ECONOMICS:
Economics in a Global Context:
CURRENCY EXCHANGE RATES

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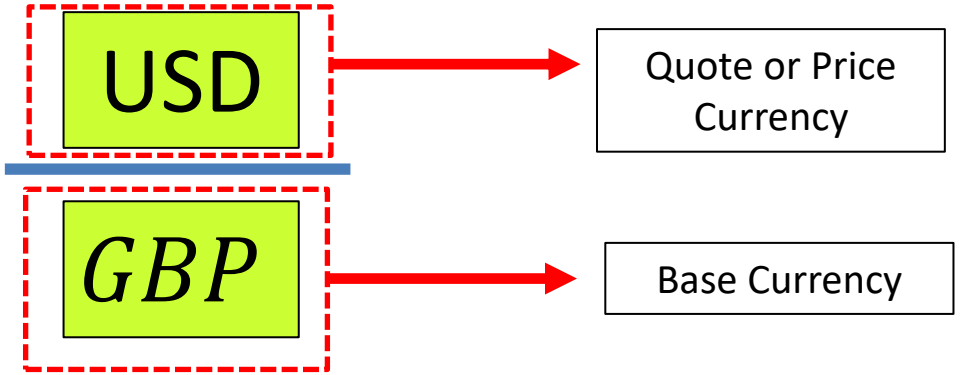
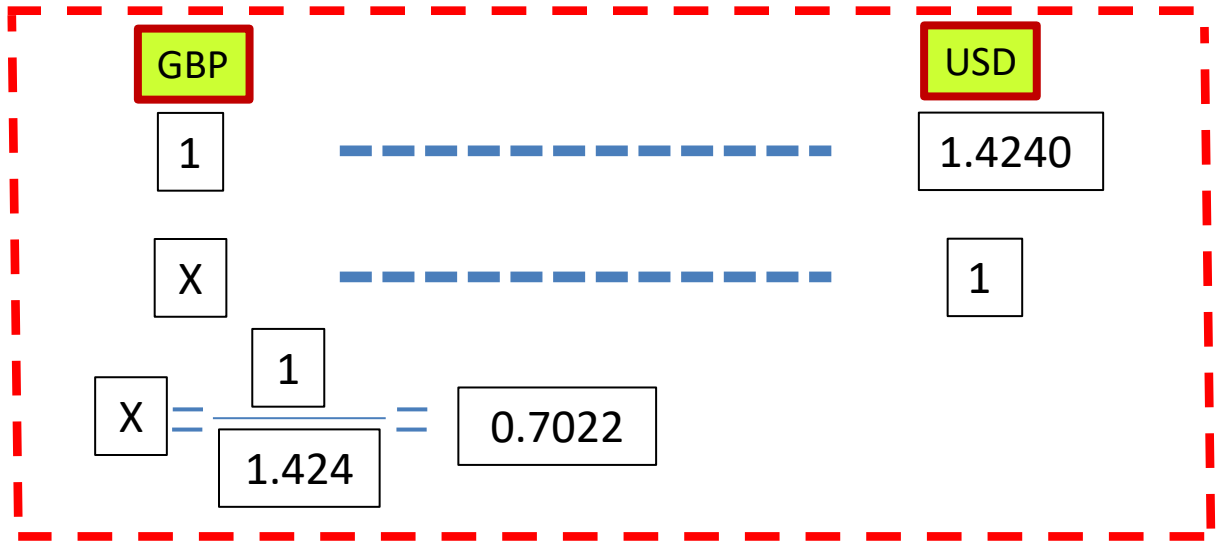


X US Dollars per 1 Great Britain Pound

$$1.42 \ \frac{USD}{GBP} \qquad \frac{1.42USD}{GBP}$$

1.42 US Dollars per one Great Britain Pound



Nominal exchange rate → Quoted rate at any point in time

Real exchange rate → Nominal exchange rate adjusted for inflation in each country compared to a base period

$$\textbf{Real Exchange Rate } \left(\frac{Quote\ Currency}{Base\ Currency}\right) = \textbf{Nominal Exchange Rate } \left(\frac{Quote\ Currency}{Base\ Currency}\right) x \frac{CPI_{Base\ Currency}}{CPI_{Quote\ Currency}}$$

