

# Production and Income I

Luis Francisco Gomez Lopez

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# Please Read Me

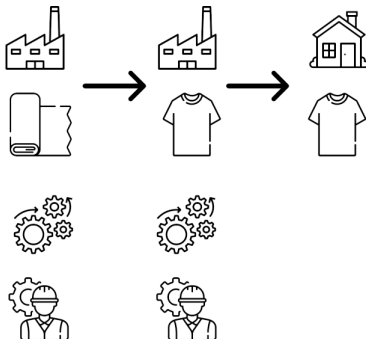
- Check the message **Welcome greeting** published in the News Bulletin Board.
- Dear student please edit your profile uploading a photo where your face is clearly visible.
- The purpose of the virtual meetings is to answer questions and not to make a summary of the study material.
- This presentation is based on ([Cardenas 2020, chap. 2](#))

# Purpose

Understand how production is measured using the concept of Gross Domestic Product (GDP)

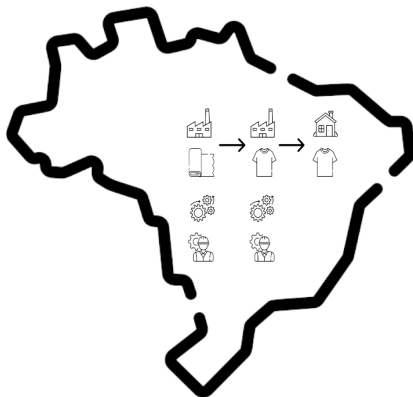
# Gross Domestic Product (GDP)

- What is? ([Lequiller and Blades 2014, 19](#))
  - **Product:** means that we are trying to measure production without double counting



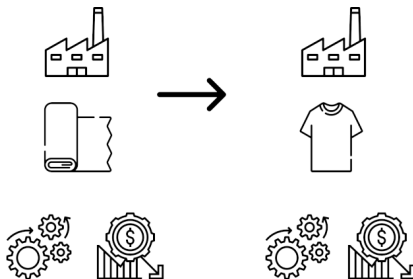
# Gross Domestic Product (GDP)

- What is? ([Lequiller and Blades 2014, 19](#))
  - **Domestic:** means that the production to be taken into account is the one that is carried within a certain territory clearly delimited



# Gross Domestic Product (GDP)

- What is? ([Lequiller and Blades 2014, 19](#))
  - **Gross:** means that depreciation is not deducted (in economy it is called consumption of fixed capital). In other words, the decrease in the value of the assets used in the production process due to physical deterioration, foreseeable wear or accidental damage is not deducted



# Gross Domestic Product (GDP)

- How is measure?
  - 3 equivalent<sup>1</sup> approaches are used ([Lequiller and Blades 2014, 31](#))
    - **Output/Production approach:** adding the aggregate value of all the production units in a territory, plus taxes minus subsidies on products
    - **Income approach:** adding all the incomes that are perceived because of the contribution to the production process
    - **Expenditure/Final demand approach:** adding all uses that firms, non-profit institutions, government bodies, households and the external sector give to production
  - Gross Domestic Product is a flow so is measured over a period of time. Usually you can find information about this variable in an monthly, quarterly or yearly periodicity
  - Initially Gross Domestic Product is expressed in **current** Local Currency Units (LCU)

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<sup>1</sup>In practice, discrepancies may occur



# Gross Domestic Product (GDP)

## ● Output/Production approach (Colombia, Period: 2023-Q3)

Concepto	Miles de Millones - COP <sup>a</sup>
Agricultura, ganadería, caza, silvicultura y pesca	33086
Explotación de minas y canteras	21970
Industrias manufactureras	44122
Suministro de electricidad, gas, vapor y aire acondicionado; Distribución de agua; evacuación y tratamiento de aguas residuales, gestión de desechos y actividades de saneamiento ambiental	16351
Construcción	15855
Comercio al por mayor y al por menor; reparación de vehículos automotores y motocicletas; Transporte y almacenamiento; Alojamiento y servicios de comida	73559
Información y comunicaciones	9274
Actividades financieras y de seguros	15278
Actividades inmobiliarias	28641
Actividades profesionales, científicas y técnicas; Actividades de servicios administrativos y de apoyo	25065
Administración pública y defensa; planes de seguridad social de afiliación obligatoria; Educación; Actividades de atención de la salud humana y de servicios sociales	57350
Actividades artísticas, de entretenimiento y recreación y otras actividades de servicios; Actividades de los hogares individuales en calidad de empleadores; actividades no diferenciadas de los hogares individuales como productores de bienes y servicios para uso propio	14297
Valor agregado bruto	354846
Impuestos menos subvenciones sobre los productos	42130
Producto interno bruto	396976

