International monetary system

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2023-07-11

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 (Wild and Wild 2020, chap. 10)

Purpose

Analyze the importance of exchange rates to international business management and the factors that determine them

Analysis of exchange rates

- Knowing the data
  - **Variable**: Market Representative Exchange Rate (MRE)[1] COP/USD
    - Calculation methodology: (Banrep 2018)
    - Only includes operations agreed by the Exchange Market Intermediaries (EMI)[2] with other entities supervised by the Superintendencia Financiera de Colombia (SFC) and with the Nación - Ministerio de Hacienda y Crédito Público
    - The MRE is calculated and certified daily by the SFC with the operations of the day and will be effective for the next day

[1] Tasa de Cambio Representativa del Mercado (TRM) in spanish

[2] Intermediarios del Mercado Cambiario (IMC) in spanish

Analysis of exchange rates

- Knowing the data
  - **Variable**: Market Representative Exchange Rate (MRE) COP/USD
    - The MRE in a business day following a holiday of the Federal Reserve banks of the United States of America will be the same MRE in effect on the holiday
    - For saturdays, sundays, holidays and those in which the Banco de la República does not provide the services of the "Sistema de Cuentas de Depósito", the MRE in force on the immediately following business day will apply
  - **Data source**: https://www.banrep.gov.co/ > Estadísticas > ¡NUEVO! Estadísticas Banrep > CATÁLOGO DE SERIES > Tasas de cambio y sector externo > Tasas de cambio nominales > Tasa Representativa del Mercado (TRM) > DESCARGAR

Analysis of exchange rates

- Visualizing the data

Analysis of exchange rates

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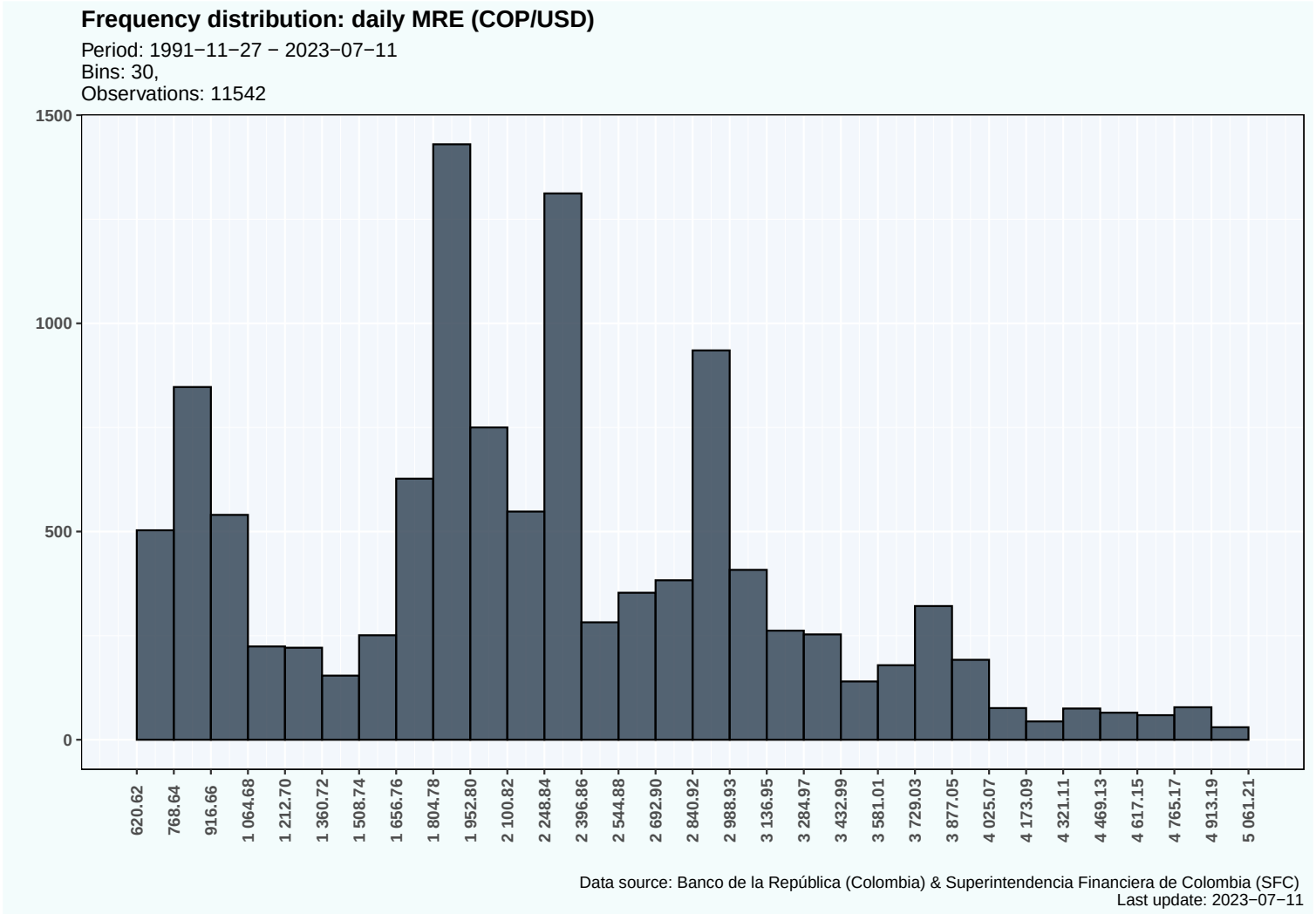

