Model Fitting: same setting, but more quantile levels are included

1. Fit the entire dataset from ages 0 to 20 with the QR model

$$Q_\tau(BMI) = G_\tau(age)$$

2. Fit with cubic spline with $Knots = (0.1, 0.25, 0.5, 1.0, 1.5, 2.0, 4.0, 6.0, 8.0, 10.0, 12.0, 14.0, 16.0)$

3. Again, choose quantiles $\tau = (0.02, 0.05, 0.1, 0.25, 0.5, 0.75, 0.85, 0.9, 0.95, 0.98)$

4. The resulting quantile curves are displayed separately in two age frame: ages 0-2.5 and ages 2-18. (See Figure 1-4) Boys and Girls are fitted separately.

5. In the growth charts of ages 2-18, the solid points indicating the age of "zero" acceleration, which I define it as the first time between years 2 an 12 when the velocity curve exceed zero. The velocity curves are simply the first derivatives of the fitted quantile curves see Figures 5 and 6.

6. In the last two pages, the model was fitted to the two cohorts separately to explore the cohort difference. The difference seems quite evident, especially in the upper quantiles. For example, during the infancy, the earlier cohort has faster decrease in BMI after about age 1. So should we combine the two cohorts together?

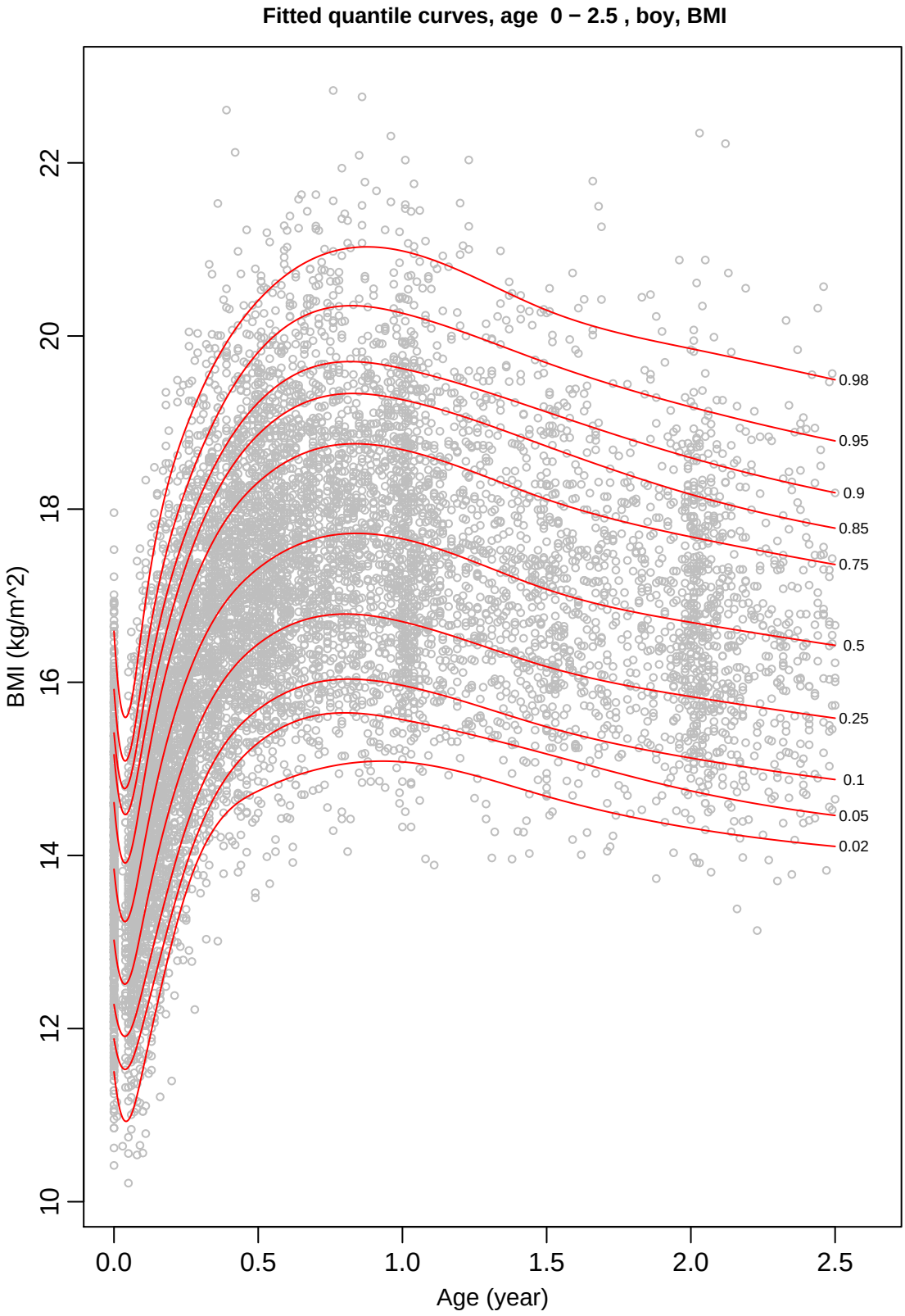

Fitted quantile curves, age 0 − 2.5 , boy, BMI
BMI (kg/m^2)
Age (year)
10
12
14
16
18
20
22
0.0
0.5
1.0
1.5
2.0
2.5
0.98
0.95
0.9
0.85
0.75
0.5
0.25
0.1
0.05
0.02

