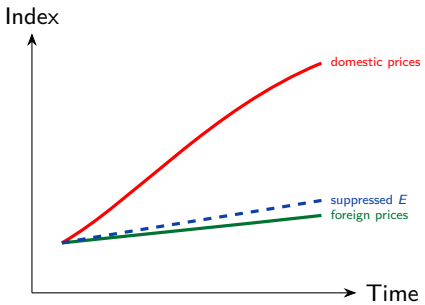
If domestic inflation is high but the nominal exchange rate is held down:

$$P \uparrow \quad \text{while} \quad E \text{ does not rise enough}$$

$$q \downarrow$$

- Domestic goods become expensive relative to foreign goods.
- Imports become attractive for domestic consumers.
- Exports become less competitive in foreign markets.
- A fall in q is **weaker competitiveness**.
- This is called a **real appreciation**.

Turkiye Example: Suppressing the Exchange Rate

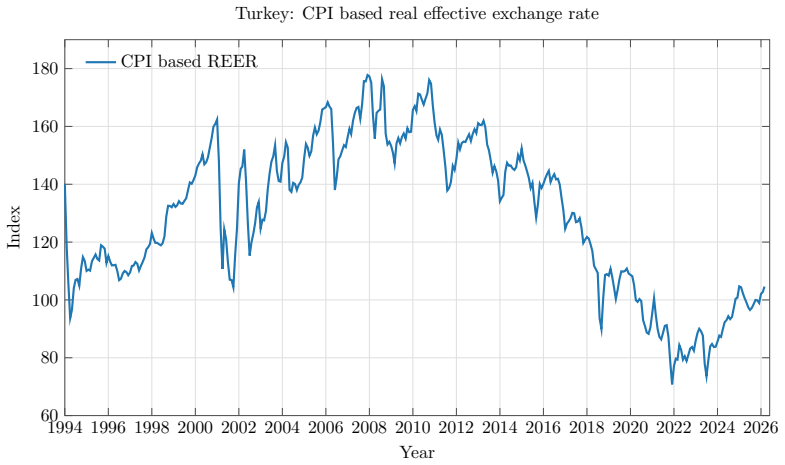


- Suppose domestic inflation is much higher than foreign inflation.
- PPP says the exchange rate should rise over time.
- If policy keeps E too low, the currency becomes **overvalued in real terms**.
- This is a fall in q: **weaker competitiveness**.
- This can happen through FX sales, regulations, deposit schemes, and expectations management.

$$\text{High } \pi - \pi^* \quad + \quad \text{slow } E \text{ adjustment}$$

$$\Rightarrow \quad q \downarrow$$

Real effective exchange rate



The term "effective" signifies that the rate is a weighted average based on trade volume, ensuring that a country's primary trading partners have a proportionally larger influence on the index than minor ones.

Exports and Imports as Functions

$$\boxed{X = f(q, Y_f)} \qquad \boxed{M = g(q, Y)}$$

$$\frac{\partial X}{\partial q} > 0, \qquad \frac{\partial X}{\partial Y_f} > 0$$

- Exports rise when the real exchange rate rises.
- Exports rise when foreign demand Y_f rises.

$$\frac{\partial M}{\partial q} < 0, \qquad \frac{\partial M}{\partial Y} > 0$$

- Imports fall when the real exchange rate rises.
- Imports rise when domestic demand Y rises.

$$NX = f(q, Y_f) - g(q, Y)$$

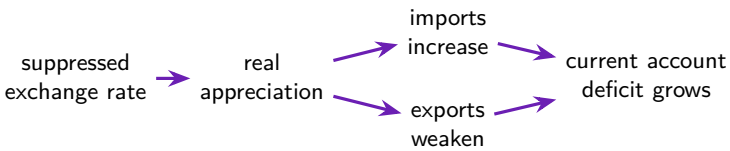
- $q \uparrow$: stronger price competitiveness, so $X \uparrow$ and $M \downarrow$.
- $q \downarrow$: weaker competitiveness, so $X \downarrow$ and $M \uparrow$.