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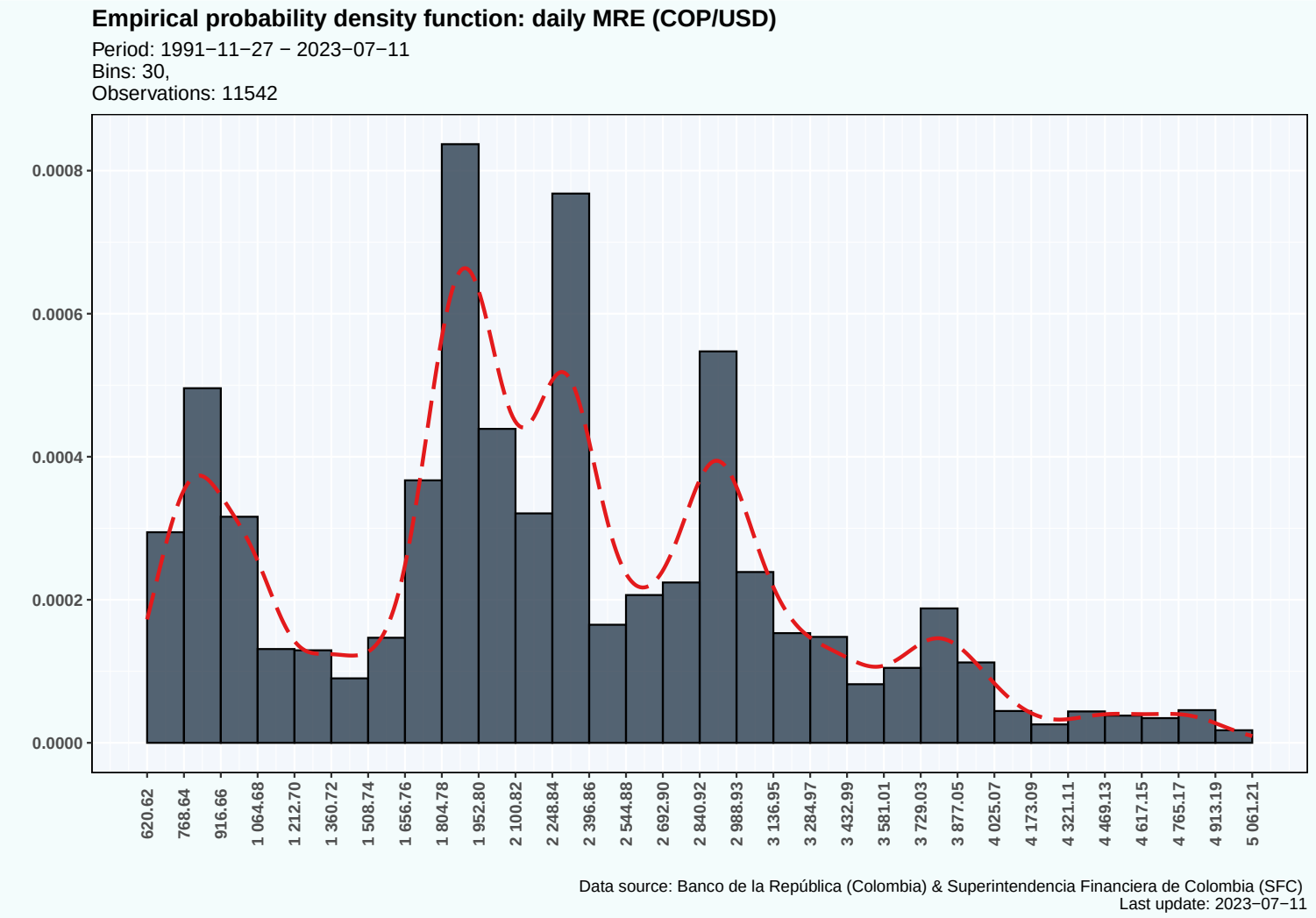

