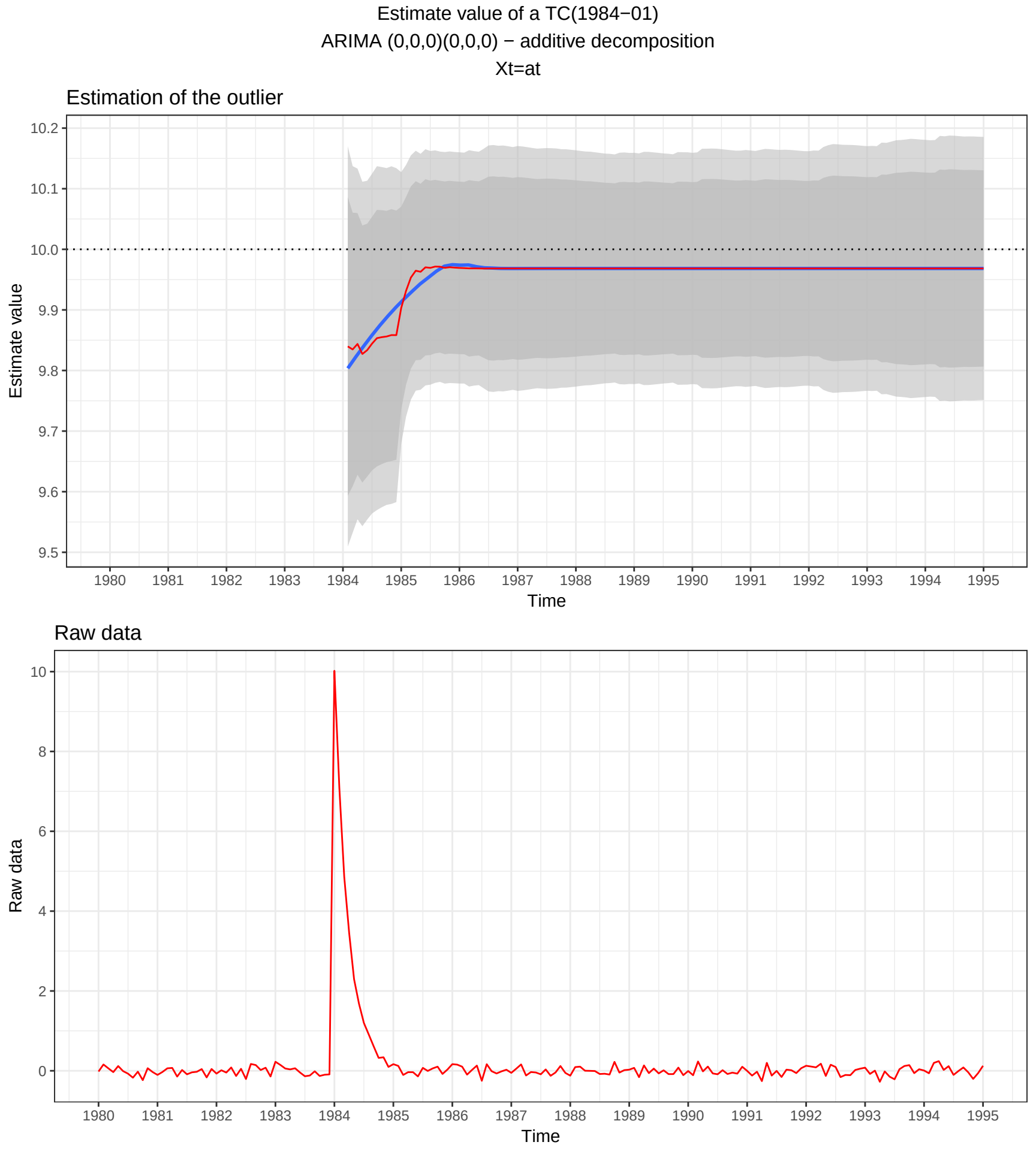
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(0,0,0) − additive decomposition
Xt=at
Estimation of the outlier
Estimate value
10.2
10.1
10.0
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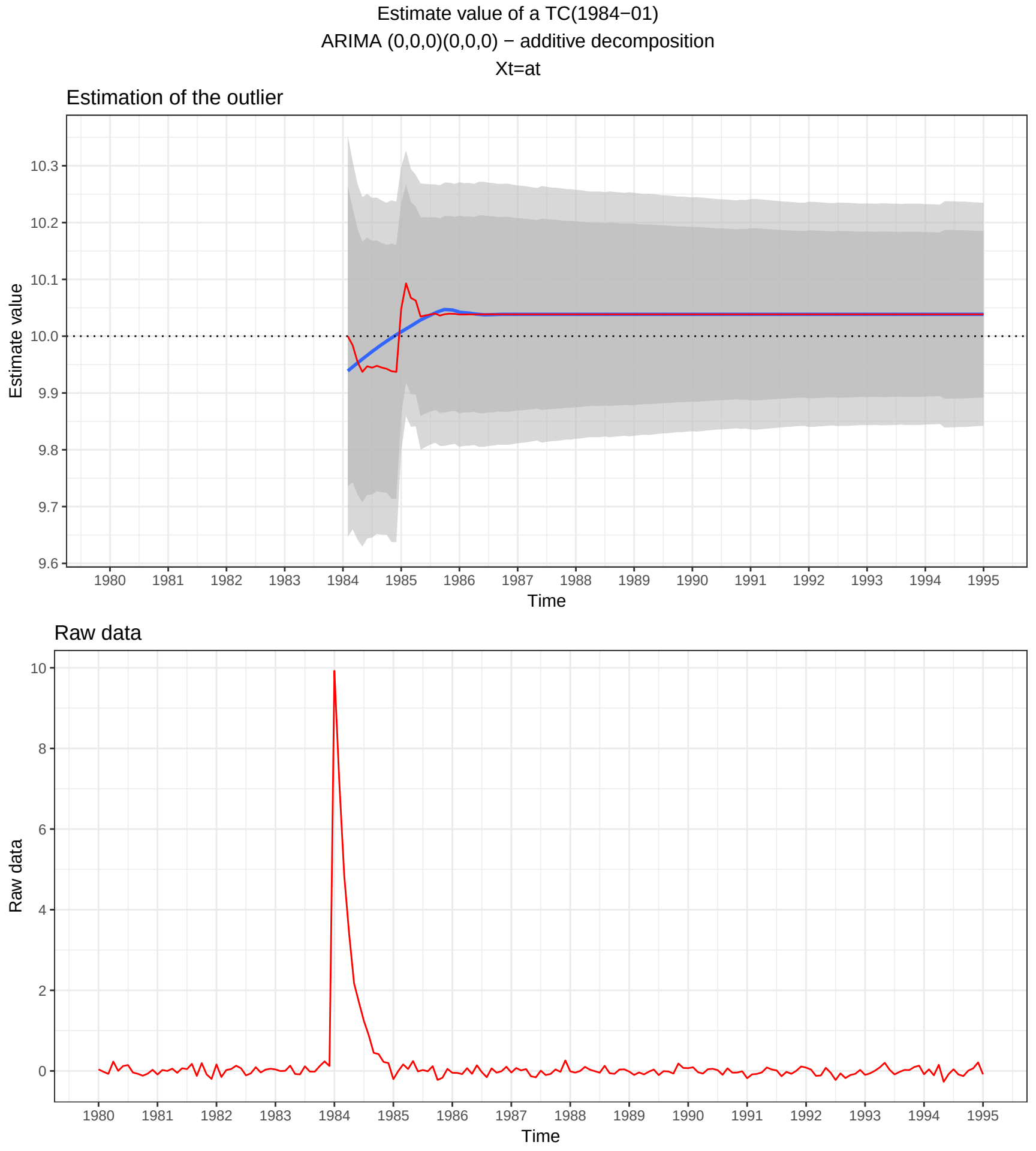
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(0,0,0) − additive decomposition
Xt=at
Estimation of the outlier
Estimate value
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10.0
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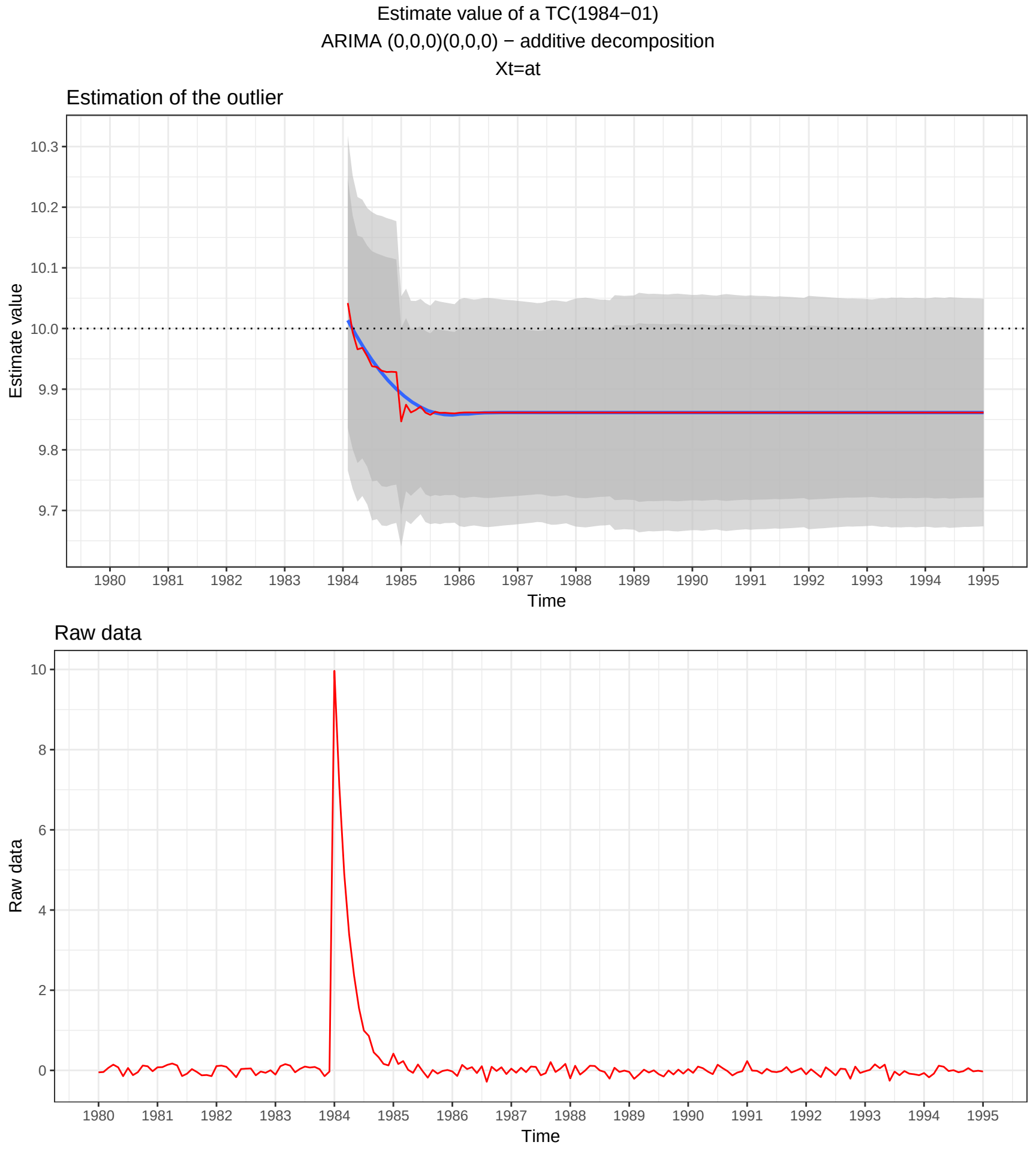
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(0,0,0) − additive decomposition
Xt=at
Estimation of the outlier
Estimate value
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Time
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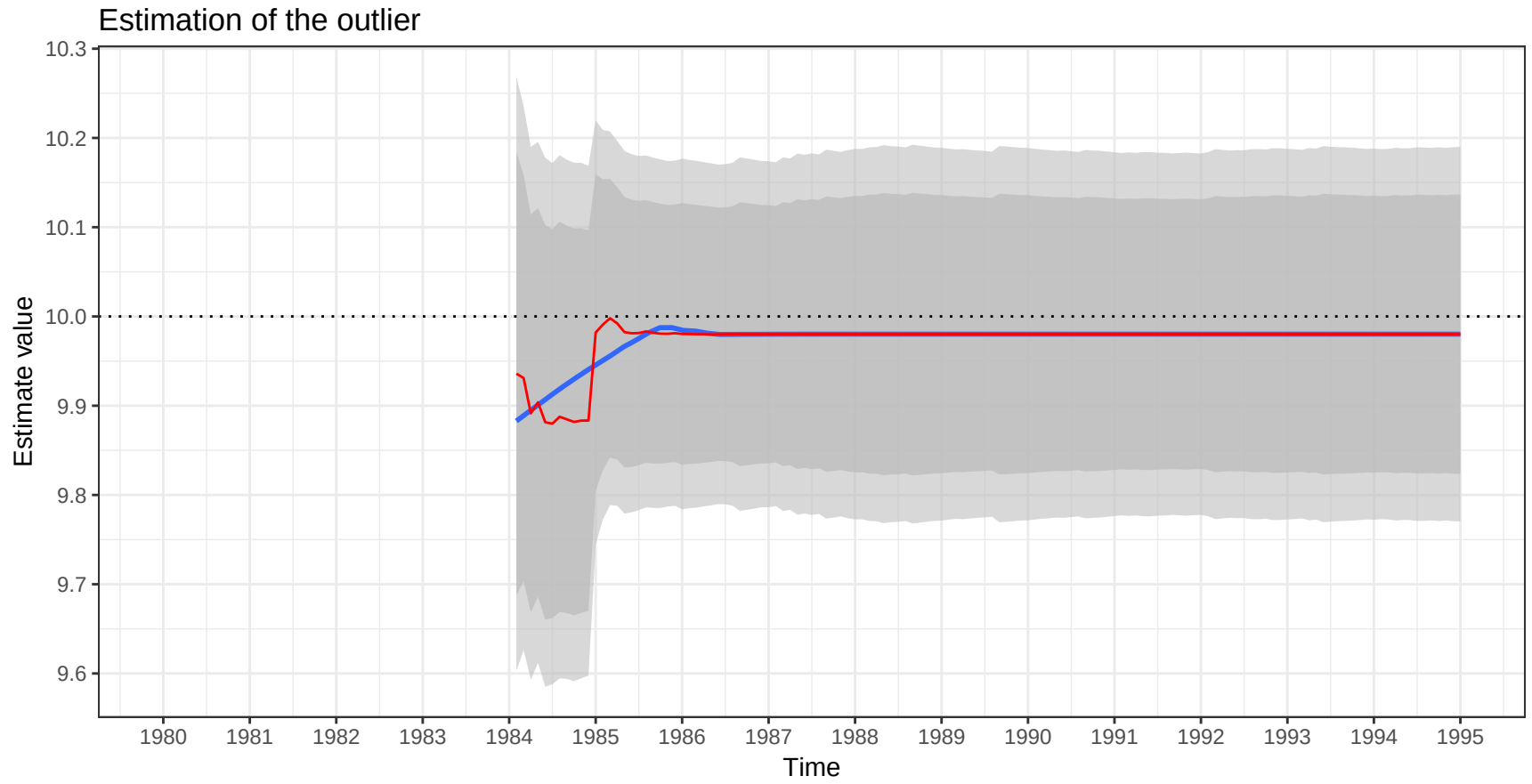
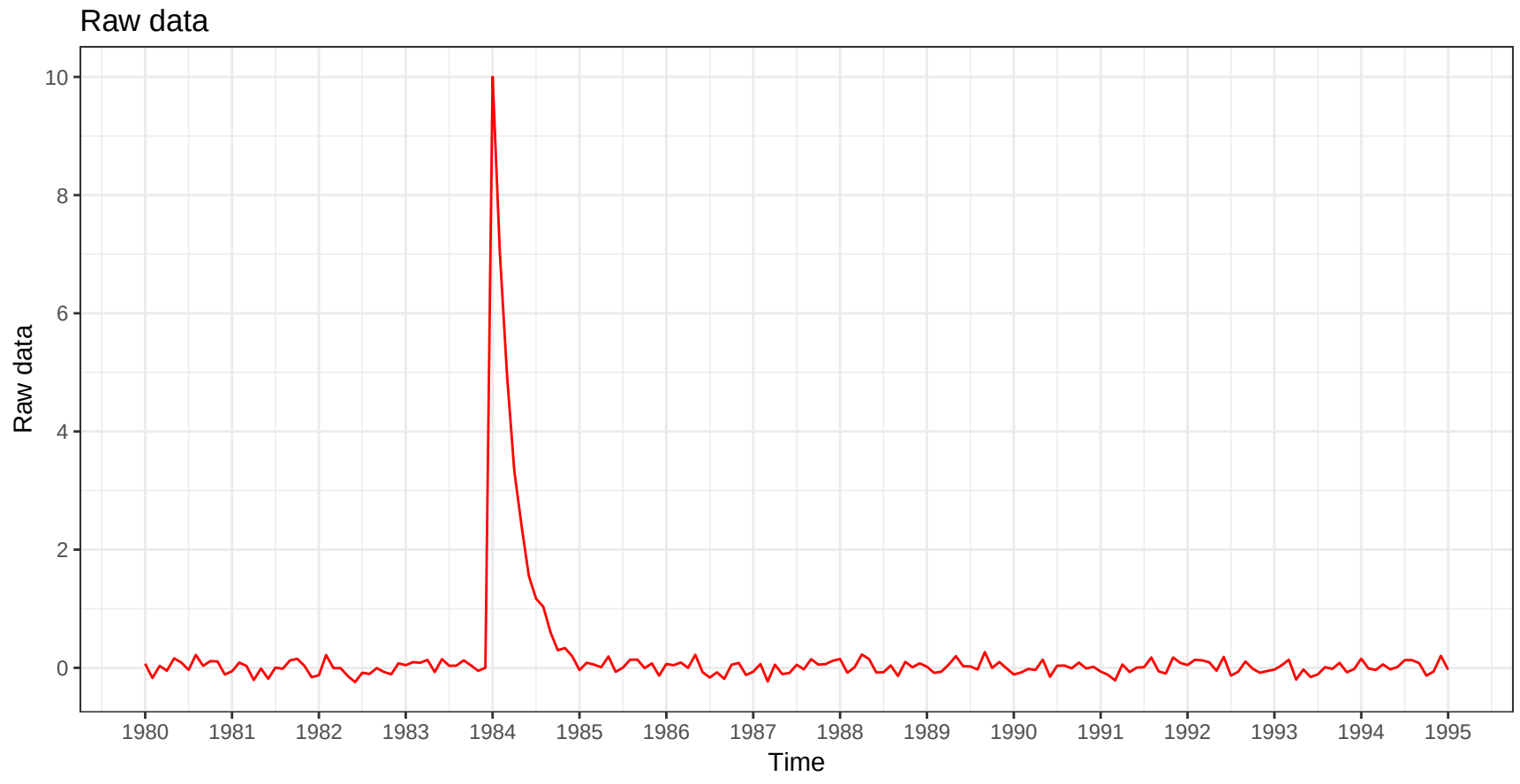
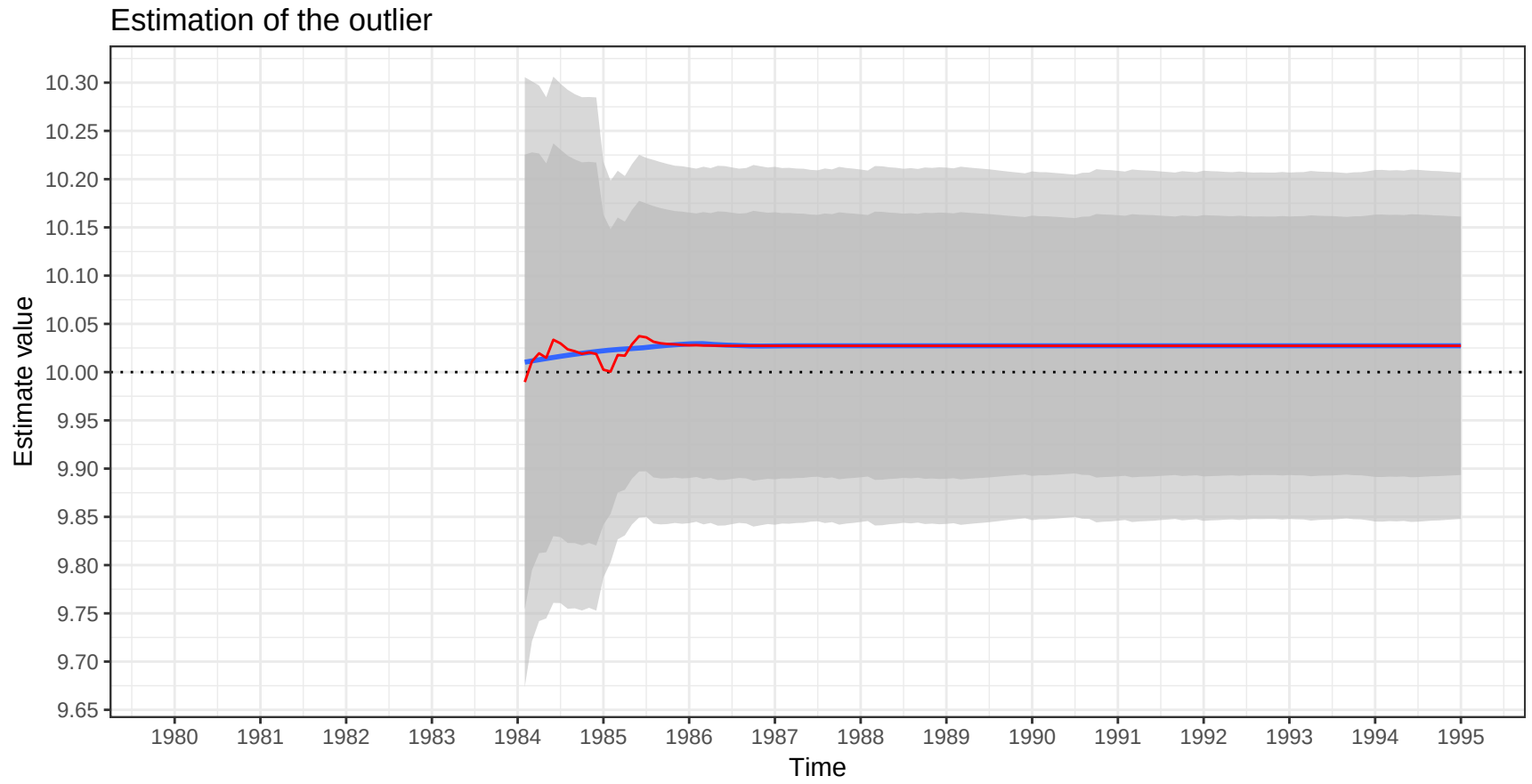
Time

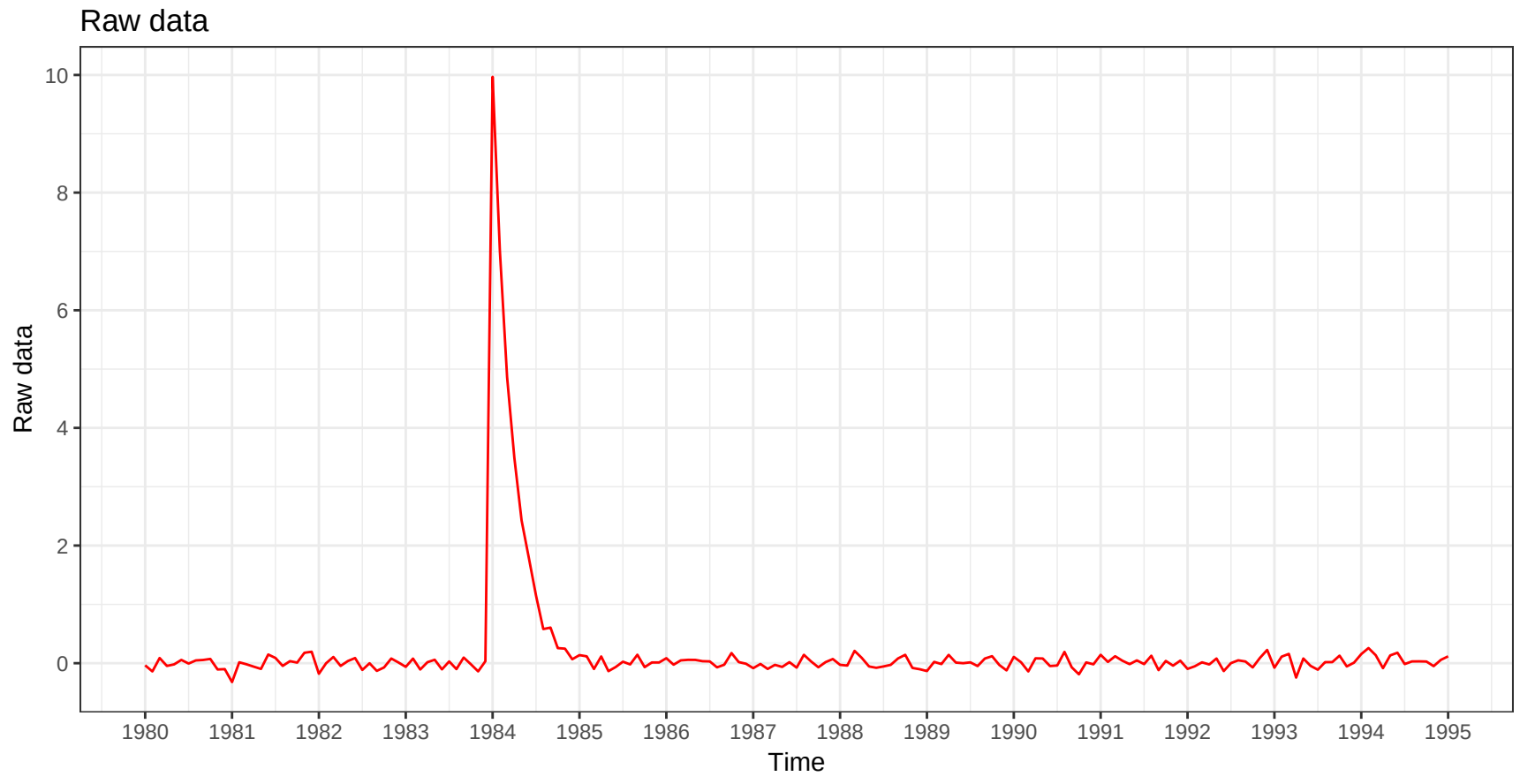
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(0,0,0) − additive decomposition
Xt=at



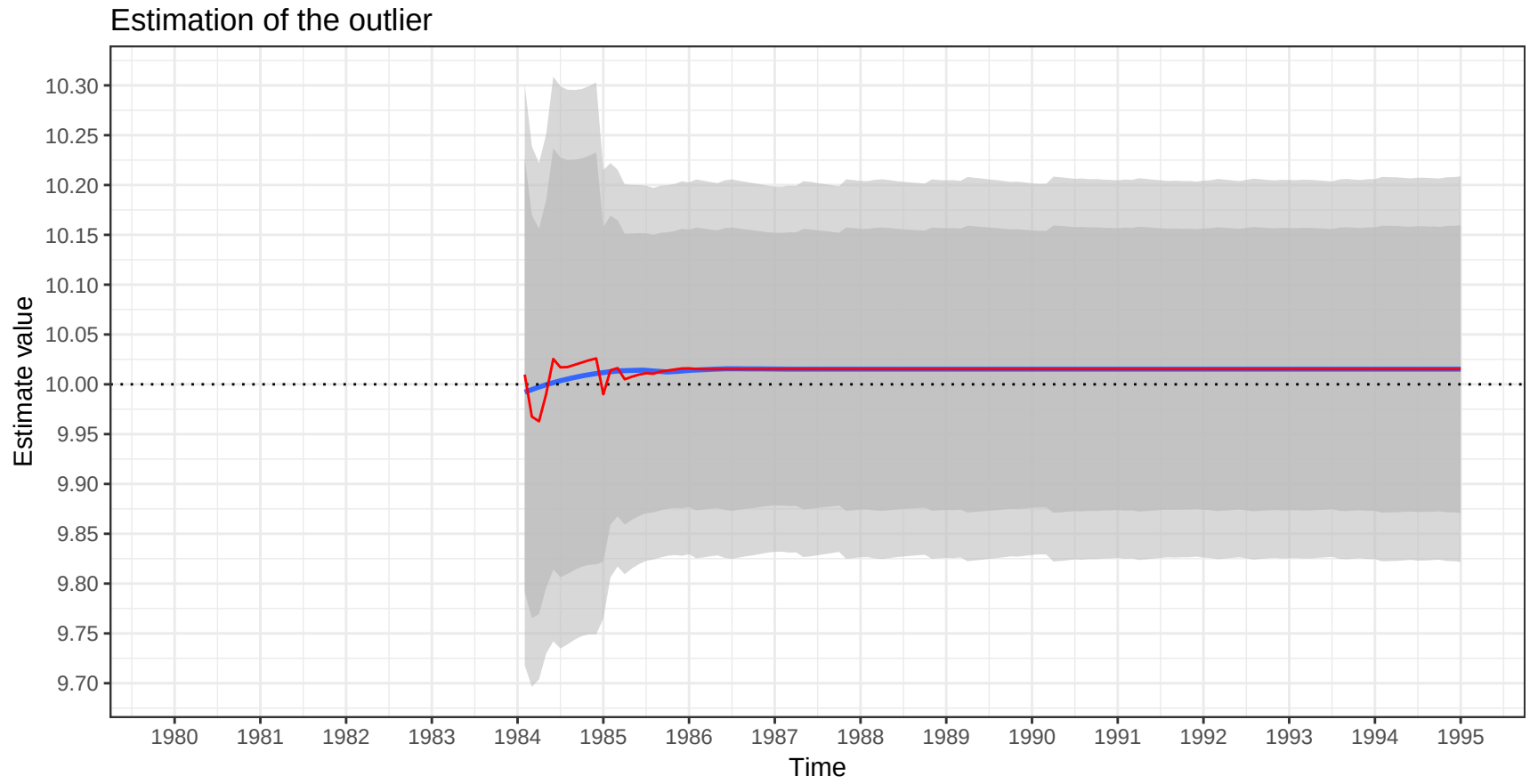


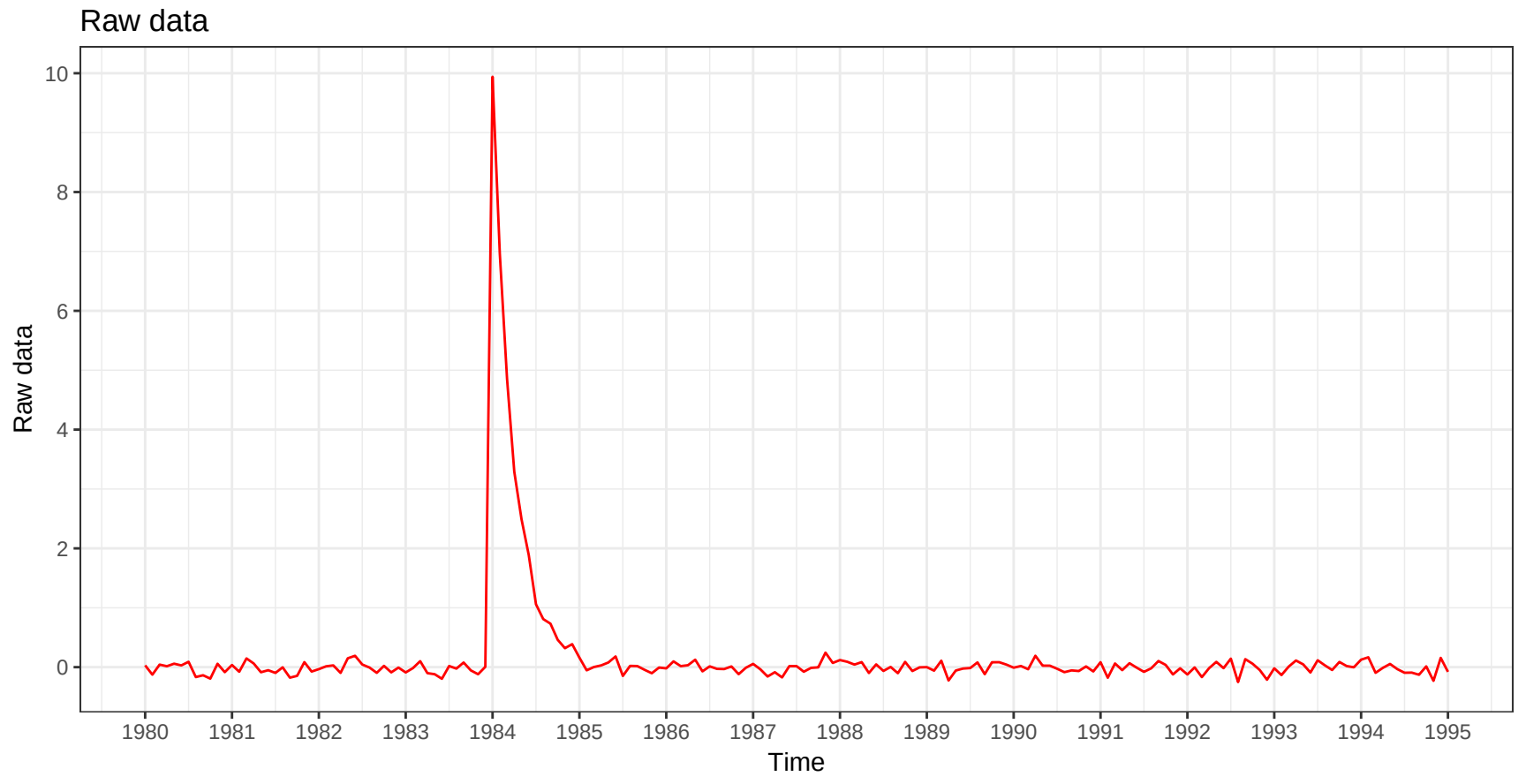
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(0,0,0) − additive decomposition
Xt=at



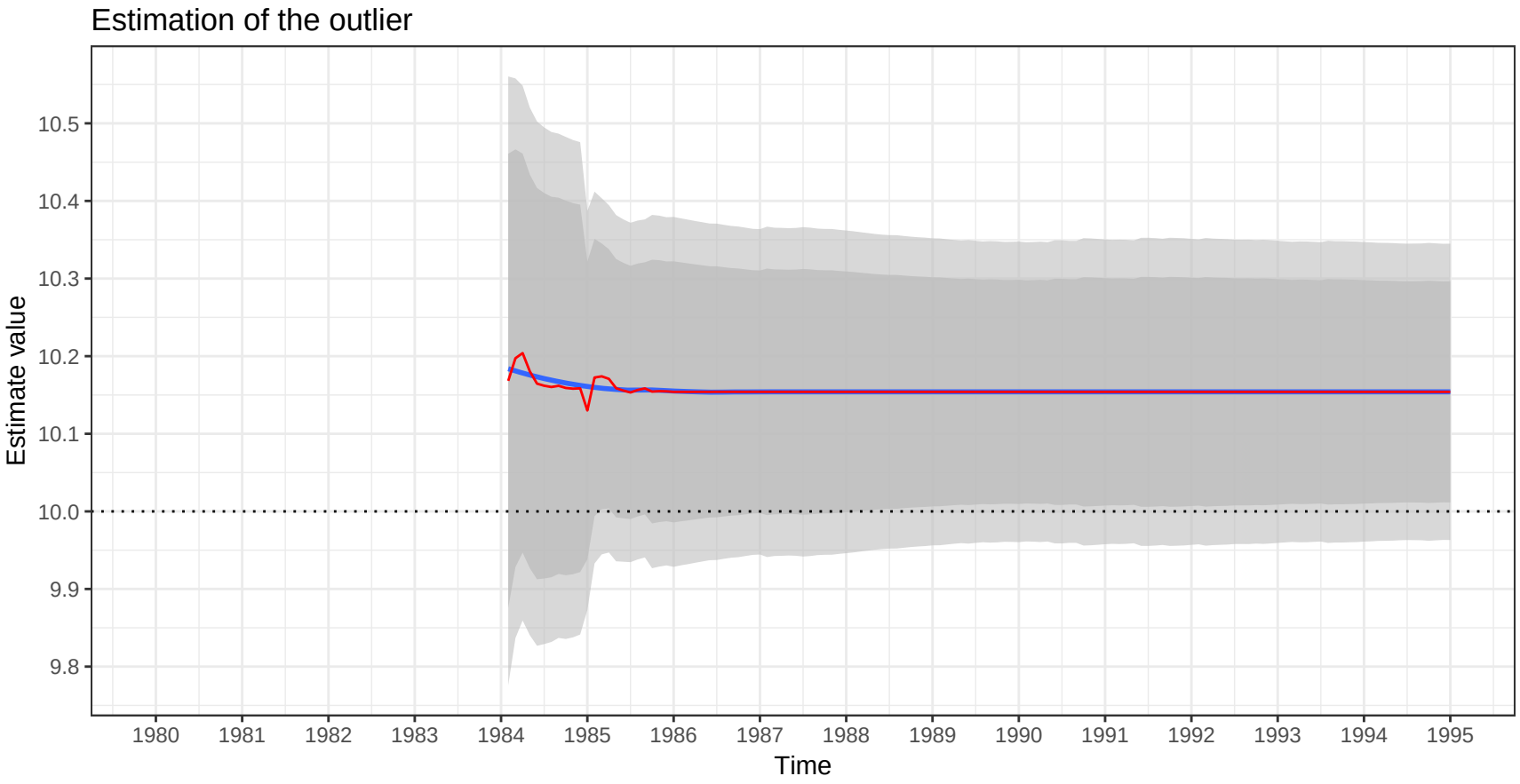


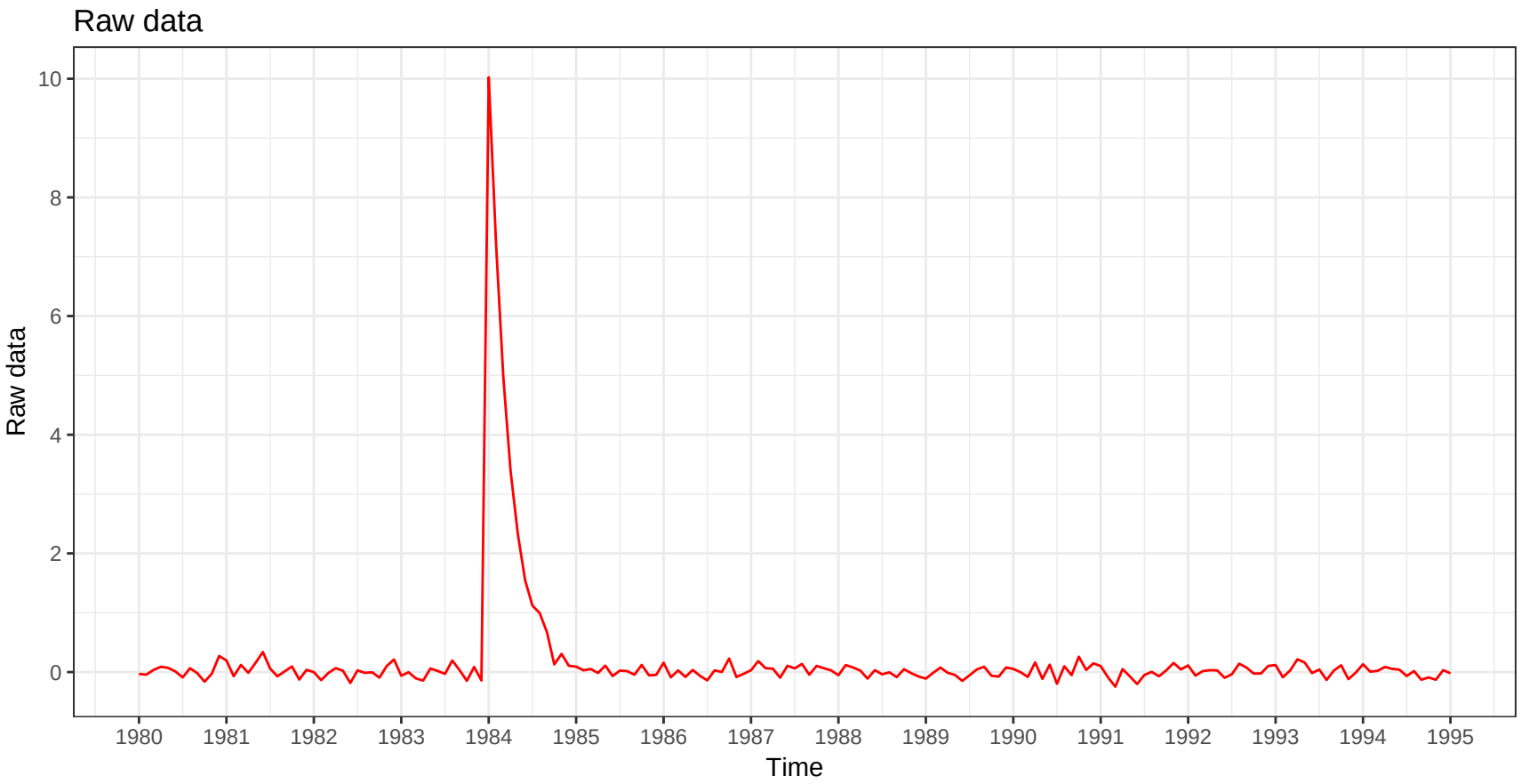
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(0,0,0) − additive decomposition
Xt=at



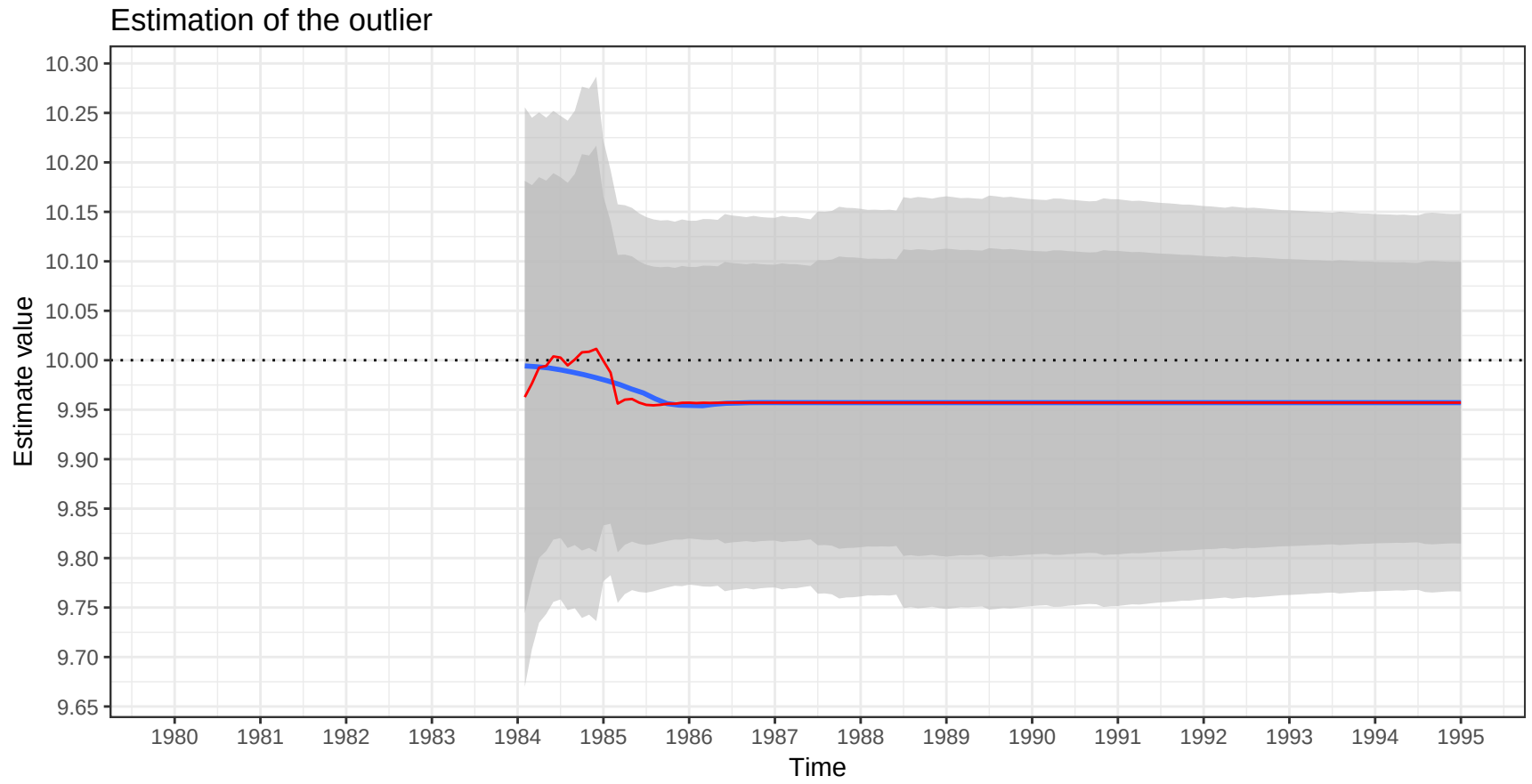


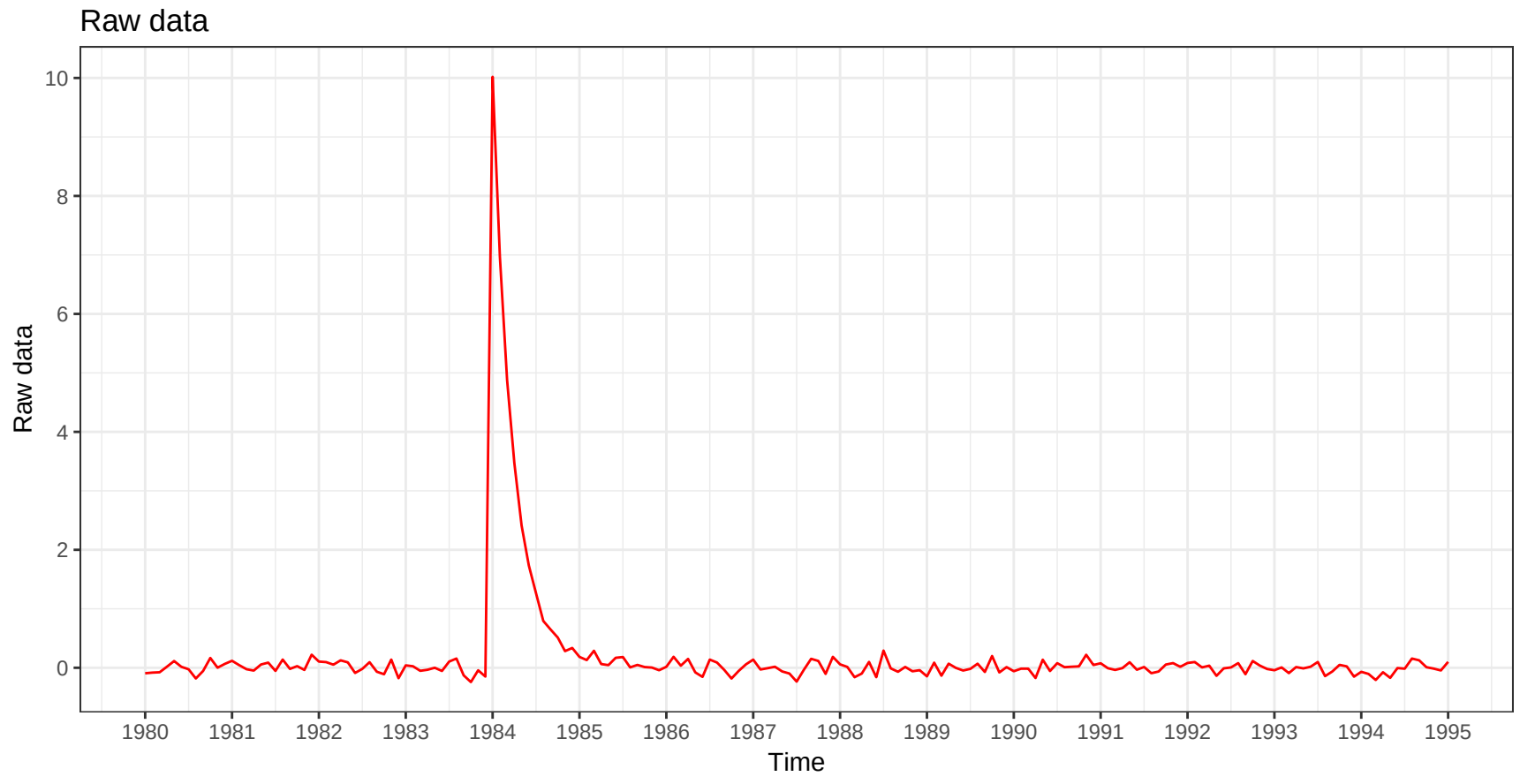
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(0,0,0) − additive decomposition
Xt=at

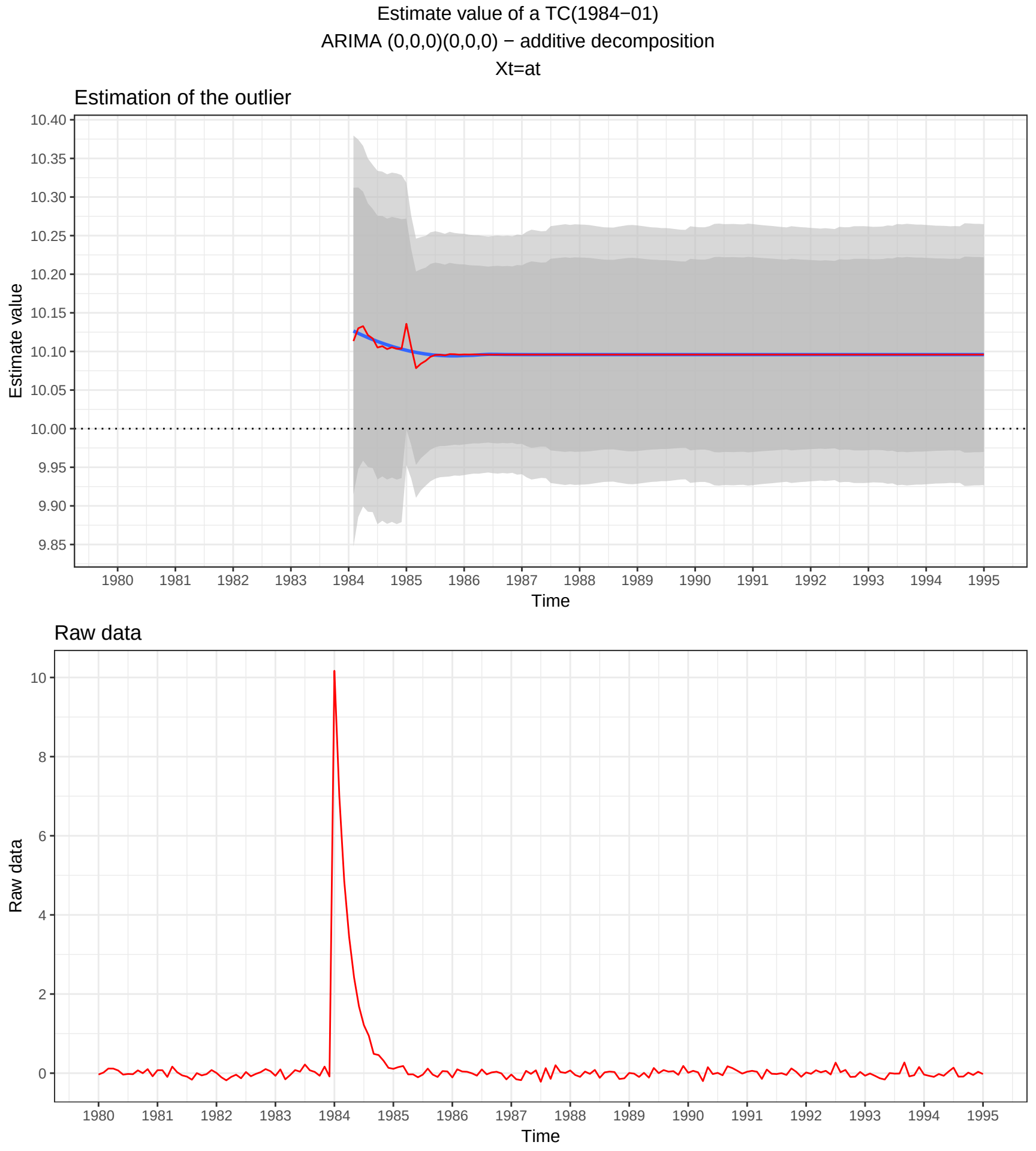




Estimate value of a TC(1984−01)
ARIMA (0,0,0)(0,0,0) − additive decomposition
Xt=at






Estimate value of a TC(1984−01)
ARIMA (0,0,0)(0,0,0) − additive decomposition
Xt=at
Estimation of the outlier
Estimate value
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10.35
10.30
10.25
10.20
10.15
10.10
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10.00
9.95
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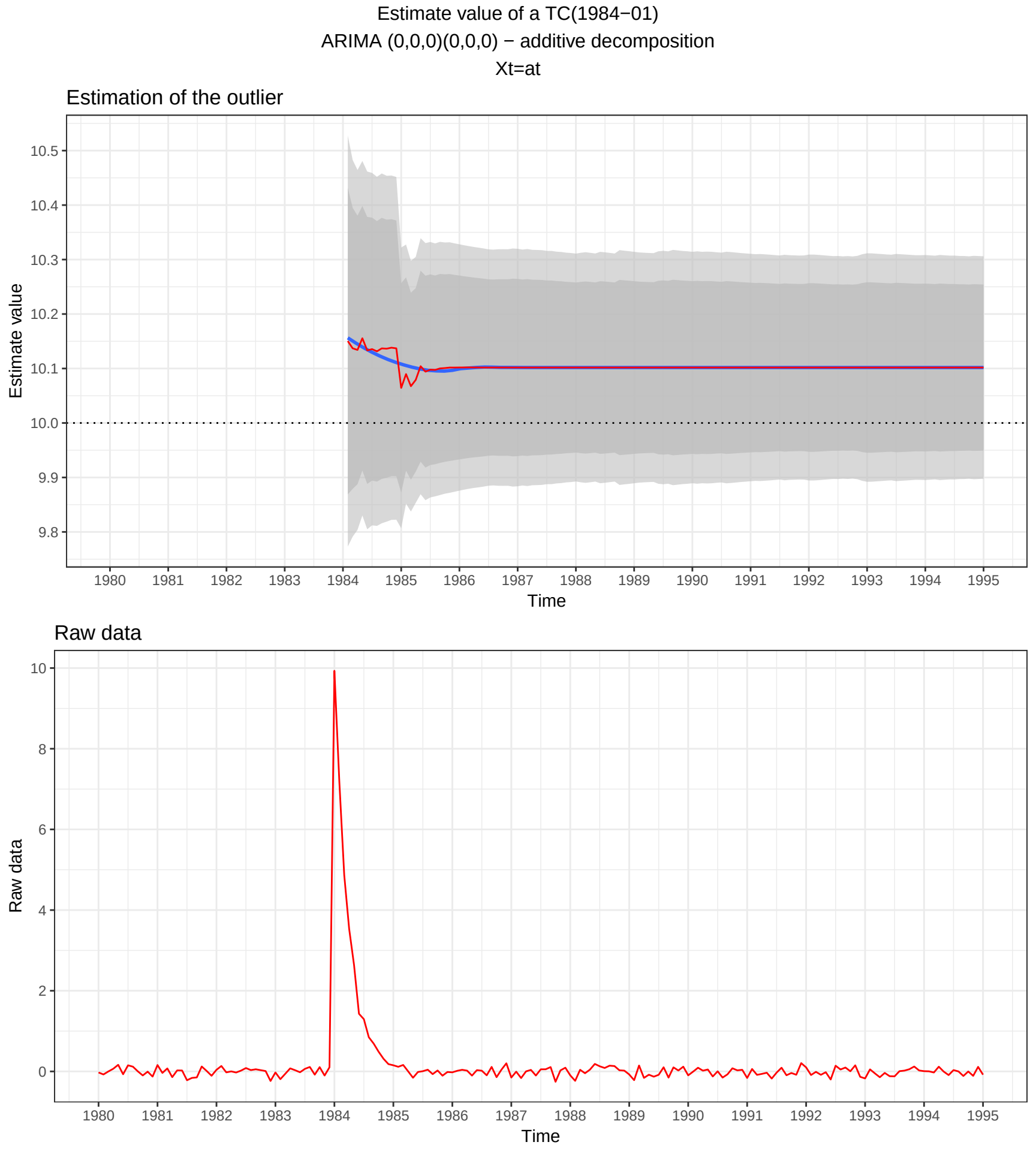
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(0,0,0) − additive decomposition
Xt=at
Estimation of the outlier
Estimate value
10.5
10.4
10.3
10.2
10.1
10.0
9.9
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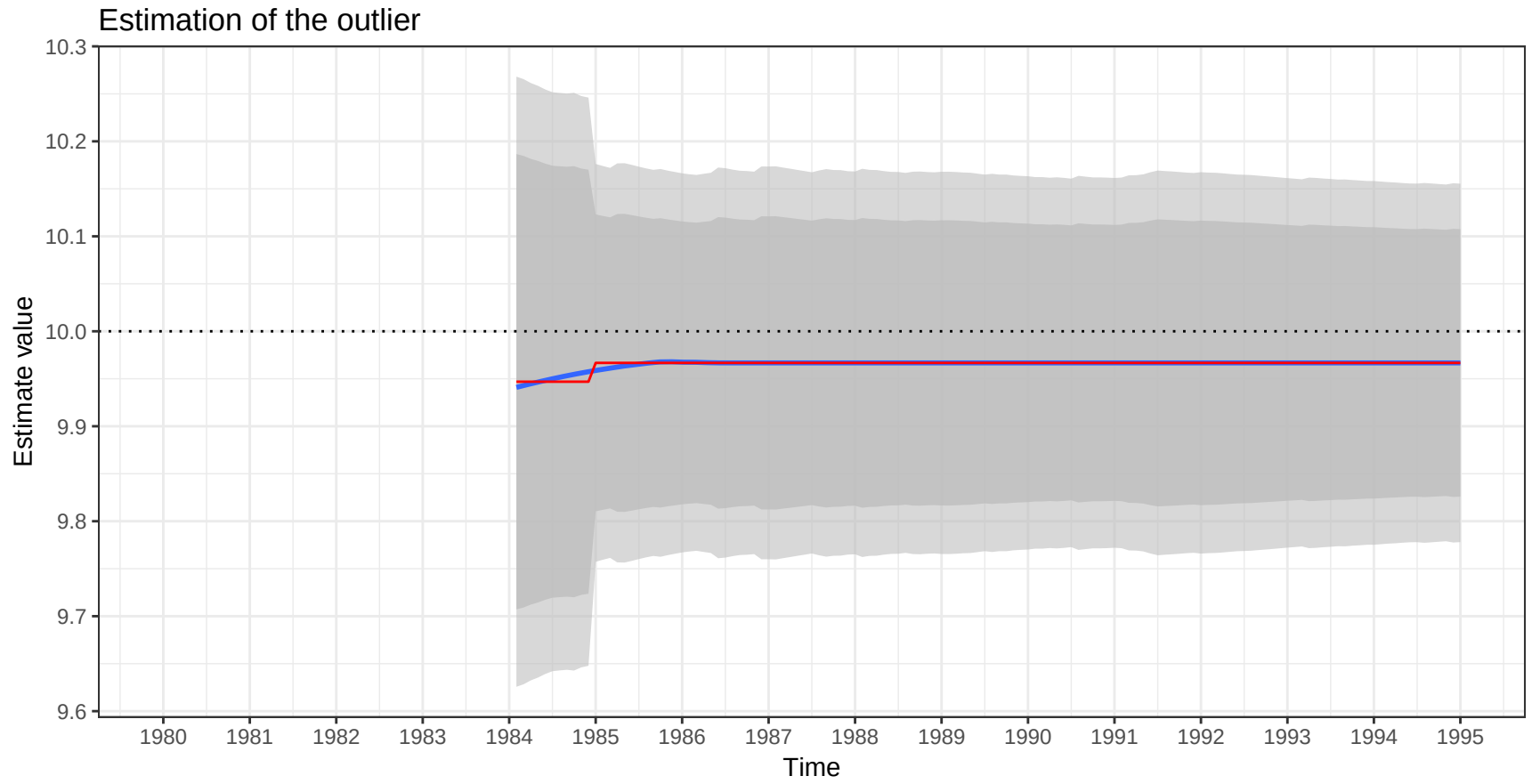
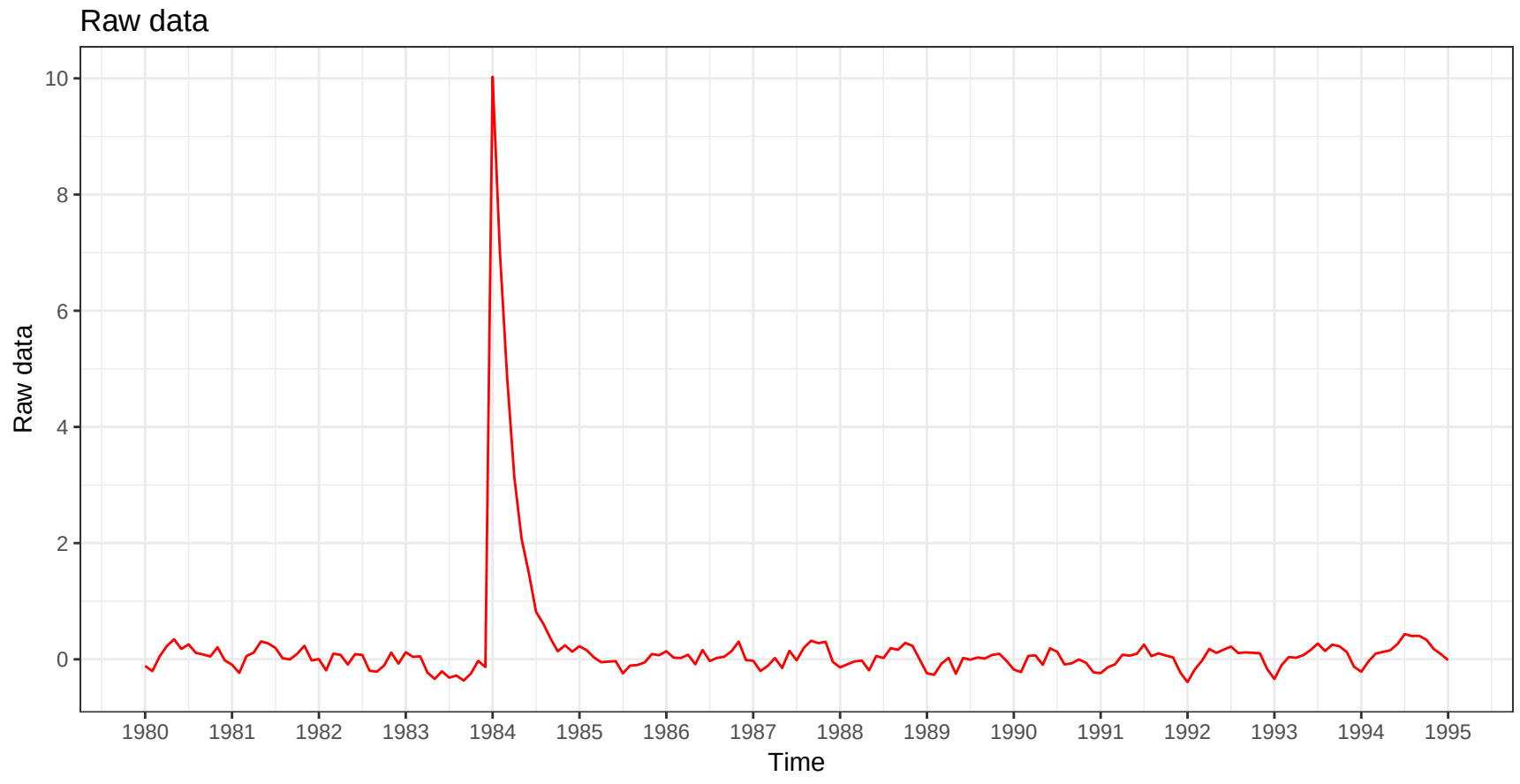
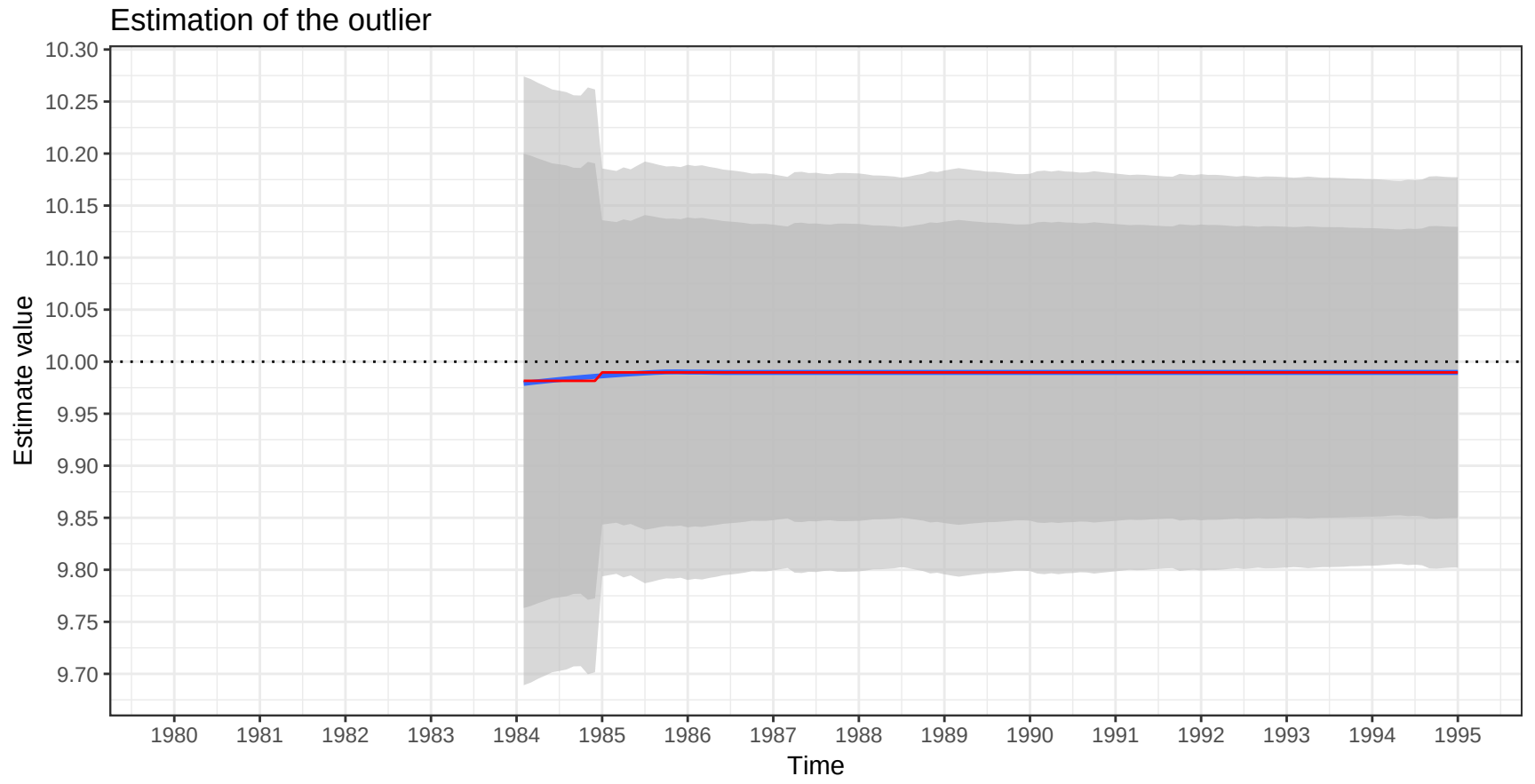
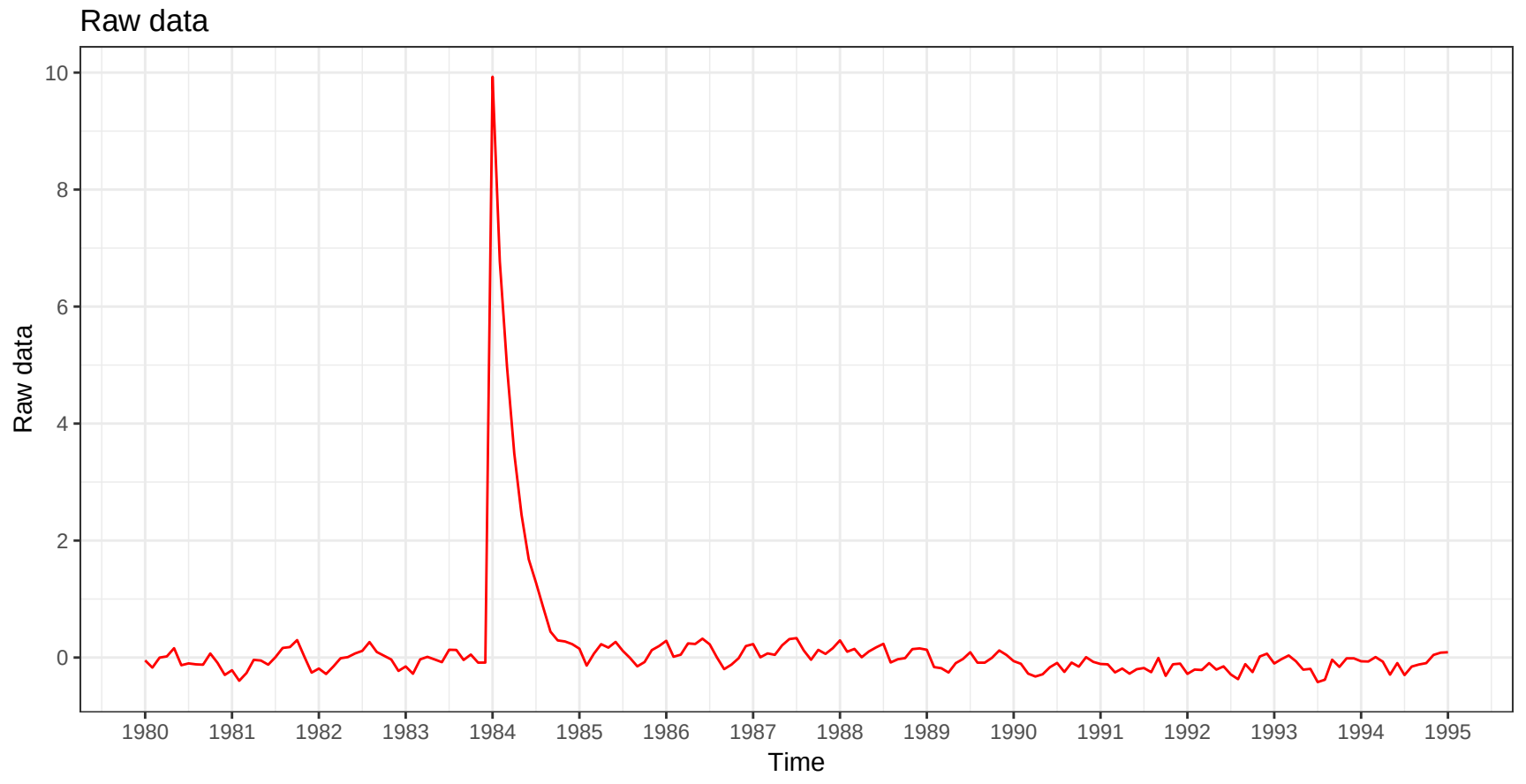
Estimate value of a TC(1984−01)
ARIMA (1,0,0)(0,0,0) − additive decomposition
(1−0.7B)Xt=at

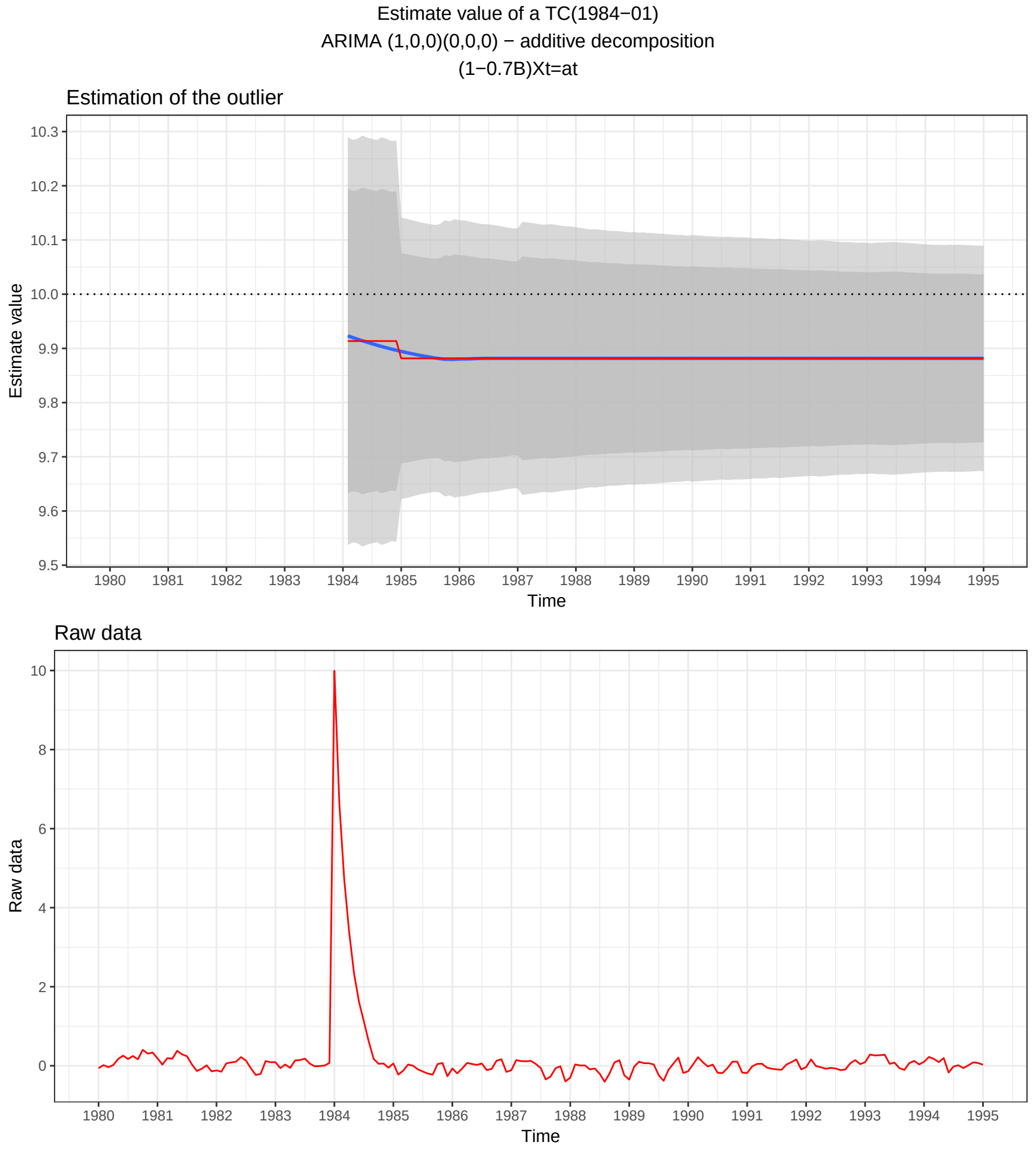




Estimate value of a TC(1984−01)
ARIMA (1,0,0)(0,0,0) − additive decomposition
(1−0.7B)Xt=at






Estimate value of a TC(1984−01)
ARIMA (1,0,0)(0,0,0) − additive decomposition
(1−0.7B)Xt=at
Estimation of the outlier
Estimate value
10.3
10.2
10.1
10.0
9.9
9.8
9.7
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Time
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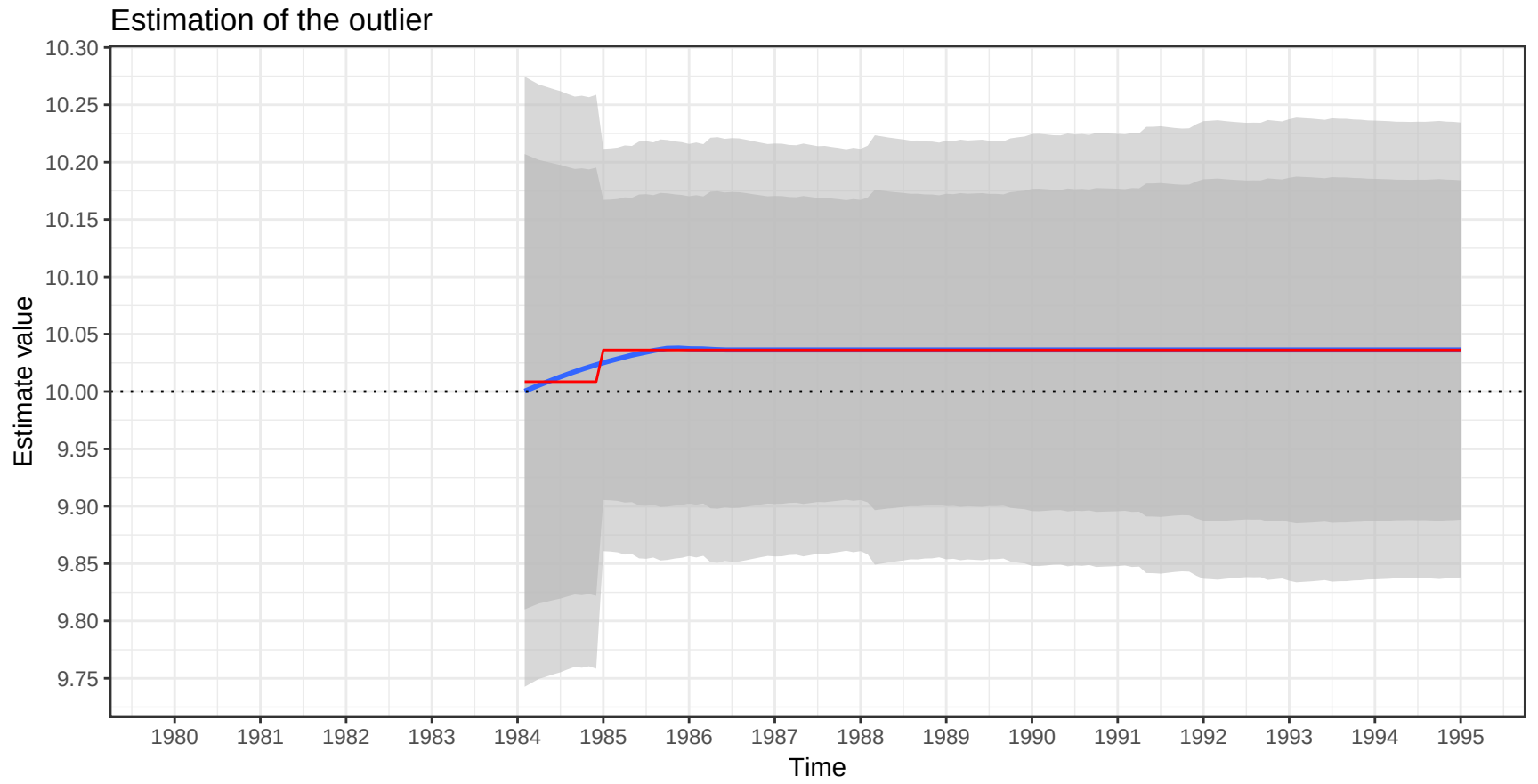
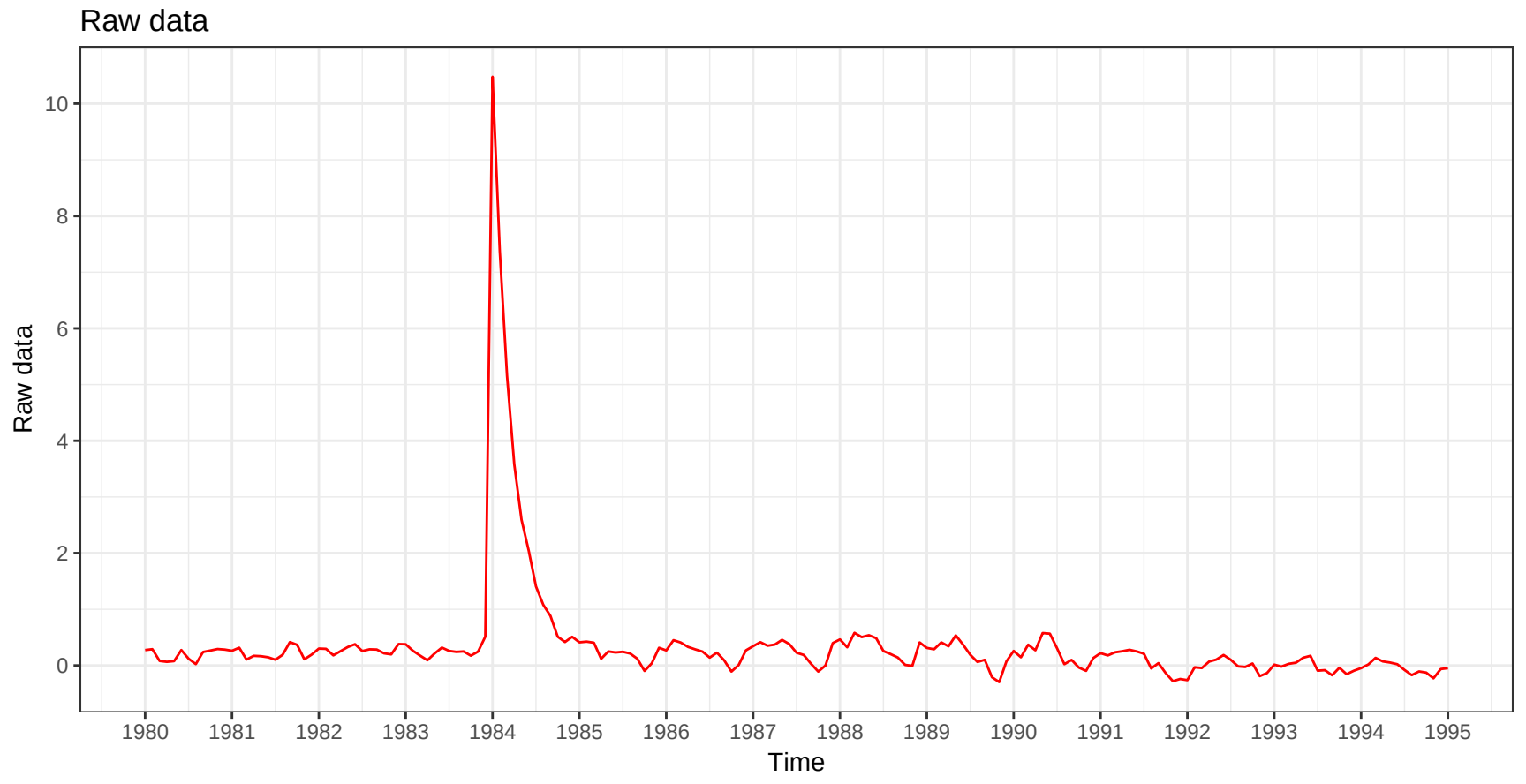
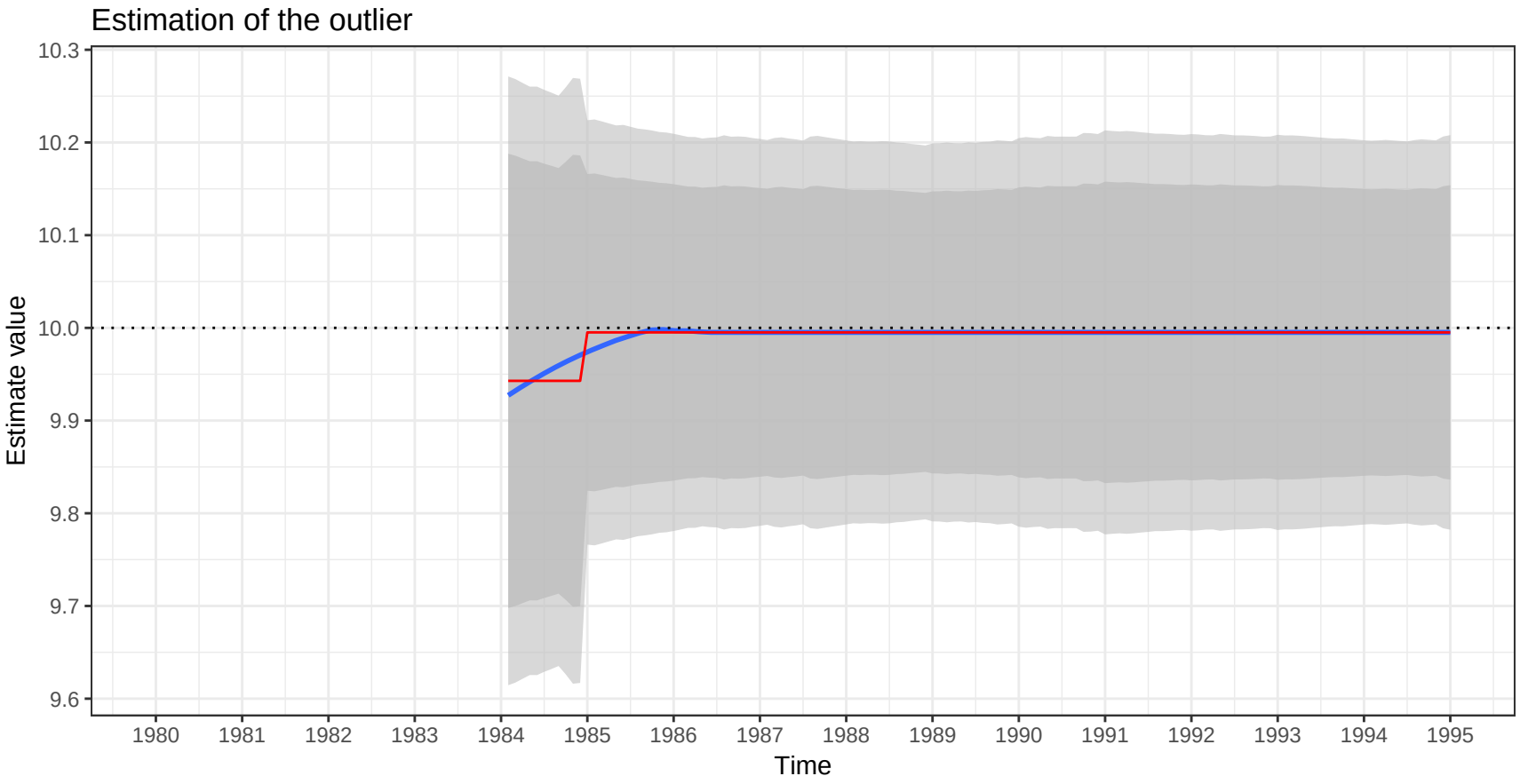
Time

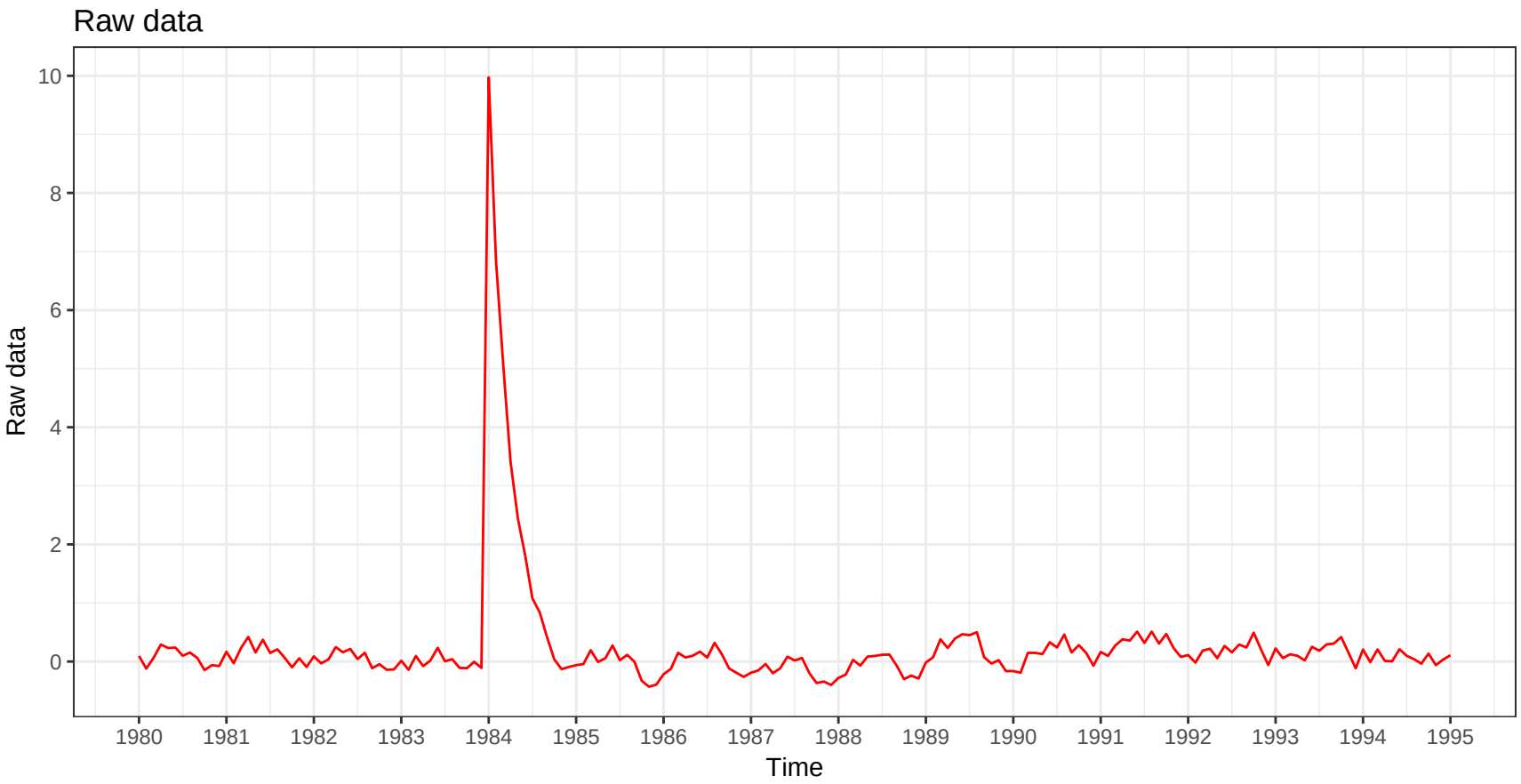
Estimate value of a TC(1984−01)
ARIMA (1,0,0)(0,0,0) − additive decomposition
(1−0.7B)Xt=at



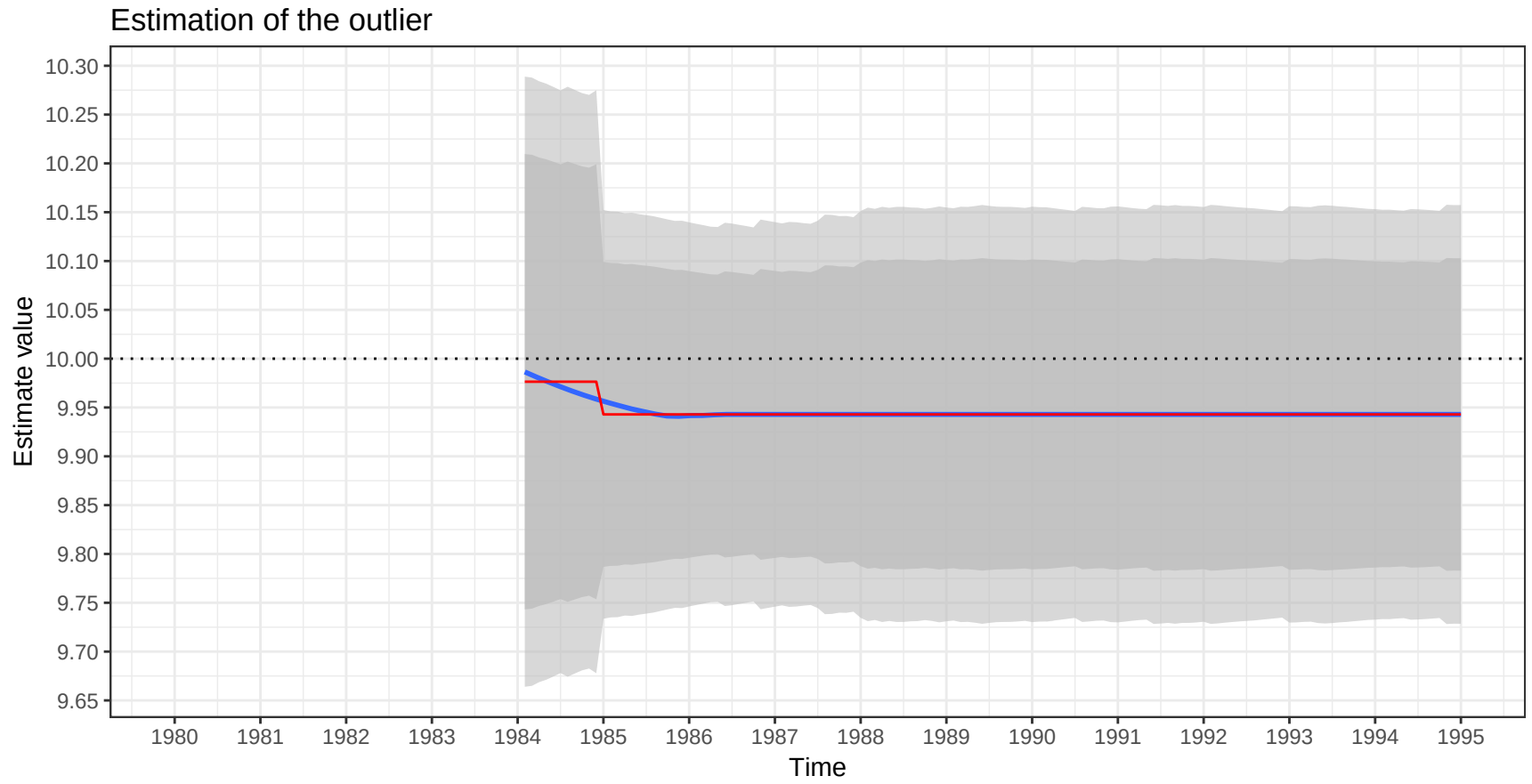


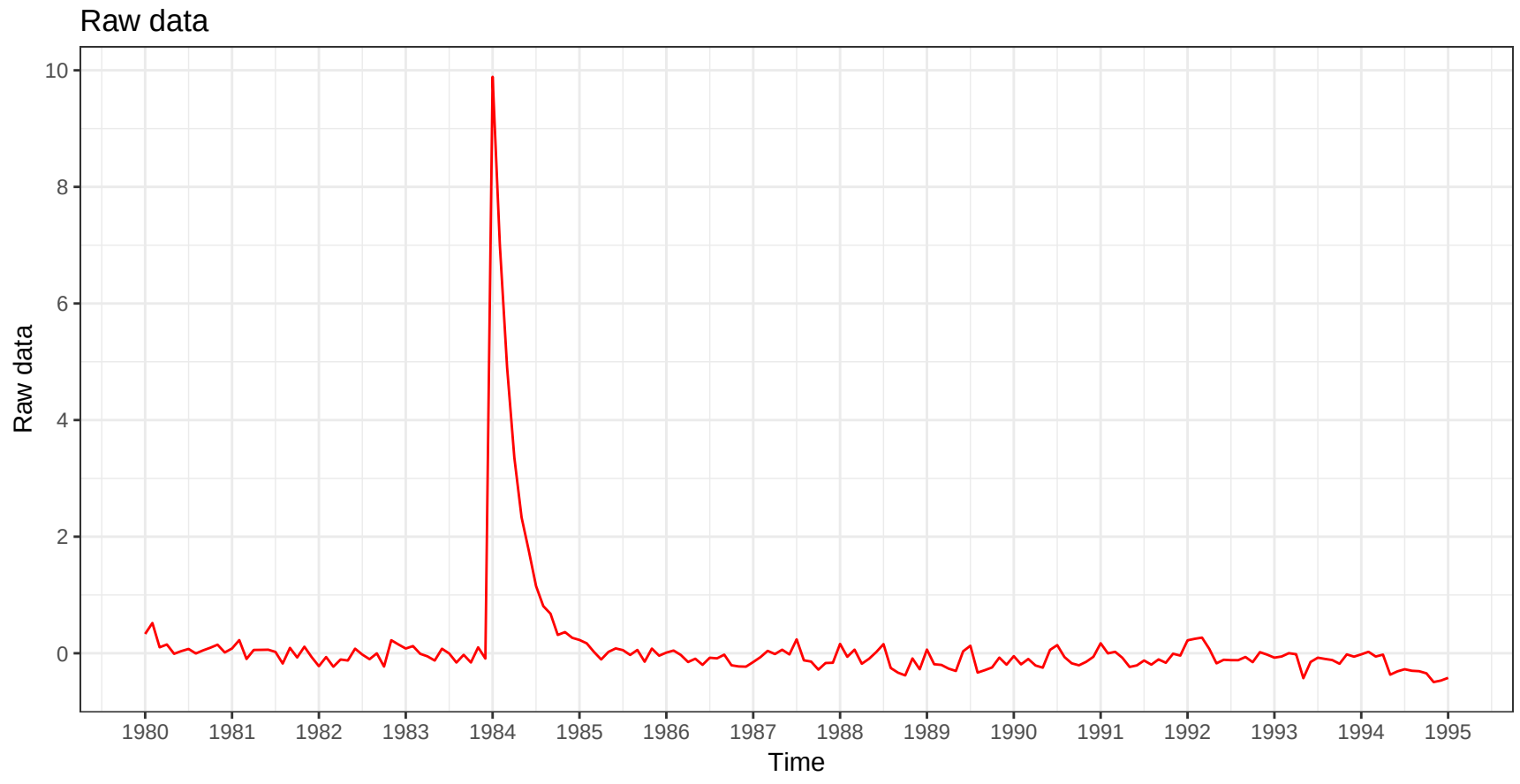
Estimate value of a TC(1984−01)
ARIMA (1,0,0)(0,0,0) − additive decomposition
(1−0.7B)Xt=at



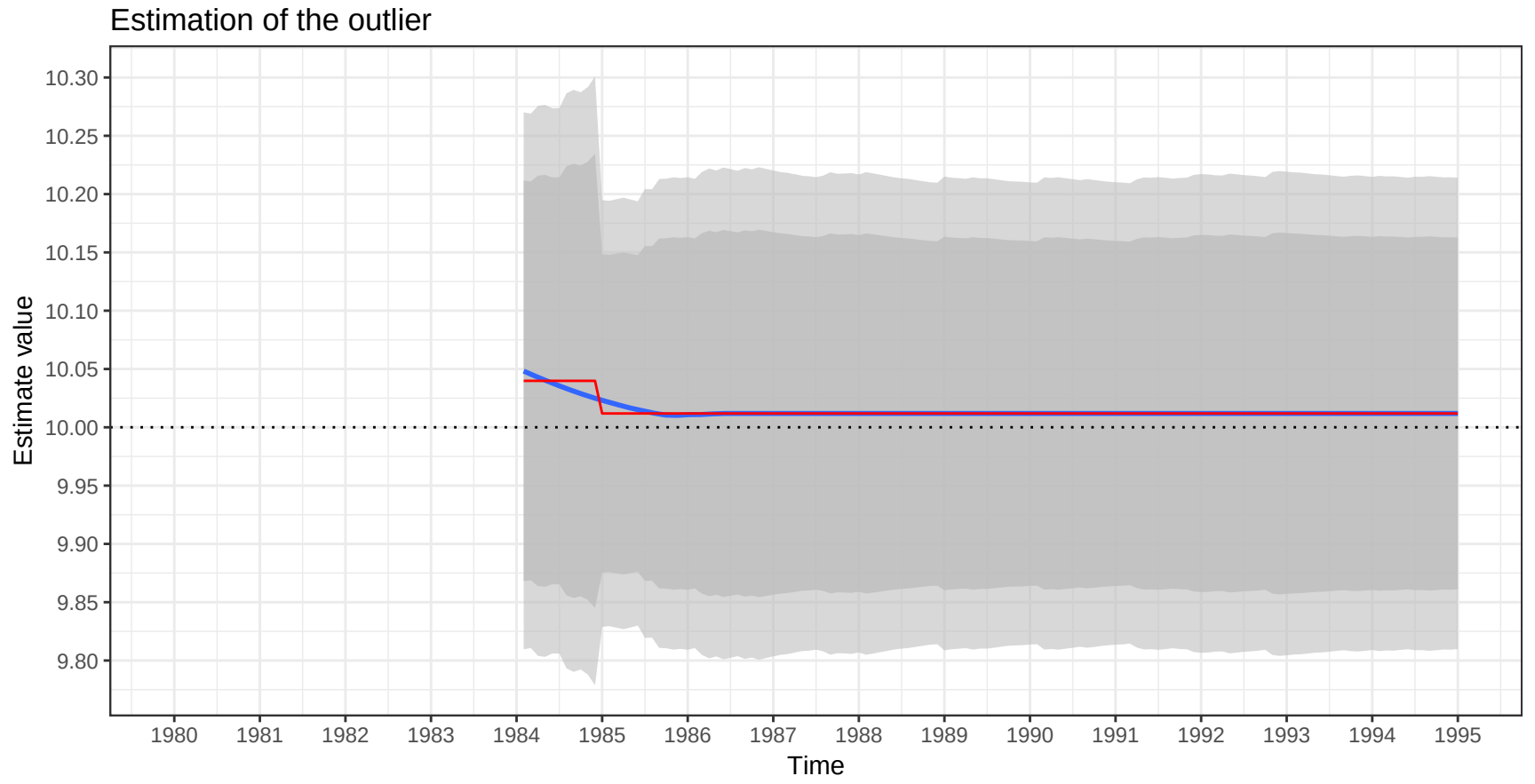


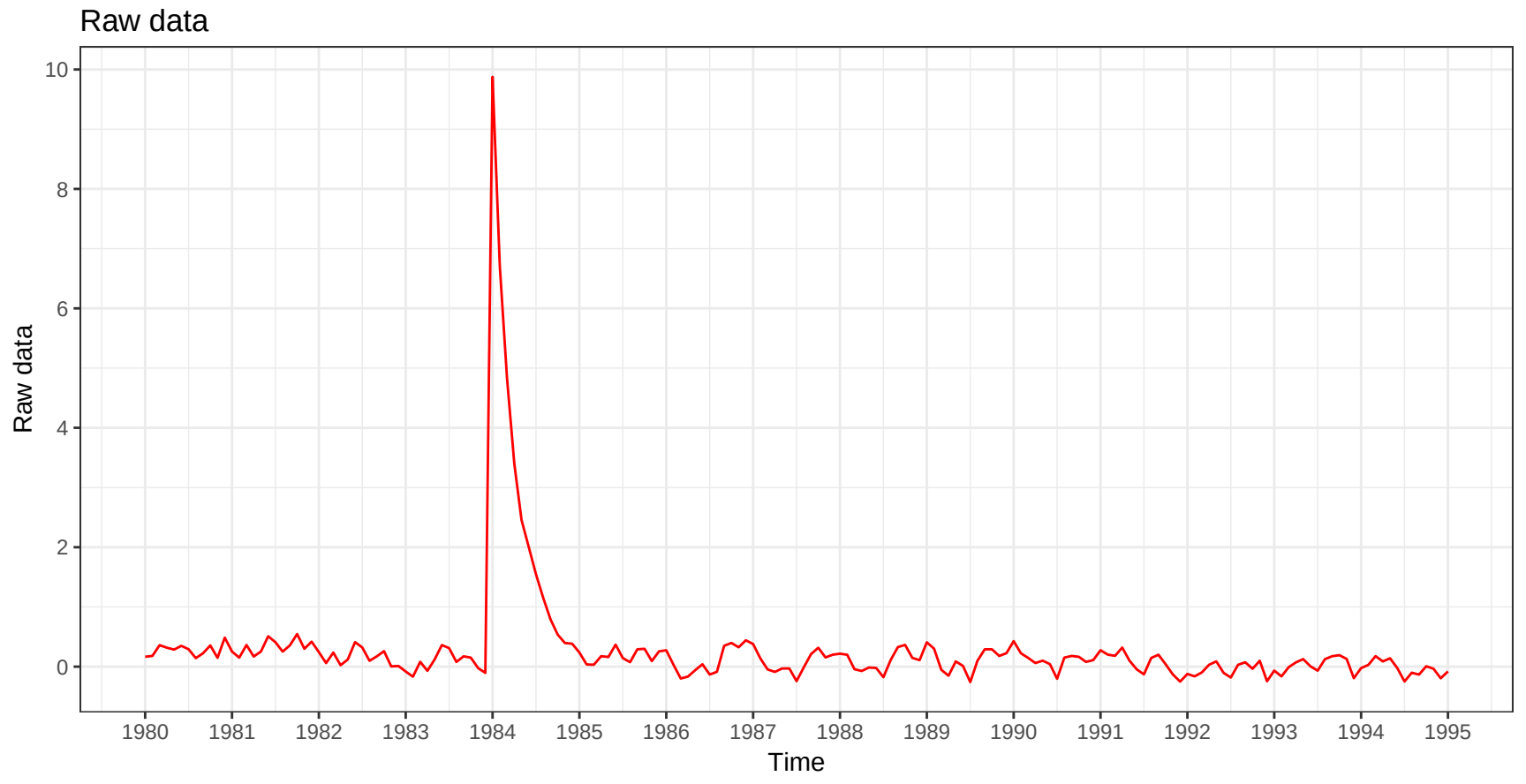
Estimate value of a TC(1984−01)
ARIMA (1,0,0)(0,0,0) − additive decomposition
(1−0.7B)Xt=at



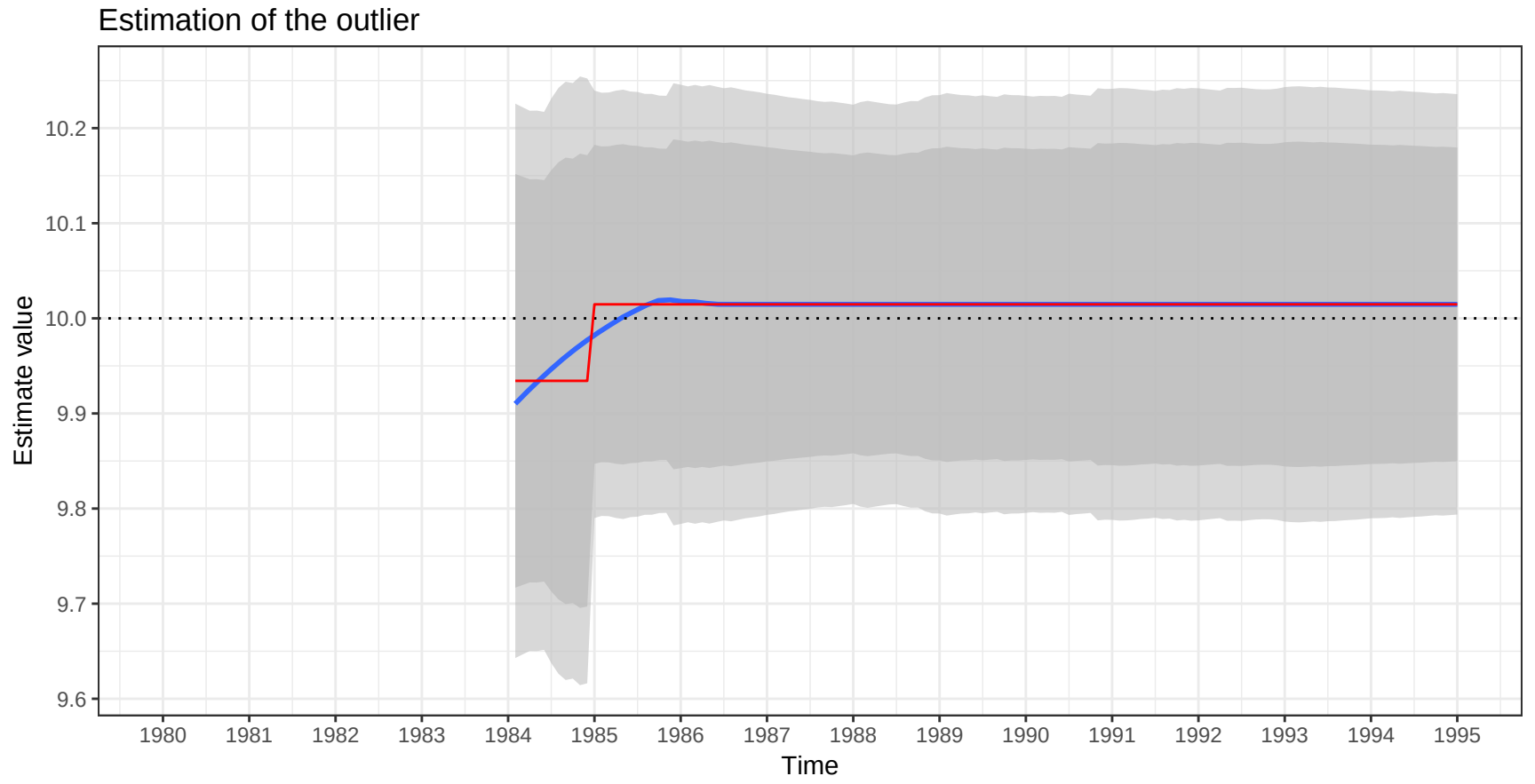


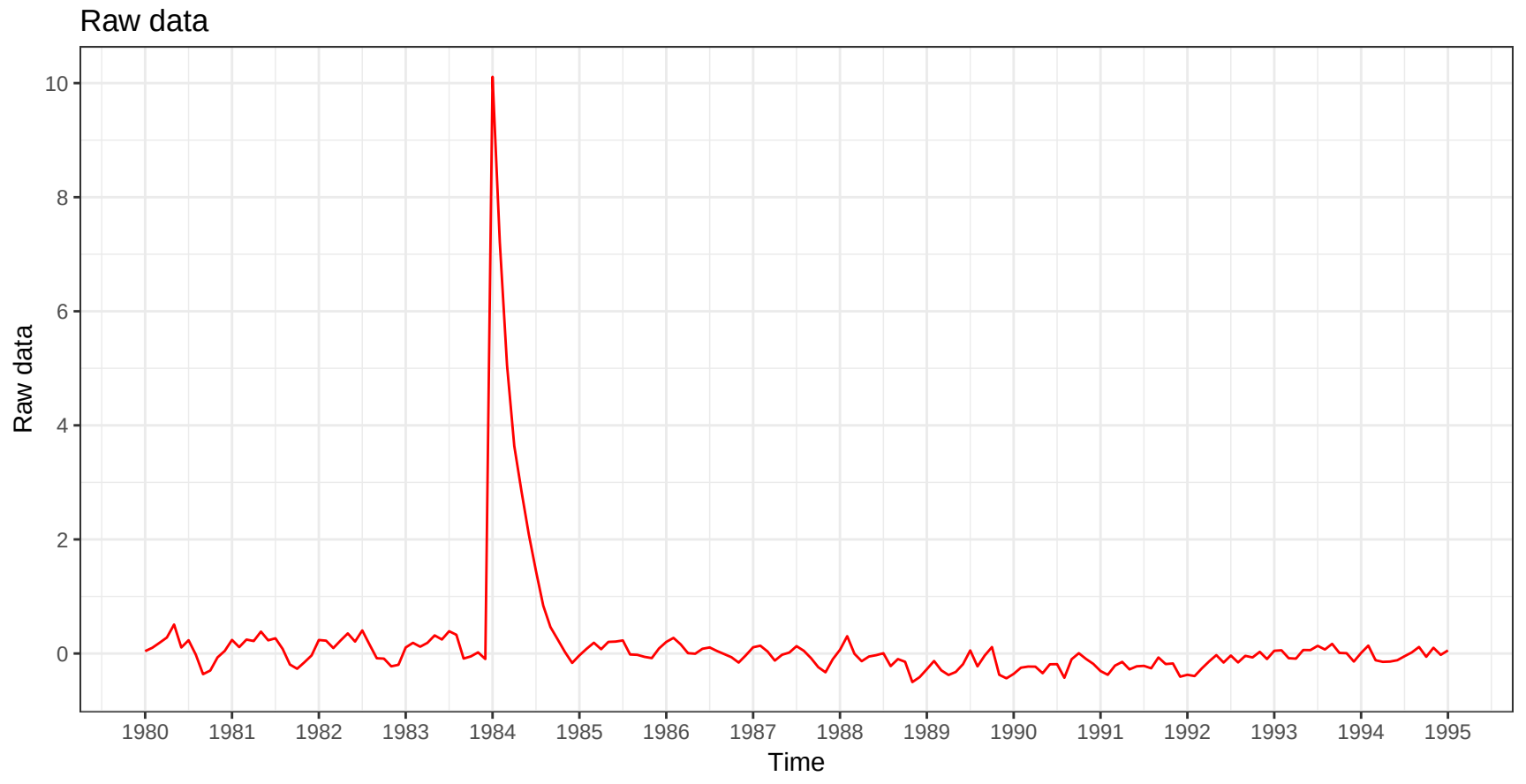
Estimate value of a TC(1984−01)
ARIMA (1,0,0)(0,0,0) − additive decomposition
(1−0.7B)Xt=at



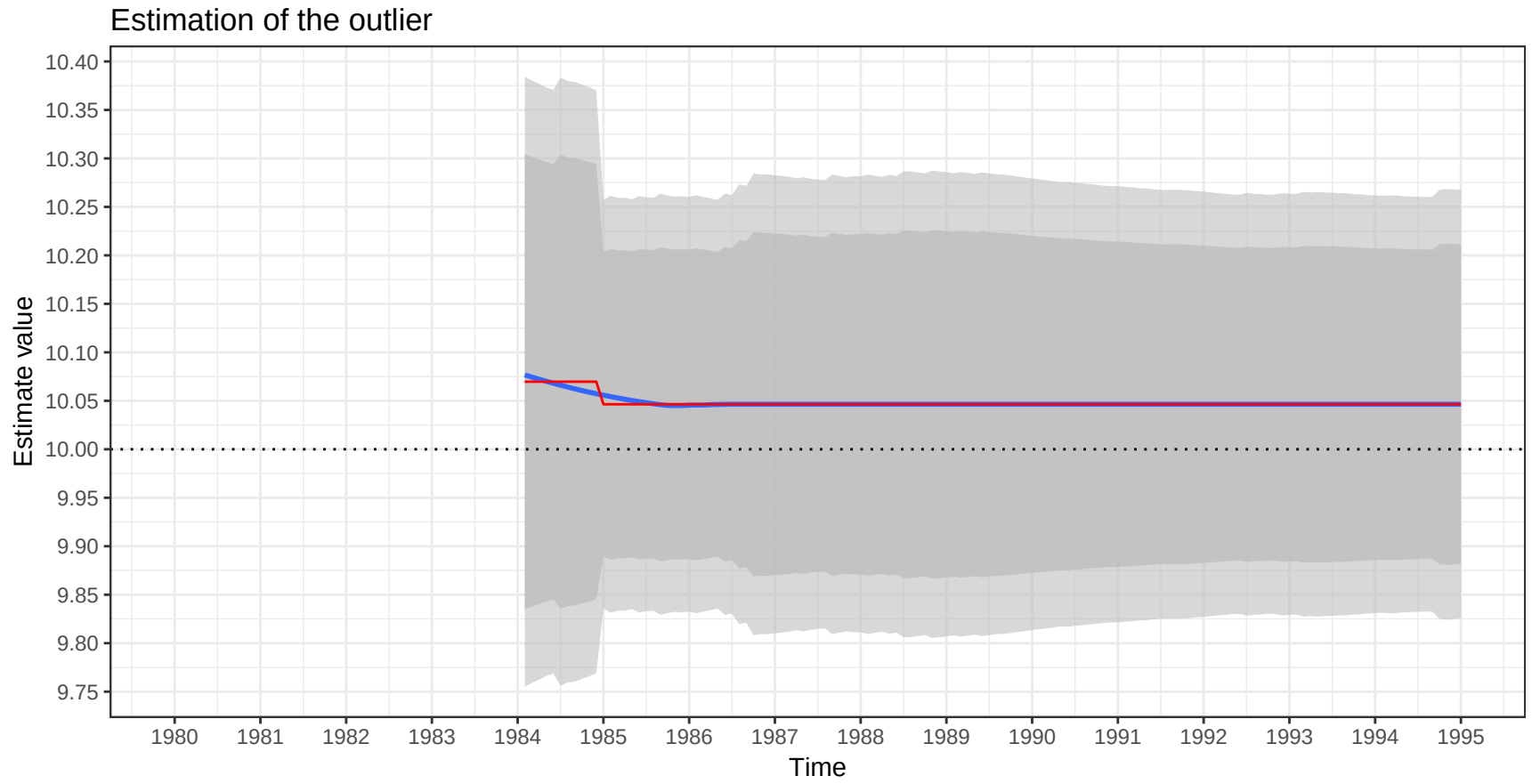


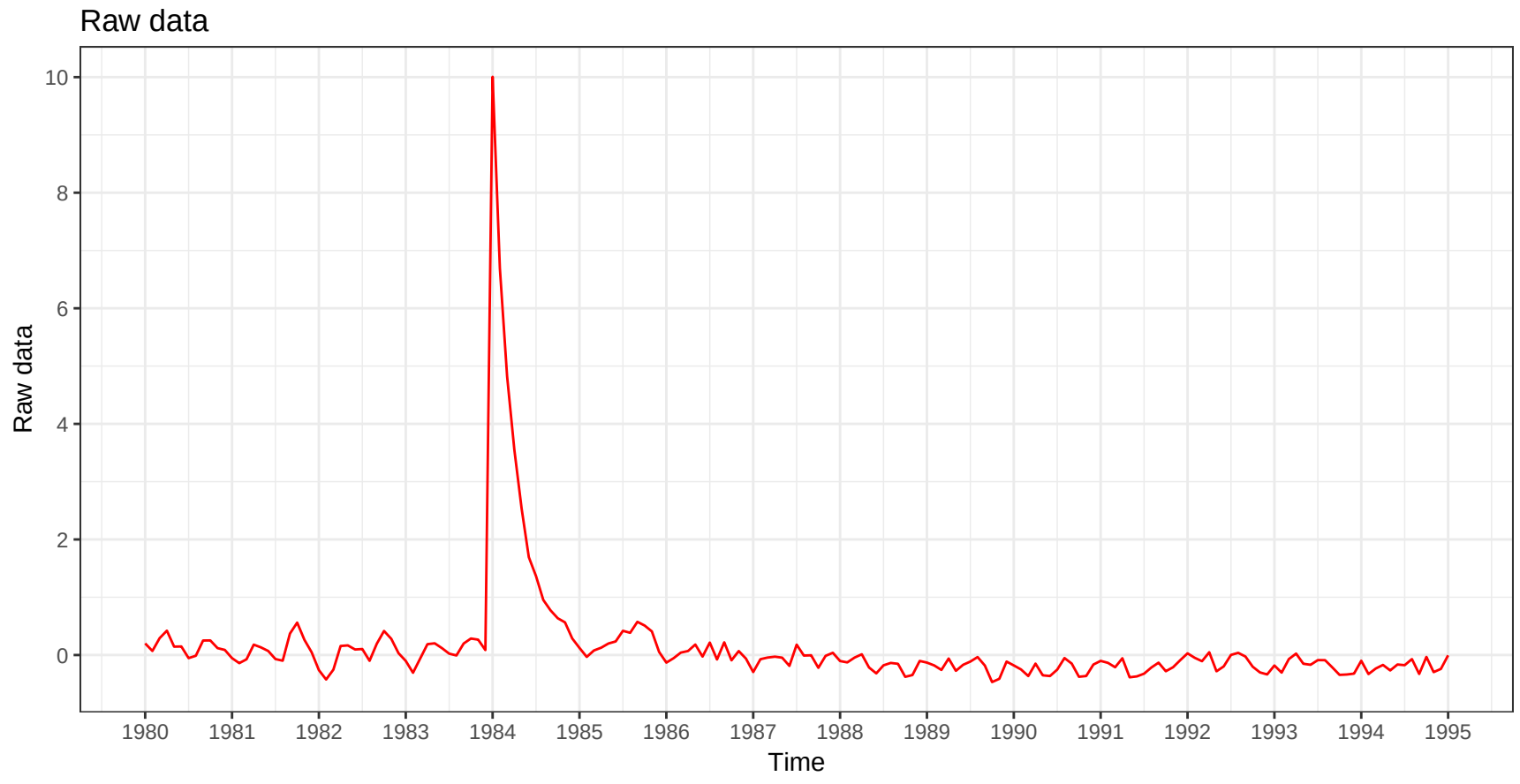
Estimate value of a TC(1984−01)
ARIMA (1,0,0)(0,0,0) − additive decomposition
(1−0.7B)Xt=at



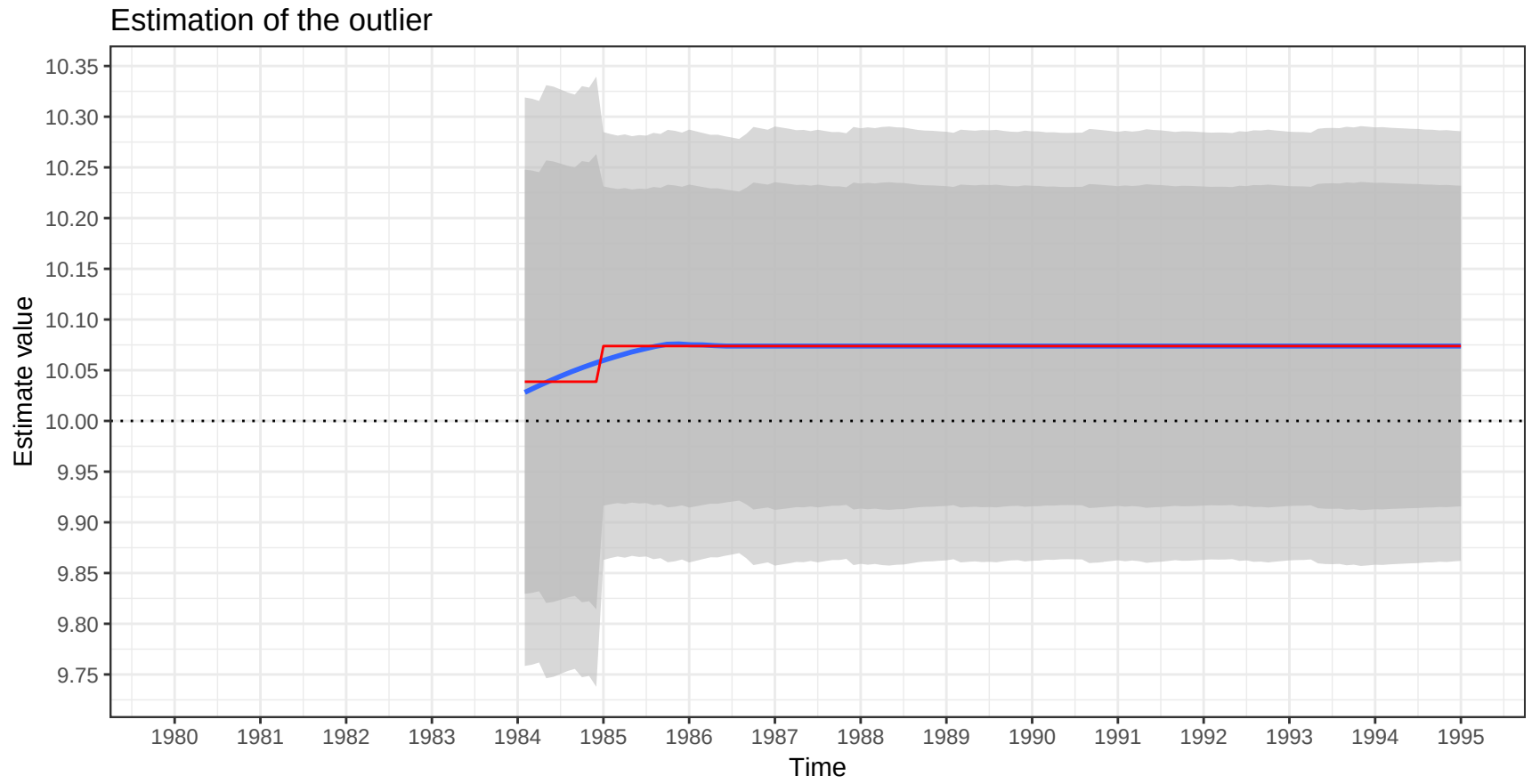


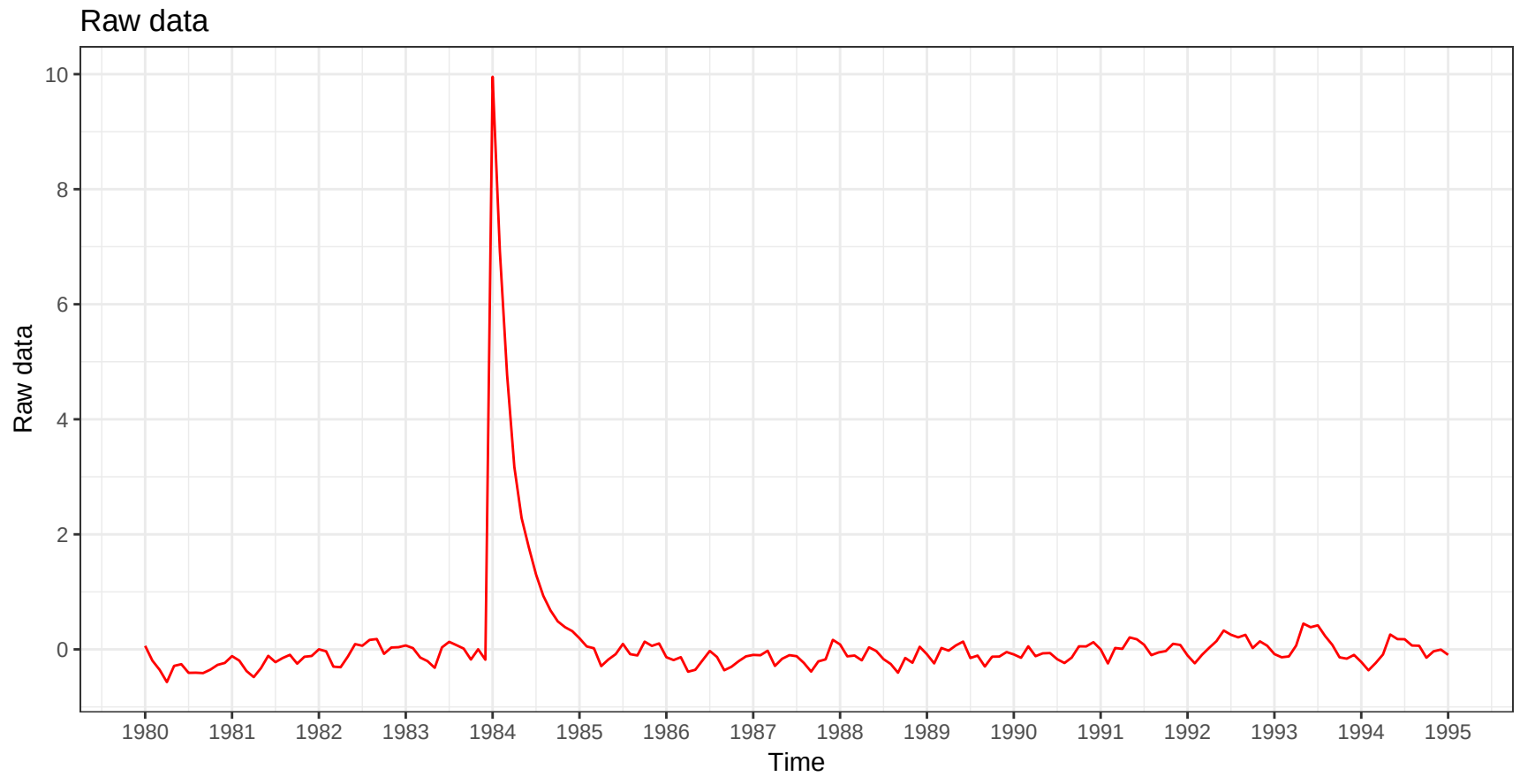
Estimate value of a TC(1984−01)
ARIMA (1,0,0)(0,0,0) − additive decomposition
(1−0.7B)Xt=at



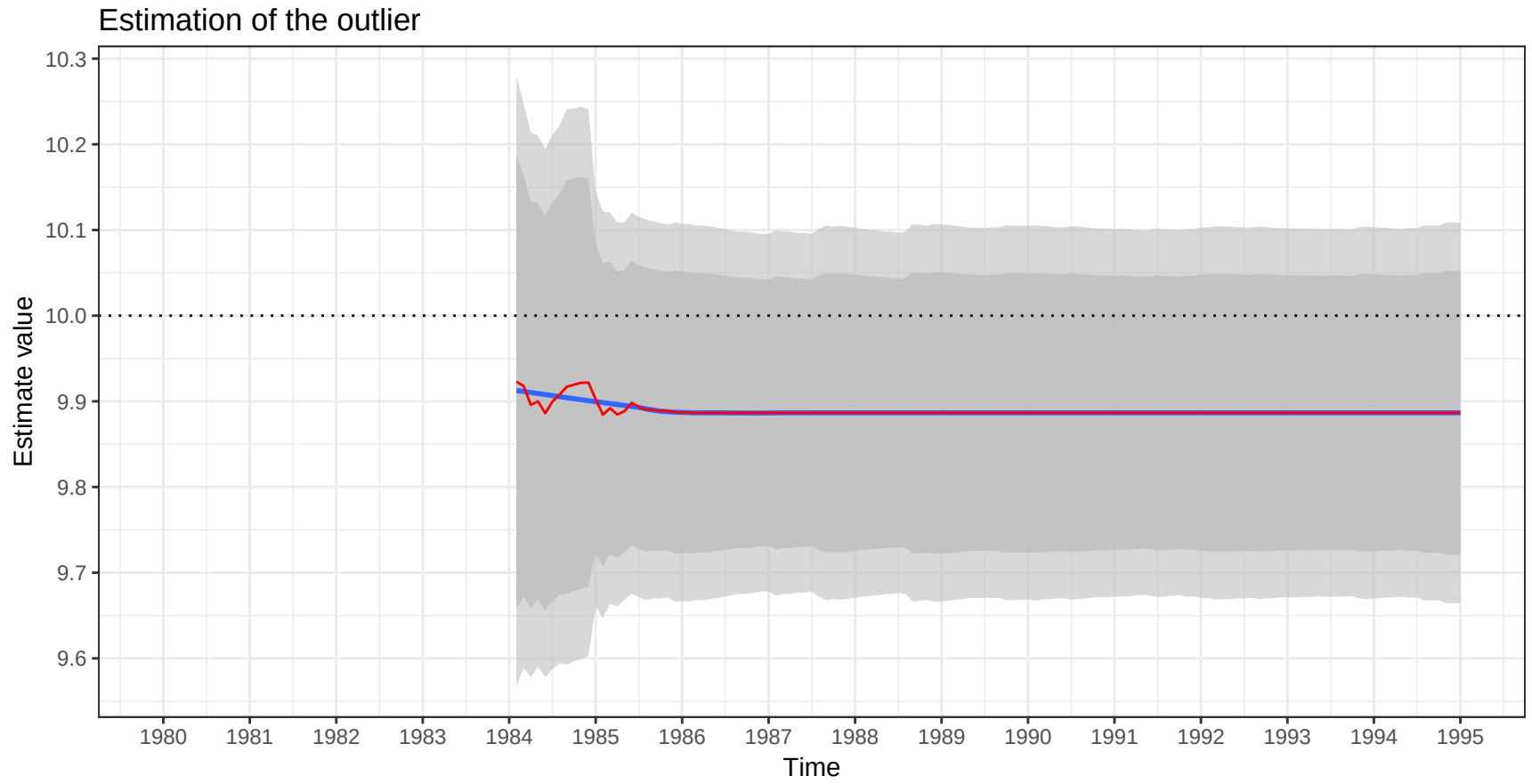


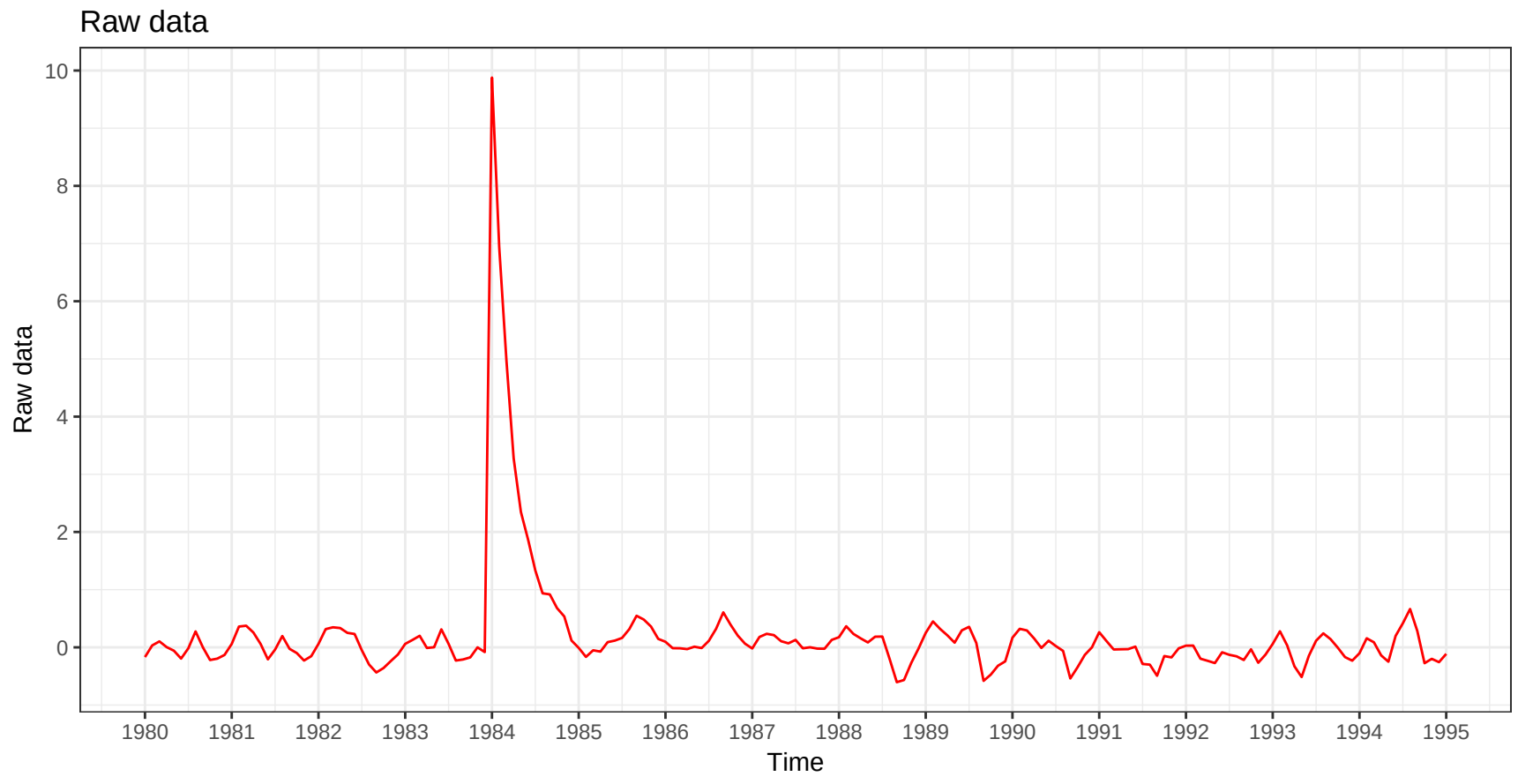
Estimate value of a TC(1984−01)
ARIMA (1,0,0)(0,0,0) − additive decomposition
(1−0.7B)Xt=at



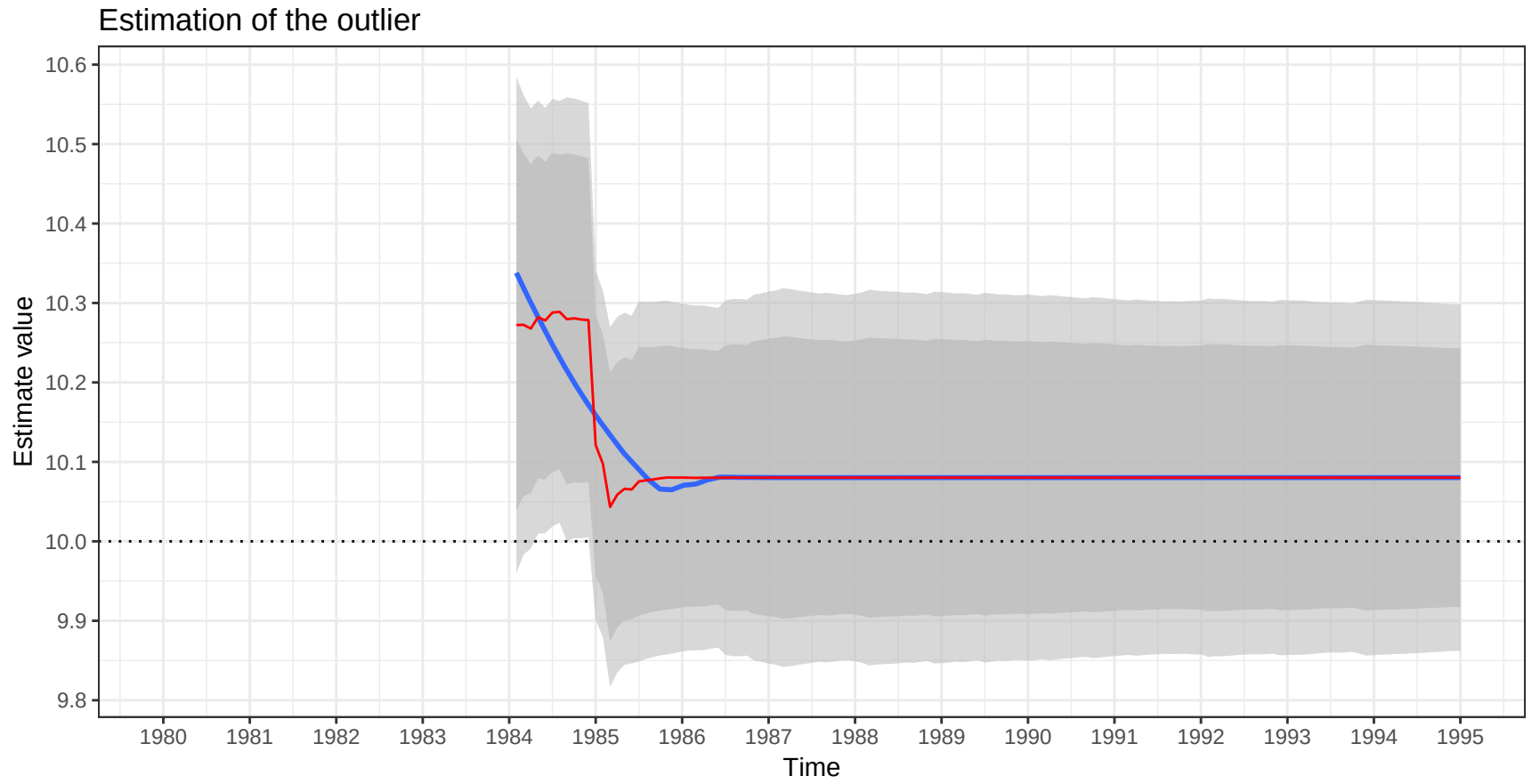


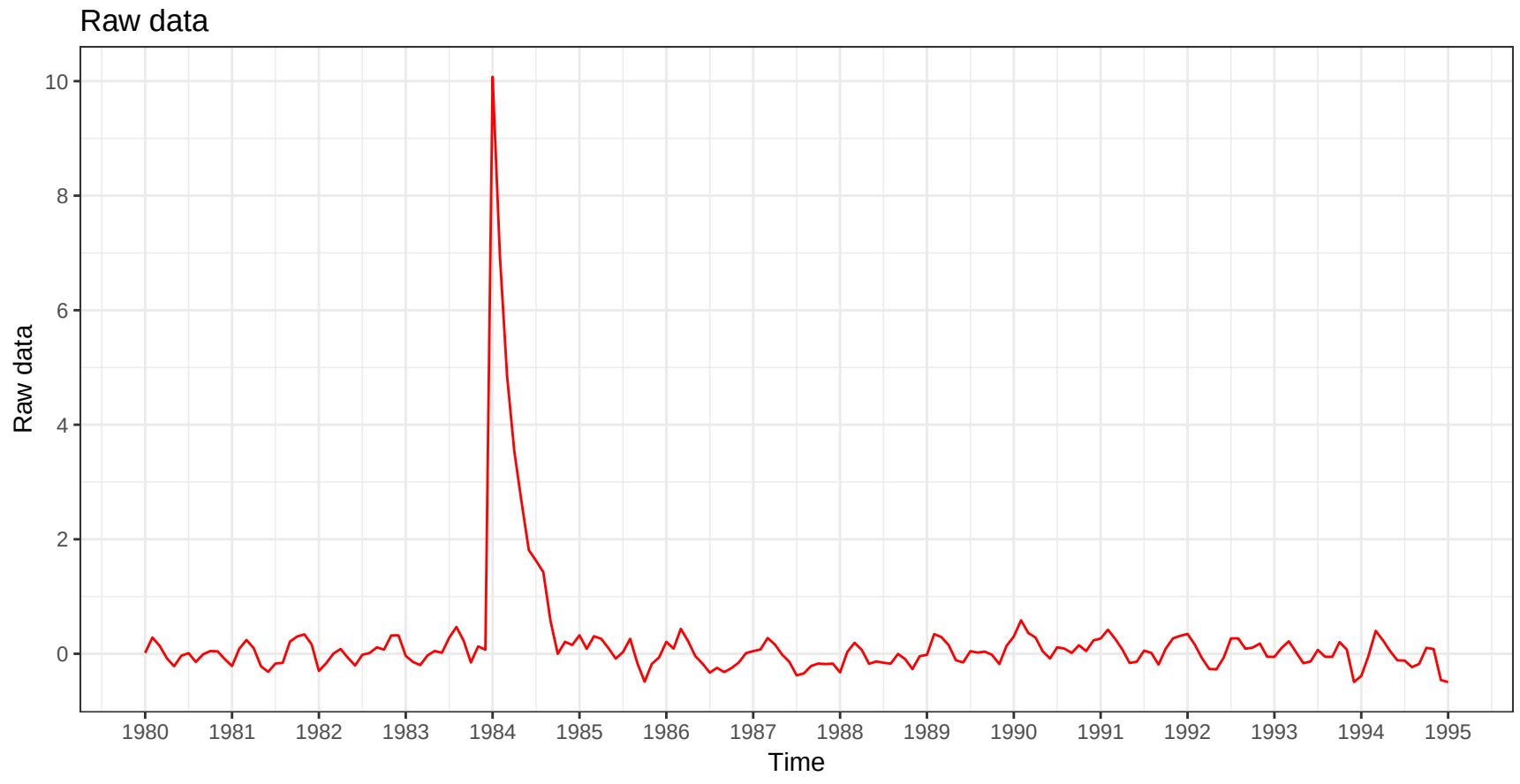
Estimate value of a TC(1984−01)
ARIMA (2,0,0)(0,0,0) − additive decomposition
(1−B+0.6B2)Xt=at



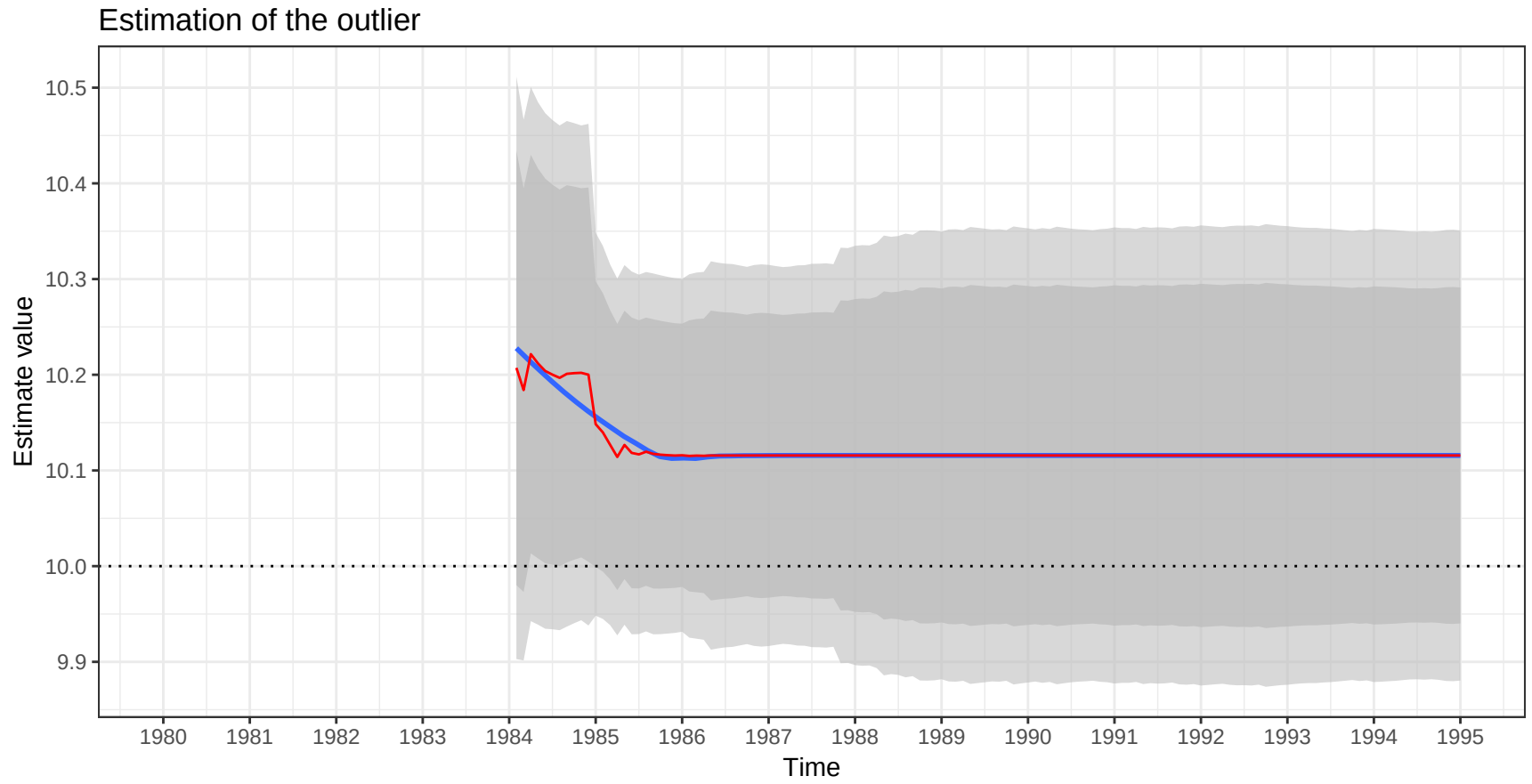


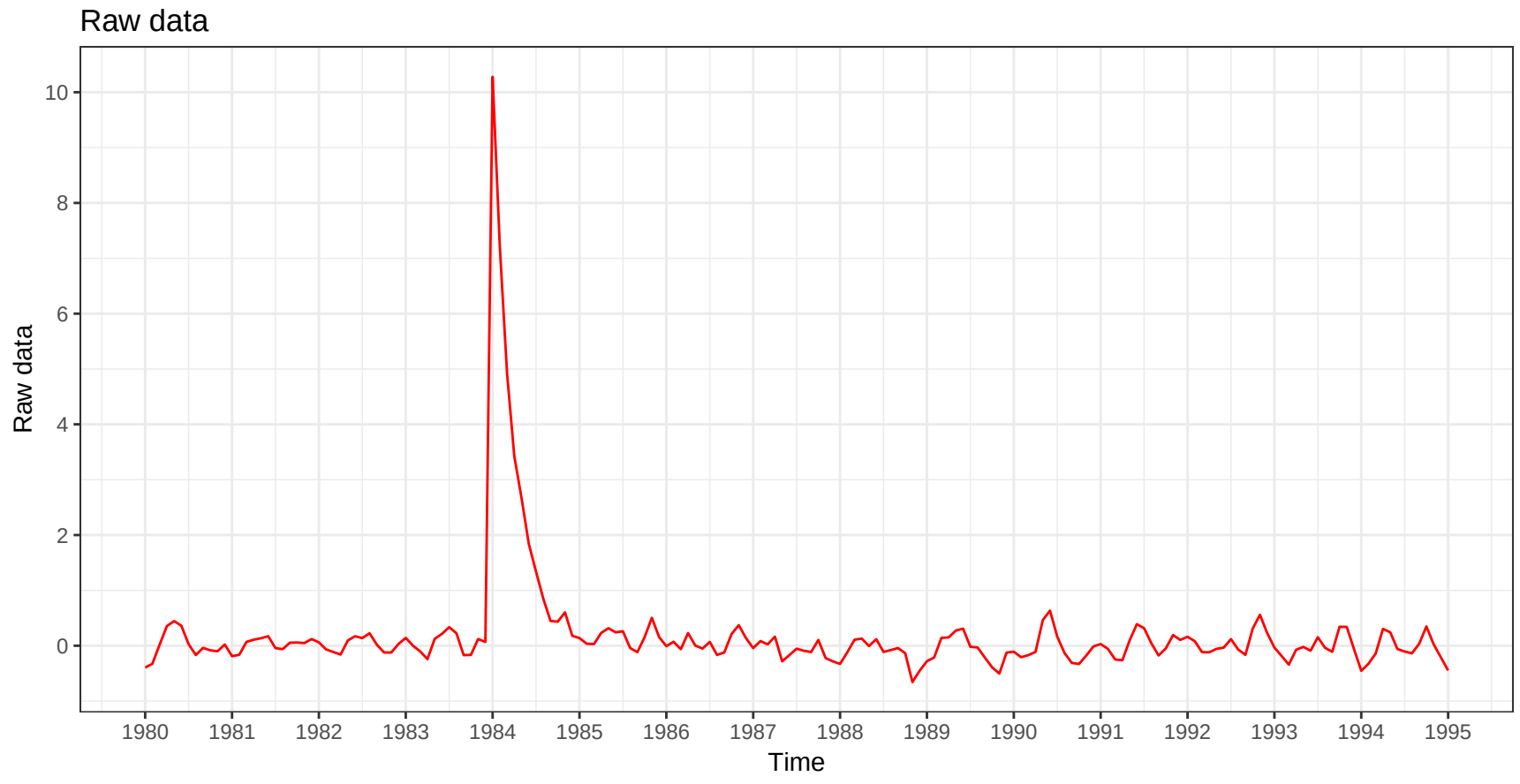
Estimate value of a TC(1984−01)
ARIMA (2,0,0)(0,0,0) − additive decomposition
(1−B+0.6B2)Xt=at

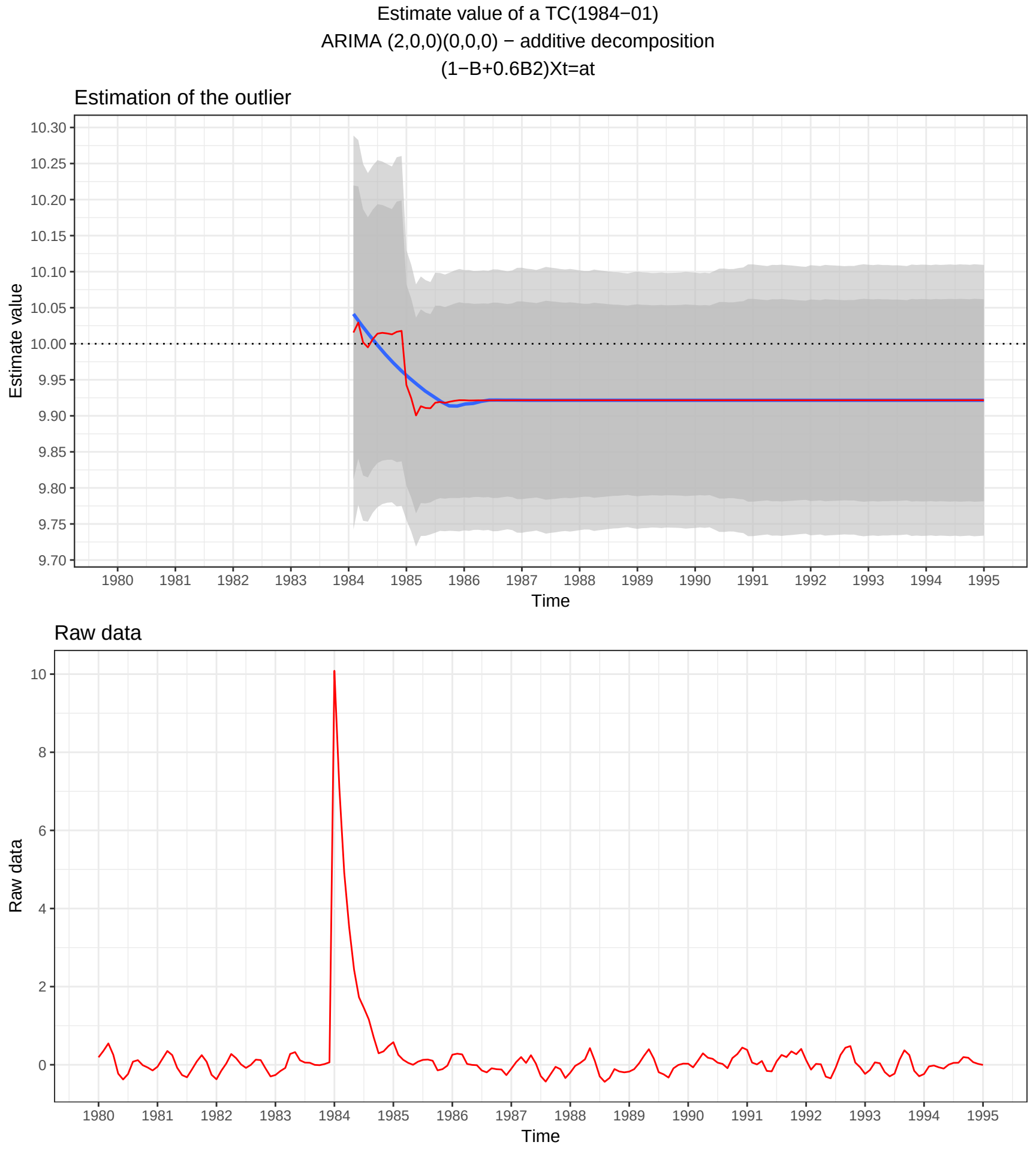




Estimate value of a TC(1984−01)
ARIMA (2,0,0)(0,0,0) − additive decomposition
(1−B+0.6B2)Xt=at






