ECO 3302 – Intermediate Macroeconomics

Lecture 10: The Open Economy

Luis Pérez
(luisperez@smu.edu)

April 2–9, 2025

Table of Contents

1. Introduction
2. International Flows
3. Savings and Investment
   - Small Open Economy
   - Large Open Economy
4. Exchange Rates
   - Nominal vs. Real Exchange Rate
   - Policy Effects on Real Exchange Rate
   - Determinants of the Nominal Exchange Rate
5. Taking Stock

Introduction

Introduction

- So far we've focused on closed economies
- But **today's world is a highly integrated one**: consumers and firms purchase goods and services and invest both domestically and abroad
  - In supermarket, you can buy all kinds of cheese & wine (US, Spanish, French, ...)
  - In mall, you can buy clothes from all over world: Tom Ford, Chanel, Ferragamo, ...
  - In financial markets, you can invest in S&P500, DAX, TSLA, TSMC, ...
- **Economists believe a highly integrated world is good for many reasons**:
  - Greater variety of goods and services to choose from
  - More competition
  - More opportunities to diversify risk

Introduction

- **Today, we begin the study of open-economy macroeconomics**:
  - How to measure connections (and their strength) between countries?
  - What determines international flows of goods and services? And financial flows?
  - Does it matter if the economy is large or small relative to the rest of the world?
  - What determines rate at which domestic currency trades for foreign currency?
  - ⋮

International Flows

Closed vs. Open economy

- **Key difference between closed and open economy**: in open economy, aggregate spending needs not equal produced output
  - Country can borrow from and lend to foreign countries

- **National accounting in open economy**:

$$Y = C + I + G + \underbrace{(X - M)}_{\equiv NX \text{ (net exports)}}$$

Y: output C: consumption I: investment G: gvt spending X: exports M: imports

- Domestic output is the sum of consumption, investment, gvt spending, and net exports; we subtract imports because they are not produced domestically

Net exports and trade balances

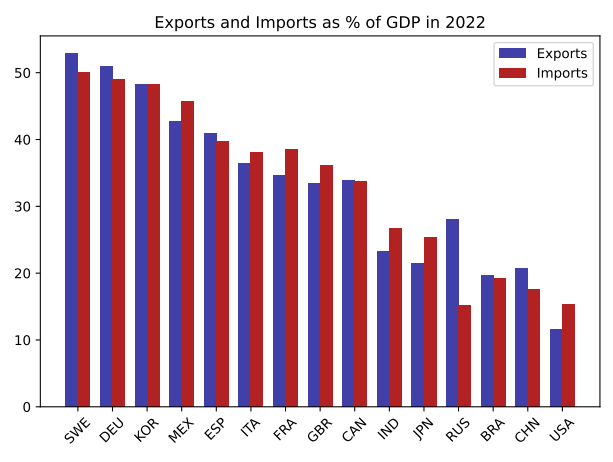
- Rearranging previous expression, **net exports**:

$$NX = Y - (C + I + G)$$

- **Three possibilities**:
  1. If country's output exceeds domestic spending (ie, $Y > C + I + G$), it exports the difference, and net exports are positive (ie, $NX > 0$)
  2. If country's output equals domestic spending (ie, $Y = C + I + G$), net exports are zero (ie, $NX = 0$)
  3. If country's output falls short of domestic spending (ie, $Y < C + I + G$), it imports the difference, and net exports are negative (ie, $NX < 0$)
- **Thus, net exports reflect a country's trade balance**: if net exports are positive, country runs a trade surplus; if negative, it runs a trade deficit

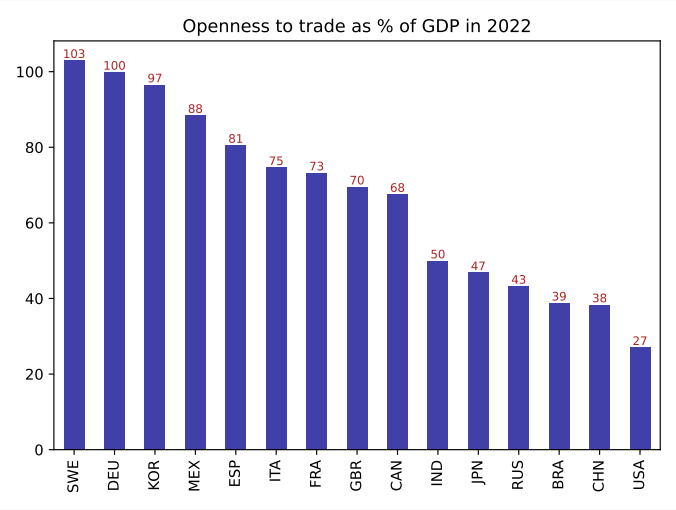
Exports and imports

Lots of trade going on in the world economy: imports and exports represent sizable fractions of countries' GDPs (but there are exceptions like North Korea)



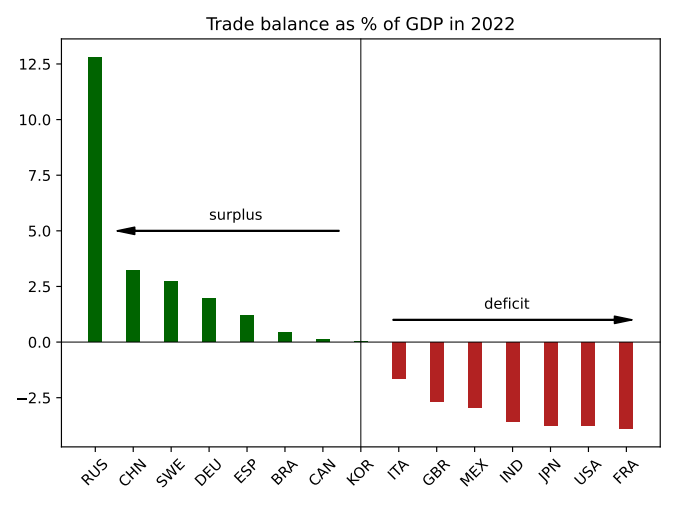
Openness to trade = (Exports + Imports) / GDP