Why Does the Current Account Deficit Grow?

$$CA \approx NX + \text{net income from abroad}$$

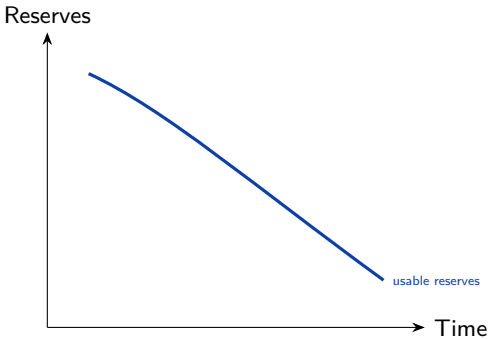
For the intro level, focus on:

$$CA \approx X - M$$



- Imported goods look cheap in domestic currency.
- Domestic production loses price competitiveness.
- More foreign currency is needed to pay for the excess of imports over exports.

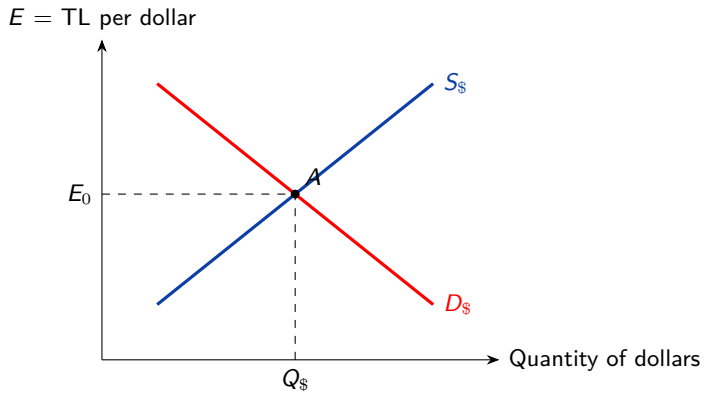
Why Is This Unsustainable?



- A current account deficit must be financed.
- Financing can come from capital inflows, borrowing, or central bank reserves.
- If investors lose confidence, inflows can stop suddenly.
- If reserves are used to suppress E, the reserves are finite.
- Eventually, the exchange rate must adjust, often abruptly.

Overvalued currency $\Rightarrow$ large FX need $\Rightarrow$ fragility

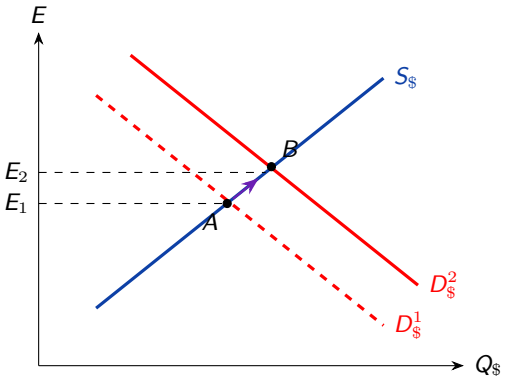
Foreign Currency Market



- Demand: imports, debt repayment, capital outflows, and expected depreciation.
- Supply: exports, tourism, foreign borrowing, capital inflows, and reserve sales.

Shock 1: Higher Demand for Foreign Currency

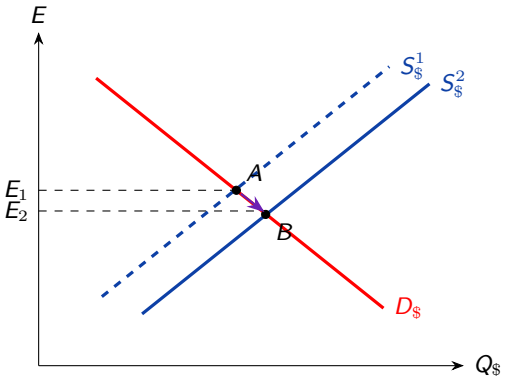
Example: import boom, capital outflow, or stronger depreciation expectations.



