MACROECONOMICS I

Open-Economy Macroeconomics: Basic Concepts

Lecture 8

April 22, 2022

LOOK FOR THE ANSWERS TO THESE QUESTIONS:

- How are international flows of goods and assets related?
- What's the difference between the real and nominal exchange rate?
- What is "purchasing-power parity," and how does it explain nominal exchange rates?

INTRODUCTION

Trade can make everyone better off.

This chapter introduces basic concepts of international macroeconomics:

- The trade balance (trade deficits, surpluses)
- International flows of assets
- Exchange rates

BASIC CONCEPTS

Closed economy

- Economy that does not interact with other economies in the world

Open economy

- Economy that interacts freely with other economies around the world
  - It buys and sells goods and services in world product markets
  - It buys and sells capital assets such as stocks and bonds in world financial markets

THE FLOW OF GOODS

Exports

- Goods and services that are produced domestically and sold abroad

Imports

- Goods and services that are produced abroad and sold domestically

Net exports (Trade balance)

= Value of exports – value of imports

ACTIVE LEARNING 1 VARIABLES THAT AFFECT NX

What do you think would happen to Czech net exports if:

A. Germany experiences a recession (falling incomes, rising unemployment)

B. Czech consumers decide to be patriotic and buy more products "Made in the ČR"

C. Prices of goods produced in Slovakia rise faster than prices of goods produced in the ČR.

ACTIVE LEARNING 1 ANSWERS

A. Germany experiences a recession (falling incomes, rising unemployment)

Czech net exports would fall

due to a fall in German consumers' purchases of Czech exports

B. Czech consumers decide to be patriotic and buy more products "Made in the ČR"

Czech net exports would rise

due to a fall in imports

ACTIVE LEARNING 1 ANSWERS

C. Prices of goods produced in Slovakia rise faster than prices of goods produced in the ČR

This makes Czech goods more attractive relative to Slovakia's goods.

Exports to Slovakia increases,
imports from Slovakia decreases,
so Czech net exports increases.

VARIABLES THAT INFLUENCE NX

Factors that might influence a country's exports, imports, and net exports:

- Consumers' preferences for foreign and domestic goods
- Prices of goods at home and abroad
- Exchange rates at which foreign currency trades for domestic currency
- Incomes of consumers at home and abroad
- Transportation costs
- Government policies

TRADE SURPLUSES & DEFICITS

Trade surplus (Positive net exports)

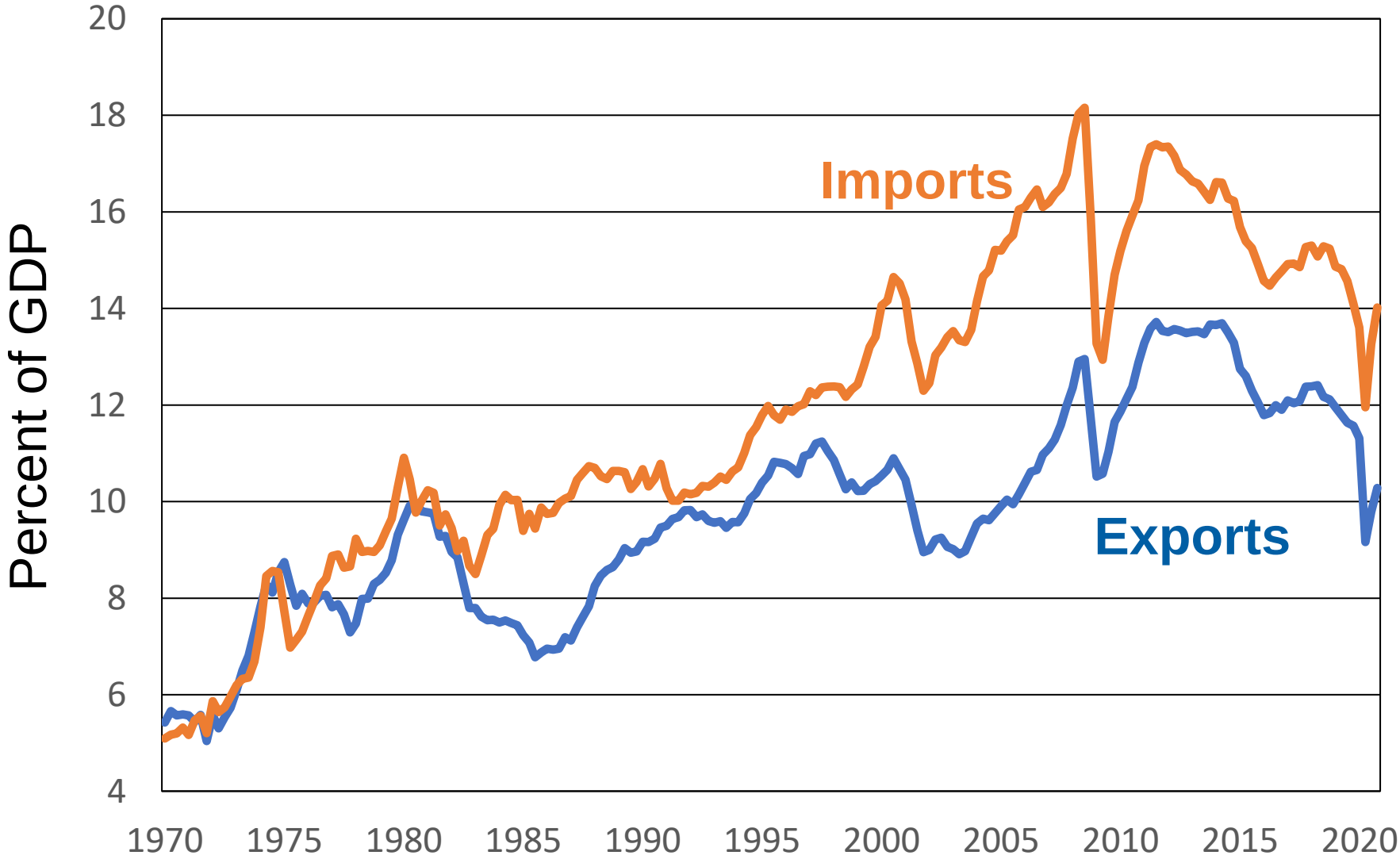
- Exports are greater than imports
  - The country sells more goods and services abroad than it buys from other countries

