

# The goods market

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# Please Read Me

- Check the message **Welcome greeting** published in the News Bulletin Board.
- Dear student please edit your profile uploading a photo where your face is clearly visible.
- The purpose of the virtual meetings is to answer questions and not to make a summary of the study material.
- This presentation is based on (Blanchard and Johnson 2017, Chapter 3)

# Purpose

Examine the equilibrium of the goods market and the determination of production.

# The macroeconomic identity

- GDP refers to the final products that are produced within a territory. However, a key element to include are imports to examine the commercial relations with the rest of the world.
- GDP can be expressed as:  $GDP_s^f(t) = C_s^f(t) + G_s^f(t) + I_s^f(t) + X_s^f(t)$ 
  - Where  $s$  refers to a certain territory,  $t$  a period of time and  $f$  are the monetary units in which the nominal GDP is measured. Also:
    - $GDP_s^f(t)$  is the final production of products produced **within**  $s$ .
    - $C_s^f(t)$  is the final consumption expenditure by households and the NPISHs<sup>1</sup> of products produced **within**  $s$ .
    - $G_s^f(t)$  is the final consumption expenditure by the government of products produced **within**  $s$ .
    - $I_s^f(t)$  is the investment<sup>2</sup> made with products produced **within**  $s$ .
    - $X_s^f(t)$  is the use of products by economic units **outside**  $s$  but produced **within**  $s$ , that is, exports.

<sup>1</sup>Non-profit institutions serving households

<sup>2</sup>Known as **gross capital formation** in the lingo of national accounts system

# Imports

- It is important to keep in mind that imports refer to final products produced **outside** the territory  $s$  but used **within** the territory  $s$ .

Imports can be used to consume or invest. In that sense:

$$IM_s^f(t) = C_{rw}^f(t) + I_{rw}^f(t) + G_{rw}^f(t)$$

- Where:
  - $IM_s^f(t)$  are the imports of the territory  $s$ .
  - $C_{rw}^f(t)$  is the final consumption expenditure by households and the NPISHs of the territory  $s$  of products produced in the rest of the world,  $rw$ .
  - $I_{rw}^f(t)$  is the investment made with products produced in the rest of the world,  $rw$ .
  - $G_{rw}^f(t)$  is the final consumption expenditure by the government of products produced in the rest of the world,  $rw$ .

# Imports

- To include imports, we can add and subtract them as follows:

$$GDP_s^f(t) = [C_s^f(t) + C_{rw}^f(t)] + [G_s^f(t) + G_{rw}^f(t)] + [I_s^f(t) + I_{rw}^f(t)] + X_s^f(t) - IM_s^f(t)$$

- In that way we can group the following variables:

- $C^f(t) \equiv C_s^f(t) + C_{rw}^f(t)$  is the total final consumption expenditure by households and the NPISHs in  $s$ .
- $I^f(t) \equiv I_s^f(t) + I_{rw}^f(t)$  is the total investment in  $s$ .
- $G^f(t) \equiv G_s^f(t) + G_{rw}^f(t)$  is the total final consumption expenditure by the government in  $s$ .

- In that way  $GDP_s^f(t) \equiv C_s^f(t) + I_s^f(t) + G_s^f(t) + X_s^f(t) - IM_s^f(t)$
- If the subscripts and superscripts are removed to facilitate the notation, we have the expression that are usually found in the economics textbooks:  $GDP(t) \equiv C(t) + I(t) + G(t) + X(t) - IM(t)$

# Imports

- What happens if a car is imported and a household acquires it within the territory?
  - The value of the car is subtracted from  $IM(t)$  but it is added to  $C(t)$ .
- What happens if a machine is imported and a company acquires it within the territory to produce other products?
  - The value of the machine is subtracted from  $IM(t)$  but added to the  $I(t)$ .
- What happens if a product is imported and the government acquires it to provide a service to citizens within the territory?
  - The value of the product is subtracted from  $IM(t)$  but added to  $G(t)$ .



# Domestic production plus imports and aggregate demand

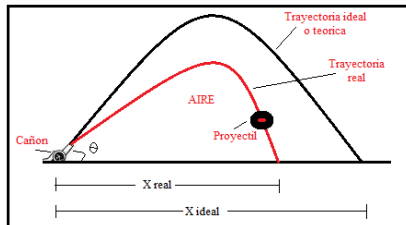
$$\begin{aligned} GDP(t) &\equiv C(t) + I(t) + G(t) + X(t) - IM(t) \\ \underbrace{GDP(t)}_{\text{Domestic production}} + \underbrace{IM(t)}_{\text{Imports}} &\equiv \underbrace{C(t) + I(t) + G(t)}_{\text{Domestic aggregate demand}} + \underbrace{X(t)}_{\text{Exports}} \\ \underbrace{GDP(t) + IM(t)}_{\text{Aggregate supply}} &\equiv \underbrace{C(t) + I(t) + G(t) + X(t)}_{\text{Aggregate demand}} \end{aligned}$$