$D_\$ \uparrow \quad \Rightarrow \quad E \uparrow \quad \Rightarrow \quad$ depreciation

Shock 2: Higher Supply of Foreign Currency

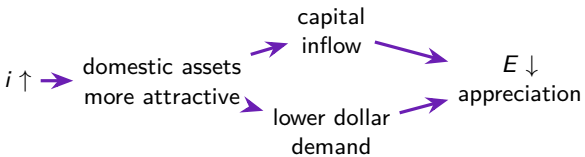
Example: export boom, tourism receipts, capital inflow, or foreign borrowing.



$S_\$ \uparrow \quad \Rightarrow \quad E \downarrow \quad \Rightarrow \quad$ appreciation

Shock 3: Monetary Policy Shock

Suppose the central bank raises the policy interest rate.



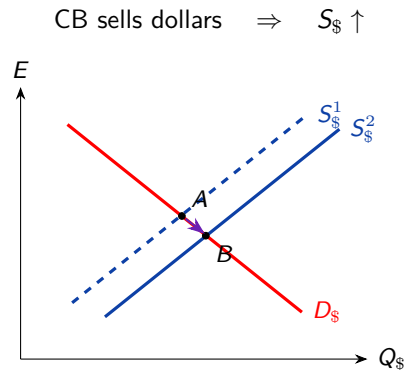
Tight monetary policy $\Rightarrow E \downarrow \Rightarrow$ appreciation

Easy monetary policy $\Rightarrow E \uparrow \Rightarrow$ depreciation

- This is the exchange-rate channel of monetary policy.
- It is especially important in open economies with mobile capital.

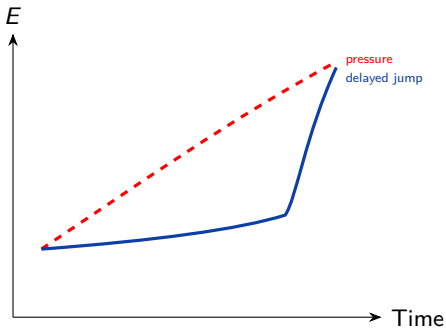
Shock 4: Central Bank Intervention

Central bank sells foreign currency reserves in the market:



- Intervention can slow depreciation in the short run.
- It uses reserves.
- If the inflation differential remains, pressure returns.

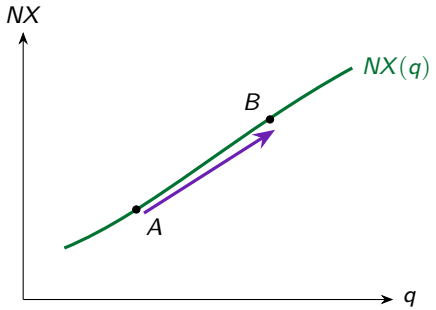
The Limit of Intervention



- Intervention changes the market supply today.
- It does not eliminate the reason people want foreign currency.
- If high inflation and low confidence continue, the market expects future depreciation.
- Once reserves become scarce, the exchange rate may jump.

Temporary price control $\neq$ permanent real adjustment

Exchange Rate and Net Exports



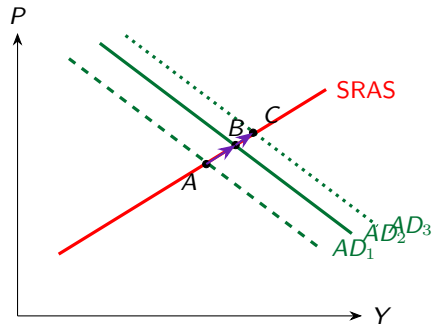
$$E \uparrow \Rightarrow q \uparrow \Rightarrow \begin{cases} \text{exports become cheaper for foreigners} \\ \text{imports become more expensive at home} \end{cases} \Rightarrow NX \uparrow$$

- This assumes quantities respond to relative prices.
- Very short run: import bills can rise before quantities adjust.