Trade deficit (Negative net exports)

- Imports are greater than exports
  - The country sells fewer goods and services abroad than it buys from other countries

Balanced trade: Exports equal imports

THE U.S. ECONOMY'S INCREASING OPENNESS



THE INCREASING OPENNESS OF THE ECONOMY

- cheaper cost of transportation
- better communication
- devices, high value per weight
- lower tariffs

THE FLOW OF FINANCIAL RESOURCES

Net capital outflow, NCO (net foreign investment)

$$NCO = \text{purchases of foreign assets by domestic residents} - \text{purchases of domestic assets by foreigners}$$

The flow of capital abroad takes two forms.

- Foreign direct investment

(a capital investment is owned and operated by a foreign entity)

- Foreign portfolio investment

(an investment that is financed with foreign money but operated by domestic residents)

THE FLOW OF CAPITAL

NCO measures the imbalance in a country's trade in assets:

When NCO > 0, "capital outflow"

- Domestic purchases of foreign assets exceed foreign purchases of domestic assets

When NCO < 0, "capital inflow"

- Foreign purchases of domestic assets exceed domestic purchases of foreign assets

VARIABLES THAT INFLUENCE NCO

- Real interest rates paid on foreign assets
- Real interest rates paid on domestic assets
- Perceived risks of holding foreign assets
- Government policies affecting foreign ownership of domestic assets

THE EQUALITY OF NX AND NCO

An accounting identity: NCO = NX

- Every transaction that affects NX also affects NCO by the same amount (and vice versa)

When a foreigner purchases a good from the U.S.,

- U.S. exports and NX increase
  - The foreigner pays with currency or assets, so the U.S. acquires some foreign assets, causing NCO to rise.

THE EQUALITY OF NX AND NCO

An accounting identity: NCO = NX

- Every transaction that affects NX also affects NCO by the same amount (and vice versa)

When a U.S. citizen buys foreign goods,

- U.S. imports rise, NX falls
  - The U.S. buyer pays with U.S. dollars or assets, so the other country acquires U.S. assets,

    causing U.S. NCO to fall.

THE EQUALITY OF NX AND NCO

An accounting identity: NCO = NX

- Arises because every transaction that affects NX also affects NCO by the same amount (and vice versa)

SAVING AND INVESTMENT

Open economy: $Y = C + I + G + NX$

National saving: $S = Y - C - G$

- $Y - C - G = I + NX$
- $S = I + NX$

$NX = NCO$

- $S = I + NCO$
- Saving = Domestic investment + Net capital outflow

INTERNATIONAL FLOWS

Trade surplus: Exports > Imports

- Net exports > 0
- Y > Domestic spending (C+I+G)
- S > I
- NCO > 0

Trade deficit: Exports < Imports

- Net exports < 0
- Y < Domestic spending (C+I+G)
- S < I
- NCO < 0

IS THE U.S. TRADE DEFICIT A NATIONAL PROBLEM?

