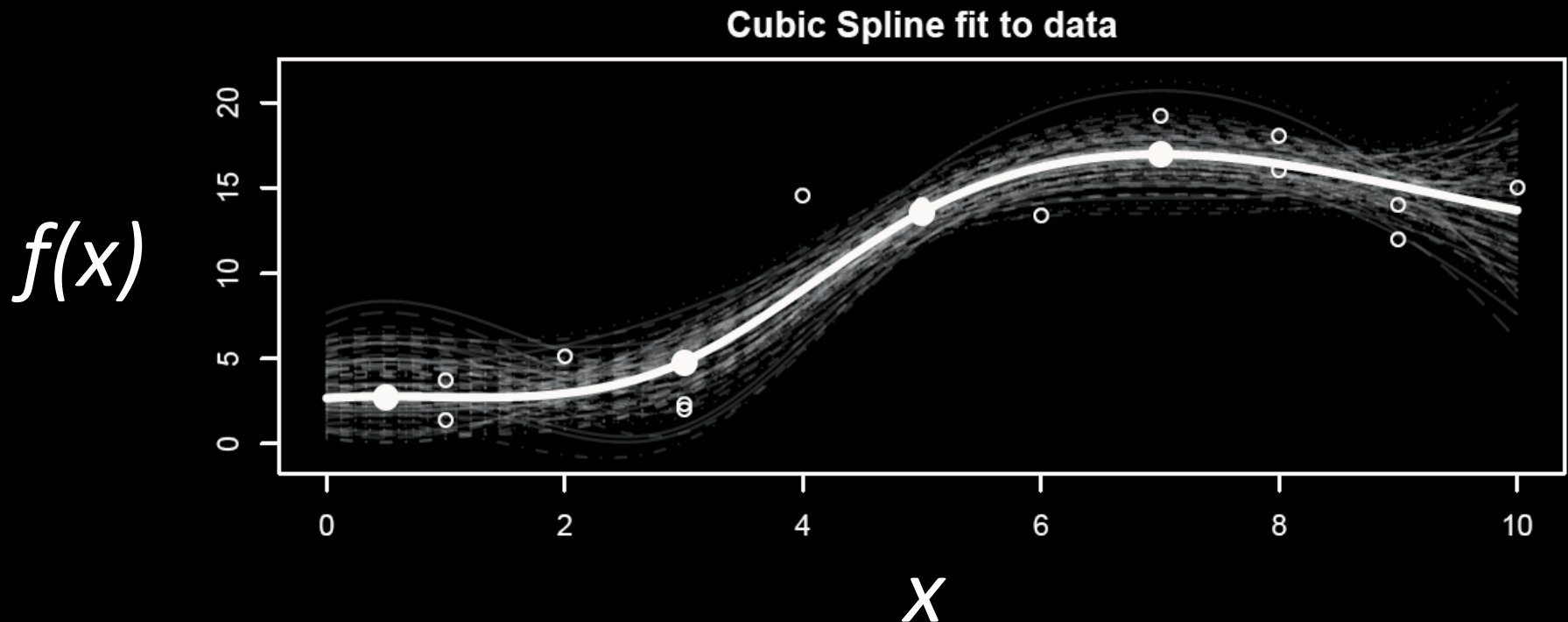


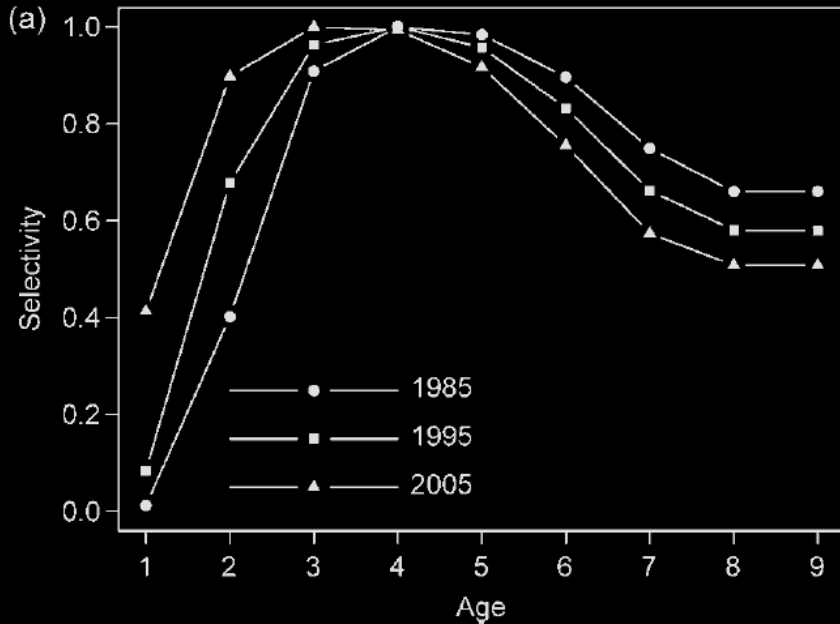
Splines demo?

