Financial markets I

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Contents

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 4)

Purpose

Analyze the equilibrium of financial markets and the determination of the interest rate.

Language of interest rates

- This topic belongs to **Financial Mathematics**.
- The *"full name"* of an interest rate is made up of the following elements:
  - **The rate**: refers to a number where it is usually indicated in percentage terms.
  - **The type of the rate**: there are 2 types of interest rates that are usually recognized.
    - **Nominal**: with this interest rate the additional value earned is withdrawn and not reinvested.
    - **Effective**: with this interest rate the additional value earned is not withdrawn and reinvested again.

Language of interest rates

- This topic belongs to **Financial Mathematics**.
- The *"full name"* of an interest rate is made up of the following elements:
  - **Periodicity of the rate**: the period to which the rate refers. For example daily, monthly, quarterly, annual or any other conceivable period.
  - **Interest payment method**:
    - **Prepaid** (*"Anticipada"* in spanish): paid at the beginning of the period.
    - **Overdue** (*"Vencida"* in spanish): paid at the end of the period.

Language of interest rates

- **The rate**:
  - In the link **http://www.banrep.gov.co/es/estadisticas/tasas-interes-politica-monetaria** on **2020-02-11** it was pointed out that:
    - *"La tasa de intervención de política monetaria es la tasa de interés mínima que el Banco de la República cobra a las entidades financieras por los préstamos que les hace mediante las operaciones de mercado abierto (OMA) que se otorgan en las subastas de expansión monetaria a un día. Esta tasa es el principal mecanismo de intervención de política monetaria usado por el Banco de la República para afectar la cantidad de dinero que circula en la economía."*
  - Also the *"tasa de intervención de política monetaria"* on **2020-02-11** was 1.75%
  - In this case the only component that we know is **the rate** which corresponds to 1.75%. However, we will know later the *"full name"* of this particular interest rate.

Language of interest rates

- **The type of the rate**:
  - **Nominal**: let us assume that we have 100 **COP**[1] and the rate is 1.75%.
    - t = 0: 100
    - t = 1: $100 + (0.0175)100 = 101.75$
    - t = 2: $100 + (0.0175)100 + (0.0175)100 = 100(1 + 2(0.0175)) = 103.5$

[1] Colombian pesos according to the ISO 4217 standard

Language of interest rates

- **The type of the rate**:
  - **Effective**: let us assume that we have 100 **COP** and the rate is 1.75%.
    - t = 0: 100
    - t = 1: $100 + (0.0175)100 = 101.75$
    - $t = 2$: $101.75 + (0.0175)(101.75) = 101.75(1 + 0.0175) = (100 + 0.0175*100)(1 + 0.0175) = 100(1 + 0.0175)(1 + 0.0175) = 100(1 + 0.0175)^2 = 103.530625$
  - With a **nominal** interest rate we obtain in t = 2, 103.5 **COP** but with an **effective** interest rate we obtain in t = 2, 103.530625 **COP**.

Language of interest rates

- **Periodicity of the rate**:
  - In the previous example, we indicate the period as t with $t = 0, 1, 2$. However, in a specific situation we use periods to measure time.
  - In the case of the link it refers to a 1.75% **annual** and **effective** interest rate.
  - In **Financial mathematics** you will learn how to find the equivalences between a **nominal** and an **effective** interest rate with a different **periodicity**.

Language of interest rates

- **Interest payment method**:
  - In the case of the link it refers to a 1.75% **annual effective** and **overdue** interest rate.
  - In **Financial mathematics** you will learn how to find the equivalences between a **nominal** and an **effective** interest rate with a different **periodicity** and **payment method**.

Language of interest rates

- **Interest payment method**:
  - If you are concerned about the matter and have not taken the subject **Financial mathematics** there are 2 solutions:
    - In Colombia, banks (including of course the Bank of the Republic) and financial institutions must express all interest rates as **annual effective overdue**.
    - If you wish you can consult the link **https://www.sabermassermas.com/conversion-de-tasas-de-interes/** of Asobancaria[2] where you can access a calculator to find equivalences between different interest rates.

