Introductory Class

International Finance

Nicolas Franz-Pattillo

2024

Universidad de Chile

This class

1. Course Outline and Expectations

2. Introduction

2.1 Questions and facts

2.2 International Economics

2.3 Macroeconomics in practice

3. Macro Data

3.1 Economic Activity

3.2 Prices and Inflation

3.3 Exchange Rate

This class (cont.)

3.4 Interest Rates

3.5 The balance of payments

Course Outline and Expectations

General Information

- **Classes**:
  - Fridays, 17:30 - 21:00 @ Edificio Genesis.
  - Saturdays, 8:30 - 10:00 @ Diag. Paraguay.
- **Office Hours**: Virtual, upon request.
- **e-mail**: nfranzpa@fen.uchile.cl
- **Course Material** will be uploaded to canvas.fen.uchile.cl
- **TA**: Josefa Guerrero (jguerrerom@fen.uchile.cl).
- **TA Office Hours**: Virtual, upon request.

Evaluations

- Exam (30%): Take home exam. It will be published on Jan. 20th and must be submitted by Nov 24th.

- Quizzes and Problem sets (70%): We have 7 class sessions. On most weeks we will have either a problem set due at the end of it or a 20 to 30 minutes quiz at the end of the class. There will be no makeup quiz or problem sets. To compensate for this, we will drop the worst score.

Quizzes are individual. Problem sets can be delivered by groups of 3 people maximum. The exam can be discussed in groups, but the submission is individual.

The way I expect to course to go...

Table 1: Course proposed schedule

Date	Topic
Nov. 17th	Intro + National Income Accounting and BOP
Nov. 18th	Exchange Rates and the Foreign Exchange Market
Dec. 1st	Money, Interest Rates, and Exchange Rates
Dec. 2nd	Price Levels and the Exchange Rate in the Long Run
Jan. 5th	Output and the Exchange Rate in the Short Run
Jan. 6th	Fixed Exchange Rates and Foreign Exchange Intervention
Jan. 20th	Current Account Sustainability + CA Theory + Exam

Introduction

Introduction: goals

After we cover this section you should know what International Finance is about, what type of questions economists look to answer in this field, and be able to distinguish between trade and monetary aspects of international economics.

International finance studies the monetary aspects of the relationships between countries

- Macroeconomics: the study of the structure and performance of national economies and the elements that affect them.
- Aggregation: Micro vs Macro.

Examples of Issues addressed by macroeconomists

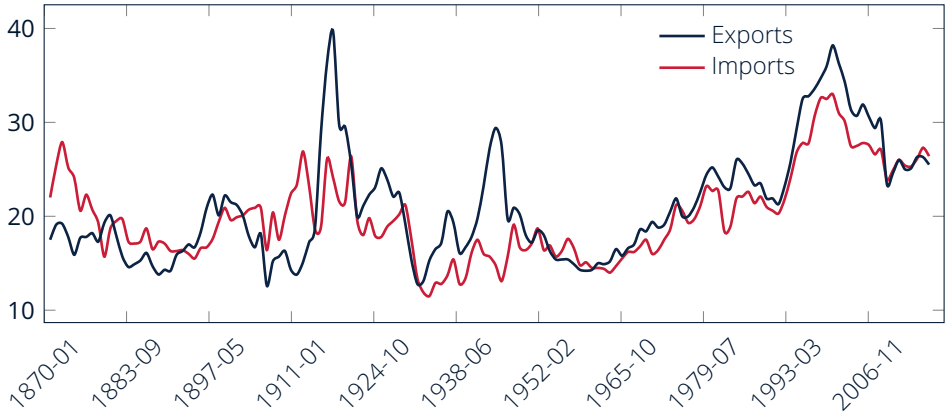
- Long-run economic growth
- Business cycles
- Unemployment
- Inflation
- Trade and exchange rates
- Debt and capital flows
- Macroeconomic policy

Introduction: Questions

- What determines the exchange rate?
- Is a monetary union any good?
- Why are some countries indebted?
- Why do countries default on their debt?
- What is the role of economic policy in all of this (Monetary/ Fiscal)

How can we import more than we export? and why do this happen?