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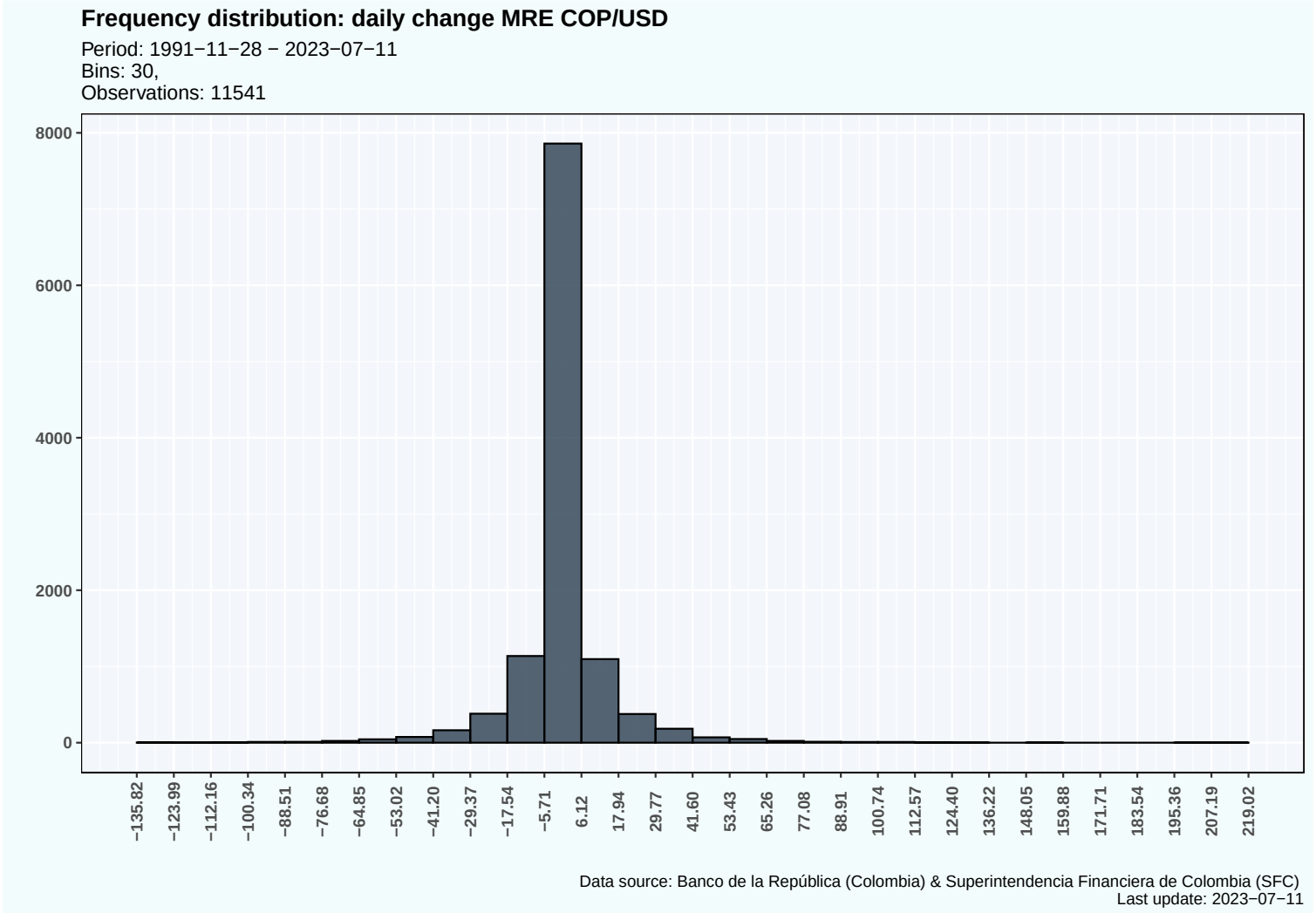

