



MANIPULATING TIME SERIES DATA IN R: CASE STUDIES

# Welcome to the Course

# Introduction

- Practice with data related to Boston tourism



# Course Overview

- Chapter 1: Flights arriving in Boston
- Chapter 2: Boston weather data
- Chapter 3: United States economic data
- Chapter 4: Boston sports data



MANIPULATING TIME SERIES DATA IN R: CASE STUDIES

# Let's get started!





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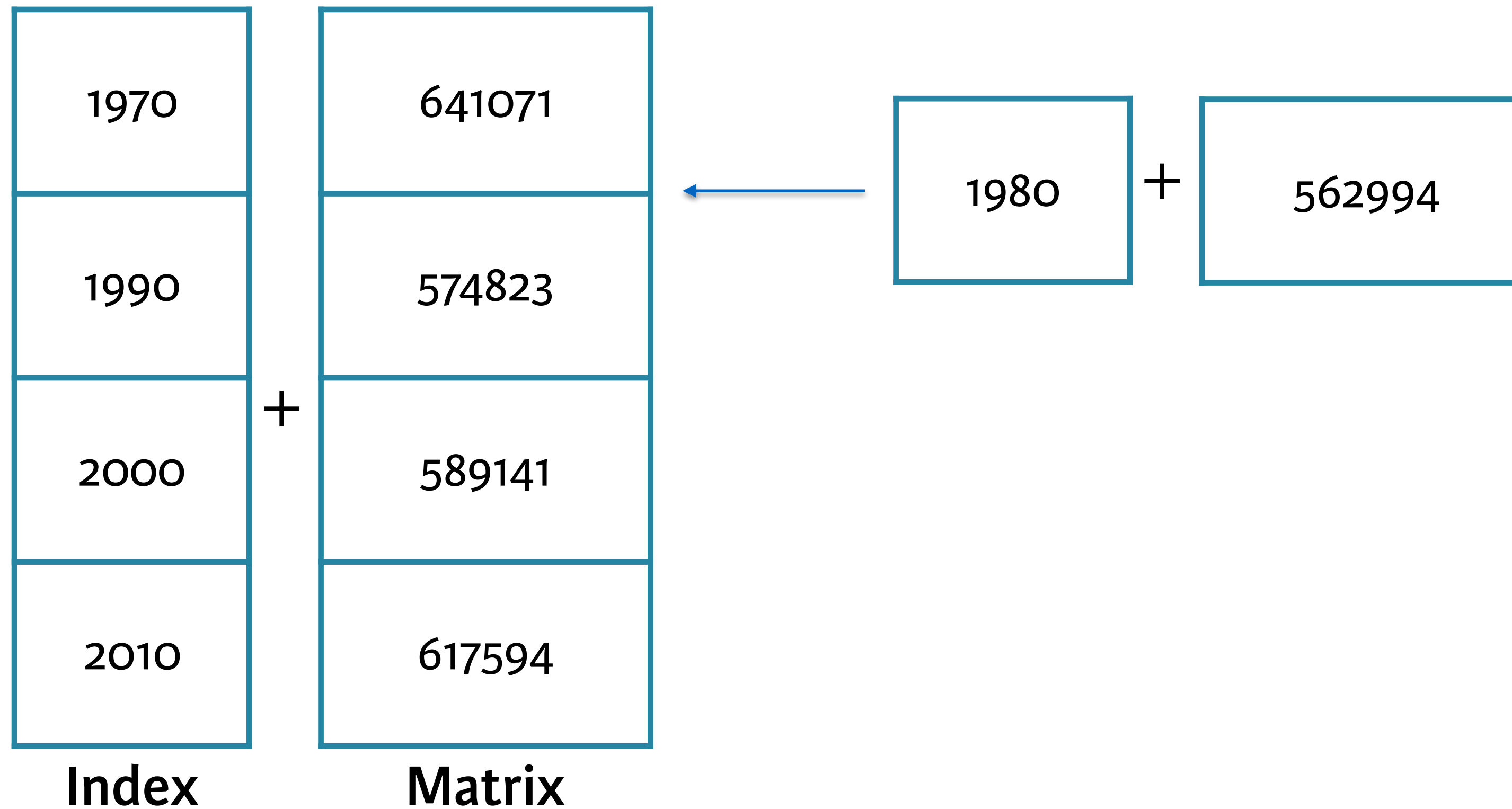
# **Review xts Fundamentals**

# Time Series Data

- One or more units over many periods

Year	Population
1980	562994
1990	574823
2000	589141
2010	617594

# What are xts Objects?



# Flight Data

- Flight delays and cancellations, 2010 through 2015







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**Let's practice!**



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# **Manipulating and Visualizing Your Data**