Figure 1

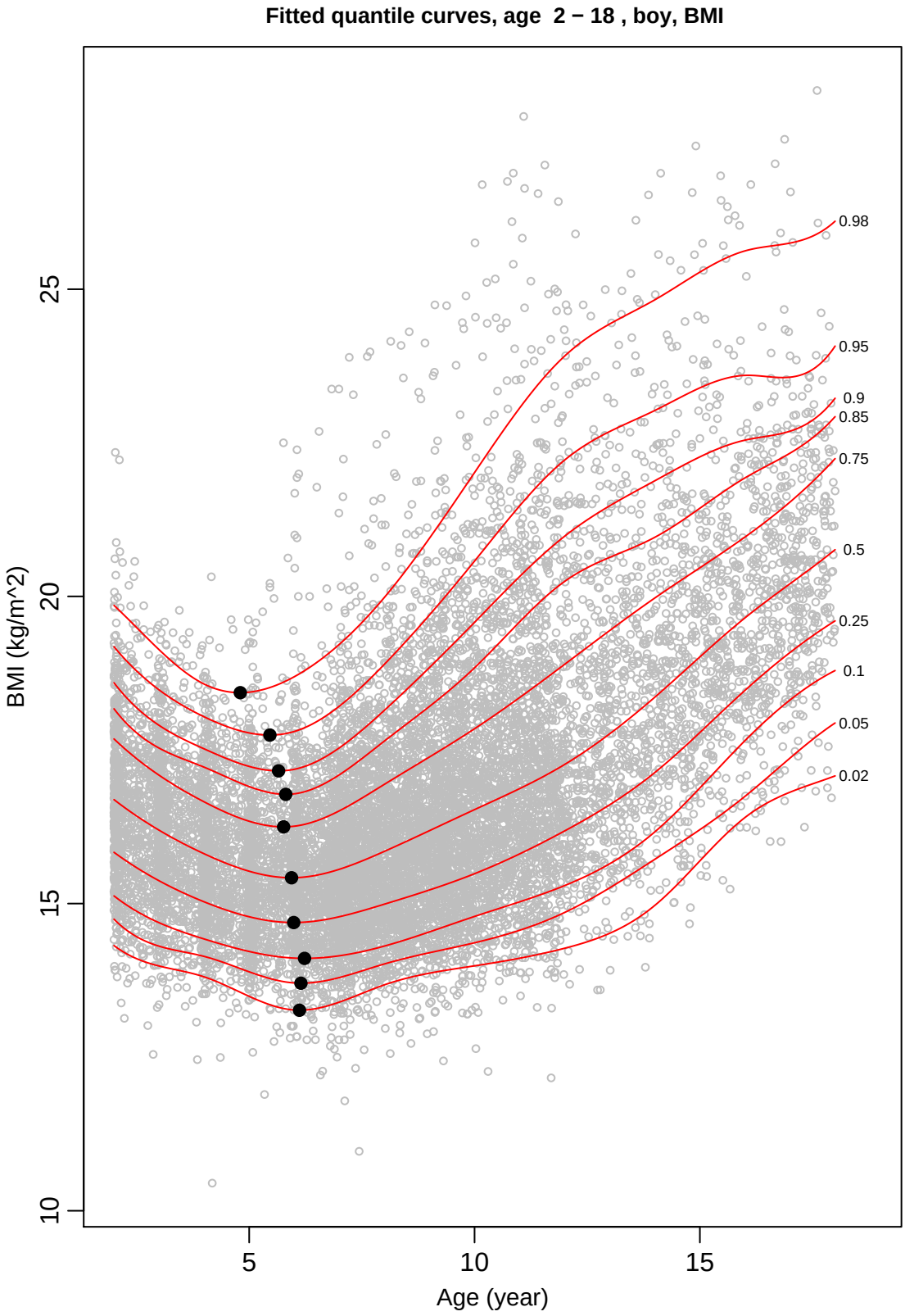

Fitted quantile curves, age 2 − 18 , boy, BMI
BMI (kg/m^2)
10
15
20
25
5
10
15
Age (year)
0.98
0.95
0.9
0.85
0.75
0.5
0.25
0.1
0.05
0.02