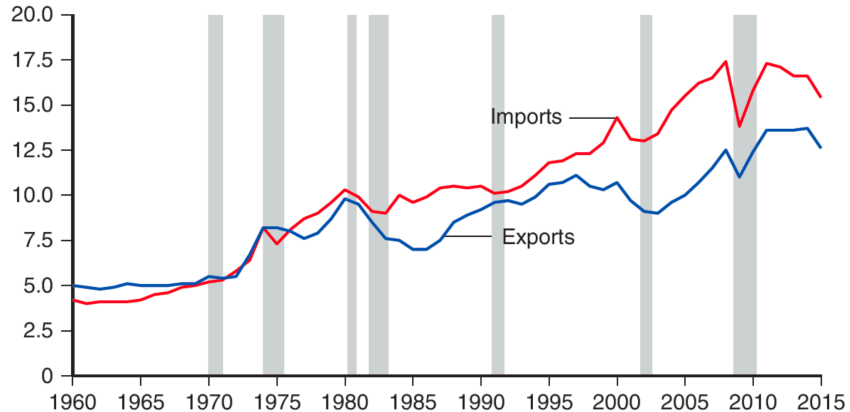
Figure 1: Canadian trade (% of GDP)



Source: Jordà et.al. 2017

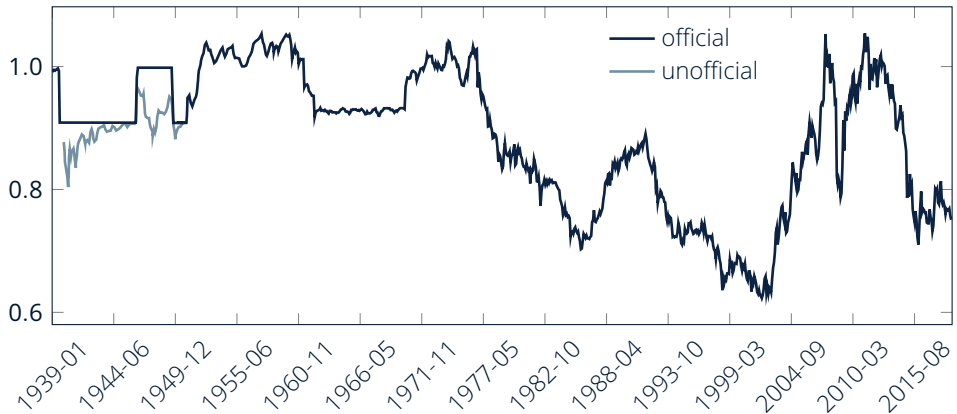
How can we import more than we export? and why do this happen?

Figure 2: U.S. trade (% of GNI)



What factors are behind the exchange rate?

Figure 3: Exchange Rate (CAD/USD)



Source: Statistics Canada

What is International Economics About?

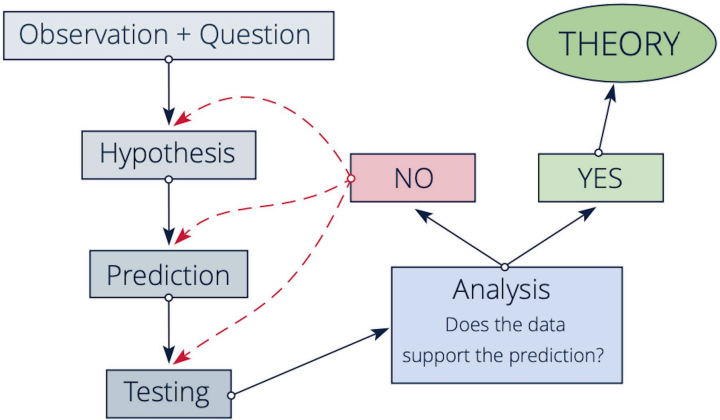
- International economics deals with economic interactions that occur between independent nations.
  - The role of governments in regulating international trade and investment is substantial.
  - Analytically, international markets allow governments to discriminate against a subgroup of companies.
  - Governments also control the supply of currency.
- There are several issues that recur throughout the study of international economics

Issues that recur throughout the study of international economics

- The Gains from Trade
- The Pattern of Trade
- How Much Trade?
- The Balance of Payments
- Exchange Rate Determination
- International Policy Coordination
- The International Capital Market

How to approach these questions?

