

# ETF3231/5231: Business forecasting

Ch1. Getting started

[OTexts.org/fpp3/](https://OTexts.org/fpp3/)



# Outline

- 1 What can we forecast?
- 2 Time series data and random futures
- 3 Some case studies

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# Forecasting is difficult

## A Timeline of Very Bad Future Predictions

1800



“Rail travel at high speed is not possible, because passengers, unable to breathe, would die of asphyxia.”

Dr. Dionysius Larder, Professor of Natural Philosophy & Astronomy, University College London

1859



“Drill for oil? You mean drill into the ground to try and find oil? You’re crazy!”

Associates of Edwin L. Drake refusing his suggestion to drill for oil in 1859 (Later that year, Drake succeeded in drilling the first oil well.)

1876



“This telephone has too many shortcomings to be seriously considered as a means of communication.”

Western Union internal memo

1880



“Everyone acquainted with the subject will recognize it as a conspicuous failure.”

Henry Morton, president of the Stevens Institute of Technology, on Edison's light bulb

1902



“Flight by machines heavier than air is unpractical and insignificant, if not utterly impossible.”

Simon Newcomb, Canadian-American astronomer and mathematician, 18 months before the Wright Brothers' flight at Kittyhawk

1903



“The horse is here to stay, but the automobile is only a novelty, a fad.”

The president of the Michigan Savings Bank, advising Henry Ford's lawyer not to invest in the Ford Motor Company

1916



“The idea that cavalry will be replaced by these iron coaches is absurd. It is little short of treasonous.”

Comment of Aide-de-camp to Field Marshal Haig, at tank demonstration

1916



“The cinema is little more than a fad. It's canned drama. What audiences really want to see is flesh and blood on the stage.”

Charlie Chaplin, actor, producer, director, and studio founder

1946



“Television won't last because people will soon get tired of staring at a plywood box every night.”

Darryl Zanuck, movie producer, 20th Century Fox

1977



“There is no reason for any individual to have a computer in his home.”

Ken Olson, president, chairman and founder of Digital Equipment Corporation

1995



“The truth is no online database will replace your daily newspaper.”

Clifford Stoll, Newsweek article entitled *The Internet? Bah!*

# Reputations can be made and lost

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“We’re going to be opening relatively soon … The virus … will go away in April.” (Donald Trump, February 2020)

# Reputations can be made and lost

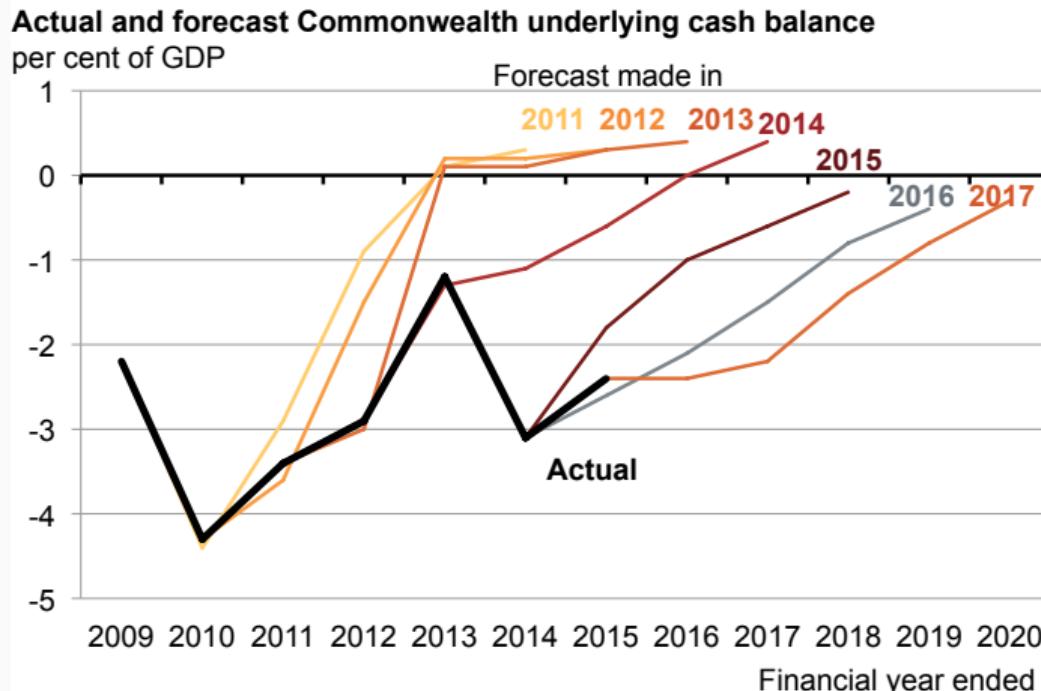
“There’s no chance that the iPhone is going to get any significant market share. No chance.” (Steve Ballmer, CEO Microsoft, April 2007)

“We’re going to be opening relatively soon … The virus … will go away in April.” (Donald Trump, February 2020)

There is a major difference between the first one and the second one.  
What is it?

# Forecasts that are not forecasts

Commonwealth plans to drift back to surplus **GRATTAN**  
show the triumph of experience over hope Institute



# What can we forecast?



# Which is easiest to forecast?

- 1 Google stock price tomorrow
- 2 Tourism demand next summer
- 3 Google stock price in 6 months time
- 4 Exchange rate of \$US/AUS next week
- 5 Prison population in 2 years
- 6 Time of sunrise this day next year
- 7 Maximum temperature tomorrow
- 8 Daily electricity demand in 3 days time

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<https://PollEv.com/georgeathana023>

Which one is easiest to forecast?

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- 
- The list is grouped into three categories by hand-drawn orange brackets:
- Group H (Highly predictable): Items 1, 2, and 3.
  - Group M (Medium predictable): Items 4, 5, and 6.
  - Group E (Extremely low predictable): Item 7 and Item 8.

# Which is easiest to forecast?

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- how do we measure “easiest”?
- what makes something easy/difficult to forecast?

# Factors affecting forecastability

Something is easier to forecast if:

- 1 we have a good understanding of the factors that contribute to it;
- 2 there is lots of data available;
- 3 the future is somewhat similar to the past; (Covid, GFC 07/08)
- 4 the forecasts cannot affect the thing we are trying to forecast.

# Forecasting, goals and planning

- **Forecasting:** predicting the future as accurately as possible, given information available (historical data, future events that might impact the forecasts).
- **Goals:** are what you would like to have happen. Linked to forecasts and plans, but this does not always occur.
- **Planning:** is a response to forecasts and goals. Determining appropriate actions to make your forecasts match your goals.
  - Make sure you separate these, especially forecasting and goals.

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# Types of data and methods

- **Qualitative forecasts:** Judgemental forecasting the only option if no historical data, new product, new market conditions. See fpp3 Chapter 6: <https://otexts.com/fpp3/judgmental.html>.  
*(Show covid in case studies)*
- **Quantitative forecasts:** most forecasting problems use either
  - ▶ Time series data (collected at **regular intervals** over time).
  - ▶ Cross-sectional data are for a single point in time.