Smaller economies are generally more open to trade



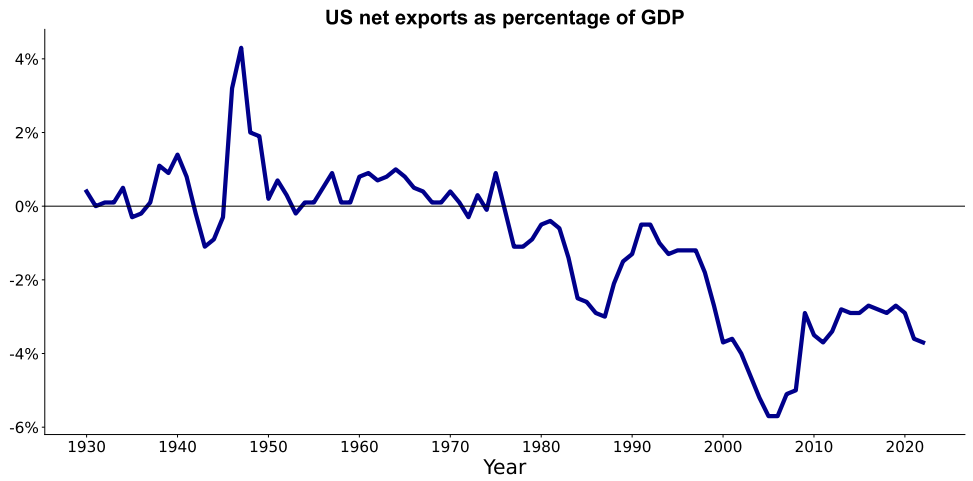
Trade balance = (Exports − Imports) / GDP

Trade deficits and surpluses can be large relative to GDP



US trade balance = (Exports − Imports) / GDP

US has been running a trade deficit since the mid 1970s



International capital flows and trade balance

- Rearranging accounting relationship, we can write:

$$\underbrace{Y - C - G}_{\equiv S \text{ (national savings)}} = I + NX$$

- Hence, **net foreign investment** $(= S - I)$ **is equal to the trade balance**

$$S - I = NX$$

- Net foreign investment is the amount of money that domestic residents lend abroad minus the amount they borrow from foreign residents

- National accounting makes clear that intl flow of funds and intl flow of goods and services are two sides of same coin

The paradox of the US trade deficit

- **As we just saw, the US continuously ran a trade deficit since the mid 1970s**
  - This means that US investment has been larger than US savings
  - In other words, the US has been receiving capital flows from other countries
  - Majority of countries investing in the US are poorer
    (eg, Malaysia, China, South Africa, Slovenia, Uruguay, ...)

- **Paradox in direction of capital flows**: relatively poor countries invest in US whereas economic theory suggests it should be the other way around
  - Capital is scarcer in poorer countries
  - Returns to capital are higher where it is scarcer

The paradox of the US trade deficit

- **Return to capital** with Cobb–Douglas production and perfect competiton:

$$R = \alpha A \left(\frac{K}{L}\right)^{\alpha-1}$$

Return to capital is higher in countries with lower capital-labor ratios

- **Why does capital not flow into poorer countries?** Possible explanations:
  - Rich countries like the US have superior technologies (ie, $A_{\text{rich}} > A_{\text{poor}}$)
  - Rich countries like the US have better institutions (ie, $A_{\text{rich}} > A_{\text{poor}}$)

Savings and Investment

Savings and investment in a small open economy

- We now build a model of savings an investment to explain the trade balance
- This model is for a **small open economy (SOE)**—economy sufficiently small as to not influence global prices or interest rates—with **perfect capital mobility** (ie, capital is freely mobile across countries)

  World interest rate r^* taken as given

- You may worry this economy doesn't make justice to large countries like US
  - For now think of SOE model as useful benchmark to build intuition
  - We'll focus in large economies soon enough
- Since equilibrium interest rate does not adjust to balance *domestic* savings and investment, economy can borrow/lend and run a trade deficit/surplus
  - In closed economy, eq. interest rate balances supply & demand of savings

Savings and investment in a small open economy

- **Assumptions**:
  1. World interest rate r^* taken as given
  2. Economy's output fixed by its factors of production: $Y = \overline{Y} = F(\overline{K}, \overline{L})$
  3. Consumption is positively related to disposable income: $C = C(Y - T)$
  4. Investment is negatively related to interest rate: $I = I(r)$

- **Accounting identity**:

$$NX = (Y - C - G) - I \equiv S - I$$

- **Making use of assumptions**:

$$NX = \left[\overline{Y} - C(\overline{Y} - T) - G\right] - I(r^*) \equiv \overline{S} - I$$

Savings and investment in a small open economy

$$NX = \underbrace{\left[\overline{Y} - C(\overline{Y} - T) - G\right]}_{\overline{S}\text{, savings}} - I(r^*)$$

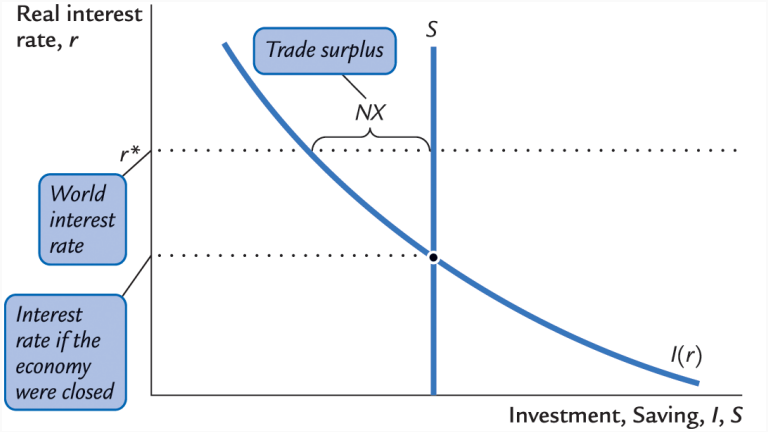
This equation says:

- Trade balance NX depends on vars affecting savings S and investment I (those variables are interest rate r^*, government spending G and taxes T)
- More austere fiscal policy ($\downarrow G$ or $\uparrow T$) raises national savings
- A higher interest rate makes less projects attractive