# Qualities of xts Objects

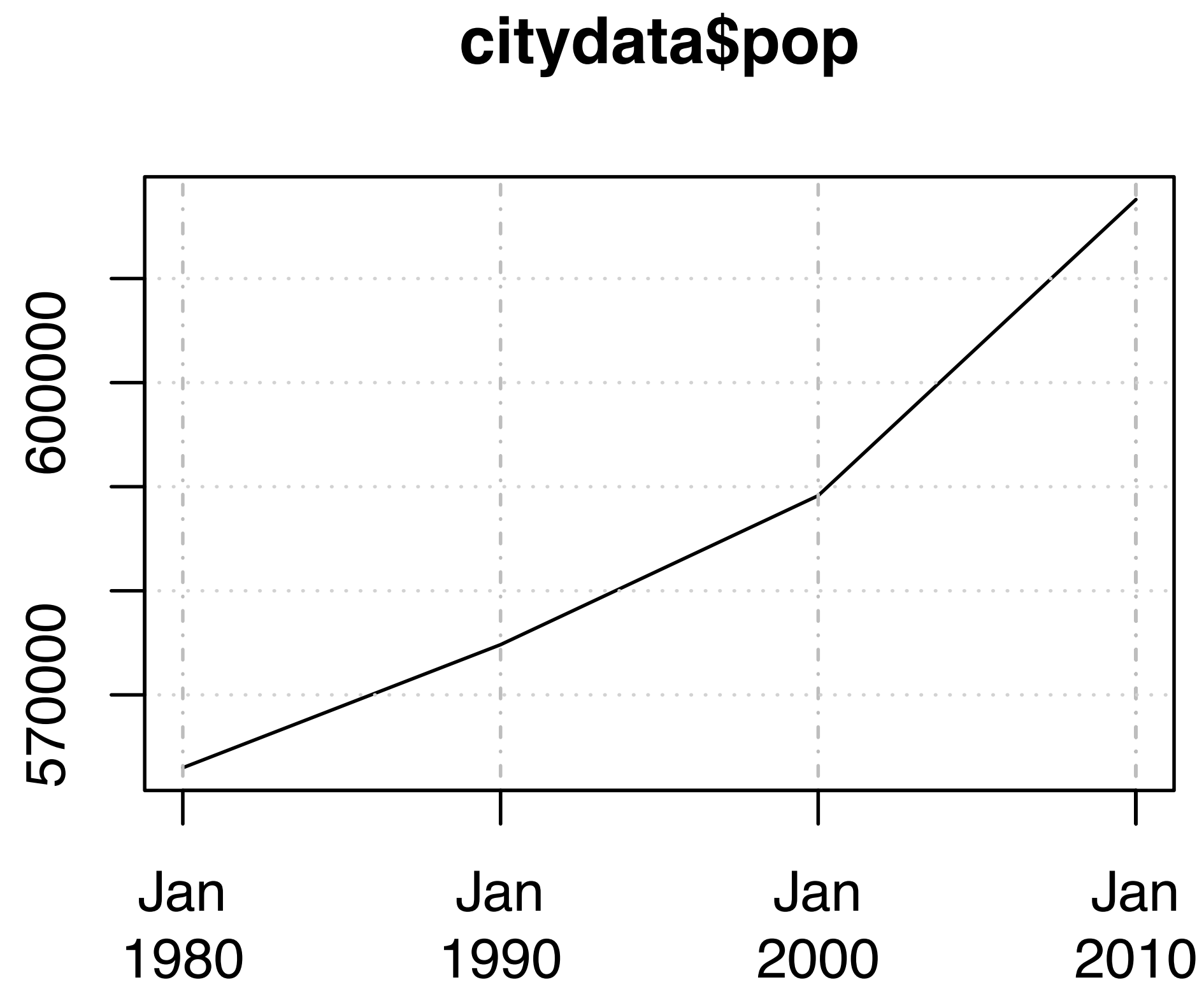
- Periodicity: Units of time in your data

```
> periodicity(citydata)
```

```
Yearly periodicity from 1980-01-01 to 2010-01-01
```