# Time series data

- Four-yearly Olympic winning times
- Annual Google profits
- Quarterly sales results for Amazon
- Monthly rainfall
- Weekly retail sales
- Daily IBM stock prices
- Hourly electricity demand
- 5-minute freeway traffic counts
- Time-stamped stock transaction data

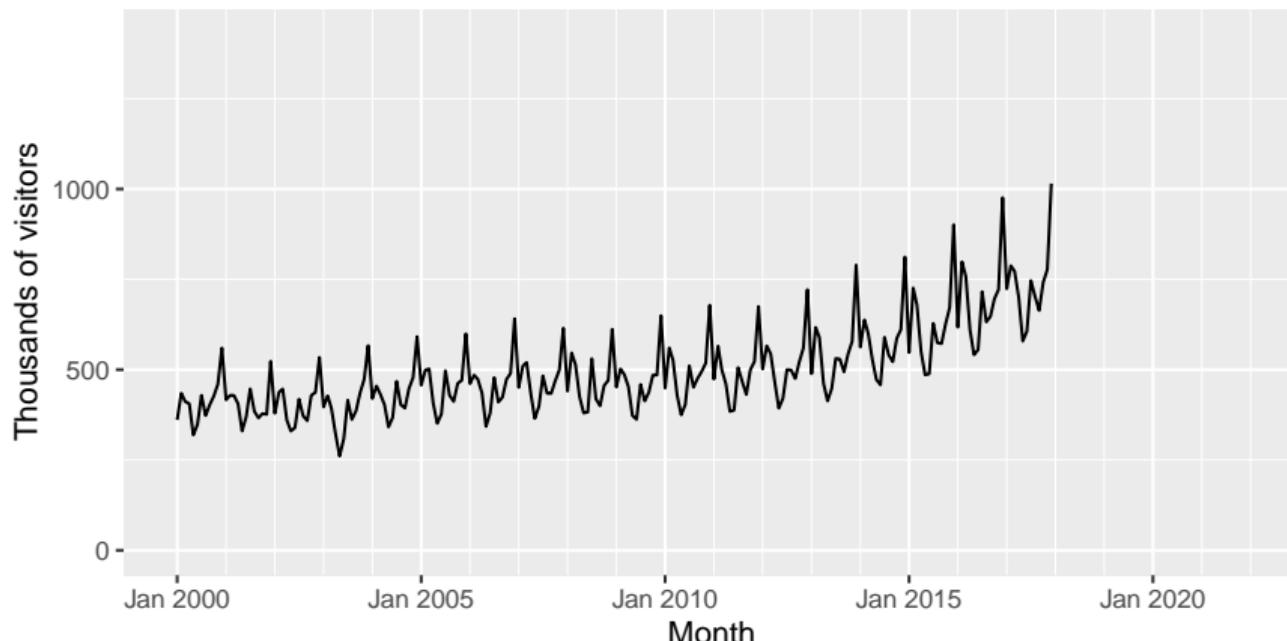
# Random futures

A forecast is an estimate of the probabilities of possible futures.

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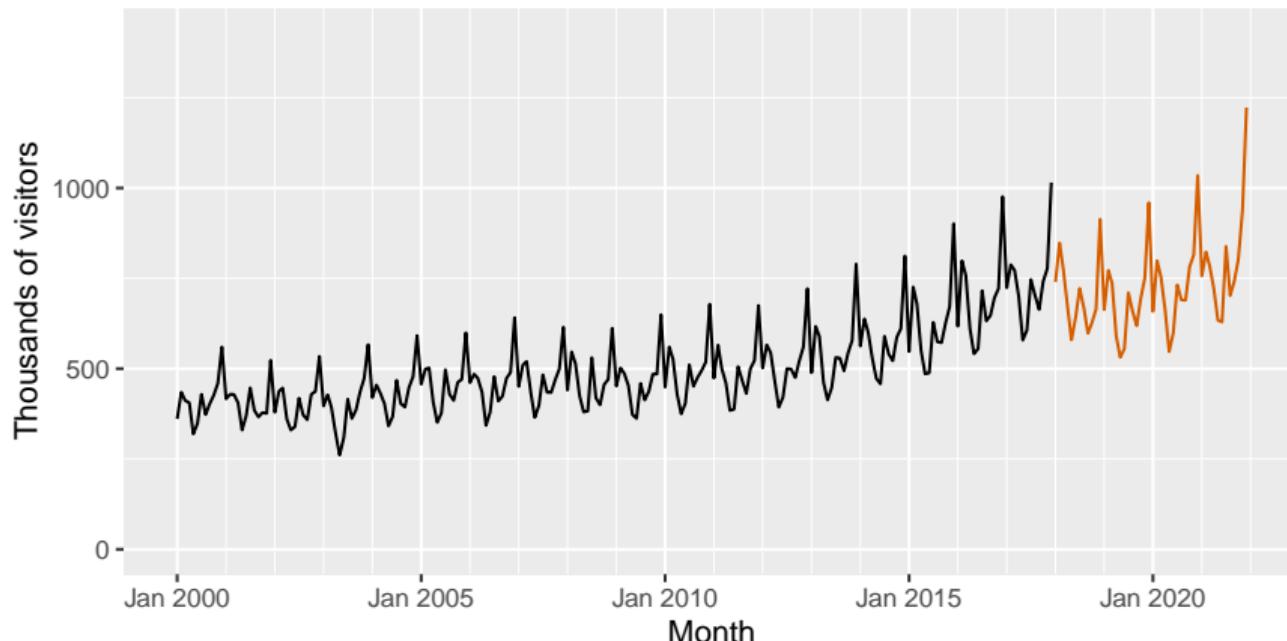
Total short-term visitors to Australia



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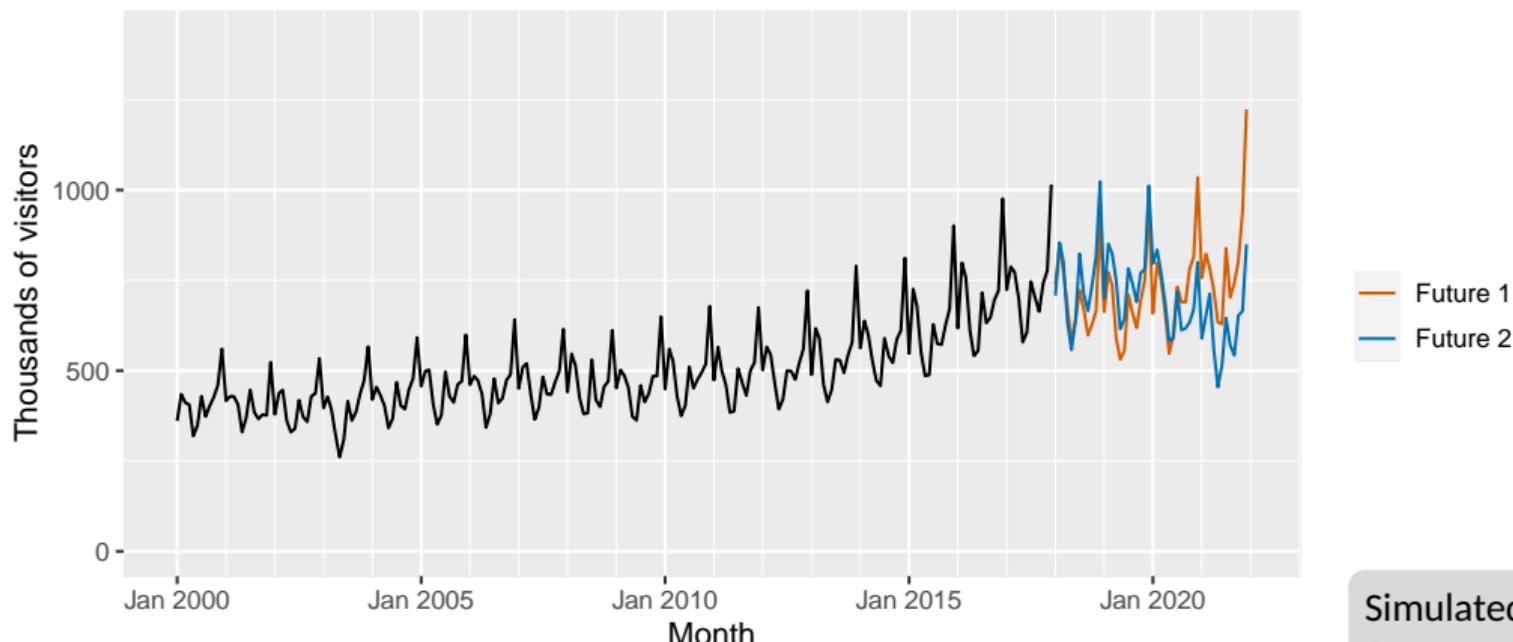


