

# ETC3550/ETC5550 Applied forecasting

## Week 3: Time series decomposition

[af.numbat.space](http://af.numbat.space)



# Your turn

- 1 Produce an STL decomposition as follows

```
us_construction <- us_employment |>
  filter(Title == "Construction", year(Month) > 1980)
dcmp <- us_construction |>
  model(stl = STL(Employed ~ trend(window = 9) + season(window = 11)))
dcmp |> components() |> autoplot()
```

- 2 What happens as you change the values of the two window arguments?
- 3 How does the seasonal shape change over time?  
*[Hint: Try plotting the seasonal component using gg\_season.]*
- 4 Can you produce a plausible seasonally adjusted series?  
*[Hint: season\_adjust is returned by components().]*

# The ABS stuff-up

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## Treasurer Joe Hockey calls for answers over Australian Bureau of Statistics jobs data


By [Michael Vincent](#) and [Simon Frazer](#)  
Updated 9 Oct 2014, 12:17pm

**Federal Treasurer Joe Hockey says he wants answers to the problems the Australian Bureau of Statistics (ABS) has had with unemployment figures.**

Mr Hockey, who is in the US to discuss Australia's G20 agenda, said last month's unemployment figures were "extraordinary".


The rate was 6.1 per cent after jumping to a 12-year high of 6.4 per cent the previous month.

The ABS has now taken the rare step of abandoning seasonal adjustment for its latest employment data.




**PHOTO:** Joe Hockey says he is unhappy with the volatility of ABS unemployment figures. (AAP: Alan Porritt)

# The ABS stuff-up

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## ABS abandons seasonal adjustment for latest jobs data

By business reporter [Michael Janda](#)  
Updated 8 Oct 2014, 4:19pm

**The Australian Bureau of Statistics is taking the rare step of abandoning seasonal adjustment for its latest employment data.**

The ABS uses seasonal adjustment, based on historical experience, to account for the normal variation between hiring and firing patterns between different months.

However, after a winter where the seasonally adjusted unemployment rate swung wildly from 6.1 to 6.4 and back to 6.1 per cent, [the bureau released a statement](#) saying it will not adjust the original figure for September for seasonal factors.

It will also reset the seasonal adjustment for July and August to one, meaning that these months will

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**VIDEO:** Westpac chief economist Bill Evans discusses the ABS jobs data changes (ABC News)

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**RELATED STORY:** Unemployment surges to 12-year high at 6.4 pc

**MAP:** Australia

# The ABS stuff-up

## ABS jobs and unemployment figures – key questions answered by an expert

A professor of statistics at Monash University explains exactly what is seasonal adjustment, why it matters and what went wrong in the July and August figures



📷 School leavers come on to the jobs market at the same time, causing a seasonal fluctuation. Photograph: Brian Snyder/Reuters

The Australian Bureau of Statistics has [retracted its seasonally adjusted employment data for July and August](#), which recorded huge swings in the jobless rate. The ABS is also planning to review the methods it uses for seasonal adjustment to ensure its figures are as accurate as possible. Rob Hyndman, a professor of statistics at Monash University and member of the bureau's

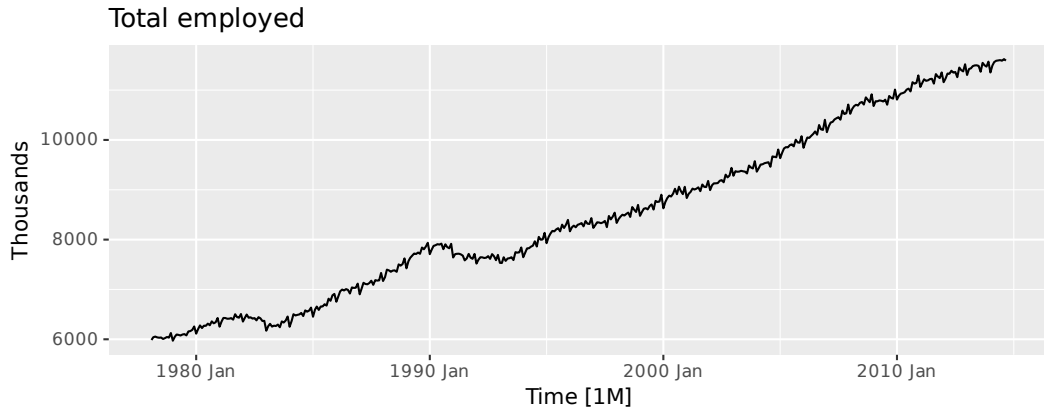
# The ABS stuff-up

```
employed
```

```
# A tsibble: 440 x 4 [1M]
  Time Month Year Employed
  <tmth> <ord> <dbl>     <dbl>
1 1978 Feb Feb      1978      5986.
2 1978 Mar Mar      1978      6041.
3 1978 Apr Apr      1978      6054.
4 1978 May May      1978      6038.
5 1978 Jun Jun      1978      6031.
6 1978 Jul Jul      1978      6036.
7 1978 Aug Aug      1978      6005.
8 1978 Sep Sep      1978      6024.
9 1978 Oct Oct      1978      6046.
10 1978 Nov Nov      1978      6034.
# i 430 more rows
```