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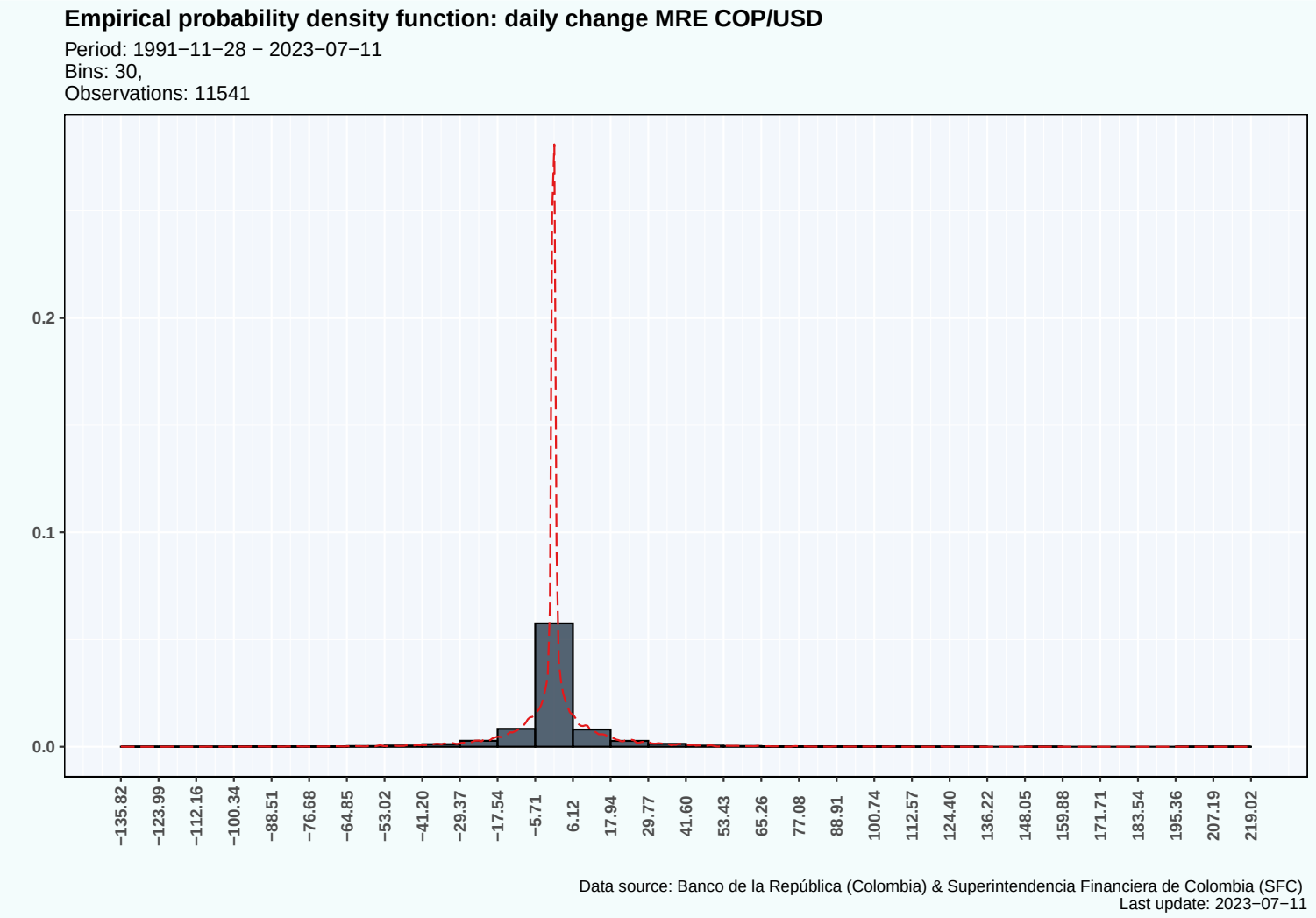