Simulated futures  
from an ETS model

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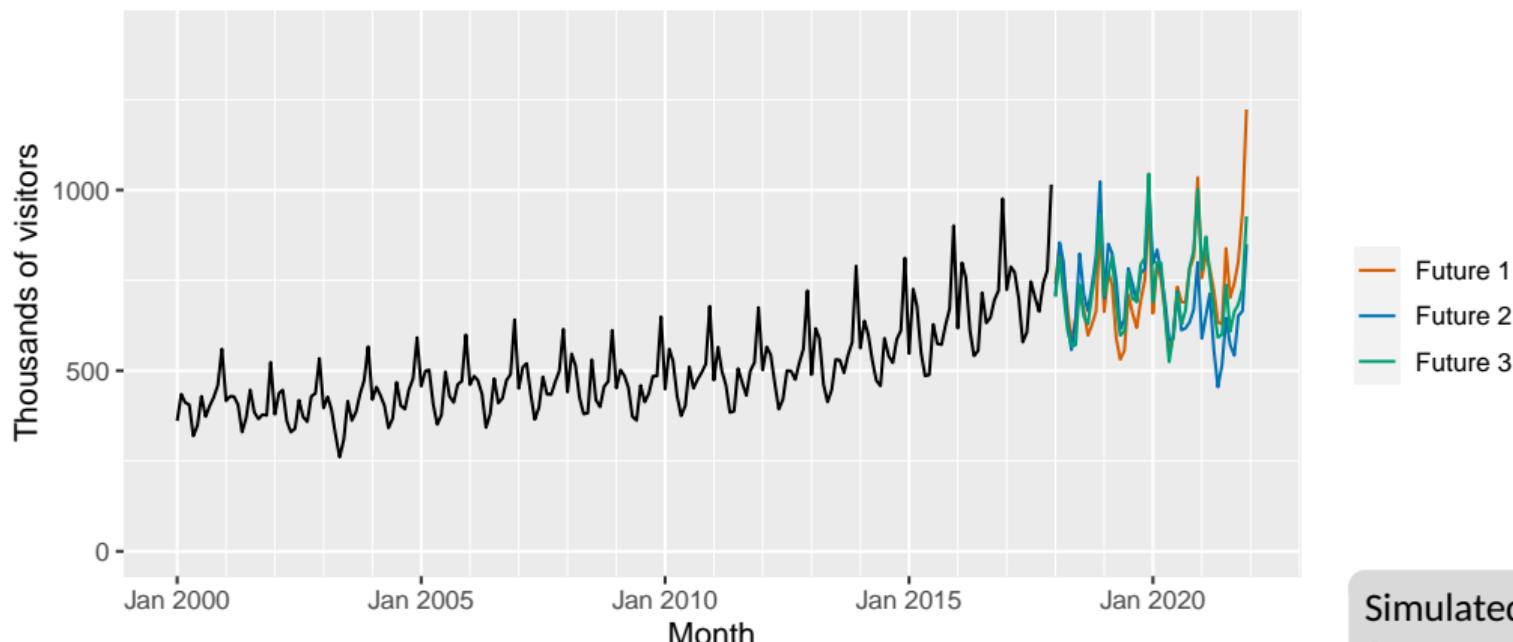


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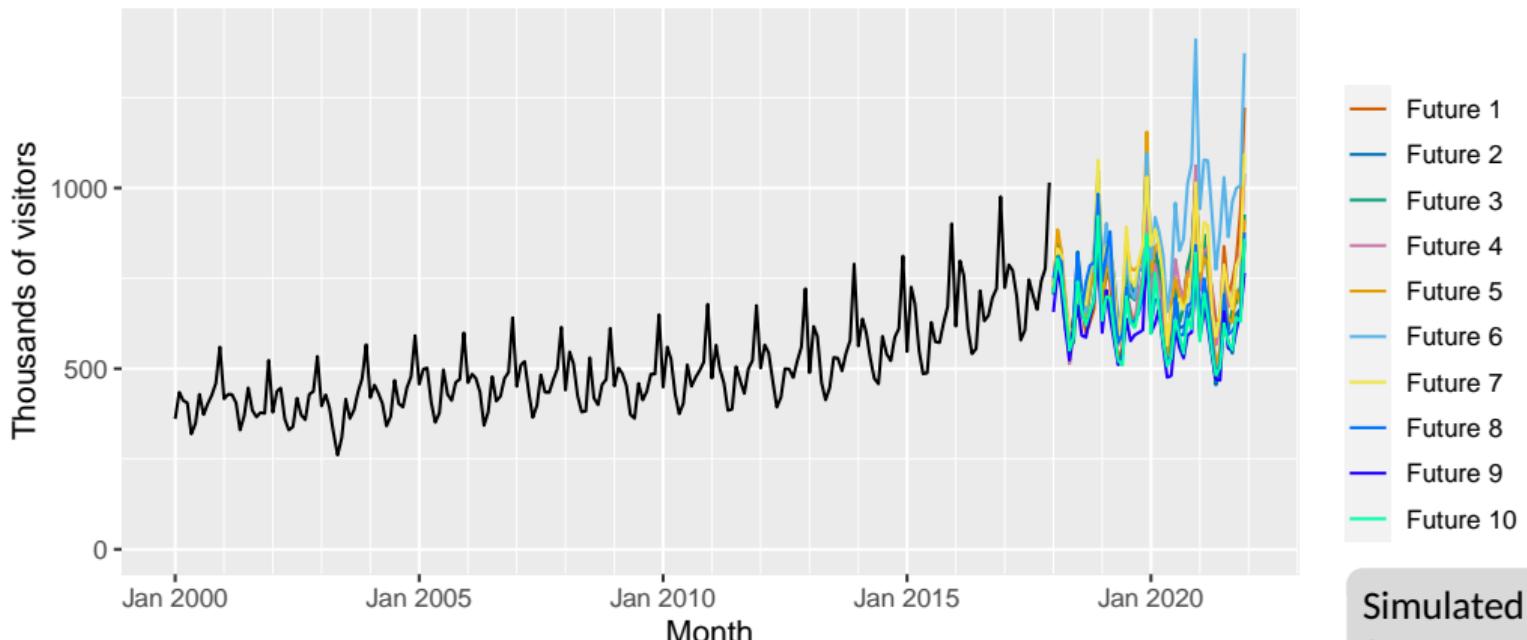