Monetary Policy: Exchange Rate Amplifies AD

Expansionary monetary policy:

$$i \downarrow \quad \Rightarrow \quad E \uparrow \quad \Rightarrow \quad NX \uparrow$$

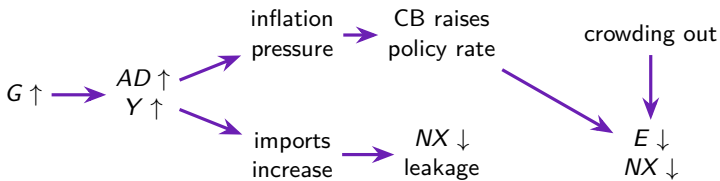


- First effect: lower interest rates increase C and I, so AD shifts right.
- Exchange-rate effect: depreciation raises NX, so AD shifts further right.
- In an open economy, this exchange-rate channel can make monetary policy more powerful.

Fiscal Policy: CB Reaction and Crowding Out

Expansionary fiscal policy:

$$G \uparrow \quad \Rightarrow \quad AD \uparrow$$



- Fiscal expansion can be inflationary; central banks often respond by raising the policy rate.
- In the short run, higher G can crowd out private demand: C and I fall.
- Imports also rise with domestic demand, so fiscal policy is weaker in an open economy.

Policy Through the Exchange Rate

Shock	FX market	Exch. rate	AD effect through NX
Monetary easing	$D_\$ \uparrow$ or $S_\$ \downarrow$	$E \uparrow$	$NX \uparrow$, AD amplified
Monetary tightening	$D_\$ \downarrow$ or $S_\$ \uparrow$	$E \downarrow$	$NX \downarrow$, AD contraction amplified
Fiscal expansion	imports and CB reaction	often $NX \downarrow$	AD leakage/crowding out
CB sells FX	$S_\$ \uparrow$	$E \downarrow$	$NX \downarrow$ temporarily
Import boom	$D_\$ \uparrow$	$E \uparrow$	import prices rise
Export boom	$S_\$ \uparrow$	$E \downarrow$	purchasing power rises

- The exchange rate is not only a price of foreign currency.
- It is also a transmission channel from policy and shocks to aggregate demand, inflation, and the current account.
- In open economies, monetary policy is often more effective and fiscal policy less effective because the exchange rate and imports create additional feedback.

Exchange Rate Regimes

Regime	How it works	Main tradeoff
Fixed exchange rate	Central bank commits to a target value for E and buys/sells FX to defend it.	More exchange-rate stability, but less monetary-policy independence.
Managed float	The market moves E, but the central bank sometimes intervenes to reduce volatility or guide the path.	Some flexibility, but intervention can use reserves and create credibility questions.
Floating exchange rate	The market determines E with little direct intervention.	More monetary-policy independence, but more exchange-rate volatility.

More fixing $\Rightarrow$ more reserve use and less policy independence

More floating $\Rightarrow$ more exchange-rate adjustment and volatility

Takeaways

1. **PPP:**
$$\frac{\Delta E}{E} \approx \pi - \pi^*$$
Higher domestic inflation implies long-run depreciation.
2. **Short run:** exchange rates can deviate from PPP because of interest rates, risk, expectations, and intervention.
3. **Real exchange rate:**
$$q = \frac{EP^*}{P}$$
If domestic prices rise but E is suppressed, q falls and competitiveness becomes weaker.
4. **Exports and imports:** $X = f(q, Y_f)$ with $(+, +)$ and $M = g(q, Y)$ with $(-, +)$, so a lower q reduces X and raises M.
5. **Policy:** monetary policy can be more effective in an open economy through the exchange-rate channel; fiscal policy can be less effective because of import leakage, central-bank reaction, and short-run crowding out.