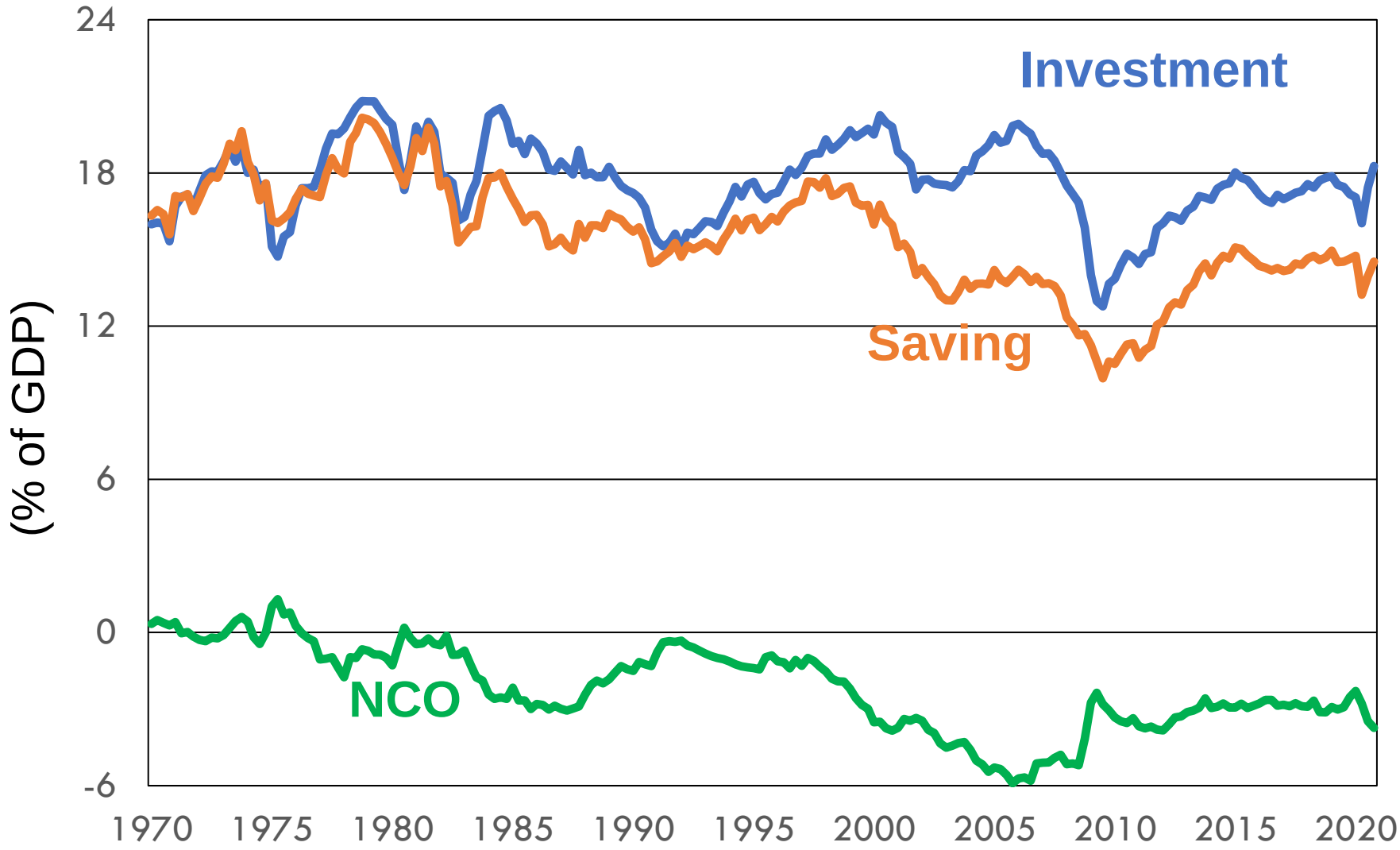
Before 1980

- National saving and domestic investment were close: small net capital outflow (between – 1 and 1 % of GDP)

After 1980

- National saving – often falling below domestic investment
- Sizable trade deficits, substantial inflows of capital
- Net capital outflow is often a large negative number

U.S. SAVING, INVESTMENT, AND NCO, 1950–2016



IS THE U.S. TRADE DEFICIT A NATIONAL PROBLEM?