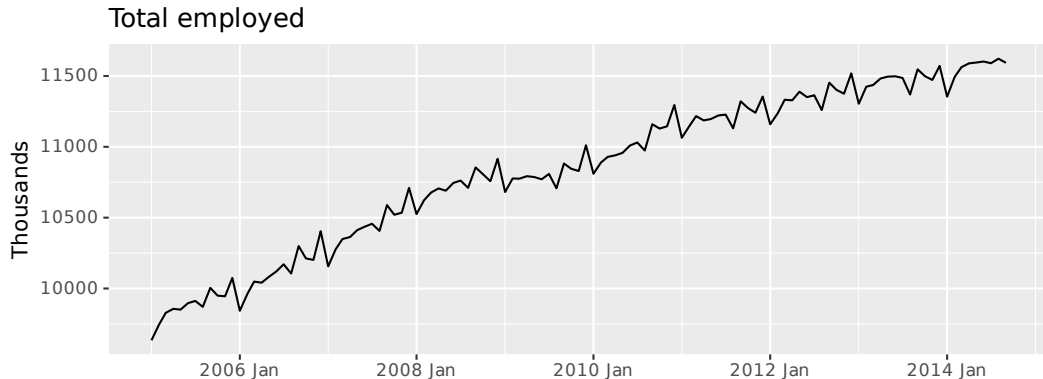
# The ABS stuff-up

```
employed |>  
  autoplot(Employed) +  
  labs(title = "Total employed", y = "Thousands")
```



# The ABS stuff-up

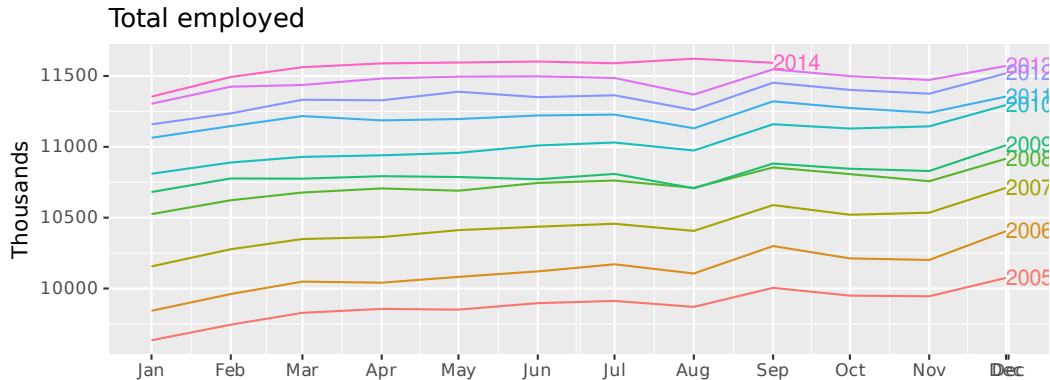
```
employed |>  
  filter(Year >= 2005) |>  
  autoplot(Employed) +  
  labs(title = "Total employed", y = "Thousands")
```





# The ABS stuff-up

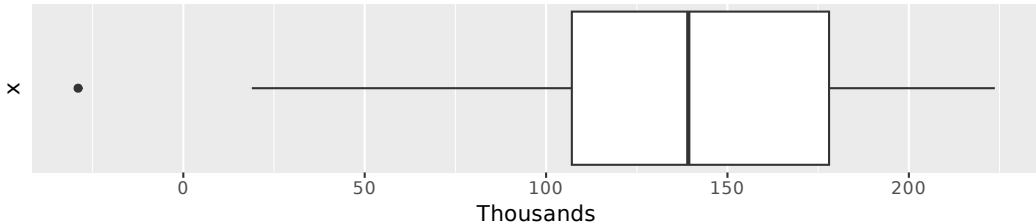
```
employed |>  
  filter(Year >= 2005) |>  
  gg_season(Employed, labels = "right") +  
  labs(title = "Total employed", y = "Thousands")
```



# The ABS stuff-up

```
employed |>
  mutate(diff = difference(Employed)) |>
  filter(Month == "Sep") |>
  ggplot(aes(y = diff, x = 1)) +
  geom_boxplot() +
  coord_flip() +
  labs(title = "Sep - Aug: total employed", y = "Thousands") +
  scale_x_continuous(breaks = NULL, labels = NULL)
```