Describe complex response

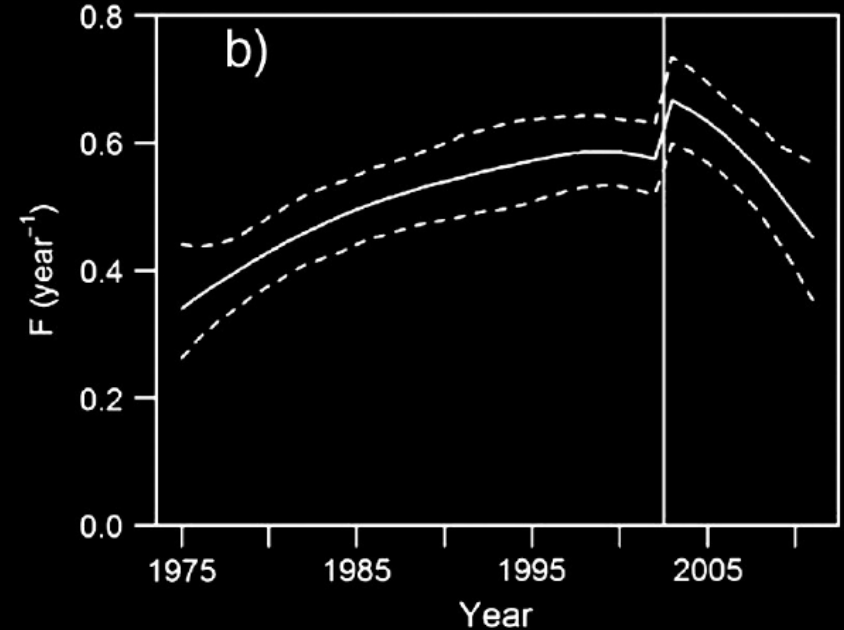
- *Smooth function*
- *Parameter reduction*
- *gam & gamm*



Describe complex response



Aarts & Poos 2009 ICES JMS



van der Hammen *et al.* 2013

My workflow

- *Generate the B-spline basis matrix for a polynomial spline in R*
- *R calls `splineDesign`: evaluates the design matrix for the B-splines defined by knots at the values in x*
- *Glue to the end of .dat file*

My workflow

Matrix with 5 df for x <- 1:8

```
1.00 0.36 0.08 0.00 0.00 0.00 0.00 0.00
0.00 0.53 0.57 0.37 0.16 0.05 0.01 0.00
0.00 0.10 0.30 0.47 0.47 0.30 0.10 0.00
0.00 0.01 0.05 0.16 0.37 0.57 0.53 0.00
0.00 0.00 0.00 0.00 0.00 0.08 0.36 1.00
```

My workflow

In ADMB:



results in vector with estimates at x

Works, but is cumbersome (rerunning model with different df means recreating .dat file)

The ADMB way

Union-wages example does roughly the same thing (create design matrix in R and then read it from dat file)

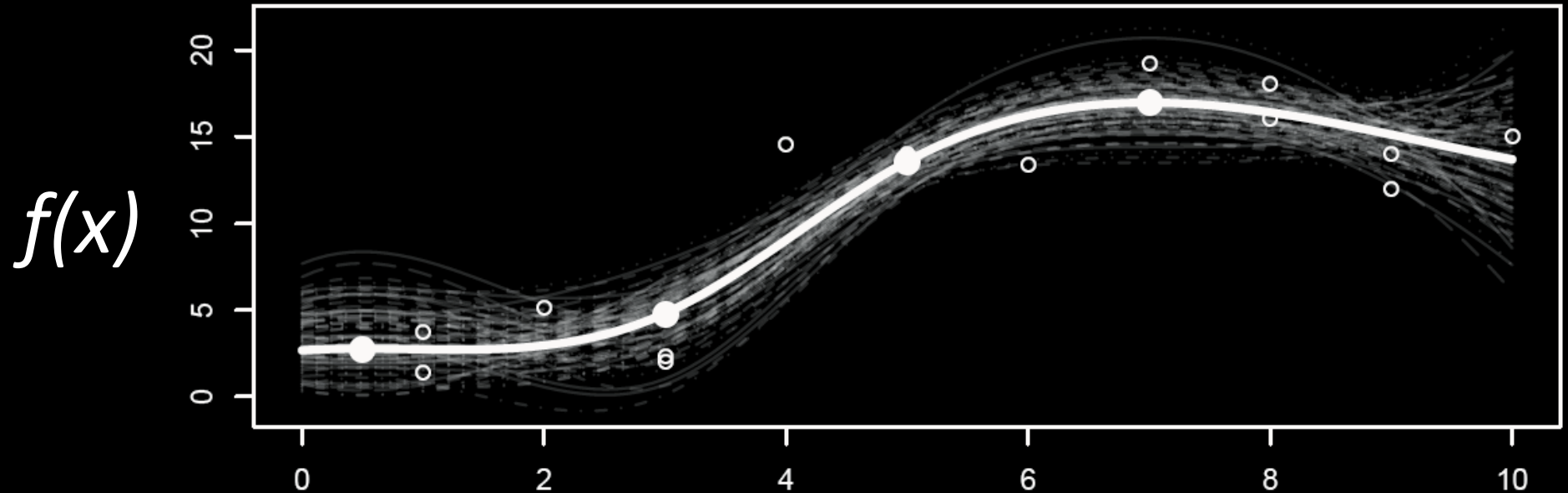
Alternative is to use

```
vcubic_spline_function qs(nodesX, log_sel1, 0, 0);
```

value of first order derivative in first and last node

The ADMB way

Cubic Spline fit to data



Do we really have to assume first order derivatives?

x