# Types of equations in the models

- **Identities:** are relationships that are true by definition.
  - Accounting equation:  $Assets \equiv Liabilities + Equity$
  - Accounting of GDP as the value of final products:  
 $GDP(t) \equiv C(t) + I(t) + G(t) + X(t) - IM(t)$
  - Definition of tangent function in trigonometry:  $\tan \theta \equiv \frac{\sin \theta}{\cos \theta}$

# Types of equations in the models

- **Behavioral equations:** represent hypotheses about how a variable is determined.
  - How does consumption behave? In economics, an **ideal** consumption function is assumed that explains how this variable is determined:  
$$C(t) = c_0 + c_1 Y_D(t) \quad c_0 > 0 \quad 0 < c_1 < 1$$
  - What is the maximum distance a projectile travels from the ground? In physics, an **ideal** projectile motion function is assumed that explains how this variable is determined:  $X_{ideal}^{max} = \frac{v_0^2 \sin(2\theta)}{g}$  (Mattos 2014)



# Types of equations in the models

- **Equilibrium conditions:** establish a requirement that should be met.
  - What condition must be met in a market so that resources are optimally allocated? The quantity demanded should tend to be equal to the quantity supplied **or there will be a surplus or shortage.**
  - What condition must be met in a supermarket when people line up with their cart to pay? The length of the rows should tend to be the same **or people will change lines.**
  - **Disequilibrium** (left) and **equilibrium** (right) situations:



# Goods market model

- The models that will be seen can be expressed in three ways: algebraically, graphically and explained with words.
- **Algebraically**
  - Aggregate demand (identity) assuming no commercial relations with the rest of the world and that investment doesn't vary:  
$$Z(t) \equiv C(t) + \bar{I} + G(t).$$
  - Aggregate supply as the added value of production:  $Y(t)$ .
  - Consumption (behavioral equation):  $C(t) = c_0 + c_1 Y_D(t)$ .
  - Disposable income (identity):  $Y_D(t) \equiv Y_R(t) - T(t)$ .
    - Where  $T(t)$  includes taxes paid minus transfers from the state that consumers receive.
    - By definition aggregate value is equivalent to the sum of the different incomes in a territory (identity)  $Y(t) \equiv Y_R(t)$ . Therefore  
$$Y_D(t) = Y(t) - T(t).$$

# Goods market model

- **Algebraically**

- Equilibrium condition:

$$Y(t) = Z(t)$$

$$Y(t) = C(t) + \bar{I} + G(t)$$

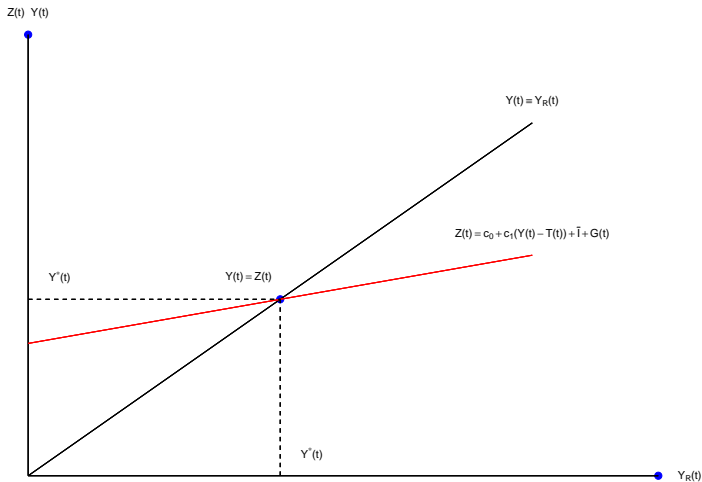
$$Y(t) = c_0 + c_1 Y_D(t) + \bar{I} + G(t)$$

$$Y(t) = c_0 + c_1(Y(t) - T(t)) + \bar{I} + G(t)$$

$$Y^*(t) = \frac{1}{1 - c_1}(c_0 + \bar{I} + G(t) - c_1 T(t))$$

# Goods market model

- Graphically



# Goods market model

- Using **words**

- **Equilibrium condition:**

- If  $Y(t) > Z(t)$  then companies accumulate inventories by not selling everything they produce. Therefore they restrict production until they sell their inventories.
- If  $Y(t) < Z(t)$  households or NPISHs seek to consume more, companies want to invest more and government want to spend more. However, production is not enough, so a shortage is generated and the prices of final products rise. As prices rise there are incentives to produce more.

- **Consumption function:**  $C(t) = c_0 + c_1(Y(t) - T(t))$

- If  $c_0 > 0$  it means that if the disposable income is equal to zero, consumers can: dissave selling for example assets or using money accumulated in previous periods or borrowing.
- If  $0 < c_1 < 1$  it means that if the disposable income increases, consumers do not consume or save the entire increase.