Equilibrium in small open economy

Investment determined by world interest rate r^*, which is taken as given

Domestic savings don't need to equal investment $\rightarrow$ Trade imbalance

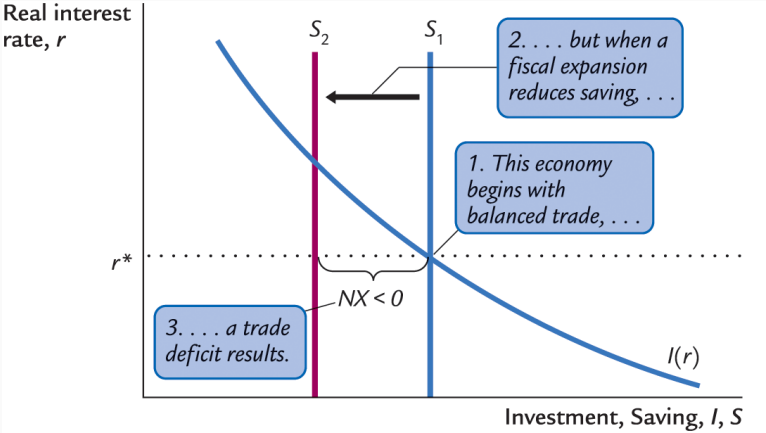


Fiscal policy and the trade balance in SOE

- Now try to understand how trade balance responds to changes in fiscal policy
- **Baseline scenario**: balanced trade ($NX = 0$)
- **Two fiscal-policy experiments**:
  1. Expansionary fiscal policy at home: ↑ domestic G or ↓ domestic T
     - ↑ domestic $G \Longrightarrow$ ↓ domestic S $(= Y - C - G)$, I unchanged since r^* fixed; Hence, $S < I$ and economy runs trade deficit: $NX = S - I < 0$
     - ↓ $T \Longrightarrow$↑ $C \Longrightarrow$↓ S, Iunchanged $\Longrightarrow NX < 0$
  2. Expansionary fiscal policy abroad: ↑ foreign G
     - ↑ foreign $G \Longrightarrow$ ↓ foreign S $(= Y - C - G)$, r^* **increases since rest of world is large**. ↑ $r^* \Longrightarrow$↓ I, domestic S unchanged; hence economy runs trade surplus: $NX > 0$

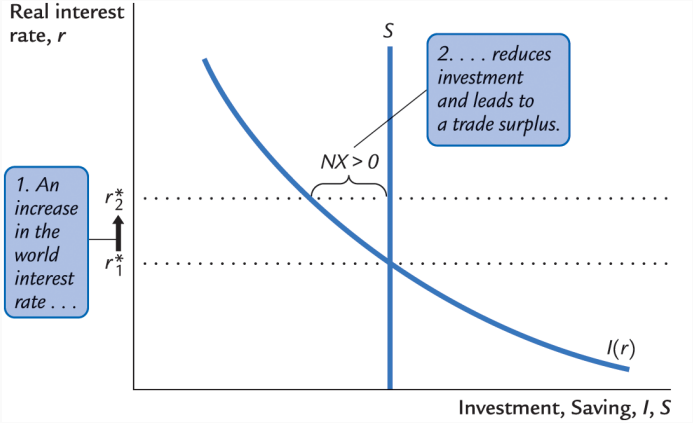
Fiscal expansion at home in SOE

Increase in government spending at home reduces domestic savings while leaving investment unchanged (since r^* unaffected) $\Longrightarrow$ **Trade deficit**



Fiscal expansion abroad in SOE

Increase in government spending abroad reduces foreign savings.
Because RoW is large, interest rate rises and domestic investment decreases
Given that domestic savings unchanged (independent of r^*) $\Longrightarrow$ **Trade surplus**

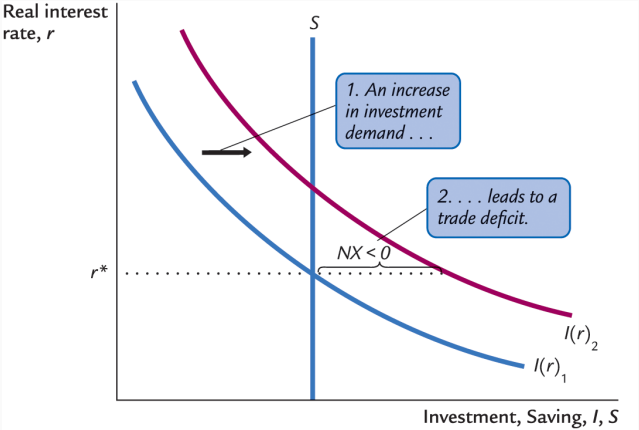


Savings and investment in a small open economy

- Now try to understand how trade balance responds to changes in investment
- **Baseline scenario**: balanced trade ($NX = 0$)
- **Experiment**: Suppose there is higher demand at every interest rate
  (Eg, gvt offers investment tax credits)
  - Outward shift of investment curve
  - Domestic savings curve unaffected
  - Investment financed by borrowing internationally
  - Trade deficit: $NX = S - I < 0$

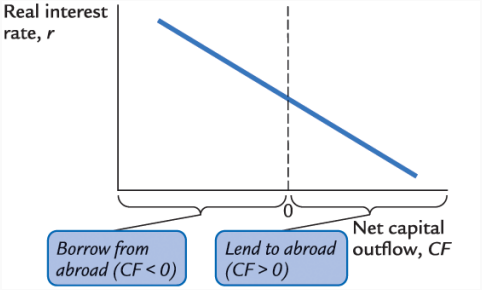
Experiment: Outward shift in investment curve

Outward shift in investment curve doesn't cause savings to respond so investment financed by borrowing more internationally $\Longrightarrow$ **Trade deficit**



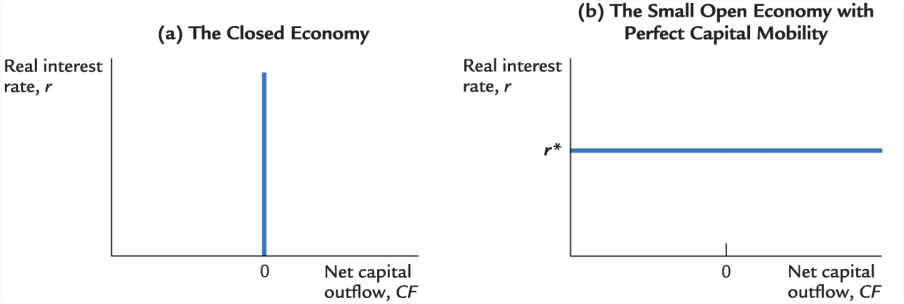
Savings and investment in a large open economy