Figure 2

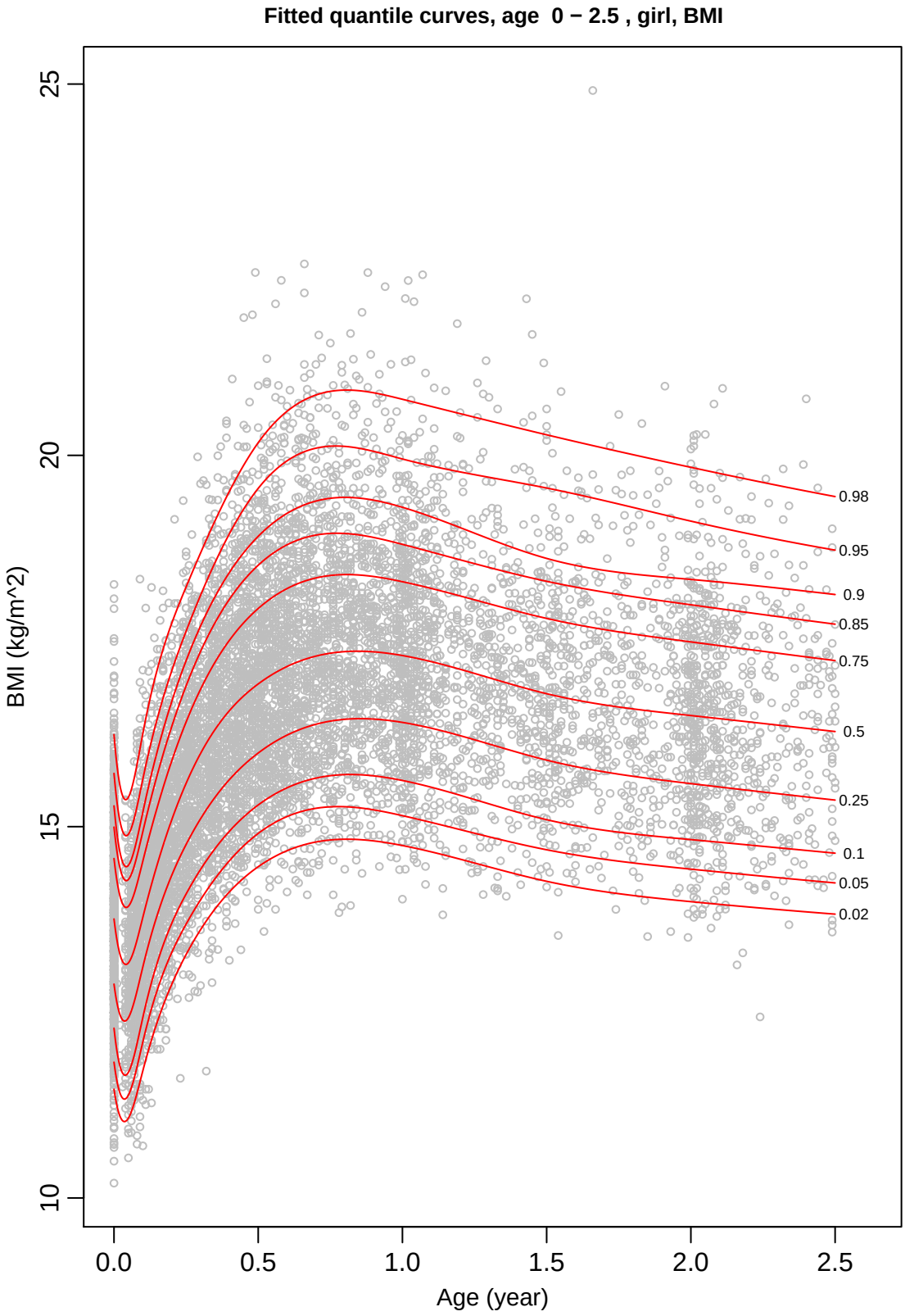

Fitted quantile curves, age 0 − 2.5 , girl, BMI
BMI (kg/m^2)
Age (year)
10
15
20
25
0.0
0.5
1.0
1.5
2.0
2.5
0.98
0.95
0.9
0.85
0.75
0.5
0.25
0.1
0.05
0.02