Real Exchange Rate $\left(\frac{Quote\ Currency}{Base\ Currency}\right) =$ **Nominal Exchange Rate** $\left(\frac{Quote\ Currency}{Base\ Currency}\right) x \frac{CPI_{Base\ Currency}}{CPI_{Quote\ Currency}}$

Time - 0

Time - 1

$1 \frac{USD}{EUR}$

Inflation USA = 3%

Inflation Euro = 0%

$1 \frac{USD}{EUR}$

THE REAL PURCHASING POWER OF ONE €URO exchanged for one $, has decreased due to the increase in prices in the US

Real Exchange Rate $\left(\frac{USD}{EUR}\right) = 1 \frac{USD}{EUR} x \frac{100}{103} = 0.97$

Base period: 1/1/X1 exchange rate=1.20$/€
1/1/X3 exchange rate=1.30$/€

Base period: 1/1/X1 CPI_{USD}=100; CPI_{euro}=100

- 1/1/X3, CPI_{USD}=114; CPI_{euro}=109

Calculate the real exchange rate on 1/1/X3

Real Exchange Rate $\left(\frac{Quote\ Currency}{Base\ Currency}\right)$ = **Nominal Exchange Rate** $\left(\frac{Quote\ Currency}{Base\ Currency}\right) x \frac{CPI_{Base\ Currency}}{CPI_{Quote\ Currency}}$

$$\text{Real Exchange Rate}\left(\frac{\$}{€}\right) = 1.3\ x\ \frac{109}{114} = 1.243$$

Spot exchange rates → Exchange rates for immediate delivery

Forward Contract → An agreement to buy or sell a specific amount of a foreign currency at a future date at the quoted forward exchange rate (e.g. 30,60 or 90 days in the future)

HEDGERS

Have an existing FX risk that they want to reduce/eliminate with forward FX contracts

SPECULATORS

Have no existing FX risk

They take on FX risk with forward contracts with the expectation of earning a profit

SELL SIDE

Market Makers→ Large multinational Banks

BUY SIDE

① Corporations

② Investment Accounts: Real Money and leveraged

③ Governments, sovereign wealth funds, pension plans, central banks

④ Retail market: Household (e.g. tourism)

CURRENCY APPRECIATION/DEPRECIATION

Exchange rate t=0	Exchange rate t=1	$	€
$1 \frac{USD}{EUR}$	$2 \frac{USD}{EUR}$	↓	↑
$0.5 \frac{USD}{EUR}$	$0.3 \frac{USD}{EUR}$	↑	↓
$0.5 \frac{EUR}{USD}$	$0.3 \frac{EUR}{USD}$	↓	↑
$0.3 \frac{EUR}{USD}$	$0.5 \frac{EUR}{USD}$	↑	↓
$1 \frac{EUR}{USD}$	$2 \frac{EUR}{USD}$	↑	↓

CURRENCY APPRECIATION/DEPRECIATION

Exchange rate t=0	Exchange rate t=1	% $	% €
$1 \frac{USD}{EUR}$	$2 \frac{USD}{EUR}$	↓50%	↑100%
$0.5 \frac{USD}{EUR}$	$0.3 \frac{USD}{EUR}$	↑67%	↓40%
$0.5 \frac{EUR}{USD}$	$0.3 \frac{EUR}{USD}$	↓40%	↑67%
$0.3 \frac{EUR}{USD}$	$0.5 \frac{EUR}{USD}$	↑67%	↓40%
$1 \frac{EUR}{USD}$	$2 \frac{EUR}{USD}$	↑100%	↓50%

Cross Rates → The exchange rate between two currencies implied by their exchange rates with a common third currency

If you have the following quotes:

$\frac{USD}{GBP}$

$\frac{CHF}{USD}$

→ The common currency is the **USD**

The cross rate defines the value of the GBP versus the CHF

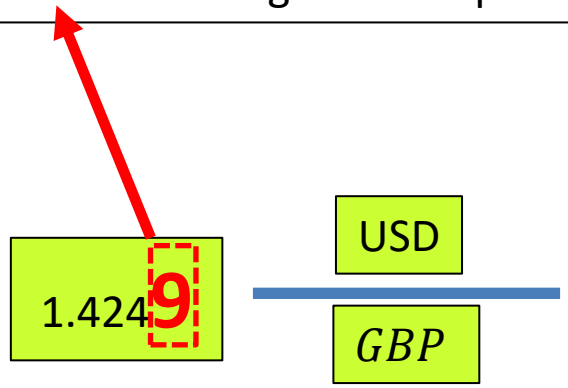
$$\frac{\cancel{USD}}{GBP} \times \frac{CHF}{\cancel{USD}} = \frac{CHF}{GBP}$$

$$1.4240\ \frac{USD}{GBP} \times 1.0226\ \frac{CHF}{USD} = 1.4562\ \frac{CHF}{GBP}$$

$$\frac{1}{1.4562} = 0.6867\ \frac{GBP}{CHF}$$

Forward quote is points above (below) spot

Point is last digit of the spot rate quote (fourth decimal point)