Scientific method:



Macroeconomics in practice: Challenges

- To develop a Theory we must have a common language and sound interpretation of the mechanisms playing an important role.
- We don't have a laboratory where we can control the environment.
- The data that we have comes from one "realization of the world"

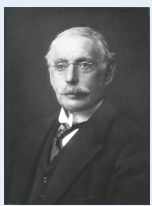
Natural Experiment

Empirical study in which individuals (or clusters of individuals) are exposed to the experimental and control conditions that are determined by nature or by other factors outside the control of the investigators

Macroeconomics in practice: Challenges

- Even if we had several versions of an economy, experimenting with them is not feasible: think about it in moral and practical terms.
- Economics is not the only field in science facing this challenge

Example: the physics of cavitation



Sir Charles Algernon Parsons

Improvements in steam turbines allowed ships to travel faster. At the same time a mysterious damage appeared in the propellers. In 1895, Parsons discovered the relationship between cavitation and the damage to the propeller.
How do you think he did it? would it be practical to build full size vessels and test them at sea?

Macroeconomics in practice: Models

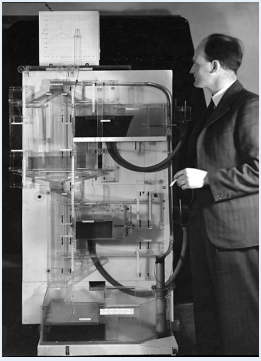
- A model is a simplified representation of Nature.
- A good model is simple/clear and allow us to test accurately our predictions.
  - We can easily adjust the inputs.
  - We can easily observe the outcomes.

Example: the physics of cavitation

Sir Charles Algernon Parsons

The first water tunnel to study this particular phenomenon!

Example: Monetary National Income Analogue Computer



Professor A.W.H (Bill) Phillips with MONIAC, the analog computer that modeled economic theory with water flows.

Macroeconomics in practice: Models

Nowadays, in macroeconomics, a model is a set of assumptions that lead to a mathematical representation

Example: the "standard" international finance model

- Four players: Households, Firms, Government and external sector
- Three competitive markets: Labor, Goods, financial
- All households, firms, goods and assets are identical
- Firms operate to maximize profits and Individuals maximize utility
- Small open economy.

Important

different assumptions can lead to different implications and policy prescription (e.g. competitive vs non-competitive markets)

Macroeconomics in practice: Policy

- Once we have a model we can use its predictions to test potential policy interventions.
- Most of the decisions are taken with a model on the back of the head of the policy makers.
- Usually, macroeconomic policy cross paths with politics: Positive vs Normative analysis.
- Agreements and Disagreements among macroeconomists.

Macro Data

Macro Data: goals

After we cover this section you should understand how the Balance of Payments' aggregates are constructed. You should also be able to answer what are the differences between gross domestic product (GDP) and gross national income (GNI).

Intro

- The national income accounts and the balance of payments accounts are essential tools for studying the macroeconomics of open, interdependent economies.
- National income accounting: Records all the expenditures that contribute to a country's income and output
- Balance of payments accounting: helps us keep track of both changes in a country's indebtedness to foreigners and the fortunes of its export- and import-competing industries

Macro Data: Economic Activity

- System of National Accounts:
  "is the internationally agreed standard set of recommendations on how to compile measures of economic activity."

