ECON 0150 | Economic Data Analysis

The economist's data analysis pipeline.

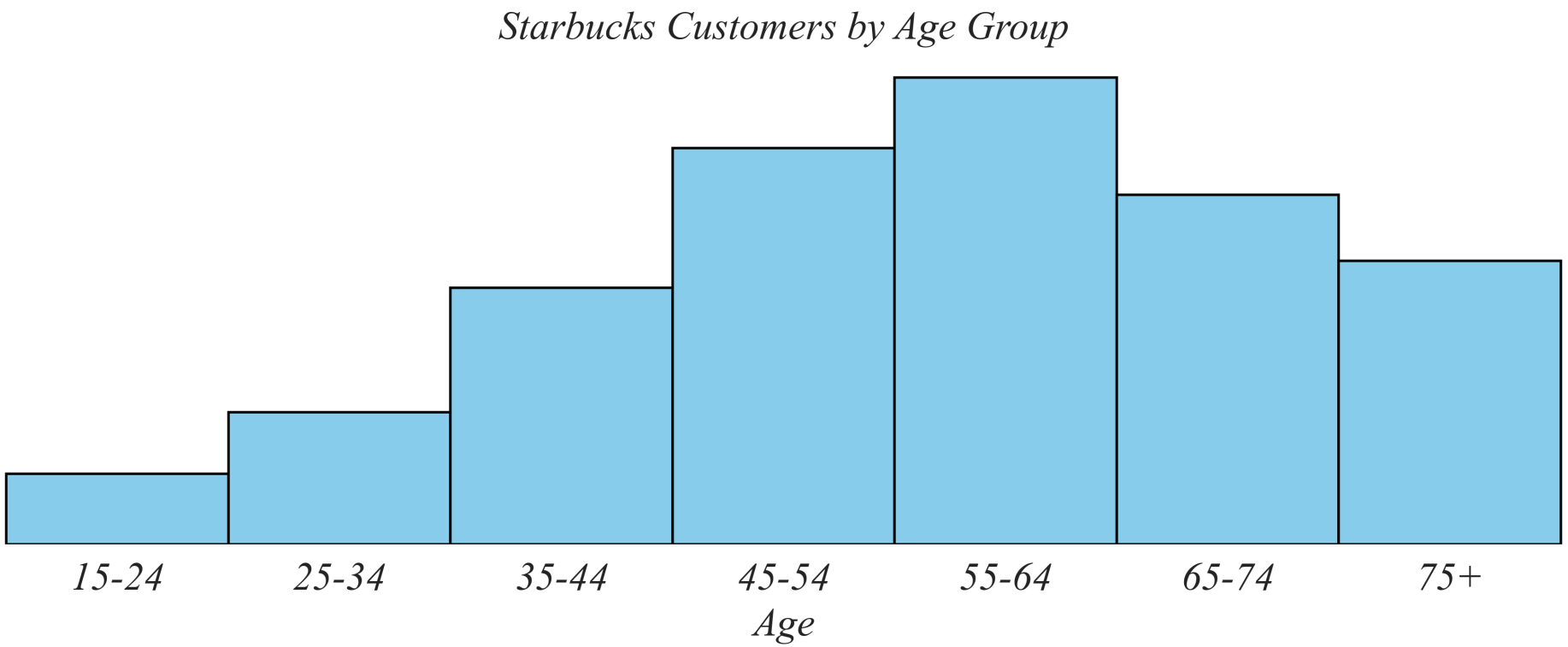
Part 1.2 | Summarizing Numerical Variables

Summarizing Numerical Variables

... use the appropriate summary tool for the variable type

Numerical Variables: Histograms

Q. Which age group has the most Starbucks customers?



> the bin sizes aren't even, making it hard to interpret

Numerical Variables: Histograms

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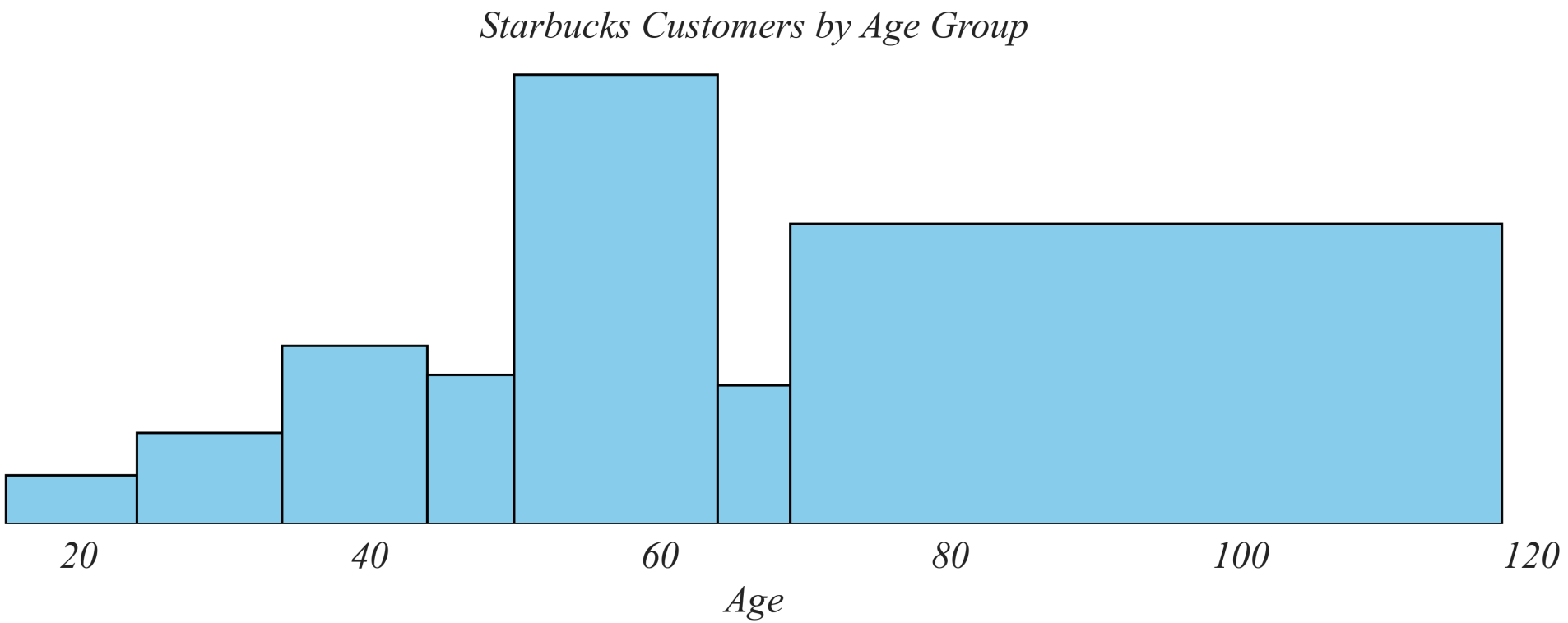
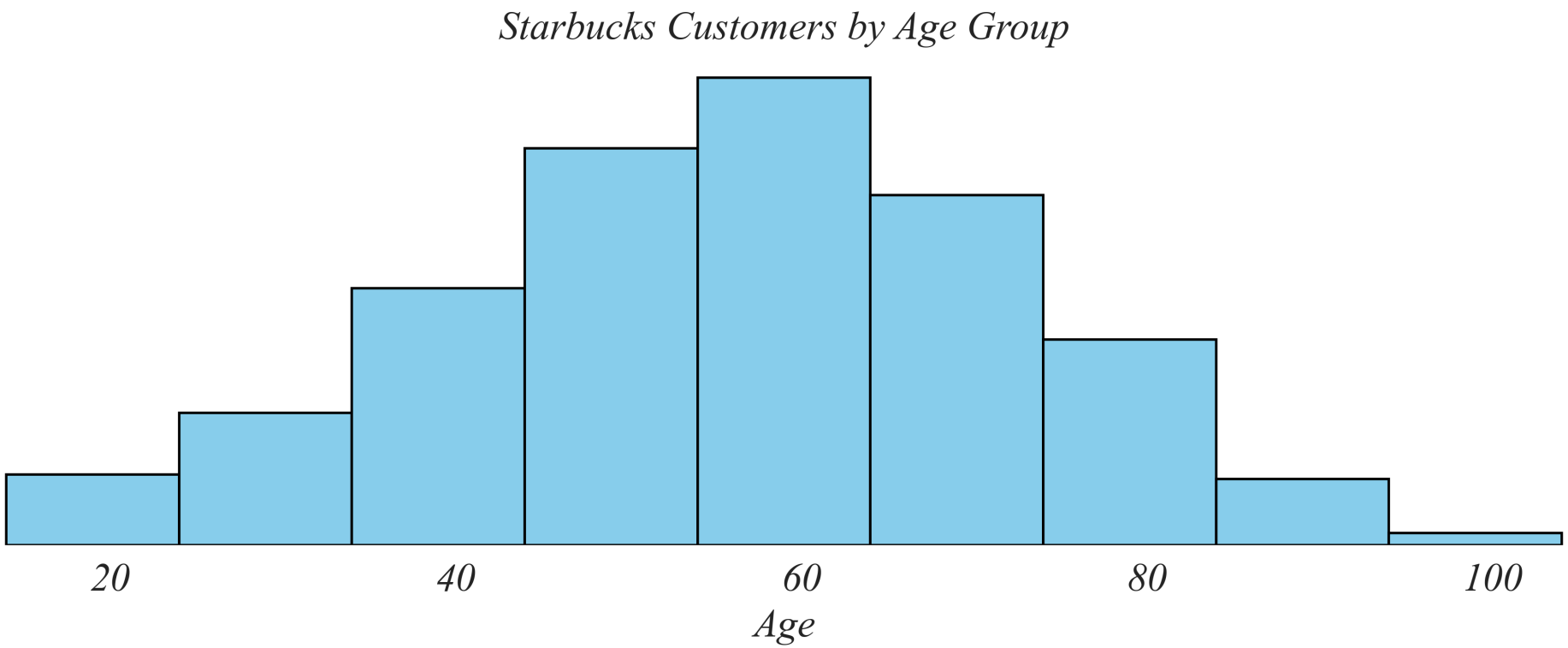