Estimate value of a TC(1984−01)
ARIMA (2,0,0)(0,0,0) − additive decomposition
(1−B+0.6B2)Xt=at
Estimation of the outlier
Estimate value
10.30
10.25
10.20
10.15
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10.05
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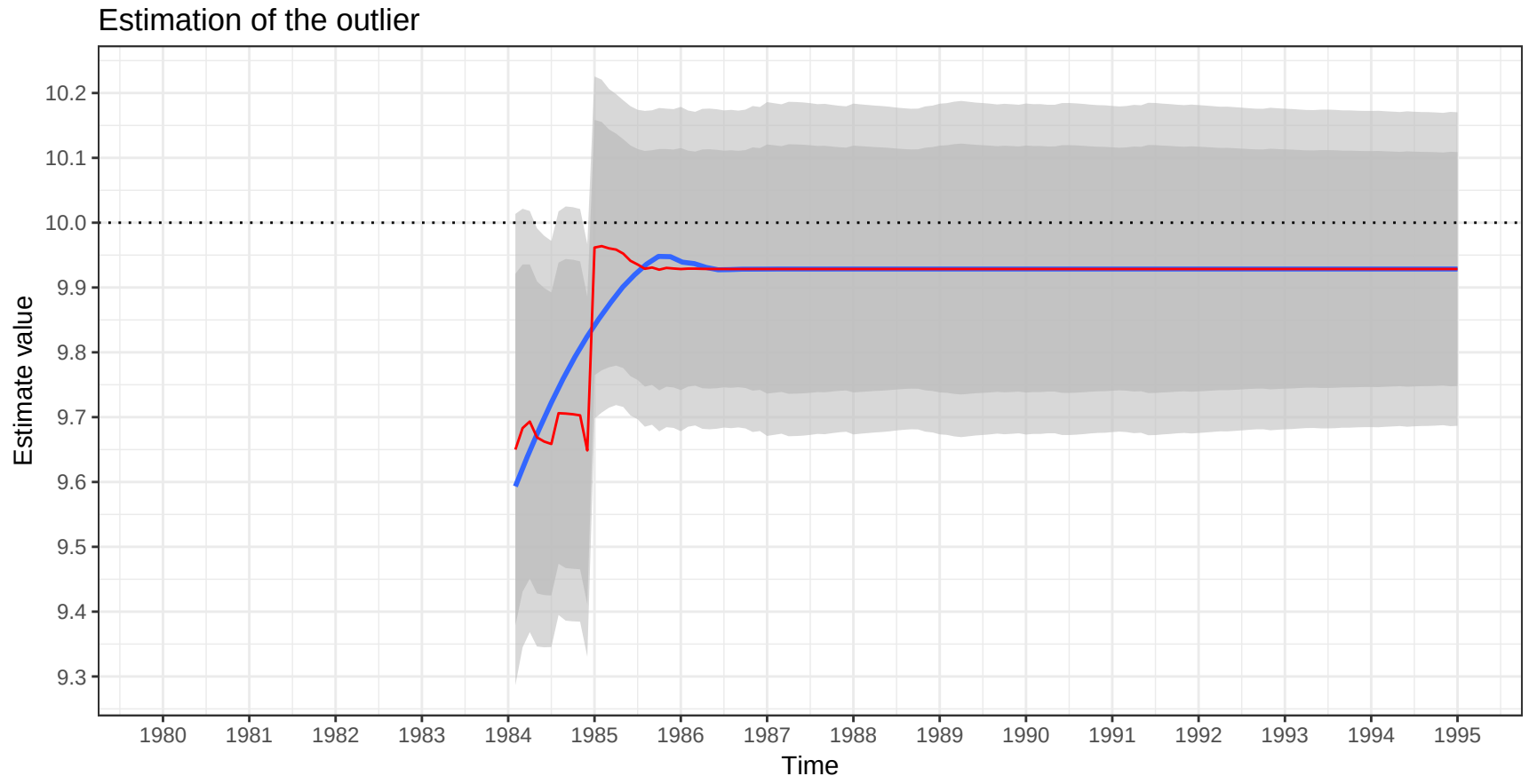
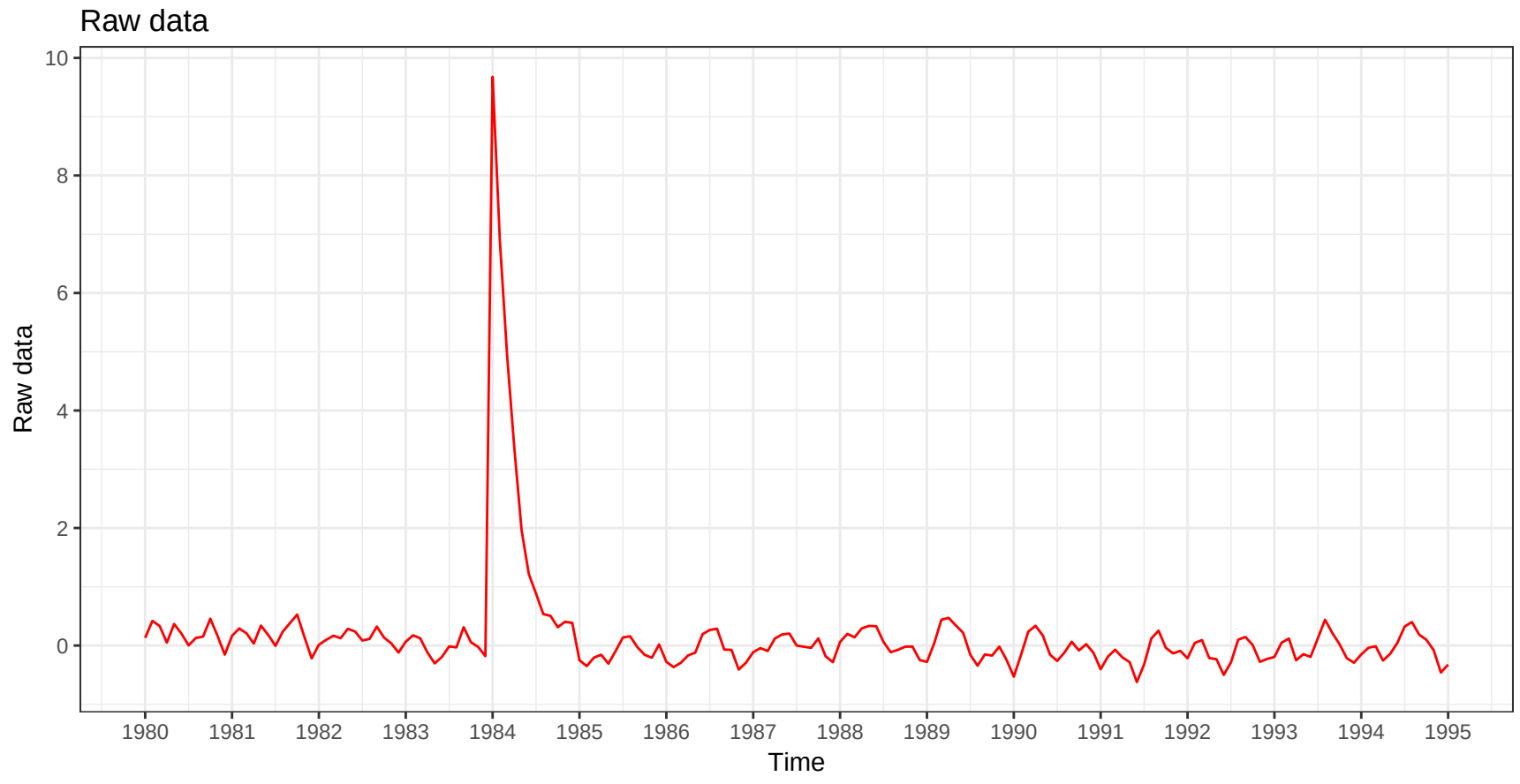
1995
Time

Estimate value of a TC(1984−01)
ARIMA (2,0,0)(0,0,0) − additive decomposition
(1−B+0.6B2)Xt=at





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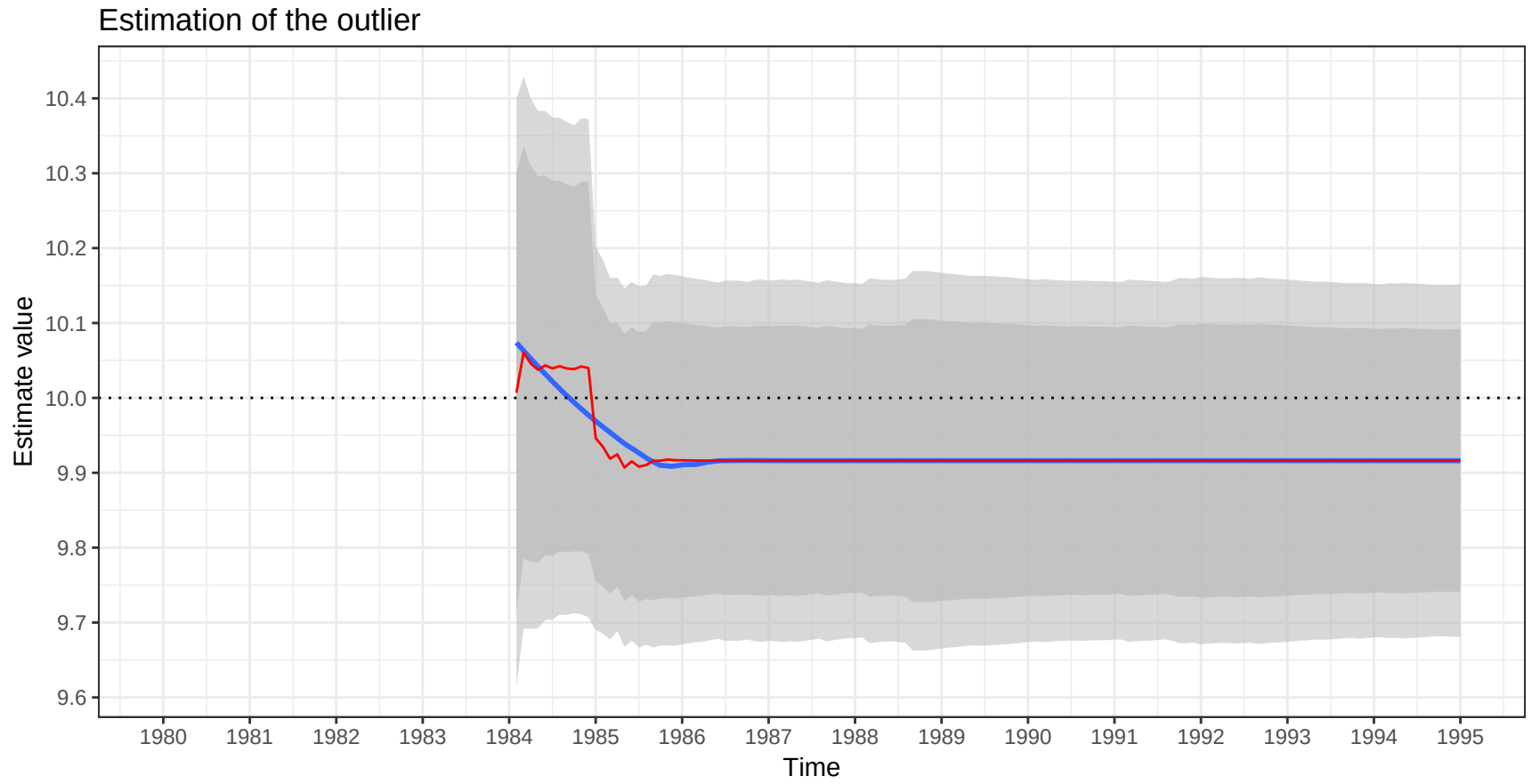

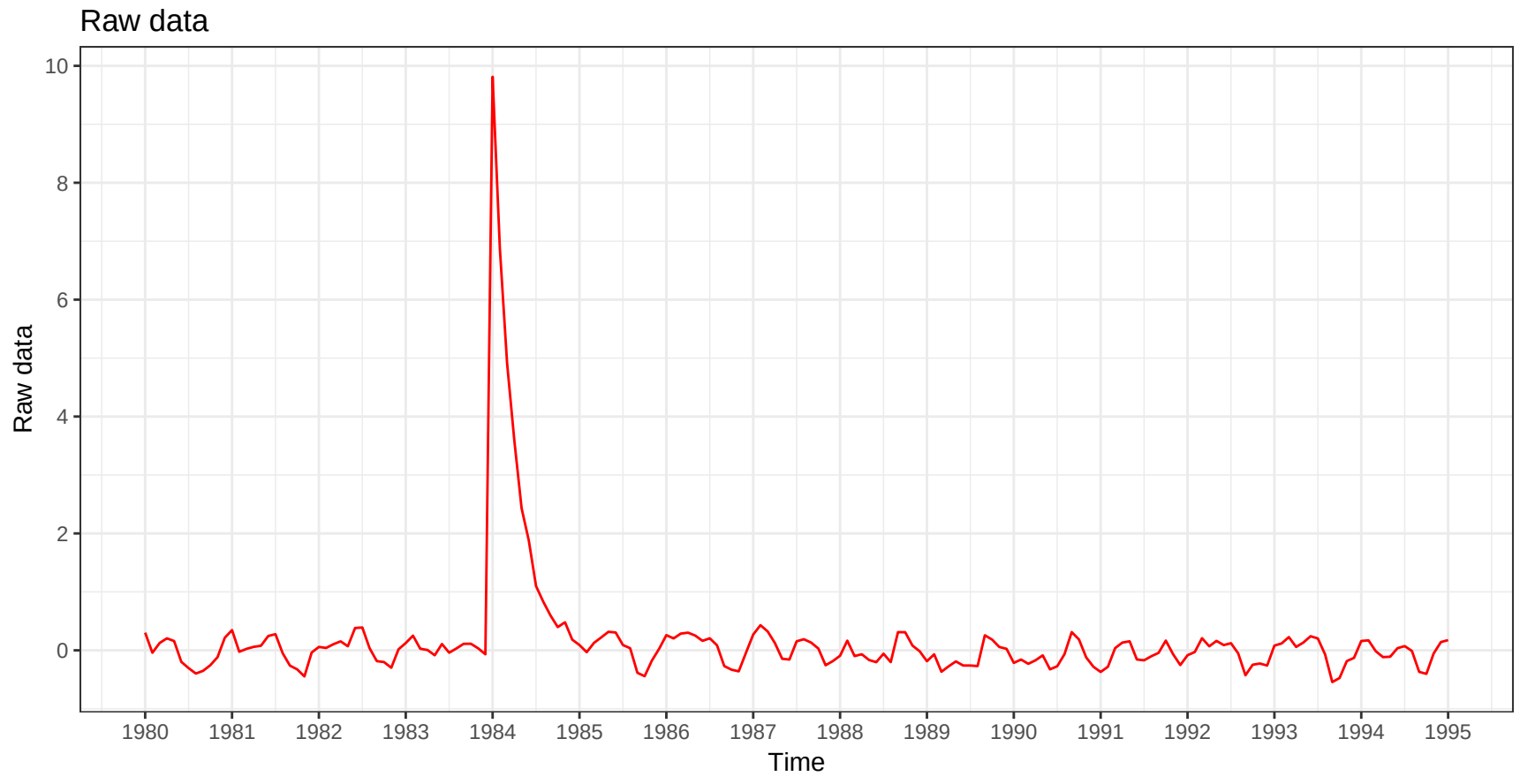

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ARIMA (2,0,0)(0,0,0) − additive decomposition
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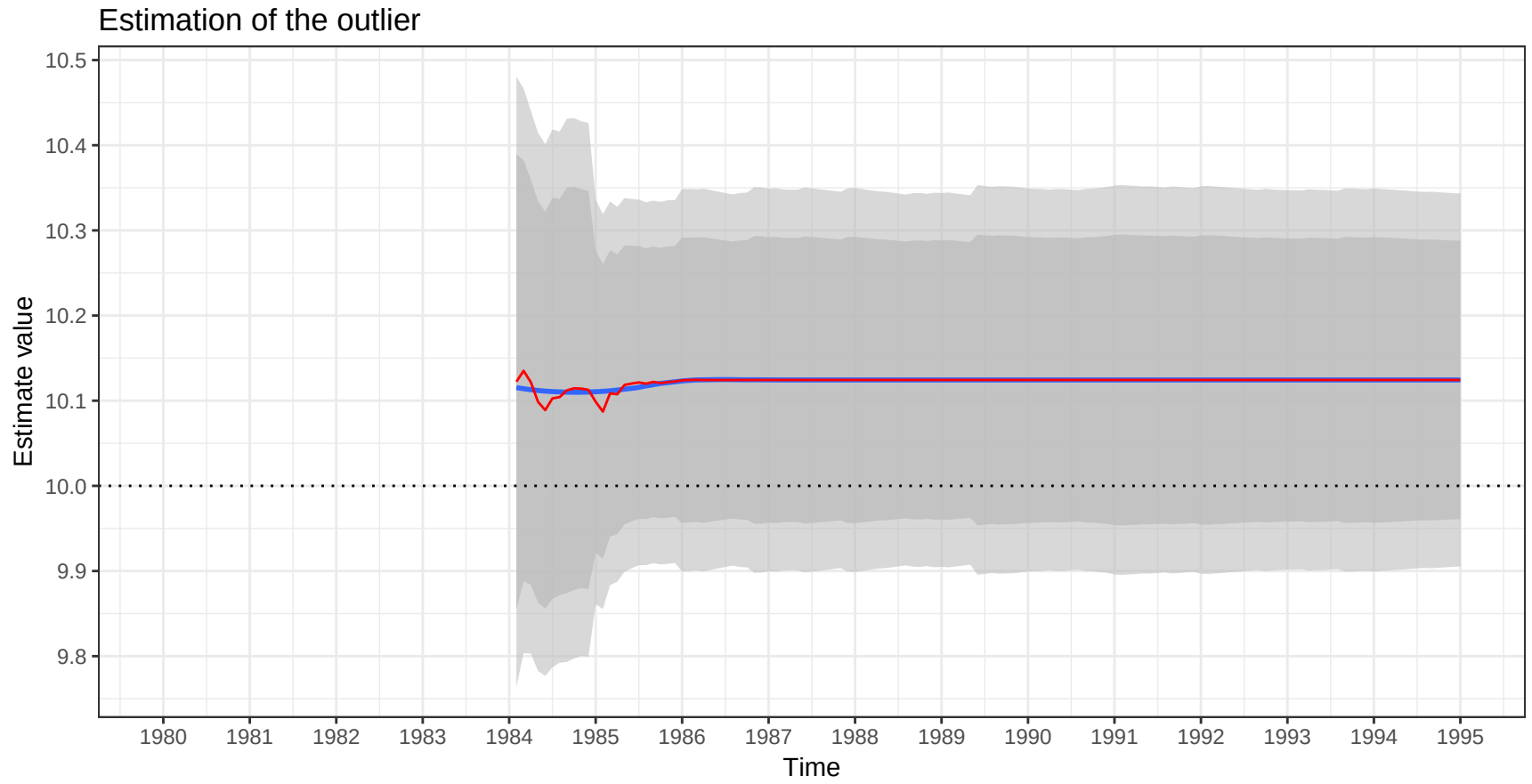

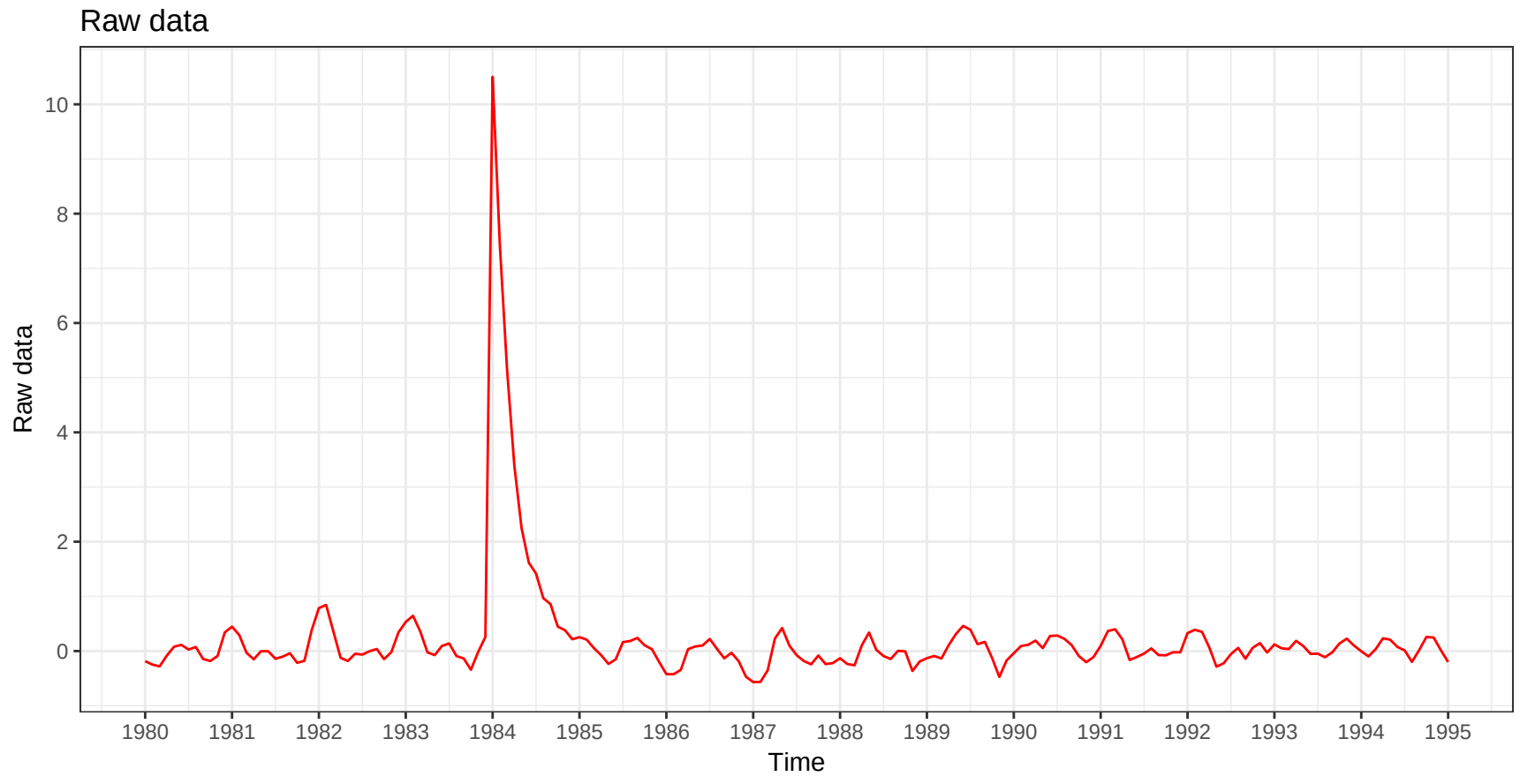

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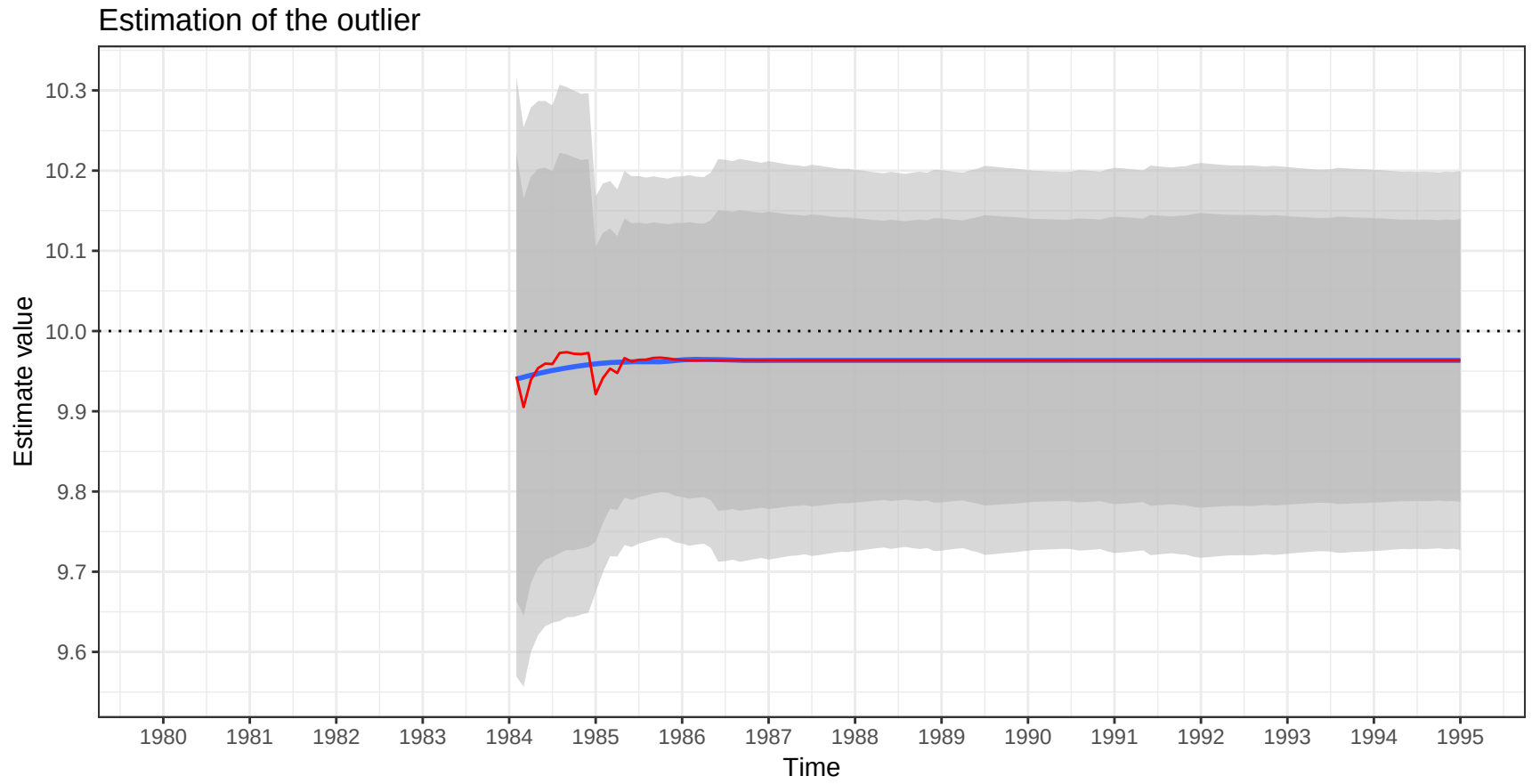

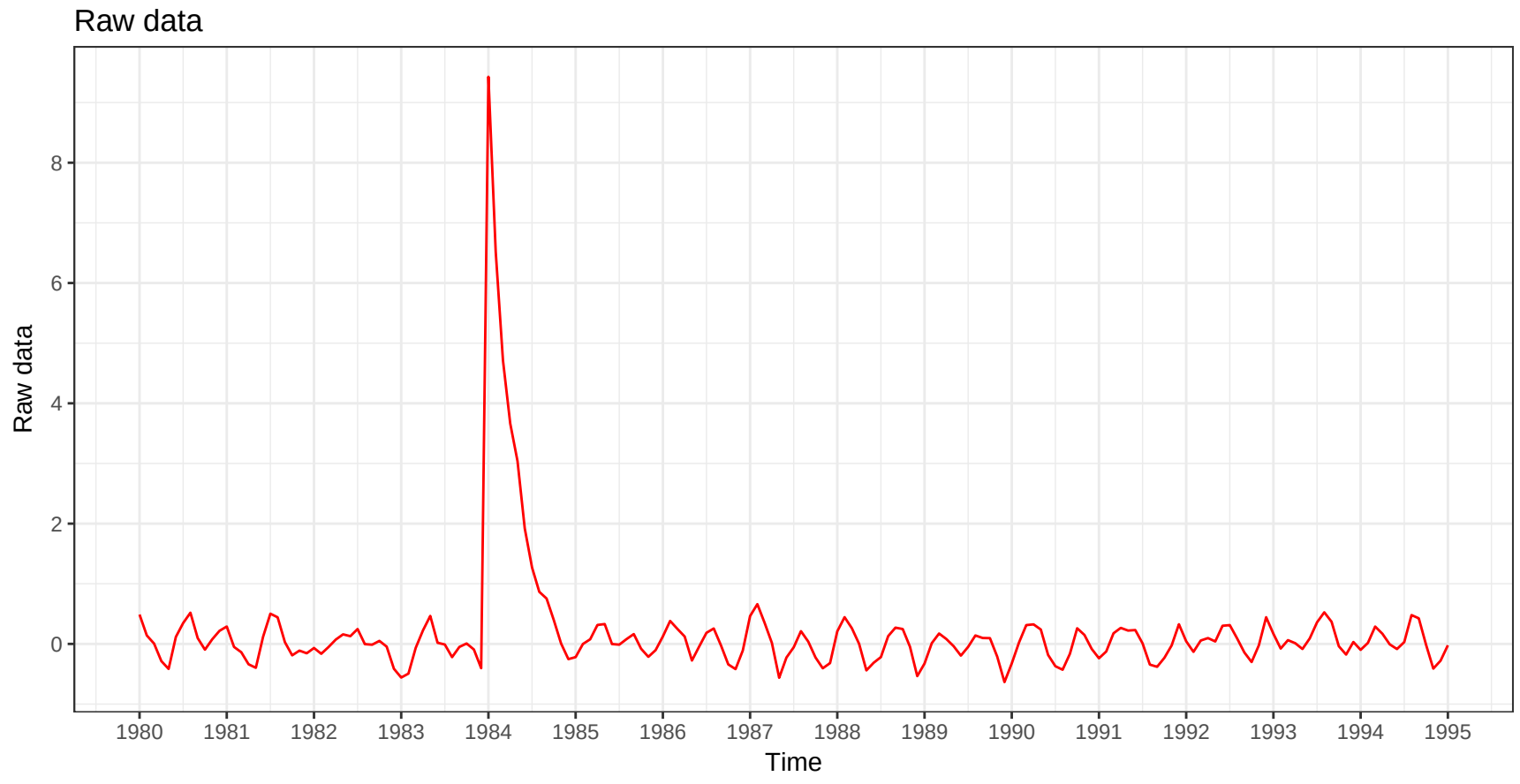

Estimate value of a TC(1984−01)
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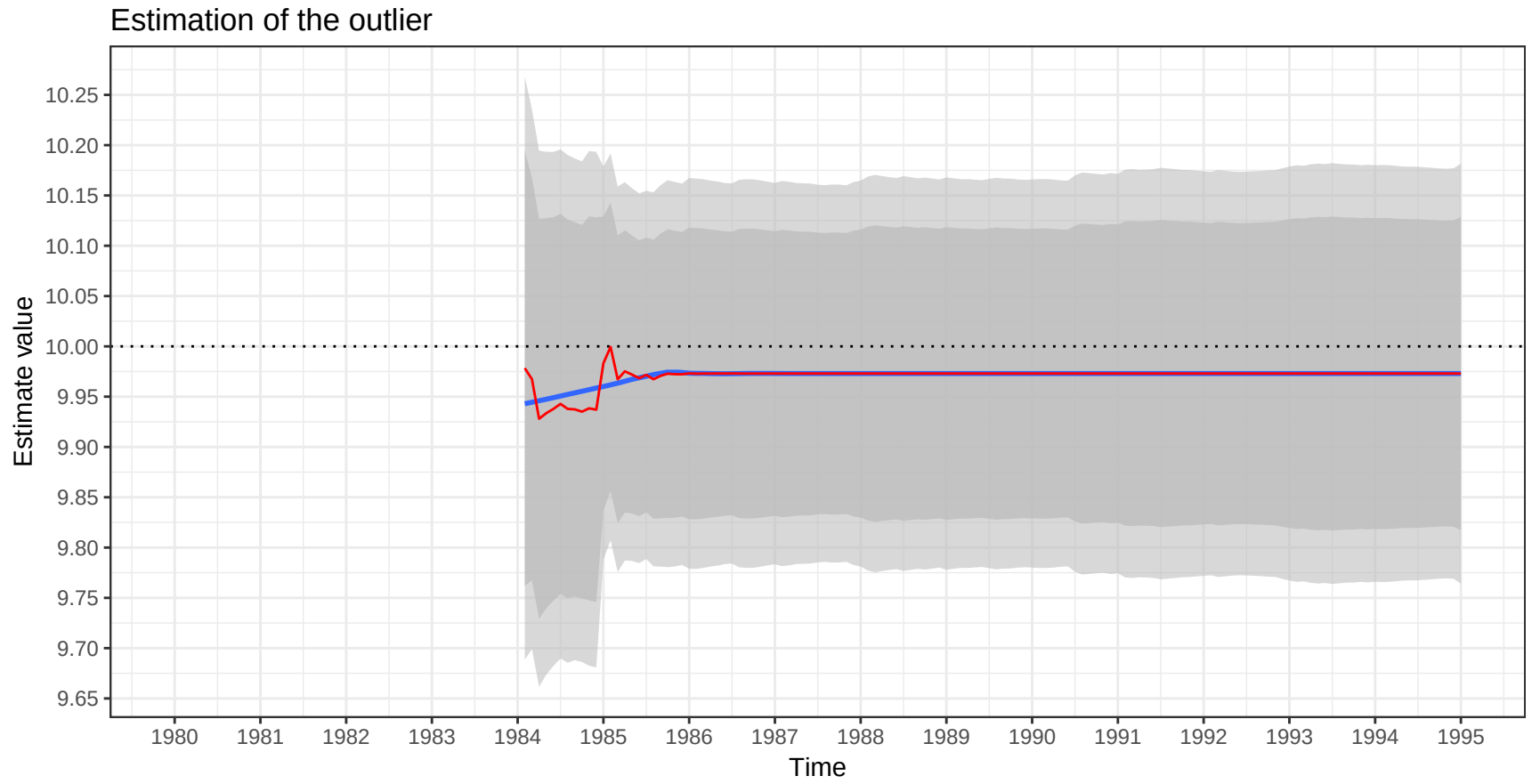

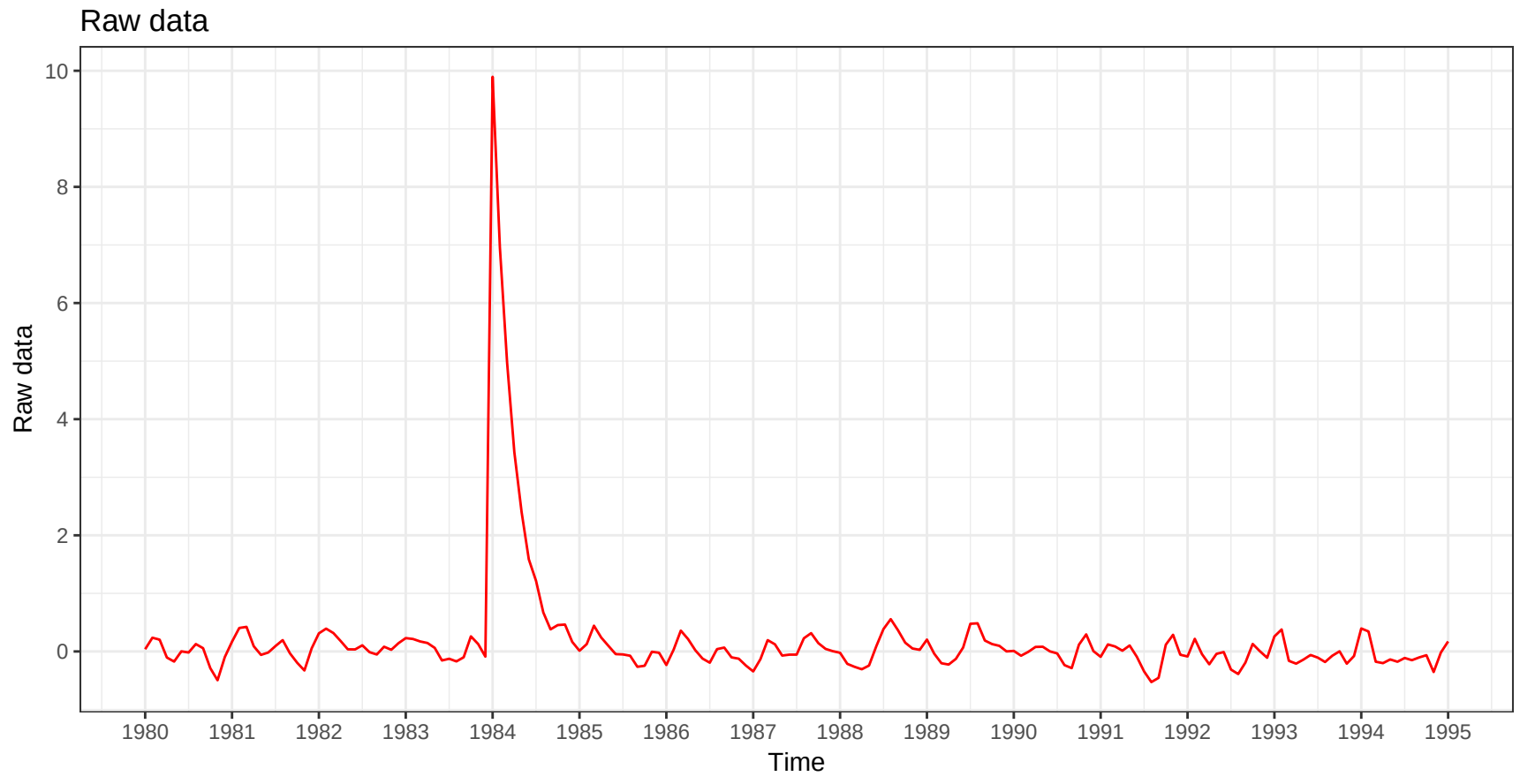

Estimate value of a TC(1984−01)
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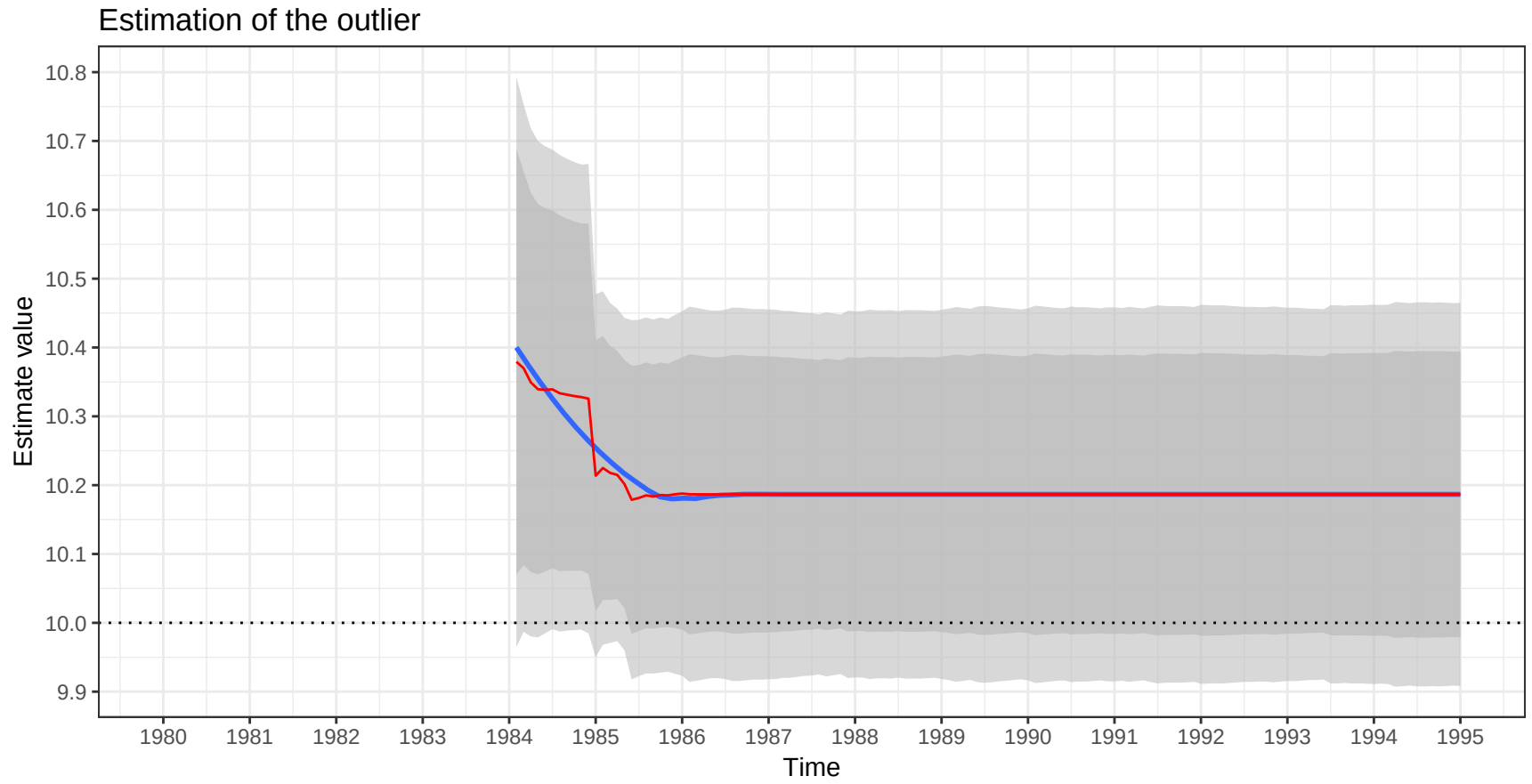
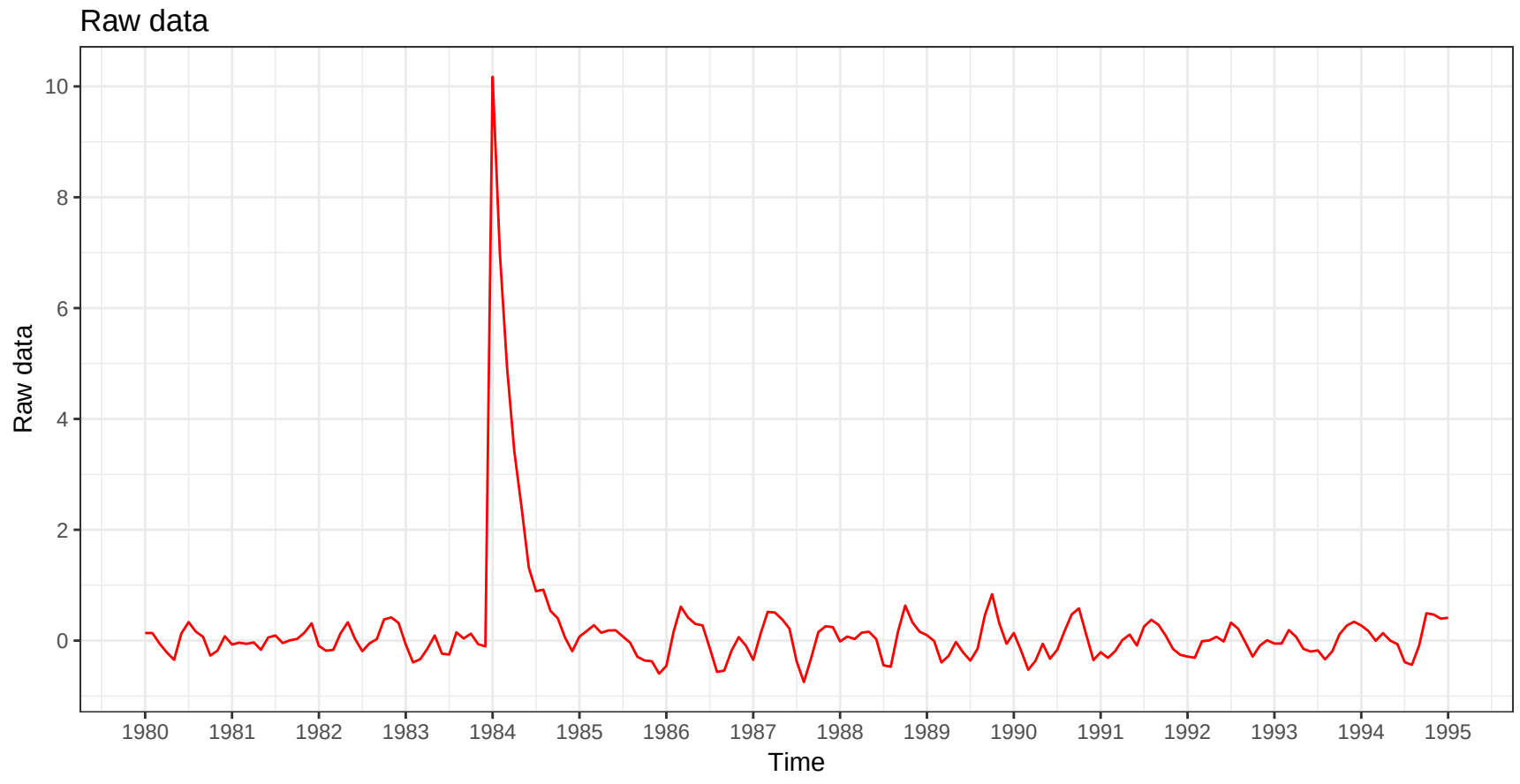
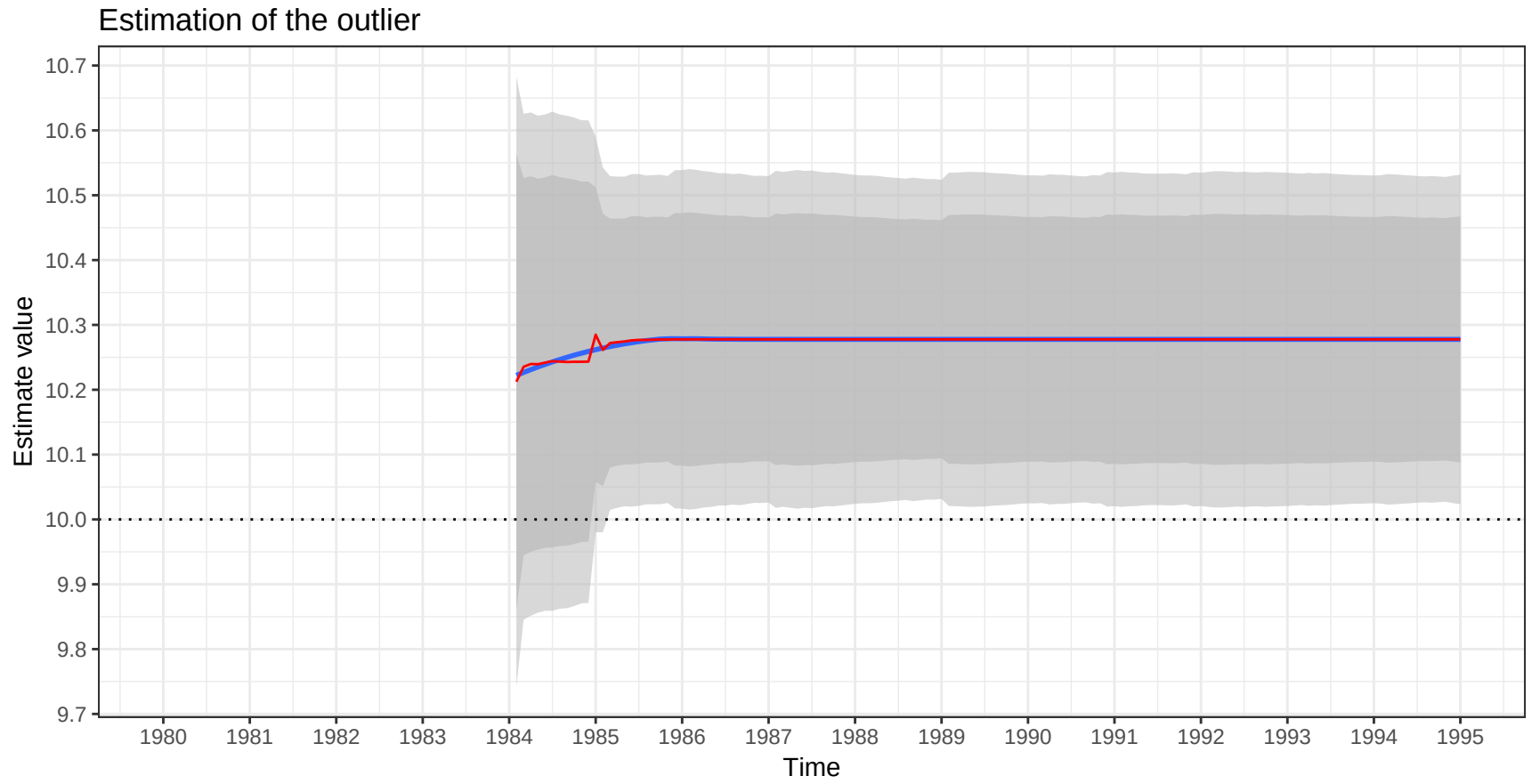
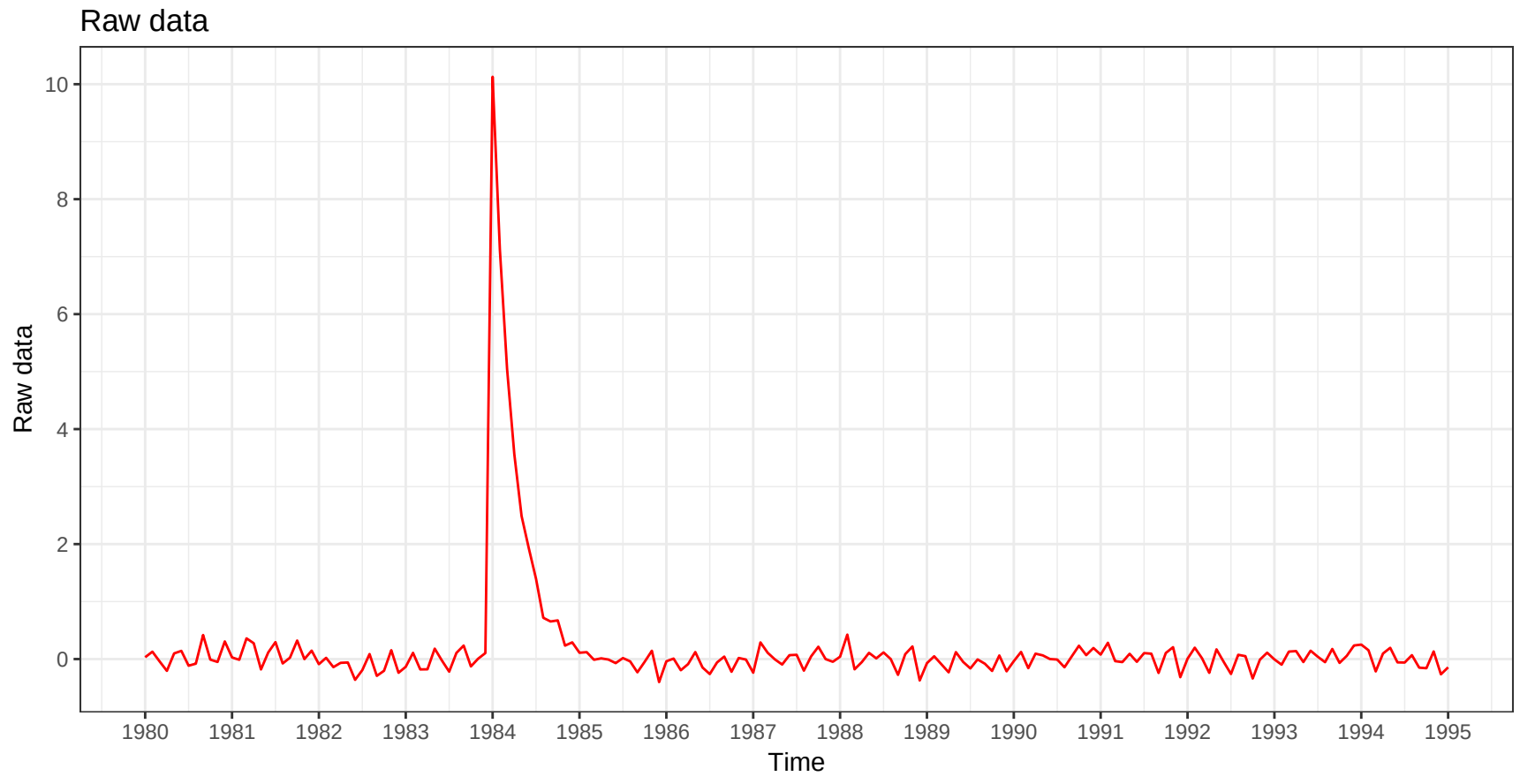




Estimate value of a TC(1984−01)
ARIMA (3,0,0)(0,0,0) − additive decomposition
(1+0.3B2−0.5B3)Xt=at





Estimate value of a TC(1984−01)
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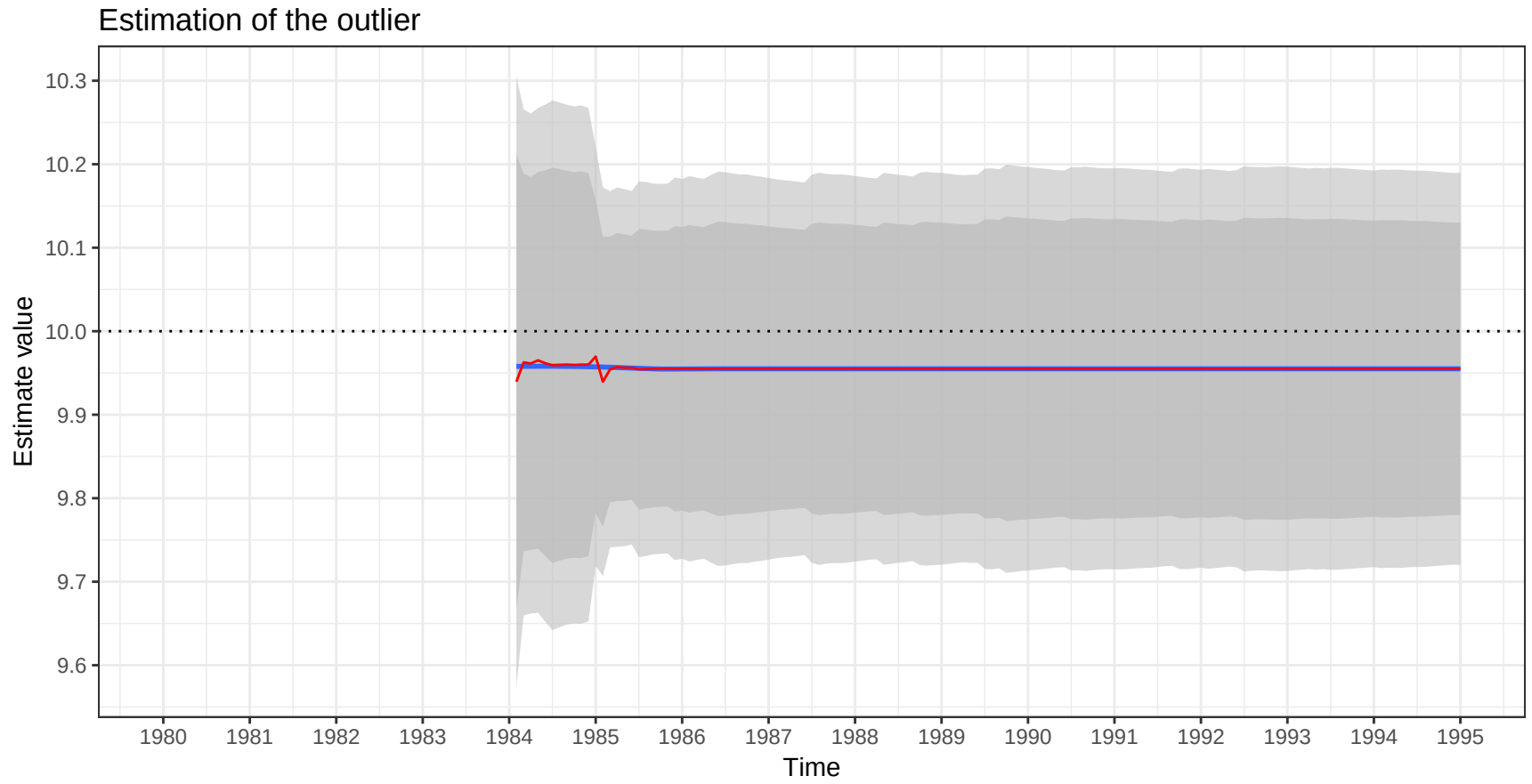
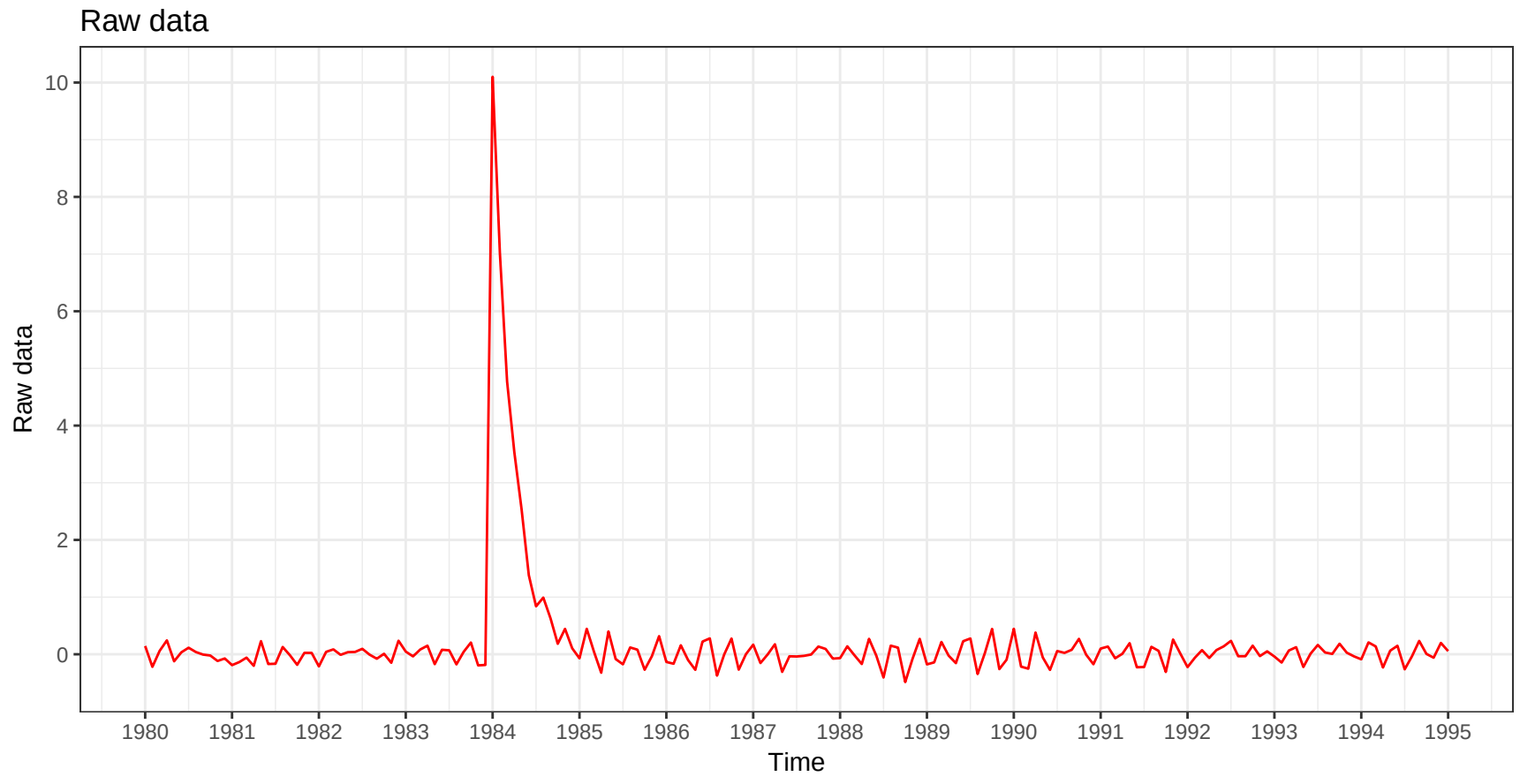
(1+0.3B2−0.5B3)Xt=at





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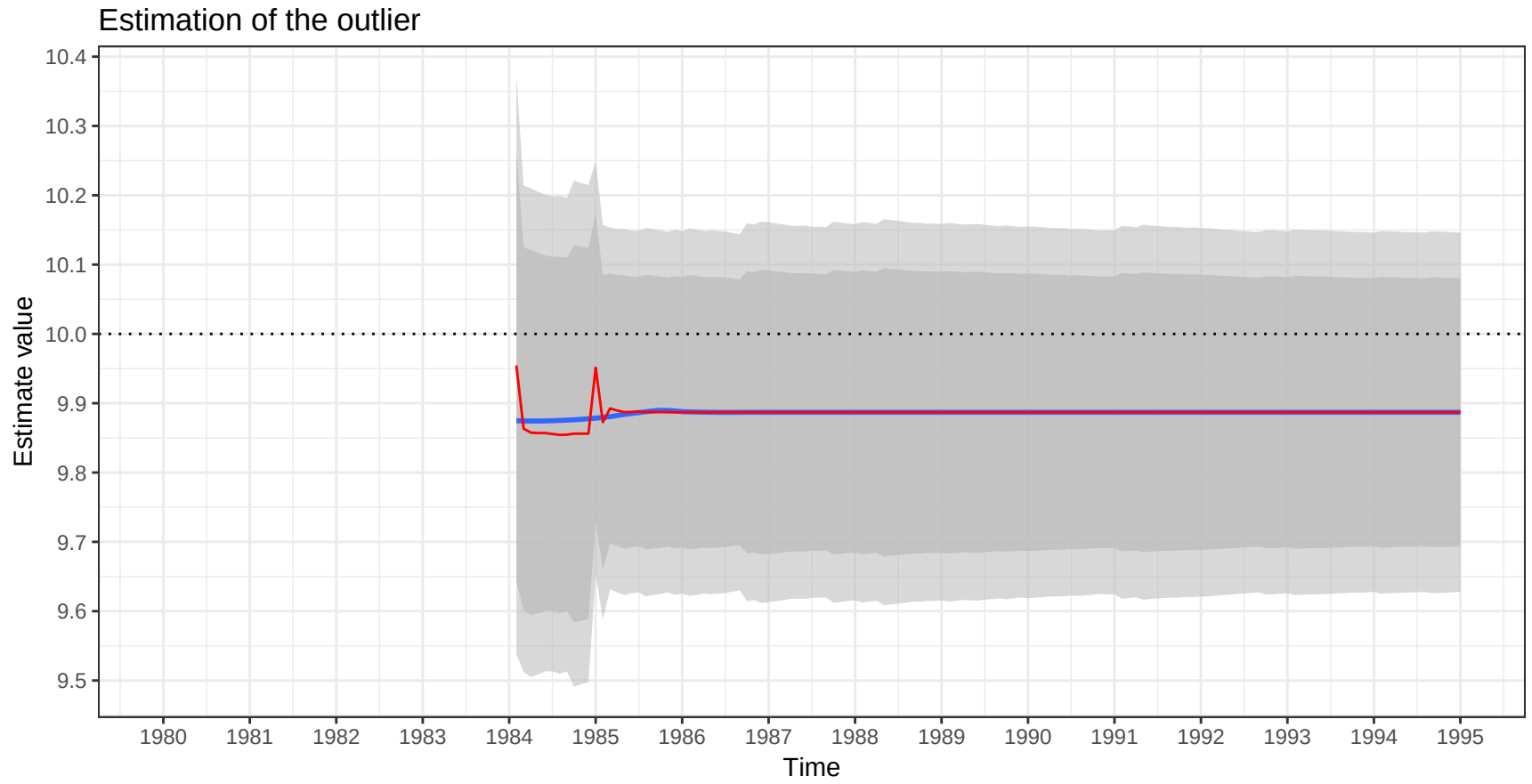

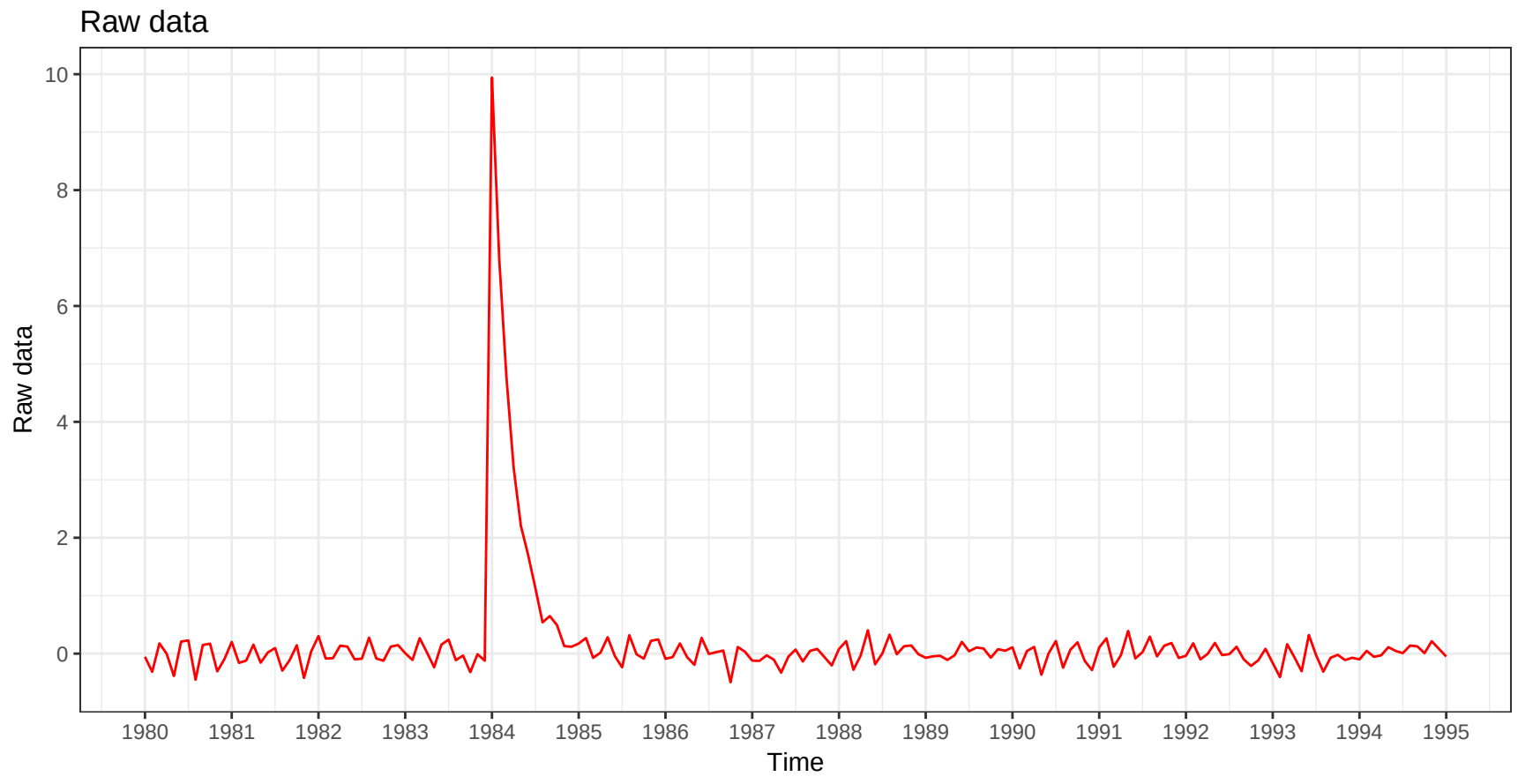

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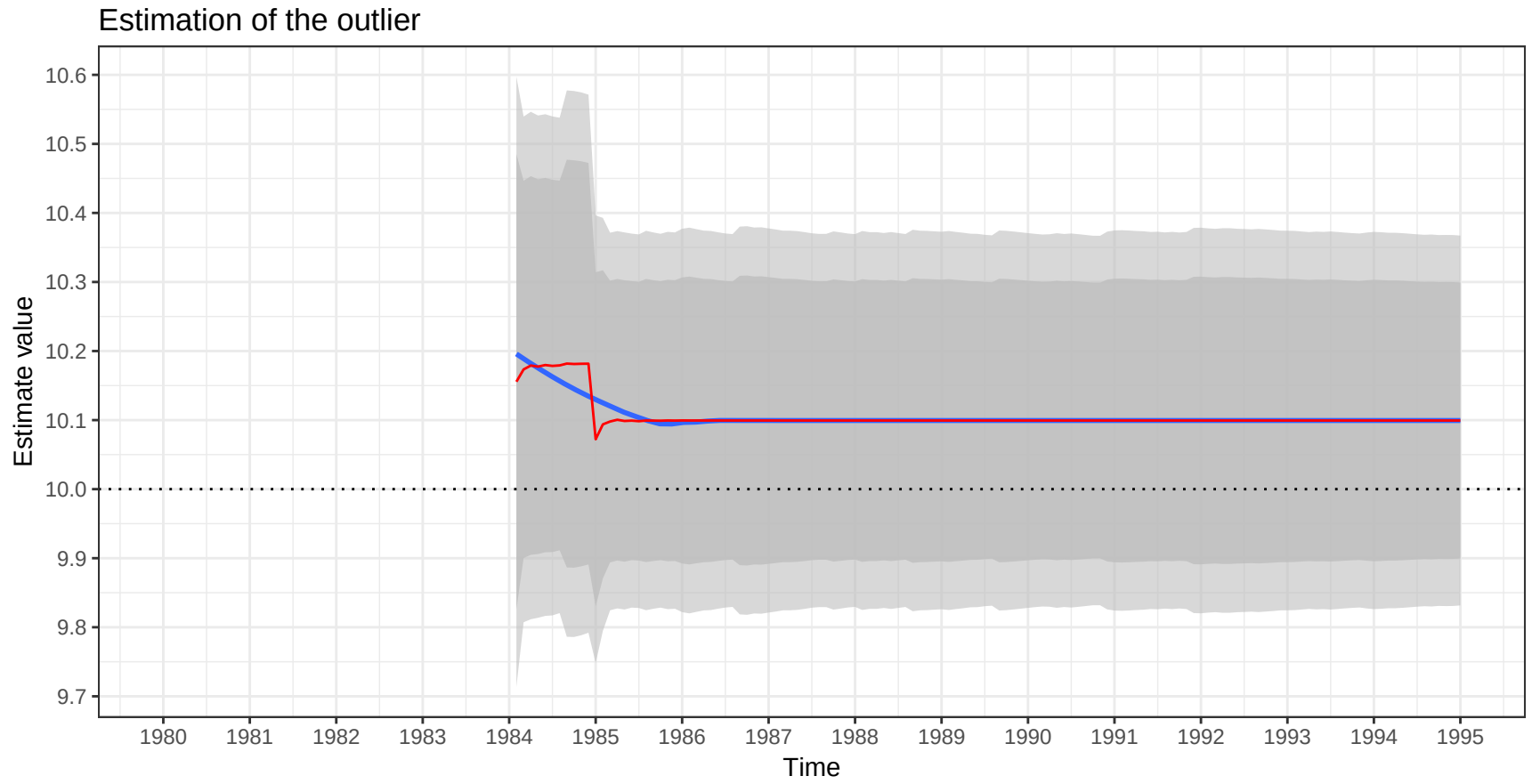

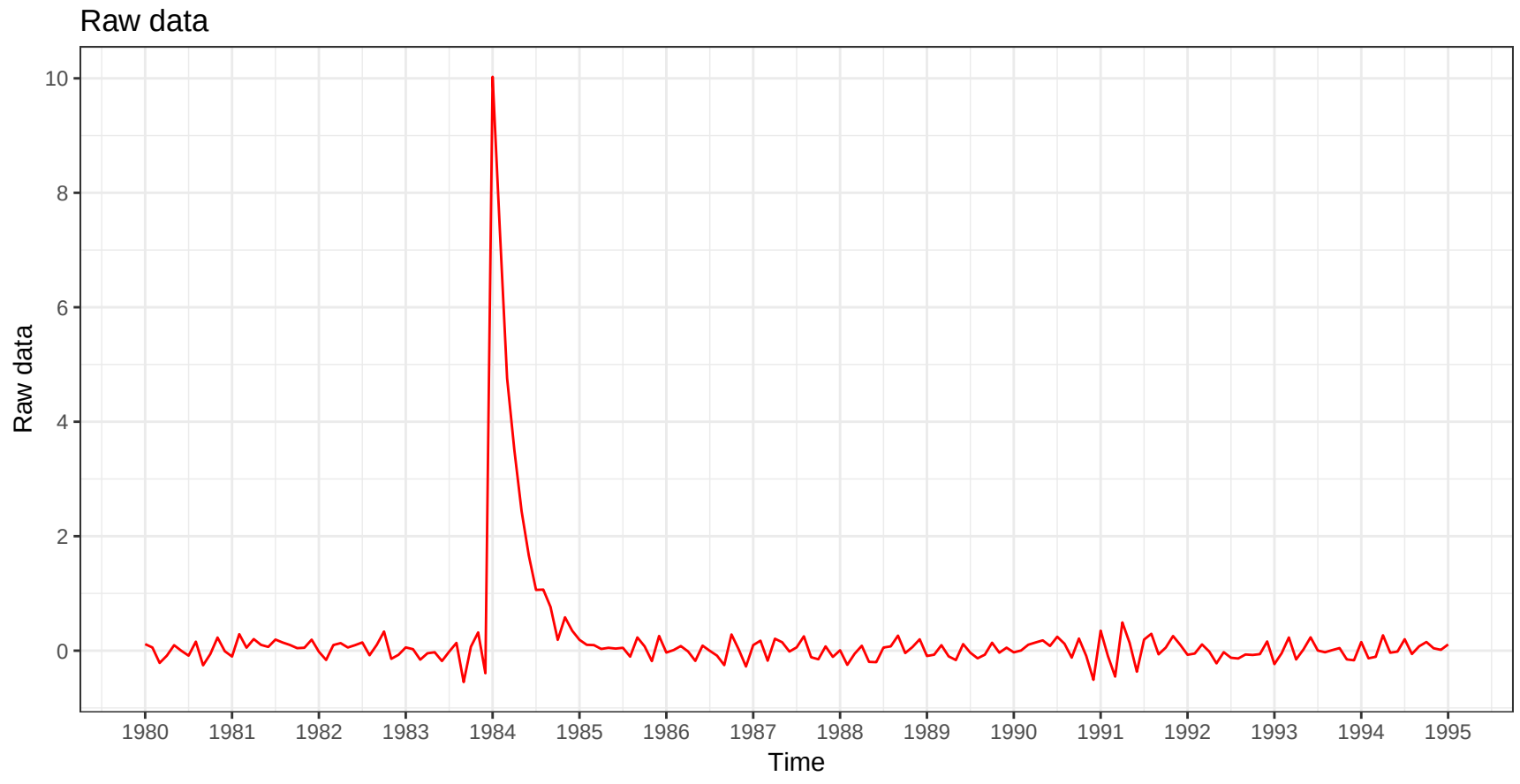

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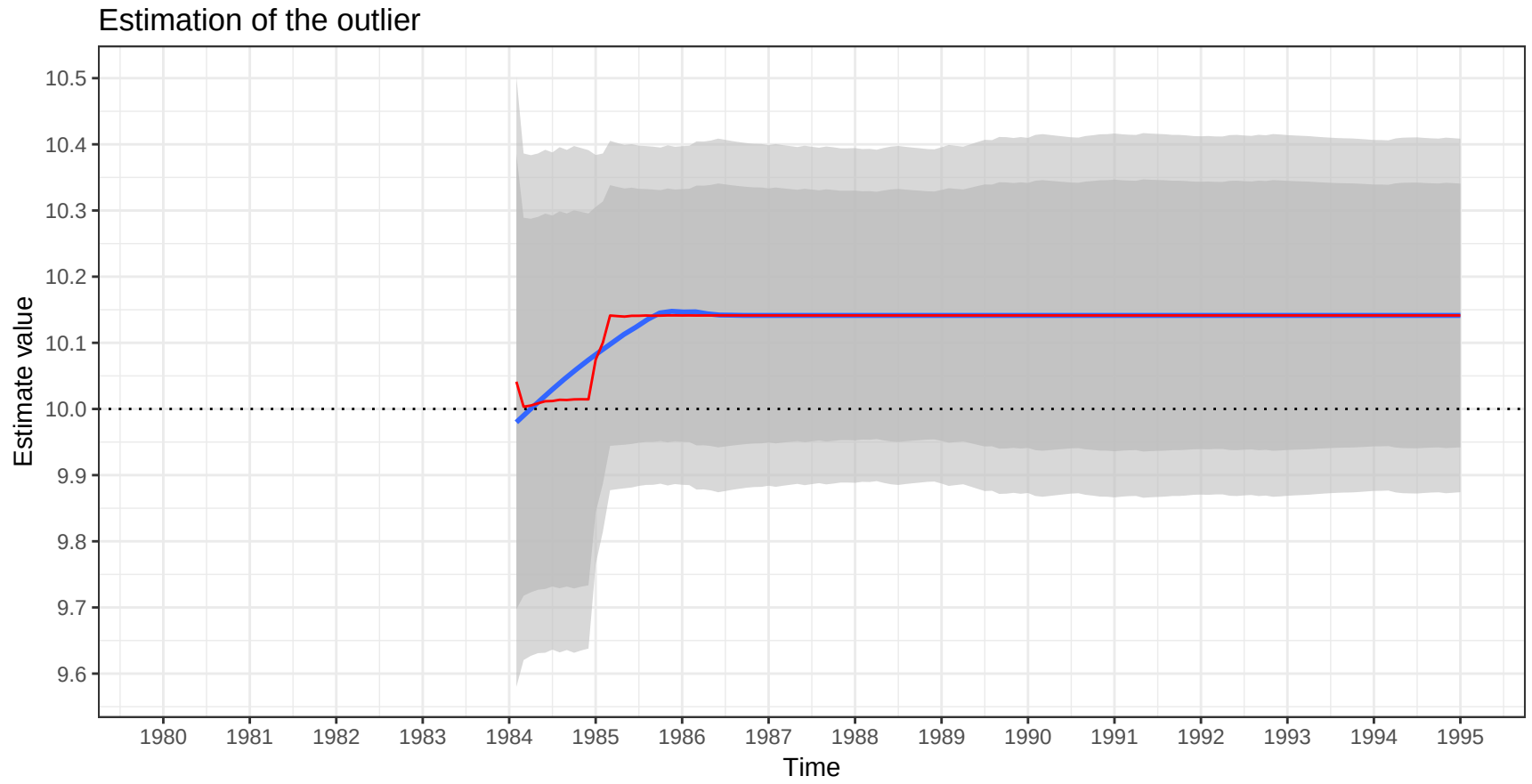

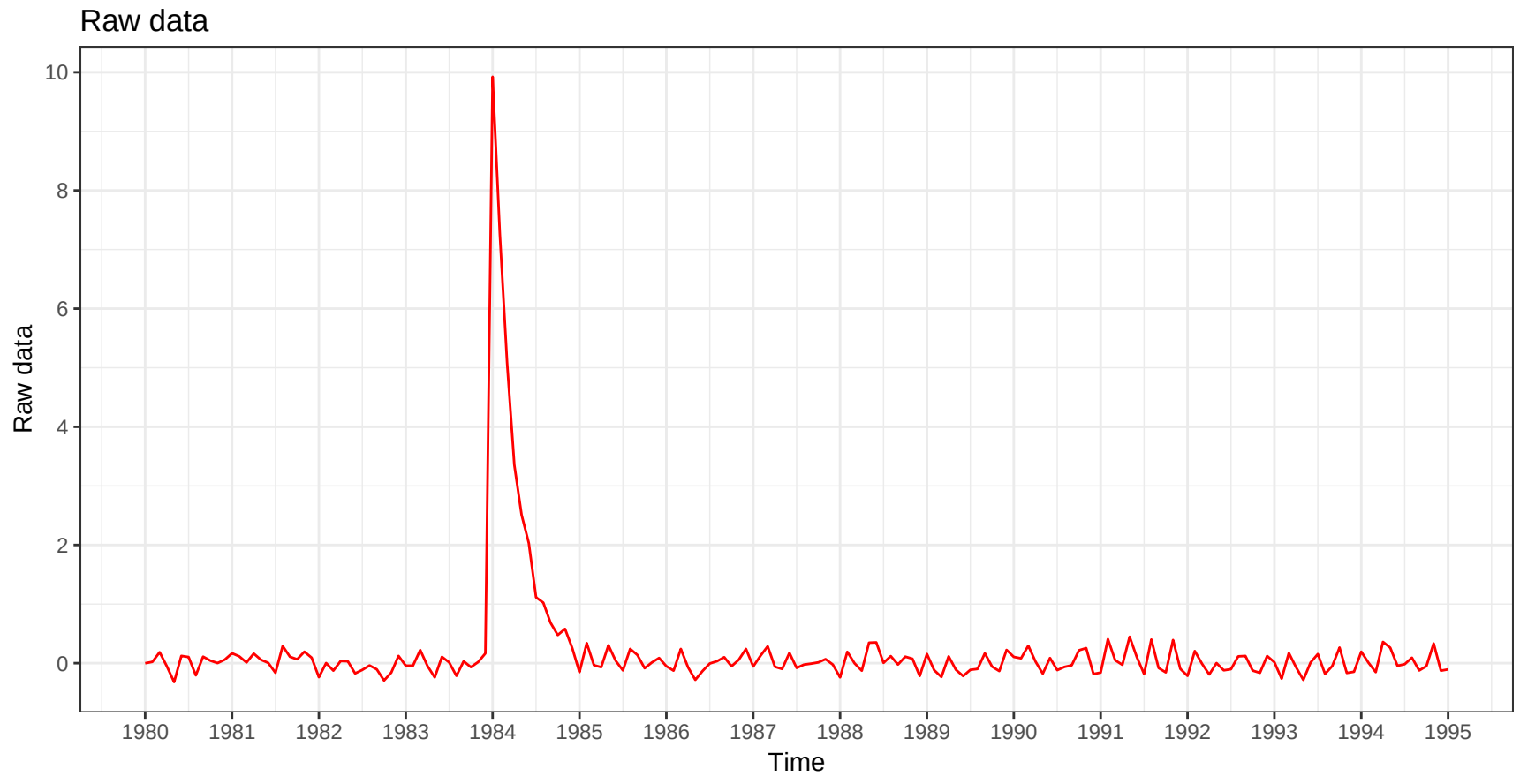

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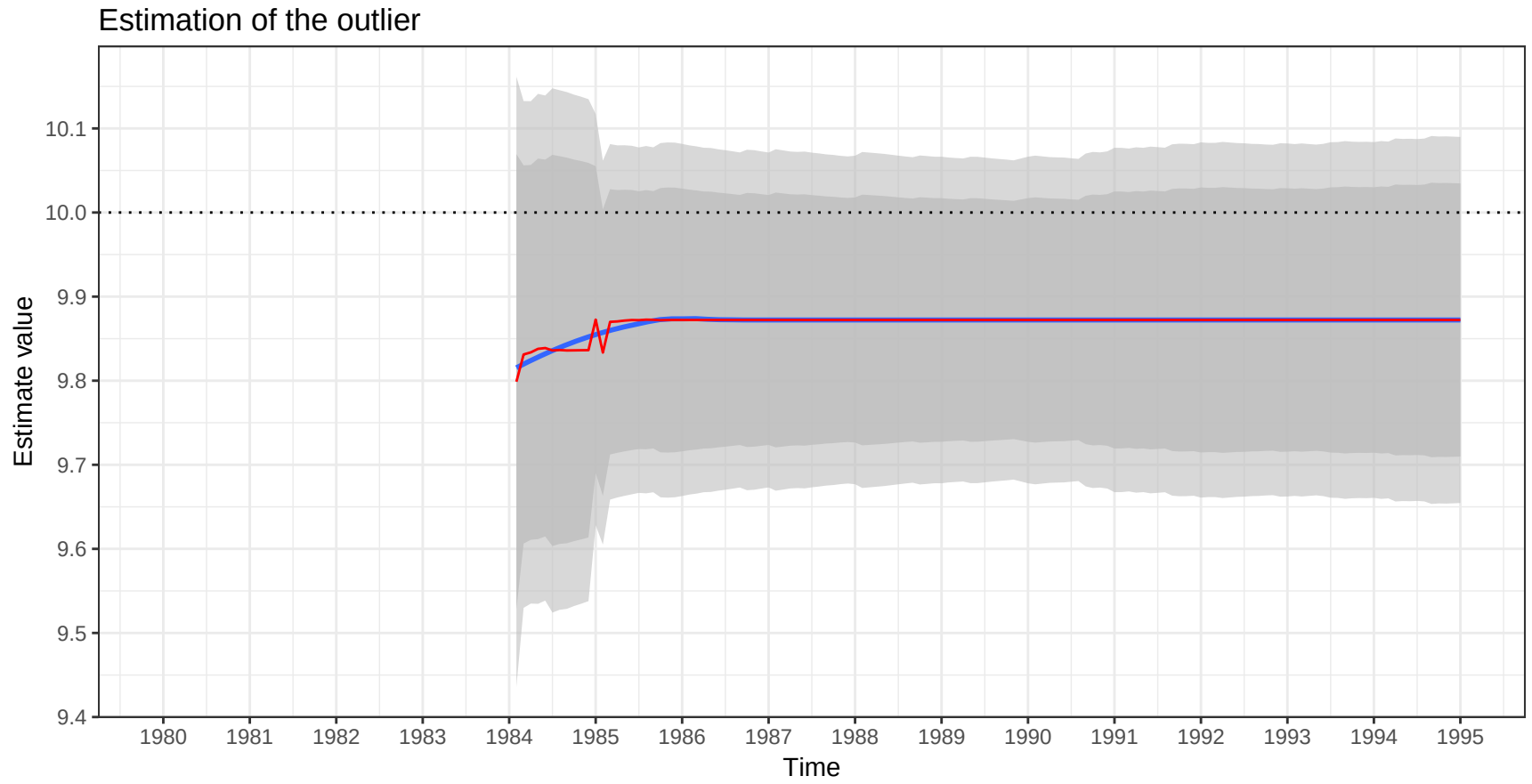

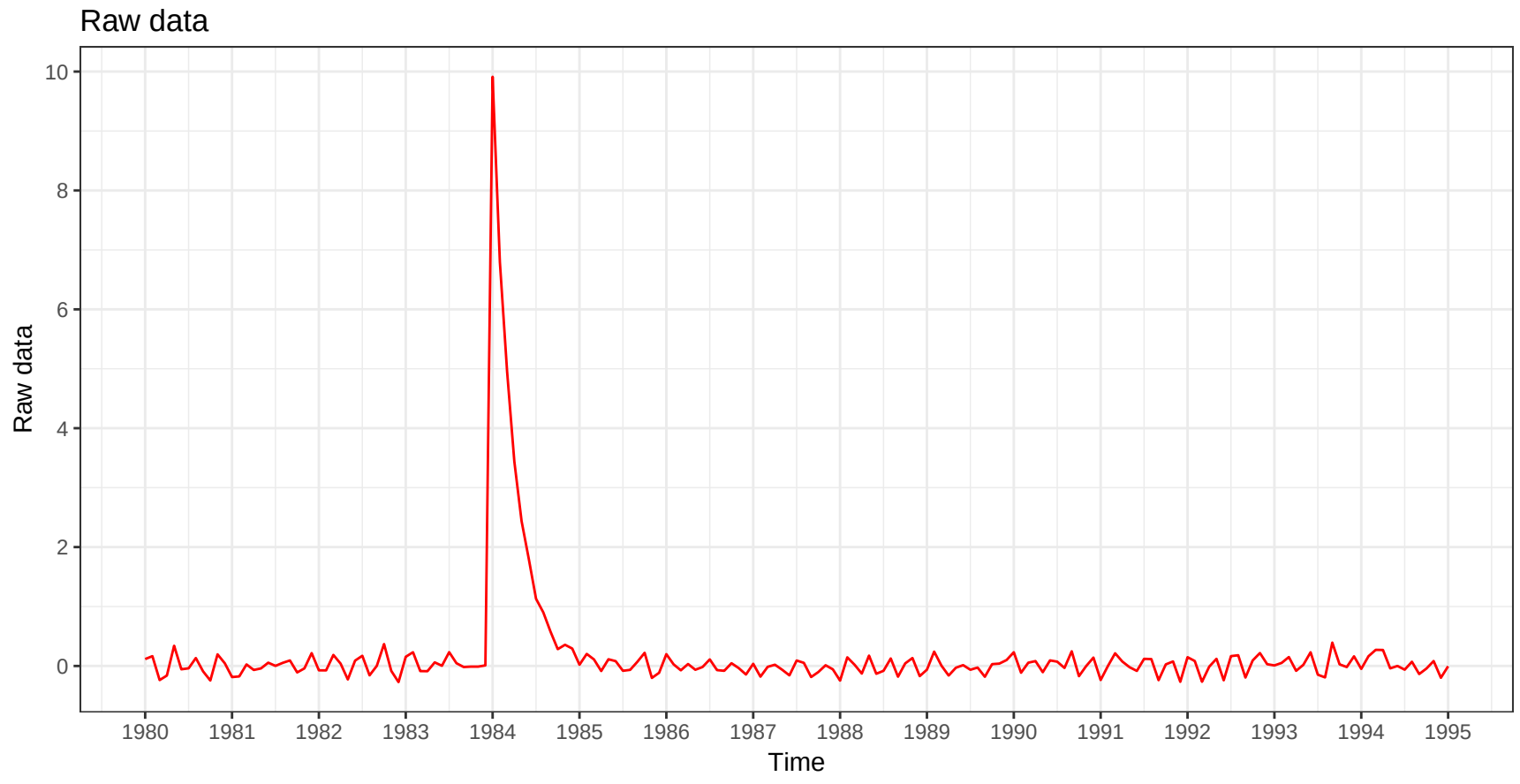

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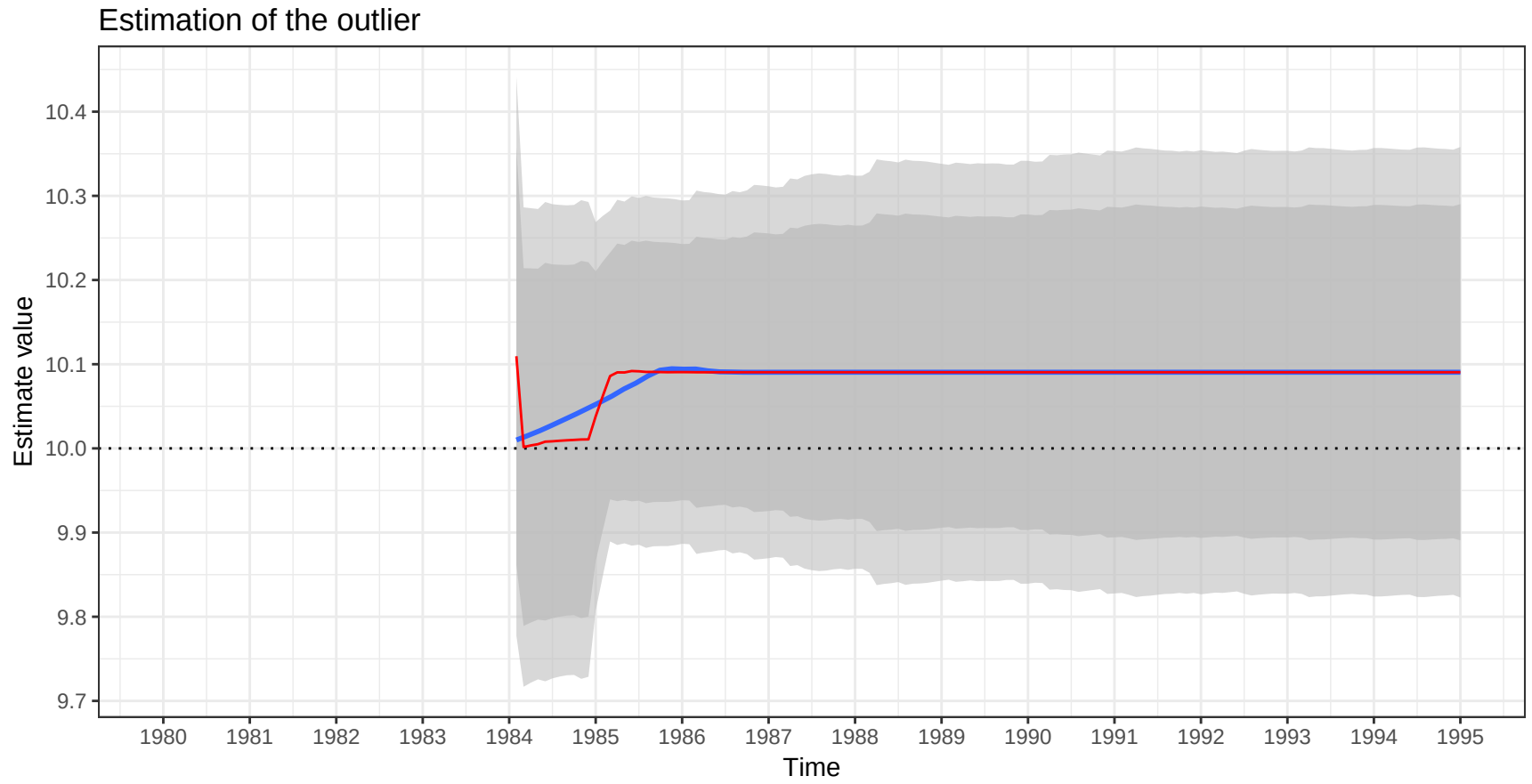

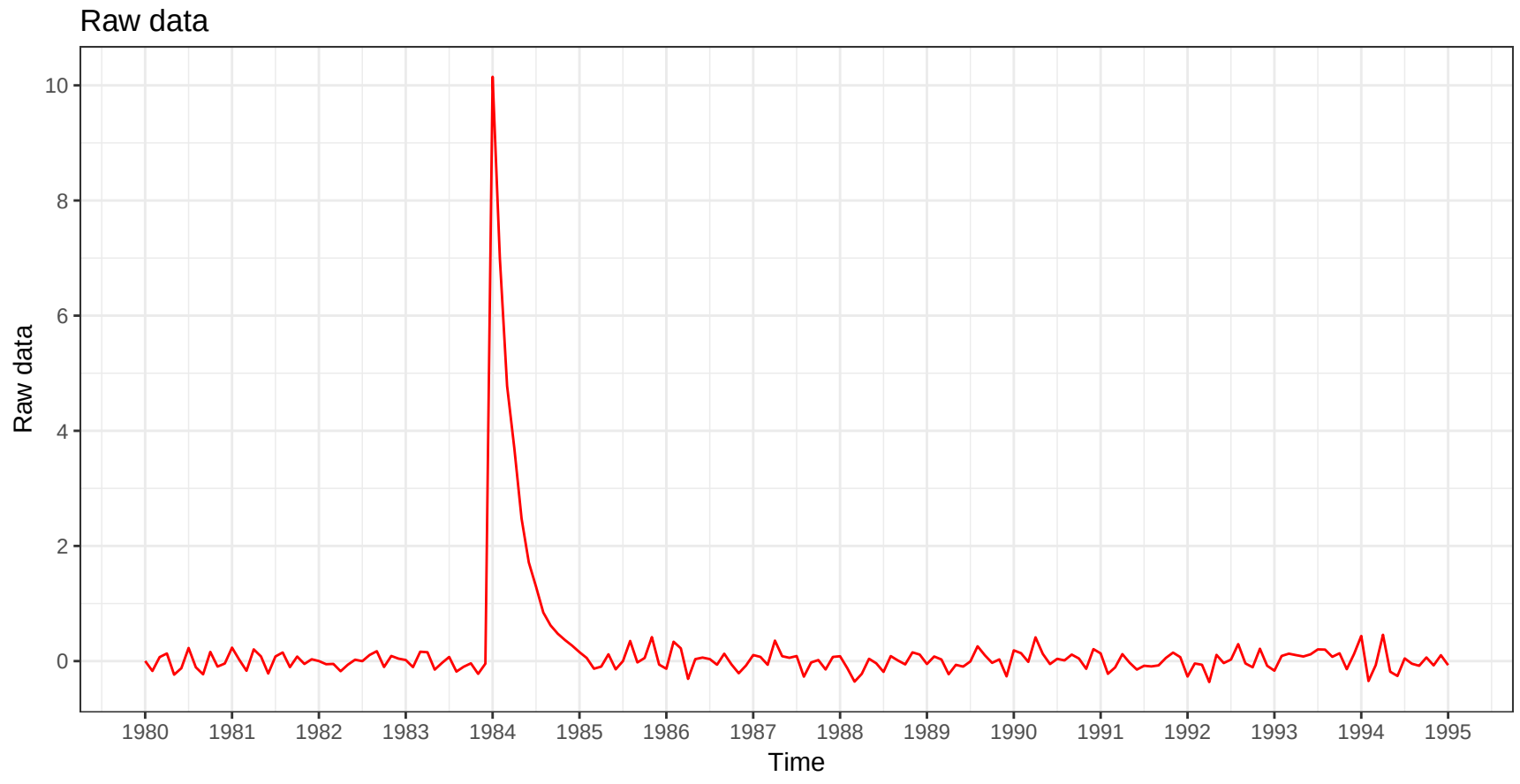

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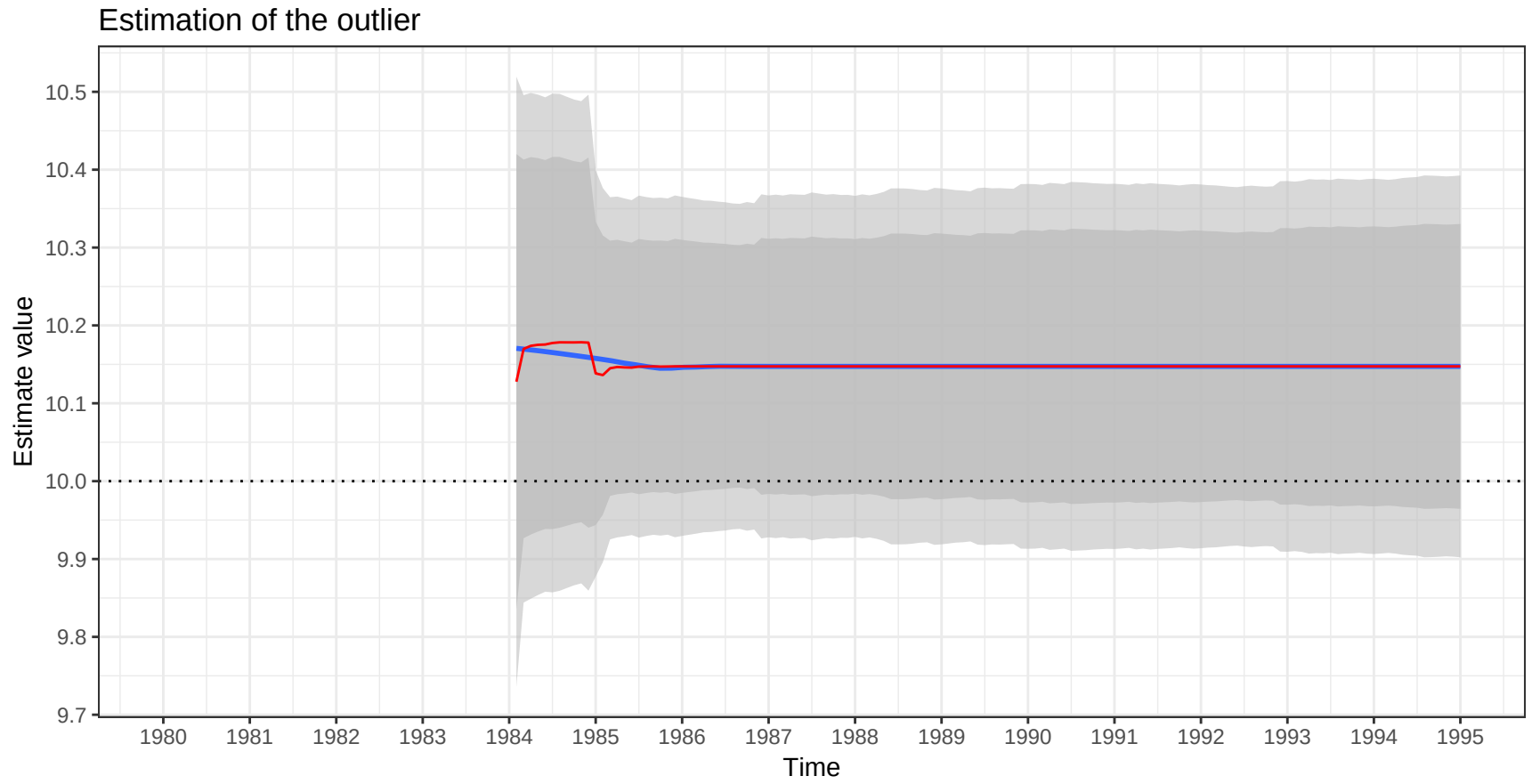

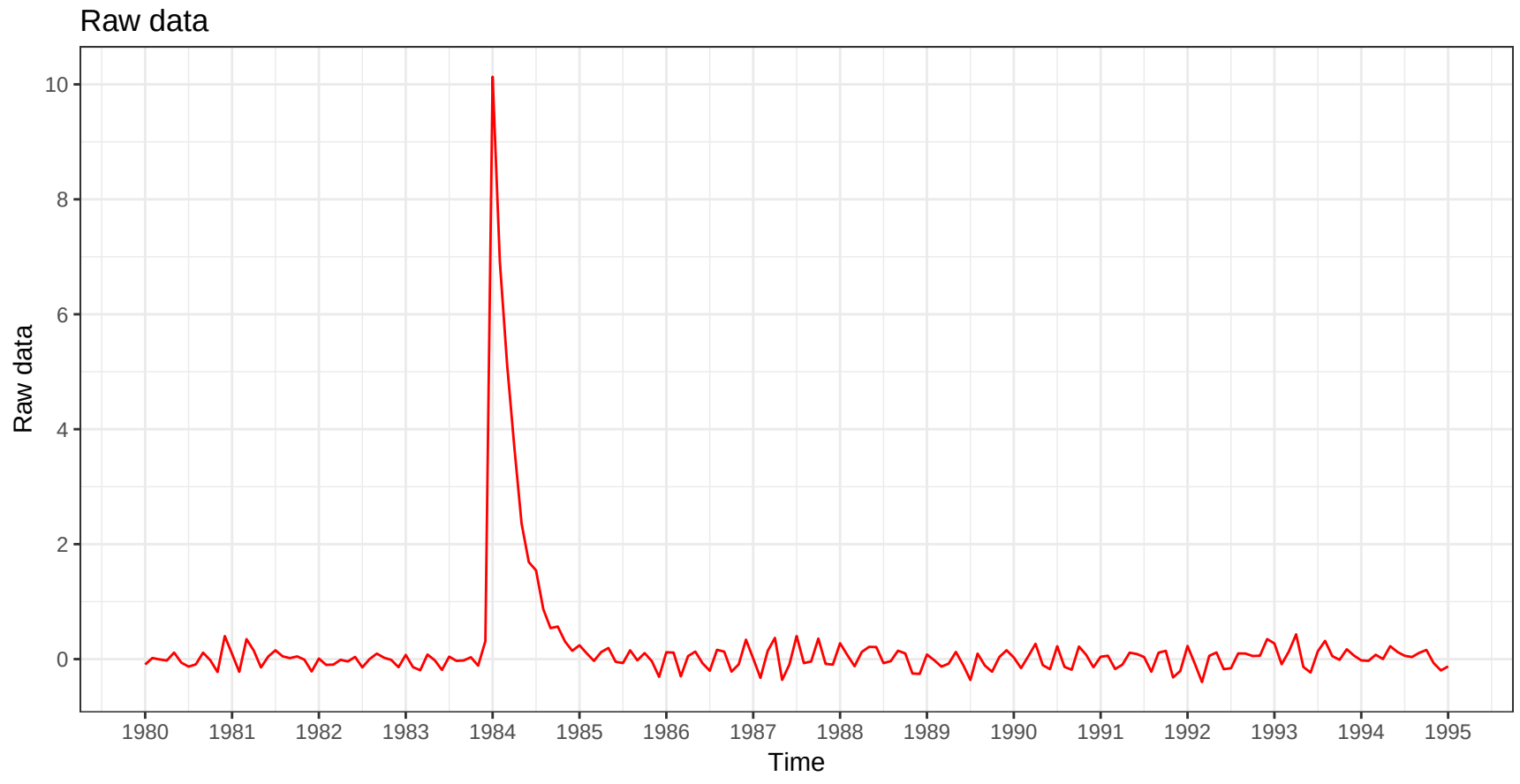

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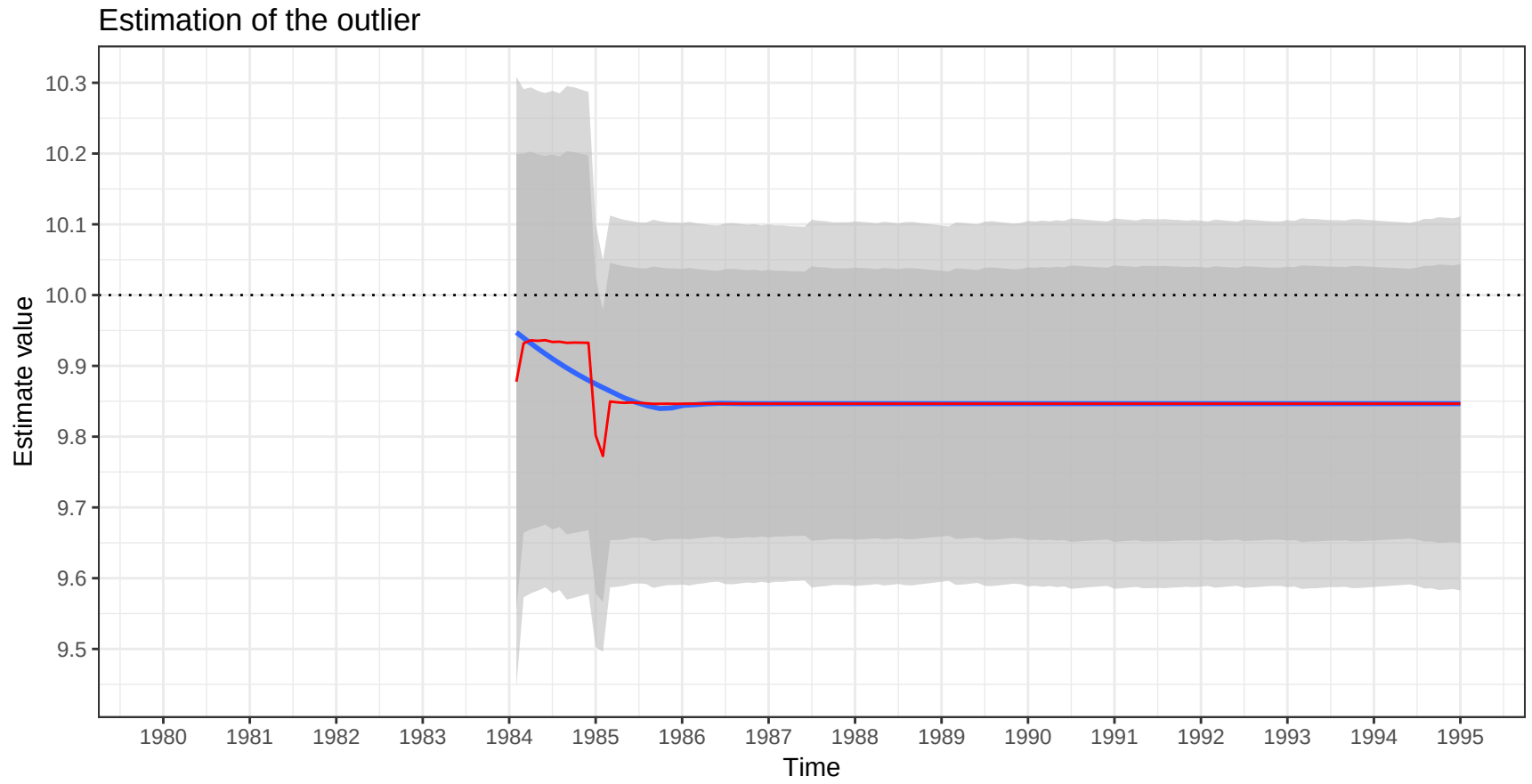

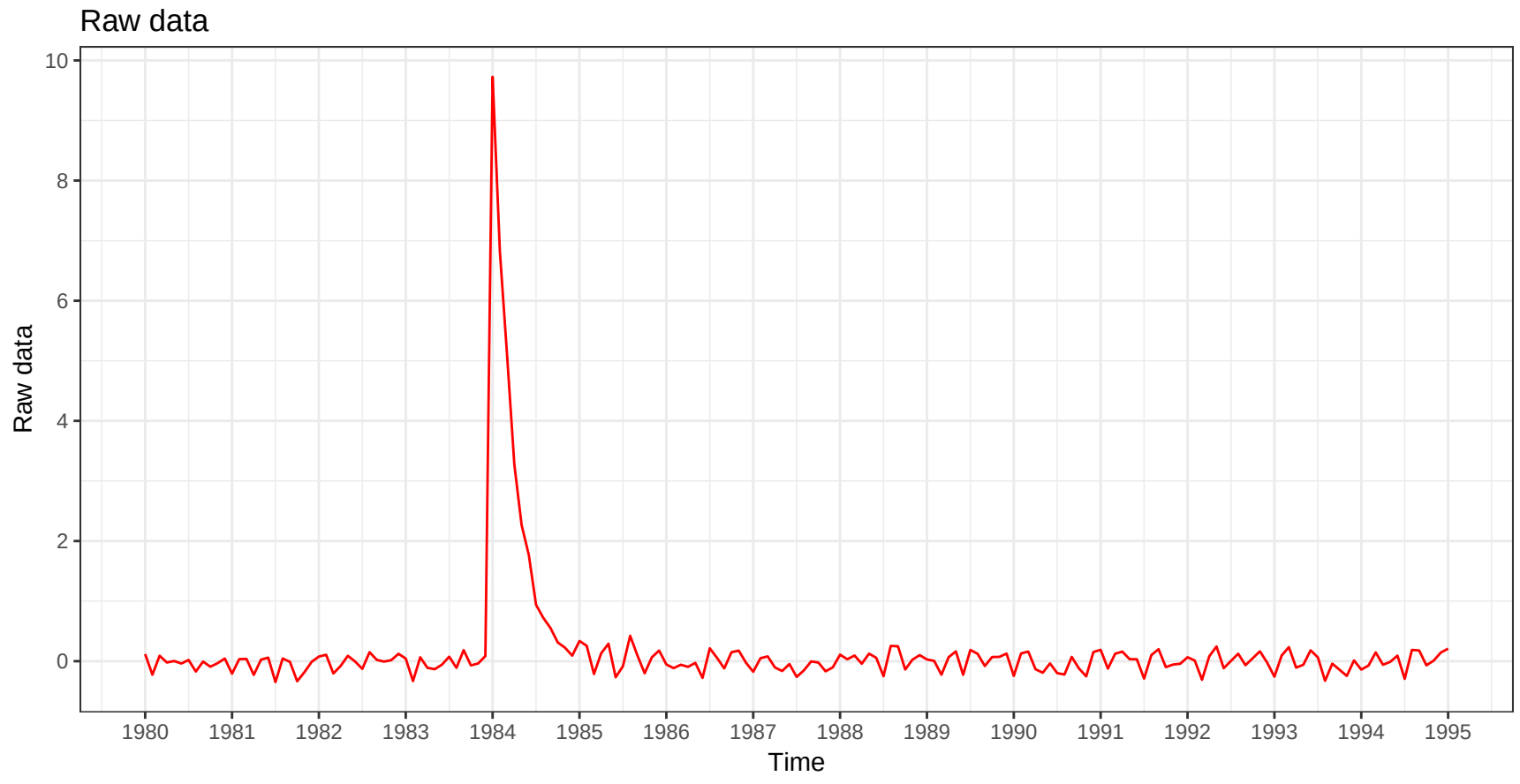

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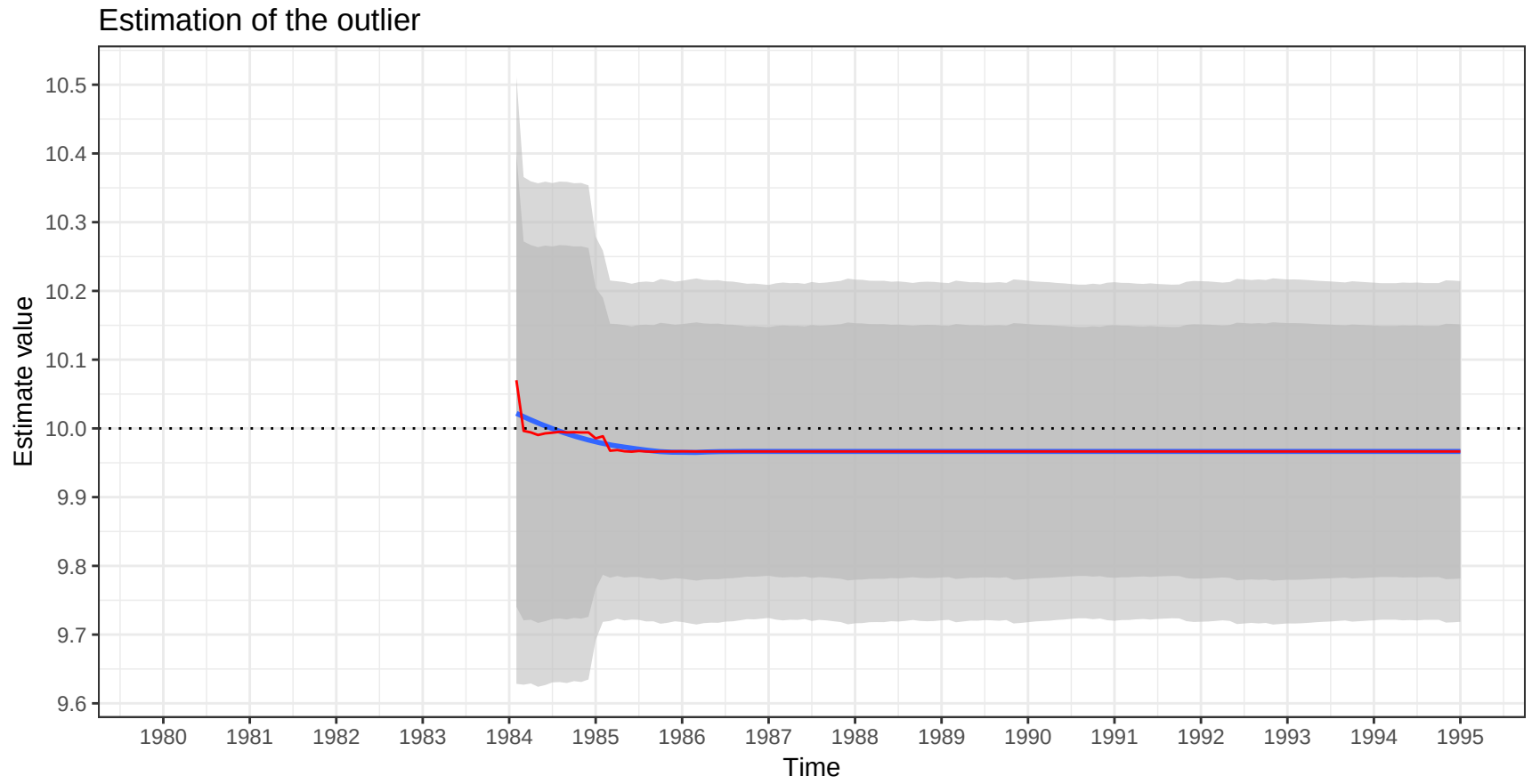
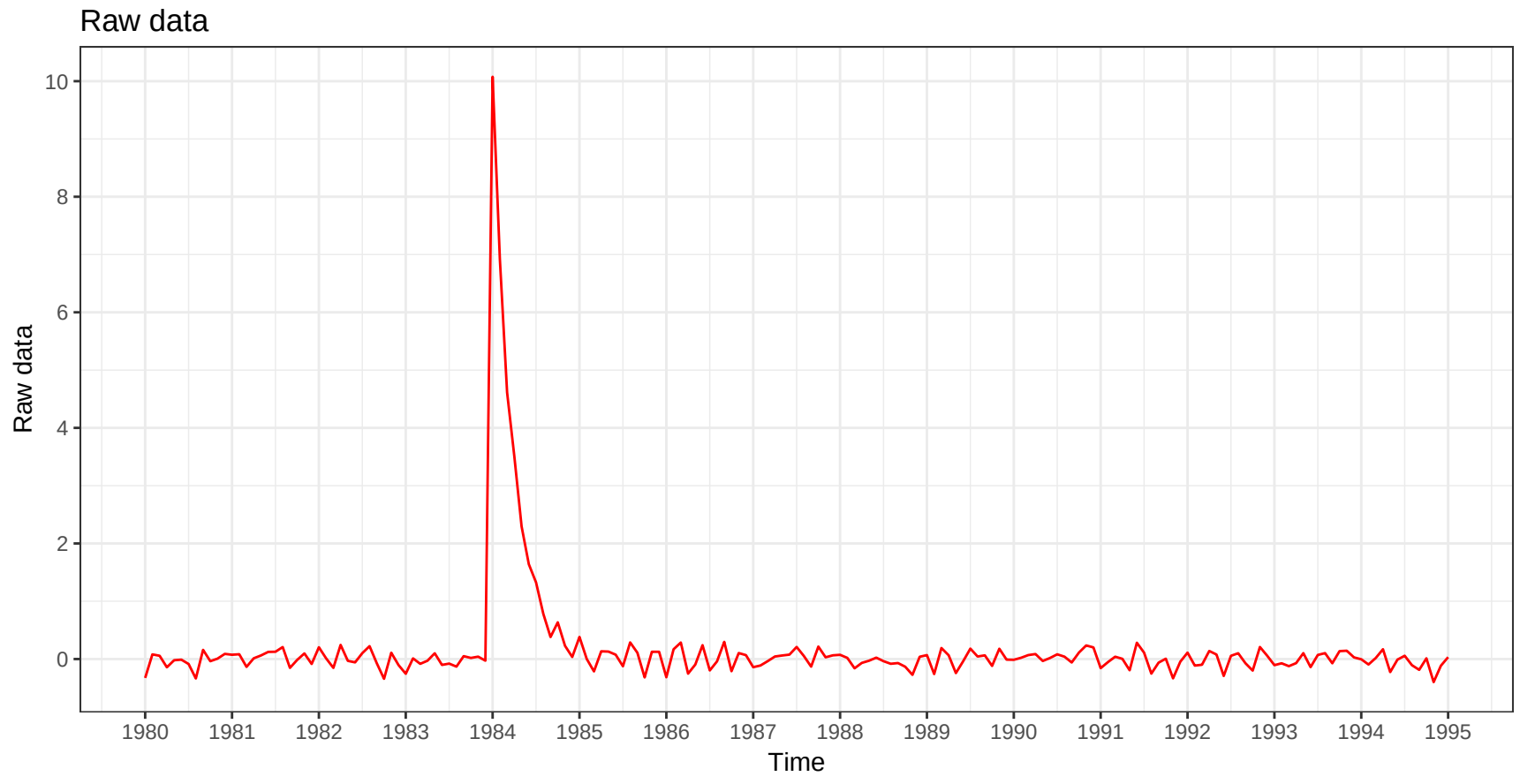
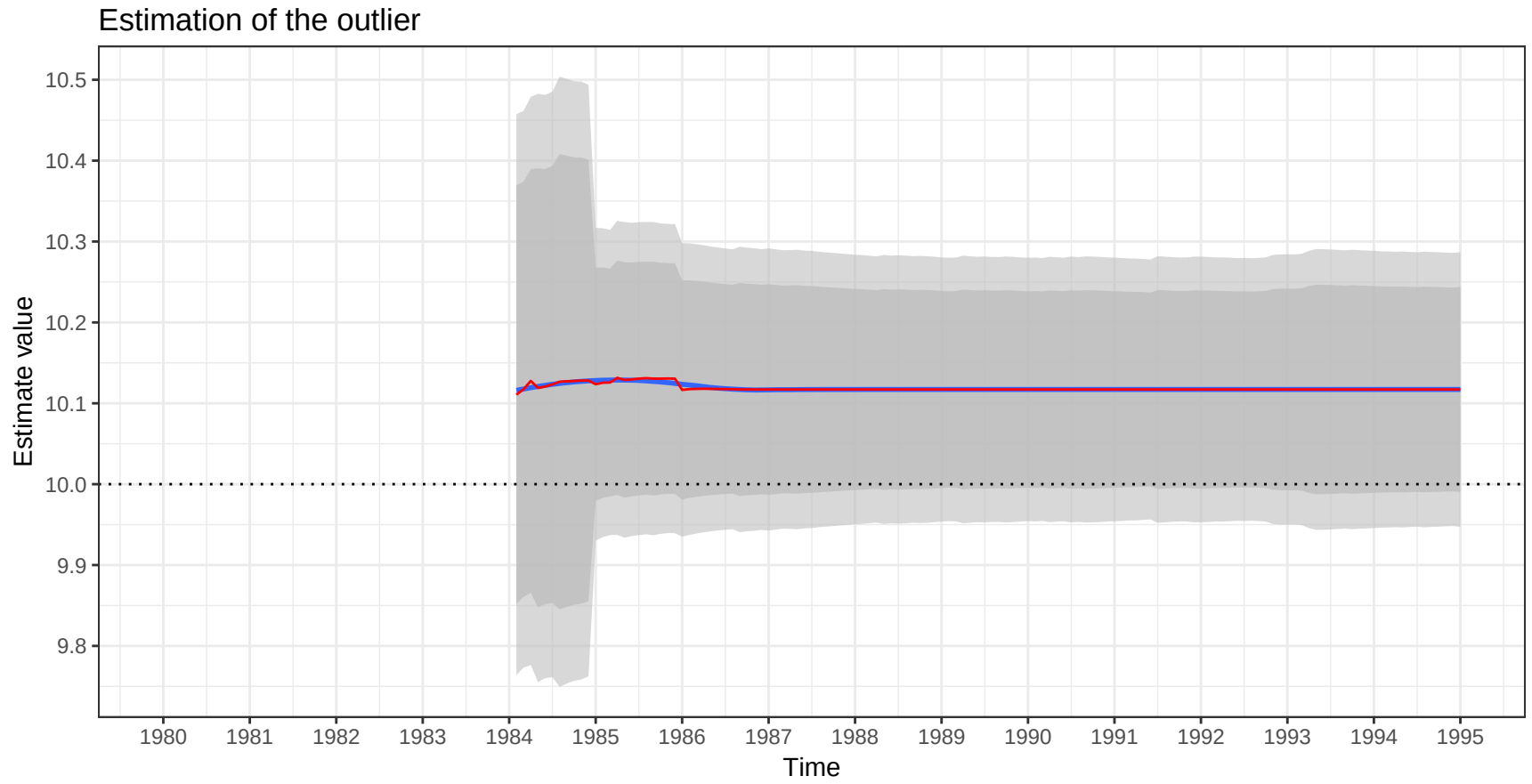
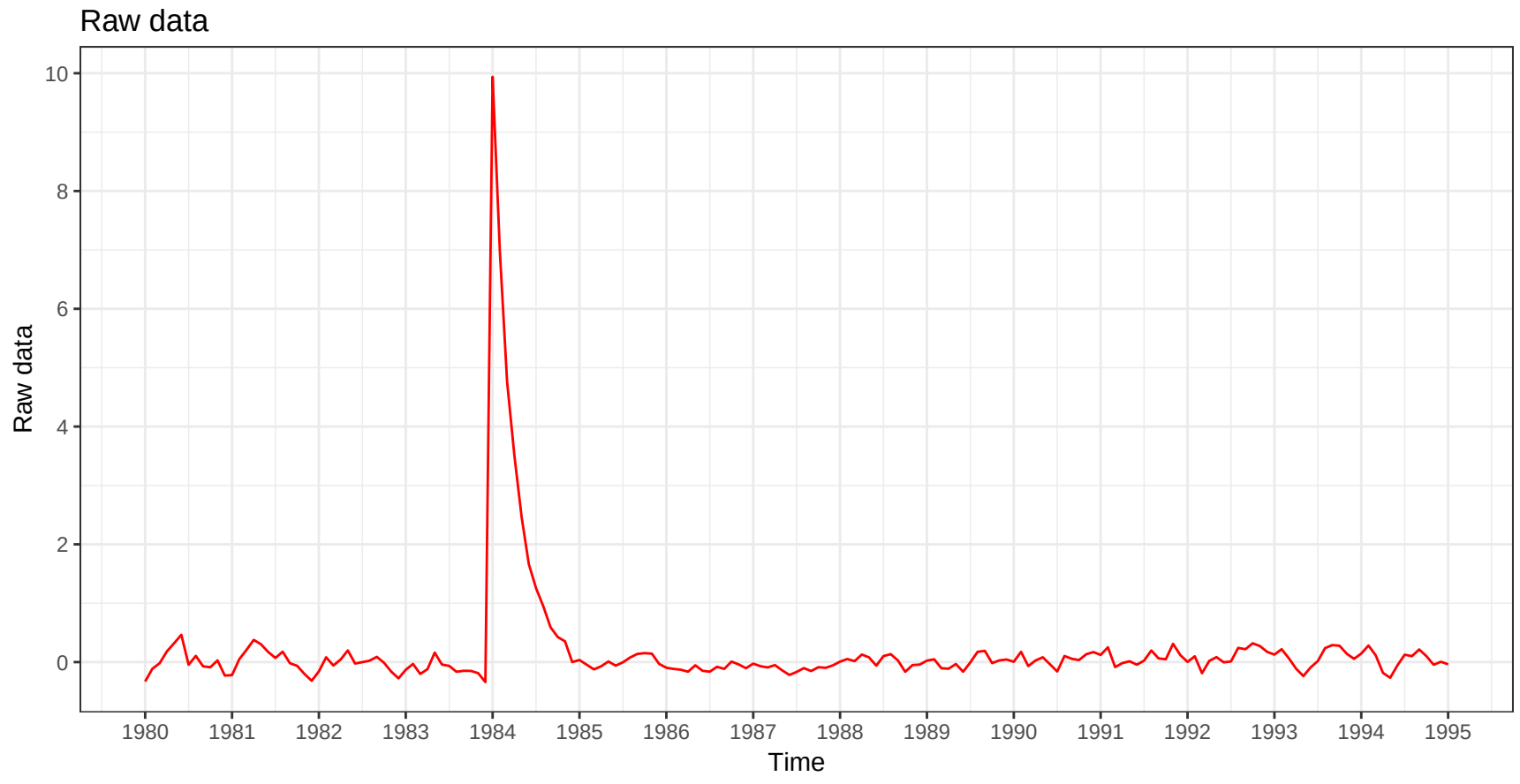
ARIMA (3,0,0)(0,0,0) − additive decomposition
(1+0.3B2−0.5B3)Xt=at



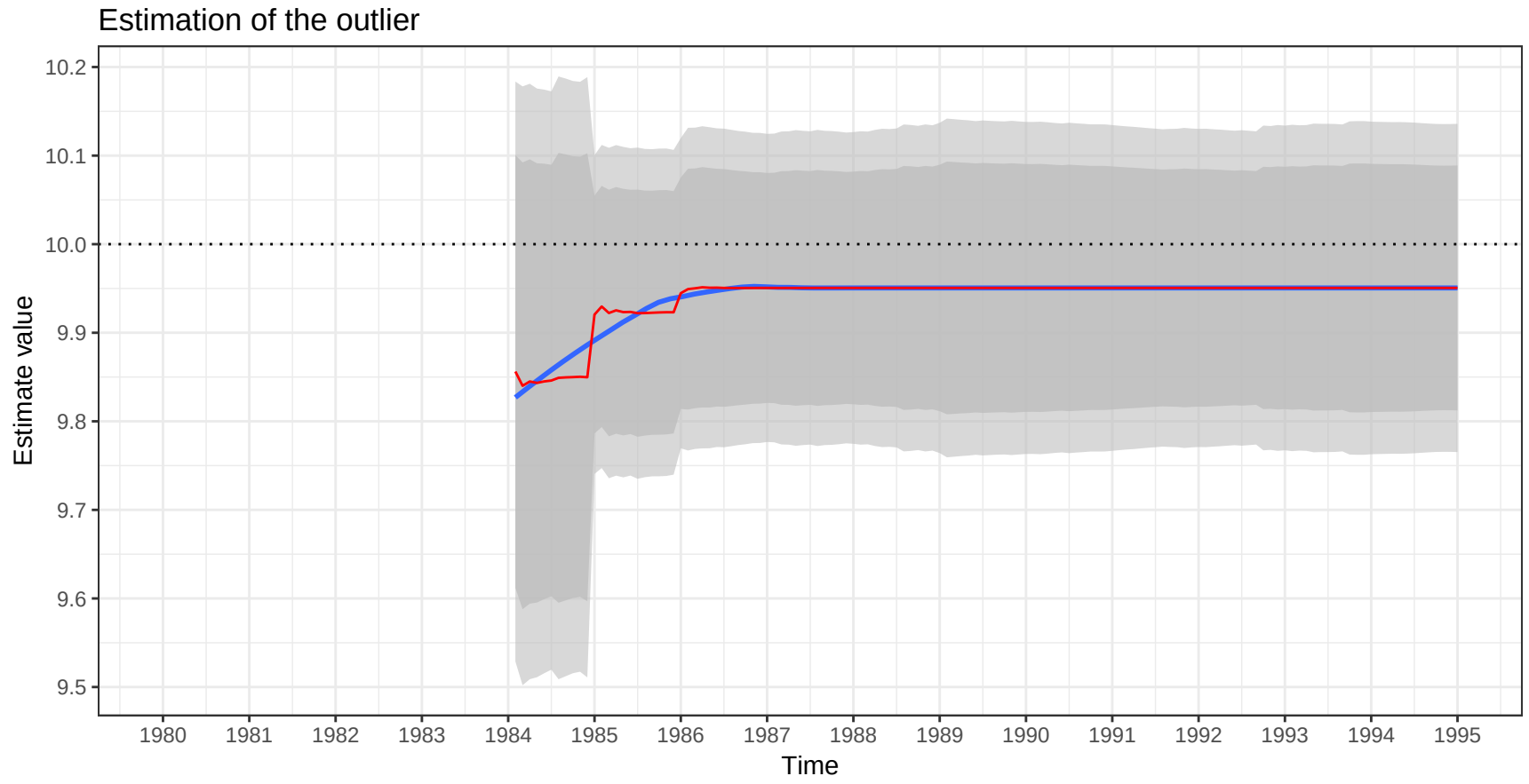


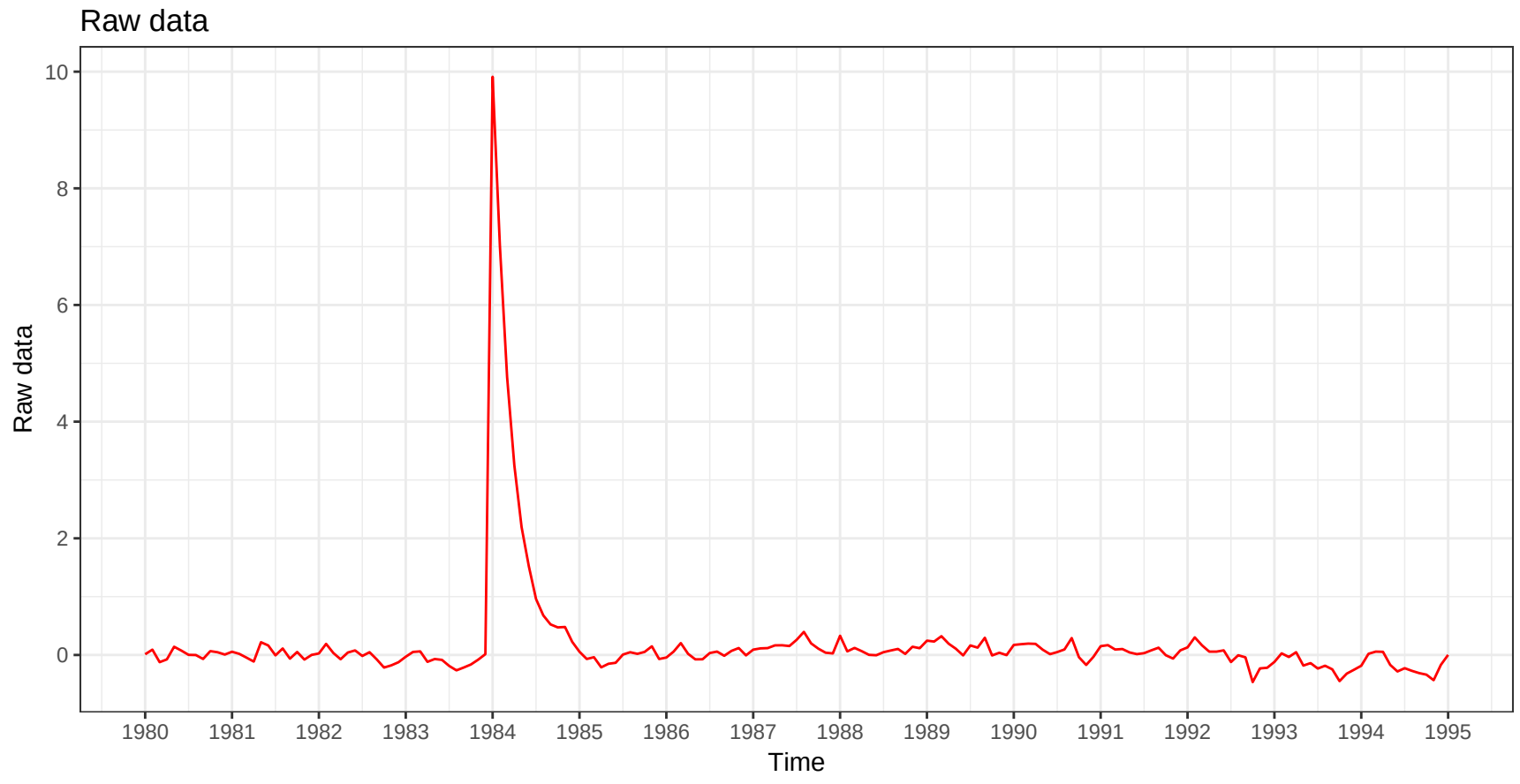
Estimate value of a TC(1984−01)
ARIMA (1,0,0)(1,0,0) − additive decomposition
(1−0.6B)(1−0.6B12)Xt=at



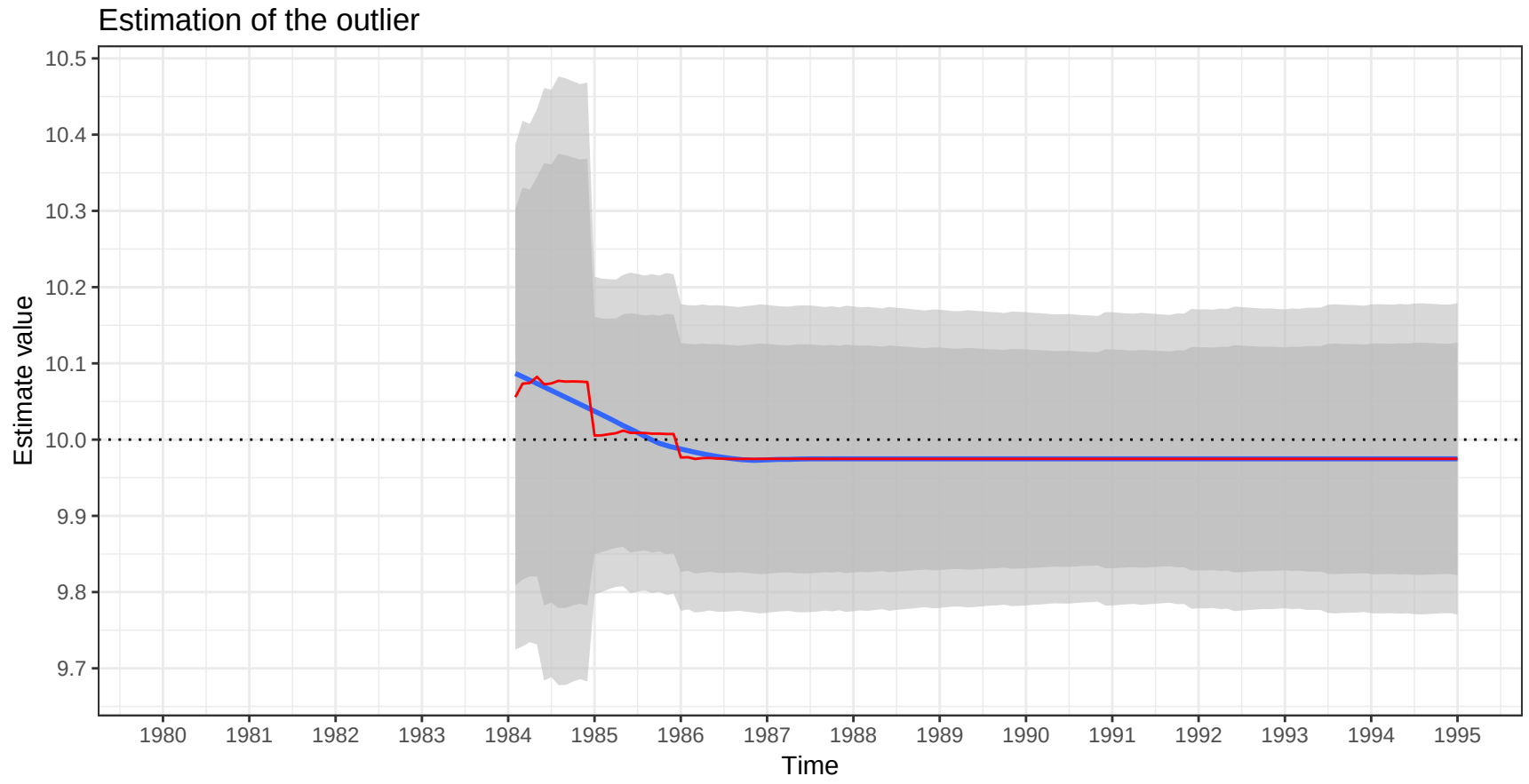


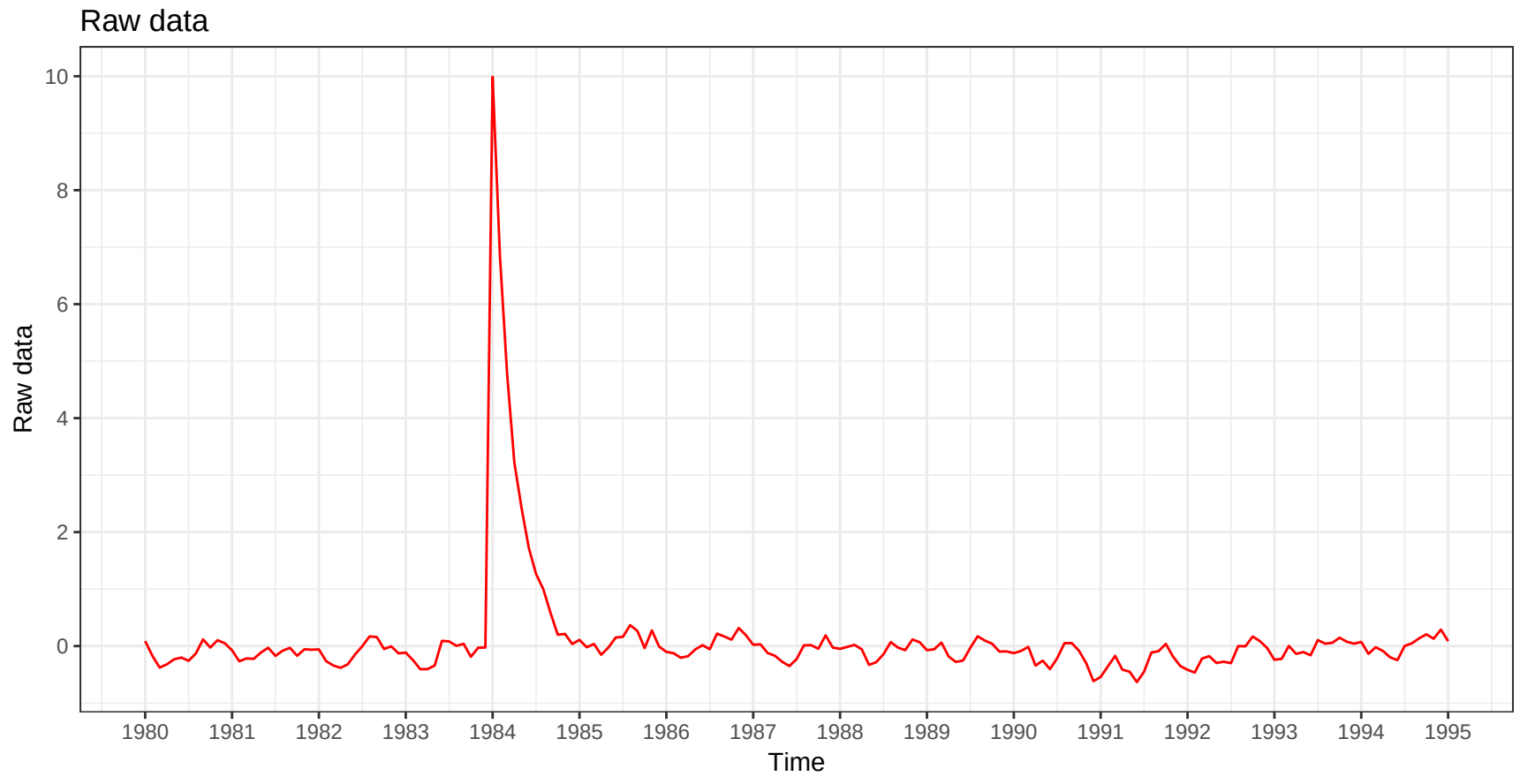
Estimate value of a TC(1984−01)
ARIMA (1,0,0)(1,0,0) − additive decomposition
(1−0.6B)(1−0.6B12)Xt=at



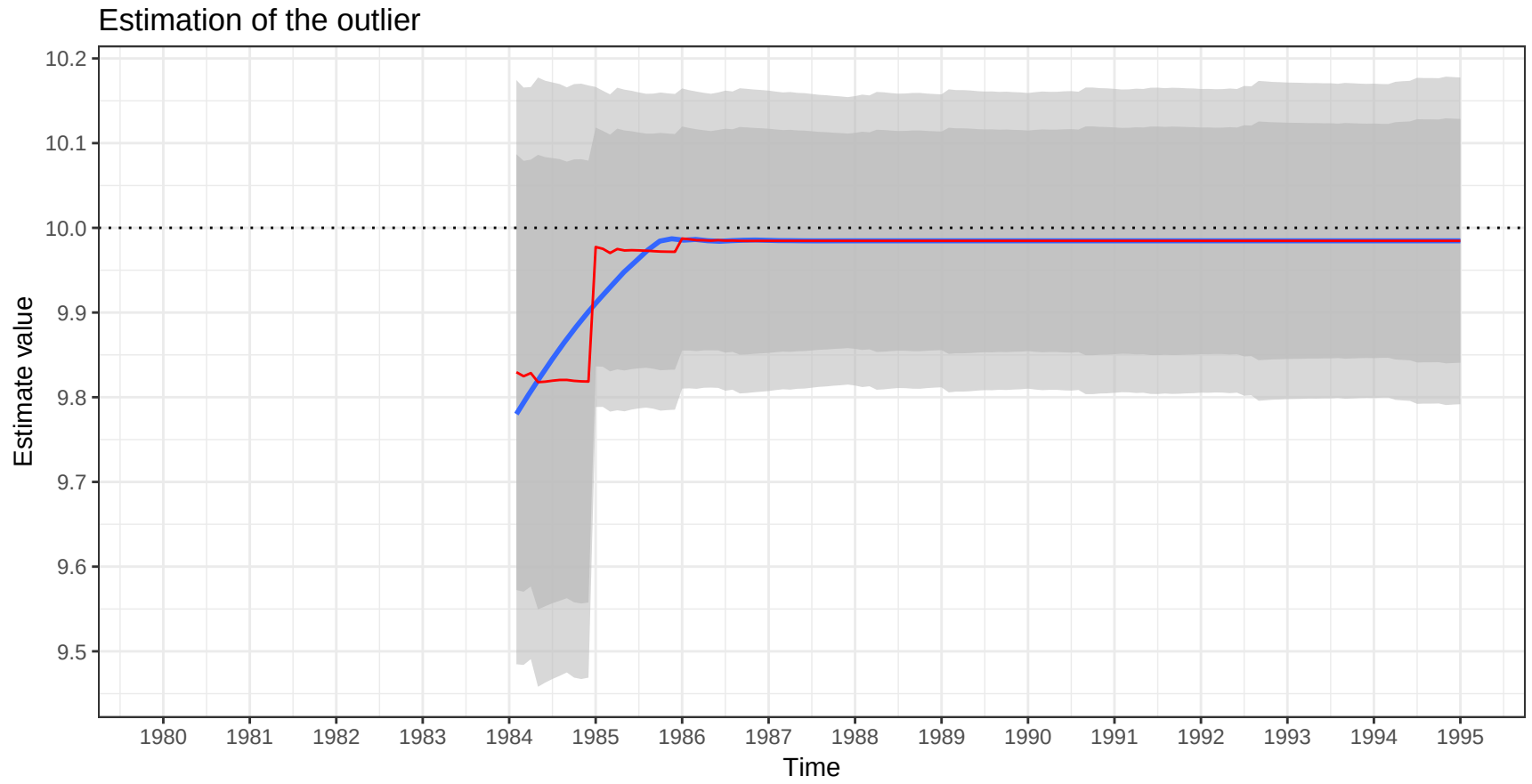


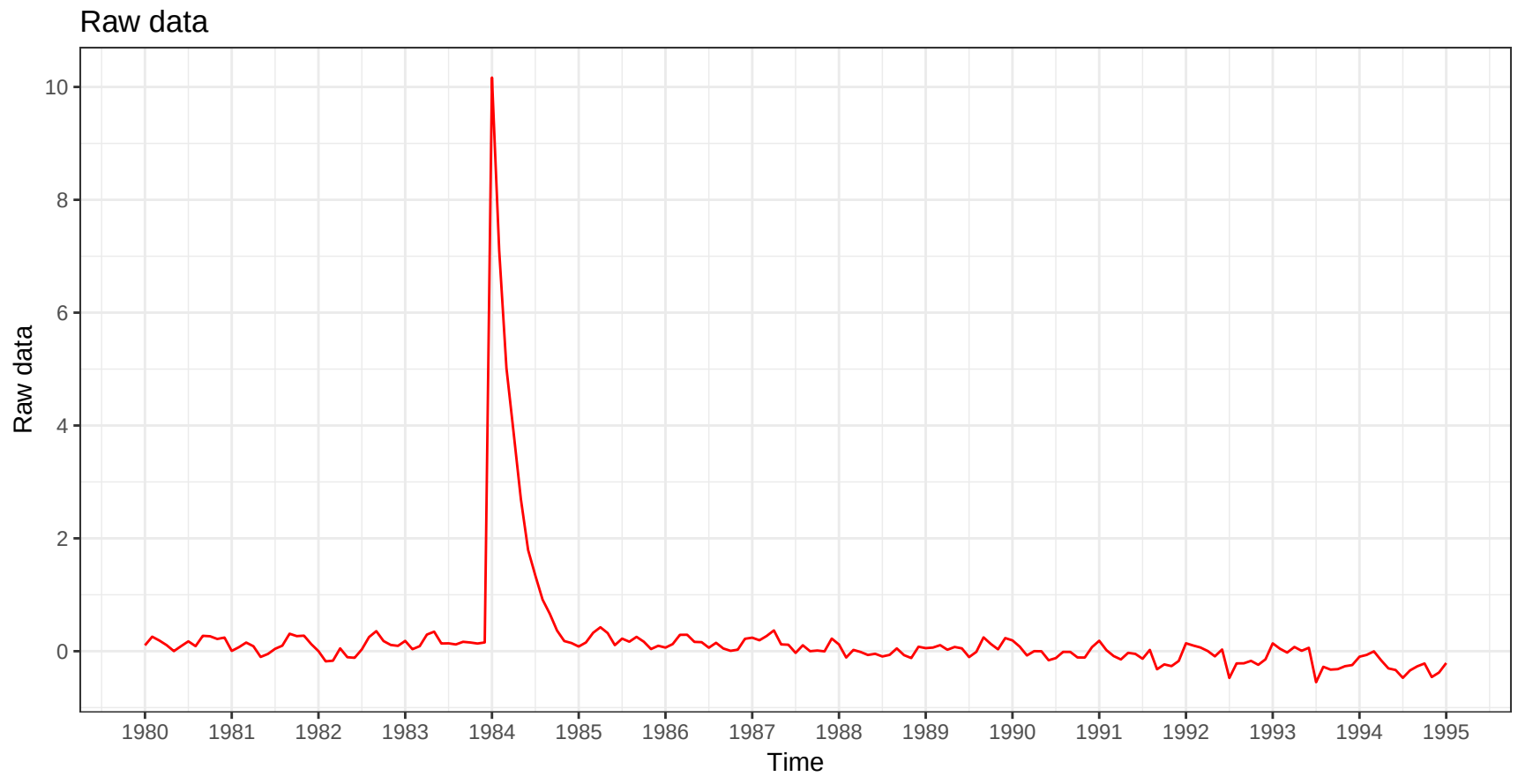
Estimate value of a TC(1984−01)
ARIMA (1,0,0)(1,0,0) − additive decomposition
(1−0.6B)(1−0.6B12)Xt=at



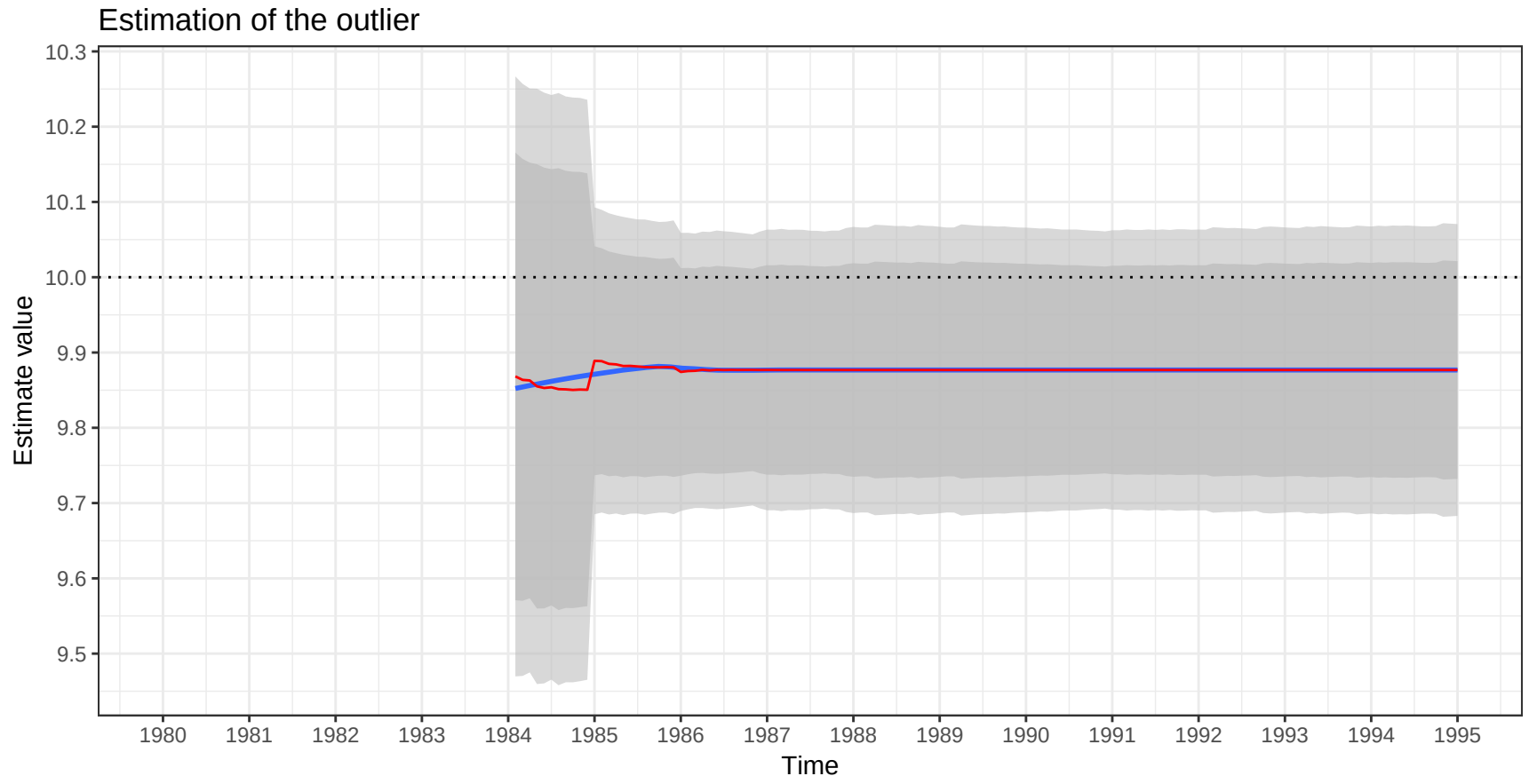


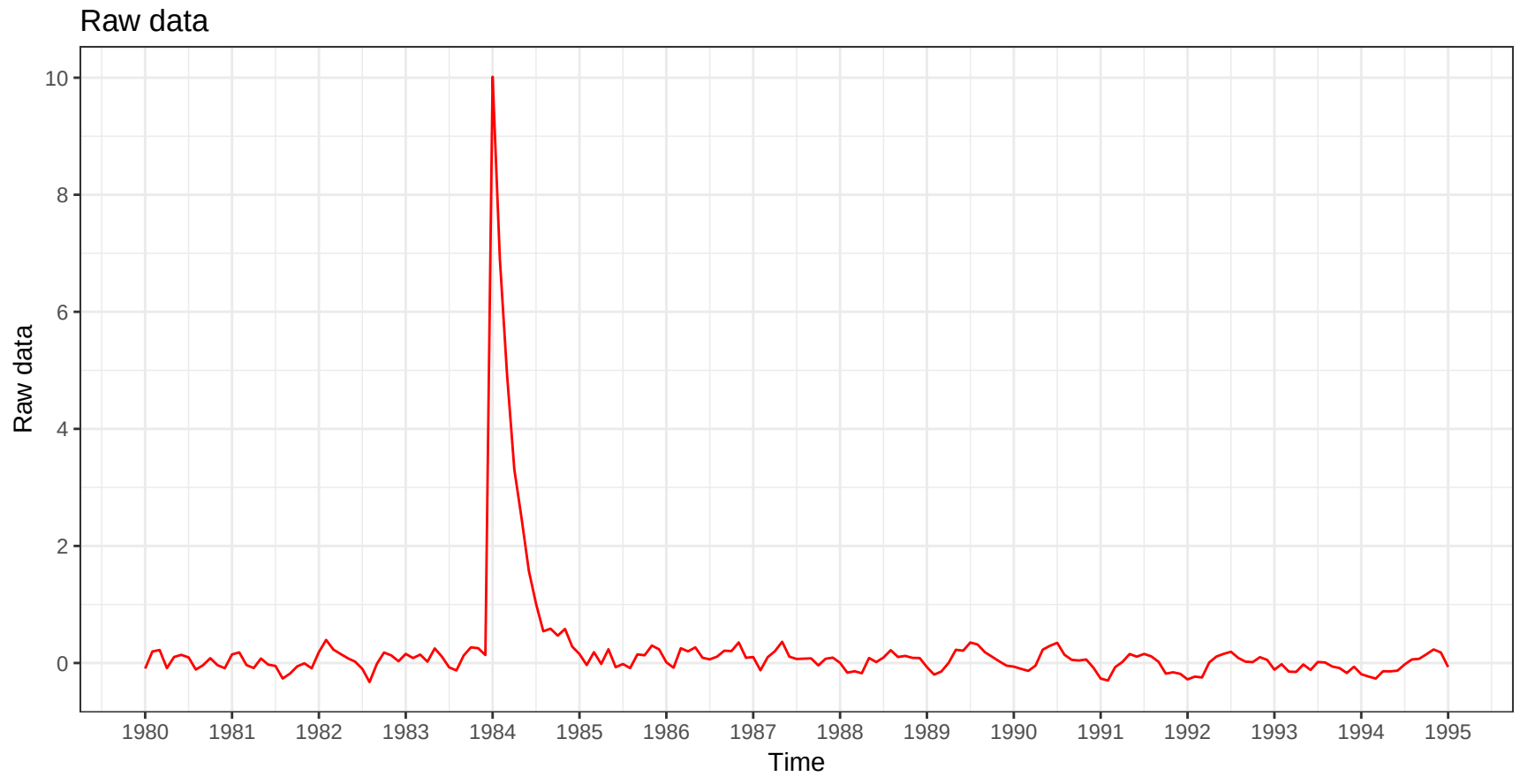
Estimate value of a TC(1984−01)
ARIMA (1,0,0)(1,0,0) − additive decomposition
(1−0.6B)(1−0.6B12)Xt=at