  — United Nations, Statistics Division

- Gross Domestic Product (GDP):
  ..."*is an aggregate measure of production equal to the sum of the gross values added of all resident institutional units engaged in production (plus any taxes, and minus any subsidies, on products not included in the value of their outputs). The sum of the final uses of goods and services (all uses except intermediate consumption) measured in purchasers' prices, less the value of imports of goods and services, or the sum of primary incomes distributed by resident producer units*".

  — United Nations, Statistics Division

Macro Data: Economic Activity

- Gross National Product (GNP):
  ..." is the sum of value added by all resident producers plus any taxes (less subsidies) not included in the valuation of output, plus net receipts of primary income (compensation of employees and property income) from abroad.".

  — *United Nations, Statistics Division*

Three approaches to measure Output

1. **The Product Approach**: the amount of output produced (Value Added).
2. **The Income Approach**: total income received by all producers of output (wages, capital income, firm profits).
3. **The Expenditure Approach**: the amount of spending by ultimate purchasers (final consumers).

$$AE = C + I + G + EX - IM \tag{1}$$

Total Production = Total Income = Total Expenditure

Macro Data: Economic Activity

Table 2: Canadian GDP (expenditure, current prices)

	2015	2016
Final consumption expenditure	1,563,236	1,613,915
Household final consumption expenditure	1,117,690	1,154,829
Goods	487,180	504,453
Services	630,510	650,376
Non-profit inst serving households FCE	28,535	29,492
Gen. govts. final consumption expenditure	417,011	429,594
Gross fixed capital formation	475,988	472,419
Business gross fixed capital formation	398,389	389,592
Non-profit inst serving households' GFCF	2,981	3,065
Gen. govts. gross fixed capital formation	74,618	79,762
Investment in inventories	3,940	-487
Exports of goods and services	995,187	1,000,767
Statistical discrepancy	1,057	-1,156
Gross domestic product at market prices	1,994,911	2,035,506

Macro Data: Economic Activity

Table 3: Canadian GDP (income, current prices)

	2015	2016
Compensation of employees	1,026,914	1,044,005
Wages and salaries	884,410	896,899
Employers' social contributions	142,504	147,106
Gross operating surplus	515,737	518,979
Net operating surplus: corporations	231,937	227,625
Consumption of FC: corporations	216,207	222,204
Consumption of FC: Govt. and non-profit	67,593	69,150
Gross mixed income	232,366	241,415
Net mixed income	174,982	180,653
Consumption of FC: uninc. businesses	57,384	60,762
Taxes less subsidies on production	87,853	90,507
Taxes less subsidies on products and imports	133,099	139,443
Statistical discrepancy	-1,058	1,157
Gross domestic product at market prices	1,994,911	2,035,506

Macro Data: Economic Activity

- GDP does not take into account out-of-market activities:
  - Home production
  - Underground economy
  - Environmental quality
  - Crime and safety
  - Income inequality
- GDP does not measure welfare
- GDP cannot be easily compared across countries.

Macro Data: Nominal vs Real GDP

- The magnitudes we saw in tables 1 and 2 are Nominal (i.e they are measured in current dollars). Nominal GDP for any period is the sum of price times quantity of each good produced in the economy. Why do we do this?

$$GDP(t) = \sum_i p_t^i q_t^i \tag{2}$$

- Let's say that my country's nominal GDP was 1 Bn. dollars last year, and 2 Bn. dollars this year. Is it because we actually produced more goods?
- The measure that we are after — Real GDP— reflects changes only on quantities. How can we get this?

Macro Data: Real GDP (base year)

- Select a base year.