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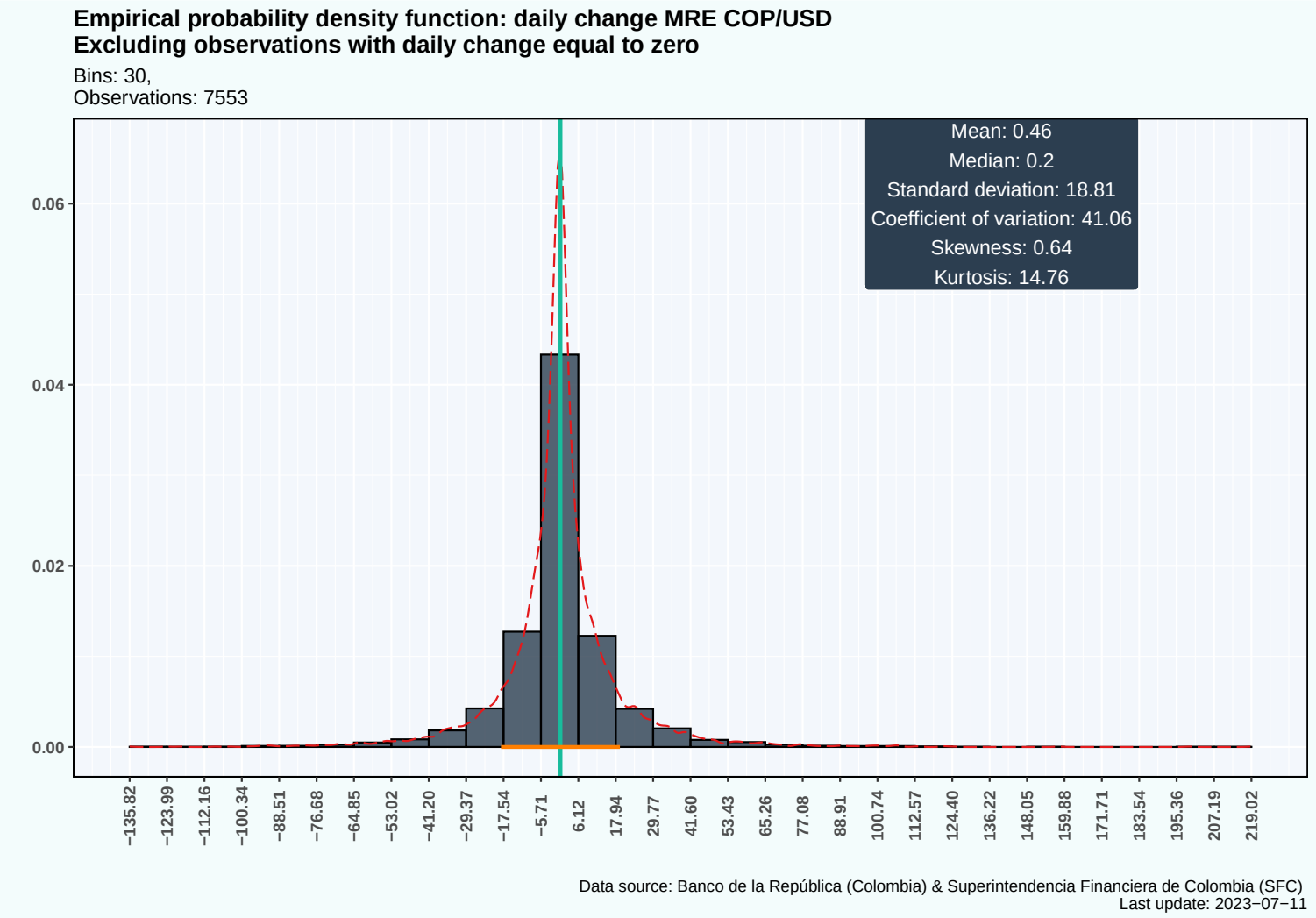