# Plotting Time Series Data

```
> plot.xts(citydata$pop)
```

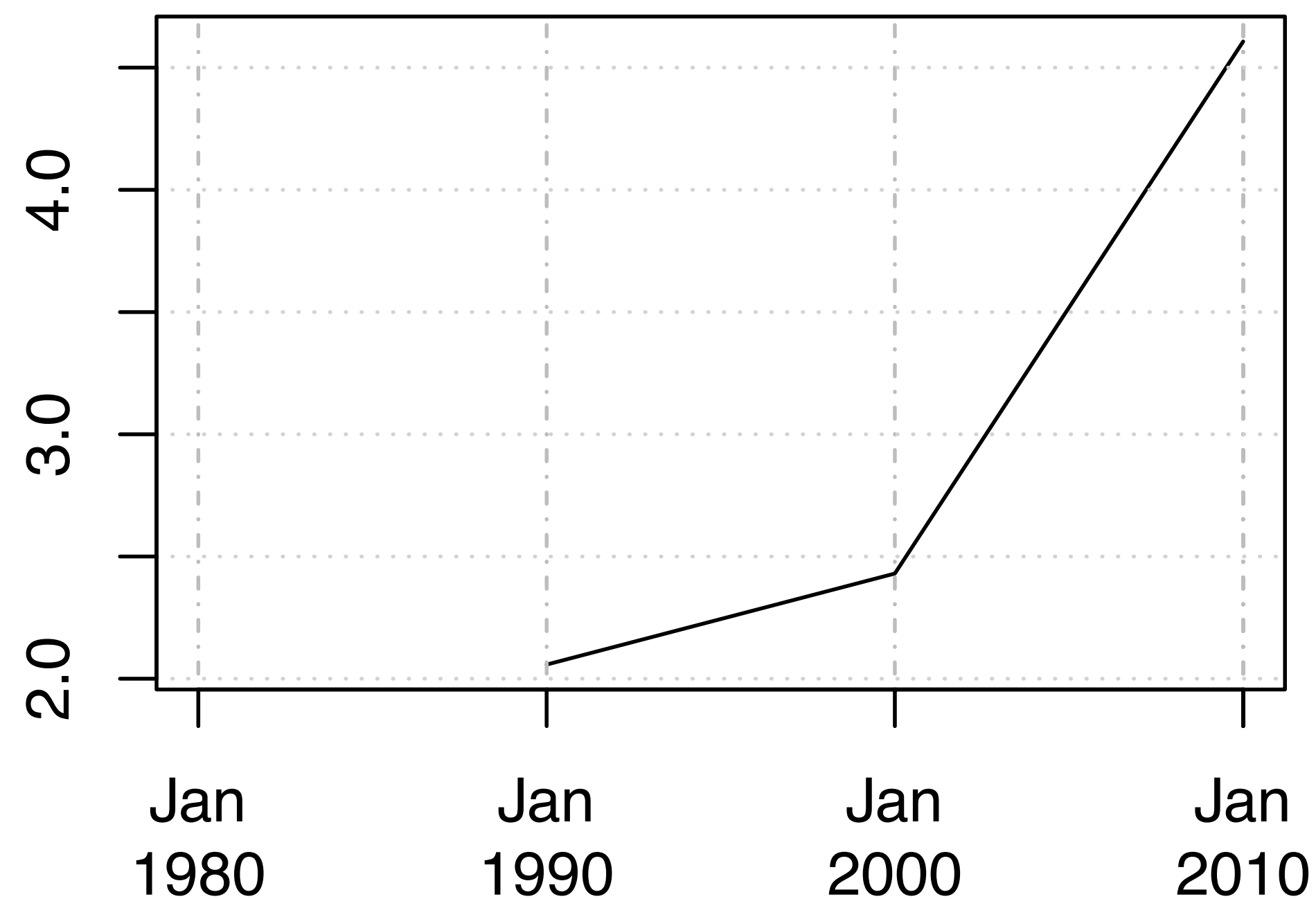




# Plotting Time Series Data

```
> citydata$pct_growth <- (diff(citydata$pop) / citydata$pop) * 100  
> plot.xts(citydata$pct_growth)
```

**citydata\$pct\_growth**





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# **Saving and Exporting xts Objects**

# Saving as rds

- Use `saveRDS()` and `readRDS()`

```
> saveRDS(citydata, file = "citydata.rds")
```

- Maintains time index of xts objects

```
> readRDS("citydata.rds")
```

	pop	pct_growth
1980-01-01	562994	NA
1990-01-01	574823	2.057851
2000-01-01	589141	2.430318
2010-01-01	617594	4.607072



# Saving as CSV

- Use `write.zoo()` and `read.zoo()`

```
> write.zoo(citydata, file = "citydata.csv", sep = ",")
```

- Must re-convert to xts

```
> citydata <- read.zoo("citydata.csv", sep = ",", header = TRUE)
> as.xts(citydata)
```

	pop	pct_growth
1980-01-01	562994	NA
1990-01-01	574823	2.057851
2000-01-01	589141	2.430318
2010-01-01	617594	4.607072



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