- Fix prices at their base year level, and adjust quantities only.

$$RGDP_0(t) = \sum_i p_0^i q_t^i \tag{3}$$

Example: Nominal vs Real GDP

	Quantity		Price	
	2017	2018	2017	2018
Computers	10 units	8 units	1,000 $ /unit	2,000 $ /unit
Apples	10 tons	15 tons	400 $ /ton	50 $ /ton

- Nominal GDP calculation:

$$GDP(2017) = 10u \times 1,000\frac{\$}{u} + 10t \times 400\frac{\$}{t} = \$14,000$$

$$GDP(2018) = 8u \times 2,000\frac{\$}{u} + 15t \times 50\frac{\$}{t} = \$16,750$$

- Nominal GDP growth: 19.6%
- But we are comparing dollars from different years

Example: Nominal vs Real GDP

	Quantity		Price	
	2017	2018	2017	2018
Computers	10 units	8 units	1,000 $ /unit	2,000 $ /unit
Apples	10 tons	15 tons	400 $ /ton	50 $ /ton

- Real GDP calculation (2017 prices):

$$RGDP_{17}(2017) = 10u \times 1,000\frac{\$}{u} + 10t \times 400\frac{\$}{t} = \$14,000$$

$$RGDP_{17}(2018) = 8u \times 1,000\frac{\$}{u} + 15t \times 400\frac{\$}{t} = \$14,000$$

- Real GDP growth: 0%

Example: Nominal vs Real GDP

	Quantity		Price	
	2017	2018	2017	2018
Computers	10 units	8 units	1,000 $ /unit	2,000 $ /unit
Apples	10 tons	15 tons	400 $ /ton	50 $ /ton

- Real GDP calculation (2018 prices):

$$RGDP_{18}(2017) = 10u \times 2,000\frac{\$}{u} + 10t \times 50\frac{\$}{t} = \$20,500$$

$$RGDP_{18}(2018) = 8u \times 2,000\frac{\$}{u} + 15t \times 50\frac{\$}{t} = \$16,750$$

- Real GDP growth: -18.3%

Macro Data: Real GDP (base year)

The previous example is deliberately extreme since it shows one of the main problems of the fixed year base: As time goes on, goods whose prices go down (and quantities usually go up) are still weighted by the old prices, and consequently get too much weight in later years' GDP calculations.

Problems with the fixed base year

- The choice of a base year is crucial when the prices of different goods grow at very different rates.
- New products don't have prices in previous years.
- Obsolete products don't have prices in following years.
- Some products are not comparable to its predecessors

Macro Data: Real GDP (chained-weight)

- A partial solution is *Chain Weighted* GDP Growth. The idea is to update the base every year and compute the change in quantities using previous and present year prices. The growth rate of real GDP is:

$$g_{Y,t} = \left[\frac{\sum_i p^i_{t-1} q^i_t}{\sum_i p^i_{t-1} q^i_{t-1}} \right]^{1/2} \left[\frac{\sum_i p^i_t q^i_t}{\sum_i p^i_t q^i_{t-1}} \right]^{1/2} - 1 \tag{4}$$

- Recover real GDP using $GDP_{t+1} = (1 + g_t) GDP_t$

Attention!

Since we are taking a geometric average of two types of indexes, now the sub-categories will not be additive. For example real Expenditures will not be the sum of real consumption, investment, etc.

Macro Data: Prices and Inflation

- A Price Index (P_t) is a measure of the average price level in the economy.

- The rate of Inflation is the percentage change of the price index per period

$$\pi_{t+1} = \frac{P_{t+1} - P_t}{P_t} \tag{5}$$

- Two common ways of computing price indexes are using *Laspeyres* and *Paasche* indexes.

$$P_t^{Laspeyres} = \frac{\sum_i p_t^i q_0^i}{\sum_i p_0^i q_0^i} \quad (6)$$

$$P_t^{Paasche} = \frac{\sum_i p_t^i q_t^i}{\sum_i p_0^i q_t^i} \quad (7)$$

Problems: Assume there's inflation

- Laspeyres index overstates inflation
- Paasche index understates inflation

why? SUBSTITUTION EFFECT!

- Since Laspeyres overstates and Paasche understate inflation, an average of both will be closer to the "ideal" price index.

- Fisher Ideal Index for prices:

$$P_t^{Fisher} = \sqrt{P_t^{Laspeyres} \times P_t^{Paasche}} \tag{8}$$

- Take the time to see how the chained-weight real GDP is similar to the Fisher Ideal index (for quantity instead of price).