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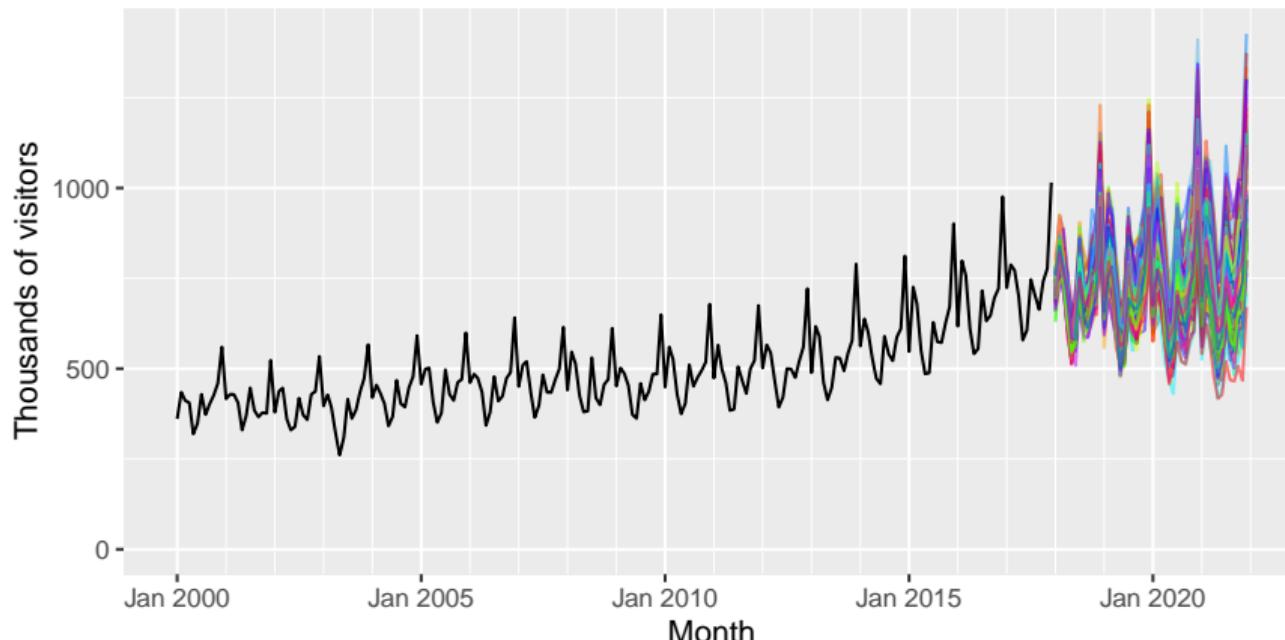


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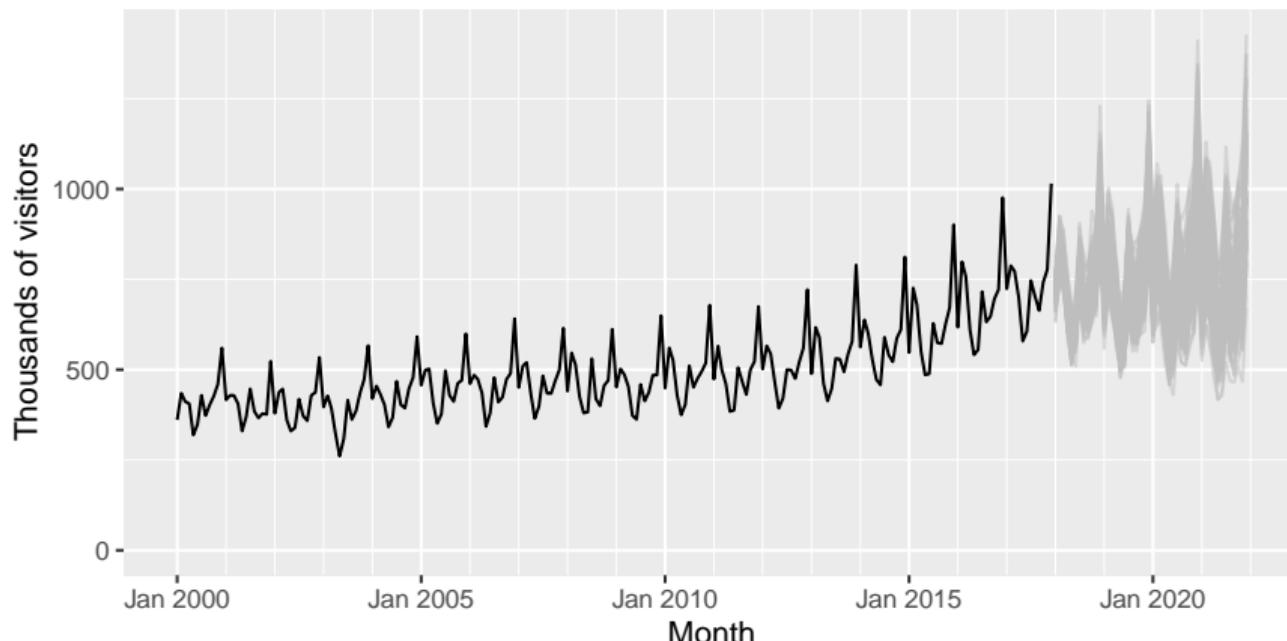


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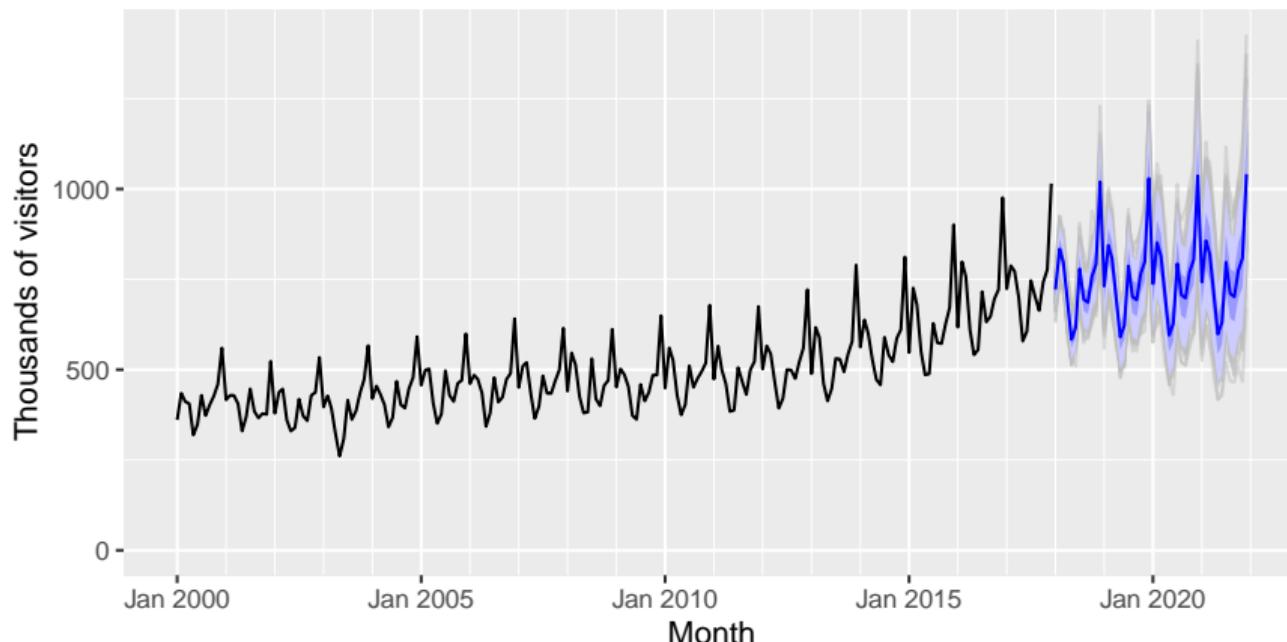