> the bin sizes aren't even, making it hard to interpret

Histograms: Use equal sized bins

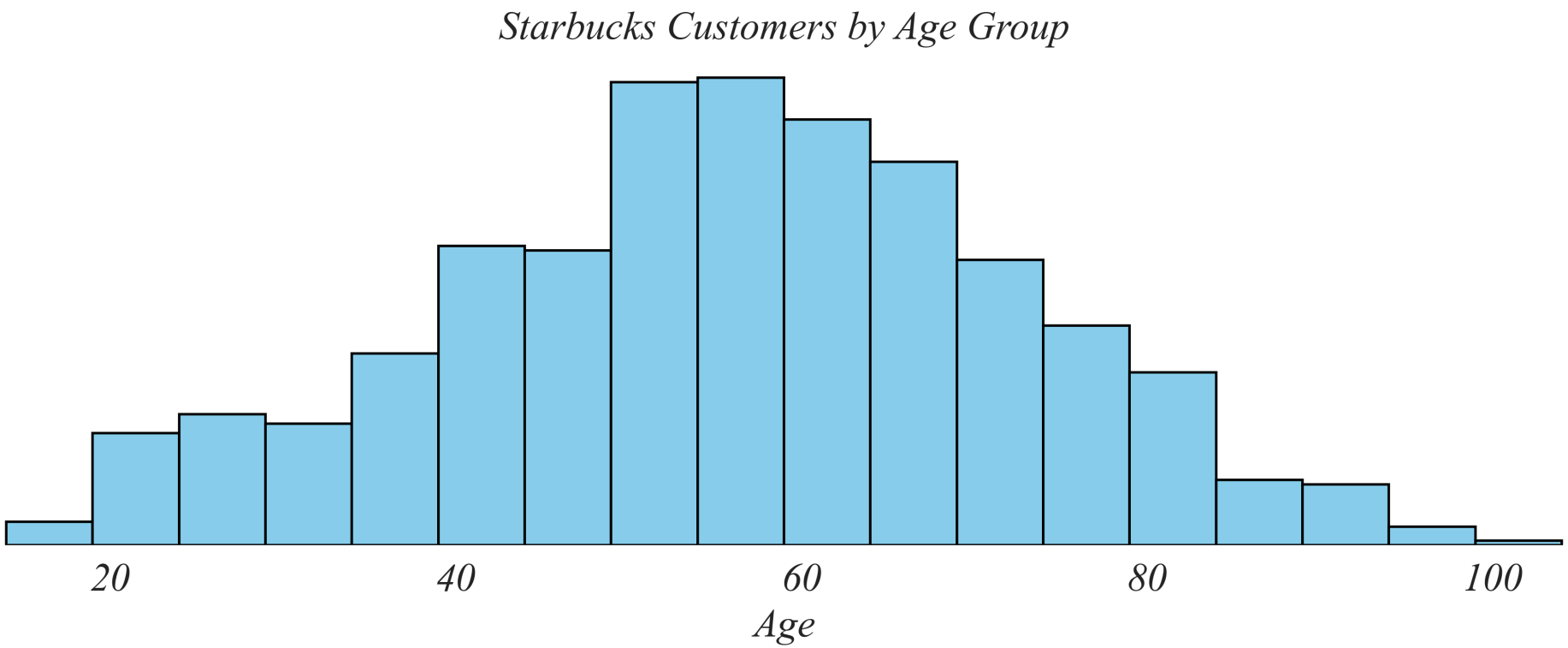
Q. Which age group has the most Starbucks customers?



> but what if we want to distinguish between a 55 year old and a 60 year old?

Histograms: Use narrow enough bins

Q. Which age group has the most Starbucks customers?

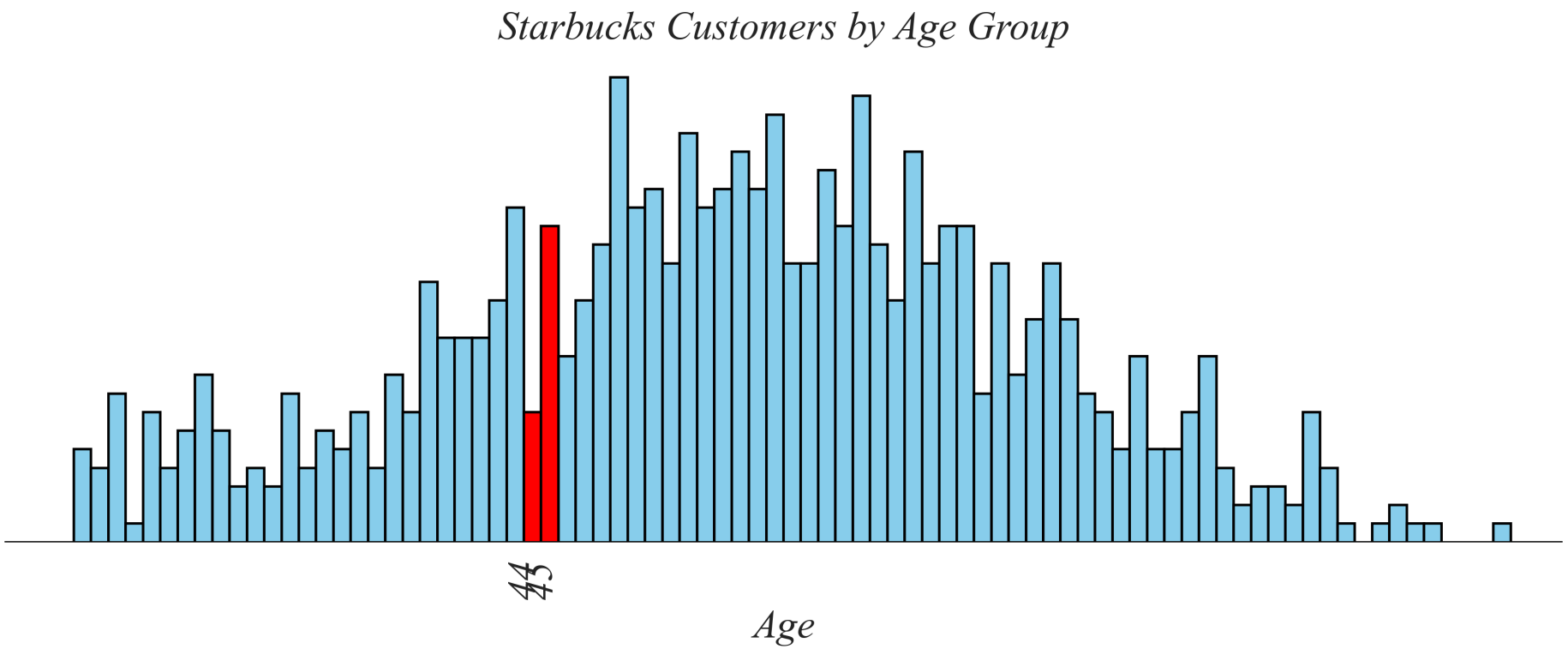


> *what if we take this even further?*

> *what if we compare 44 year olds to 45 year olds?*

Histograms: Avoid visualizing noise

Q. Do 44 or 45 year olds spend more at Starbucks?

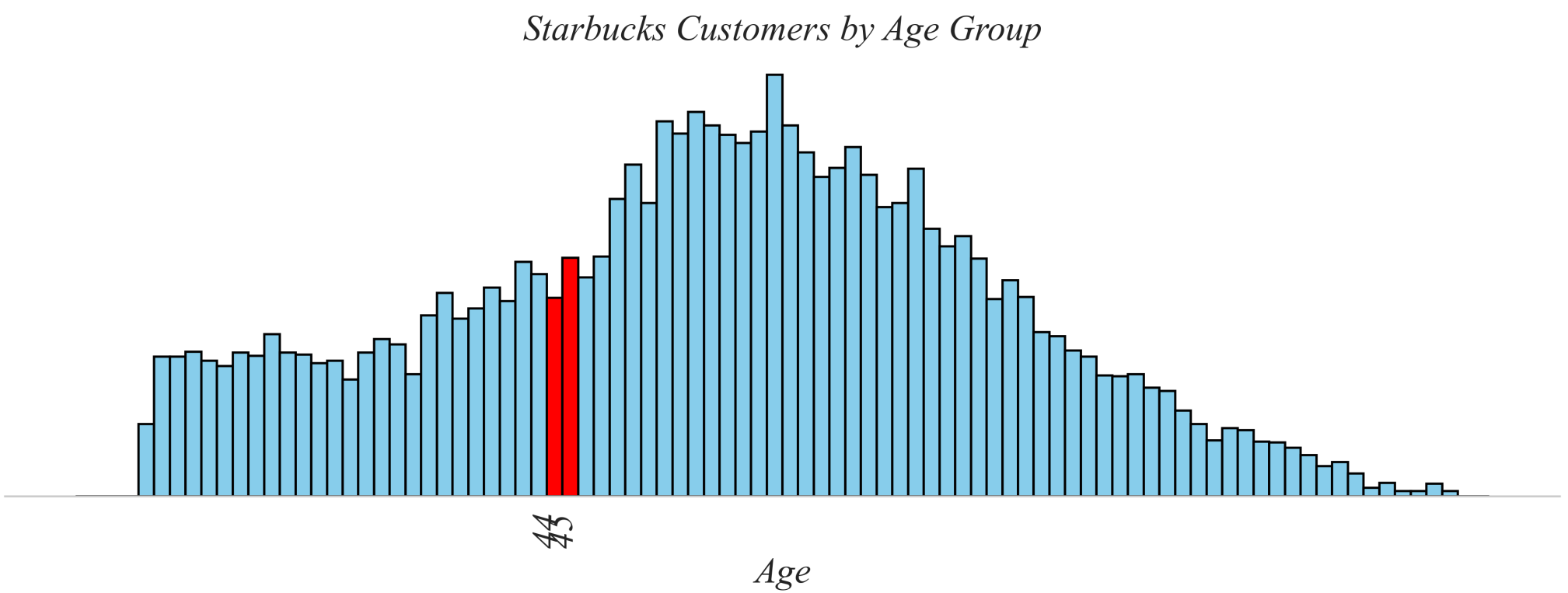


> we can go too far, introducing statistical noise. how do we fix the problem?