Macro Data: Prices and Inflation

The most common price indexes are

- **GDP deflator** = $\frac{\text{Nominal GDP}}{\text{Real GDP}}$
- **Consumer Price Index** (CPI): measures current prices of a fixed "consumption basket"
  - Pick a base year (e.g. 2011=100)
  - Pick the representative consumption basket
  - Track the change in prices

Are these Laspeyres or Paasche indexes?

- CPI $\rightarrow$ Laspeyres, and
- GDP deflator $\rightarrow$ Paasche

Are there other differences? GDP is not only consumption goods: eg. Investment

Macro Data: Exchange Rate

- Suppose you want to compare GDP levels of different countries
- Problems?: Transactions inside the country are made in local currency (LCu) and, therefore, GDP is measured in local currency
- We have to convert the data into some common unit. Typically US dollars

Macro Data: Exchange Rate

- One option is to use the Nominal Exchange Rate

$$e_t^{\text{nominal}} = \frac{\text{LCu}}{\text{USD}} \tag{9}$$

  e.g. 1.32 CAD per 1 USD.

- Note that the definition here is arbitrary:
  - We could use another currency in the denominator (or basket of currencies)
  - We could use the inverse ratio. When in doubt, ask yourself what would happen to the exchange rate with a local appreciation: if the exchange rate goes down, then the definition is as (9)

Problem

Prices and basket compositions of goods and services vary across countries. The market exchange rate typically does a poor job reflecting this (who participates in the FX market?)

A
fr
di
vi

Macro Data: Exchange Rate (PP)

- A way to account for the **purchasing power** of a currency is to consider the price, in local currency, of the same good (or basket of goods) in different countries.

$$e_t^{pp} = \frac{P_t^{\text{LCu}}}{P_t^{\text{US}}} \tag{10}$$

- That way the conversion is based on actual quantities produced

$$GDP_t^{\text{pp}} = \frac{GDP_t^{LCu}}{e_t^{pp}}$$

- Problem: how can we know that the representative basket of goods is identical in two different countries? Is a Dabbawala the same than Uber-eats?

$$e_t^{\text{Real}} = \frac{e_t^{\text{nominal}}}{e_t^{pp}} = e_t^{\text{nominal}} \times \frac{P_t^{\text{US}}}{P_t^{\text{LCu}}} \tag{11}$$

Example: Real exchange rate

- Suppose I can buy a coffee for 2 USD in California.
- Convert 2 USD to 2.64 CAD and spend it all in coffee.
- The ratio of coffee that I get in Canada relative to the US is the Real Exchange Rate.
- If I can get exactly the same coffee in Vancouver as in California, then $e_t^{\text{Real}} = 1$. In this case we also say that *Purchasing Power Parity* (PPP) holds.
- If I can get more coffee in California then $e_t^{\text{Real}} < 1$. The USD is "undervalued" (CAD is "overvalued").

Nominal interest rate

An interest rate is the return a borrower promises to a lender, expressed as a percentage of the principal. When this promises are expressed in dollars we refer to it as a Nominal Interest rate (i_t).

The nominal interest rate reflects the price of bringing money from, or to, the future.

- When a savings account pays x% interest rate, that is usually a nominal interest rate.
- How valuable is the nominal return? Think about why you need money and what else can you do with it instead of saving .

Real interest rates

A real interest rate (r_t) expresses the promised return in terms of goods.

If you received x% nominal return and prices did not change, then you can afford to buy x% more goods than before (positive real interest rate). If prices went up by more than x%, you can buy less things than before (negative real interest rate).

Example: Nominal vs Real interest rates

- Let's say you have $100. You can buy a Kindle today or save them in the bank for a promised 2% nominal interest per year.
- At the end of the year, you get $ 102 but the Kindle's price is now $104.
- What is your real return?