Unbalanced fiscal policy: 1980 to 1987

- Flow of capital into the U.S. declines due to a fall in national saving

An investment boom: 1991 to 2000

- Increase flow of capital
- Saving increased
- Government budget surplus
- Investment increased

IS THE U.S. TRADE DEFICIT A NATIONAL PROBLEM?

An economic downturn and recovery: 2000 to 2015

- 2000-2009, saving and investment fell by about 6 percentage points.
  - Investment: tough economic times made capital accumulation less profitable
  - Saving: government began running extraordinarily large budget deficits
- 2009-2015, as the economy recovered, saving and investment increased by about 3 percentage points

IS THE U.S. TRADE DEFICIT A NATIONAL PROBLEM?

Trade deficit: by a fall in saving (1980s)

- The nation is putting away less of its income to provide for its future
  - Better to have foreigners invest in the U.S. economy than no one at all

Trade deficit: by an investment boom (1990s)

- Economy is borrowing from abroad to finance the purchase of new capital goods
  - For lower return on investment - debts will look less desirable

IS THE U.S. TRADE DEFICIT A NATIONAL PROBLEM?

Is the U.S. trade deficit a problem?

- The extra capital stock from the ’90s investment boom may well yield large returns.
- The fall in saving of the ’80s and ’00s, while not desirable, at least did not depress domestic investment, since firms could borrow from abroad.

A country, like a person, can go into debt for good reasons or bad ones.

- A trade deficit is not necessarily a problem, but might be a symptom of a problem.

THE U.S. TRADE DEFICIT

as of Q4 2020

People abroad owned $32.2 trillion in U.S. assets.

U.S. residents owned $46.3 trillion in foreign assets.

U.S.' net indebtedness to other countries = $14.1 trillion.

- Higher than every other country's
- hence, U.S. is "world's biggest debtor nation."

THE NOMINAL EXCHANGE RATE

Nominal exchange rate:

- Rate at which one country's currency trades for another
- We express all exchange rates as foreign currency per unit of domestic currency.

Some exchange rates, per US$

	12.06.2016	11.04.2018	22.04.2021	21.04.2022
Canadian dollar	1.31	1.34	1.25	1.25
Euro	0.90	0.89	0.83	0.92
Japanese yen	104.13	111.66	107.95	128.07
Mexican peso	18.39	18.83	19.93	20.09
Czech koruna	24.02	20.48	21.51	22.42

PRICES FOR INTERNATIONAL TRANSACTIONS

Appreciation (or "strengthening")

- Increase in the value of a currency as measured by the amount of foreign currency it can buy

Example: dollar appreciation

- Exchange rate (old) = 20 CZK per dollar
- Exchange rate (new) = 23 CZK per dollar
- (CZK depreciation)

PRICES FOR INTERNATIONAL TRANSACTIONS

Depreciation (or "weakening")

- Decrease in the value of a currency
- As measured by the amount of foreign currency it can buy

Example: dollar depreciation

- Exchange rate (old) = 20 CZK per dollar
- Exchange rate (new) = 17 CZK per dollar
- (CZK appreciation)

THE REAL EXCHANGE RATE

Real exchange rate:

- Rate at which the goods and services of one country trade for the goods and services of another

$$\text{Real exchange rate} = e \times P / P^*$$

Where

- P = domestic price
- P^* = foreign price (in foreign currency)
- e = nominal exchange rate (foreign currency per unit of domestic currency)

EXAMPLE WITH ONE GOOD

A Big Mac costs $2.50 in U.S., 400 yen in Japan

- e = 120 yen per $
- e x P = price in yen of a U.S. Big Mac

  = (120 yen per $) x ($2.50 per Big Mac)

  = 300 yen per U.S. Big Mac

Compute the real exchange rate:

e x P / P^* = 300 yen per U.S. Big Mac / 400 yen per Japanese Big Mac =

= 0.75 Japanese Big Macs per U.S. Big Mac

ACTIVE LEARNING 2 COMPUTE A REAL EXCHANGE RATE

e = 10 pesos per $

price of a tall Starbucks Latte:

- P = $3 in U.S.,
- P^* = 24 pesos in Mexico

A. What is the price of a U.S. latte measured in pesos?

B. Calculate the real exchange rate, measured as Mexican lattes per U.S. latte.

ACTIVE LEARNING 2 ANSWERS

e = 10 pesos per $

price of a tall Starbucks Latte:

P = $3 in U.S., $P^* = 24$ pesos in Mexico

A. What is the price of a U.S. latte measured in pesos?

e x P = (10 pesos per $) x (3 $ per U.S. latte)

= 30 pesos per U.S. latte

B. Calculate the real exchange rate, measured as Mexican lattes per U.S. latte.

e x P / P^* = 30 pesos per U.S. latte / 24 pesos per Mexican latte = 1.25 Mexican lattes per U.S. latte

THE BIG MAC INDEX

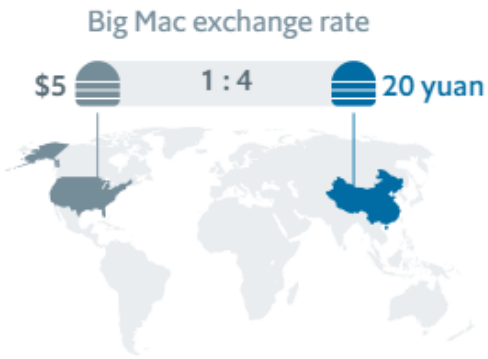
- informal way of measuring the purchasing power parity (PPP) between two currencies
- test of the extent to which market exchange rates result in goods costing the same in different countries
- As a Big Mac is a completely standardized product across the world, the argument goes that it should have the same relative cost in every country

How it works

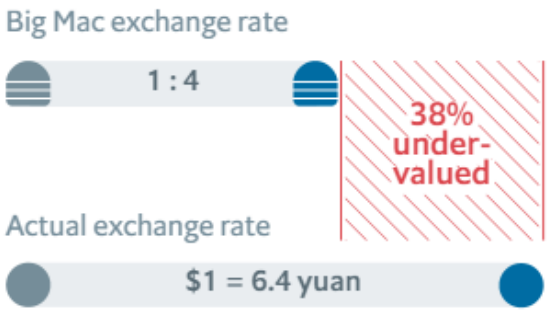
Raw index /GDP-adjusted

Purchasing-power parity implies that exchange rates are determined by the value of goods that currencies can buy

Differences in local prices – in our case, for Big Macs – can suggest what the exchange rate should be



Using burgernomics, we can estimate how much one currency is under- or over-valued relative to another