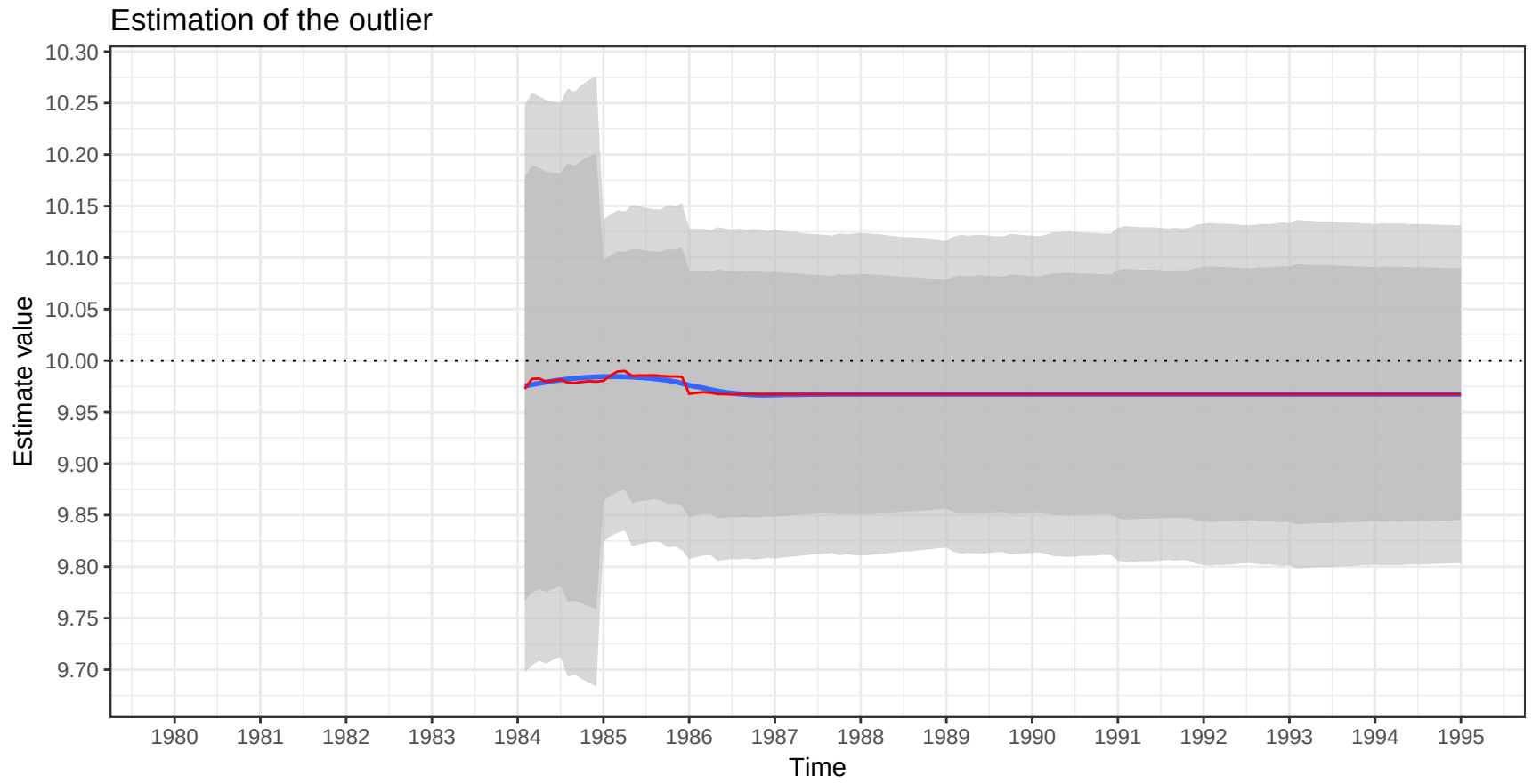


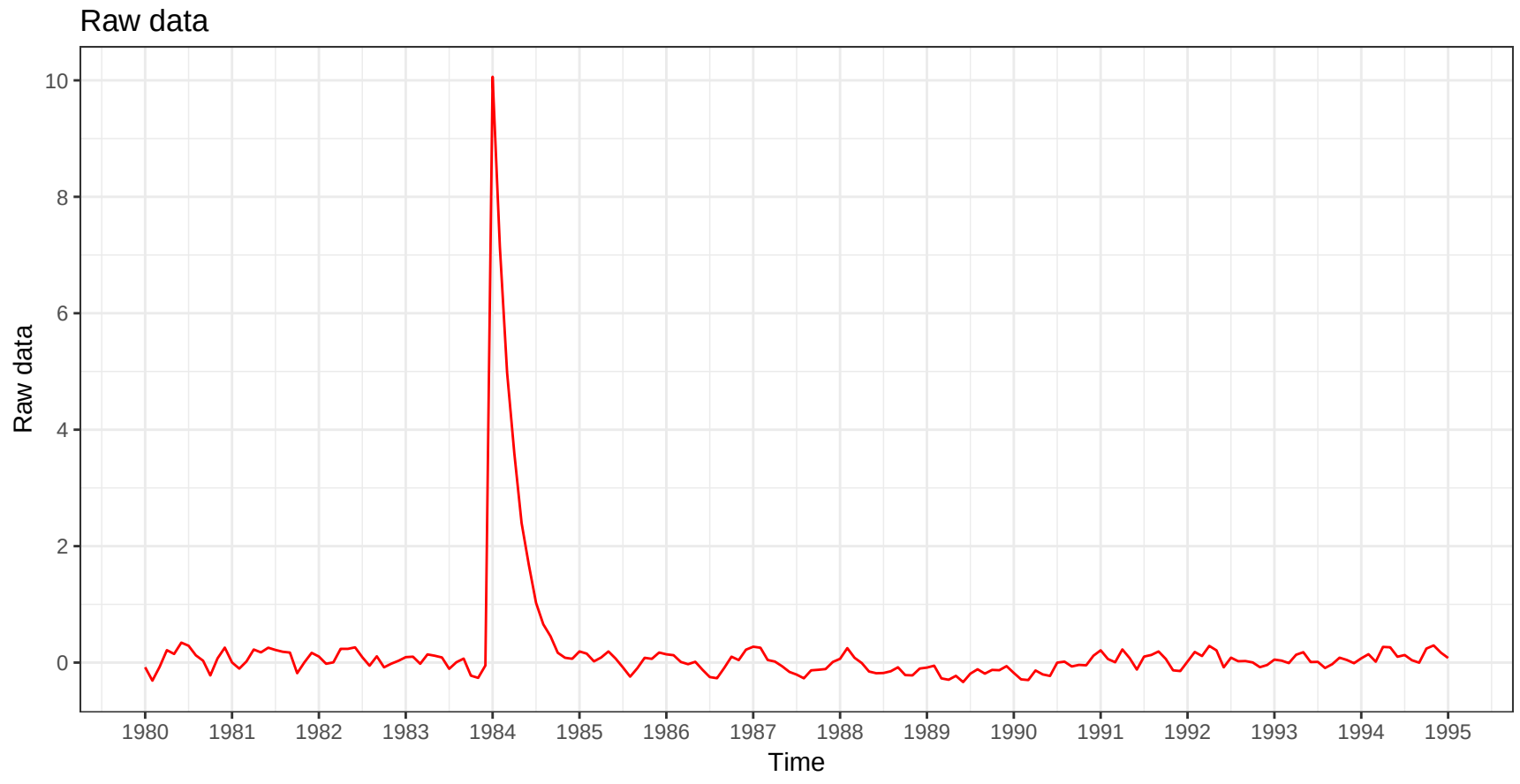
Estimate value of a TC(1984−01)
ARIMA (1,0,0)(1,0,0) − additive decomposition
(1−0.6B)(1−0.6B12)Xt=at



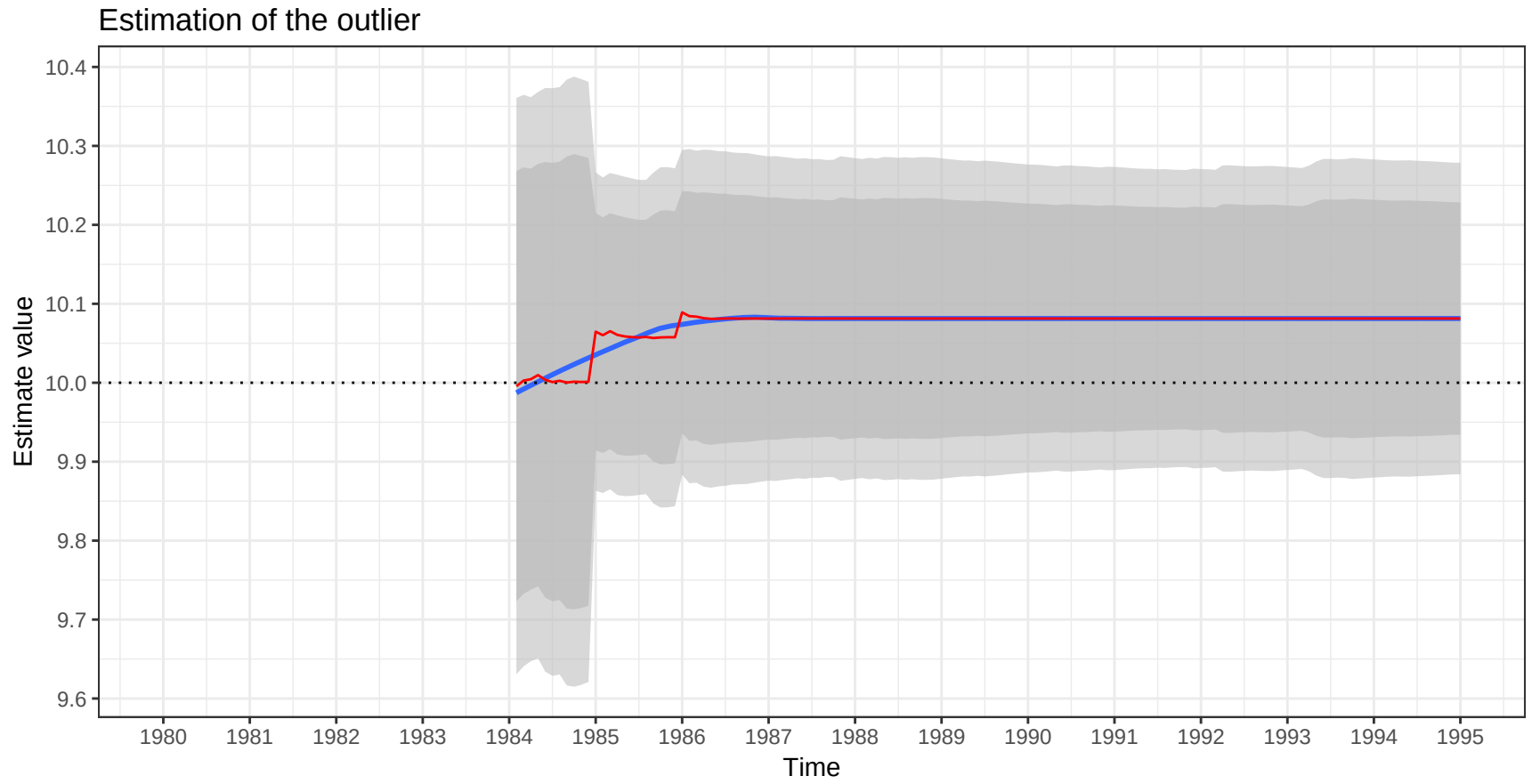


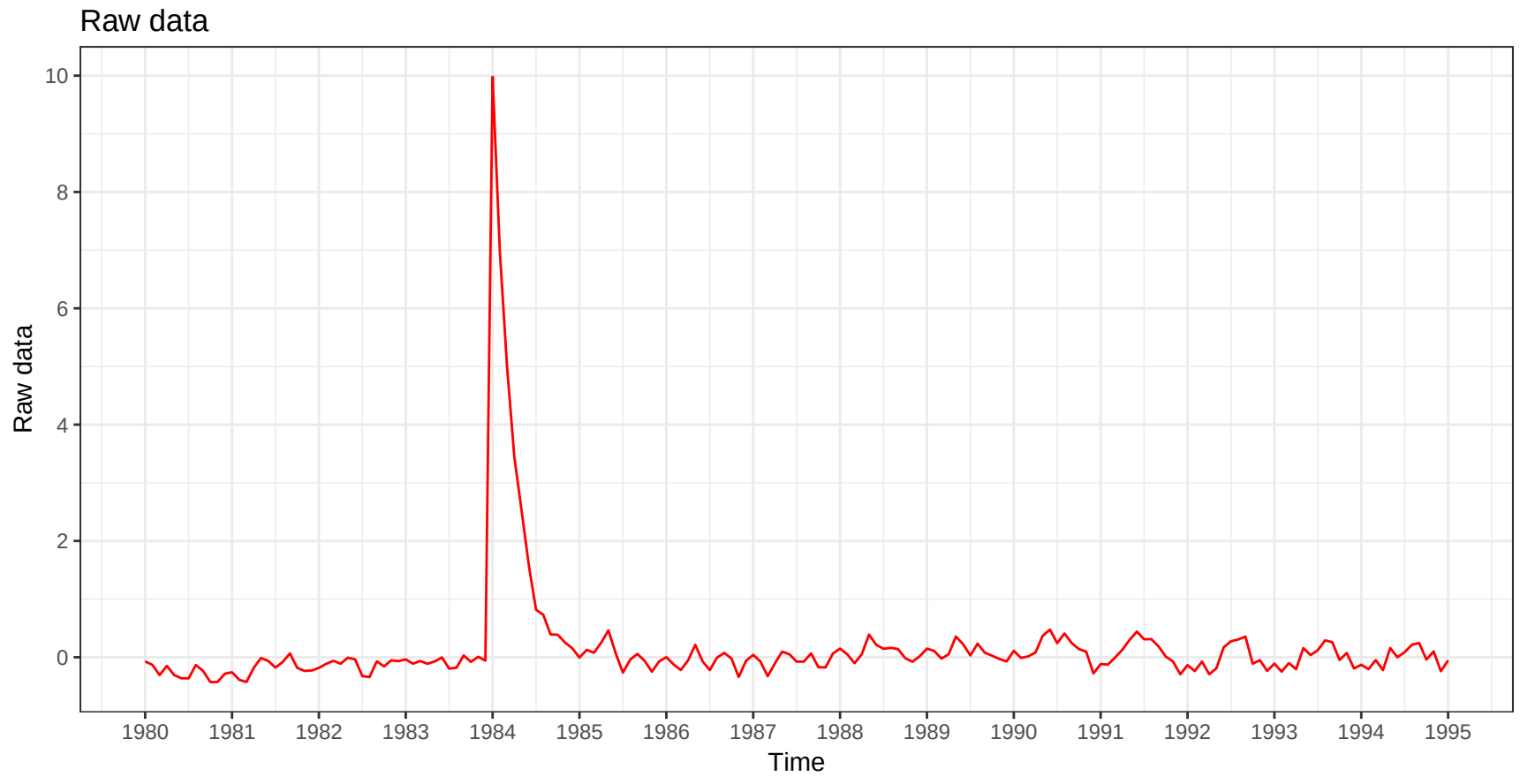
Estimate value of a TC(1984−01)
ARIMA (1,0,0)(1,0,0) − additive decomposition
(1−0.6B)(1−0.6B12)Xt=at



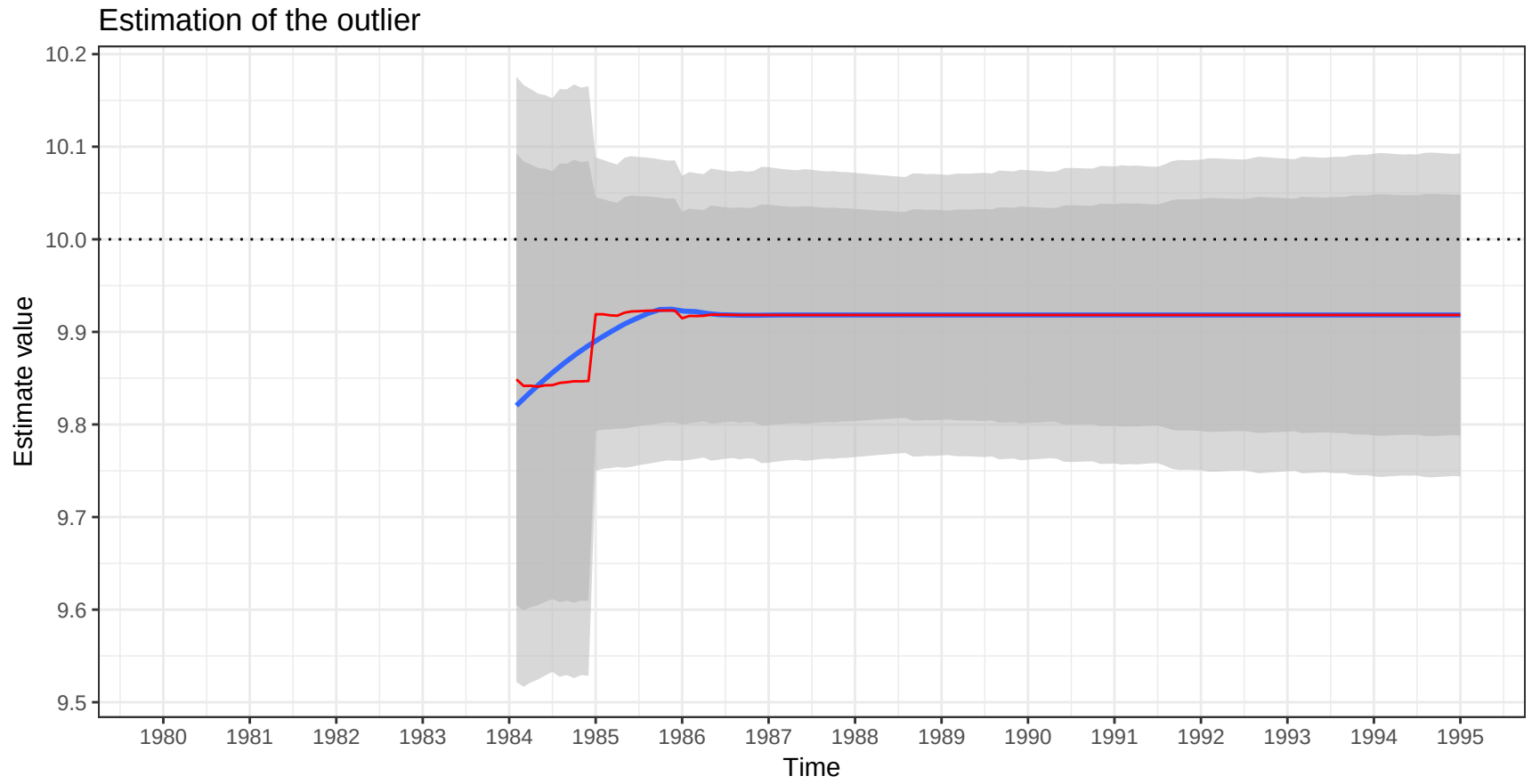


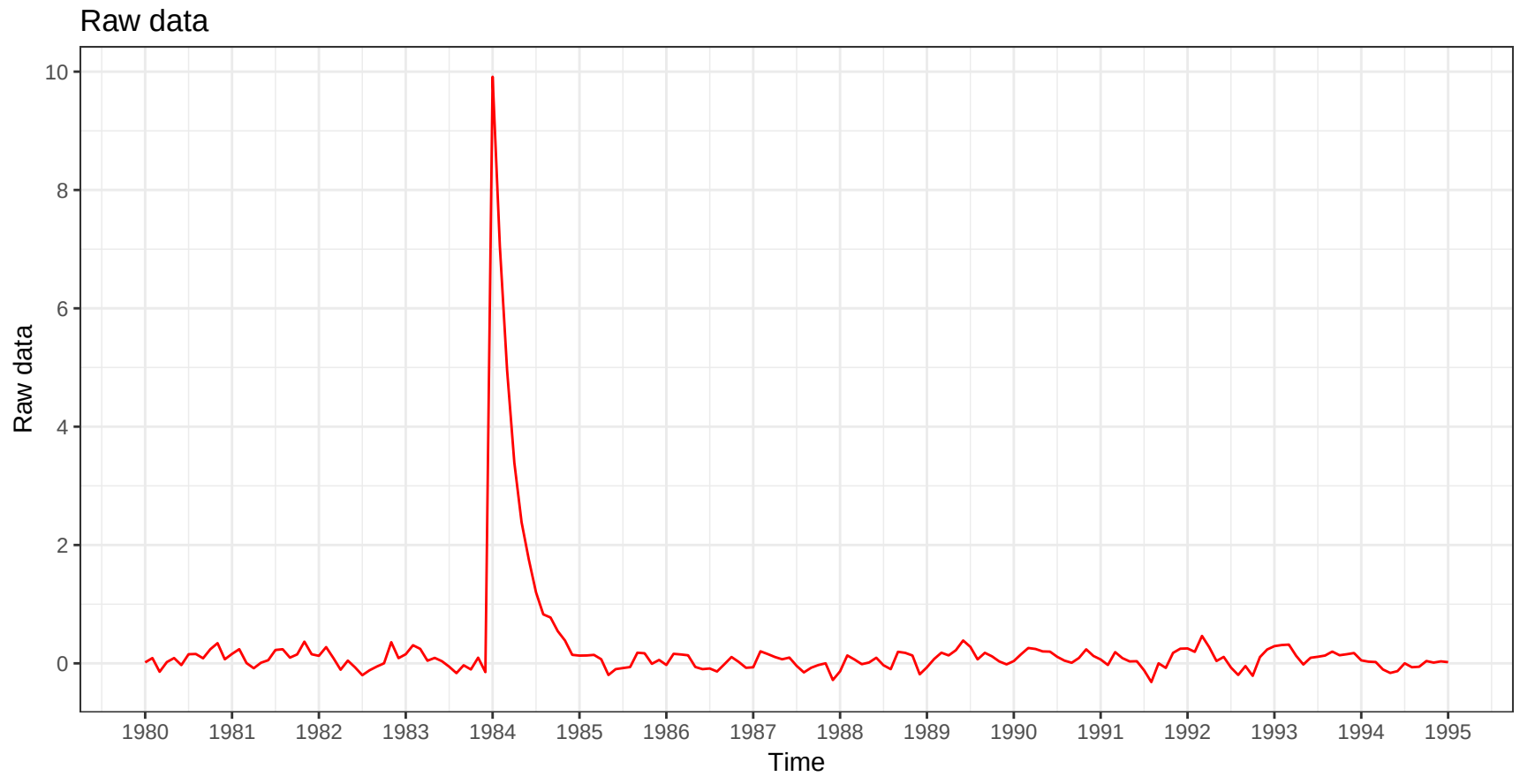
Estimate value of a TC(1984−01)
ARIMA (1,0,0)(1,0,0) − additive decomposition
(1−0.6B)(1−0.6B12)Xt=at



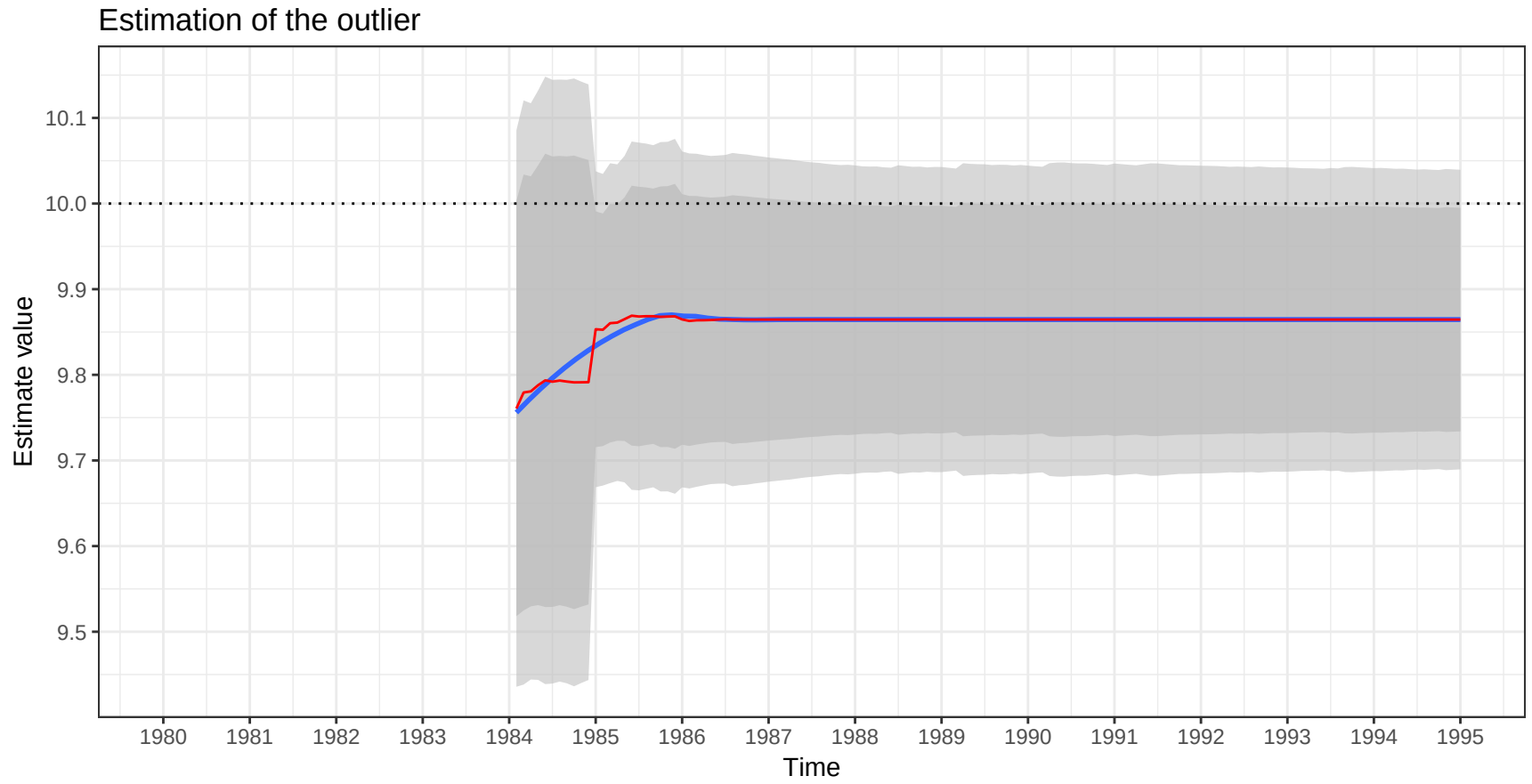


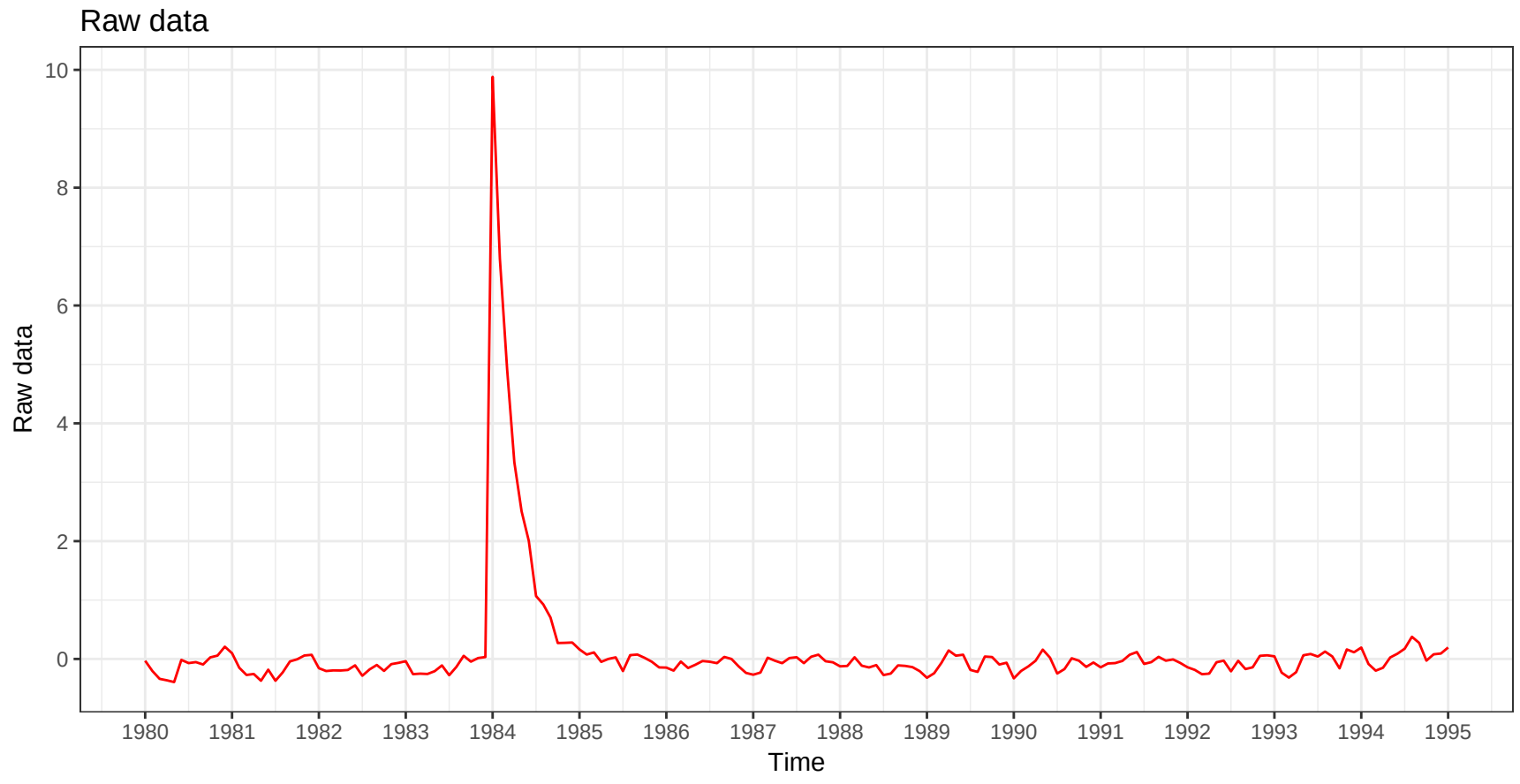
Estimate value of a TC(1984−01)
ARIMA (1,0,0)(1,0,0) − additive decomposition
(1−0.6B)(1−0.6B12)Xt=at



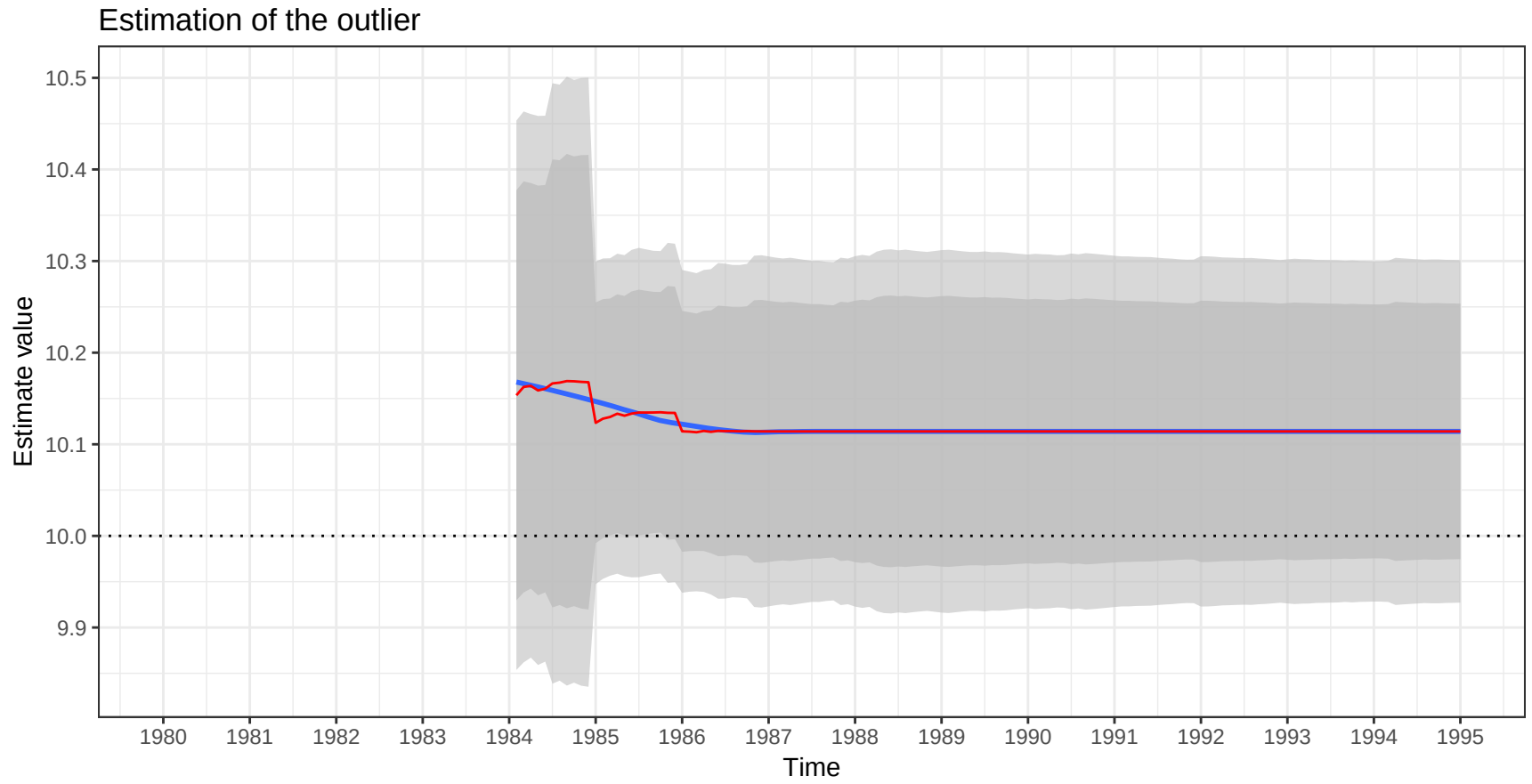


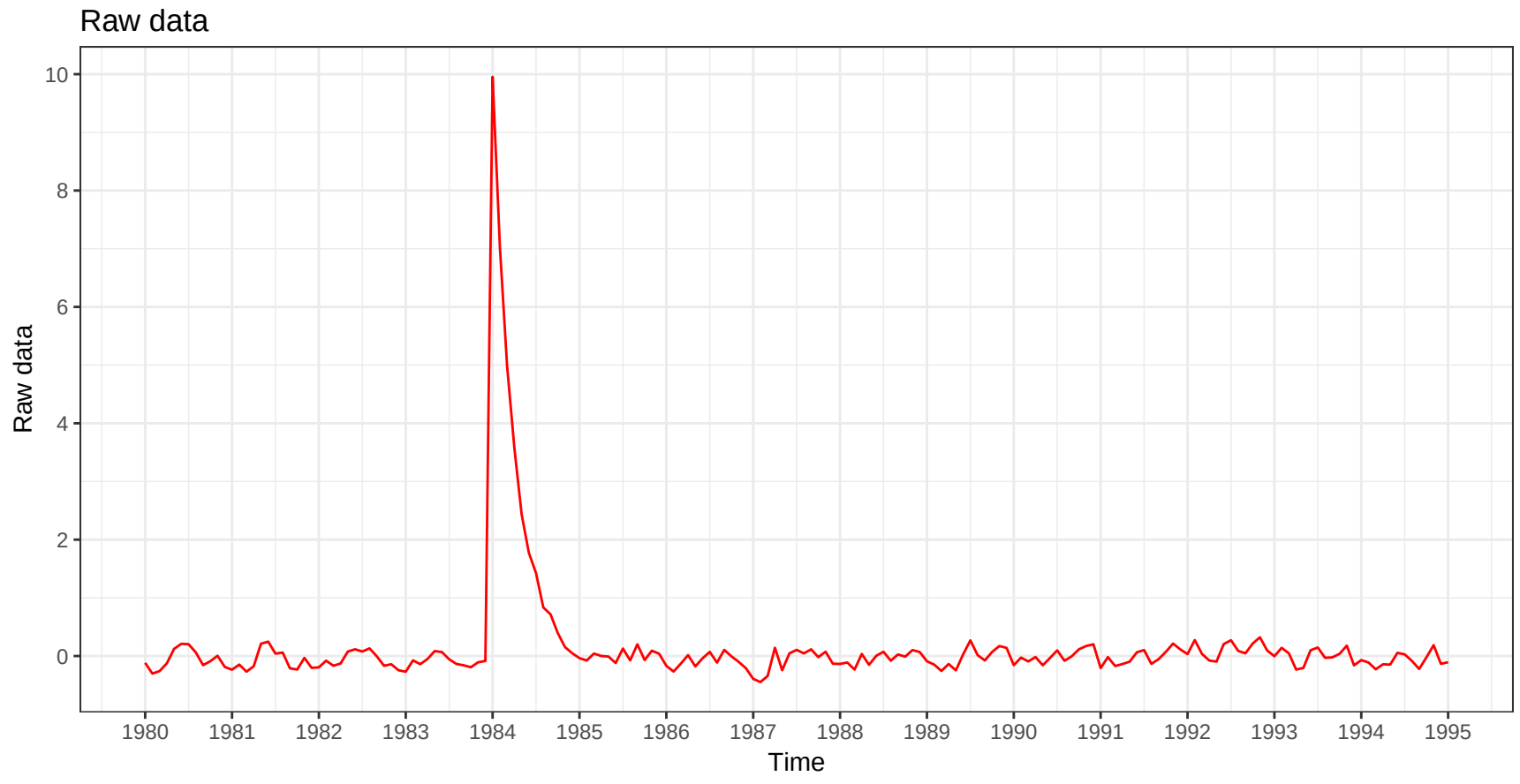
Estimate value of a TC(1984−01)
ARIMA (1,0,0)(1,0,0) − additive decomposition
(1−0.6B)(1−0.6B12)Xt=at



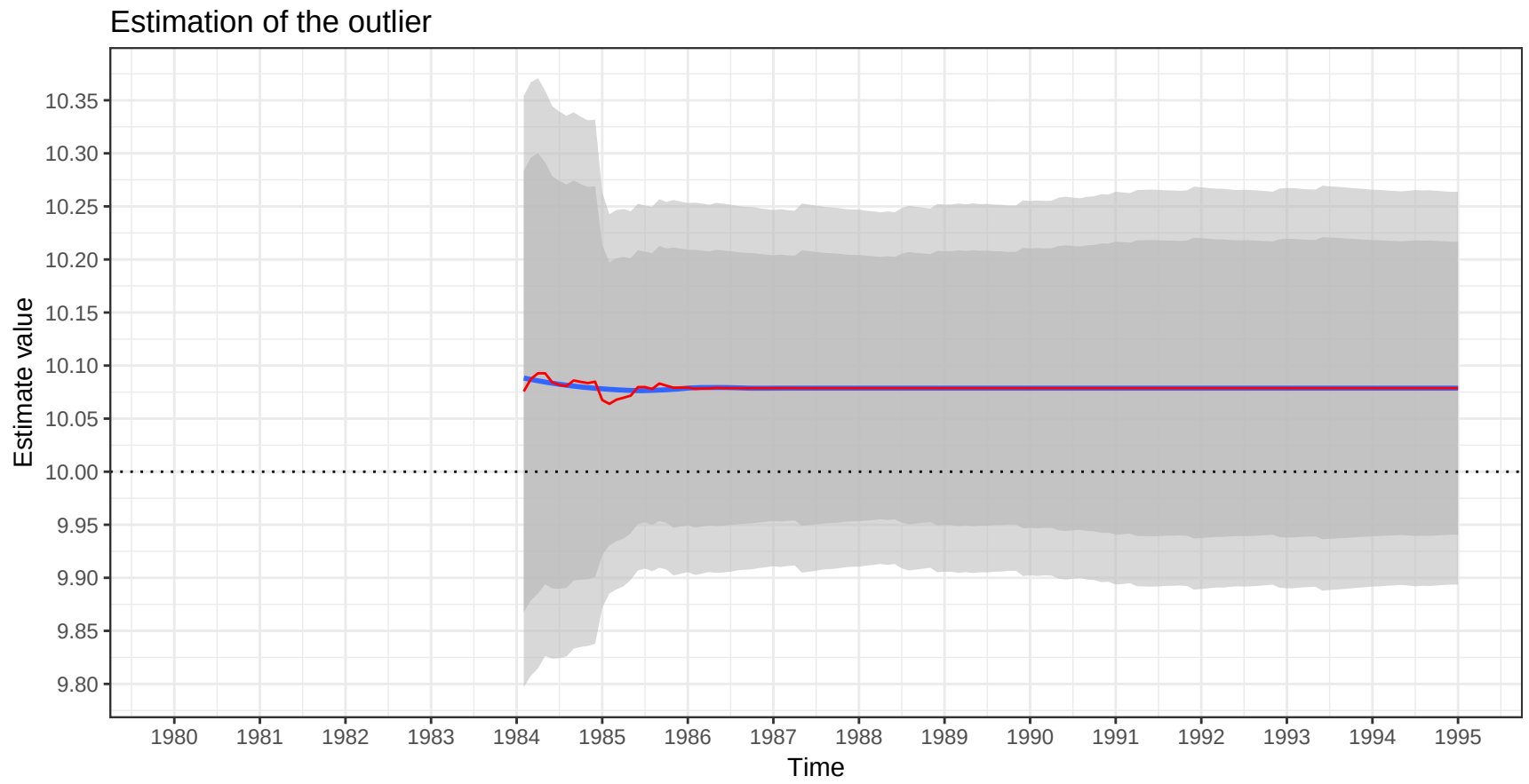


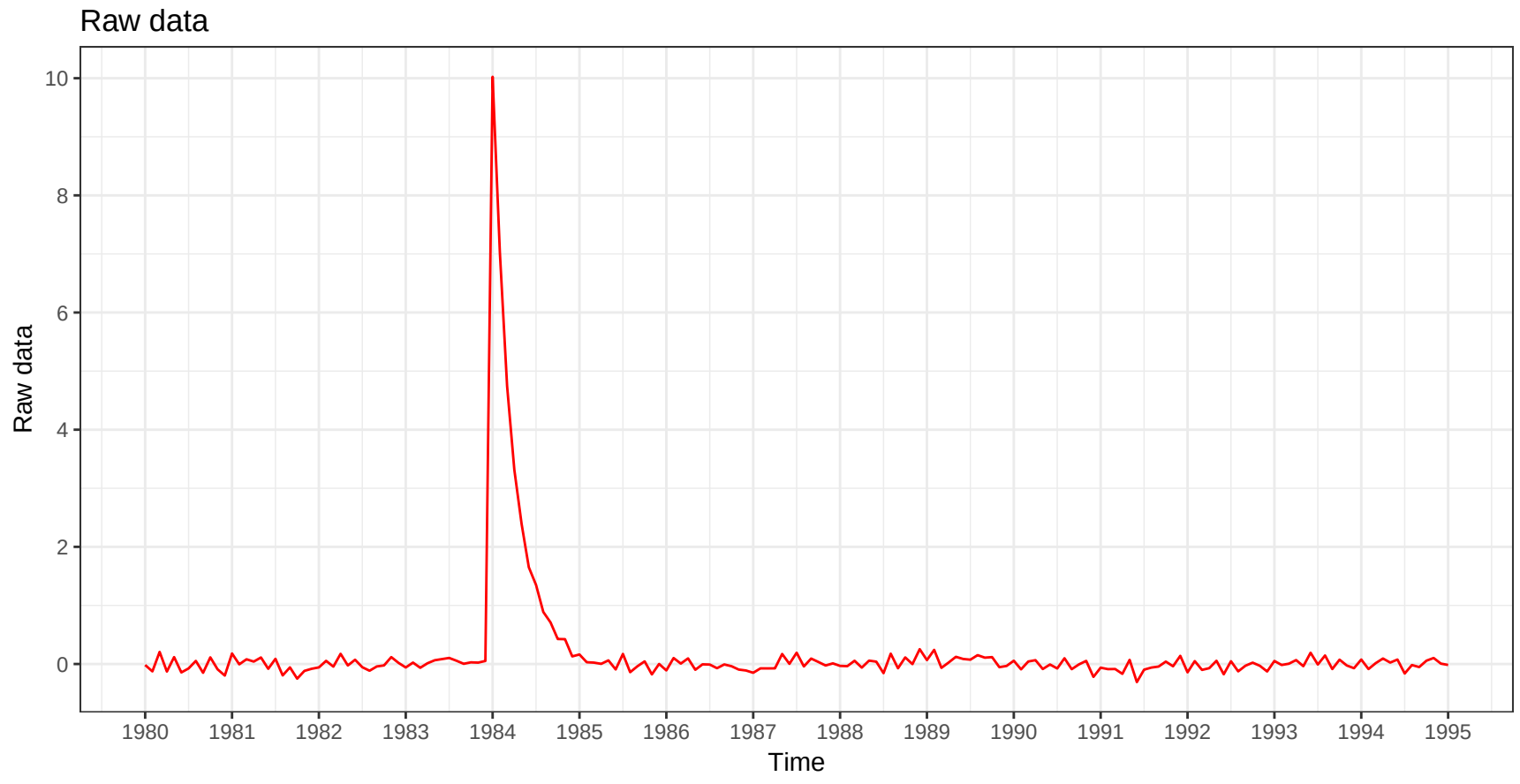
Estimate value of a TC(1984−01)
ARIMA (1,0,0)(1,0,0) − additive decomposition
(1−0.6B)(1−0.6B12)Xt=at



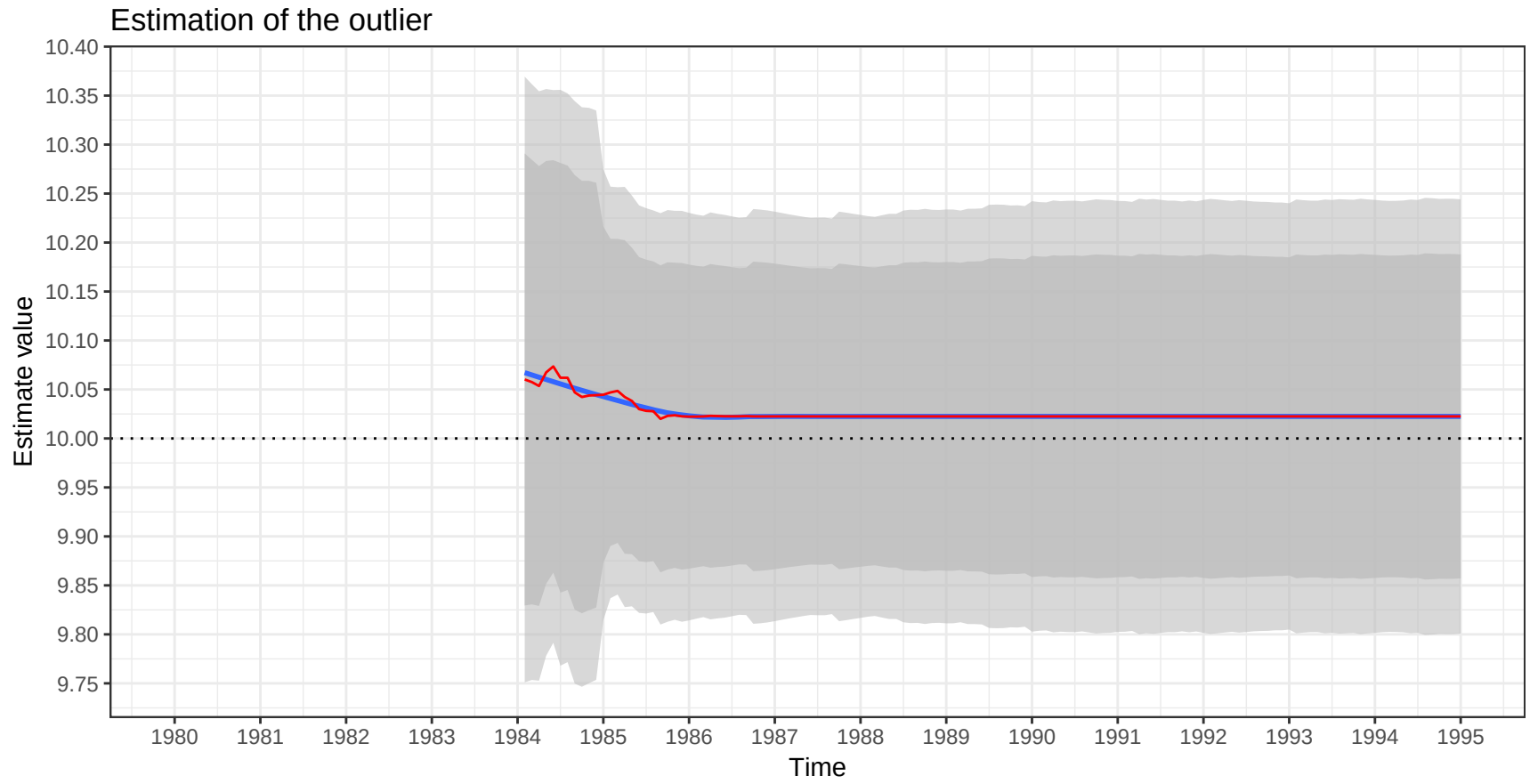


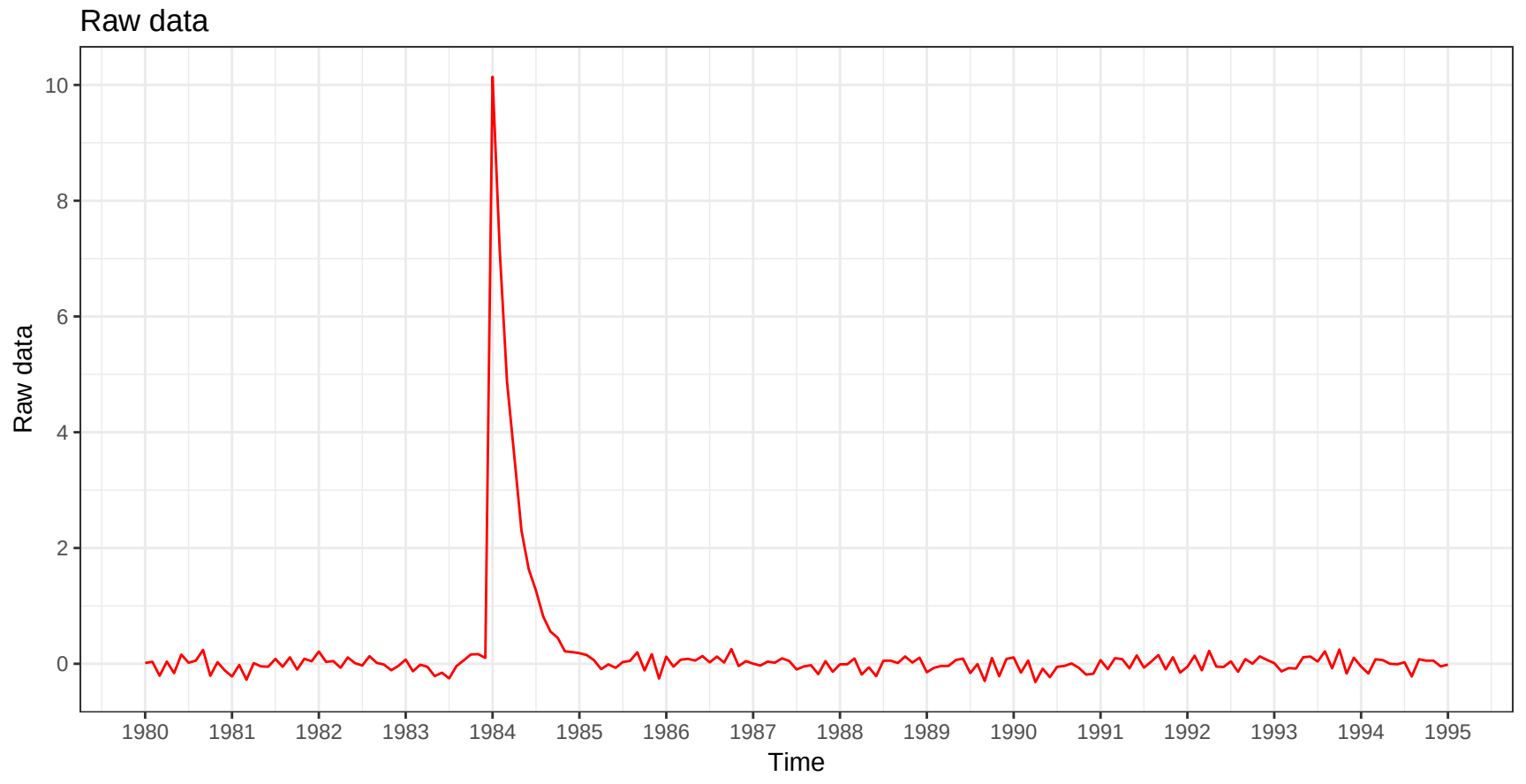
Estimate value of a TC(1984−01)
ARIMA (0,0,2)(0,0,0) − additive decomposition
Xt=(1+0.6B2)at



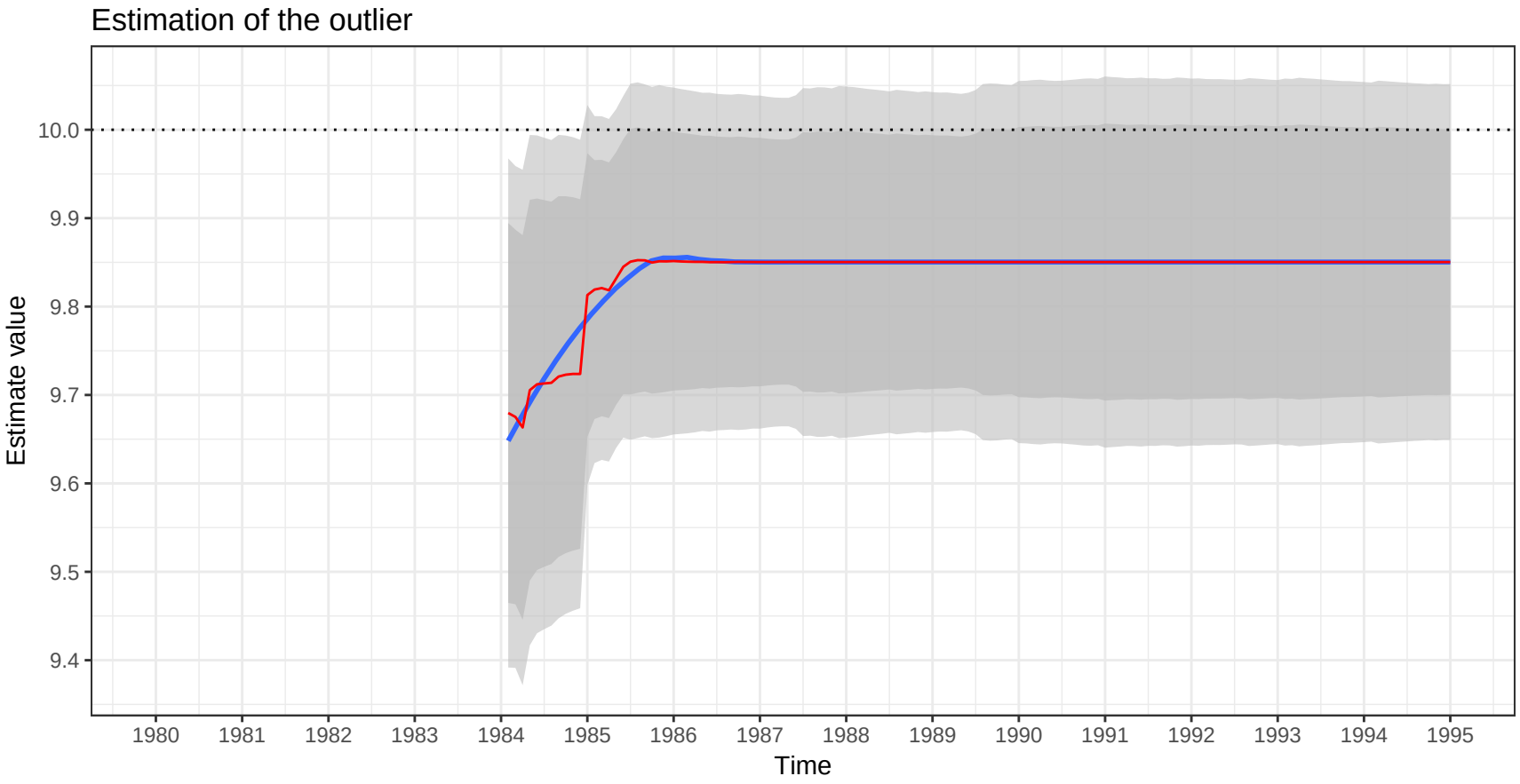


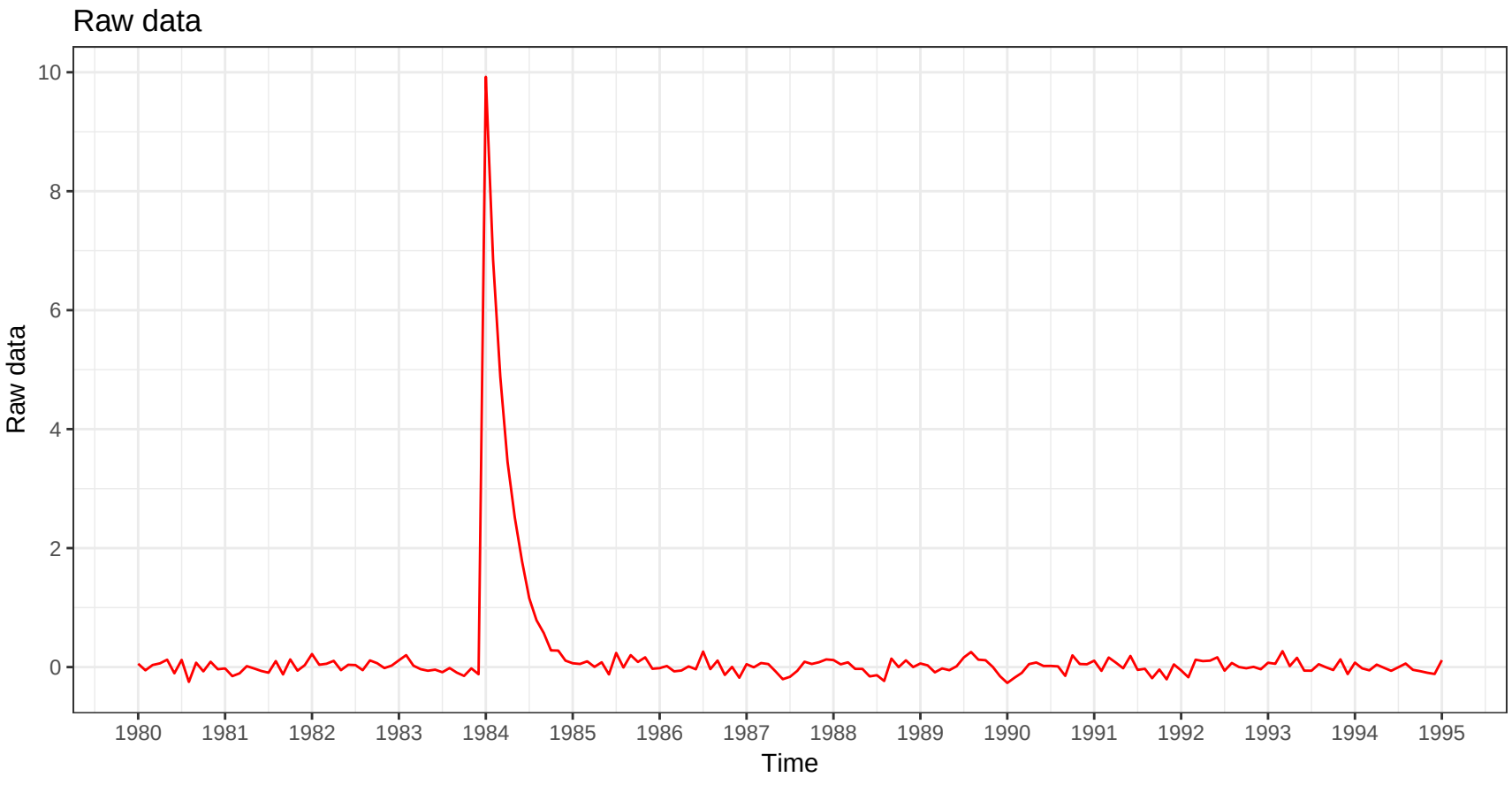
Estimate value of a TC(1984−01)
ARIMA (0,0,2)(0,0,0) − additive decomposition
Xt=(1+0.6B2)at



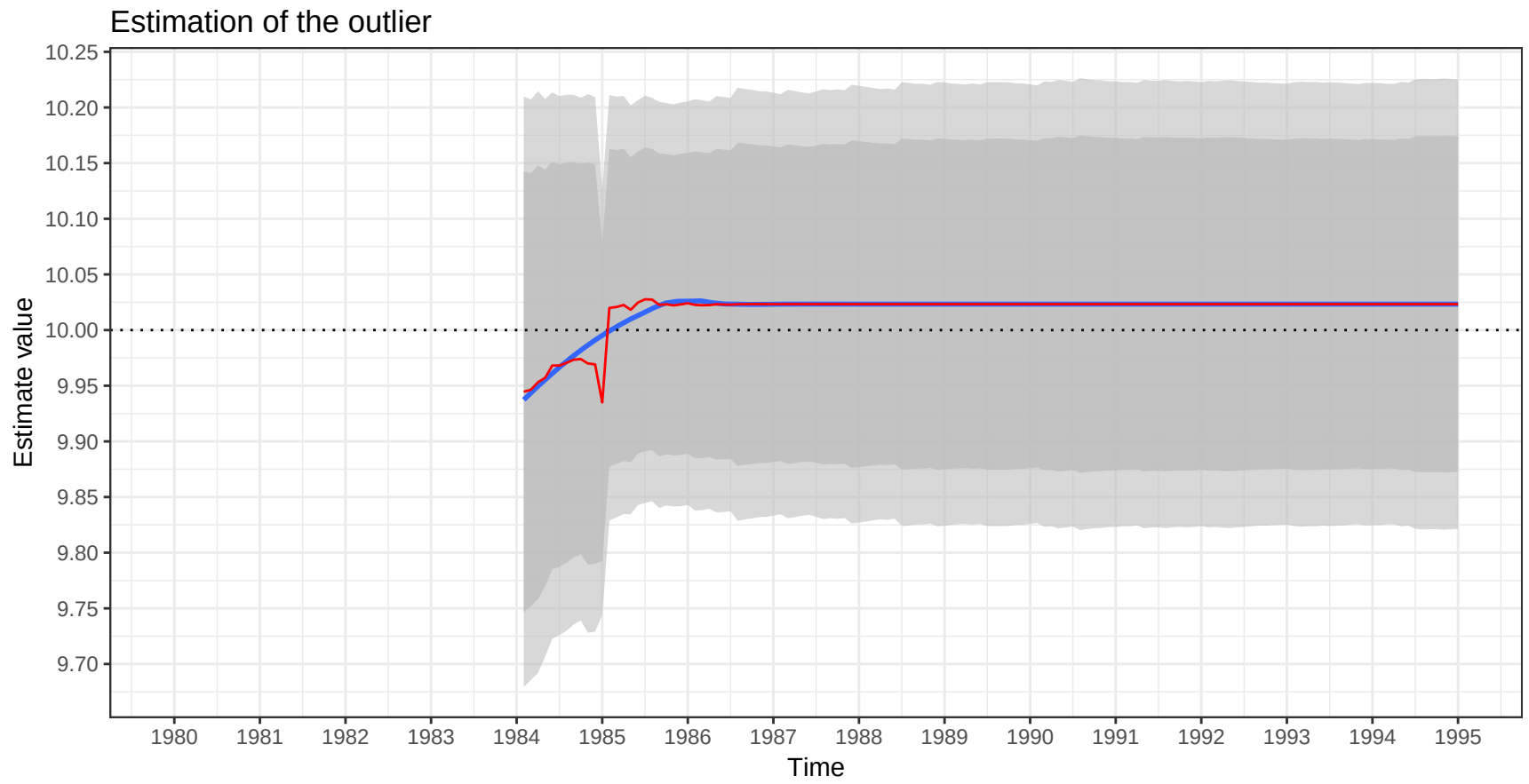


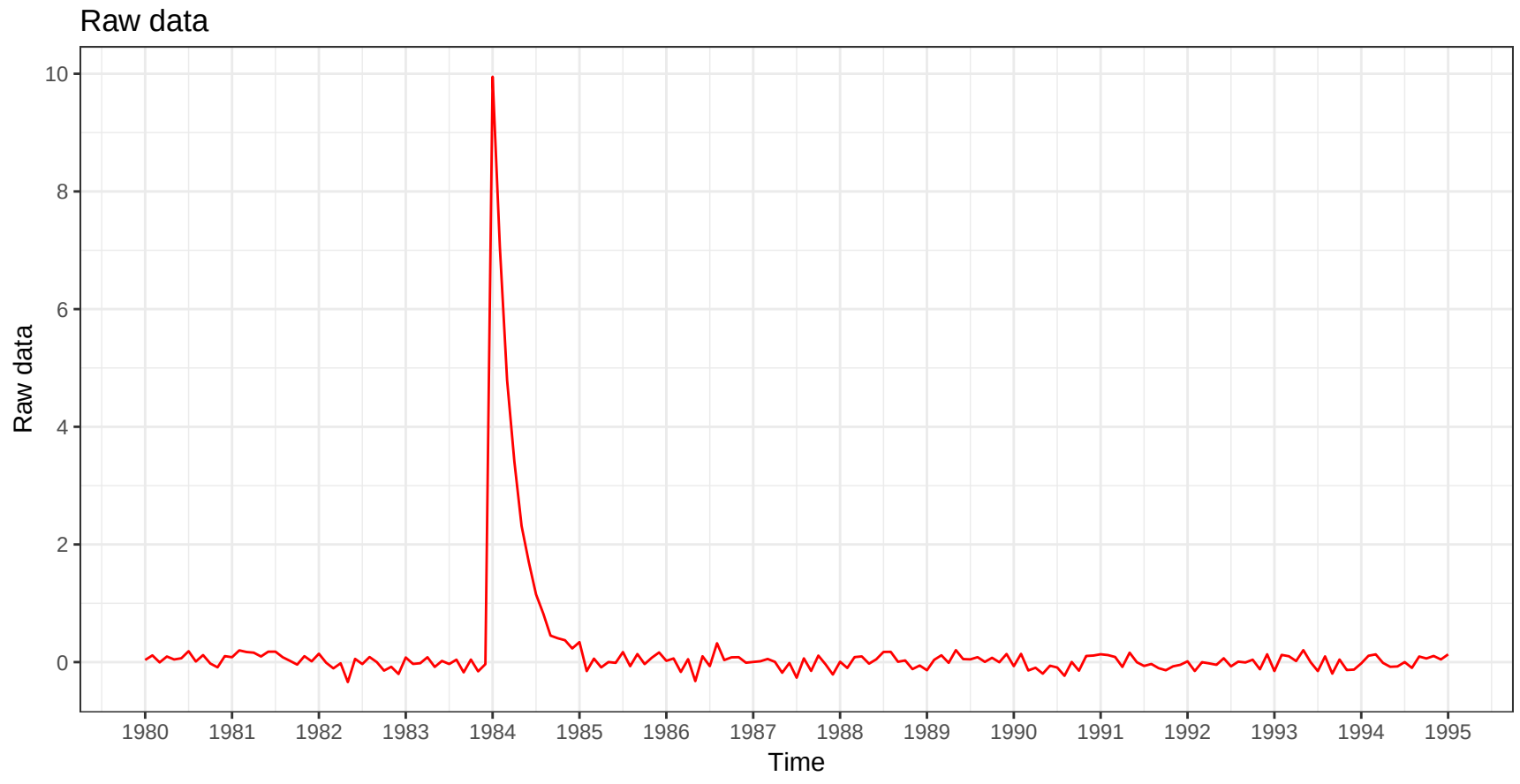
Estimate value of a TC(1984−01)
ARIMA (0,0,2)(0,0,0) − additive decomposition
Xt=(1+0.6B2)at



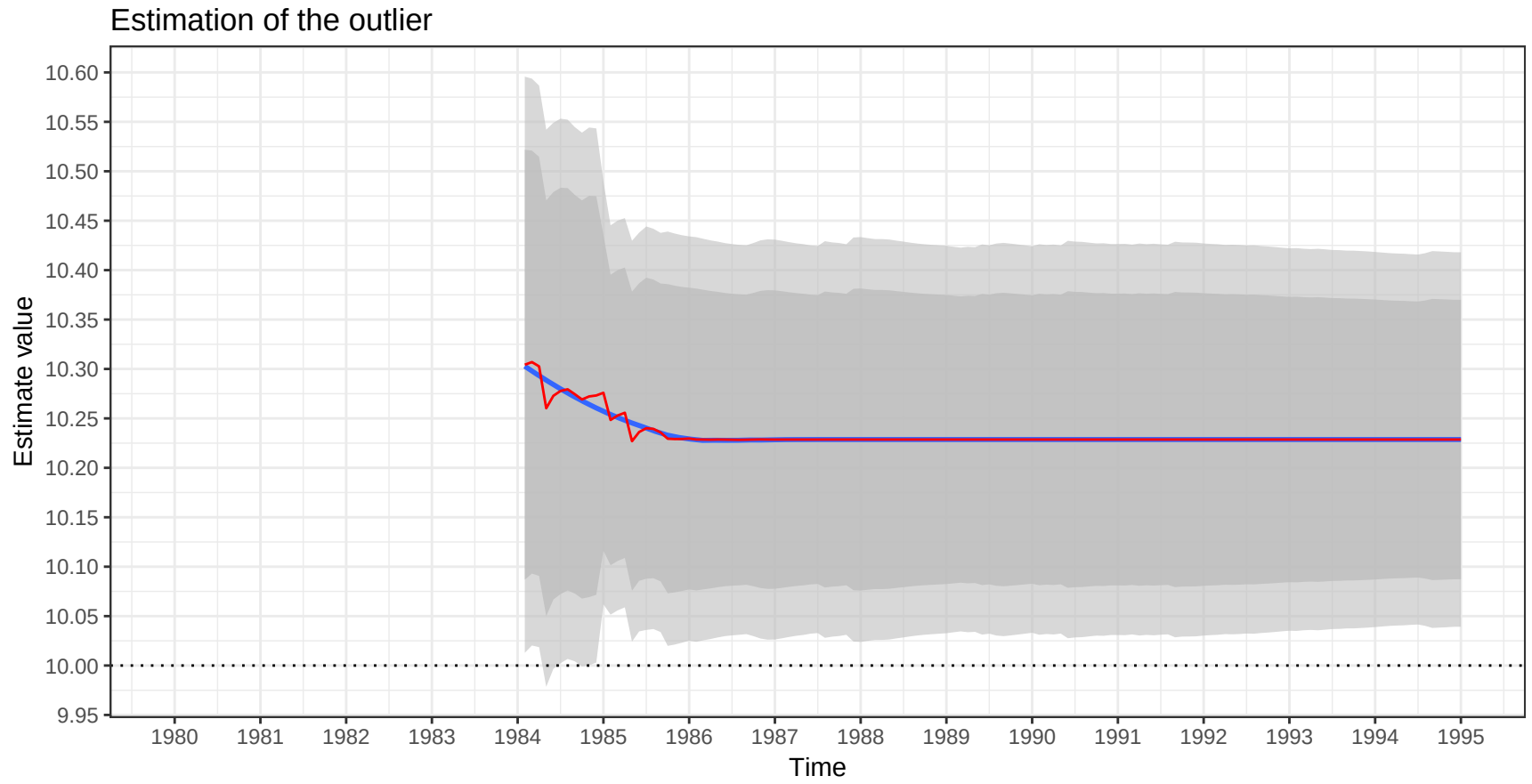


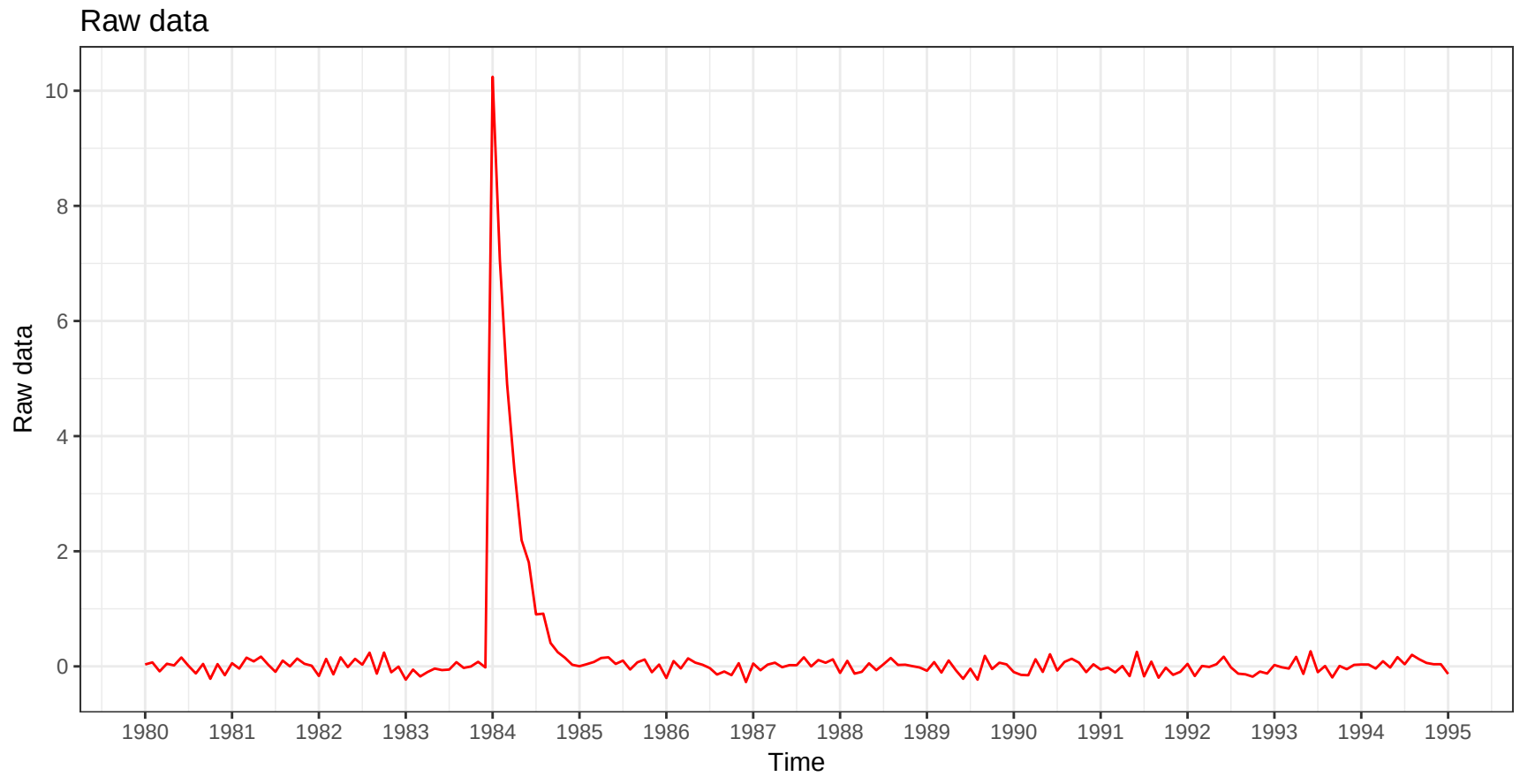
Estimate value of a TC(1984−01)
ARIMA (0,0,2)(0,0,0) − additive decomposition
Xt=(1+0.6B2)at



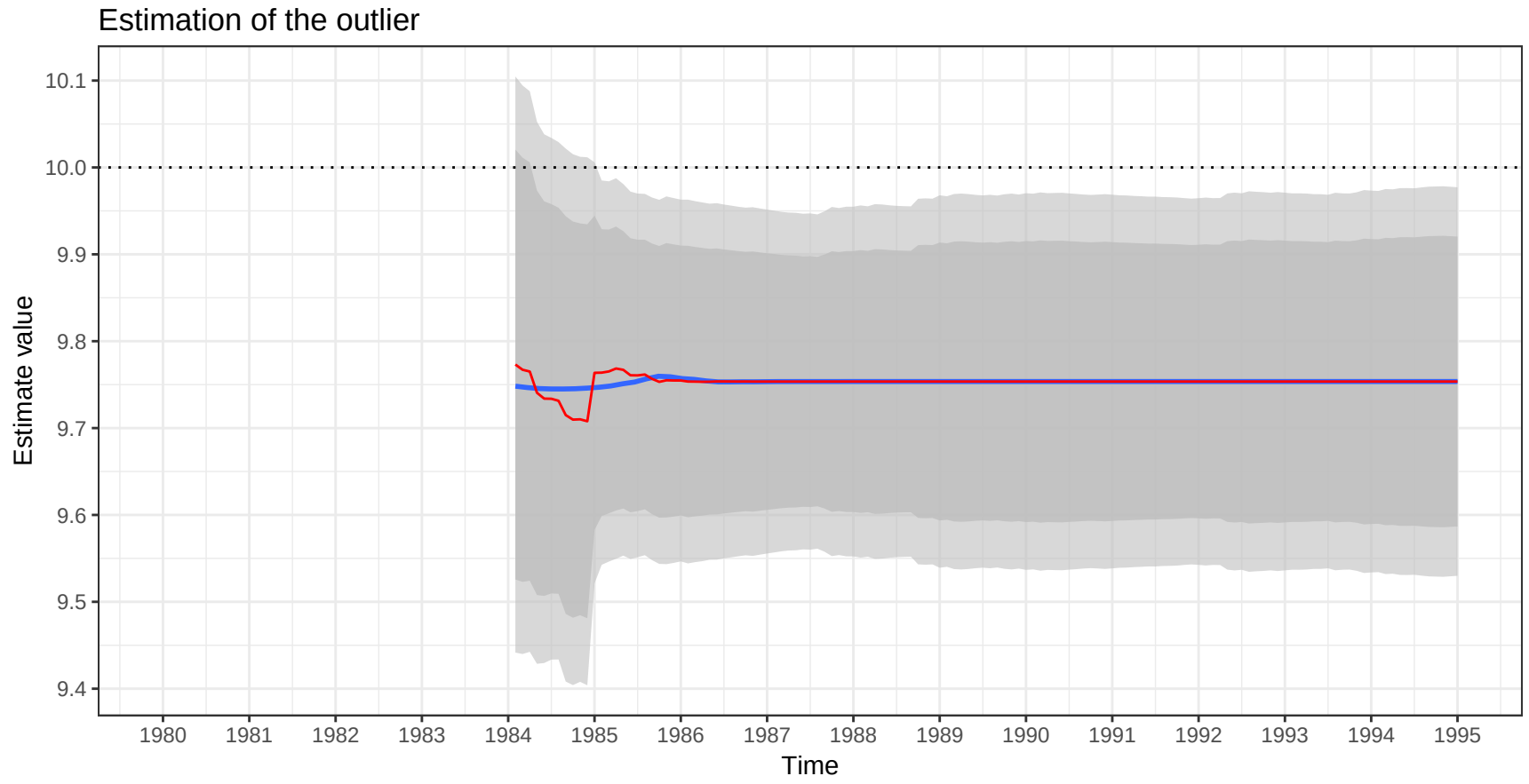


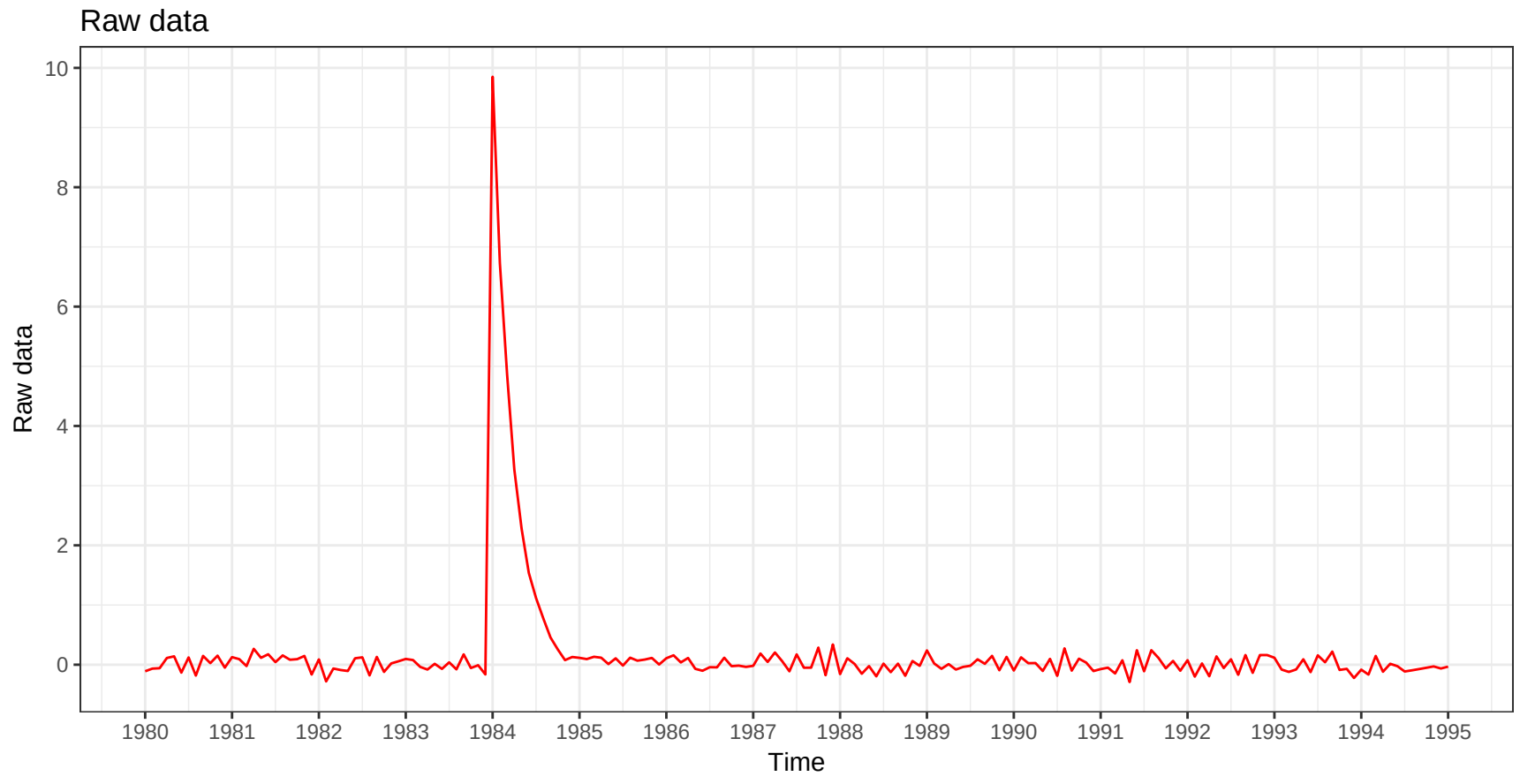
Estimate value of a TC(1984−01)
ARIMA (0,0,2)(0,0,0) − additive decomposition
Xt=(1+0.6B2)at



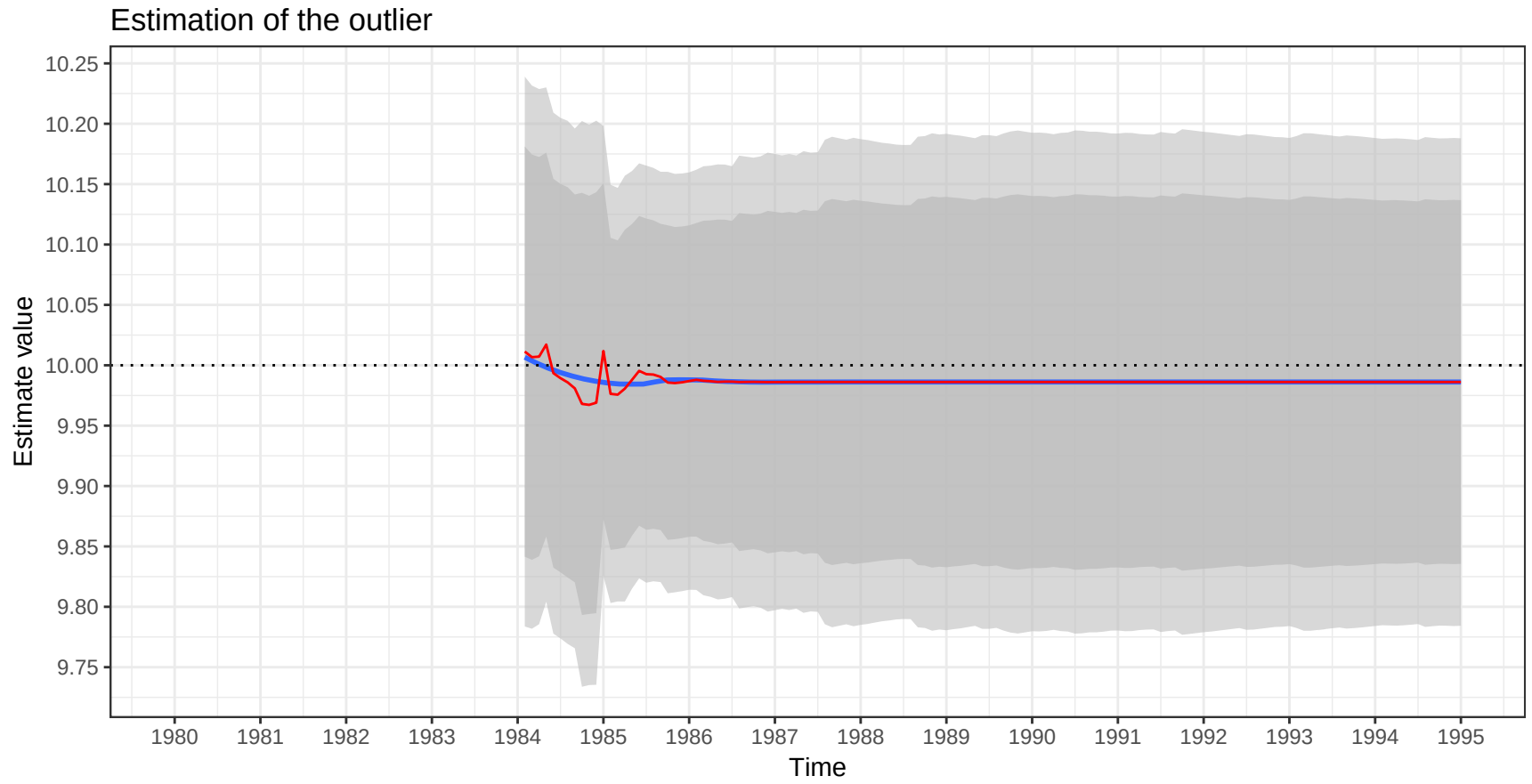


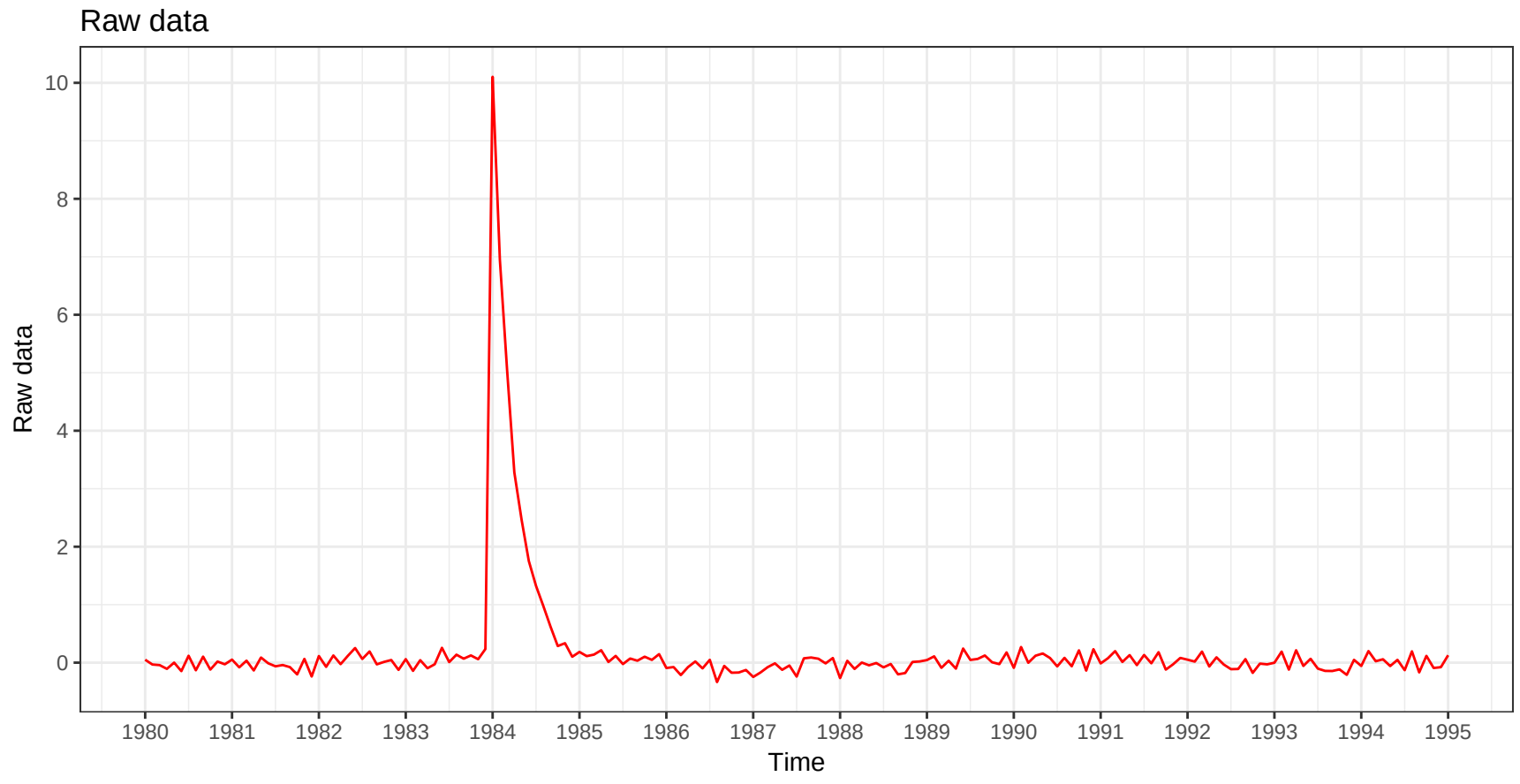
Estimate value of a TC(1984−01)
ARIMA (0,0,2)(0,0,0) − additive decomposition
Xt=(1+0.6B2)at



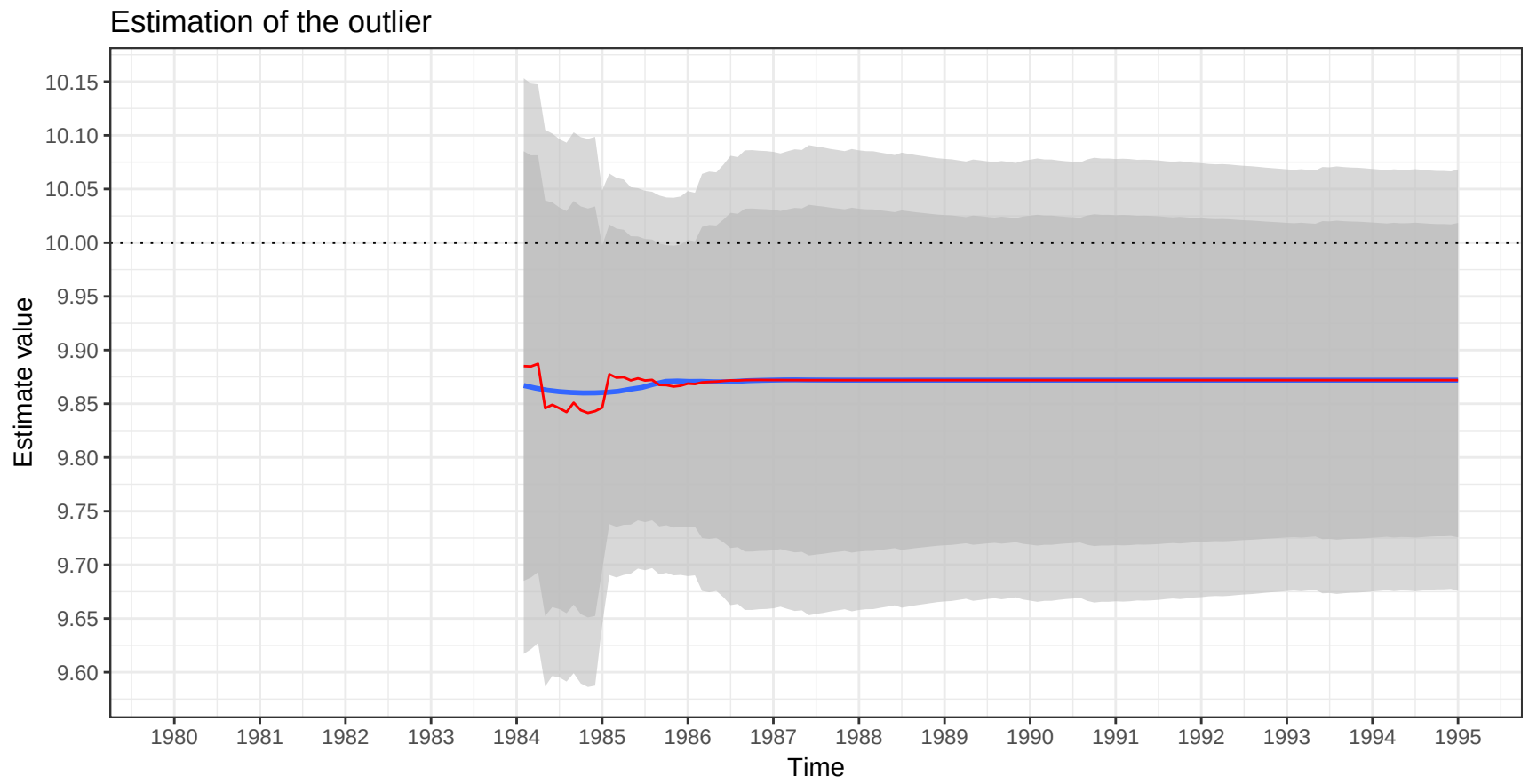


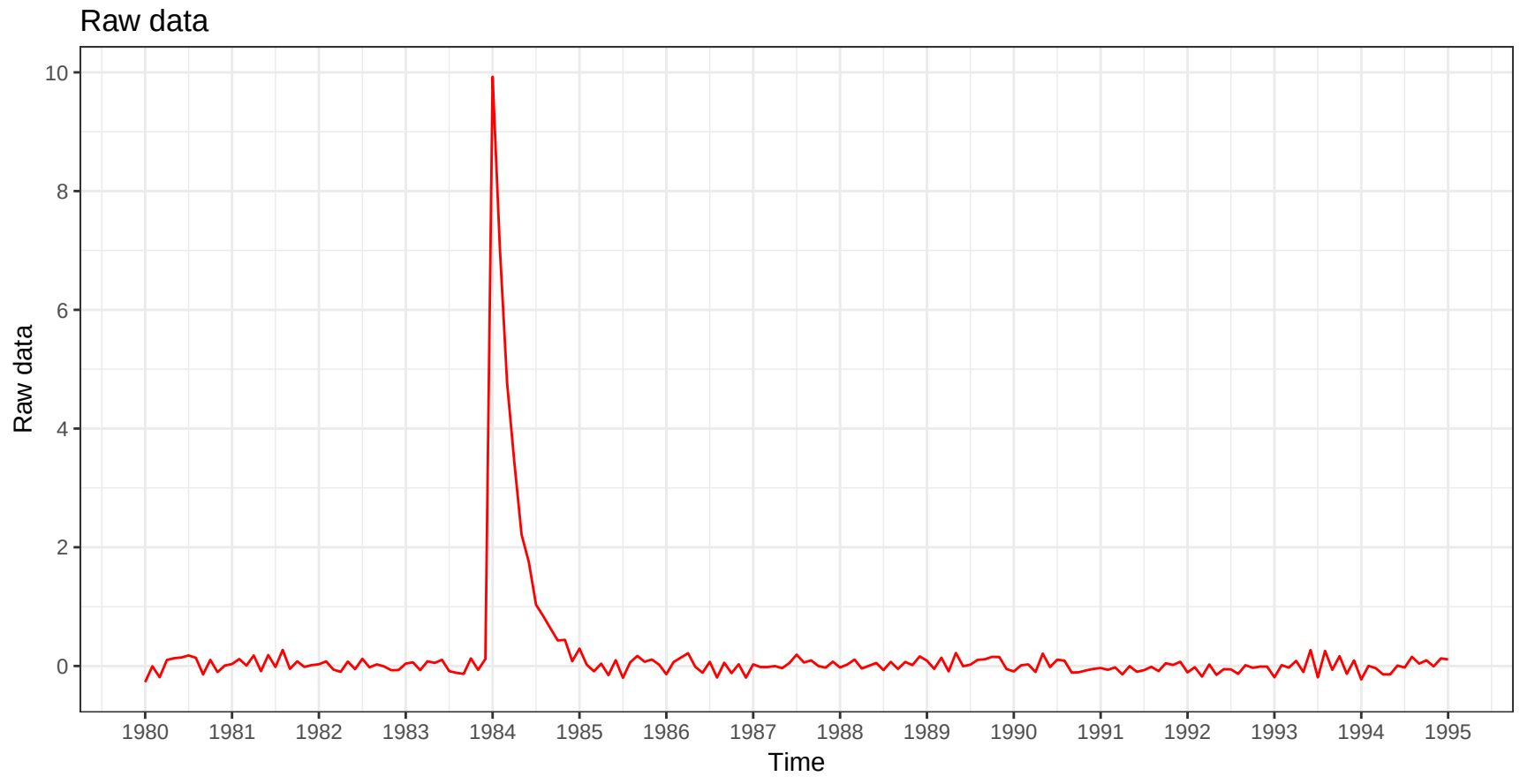
Estimate value of a TC(1984−01)
ARIMA (0,0,2)(0,0,0) − additive decomposition
Xt=(1+0.6B2)at



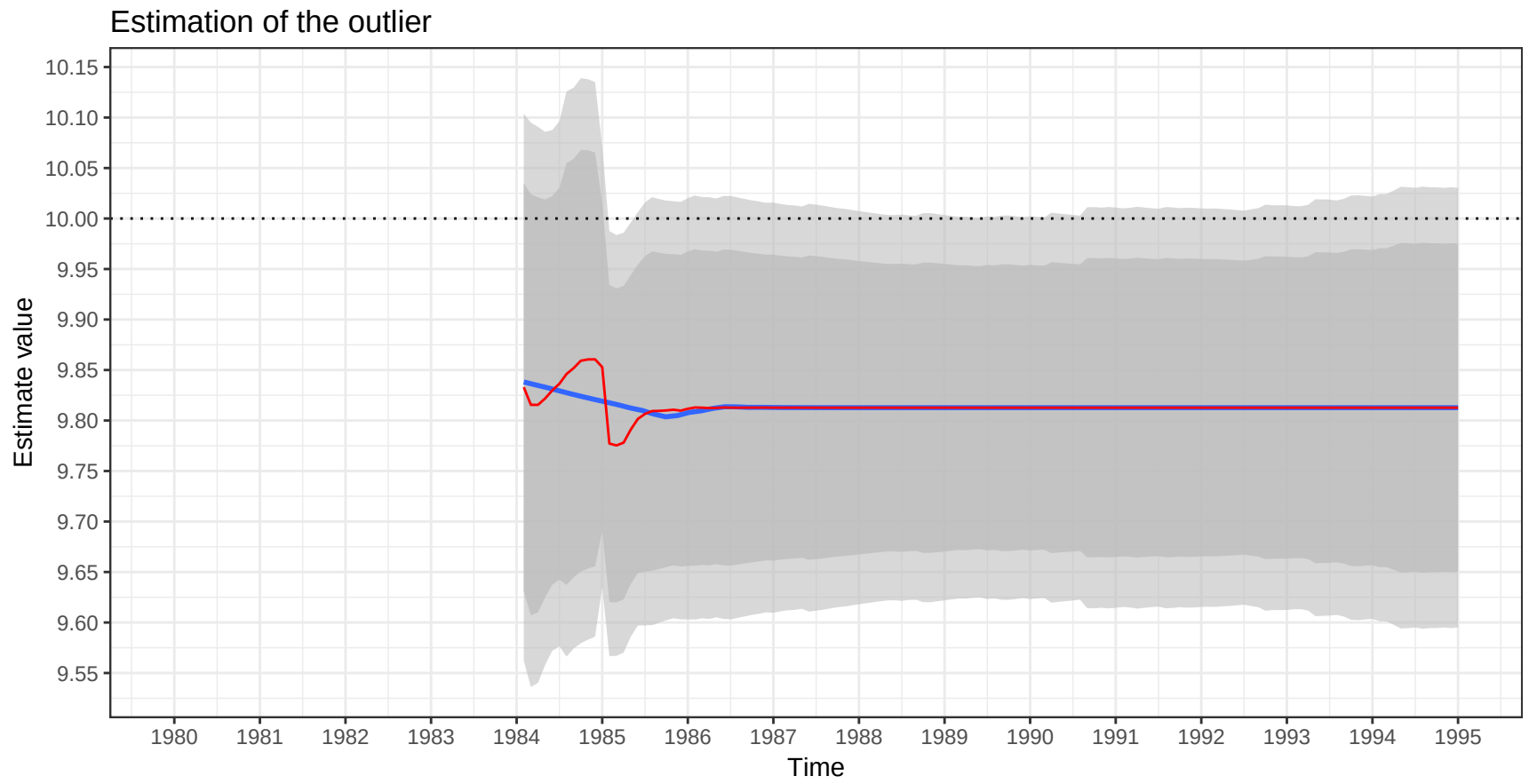


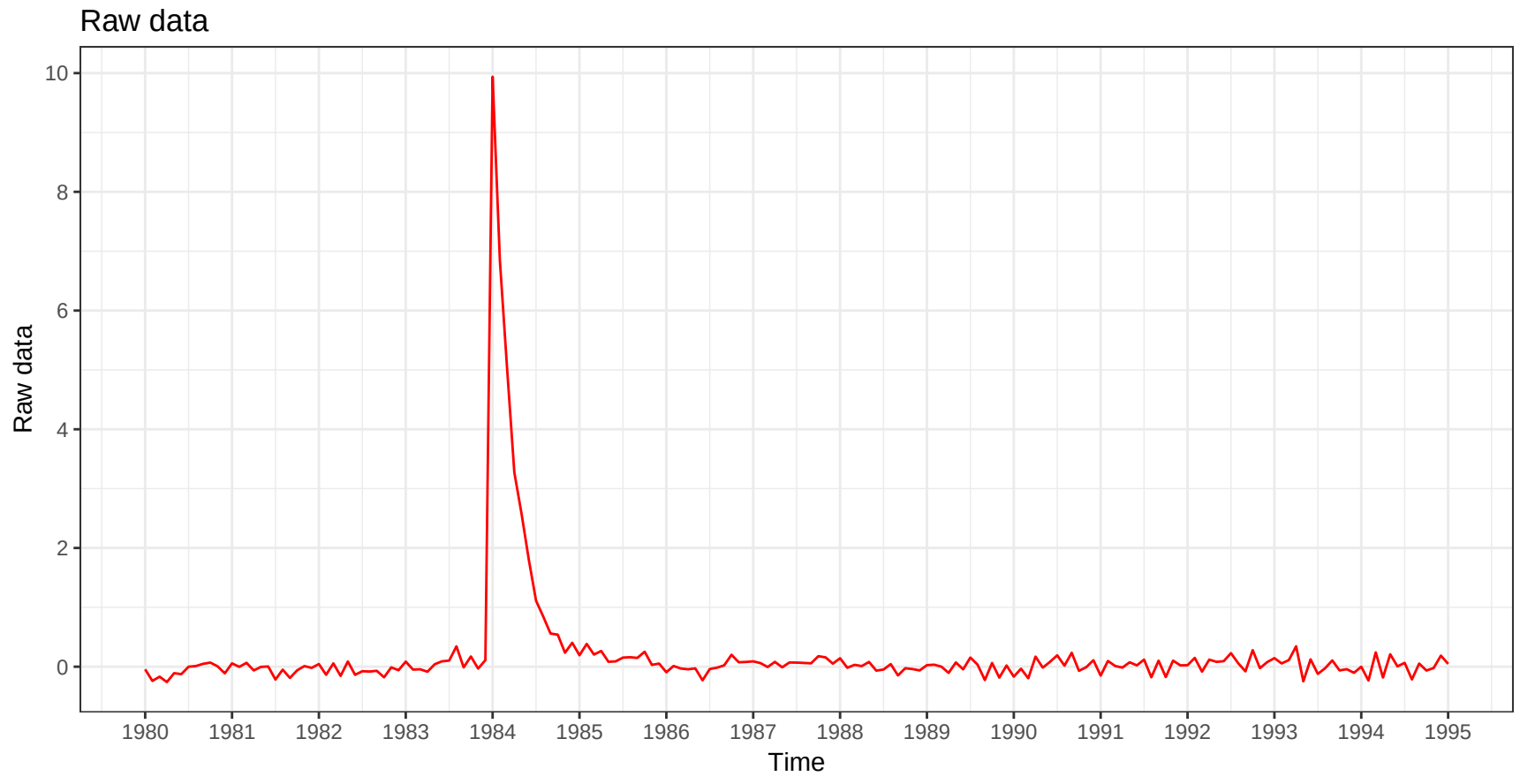
Estimate value of a TC(1984−01)
ARIMA (0,0,2)(0,0,0) − additive decomposition
Xt=(1+0.6B2)at



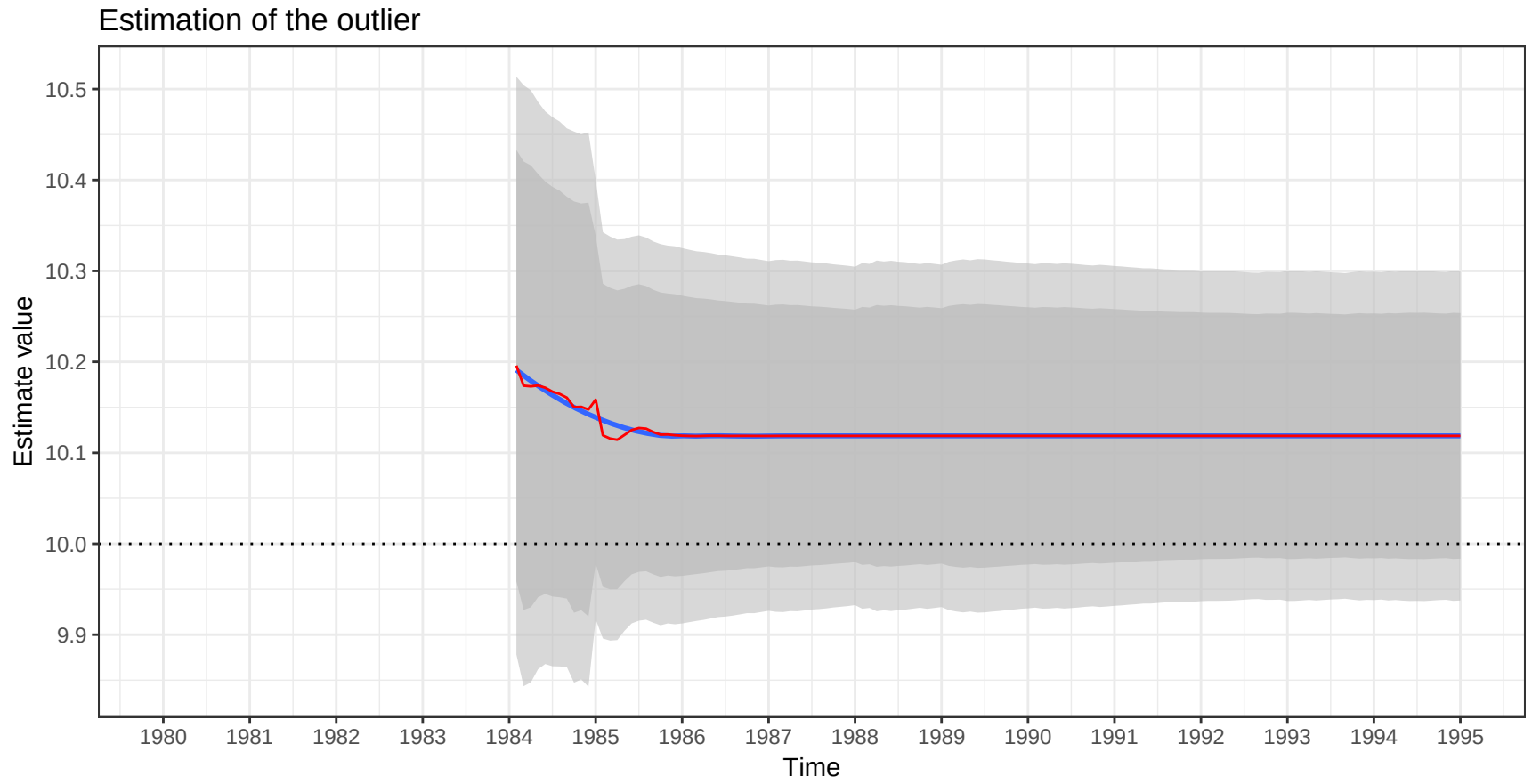


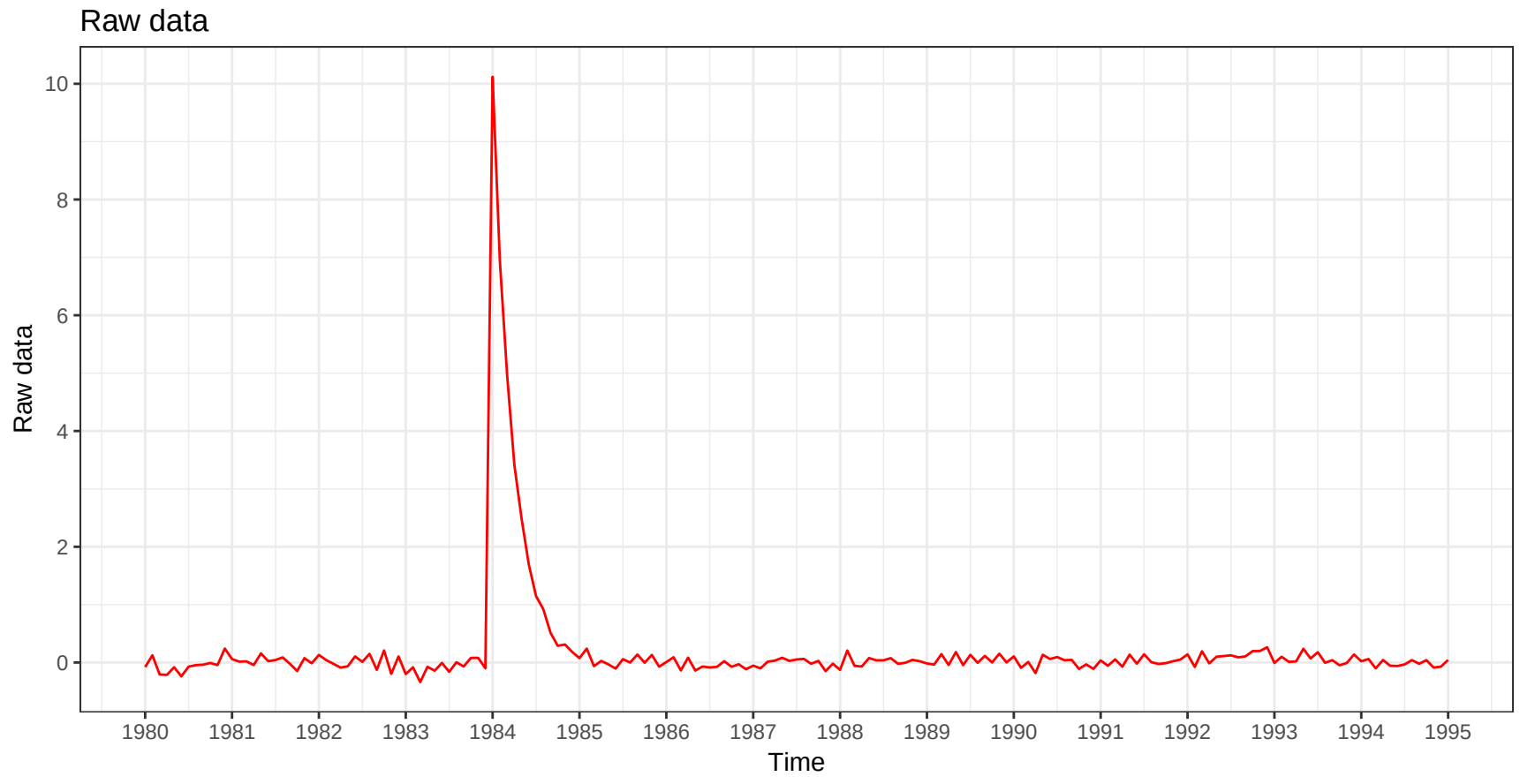
Estimate value of a TC(1984−01)
ARIMA (0,0,2)(0,0,0) − additive decomposition
Xt=(1+0.6B2)at



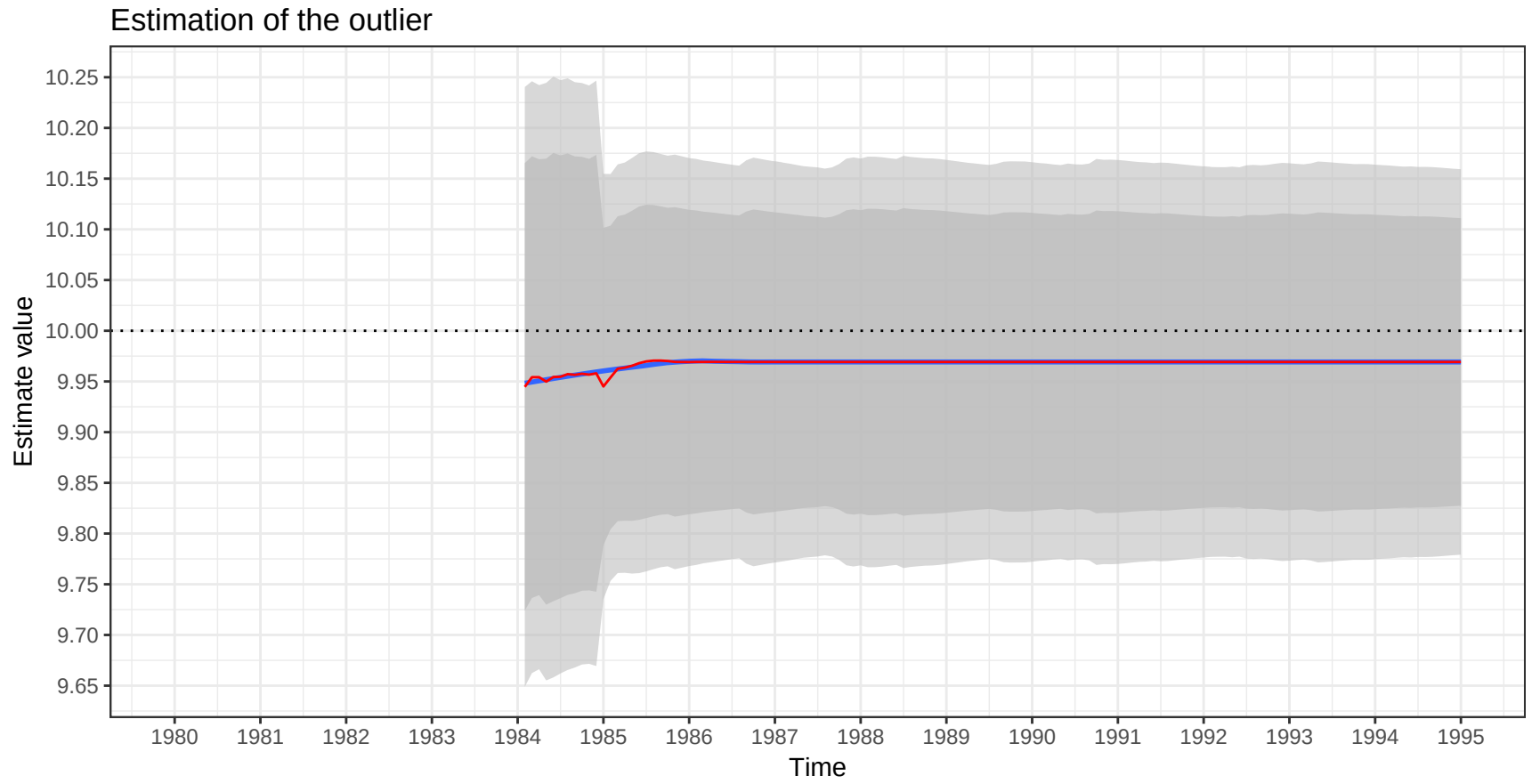


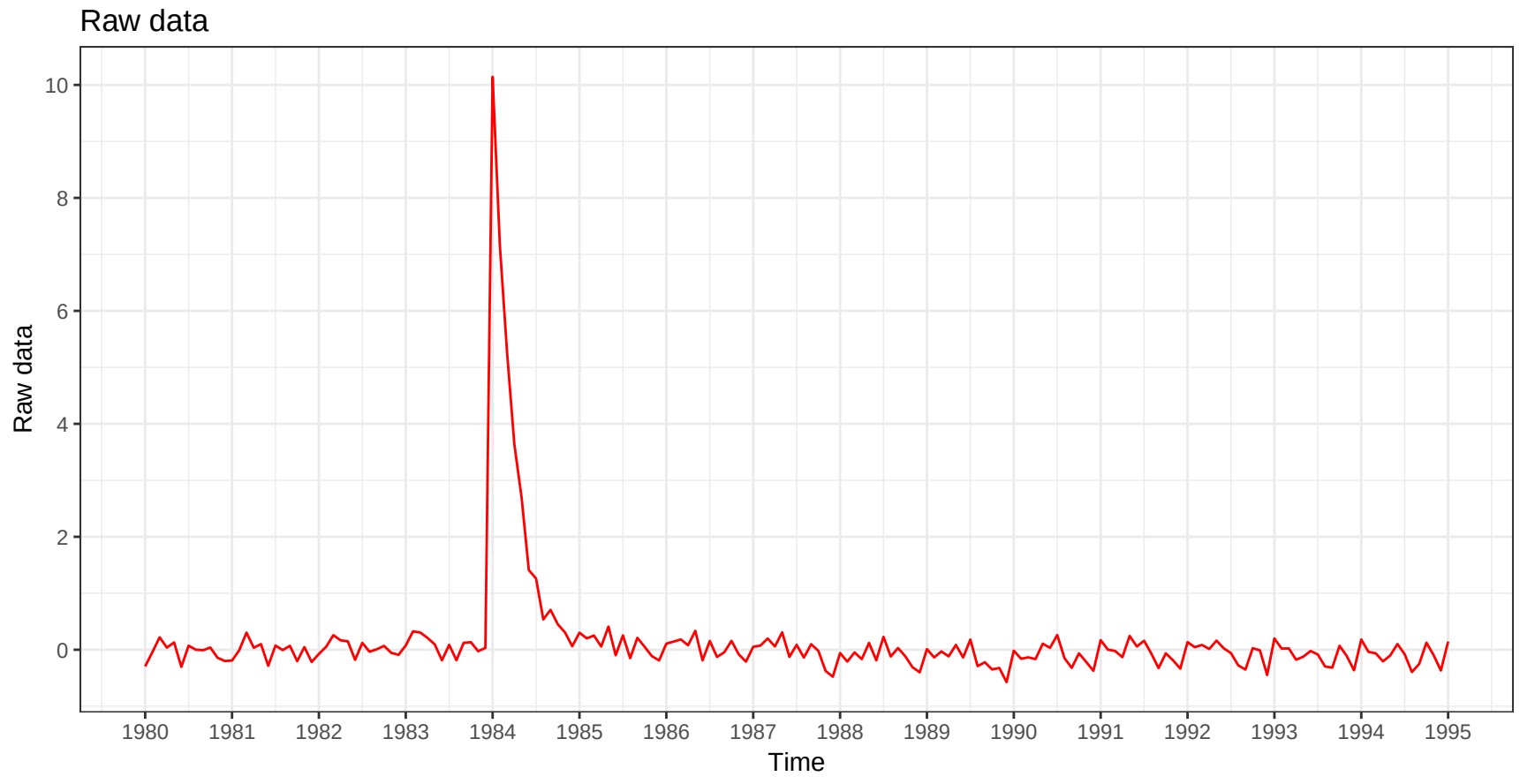
Estimate value of a TC(1984−01)
ARIMA (0,0,2)(0,0,0) − additive decomposition
Xt=(1+0.6B2)at



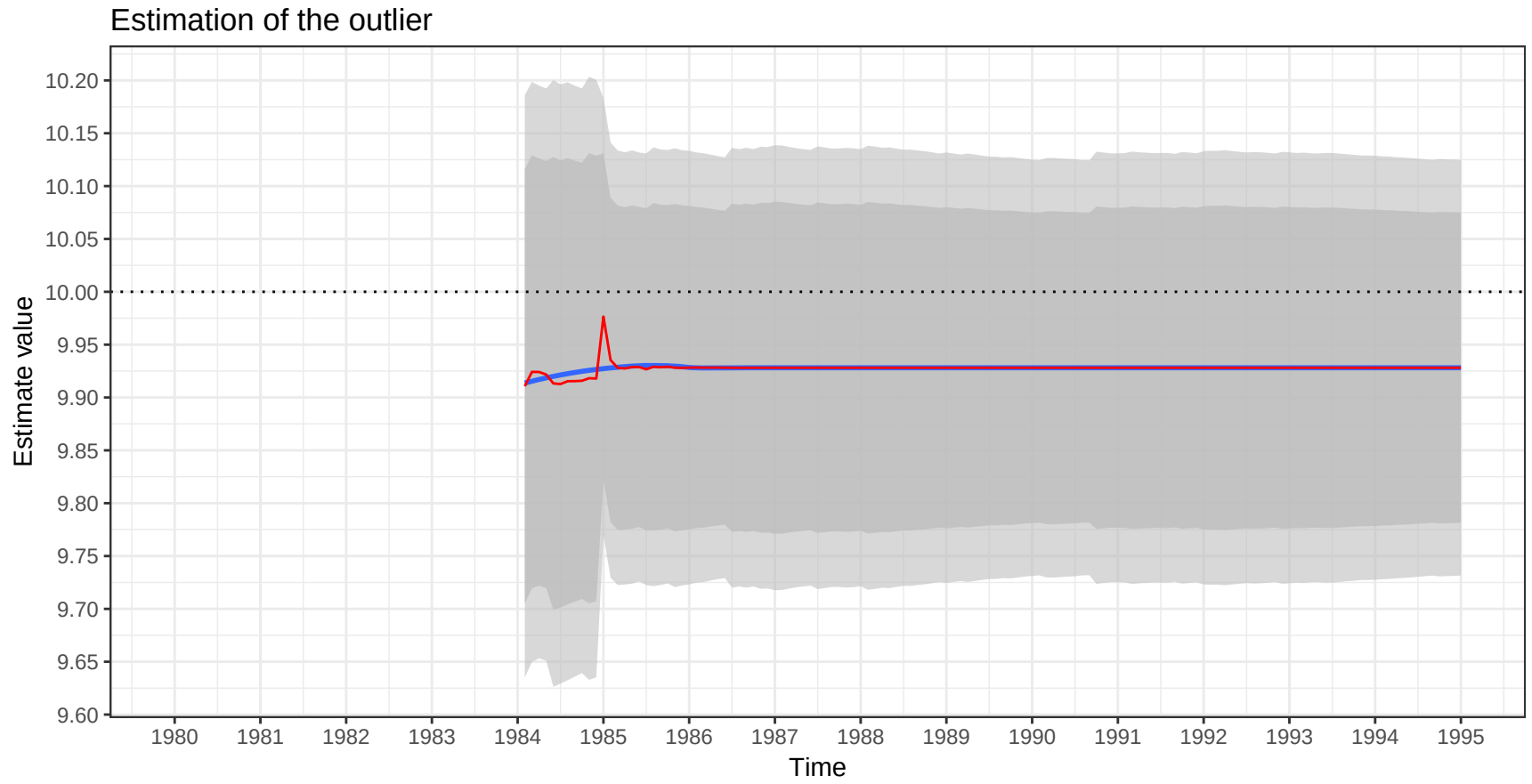


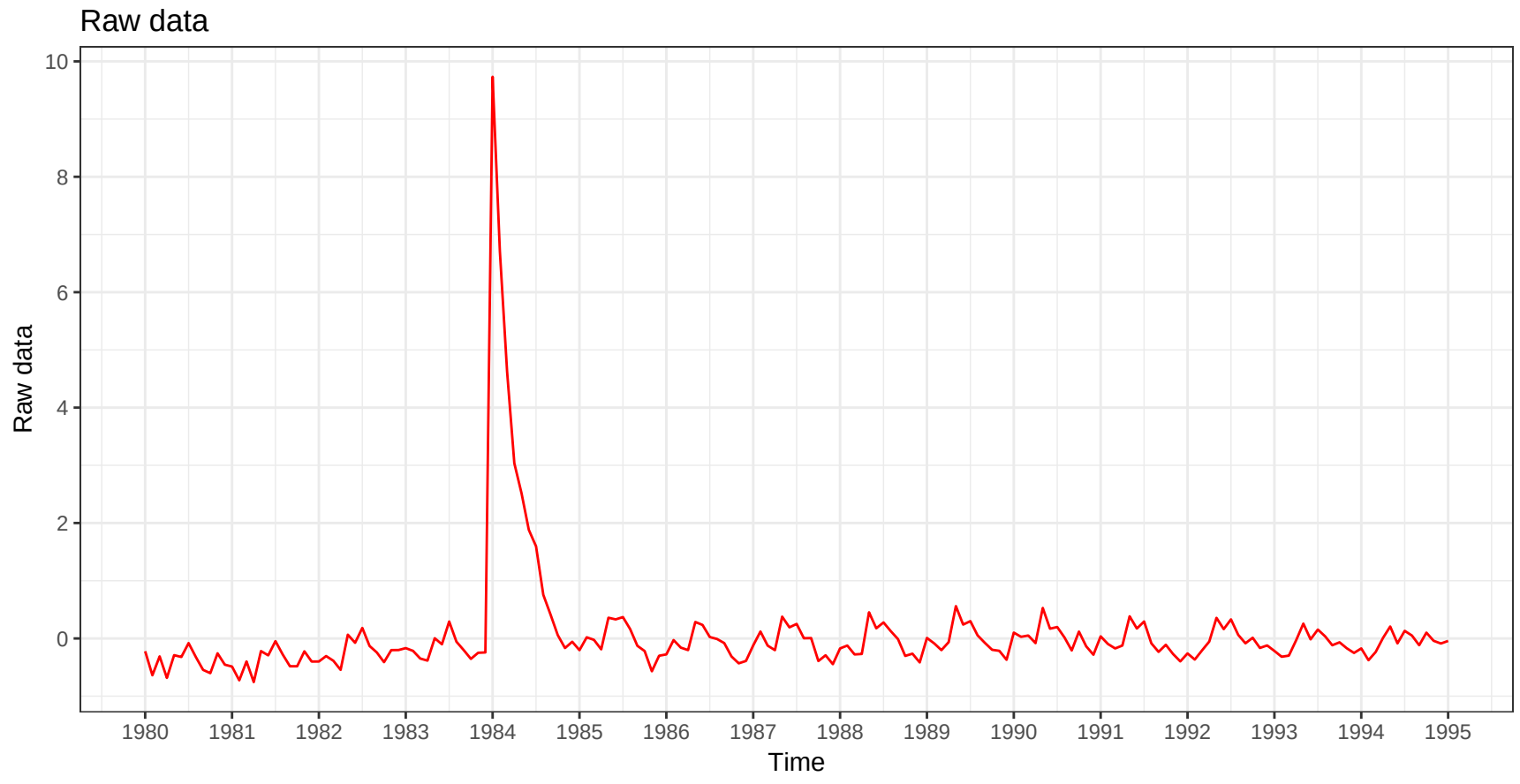
Estimate value of a TC(1984−01)
ARIMA (1,0,1)(0,0,0) − additive decomposition
(1−0.8B)Xt=(1−0.5B)at



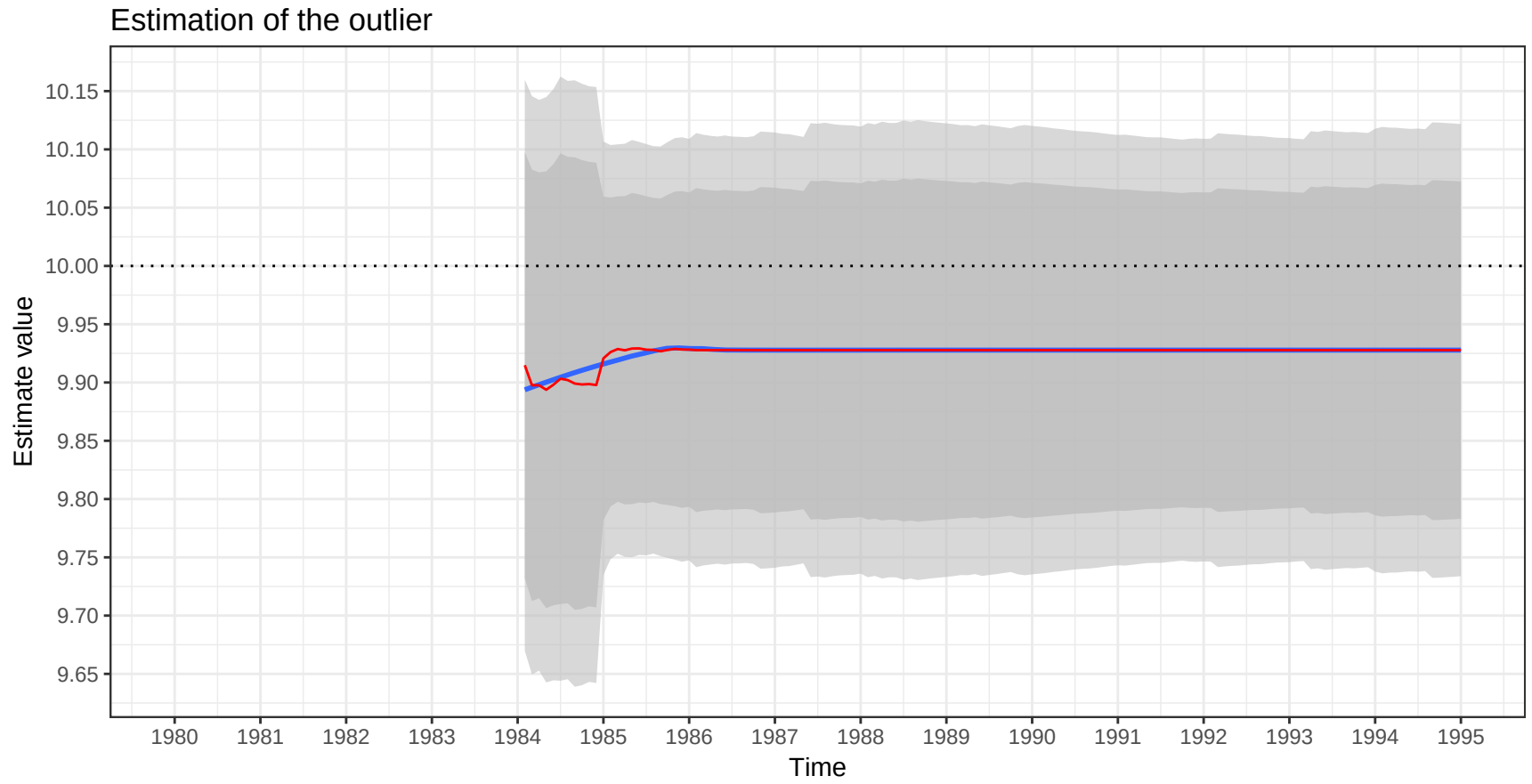


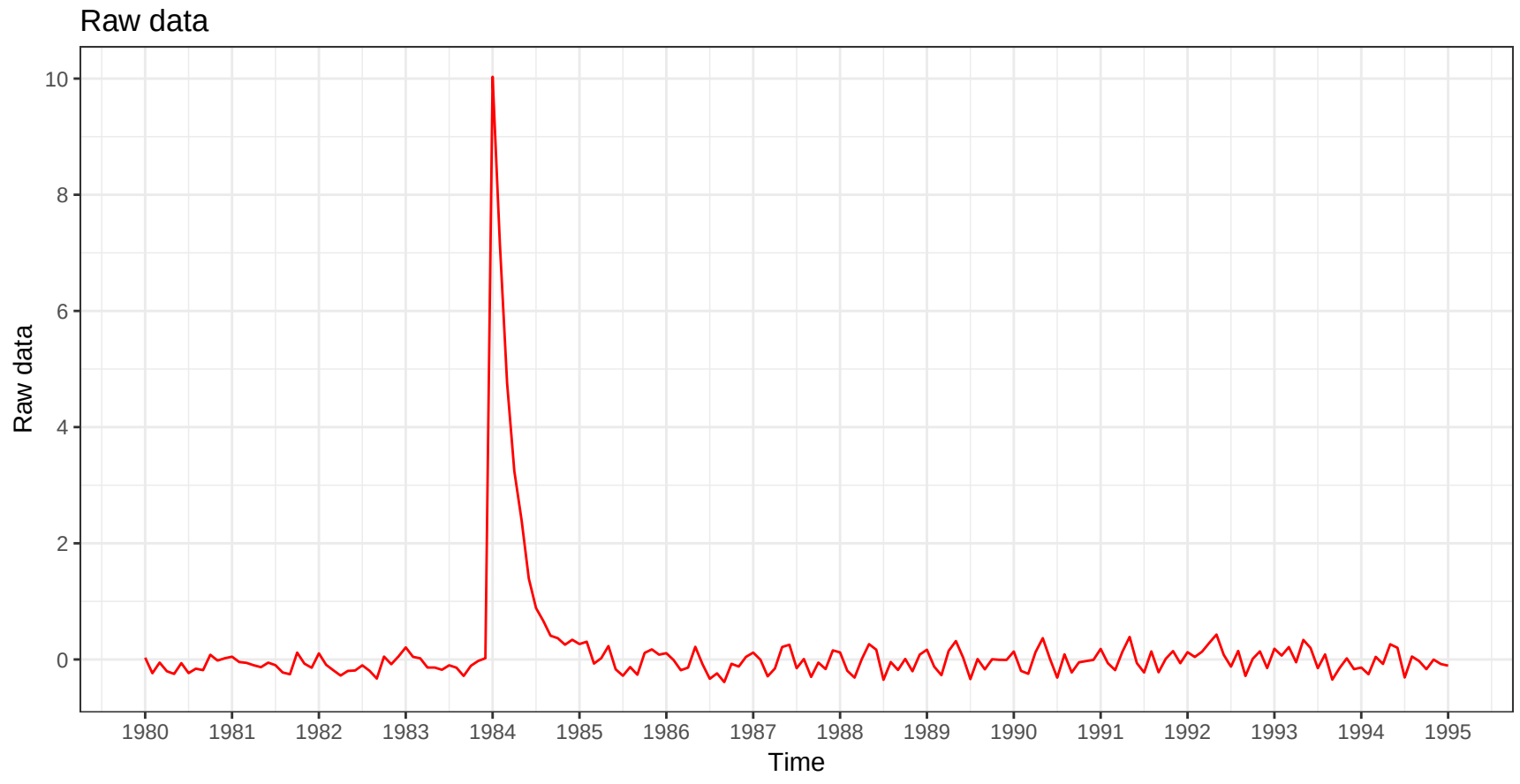
Estimate value of a TC(1984−01)
ARIMA (1,0,1)(0,0,0) − additive decomposition
(1−0.8B)Xt=(1−0.5B)at



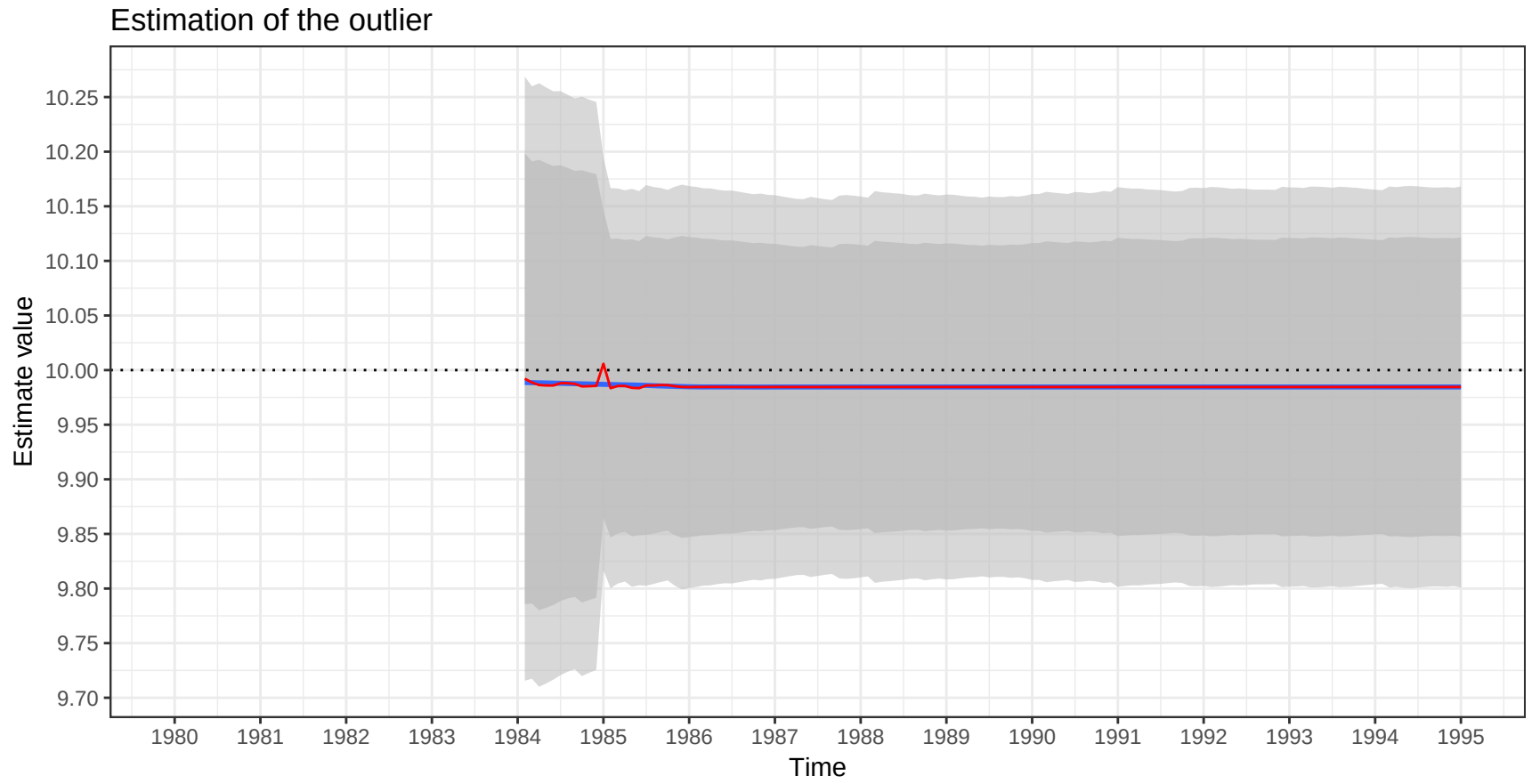


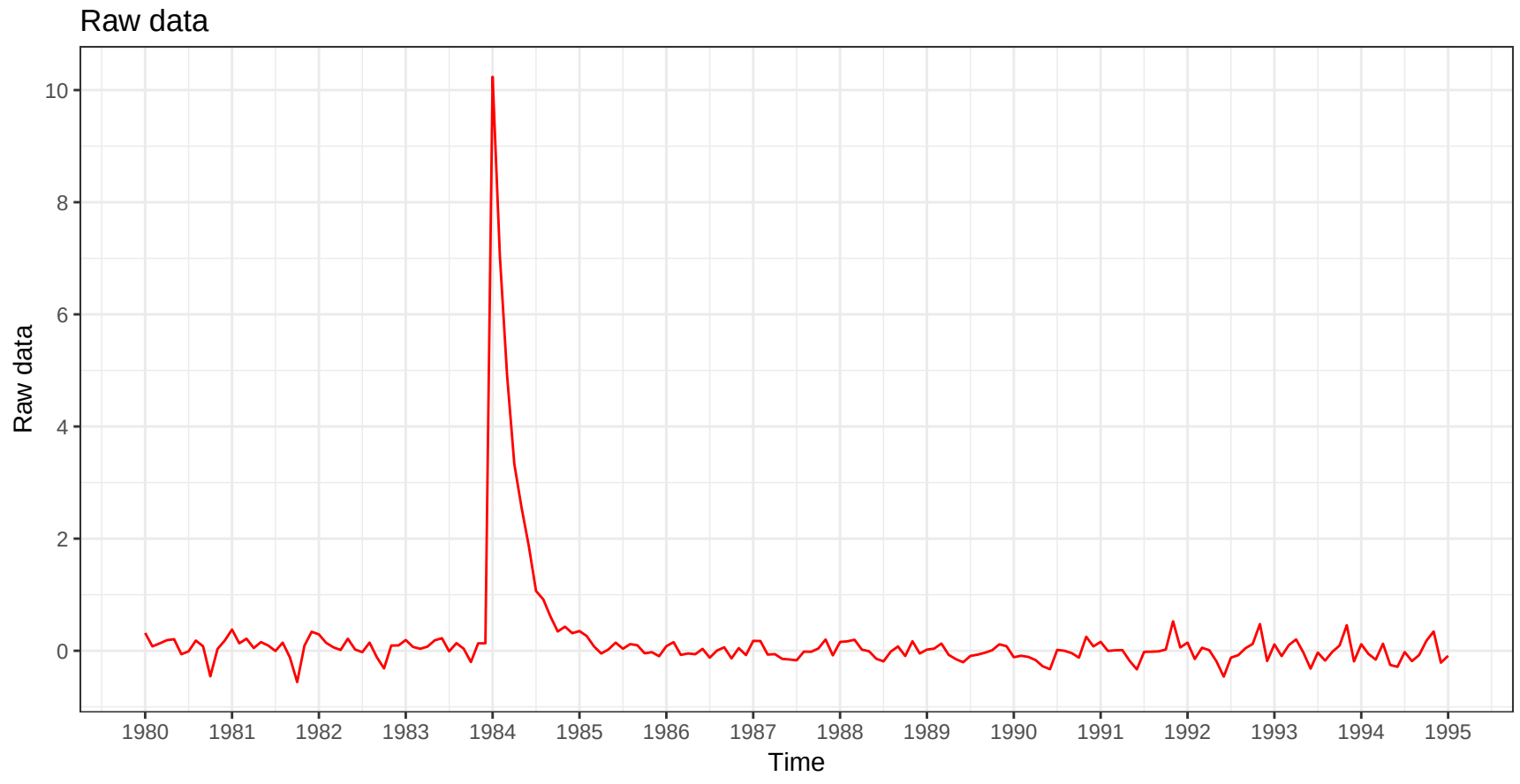
Estimate value of a TC(1984−01)
ARIMA (1,0,1)(0,0,0) − additive decomposition
(1−0.8B)Xt=(1−0.5B)at



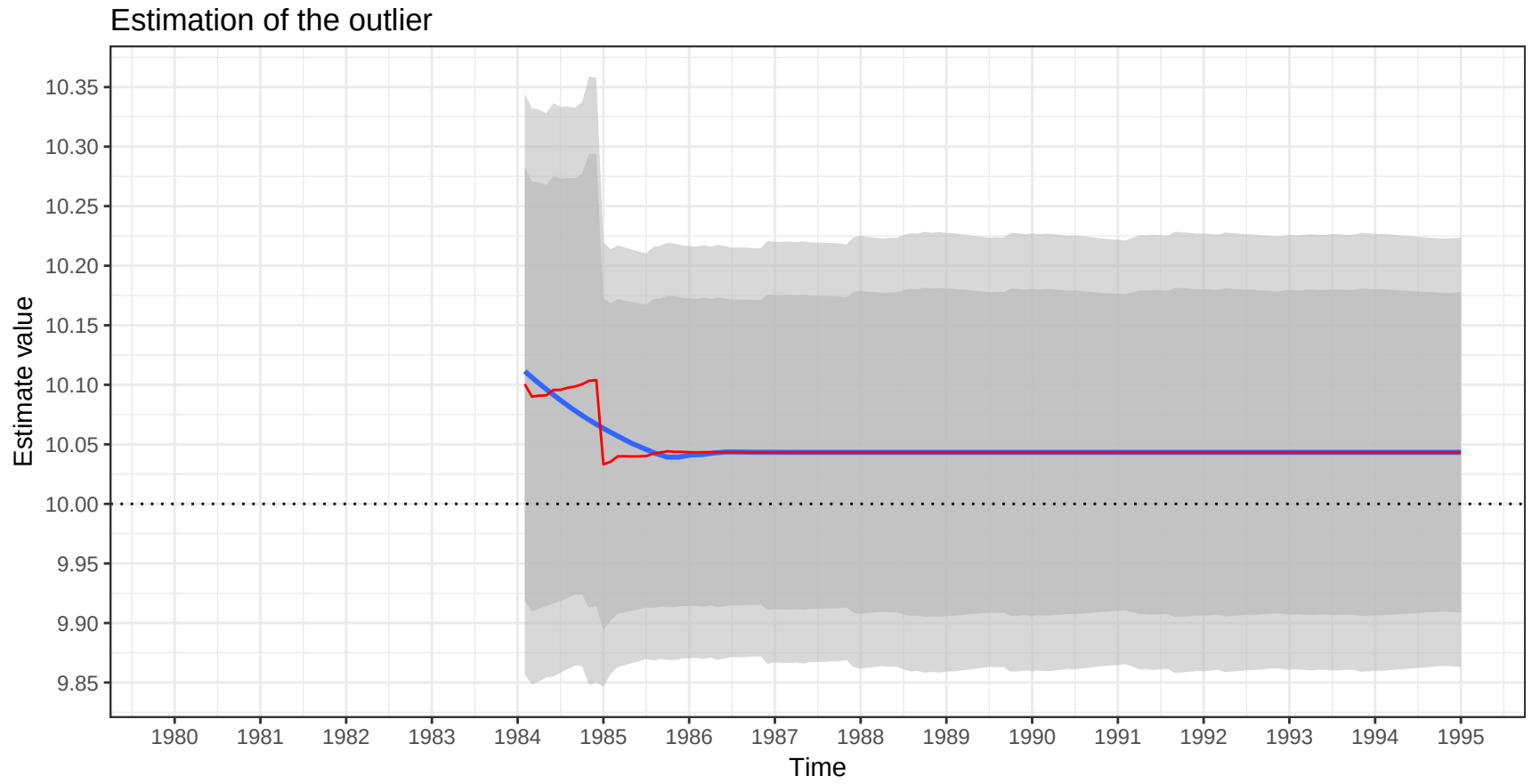


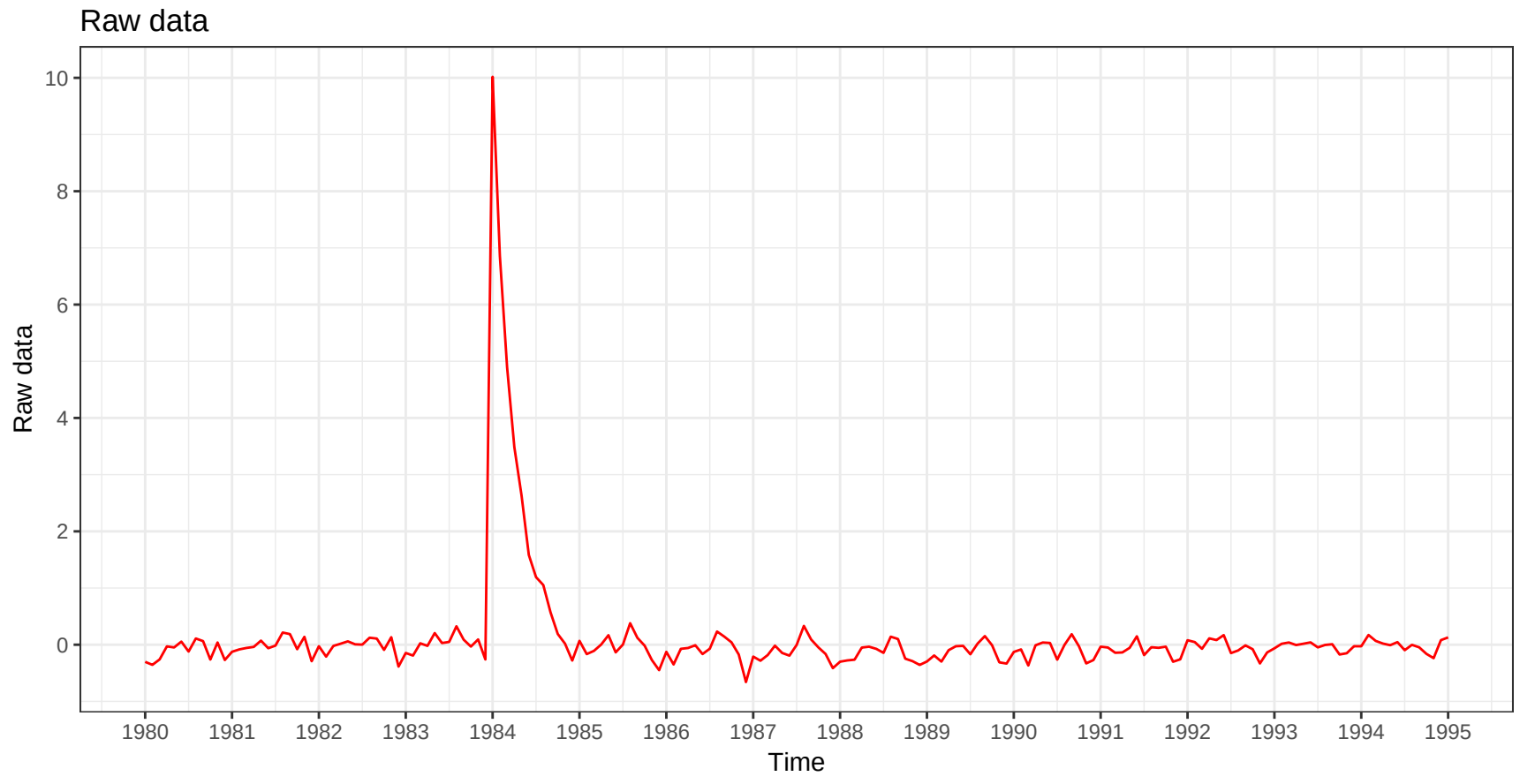
Estimate value of a TC(1984−01)
ARIMA (1,0,1)(0,0,0) − additive decomposition
(1−0.8B)Xt=(1−0.5B)at



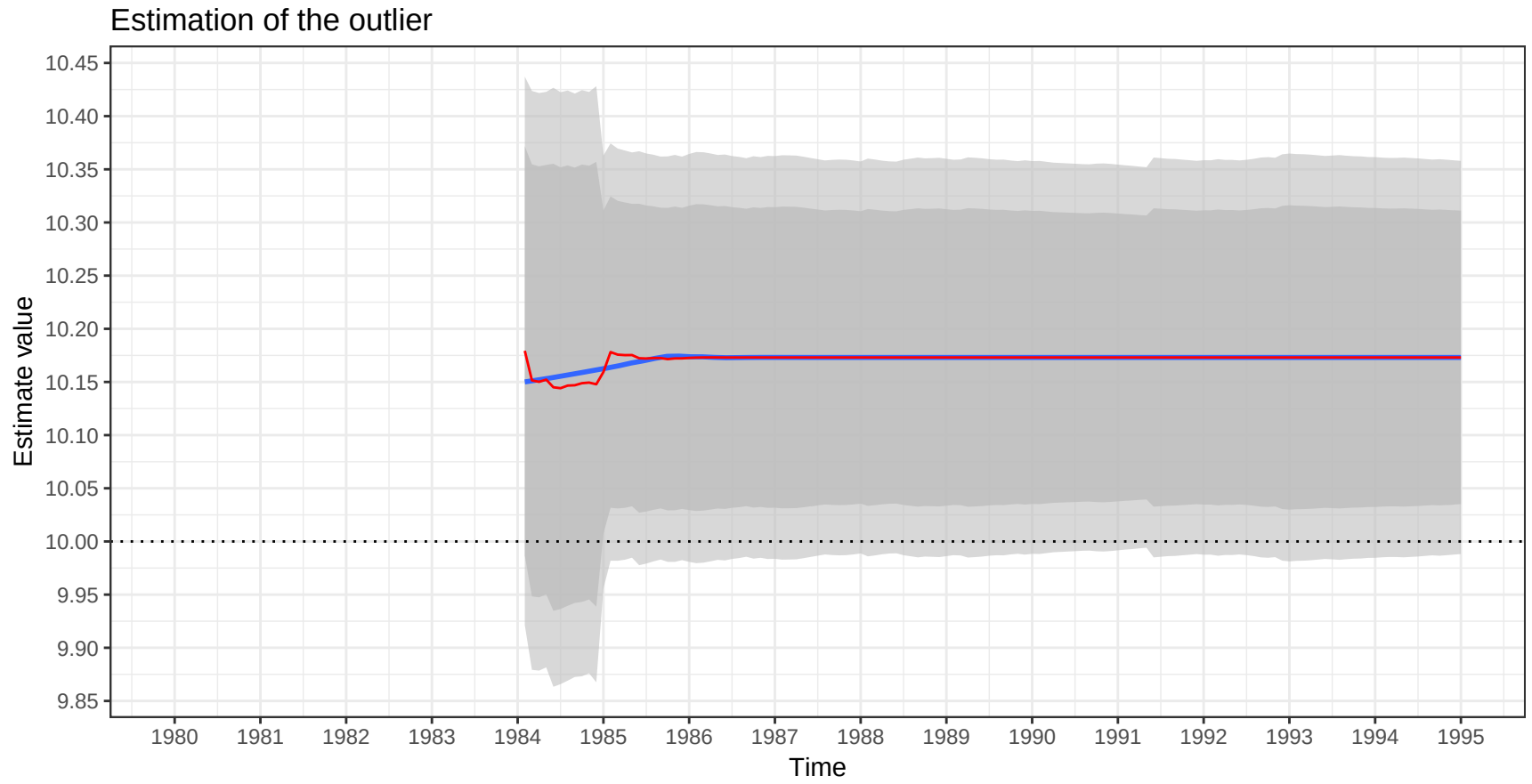


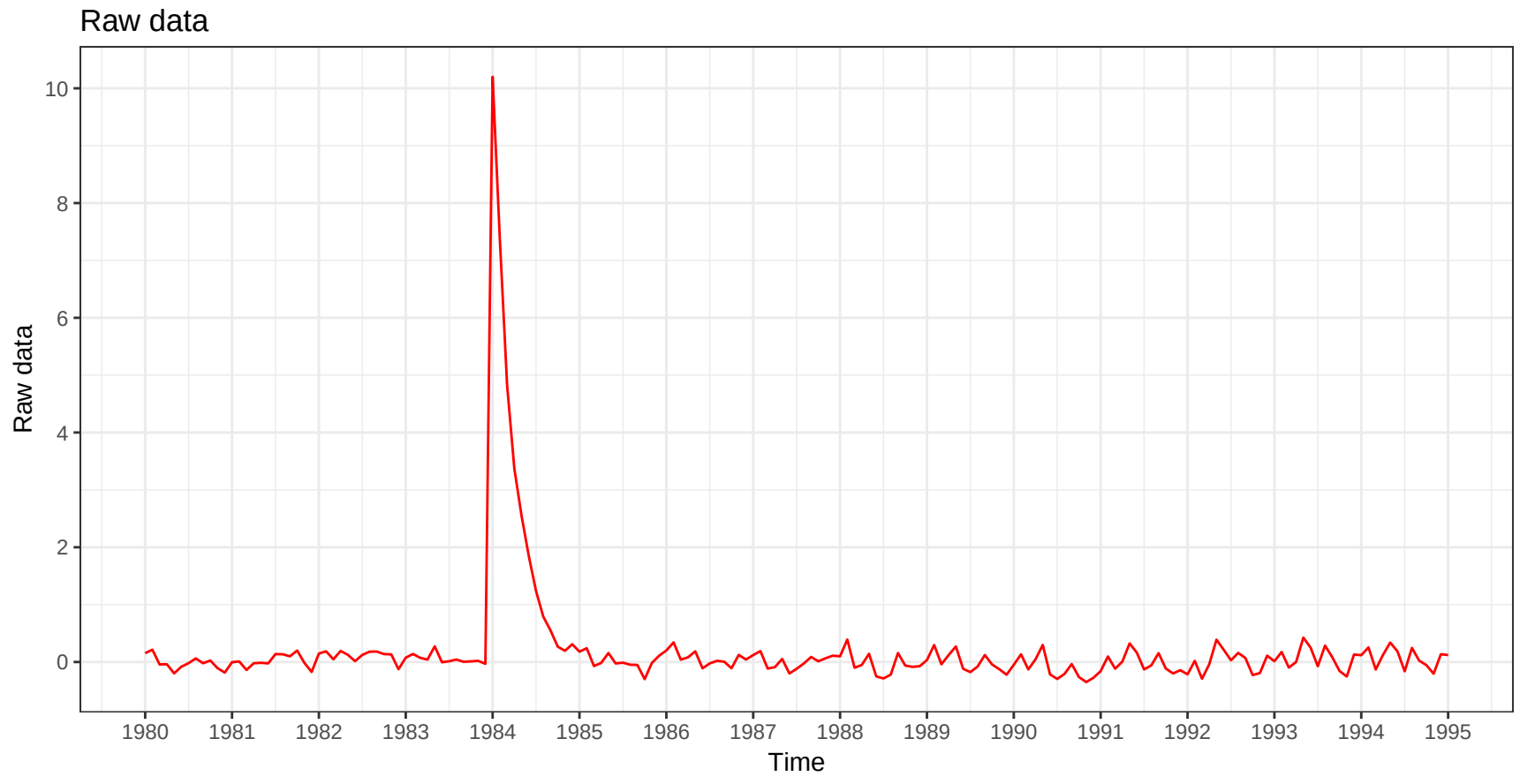
Estimate value of a TC(1984−01)
ARIMA (1,0,1)(0,0,0) − additive decomposition
(1−0.8B)Xt=(1−0.5B)at