In general, to account for the change in prices

$$1 + r_t = \frac{1 + i_t}{1 + \pi_{t+1}}$$

When r, i and π are small (are they?), we can take natural logs and get

$$r_t \approx i_t - \pi_{t+1} \tag{12}$$

This is an ex-post equation (known i_t and known π_{t+1}). Usually i_t is known but π_{t+1} is not, therefore the expected rate becomes relevant

$$\mathbb{E}(r_t) = i_t - \mathbb{E}(\pi_{t+1}) \tag{13}$$

The Balanace of Payments (BoP)

"The balance of payments is a statistical statement that systematically summarizes, for a specific time period, the economic transactions of an economy with the rest of the world. Transactions, for the most part between residents and nonresidents,1 consist of those involving goods, services, and income; those involving financial claims on, and liabilities to, the rest of the world; and those (such as gifts) classified as transfers, which involve offsetting entries to balance—in an accounting sense—one-sided transactions."

— International Monetary Fund

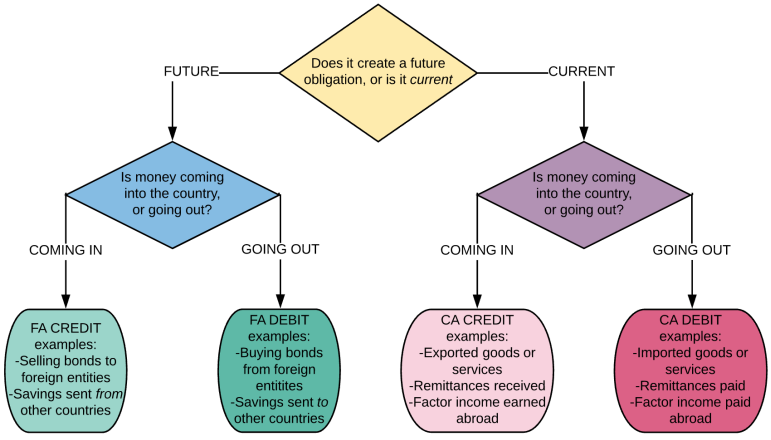
The Balanace of Payments (BoP)

- Balance of payments record of all funds ($) going in and out of a country
- The balance of payments tracks international transactions. When funds go into a country, a credit is added to the BOP. When funds leave a country, a deduction is made. There is a manual for this since 1948
- For example, when a country exports to another country, a credit is made in the balance of payments.

The Balanace of Payments (BoP): definitions

- Current Account (CA): a record of international transactions that do not create liabilities
- Capital Financial Account (CFA): a record of international transactions that do create liabilities; the capital and financial account includes official and private sales and purchases of financial assets, such as bonds.
- Factor Income: the net of payments received and payments made on investments overseas; for example, if a U.S. resident owns stock in a Japanese company, any income earned on that stock is emphfactor income in the U.S. current account.
- Remittances: money that is received from another country that is not in exchange for a good, service, or financial asset; for example, when someone is working abroad and sends money home to their family.

If a transaction creates a liability, that gets counted in the CFA. If a transaction doesn't create a liability, the transaction gets counted in the CA



The BOP is a Double-entry bookkeeping of international transactions (flow)