> increase the sample size or the bin width!

Histograms: Balance resolution vs noise

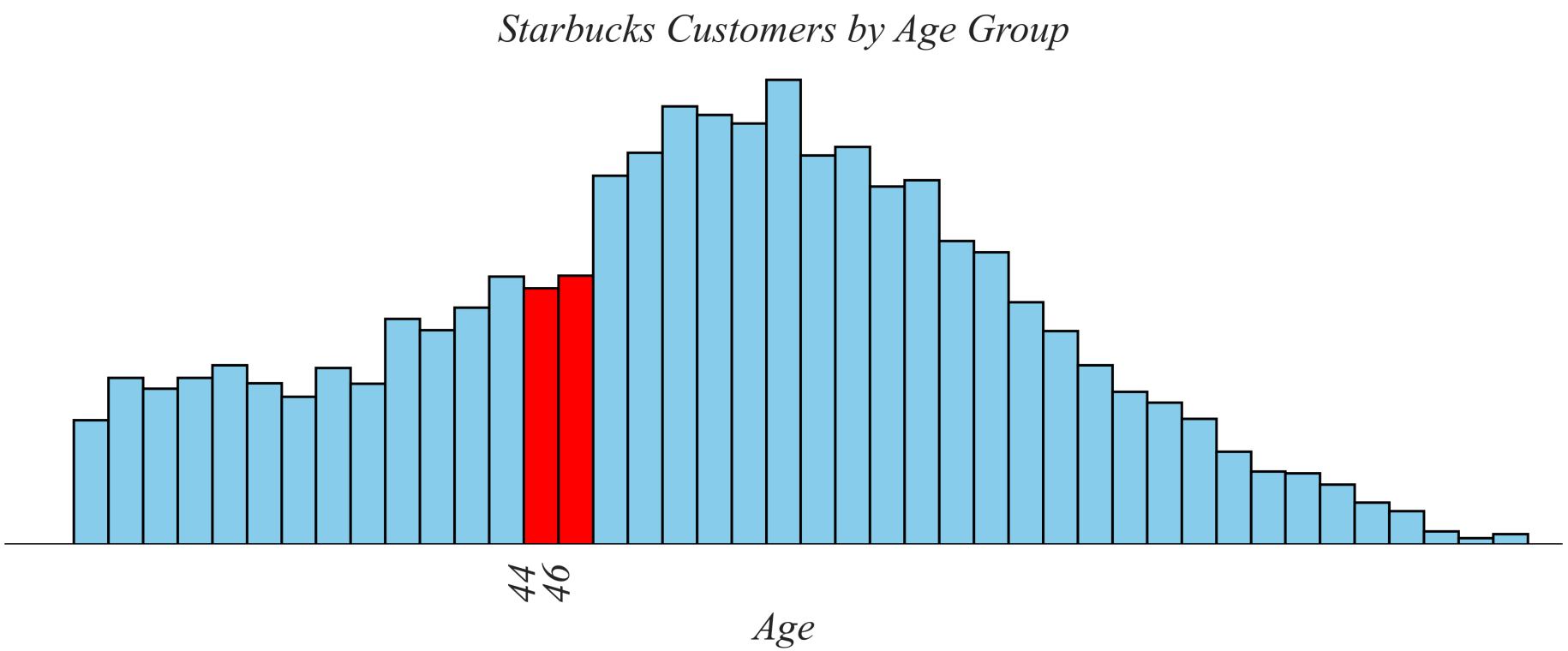
Q. Which age group has the most Starbucks customers?



> larger sample has less noise!

Histograms: Balance resolution vs noise

Q. Which age group has the most Starbucks customers?



> larger bins also has less noise!

Histograms: Summary

... use the right summary tool for the variable type

- *Use histograms to visualize continuous variables.*
- *Make histograms with equally sized bins.*
- *Histograms with bins that are too narrow increase statistical noise, which can obscure underlying relationships.*

Exercise: High Income Starbucks Customers

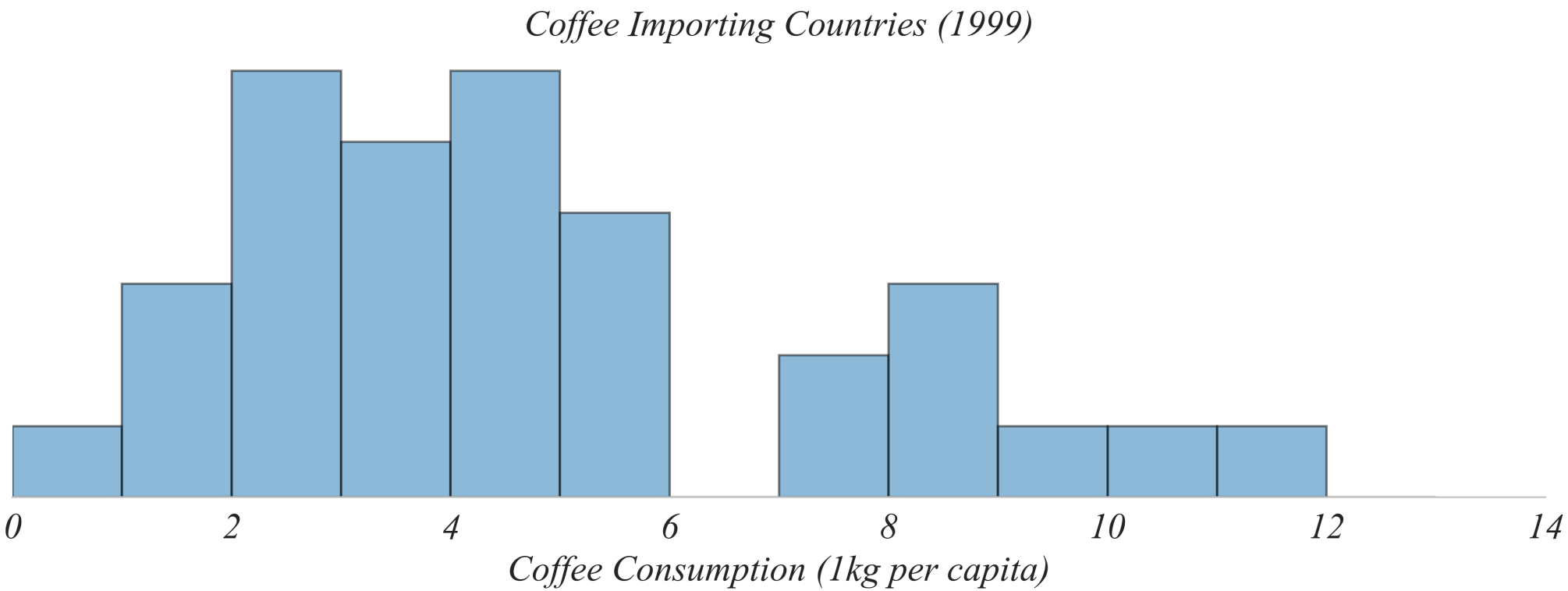
... use Excel and/or Python

Lets use the data to examine whether customers between 45 - 55 years old spend the most among high income customers.

Data: `Starbucks_Customer_Profiles_High_Income.csv`

Numerical Variables

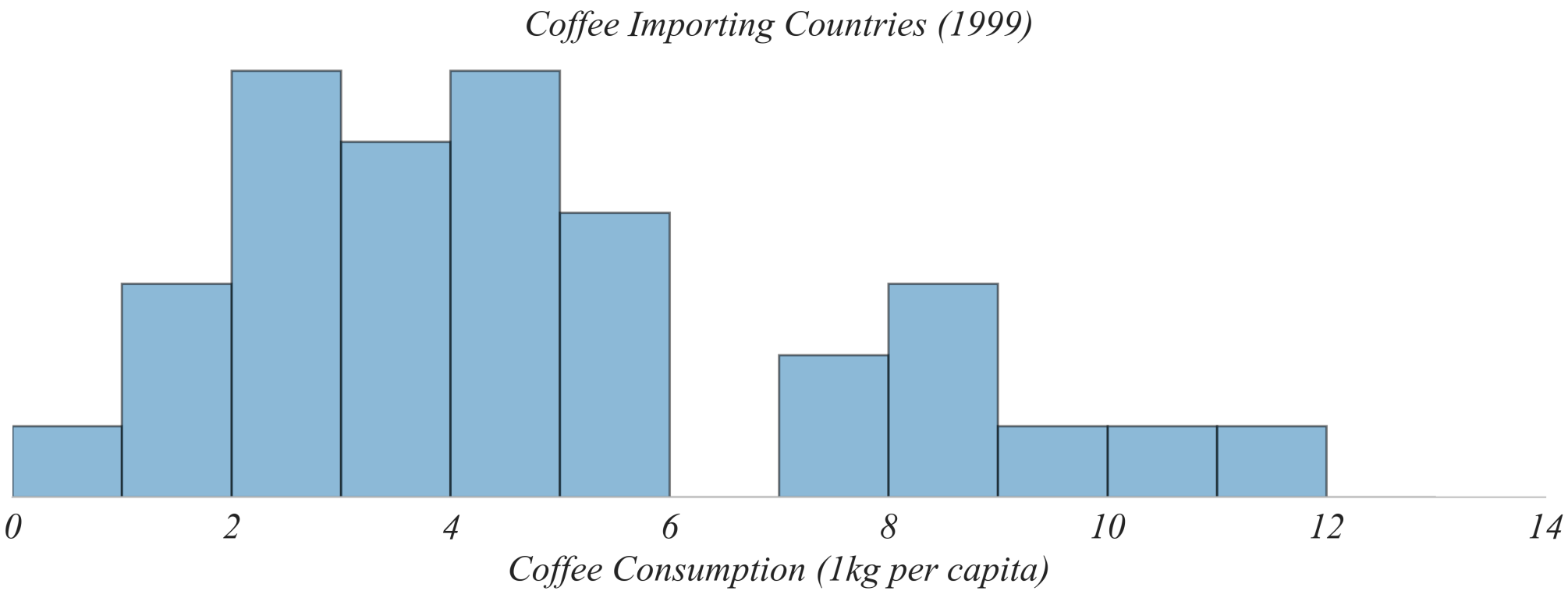
Q. Which countries drank an average amount of coffee?