- Countries like US, China or Rusia are everything but small open economies
- We develop a different model for these countries—one in which the world interest rate is not taken as given—called a **large open economy model**
- **Key assumption**: net flow of capital to other countries, CF, negatively related to domestic/world real interest rate r: $CF(r)$



Savings and investment in a large open economy

- **Notice the contrast of LOE with previous models** (closed economy and SOE)
  - In LOE, net capital outflow CF to other countries negatively associated with r
  - In closed economy, $CF = 0$ for all interest rates
    (Investors unwilling to hold foreign assets or these transactions prohibited by law)
  - In SOE with perfect capital mobility, capital flows at world interest rate r^*



Large open economy model

- **Two key markets**:
  - Market for loanable funds, where interest rate r is determined
  - Market for foreign exchange, where exchange rate ε is determined
- These two prices, r and ε, will determine the allocation of resources
- **Assumptions**:
  1. World interest rate r affected by asset transactions in large open economy
  2. Economy's output fixed by its factors of production: $Y = \overline{Y} = F(\overline{K}, \overline{L})$
  3. Consumption is positively related to disposable income: $C = C(Y - T)$
  4. Investment is negatively related to interest rate: $I = I(r)$
  5. Net capital outflow negatively related to interest rate: $CF = CF(r)$
  6. Net exports negatively related to the exchange rate ε: $NX = NX(\varepsilon)$

Large open economy model

- **Market for loanable funds**. Using accounting identity:

$$S = I + CF$$

National savings used to finance domestic investment or net capital outflows

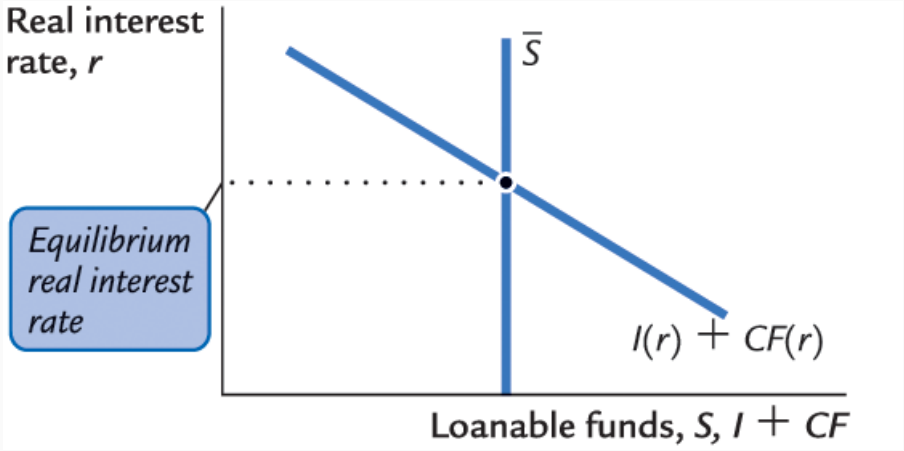
- **Making use of assumptions**:

$$\overline{S} = I(r) + CF(r)$$

  - National savings fixed by level of output, fiscal policy & consumption function
  - Investment and net capital outflows depends on *domestic* real interest rate

Equilibrium in market for loanable funds in LOE

Eq. interest rate balances supply ($\overline{S}$) and demand ($I + CF$) of loanable funds



Large open economy model

- **Market for foreign exchange**. Using accounting identity:

$$NX = S - I = CF$$

- **Making use of assumptions**:

$$NX(\varepsilon) = CF$$

Real exchange rate ε equilibrates trade balance and net capital outflow

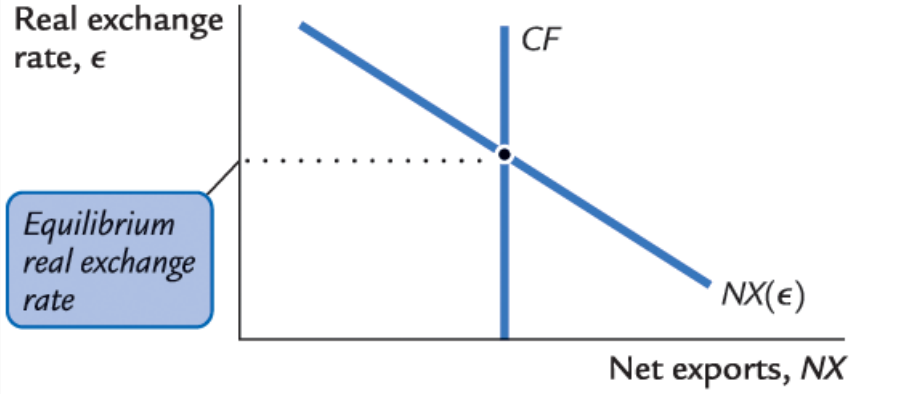
- Nominal exchange rate e is real exchange rat times ratio of price levels

$$e = \varepsilon \times \frac{P^*}{P}$$

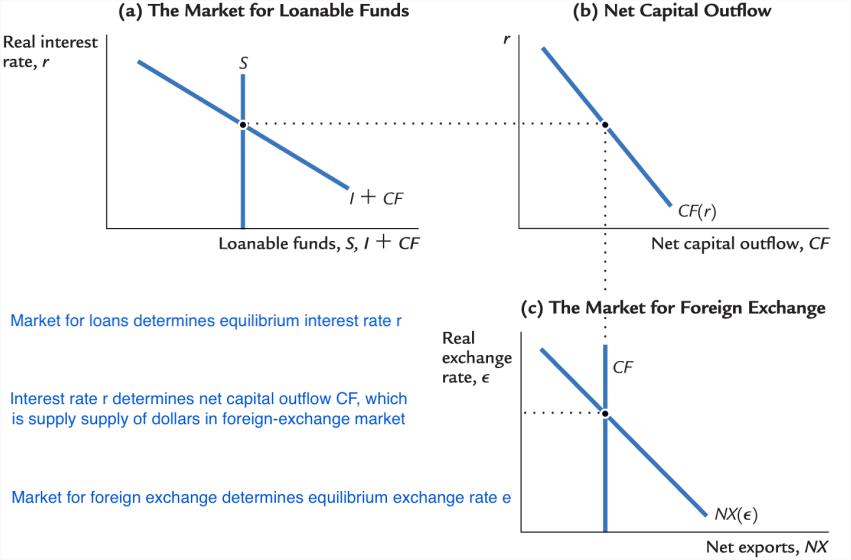
  - Real exchange rate ε determined in market for foreign exchange
  - Price levels determined by (domestic and foreign) monetary policies