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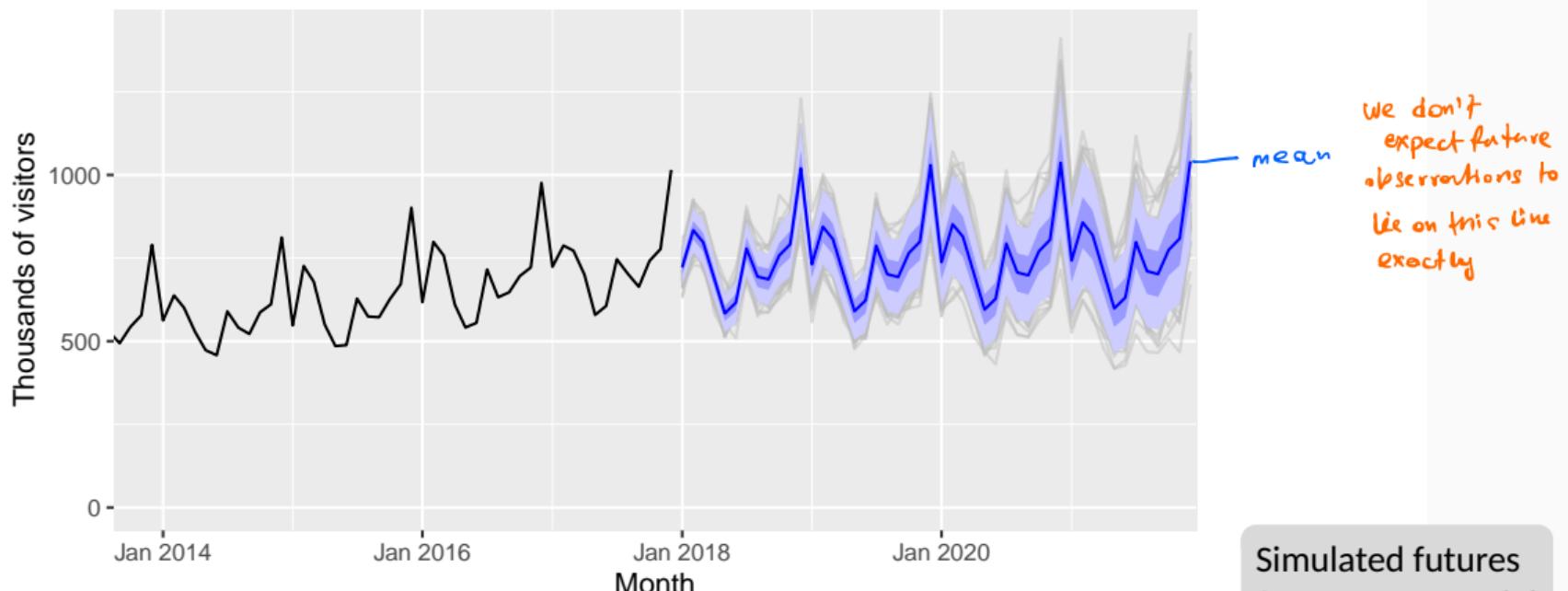


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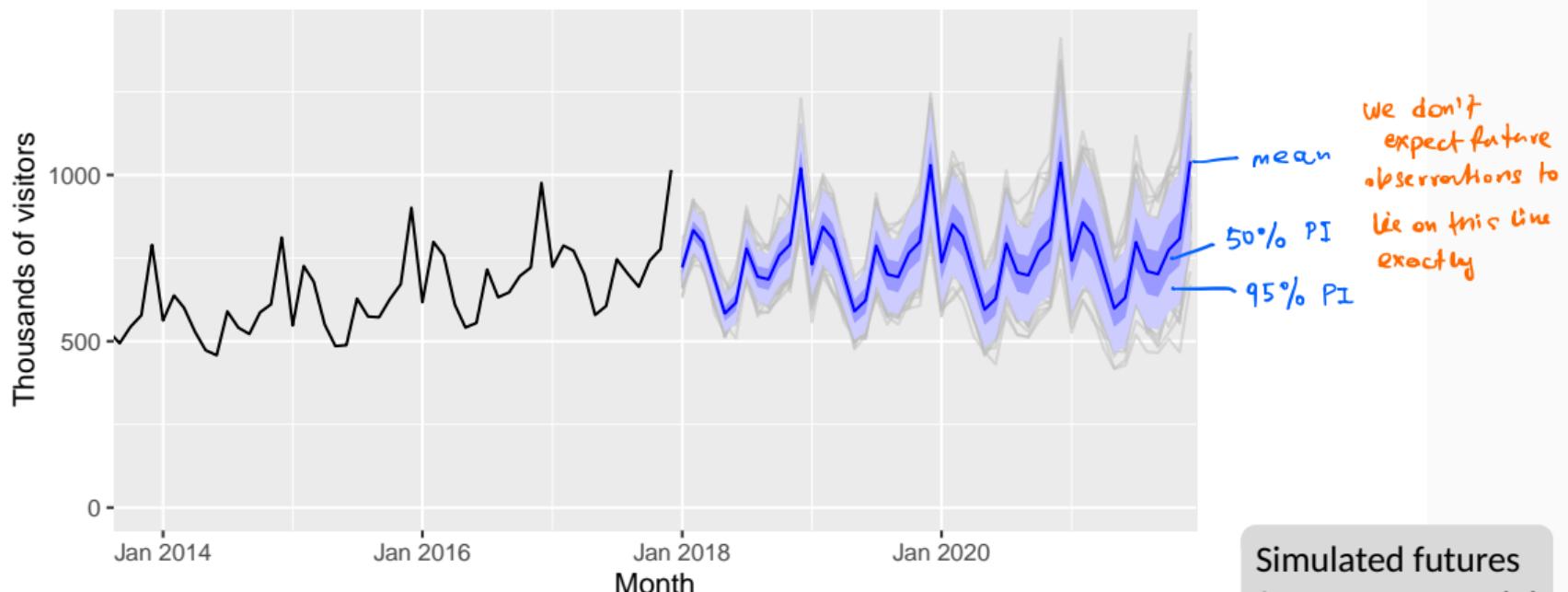
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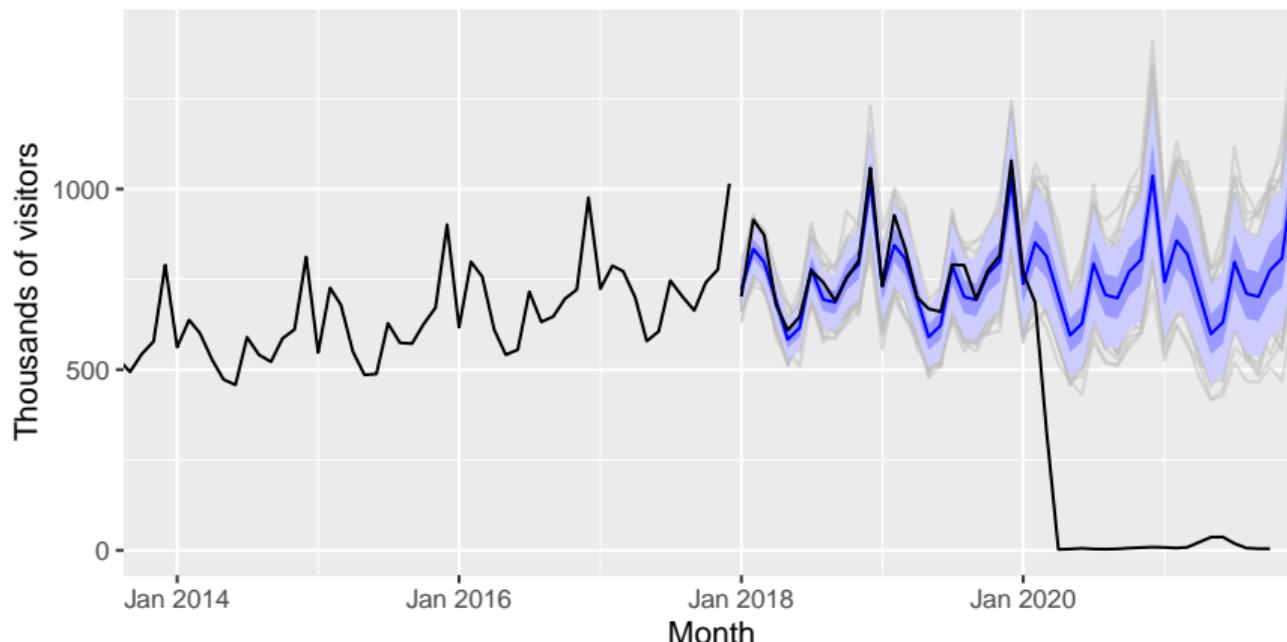
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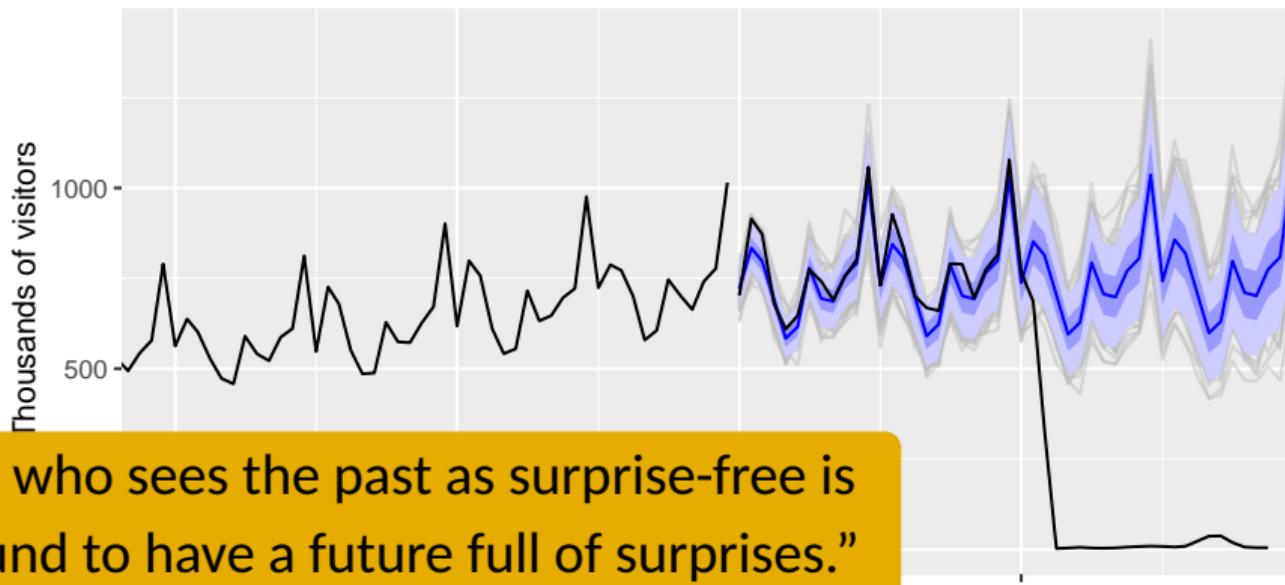