Source: DANE - Cuentas Nacionales Trimestrales - Producto Interno Bruto desde el enfoque de la producción a precios corrientes - Cuadro 1 Datos originales  
Last update: 2023-11-15

<sup>a</sup> Preliminary data at current prices

# Gross Domestic Product (GDP)

- Income approach (Colombia, Period: 2023-Q3)

Concepto	Miles de Millones - COP <sup>a</sup>
Remuneración de los asalariados	128080
Impuestos menos subvenciones	49533
Excedente Bruto de Explotación	127140
Ingreso Mixto	92223
<b>Producto Interno Bruto</b>	<b>396976</b>

Source: DANE - Cuentas Nacionales Trimestrales - PIB por Ingreso - S1 Total Economía

Last update: 2023-12-27

<sup>a</sup> Preliminary data at current prices

# Gross Domestic Product (GDP)

- Expenditure/Final demand approach (Colombia, Period: 2023-Q3)

Concepto	Miles de Millones - COP <sup>a</sup>
Gasto de consumo final individual de los hogares y las ISFLH <sup>b</sup>	296573
Gasto de consumo final del gobierno general	55620
Formación bruta de capital	58484
Exportaciones	70255
Importaciones	83956
<b>Producto Interno Bruto</b>	<b>396976</b>

Source: DANE - Cuentas Nacionales Trimestrales - Producto Interno Bruto desde el enfoque del gasto a precios corrientes - Cuadro 1 Datos originales

Last update: 2023-11-15

<sup>a</sup> Preliminary data at current prices

<sup>b</sup> Instituciones sin fines de lucro que sirven a los hogares

# Gross Domestic Product

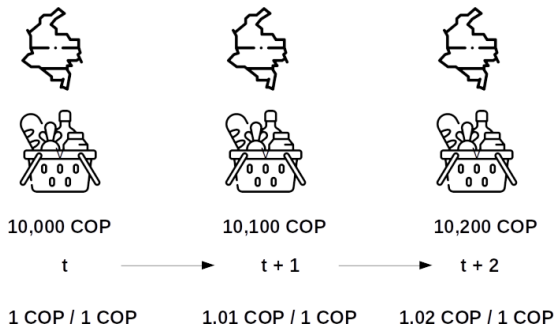
- What adjustments are applied?<sup>2</sup>
  - **Inflation adjustments**
    - GDP is expressed in **constant** Local Currency Units (LCU)
  - **Season and calendar adjustments**
    - In Colombia this is applied to quarterly GDP ([DANE 2018](#))
  - **Population adjustments**
    - GDP is expressed in per capita terms
  - **Purchase Power Parity (PPP) adjustment**
    - It is used only to make international comparisons and it is led by the International Comparison Program (ICP)

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<sup>2</sup>For an introduction of the first 3 adjustments check out ([Hyndman and Athanasopoulos 2021, chap. 3](#), Section 3.1 Transformations and adjustments)

# Gross Domestic Product

- An inflation adjustment is necessary because an arbitrary quantity of local currency units don't have the same purchase power in different periods