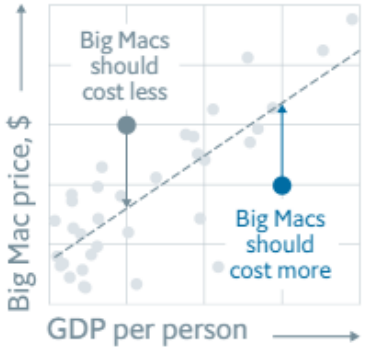


How it works

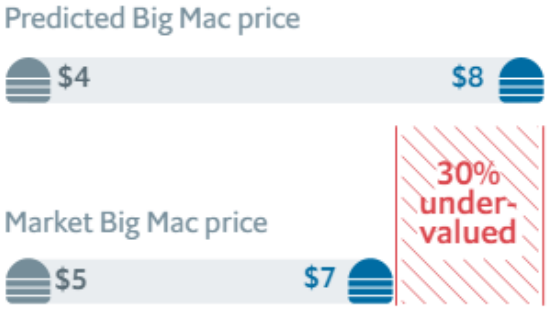
Raw index /GDP-adjusted

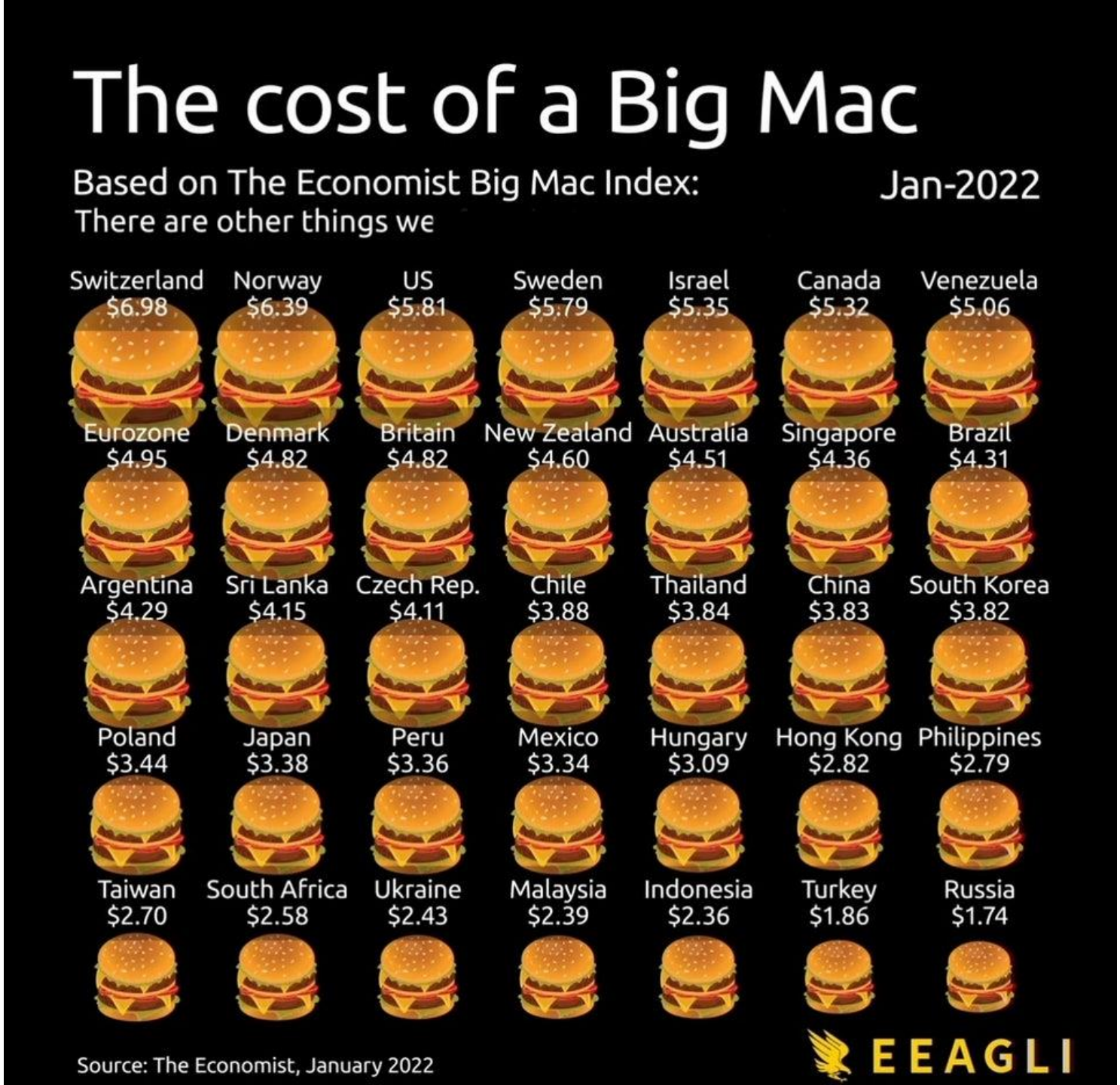
Varying labour costs and barriers to migration and trade may undermine purchasing-power parity

To control for this, our adjusted index predicts what Big Mac prices should be given a country's GDP per person



The difference between the predicted and the market price is an alternative measure of currency valuation




The cost of a Big Mac
Based on The Economist Big Mac Index:
There are other things we
Jan-2022
Switzerland $6.98
Norway $6.39
US $5.81
Sweden $5.79
Israel $5.35
Canada $5.32
Venezuela $5.06
Eurozone $4.95
Denmark $4.82
Britain $4.82
New Zealand $4.60
Australia $4.51
Singapore $4.36
Brazil $4.31
Argentina $4.29
Sri Lanka $4.15
Czech Rep. $4.11
Chile $3.88
Thailand $3.84
China $3.83
South Korea $3.82
Poland $3.44
Japan $3.38
Peru $3.36
Mexico $3.34
Hungary $3.09
Hong Kong $2.82
Philippines $2.79
Taiwan $2.70
South Africa $2.58
Ukraine $2.43
Malaysia $2.39
Indonesia $2.36
Turkey $1.86
Russia $1.74
Source: The Economist, January 2022
EEAGLI

How many Big Macs can European workers buy per hour?

Number of Big Macs earned per hour on the minimum wage in European countries

Source: The Economist's Big Mac Index

THE REAL EXCHANGE RATE WITH MANY GOODS

Real exchange rate = (e x P)/P^*

= price of a domestic basket of goods relative to price of a foreign basket of goods

- P = U.S. price level, e.g., Consumer Price Index, measures the price of a basket of goods
- P* = foreign price level
- If U.S. real exchange rate appreciates, U.S. goods become more expensive relative to foreign goods.