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A forecast is an estimate of the probabilities of possible futures.

Total short-term visitors to Australia



“He who sees the past as surprise-free is bound to have a future full of surprises.”

(Amos Tversky)

Simulated futures  
from an ETS model

# What is a forecast

A whole probability distribution, we call this a **forecast distribution**, which we summarise with the mean, we call this a **point forecast** and some other quantiles, we call these **prediction intervals**.

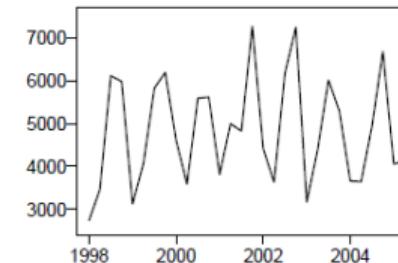
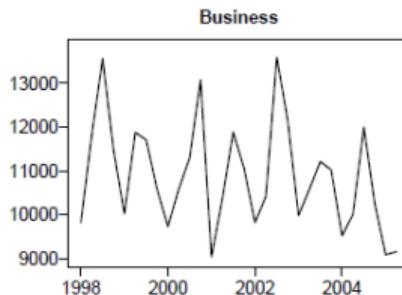
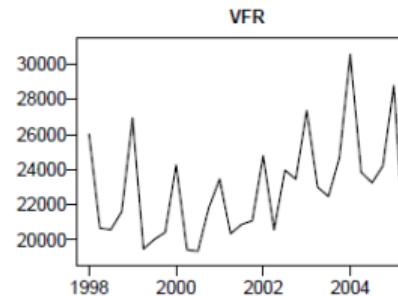
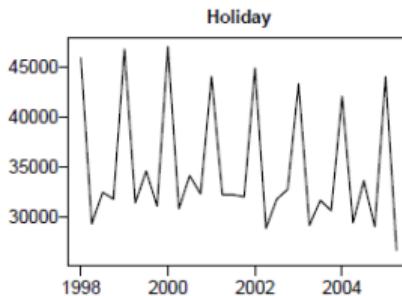
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# CASE STUDY: Australian domestic tourism

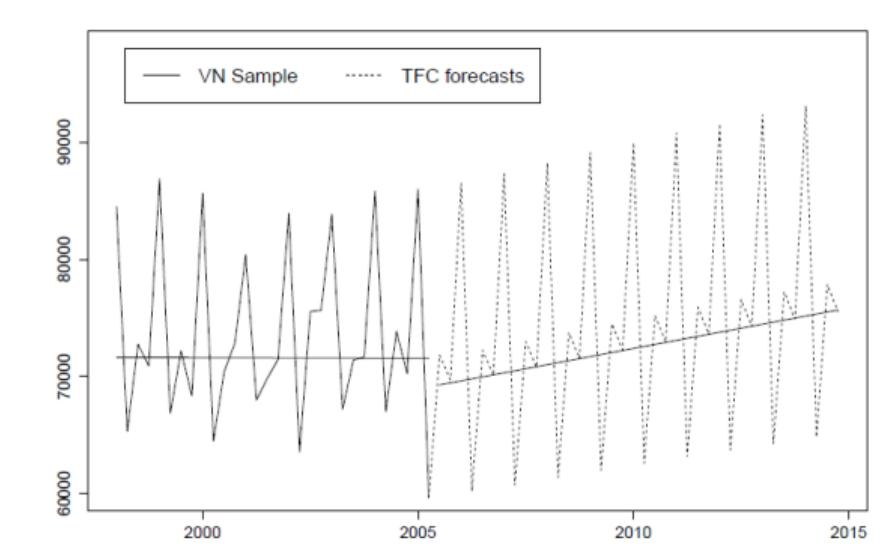
National Visitor Survey (1998Q1-2005Q2)