Equilibrium in market for foreign exchange in LOE

Equilibrium real exchange rate ε equilibrates trade balance & net capital outflow



Equilibrium in LOE



Market for loans determines equilibrium interest rate r

Interest rate r determines net capital outflow CF, which is supply supply of dollars in foreign-exchange market

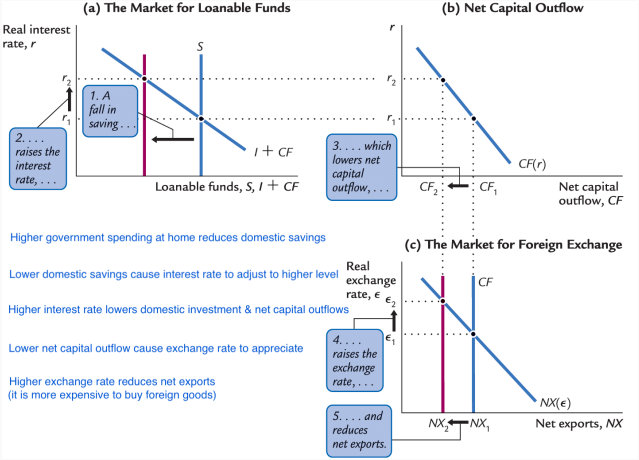
Market for foreign exchange determines equilibrium exchange rate e

Fiscal policy and the trade balance in LOE

- Now do same fiscal policy experiments we did for SOE
- **Baseline scenario**: balanced trade ($NX = 0$)
- **Two fiscal-policy experiments**:
  1. Expansionary fiscal policy at home: ↑ domestic G or ↓ domestic T
     - ↑ domestic $G \Longrightarrow$ ↓ domestic S $(= Y - C - G) \Longrightarrow$ ↑ r **due to lower savings** $\Longrightarrow$↓ $I(r), CF(r) \Longrightarrow$ ↑ $\varepsilon \Longrightarrow$ ↓ NX and economy runs trade deficit
     - ↓ $T \Longrightarrow$↑ $C \Longrightarrow$↓ $S \Longrightarrow$↓ $r \Longrightarrow$↓ $I(r), CF(r) \Longrightarrow$↑ $\varepsilon \Longrightarrow$↓ NX trade deficit
  2. Expansionary fiscal policy abroad: ↑ foreign G
     - ↑ foreign $G \Longrightarrow$ ↓ foreign S $(= Y - C - G)$, r **unaffected because ROW is small**. NX at home do not react because interest rate doesn't move, so eq. unchanged

Fiscal expansion at home in LOE

Increase in government spending at home reduces domestic savings and ultimately leads to a **trade deficit** through general equilibrium effects



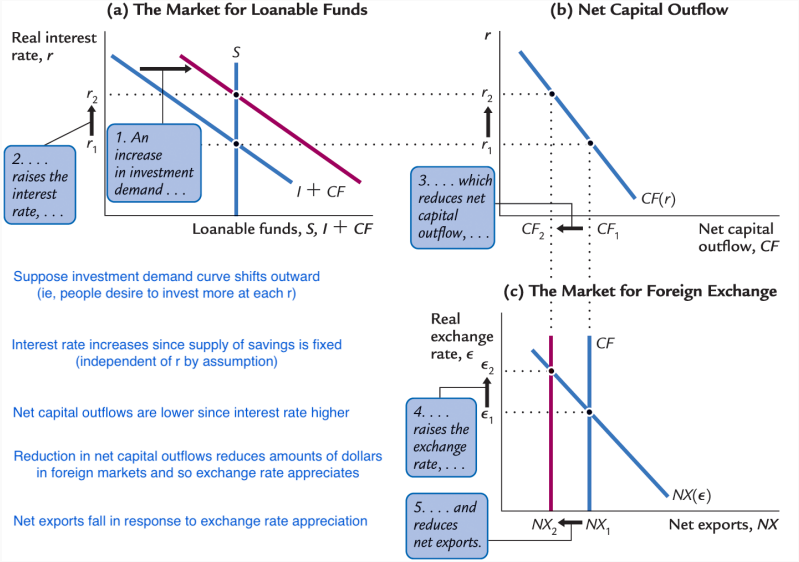
Fiscal policy in LOE

- **Fiscal policy in LOE has effects of fiscal policy in both closed economy & SOE**
  - As in closed economy, fiscal expansion raises r and crowds out investment
  - As in SOE, fiscal expansion causes trade deficit & appreciation of exchange rate
- **Key equation**:

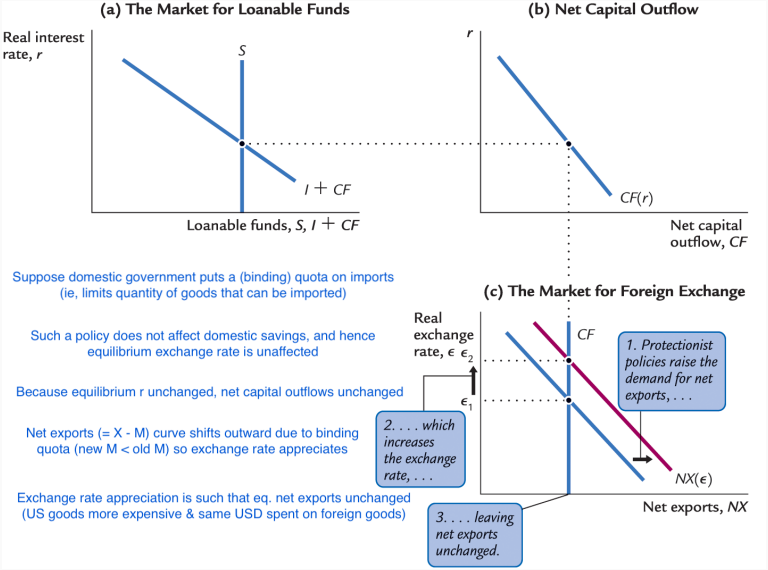
$$S = I + NX$$

  - Expansionary fiscal policy reduces S in closed economy, SOE, and LOE
  - In closed economy, fall in S accompanied with equal fall in I ($NX = 0$ always)
  - In SOE, fall in S fully matched by fall in NX (interest rate r^* doesn't change)
  - **In LOE, both I and NX fall following a fall in S.** I falls because interest rate r moves, and NX fall because change in r moves exchange rate ε

Changes in investment demand in LOE



Trade policy: binding import quota in LOE



Exchange Rates

Exchange rates

- We introduced exchange rates in the large open economy model, but didn't spent much time talking about them. We do so now!