Simple model of exchange rate determination

- Decision of an individual between a national and a foreign financial instrument with a low risk
  - Assume you have 100 COP in t
    - **Option 1**: Invest in a national financial instrument with and interest rate i_t in COP
    - **Option 2**: Invest in a foreign financial instrument with and interest rate i_t^* in USD

Simple model of exchange rate determination

- Decision of individuals between a national and a foreign financial instrument with a low risk
  - Yield obtained in $t+1$:
    - **Option 1**:

$$(1+i_t) \times 100$$

    - **Option 2**:

$$\begin{aligned} 100 &\rightarrow \frac{100}{E_t} \\ &\rightarrow (1+i_t^*) \times \frac{100}{E_t} \\ &\rightarrow (1+i_t^*) \times \frac{100}{E_t} \times E_{t+1} \\ &\rightarrow (1+i_t^*) \times 100 \times \frac{E_{t+1}}{E_t} \end{aligned}$$

Simple model of exchange rate determination

- Decision of an individual between a national and a foreign financial instrument with a low risk
  - $(1+i_t)\times 100 > (1+i_t^*)\times 100 \times \frac{E_{t+1}}{E_t}$ individuals will have only national financial instruments
  - $(1+i_t)\times 100 < (1+i_t^*)\times 100 \times \frac{E_{t+1}}{E_t}$ individuals will have only foreign financial instruments
  - $(1+i_t)\times 100 = (1+i_t^*)\times 100 \times \frac{E_{t+1}}{E_t}$ individuals will have national and foreign financial instruments
    - In an economy individuals have national and foreign financial instruments. Therefore in the long run we have that $(1+i_t)\times 100 = (1+i_t^*)\times 100 \times \frac{E_{t+1}}{E_t}$

Simple model of exchange rate determination

- Decision of an individual between a national and a foreign financial instrument with a low risk

$$(1+i_t)\times 100 = (1+i_t^*)\times 100 \times \frac{E_{t+1}}{E_t}$$

$$(1+i_t) = (1+i_t^*)\times \frac{E_{t+1}}{E_t}$$

$$\frac{(1+i_t)}{(1+i_t^*)}\times E_t = E_{t+1}$$

$$E_{t+1} = \frac{(1+i_t)}{(1+i_t^*)}\times E_t$$

- We can forecast the exchange rate in $t+1$, E_{t+1}, using information in t, i_t, i_t^*, E_t