THE LAW OF ONE PRICE

Law of one price

- A good should sell for the same price in all markets

Arbitrage

- Take advantage of price differences for the same item in different markets

EXAMPLE: THE LAW OF ONE PRICE

Beer sells for CZK15/bottle in Ostrava and CZK20/bottle in Brno; can be costlessly transported.

- Opportunity for arbitrage: making a quick profit by buying beer in Ostrava and selling it in Brno.
- Drives up the price in Ostrava and drives down the price in Brno, until the two prices are equal.

PURCHASING-POWER PARITY, PPP

Purchasing-power parity

- Theory of exchange rates
- A unit of any given currency should be able to buy the same quantity of goods in all countries

Basic logic of purchasing-power parity

- Based on the law of one price
- A good must sell for the same price in all locations
- Implies the nominal exchange rates adjust to equalize the price of a basket of goods across countries

EXAMPLE: PURCHASING-POWER PARITY (PPP)

Example: The "basket" contains a Big Mac.

P = price of U.S. Big Mac (in dollars)

P* = price of Czech Big Mac (in CZK)

e = exchange rate, CZK per dollar

According to PPP,

$$\underbrace{e \times P}_{\text{price of U.S. Big Mac, in CZK}} = \underbrace{P^*}_{\text{price of Czech Big Mac, in CZK}}$$

Solve for e we get: $e = P^* / P$

IMPLICATIONS OF PPP

If purchasing power of the dollar is always the same at home and abroad

- Then the real exchange rate cannot change

Theory of purchasing-power parity

- Nominal exchange rate between the currencies of two countries must reflect the price levels in those countries

IMPLICATIONS OF PPP

Implications:

- Nominal exchange rates change when price levels change
- When a central bank in any country increases the money supply
  - And causes the price level to rise
  - It also causes that country's currency to depreciate relative to other currencies in the world

LIMITATIONS OF PPP

Theory of purchasing-power parity does not always hold in practice

1. Many goods/services are not easily traded
   - Examples: haircuts, going to the movies
   - Price differences on such goods cannot be arbitraged away
2. Even tradable goods are not always perfect substitutes
   - Price differences reflect taste differences

LIMITATIONS OF PPP

Purchasing-power parity

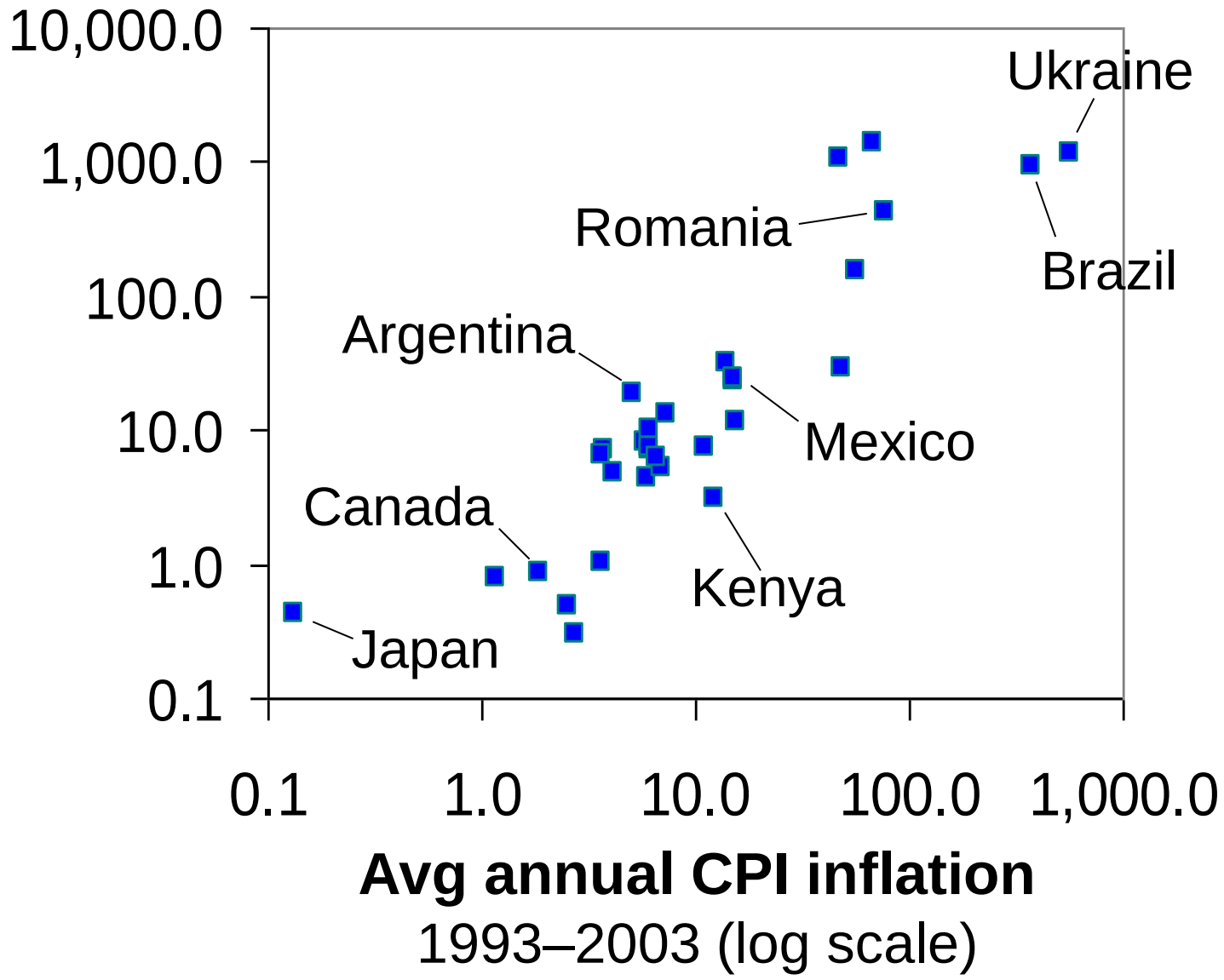
- Not a perfect theory of exchange-rate determination
- Real exchange rates fluctuate over time