If $/€ spot is 1.4249 and the forward quote is +23.4 points

$$\boldsymbol{Forward = 1.4249 + 23.4\,(0.0001) = 1.42724}$$

Percentage Basis

Spot 1.6135 $/€. 90 day forward quote is -0.29%

$$\boldsymbol{Forward = 1.6135\,(1 - 0.0029) = 1.6088}$$

We say the US Dollar is trading at a forward premium relative to the Euro

If the forward quote is -47 points, **percentage forward quote** -0.0047/1.6135 = -0.0029= -0.29%

Calculate and interpret a forward discount or premium;

If the forward quote is **greater** than the spot price:

Base currency is trading at a forward premium

Price/ Quote currency is trading at a forward discount

If the forward quote is **less** than the spot price:

Base currency is trading at a forward discount

Price/ Quote currency is trading at a forward premium

No Arbitrage Forward Exchange Rates

$$\text{Forward Price} = \text{Spot Price} \times \frac{\left(1 + R_{quote\ currency} \times \frac{\text{Days}}{360}\right)}{\left(1 + R_{Base\ currency} \times \frac{\text{Days}}{360}\right)}$$

Covered ⇒ Bound by arbitrage

① Changes in interest rates will just offset differences in exchange rates

② The currency with higher nominal interest rate will depreciate

③ When CIRP holds, an investor will make the same return holding either currency

If the US interest rate is 6% and the Euro rate is 4%

⇓

US Dollar will depreciate by approximate 2% relative to the euro

Spot Rate = 1.5 USD/GBP.

Riskless US interest rate= 2%
Riskless GB interest rate= 2.5%

Calculate the arbitrage free, 1-year forward rate

$$\text{Forward Price} = \text{Spot Price} \times \frac{\left(1 + R_{quote\ currency} \times \frac{\text{Days}}{360}\right)}{\left(1 + R_{Base\ currency} \times \frac{\text{Days}}{360}\right)}$$

$$\text{Forward Price} = 1.5 \times \frac{(1 + 2\%)}{(1 + 2.5\%)} = 1.4927 \text{ USD/GBP}$$

Euro 90 day annualized risk free interest rate = 3%
AUD 90 day annualized risk free interest rate = 4%

Spot EUR/AUD rate is 0.7276. Calculate the 90 forward AUD/EUR no-arbitrage rate

$$\text{Forward Price} = \text{Spot Price} \times \frac{\left(1 + R_{quote\ currency} \times \frac{\text{Days}}{360}\right)}{\left(1 + R_{Base\ currency} \times \frac{\text{Days}}{360}\right)}$$

$$\text{Forward Price} = 1.3744 \times \frac{\left(1 + 4\% \times \frac{90}{360}\right)}{\left(1 + 3\% \times \frac{90}{360}\right)} = 1.3778\ \text{AUD/EUR}$$

Calculate and interpret the forward rate consistent with the spot rate and the interest rate in each currency;

Spot	1	Dollar per Euro
Interest rate €	2%	
Interest rate $	4%	
One Year "Fair" rate	1.0196	Dollars per Euro
One Year Actual rate	1.0125	Dollars per Euro

If I give euros I receive less than what I deserve. Hence, give dollars

Borrow 500,000 euros
Exchange today to dollars
Invest in dollars
Enter today in the forward contract agreing to pay 520,000 dollars

Cash Flows

	Time 0	Time 1
€	500,000	(510,000)
$	500,000	520,000
	ENTER THE FORWARD	
$		(520,000)
€		513,580.25
Profit		**3,580**

Describe exchange rate regimes;