Figure 3

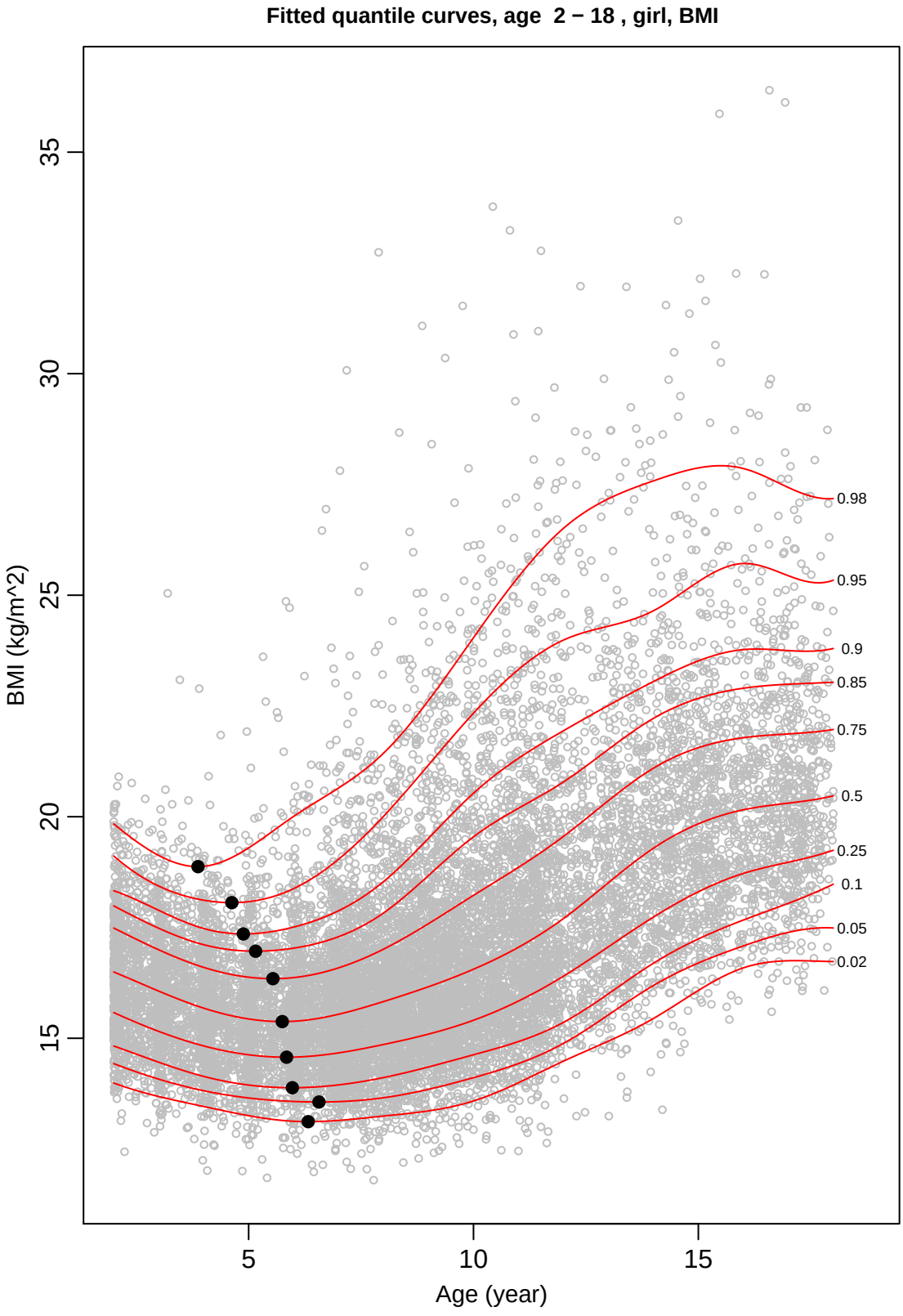

Fitted quantile curves, age 2 − 18 , girl, BMI
BMI (kg/m^2)
15
20
25
30
35
5
10
15
Age (year)
0.98
0.95
0.9
0.85
0.75
0.5
0.25
0.1
0.05
0.02

Figure 4

The "velocity" curves:

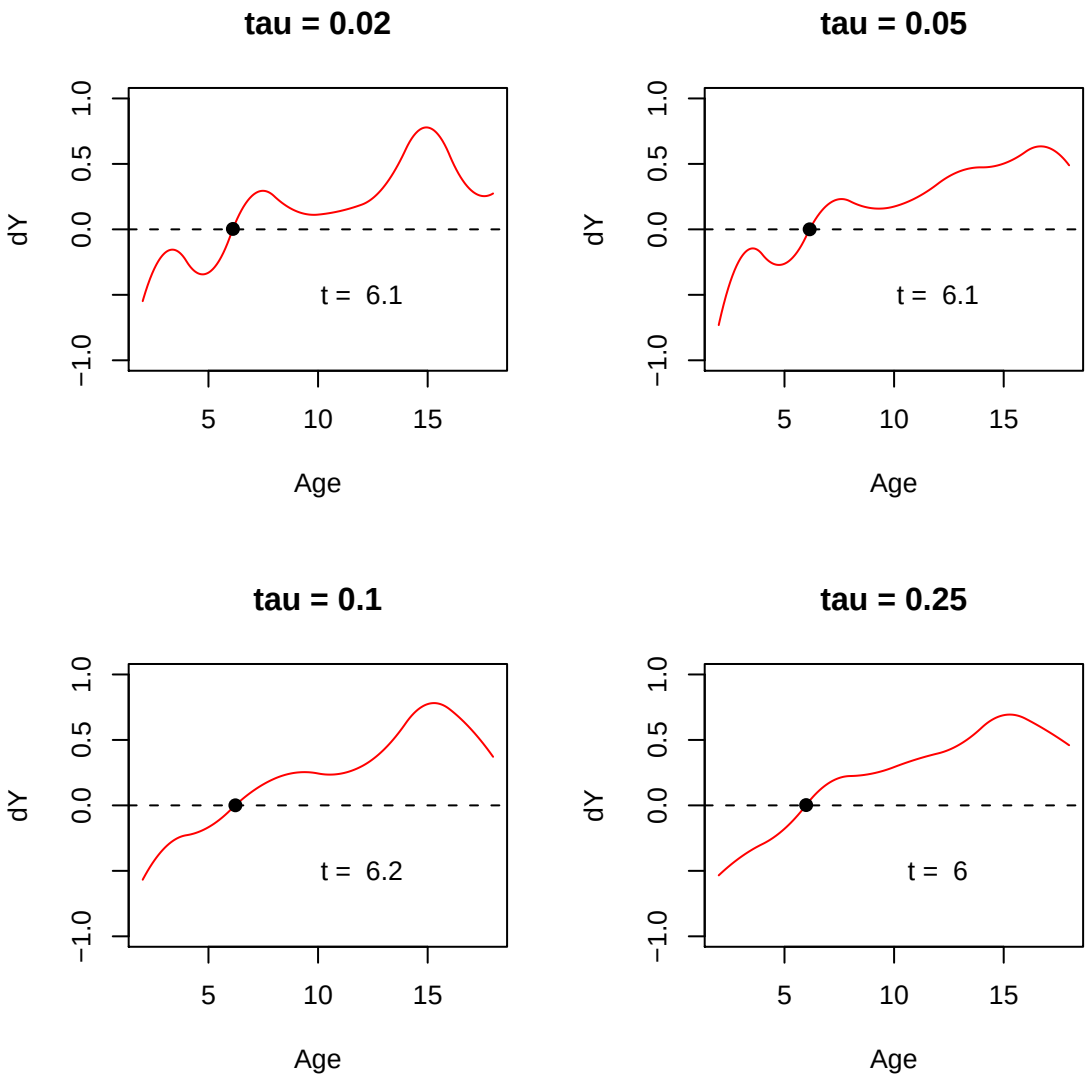


Figure 5: "velocity" curves of boy's BMI between age 2 and 18.