- **Exchange rate between two countries is the price at which currency of one country trades for currency of other country**
  - Eg, USD-MXN exchange rate tells how many Mexican pesos acquired with 1 USD
    (In November 2024, 1 USD bought approximately 20 Mexican pesos)

- **Exchange rate plays important role in transactions of goods, services, and capital flows across countries**
  - Eg, firms and consumer demand foreign goods and services, as well as cash in foreign currency (due to travel) and foreign portfolio capital

Two types of exchange rates

- **Nominal exchange rate**: relative price of *currencies* between two countries
  - Exchange rates you will find if googled USD-EUR, USD-MXN, USD-GBP, ...
  - Two ways of reporting an exchange rate:
    - USD-MXN tells us how many Mexican pesos we get with 1 USD (Eg, 20 in Nov 2024)
    - MXN-USD tells us how many USD we get with 1 Mexican peso (Eg, 0.05 in Nov 2024)
- **Real exchange rate**: relative price of *the goods* of two countries
  - Eg, suppose homogeneous car produced in both US and Mexico. Then real exchange rate USD-MXN is how many MXN cars you can get for 1 US car

Relationship between nominal and real exchange rates

- **Relationship between nominal and real exchange rate**:

$$\underbrace{\varepsilon}_{\text{Real exchange rate}} = \underbrace{e}_{\text{Nominal exchange rate}} \times \underbrace{\frac{P}{P^*}}_{\text{Relative price}}$$

Real exchange rate is high when domestic goods are relatively expensive or foreign goods are relatively cheap ($P > P^*$) and nominal interest rate is high

- **US-Mexican cars example**: US car costs 50k USD and similar Mexican car costs 500k MXN. USD-MEX nominal exchange rate is 20 (ie, 1 USD = 20 MXN)

$$\text{Real exchange rate} = \underbrace{20}_{\text{Nominal exchange rate}} \times \underbrace{\frac{50,000}{500,000}}_{\text{Relative car price}} = 2$$

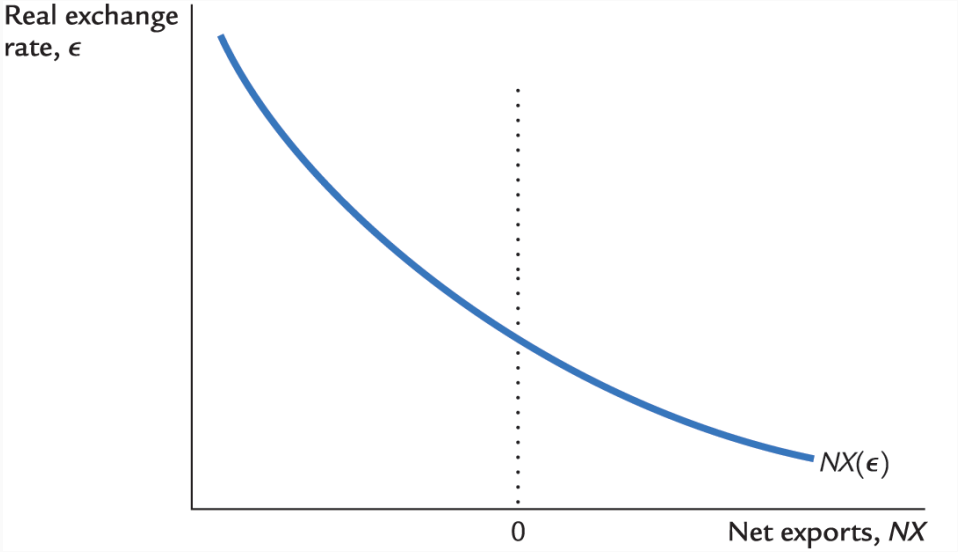
At current prices, US car costs twice as much as two Mexican cars

The real exchange rate and the trade balance

- Real exchange rate is just a relative price
  - In domestic economy, relative price of pizza to burger affects lunch decisions
  - In open economy, real exchange rates (ie, relative price of domestic and foreign goods) affects countries we source our goods from
- If USD-EUR exchange rate is low:
  - American goods relatively cheap, so Americans import fewer goods
    (eg, Ford $>$ Toyota, Dallas blonde $>$ Paulaner, vacation in Seattle $>$ vacation in Italy, ...)
  - American goods relatively cheap, so Europeans import more US goods
    (eg, more Teslas, more US beers, more vacations in New York, ...)

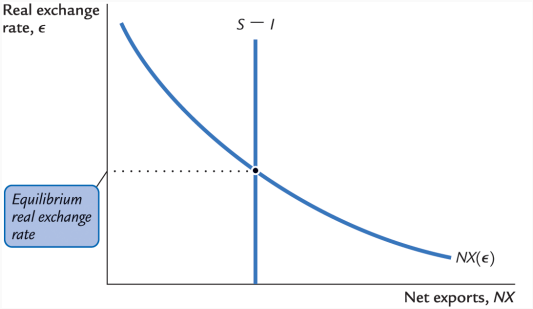
  Net exports in the US increase ($NX = X - M$ and $\uparrow X, \downarrow M$)
- This is why NX negatively associated w/ real exchange rate: $NX = NX(\varepsilon)$