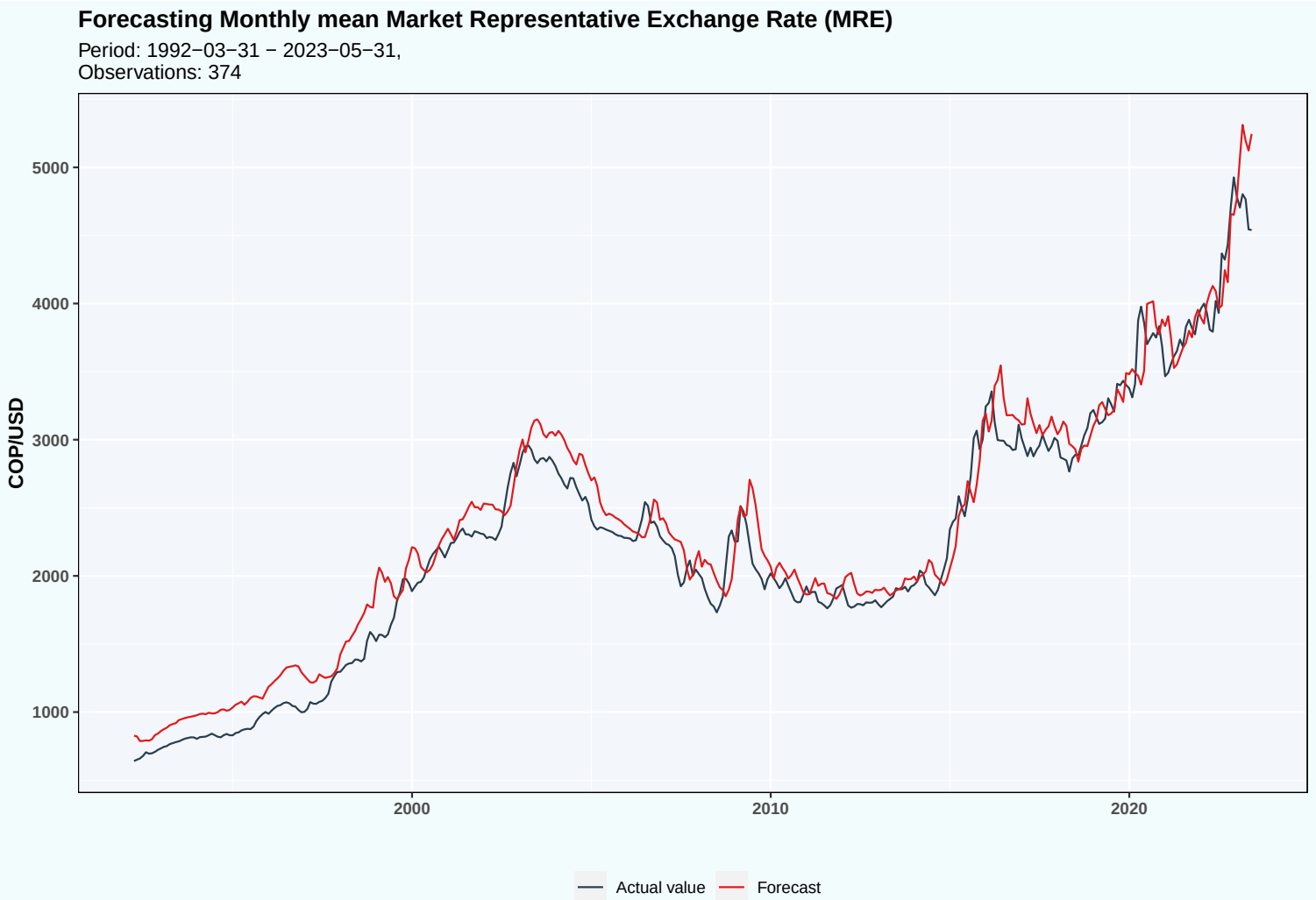
Simple model of exchange rate determination

- Using $E_{t+1} = \frac{(1+i_t)}{(1+i_t^*)} \times E_t$ to forecast E_{t+1} 3 months ahead
  - Data
    - 3-month or 90-day rates and yields: Certificates of deposit for Colombia (COLIR3TCD01STM)[3]
    - 3-Month or 90-day Rates and Yields: Certificates of Deposit for the United States (IR3TCD01USM156N)[4]
    - Monthly mean Market Representative Exchange Rate (MRE)
  - $t+1$
    - 3 months later

[3] FRED Economic Data | St. Louis FED: https://fred.stlouisfed.org/
[4] FRED Economic Data | St. Louis FED: https://fred.stlouisfed.org/