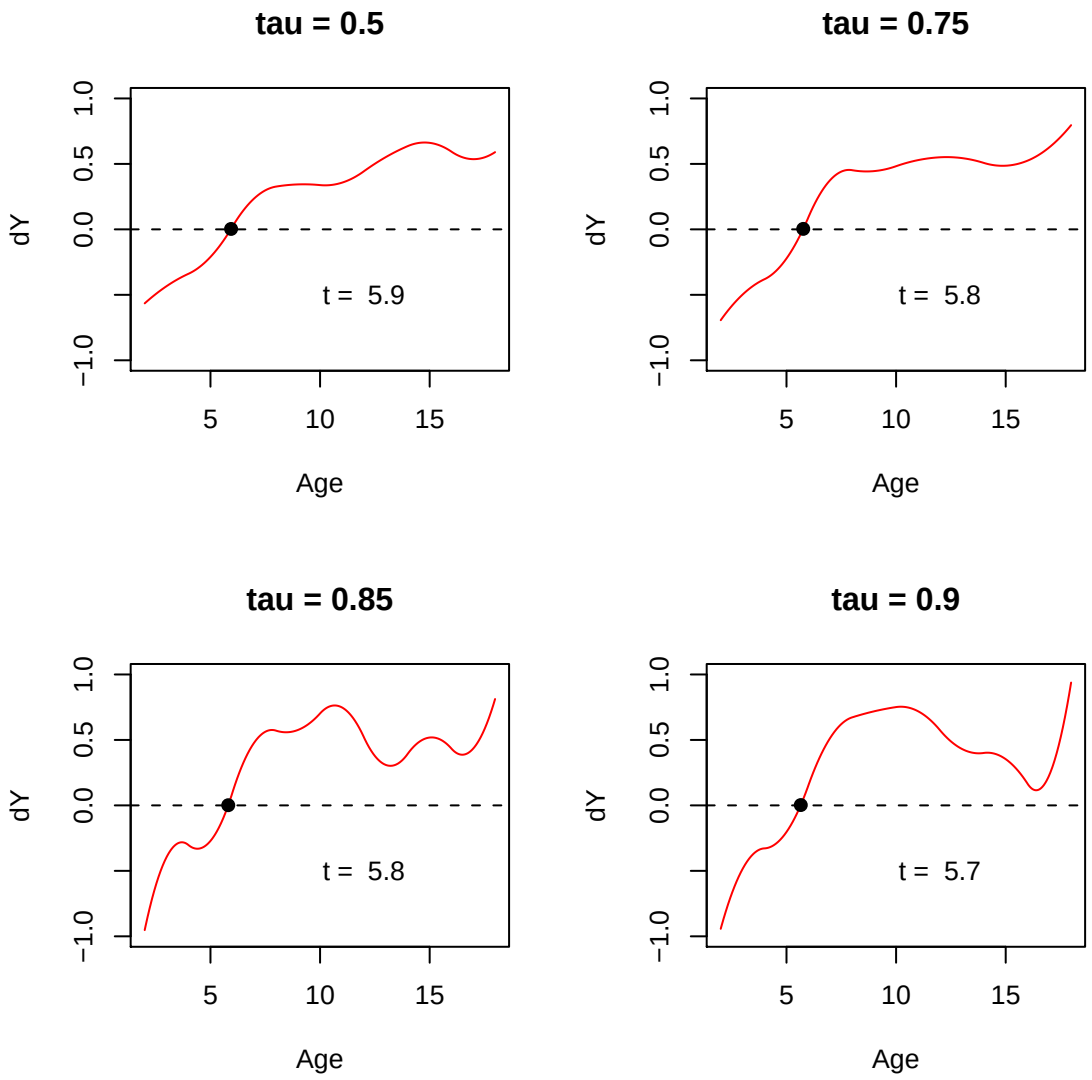


Figure 5: "velocity" curves of boy's BMI between age 2 and 18.

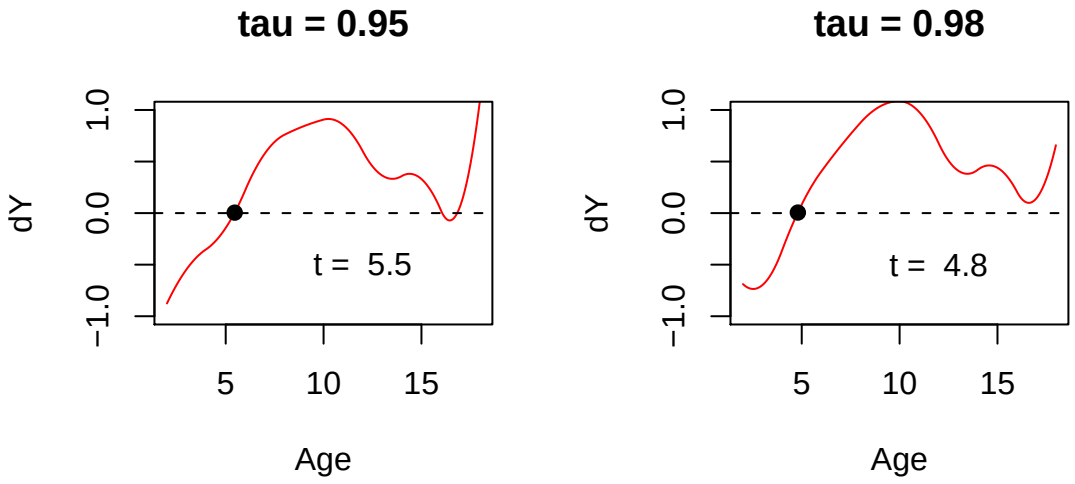


Figure 5: "velocity" curves of boy's BMI between age 2 and 18.