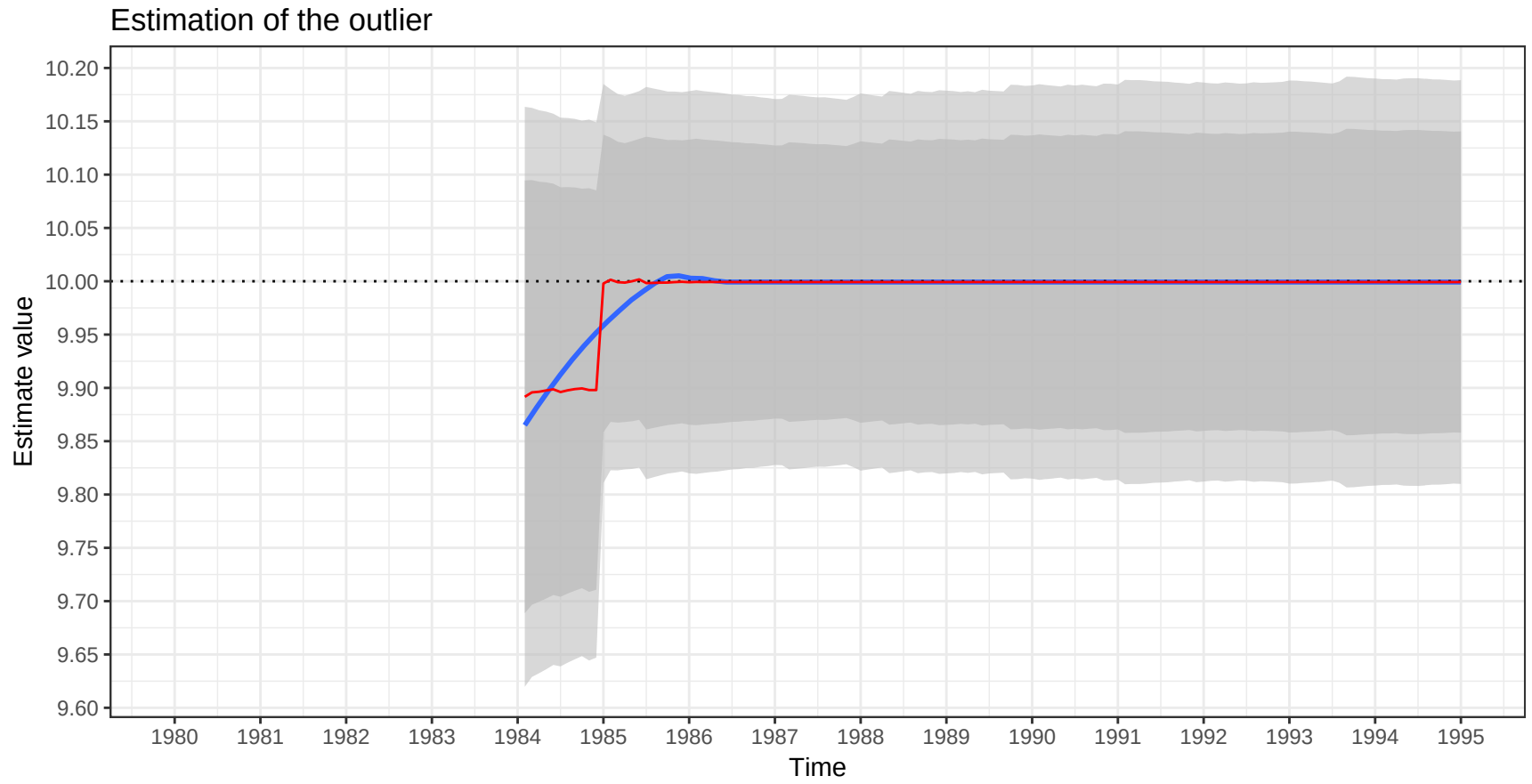


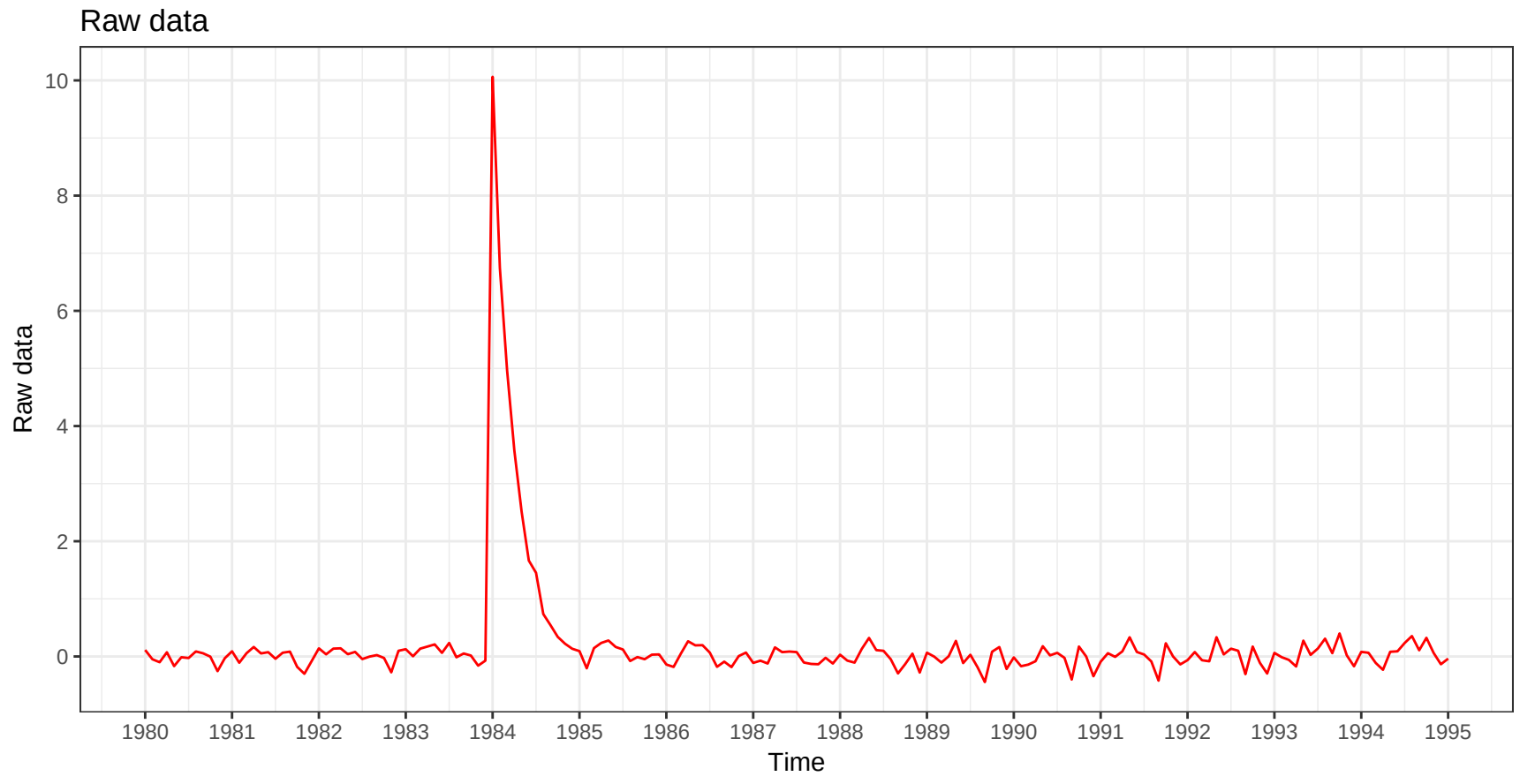
Estimate value of a TC(1984−01)
ARIMA (1,0,1)(0,0,0) − additive decomposition
(1−0.8B)Xt=(1−0.5B)at



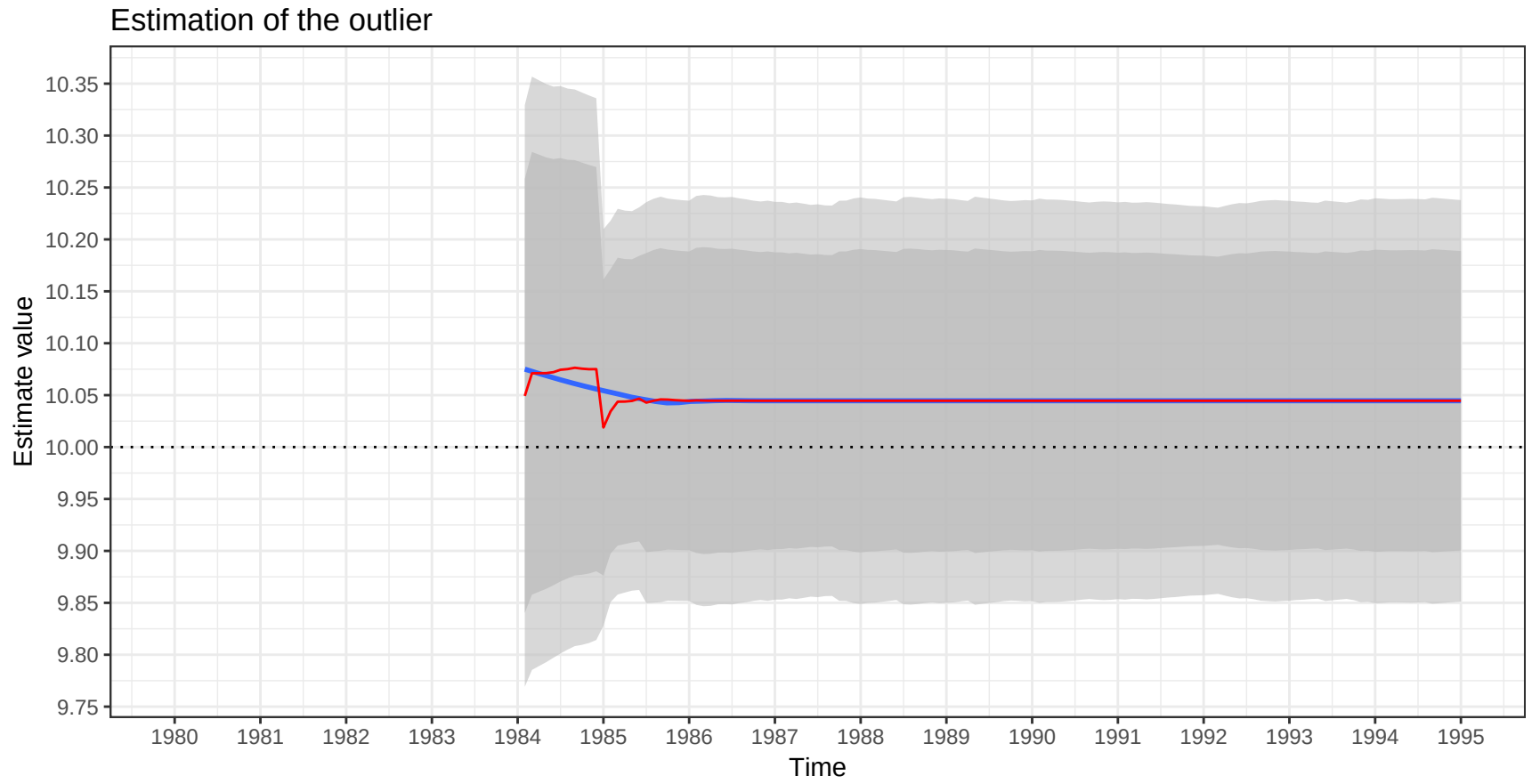


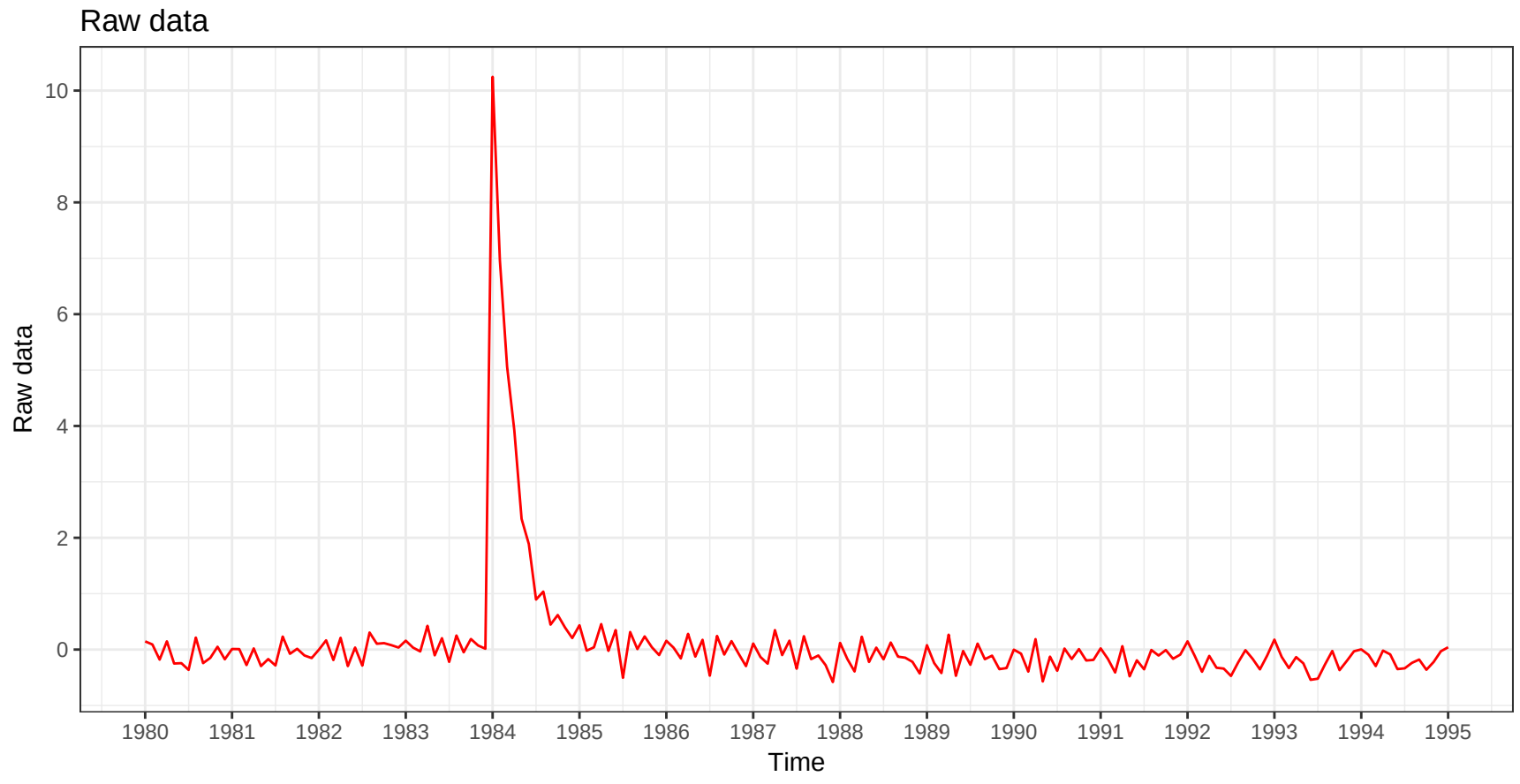
Estimate value of a TC(1984−01)
ARIMA (1,0,1)(0,0,0) − additive decomposition
(1−0.8B)Xt=(1−0.5B)at



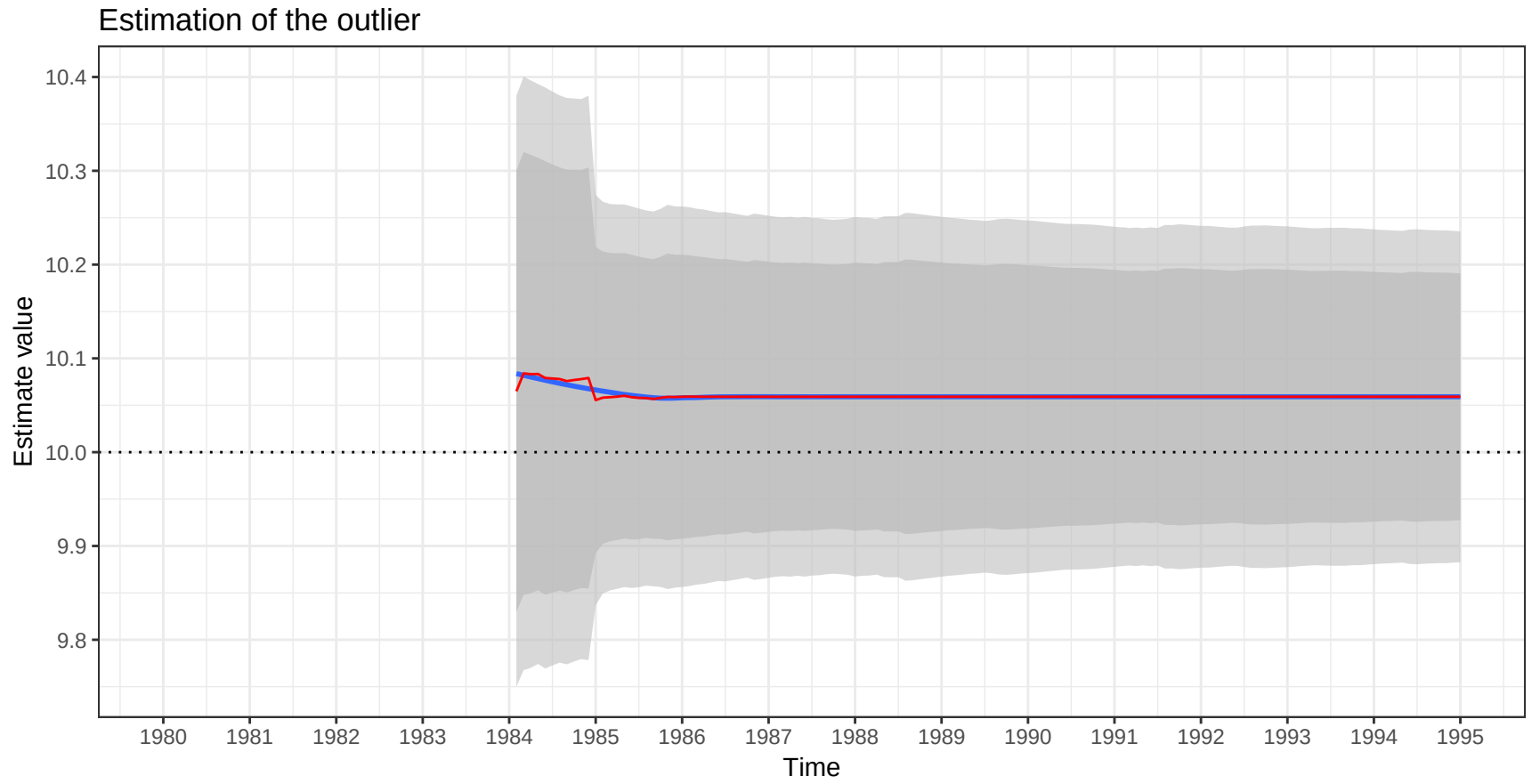


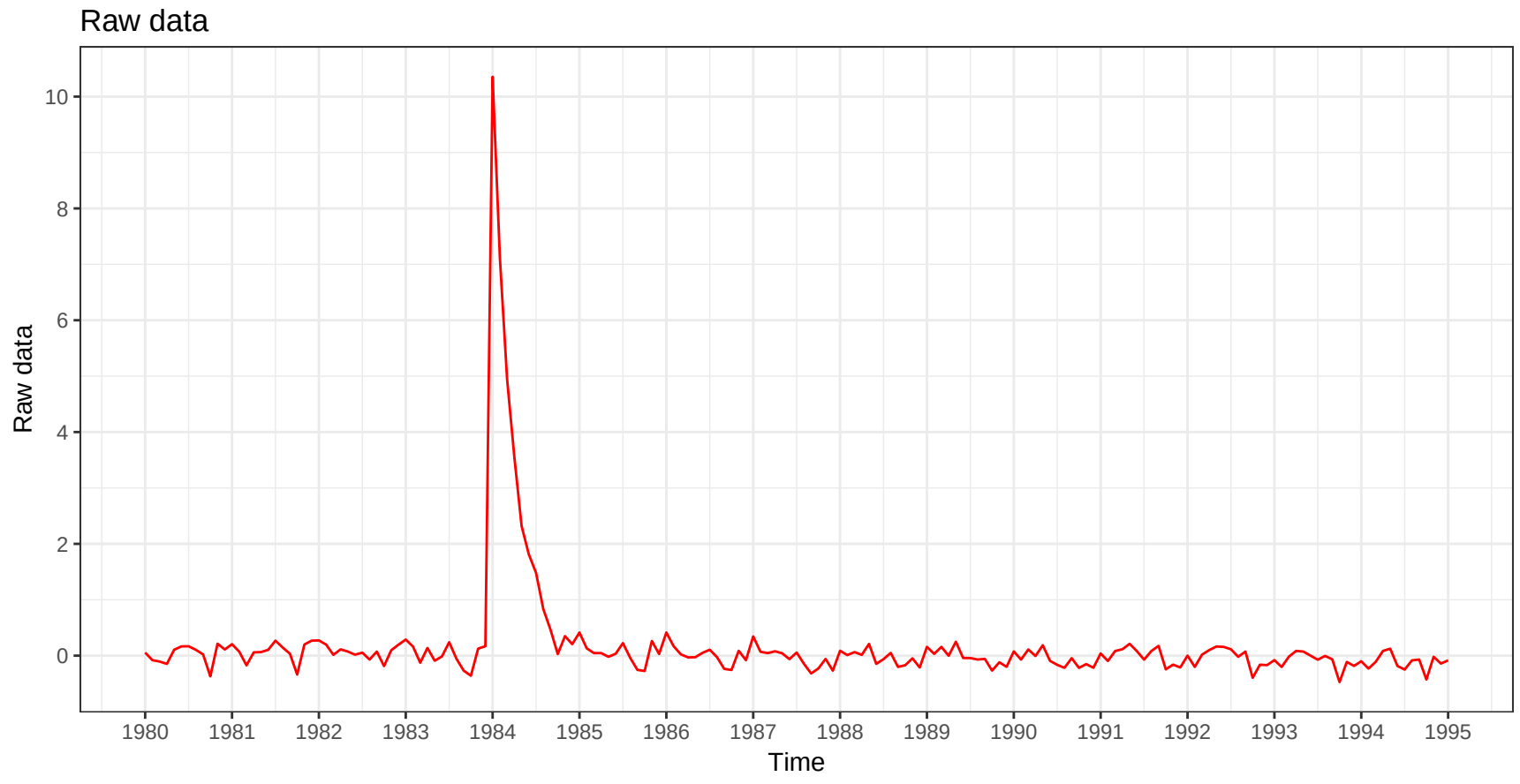
Estimate value of a TC(1984−01)
ARIMA (1,0,1)(0,0,0) − additive decomposition
(1−0.8B)Xt=(1−0.5B)at



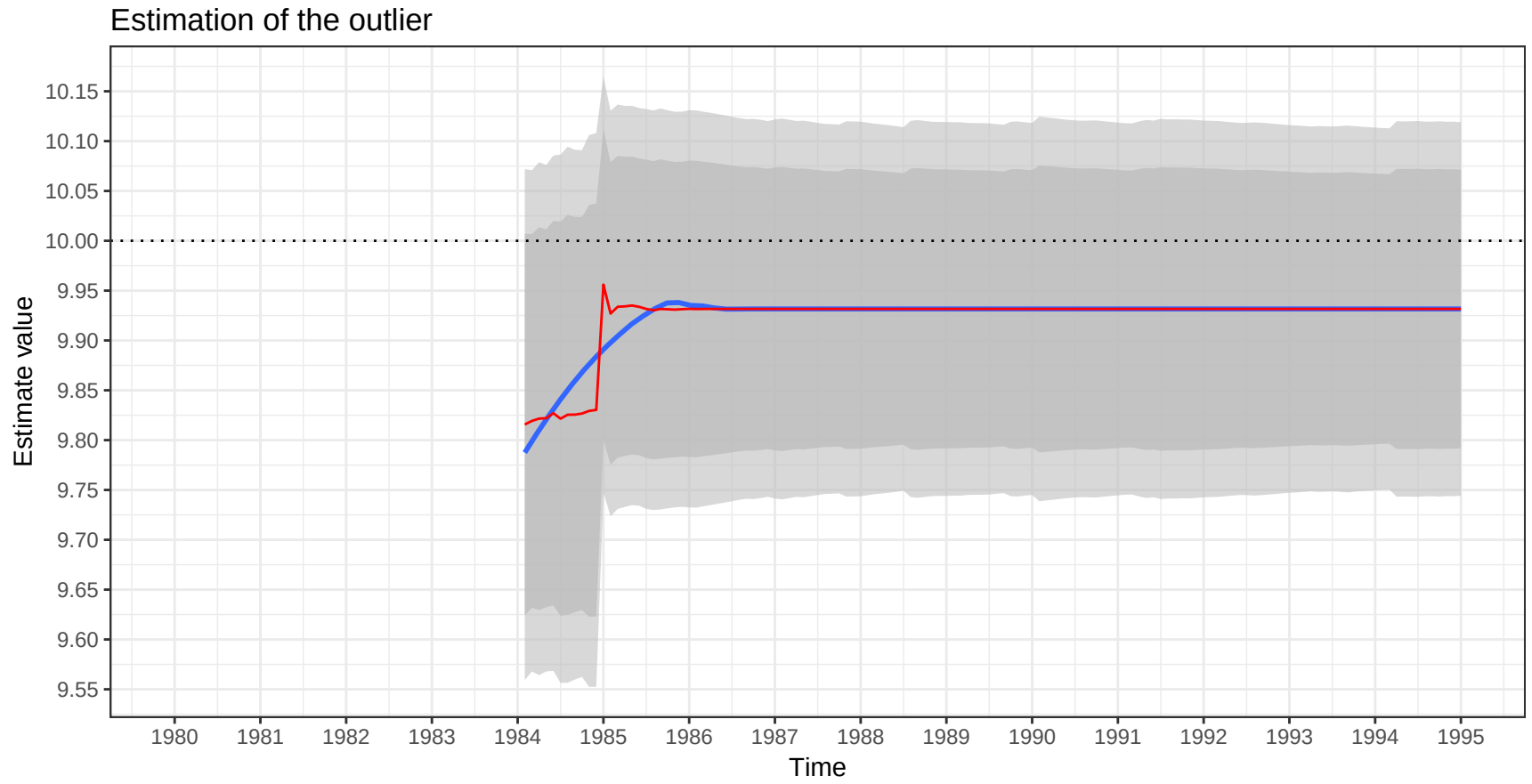


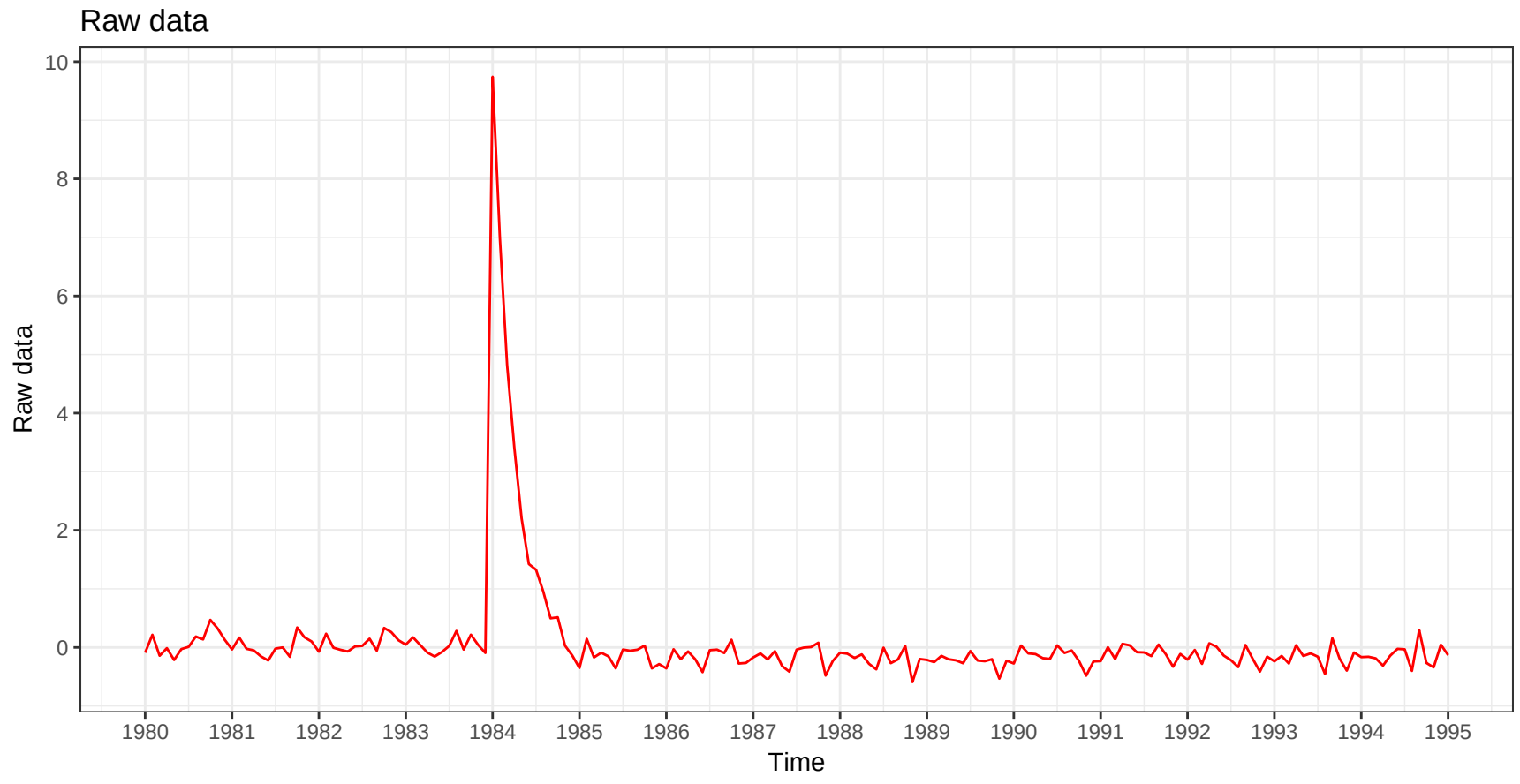
Estimate value of a TC(1984−01)
ARIMA (1,0,1)(0,0,0) − additive decomposition
(1−0.8B)Xt=(1−0.5B)at



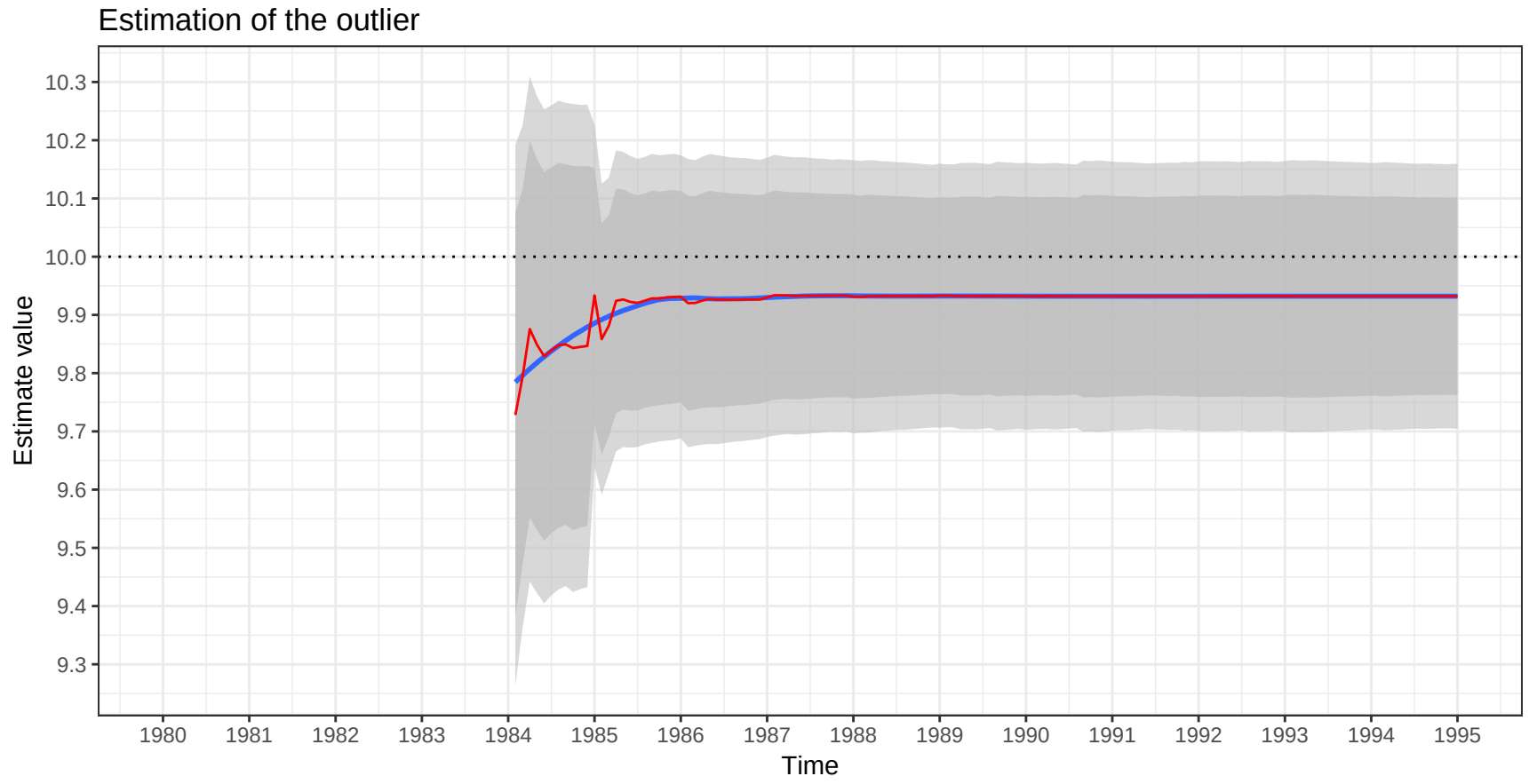


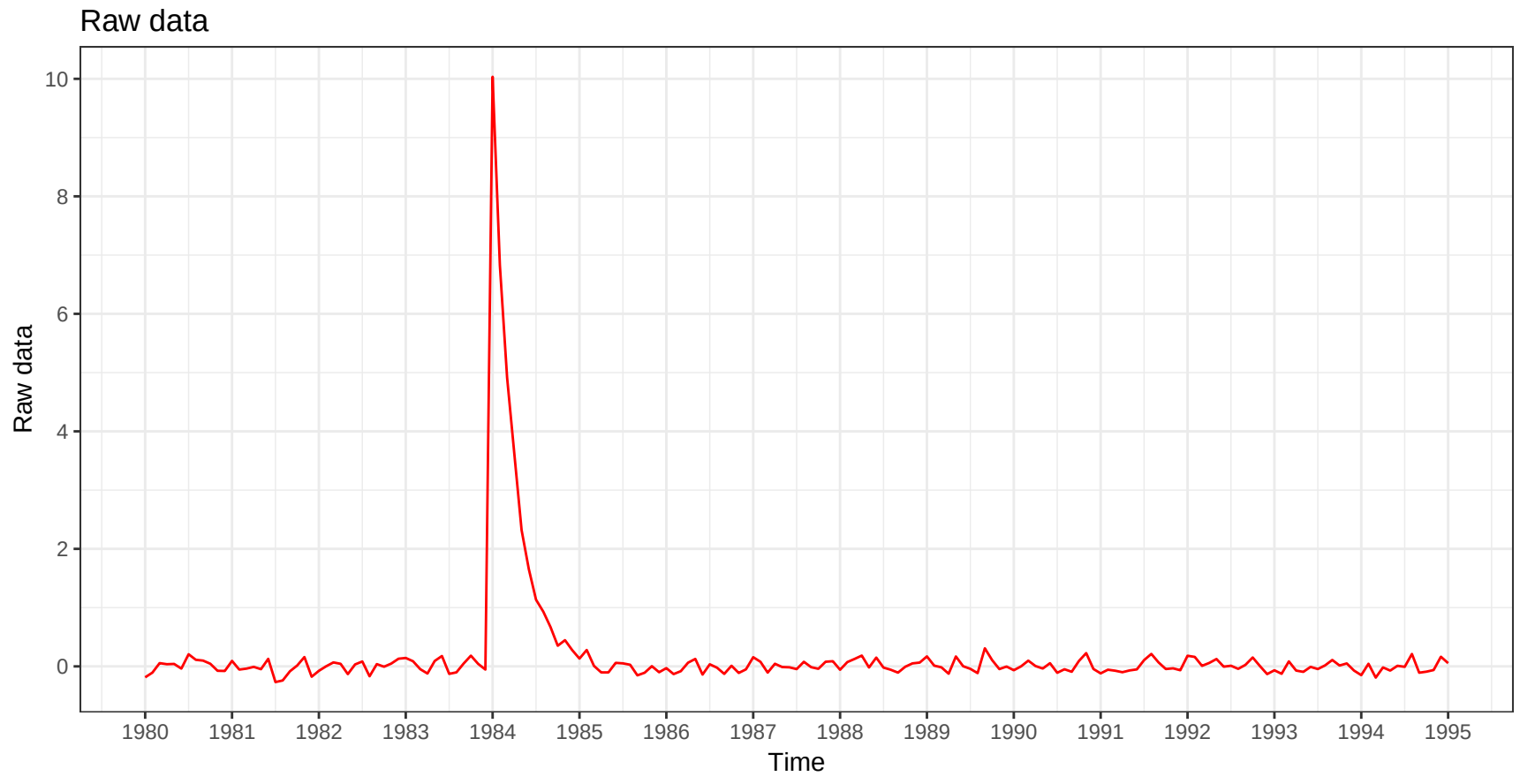
Estimate value of a TC(1984−01)
ARIMA (1,0,1)(0,0,0) − additive decomposition
(1−0.8B)Xt=(1−0.5B)at



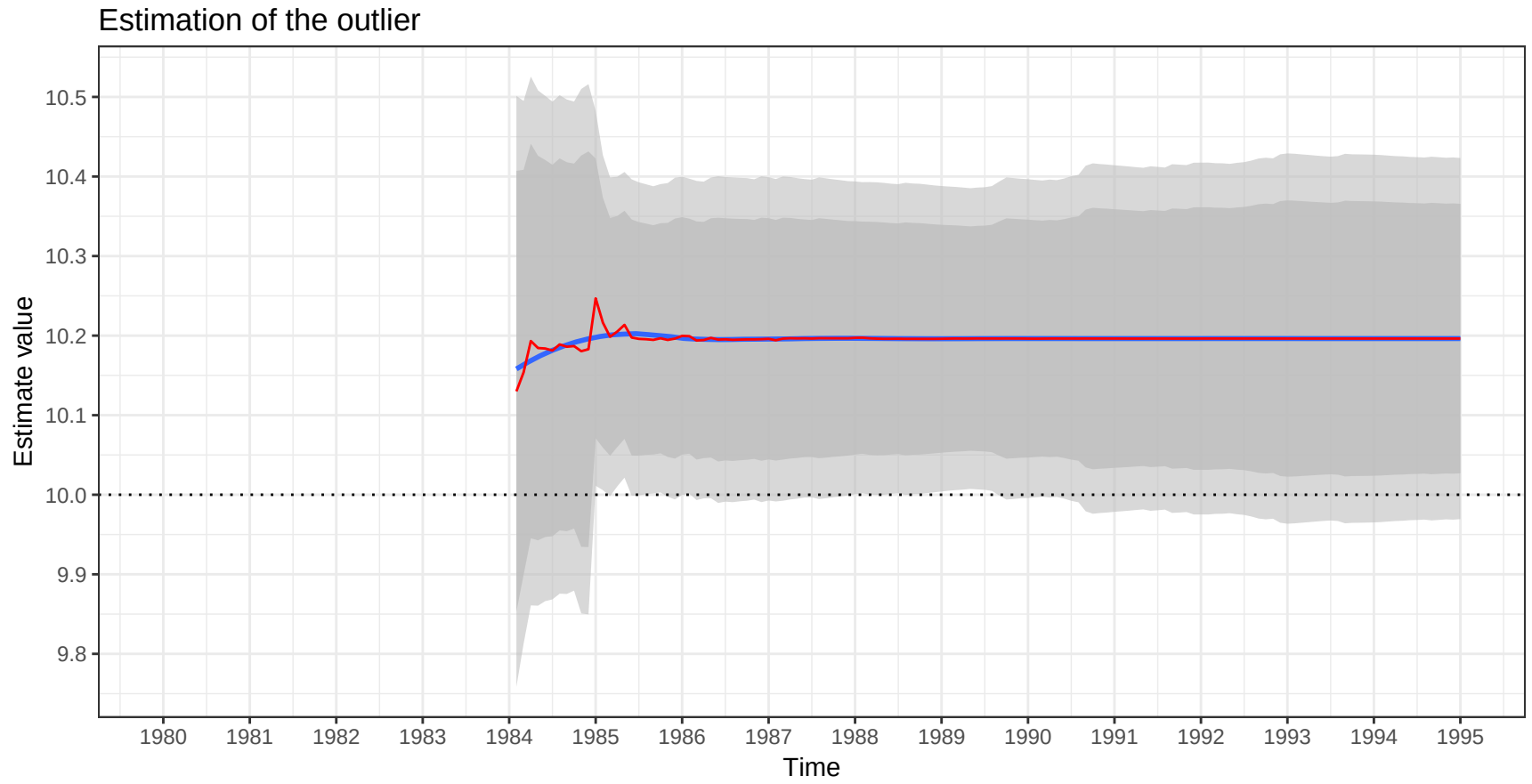


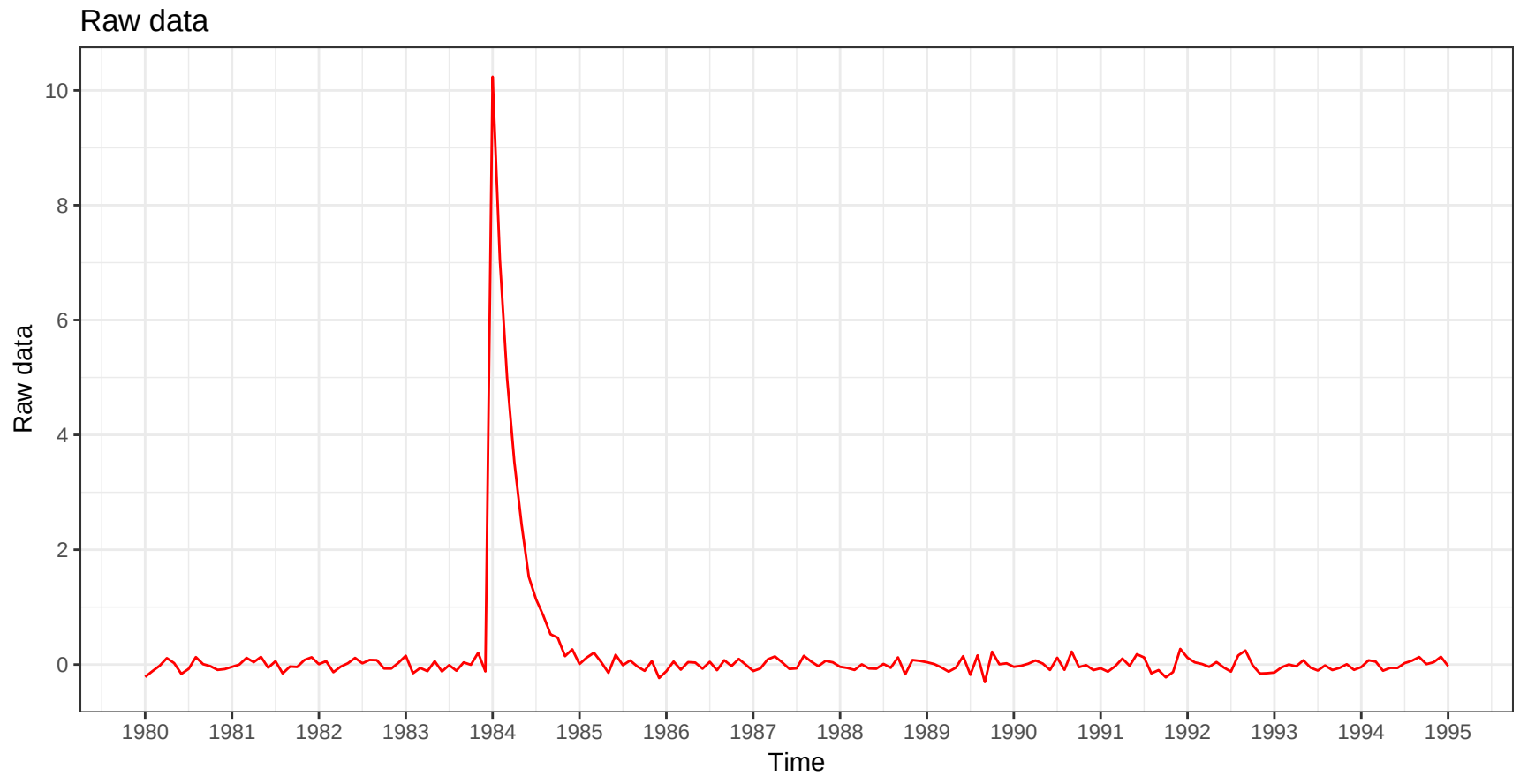
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(1,0,1) − additive decomposition
(1−0.8B12)Xt=(1−0.4B12)at

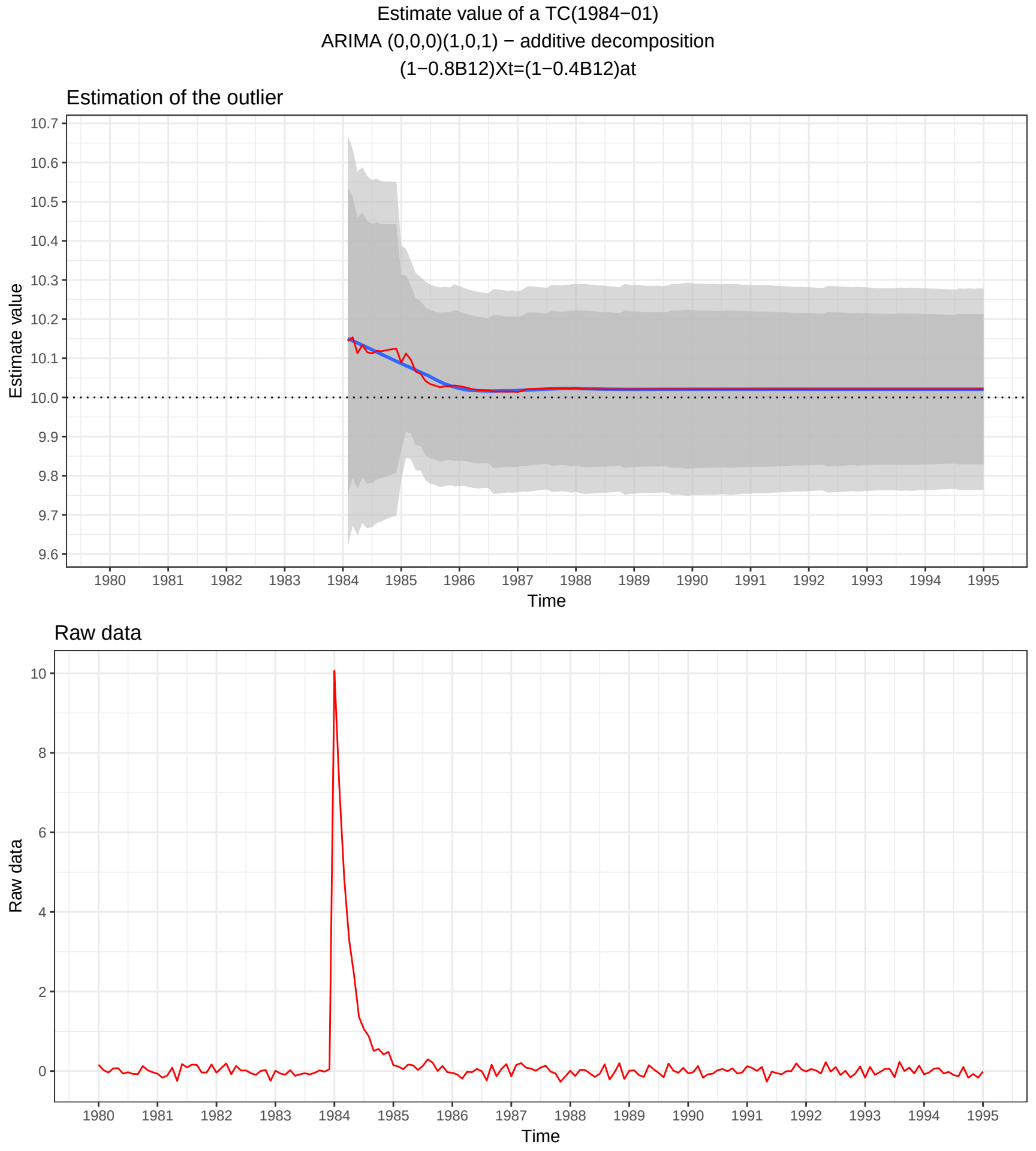




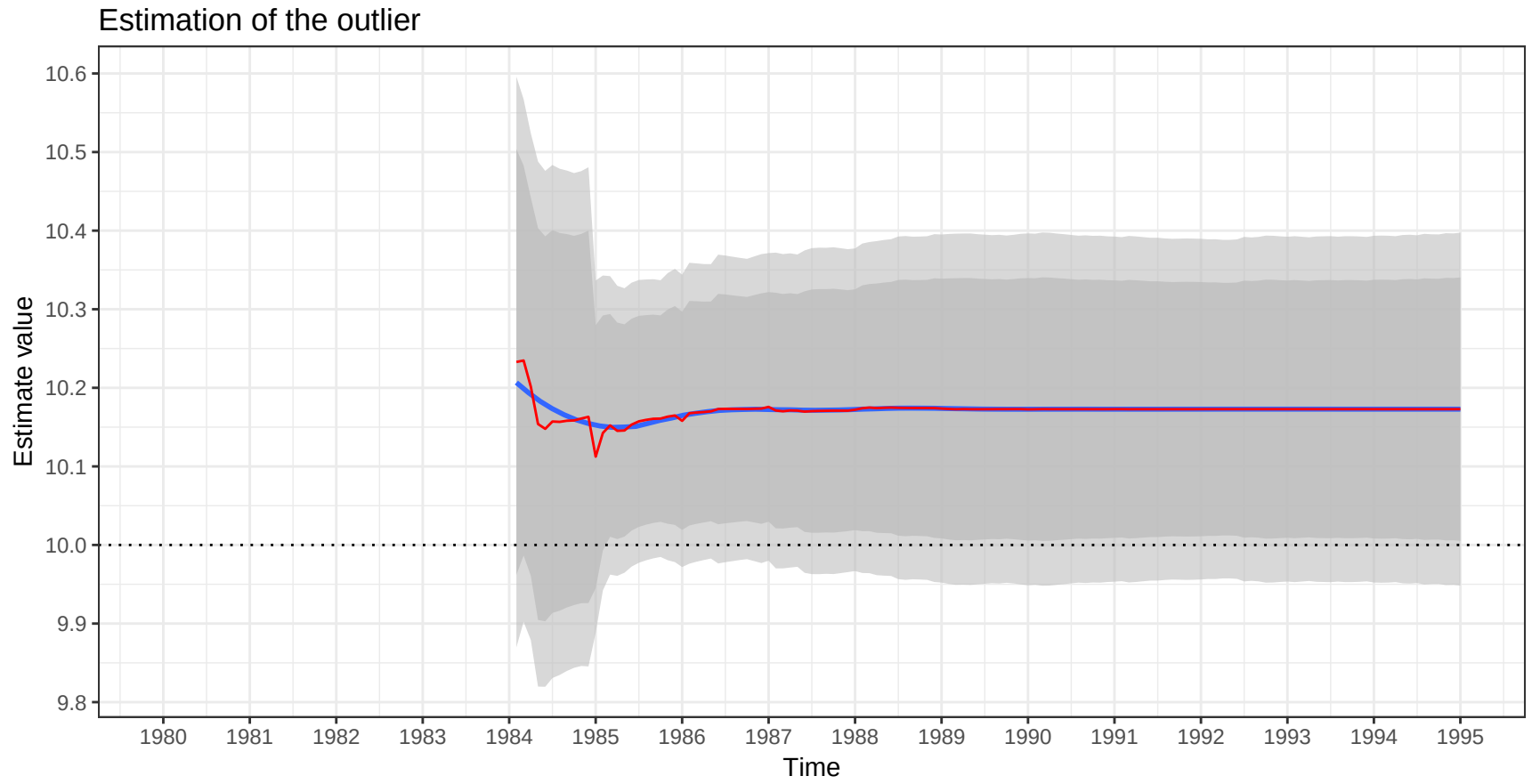
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(1,0,1) − additive decomposition
(1−0.8B12)Xt=(1−0.4B12)at

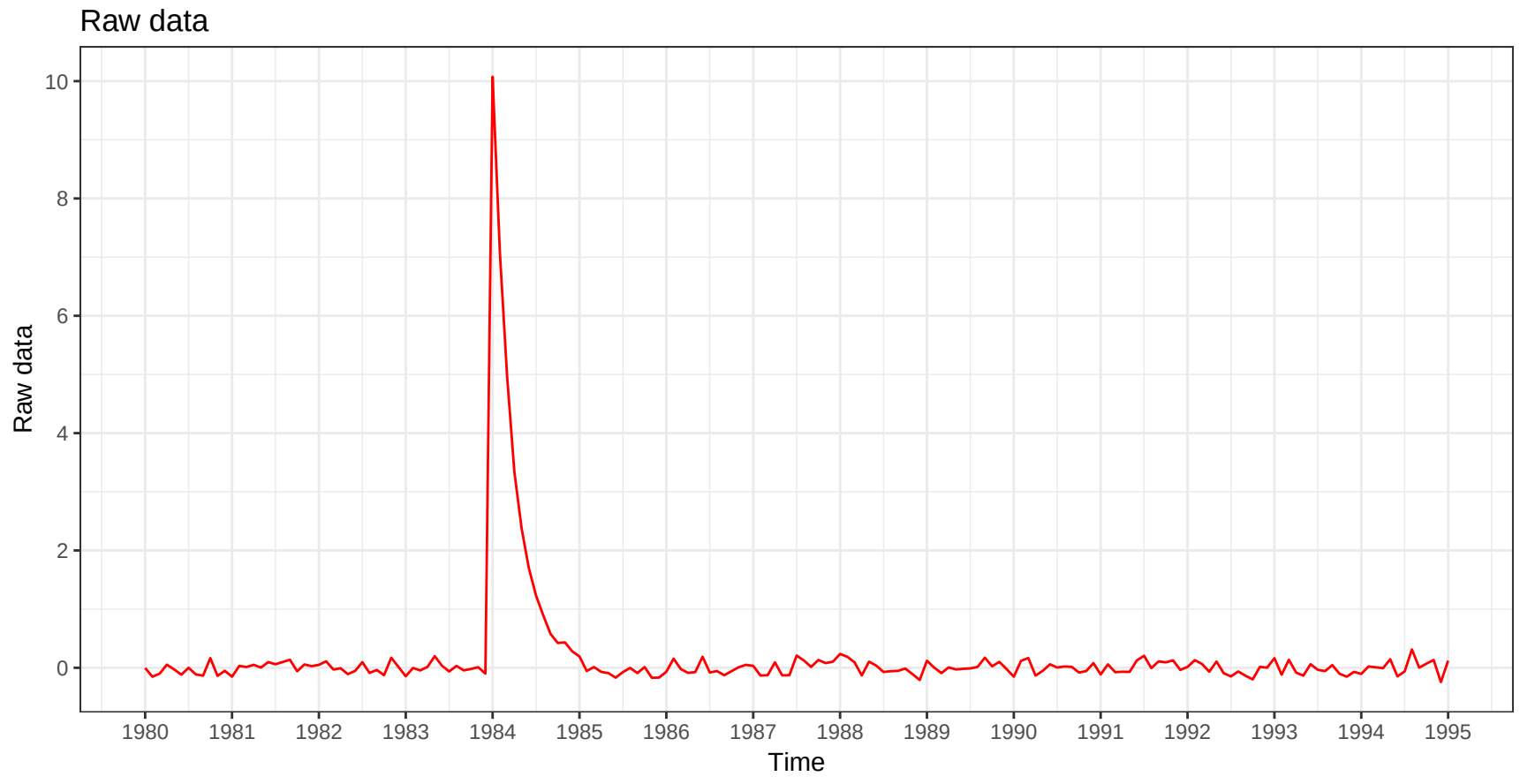


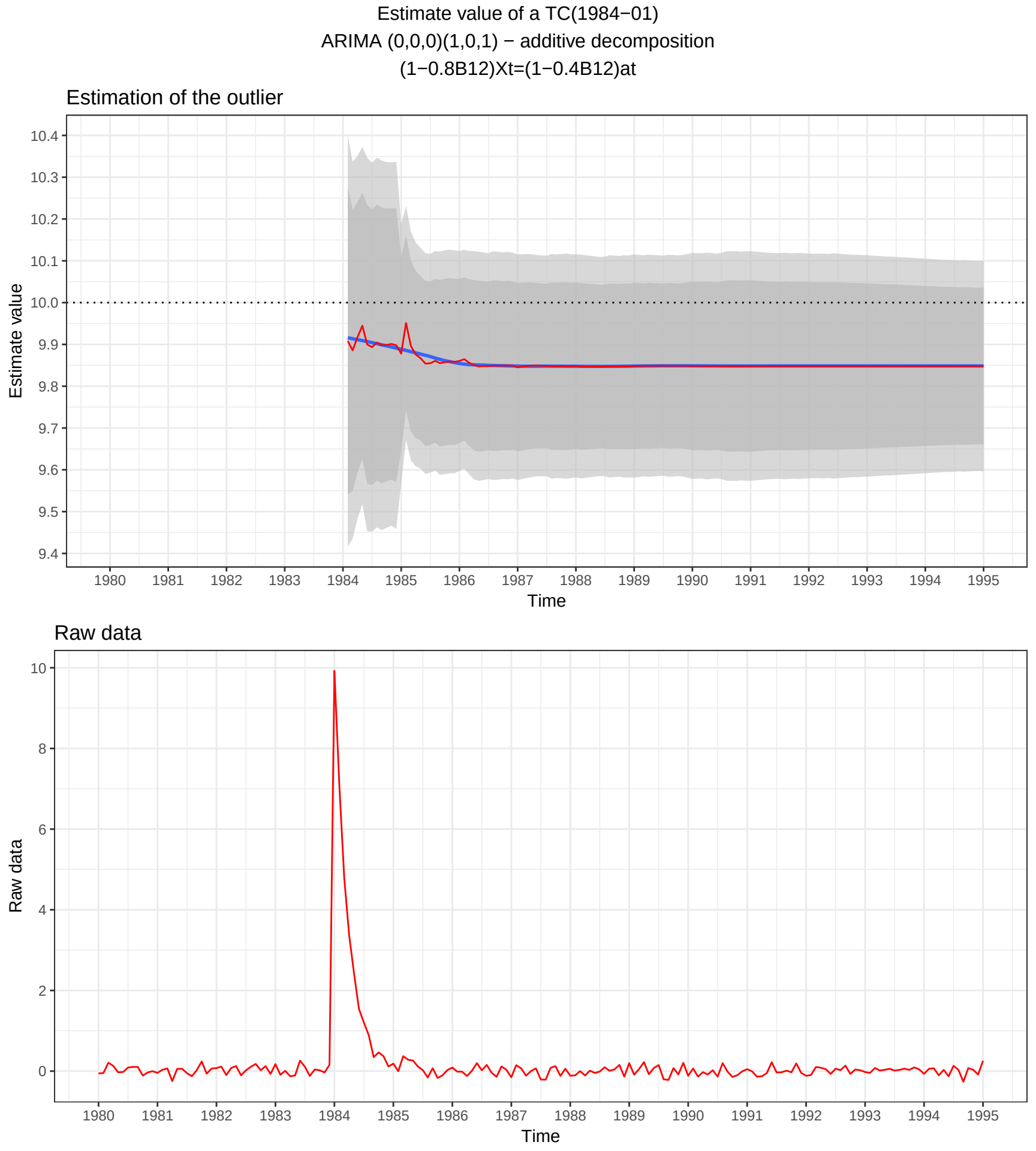



Estimate value of a TC(1984−01)
ARIMA (0,0,0)(1,0,1) − additive decomposition
(1−0.8B12)Xt=(1−0.4B12)at
Estimation of the outlier
Estimate value
10.7
10.6
10.5
10.4
10.3
10.2
10.1
10.0
9.9
9.8
9.7
9.6
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time
Raw data
Raw data
10
8
6
4
2
0
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time

Estimate value of a TC(1984−01)
ARIMA (0,0,0)(1,0,1) − additive decomposition
(1−0.8B12)Xt=(1−0.4B12)at






Estimate value of a TC(1984−01)
ARIMA (0,0,0)(1,0,1) − additive decomposition
(1−0.8B12)Xt=(1−0.4B12)at
Estimation of the outlier
Estimate value
10.4
10.3
10.2
10.1
10.0
9.9
9.8
9.7
9.6
9.5
9.4
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time
Raw data
Raw data
10
8
6
4
2
0
1980
1981
1982
1983
1984
1985
1986
1987
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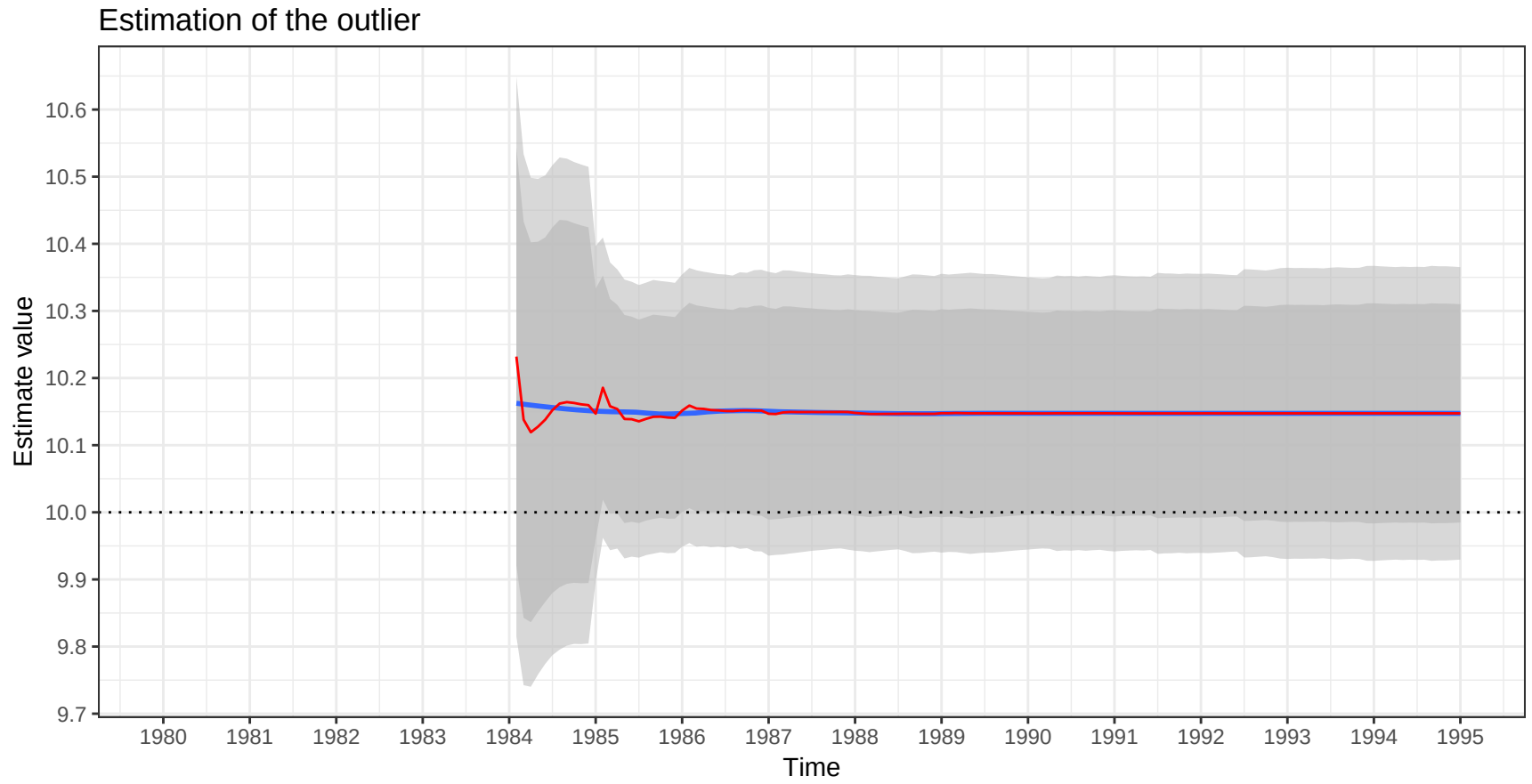
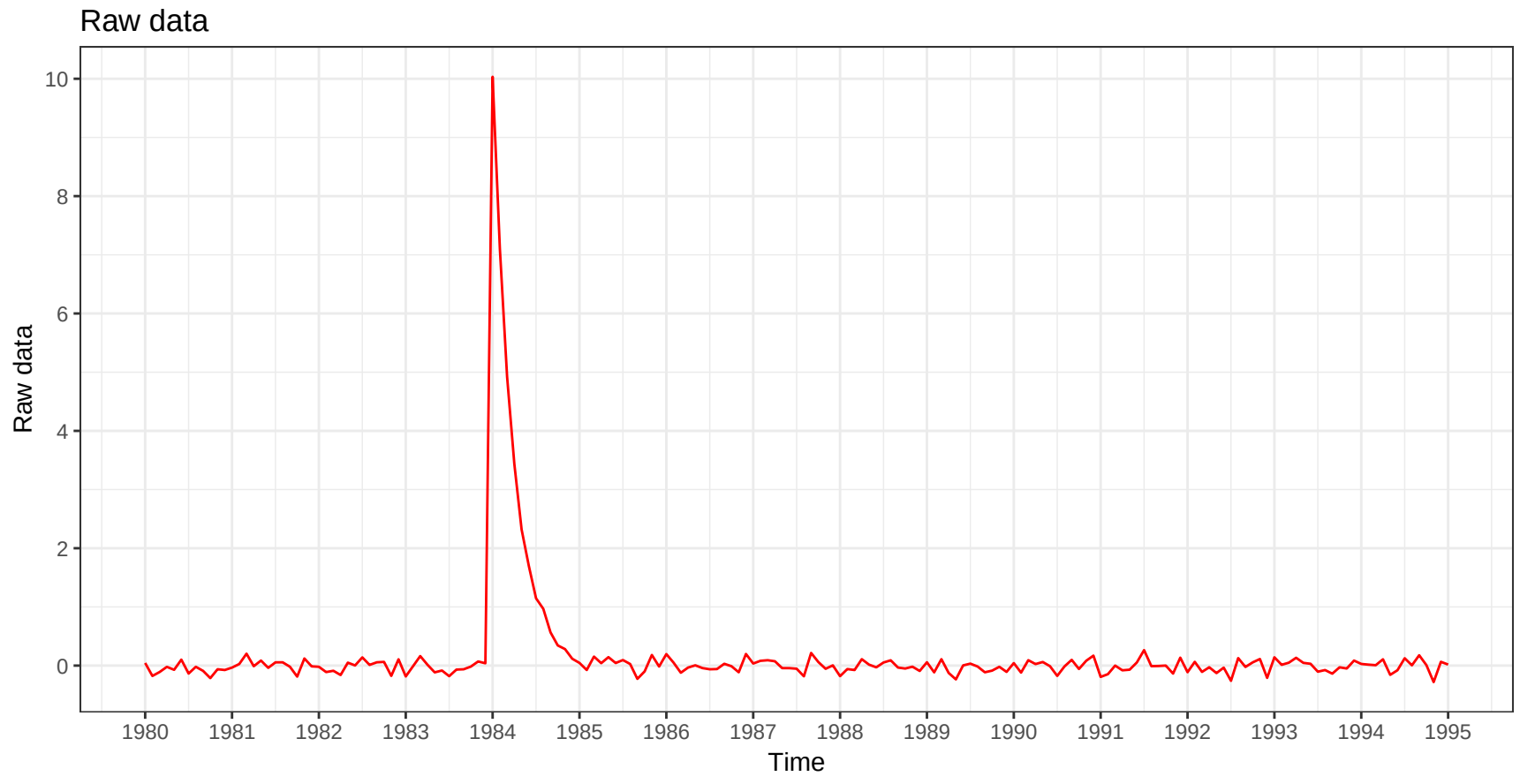
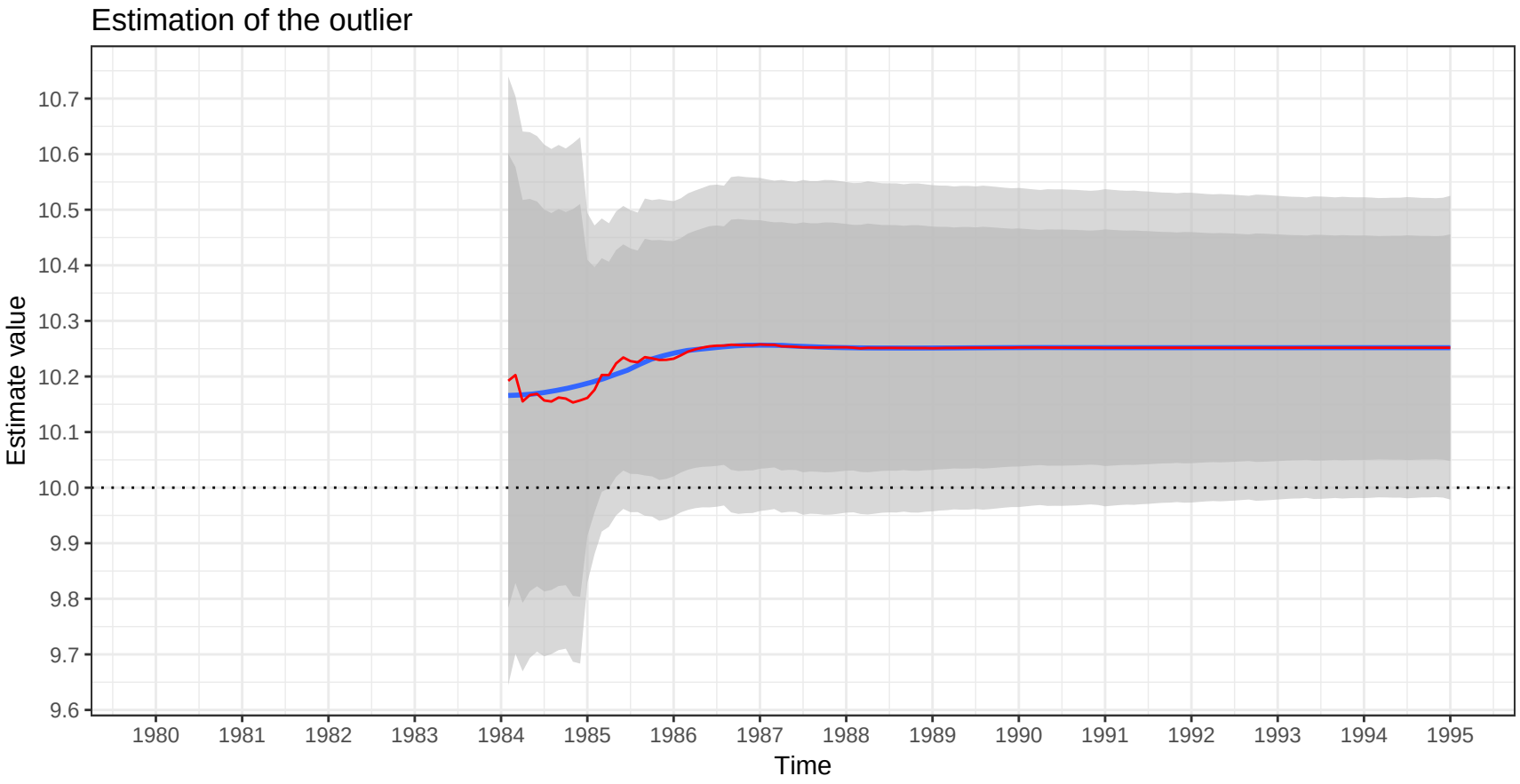
1994
1995
Time

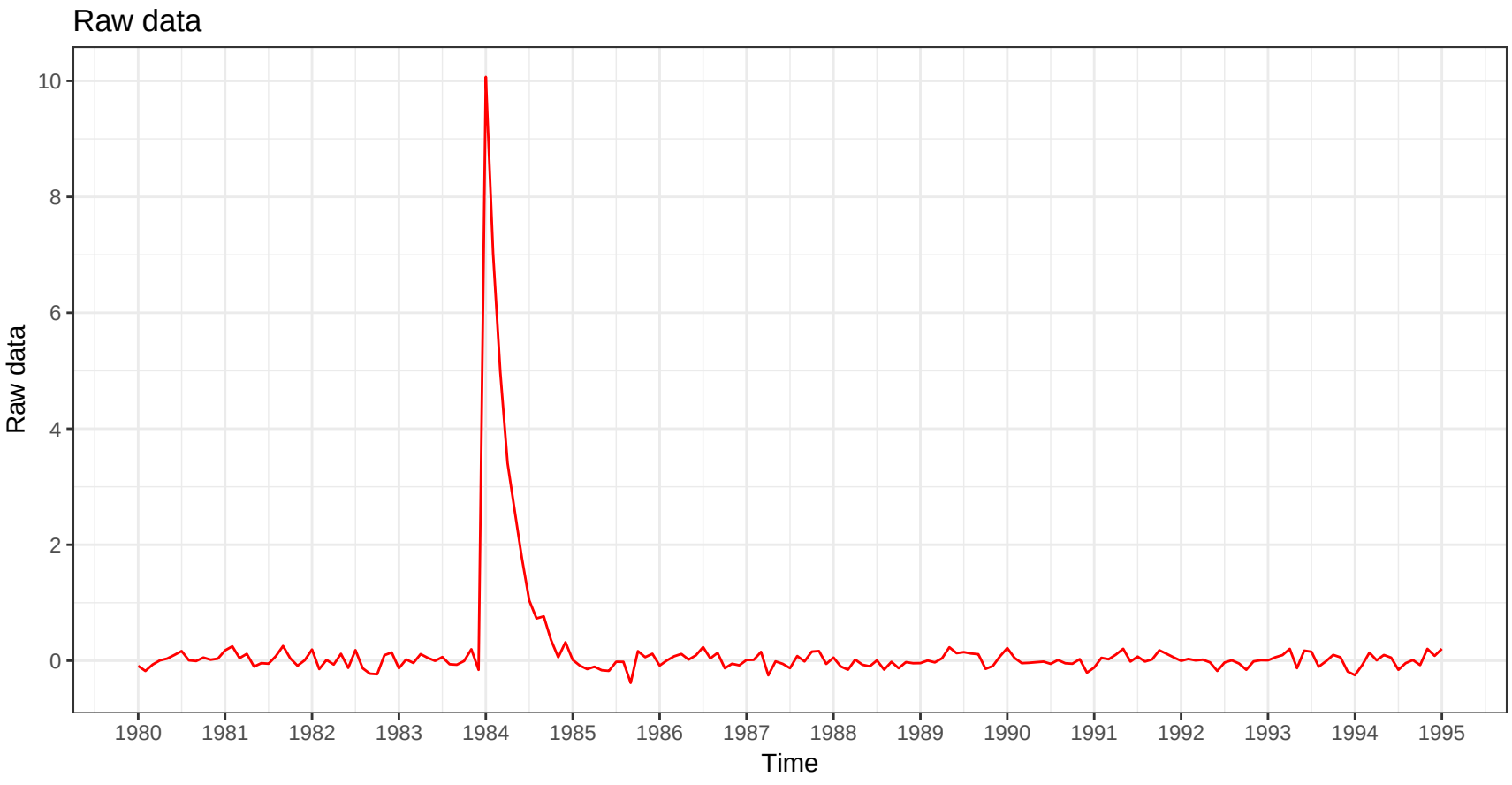
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(1,0,1) − additive decomposition
(1−0.8B12)Xt=(1−0.4B12)at

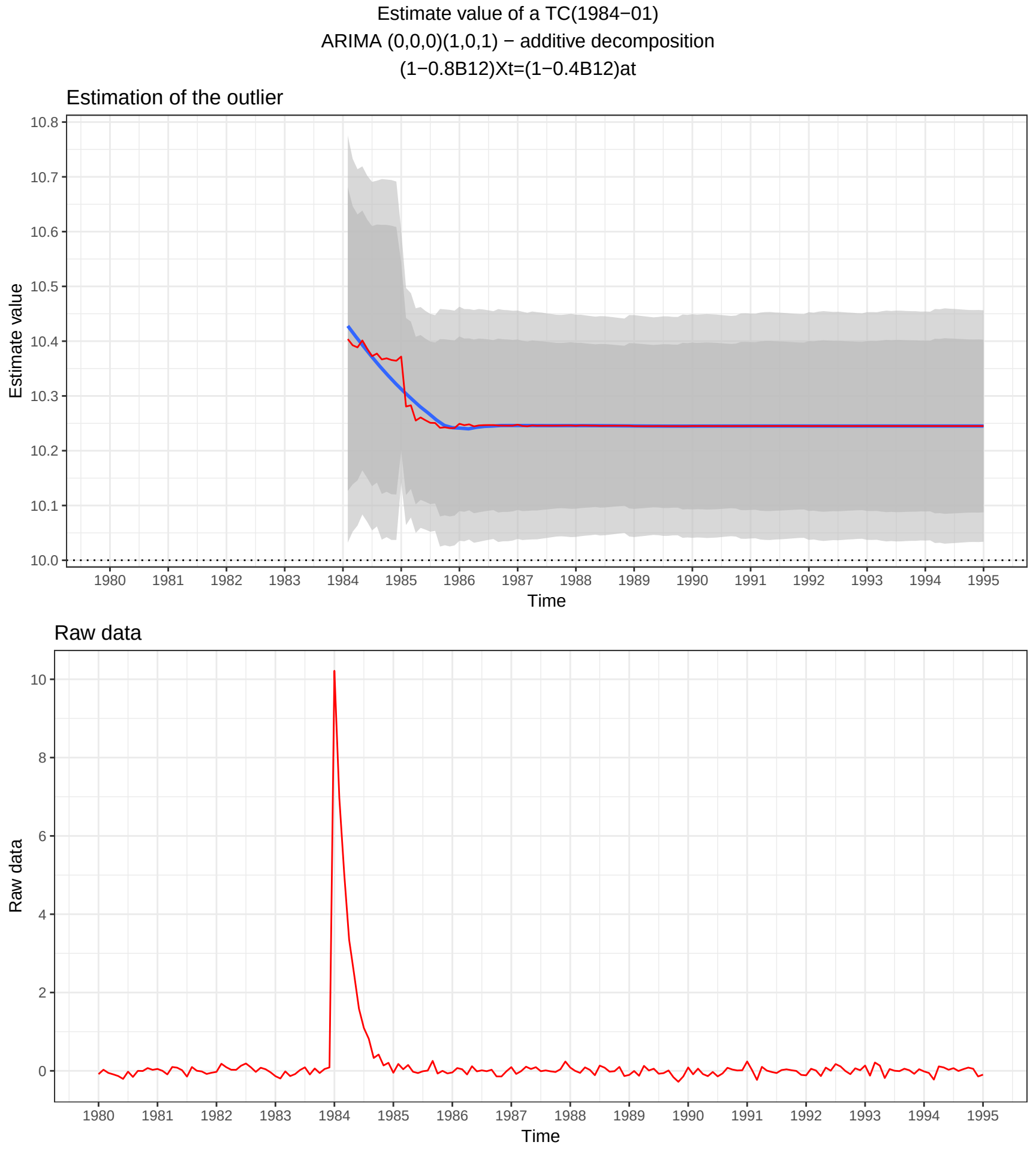




Estimate value of a TC(1984−01)
ARIMA (0,0,0)(1,0,1) − additive decomposition
(1−0.8B12)Xt=(1−0.4B12)at






Estimate value of a TC(1984−01)
ARIMA (0,0,0)(1,0,1) − additive decomposition
(1−0.8B12)Xt=(1−0.4B12)at
Estimation of the outlier
Estimate value
10.8
10.7
10.6
10.5
10.4
10.3
10.2
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10.0
1980
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1989
1990
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Raw data
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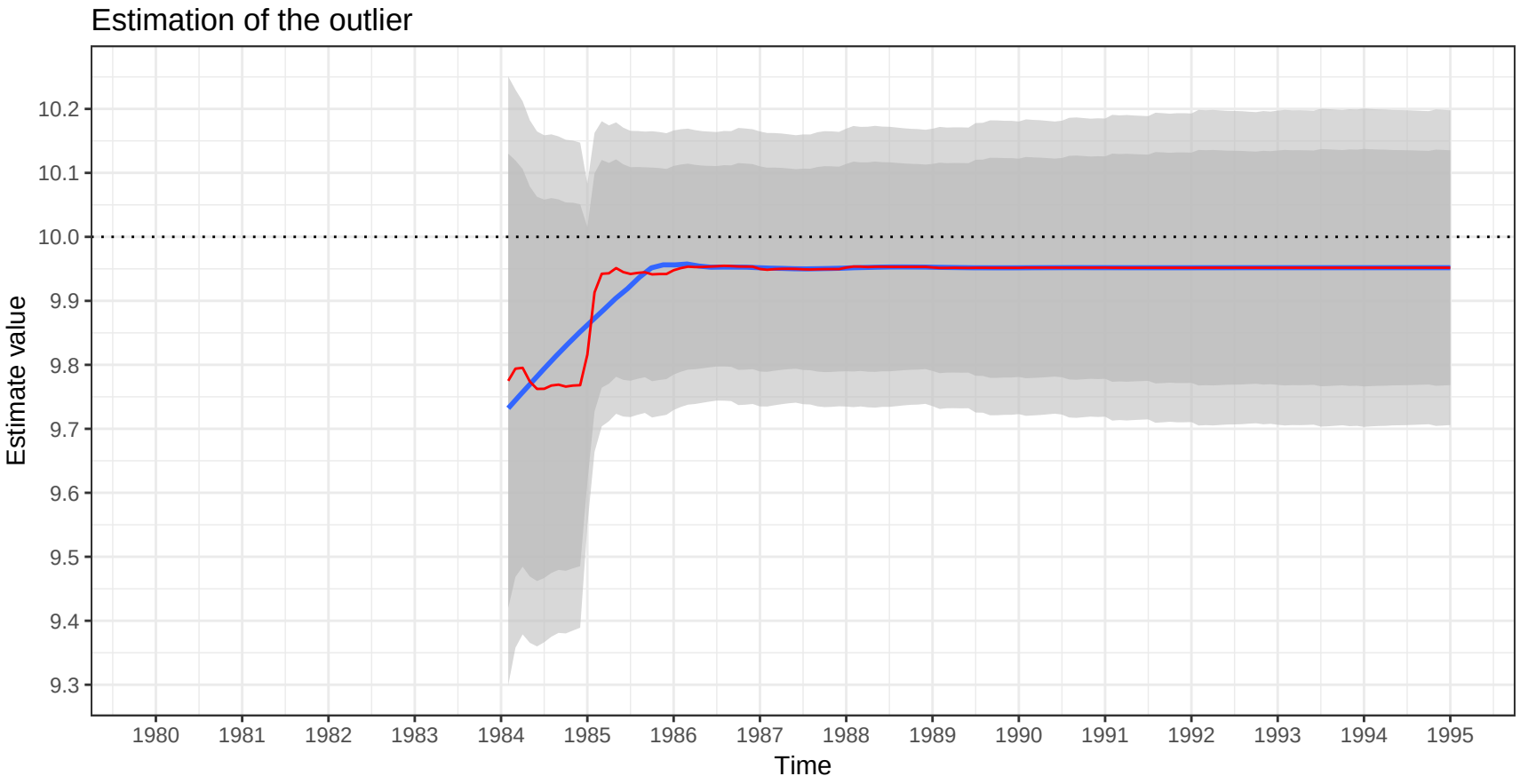
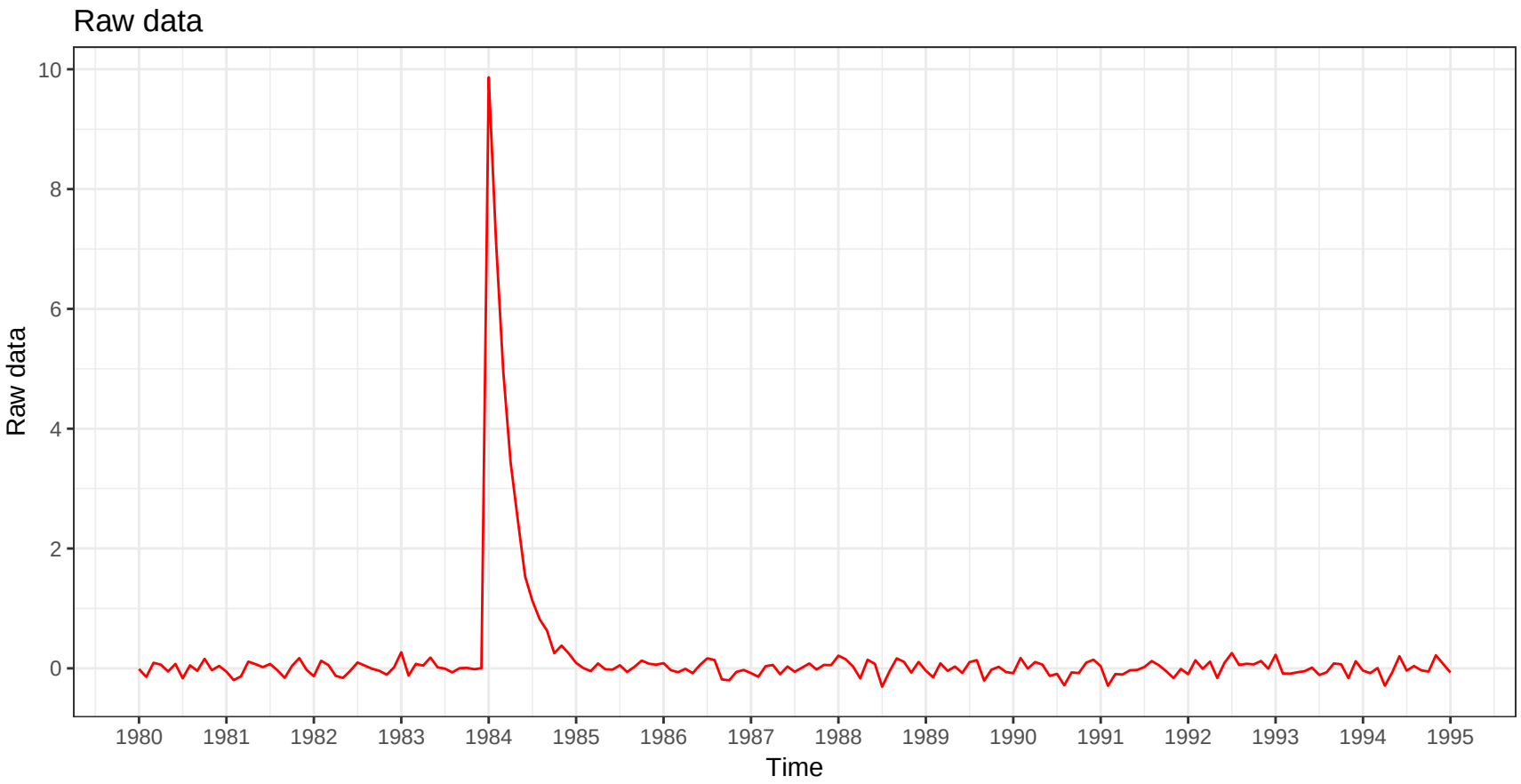
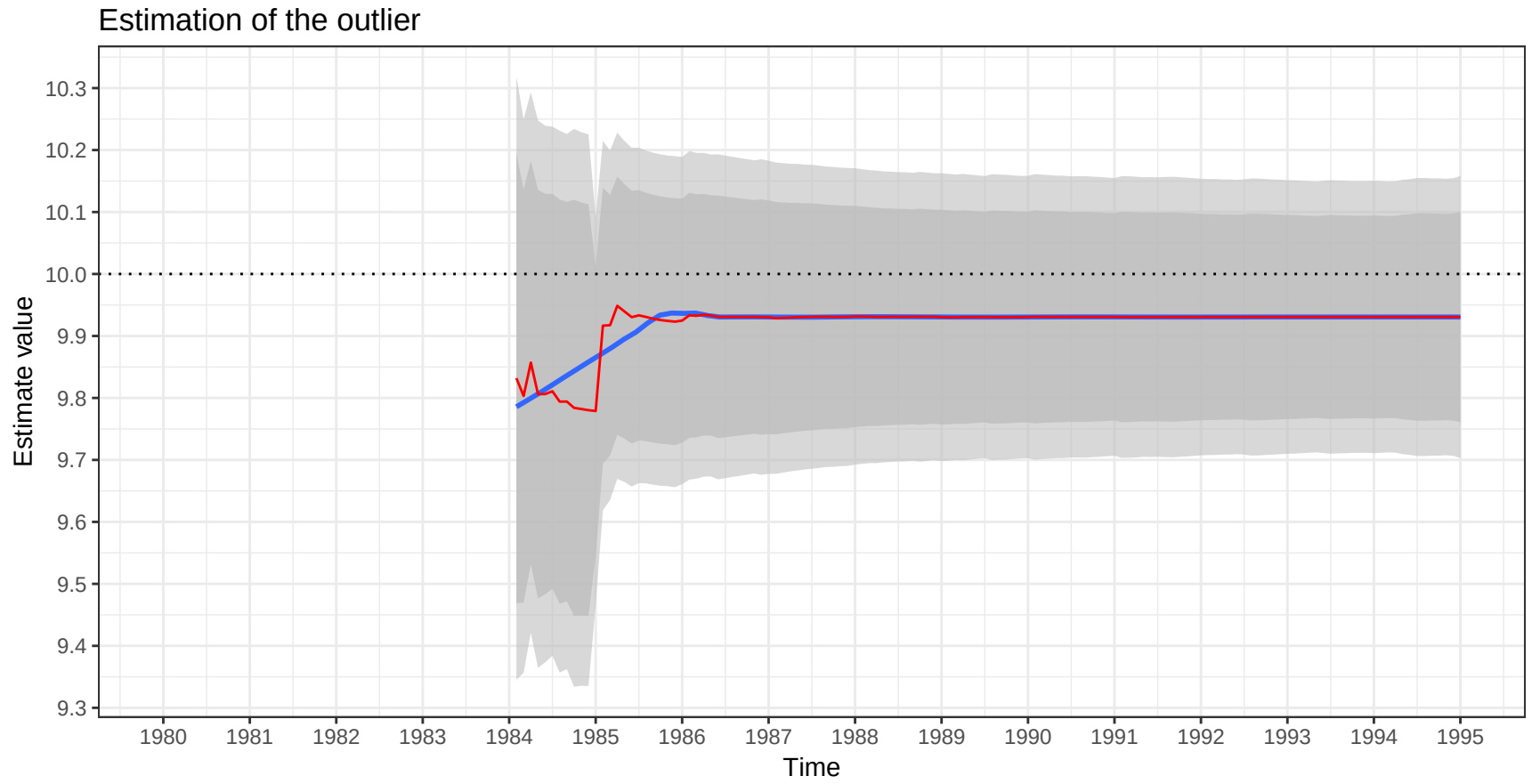
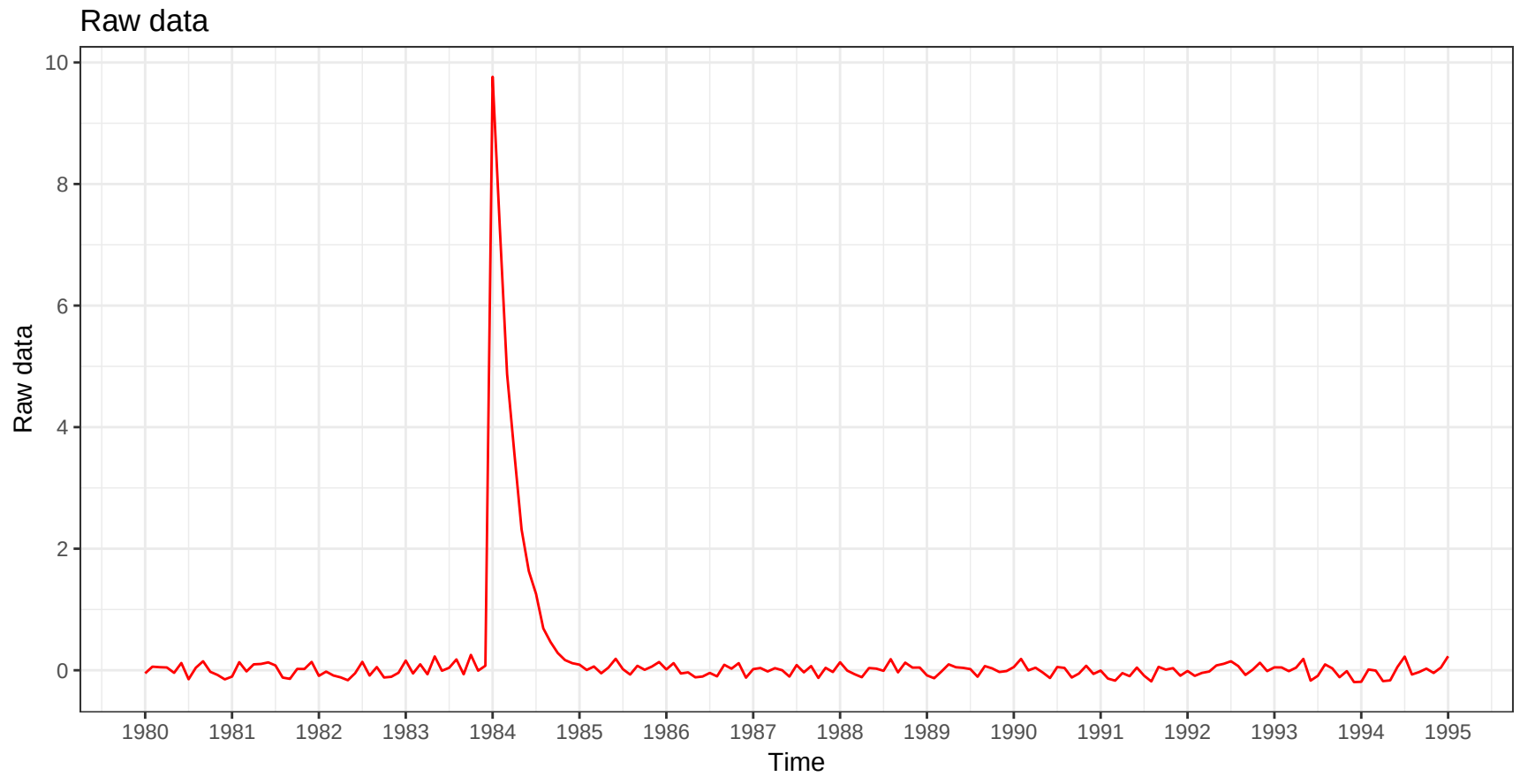
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(1,0,1) − additive decomposition
(1−0.8B12)Xt=(1−0.4B12)at



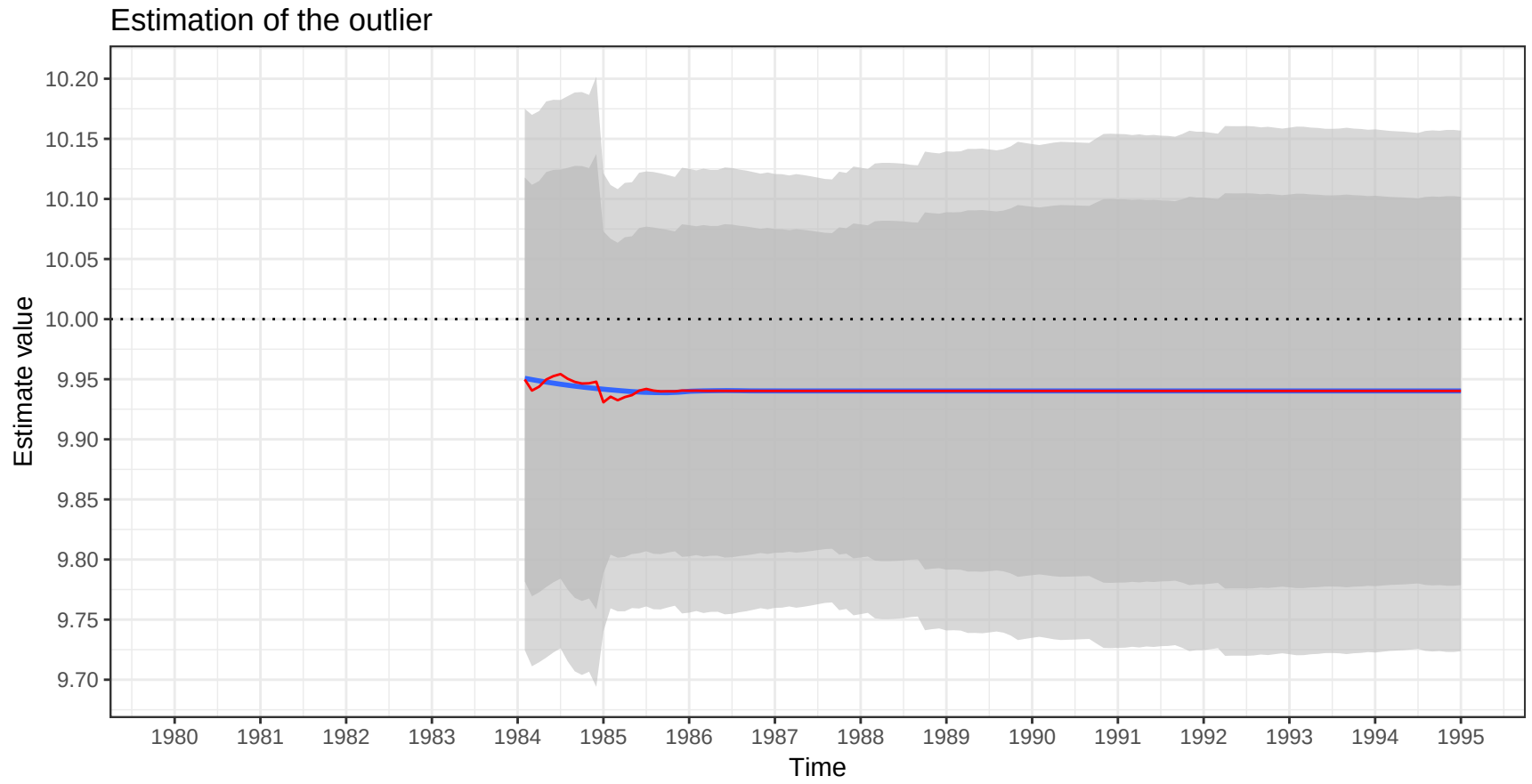


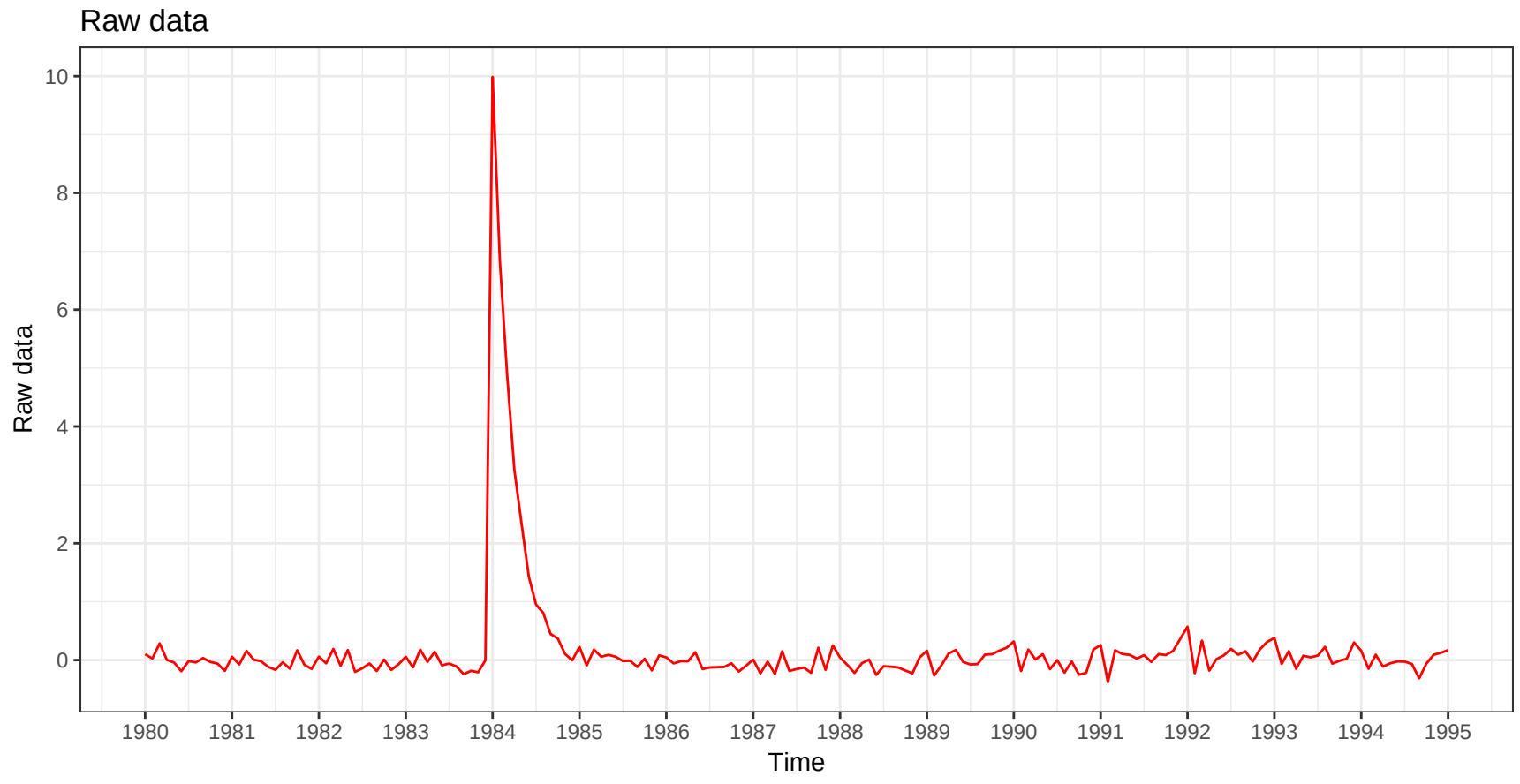
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(1,0,1) − additive decomposition
(1−0.8B12)Xt=(1−0.4B12)at



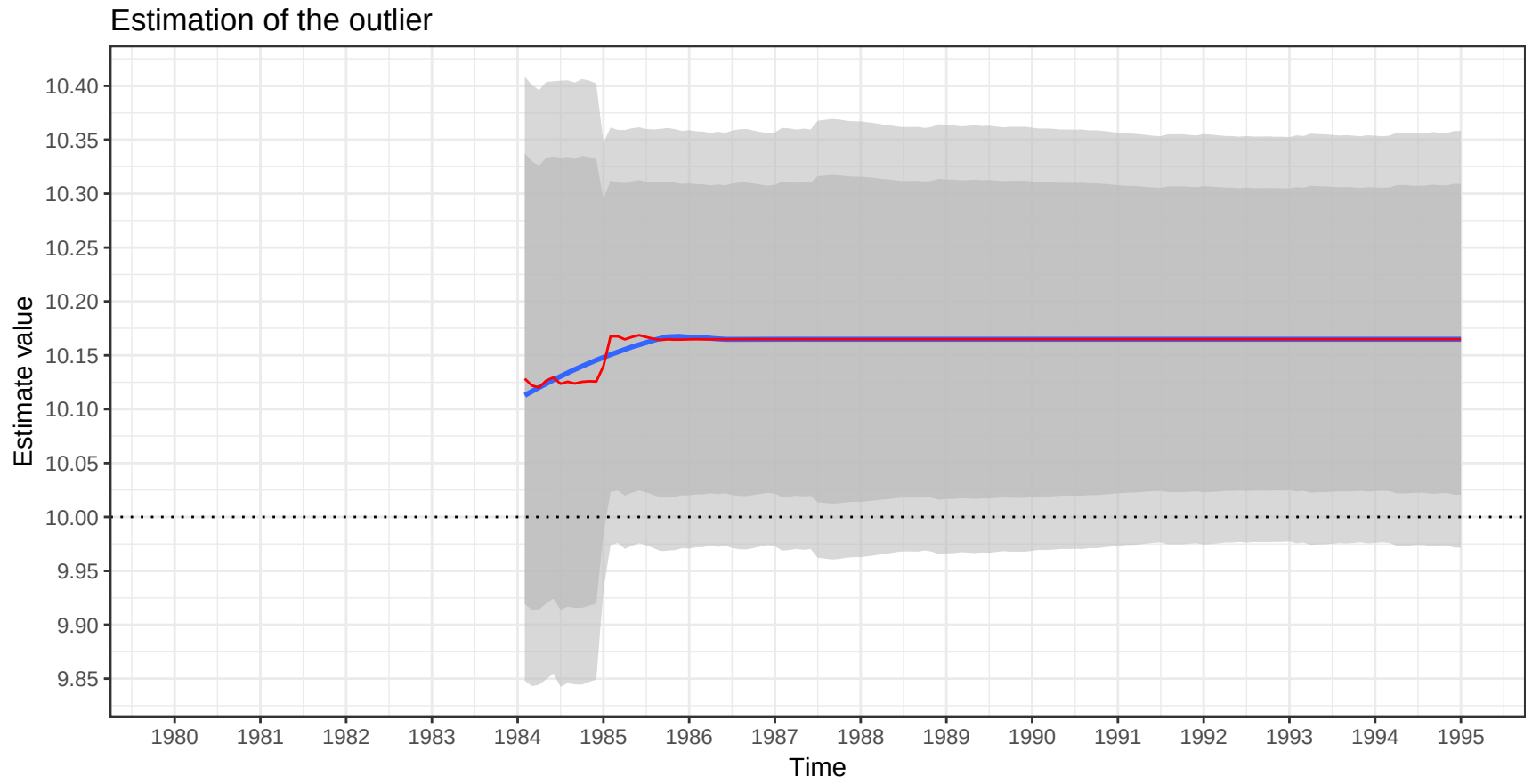


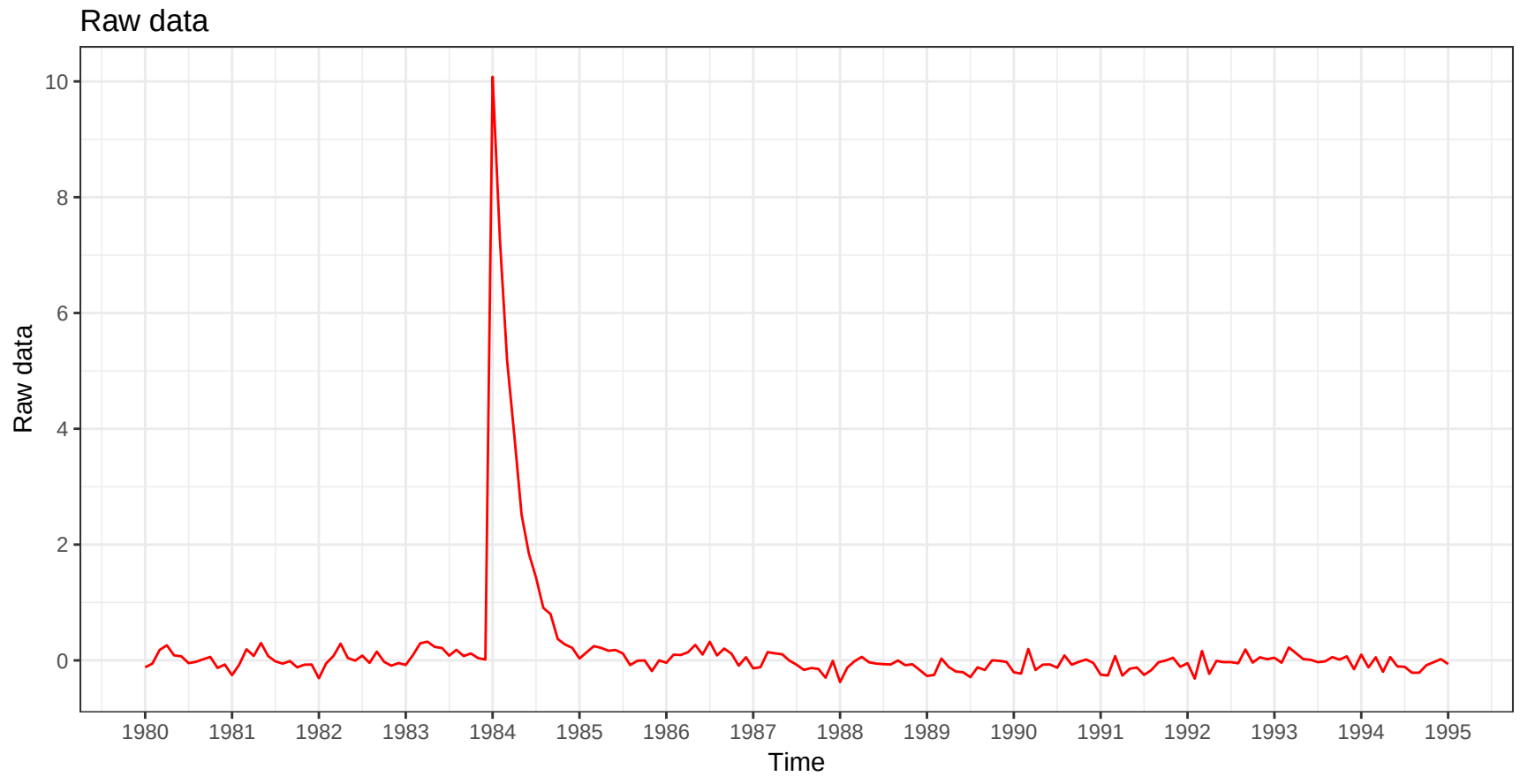
Estimate value of a TC(1984−01)
ARIMA (2,0,1)(0,0,0) − additive decomposition
(1−0.41B−0.37B2)Xt=(1−0.3B)at



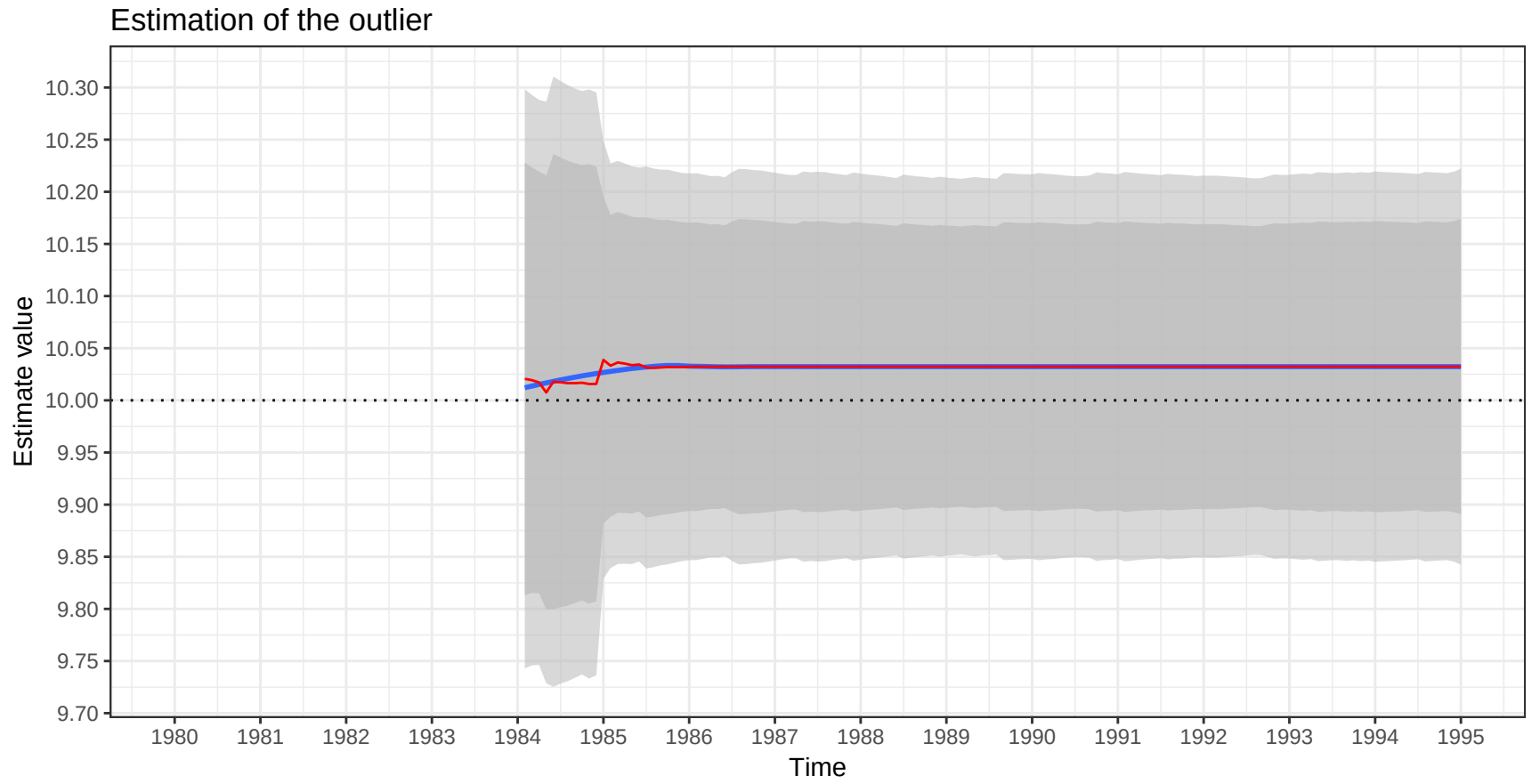


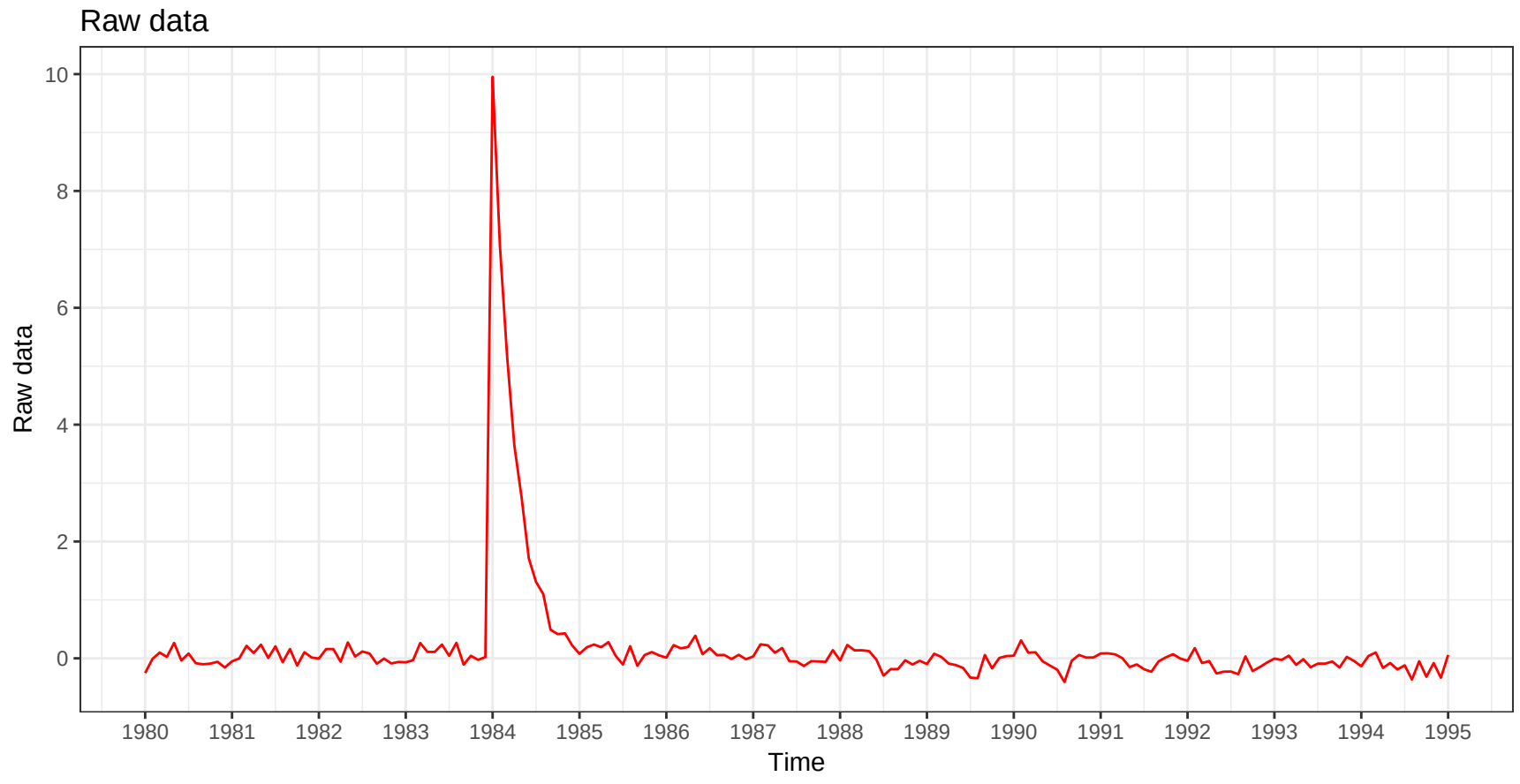
Estimate value of a TC(1984−01)
ARIMA (2,0,1)(0,0,0) − additive decomposition
(1−0.41B−0.37B2)Xt=(1−0.3B)at



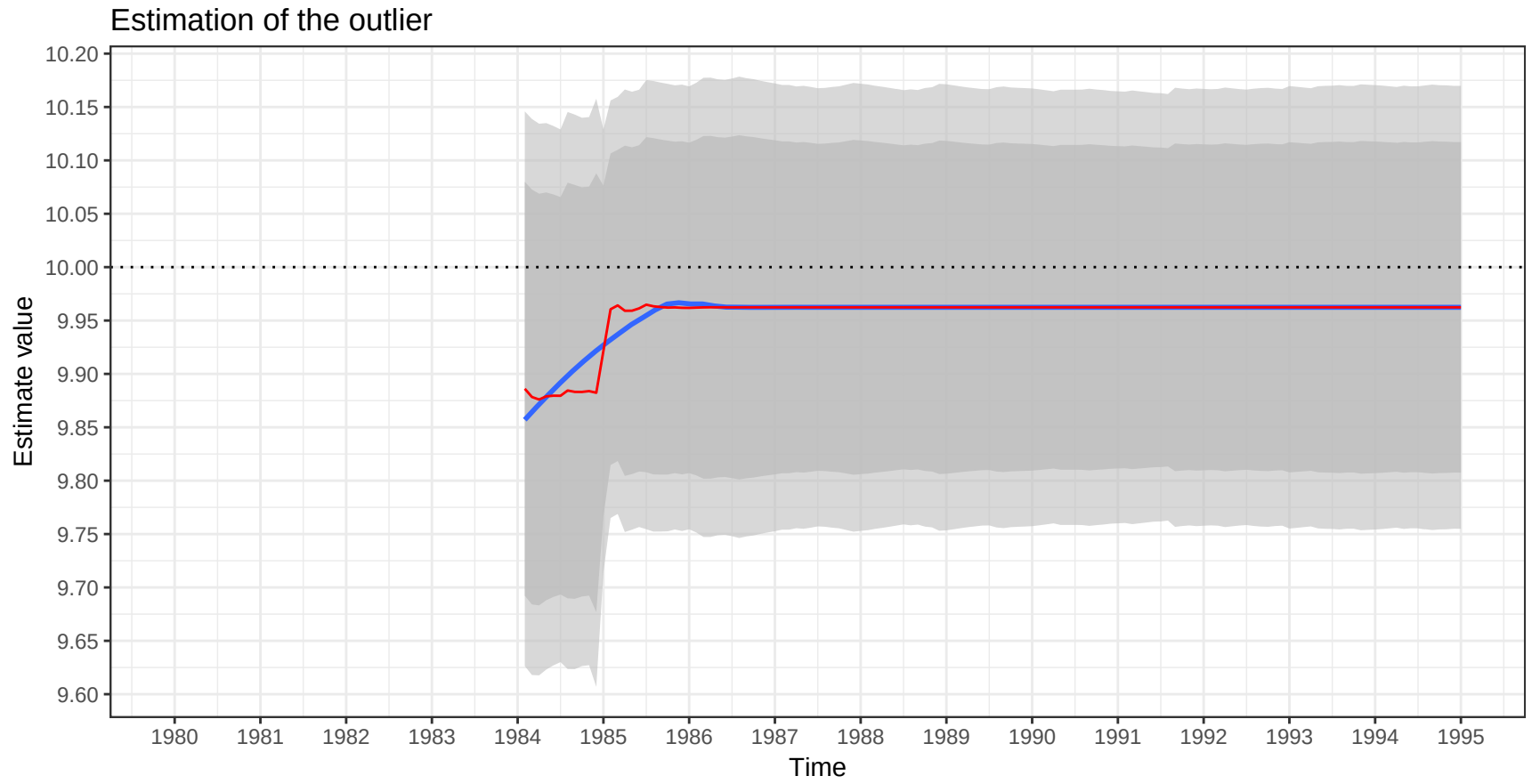


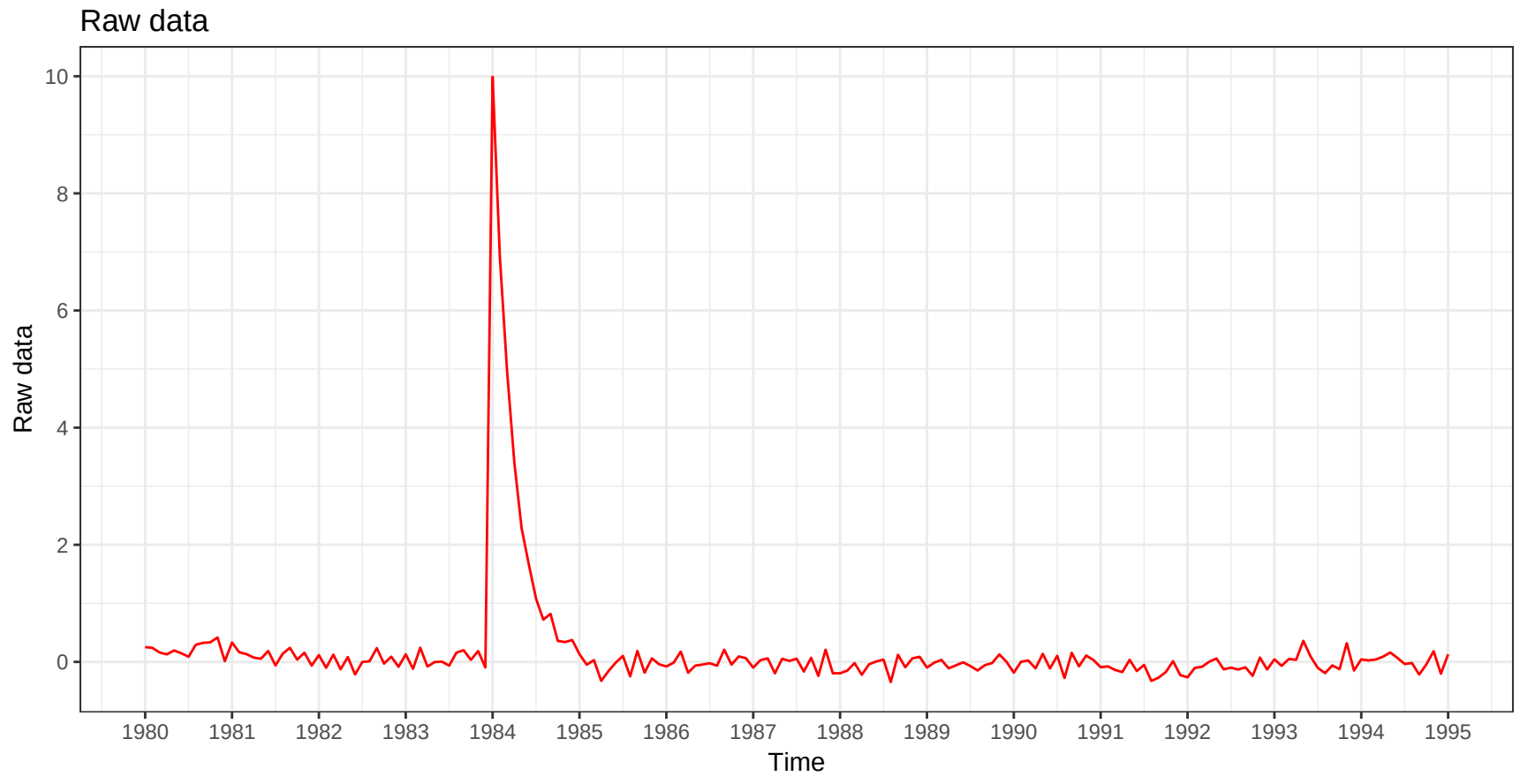
Estimate value of a TC(1984−01)
ARIMA (2,0,1)(0,0,0) − additive decomposition
(1−0.41B−0.37B2)Xt=(1−0.3B)at



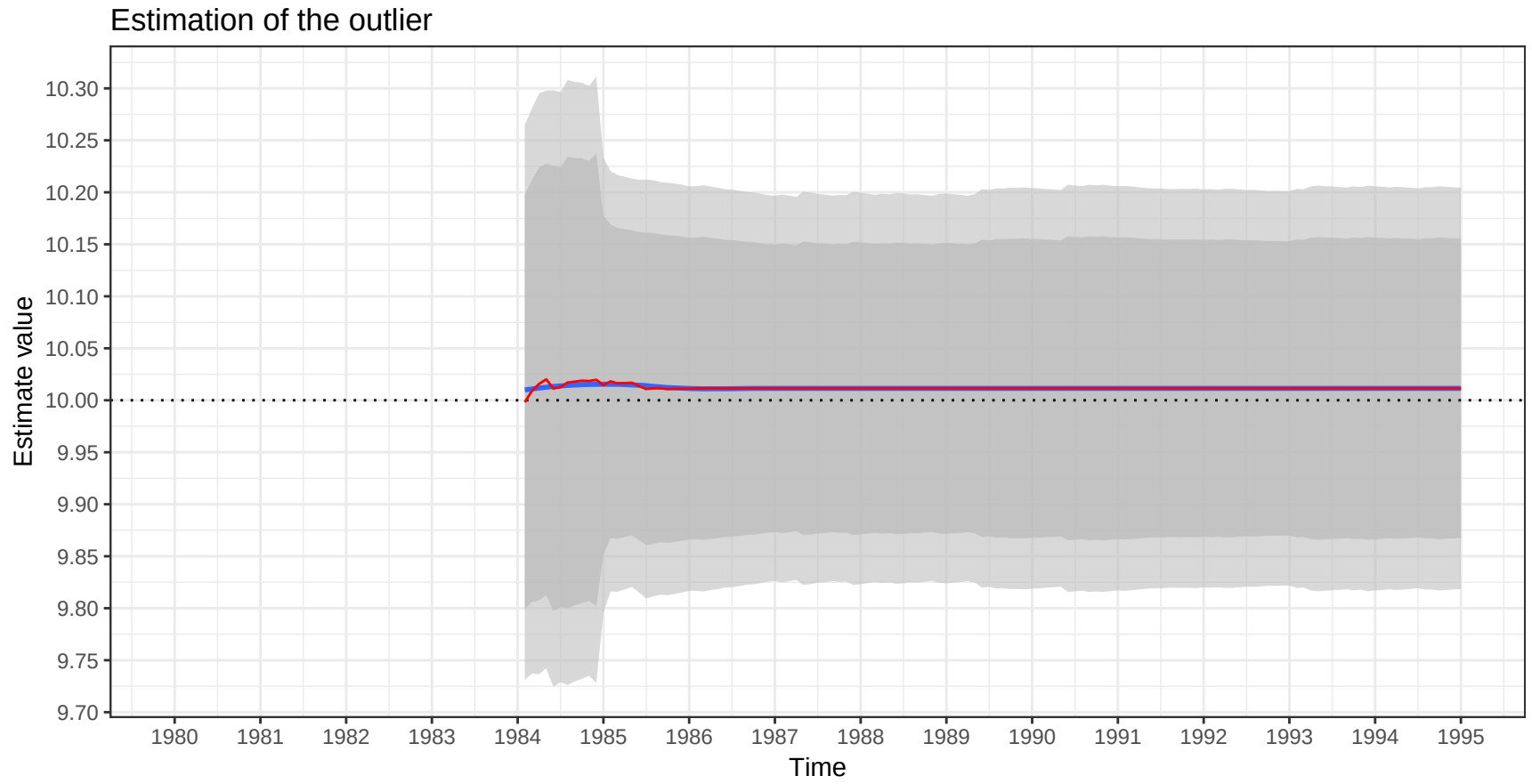


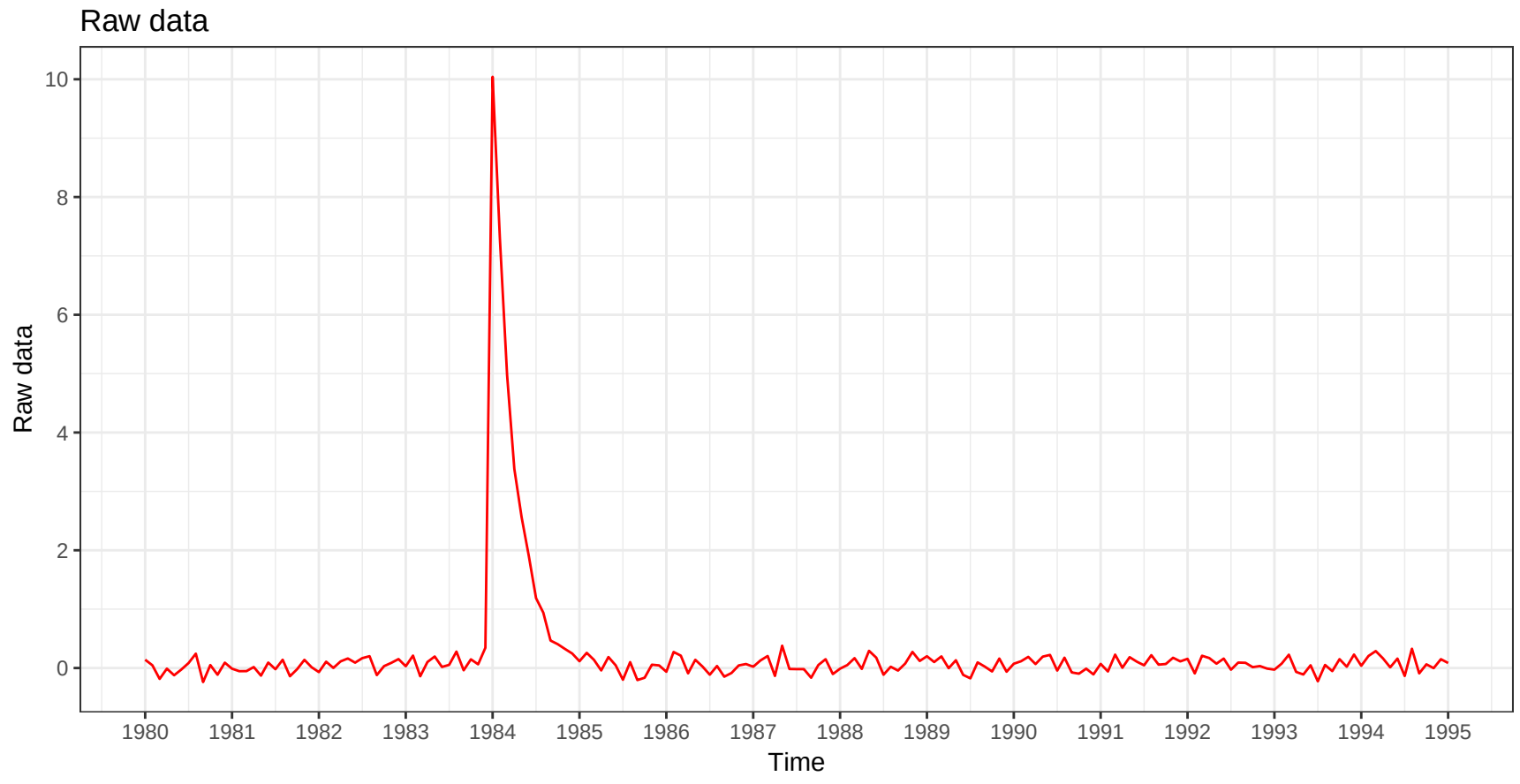
Estimate value of a TC(1984−01)
ARIMA (2,0,1)(0,0,0) − additive decomposition
(1−0.41B−0.37B2)Xt=(1−0.3B)at



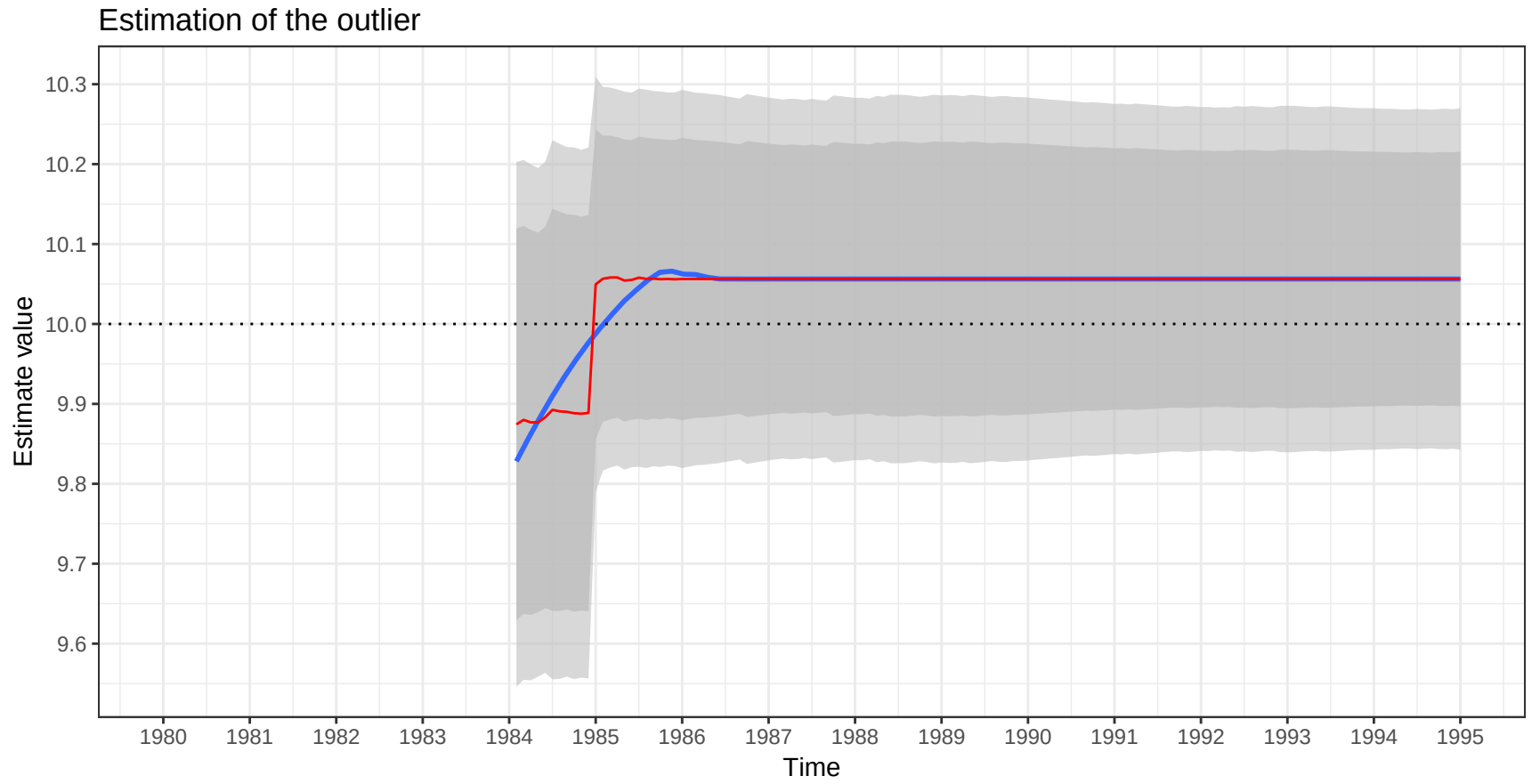


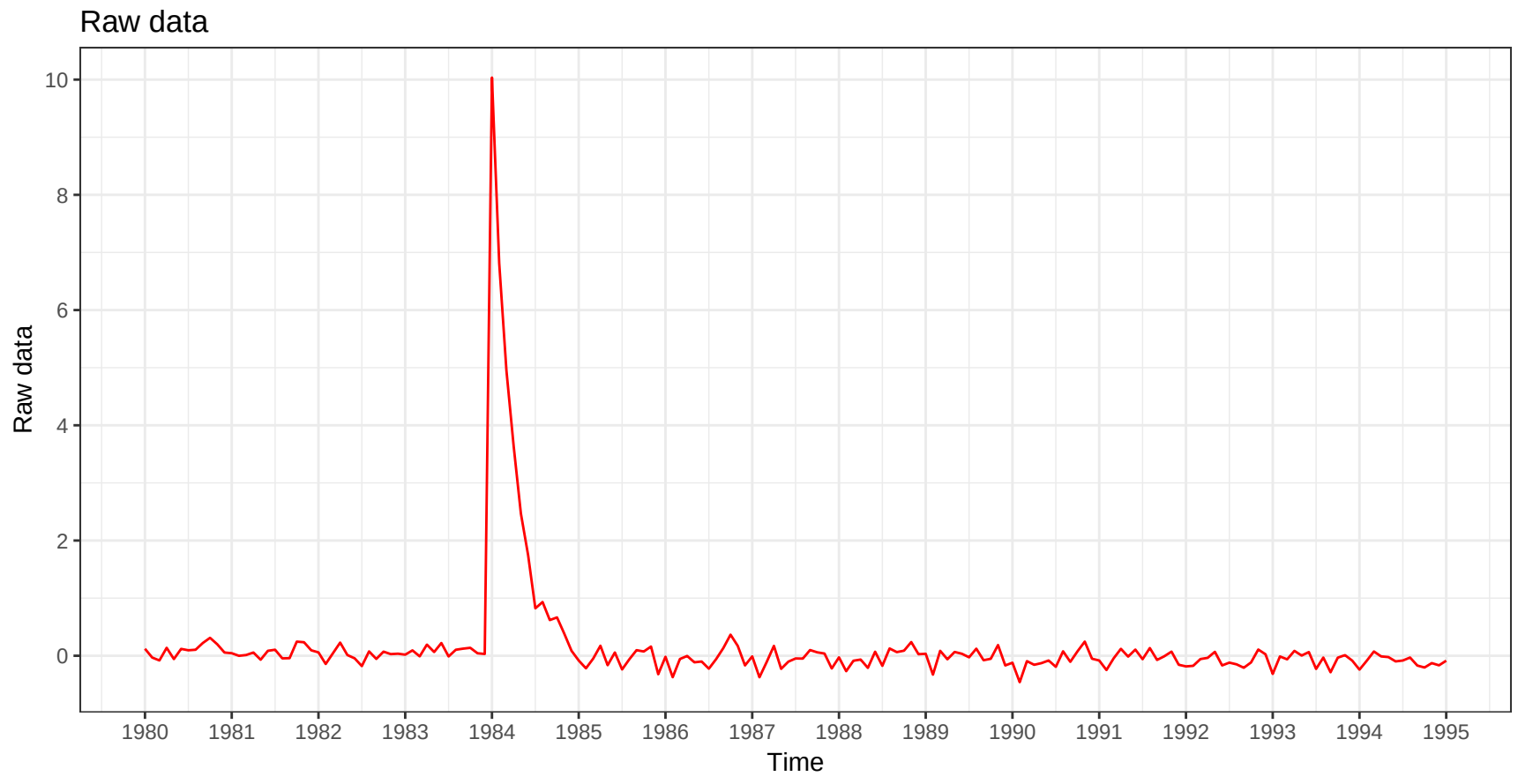
Estimate value of a TC(1984−01)
ARIMA (2,0,1)(0,0,0) − additive decomposition
(1−0.41B−0.37B2)Xt=(1−0.3B)at



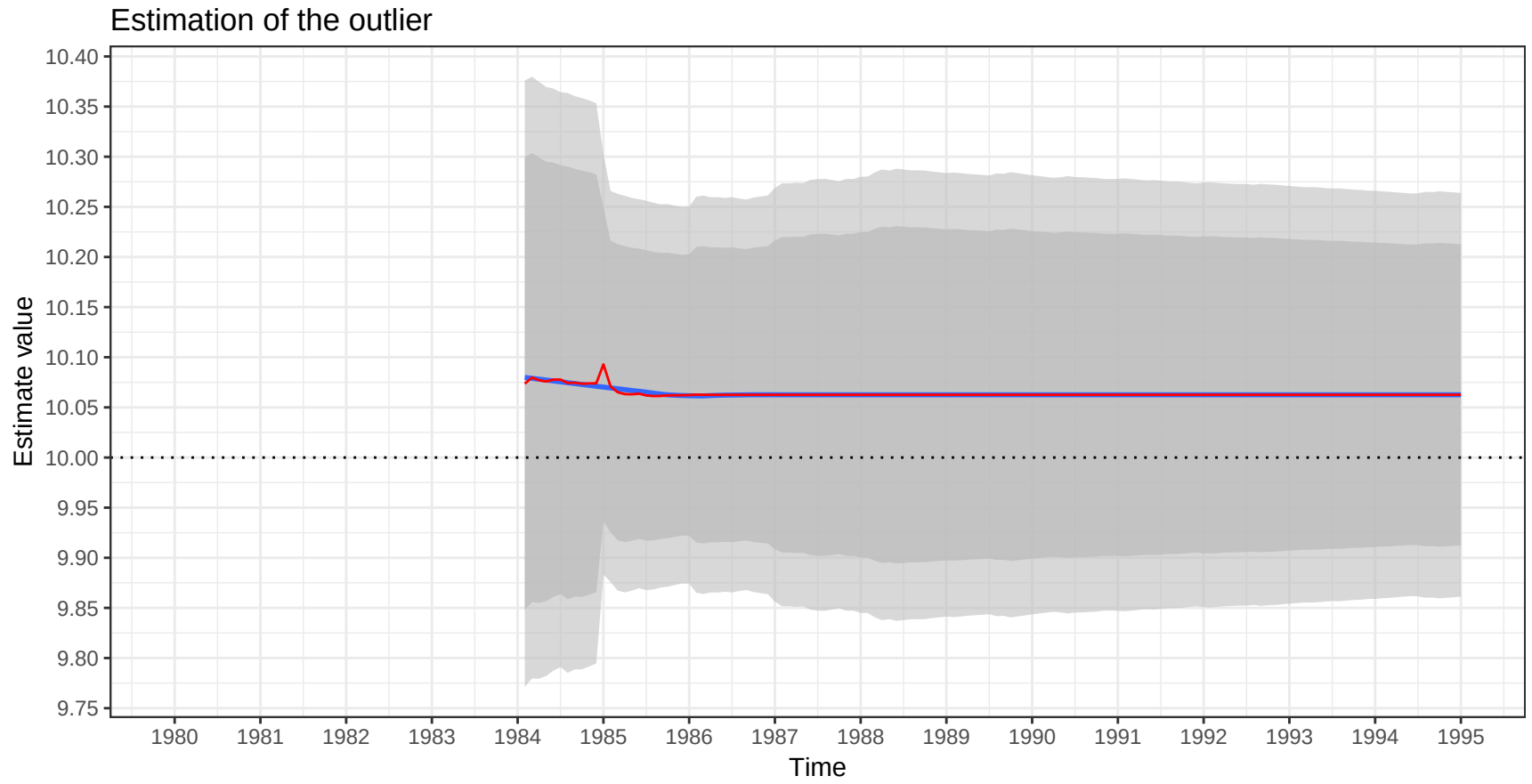


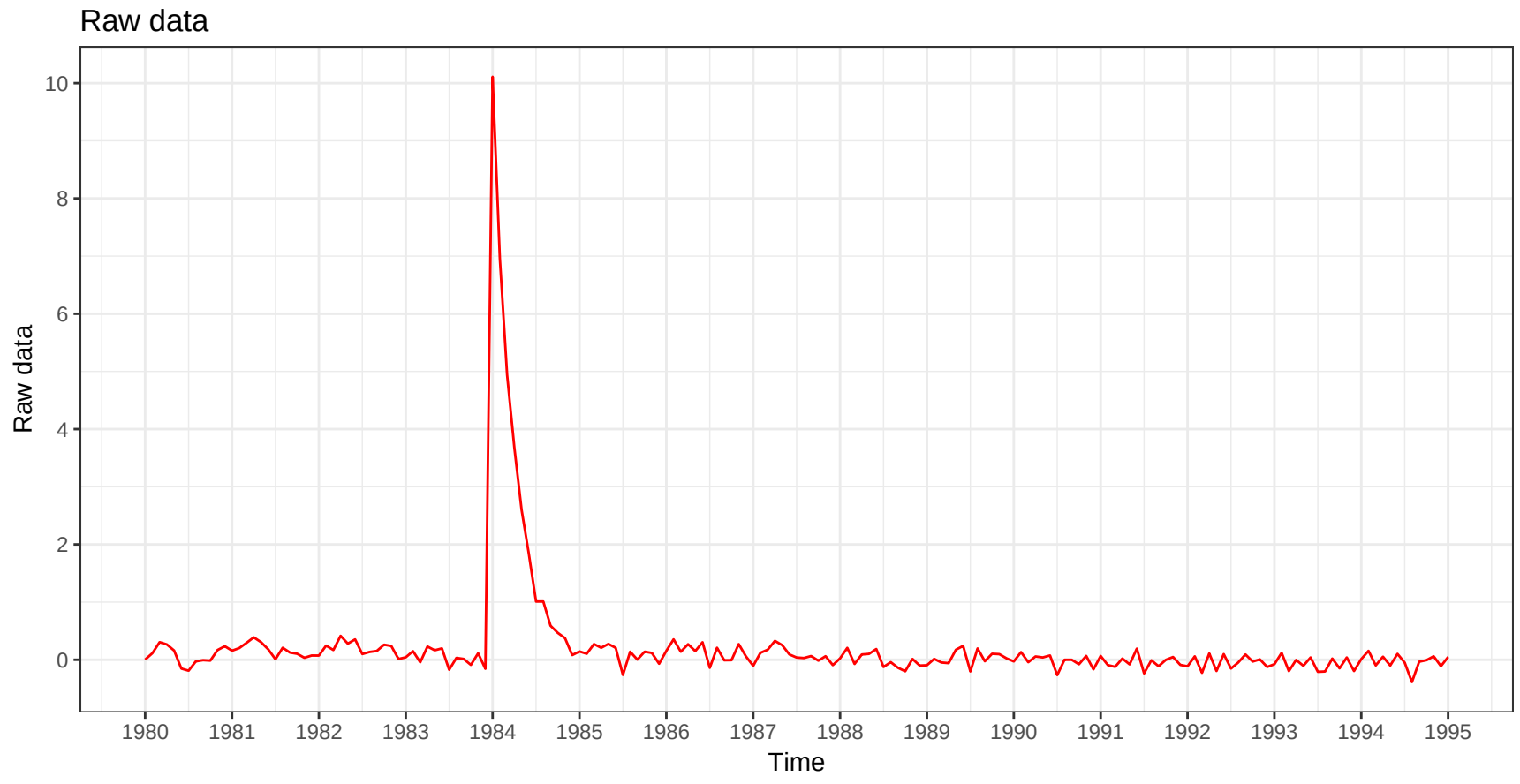
Estimate value of a TC(1984−01)
ARIMA (2,0,1)(0,0,0) − additive decomposition
(1−0.41B−0.37B2)Xt=(1−0.3B)at