Negative association between real exchange rate and the trade balance



Determinants of the real exchange rate

- Two determinants of real exchange rate:
  1. **Net exports**: real value of a currency inversely related to net exports; $\downarrow \varepsilon, \uparrow NX$
  2. **Net capital outflows**: savings minus investment must equal net exports in eq.
     - Savings fixed by consumption function and fiscal policy: $S = Y - C(Y - T)$
     - Investment fixed by investment function and world interest rate: $I = I(r^*)$



Policy effects on real exchange rate

- **Fiscal policy at home**: higher G or lower T reduces national savings, which raises RER and causes net exports to decrease
- **Fiscal policy abroad**: higher G or lower T reduces world savings, which raises world interest rate; this reduces domestic investment, causing RER to fall and NX to increase
- **Shifts in investment demand**: Increase in investment reduces net capital outflow which raises RER and reduces net exports
- **Protectionist trade policies** raise demand for net exports ($\downarrow M$), raising RER but leaving eq. NX unchanged (buying foreing goods now more expensive)

Determinants of nominal exchange rate

- Using relationship between real and nominal exchange rate:

$$\underbrace{e}_{\text{Nominal exchange rate}} = \underbrace{\varepsilon}_{\text{Real exchange rate}} \times \underbrace{\frac{P^*}{P}}_{\text{Relative price}}$$

- **Determinants of nominal exchange rate**:
  - Determinants of real exchange rate (ie, net exports + net capital outflows)
  - Determinants of domestics and foreign price levels (ie, monetary policy)
    - Given RER ε, if domestic price P rises, nominal exchange rate e decreases
      (Because 1 USD is worth less, 1 USD buys less foreign currency)
    - Given RER ε, if foreign price P^* rises, nominal exchange rate e increases
      (Because foreign currency is worth less, 1 USD buys more of it)

Determinants of nominal exchange rate

- Algebra + log properties in relationship b/w real and nominal exchange rate:

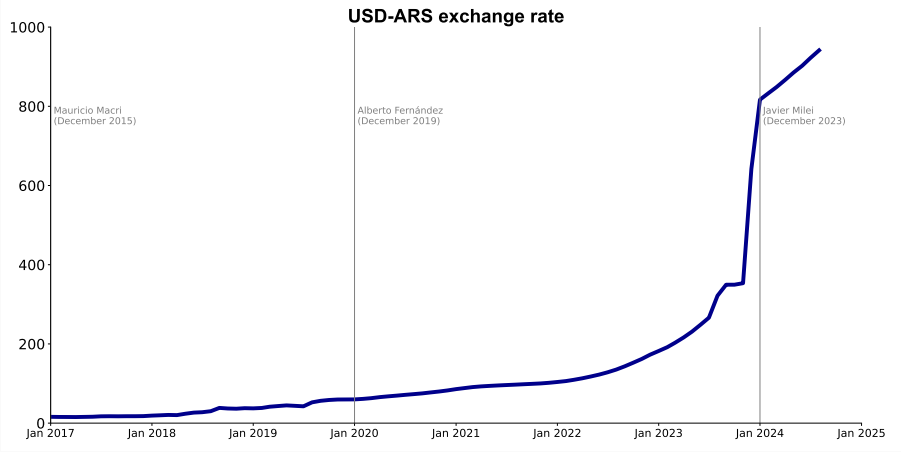
$$\underbrace{g_e}_{\substack{\text{Growth rate of} \\ \text{nominal exchange rate}}} \approx \underbrace{g_\varepsilon}_{\substack{\text{Growth rate of} \\ \text{real exchange rate}}} + \underbrace{(\pi^* - \pi)}_{\substack{\text{Differences in} \\ \text{inflation rates}}}$$

Percentage change in nominal exchange rate between two currencies comes from percentage changes in real exchange rate & differences in inflation rates

- Suppose we are looking at USD-ARS exchange rate and that $g_\varepsilon = 0$:
  - Because inflation rate in Argentina was much higher than in US (ie, $\pi^* > \pi$), we should see appreciation of NER (1 USD should buy increasing more ARS over time)

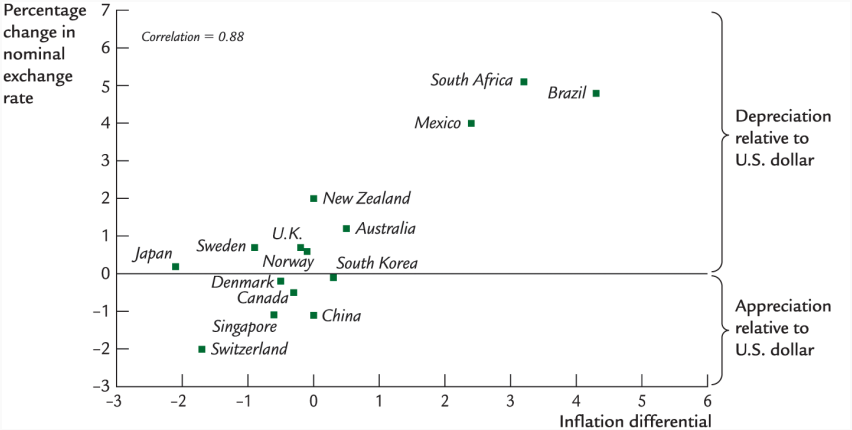
Relationship between NER and inflation rates in the data

US dollar greatly appreciated with respect to Argentinian peso in past few years as expected from observed large differences in inflation rates between countries



Relationship between NER and inflation rates in the data

Countries with high inflation (relative to the US) have depreciating currencies (relative to the USD) and those with low inflation have appreciating currencies



Purchasing power parity and the law of one price

- **Law of one price**: identical goods or assets should sell for the same price at the same time in different locations (if markets are competitive and there are no transportation or transaction costs, differences in taxes, ...)
  - If $P_{\text{corn}}^{\text{Dallas}} < P_{\text{corn}}^{\text{NYC}}$, profitable to buy in Dallas and sell in NYC
  - Some people would do this, so $\uparrow P_{\text{corn}}^{\text{Dallas}}$ (due to less availability) and $\downarrow P_{\text{corn}}^{\text{Dallas}}$ (due to more availability)
  - Eventually price of corn in Dallas would be equal to that in NYC
- When law of one price applied to international markets for goods, we get concept of **purchasing power parity**