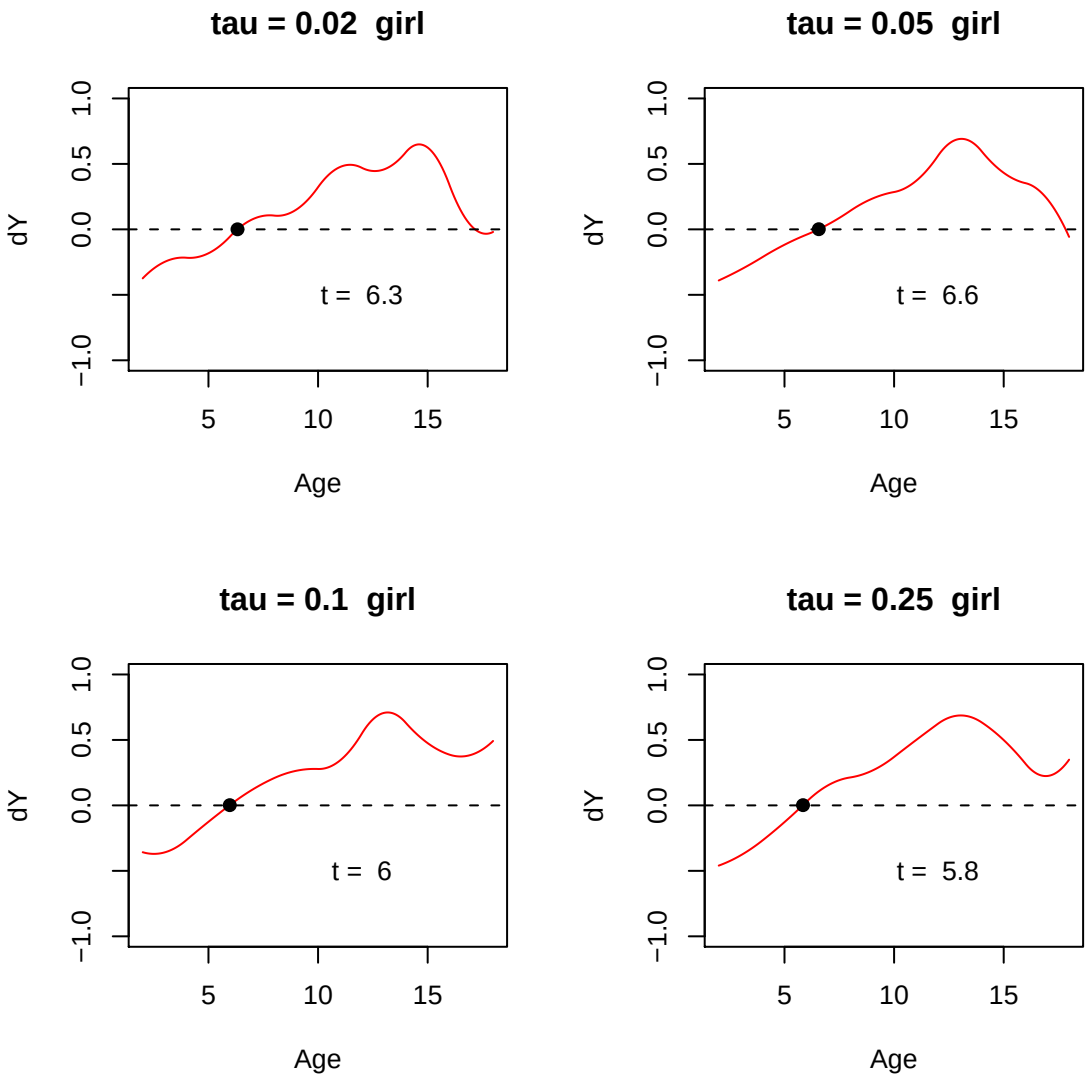


Figure 6: "velocity" curves of girl's BMI between age 2 and 18.