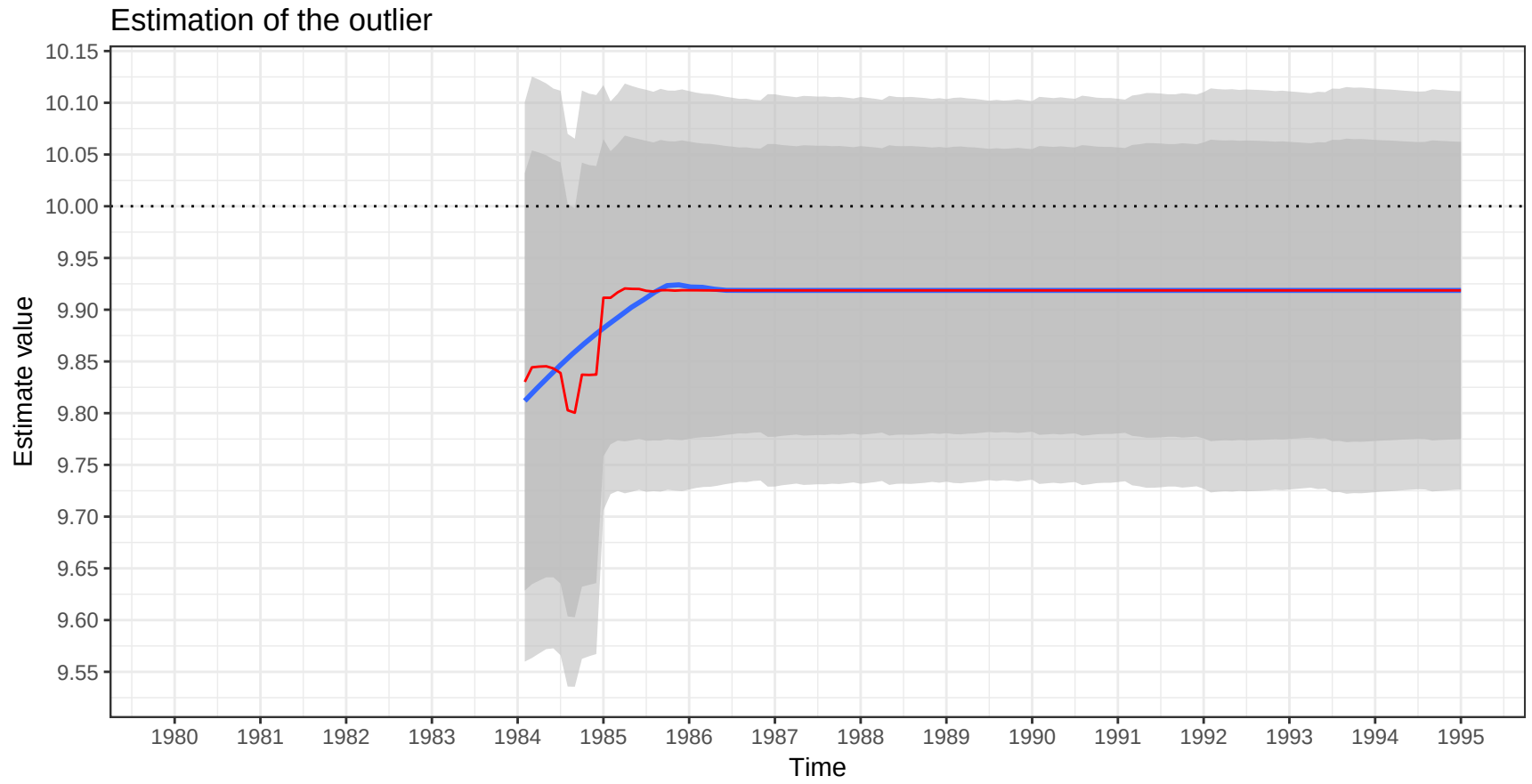


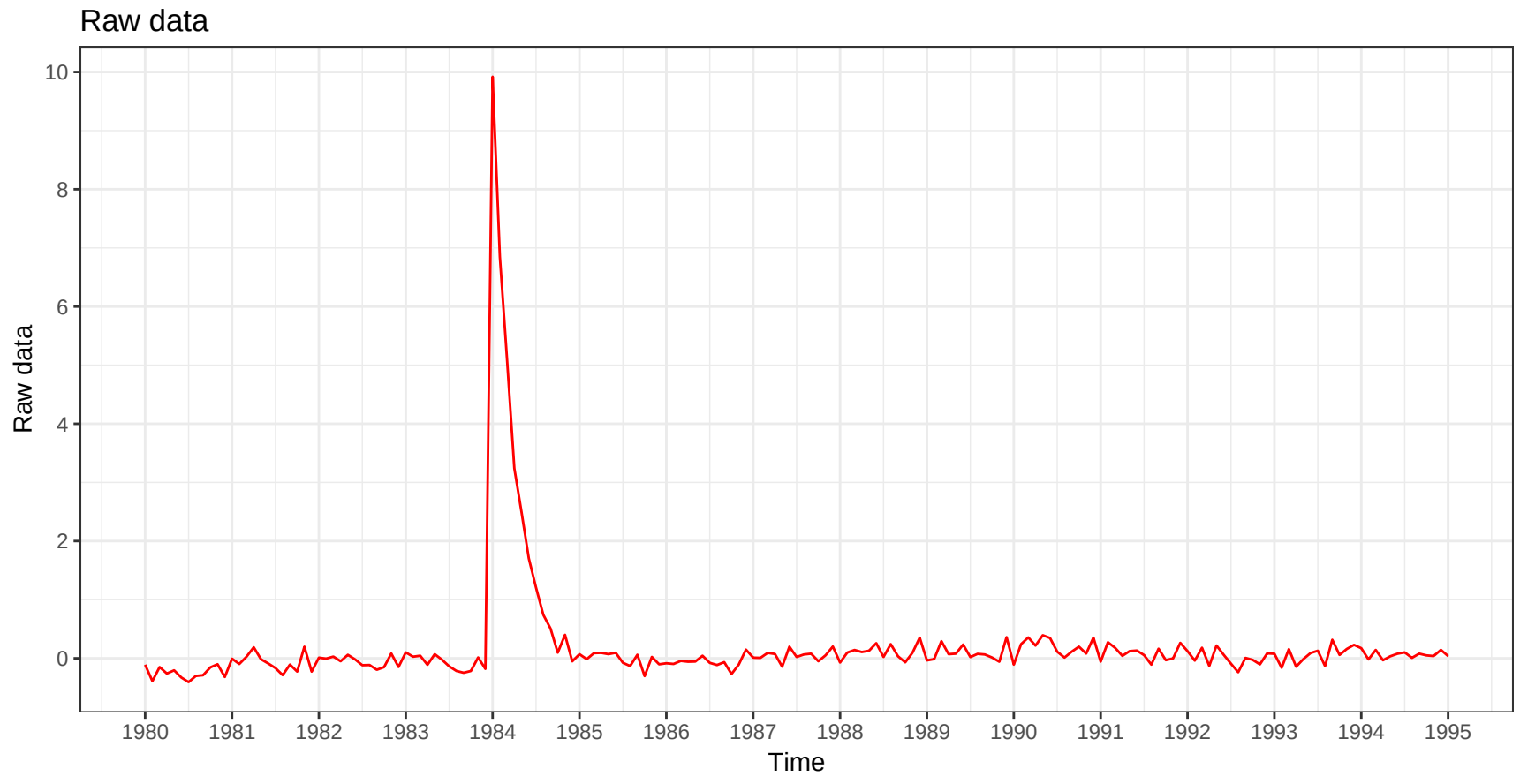
Estimate value of a TC(1984−01)
ARIMA (2,0,1)(0,0,0) − additive decomposition
(1−0.41B−0.37B2)Xt=(1−0.3B)at



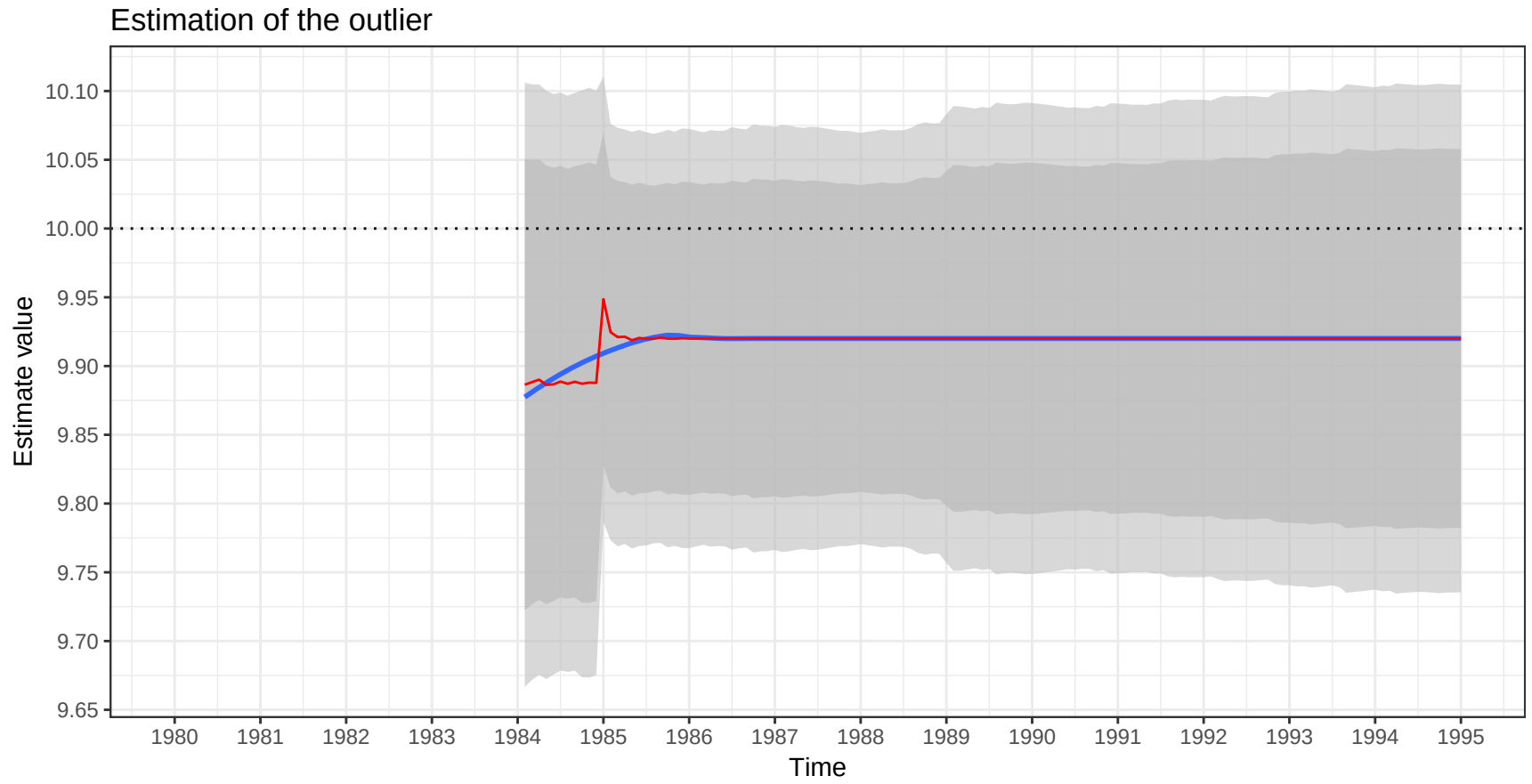


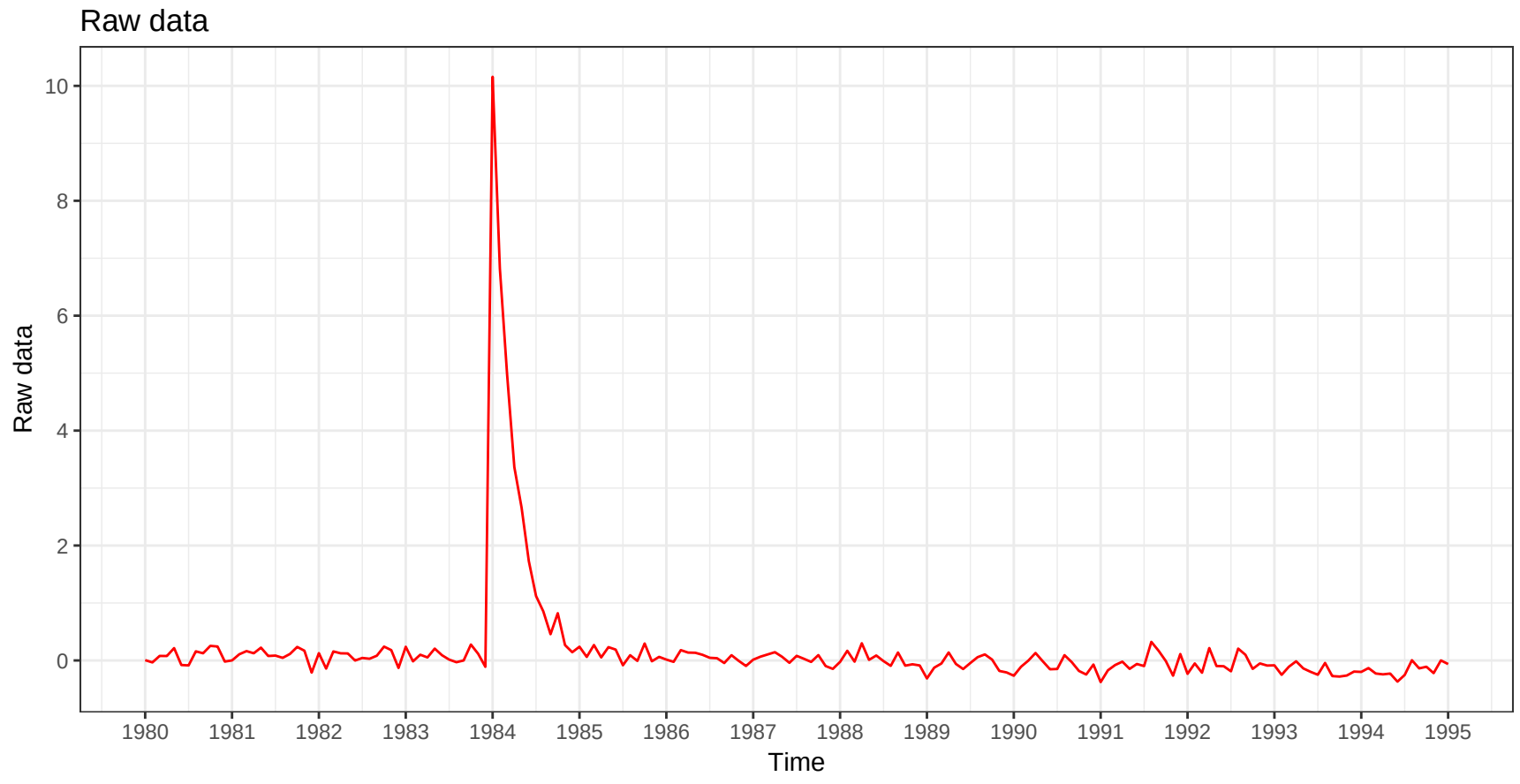
Estimate value of a TC(1984−01)
ARIMA (2,0,1)(0,0,0) − additive decomposition
(1−0.41B−0.37B2)Xt=(1−0.3B)at



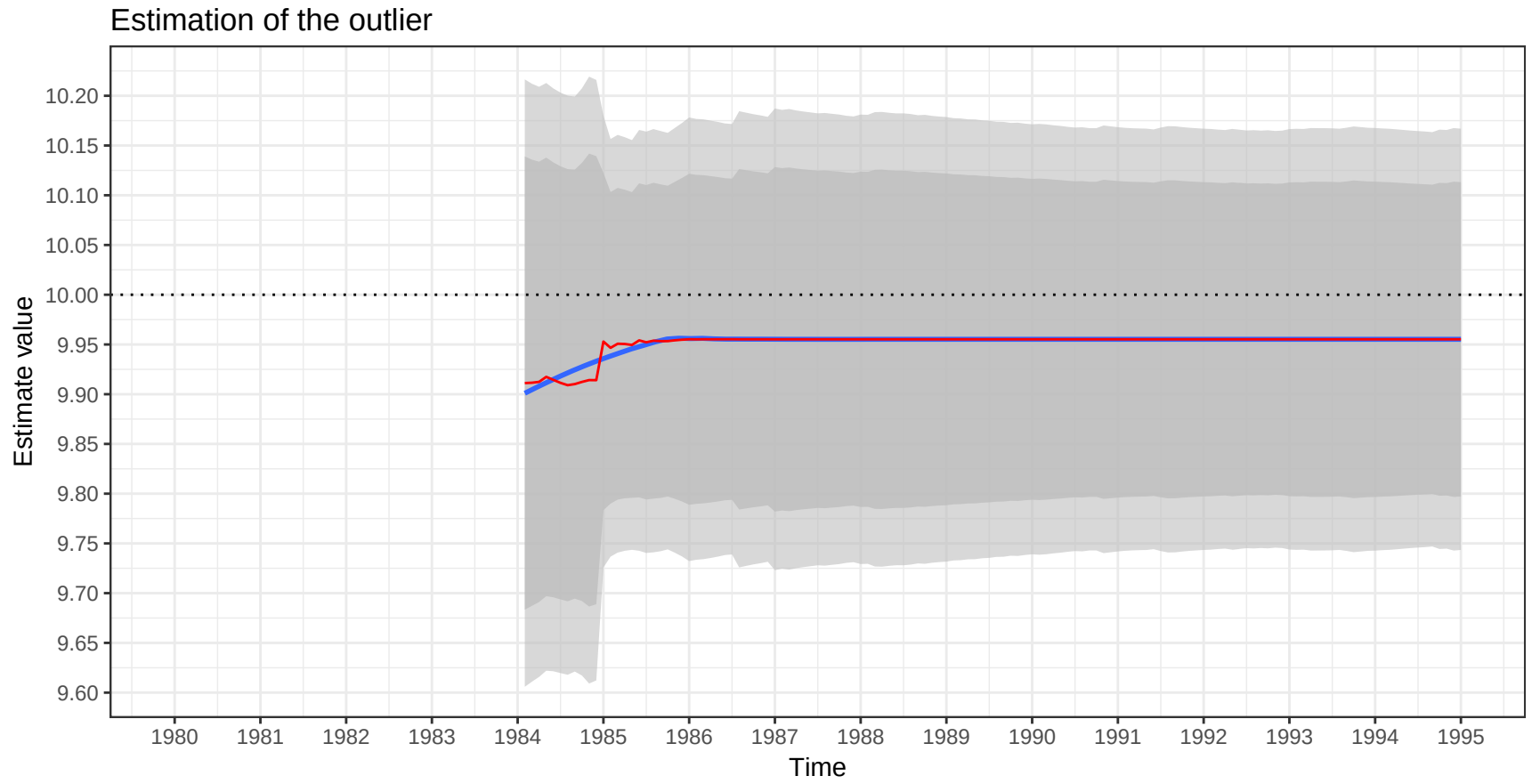


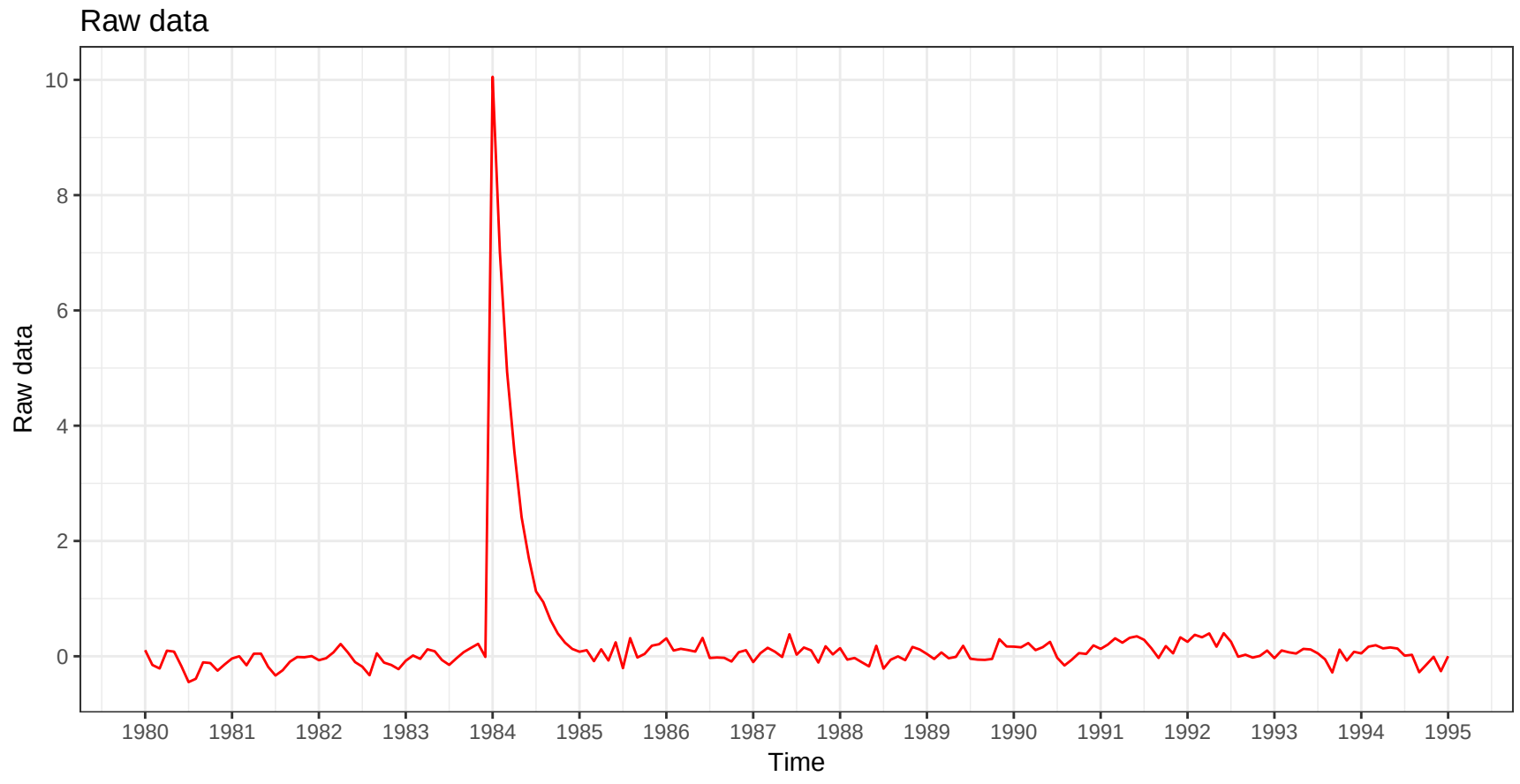
Estimate value of a TC(1984−01)
ARIMA (2,0,1)(0,0,0) − additive decomposition
(1−0.41B−0.37B2)Xt=(1−0.3B)at



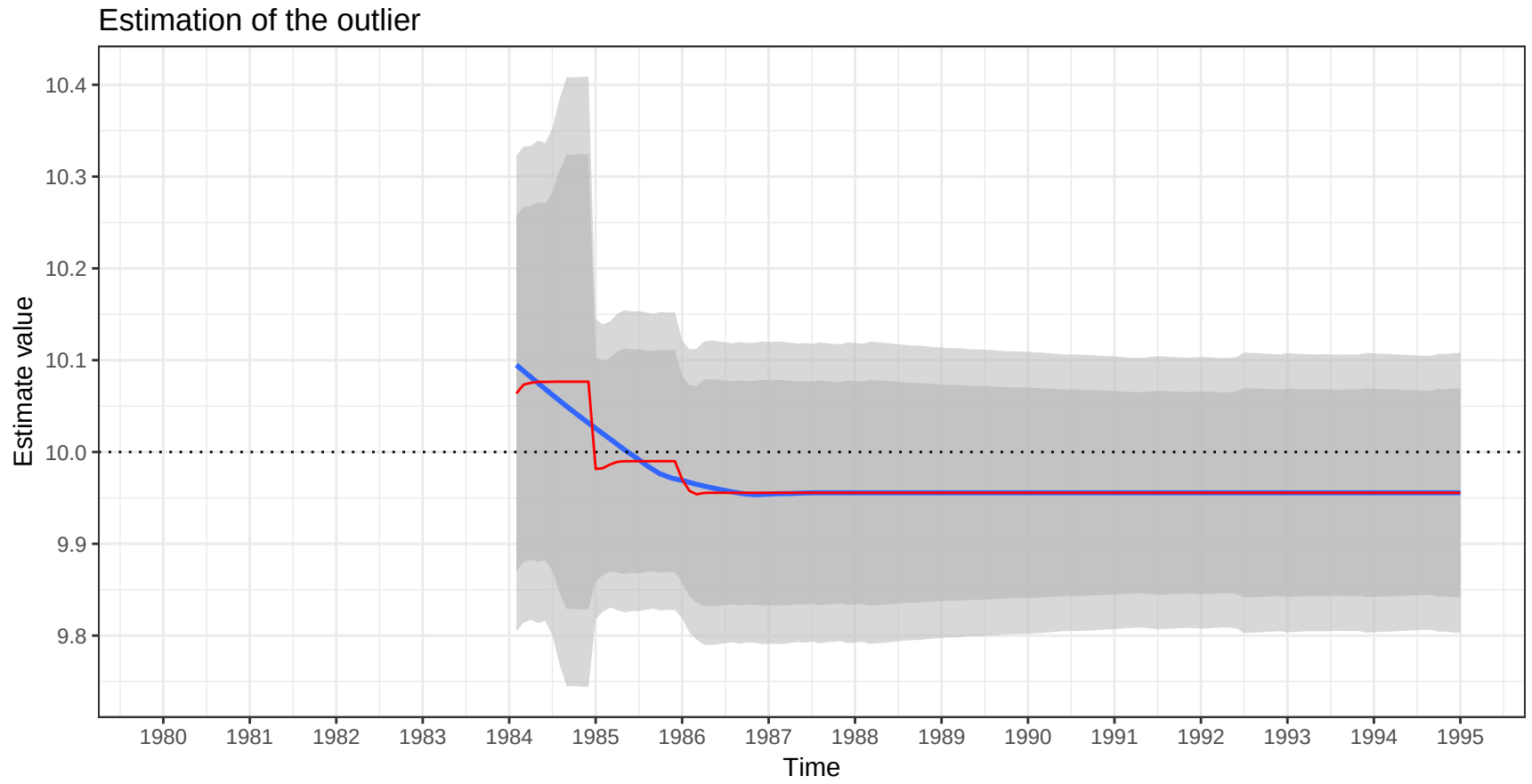


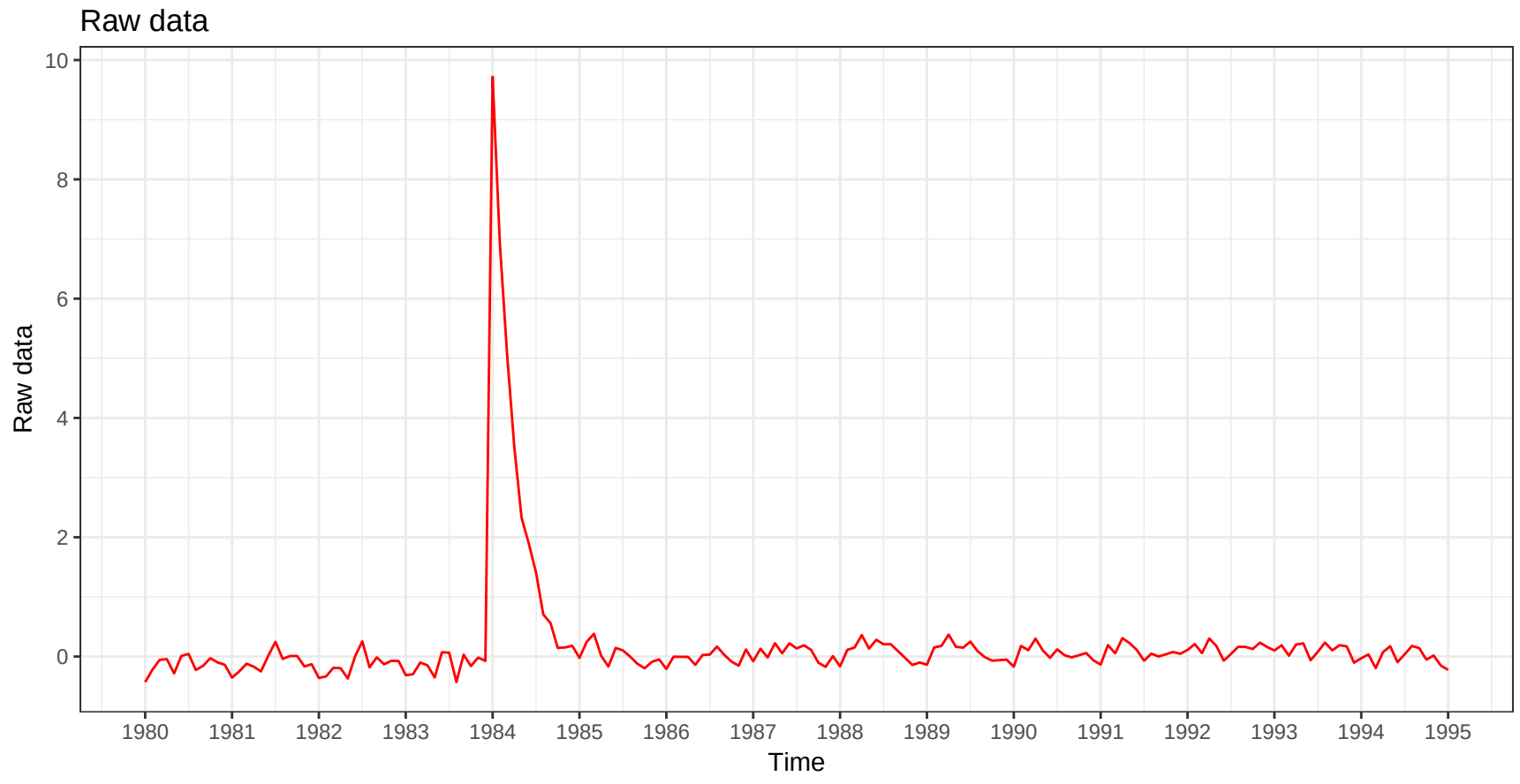
Estimate value of a TC(1984−01)
ARIMA (2,0,1)(0,0,0) − additive decomposition
(1−0.41B−0.37B2)Xt=(1−0.3B)at



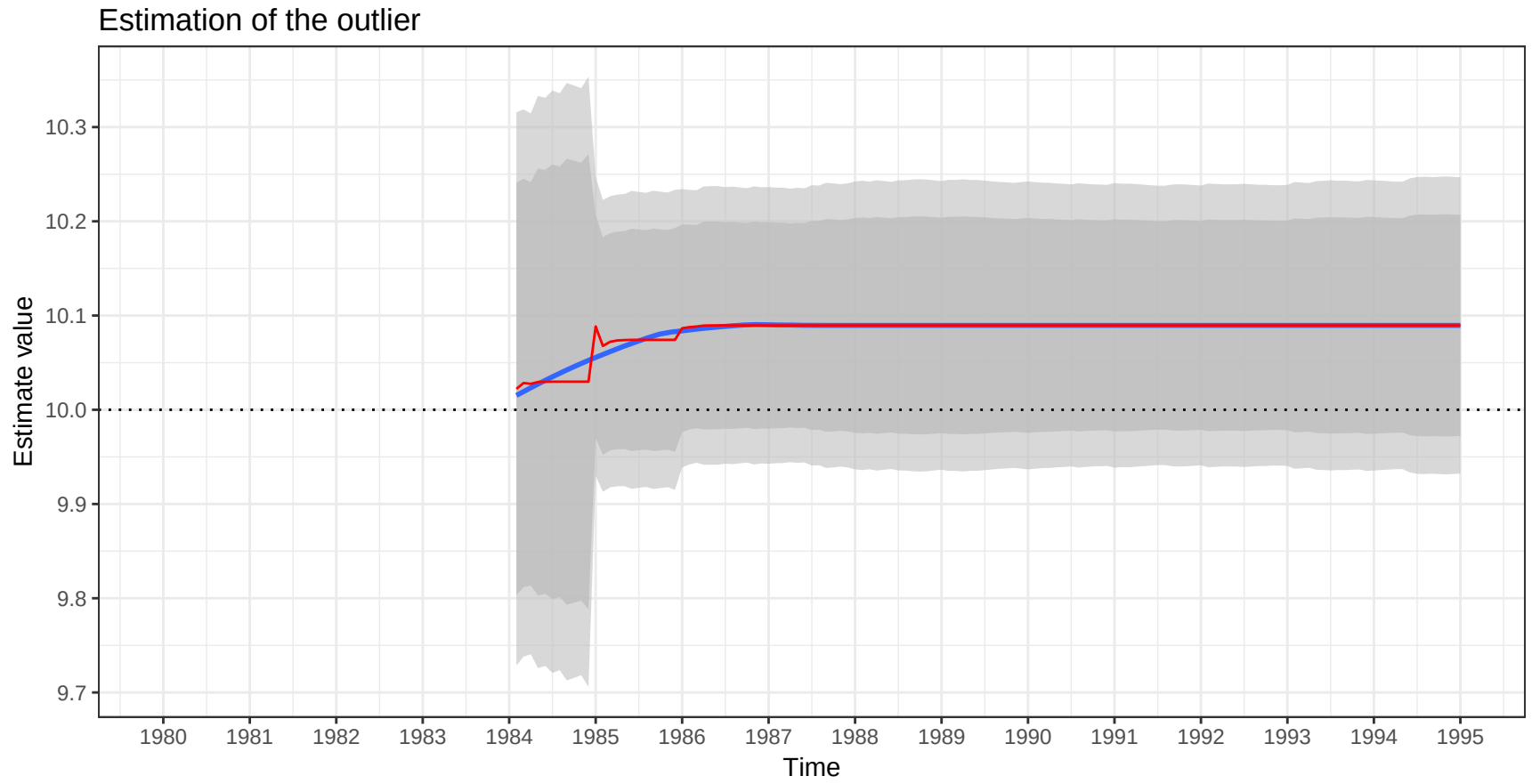


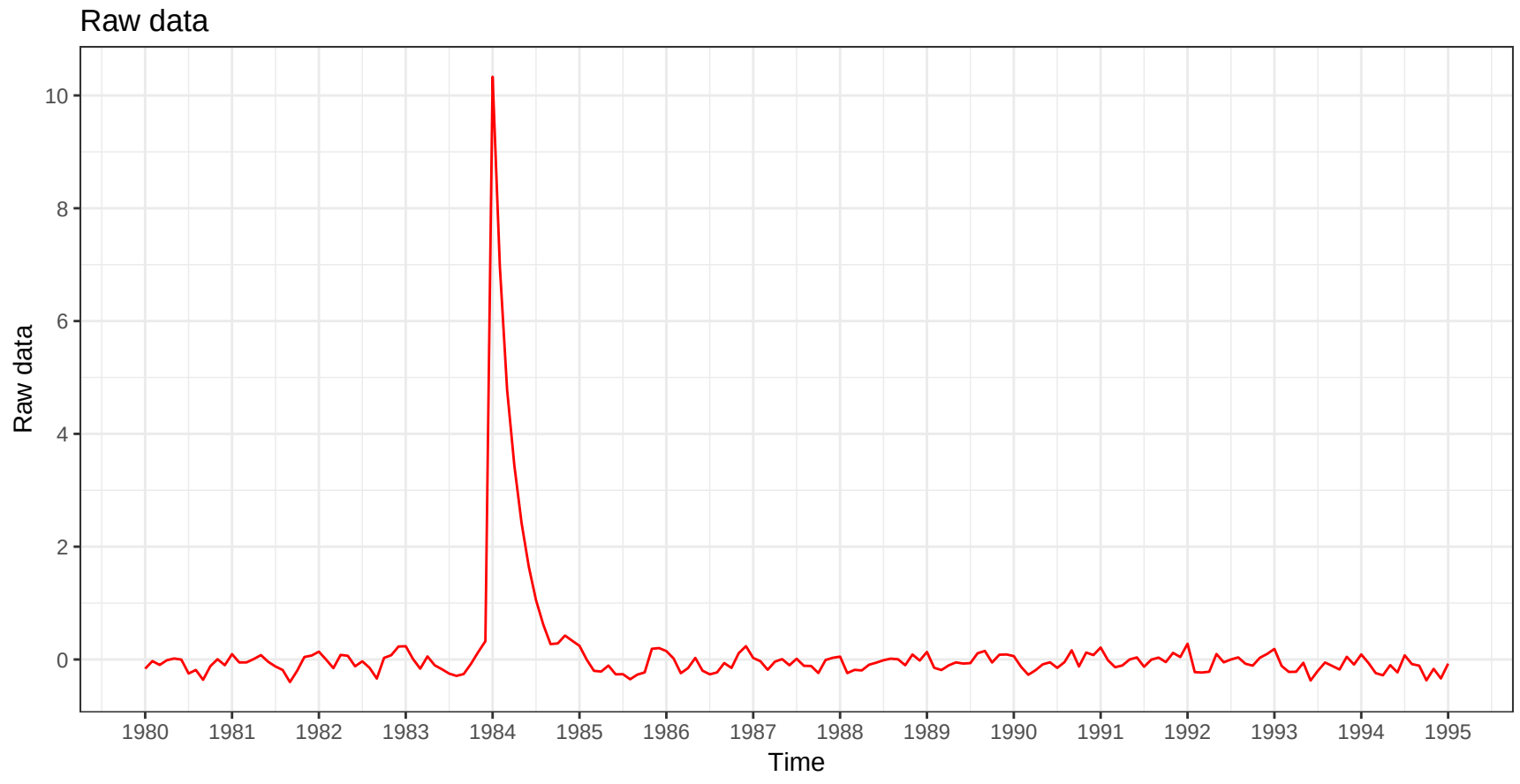
Estimate value of a TC(1984−01)
ARIMA (1,0,1)(1,0,0) − additive decomposition
(1−0.7B)(1−0.85B12)Xt=(1−0.3B)at



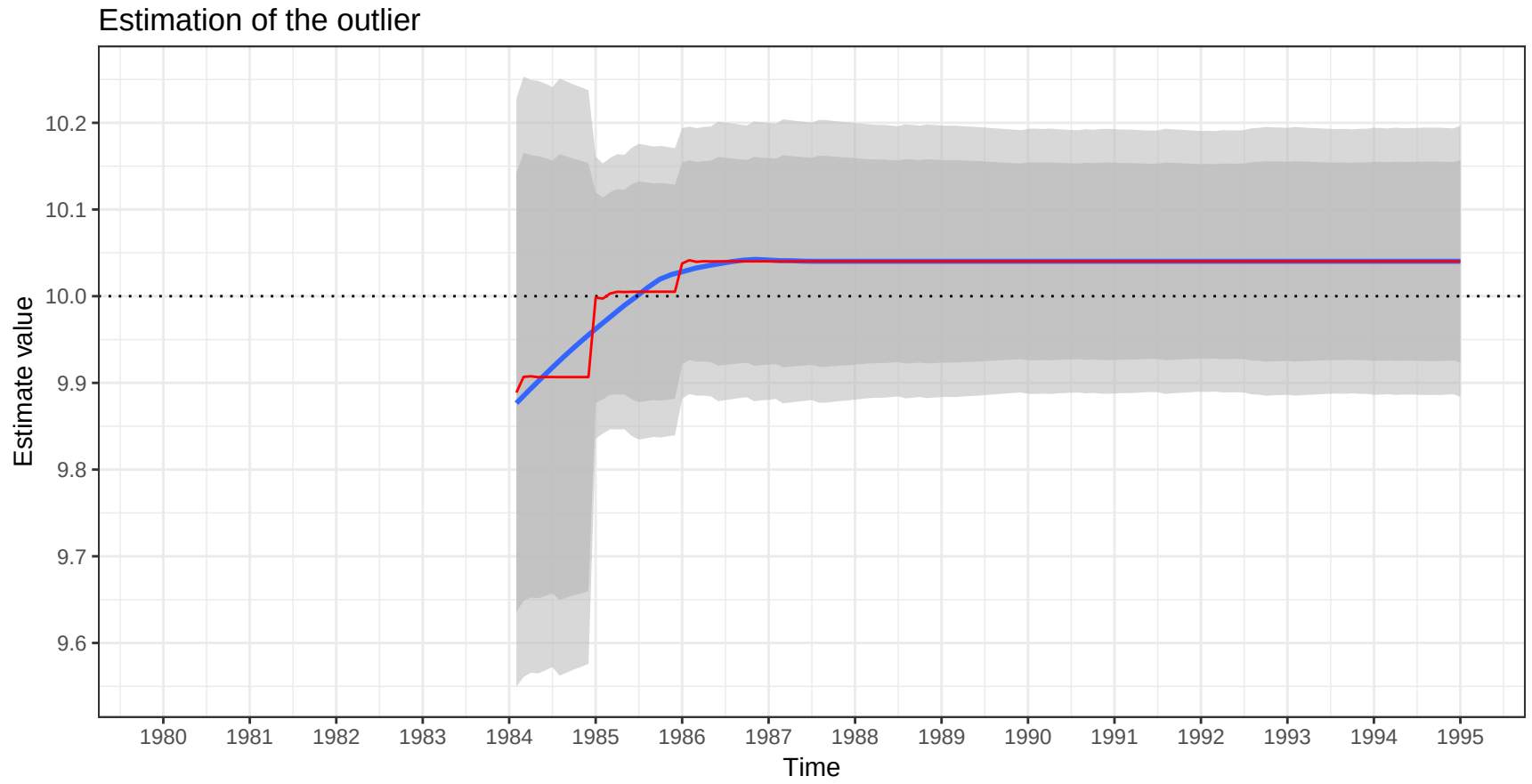


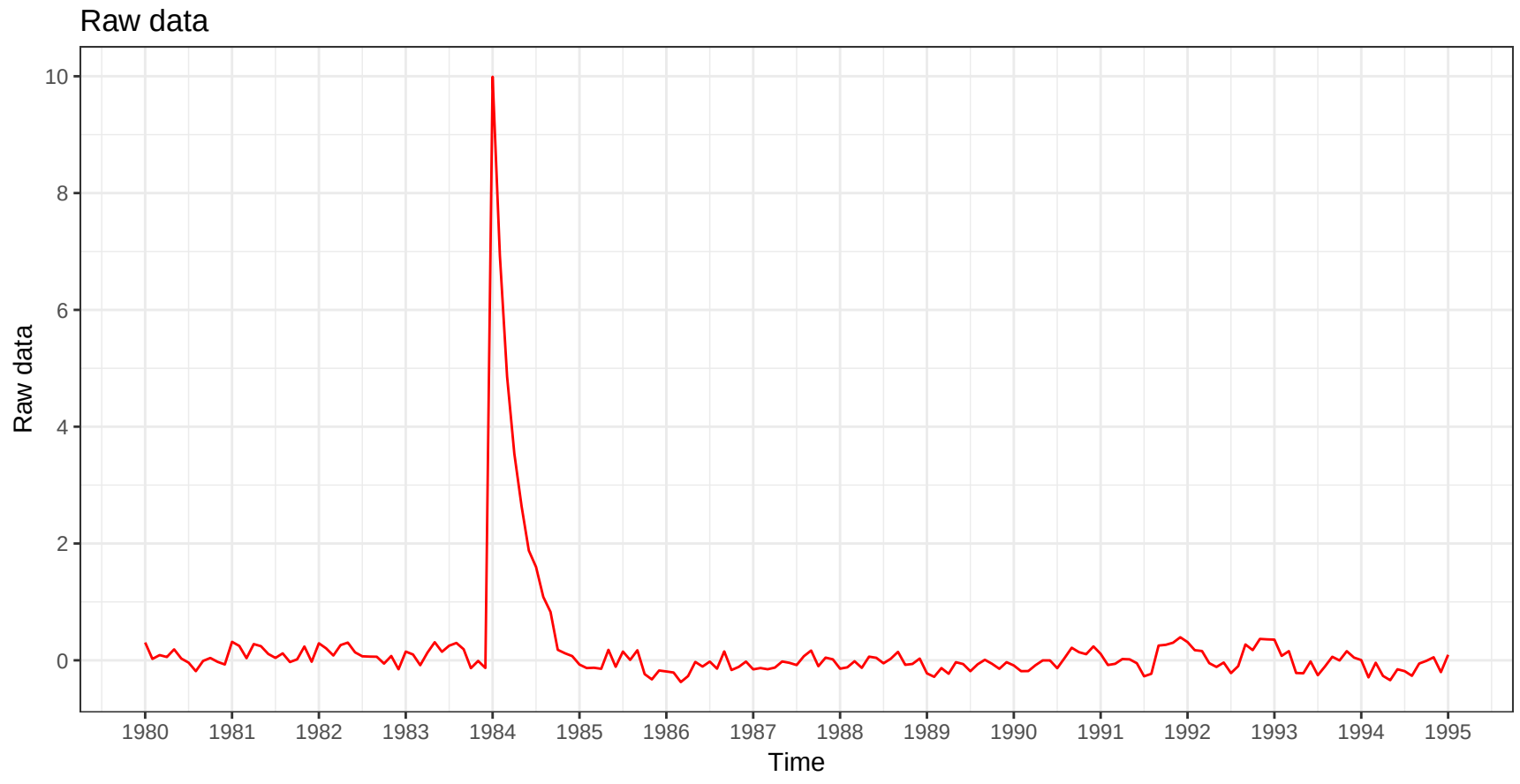
Estimate value of a TC(1984−01)
ARIMA (1,0,1)(1,0,0) − additive decomposition
(1−0.7B)(1−0.85B12)Xt=(1−0.3B)at



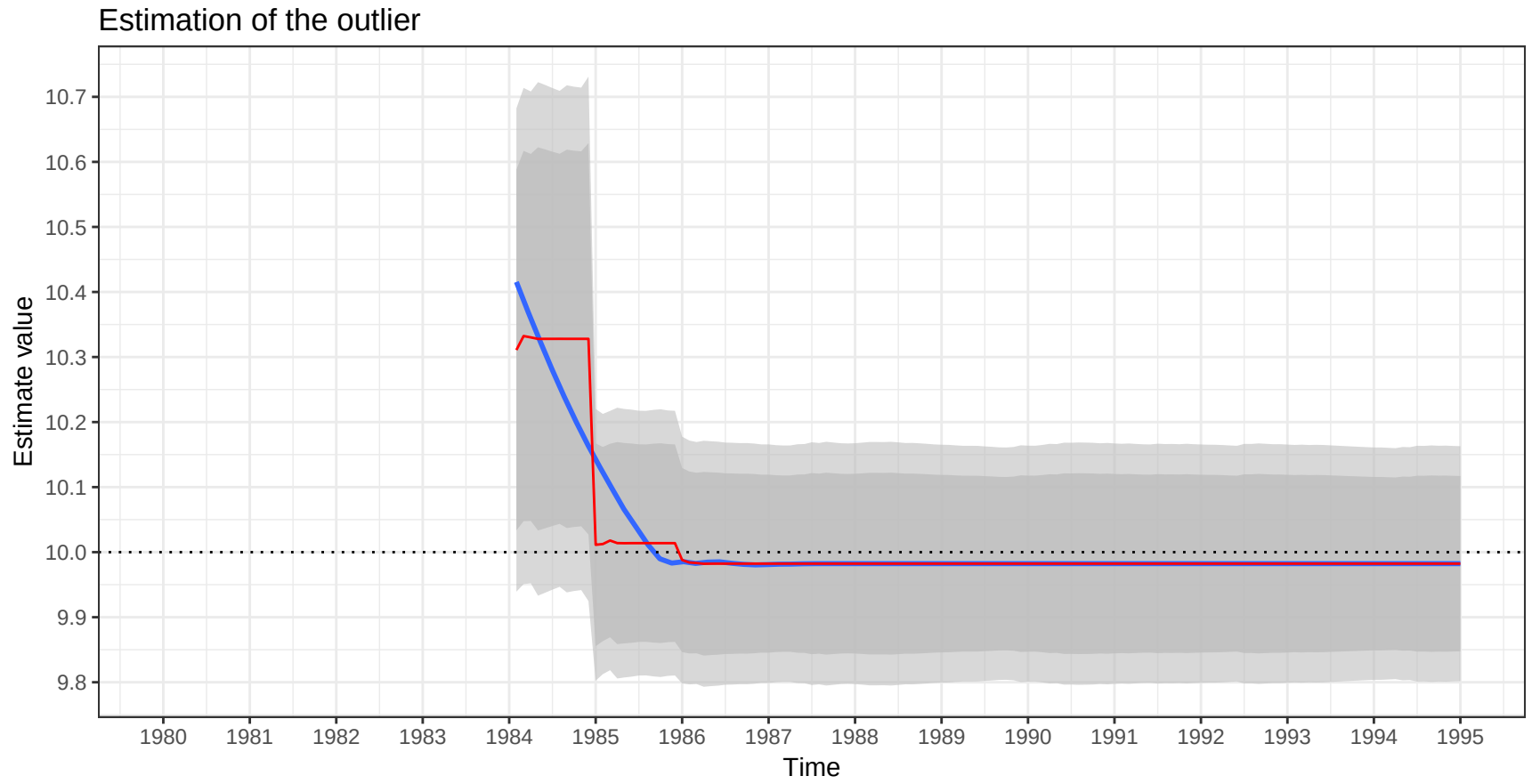


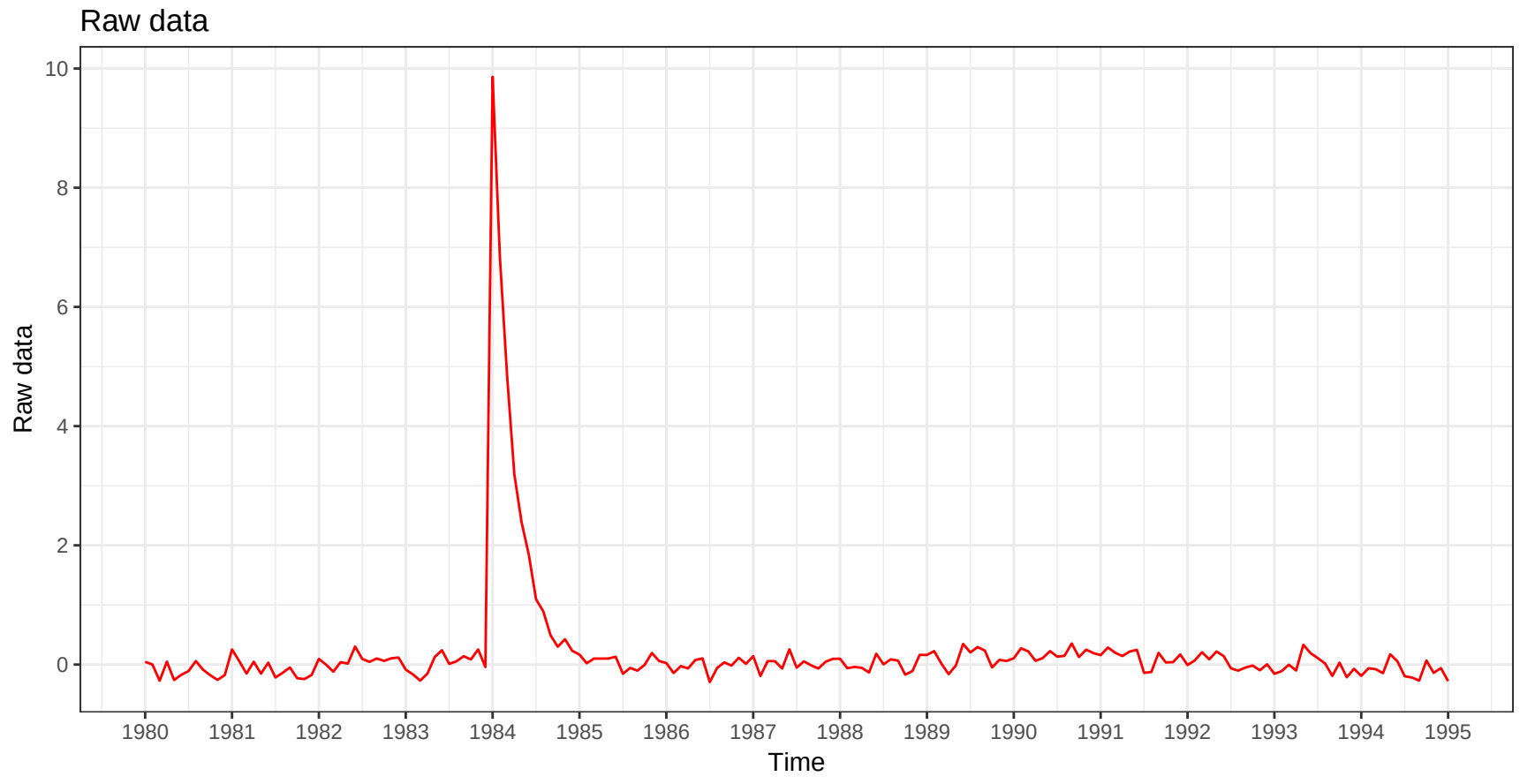
Estimate value of a TC(1984−01)
ARIMA (1,0,1)(1,0,0) − additive decomposition
(1−0.7B)(1−0.85B12)Xt=(1−0.3B)at



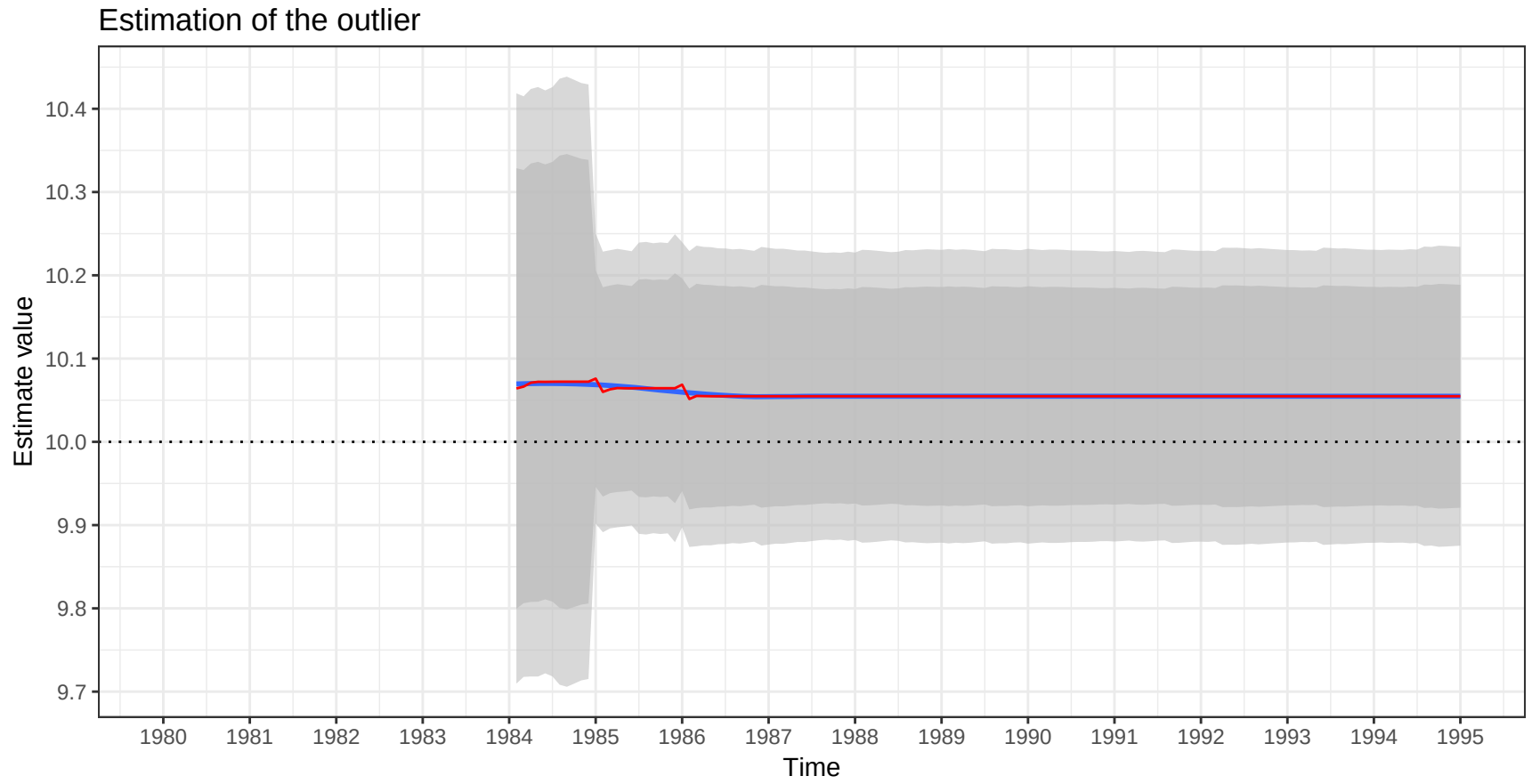


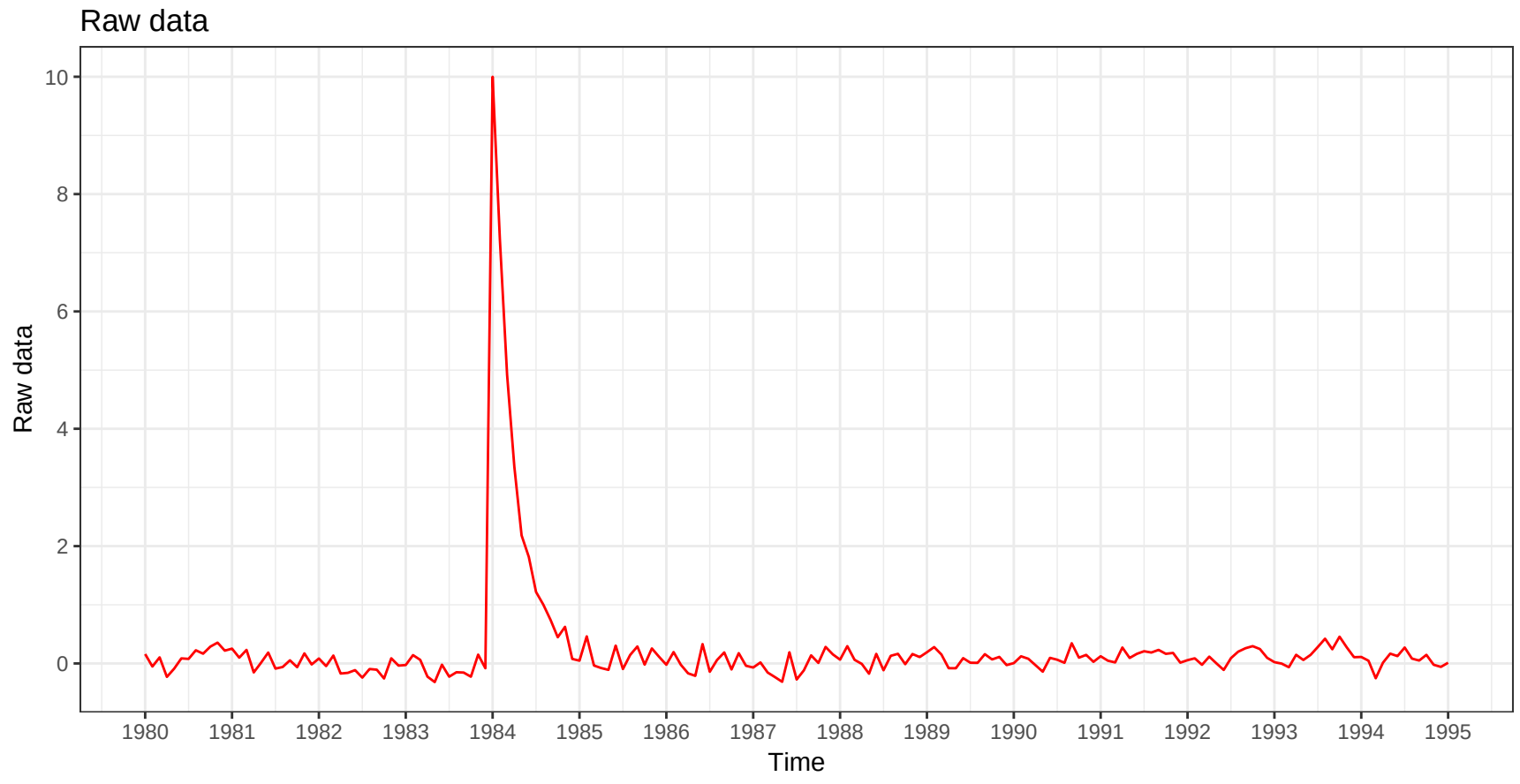
Estimate value of a TC(1984−01)
ARIMA (1,0,1)(1,0,0) − additive decomposition
(1−0.7B)(1−0.85B12)Xt=(1−0.3B)at



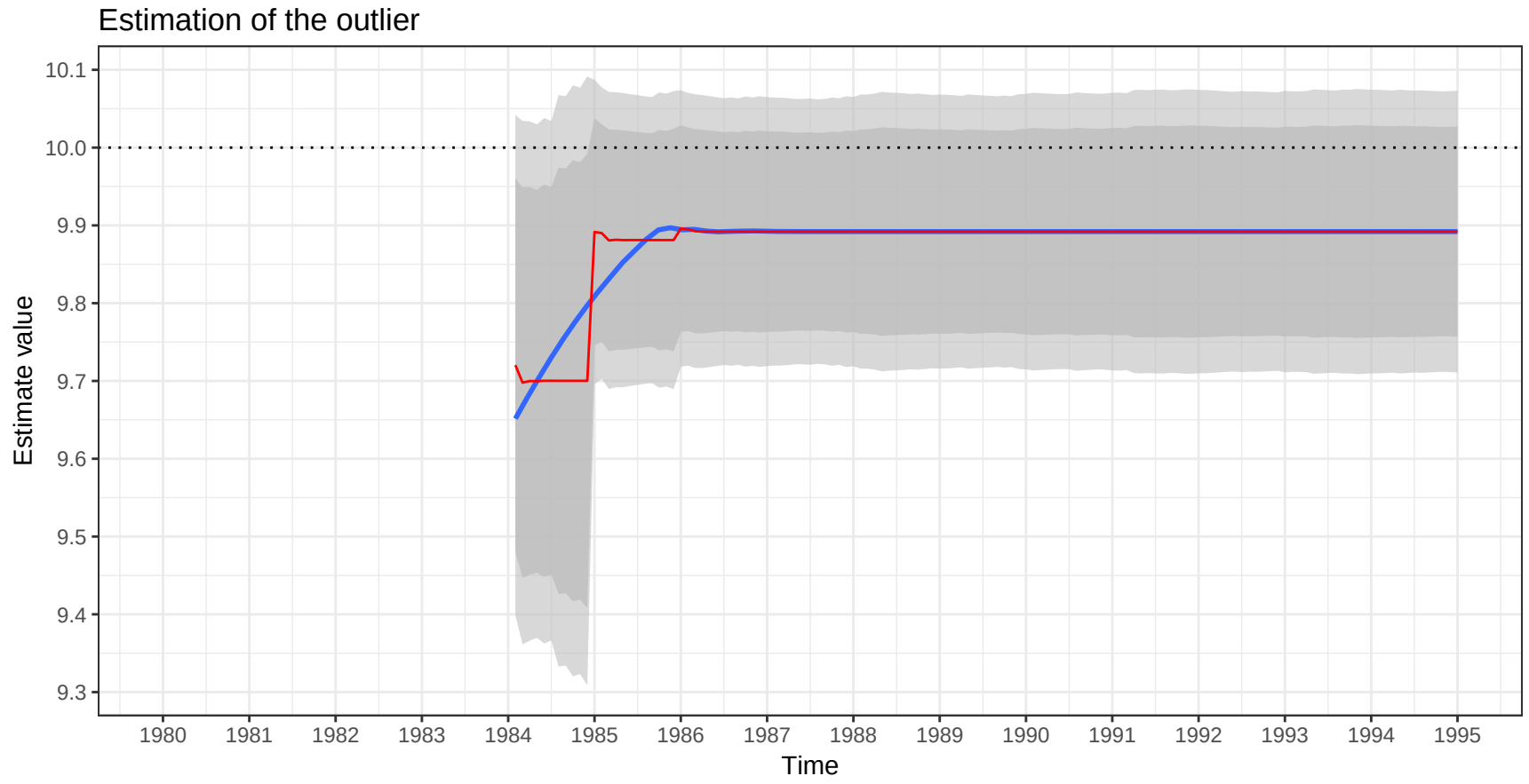


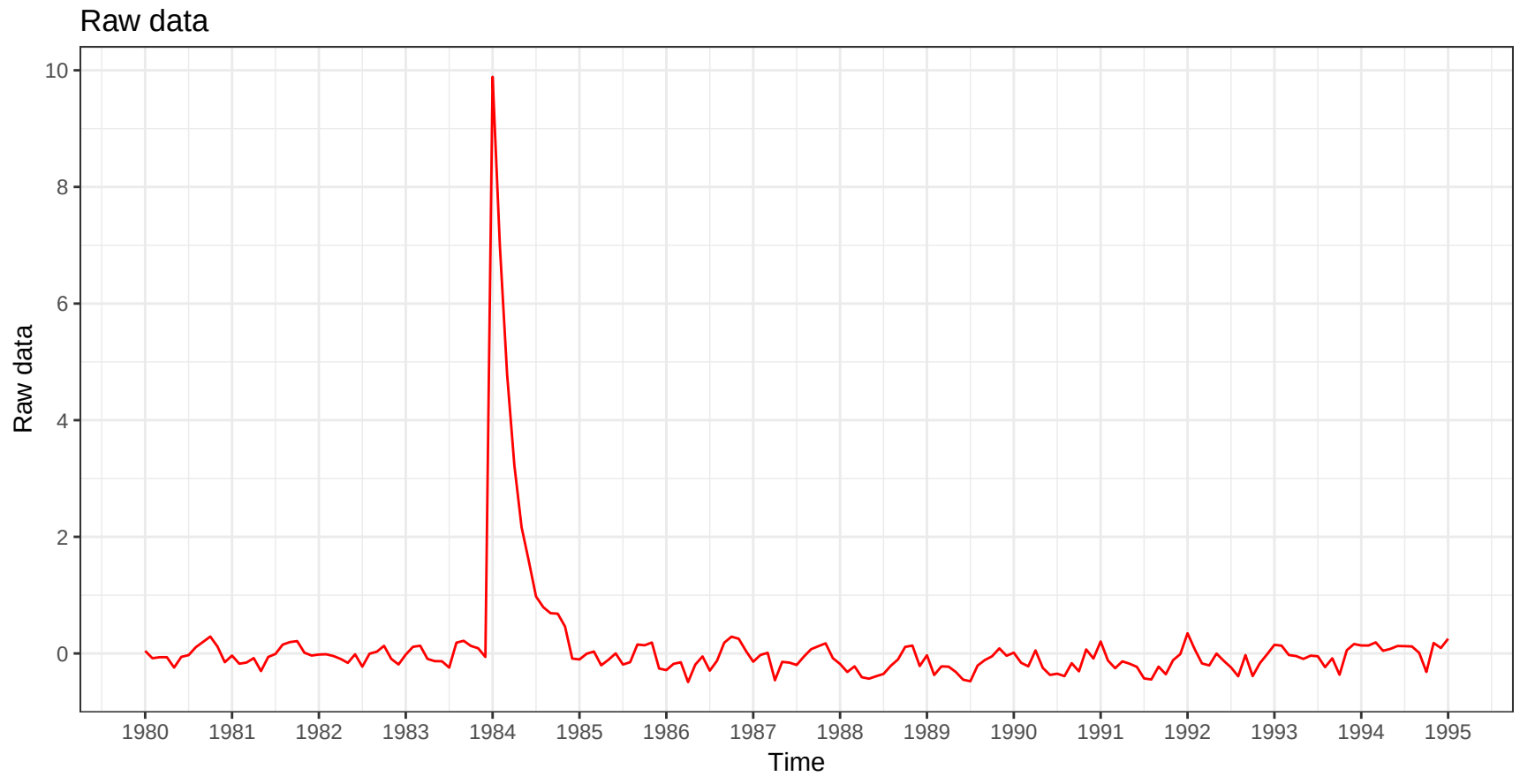
Estimate value of a TC(1984−01)
ARIMA (1,0,1)(1,0,0) − additive decomposition
(1−0.7B)(1−0.85B12)Xt=(1−0.3B)at



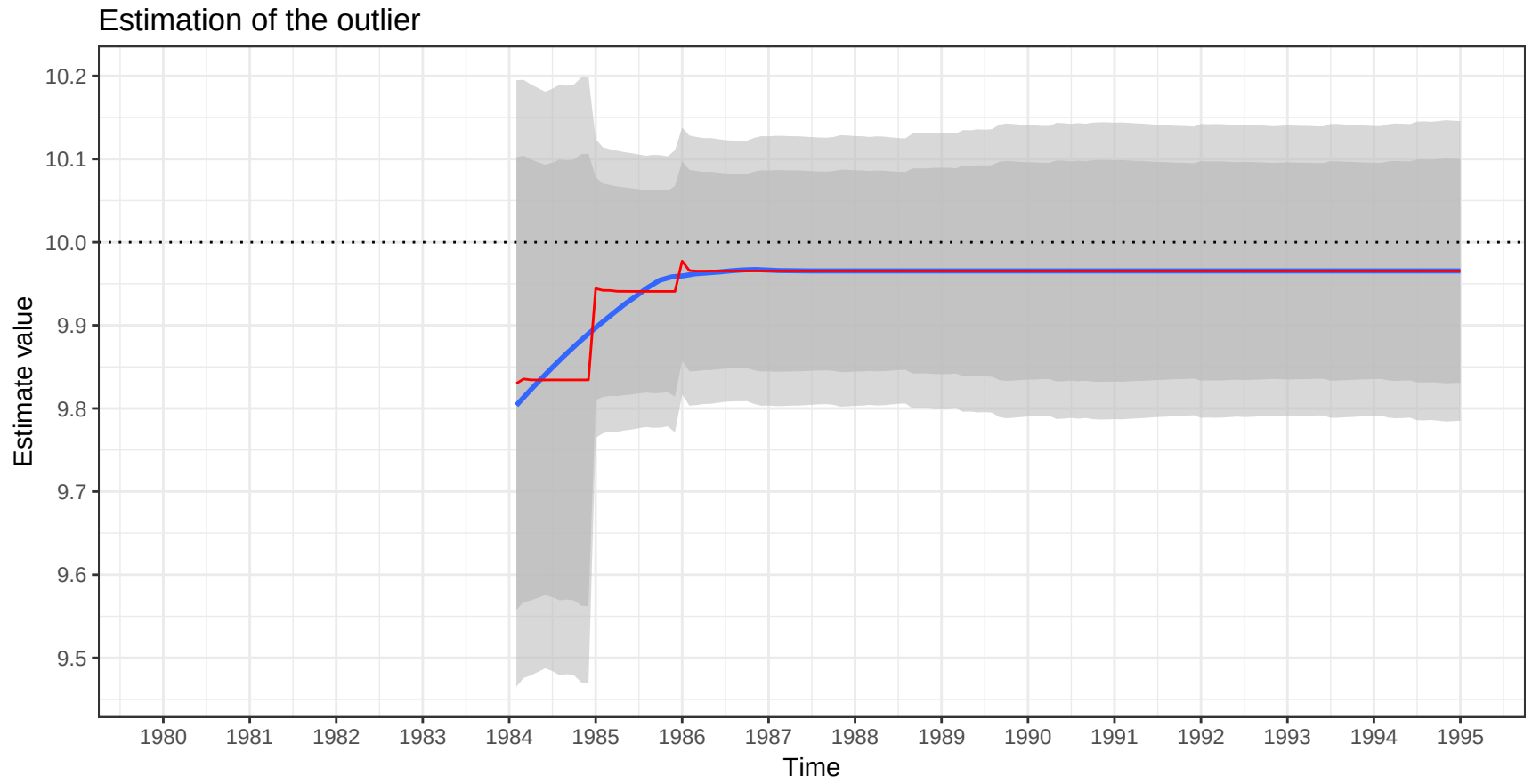


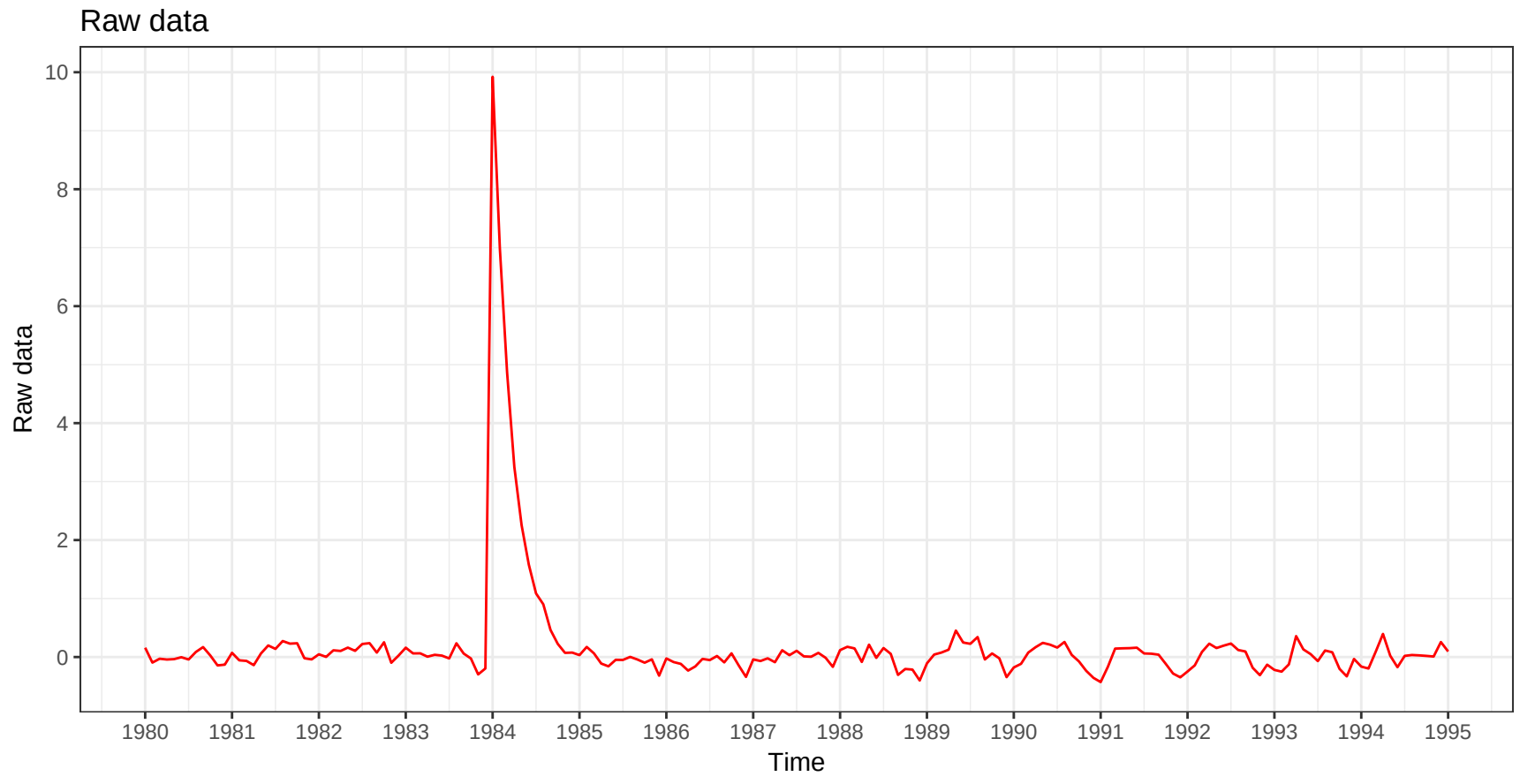
Estimate value of a TC(1984−01)
ARIMA (1,0,1)(1,0,0) − additive decomposition
(1−0.7B)(1−0.85B12)Xt=(1−0.3B)at



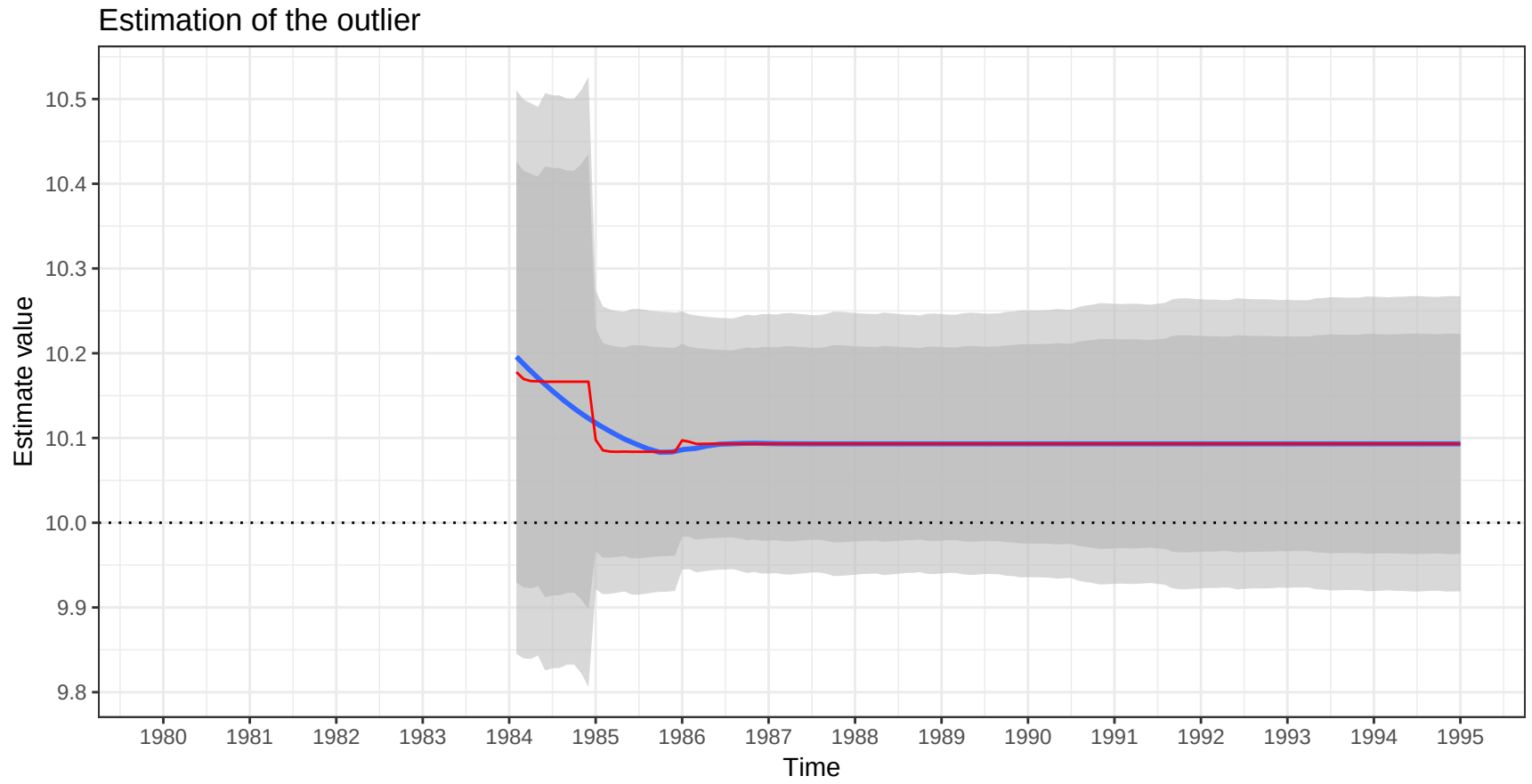


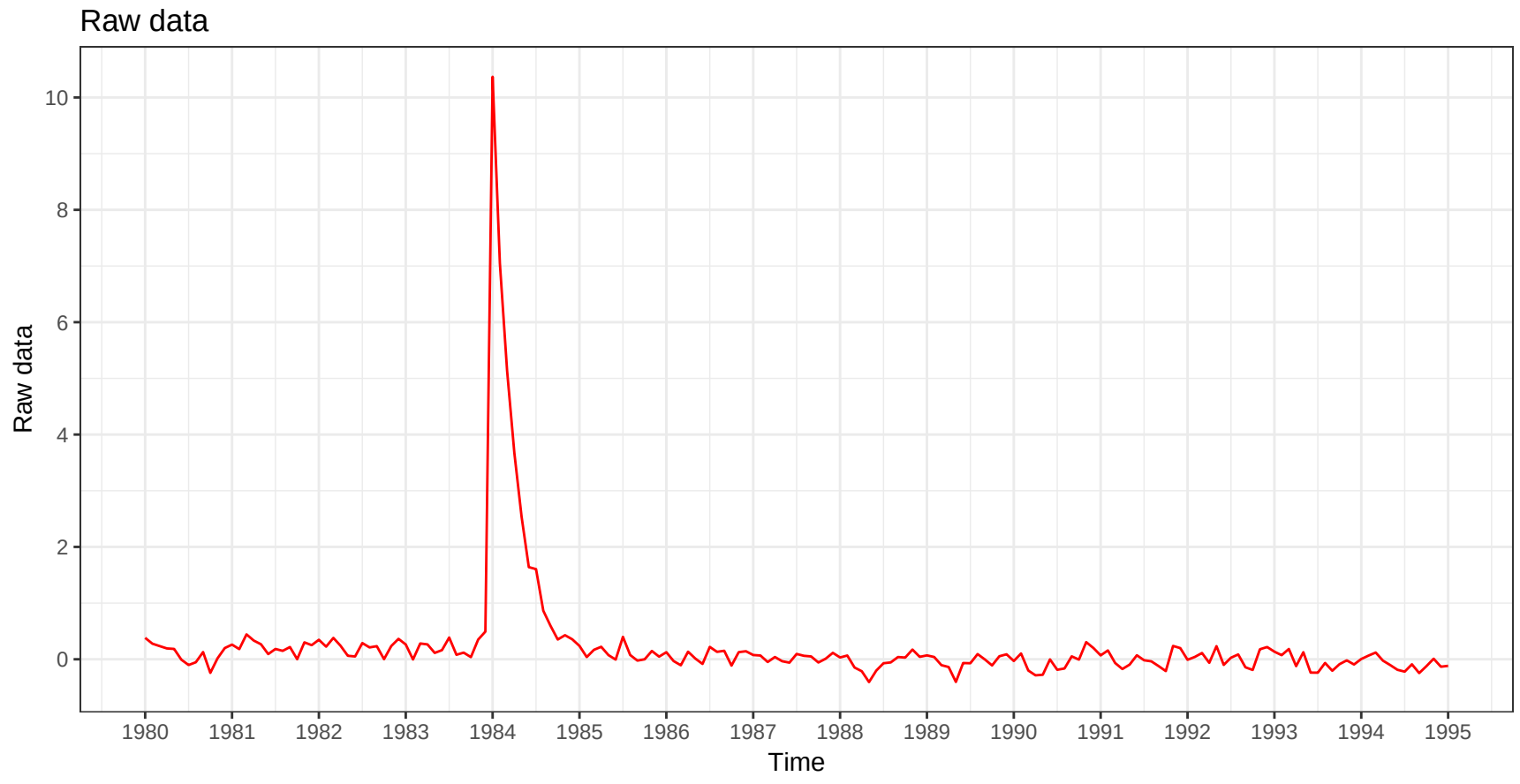
Estimate value of a TC(1984−01)
ARIMA (1,0,1)(1,0,0) − additive decomposition
(1−0.7B)(1−0.85B12)Xt=(1−0.3B)at



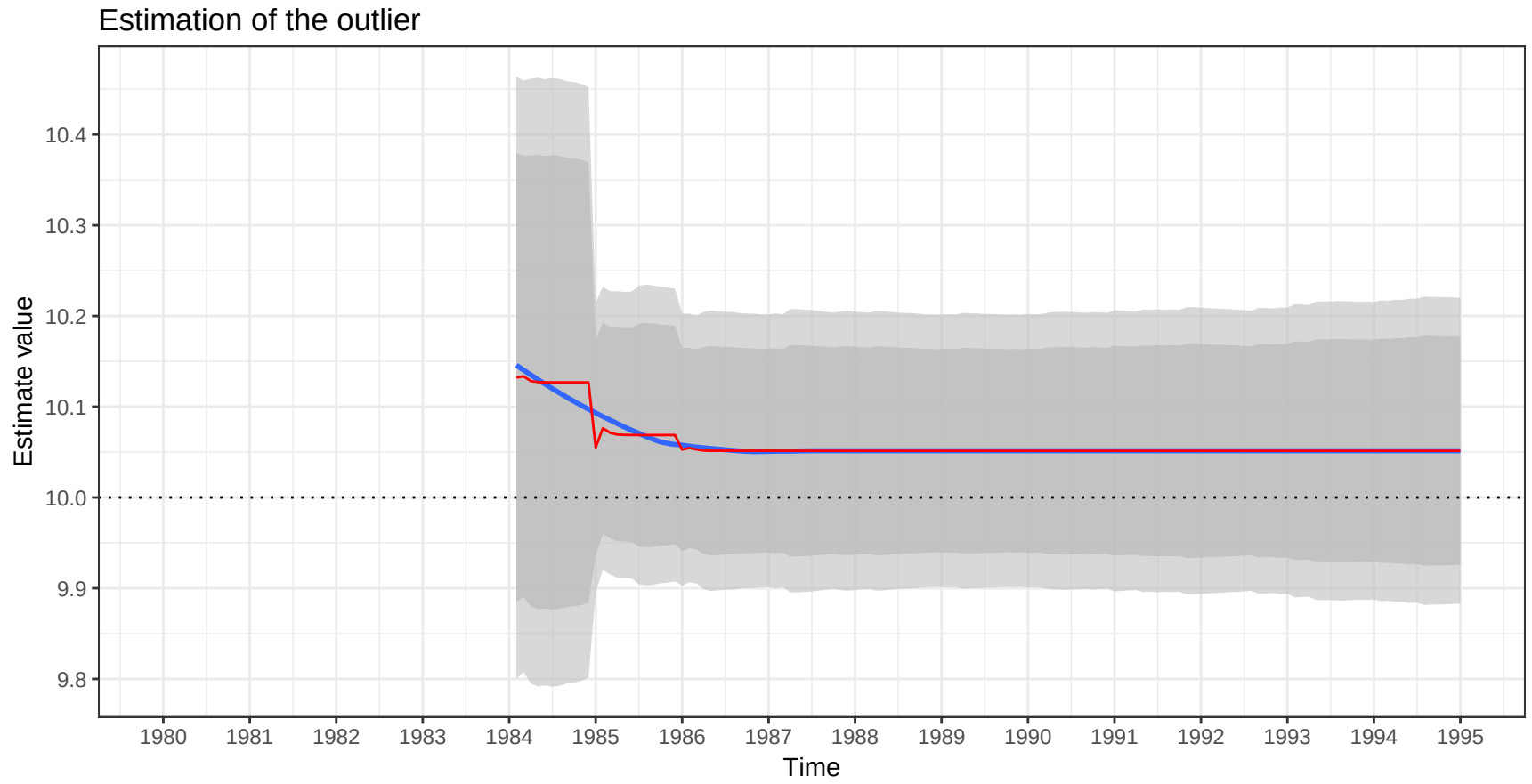


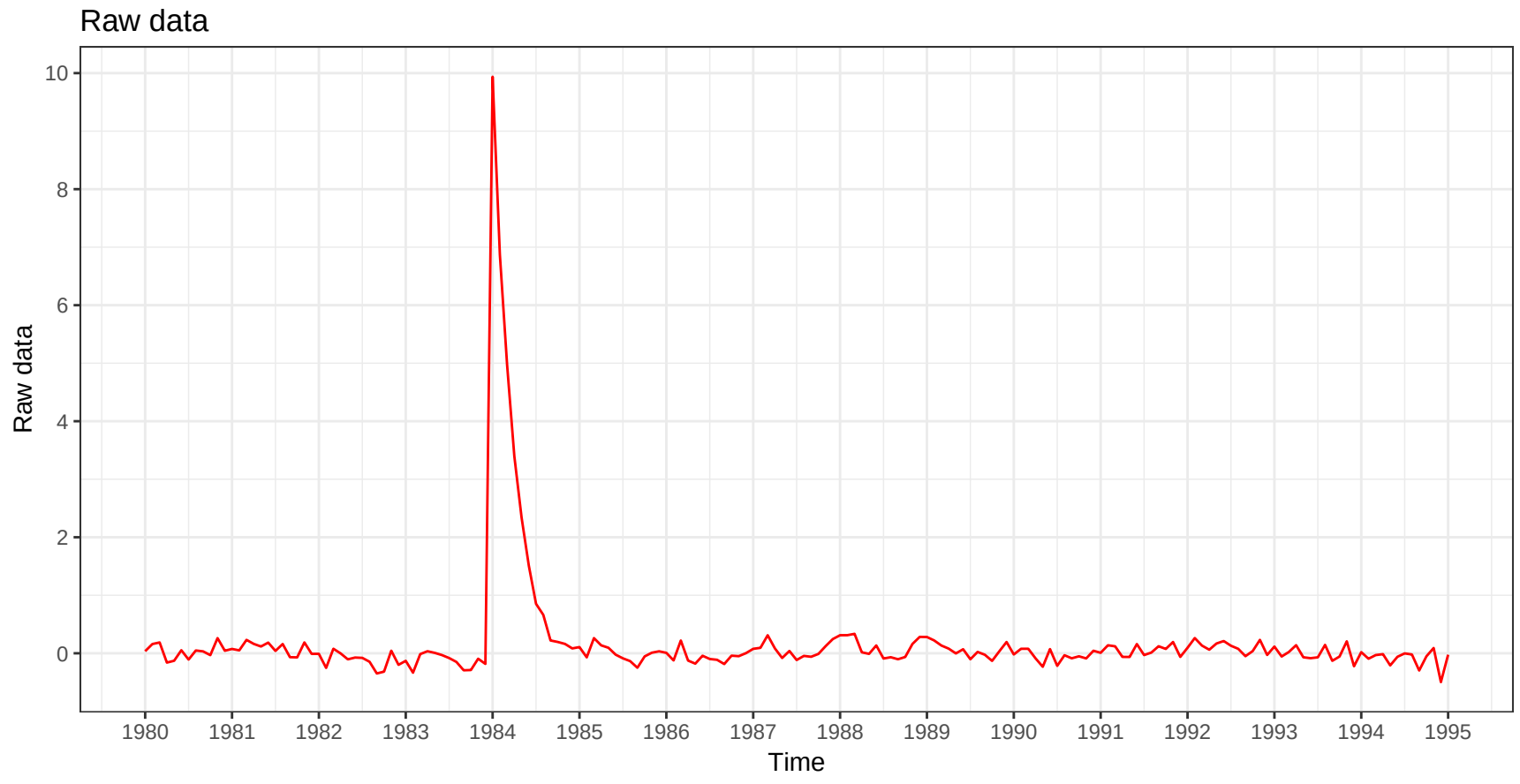
Estimate value of a TC(1984−01)
ARIMA (1,0,1)(1,0,0) − additive decomposition
(1−0.7B)(1−0.85B12)Xt=(1−0.3B)at



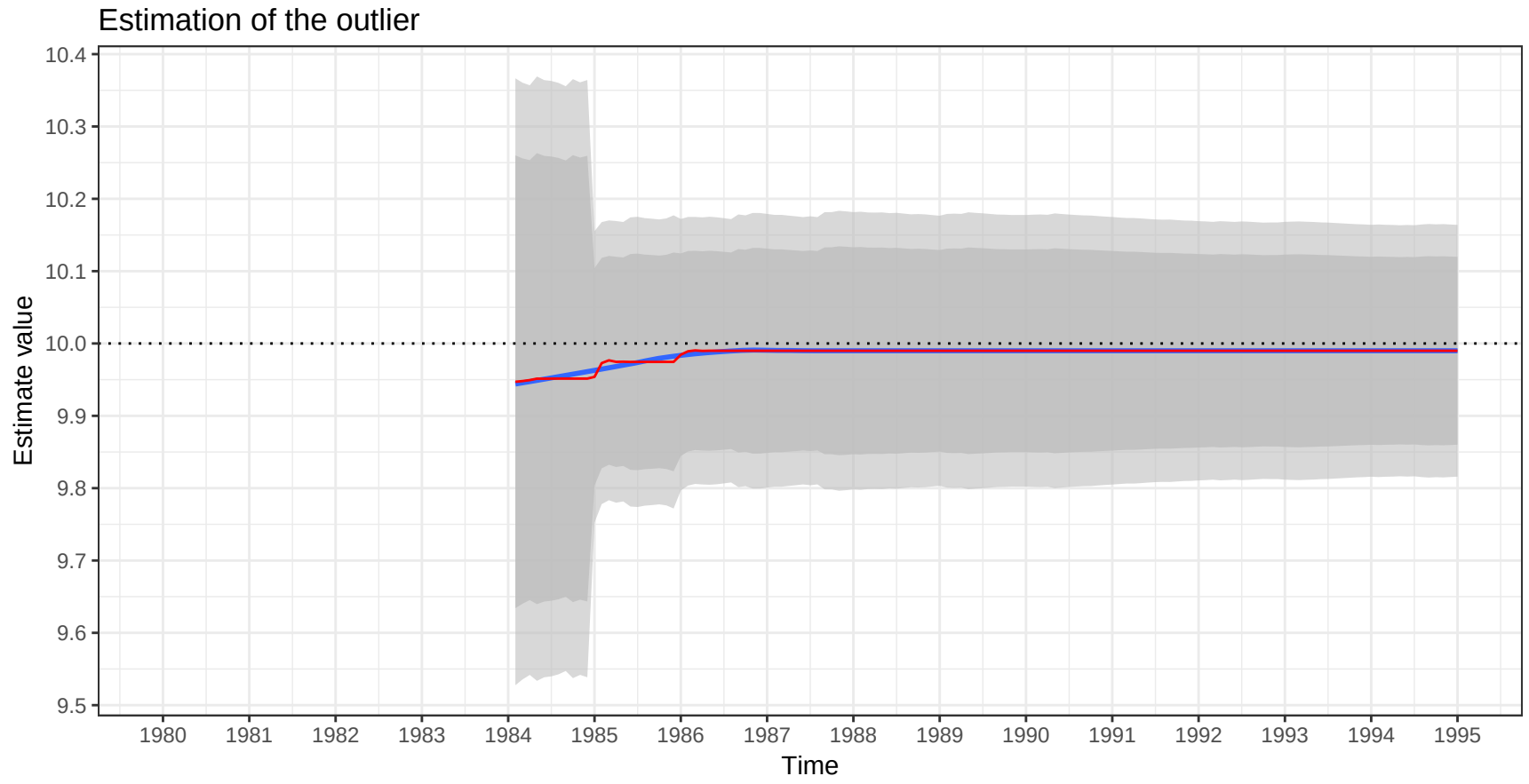


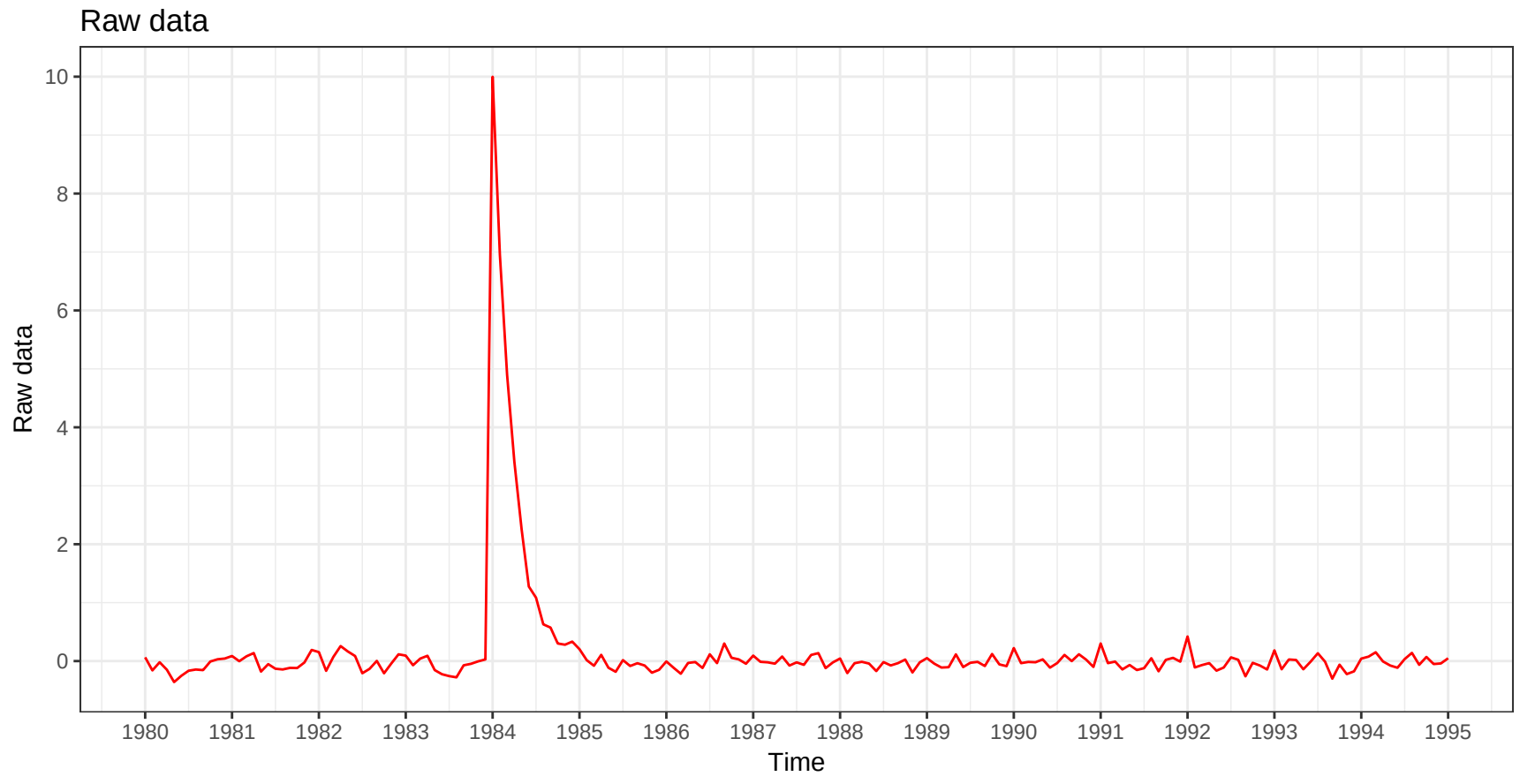
Estimate value of a TC(1984−01)
ARIMA (1,0,1)(1,0,0) − additive decomposition
(1−0.7B)(1−0.85B12)Xt=(1−0.3B)at

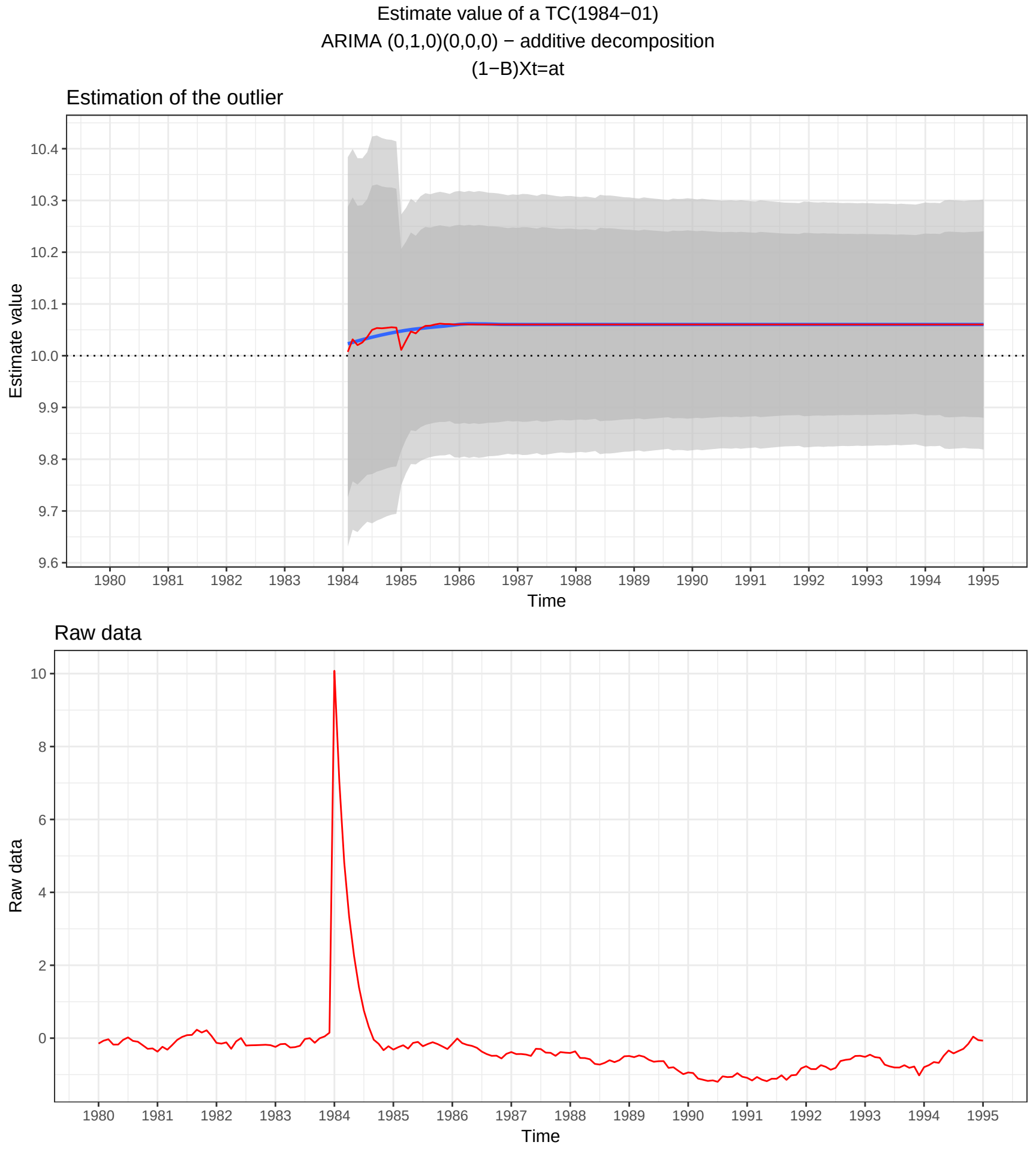




Estimate value of a TC(1984−01)
ARIMA (1,0,1)(1,0,0) − additive decomposition
(1−0.7B)(1−0.85B12)Xt=(1−0.3B)at






Estimate value of a TC(1984−01)
ARIMA (0,1,0)(0,0,0) − additive decomposition
(1−B)Xt=at
Estimation of the outlier
Estimate value
10.4
10.3
10.2
10.1
10.0
9.9
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Time
Raw data
Raw data
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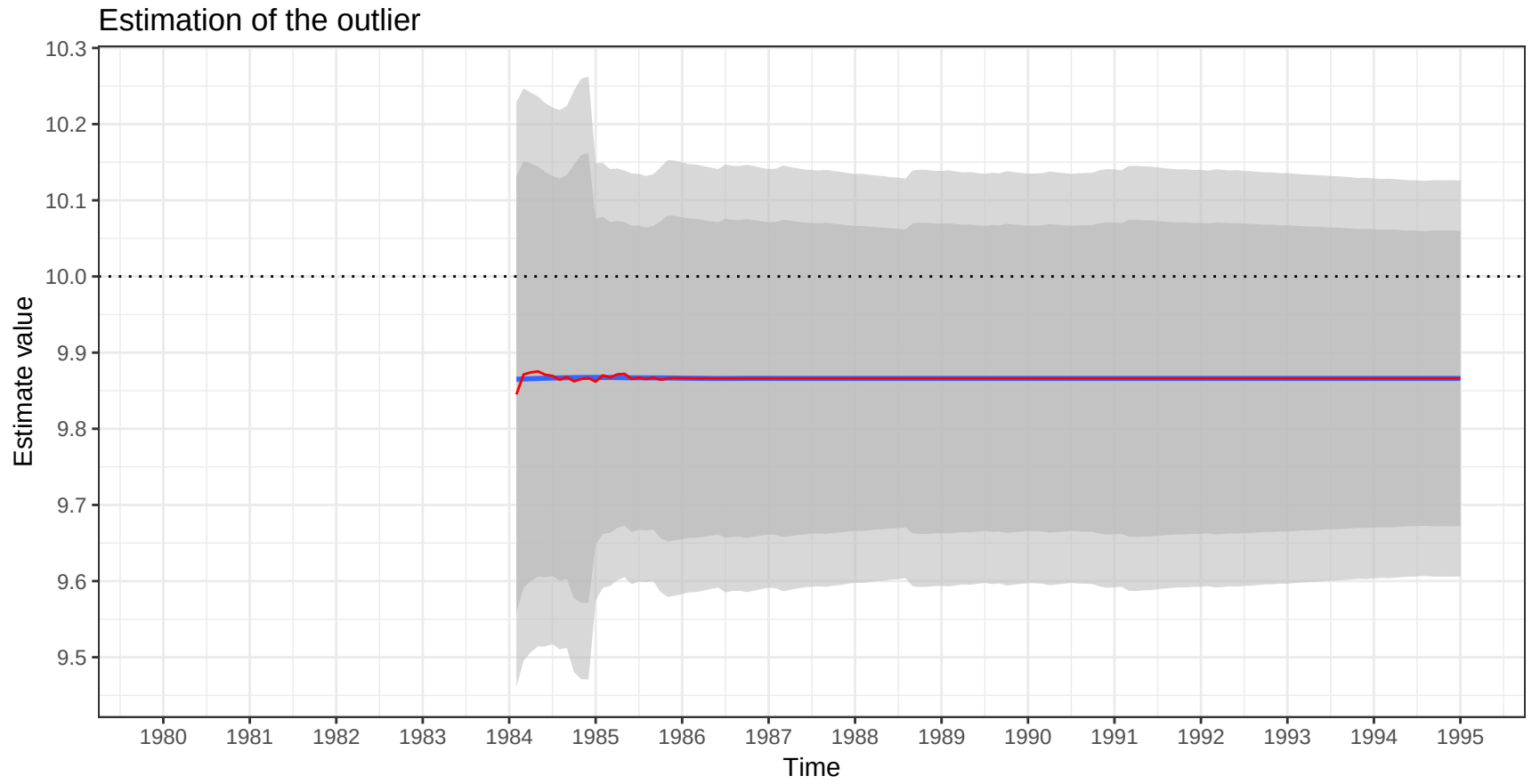
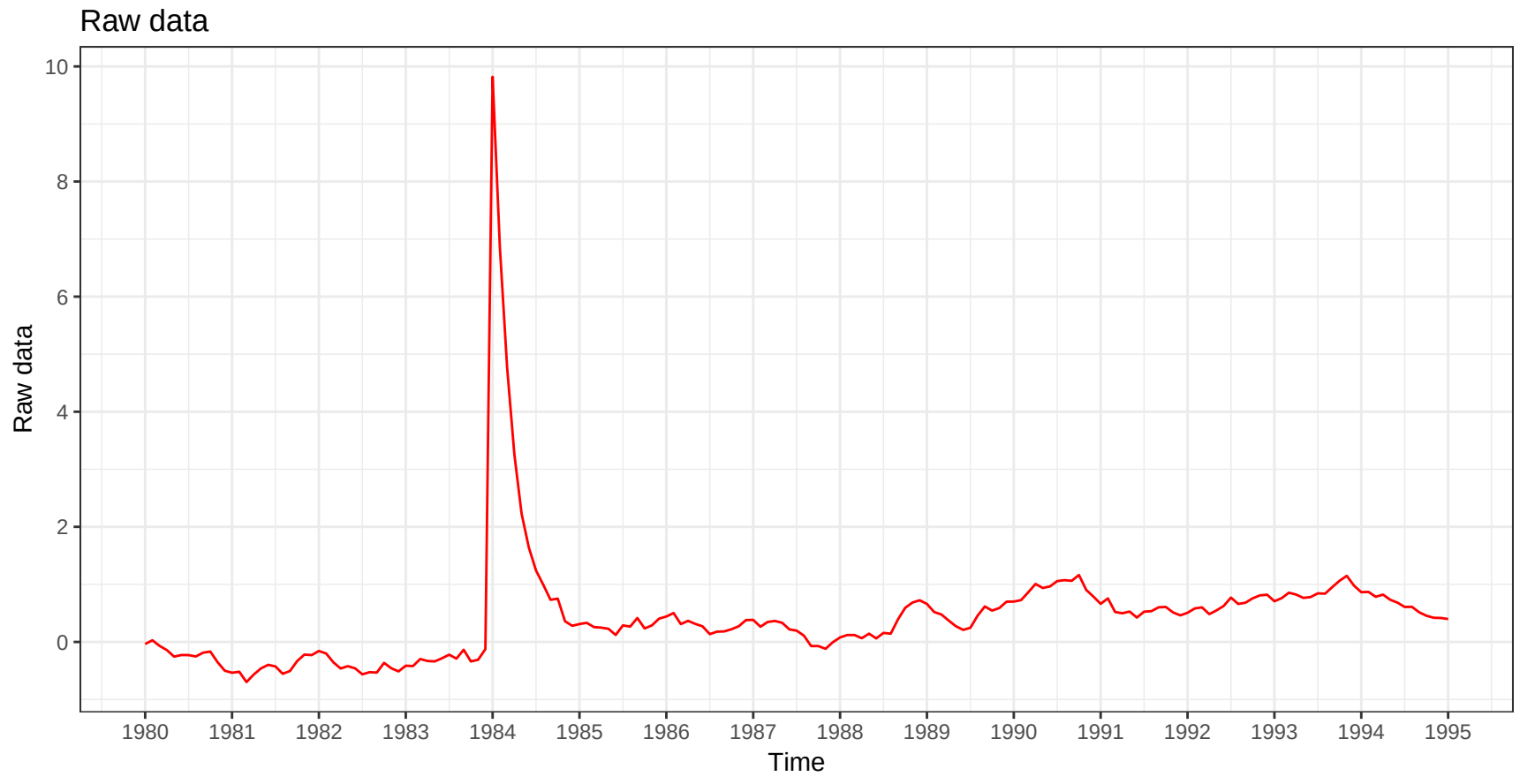
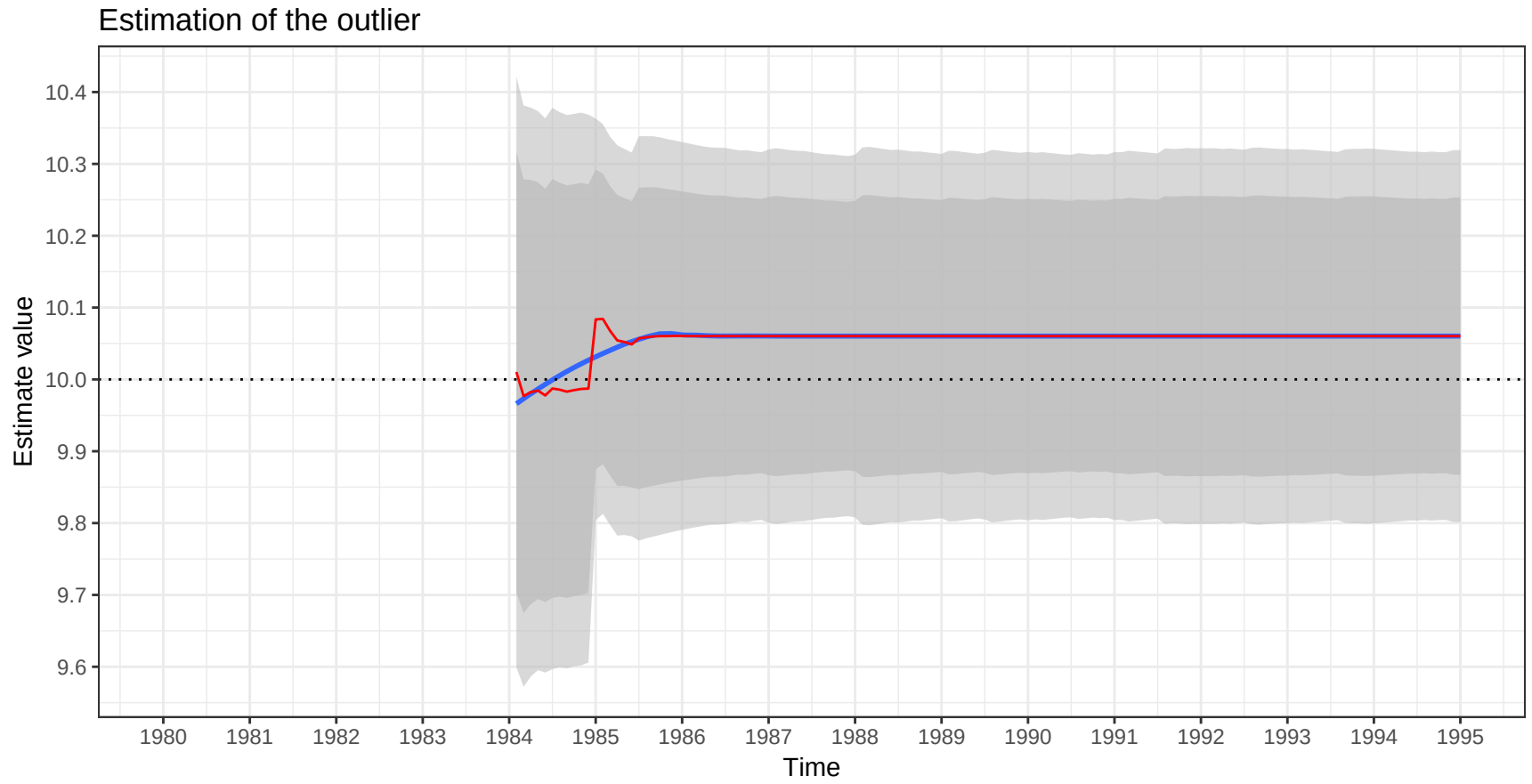
Time

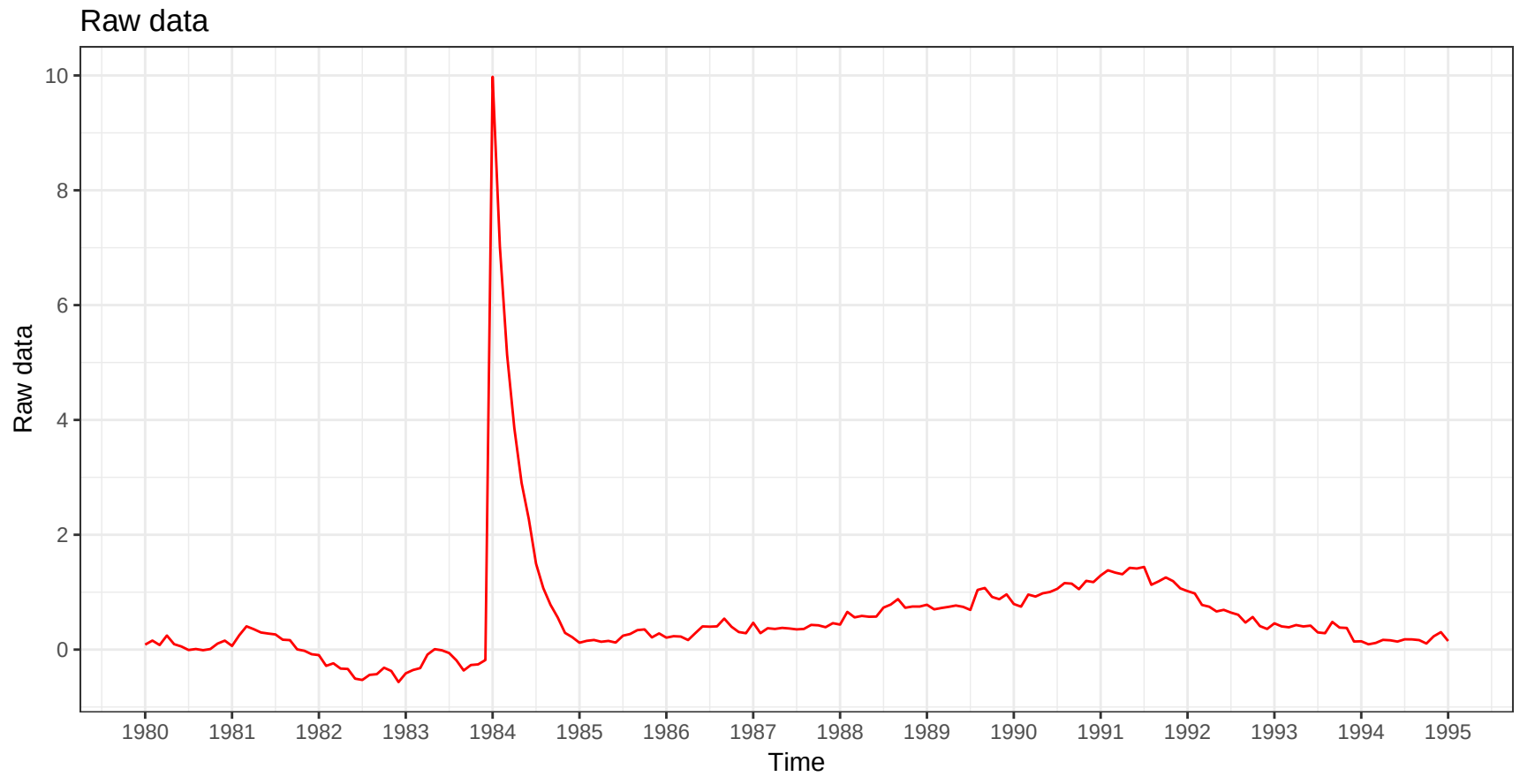
Estimate value of a TC(1984−01)
ARIMA (0,1,0)(0,0,0) − additive decomposition
(1−B)Xt=at

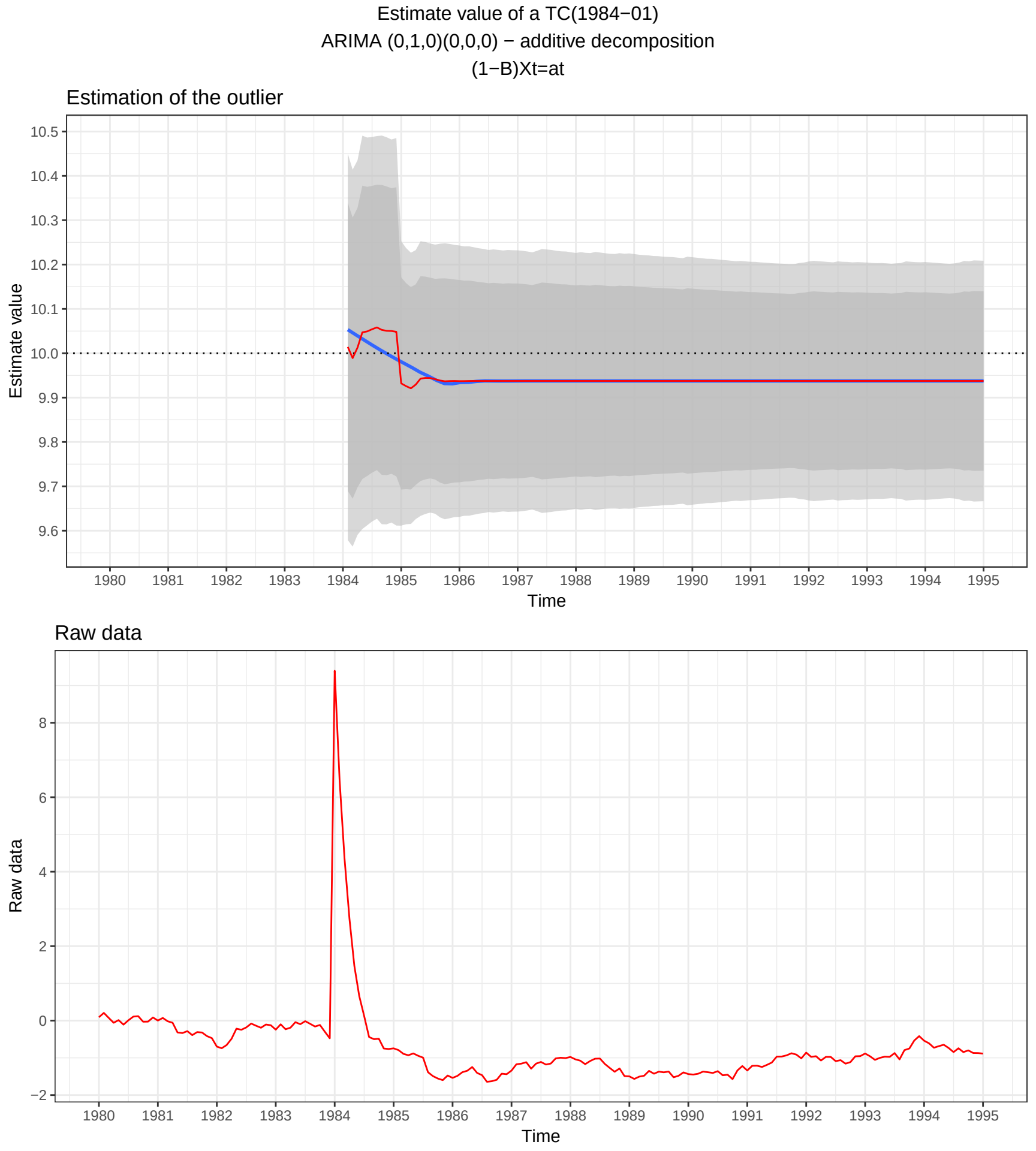




Estimate value of a TC(1984−01)
ARIMA (0,1,0)(0,0,0) − additive decomposition
(1−B)Xt=at






Estimate value of a TC(1984−01)
ARIMA (0,1,0)(0,0,0) − additive decomposition
(1−B)Xt=at
Estimation of the outlier
Estimate value
10.5
10.4
10.3
10.2
10.1
10.0
9.9
9.8
9.7
9.6
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1995
Time
Raw data
Raw data
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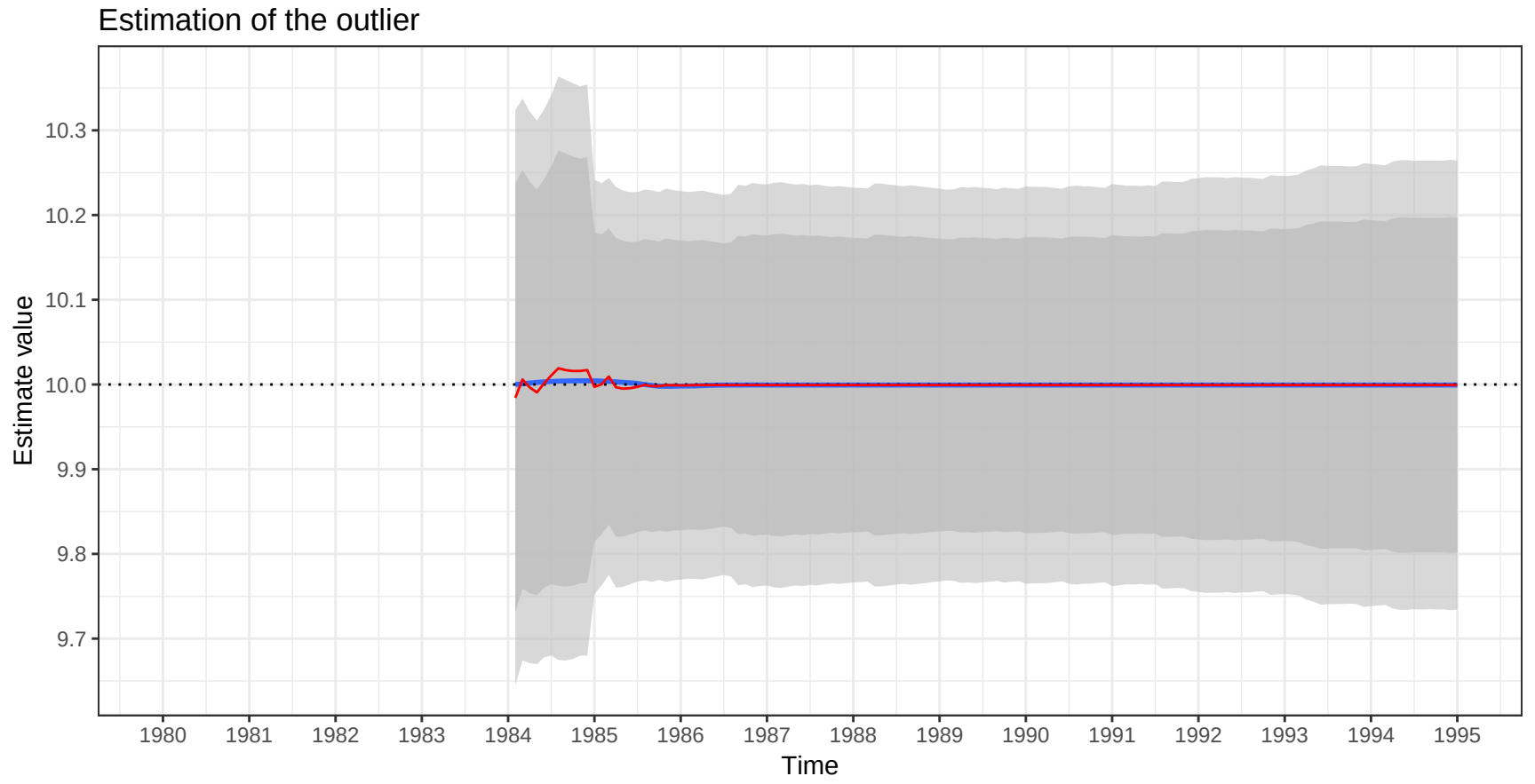
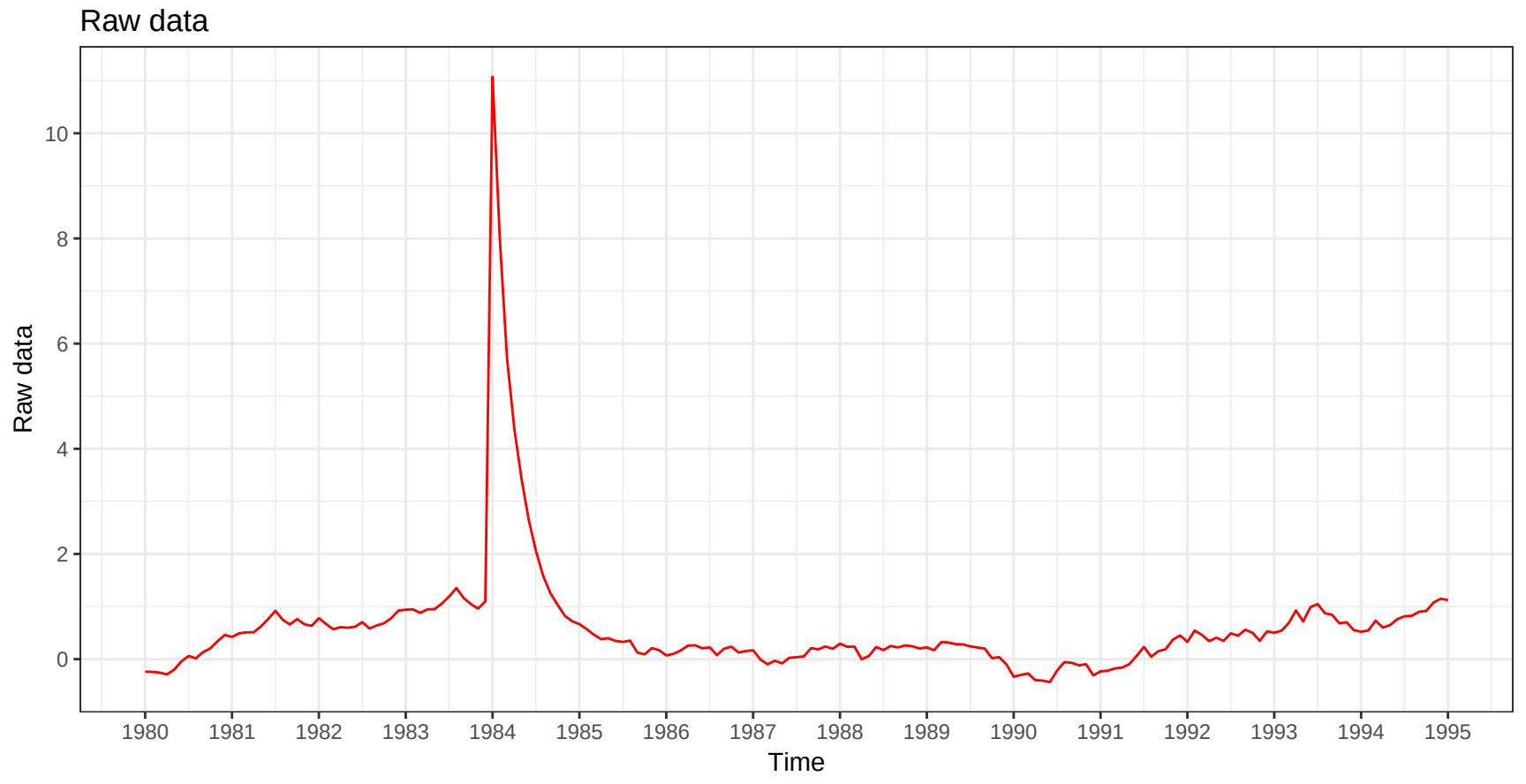
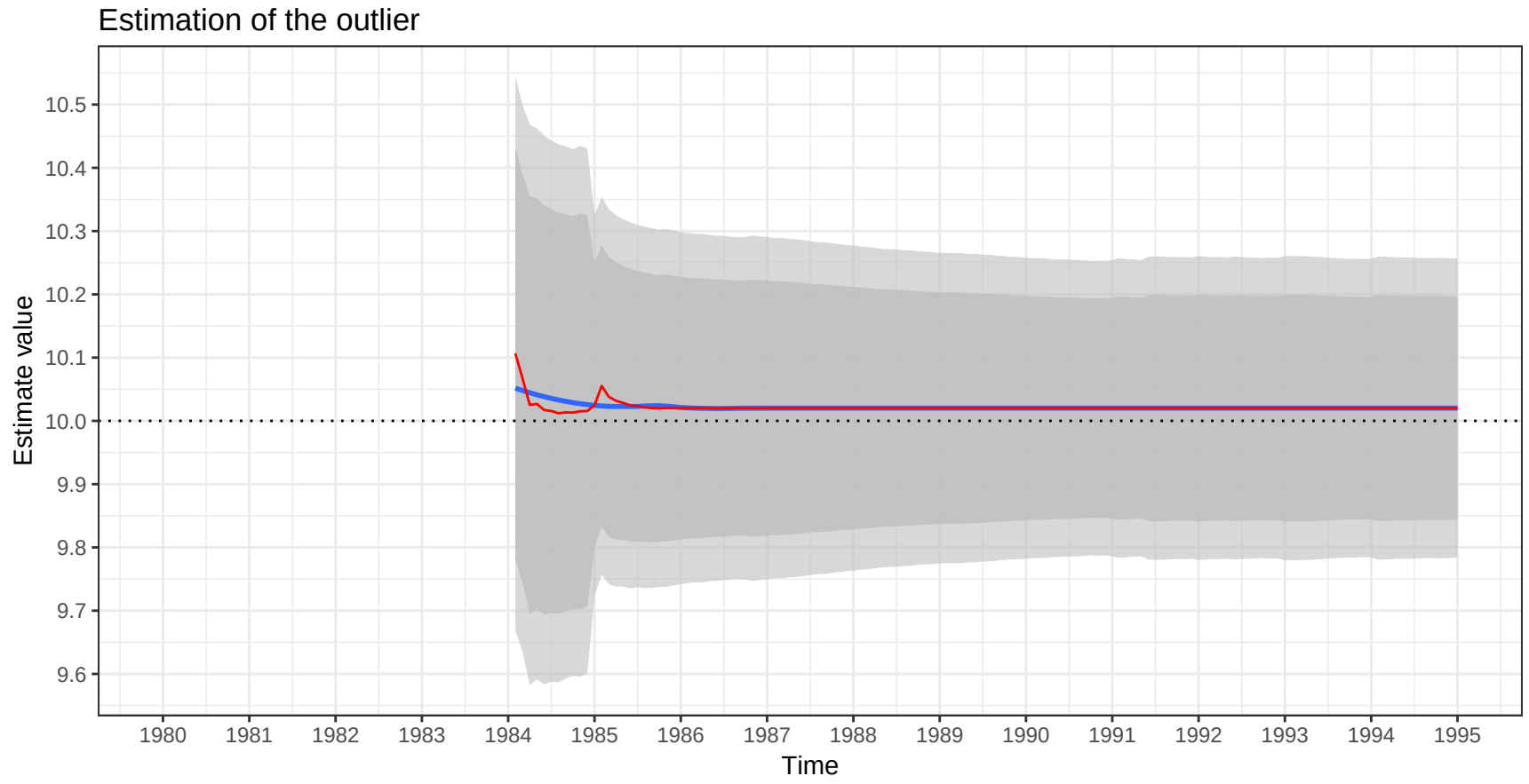
Time

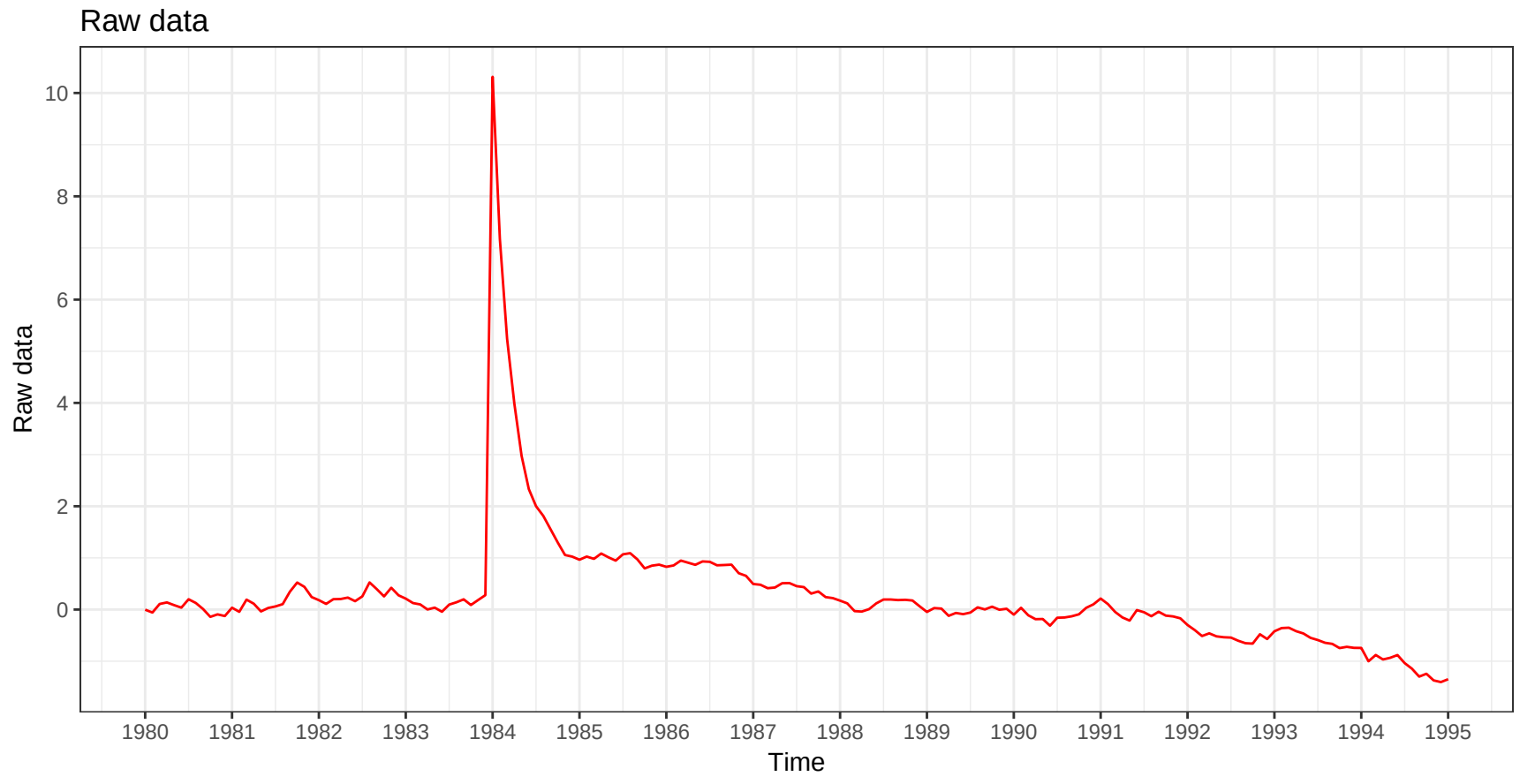
Estimate value of a TC(1984−01)
ARIMA (0,1,0)(0,0,0) − additive decomposition
(1−B)Xt=at



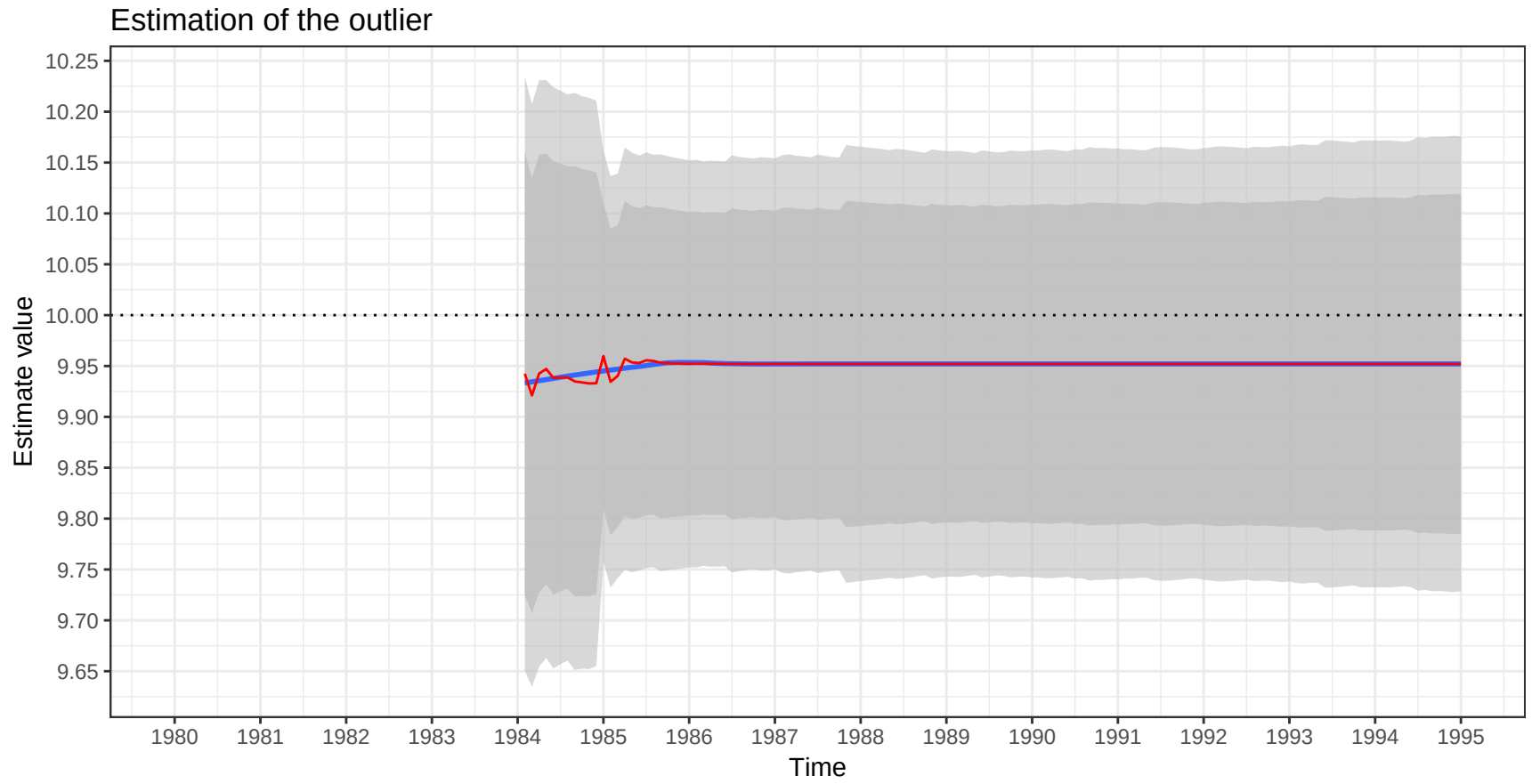


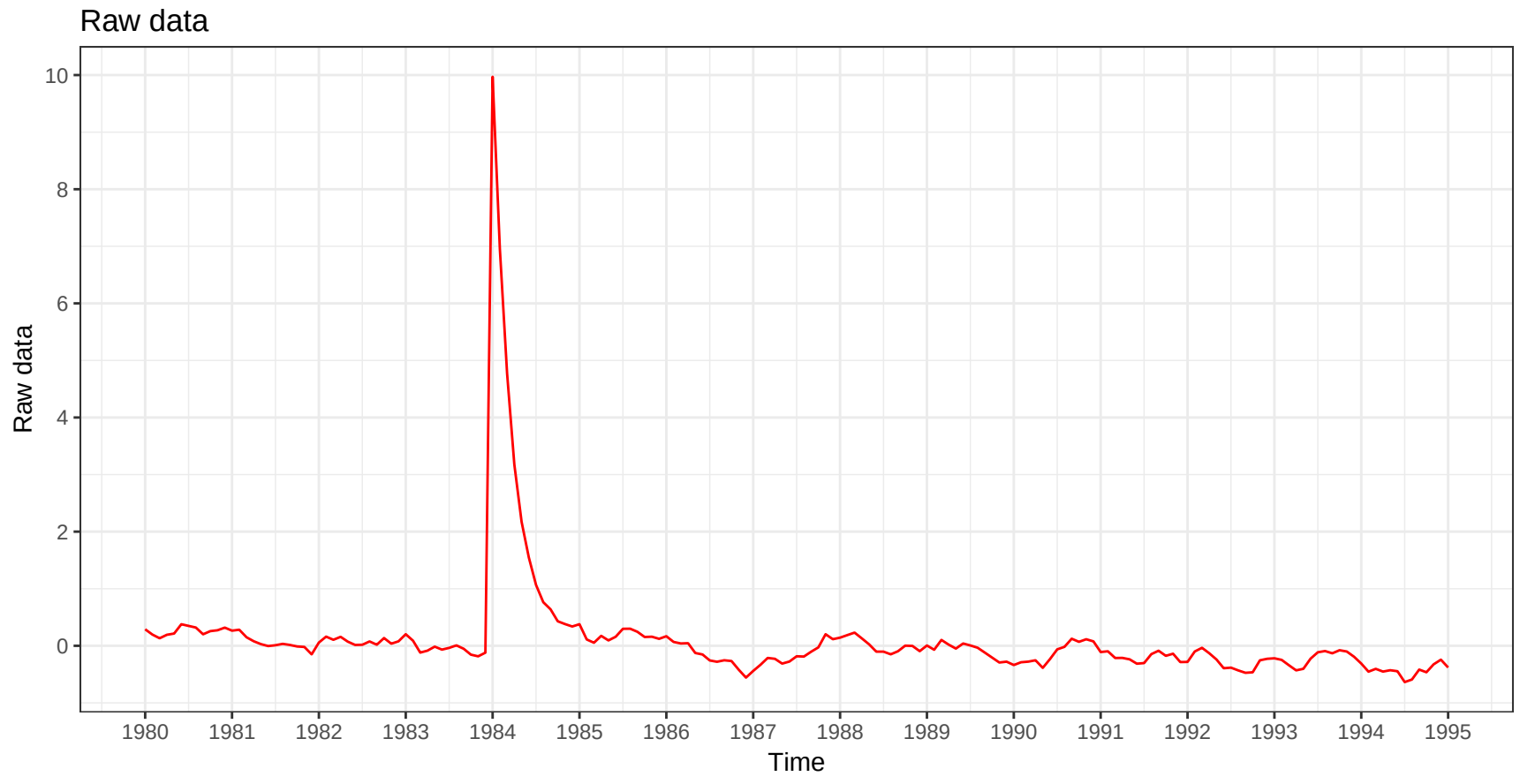
Estimate value of a TC(1984−01)
ARIMA (0,1,0)(0,0,0) − additive decomposition
(1−B)Xt=at

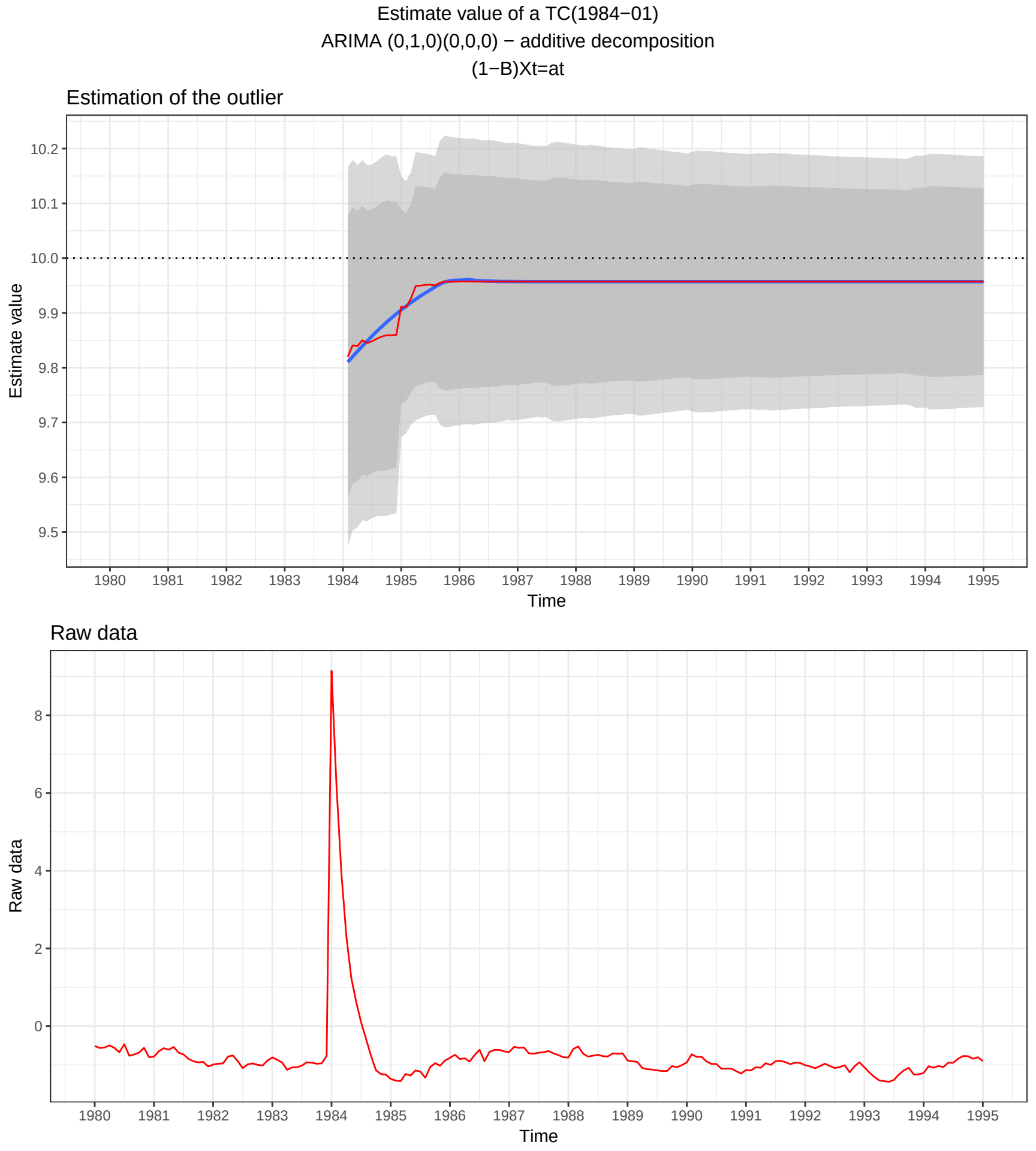




Estimate value of a TC(1984−01)
ARIMA (0,1,0)(0,0,0) − additive decomposition
(1−B)Xt=at






Estimate value of a TC(1984−01)
ARIMA (0,1,0)(0,0,0) − additive decomposition
(1−B)Xt=at
Estimation of the outlier
Estimate value
10.2
10.1
10.0
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Time
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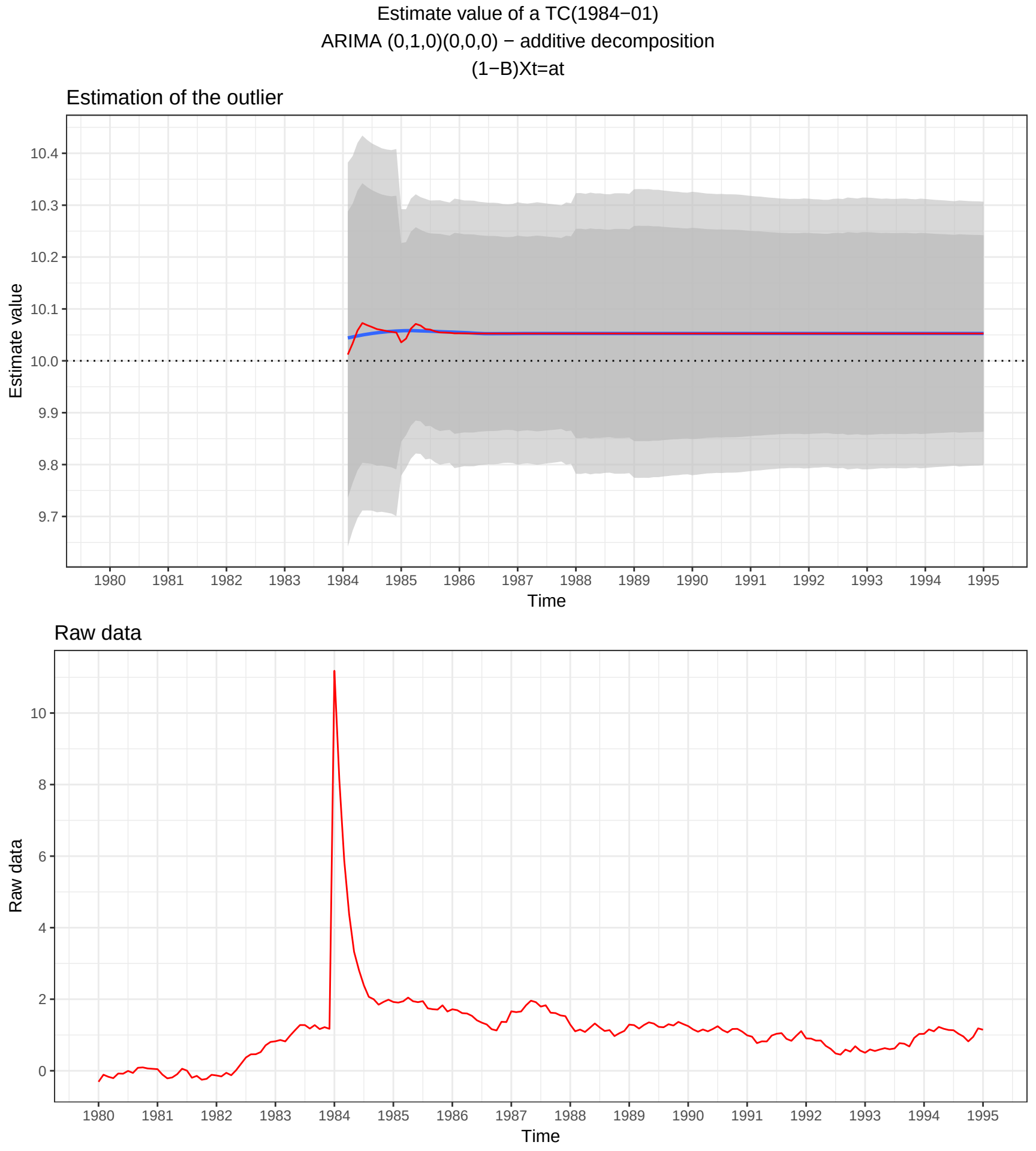
Estimate value of a TC(1984−01)
ARIMA (0,1,0)(0,0,0) − additive decomposition
(1−B)Xt=at
Estimation of the outlier
Estimate value
10.4
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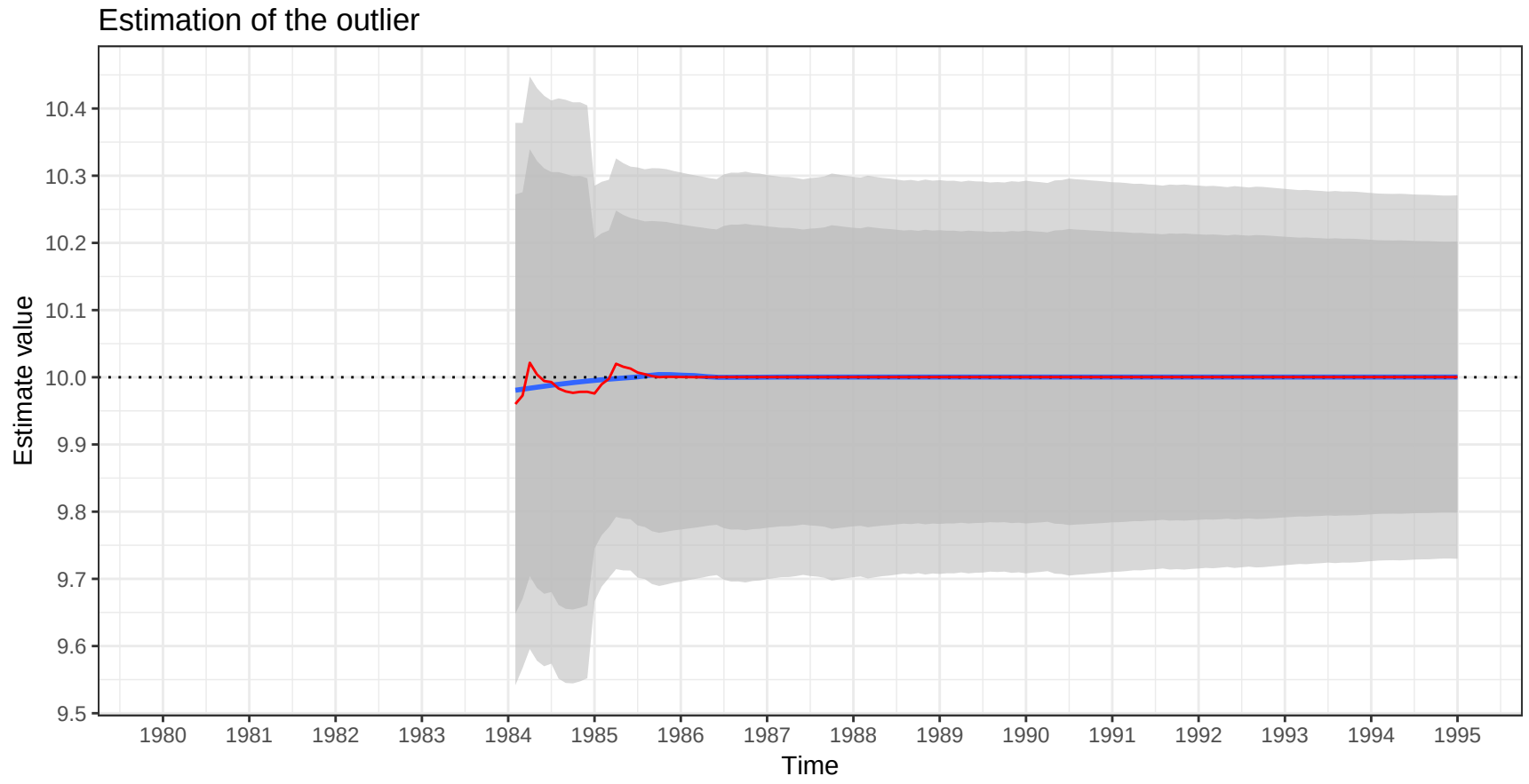
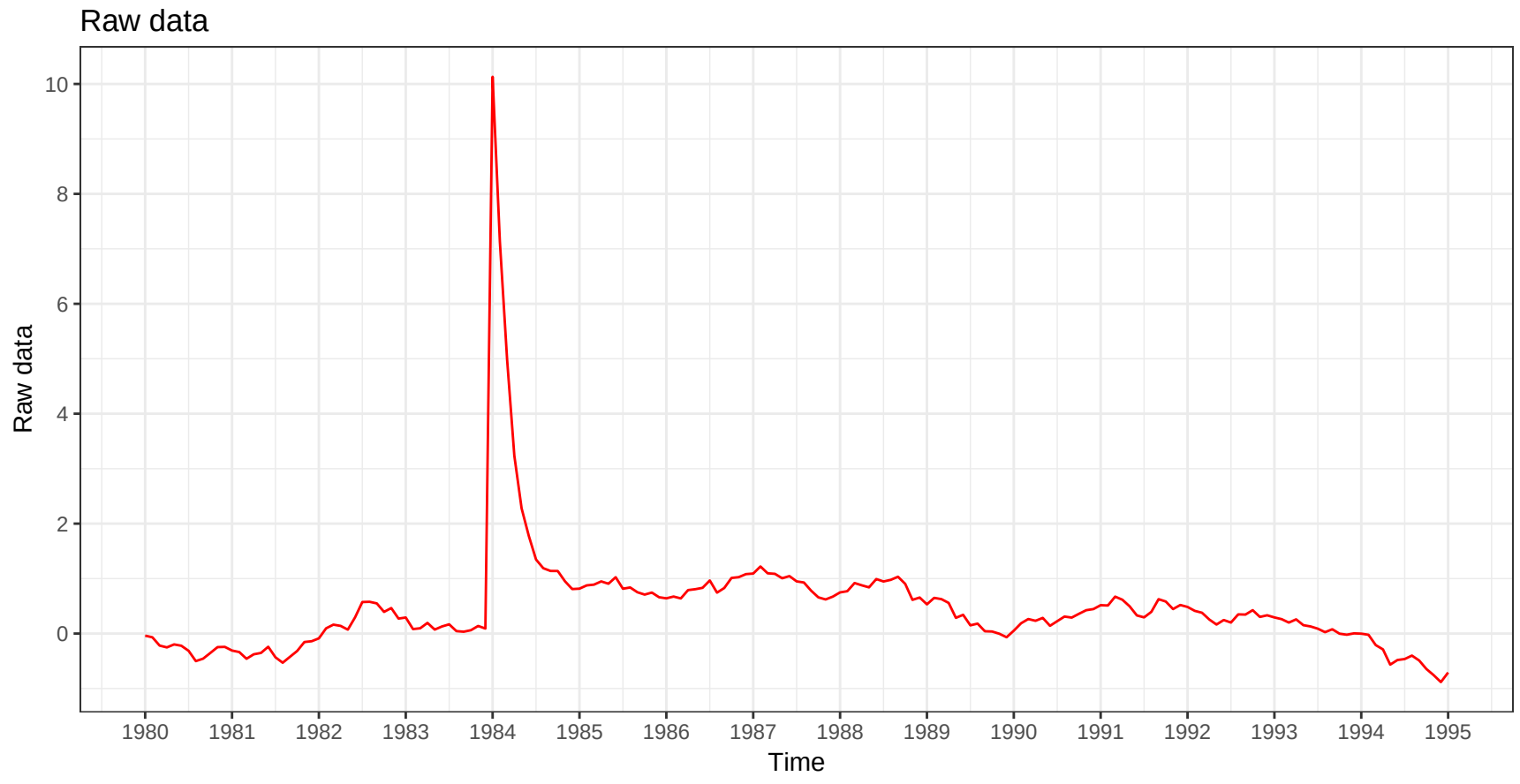
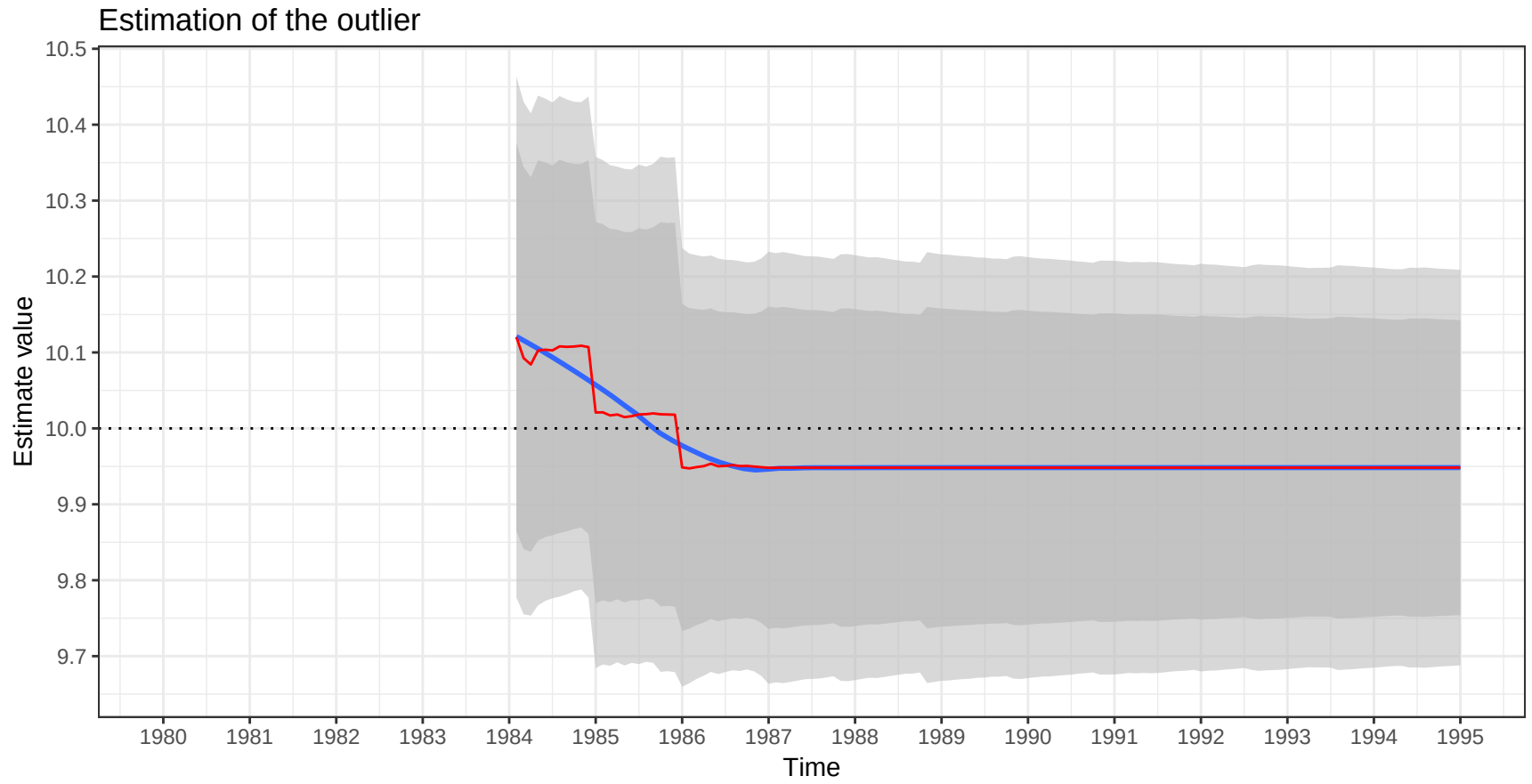
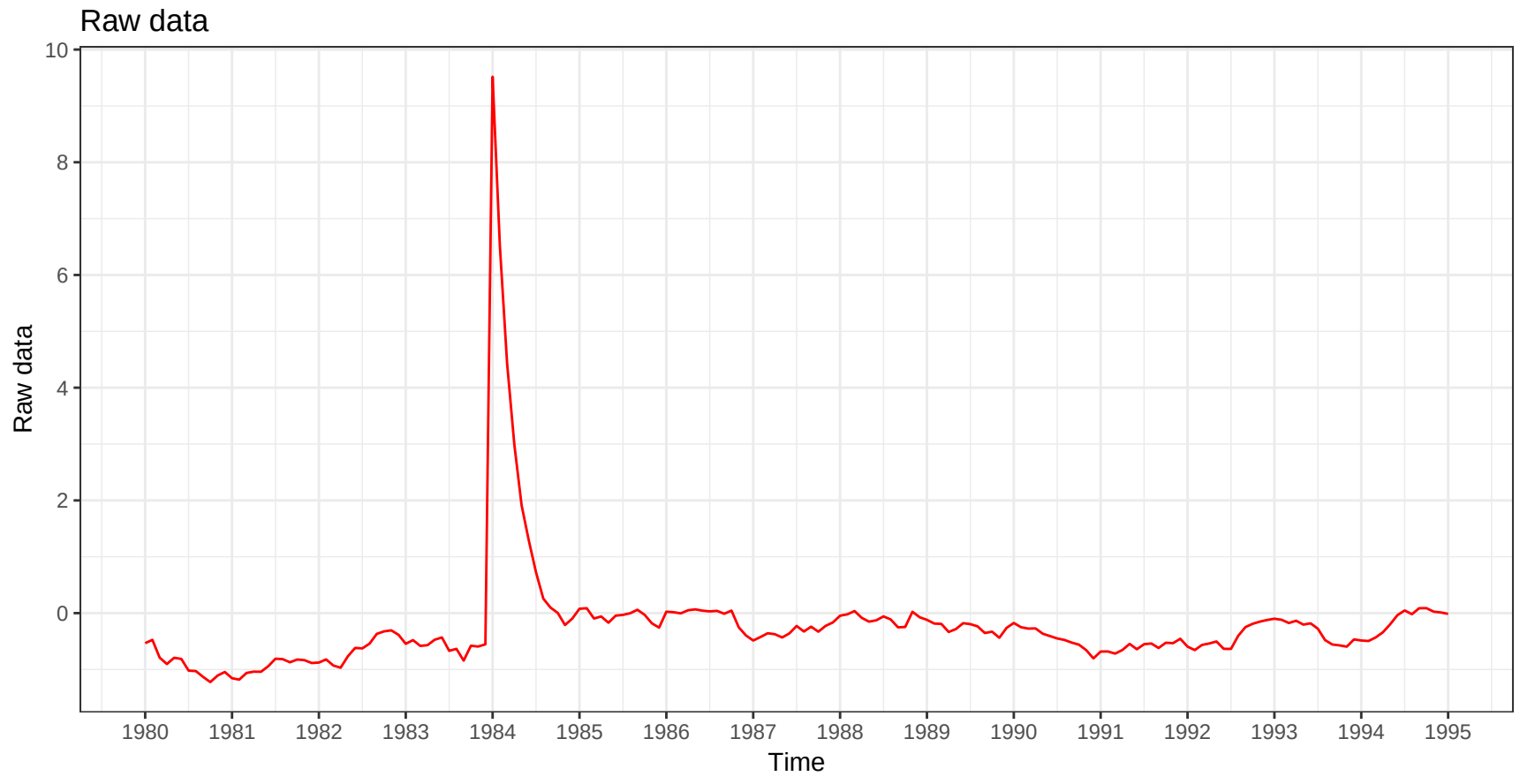
Estimate value of a TC(1984−01)
ARIMA (0,1,0)(0,0,0) − additive decomposition
(1−B)Xt=at