[2] Asociación Bancaria y de Entidades Financieras de Colombia (guild of the colombian financial sector)

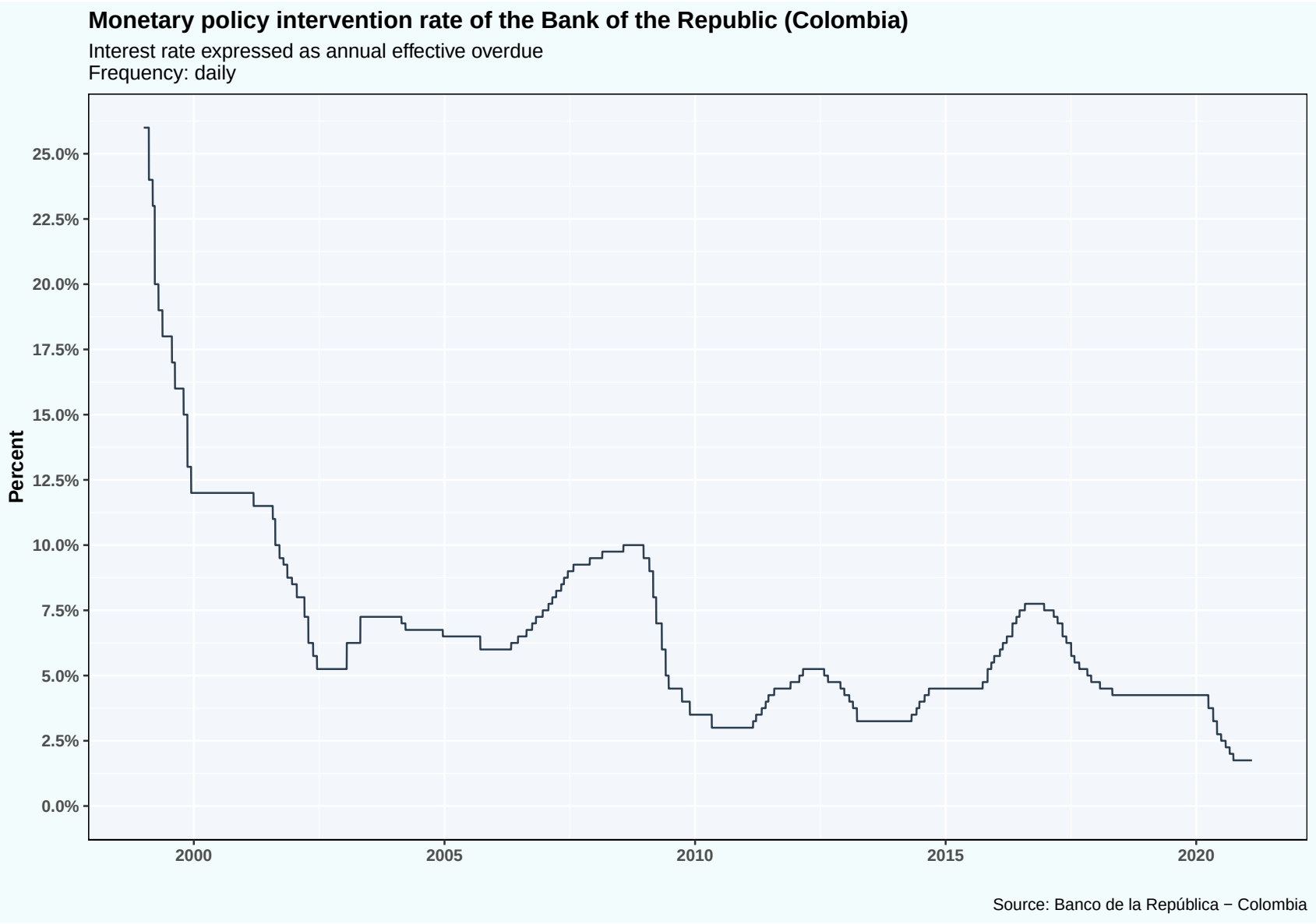
i_t in the model for Colombia

- i_t in the model for Colombia is the **"Tasa de intervención del Banco de la República."**
- If $i_t = 0.0175$ (1.75%) and also an **annual effective overdue** interest rate then this means the following:
  - If a financial institution borrows 100 **COP** from the Bank of the Republic of Colombia then a 1.75% interest rate would mean that at the end of the year the bank would receive 103.530625 **COP** from the financial institution:
    - 100 **COP** lent to the financial institution
    - 3.530625 **COP** because of interests

i_t in the model for Colombia

- **Personal and voluntary homework for students**: If you have a savings account, find out at your bank the interest rate generated by the resources in your account. Also find out in your bank the rate of **"Certificados de Depósito a Término Fijo (CDT)"** for periods of 30, 60, 90, 180 and 360 days.
  - In economics it is assumed that people decide to consider these alternatives:
    - You may want to have money in your pockets, which resembles to a savings account that generates a low interest rate.
    - You don't want money in your pockets that resembles to a **CDT** where it generates a slightly higher interest rate than a saving account but without having access to your money for a specific period.