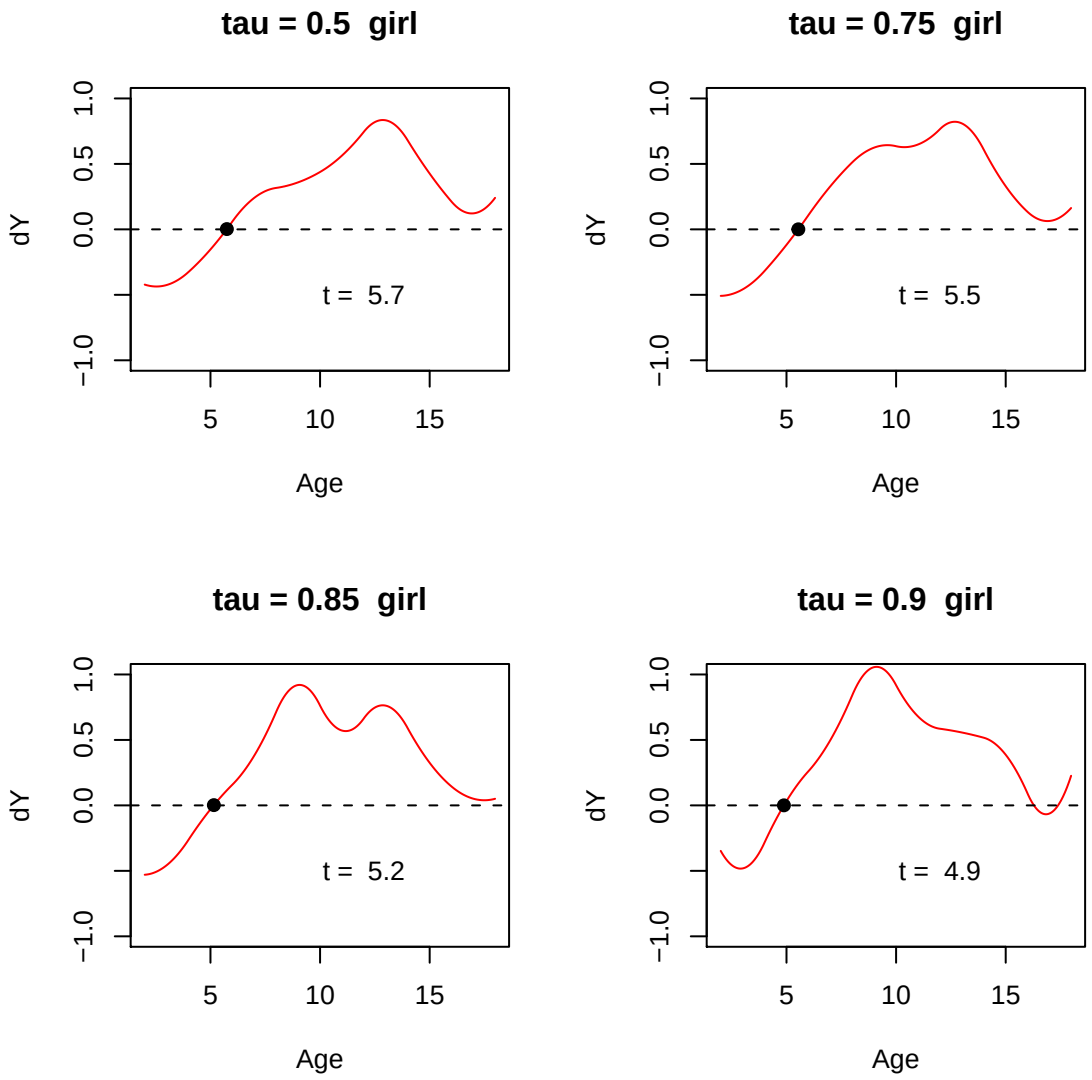


Figure 6: "velocity" curves of girl's BMI between age 2 and 18.