Large and persistent movements in nominal exchange rates

- Typically reflect changes in price levels at home and abroad

INFLATION & DEPRECIATION IN A CROSS-SECTION OF 31 COUNTRIES

Average annual depreciation relative to US dollar 1993–2003 (log scale)



ACTIVE LEARNING 3 CHAPTER REVIEW QUESTIONS

1. Which of the following statements about a country with a trade deficit is not true?

   A. Exports < imports

   B. Net capital outflow < 0

   C. Investment < saving

   D. $Y < C + I + G$

2. A Ford Escape SUV sells for $24,000 in the U.S. and 720,000 CZK in Czech Republic.

   If purchasing-power parity holds, what is the nominal exchange rate (CZK per dollar)?

ACTIVE LEARNING 3 ANSWERS

1. Which of the following statements about a country with a trade deficit is not true?

A. Exports < imports

B. Net capital outflow < 0

C. Investment < saving

D. $Y < C + I + G$

A trade deficit means $NX < 0$.

Since $NX = S - I$, a trade deficit implies $I > S$.

ACTIVE LEARNING 3 ANSWERS

2. A Ford Escape SUV sells for $24,000 in the U.S. and 720,000 CZK in Czech Republic. If purchasing-power parity holds, what is the nominal exchange rate (CZK per dollar)?

P* = 720,000 CZK

P = $24,000

e = P*/P = 720000/24000 = 30 CZK per dollar

SUMMARY

- Net exports are the value of domestic goods and services sold abroad (exports) minus the value of foreign goods and services sold domestically (imports).
- Net capital outflow is the acquisition of foreign assets by domestic residents (capital outflow) minus the acquisition of domestic assets by foreigners (capital inflow).
- An economy's net capital outflow = its net exports
- Because every international transaction involves an exchange of an asset for a good or service.

SUMMARY

- An economy's saving can be used either to finance investment at home or to buy assets abroad.
- National saving equals domestic investment plus net capital outflow.
- The nominal exchange rate is the relative price of the currency of two countries, and the real exchange rate is the relative price of the goods and services of two countries.
- When the nominal exchange rate changes so that each dollar buys more foreign currency, the dollar is said to appreciate or strengthen.

SUMMARY

- When the nominal exchange rate changes so that each dollar buys less foreign currency, the dollar is said to depreciate or weaken.
- According to the theory of PPP, a dollar (or a unit of any other currency) should be able to buy the same quantity of goods in all countries.

  - Implies that the nominal exchange rate between the currencies of two countries should reflect the price levels in those countries.

  - Countries with relatively high inflation should have depreciating currencies, and countries with relatively low inflation should have appreciating currencies.