> histogram bins make it impossible to see the exact values

Numerical Variables

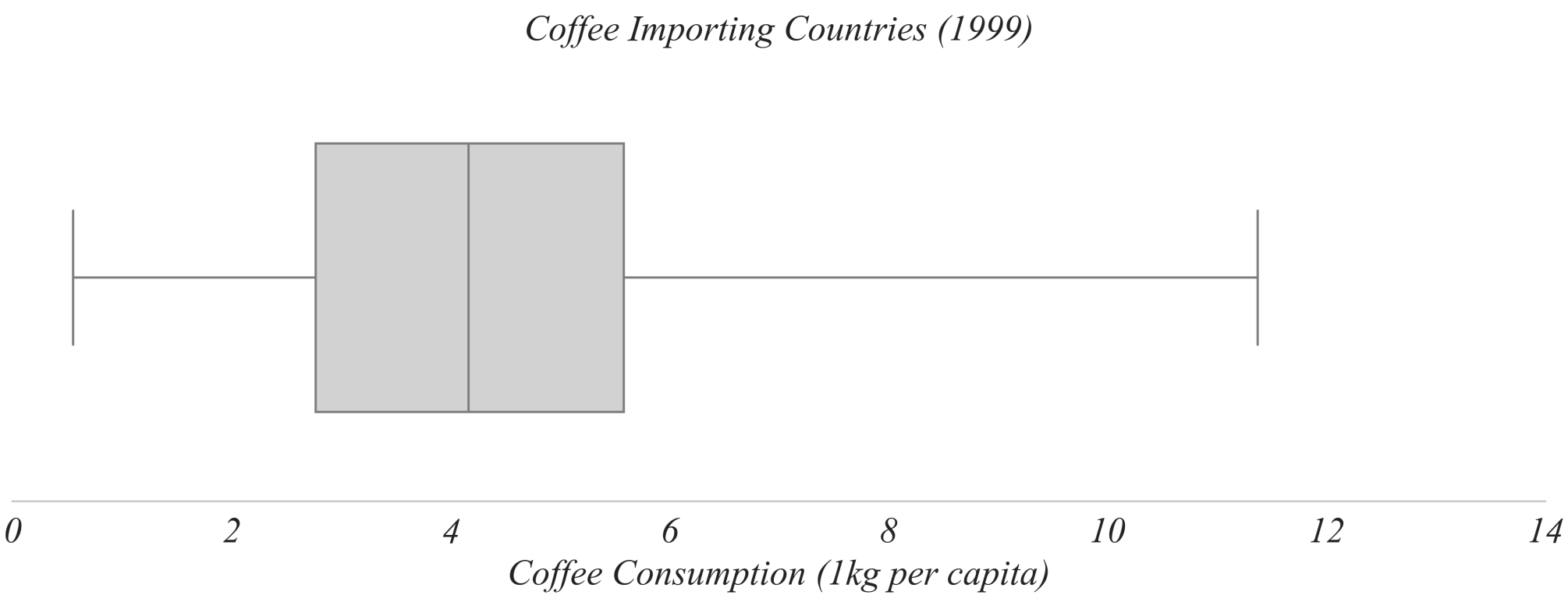
Q. Which countries drank the most coffee in 1999?