i_t in the model for Colombia



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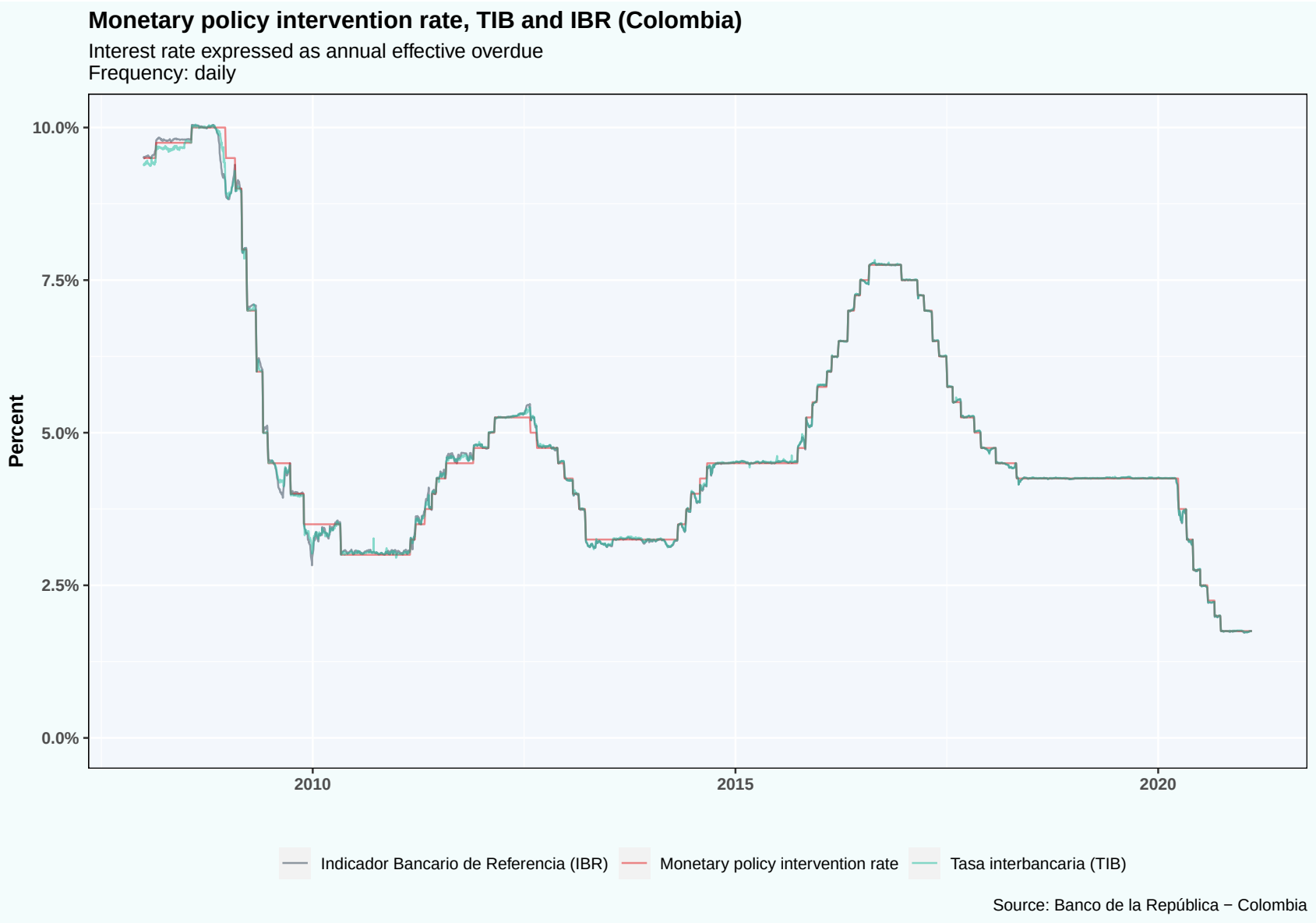
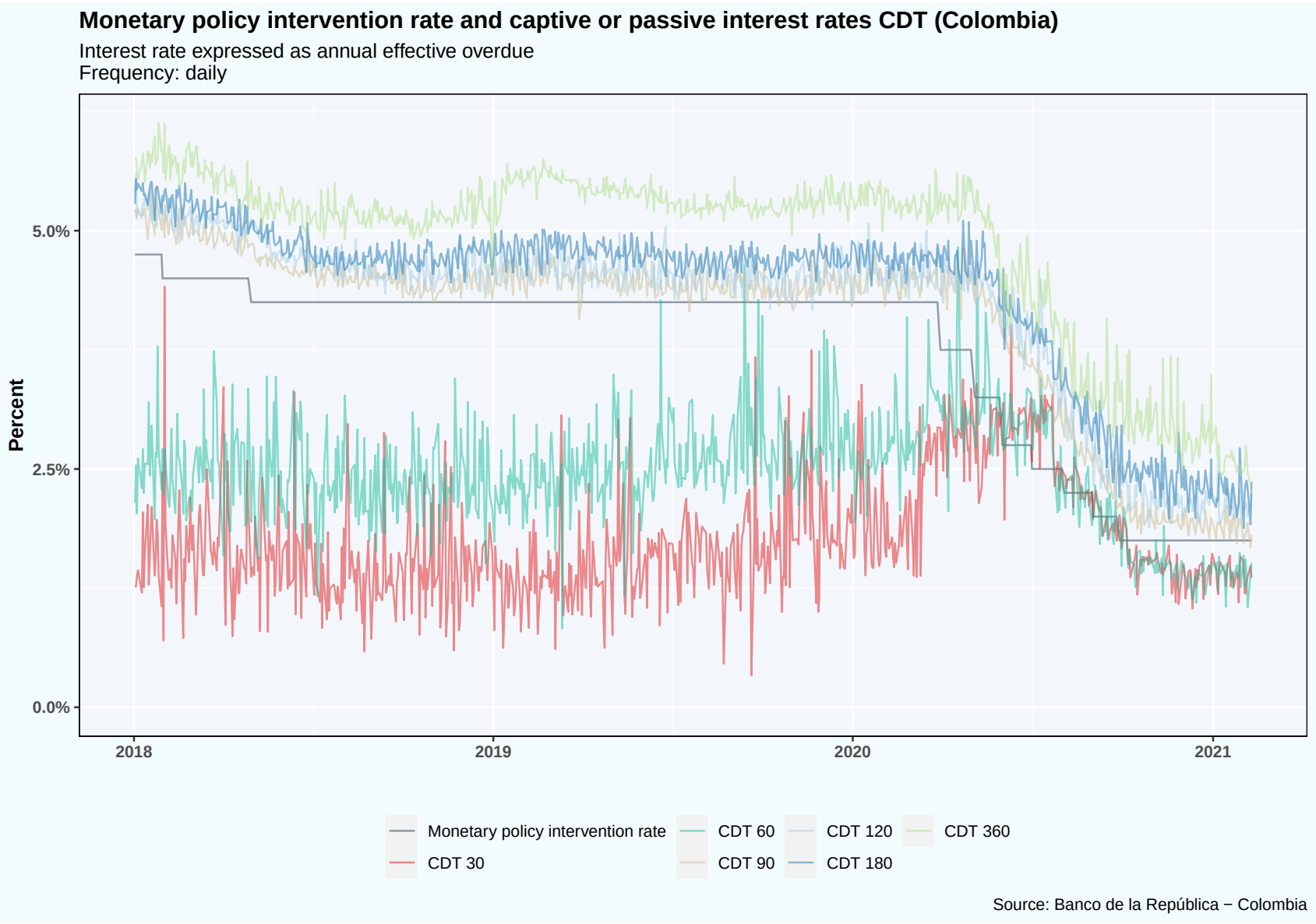