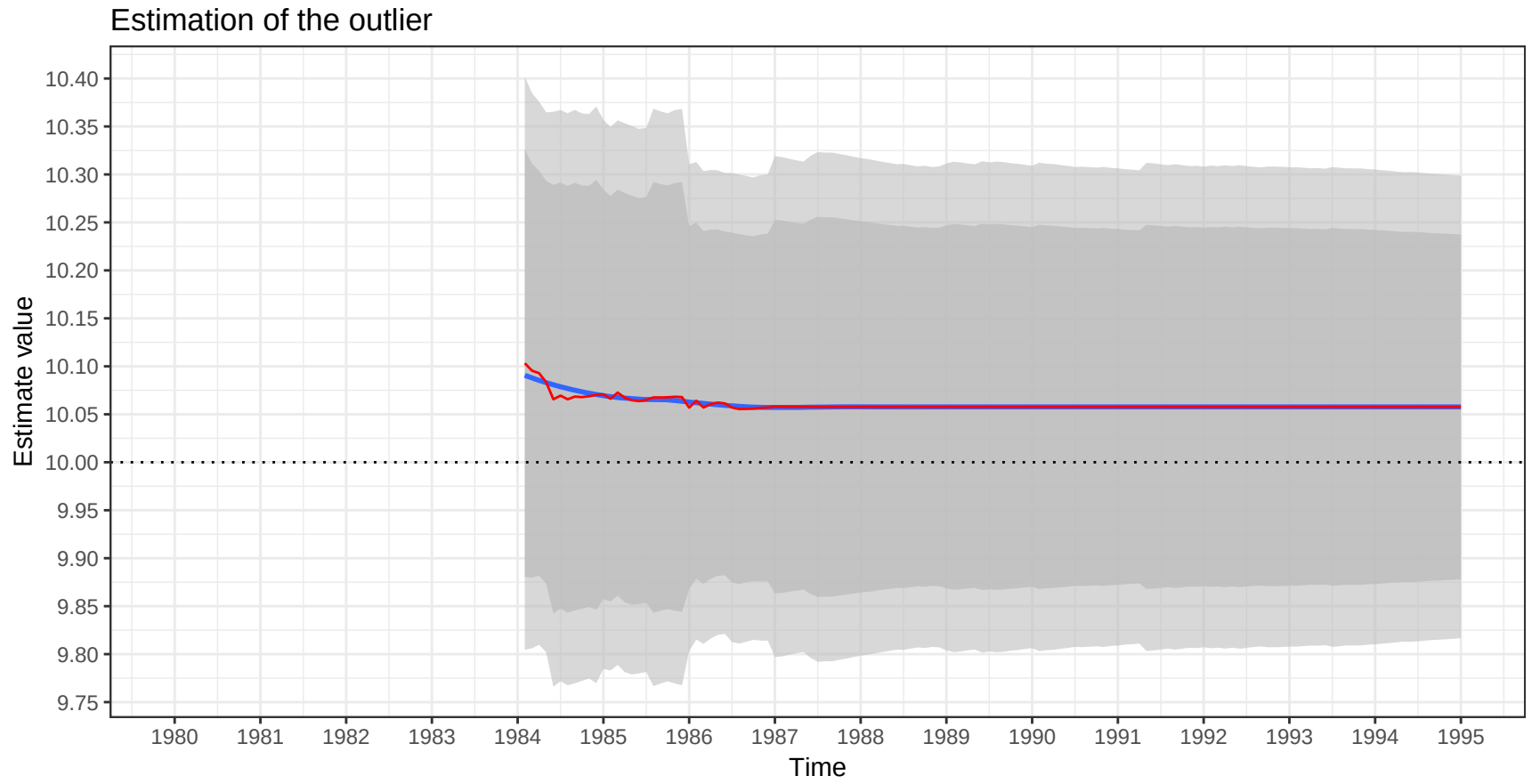


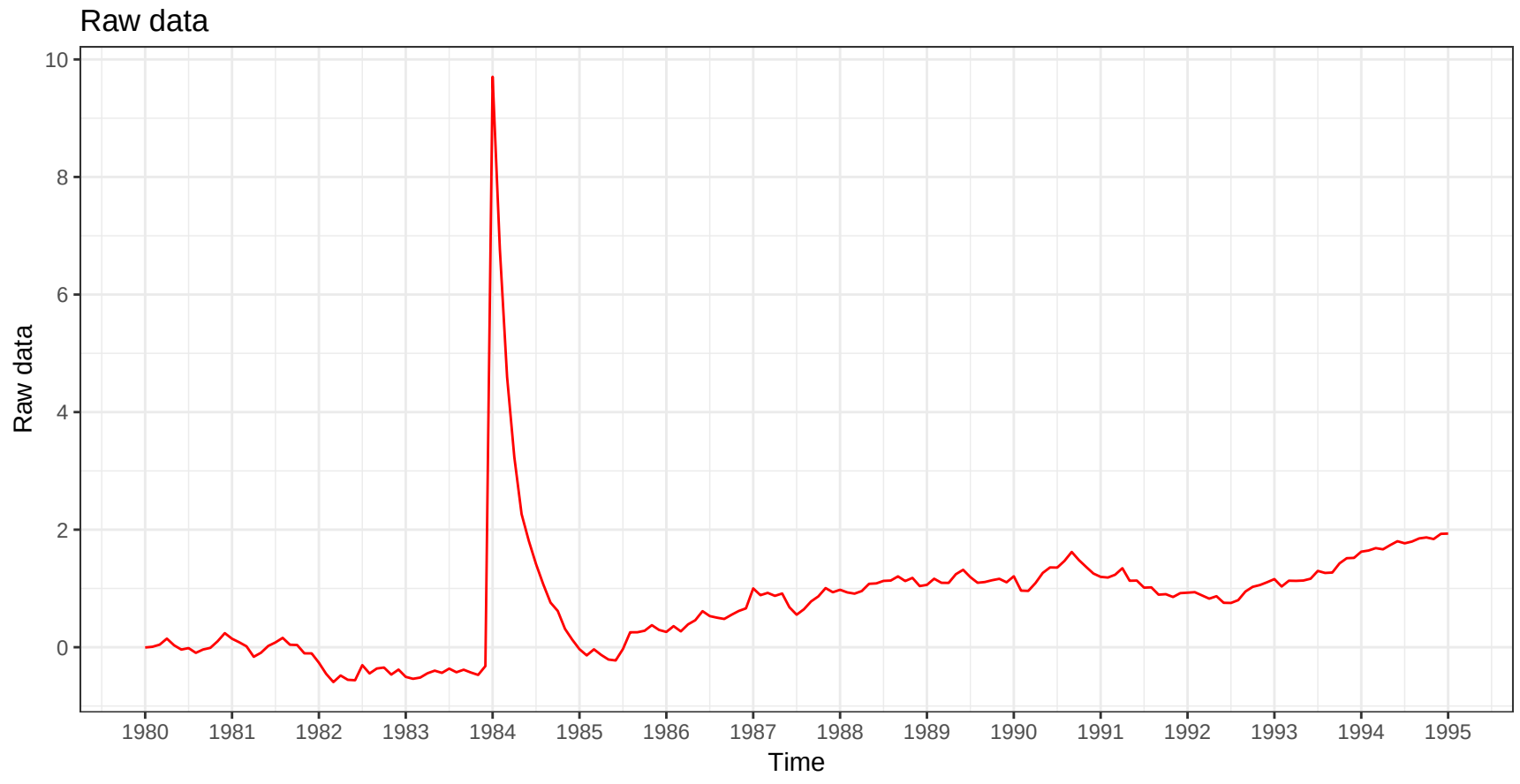
Estimate value of a TC(1984−01)
ARIMA (0,1,0)(1,0,0) − additive decomposition
(1−B)(1+0.7B12)Xt=at



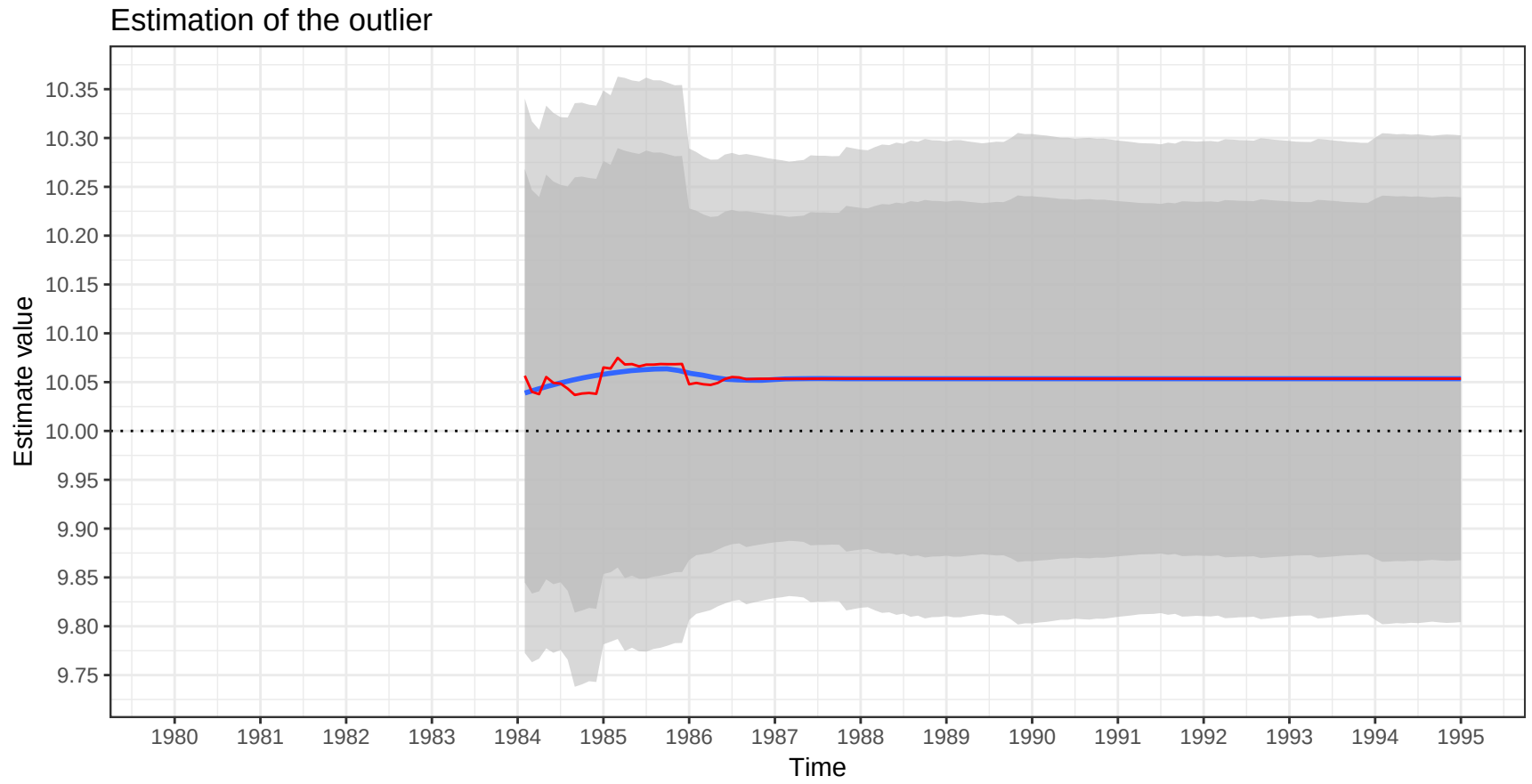


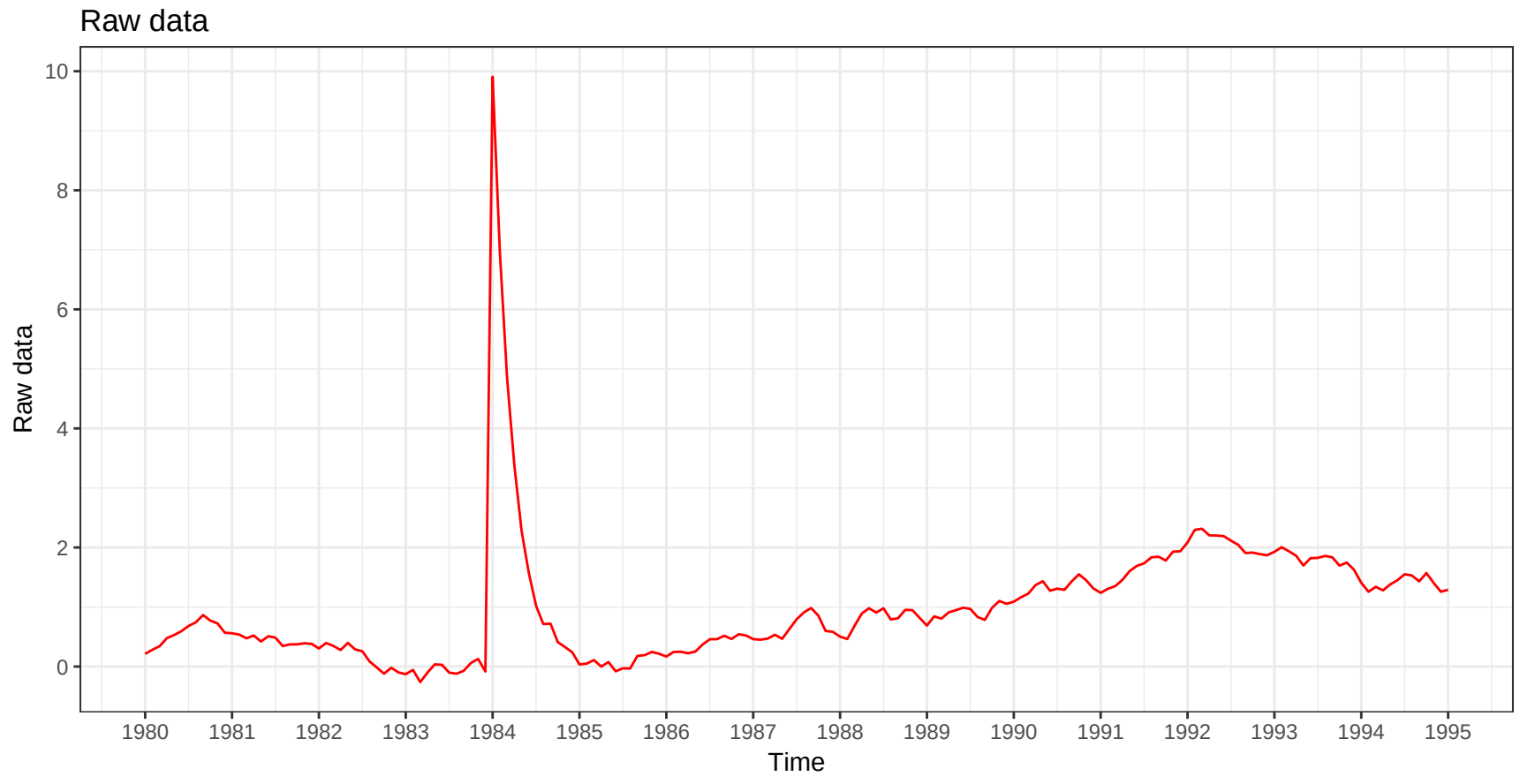
Estimate value of a TC(1984−01)
ARIMA (0,1,0)(1,0,0) − additive decomposition
(1−B)(1+0.7B12)Xt=at



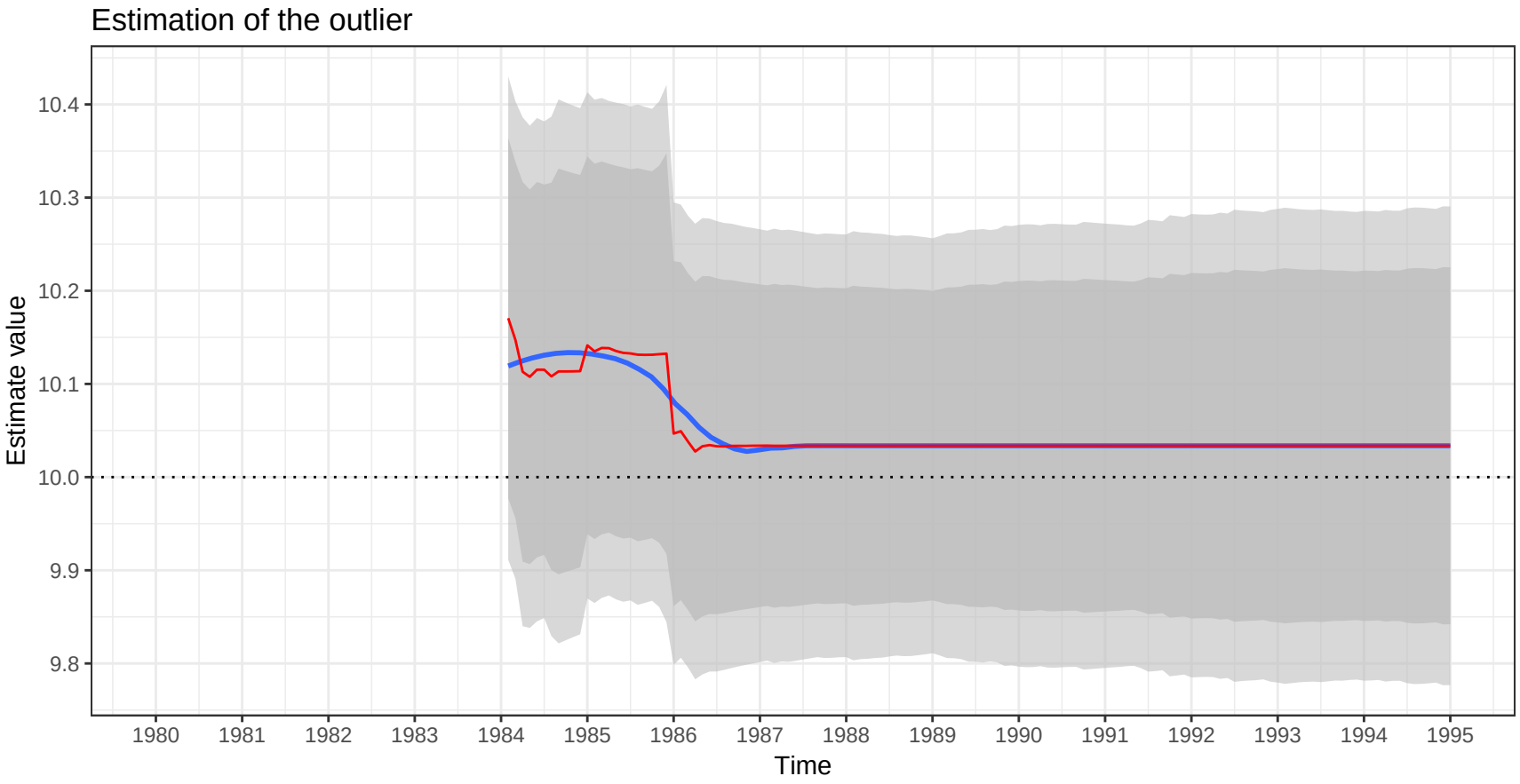


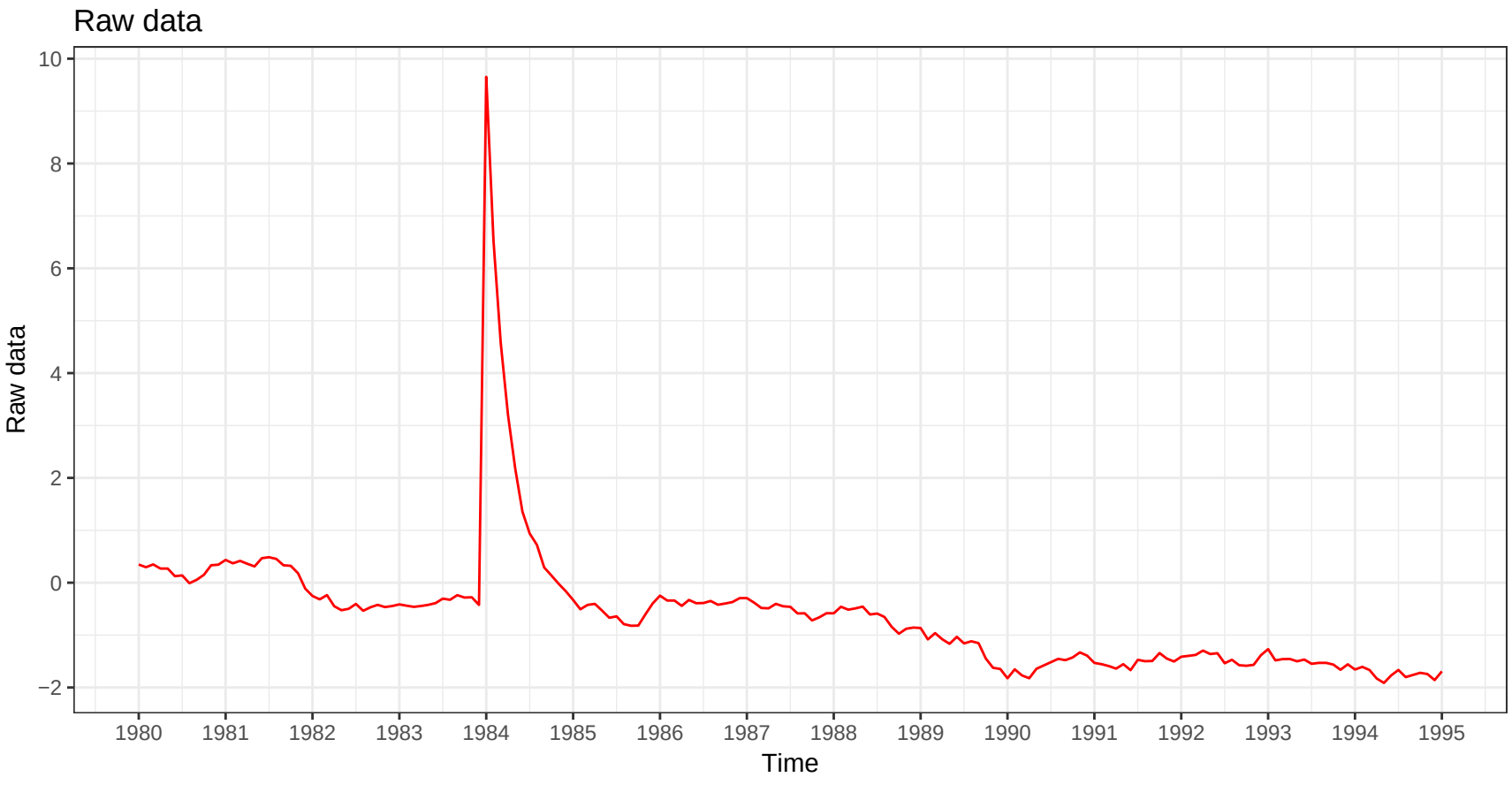
Estimate value of a TC(1984−01)
ARIMA (0,1,0)(1,0,0) − additive decomposition
(1−B)(1+0.7B12)Xt=at



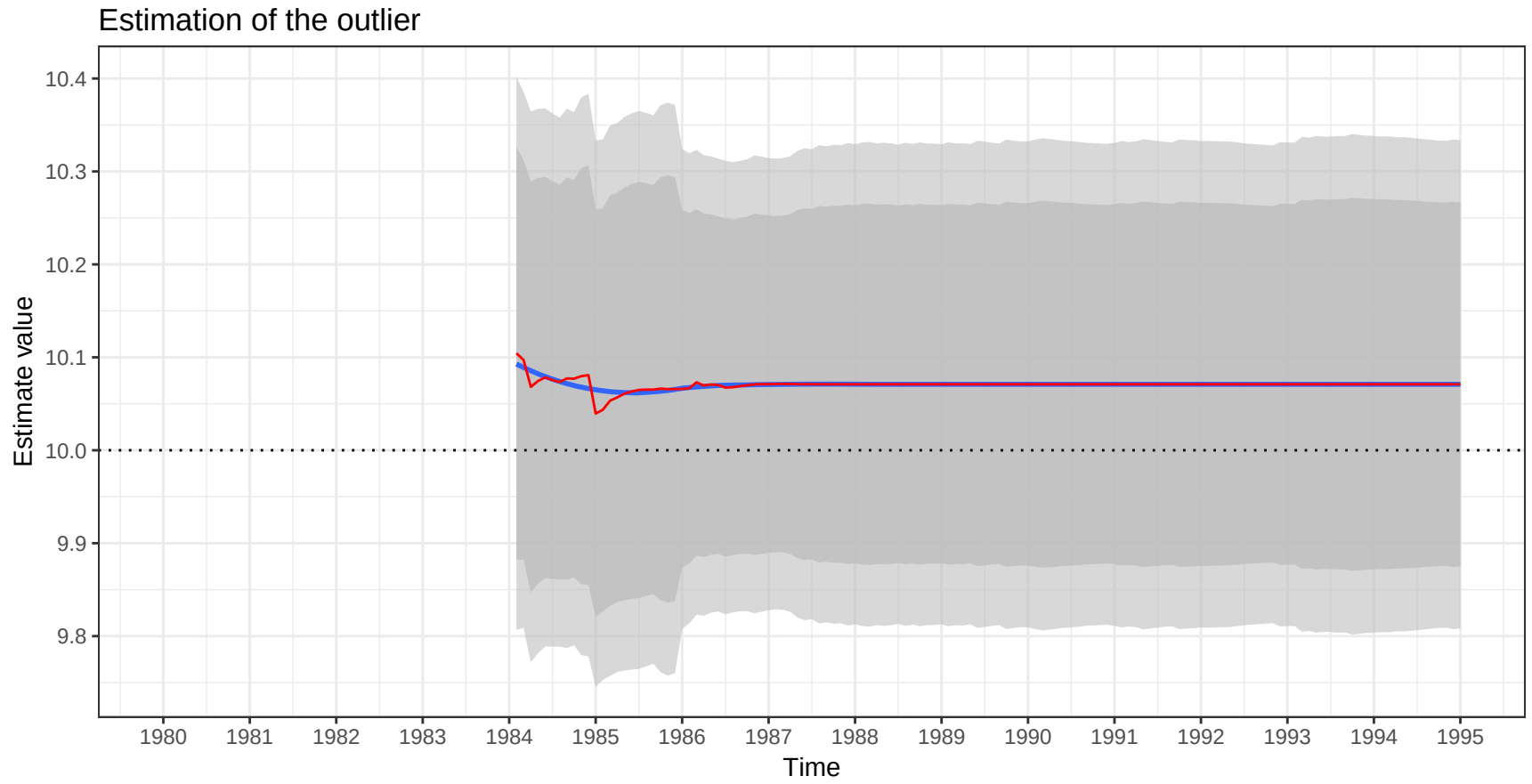


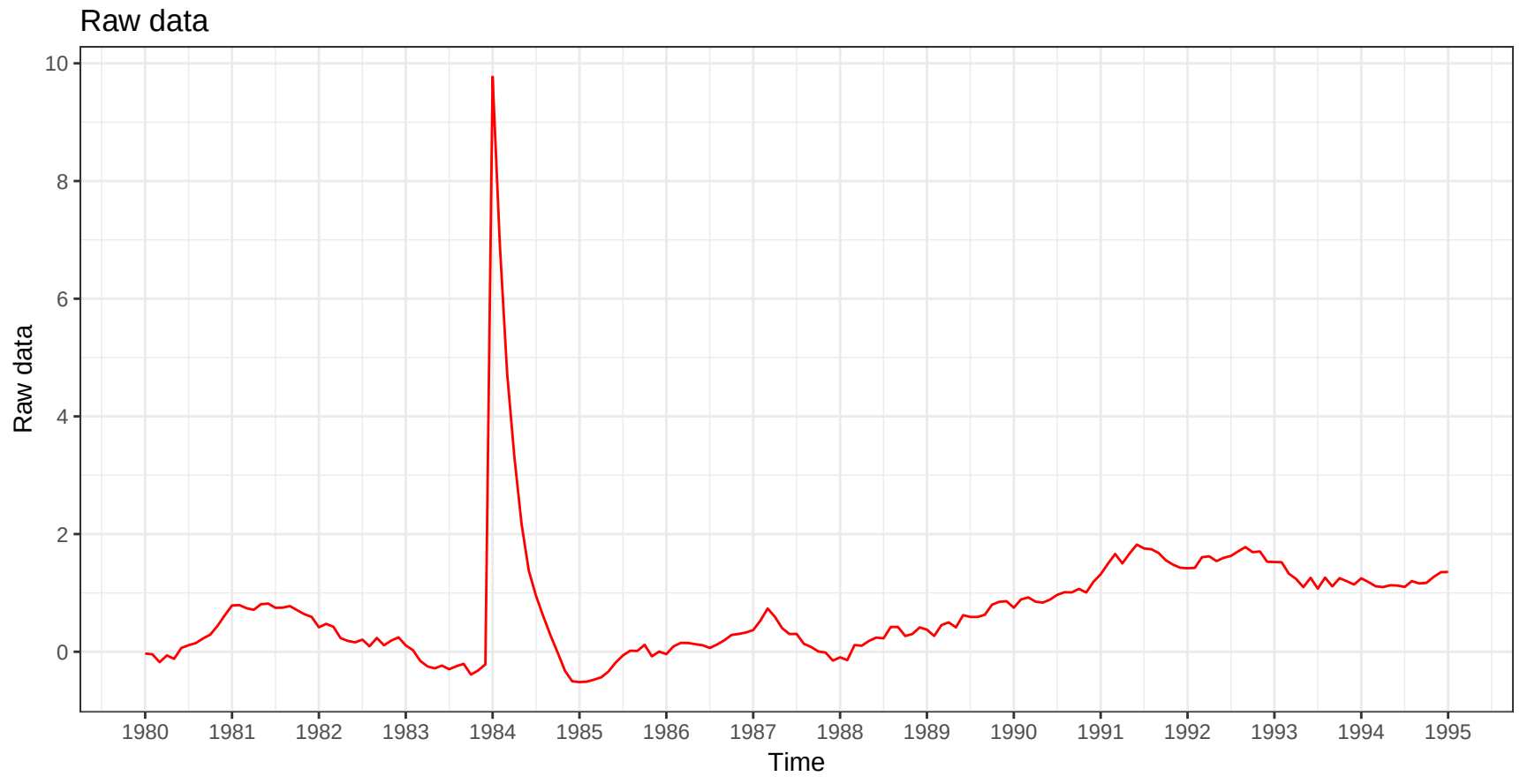
Estimate value of a TC(1984−01)
ARIMA (0,1,0)(1,0,0) − additive decomposition
(1−B)(1+0.7B12)Xt=at



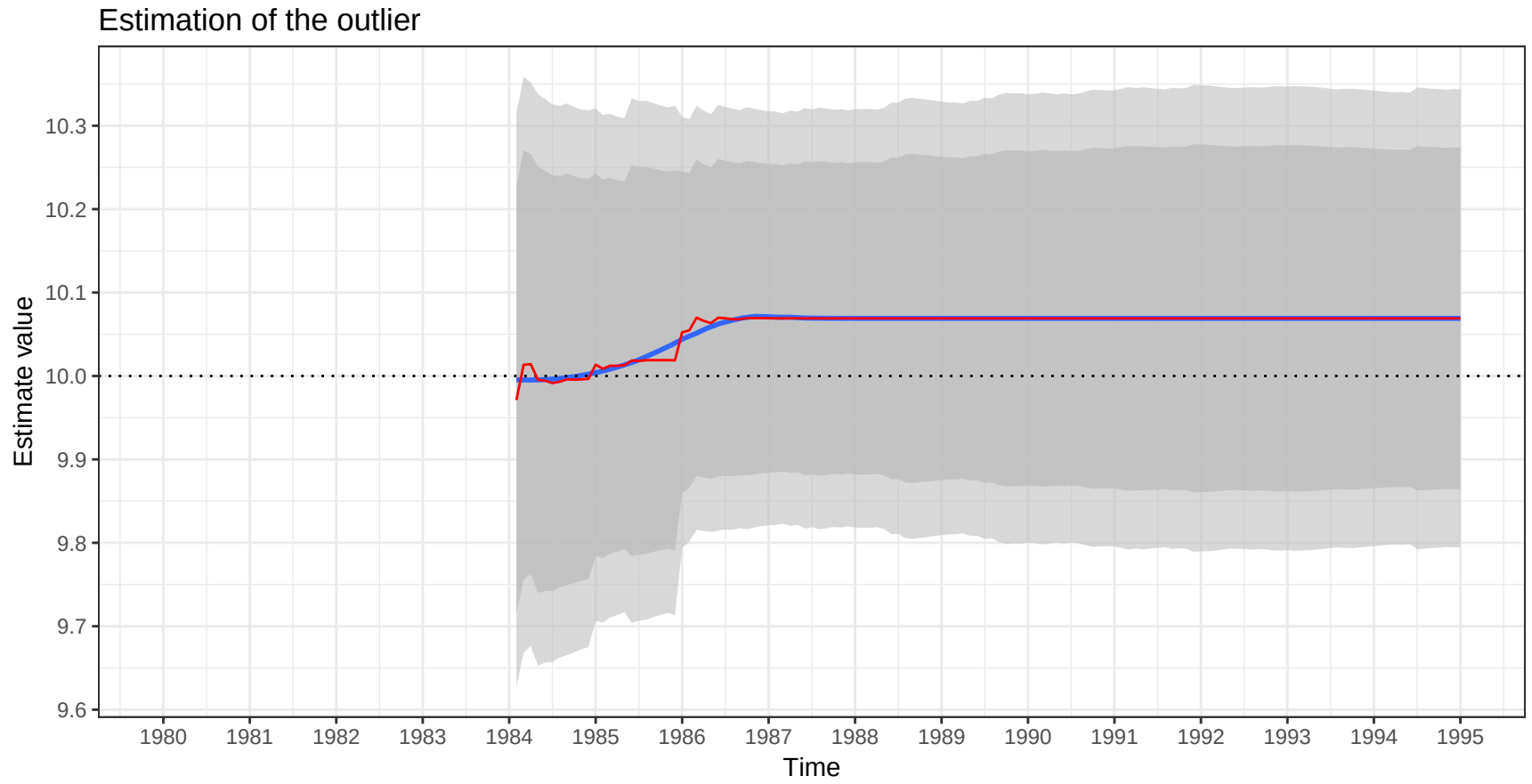


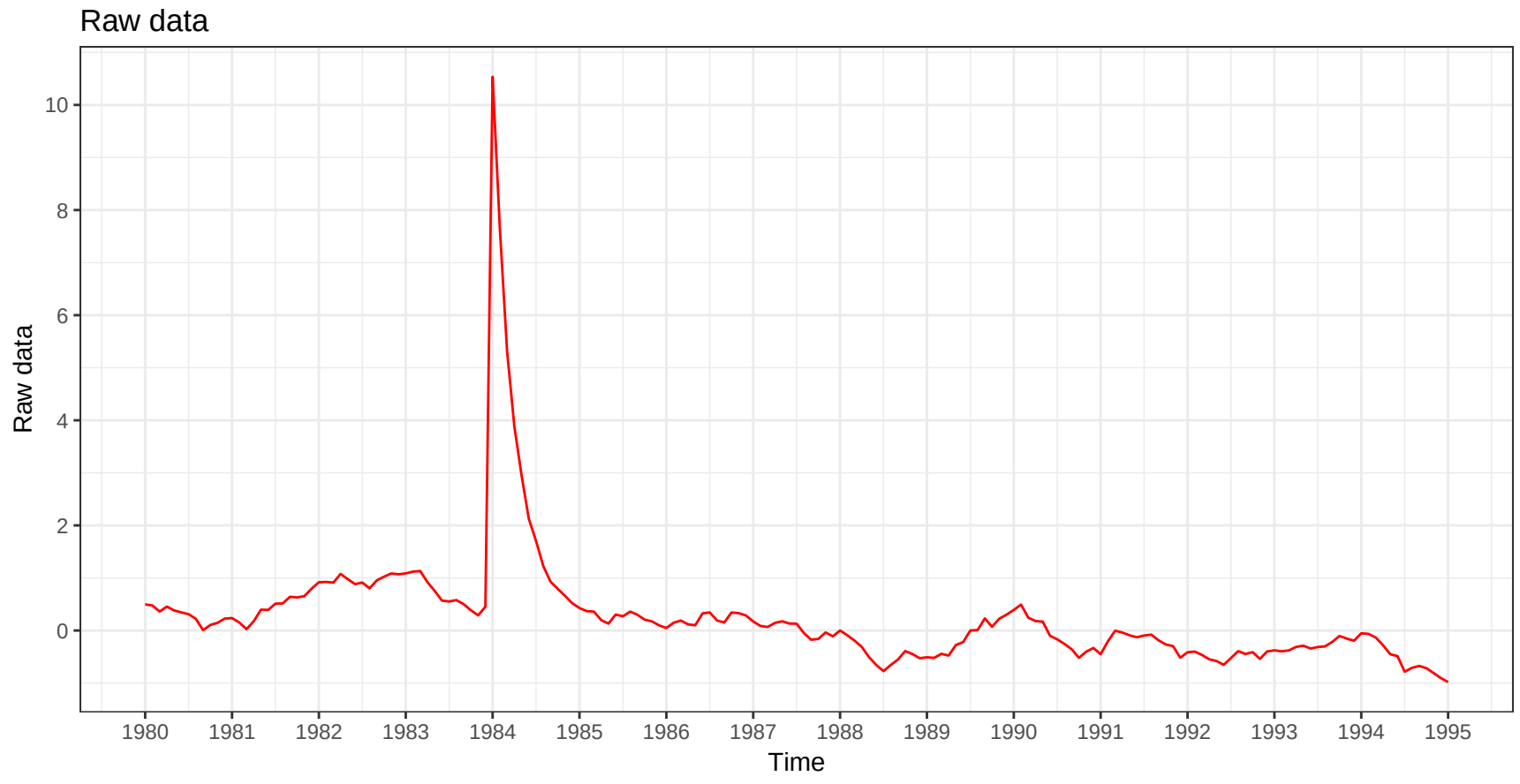
Estimate value of a TC(1984−01)
ARIMA (0,1,0)(1,0,0) − additive decomposition
(1−B)(1+0.7B12)Xt=at



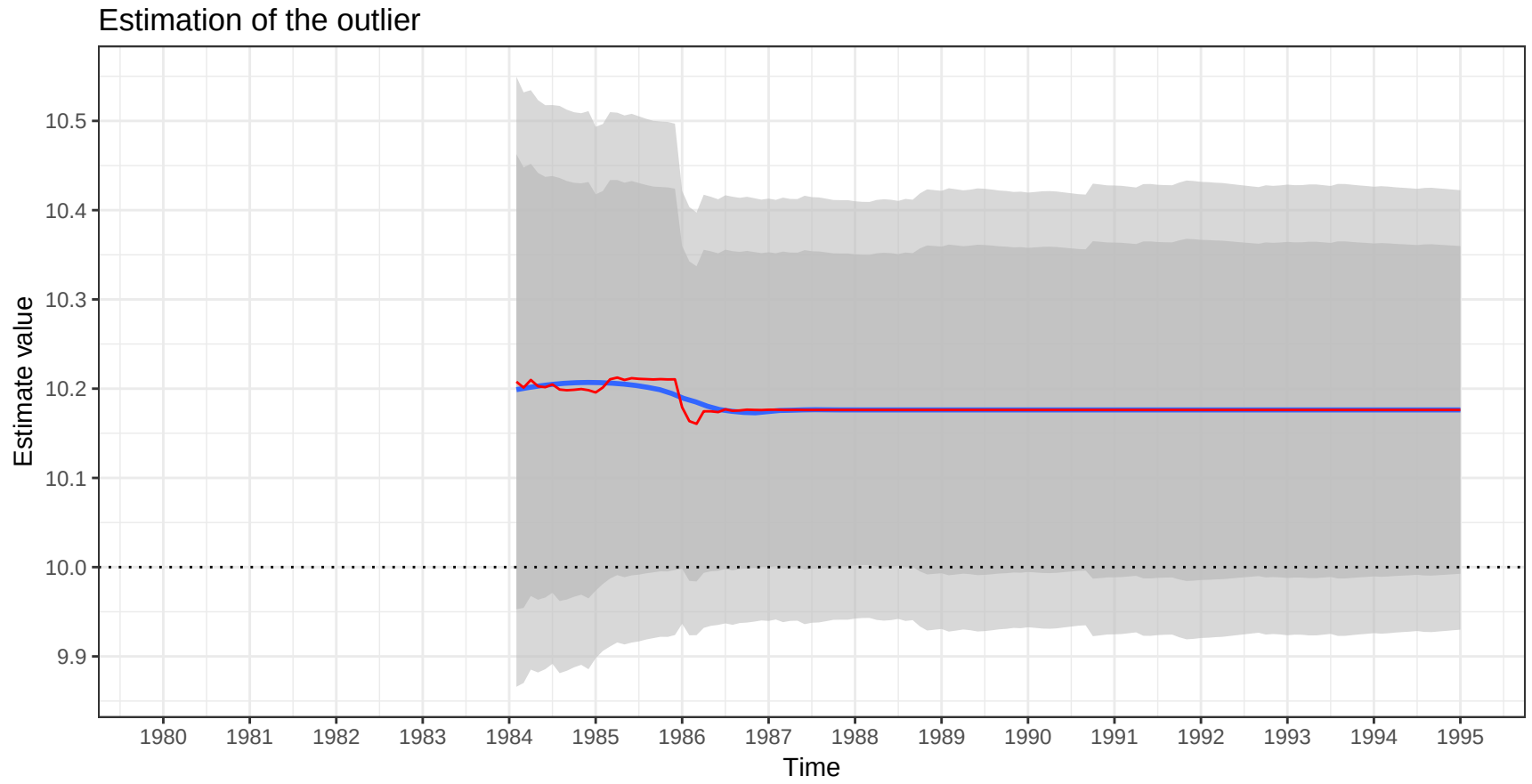


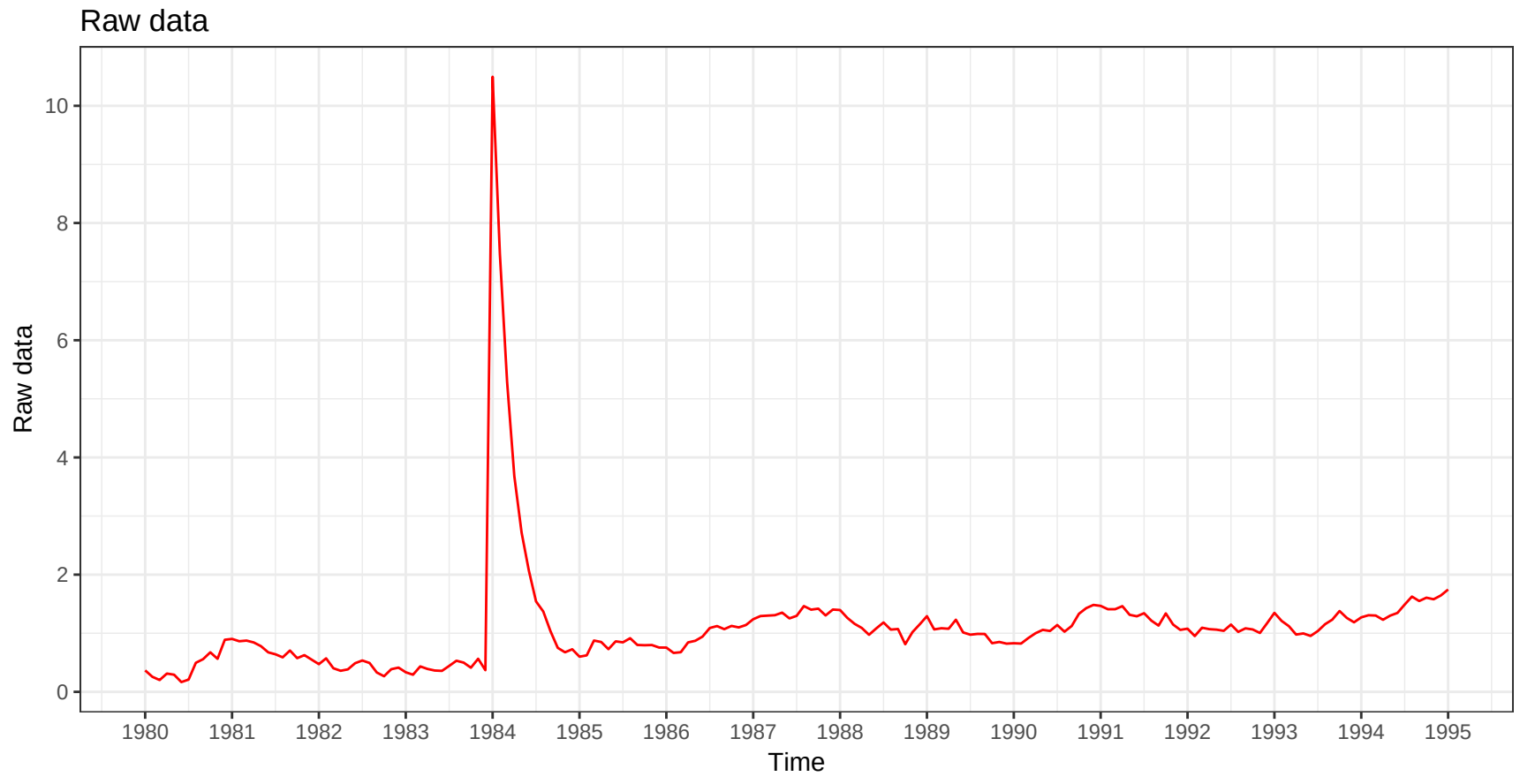
Estimate value of a TC(1984−01)
ARIMA (0,1,0)(1,0,0) − additive decomposition
(1−B)(1+0.7B12)Xt=at



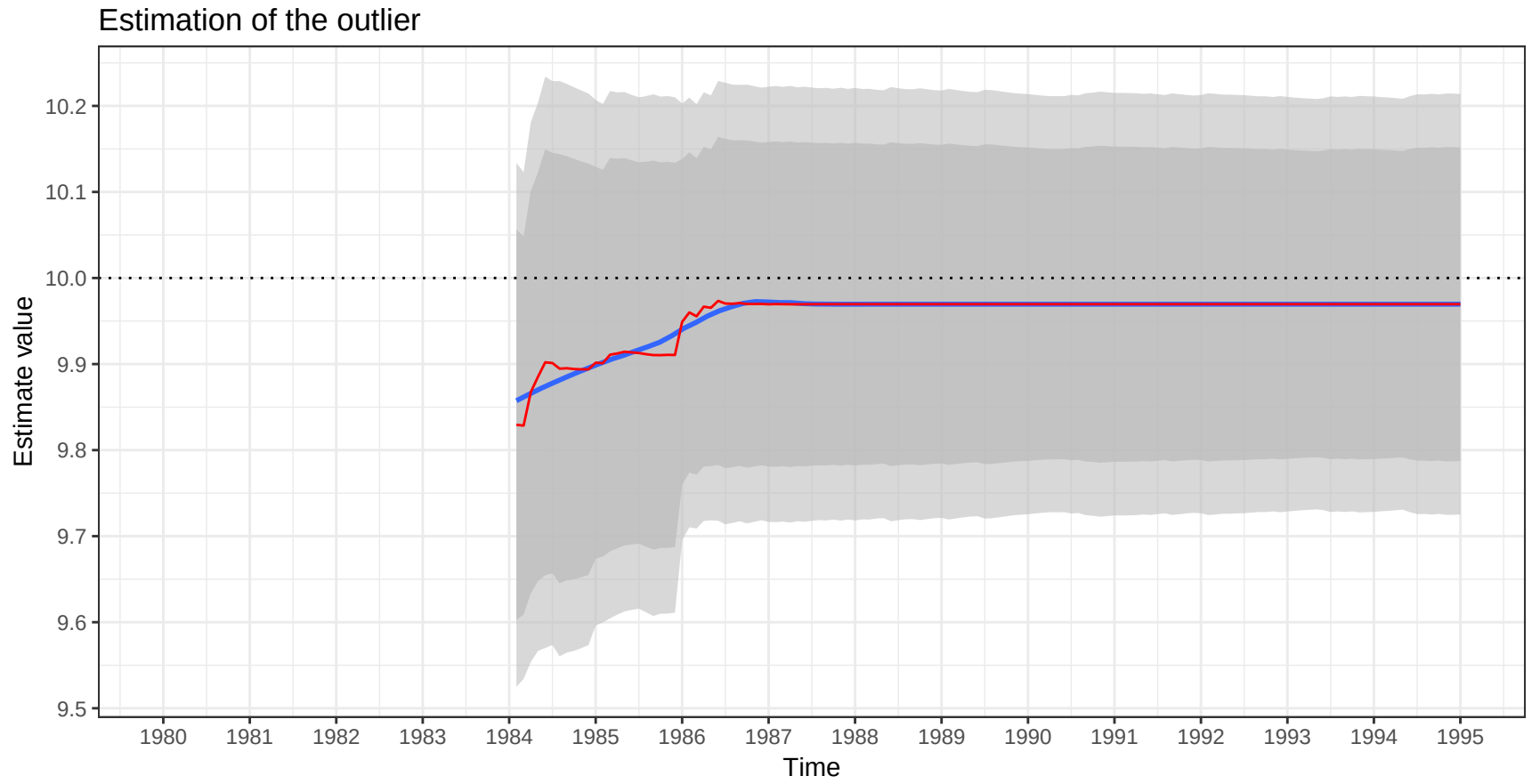


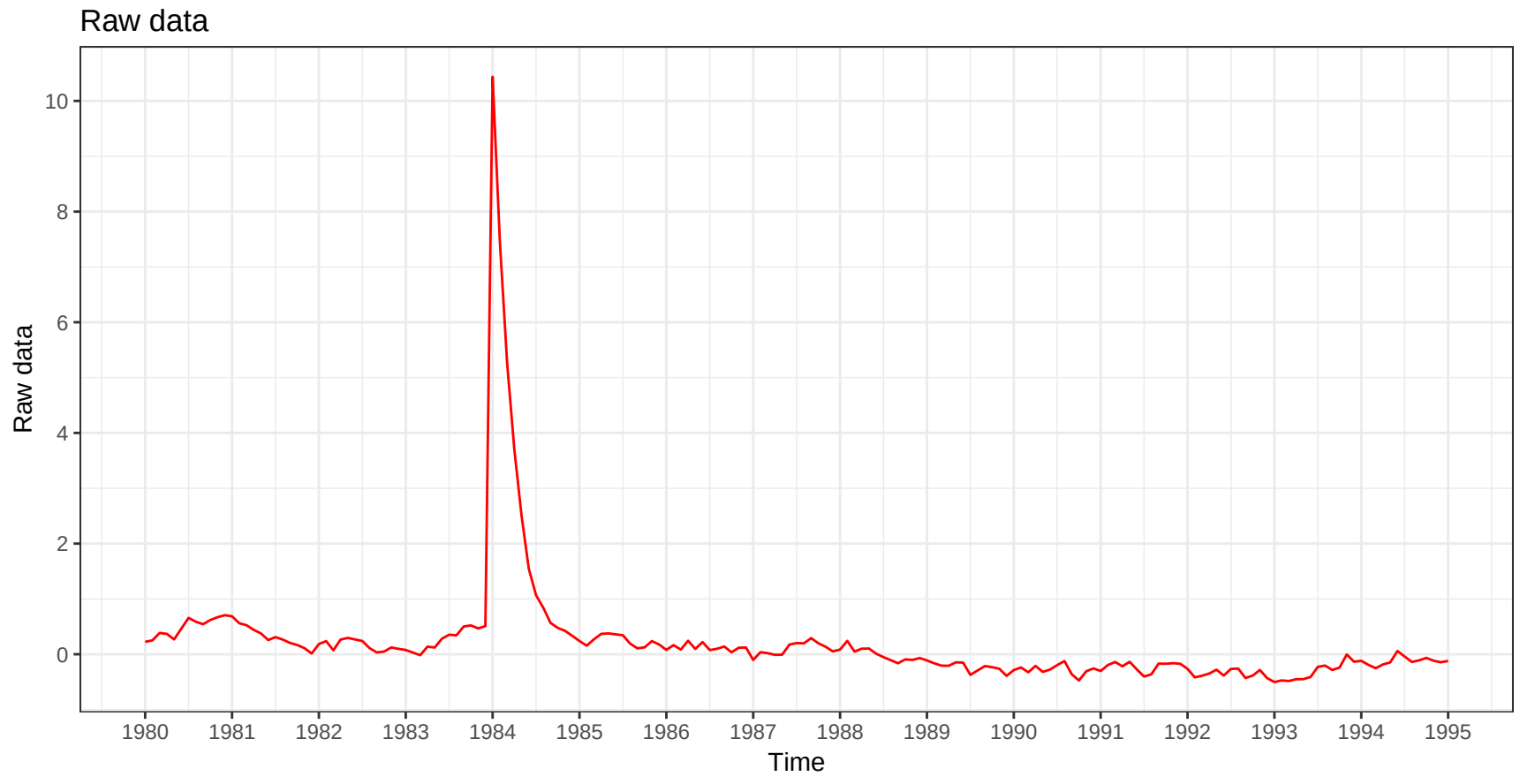
Estimate value of a TC(1984−01)
ARIMA (0,1,0)(1,0,0) − additive decomposition
(1−B)(1+0.7B12)Xt=at



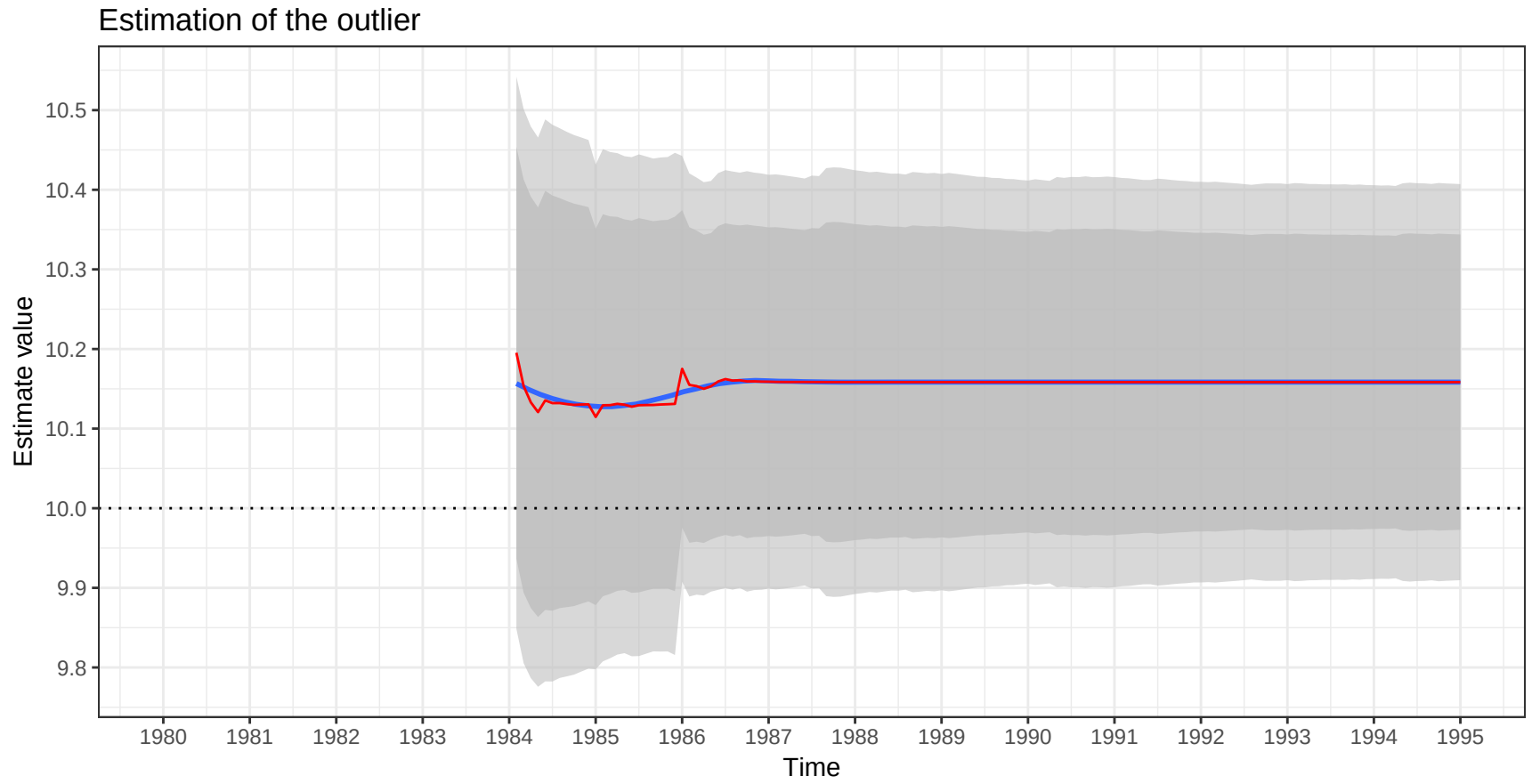


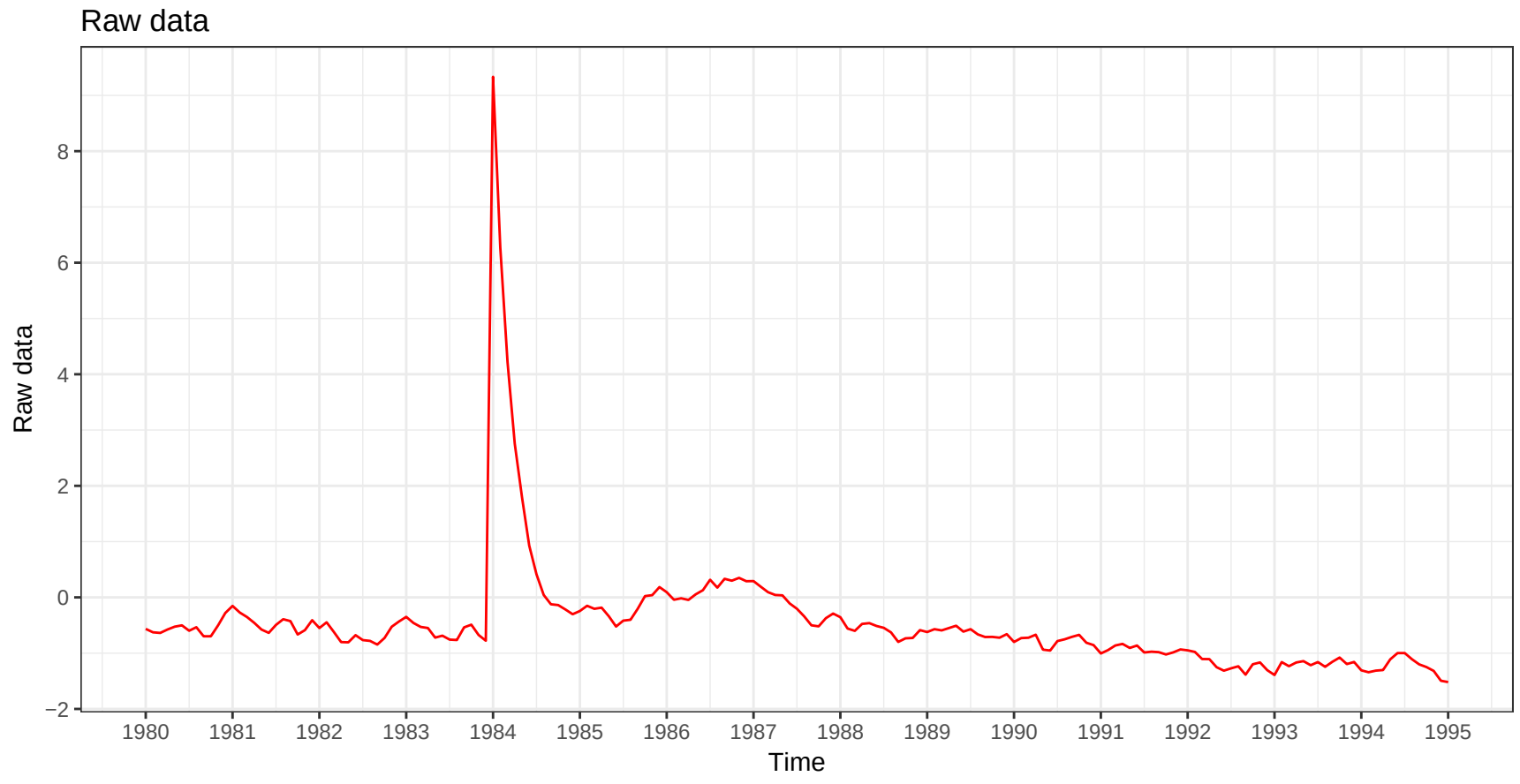
Estimate value of a TC(1984−01)
ARIMA (0,1,0)(1,0,0) − additive decomposition
(1−B)(1+0.7B12)Xt=at



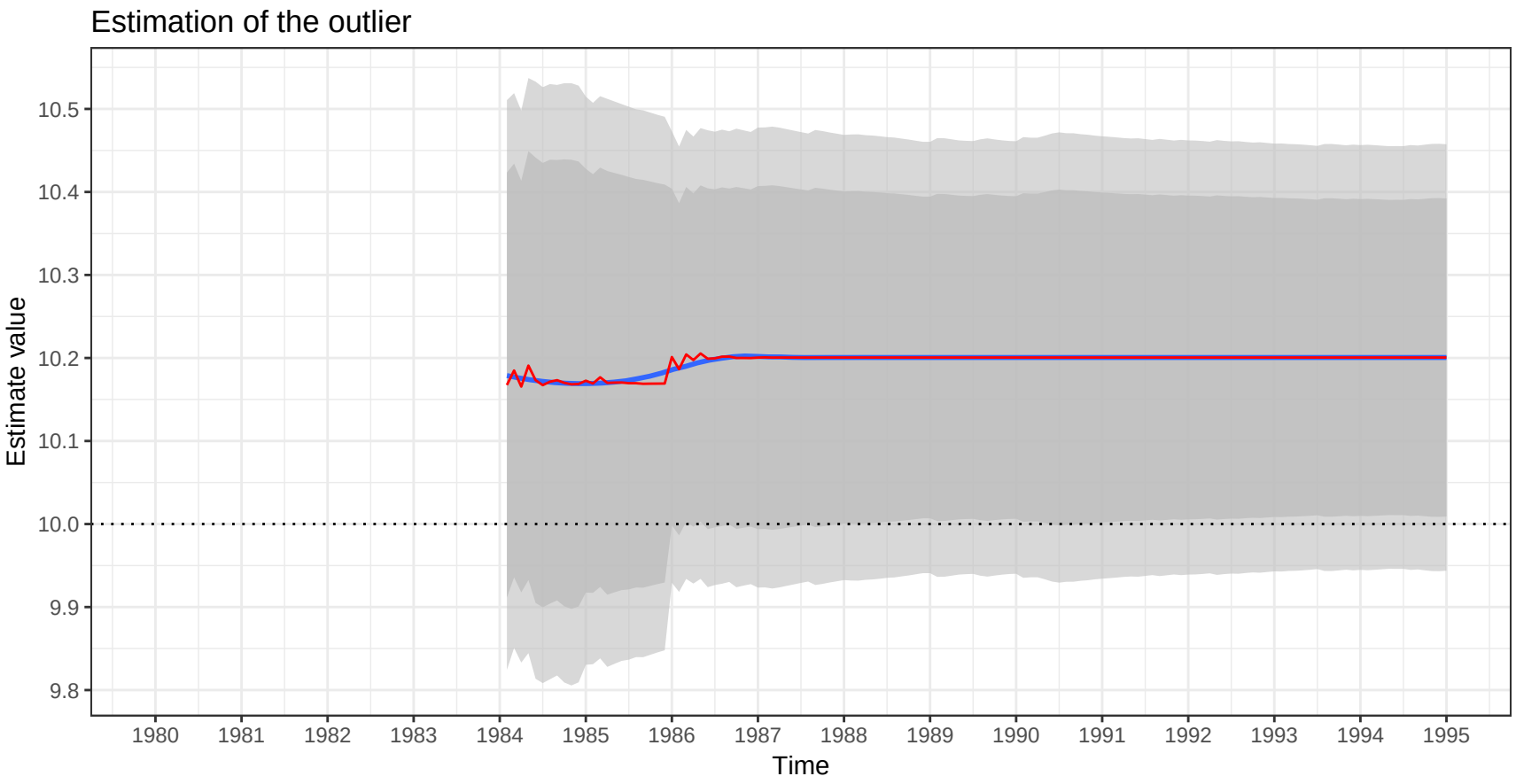


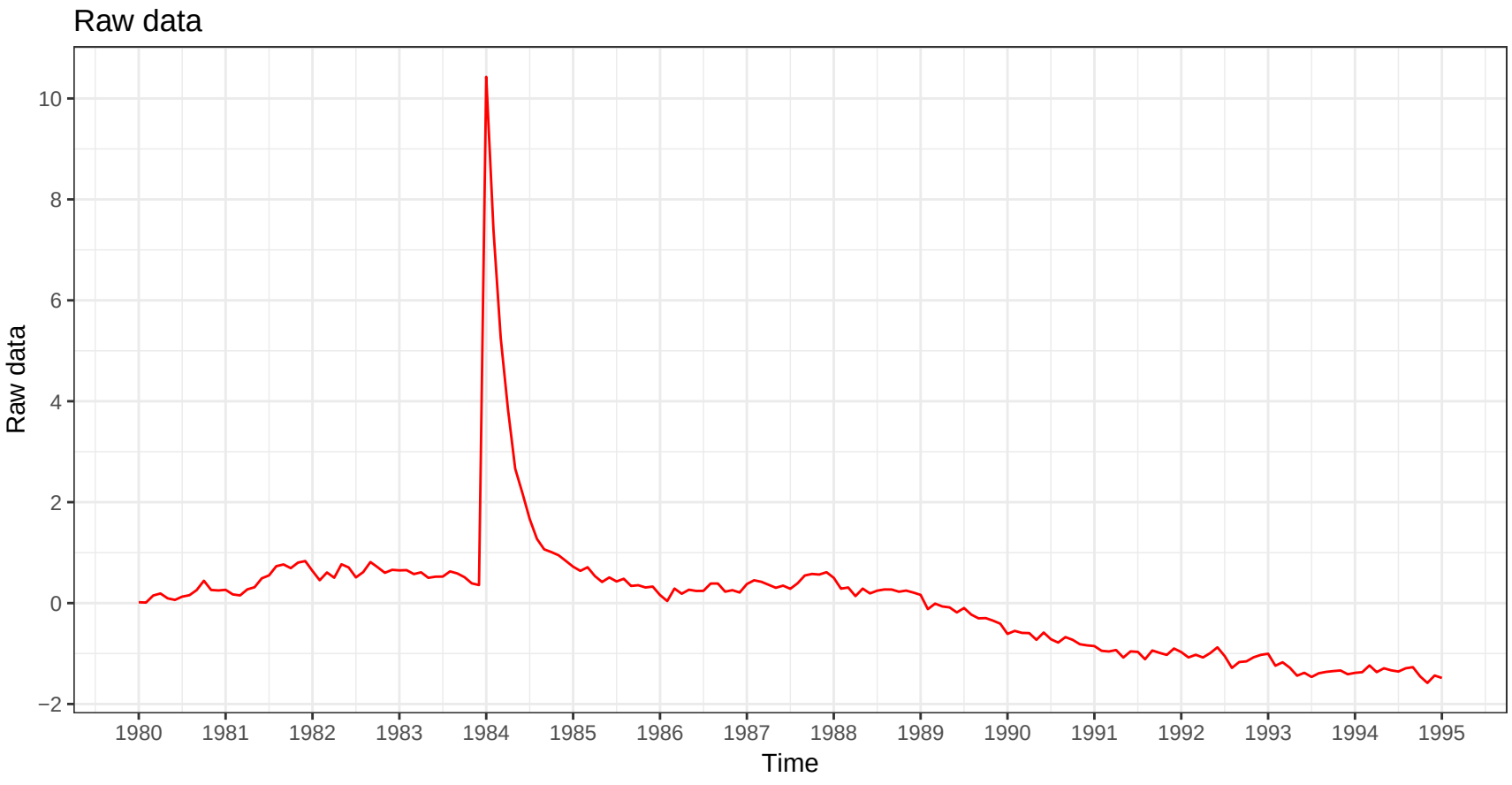
Estimate value of a TC(1984−01)
ARIMA (0,1,0)(1,0,0) − additive decomposition
(1−B)(1+0.7B12)Xt=at



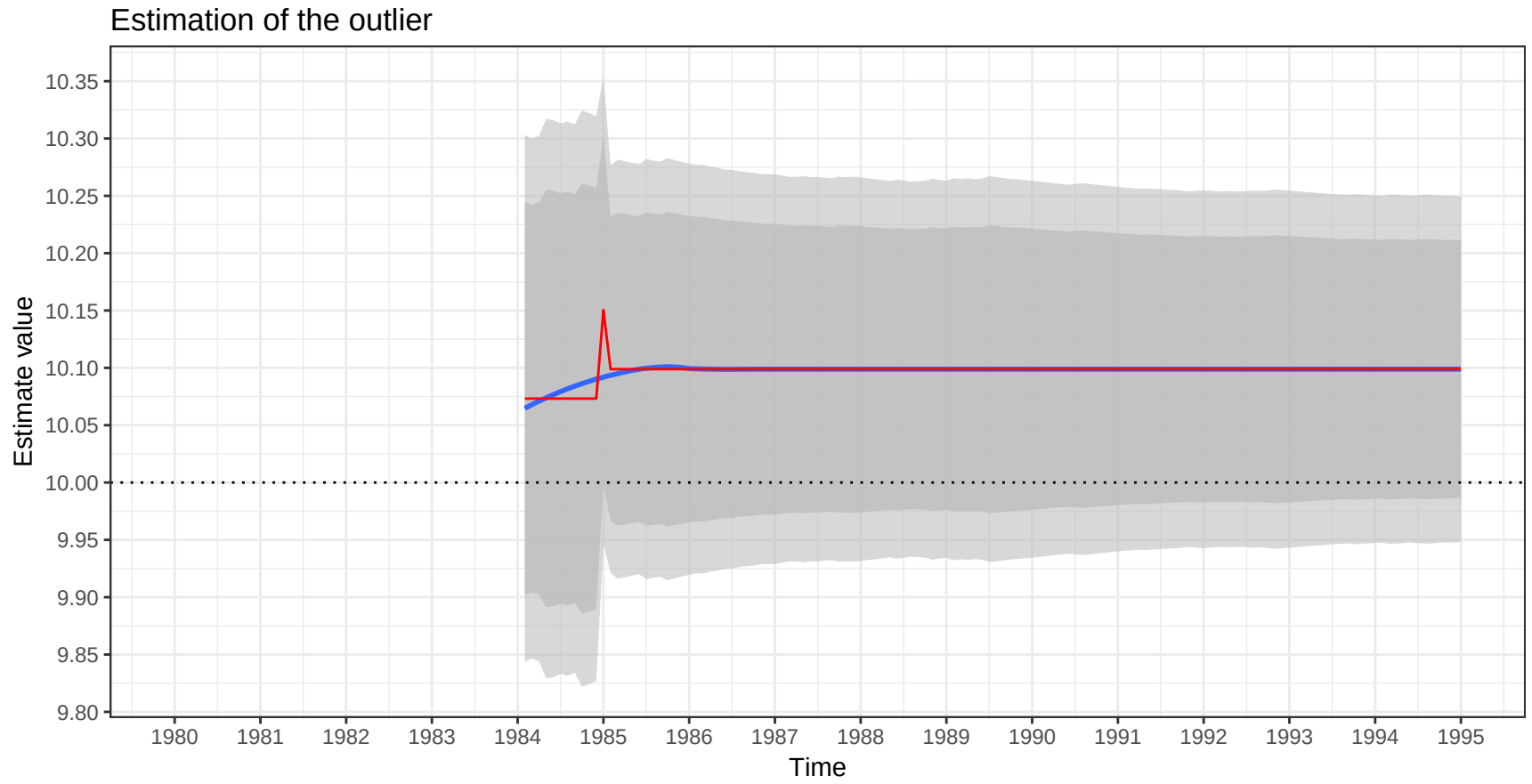


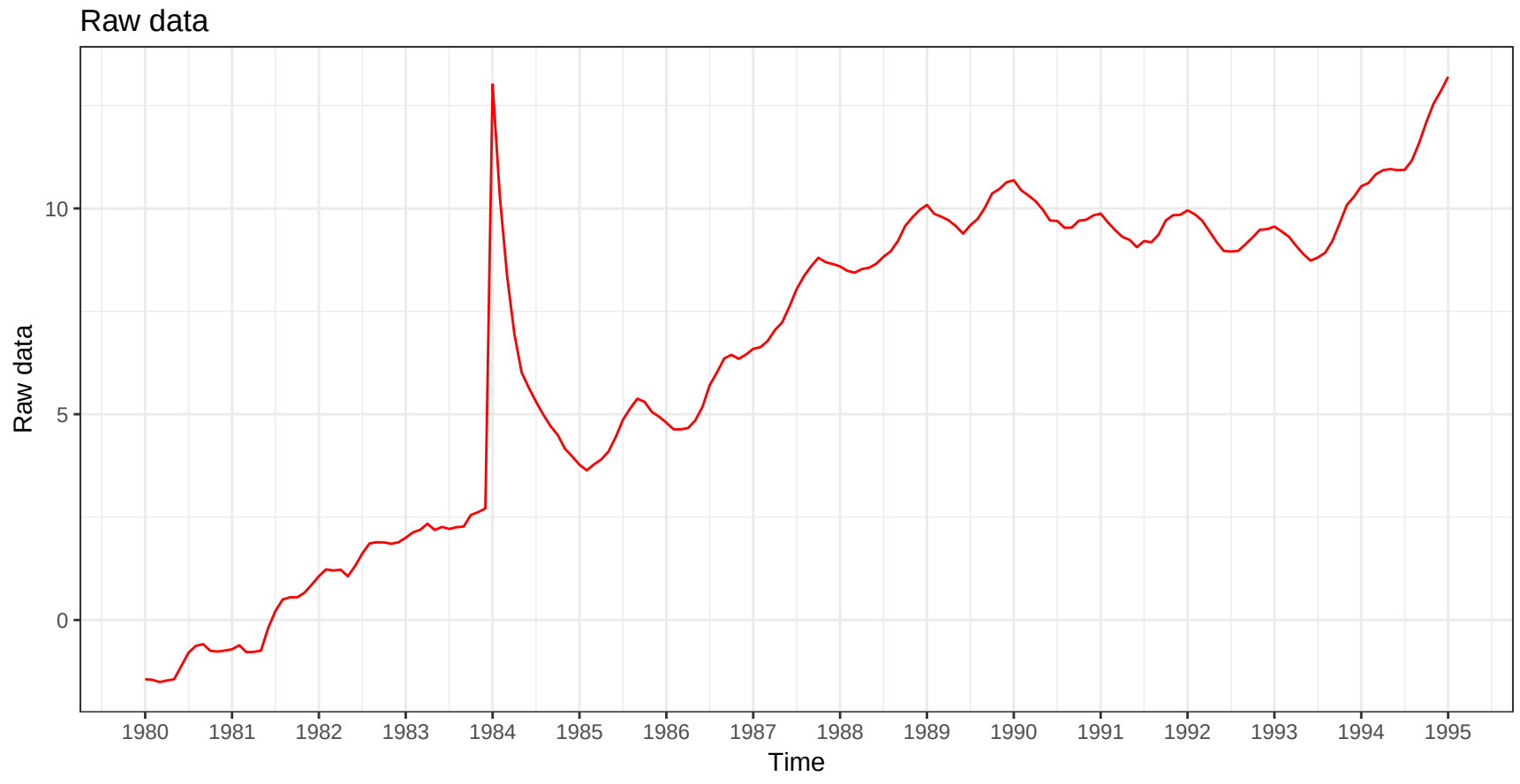
Estimate value of a TC(1984−01)
ARIMA (0,1,0)(1,0,0) − additive decomposition
(1−B)(1+0.7B12)Xt=at



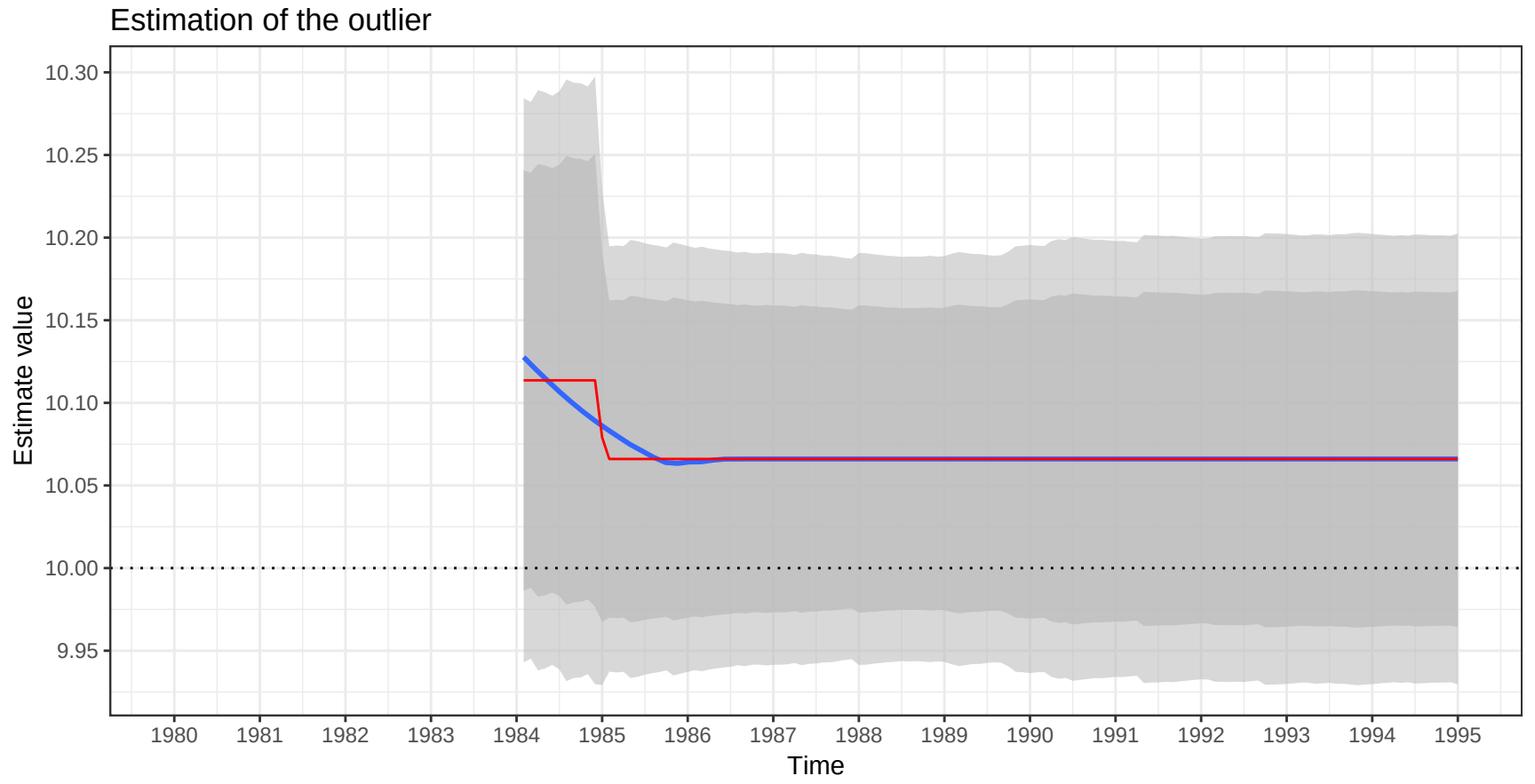


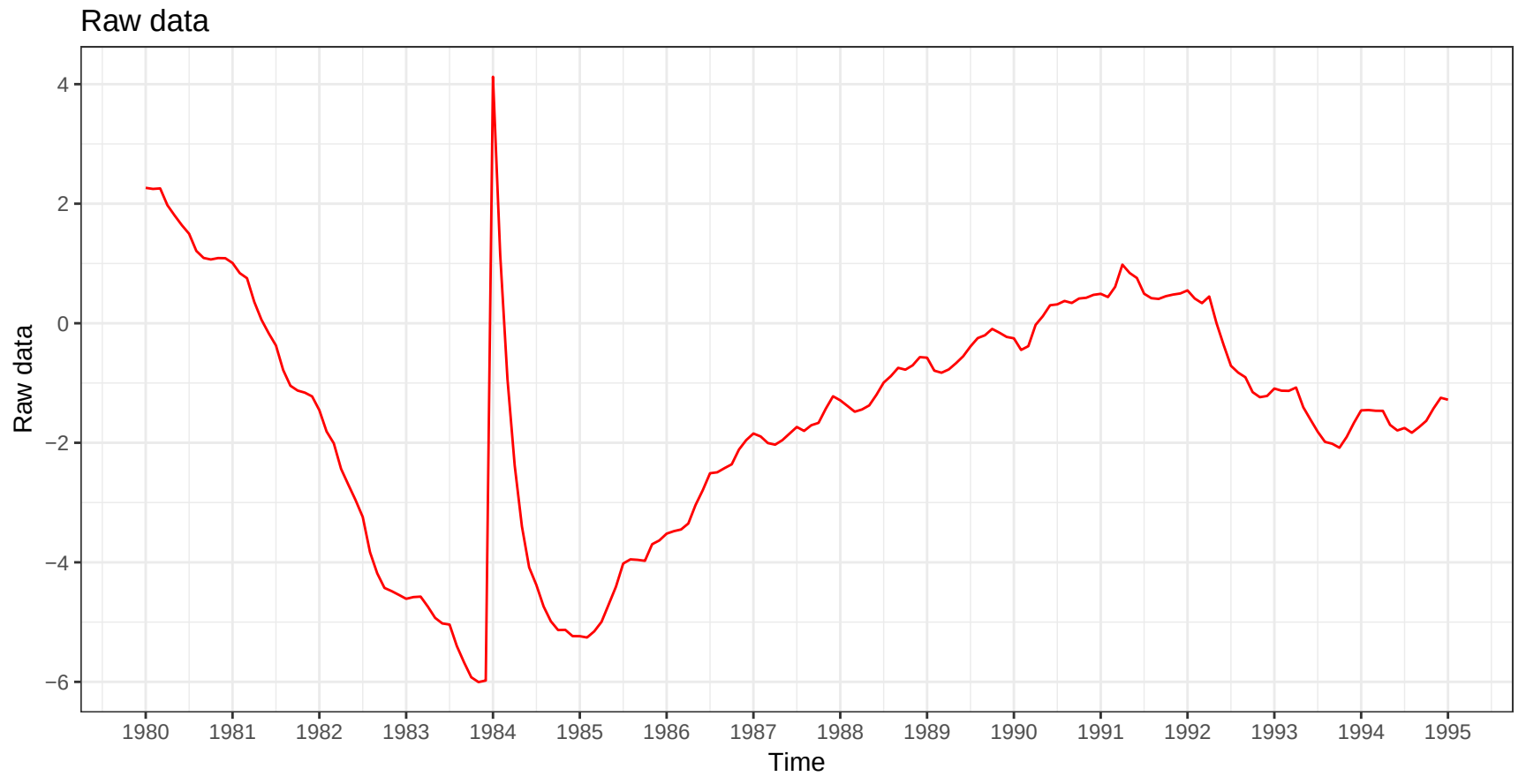
Estimate value of a TC(1984−01)
ARIMA (1,1,0)(0,0,0) − additive decomposition
(1−B)(1−0.7B)Xt=at

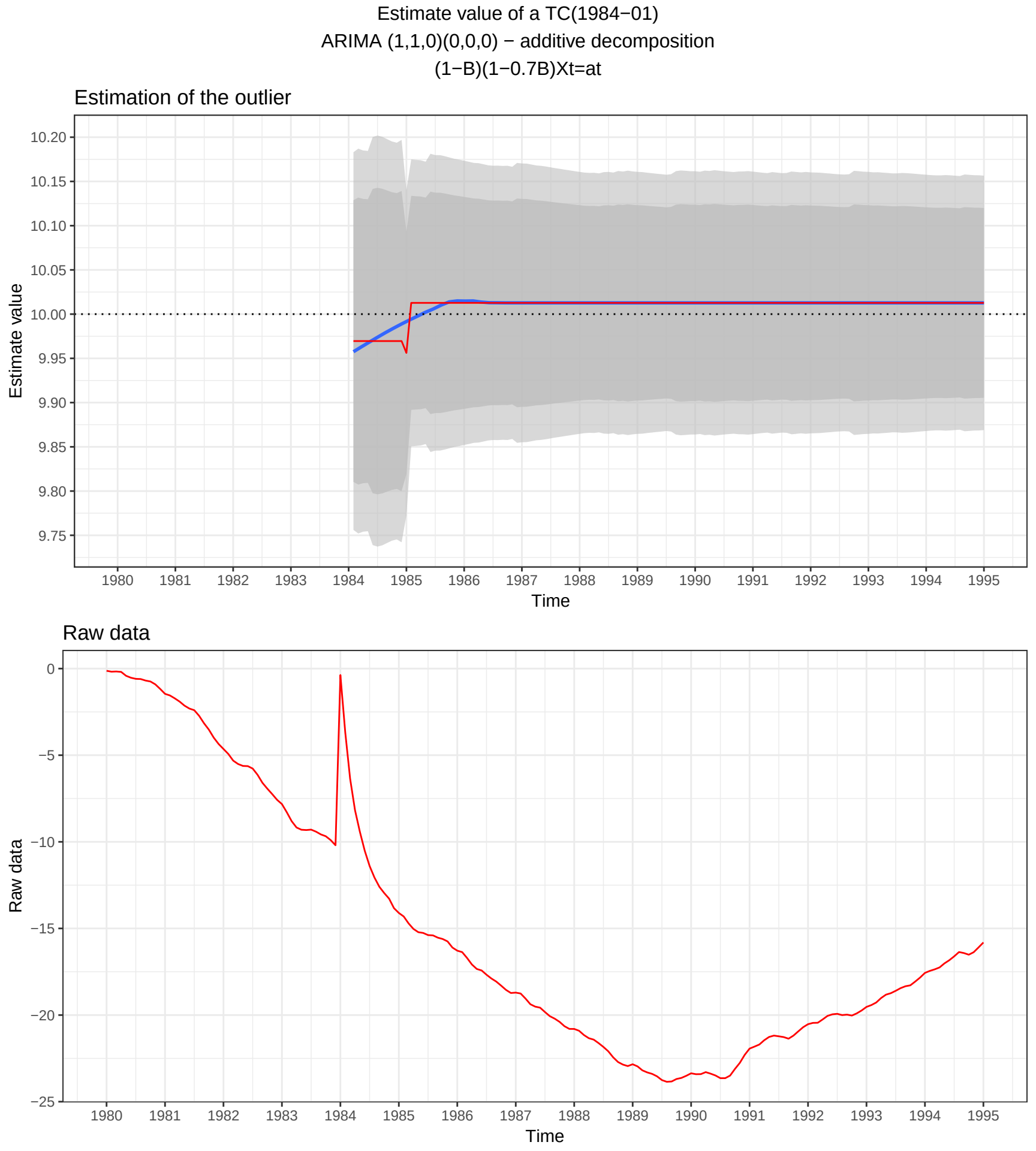




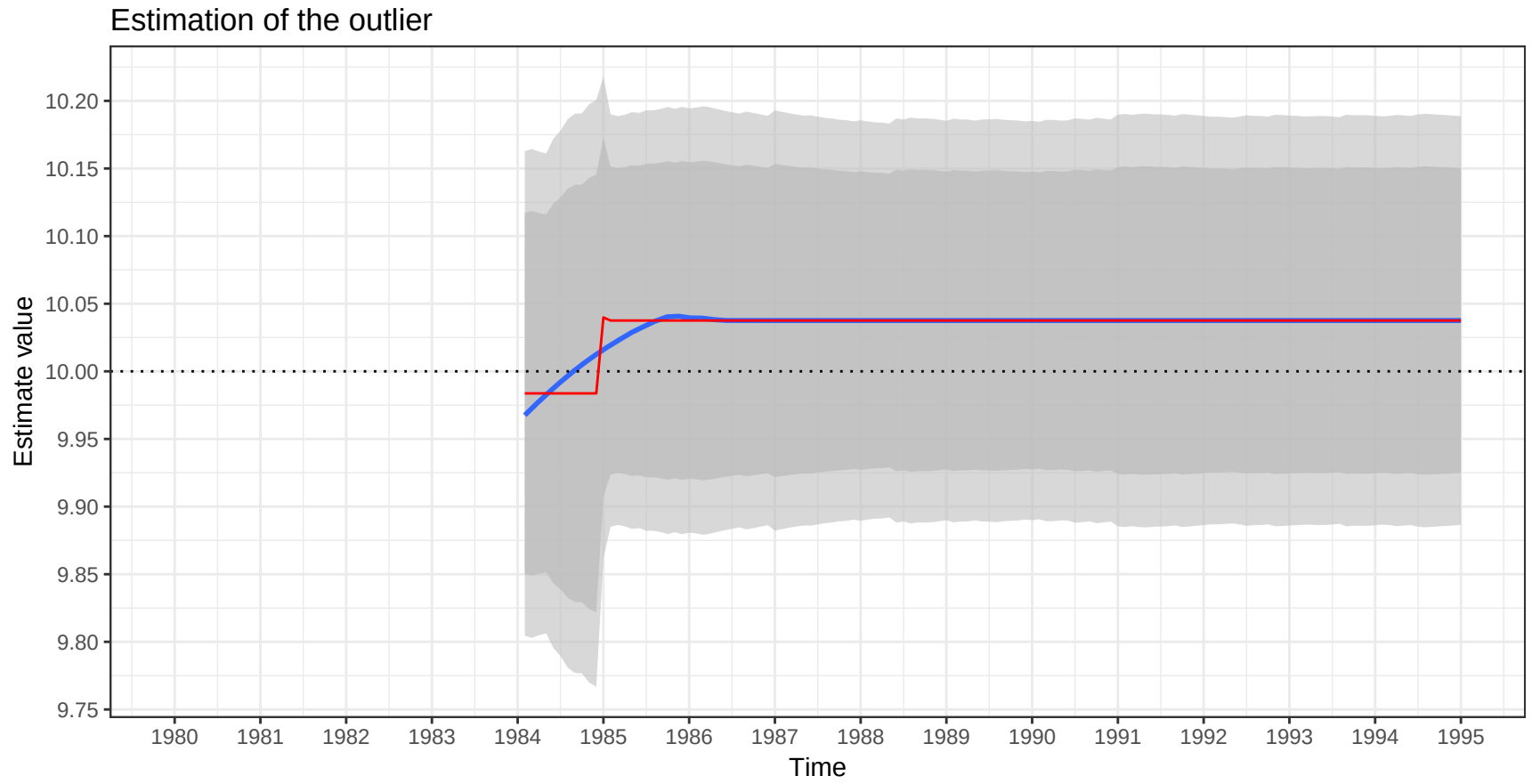
Estimate value of a TC(1984−01)
ARIMA (1,1,0)(0,0,0) − additive decomposition
(1−B)(1−0.7B)Xt=at

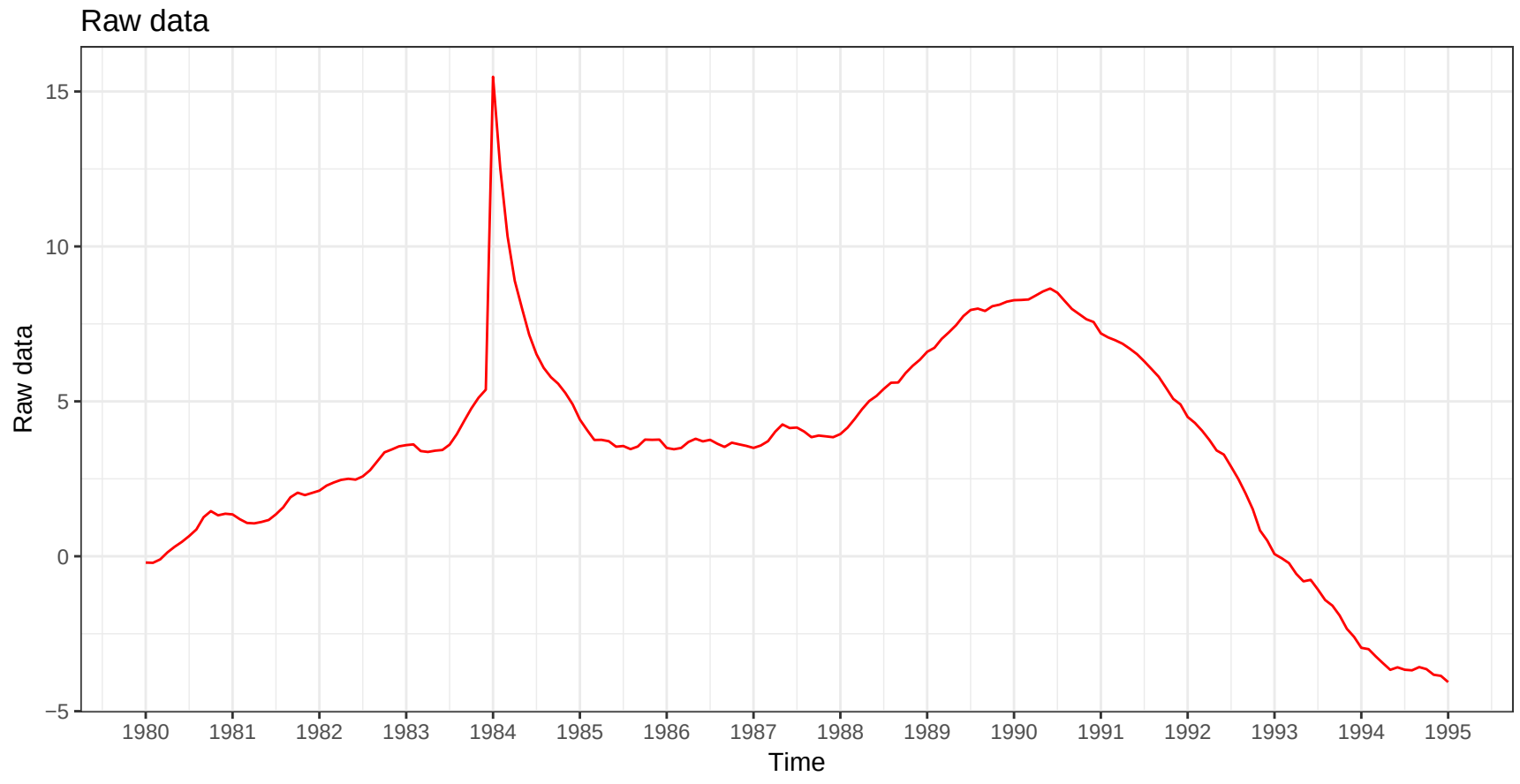




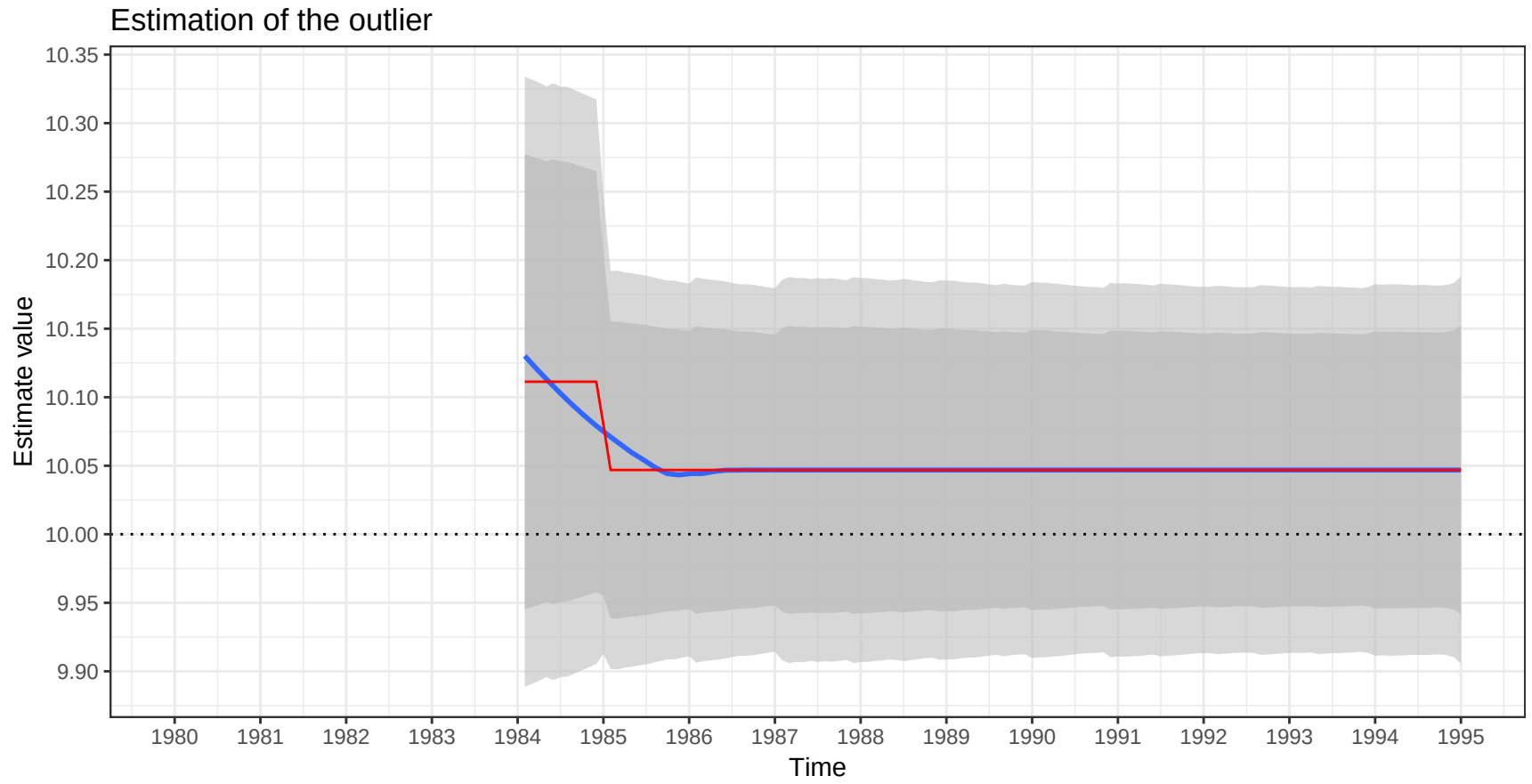

Estimate value of a TC(1984−01)
ARIMA (1,1,0)(0,0,0) − additive decomposition
(1−B)(1−0.7B)Xt=at
Estimation of the outlier
Estimate value
10.20
10.15
10.10
10.05
10.00
9.95
9.90
9.85
9.80
9.75
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time
Raw data
Raw data
0
−5
−10
−15
−20
−25
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time

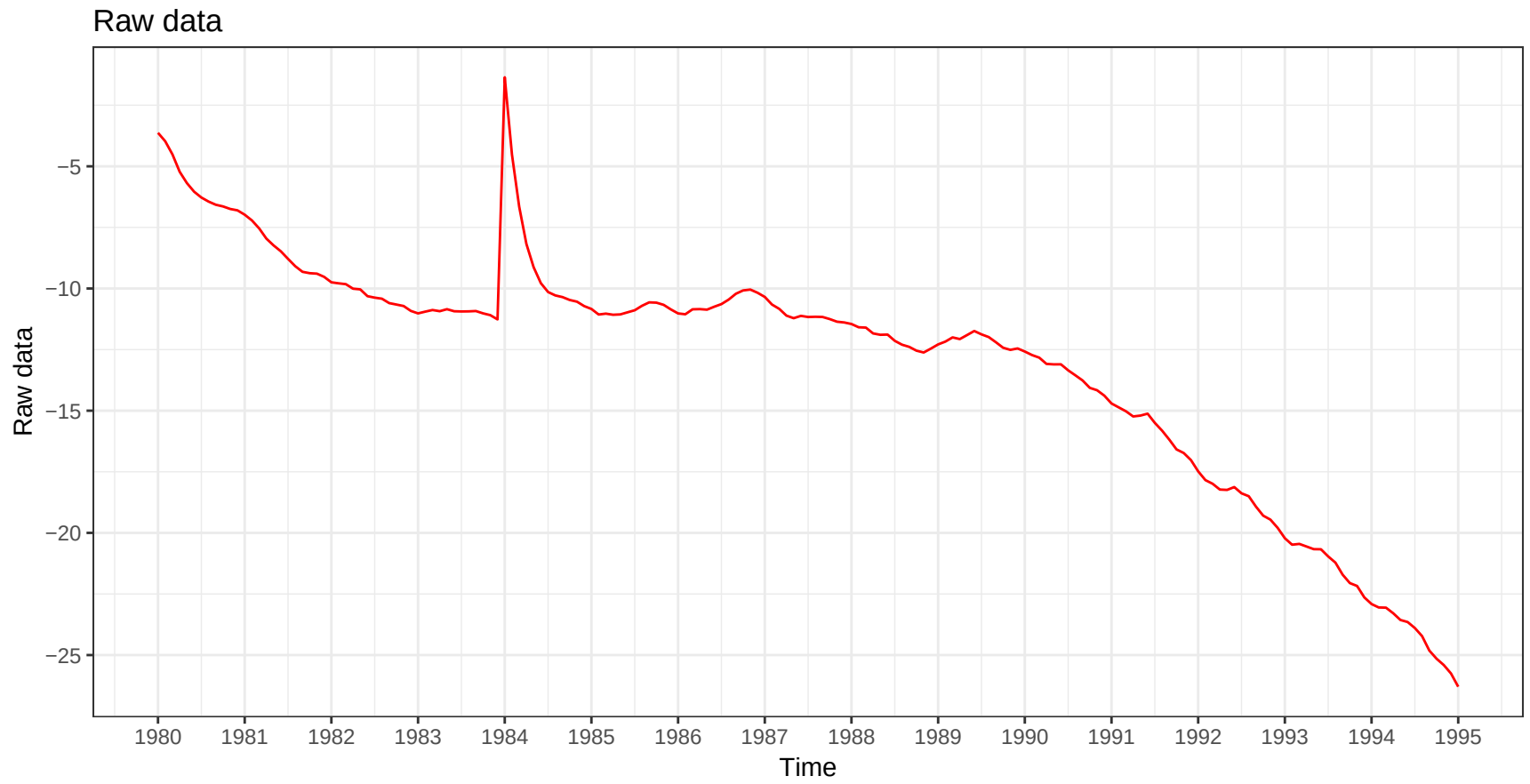
Estimate value of a TC(1984−01)
ARIMA (1,1,0)(0,0,0) − additive decomposition
(1−B)(1−0.7B)Xt=at



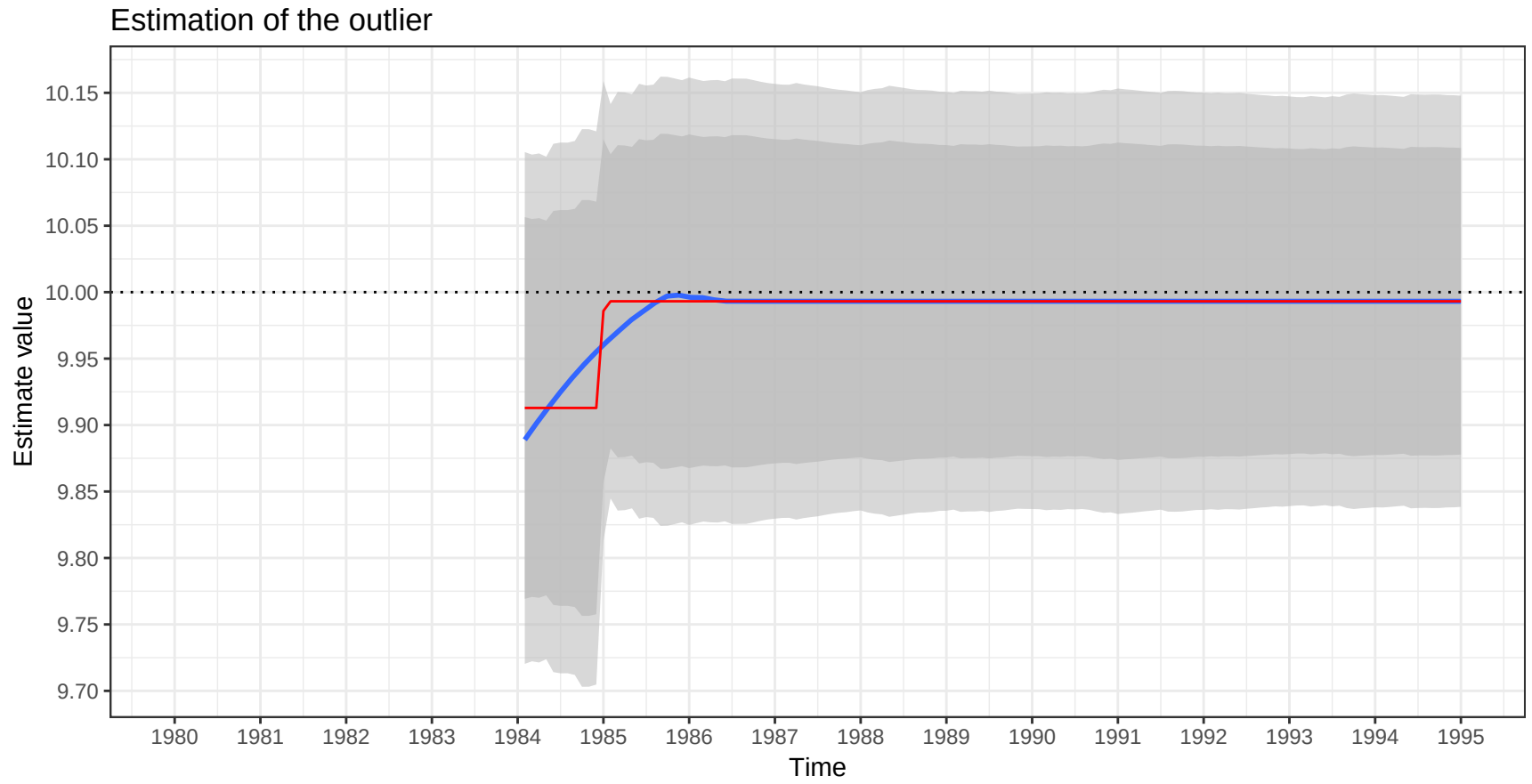


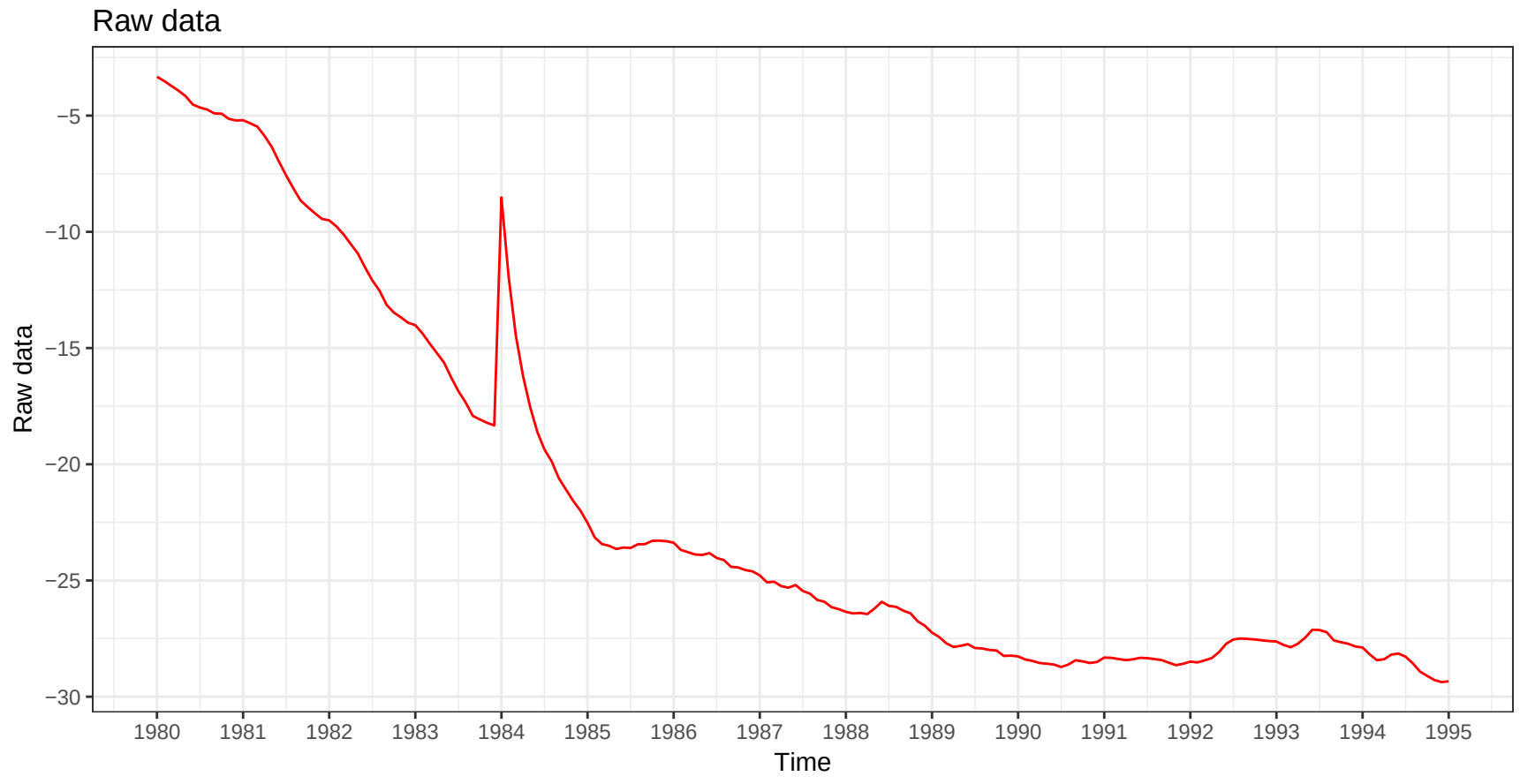
Estimate value of a TC(1984−01)
ARIMA (1,1,0)(0,0,0) − additive decomposition
(1−B)(1−0.7B)Xt=at

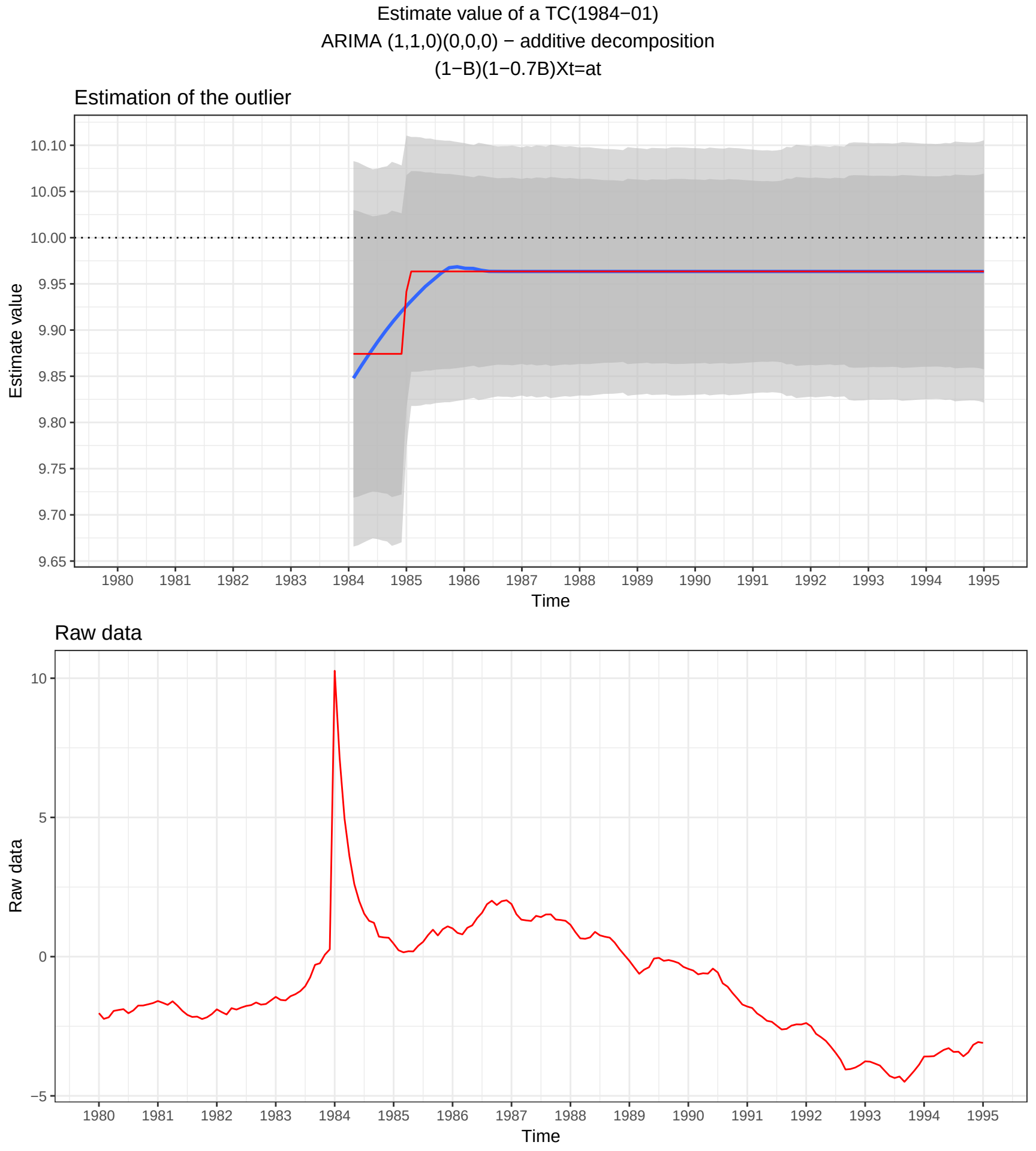




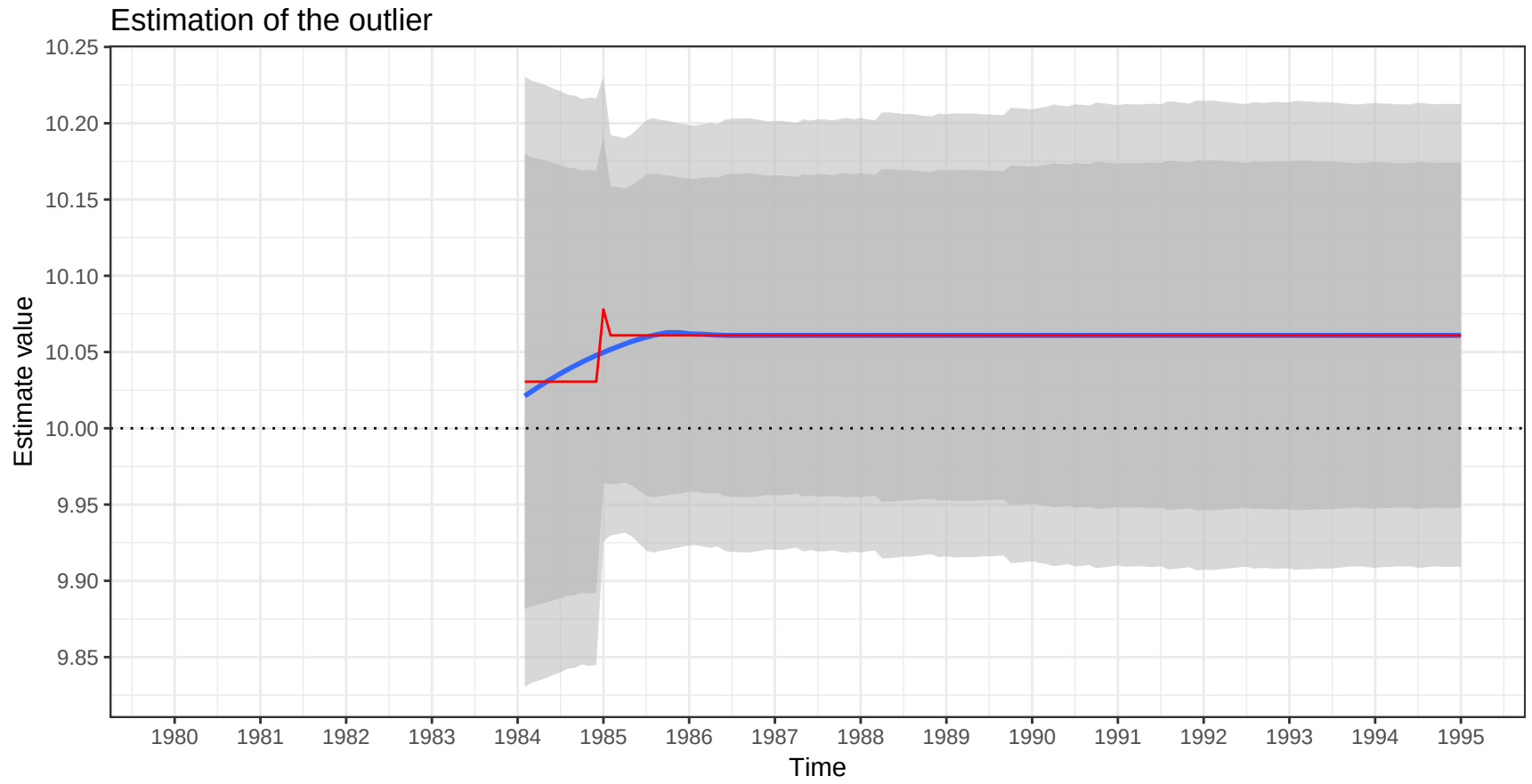
Estimate value of a TC(1984−01)
ARIMA (1,1,0)(0,0,0) − additive decomposition
(1−B)(1−0.7B)Xt=at

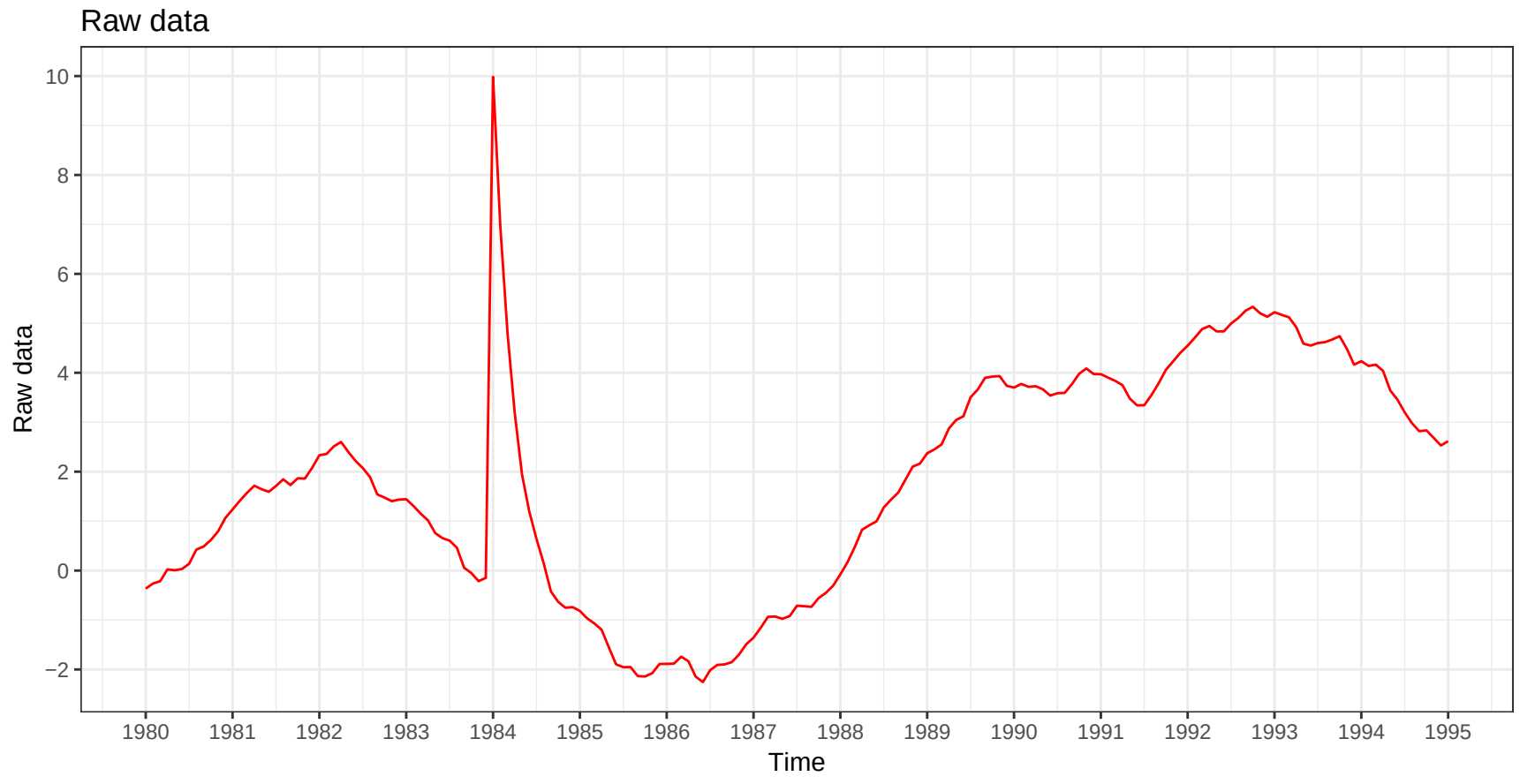




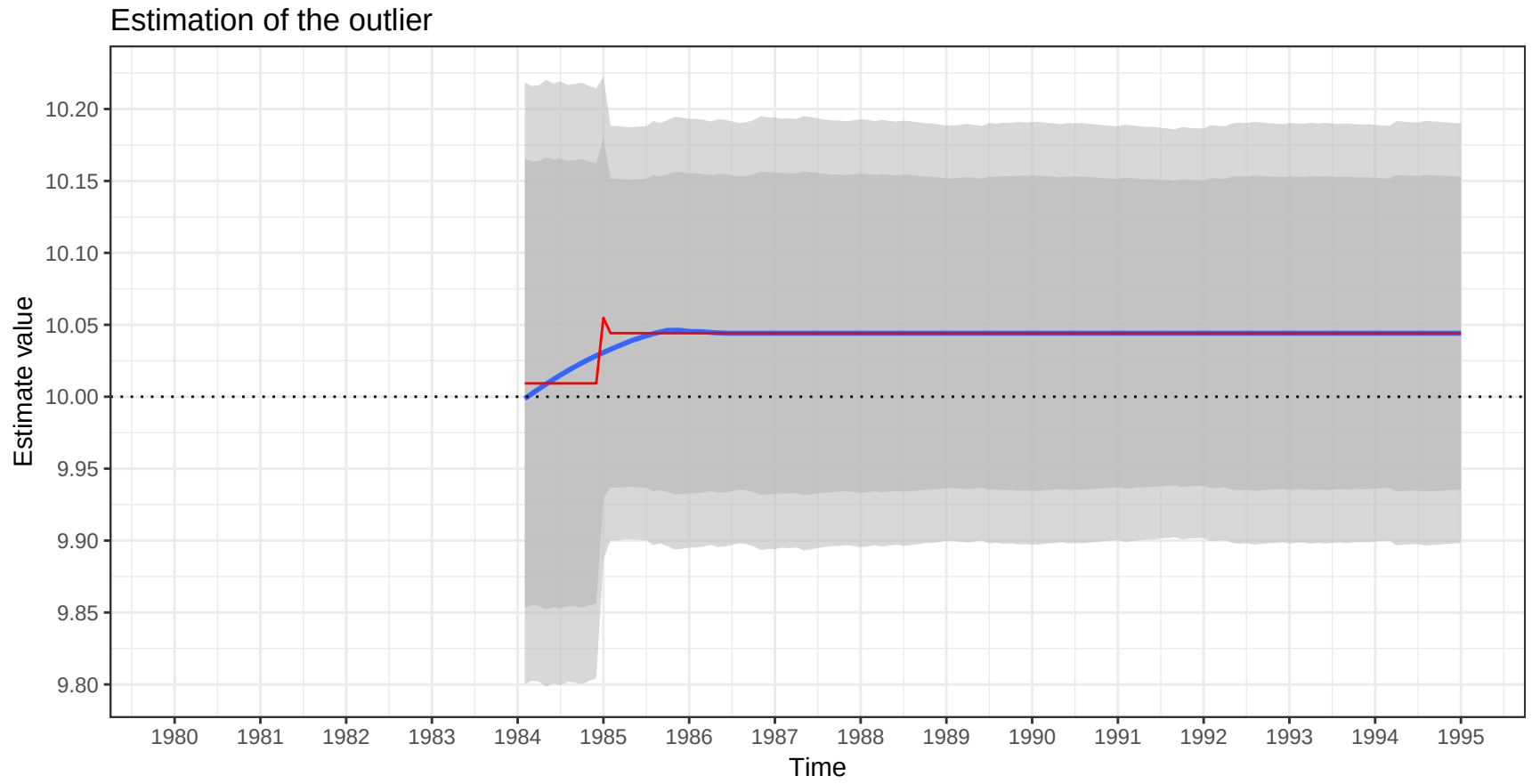

Estimate value of a TC(1984−01)
ARIMA (1,1,0)(0,0,0) − additive decomposition
(1−B)(1−0.7B)Xt=at
Estimation of the outlier
Estimate value
10.10
10.05
10.00
9.95
9.90
9.85
9.80
9.75
9.70
9.65
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time
Raw data
Raw data
10
5
0
−5
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time

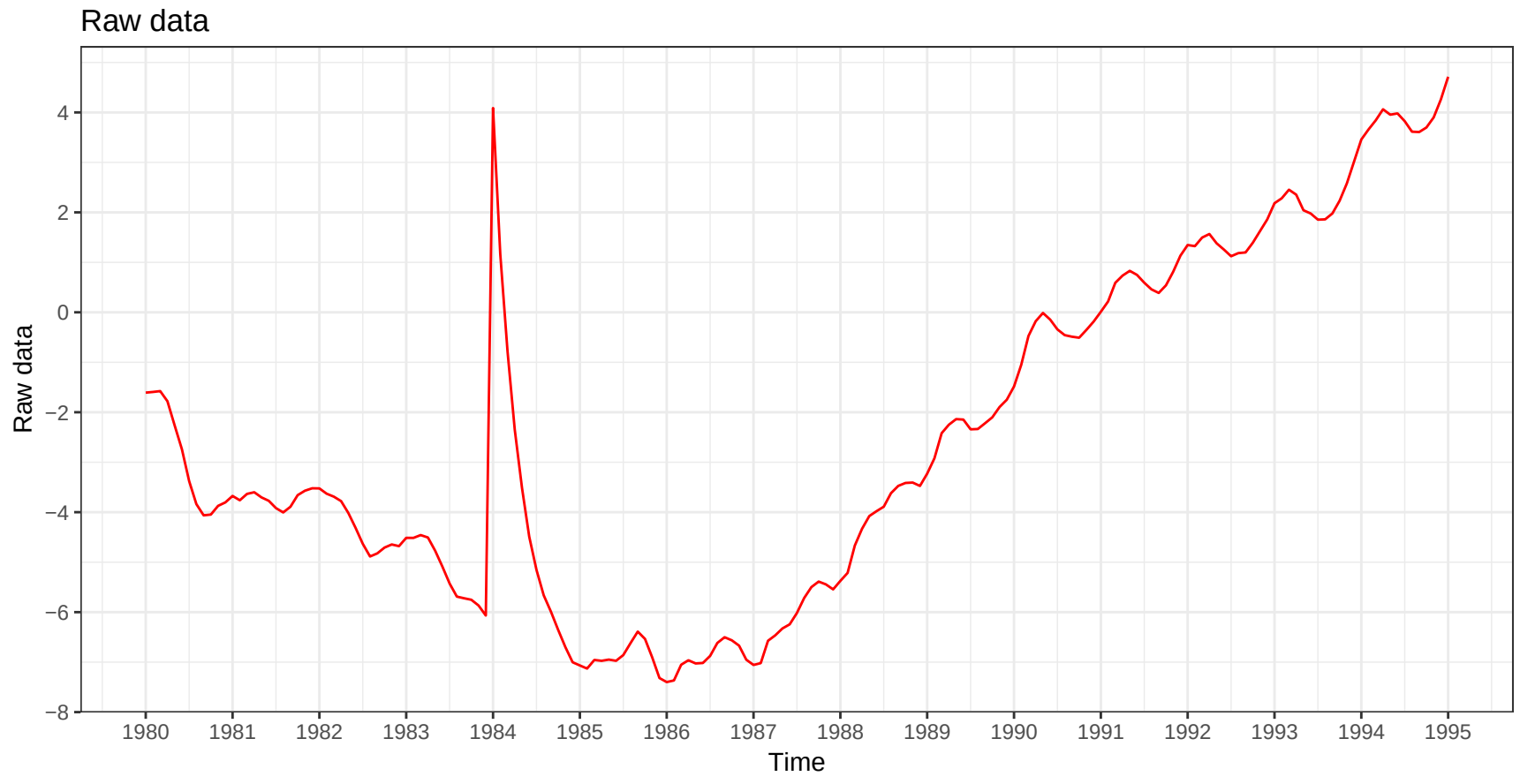
Estimate value of a TC(1984−01)
ARIMA (1,1,0)(0,0,0) − additive decomposition
(1−B)(1−0.7B)Xt=at



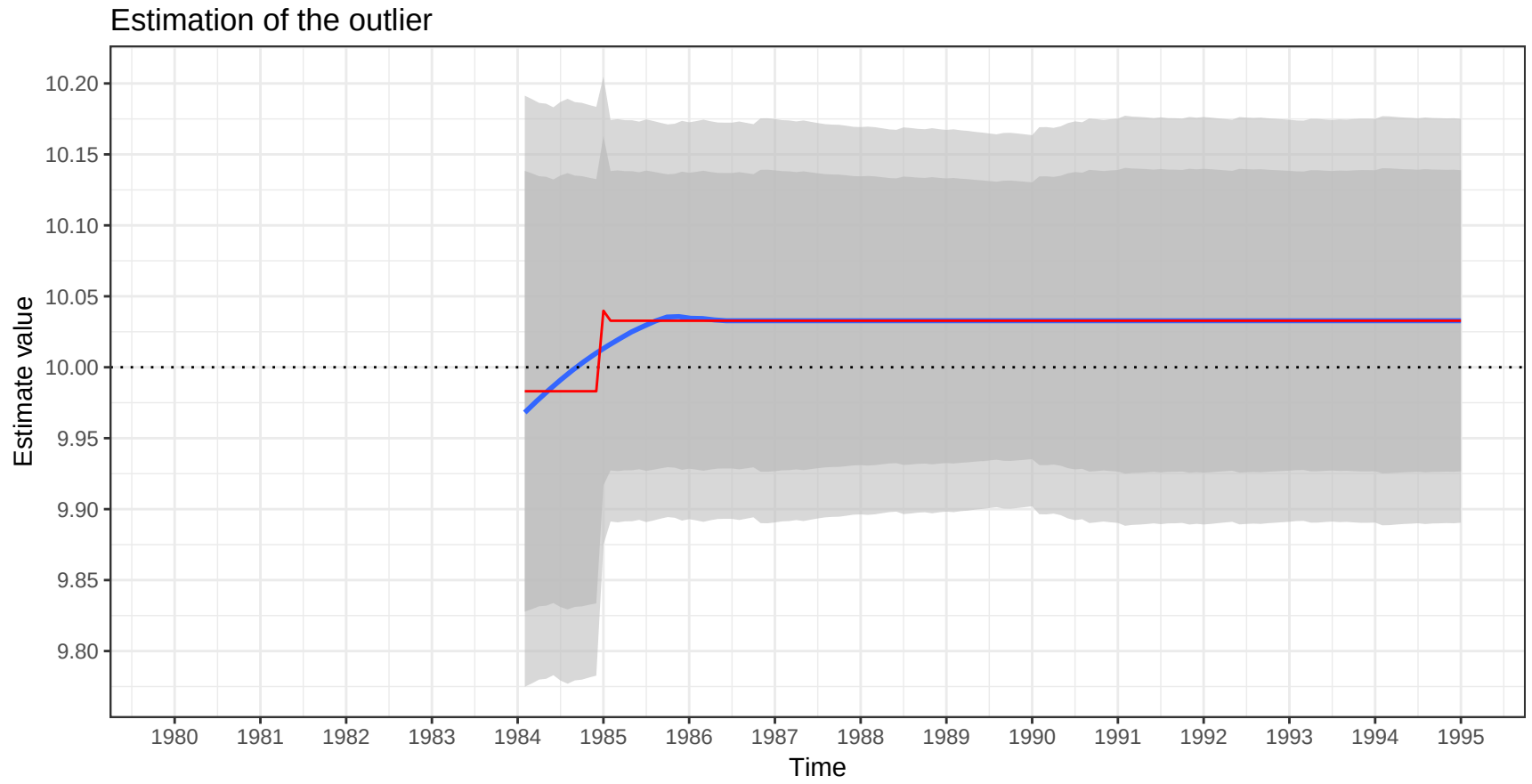


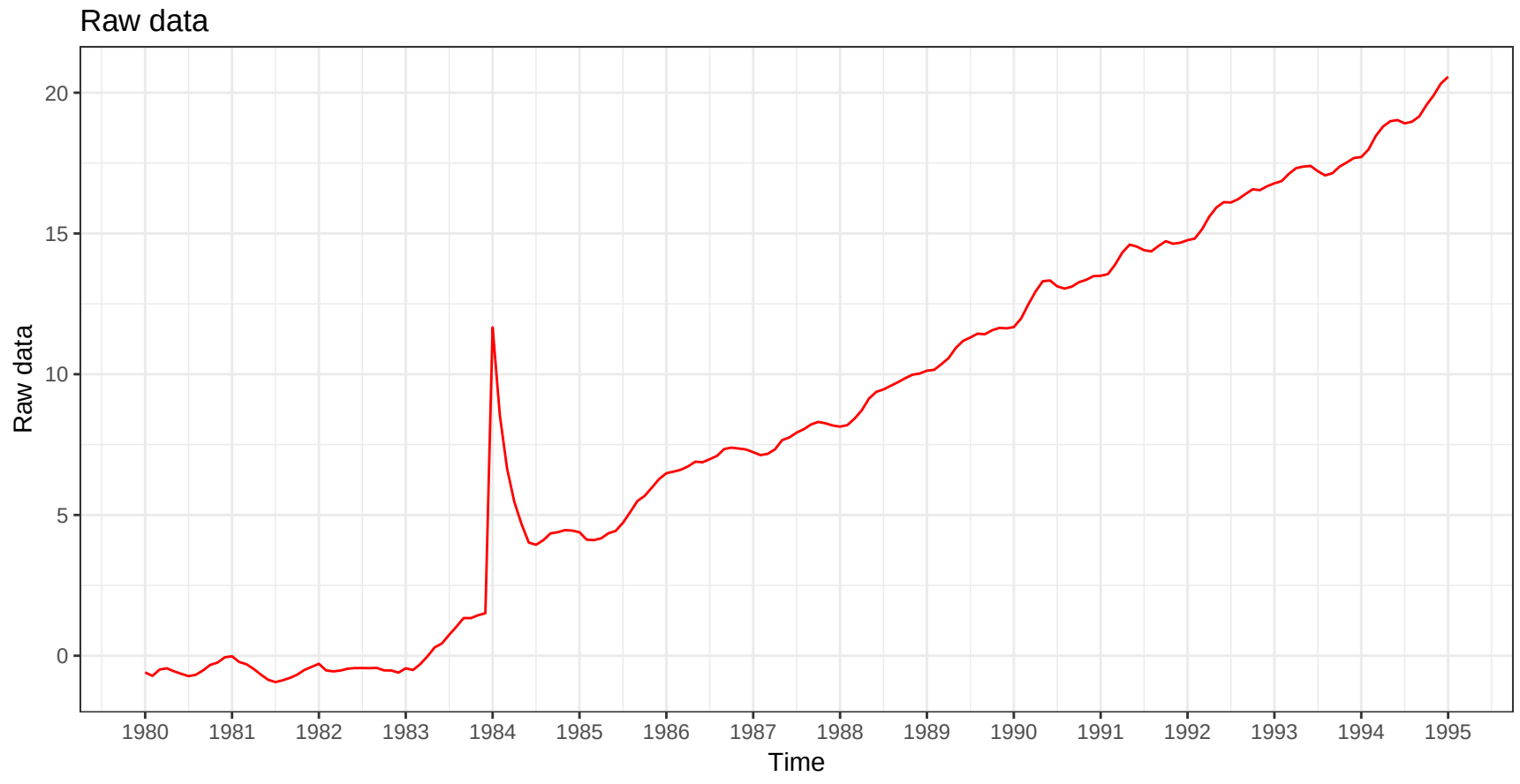
Estimate value of a TC(1984−01)
ARIMA (1,1,0)(0,0,0) − additive decomposition
(1−B)(1−0.7B)Xt=at



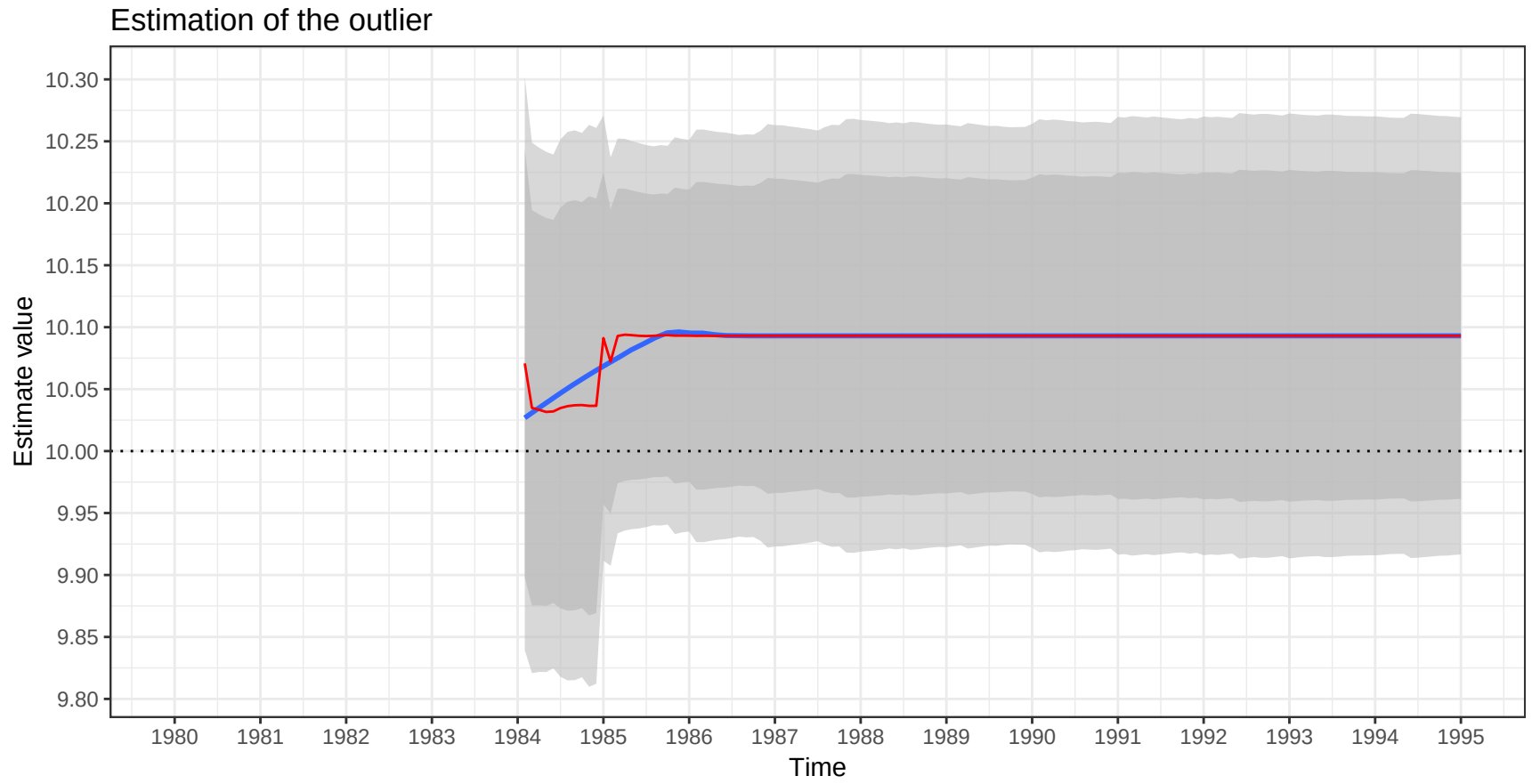


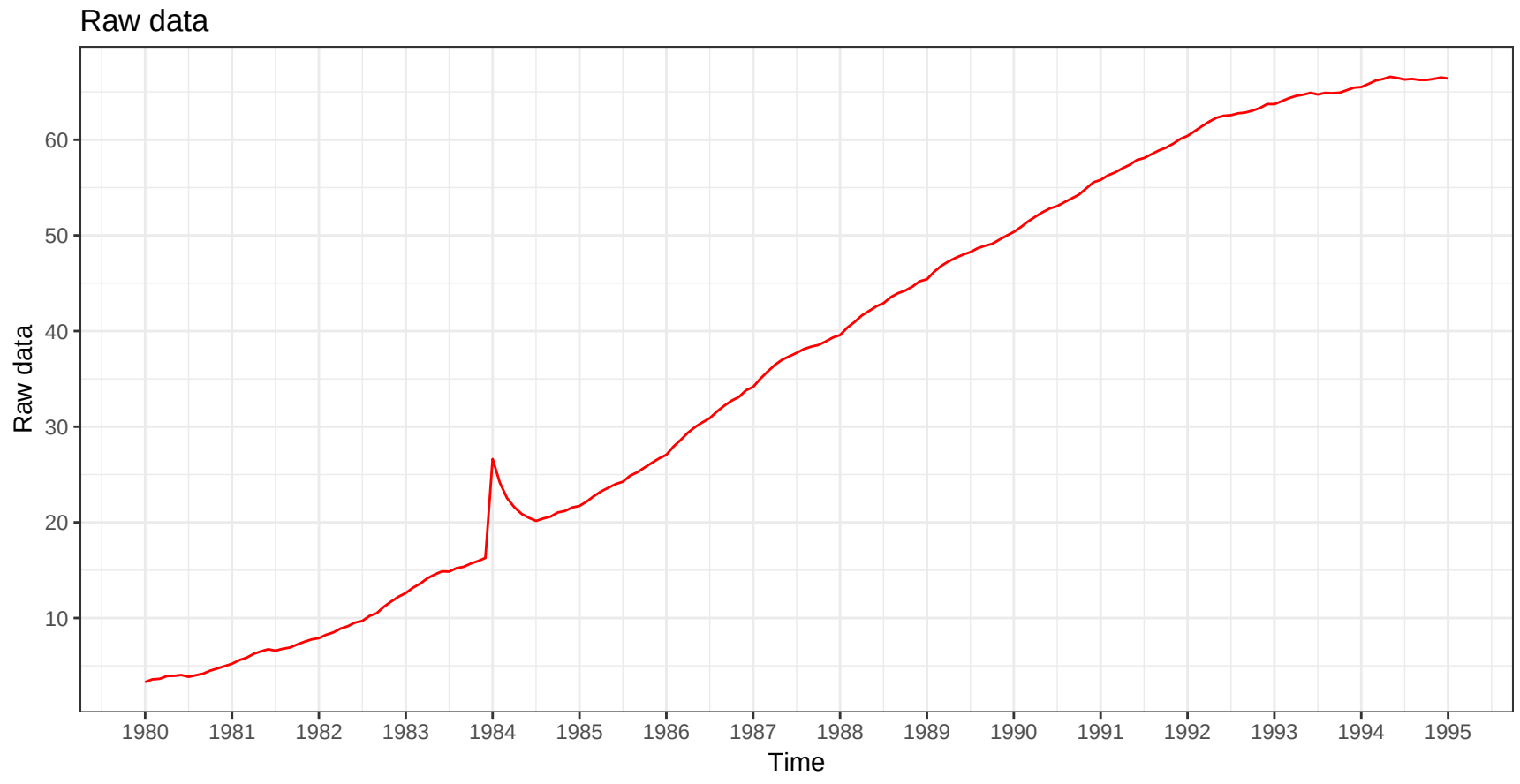
Estimate value of a TC(1984−01)
ARIMA (1,1,0)(0,0,0) − additive decomposition
(1−B)(1−0.7B)Xt=at