> again, histograms make it difficult to see statistical measures

Numerical Variables: Boxplots

Q. Which countries drank the most coffee in 1999?

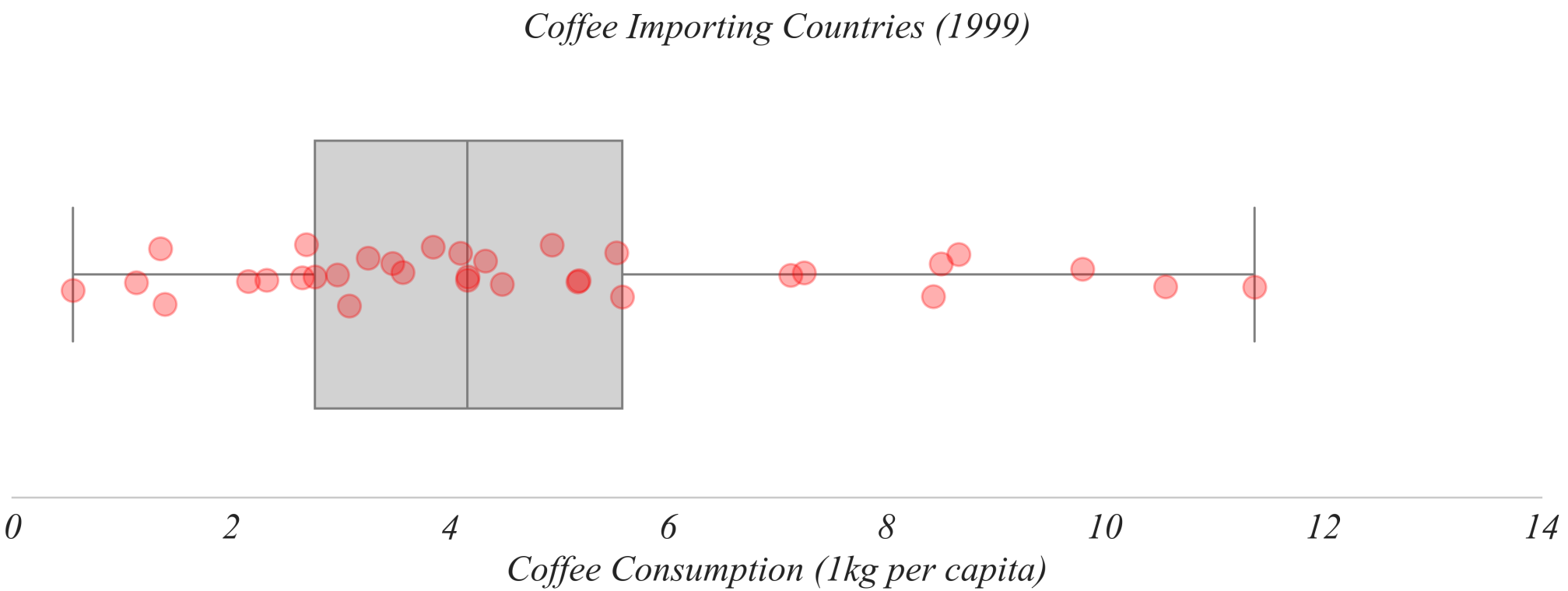


> *as we'll see, boxplots can tell us about quartiles*

> *but boxplots are still pretty unclear for our question*

Boxplots + Stripplots

Q. Which countries drank the most coffee in 1999?

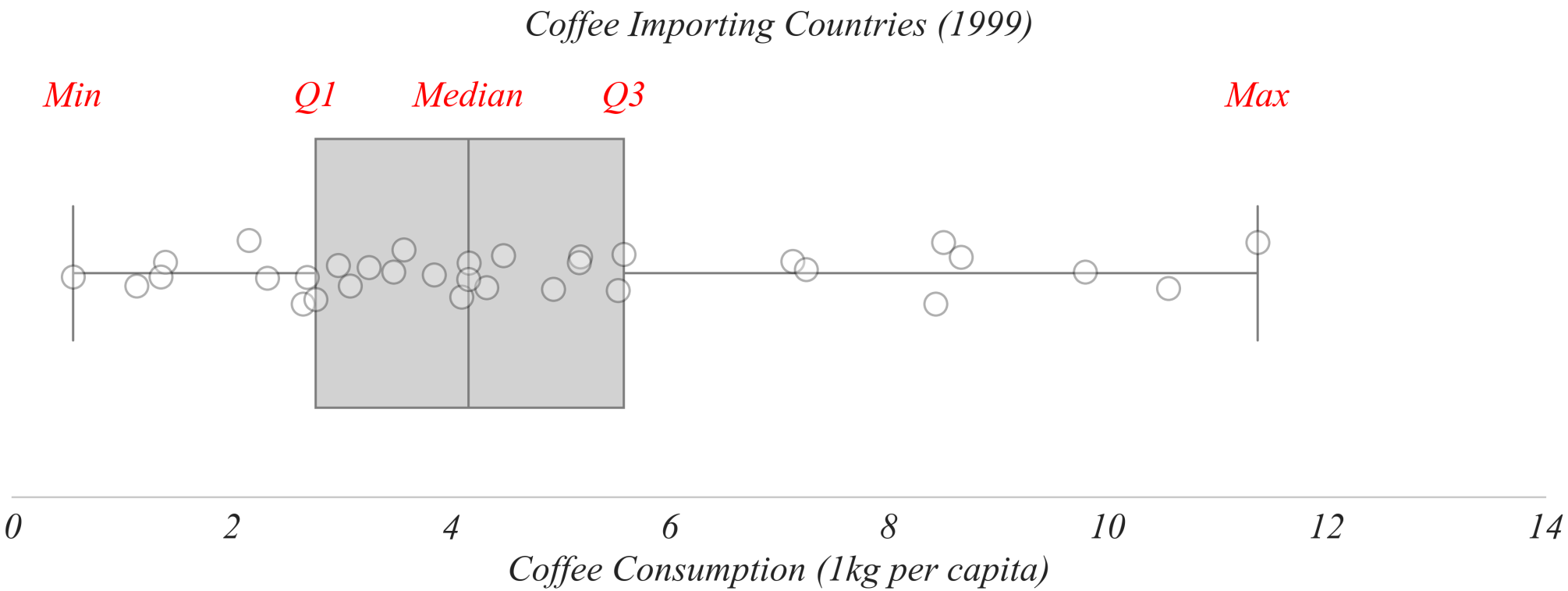


> *here we can see the datapoints directly with the boxplot*

> *each point represents a country's coffee consumption*

Boxplots + Stripplots

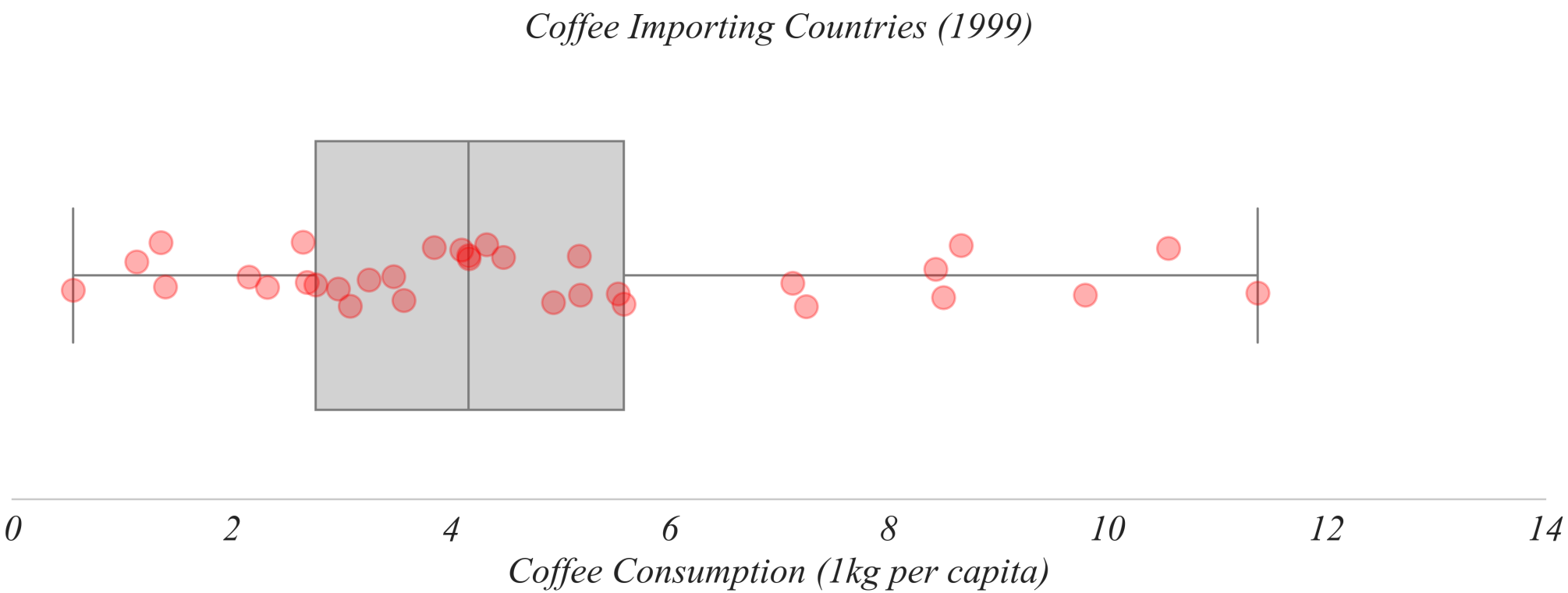
Q. Which countries drank the most coffee in 1999?



> each element of the boxplot represents one of these five quartiles

Boxplots + Stripplots

Which countries consumed more than 8 kg per capita?



Boxplots + Stripplots

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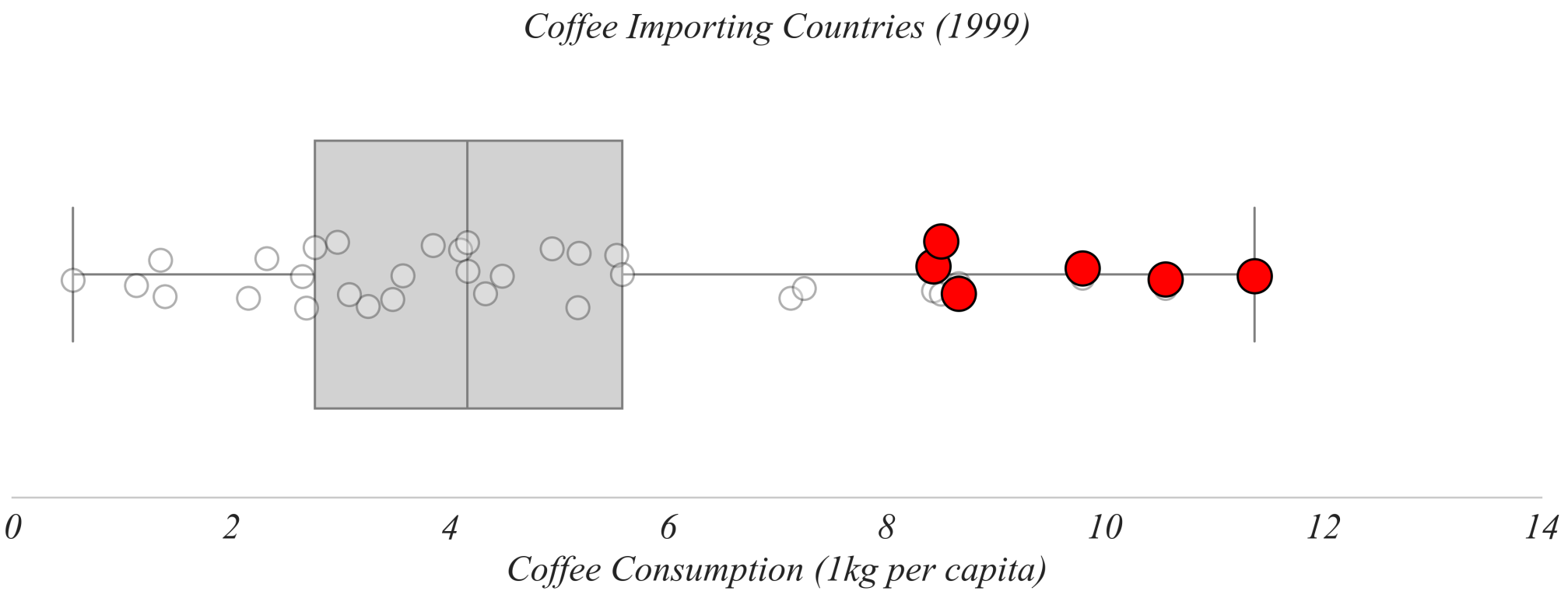
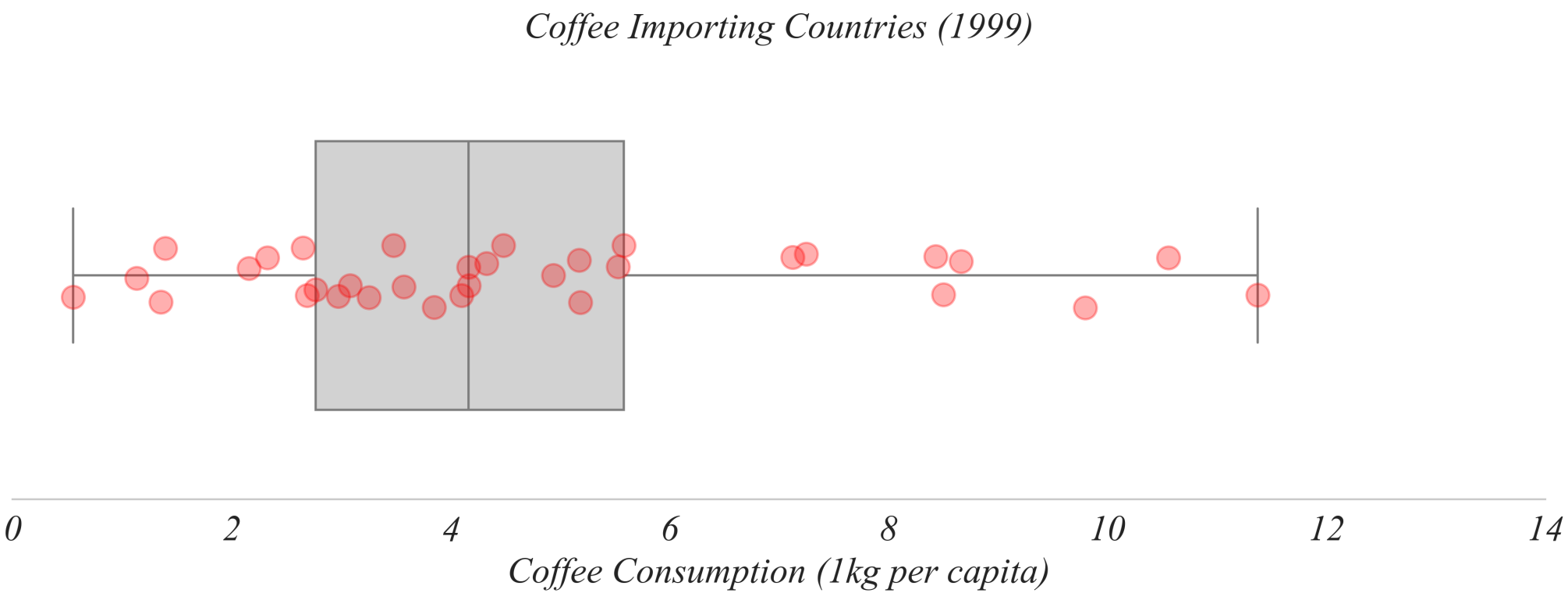