# Gross Domestic Product

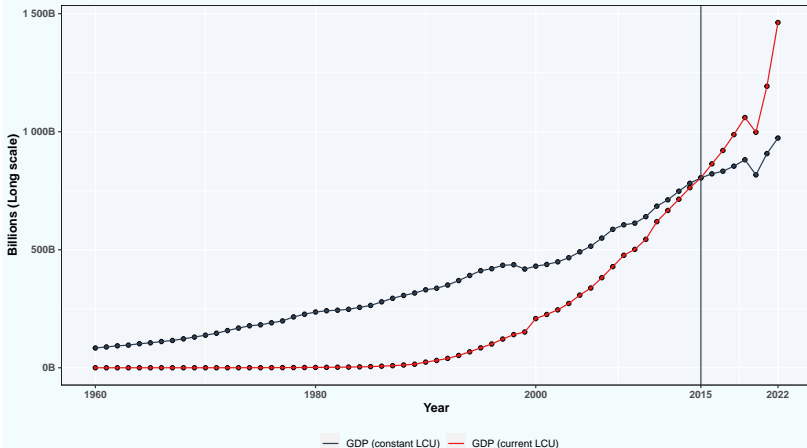
## Nominal and Real GDP Colombia

Nominal GDP code WDI: NY.GDP.MKTP.CN

Nominal GDP units: current LCU

Real GDP code WDI: NY.GDP.MKTP.KN

Real GDP units: constant LCU Base Year 2015



Source: World Development Indicators (WDI) – World Bank  
Last update date: 2023-12-18

# Gross Domestic Product

- Some countries have more population than others so they can produce more. Therefore it is necessary to express the GDP per inhabitant

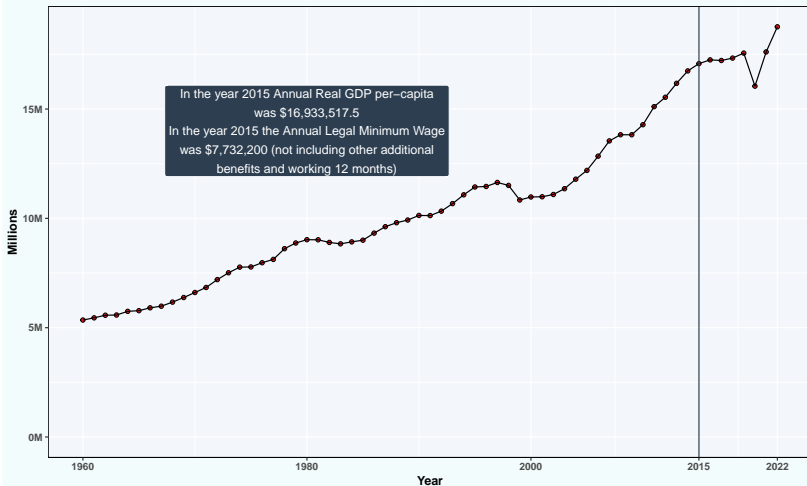


# Gross Domestic Product

## Real GDP per-capita Colombia

Variable code WDI: NY.GDP.PCAP.KN

Variable units: constant LCU Base Year 2015



Source: World Development Indicators (WDI) – World Bank  
Last update date: 2023-12-18



# Gross Domestic Product

- Purchasing power parity
  - The amount of products that 1 local currency unit of an economy can buy in another economy



10 USD



10,000 COP

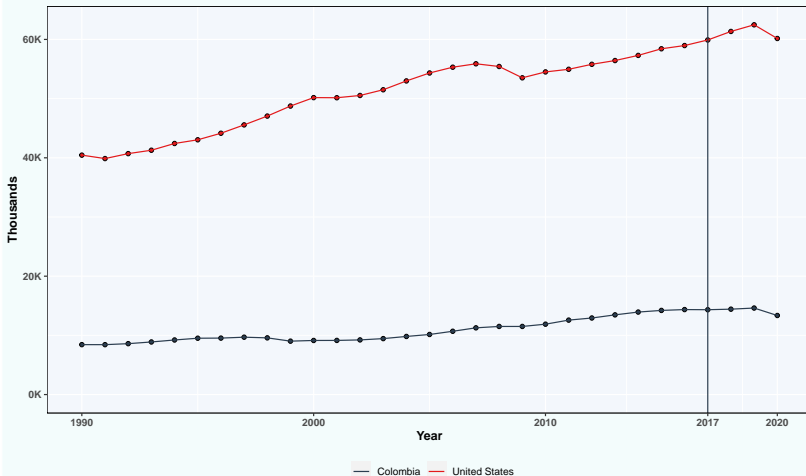
$$10,000 \text{ COP} / 10 \text{ USD} = 1,000 \text{ COP} / 1 \text{ USD}$$