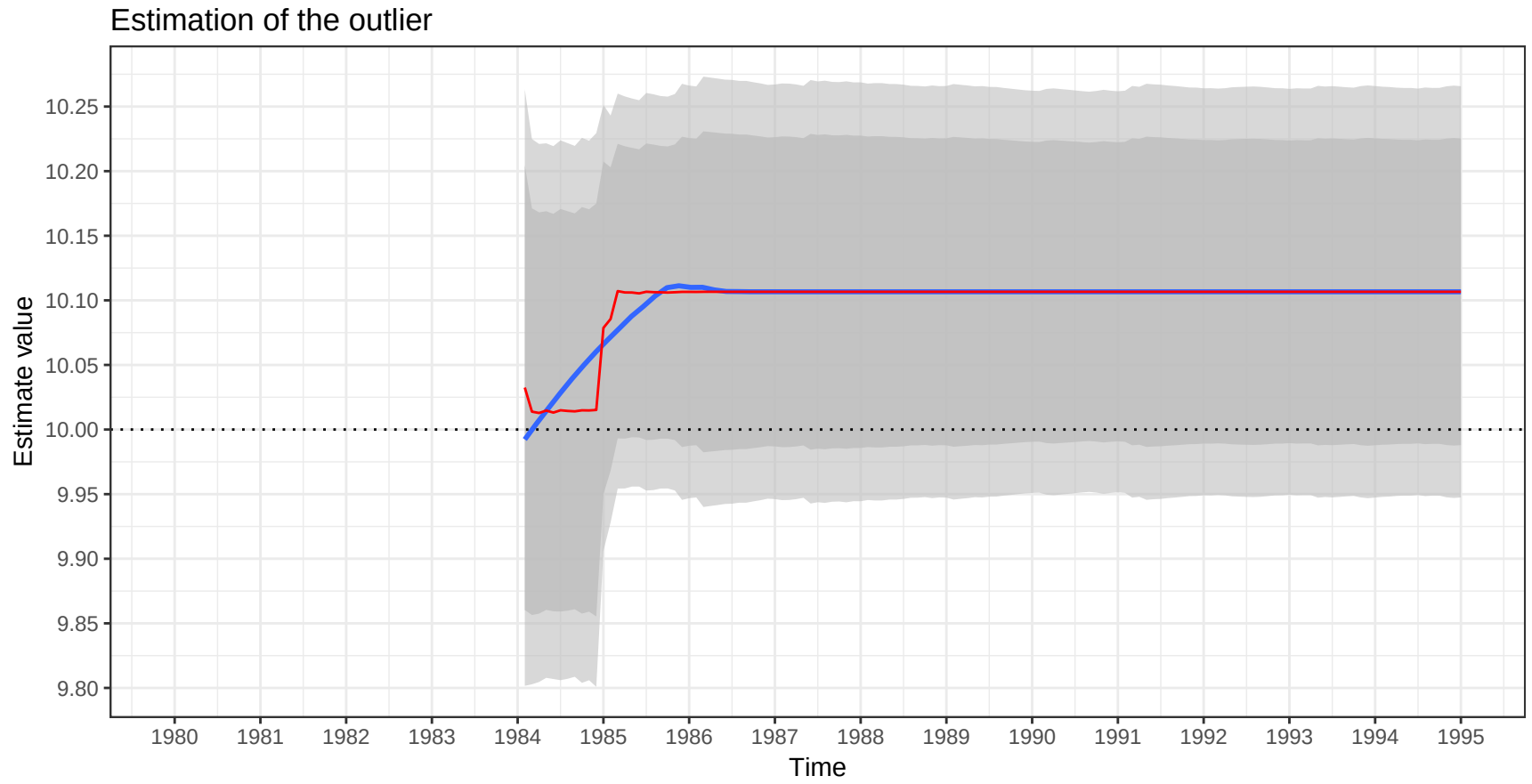


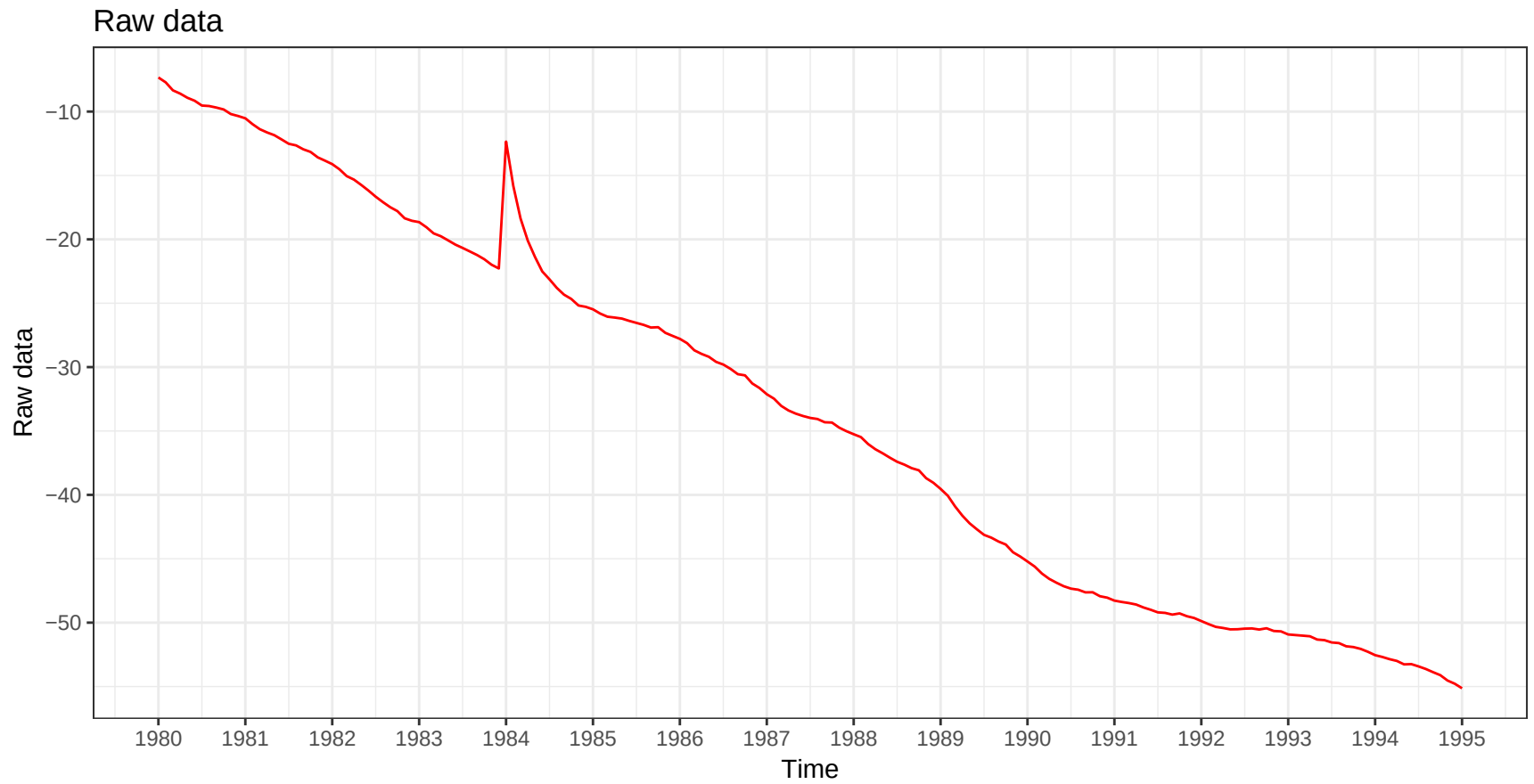
Estimate value of a TC(1984−01)
ARIMA (2,1,0)(0,0,0) − additive decomposition
(1−B)(1−0.4B+0.42B2)Xt=at



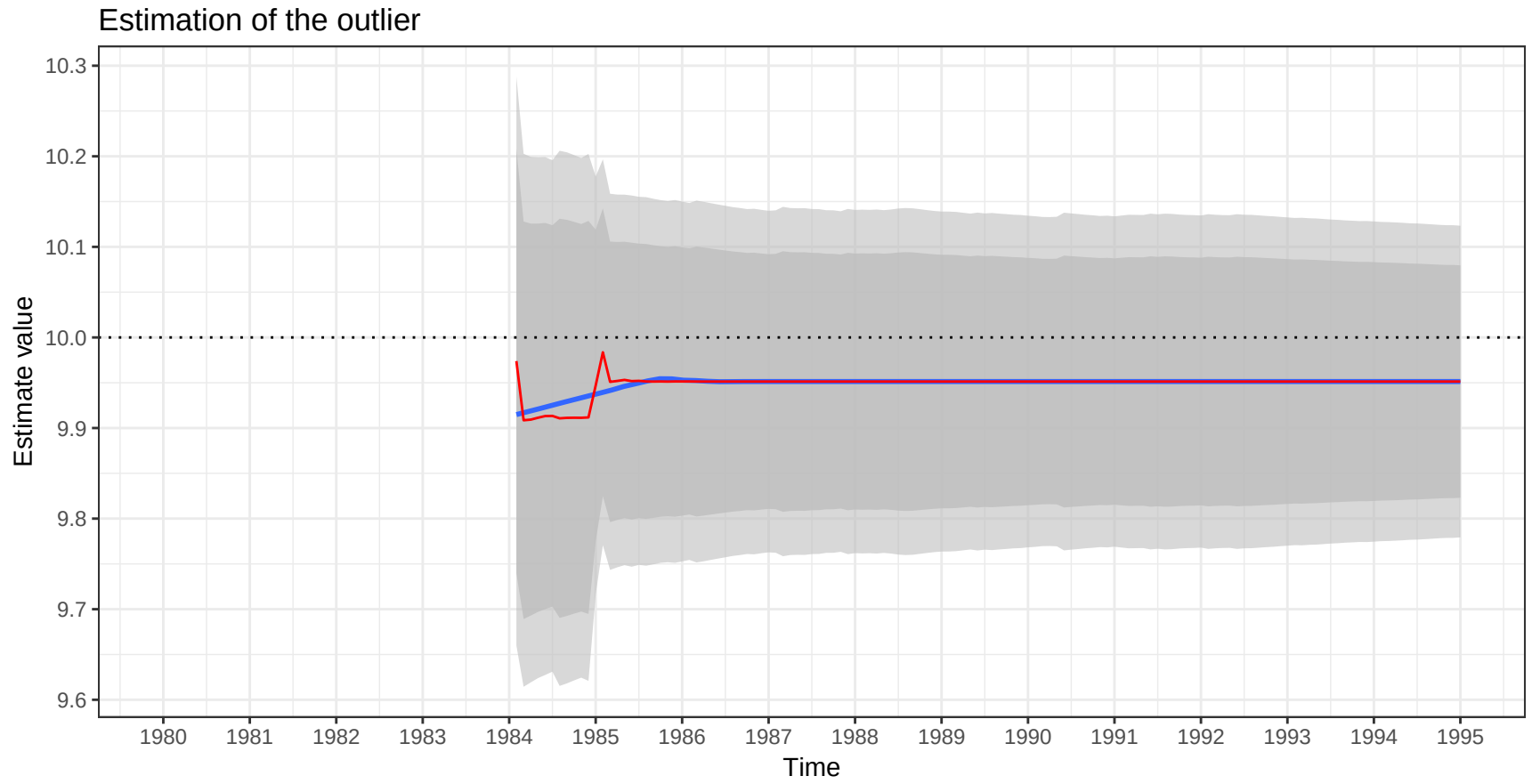


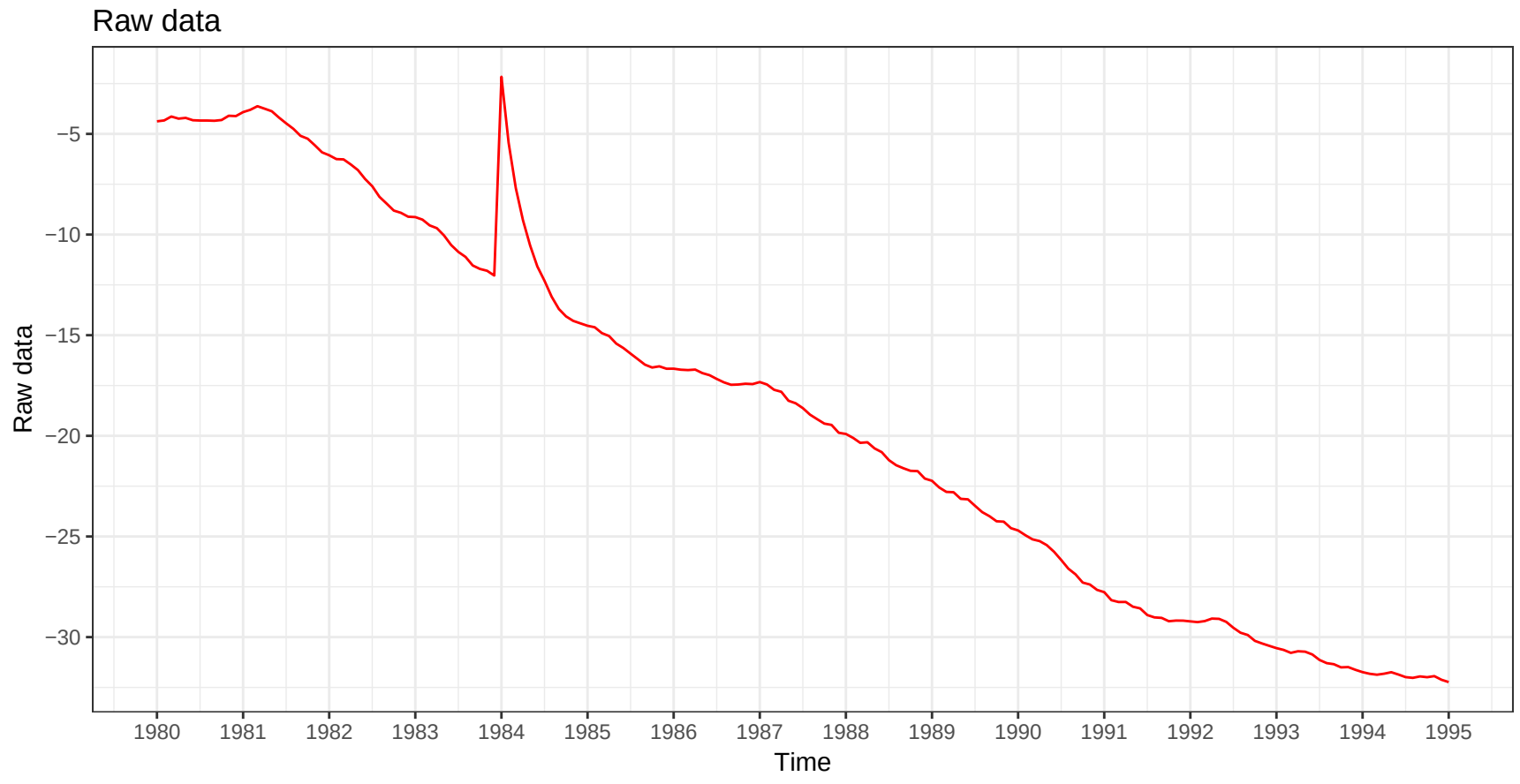
Estimate value of a TC(1984−01)
ARIMA (2,1,0)(0,0,0) − additive decomposition
(1−B)(1−0.4B+0.42B2)Xt=at



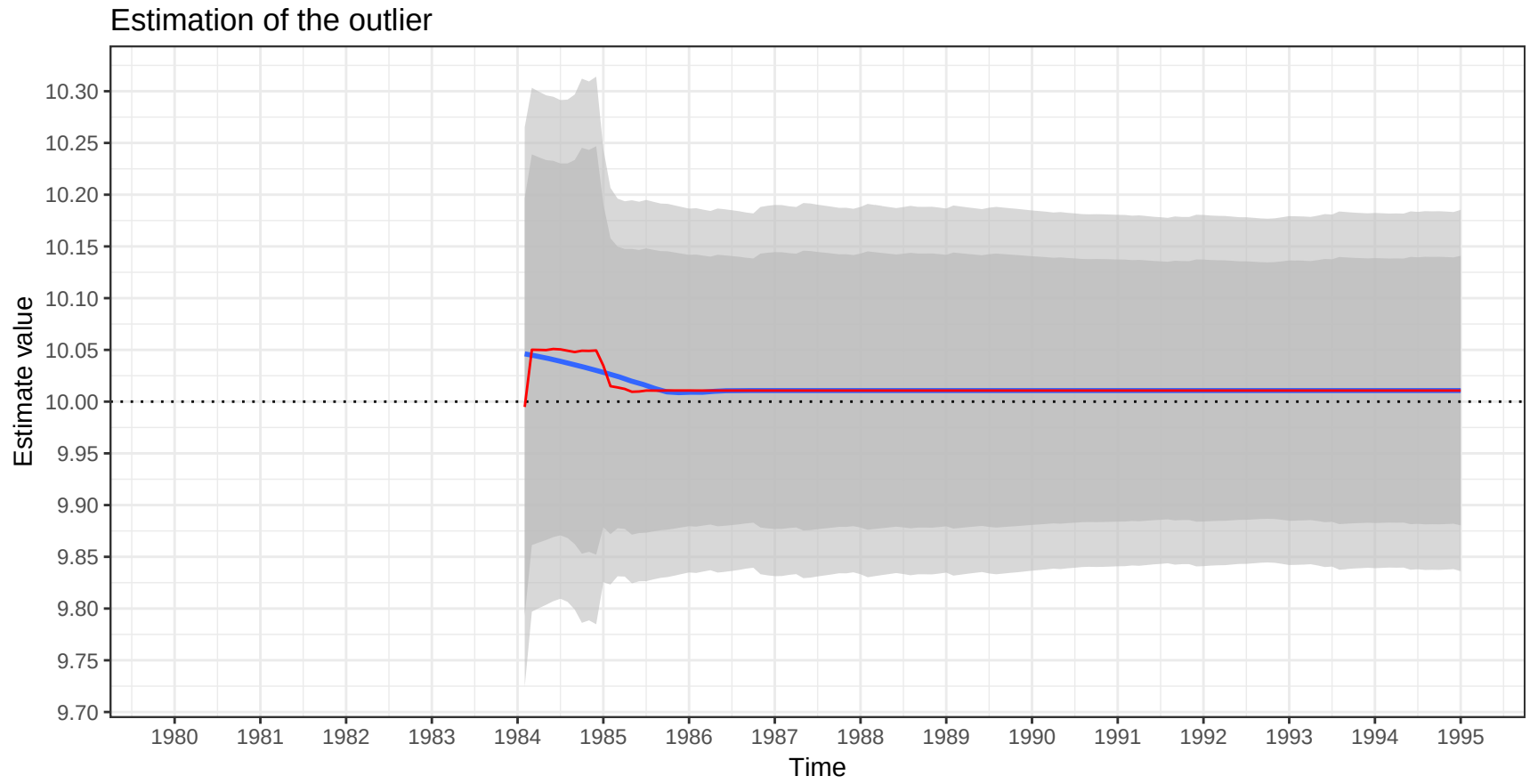


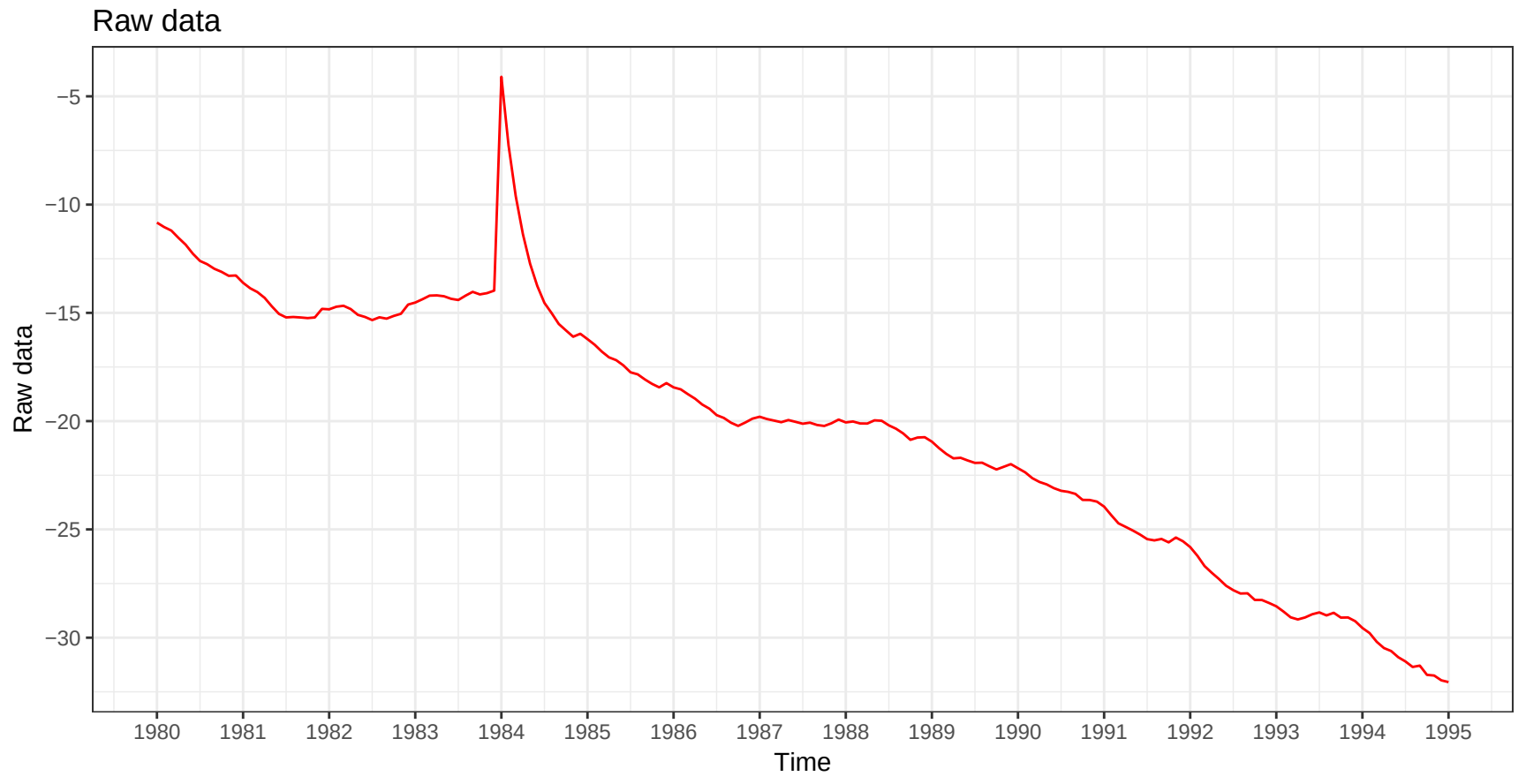
Estimate value of a TC(1984−01)
ARIMA (2,1,0)(0,0,0) − additive decomposition
(1−B)(1−0.4B+0.42B2)Xt=at



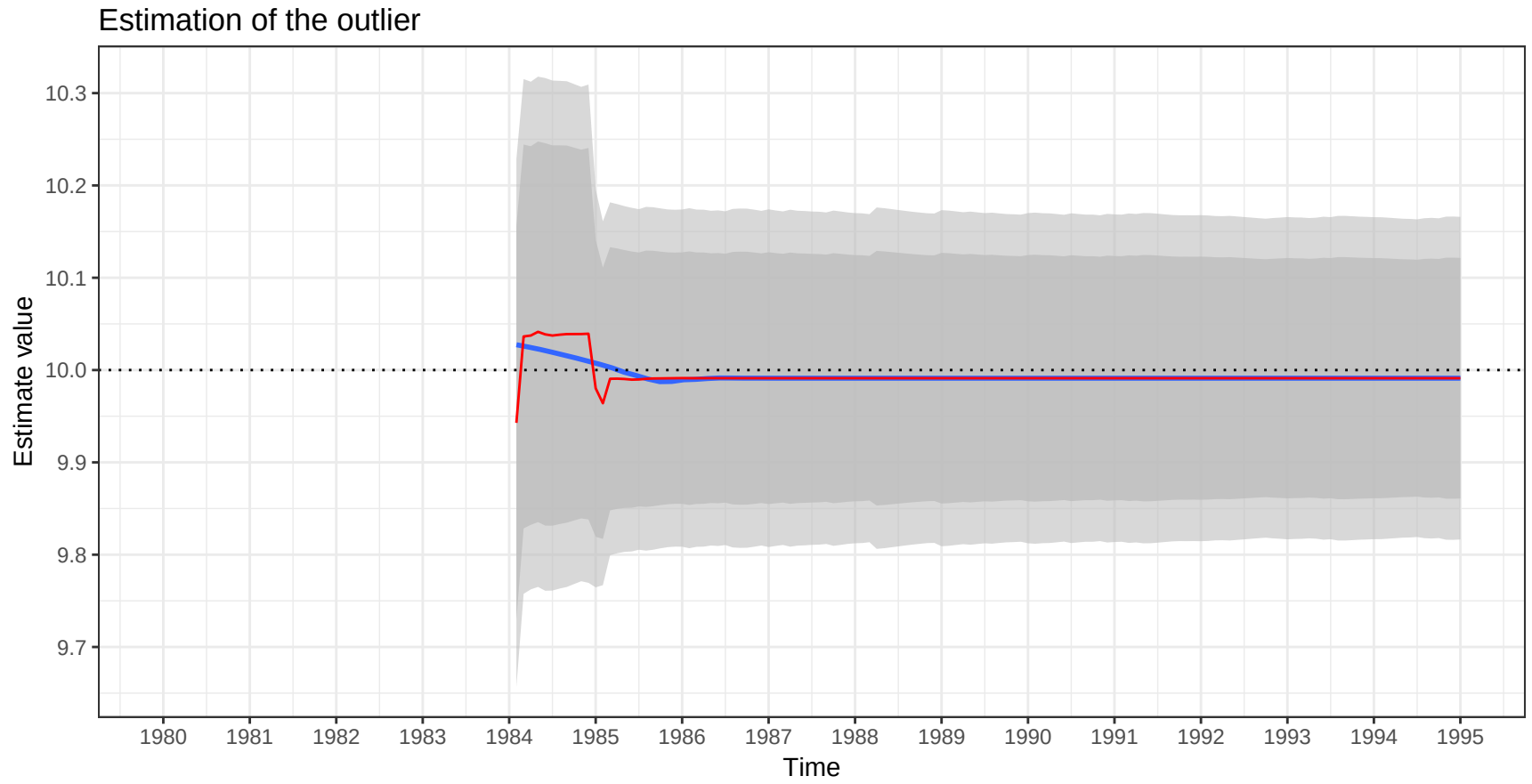


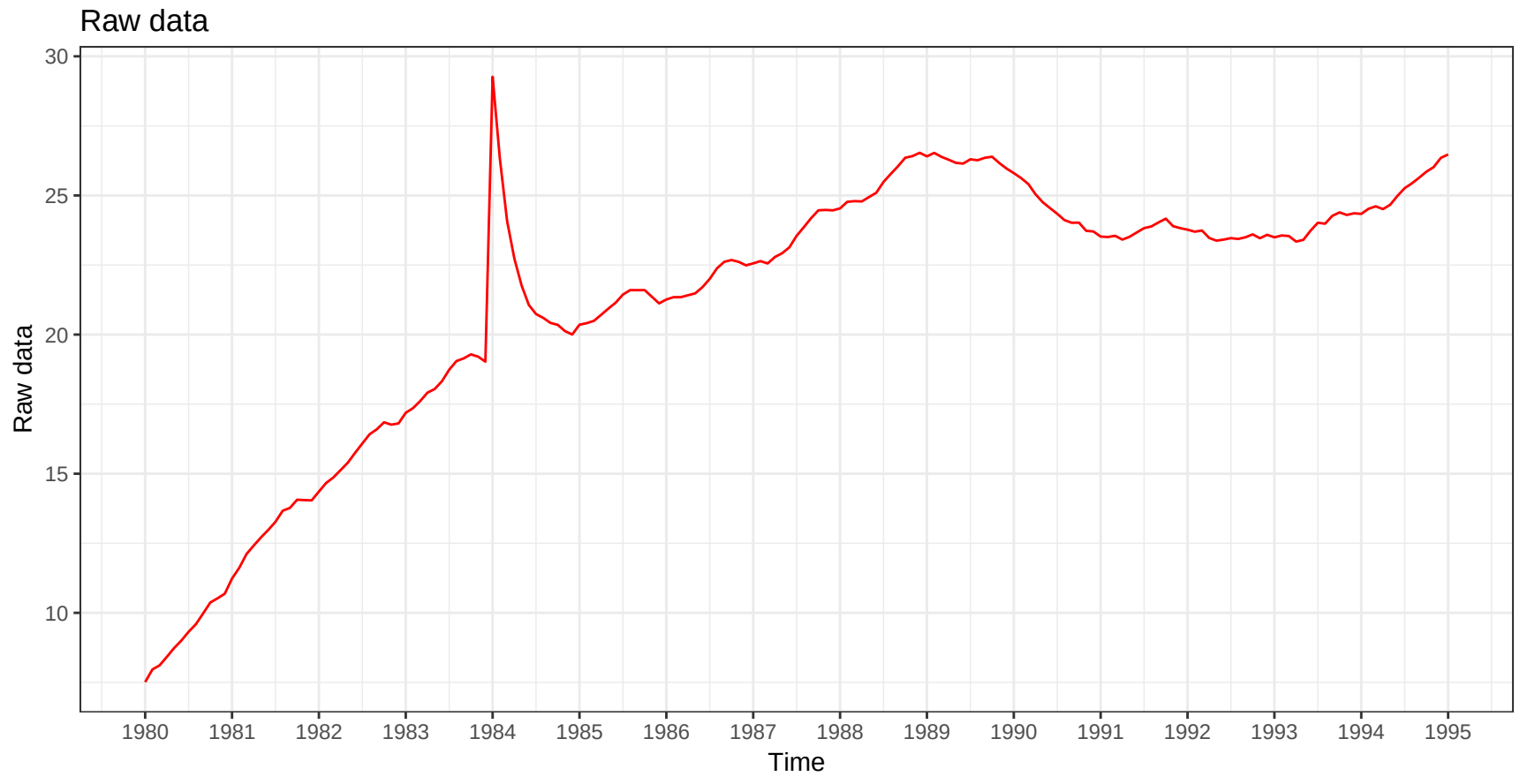
Estimate value of a TC(1984−01)
ARIMA (2,1,0)(0,0,0) − additive decomposition
(1−B)(1−0.4B+0.42B2)Xt=at



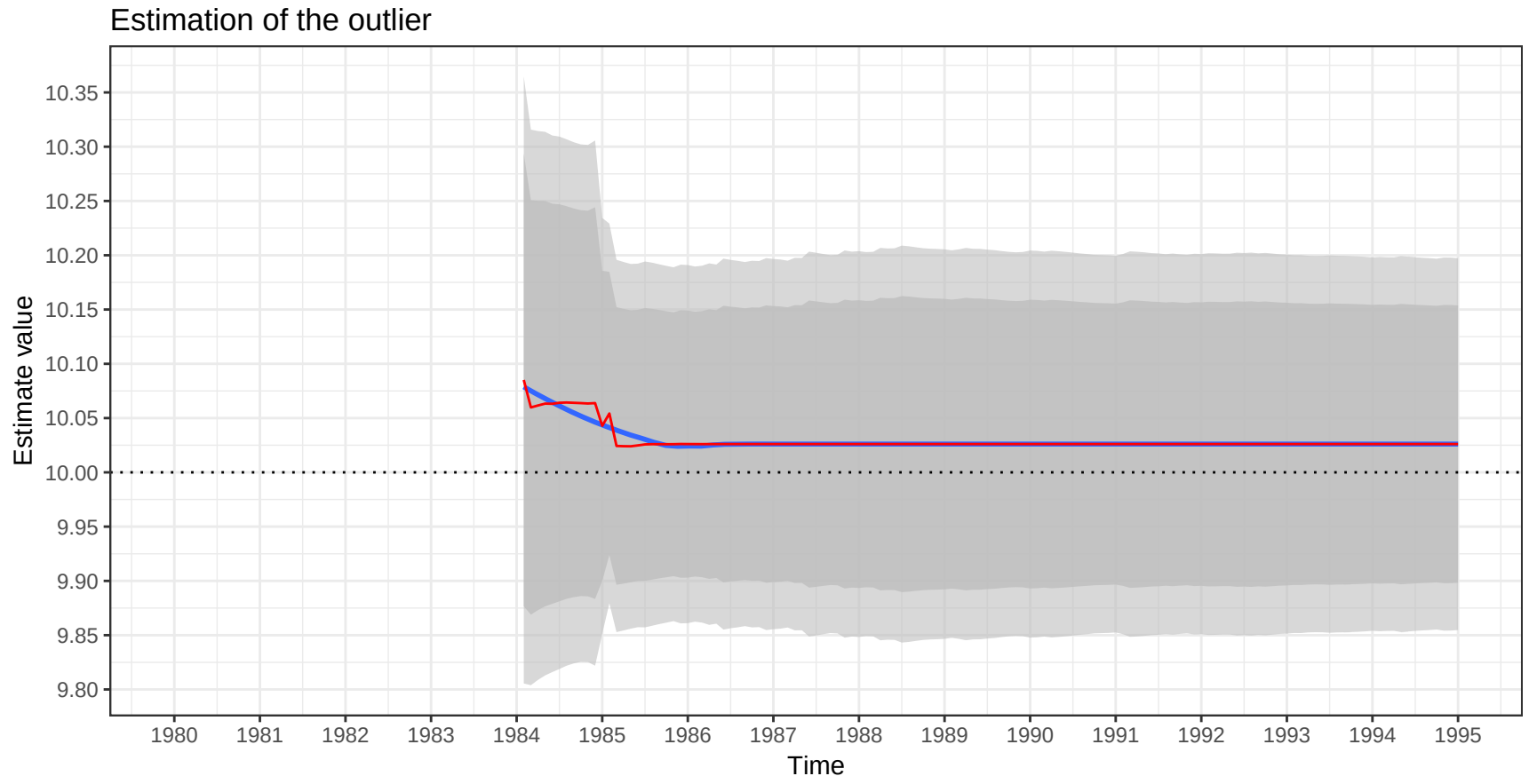


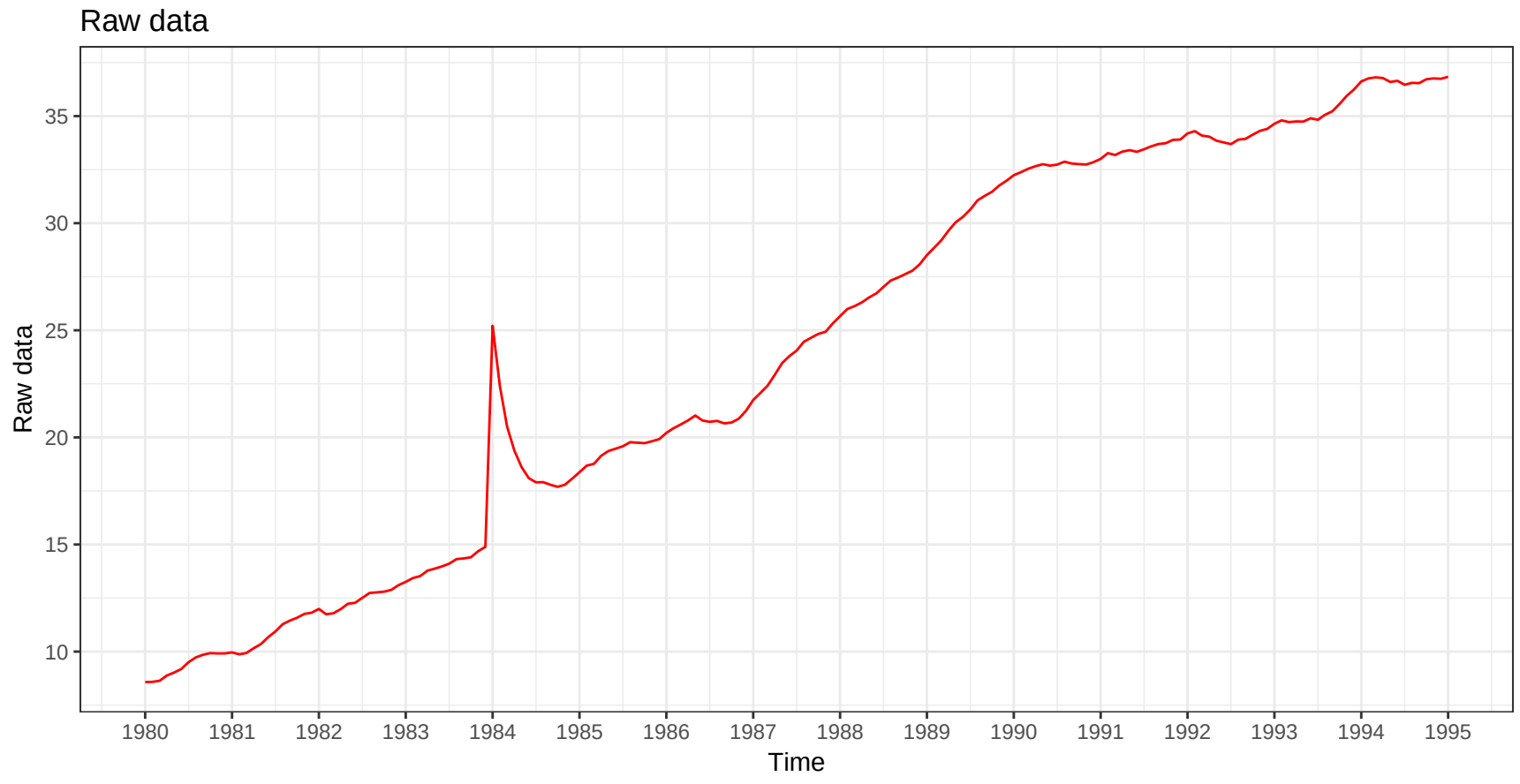
Estimate value of a TC(1984−01)
ARIMA (2,1,0)(0,0,0) − additive decomposition
(1−B)(1−0.4B+0.42B2)Xt=at



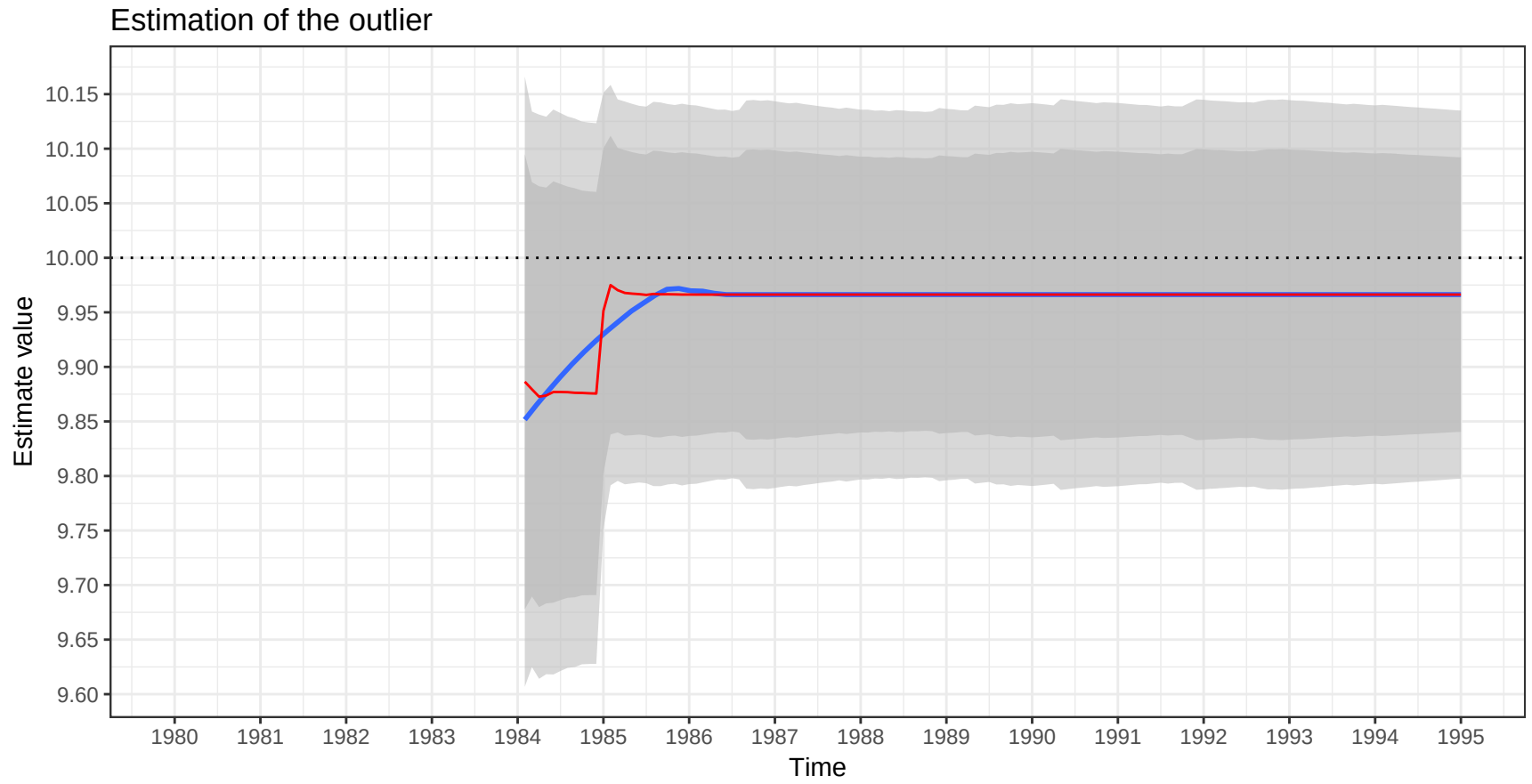


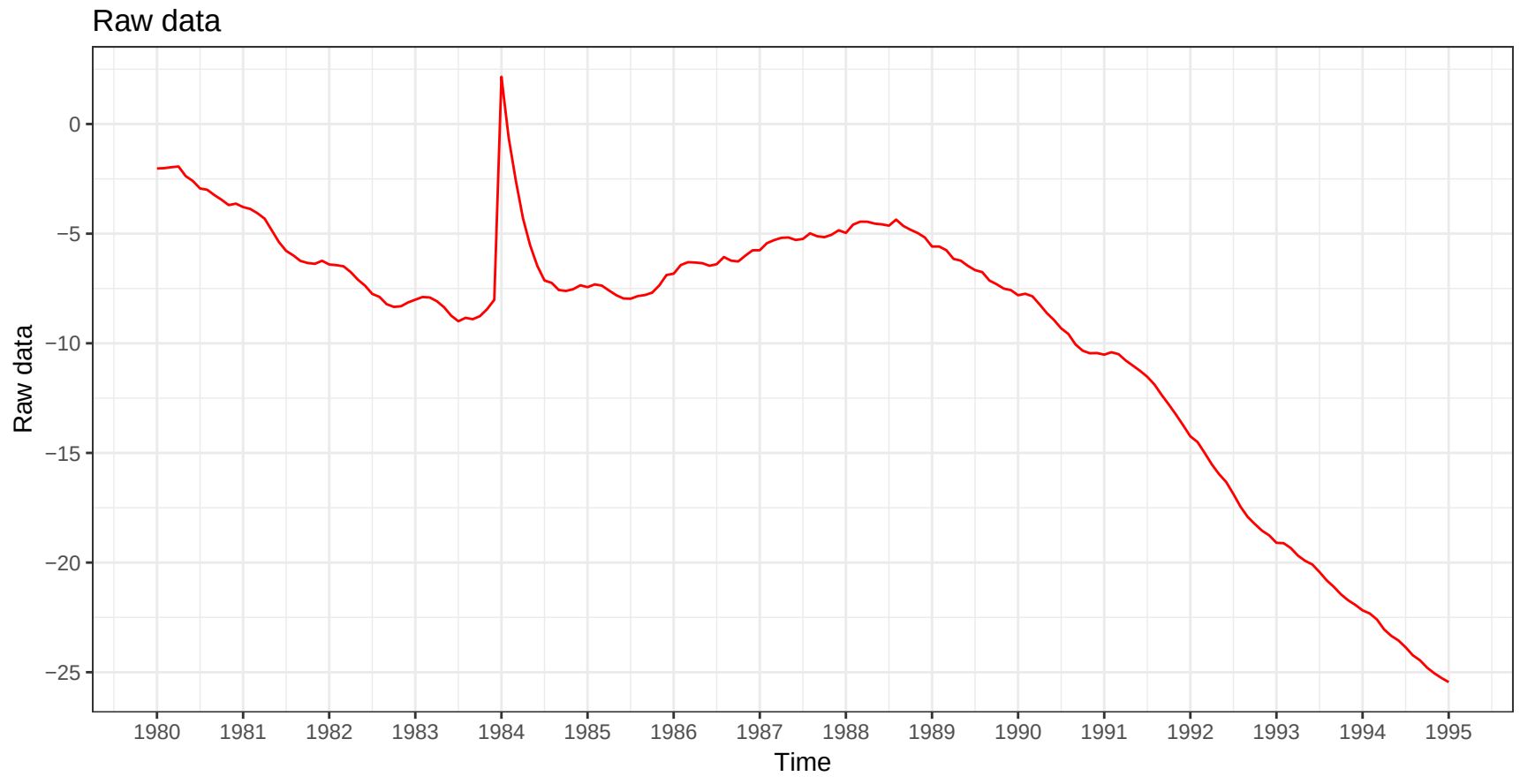
Estimate value of a TC(1984−01)
ARIMA (2,1,0)(0,0,0) − additive decomposition
(1−B)(1−0.4B+0.42B2)Xt=at



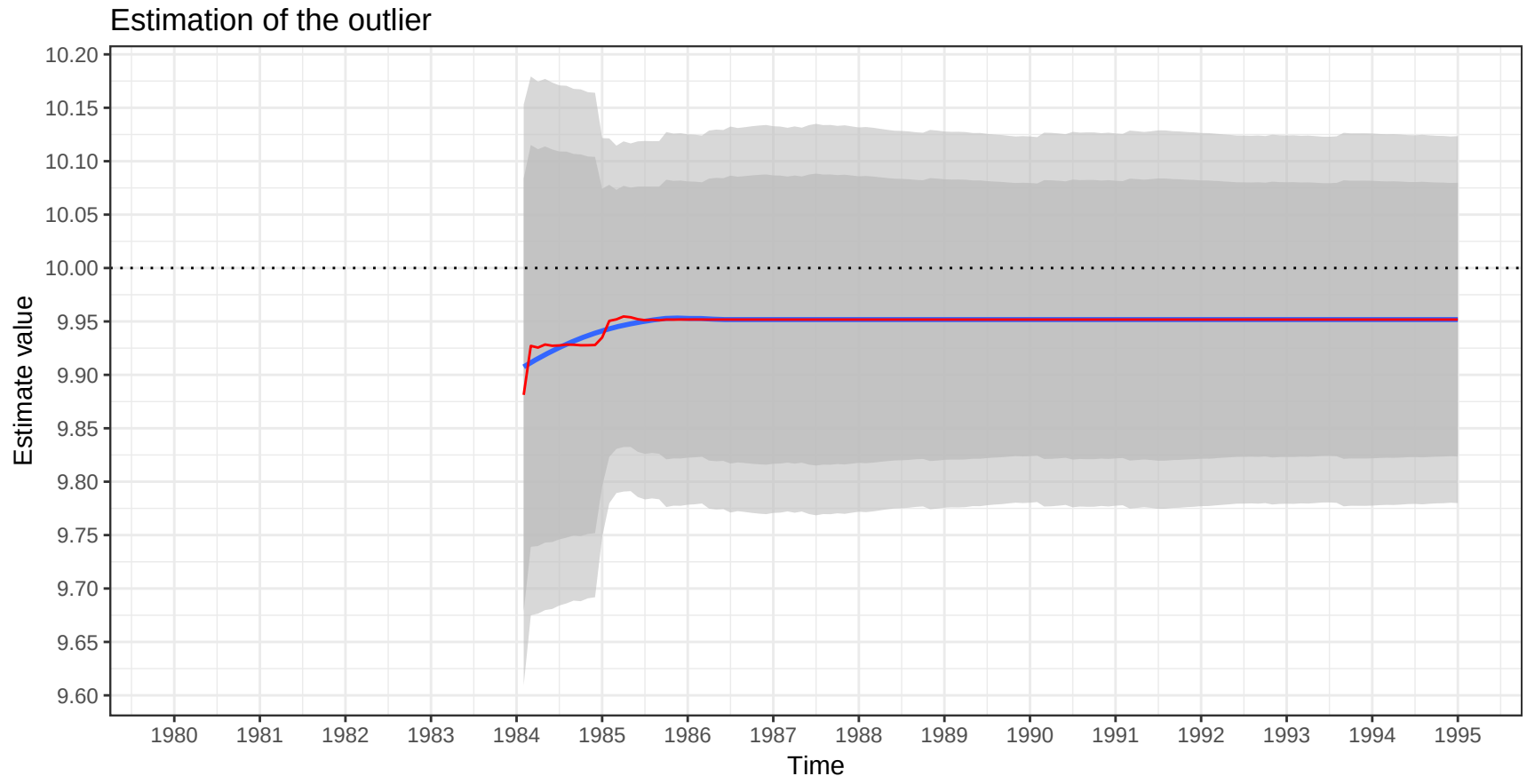


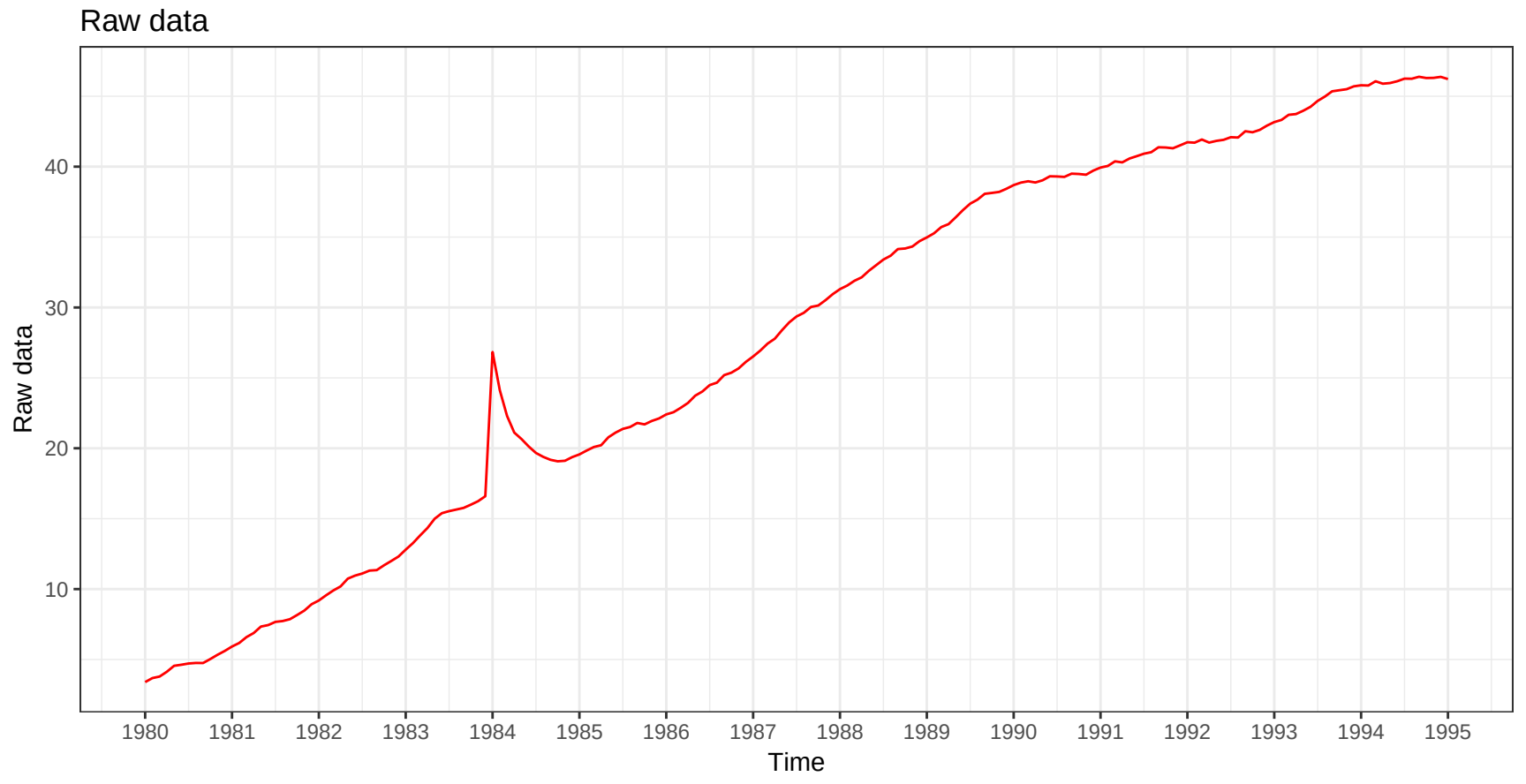
Estimate value of a TC(1984−01)
ARIMA (2,1,0)(0,0,0) − additive decomposition
(1−B)(1−0.4B+0.42B2)Xt=at



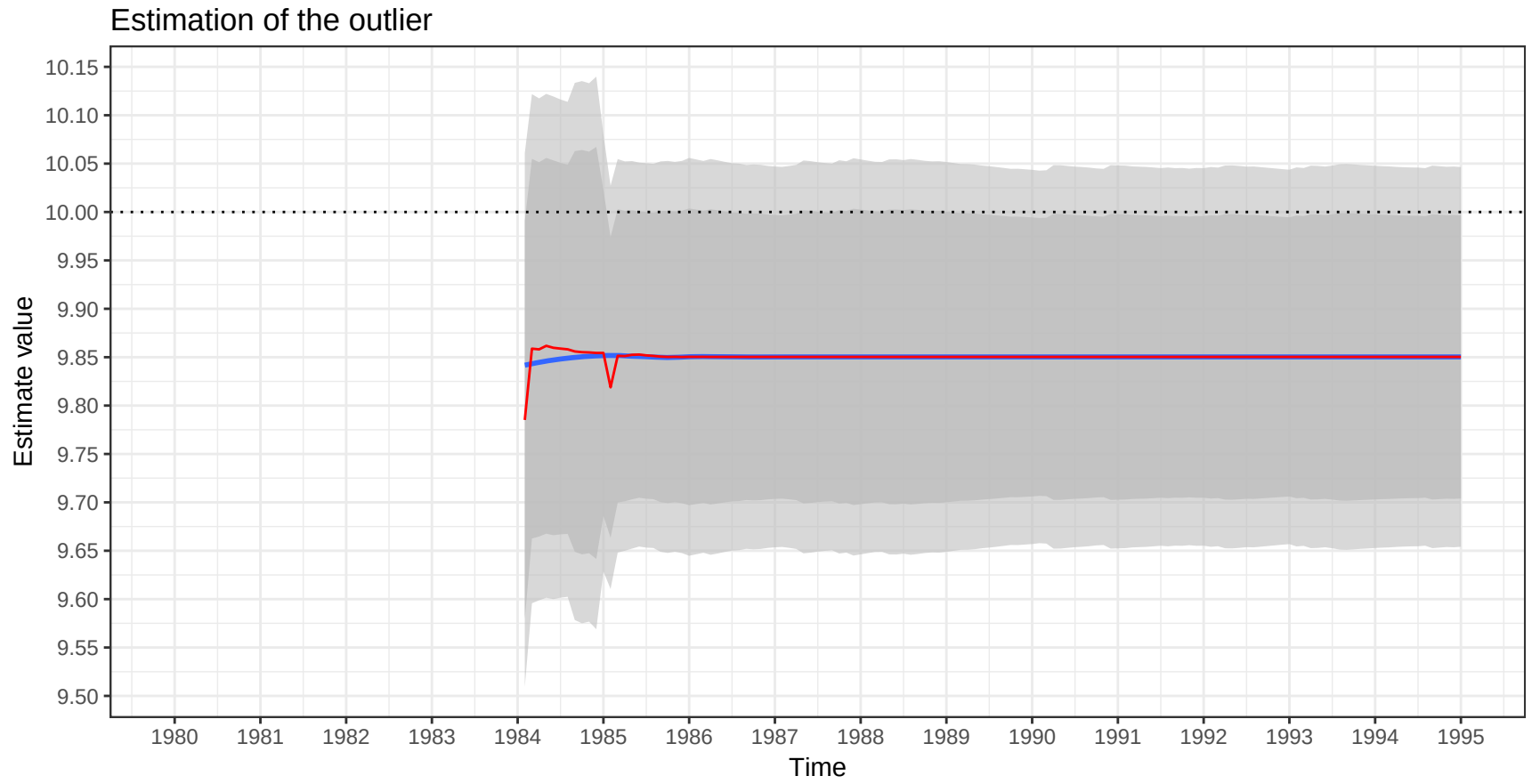


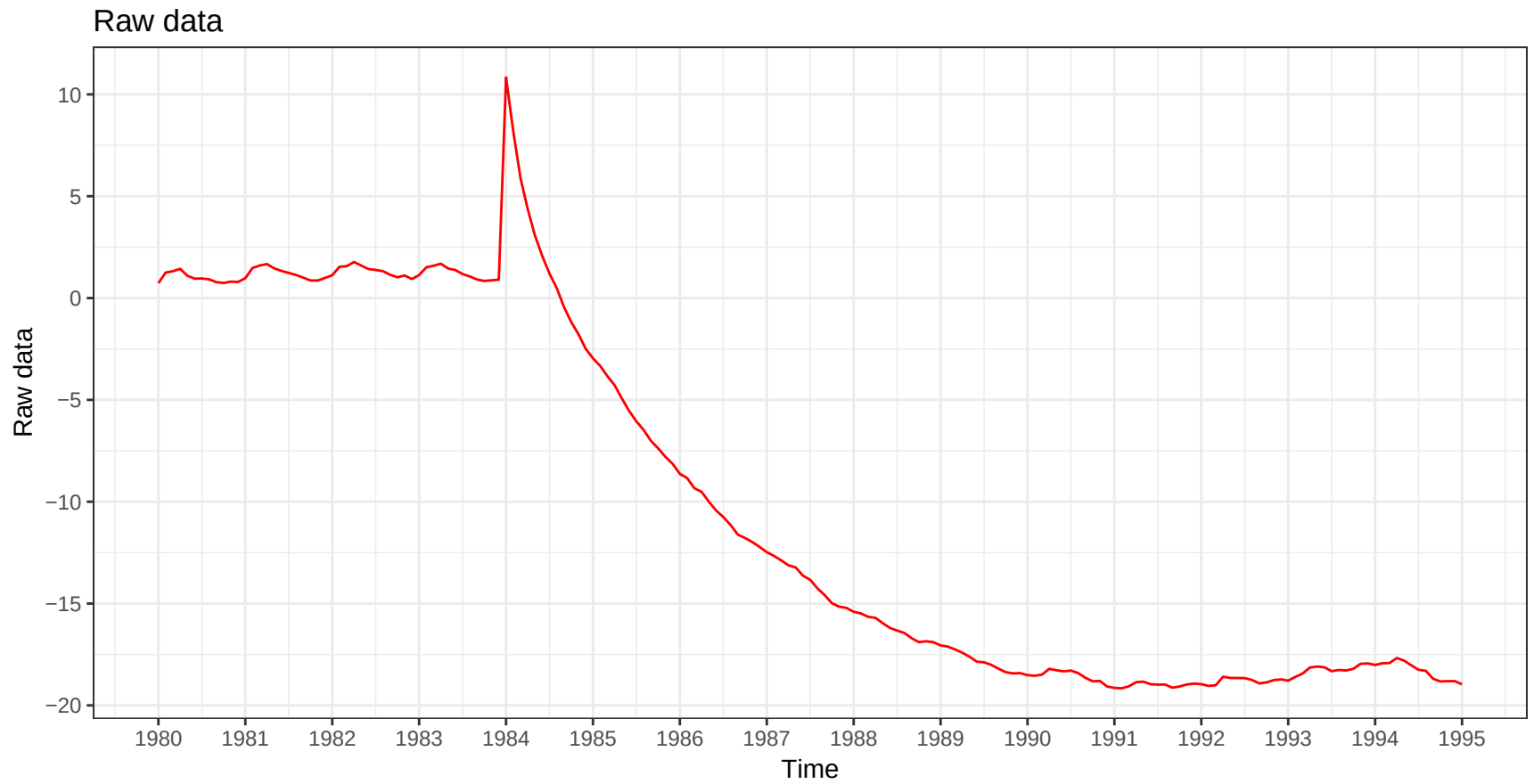
Estimate value of a TC(1984−01)
ARIMA (2,1,0)(0,0,0) − additive decomposition
(1−B)(1−0.4B+0.42B2)Xt=at



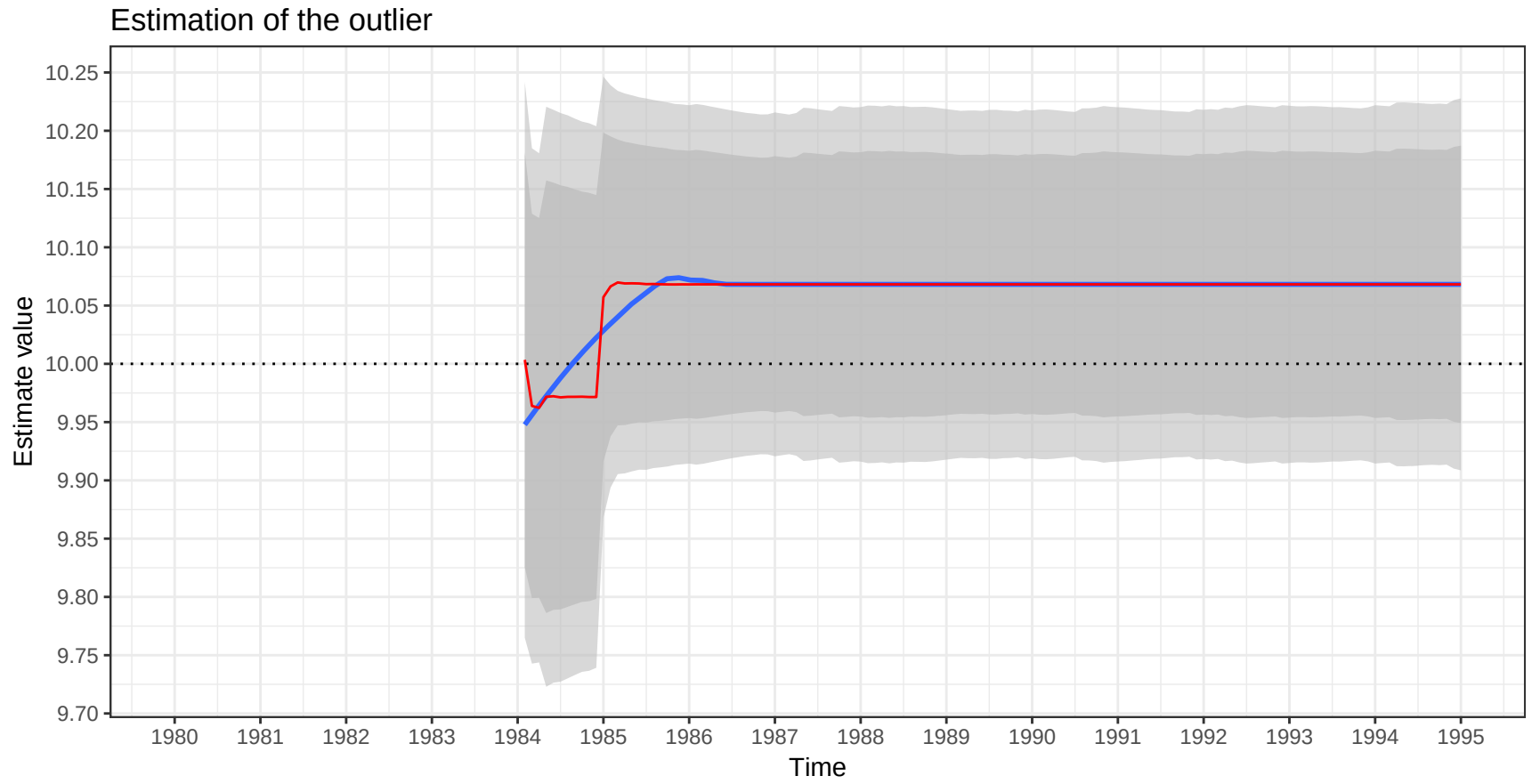


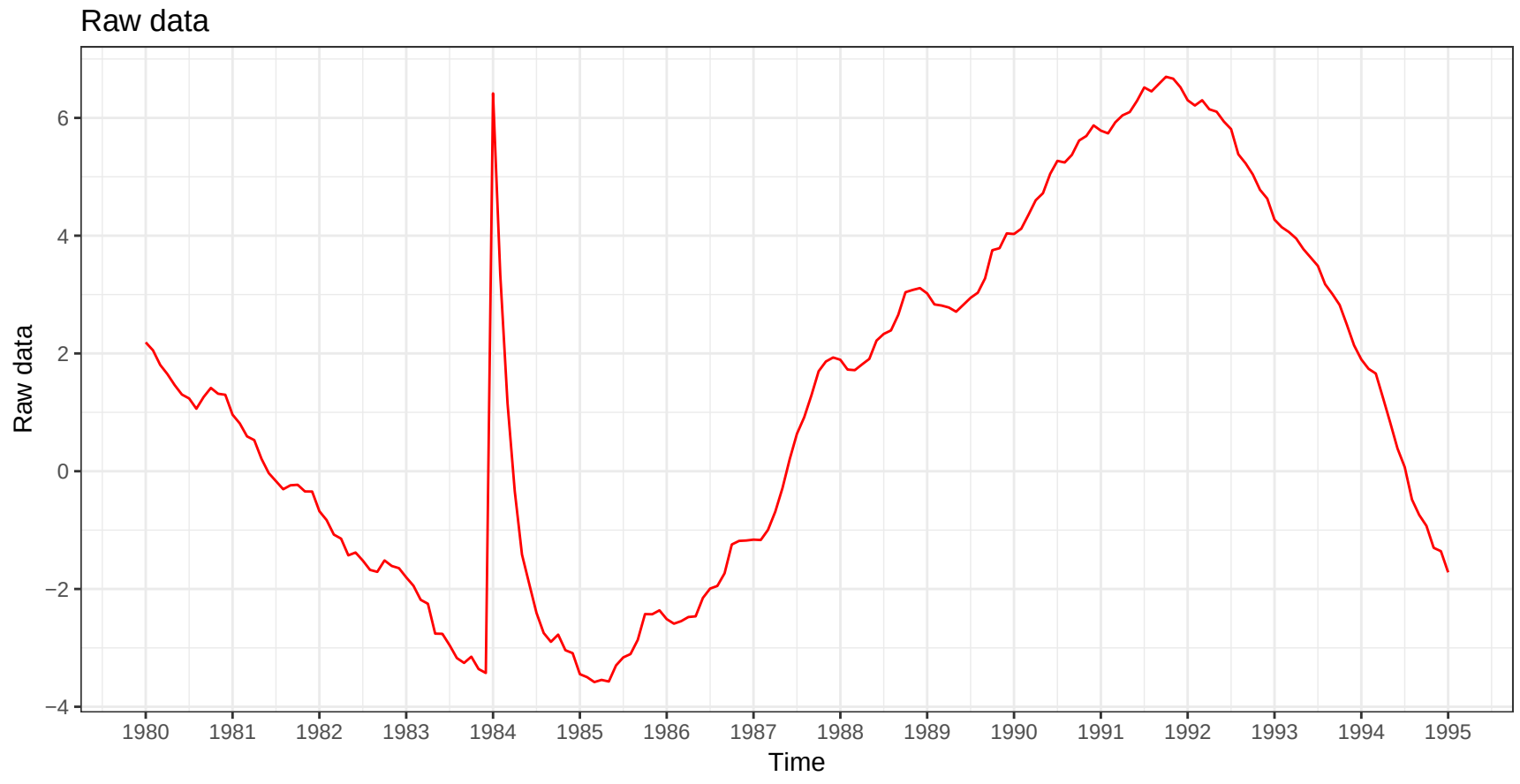
Estimate value of a TC(1984−01)
ARIMA (2,1,0)(0,0,0) − additive decomposition
(1−B)(1−0.4B+0.42B2)Xt=at



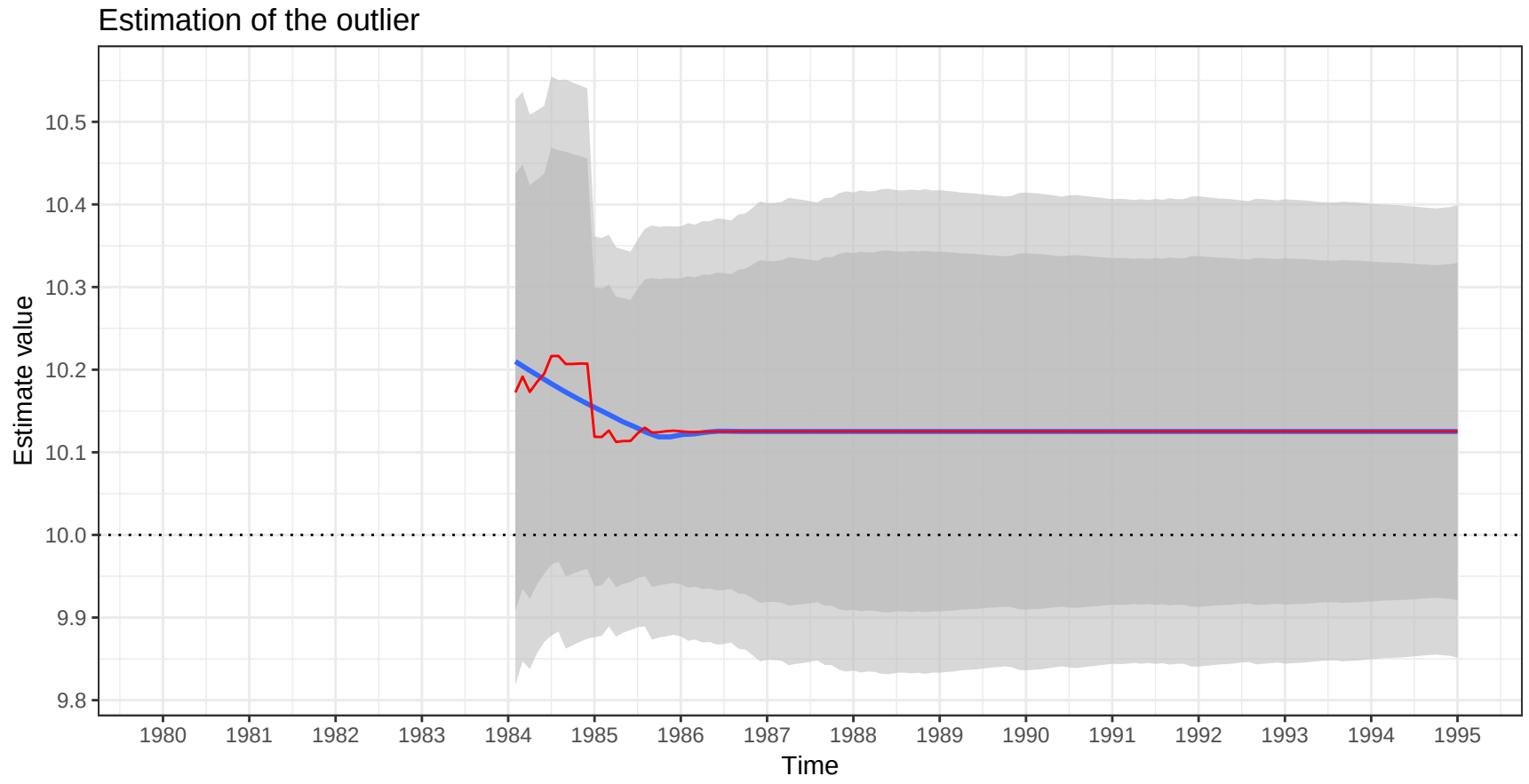


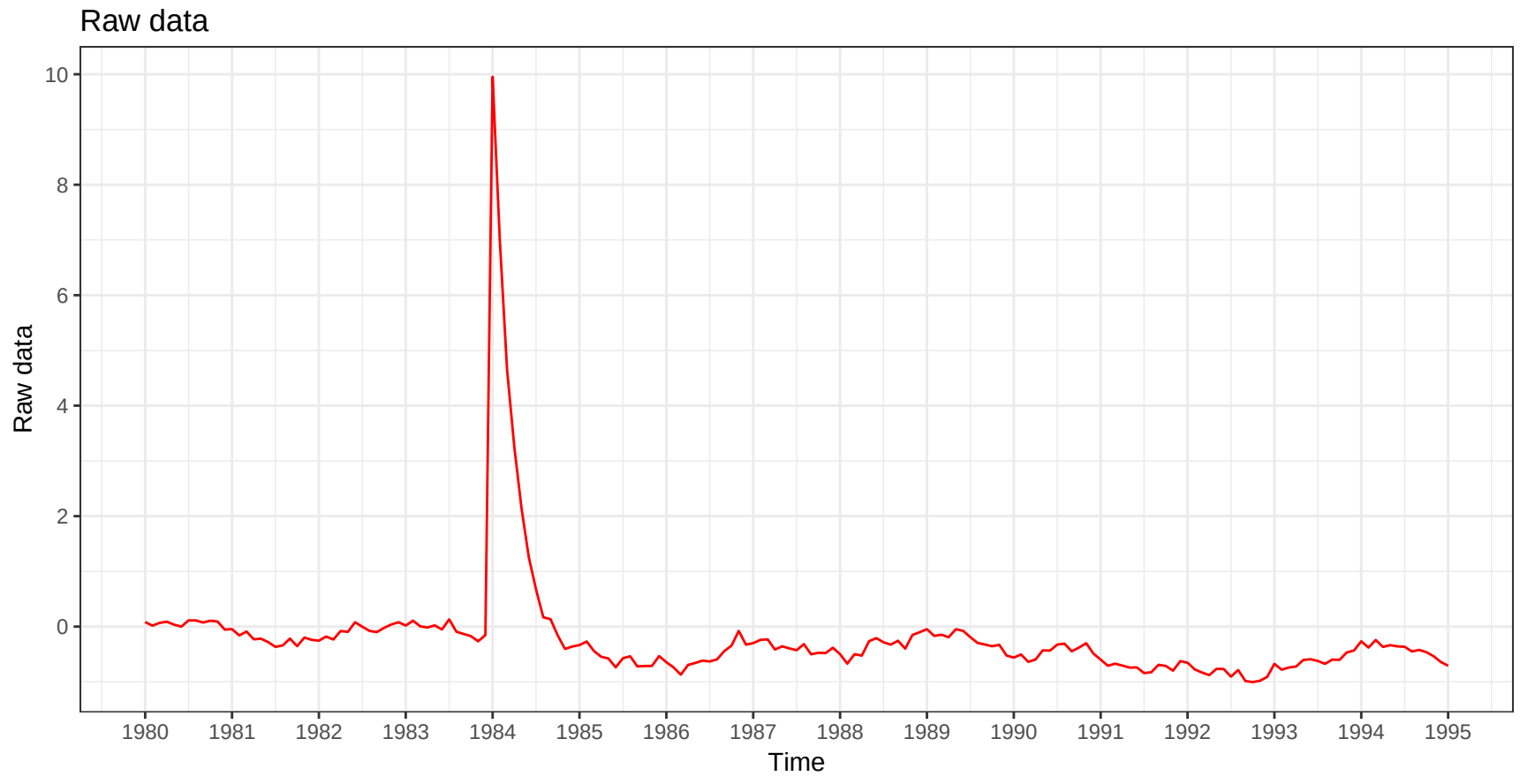
Estimate value of a TC(1984−01)
ARIMA (2,1,0)(0,0,0) − additive decomposition
(1−B)(1−0.4B+0.42B2)Xt=at



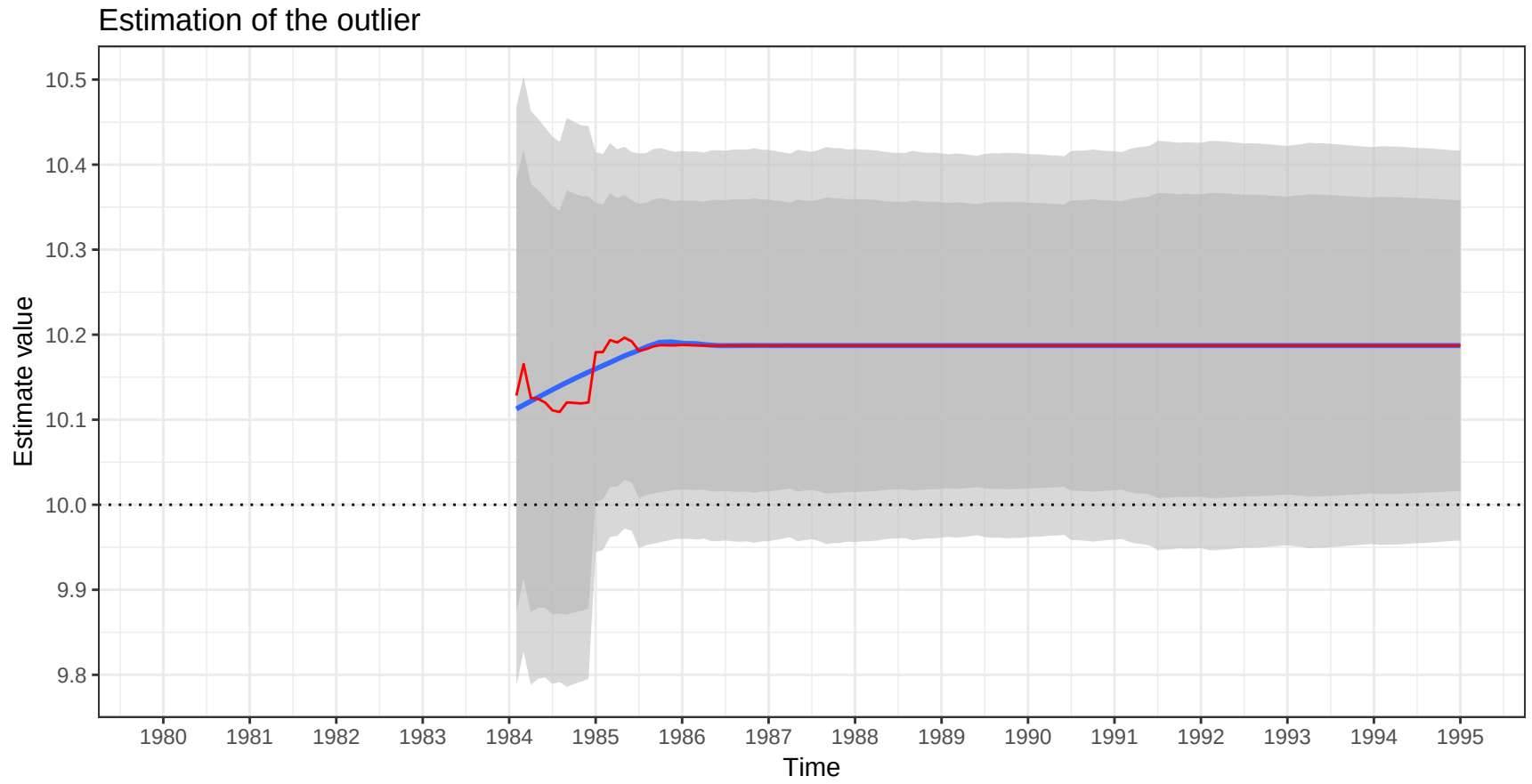


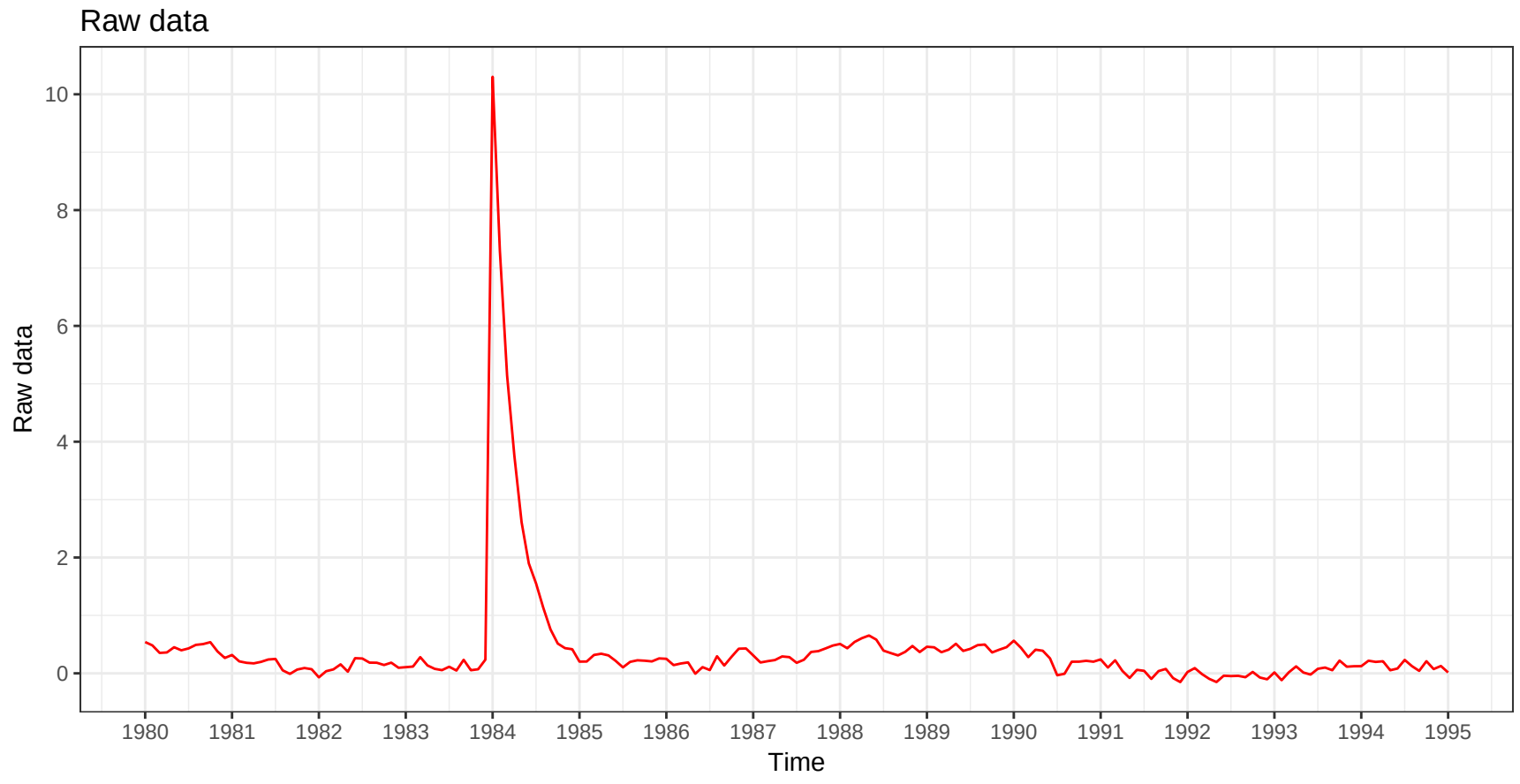
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.3B)at



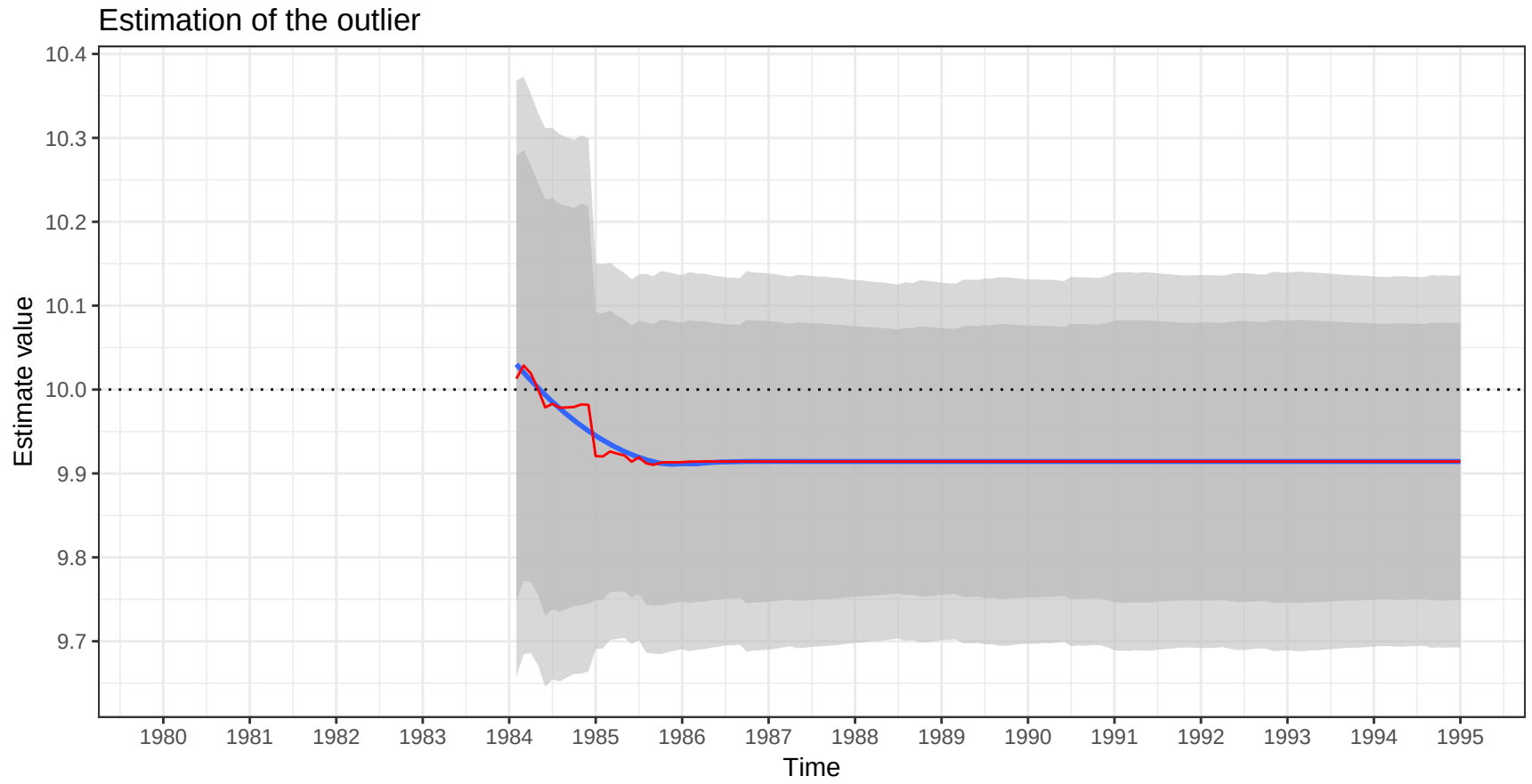


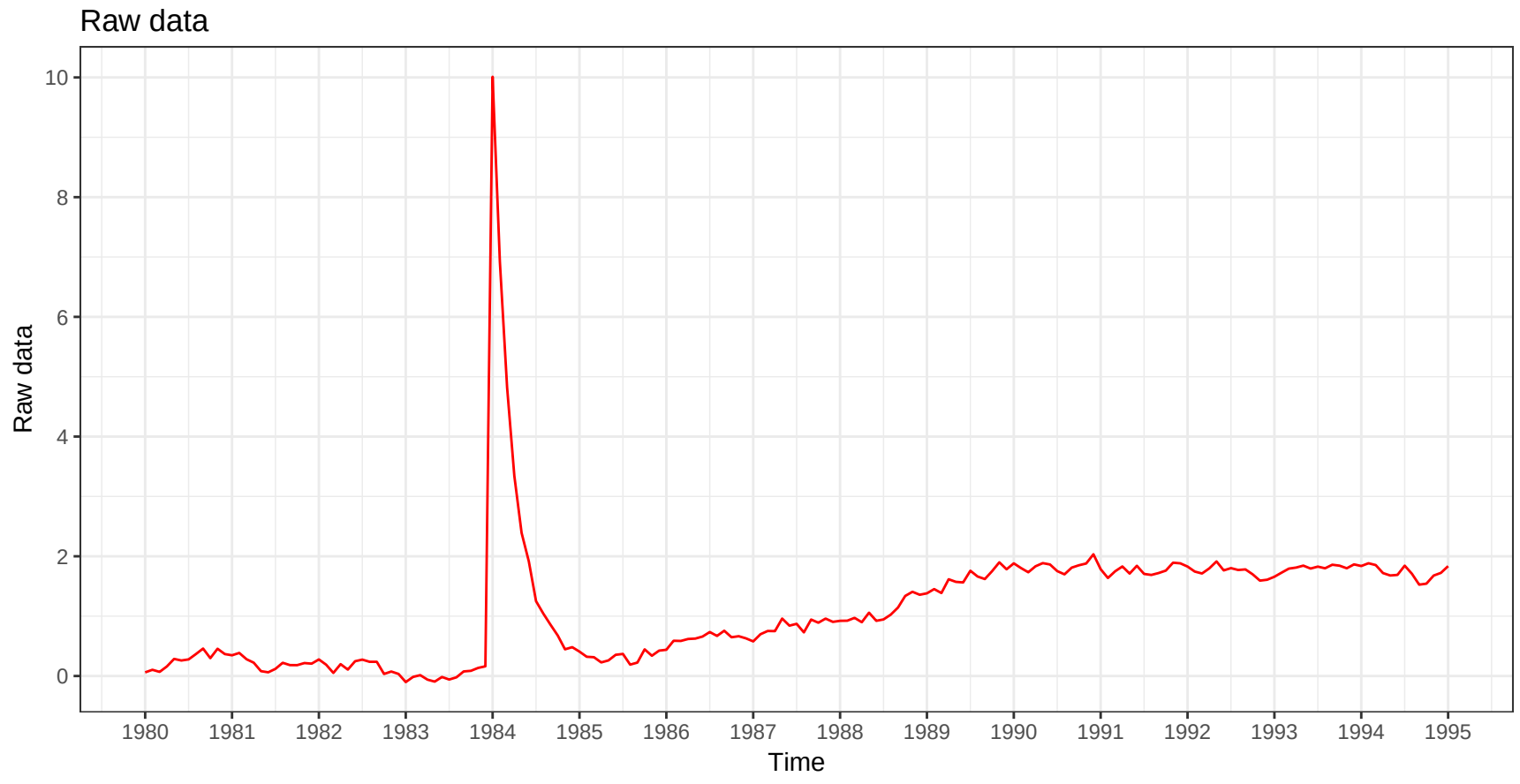
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.3B)at



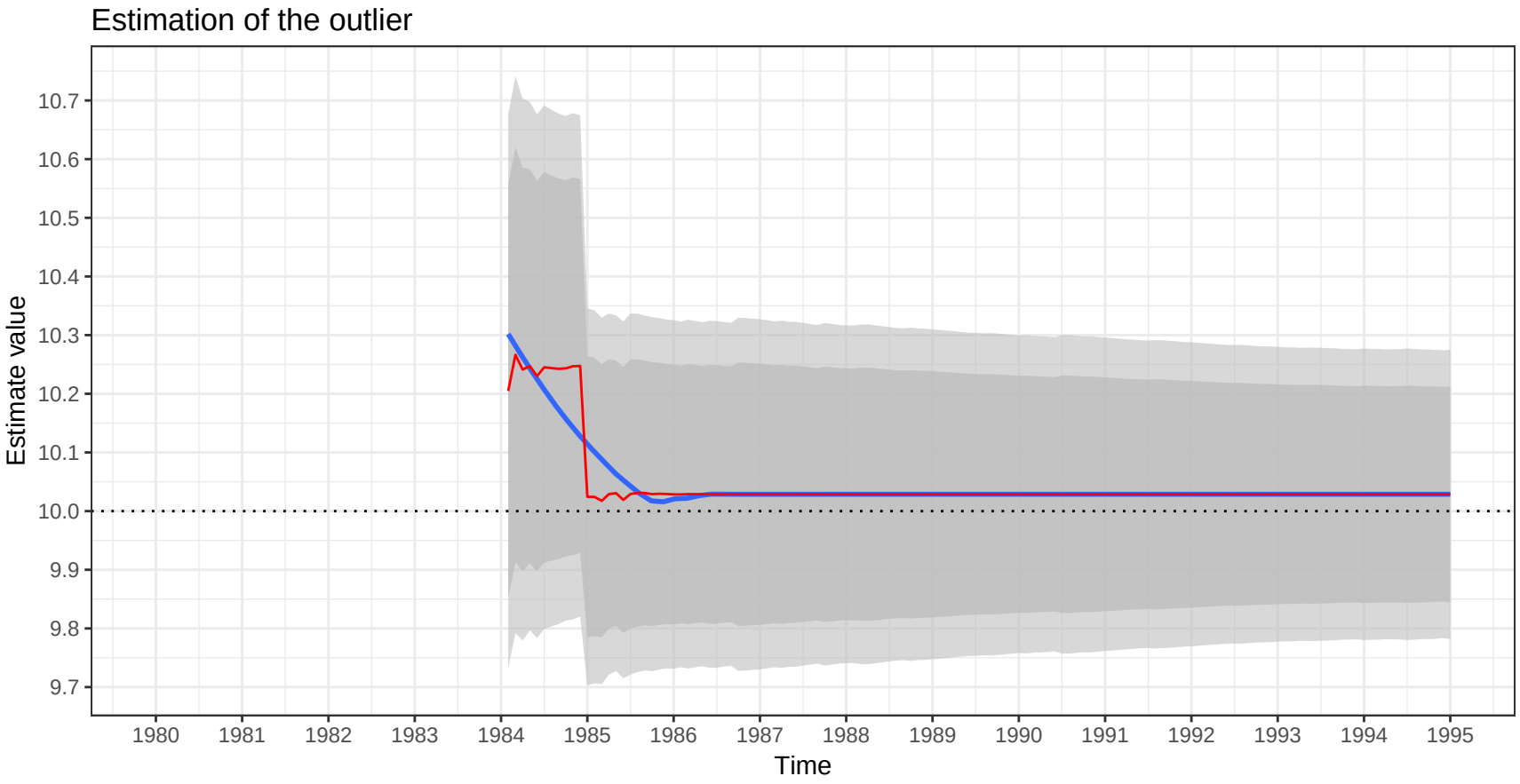


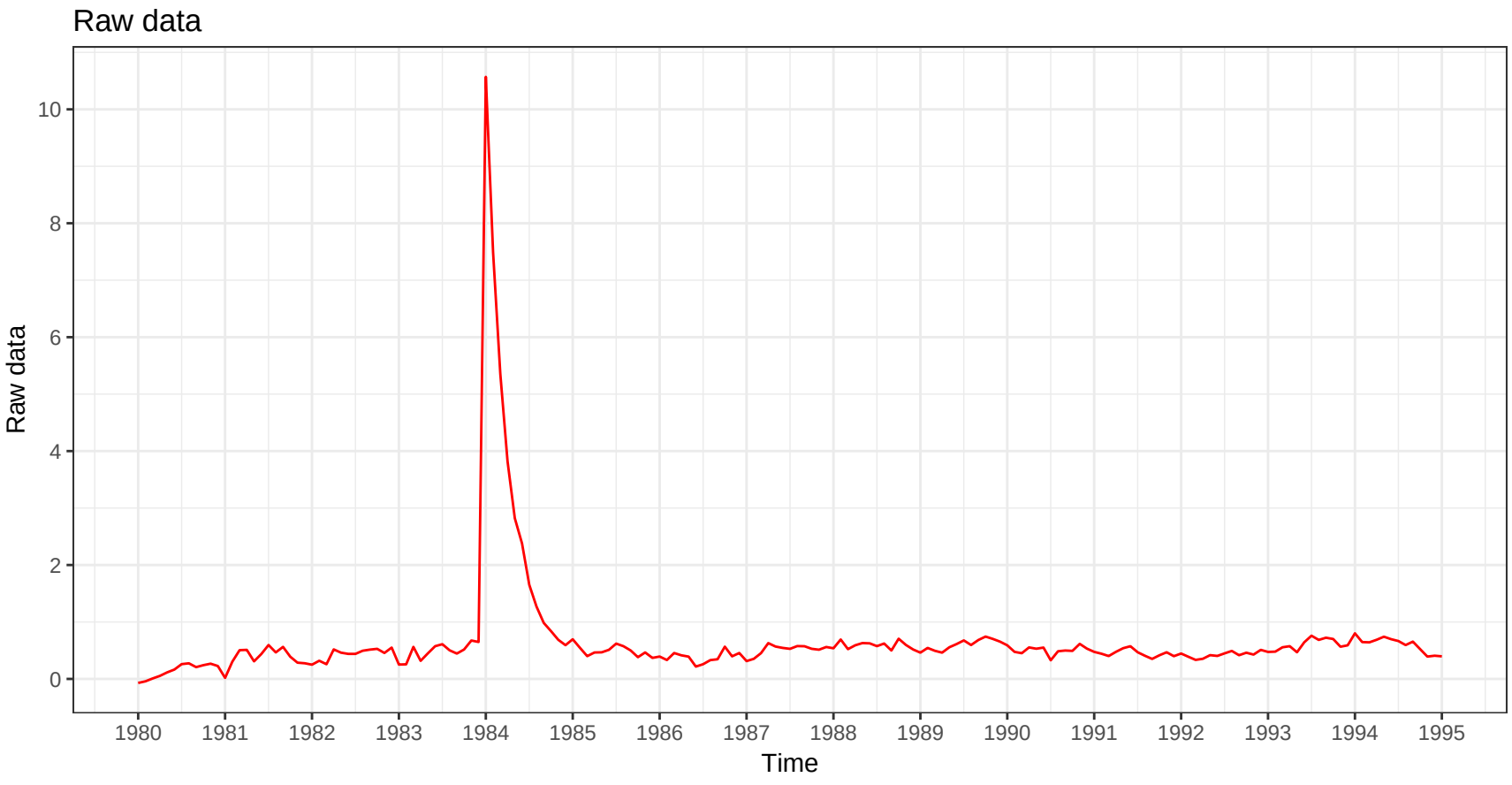
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.3B)at

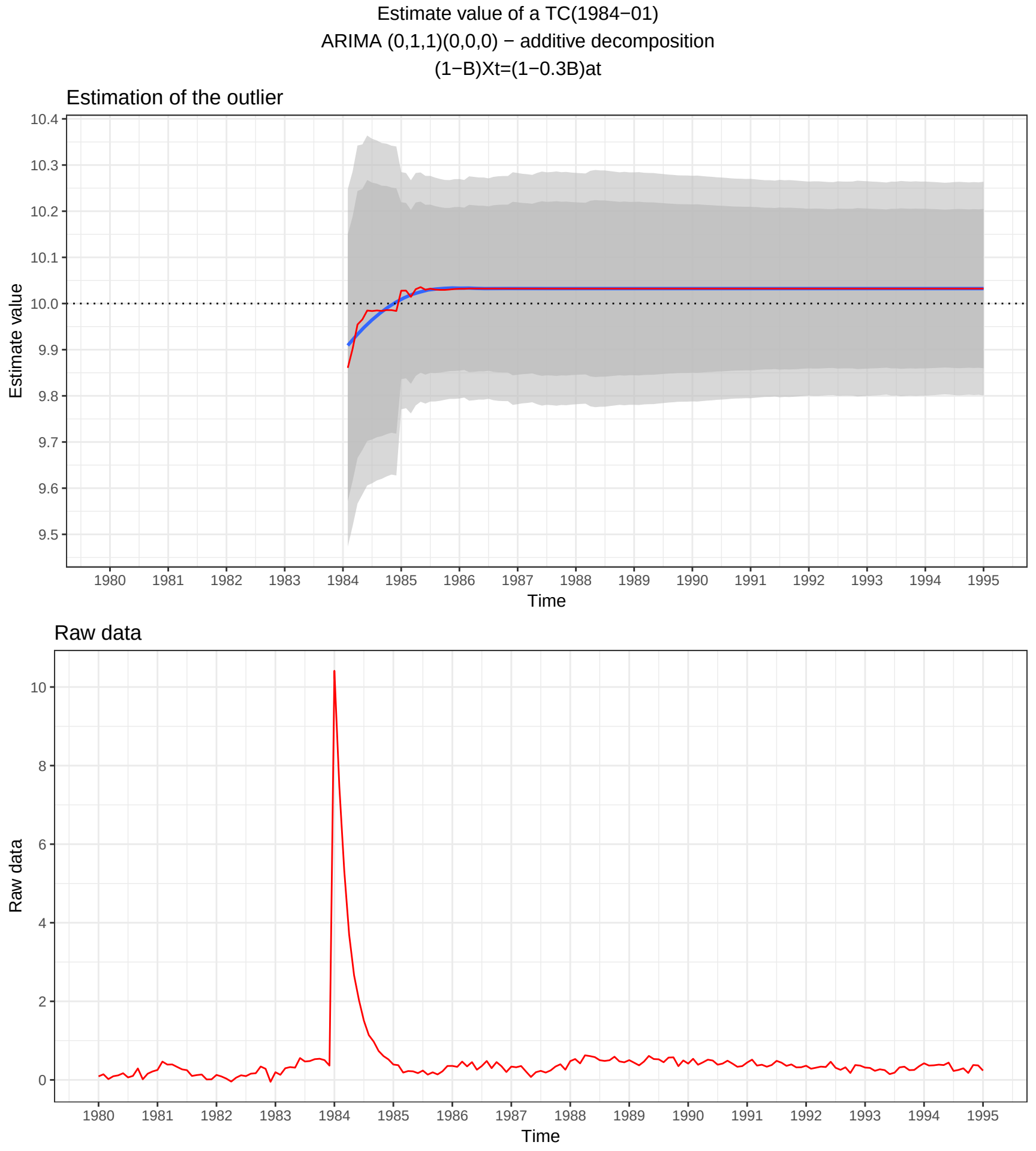




Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.3B)at






Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.3B)at
Estimation of the outlier
Estimate value
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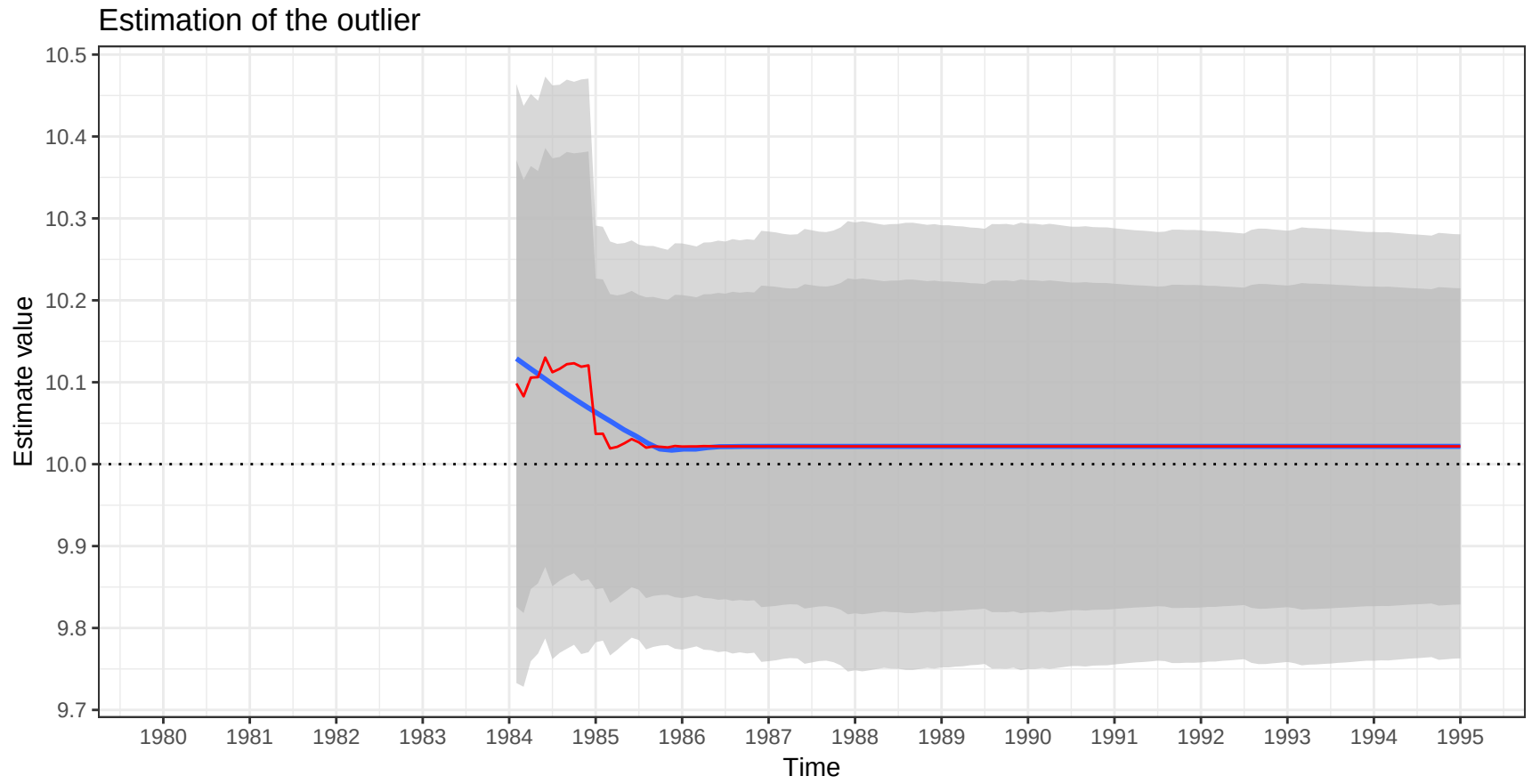
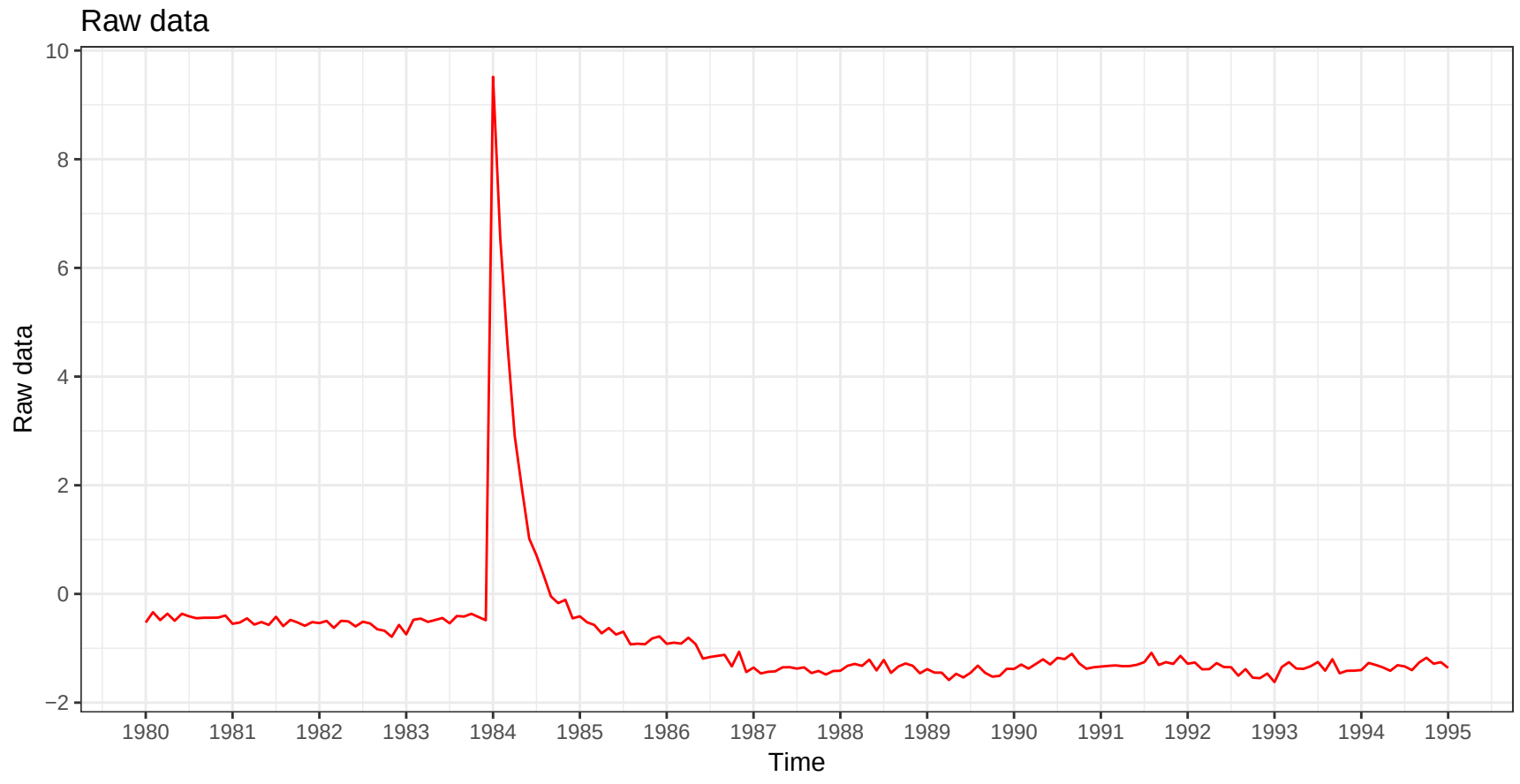
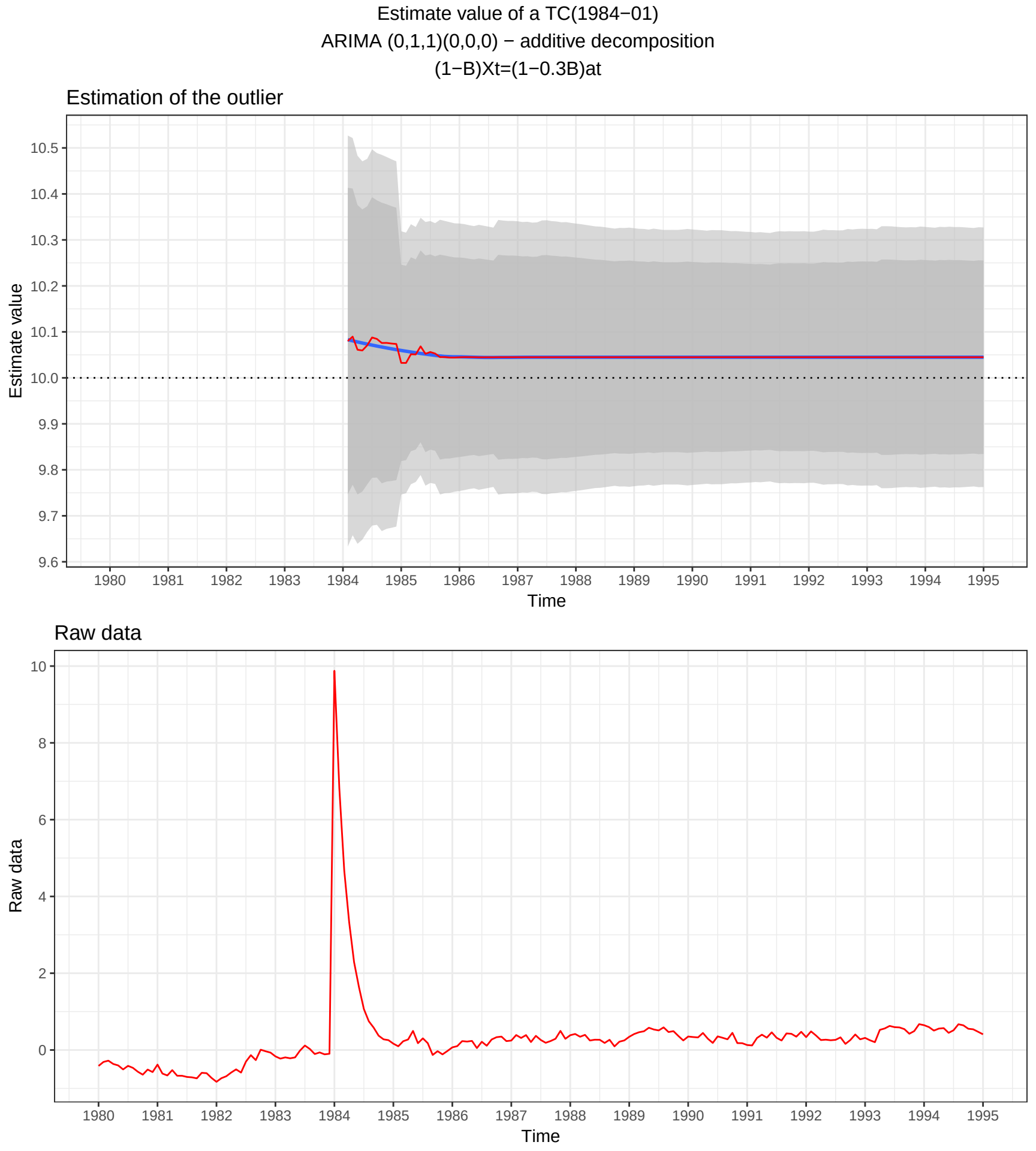
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.3B)at






Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.3B)at
Estimation of the outlier
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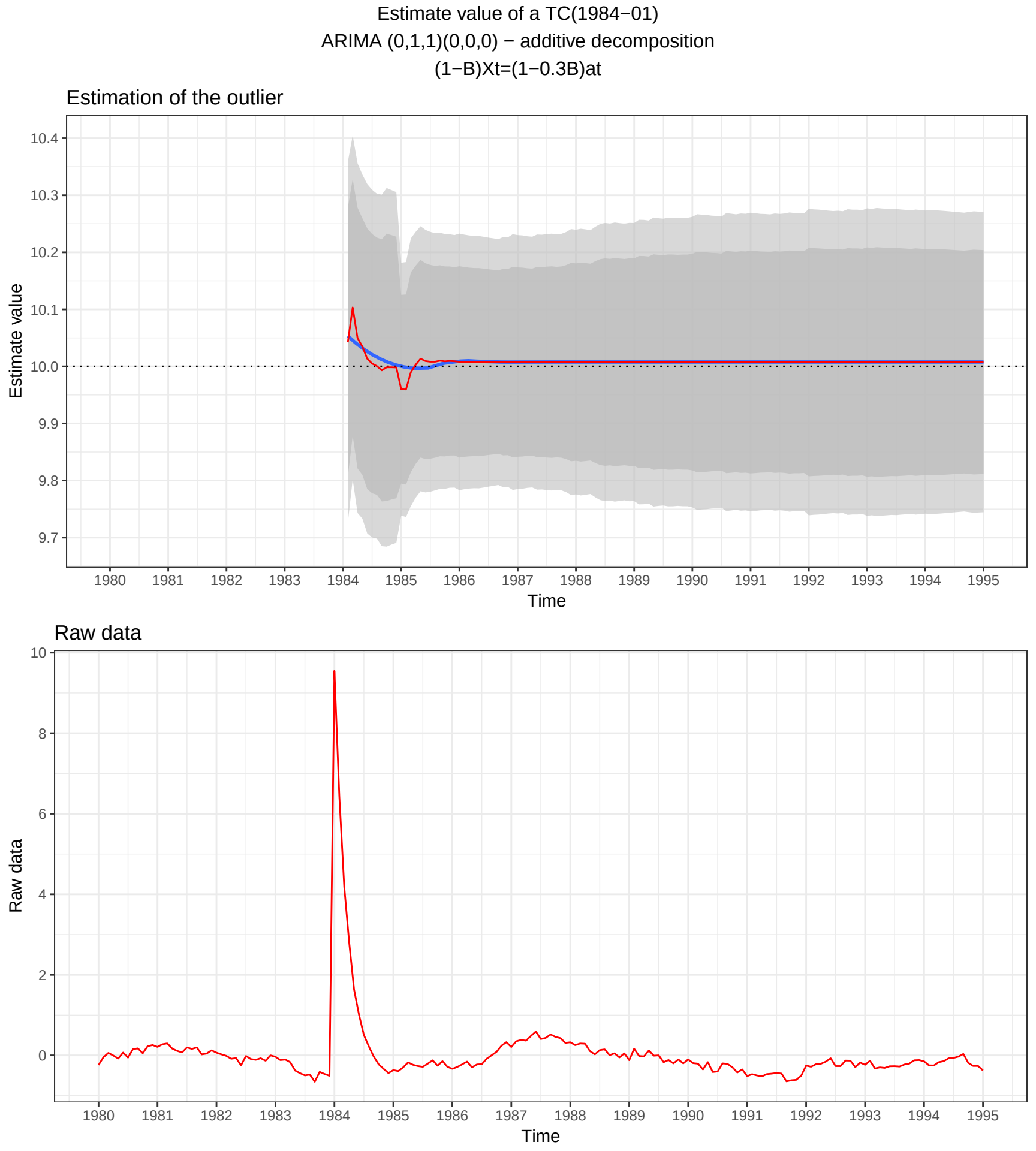
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.3B)at
Estimation of the outlier
Estimate value
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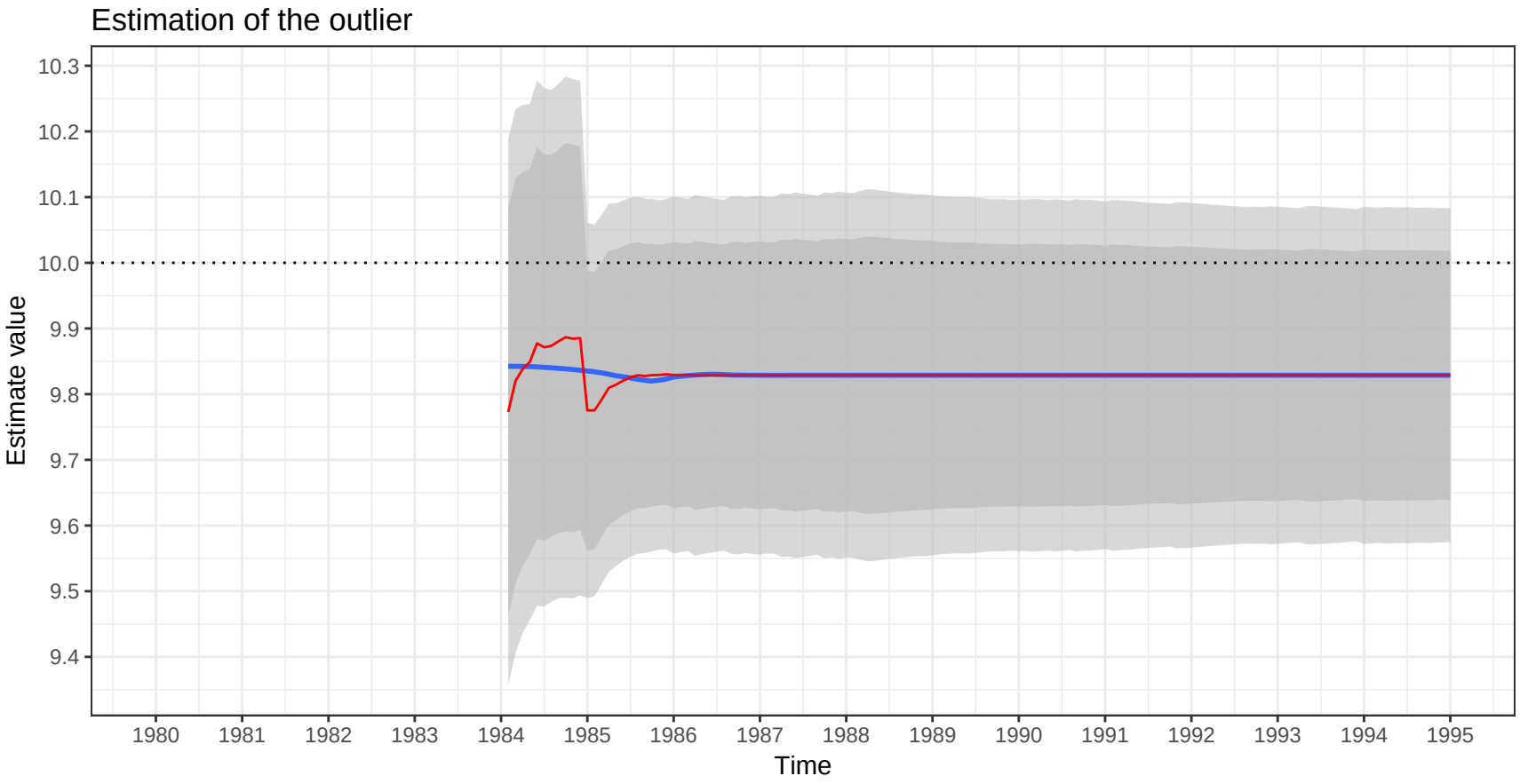
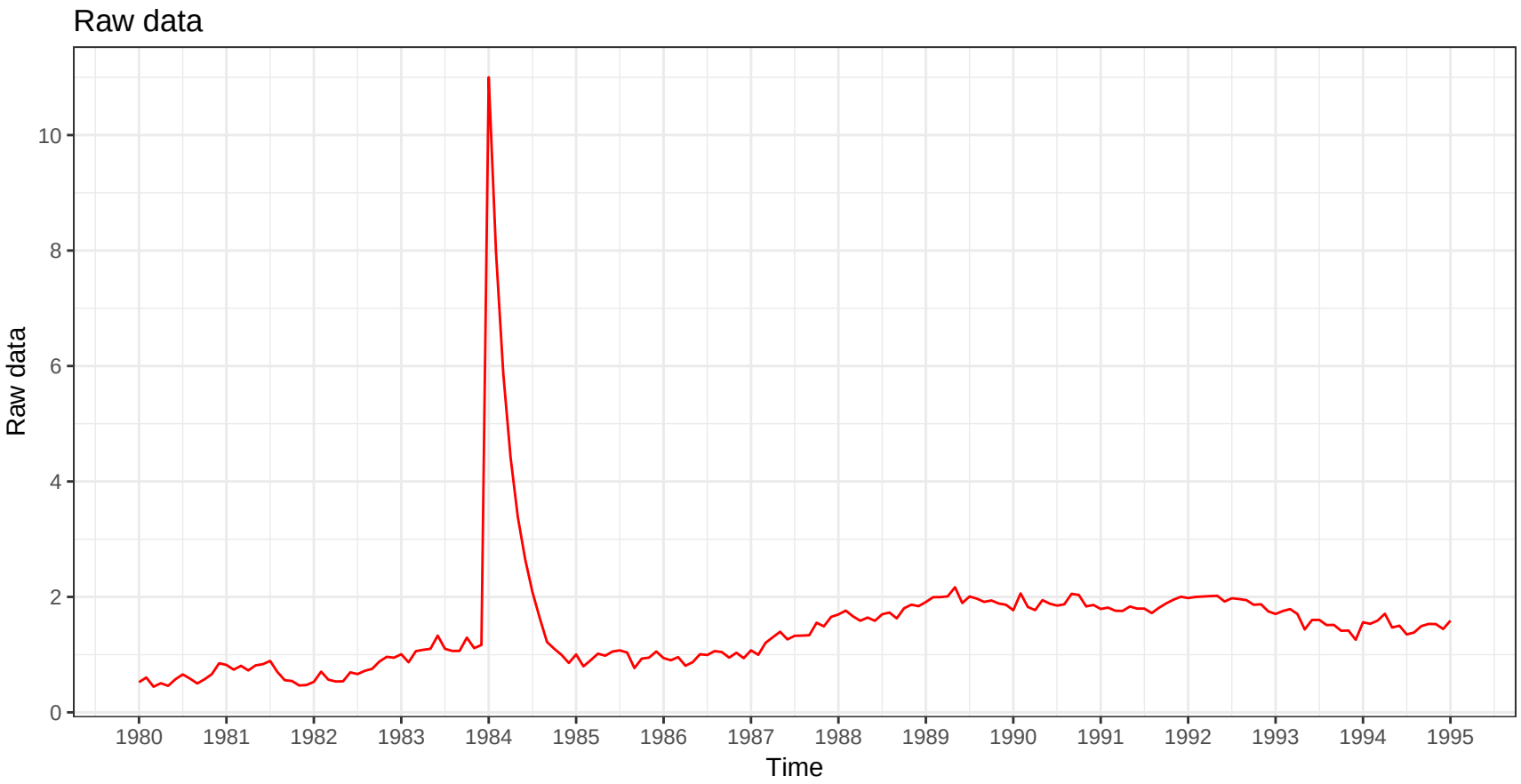
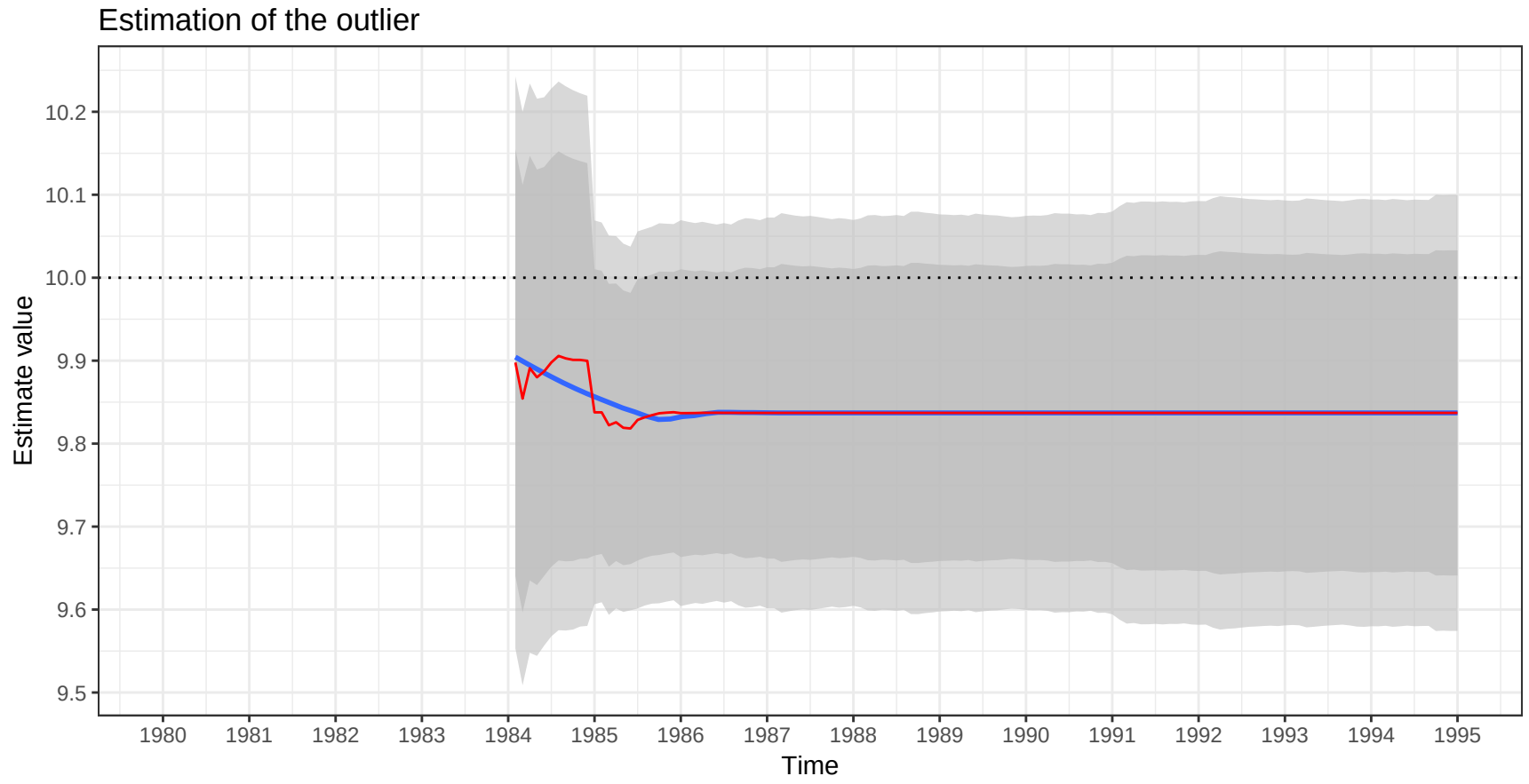
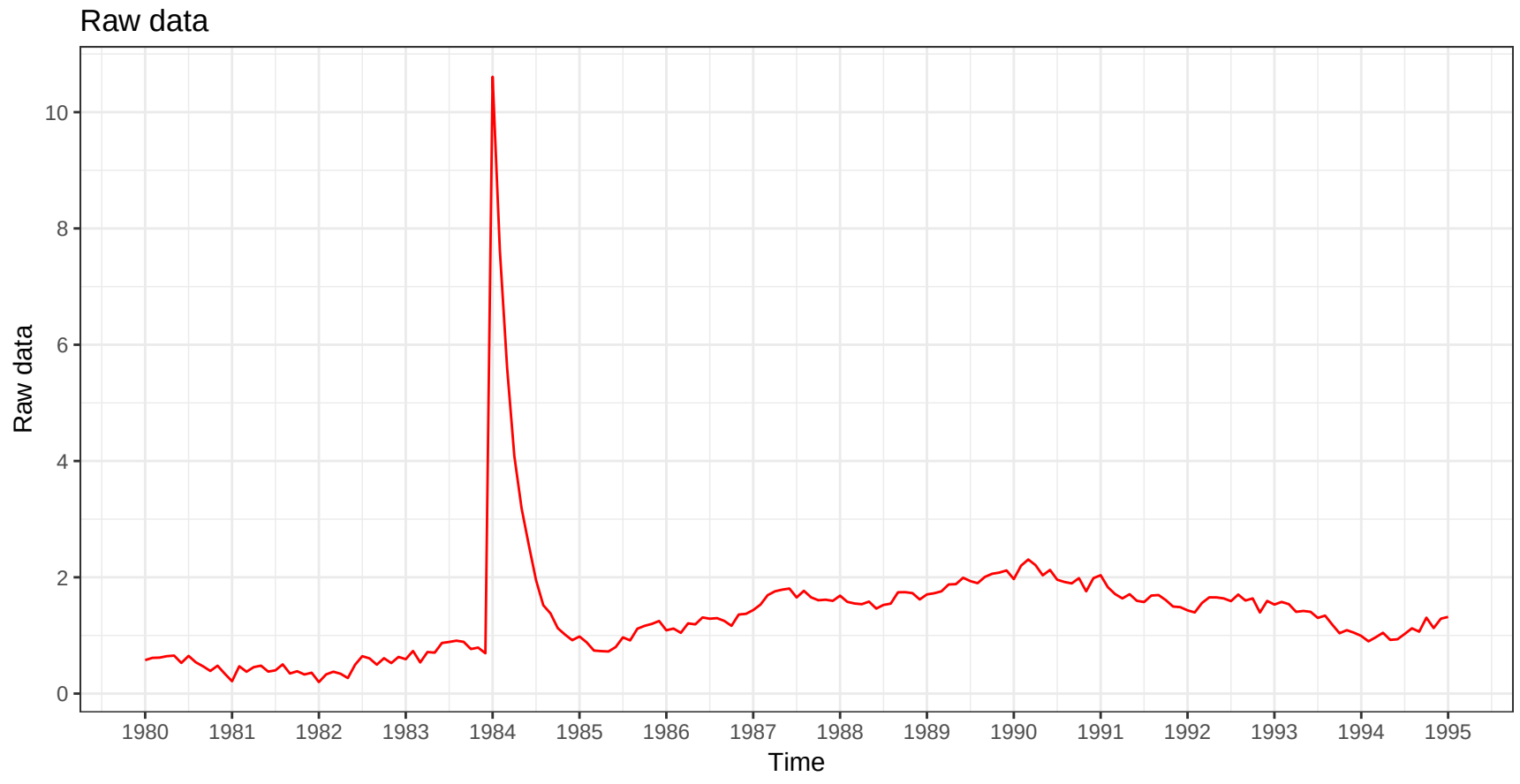
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.3B)at

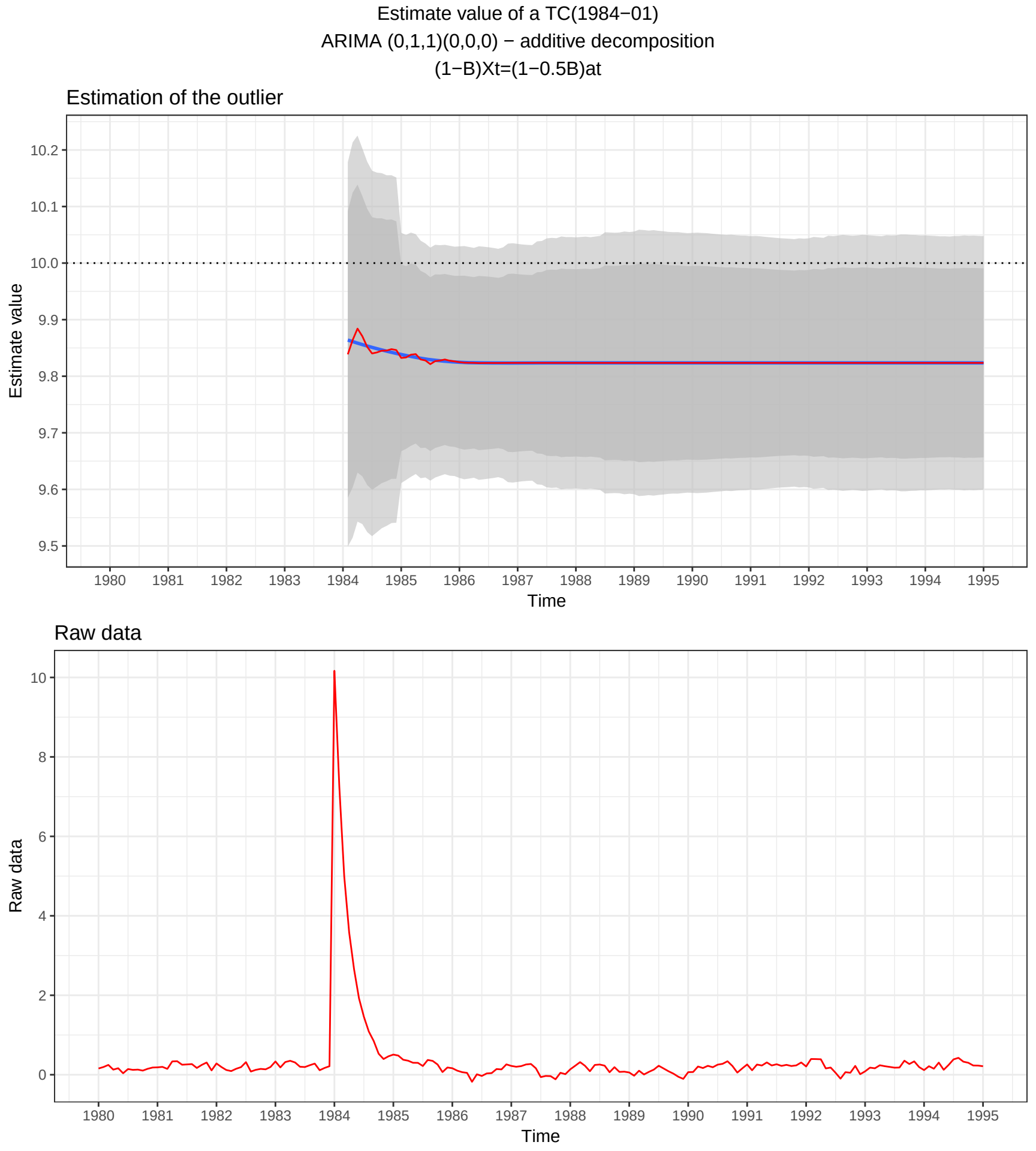




Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.3B)at






Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.5B)at
Estimation of the outlier
Estimate value
10.2
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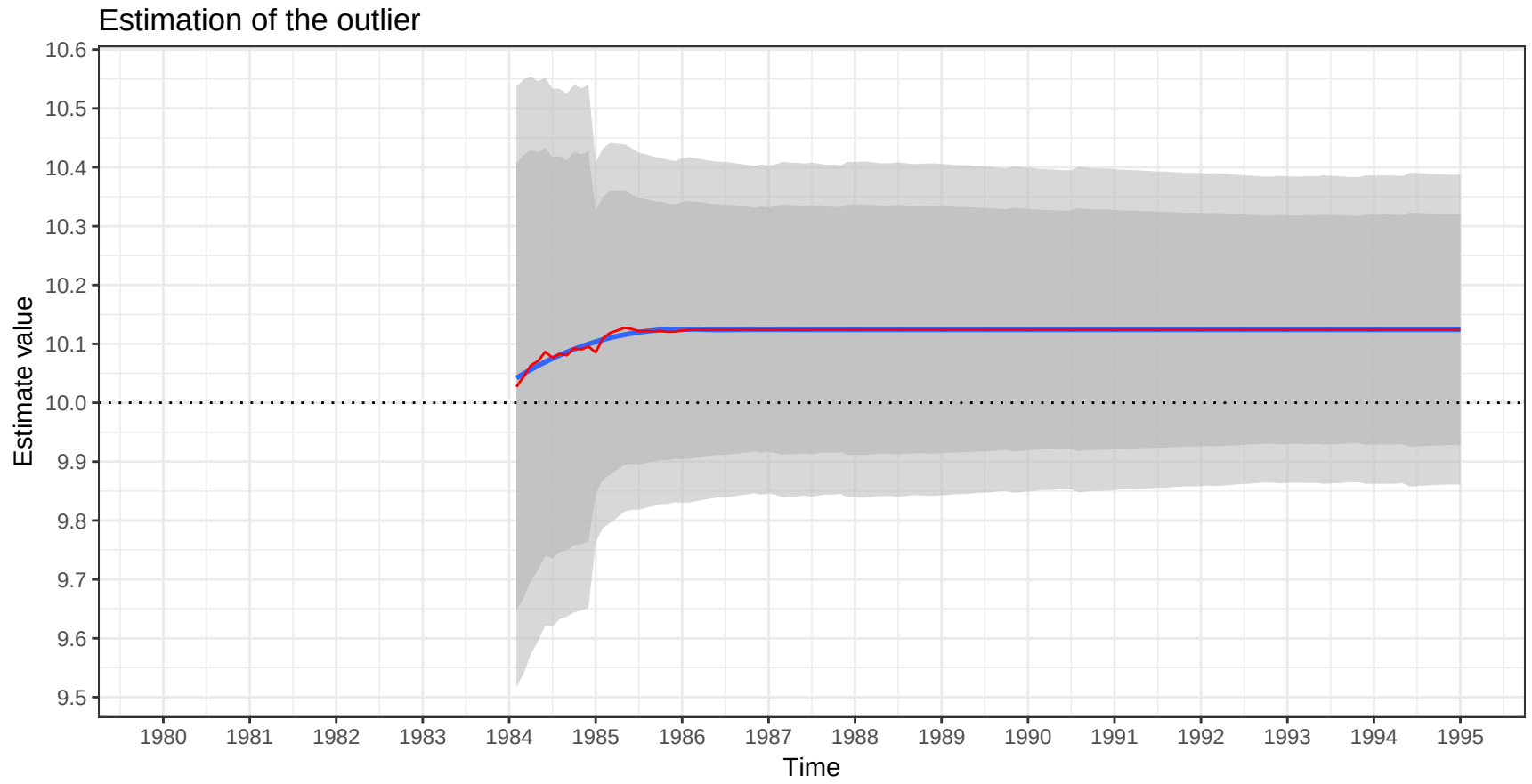
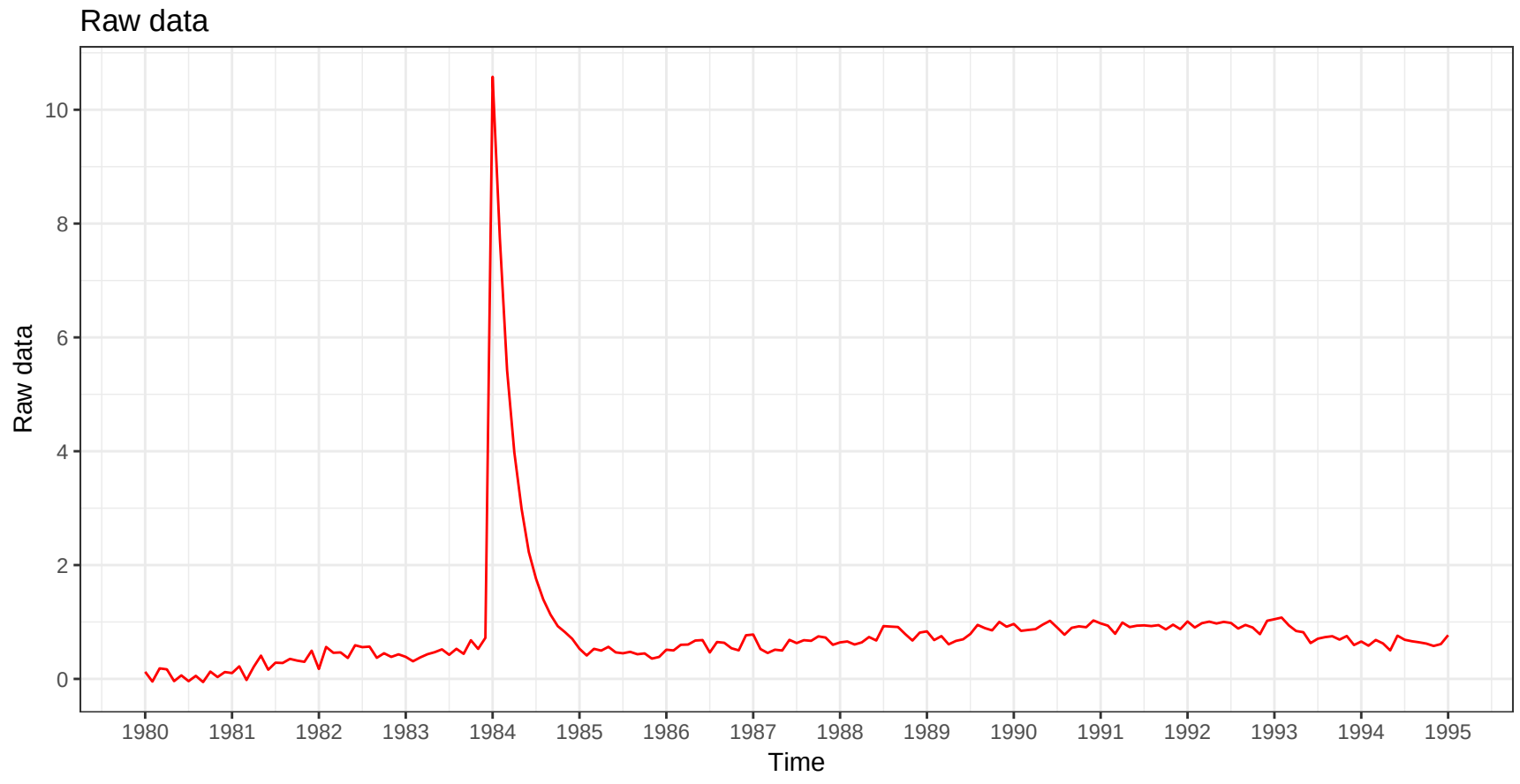
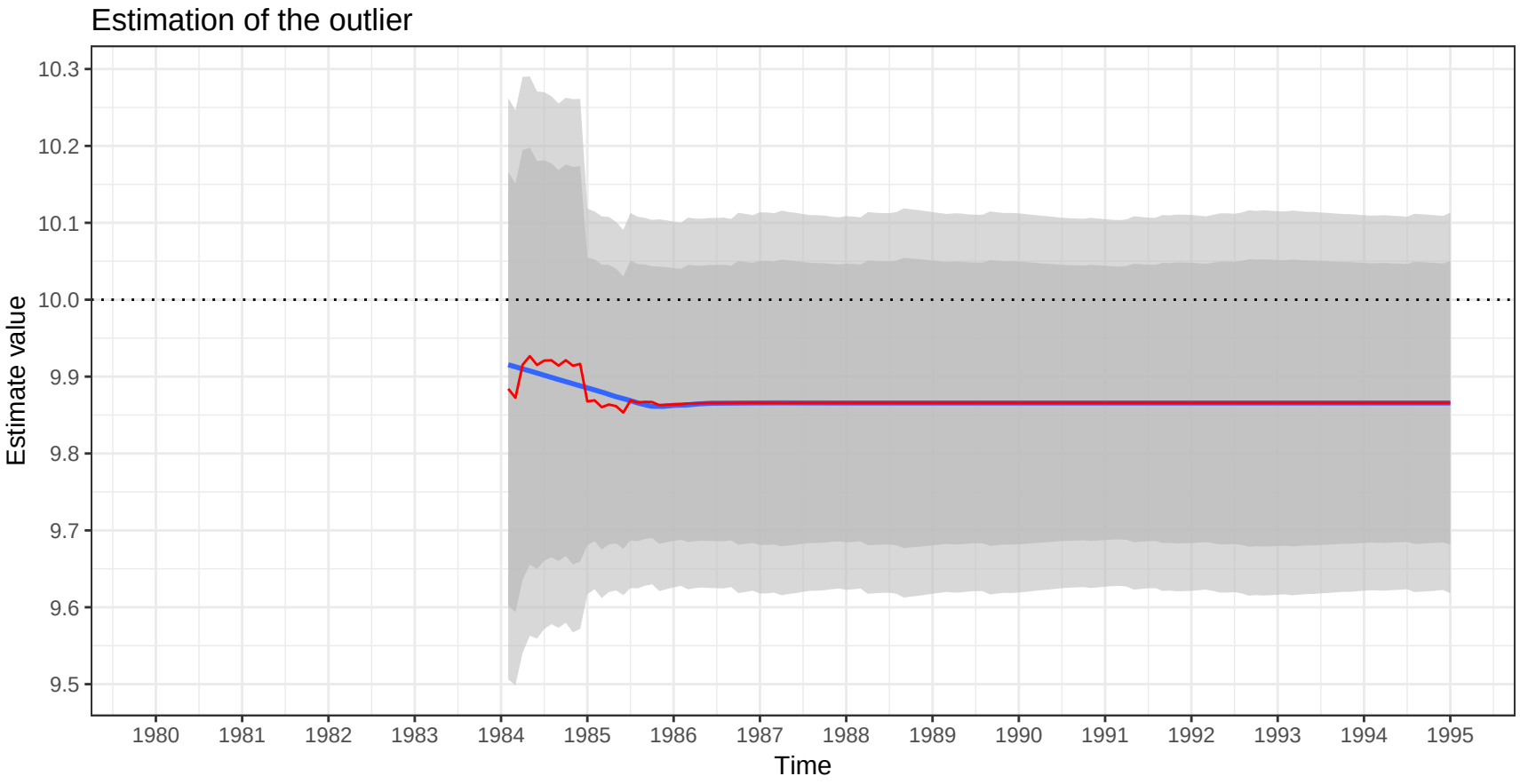
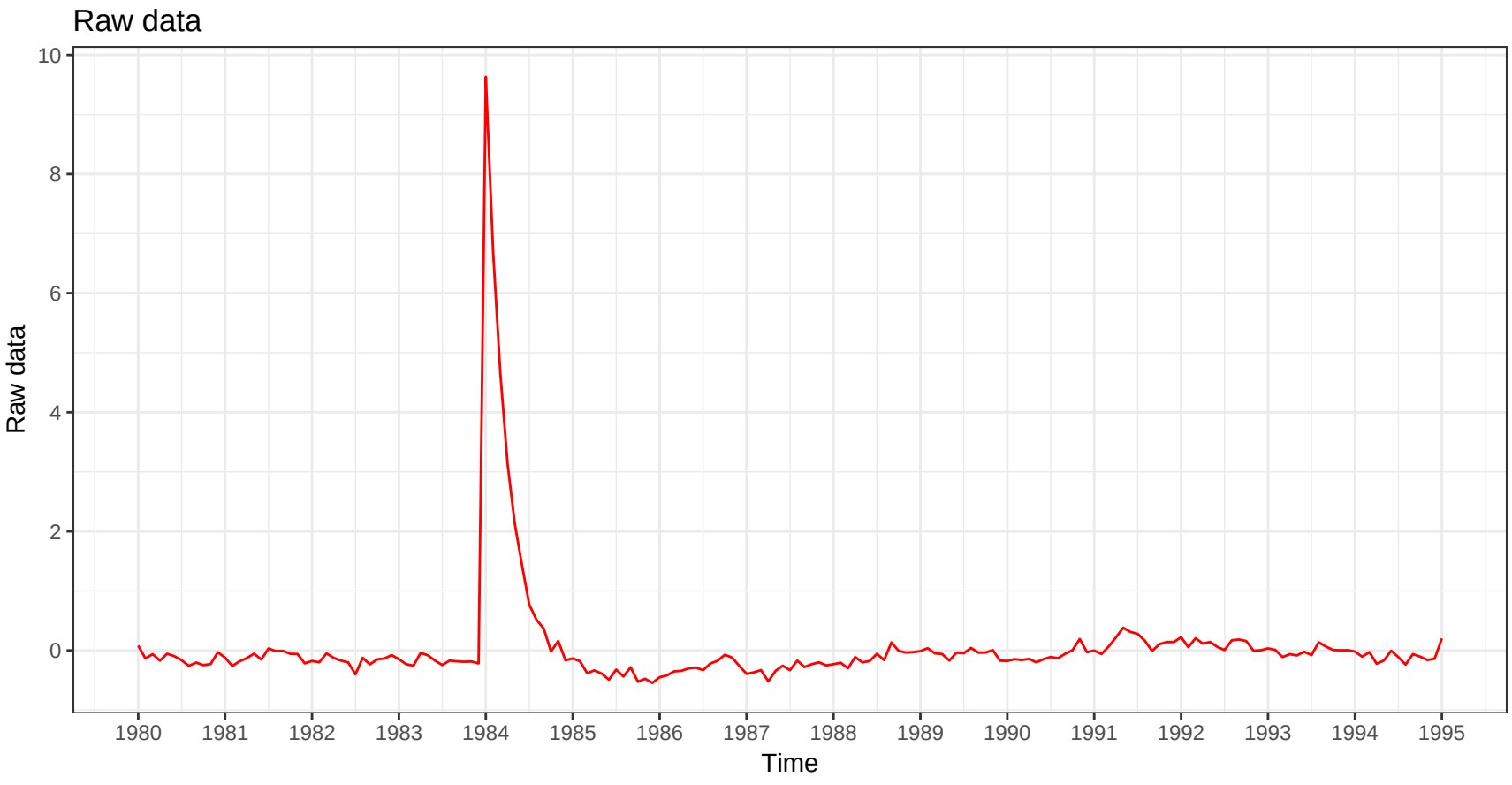
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.5B)at



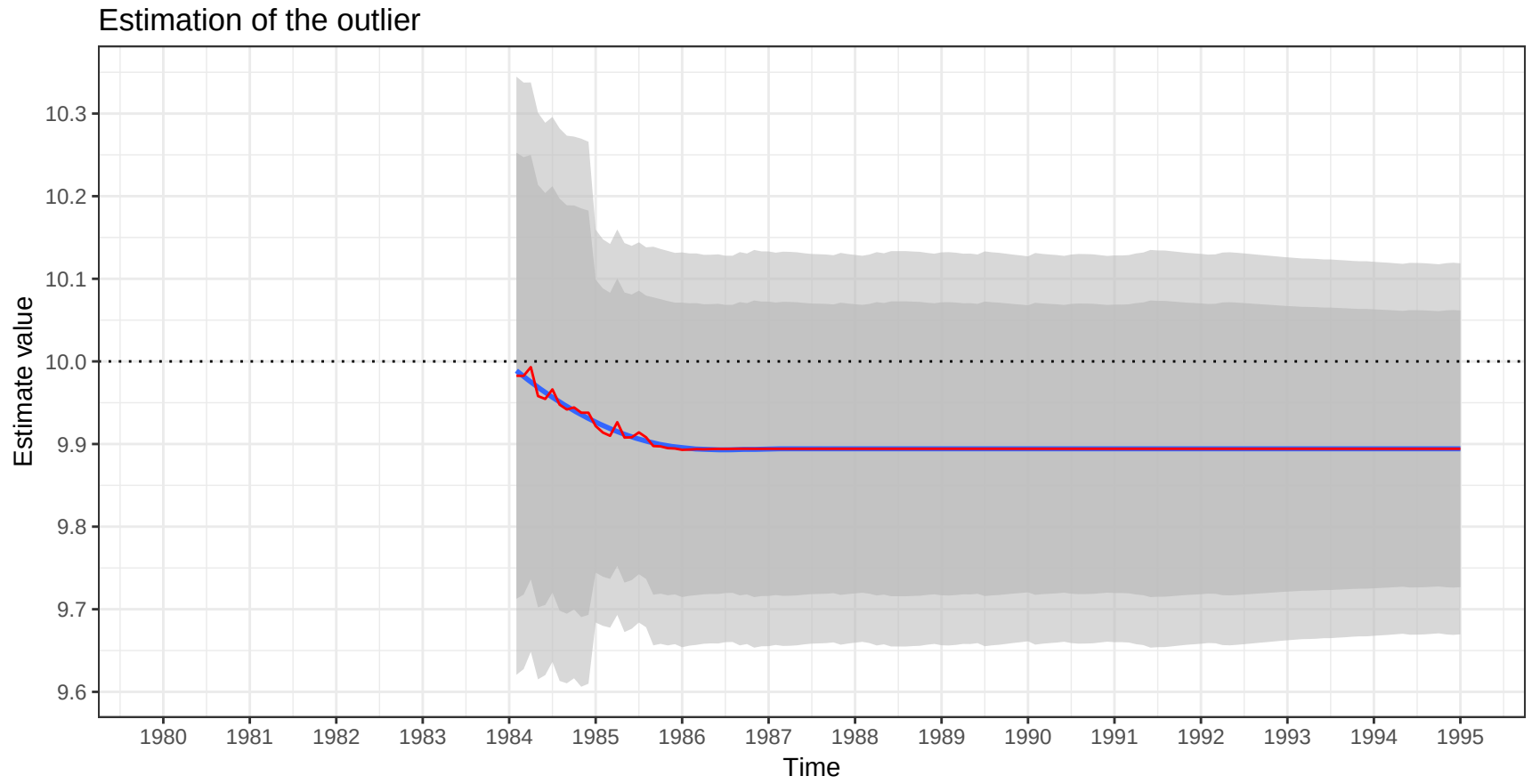


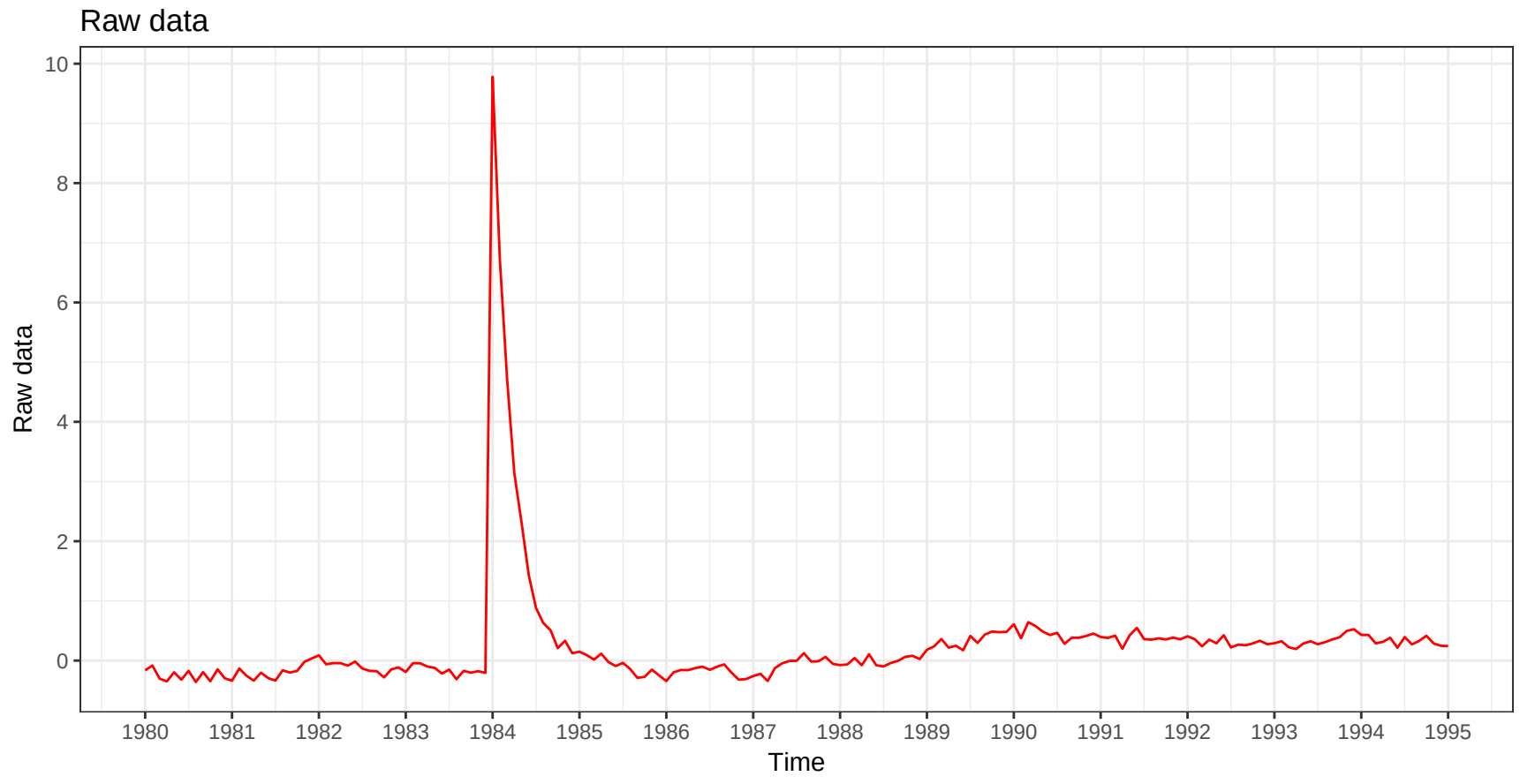
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.5B)at