> we can highlight the relevant subsets of the data

Boxplots + Stripplots

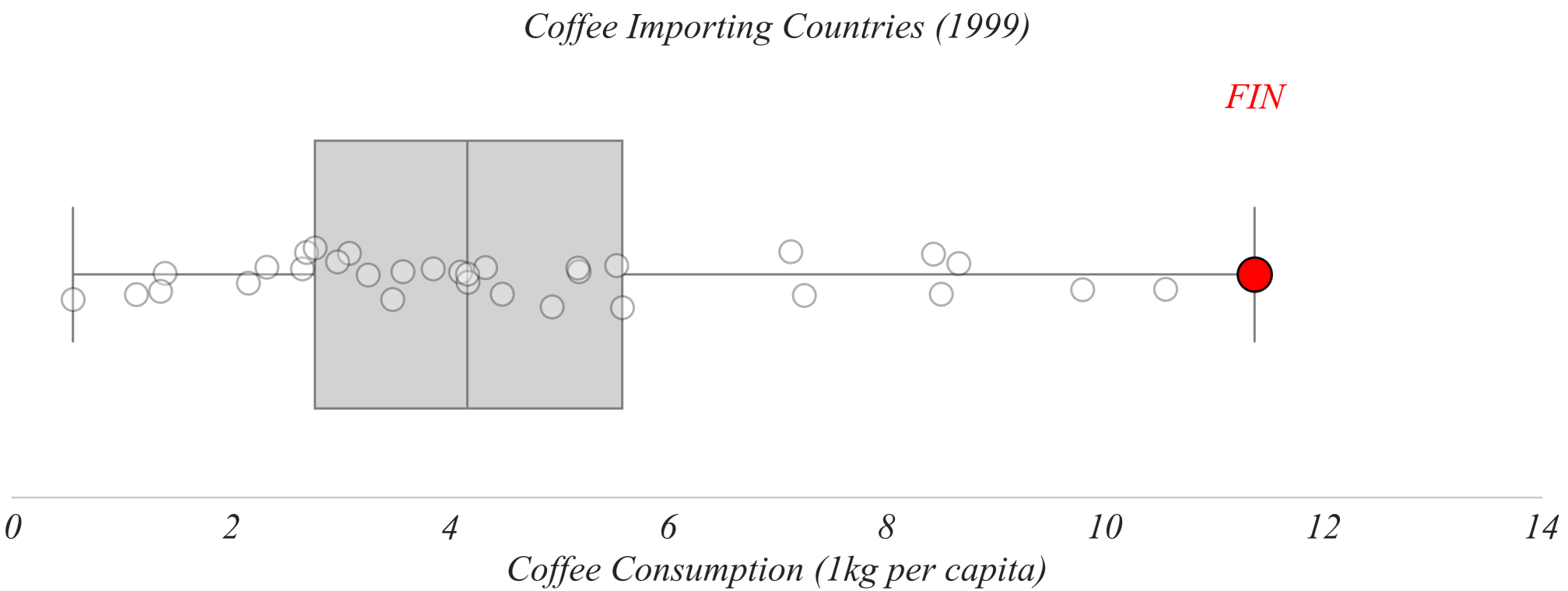
Which country consumed the most coffee per capita?



> we can find the exact values according to quartiles

Boxplots + Stripplots

Which country consumed the most coffee per capita?

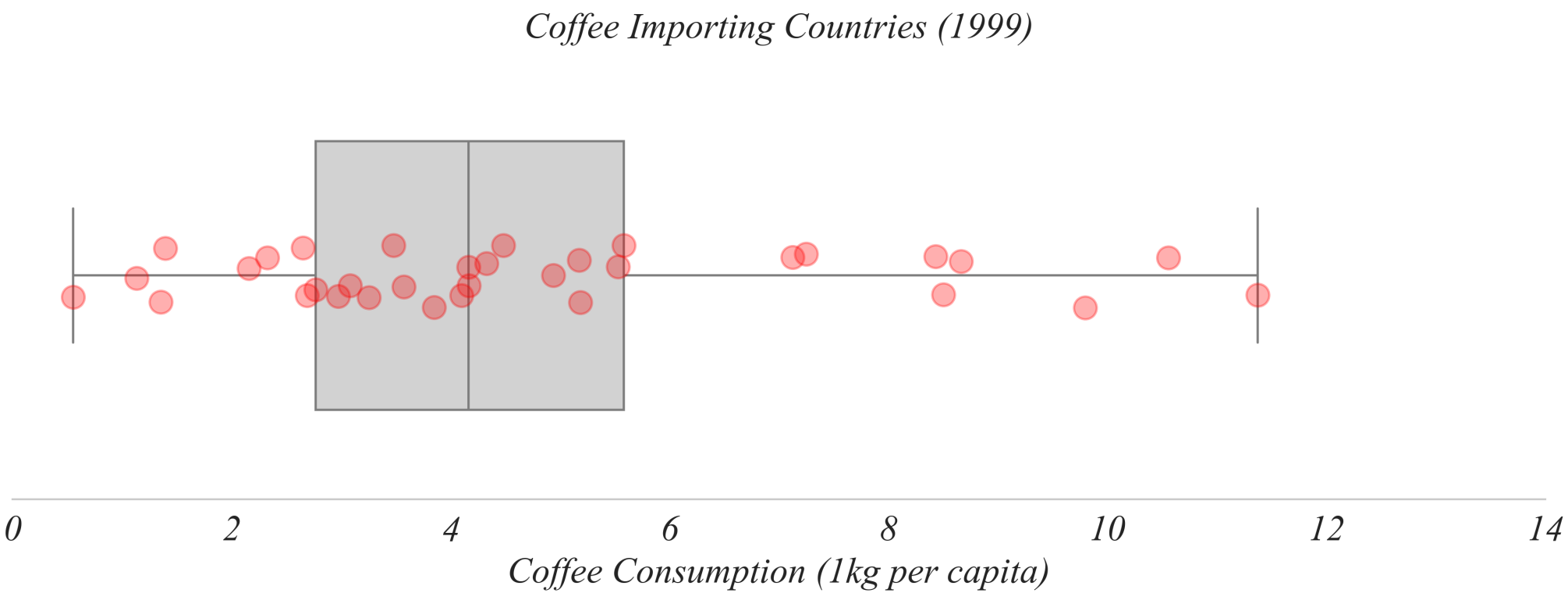


> *we can find the exact values according to quartiles*

> *Finland consumed the most coffee per capita in 1999*

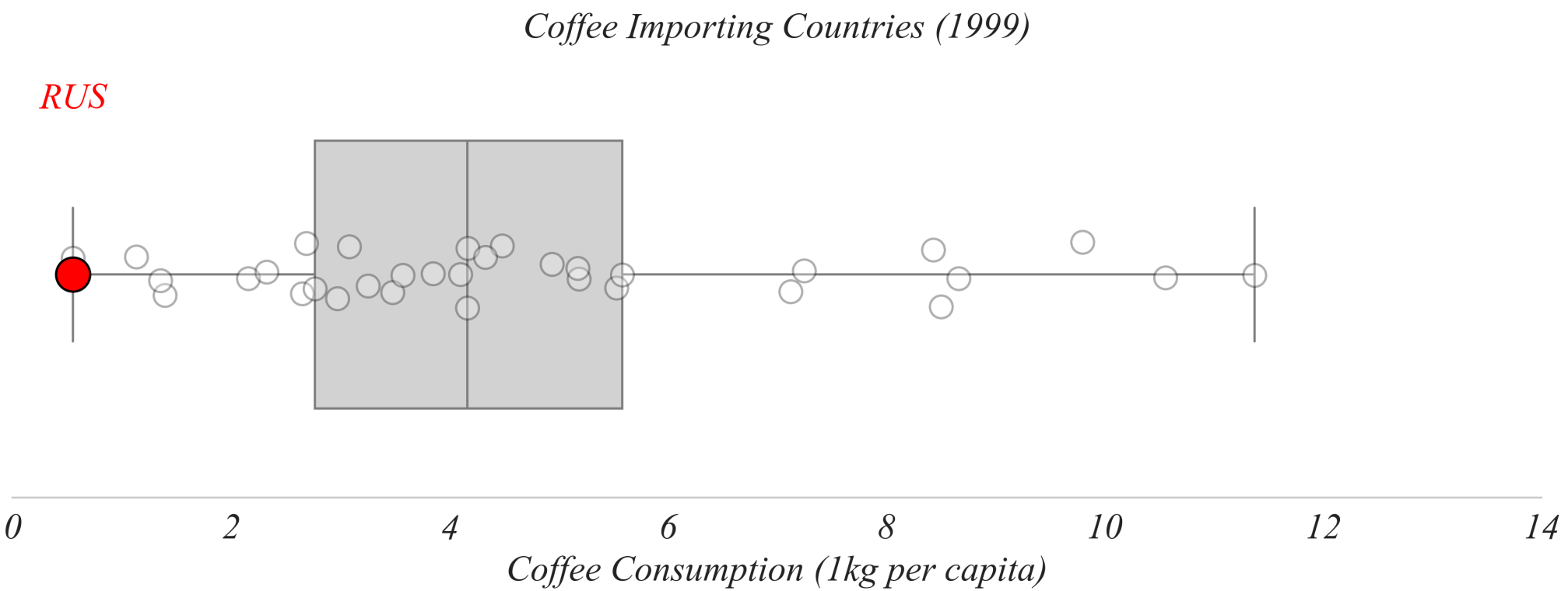
Boxplots + Stripplots

Which country consumed the least coffee per capita?



Boxplots + Stripplots

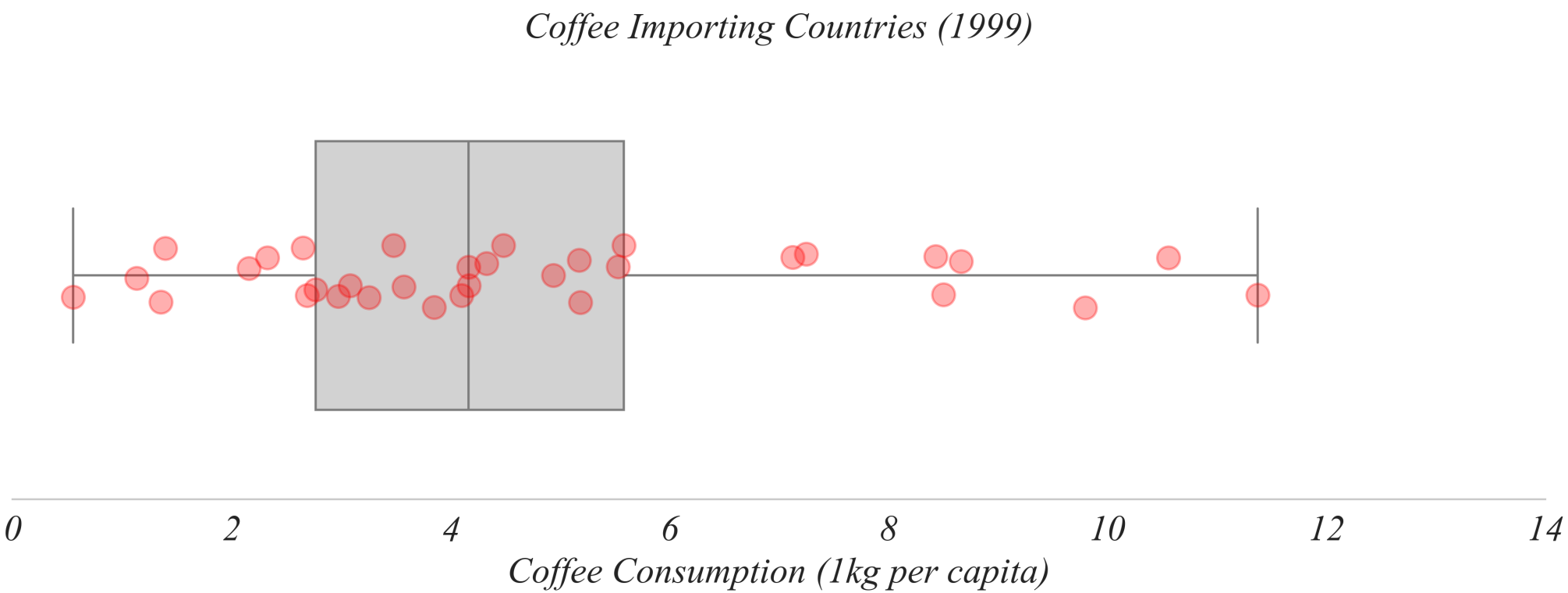
Which country consumed the least coffee per capita?