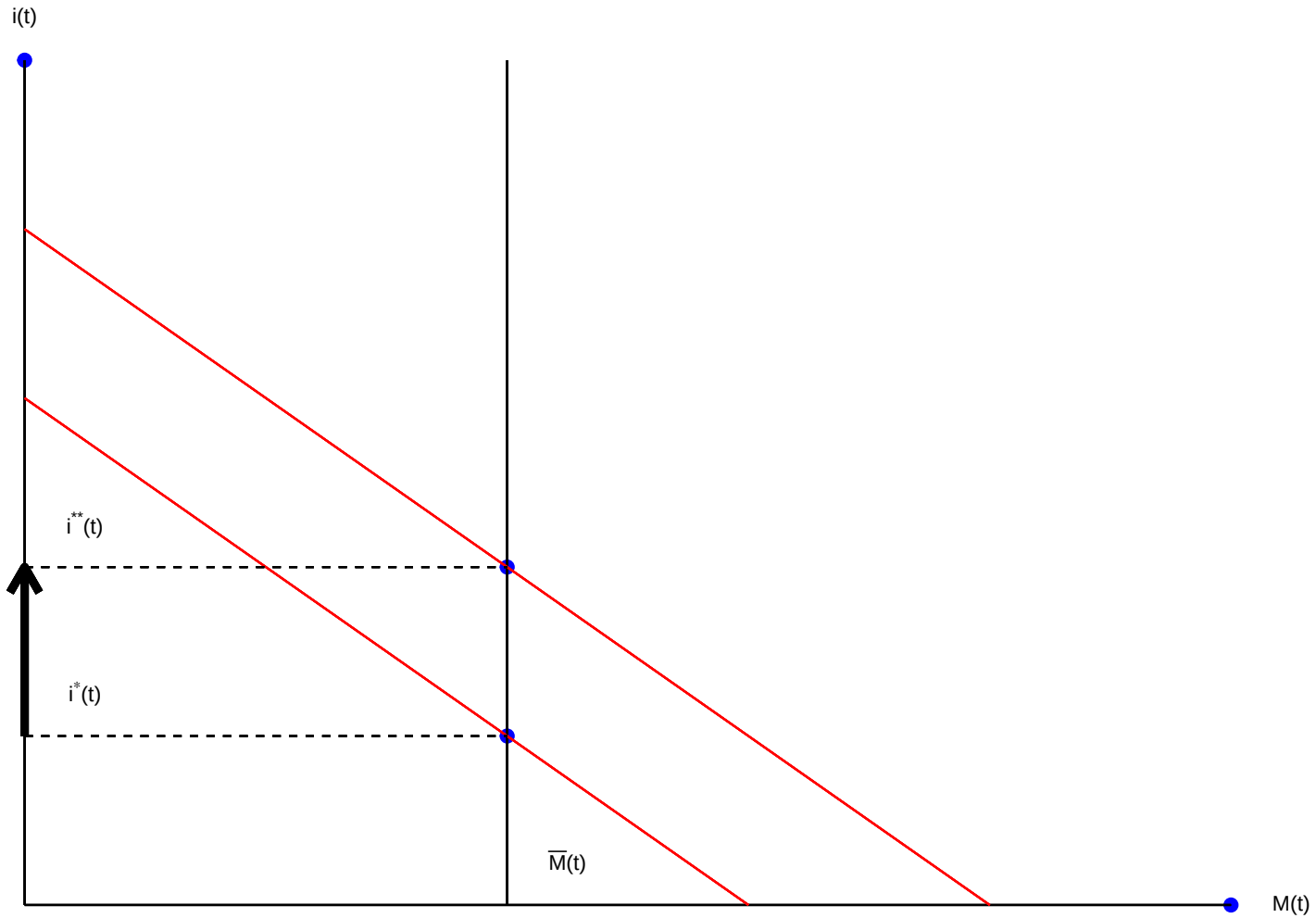
i_t in the model for Colombia



Money supply

- A central bank has the ability to create money. Therefore, the central bank does not have a cost to keep money in the pockets as individuals who demand money. In that sense, the money supply is given by $M_t^0 = \overline{M}_t$.
  - Where M_t^0 is the money supply of an entire economy in t, that is controlled by the central bank and equal to $\overline{M}_t$ since it has control over it.
- For the economy to function properly it is necessary that the money demanded by individuals in an economy tends to be equal to the money that the central bank seeks to create.
- If the money supply remains fixed and other variables that affect the demand for money change, the market adjusts, generating an increase in the equilibrium interest rate.

Money supply



Money supply

- The supply of money is controlled using **Open Market Operations (OMO)** (*"Operaciones de Mercado Abierto (OMA)"* in spanish)
- These operations are done in short periods: $1, 7$ and 14 days. Loans are granted in sessions called **expansion auctions** and the remaining resources are received in sessions called **contraction auctions**.
- The minimum rate of one-day monetary expansion auctions is called **"Tasa de intervención del Banco de la República"** that in the model refers to i_t.

Money supply

- If $i_t = 0.0175$ (1.75%) and it is an **annual effective overdue** we can convert them to **daily effective overdue**.
- The result of the conversion of 0.0175 (1.75%) **annual effective overdue** interest rate to a **daily effective overdue** interest rate is $i_t = 0.000048$ (0.0048%). Don't worry, you will see this in **Financial Mathematics**.

Money supply

- If a financial institution borrows 100 **COP** from the Bank of the Republic of Colombia at a rate of 0.0175 (1.75%) **annual effective overdue** that is equivalent to 0.000048 **daily effective overdue**, it would have to transfer to the bank 100.0048 **COP** at the end of the day:
  - 100 **COP** lent to the financial institution
  - 0.0048 **COP** because of interests
- In that way, the Bank of the Republic of Colombia creates 100 **COP**, gives them to the financial institution and then obtains 100.0048 **COP** in such a way that it takes out 0.0048 **COP** from the economy.

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References

Blanchard, Olivier, and David R. Johnson. 2017. *Macroeconomics*. Seventh edition. Boston: Pearson.