# Goods market model

- Using **words**

- Equilibrium production:**  $Y^*(t) = \frac{1}{1-c_1}(c_0 + \bar{I} + G(t) - c_1 T(t))$ 
  - If public spending increases,  $G(t)$ , the equilibrium production,  $Y^*(t)$ , increases more than the increase in spending but only in  $t$ .
  - Public spending cannot increase indefinitely and if it does then in later periods taxes will raise. That is to say,  $T(t)$  will have to increase.
  - This effect occurs because  $\frac{1}{1-c_1} > 1$ . Therefore, the government can boost the economy but only in  $t$  and not indefinitely. How much? It will depend on  $c_1$ .
  - Let's assume that  $c_1 = 0.6$ , that is, for every 100 monetary units that disposable income increases, consumption increases by 60 monetary units. Therefore  $\frac{1}{1-c_1} = 1.5$ , so for every 100 monetary units that public spending increases equilibrium production increases 150 monetary units. It is an excellent situation but only in  $t$  since this cannot be done indefinitely.

# Components of aggregate demand in Colombia

## Colombia nominal aggregate demand and its components

GDP code WDI: NY.GDP.MKTP.CN

IM code WDI: NE.IMP.GNFS.CN

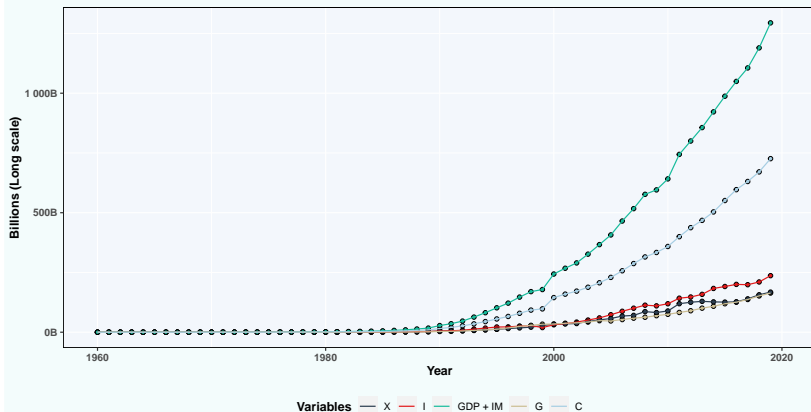
C code WDI: NE.CON.PRVT.CN

I code WDI: NE.GDI.TOTL.CN

G code WDI: NE.CON.GOV.T.CN

X code WDI: NE.EXP.GNFS.CN

Variables units: current LCU



Source: World Development Indicators (WDI) – World Bank  
Last update date: 2020-12-16

# Taxes in Colombia

- In the model taxes are part but not equal to  $T(t)$  because  $T(t)$  includes taxes paid minus transfers from the state that consumers receive.
- In economics, taxes are understood as compulsory payments made by individuals to finance the activities that the government has decided to carry out, regardless of whether the compulsory payment has a specific destination or whether or not it is proportional to the goods or services received. (Observatorio Fiscal Pontificia Universidad Javeriana 2018, p 5).
- In Colombian tax law, taxes are divided in 3 categories: “impuestos,” “tasas” and “contribuciones.” In economics we don’t make this distinction where we refer simply to the concept of tax (tributo in spanish).

# Taxes in Colombia

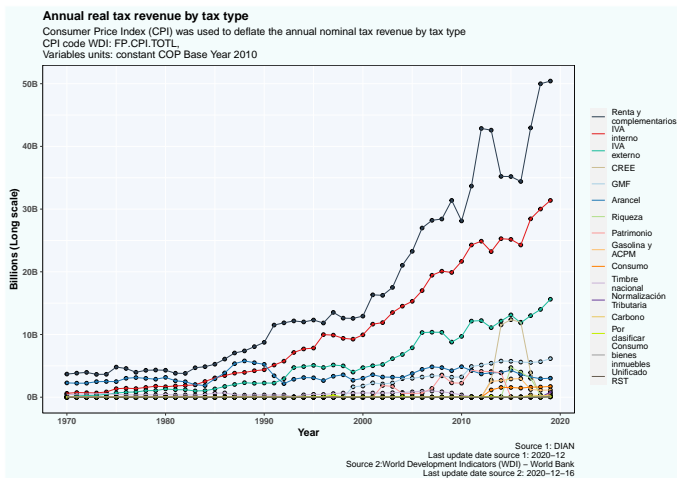
- What are the main taxes paid in Colombia? (Observatorio Fiscal Pontificia Universidad Javeriana 2018, p 15)
  - **National taxes:** Carbono, Gasolina y ACPM, Riqueza Empresas, Riqueza Personas, Consumo, IVA, 4x1000, Renta Personas, Renta Empresas, Timbre, Aranceles y tarifas
  - **Local taxes:** ICA, Predial, Alcohol, cigarrillos y loterías, Vehículos, Sobretasa a la gasolina, Registro, Otros

# Taxes in Colombia

- Annual tax revenue by tax type administered by DIAN (1970-2020) (DIAN 2020)
  - <https://www.dian.gov.co/> > Sitio web institucional > Dirección de Impuestos y Aduanas Nacionales. Portal Institucional > DIAN > Cifras > Estadísticas > Estadísticas de Recaudo > Estadísticas de Recaudo Anual por Tipo de Impuesto 1970 - 2020

# Taxes in Colombia

- Annual tax revenue by tax type administered by DIAN (1970-2019) (DIAN 2020)



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# References

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