SPECTRUM

EXTREME A. TOTAL LACK OF FREEDOM IN EXCHANGE RATE FLUCTION
DOLLARIZATION

EXTREME B. TOTAL FREEDOM IN EXCHANGE RATE FLUCTUATION
INDEPENDENTLY FLOATING

Countries without sovereign currency

① Formal Dollarization → Uses other country´s currency — ECUADOR AND ZIMBABWE

② Monetary Union → Several countries use a common currency

COUNTRY CANNOT HAVE ITS OWN MONETARY POLICY

DOLLARIZATION	ECUADOR
MONETARY UNION	EMU (Spain, etc…)
CURRENCY BOARD	HONG KONG
FIXED PARITY	SAUDI ARABIA (3.75 DOLLARS PER SAR)
TARGET ZONE	SLOVAK REPUBLIC PRE JOINING EUROPE
CRAWLING PEG	CHINA (gradually moving to floating)
CRAWLING BAND	COSTA RICA (2006-2015)
MANAGED FLOAT	COSTA RICA (2015-CURRENTLY)
INDEPENDENT	AUSTRALIA, CANADA, ETC..

Countries with sovereign currency

① Currency Board → Commits to a fixed rate of exchange of domestic for a foreign currency

extreme form of a pegged exchange rate, in which management of the exchange rate and the money supply are taken away from the central bank. Local currency 100% backed by foreign

② Conventional fixed peg → Maintain at pegged rate (+/- 1%) via direct intervention in the FX markets or indirectly via monetary policy changes

③ Target zone → Gives flexibility to maintain the exchange rate within a wider range (e.g. +/- 2%)

Countries with sovereign currency

④ Crawling Peg → Allows exchange rate to move slowly with changes in fundamentals

- Active→ Announced and implemented
- Passive→ Managed but market driven (ie. Responses to inflation)

⑤ Crawling BANDS → The width of the bands that permits free fluctuations is widen over time.

⑥ Managed floating → Does not have a target exchange rate; influences exchange rate through direct intervention or monetary policy. Common method used to transition to a floating rate from a fixed peg

⑦ Independently floating → Market determined

$$(X - M) = (private\ savings\ - investment) + (tax\ revenue\ - government\ spending)$$

If (X-M) > 0 → Trade surplus when private savings + government surplus exceeds domestic investment

If (X-M) < 0 → Trade deficit when private savings – domestic investment is less than budget deficit

Exchange Rates and Trade Deficit

Elasticities Approach

$$W_M = \frac{Imports}{(Imports + Exports)}$$

$$W_X = \frac{Exports}{(Imports + Exports)}$$

$\varepsilon_X \; and \; \varepsilon_M$ are demand elasticities of exports and imports

Generalized Marshall-Lerner Condition

$If \; W_X\varepsilon_X + W_M(\varepsilon_M - 1) > 0$ ⇒ Then depreciation of domestic currency will decrease trade deficit

Exchange Rates and Trade Deficit

$When\ W_X = W_M = 0.5, we\ get\ the:$

Classic Marshall-Lerner Condition

$$\varepsilon_X + \varepsilon_M > 1$$

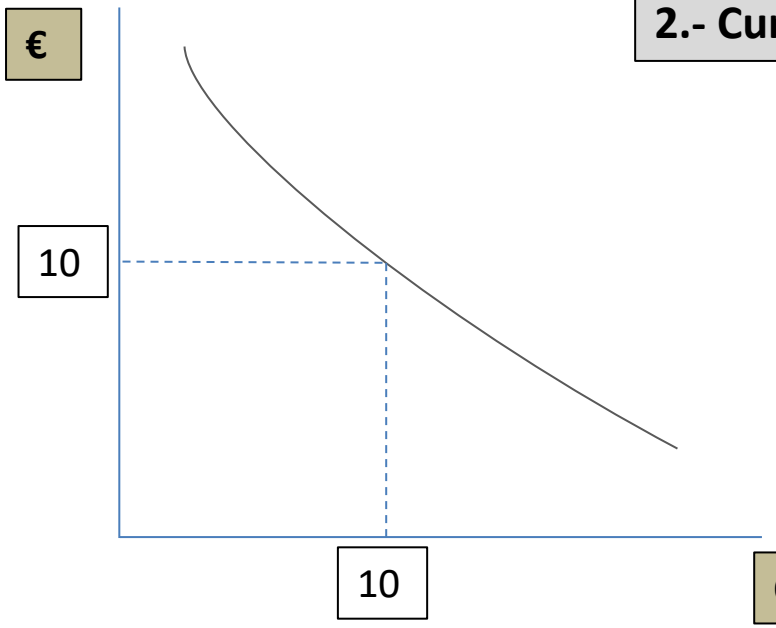
This is a sufficient condition, not a necessary condition, for a currency depreciation to reduce the trade deficit