# Gross Domestic Product

## GDP per-capita purchasing power parity, Colombia and USA

Variable code WDI: NY.GDP.PCAP.KN

Variable units: constant 2017 international USD



Source: World Development Indicators (WDI) – World Bank  
Last update date: 2023-12-18

# Economic Growth

- The most common metric used to measure economic growth is the annual percent growth of real GDP per capita.
  - If the periodicity of real GDP per capita is **yearly** and we don't want to make international comparisons the formula is:

$$\frac{\text{GDP per capita constant LCU}_t - \text{GDP per capita constant LCU}_{t-1}}{\text{GDP per capita constant LCU}_{t-1}} \times 100$$

# Economic Growth

- The most common metric used to measure economic growth is the annual percent growth of real GDP per capita.
  - If the periodicity of real GDP per capita is **quarterly** and we don't want to make international comparisons the formula is:

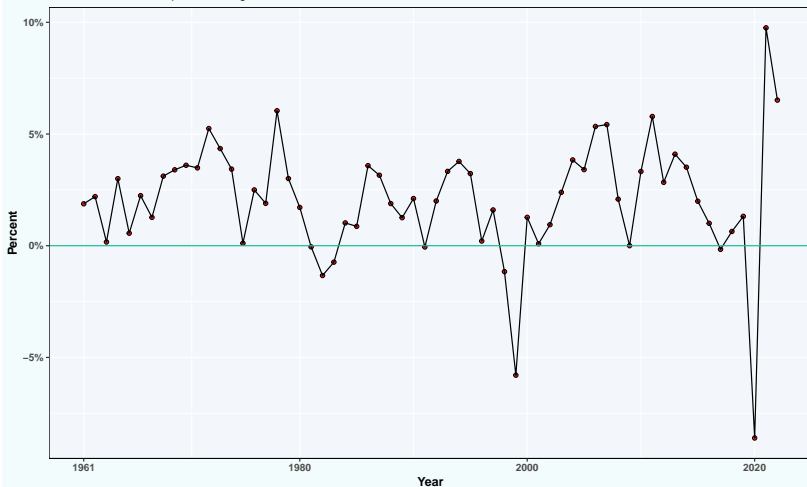
$$\frac{\text{GDP per capita constant LCU}_t - \text{GDP per capita constant LCU}_{t-4}}{\text{GDP per capita constant LCU}_{t-4}} \times 100$$

# Economic Growth

## Growth real GDP per-capita Colombia

Variable code WDI: NY.GDP.PCAP.KD.ZG

Variable units: annual percent using constant LCU Base Year 2015



Source: World Development Indicators (WDI) – World Bank  
Last update date: 2023-12-18

# Acknowledgments

- To my family that supports me
- To the taxpayers of Colombia and the **UMNG students** who pay my salary
- To the **Business Science** and **R4DS Online Learning** communities where I learn **R**
- To the **R Core Team**, the creators of **RStudio IDE**, **Quarto** and the authors and maintainers of the packages **tidyverse**, **readxl**, **knitr**, **kableExtra**, **tidyquant**, **wbstats** and **tinytex** for allowing me to access these tools without paying for a license
- To the **Linux kernel community** for allowing me the possibility to use some **Linux distributions** as my main **OS** without paying for a license

# Acknowledgments

- To the icon designers **Bregris**, **Freepik**, **Iconixar**, **Monkik** and **Eucalyp** from **Flaticon** for letting me use their work in this presentation as a free user

# References

- Cardenas, Mauricio. 2020. *Introducción a La Economía Colombiana*. 4th ed. Alfaomega.
- DANE. 2018. “Cuentas Nacionales Trimestrales Ajuste Estacional.” <https://www.dane.gov.co/files/investigaciones/boletines/pib/ajuste-estacional-pib.pdf>.
- Hyndman, Robin John, and George Athanasopoulos. 2021. *Forecasting: Principles and Practice (3rd Ed)*. <https://Otexts.com/fpp3/>.
- Lequiller, François, and Derek Blades. 2014. *Understanding National Accounts: Second Edition*. OECD. <https://doi.org/10.1787/9789264214637-en>.