Sep - Aug: total employed

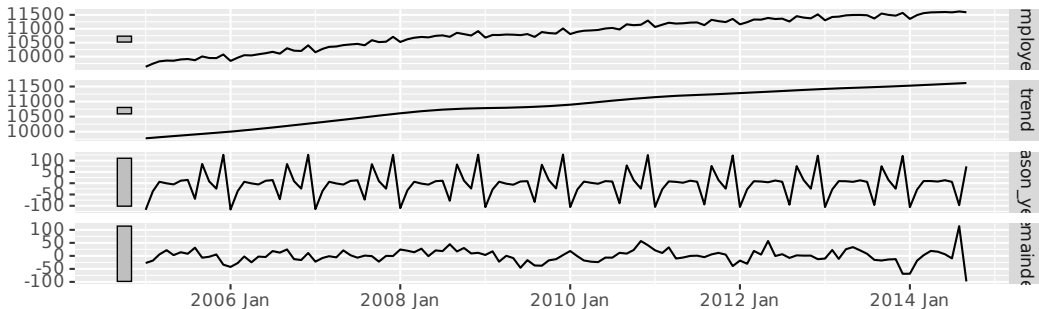


# The ABS stuff-up

```
dcmp <- employed |>  
  filter(Year >= 2005) |>  
  model(stl = STL(Employed ~ season(window = 11), robust = TRUE))  
components(dcmp) |> autoplot()
```

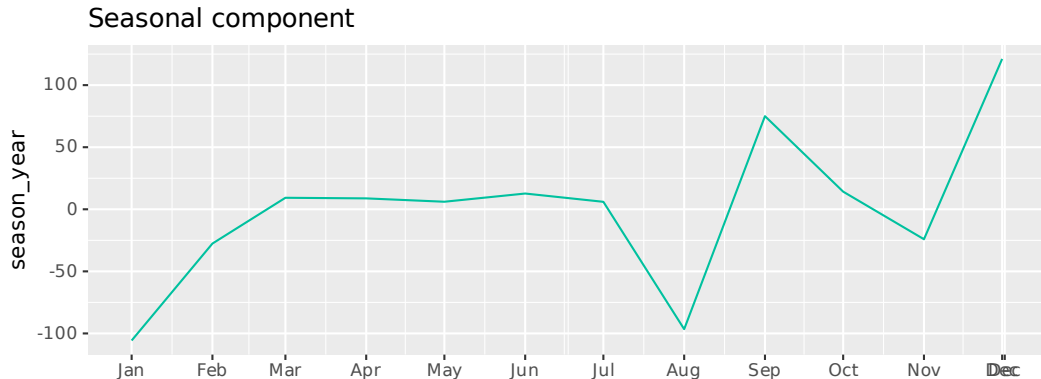
## STL decomposition

Employed = trend + season\_year + remainder



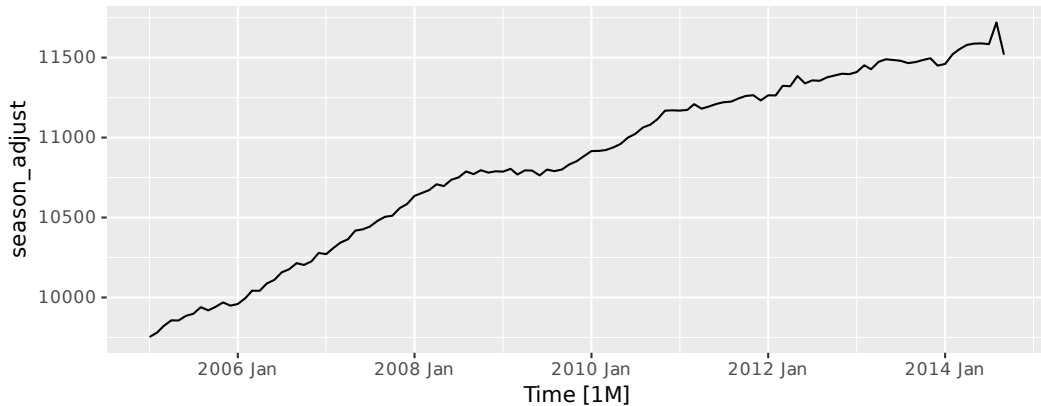
# The ABS stuff-up

```
components(dcmp) |>  
  filter(year(Time) == 2013) |>  
  gg_season(season_year) +  
  labs(title = "Seasonal component") + guides(colour = "none")
```



# The ABS stuff-up

```
components(dcmp) |>  
  as_tsibble() |>  
  autoplot(season_adjust)
```



# The ABS stuff-up

- August 2014 employment numbers higher than expected.
- Supplementary survey usually conducted in August for employed people.
- Most likely, some employed people were claiming to be unemployed in August to avoid supplementary questions.
- Supplementary survey not run in 2014, so no motivation to lie about employment.
- In previous years, seasonal adjustment fixed the problem.
- The ABS has now adopted a new method to avoid the bias.