> *Russia consumed the least coffee per capita in 1999*

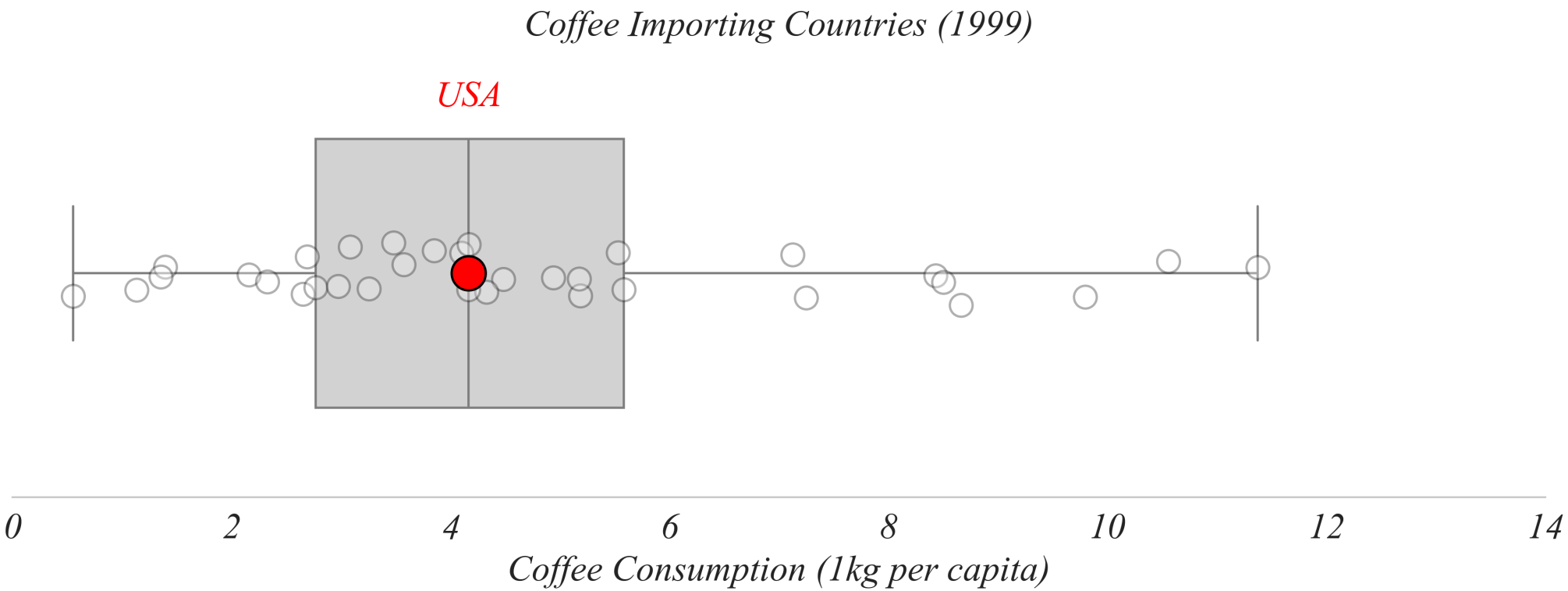
Boxplots + Stripplots

How about the median?



Boxplots + Stripplots

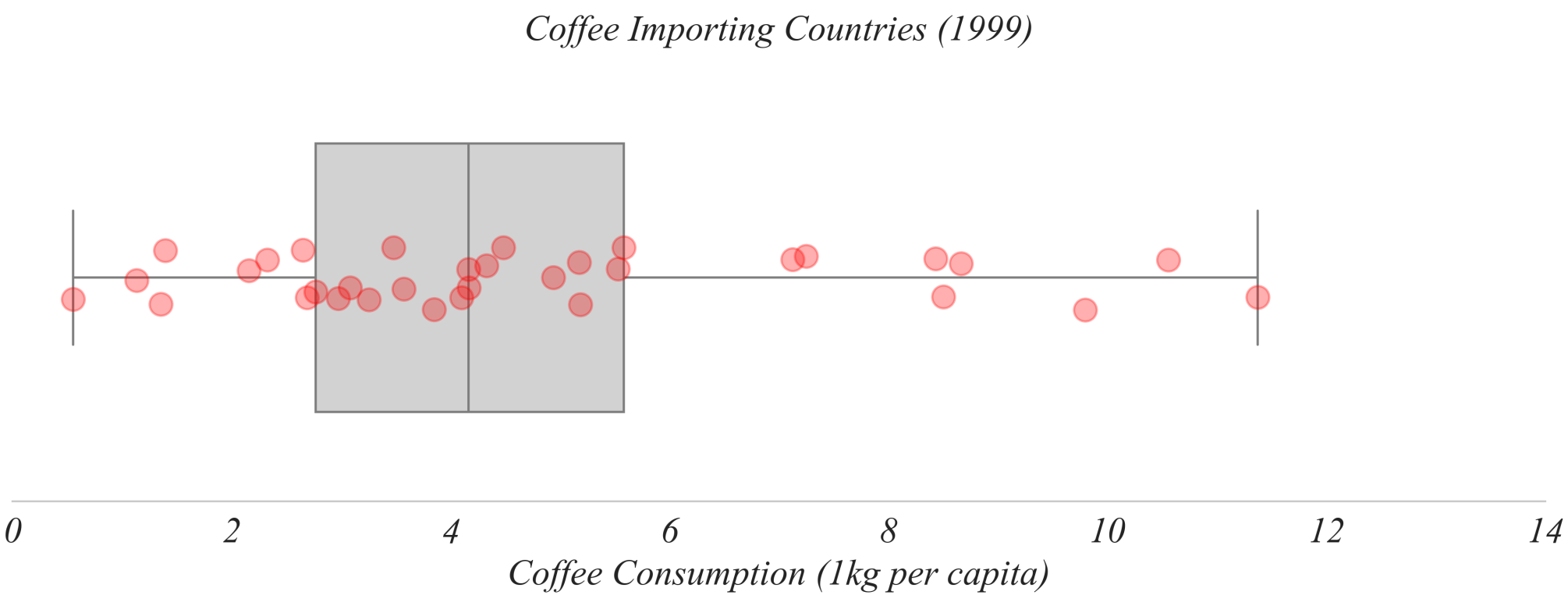
How about the median?



> the US!

Boxplots + Stripplots

Which country consumes more than exactly 25% of countries?