\* paper published  
in 2008



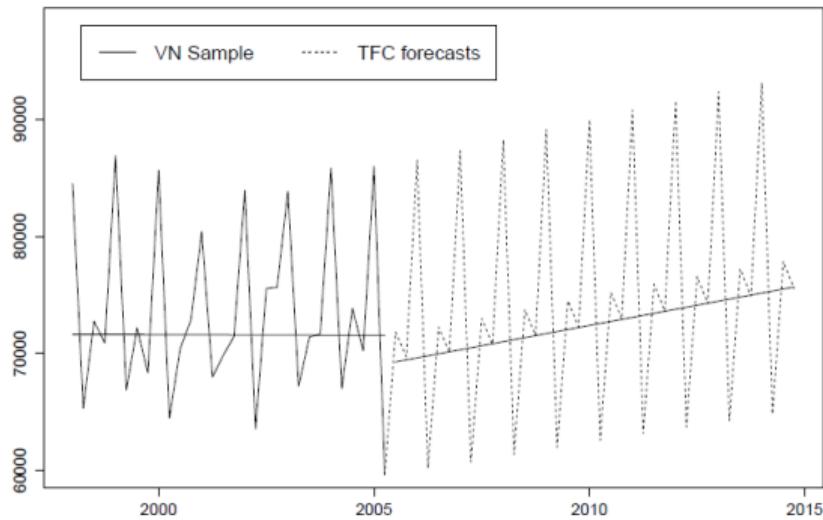
# Forecasts published by TFC

## Visitor nights: Total



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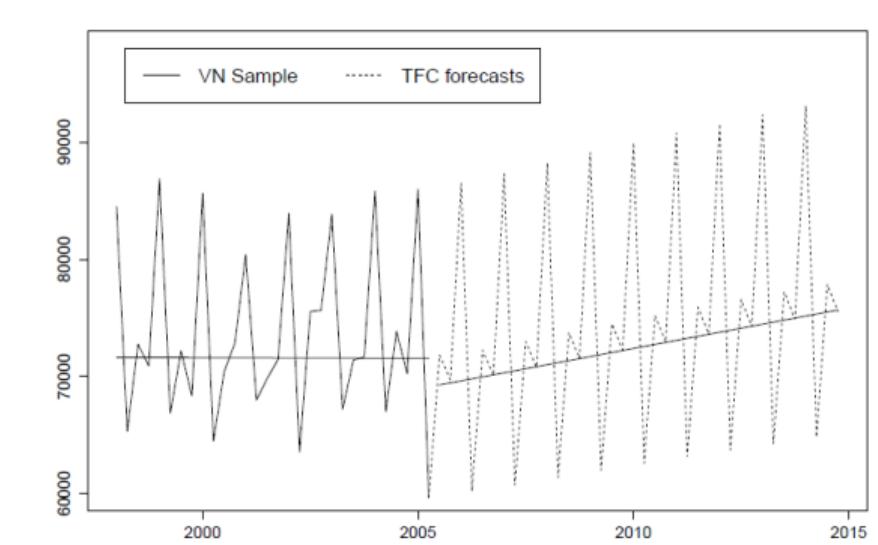


## Estimates of slope coefficients

- Sample -3.16
- Forecasts 188.07\*

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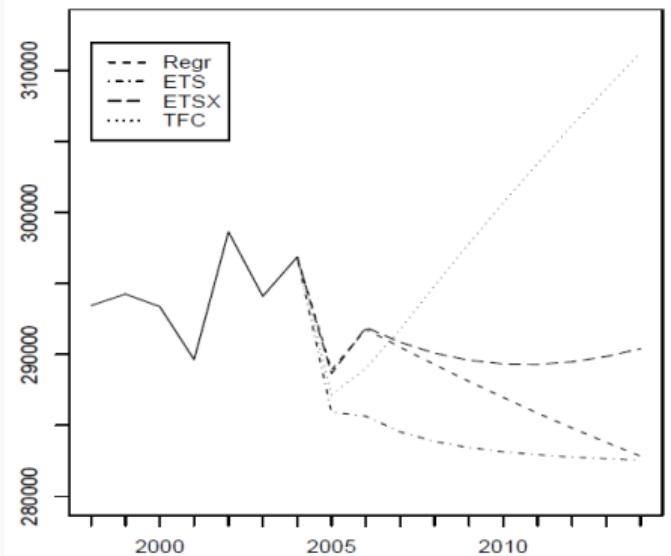


### Estimates of slope coefficients

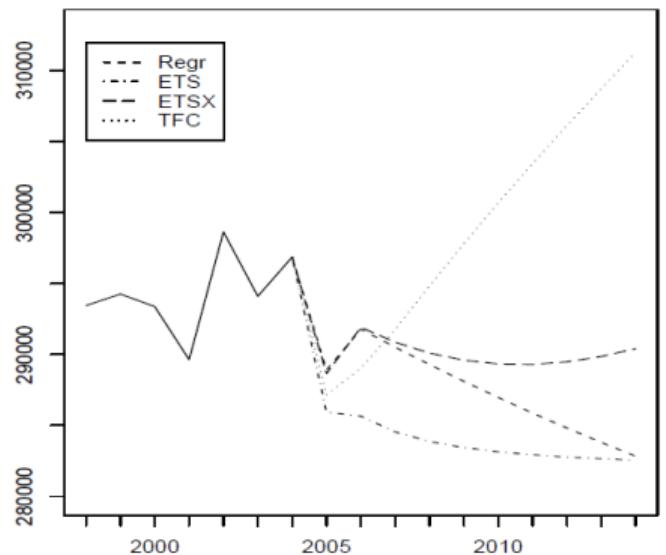
- Sample -3.16
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Always plot your data and your forecasts.

# Final long-term forecasts



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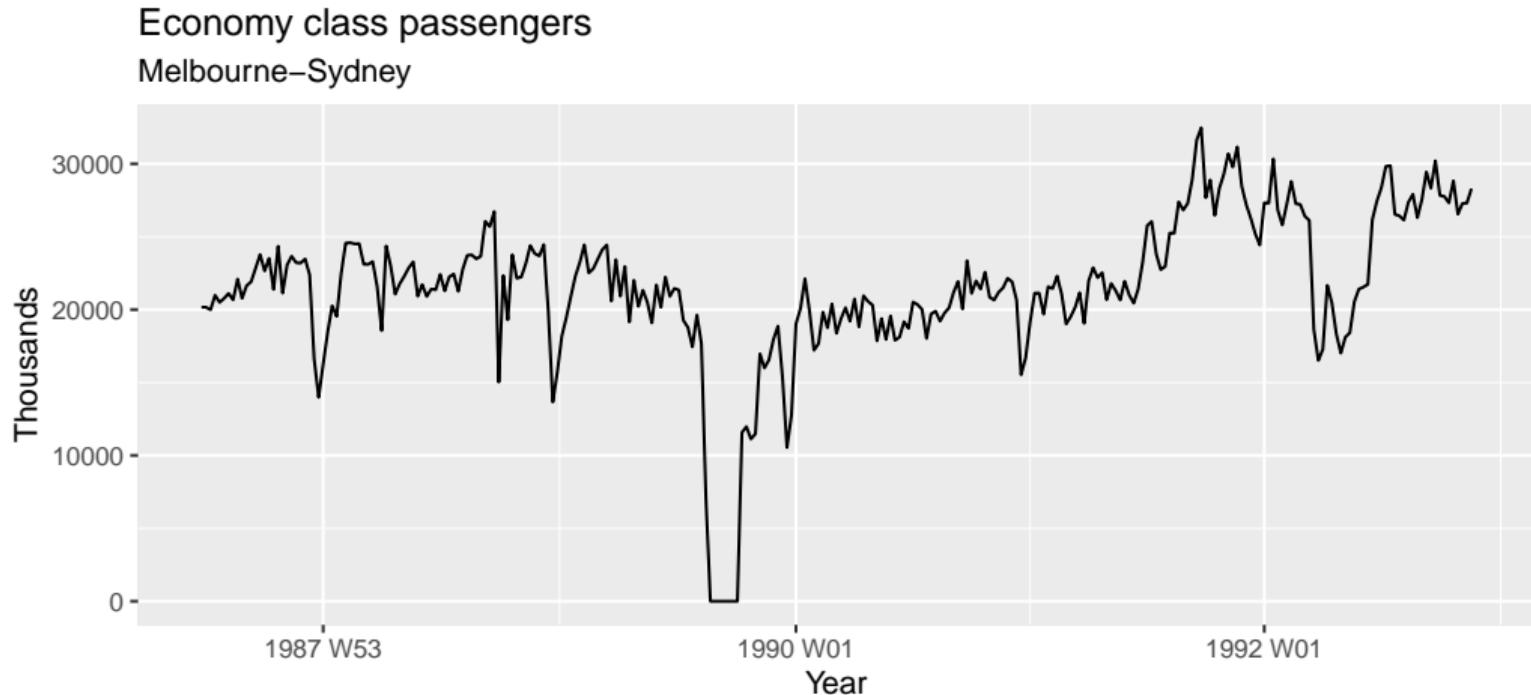
Switch to evaluation slides.