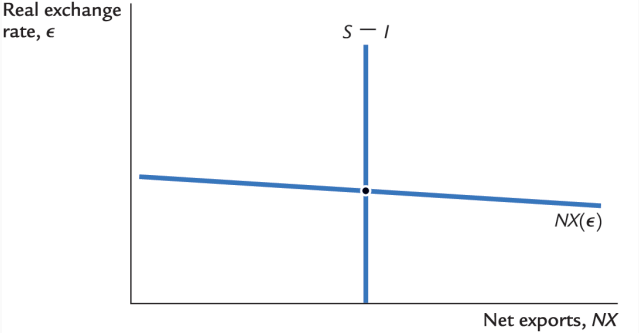
Purchasing power parity and the law of one price

- **Purchasing power parity**: 1 unit of foreign currency (say, 1 USD) should have the same purchasing power in every country if arbitrage is possible (if markets are competitive and there are no transportation or transaction costs, differences in taxes, ...)
  - If 1 USD buys more in US than Europe, profitable to buy in US and sell in Europe
  - Some people would do this, so $\uparrow P_{\text{corn}}^{\text{US}}$ (due to less availability) and $\downarrow P_{\text{corn}}^{\text{Europe}}$ (due to more availability)
  - Eventually price of corn in US would be equal to that in Europe

- Interpreted through lens of our real-exchange rate model, **fluctuations in real exchange rate should cause movements in net exports**
  - Small decrease in RER (ie, in relative price of domestic to foreign goods) should cause arbitrageurs to buy domestically and sell abroad ($\uparrow NX$)

Purchasing power parity and the law of one price

Net exports schedule is very flat around RER that equates PPPs among countries: small movements in RER lead to very large changes in net exports



Extreme sensitivity of net exports to RER guarantees that equilibrium RER is close to level that ensures purchasing power parity

Implications of purchasing power parity

- Two key implications of purchasing power parity:
  1. Given that net exports very sensitive to fluctuations in RER, changes in saving or investment should not affect RER or NER
  2. Because RER is fixed, changes in NER must result from changes in price levels
- Is the PPP theory realistic? Not really!
  - Some services aren't tradable (eg, haircuts)
  - Some goods have high transportation costs (eg, lobsters)
  - Goods are not homogeneous (eg, US vs. European cars)
- Despite not being a realistic theory, PPP theory can help us understand why RERs do not move much; if they were, we'd see lots of arbitrage!

Application of PPP theory: The Big Mac around the world

- According to PPP theory, we should not observe price difference across countries once we adjust prices using exchange rates
- To see how well theory works, we look at the price of the McDonald's Big Mac burger in different countries and compare it to its cost in US ($5.15 in 2022)

$$\underbrace{\hat{e}}_{\text{Predicted nominal exchange rate}} = \underbrace{\frac{P^*}{P}}_{\text{Relative price}}$$

Country	Currency	Local price	Predicted NER	Actual NER
			(1 USD $= x$ units of foreign currency)	
Euro area	EUR	4.65€	0.90	0.98
UK	GBP	3.69£	0.72	0.83
Sweden	SEK	57 kr	11.1	10.2

Taking Stock

Taking stock

- **Closed vs. open economy**: in open economy, aggregate spending doesn't necessarily equal aggregate output since countries can borrow and lend

$$C + G + I = Y - NX \quad \text{(Open economy)}$$

$$C + G + I = Y \quad \text{(Closed economy)}$$

- **Net exports reflect a country's trade balance**

  ($NX > 0$: surplus, $NX = 0$: balance, $NX < 0$: deficit)

- **Two empirical facts on trade**:

  1. Smaller economies generally more open to trade

     (Openness to trade = (Exports + Imports) / GDP)

  2. US running perpetual trade deficit since mid 1970s

     (Paradoxical since basic econ theory suggests capital should flow to poorer countries. Institutions?)

Taking stock

- **Small open economy (SOE) assumption**: economy is sufficiently small as to not influence global prices or world interest rate
- **Fiscal policy and investment demand in SOE**:
  - Expansionary fiscal policy at home causes decrease in net exports
  - Expansionary fiscal policy abroad increases domestic net exports
  - If domestic consumers invest more at given interest rates, net exports decrease
- **In LOE, eq. real interest rate determined in market for loanable funds, and eq. real exchange rate determined in market for foreign exchange**
- **Fiscal policy investment demand, and protectionism in LOE**:
  - Expansionary fiscal policy at home causes decrease in net exports
  - Expansionary fiscal policy abroad has no effect on domestic net exports
  - If domestic consumers invest more at given interest rates, net exports decrease
  - Protectionism (eg, import quota) has no effect on net exports ($\downarrow M, \downarrow X$ due to $\uparrow \varepsilon$)

Taking stock

- **Exchange rate**: price at which one currency trades for other currency
- **Two types of exchange rate**:
  1. Nominal exchange rate (NER): relative price of currencies between countries
  2. Real exchange rate (RER): relative price of goods between countries
- **Relationship between NER and RER**:

$$\underbrace{e}_{\text{Nominal exchange rate}} = \underbrace{\varepsilon}_{\text{Real exchange rate}} \times \underbrace{\frac{P^*}{P}}_{\text{Relative price}} \qquad \text{(Levels)}$$

$$\underbrace{g_e}_{\substack{\text{Growth rate of} \\ \text{nominal exchange rate}}} \approx \underbrace{g_\varepsilon}_{\substack{\text{Growth rate of} \\ \text{real exchange rate}}} + \underbrace{(\pi^* - \pi)}_{\substack{\text{Differences in} \\ \text{inflation rates}}} \qquad \text{(Growth rates)}$$

Taking stock

- **In the data** (as expected):
  - Domestic currency appreciates when inflation at home lower than abroad
  - Countries with relatively high inflation have depreciating currencies
- **Law of one price**: identical goods or assets should sell for the same price at the same time in different locations (if markets are competitive and no transportation or transaction costs, no differences in taxes, ...)
- **Purchasing power parity**: 1 unit of foreign currency should have the same purchasing power in every country if arbitrage is possible (if markets are competitive and there are no transportation or transaction costs, no differences in taxes, ...)
  - PPP theory is simply LOOP applied to international markets
  - PPP theory receives empirical support

Questions?

Thank You!

(Email: luisperez@smu.edu)

(Website: https://luisperezecon.com)