	2022				2023	
	I	II	III	IV	I	II
Cuenta Corriente [1]	**-5.471**	**-9.116**	**-7.522**	**-4.993**	**1.671**	**-2.754**
Bienes y Servicios	-2.769	-3.705	-4.486	-57	4.902	1.160
Bienes[2]	1.119	47	-1.018	3.659	7.458	3.577
Exportaciones	24.419	24.874	23.884	25.371	27.003	23.380
Importaciones	23.300	24.828	24.902	21.712	19.544	19.803
Servicios	-3.888	-3.751	-3.468	-3.717	-2.557	-2.417
Exportaciones	1.894	1.989	2.225	2.421	2.719	2.263
Importaciones	5.781	5.741	5.693	6.138	5.276	4.680
Renta (Ingreso primario)	-2.708	-5.596	-3.162	-5.054	-3.192	-4.266
Transferencias Corrientes (Ingreso secundario)	5	185	126	119	-39	352
Cuenta Capital	**1**	**1**	**0**	**0**	**45**	**0**
Capacidad / Necesidad de financiamiento[3]	**-5.470**	**-9.115**	**-7.522**	**-4.993**	**1.716**	**-2.754**
Cuenta Financiera [4]	**-5.467**	**-8.411**	**-9.049**	**-2.460**	**2.570**	**-1.817**
Inversión directa	-593	-5.612	128	-2.012	-2.232	-3.971
Inversión de cartera	-3.391	1.062	367	-6.435	2.520	3.574
Instr. financieros derivados	646	149	210	-360	-540	-554
Otra inversión	-349	-3.037	-2.730	5.772	3.153	-1.325
Activos de reserva	-1.779	-974	-7.024	576	-331	460
Errores y Omisiones	**3**	**704**	**-1.527**	**2.533**	**854**	**937**

The International Investment Position (IIP) shows the value (stock) of financial claims between residents and non-residents.

	2022				2023	
	I	II	III	IV	I	II
Posición de inversión internacional neta	**-45.716**	**-38.534**	**-53.312**	**-55.435**	**-52.653**	**-53.767**
Activo	452.454	443.216	430.907	445.643	460.837	459.872
Inversión directa	150.686	149.766	151.288	154.127	157.490	158.872
Inversión de cartera	186.302	173.195	162.607	171.095	176.724	180.977
Instr. financieros derivados	18.229	25.778	31.205	26.793	28.041	24.138
Otra inversión	48.917	48.655	48.022	54.475	59.279	56.388
Activos de reserva	48.320	45.821	37.784	39.154	39.304	39.497
Pasivo	498.170	481.749	484.219	501.078	513.489	513.639
Inversión directa	268.222	258.822	261.792	274.633	280.026	285.536
Inversión de cartera	139.773	122.875	114.572	125.037	128.711	128.776
Instr. financieros derivados	19.995	27.387	33.287	25.876	27.432	23.899
Otra inversión	70.179	72.665	74.568	75.533	77.321	75.429
Deuda externa	**243.157**	**233.049**	**226.502**	**233.325**	**230.163**	**229.819**
Pública	82.743	73.240	65.879	71.981	75.121	75.639
Privada	160.414	159.809	160.622	161.343	155.041	154.179
			(porcentaje del PIB trimestral)			
Cuenta Corriente (acumulado en 12 meses)	**-8,1%**	**-9,7%**	**-10,0%**	**-9,0%**	**-6,6%**	**-4,5%**
Cuenta Financiera (acumulado en 12 meses)	**-8,8%**	**-9,8%**	**-10,2%**	**-8,4%**	**-5,8%**	**-3,7%**
Posición de inversión internacional neta	**-14,5%**	**-13,9%**	**-19,9%**	**-18,1%**	**-15,5%**	**-15,8%**
Deuda externa	**77,1%**	**84,3%**	**84,5%**	**76,4%**	**67,7%**	**67,6%**

(1) El signo negativo significa salida de capitales de Chile y el signo positivo significa una entrada.
(2) Las exportaciones e importaciones se presentan valoradas en términos FOB.
(3) Corresponde a suma de cuenta corriente y cuenta de capital.
(4) Los valores negativos reflejan un endeudamiento de Chile con el resto del mundo. Los valores positivos significan un préstamo neto de Chile hacia el resto del mundo.

Homework

Help me make the next generation set of slides better.

1. Pick a country
2. Download the data series of the Balance of Payments from the IMF for that country and Chile. https://data.imf.org/
3. The data is more likely to be annual. Try to find the longest series (Bonus points here).
4. Find a way to show how the components of the BOP evolve over time. (e.g. Bar plot)
5. Write a small report (one page max) with the representation you chose above, explaining the evolution of the BOP components. You may want to take a look to the IIP too.