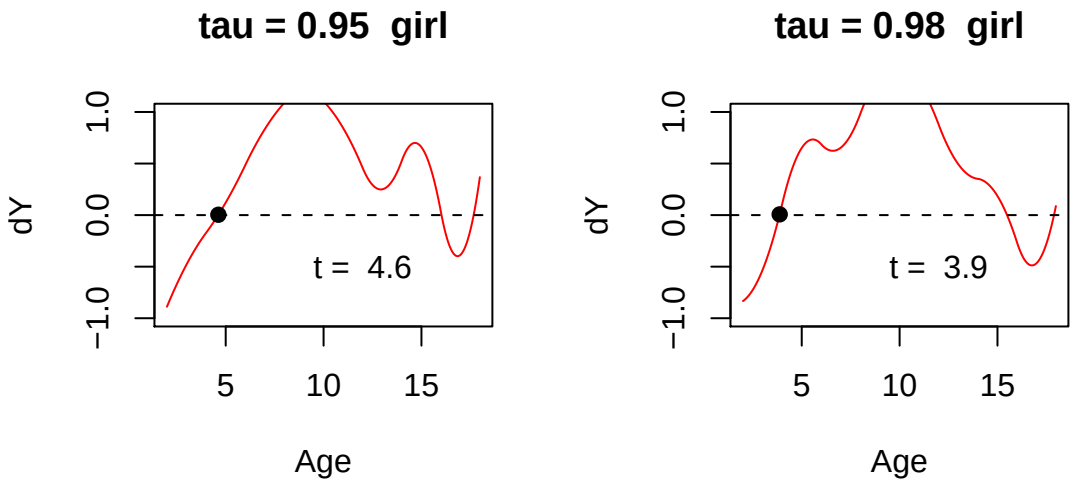
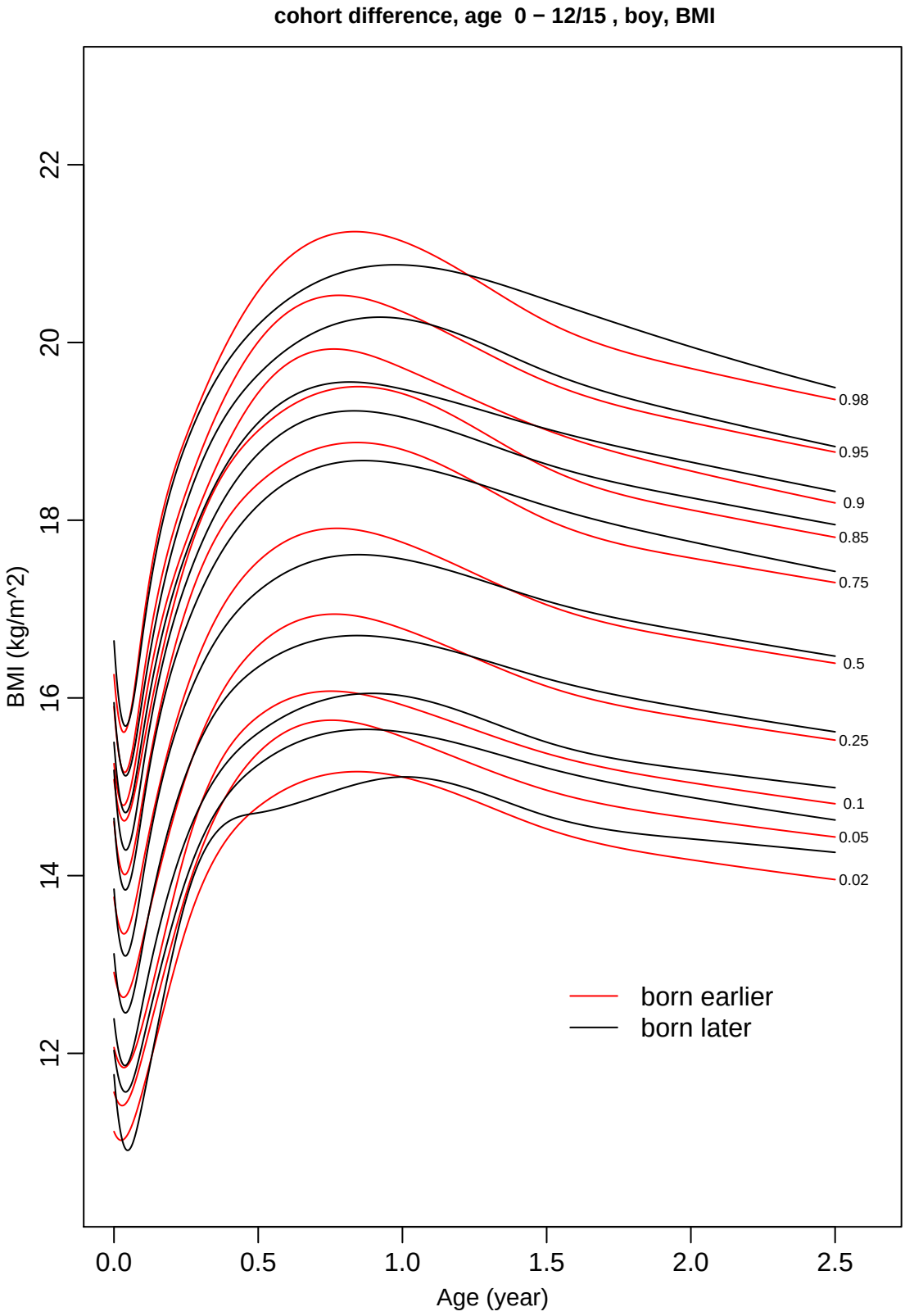
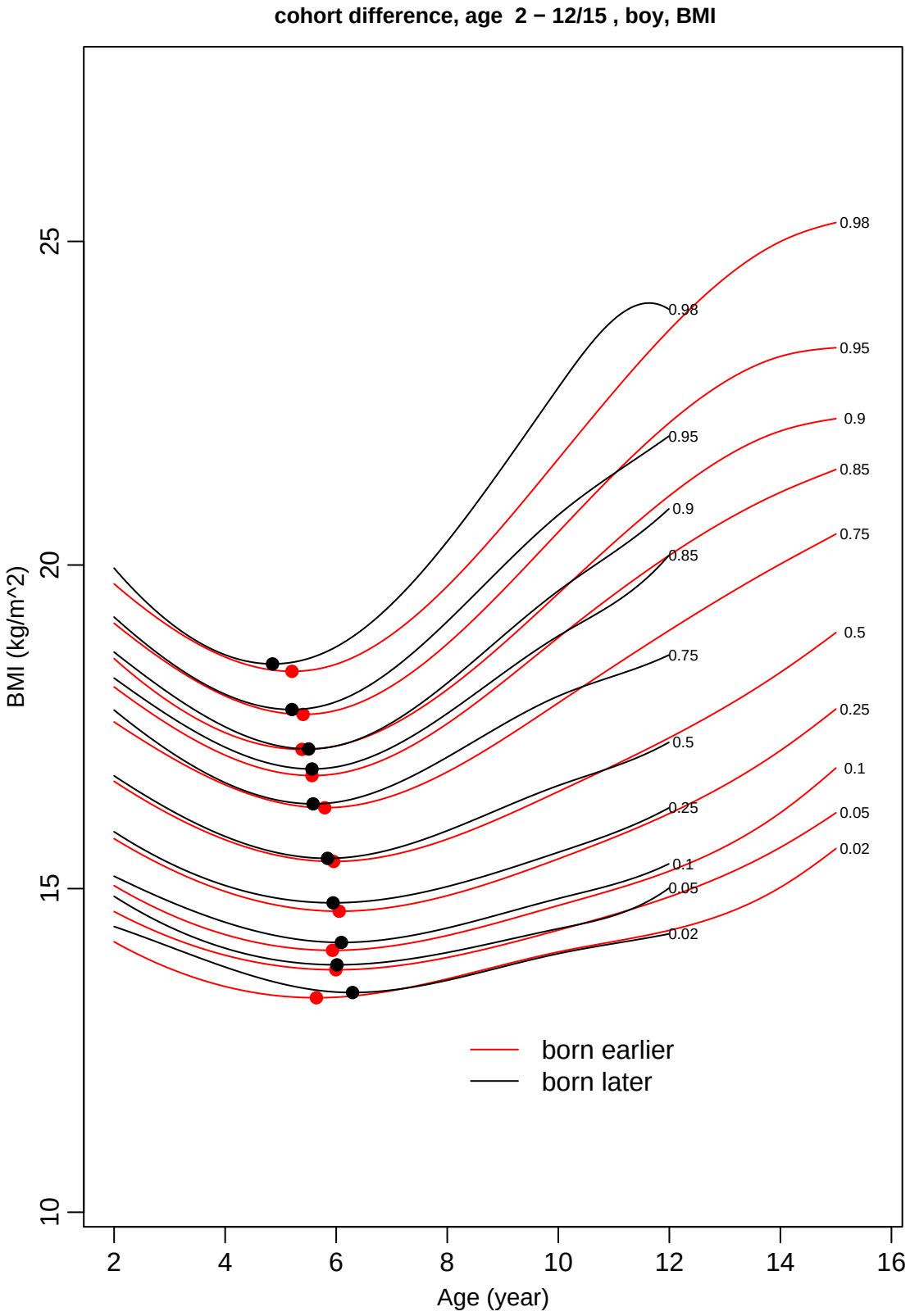


Figure 6: "velocity" curves of girl's BMI between age 2 and 18.



Cohort difference



Cohort difference