Boxplots + Stripplots

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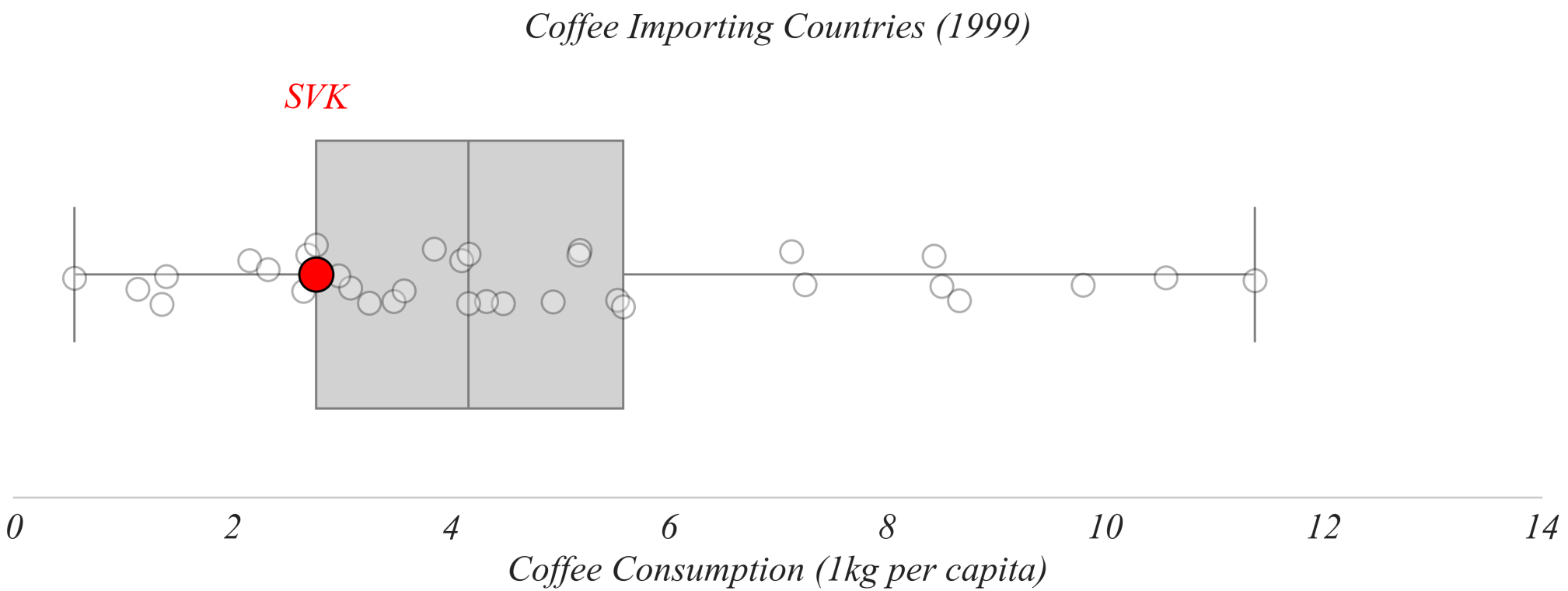
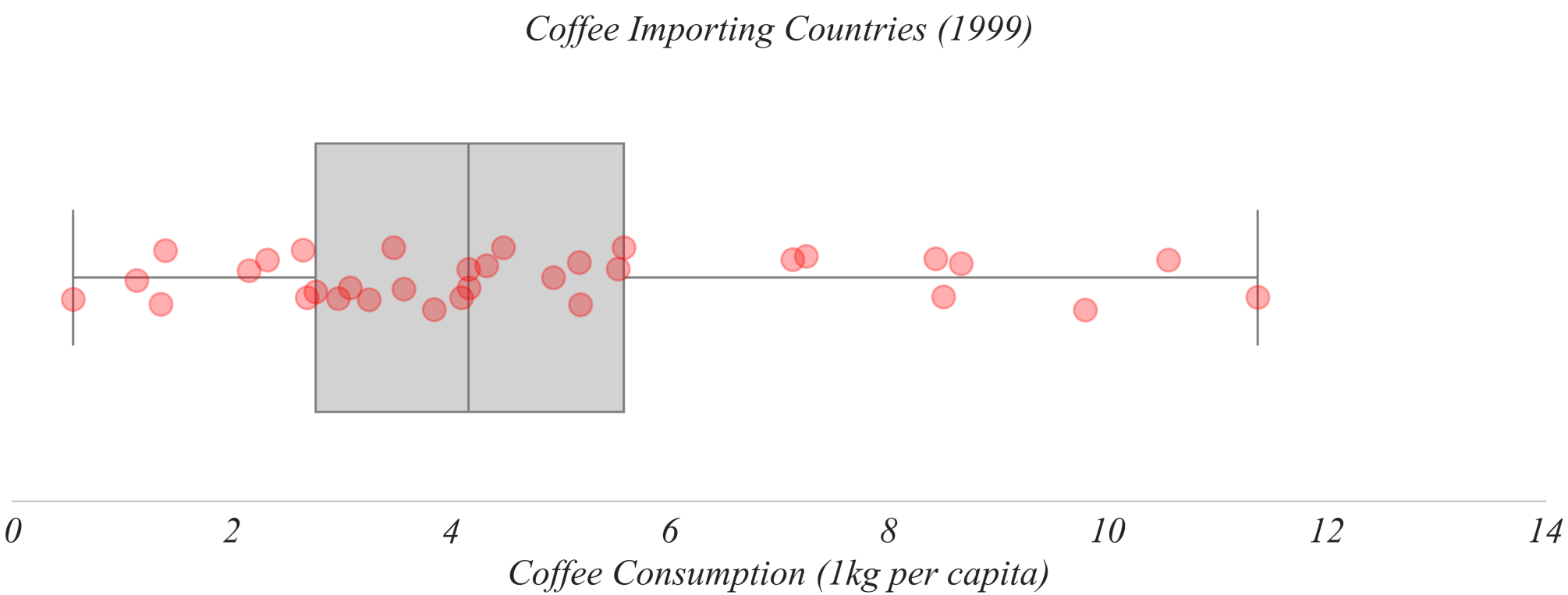


> *Slovakia!*

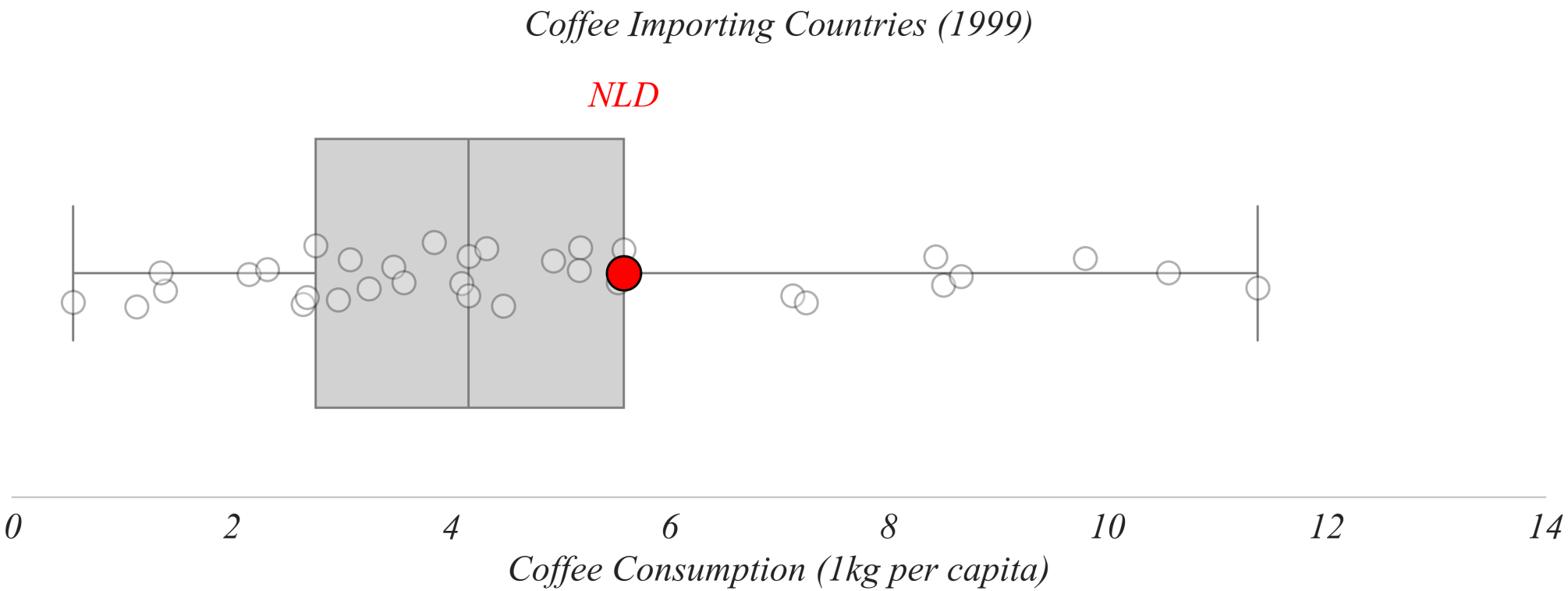
Boxplots + Stripplots

Which country consumes more than exactly 75% of countries?



Boxplots + Stripplots

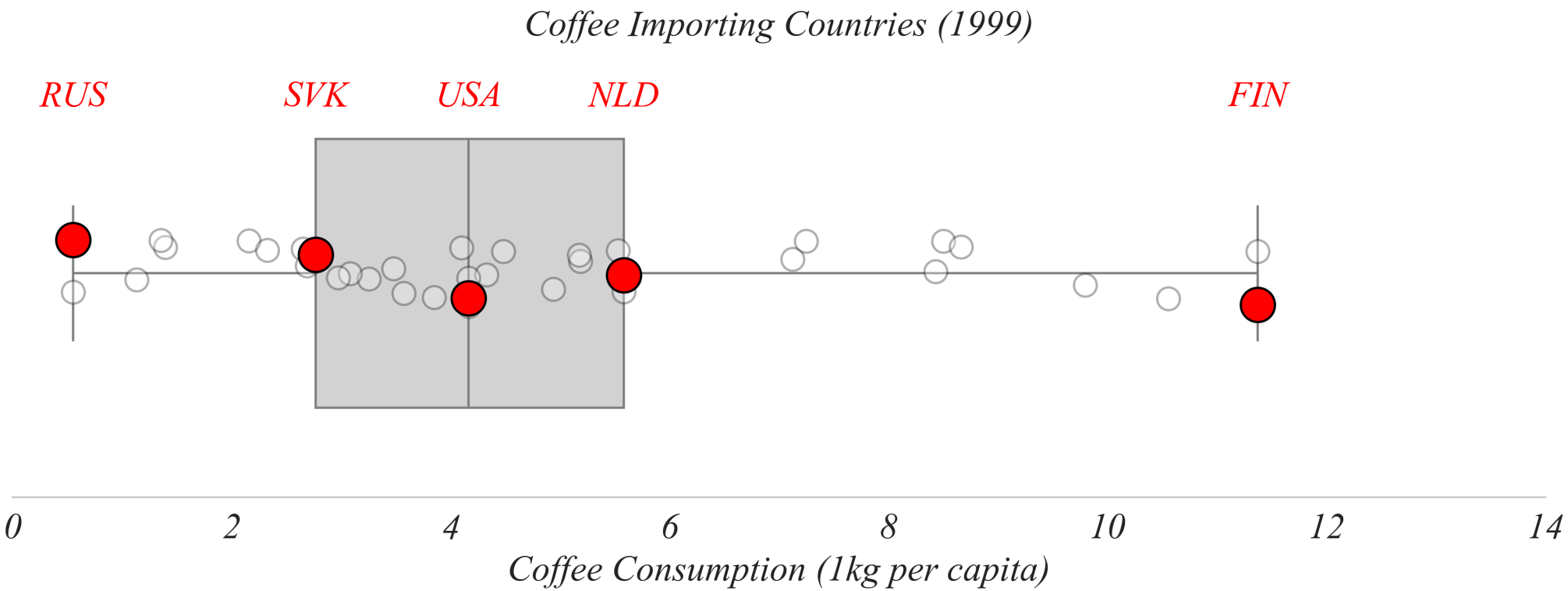
Which country consumes more than exactly 75% of countries?



> *Netherlands*

Boxplots + Stripplots

Boxplots show quartiles; stripplots show the data.



Boxplots + Stripplots: Summary

Boxplots show quartiles; stripplots show the data.

- *Boxplots make it easy to show the quartiles.*
- *Stripplots can show the distribution of the data.*
- *We can highlight subsets of the data.*

Exercise: Boxplots + Stripplots

Lets use a boxplots and stripplot to examine the distribution of coffee consumption per capita among coffee-importing countries.

- ***Data:*** `Coffee_Per_Cap.csv`