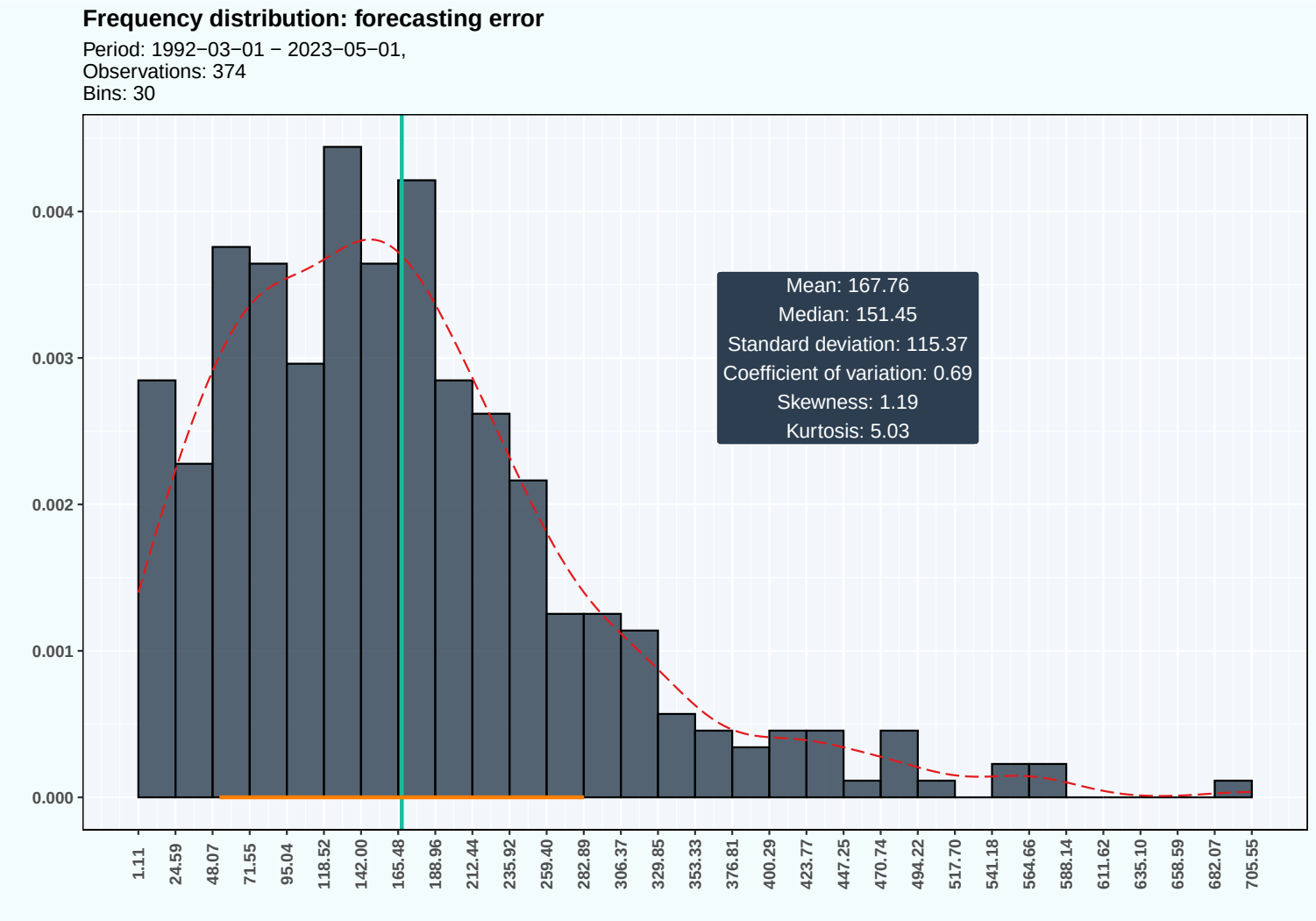
Simple model of exchange rate determination

- Using $E_{t+1} = \frac{(1+i_t)}{(1+i_t^*)} \times E_t$ to forecast E_{t+1} 3 months ahead



Simple model of exchange rate determination

- Forecast error: |Actual value - Forecast|



Implicit devaluation

- A possible way to calculate the implicit devaluation:

$$
\begin{aligned}
\text{Implicit devaluation} &= E_{t+1} - E_t \\
&= \frac{(1+i_t)}{(1+i_t^*)} \times E_t - E_t \\
&= \left[\frac{(1+i_t)}{(1+i_t^*)} - 1\right] \times E_t \\
&= \left[\frac{i_t - i_t^*}{1+i_t^*}\right] \times E_t
\end{aligned}
$$

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** and the authors and maintainers of the packages **tidyverse**, **lubridate**, **tidyquant**, **moments**, **timetk** 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

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