Then do covid

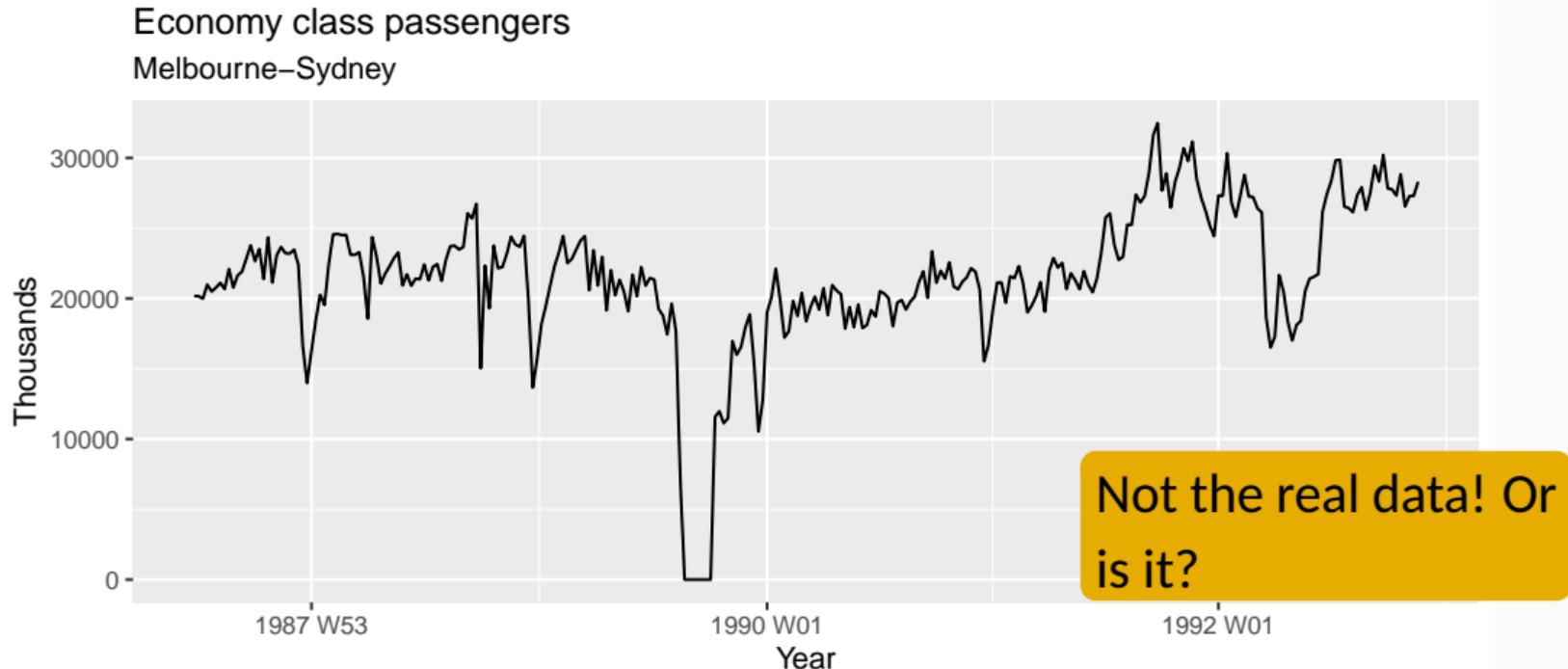
# CASE STUDY: Airline



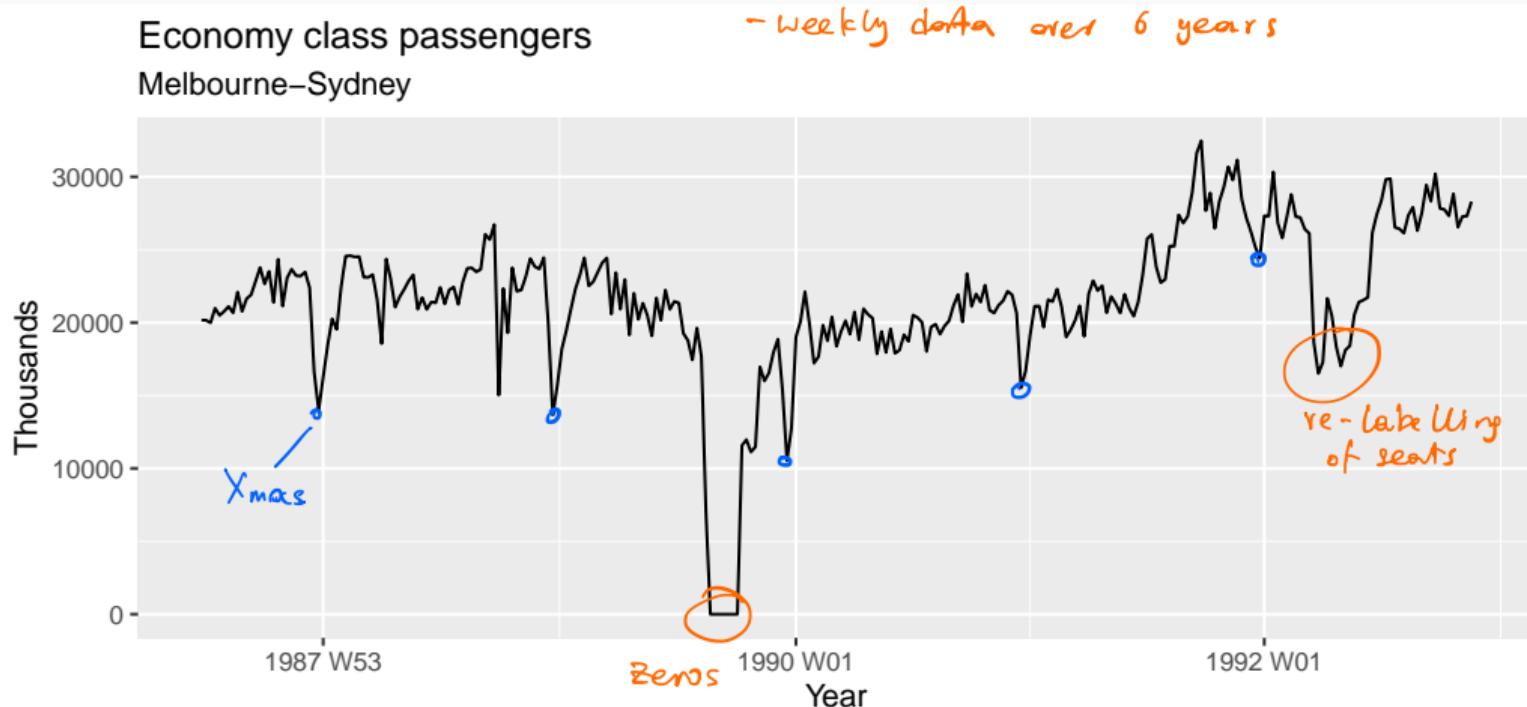
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# CASE STUDY: Airline



- special events (F1, AFL, etc)
- advertising campaigns
- non-syndicated school holidays
- competition behaviour

# CASE STUDY: Airline

**Problem:** how to forecast passenger traffic on major routes?

## Additional information

- They can provide a large amount of data on previous routes.
- Traffic is affected by school holidays, special events such as the Grand Prix, advertising campaigns, competition behaviour, etc.
- They have a highly capable team of people who are able to do most of the computing.