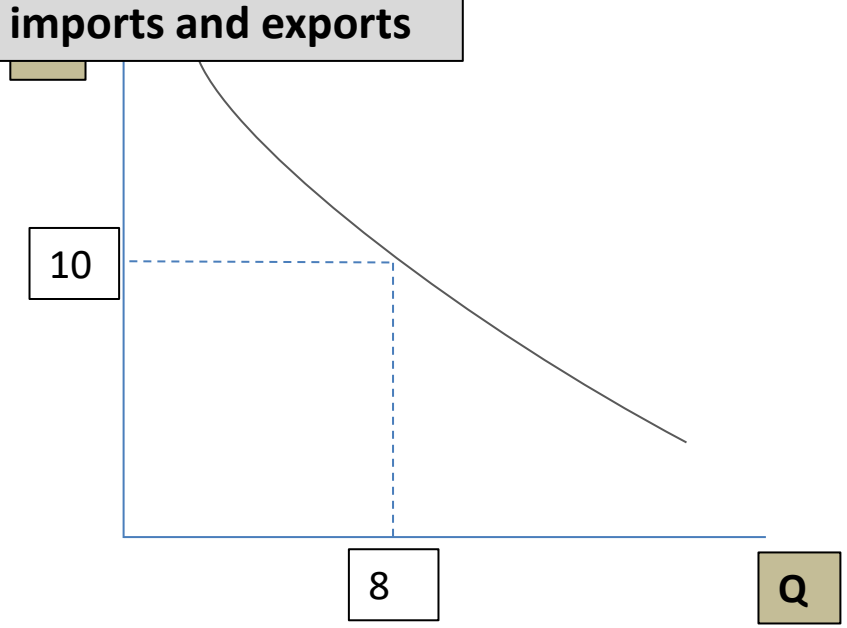
IMPORTS

1.- Currency Depreciates. Very Elastic imports and exports

2.- Currency Depreciates. Very InElastic imports and exports

EXPORTS





I_0= P X Q = 10 X 10 = 100

I_1= P X Q = 11 X 8 = 88

I_2= P X Q = 11 X 9.5 = 104.5

$$(X - M) = 80 - 100 = -20$$

$$(X - M) = 86.4 - 88 = -1.6$$

$$(X - M) = 75.6 - 104.5 = -28.9$$

X_0= P X Q = 10 X 8 = 80

X_1= P X Q = 9 X 9.6 = 86.4

X_2= P X Q = 9 X 8.4 = 75.6

WE ARE IGNORING CAPITAL FLOWS!

J- Curve Effect

① In the **short run**, due to existing contracts, export and import demand are **relatively inelastic**

Currency depreciation initially leads to a larger trade deficit

② In the **long run**, elasticities increase

Currency depreciation leads to a reduction in the trade deficit

The absorption approach

Includes the effect of currency depreciation on **capital flows**, as well as trade flows

Exports- Imports = National Income - Expenditures

For depreciation to improve the balance of trade:

National income must increase relative to expenditures

National saving (private + government) must increase relative to domestic investment in physical capital

$$(X - M) = (private\ savings\ - investment) + (tax\ revenue\ - government\ spending)$$

The absorption approach

For the Balance of Trade to improve → National income must increase relative to expenditures

For the Balance of Trade to improve → National saving (private + government) must increase relative to domestic investment in physical capital

$$(X - M) = (private\ savings\ - investment) + (tax\ revenue\ - government\ spending)$$

$$S + (T - G) - I$$

↑ ↑

ECONOMY BELOW FULL EMPLOYMENT

↓

Currency depreciation leads to reduction in deficit

The absorption approach

National income must increase relative to expenditures

National saving (private + government) must increase relative to domestic investment in physical capital

$$(X - M) = (private\ savings\ - investment) + (tax\ revenue\ - government\ spending)$$

$$S + (T - G) - I$$

↑ ↑

ECONOMY AT/NEAR FULL EMPLOYMENT

Currency depreciation doesn't lead to reduction in deficit (inflation effect)