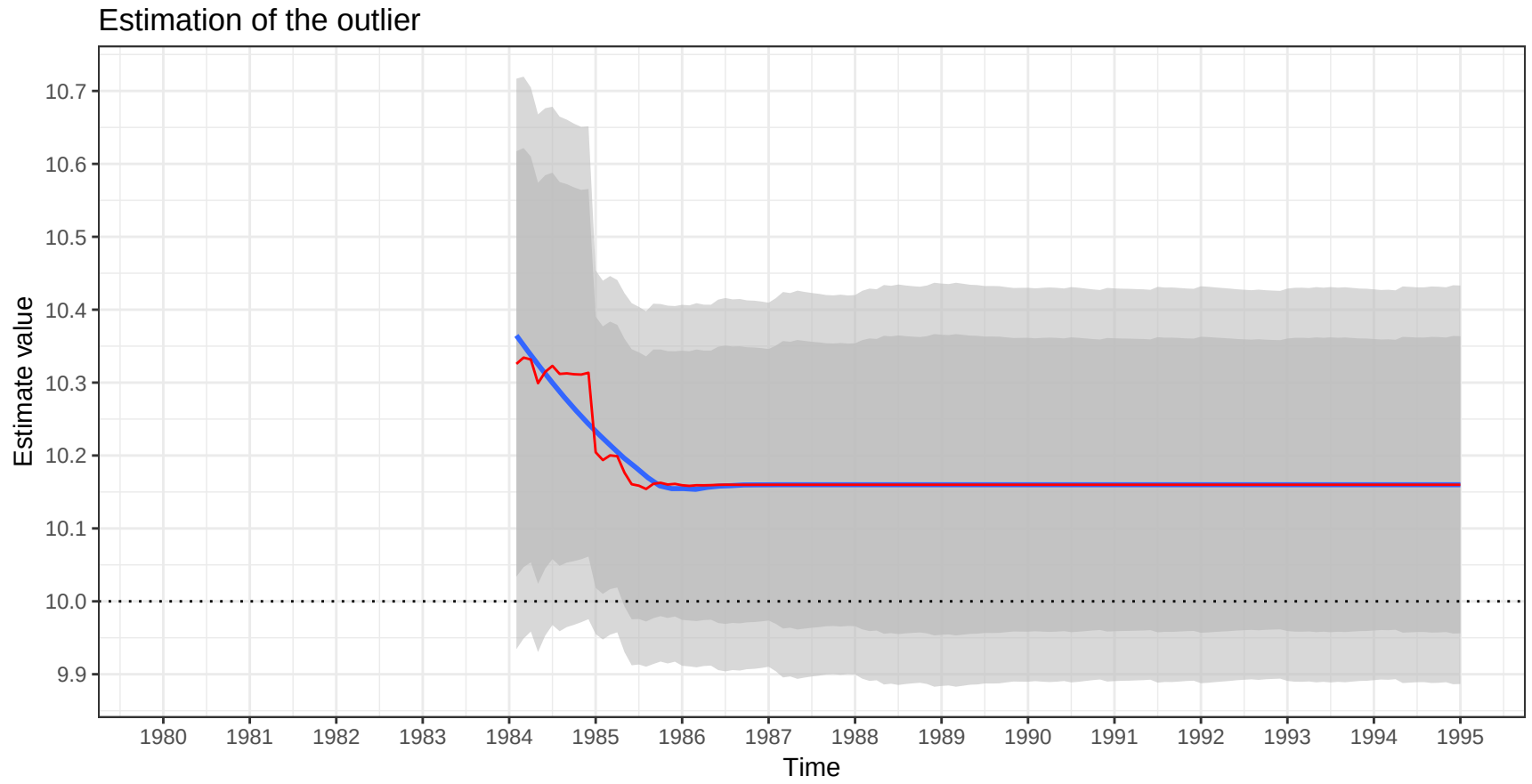


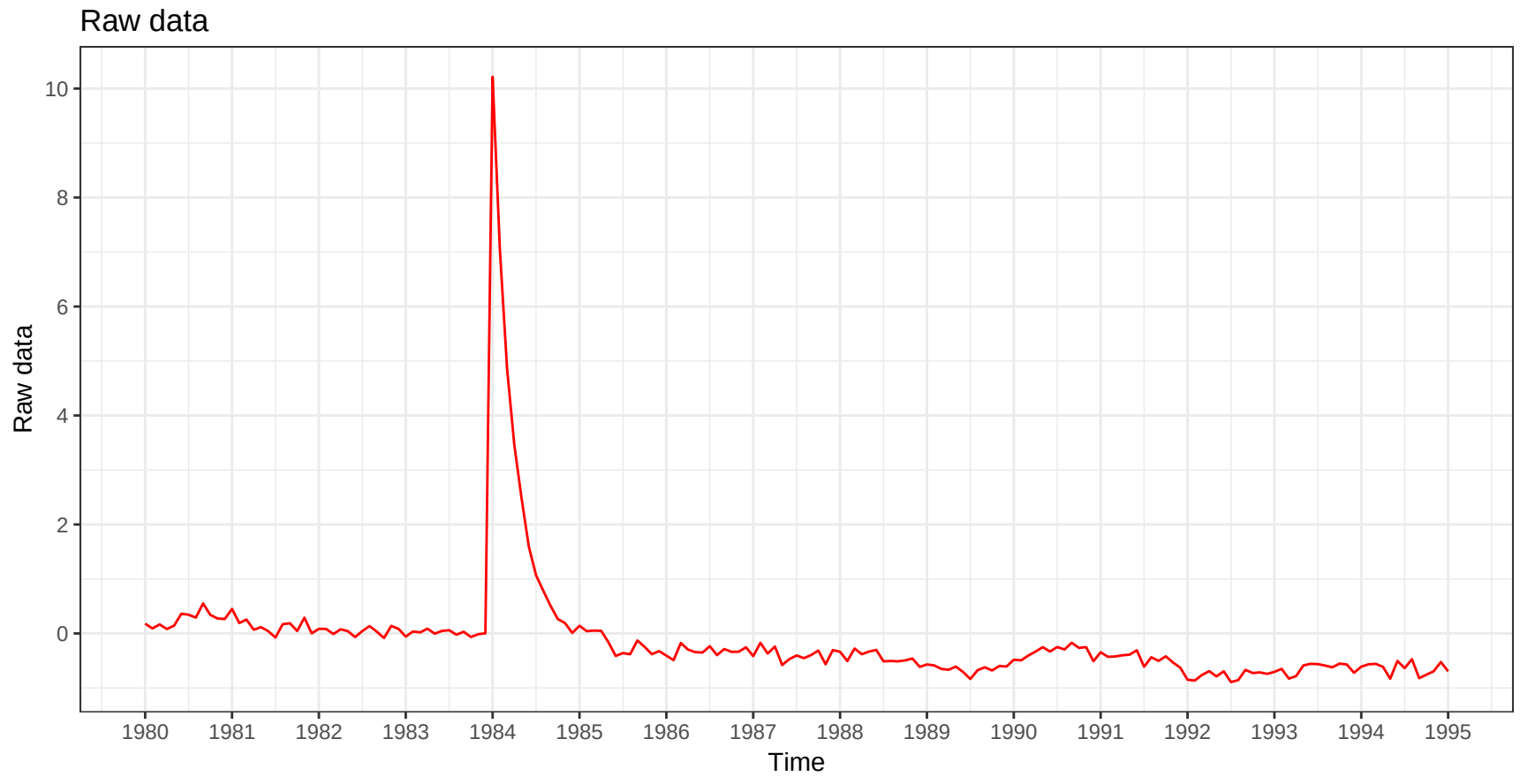
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.5B)at

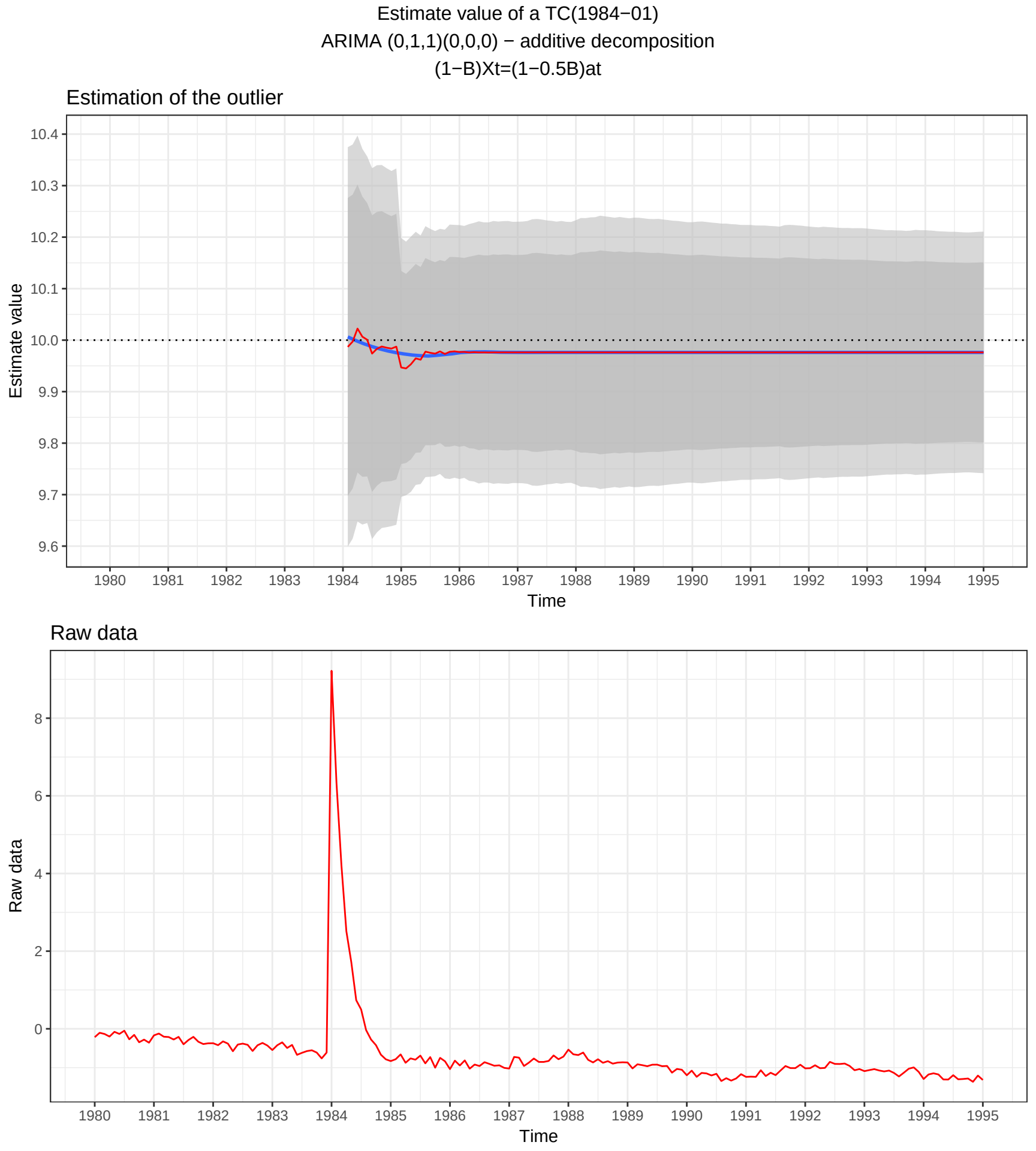




Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.5B)at






Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.5B)at
Estimation of the outlier
Estimate value
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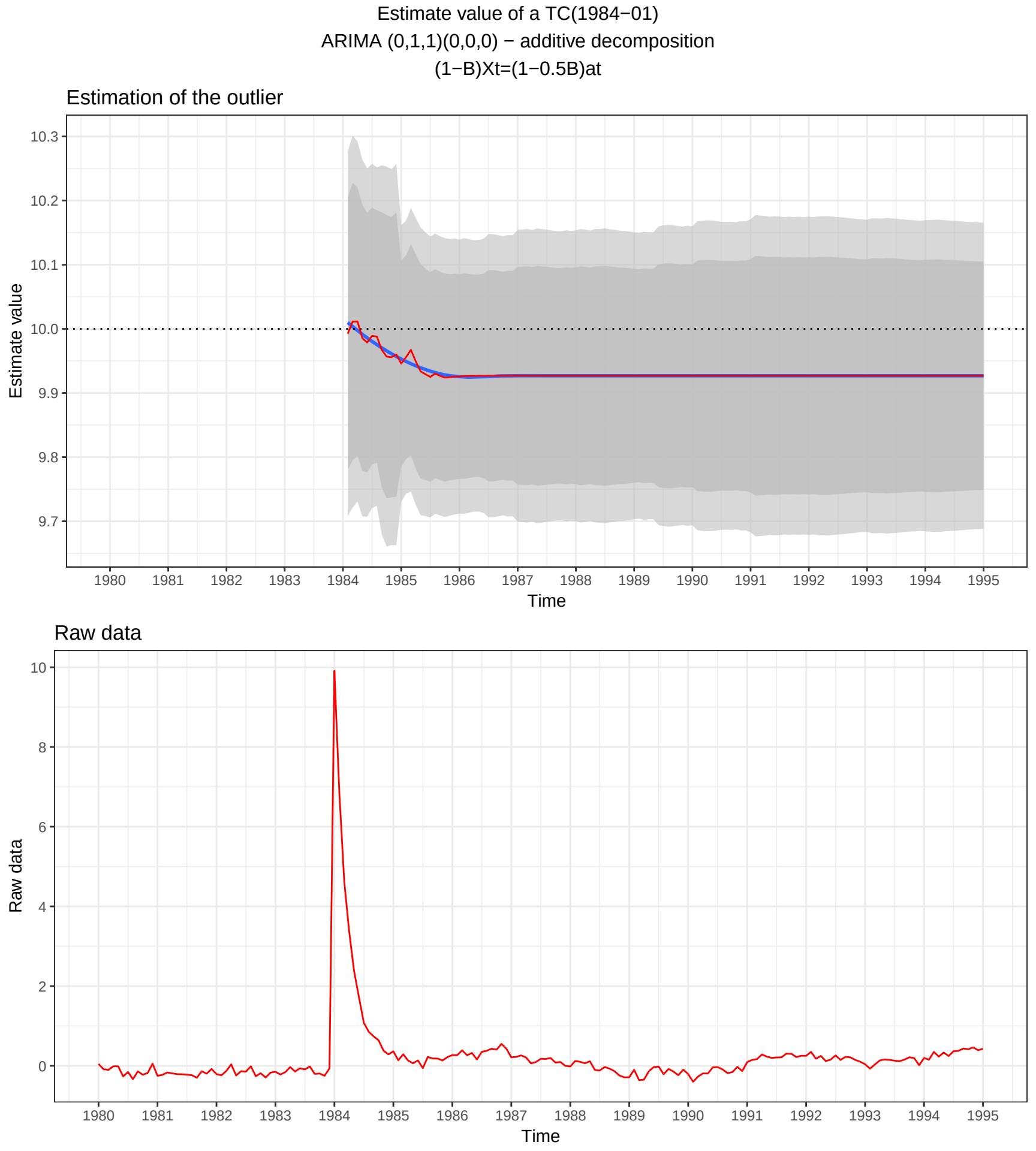
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.5B)at
Estimation of the outlier
Estimate value
10.3
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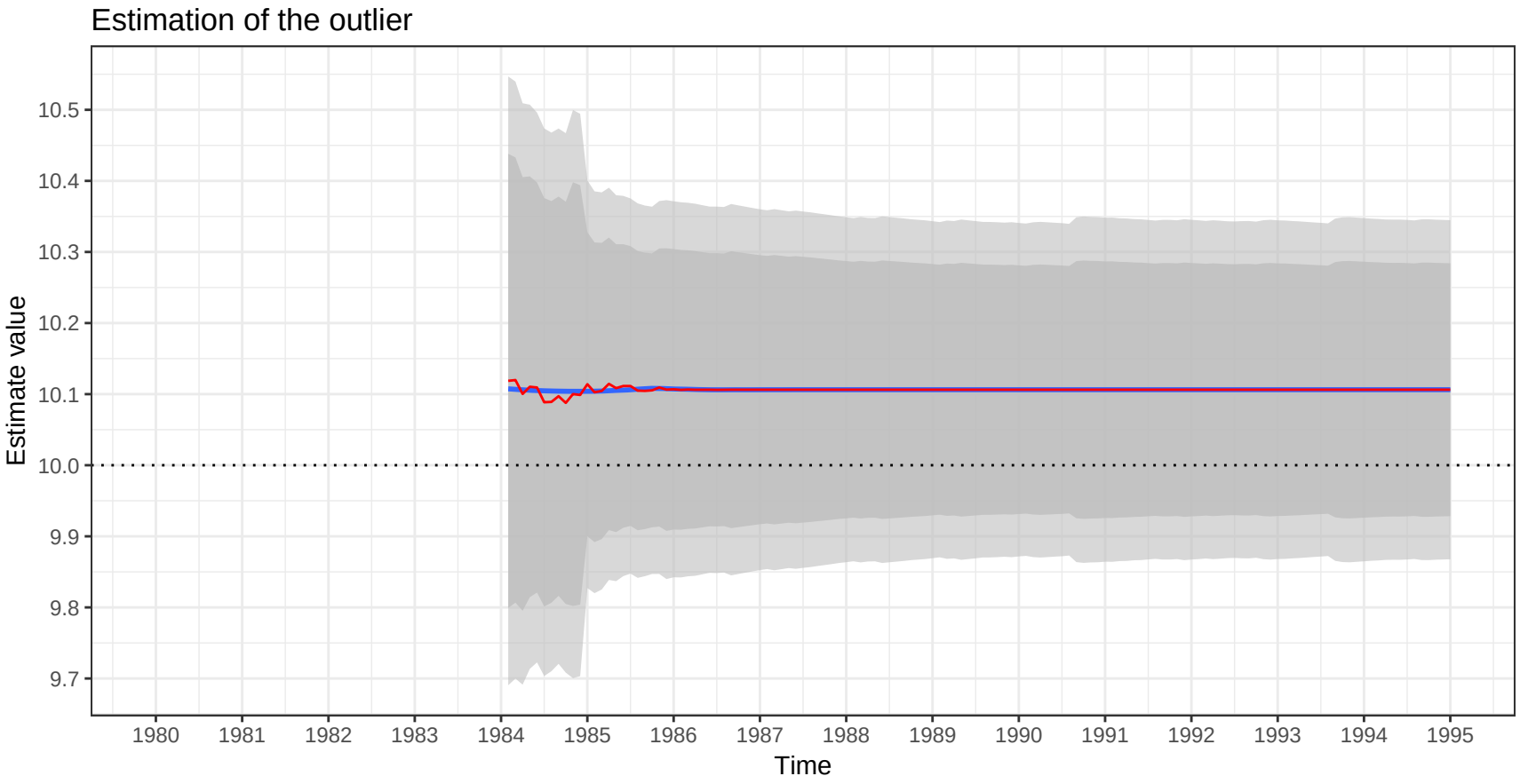
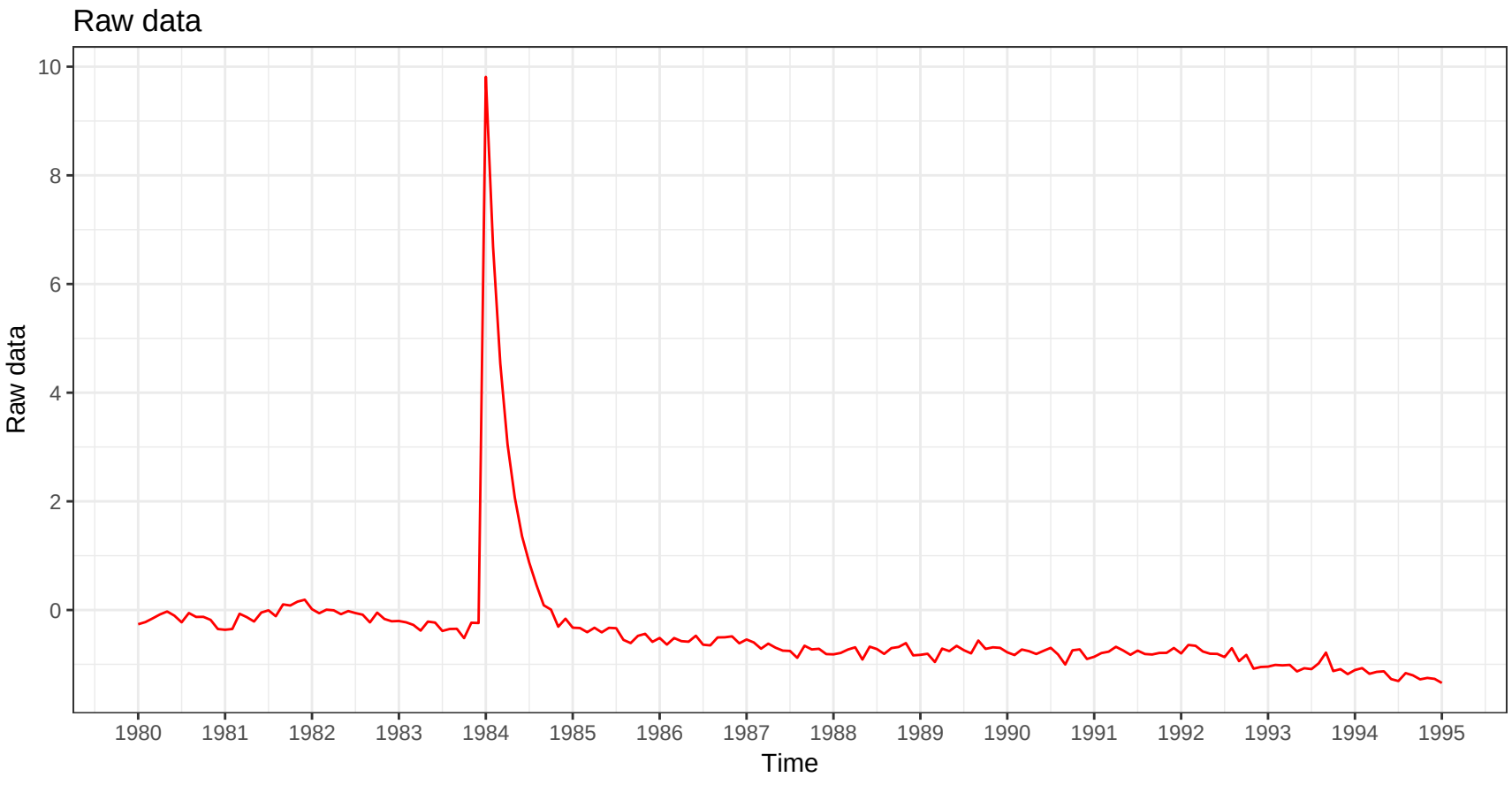
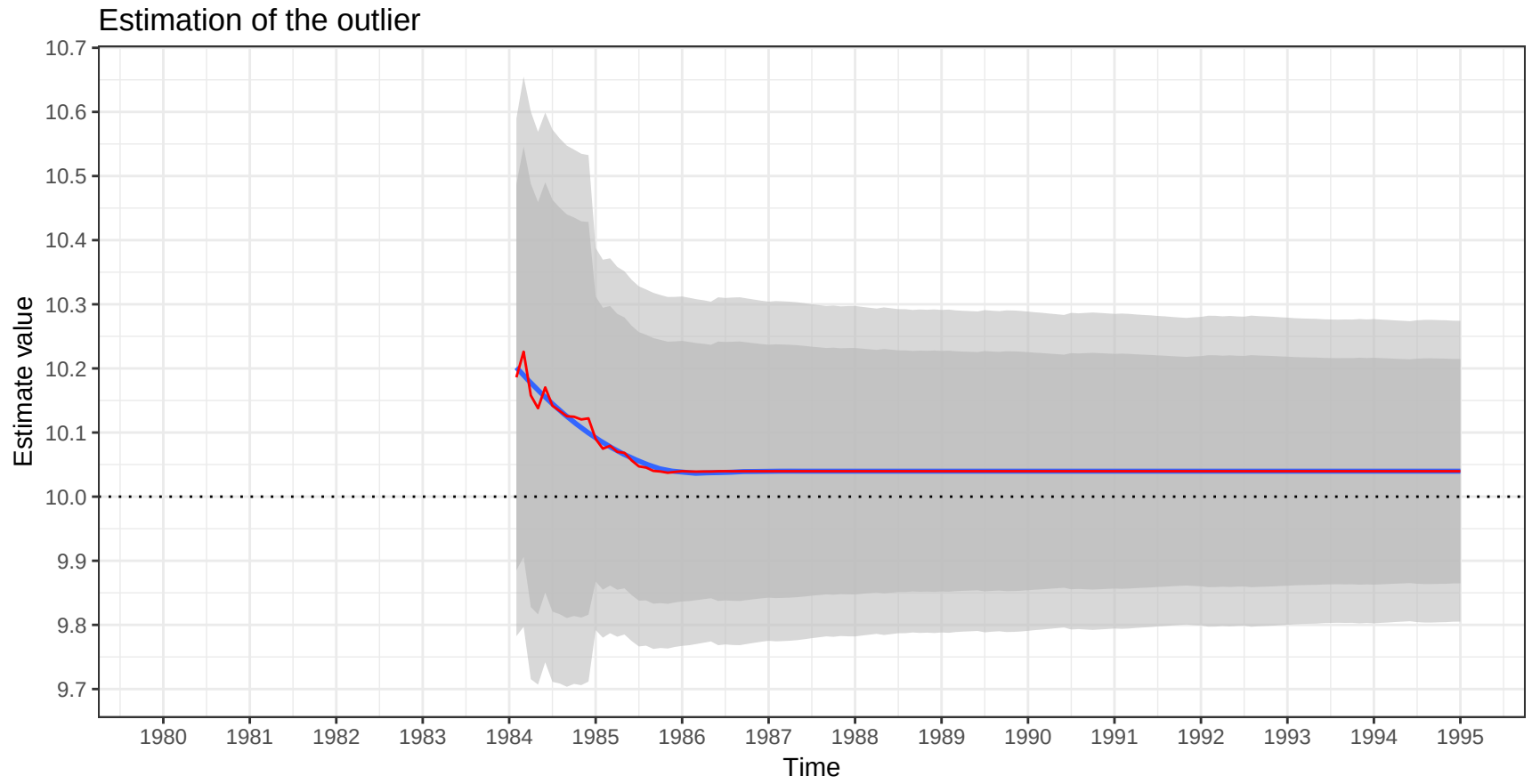
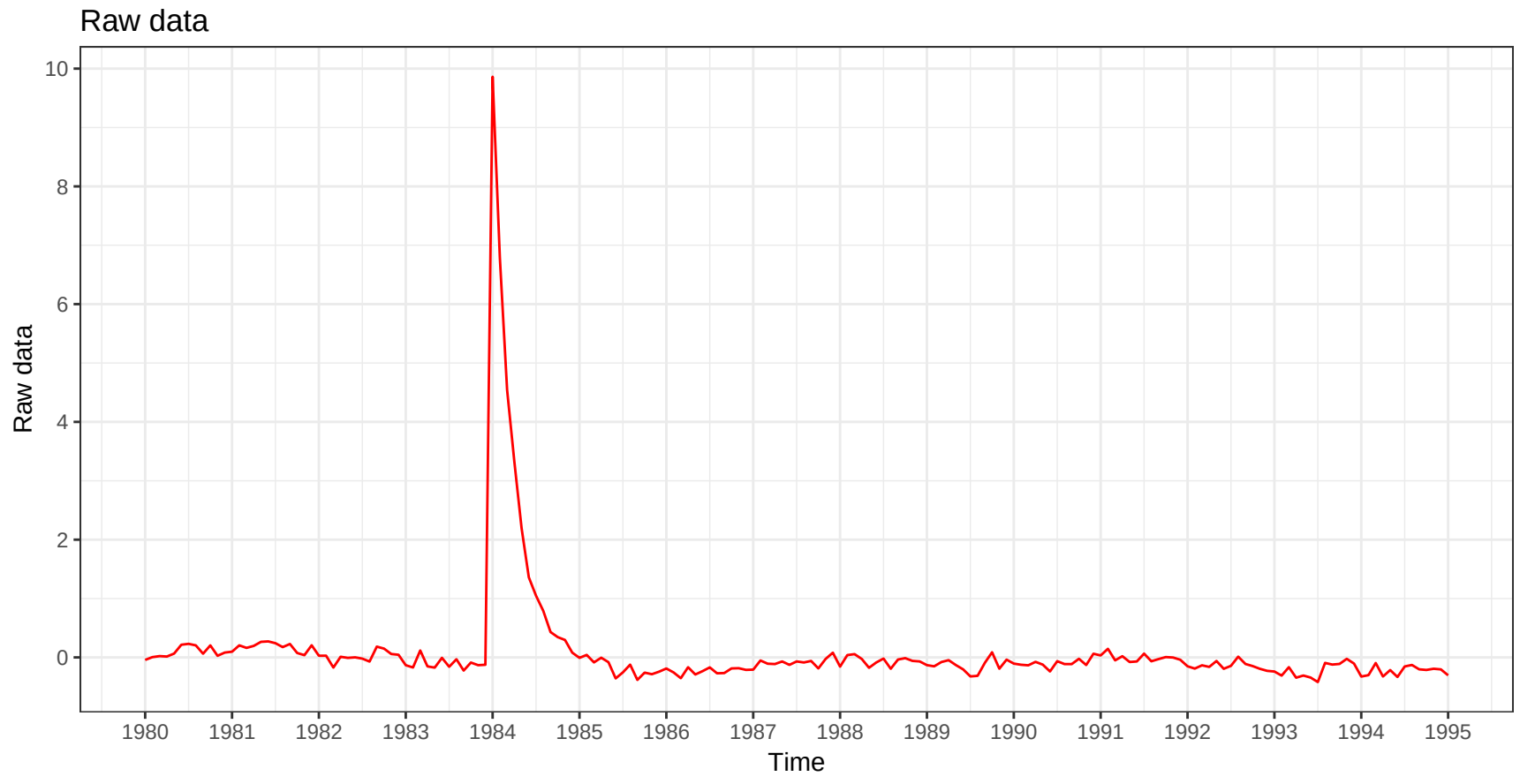
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.5B)at



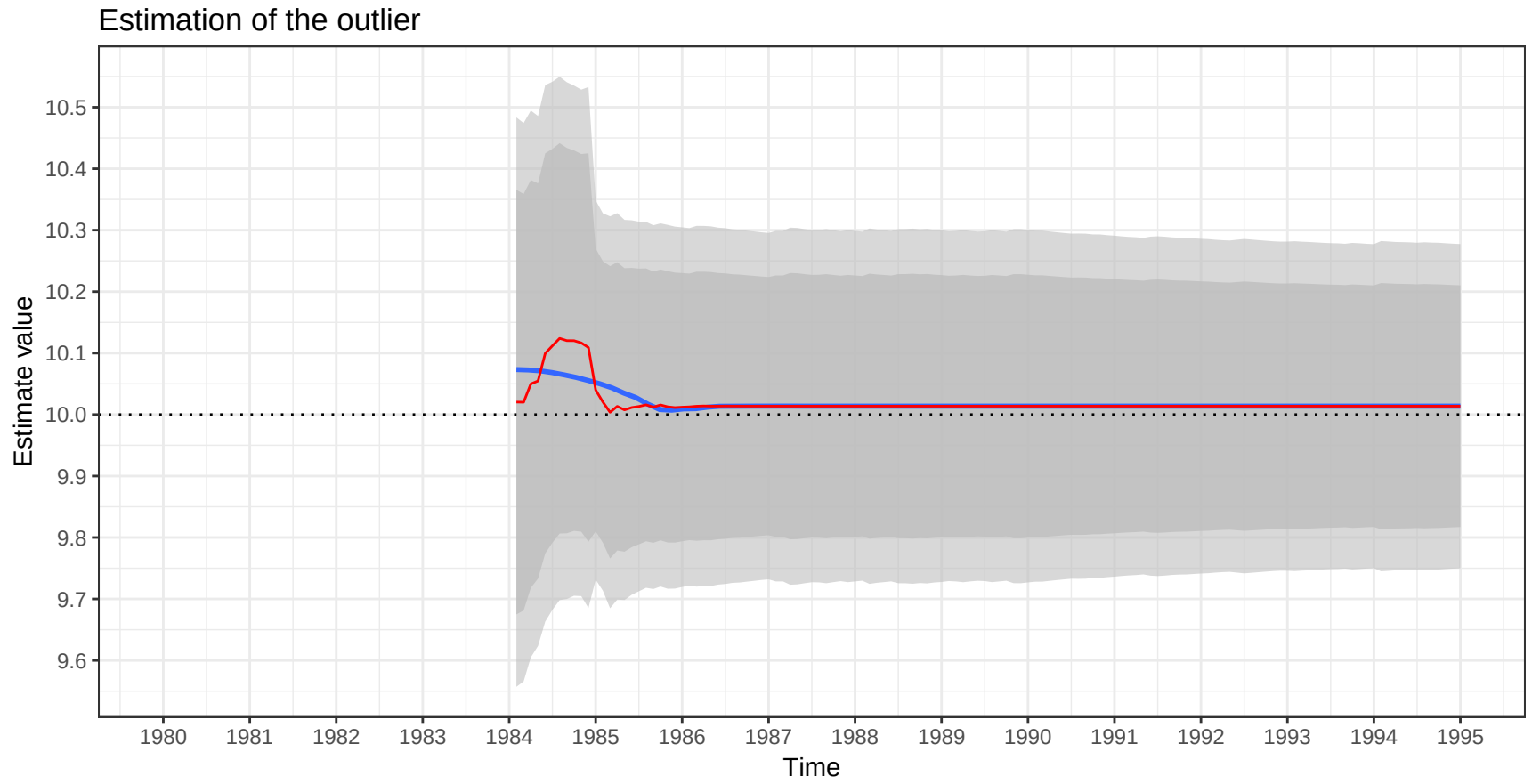


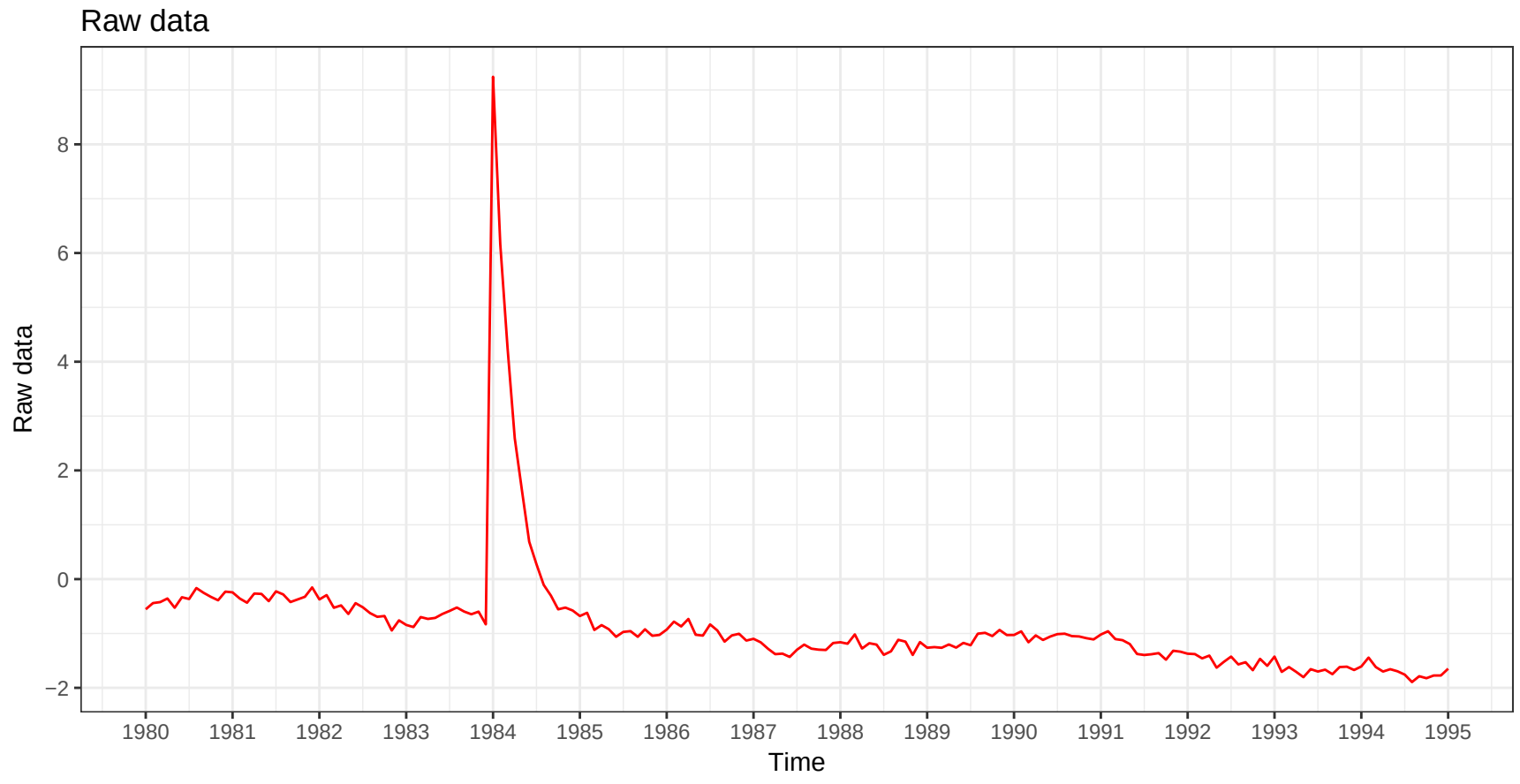
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.5B)at





Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.5B)at





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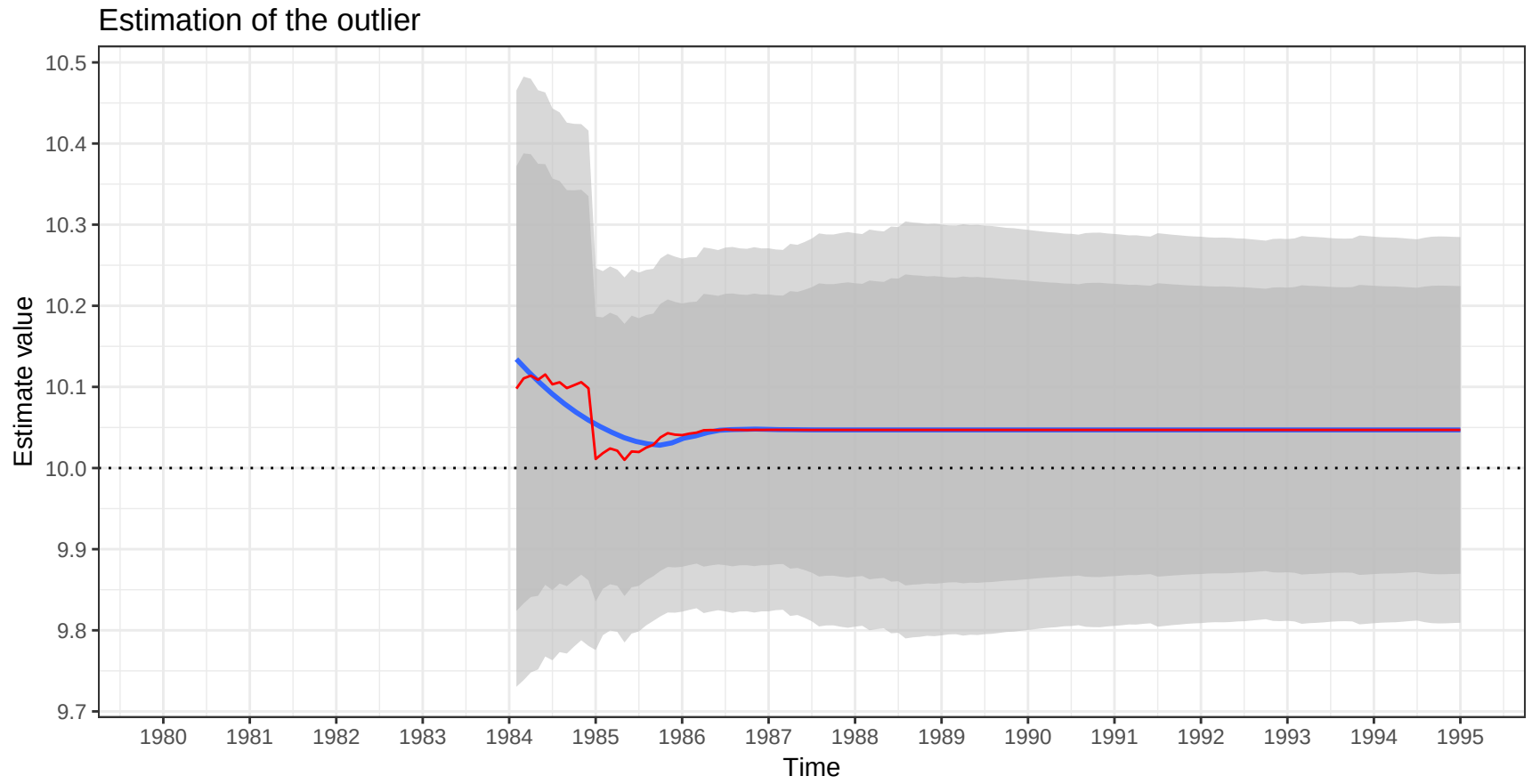
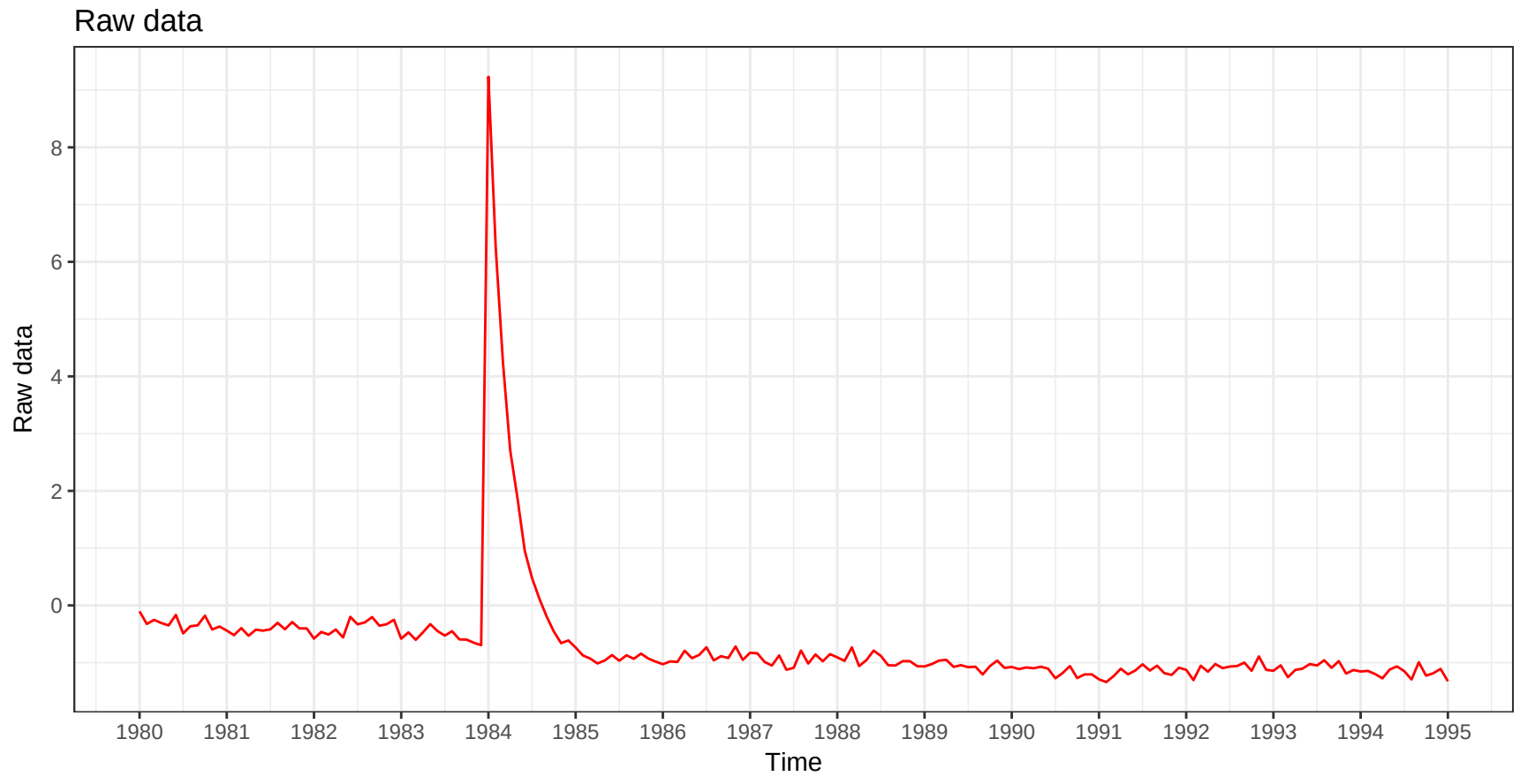
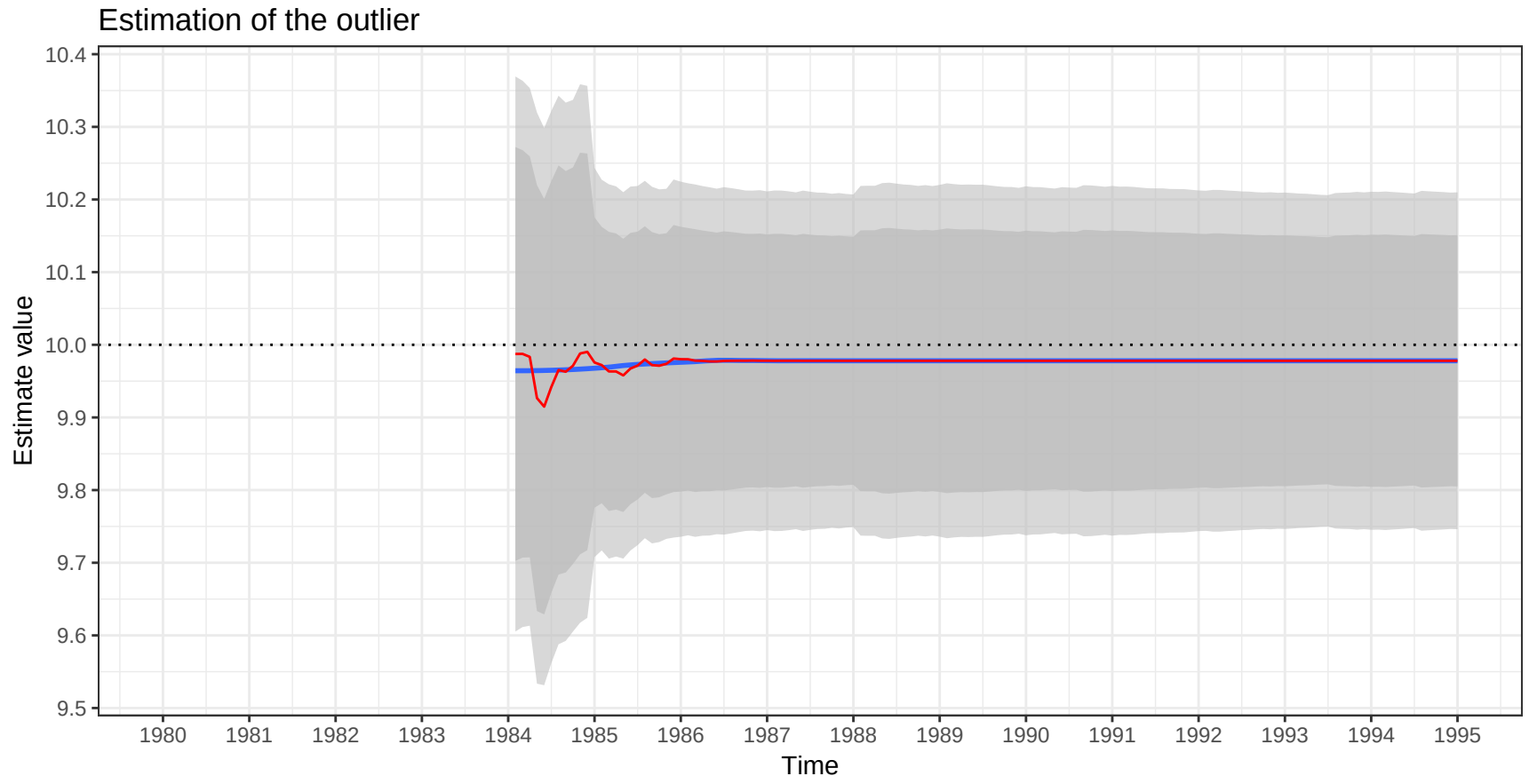
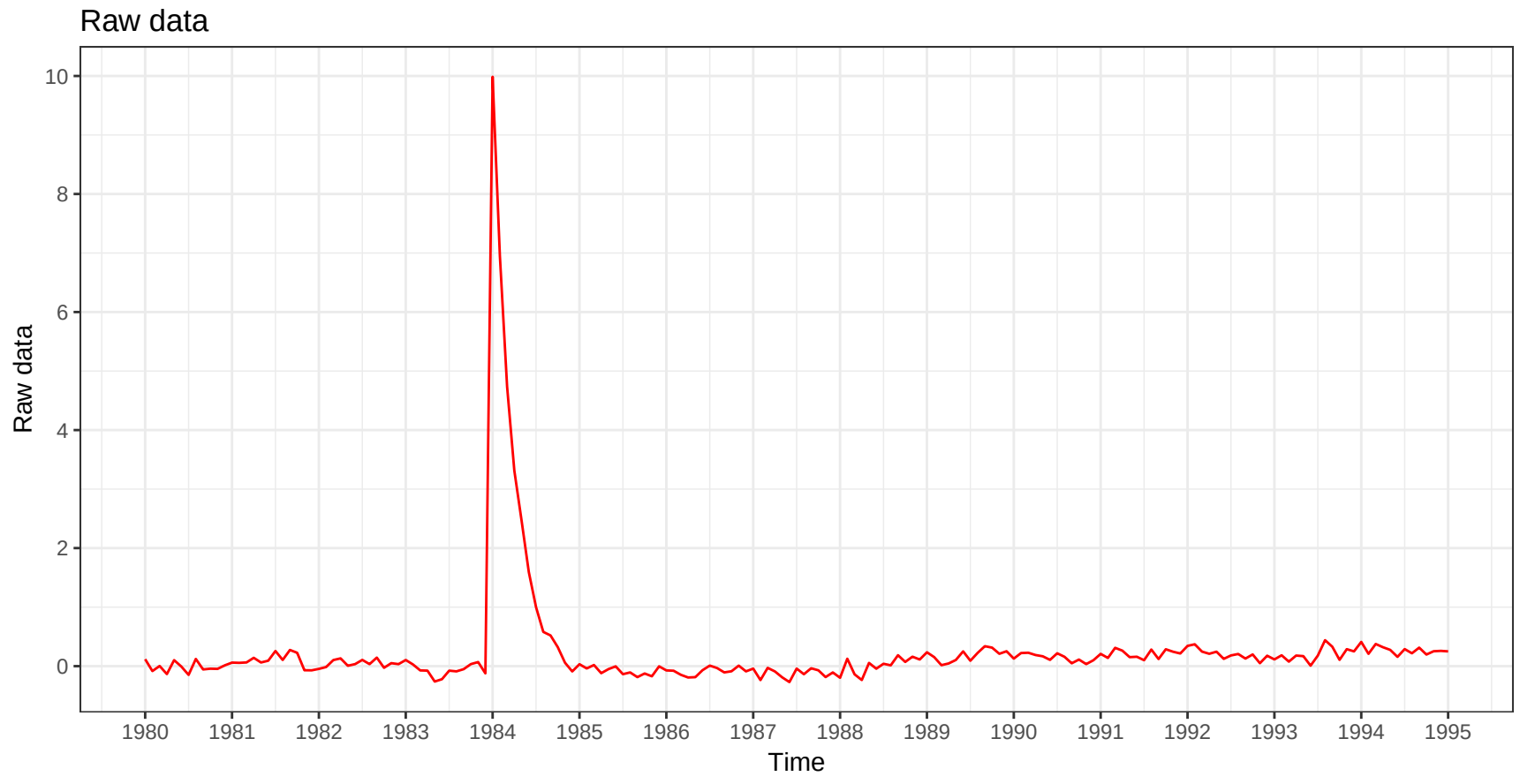


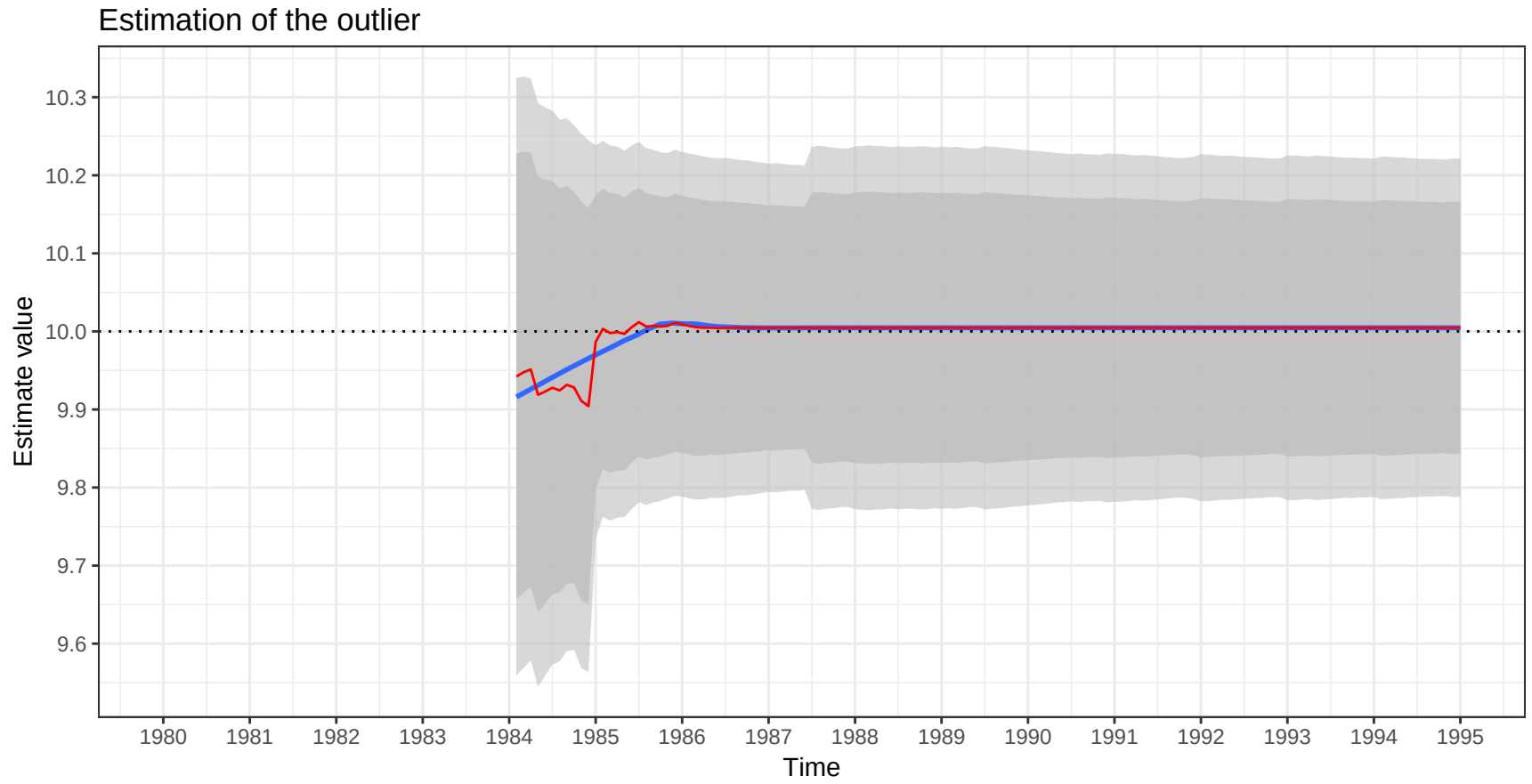


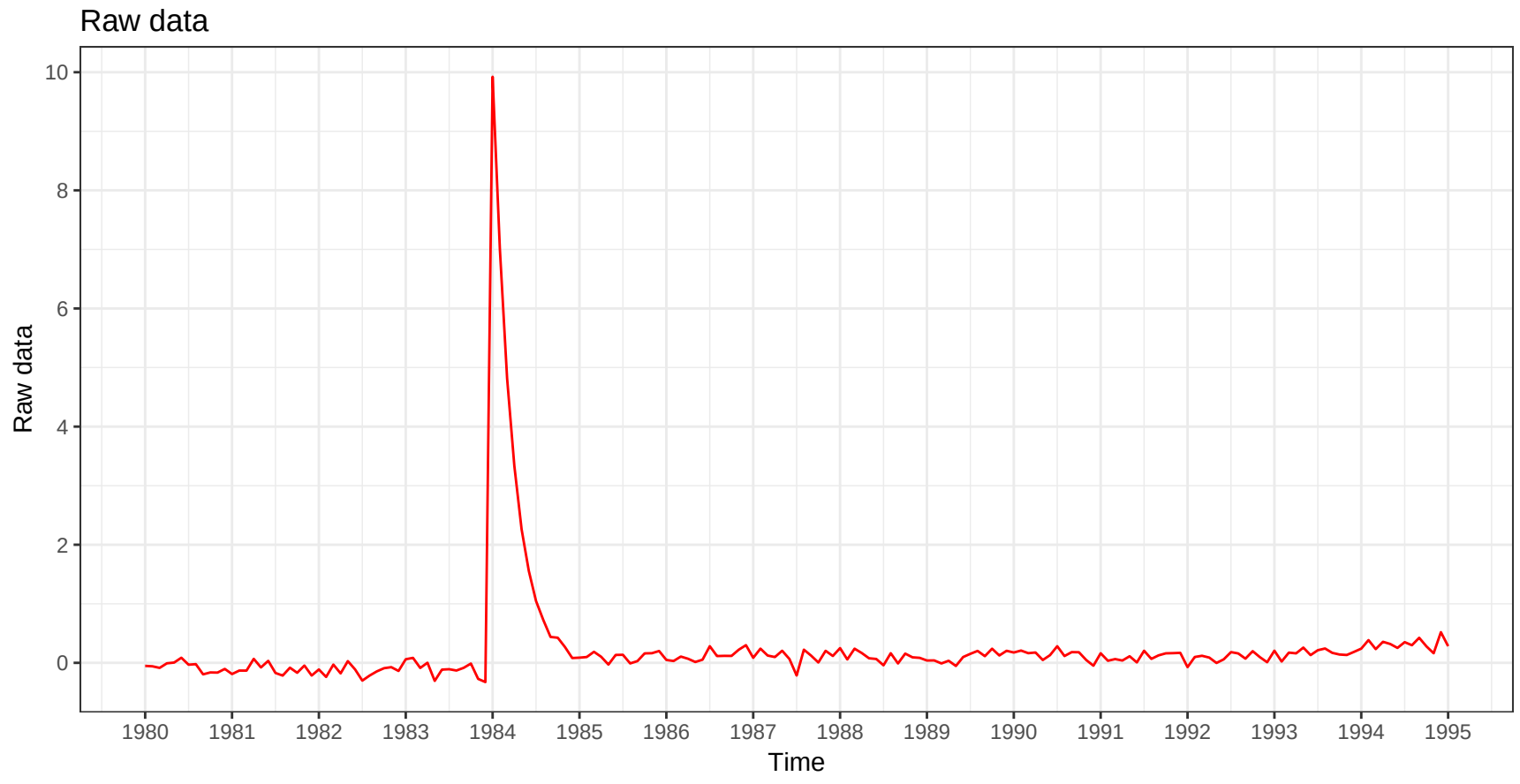
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.7B)at



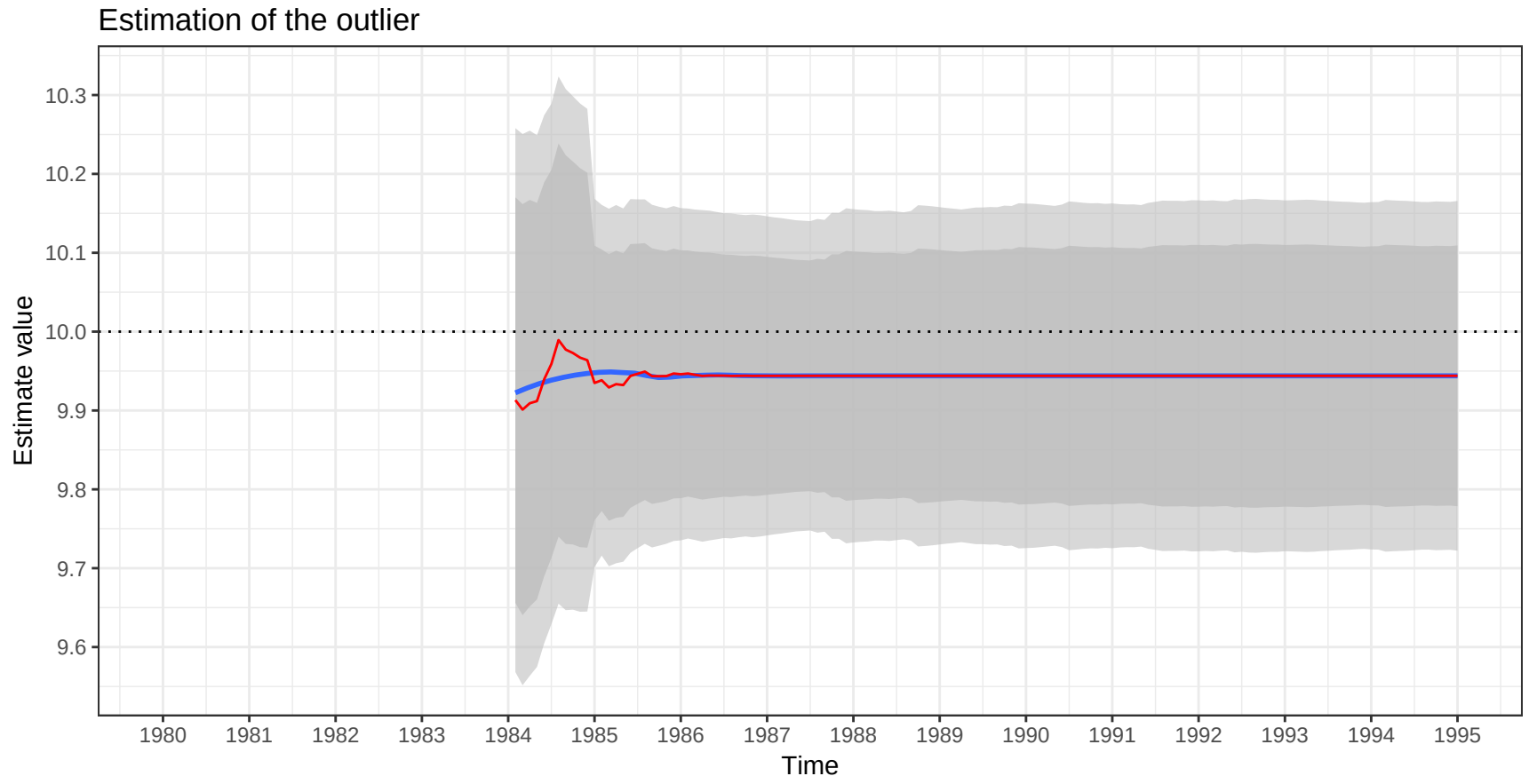


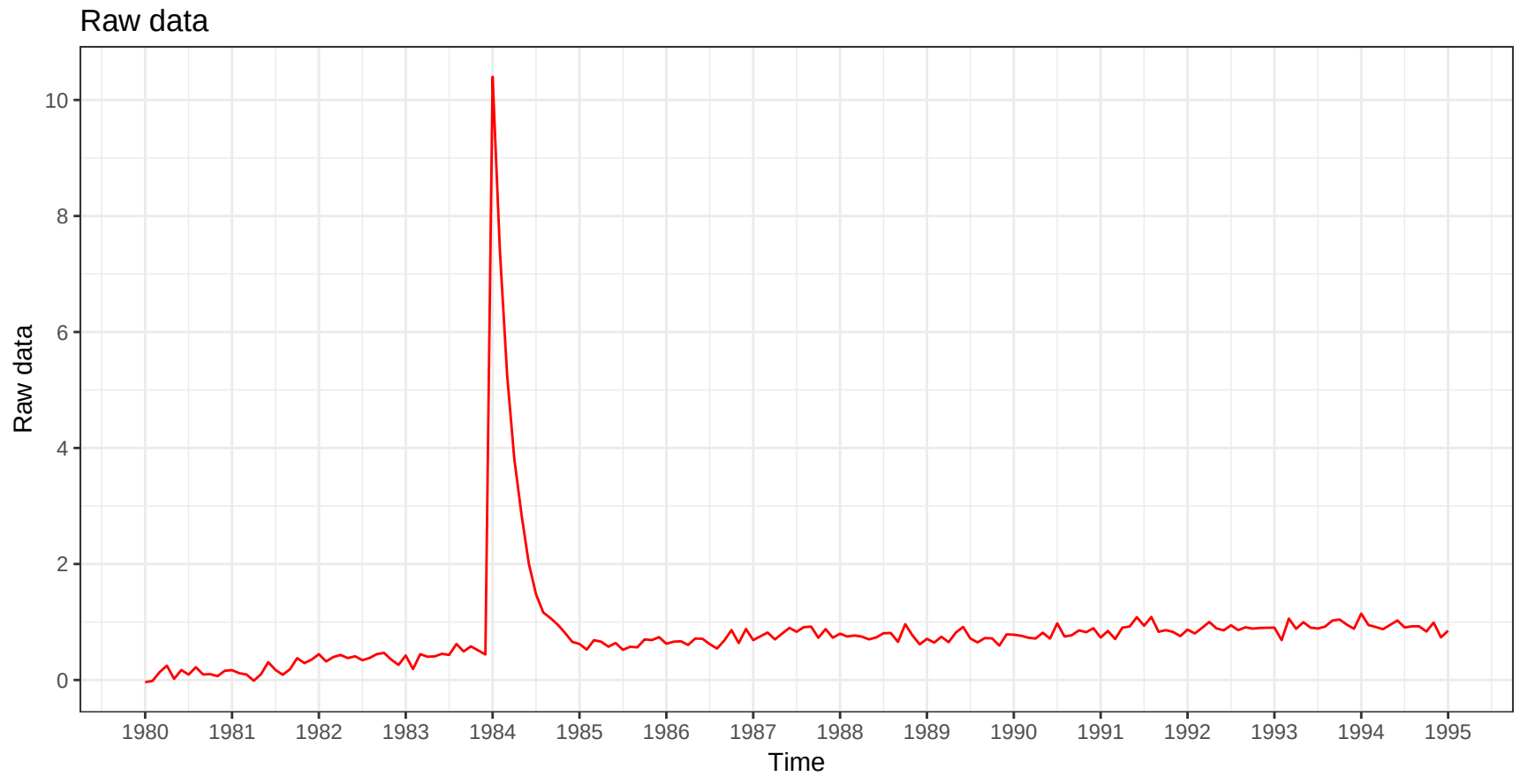
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.7B)at



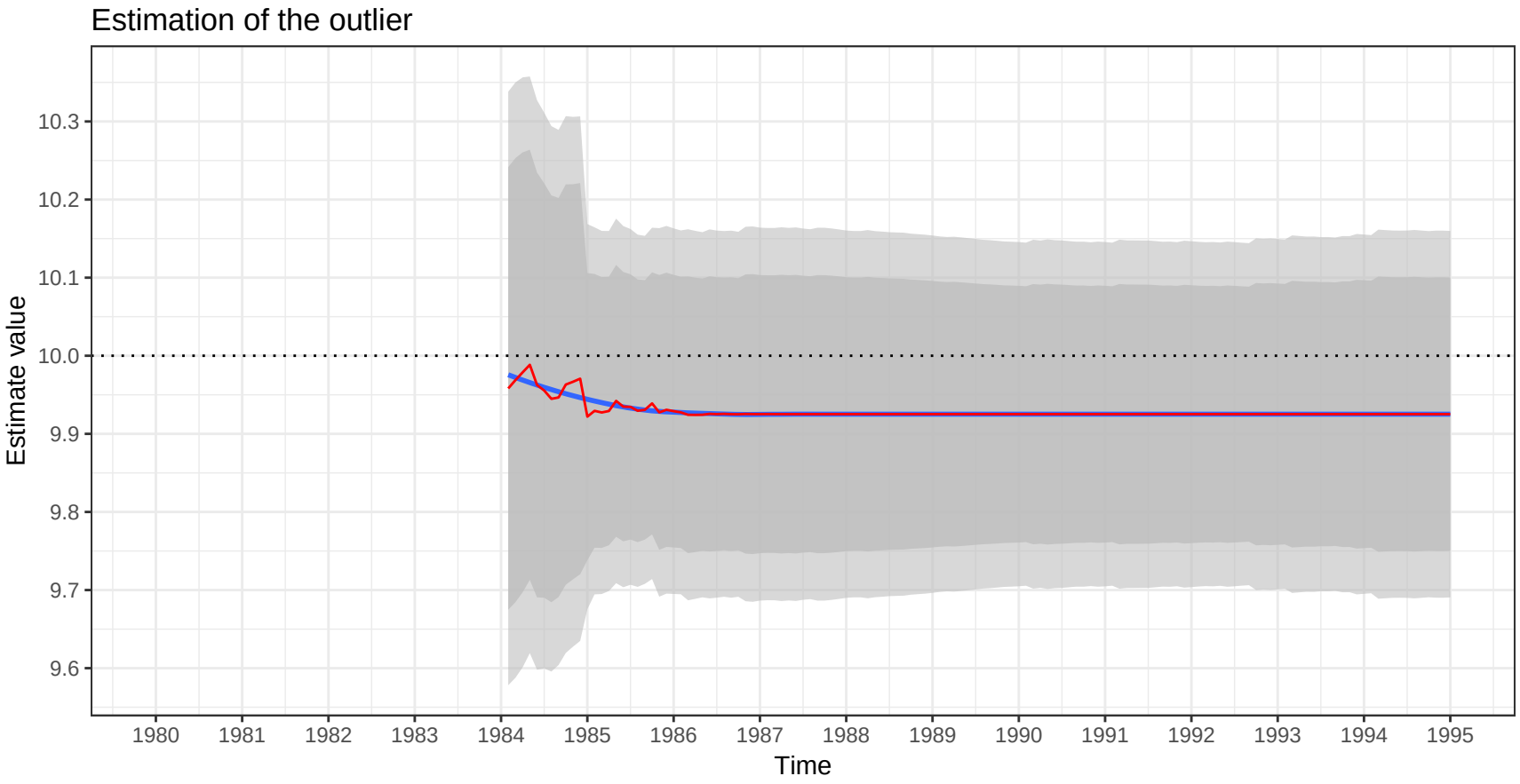


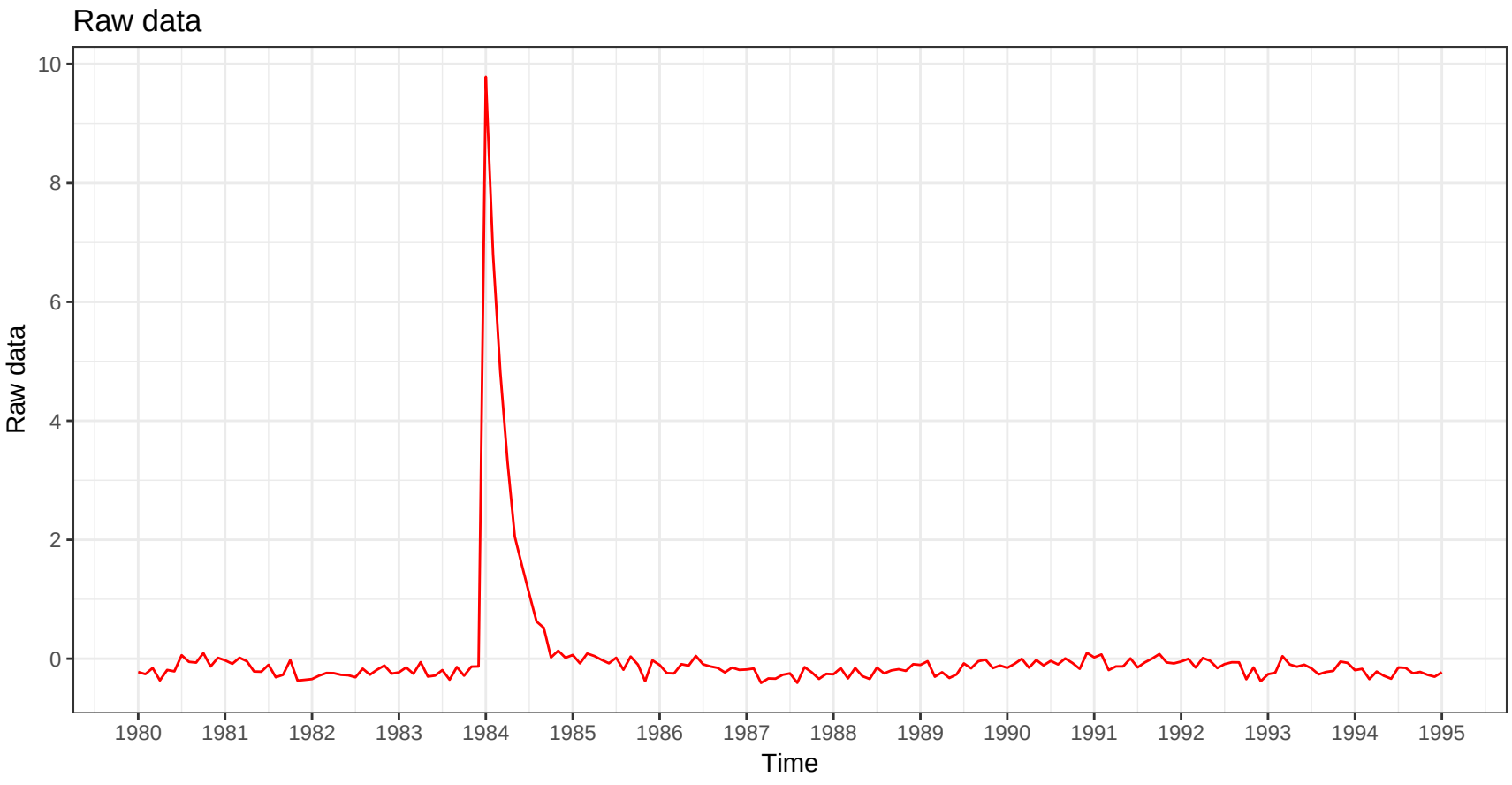
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.7B)at



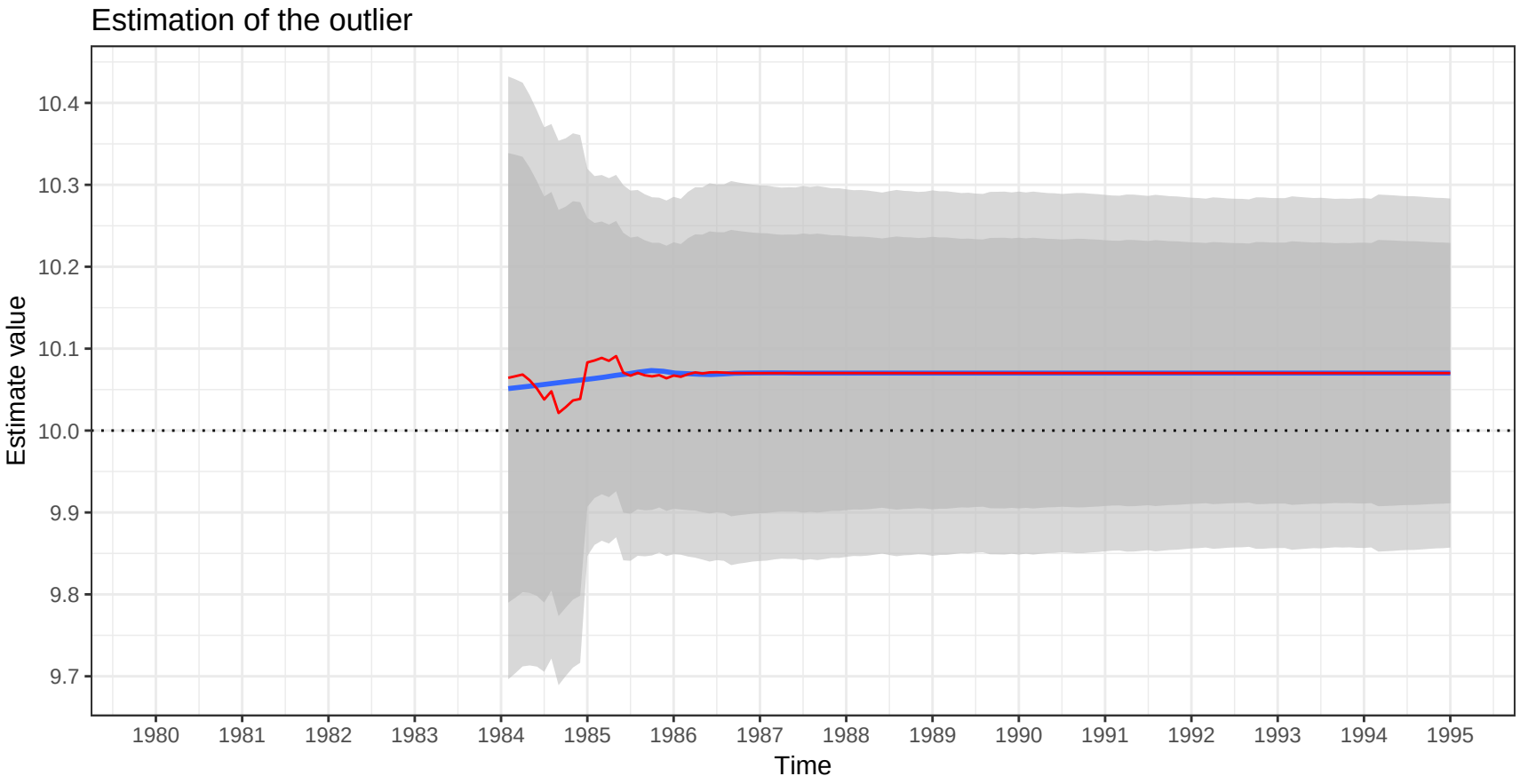


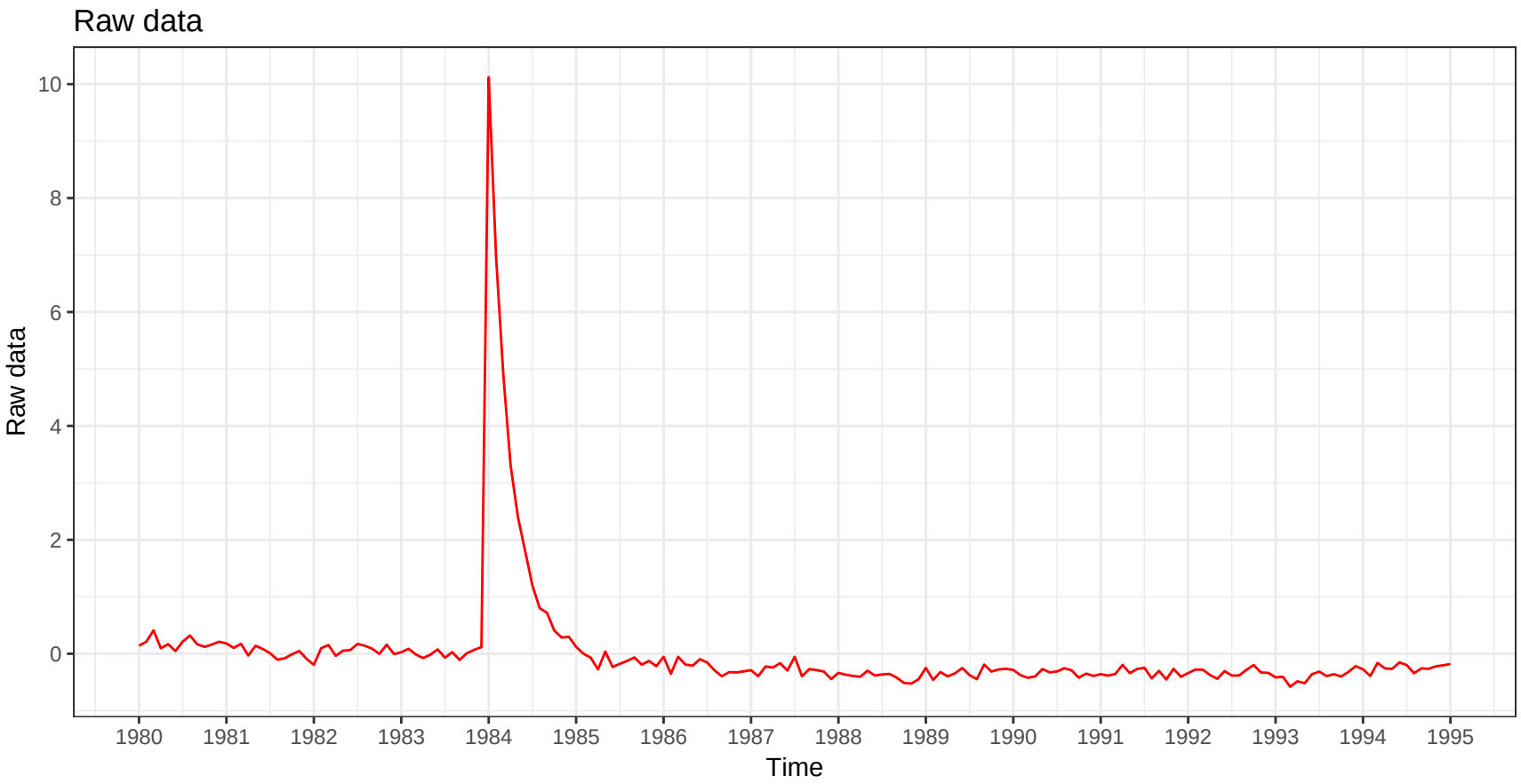
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.7B)at



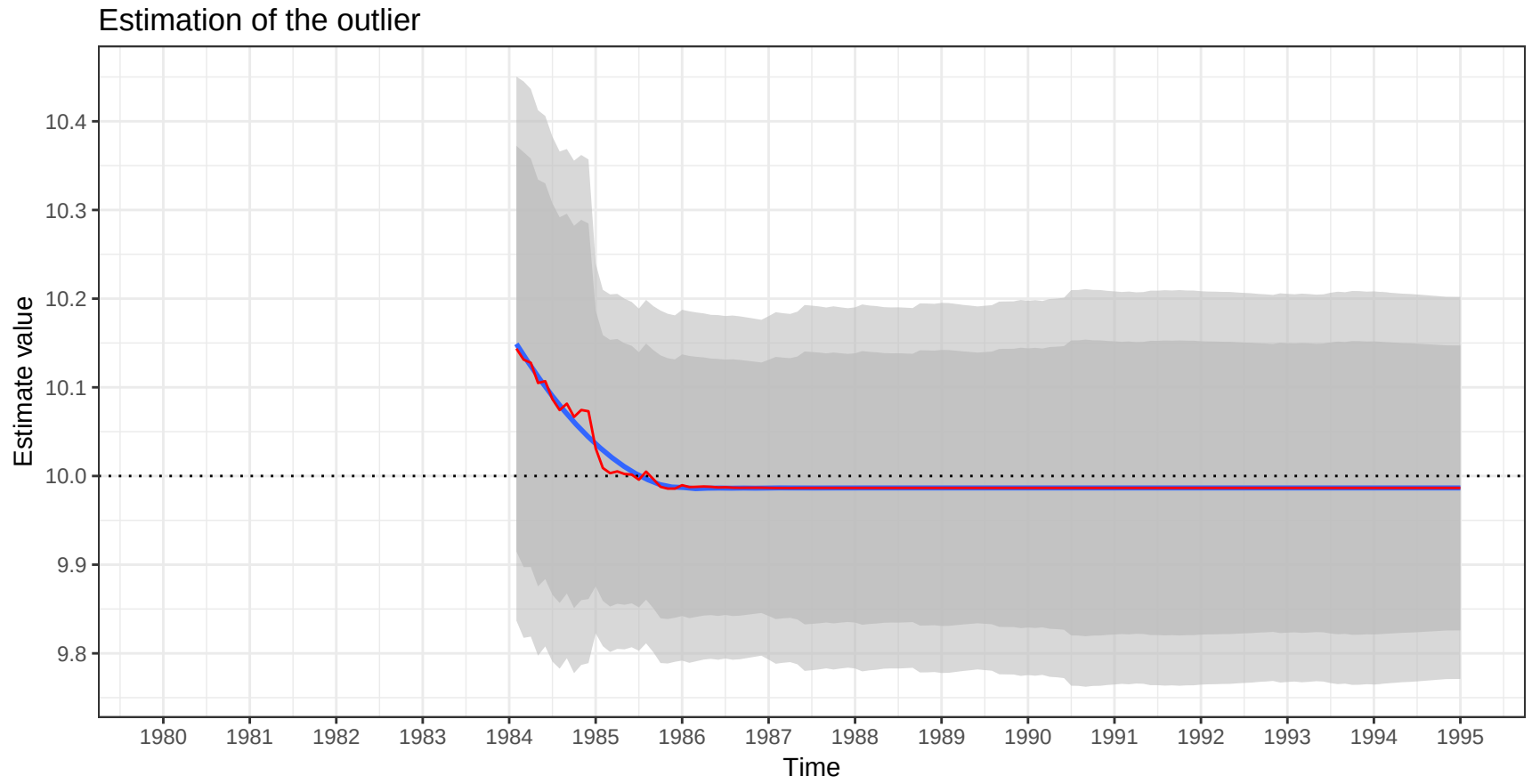


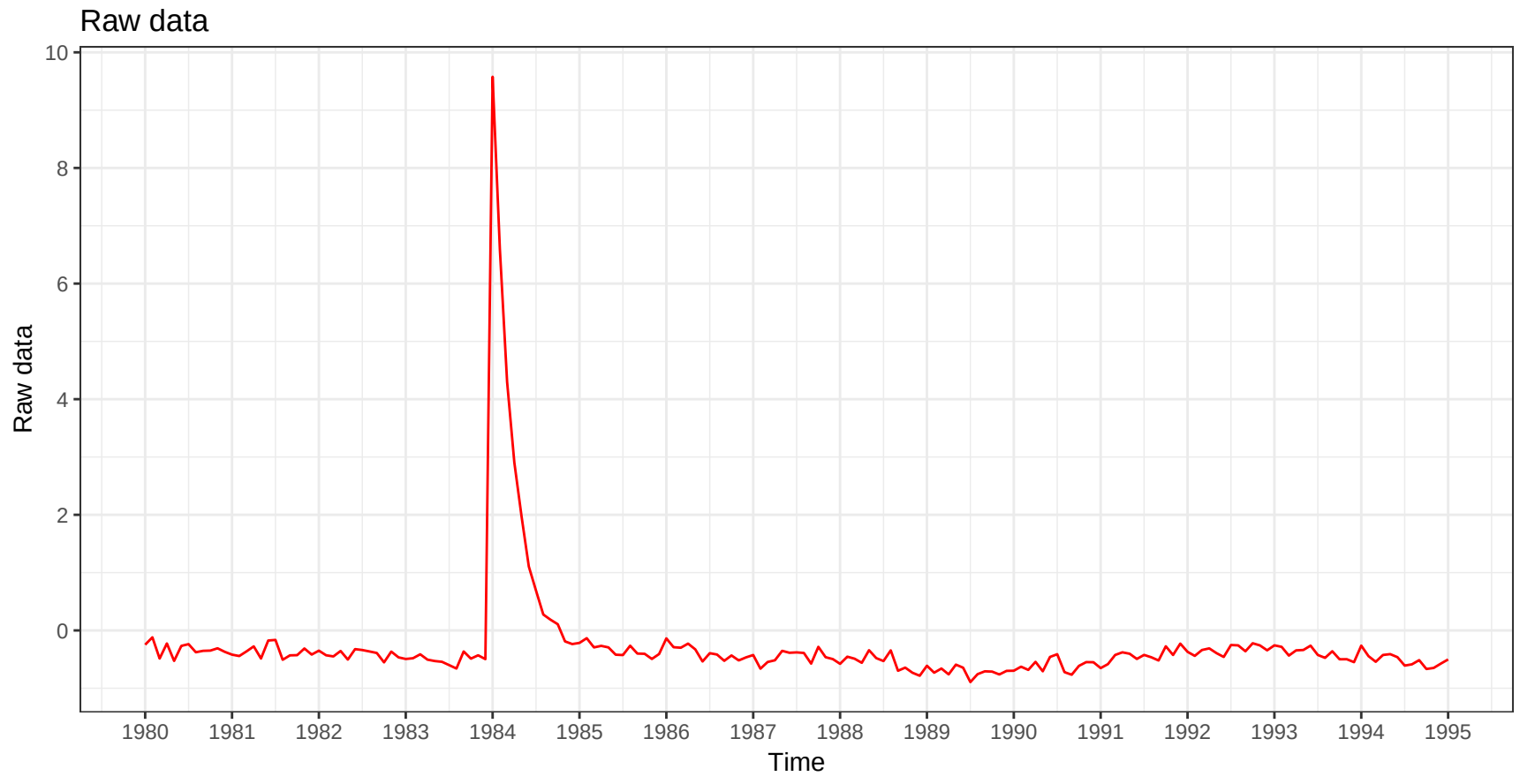
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.7B)at



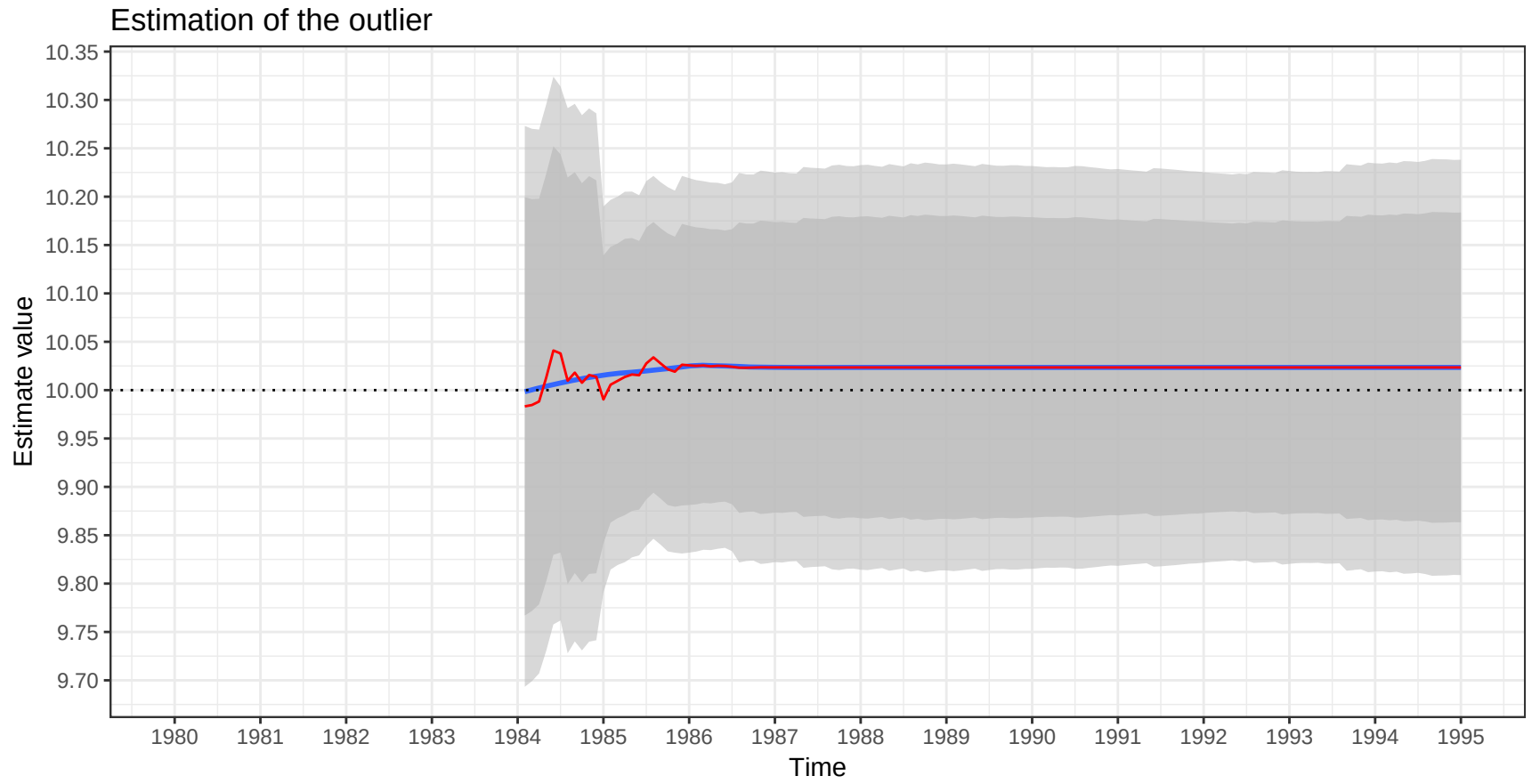


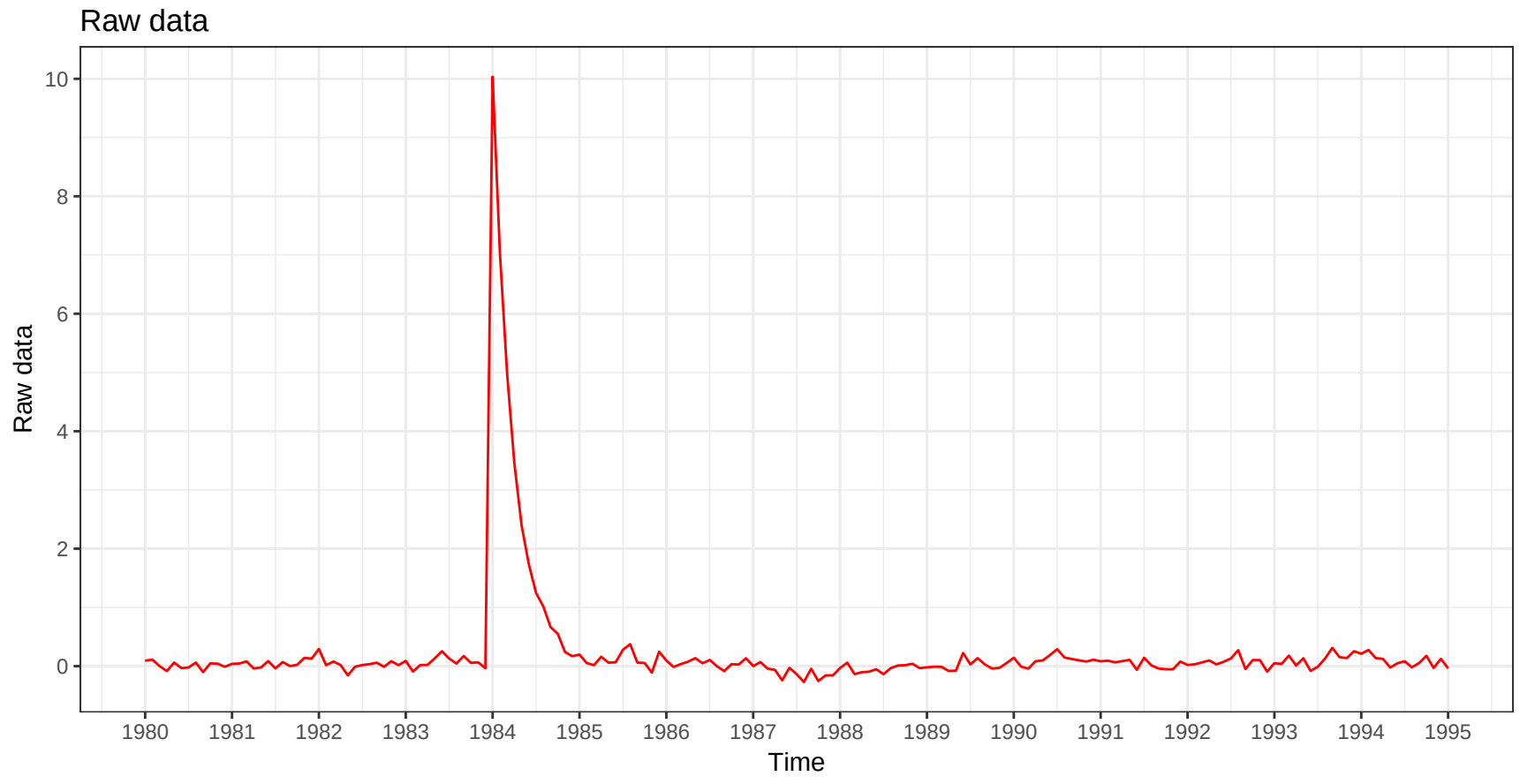
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.7B)at



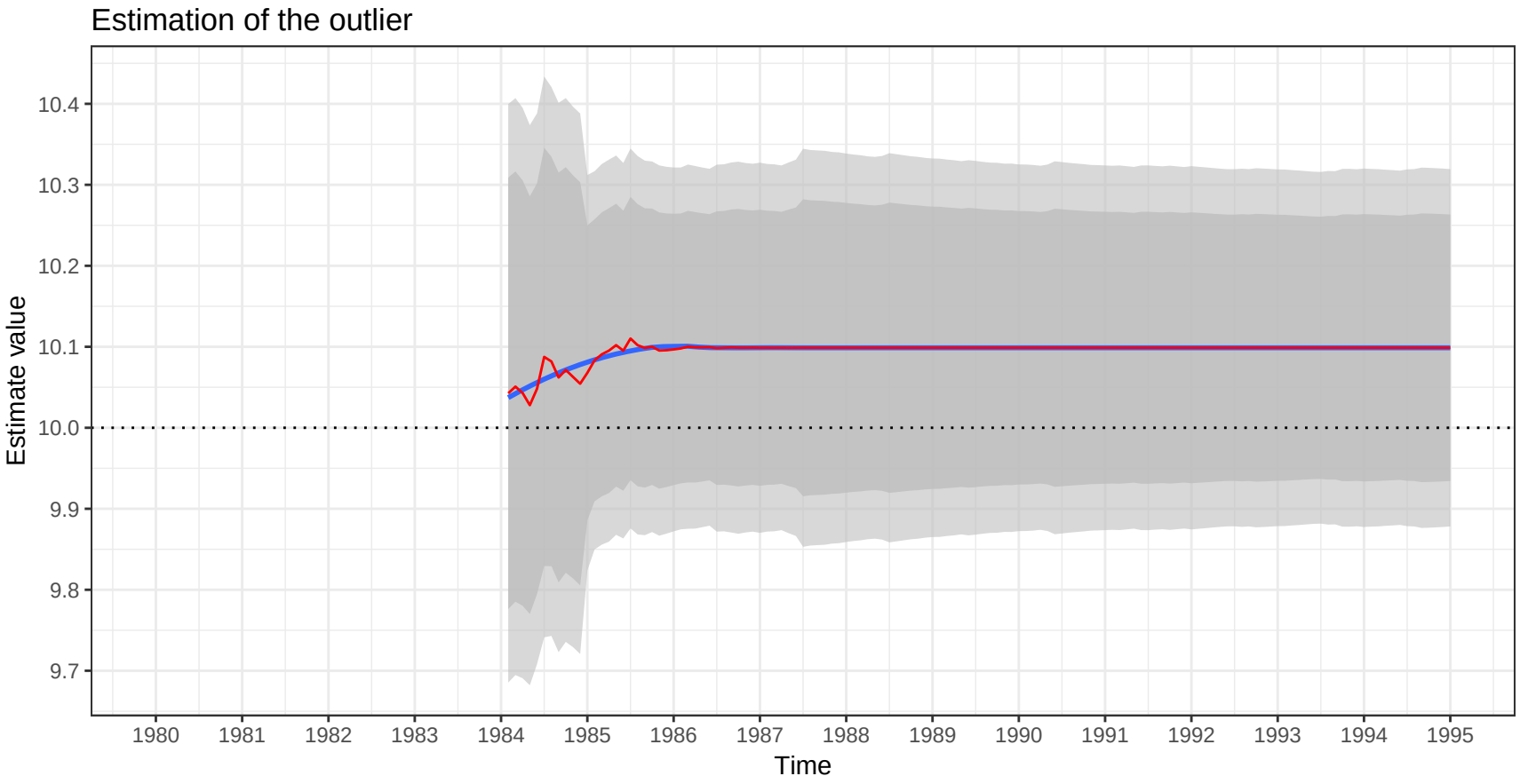


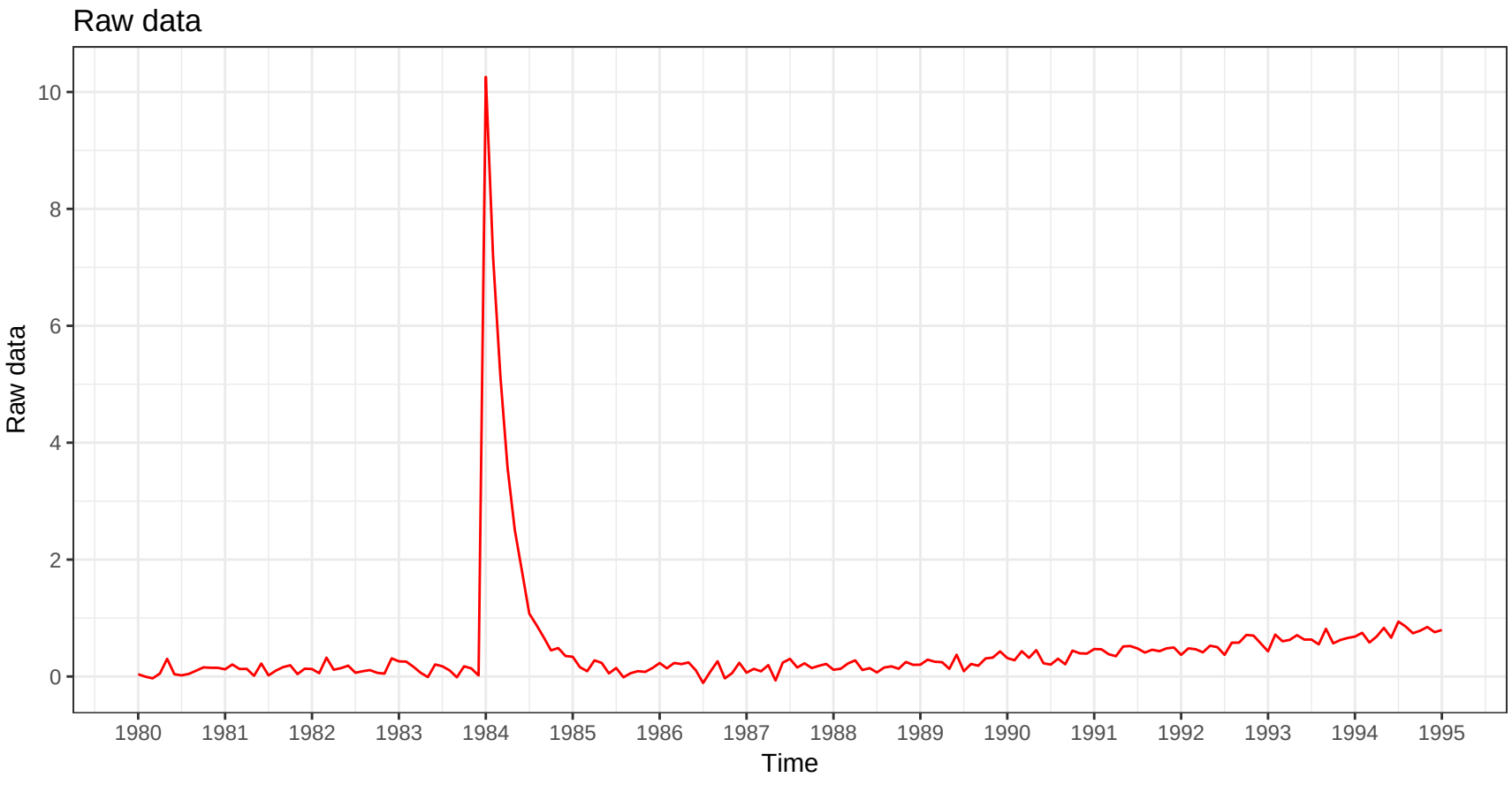
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.7B)at

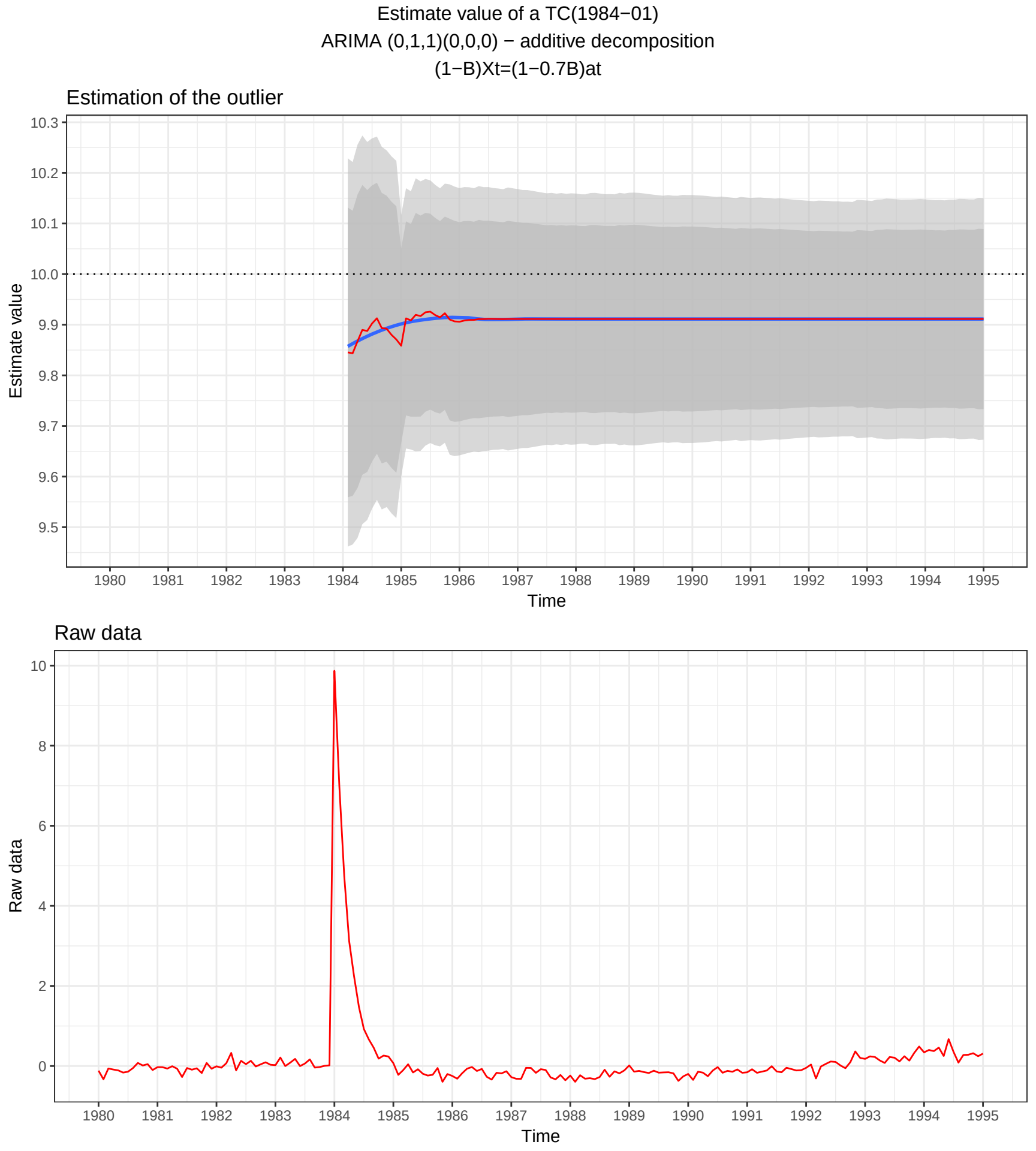




Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.7B)at






Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,0,0) − additive decomposition
(1−B)Xt=(1−0.7B)at
Estimation of the outlier
Estimate value
10.3
10.2
10.1
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Raw data
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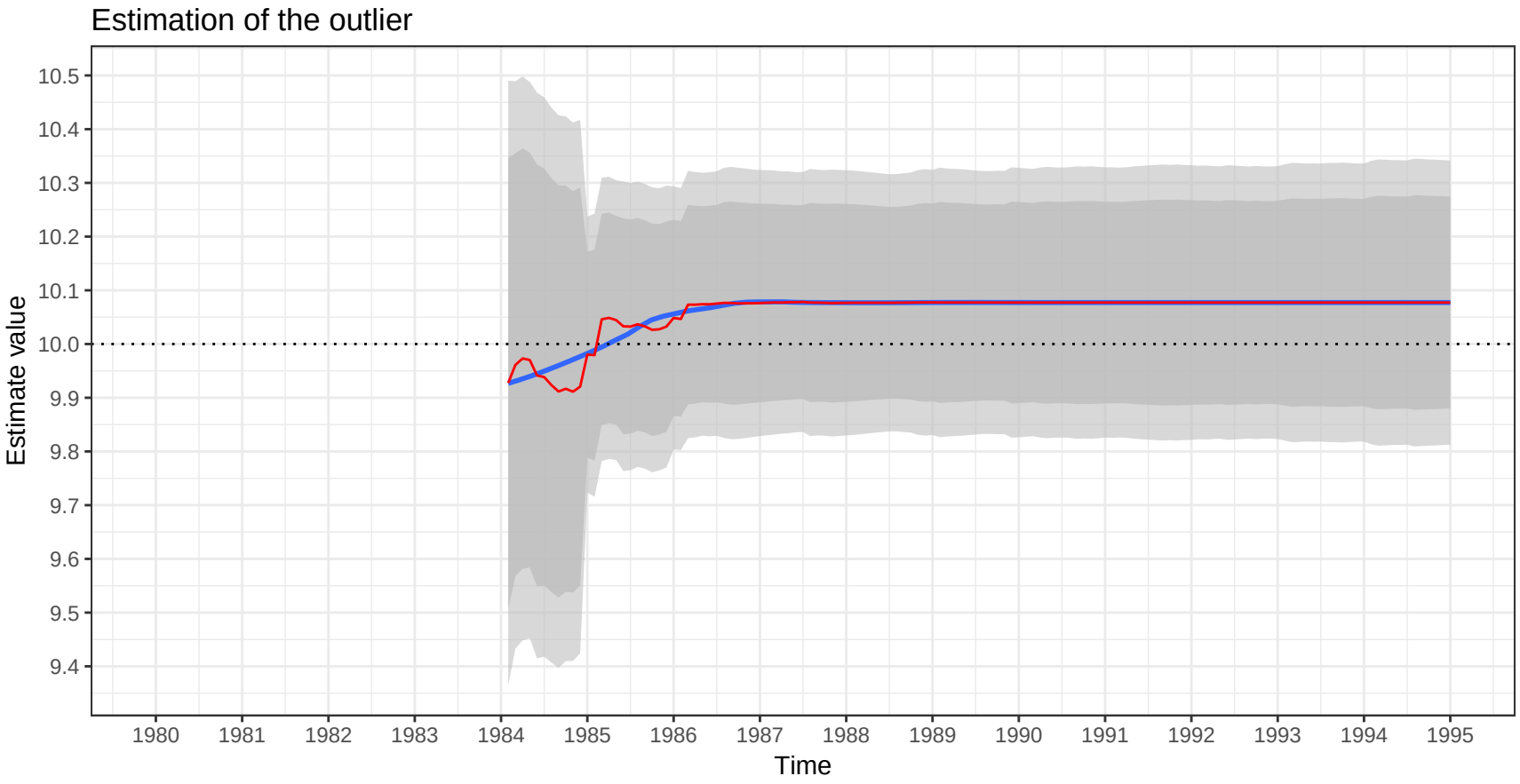
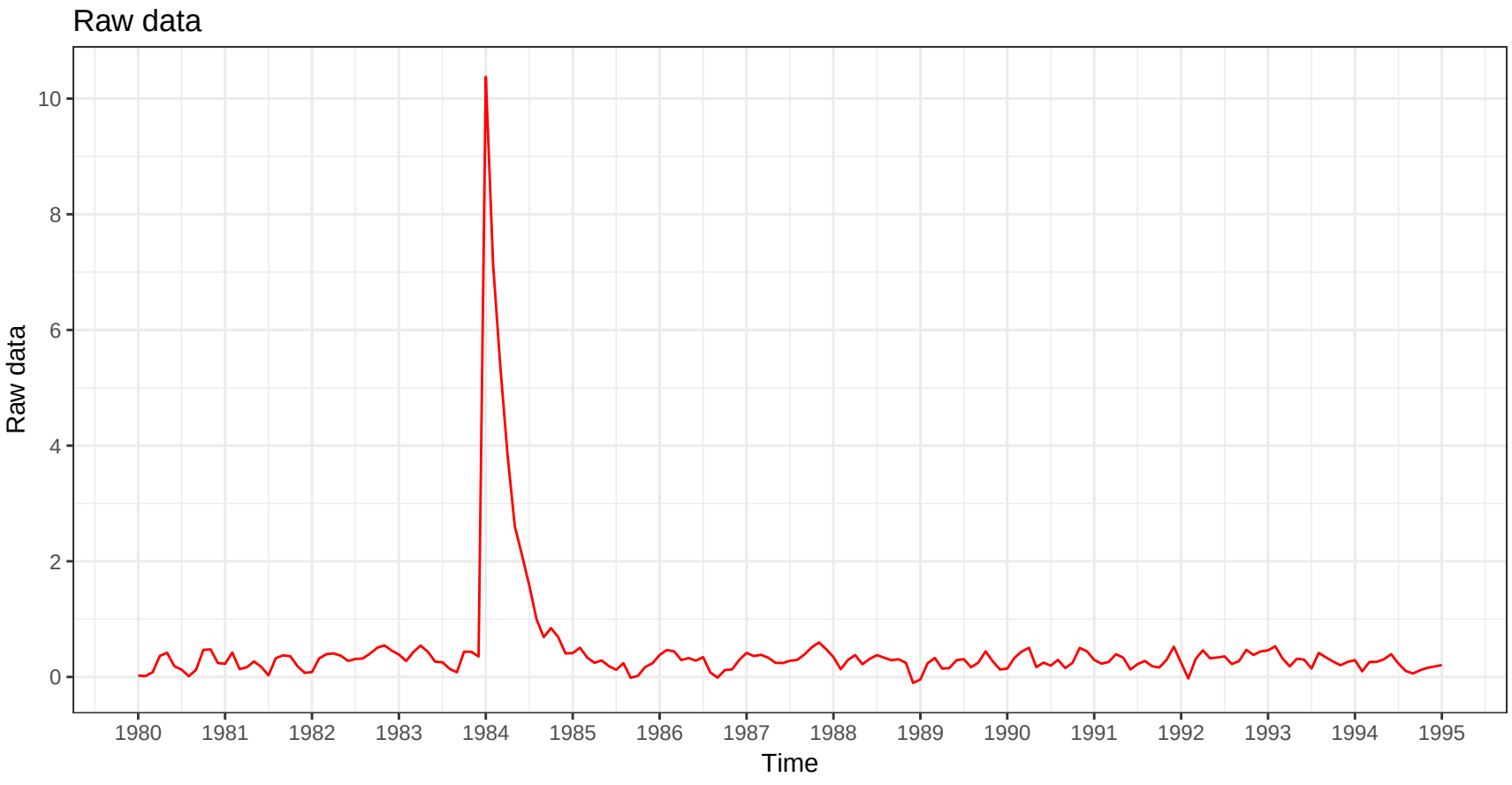
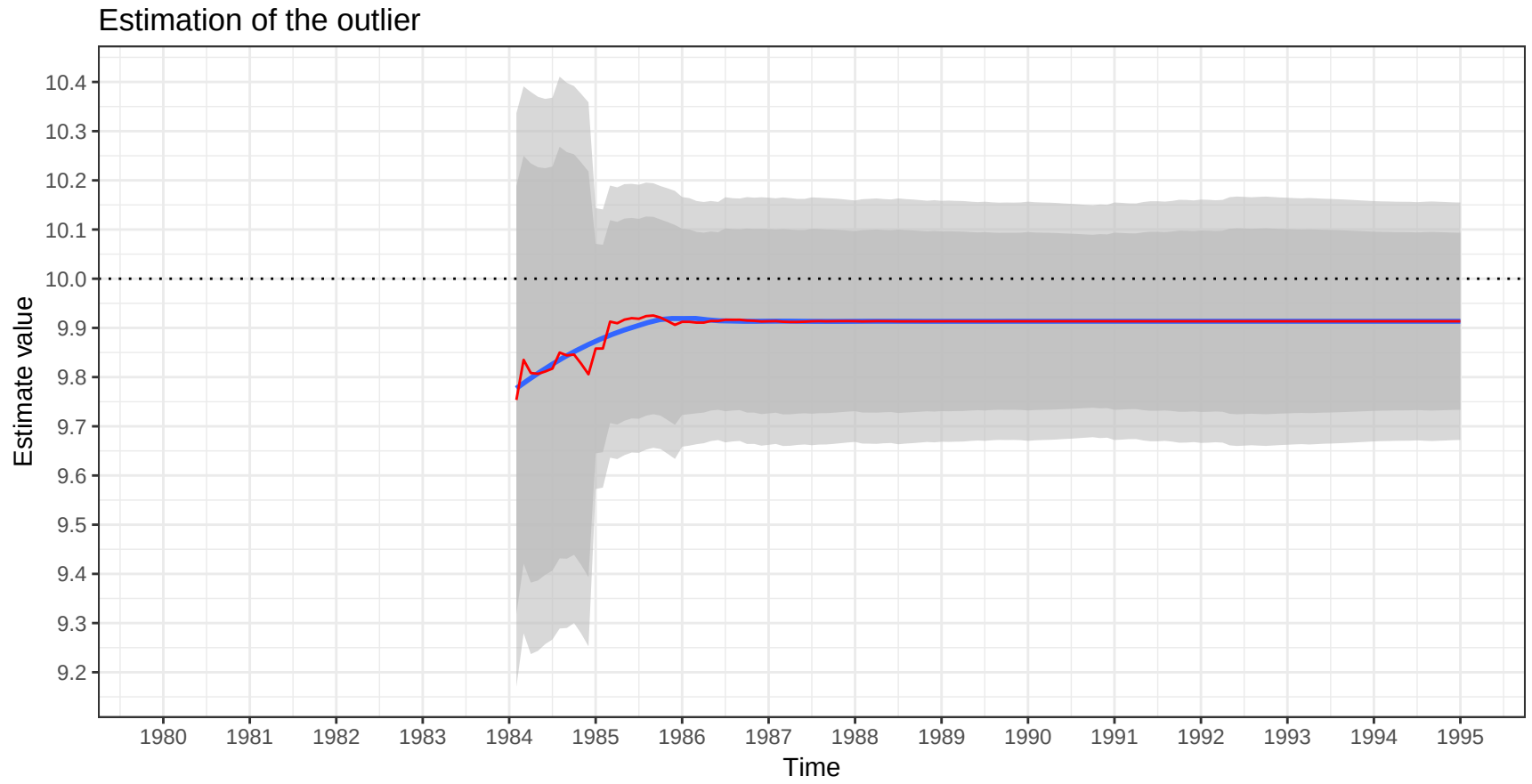
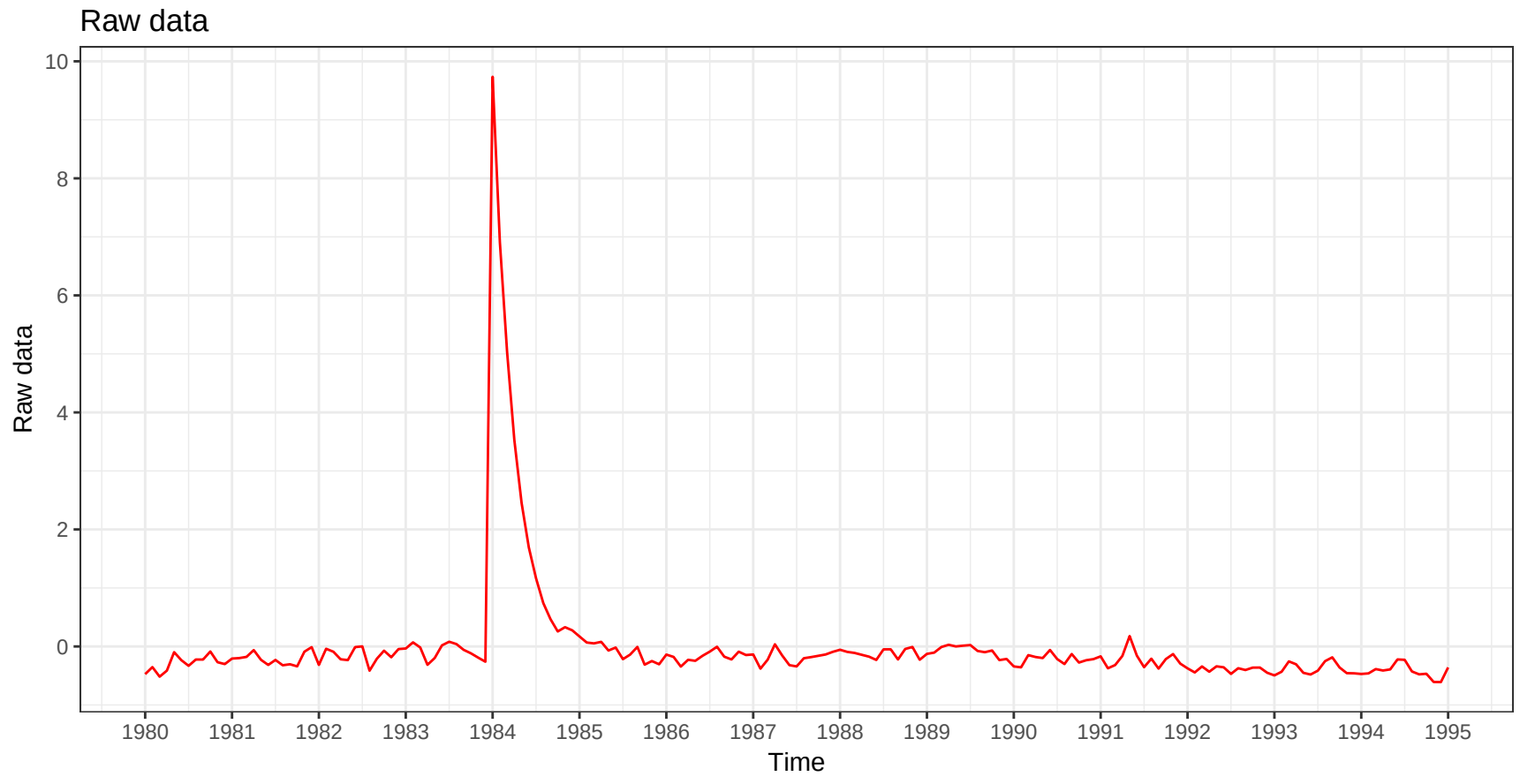
Estimate value of a TC(1984−01)
ARIMA (0,1,2)(1,0,0) − additive decomposition
(1−B)(1−0.7B12)Xt=(1−0.4B+0.7B2)at





Estimate value of a TC(1984−01)
ARIMA (0,1,2)(1,0,0) − additive decomposition
(1−B)(1−0.7B12)Xt=(1−0.4B+0.7B2)at





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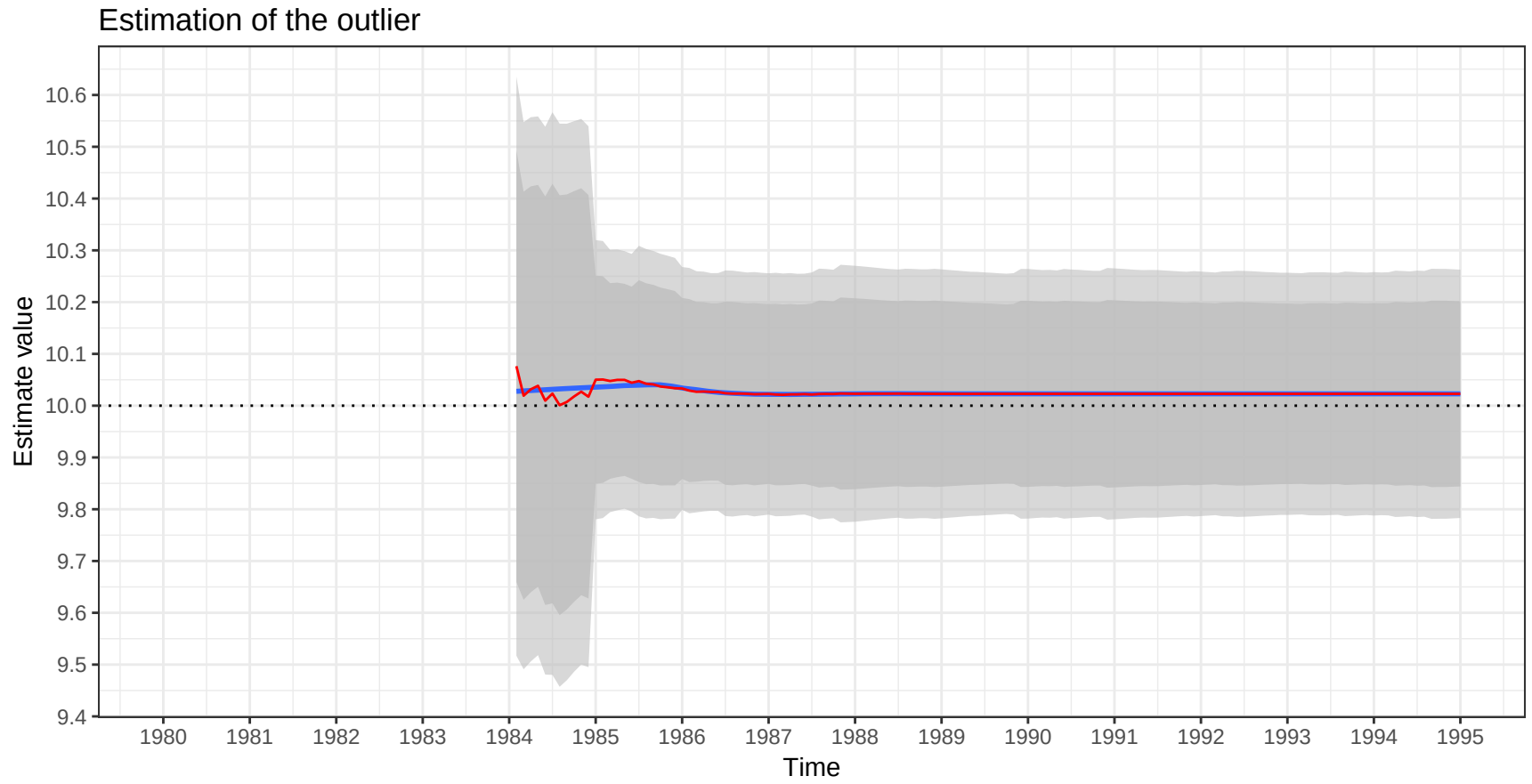

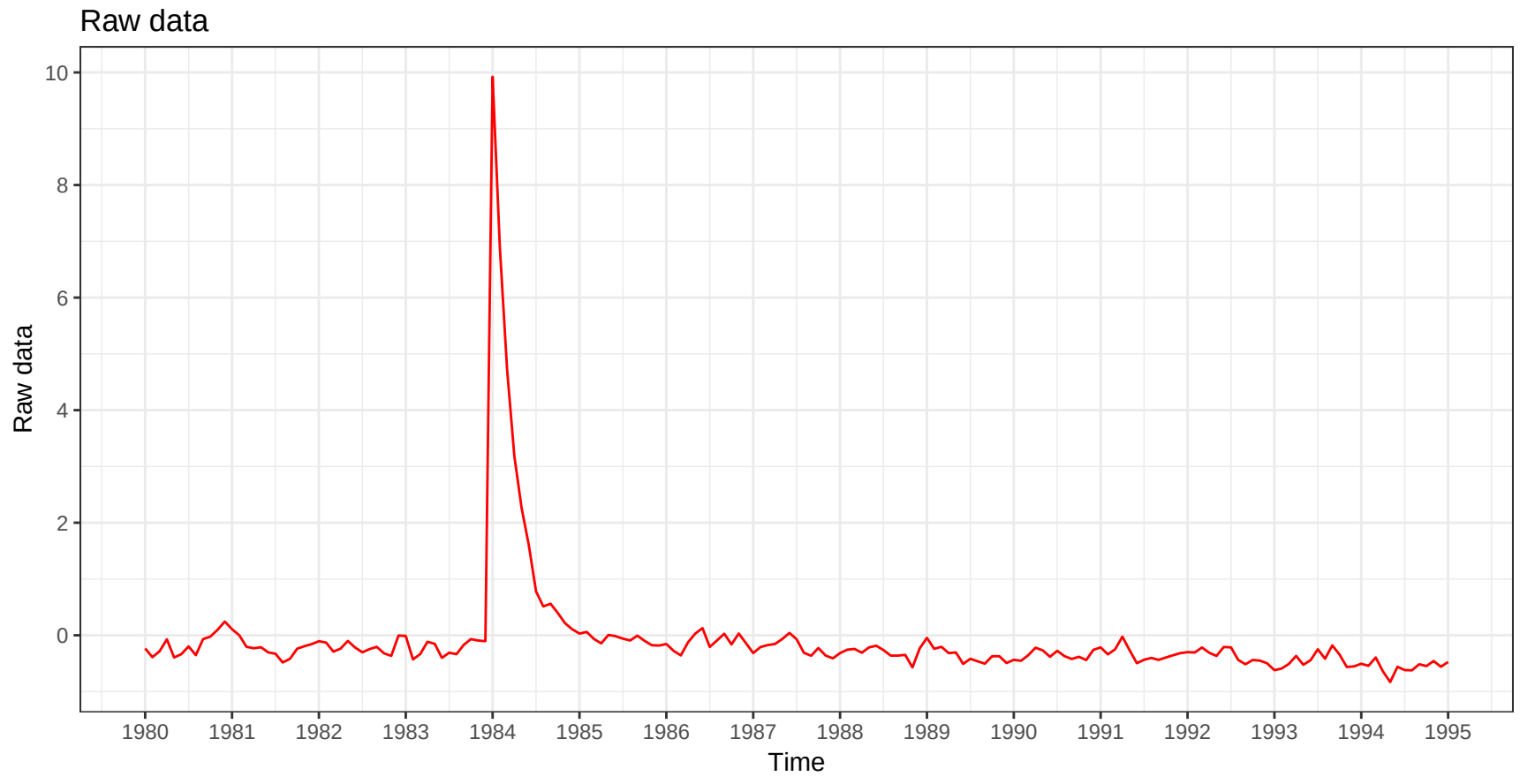

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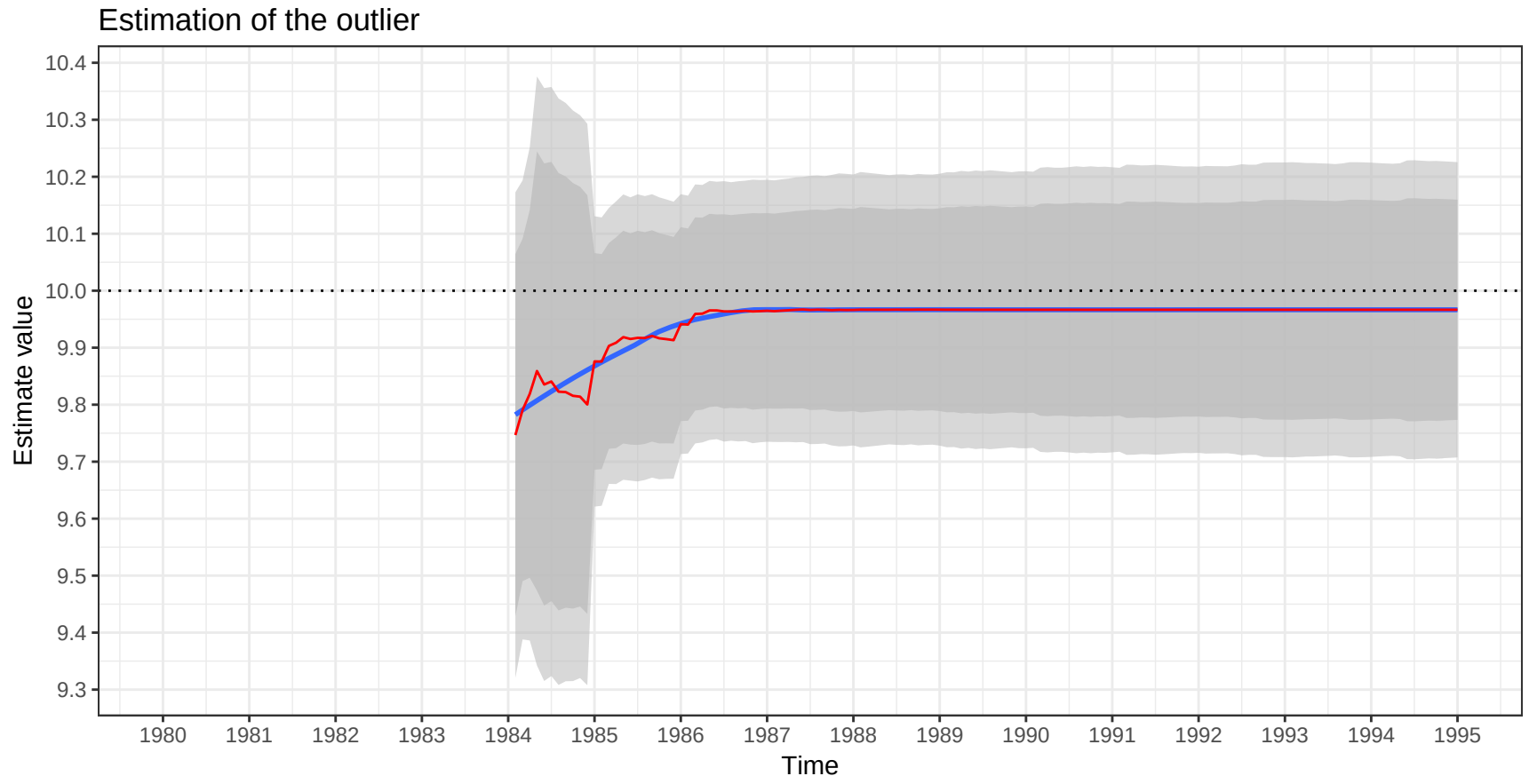
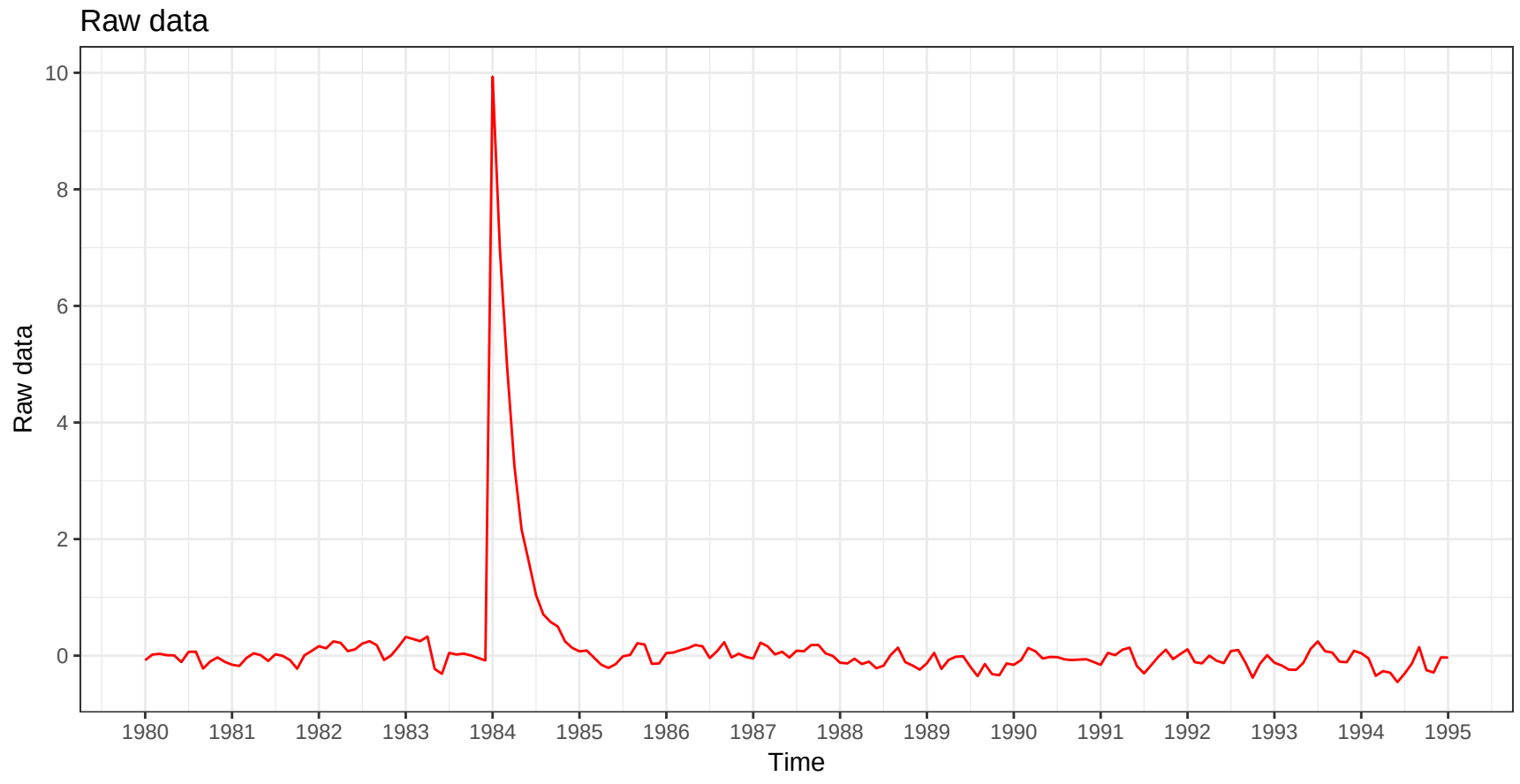
(1−B)(1−0.7B12)Xt=(1−0.4B+0.7B2)at





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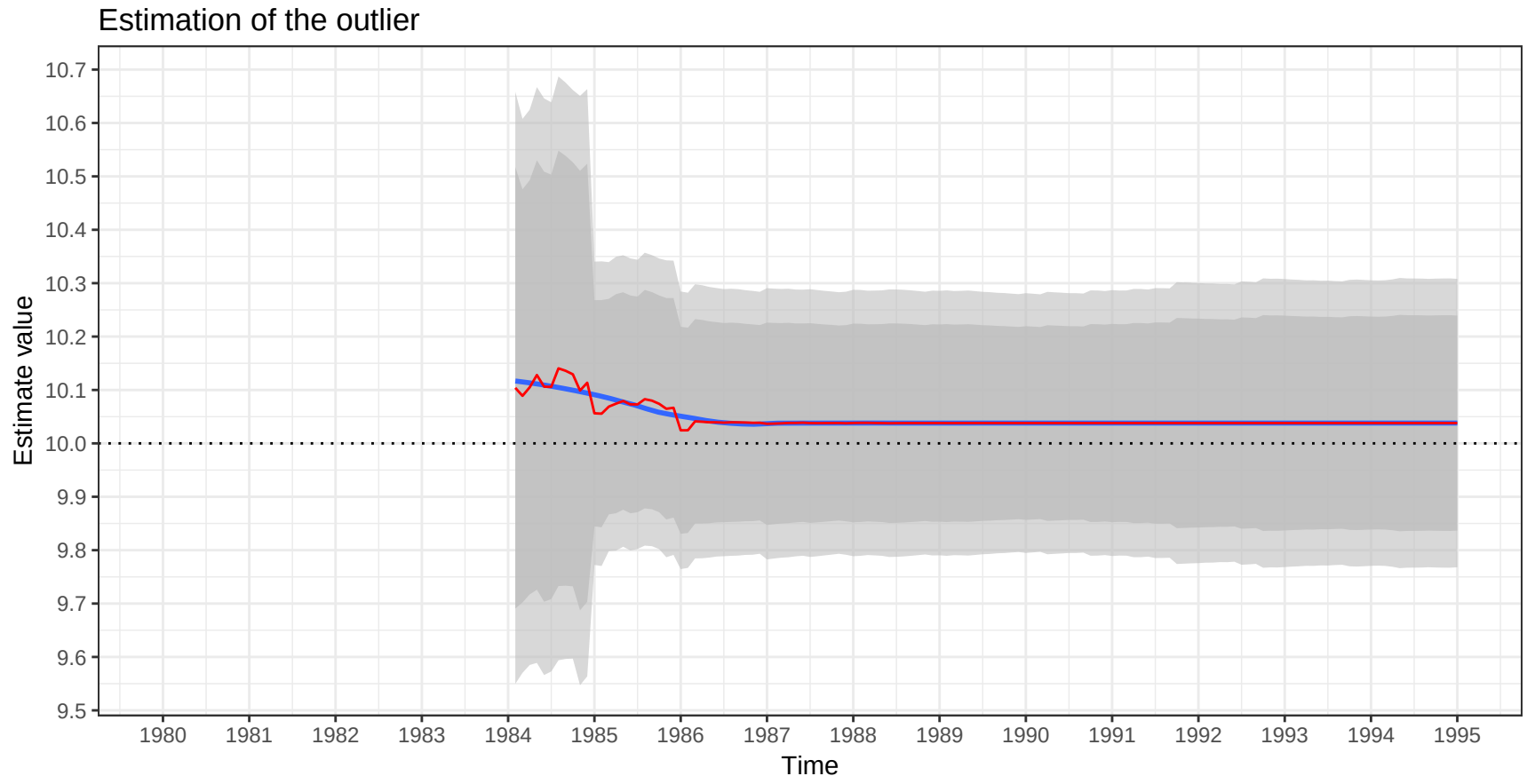
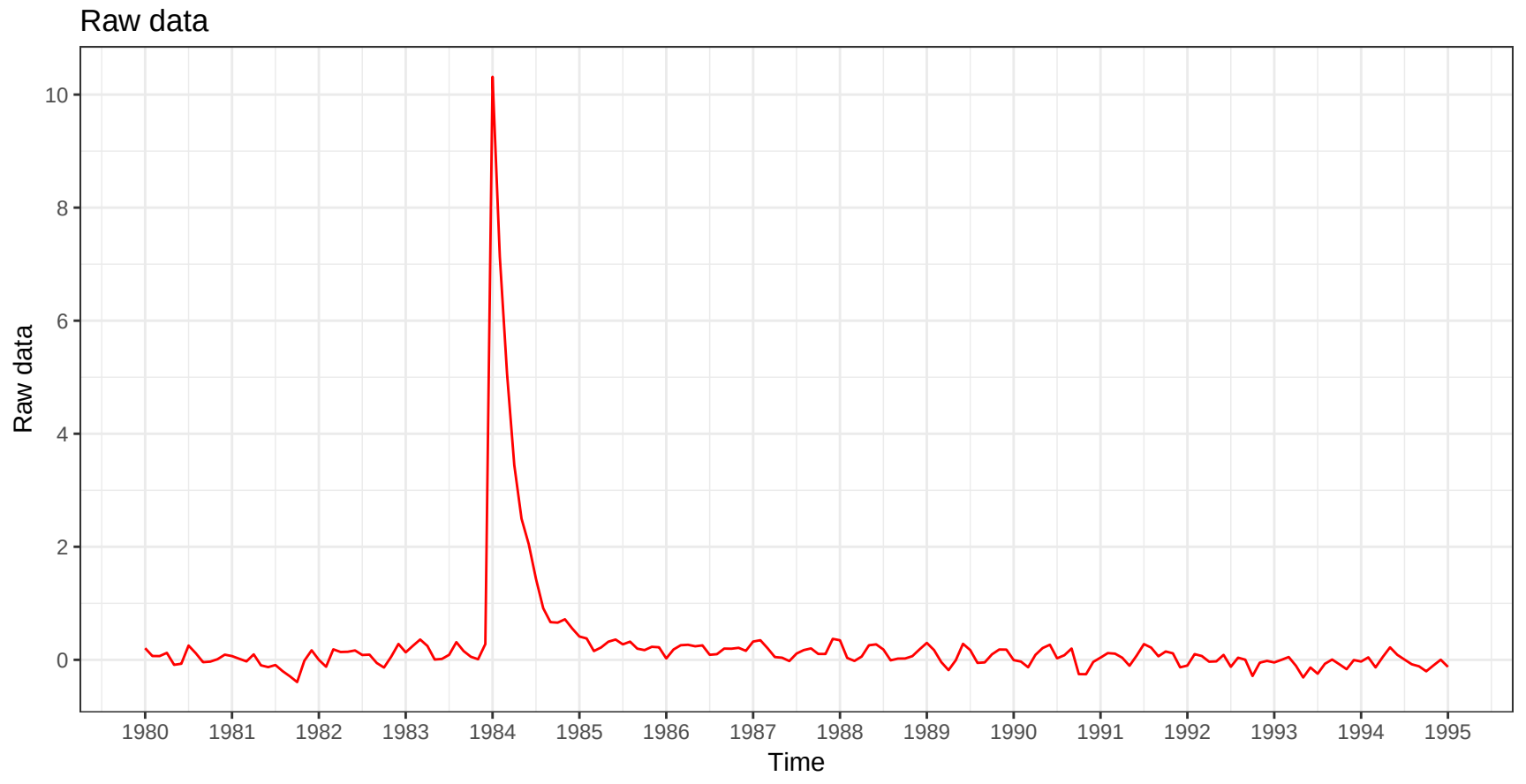
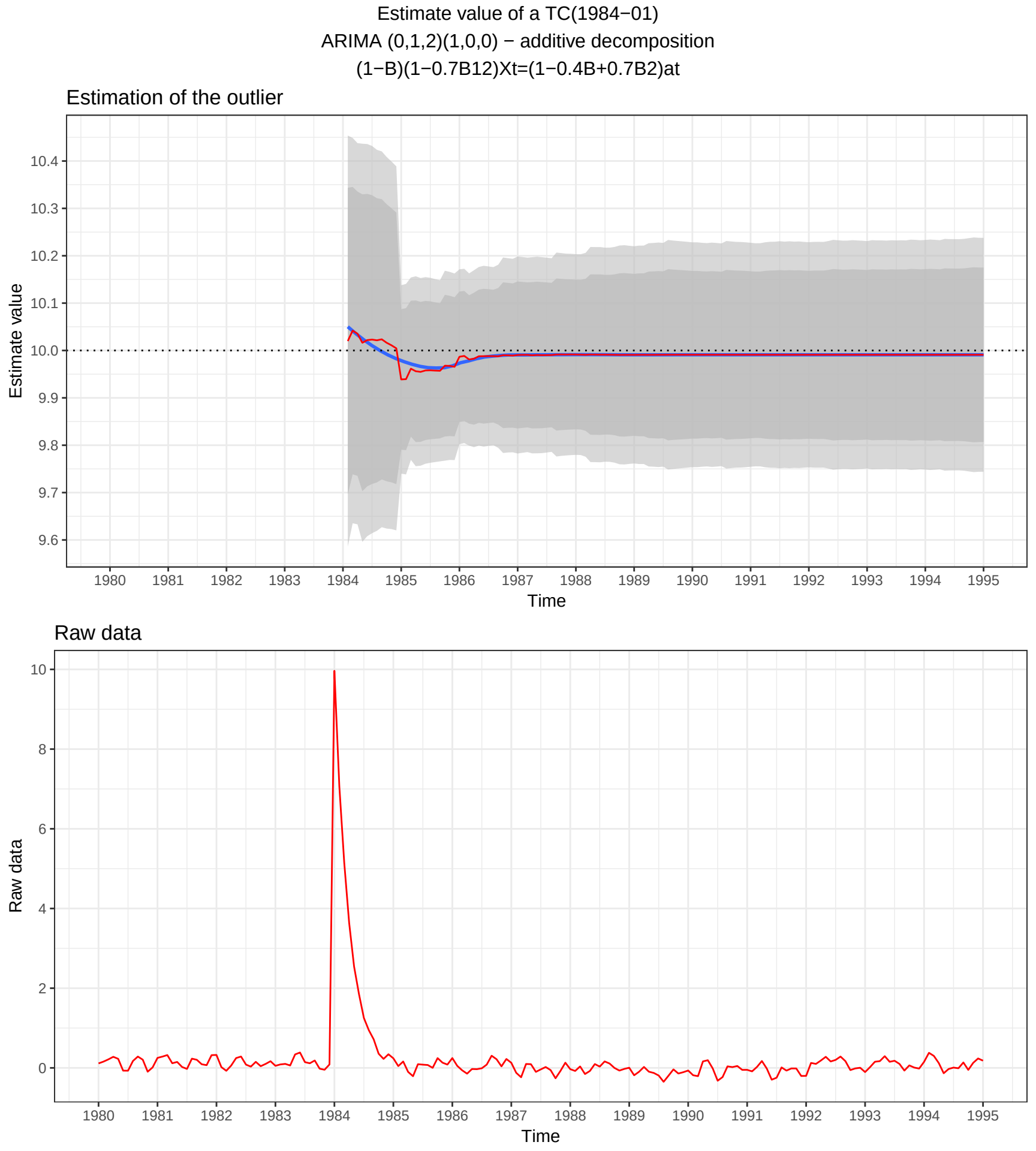
(1−B)(1−0.7B12)Xt=(1−0.4B+0.7B2)at



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(1−B)(1−0.7B12)Xt=(1−0.4B+0.7B2)at
Estimation of the outlier
Estimate value
10.4
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Estimate value of a TC(1984−01)
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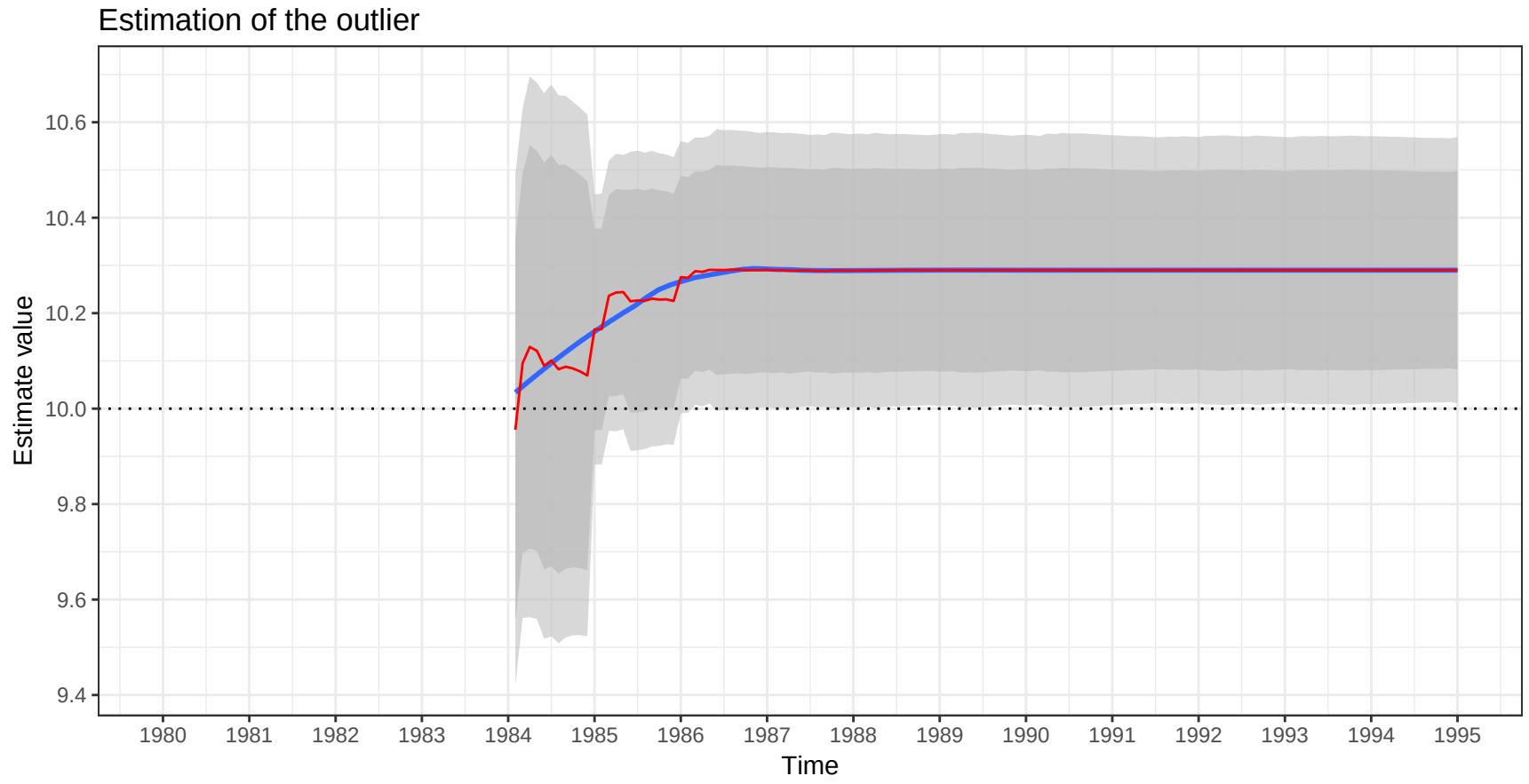
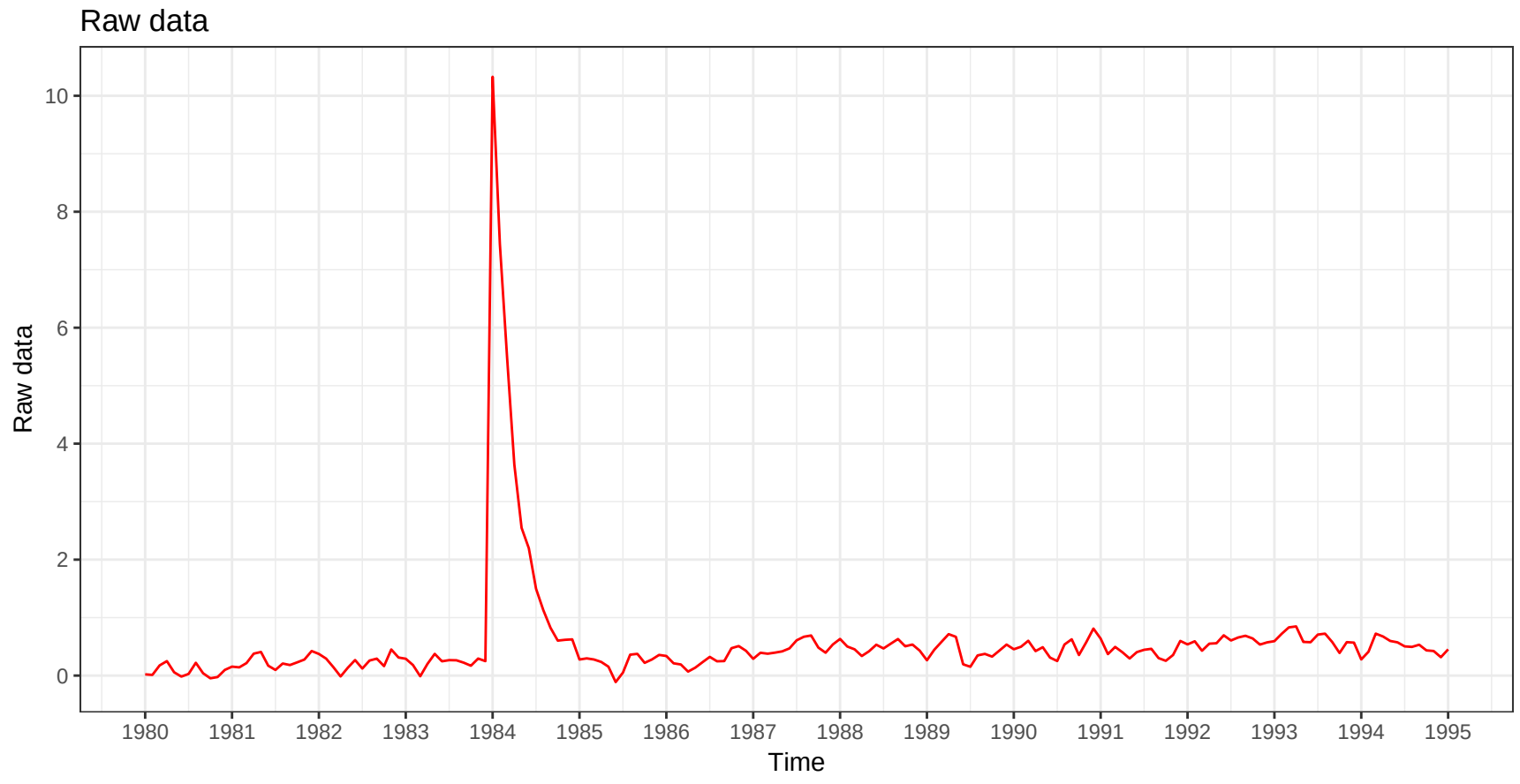
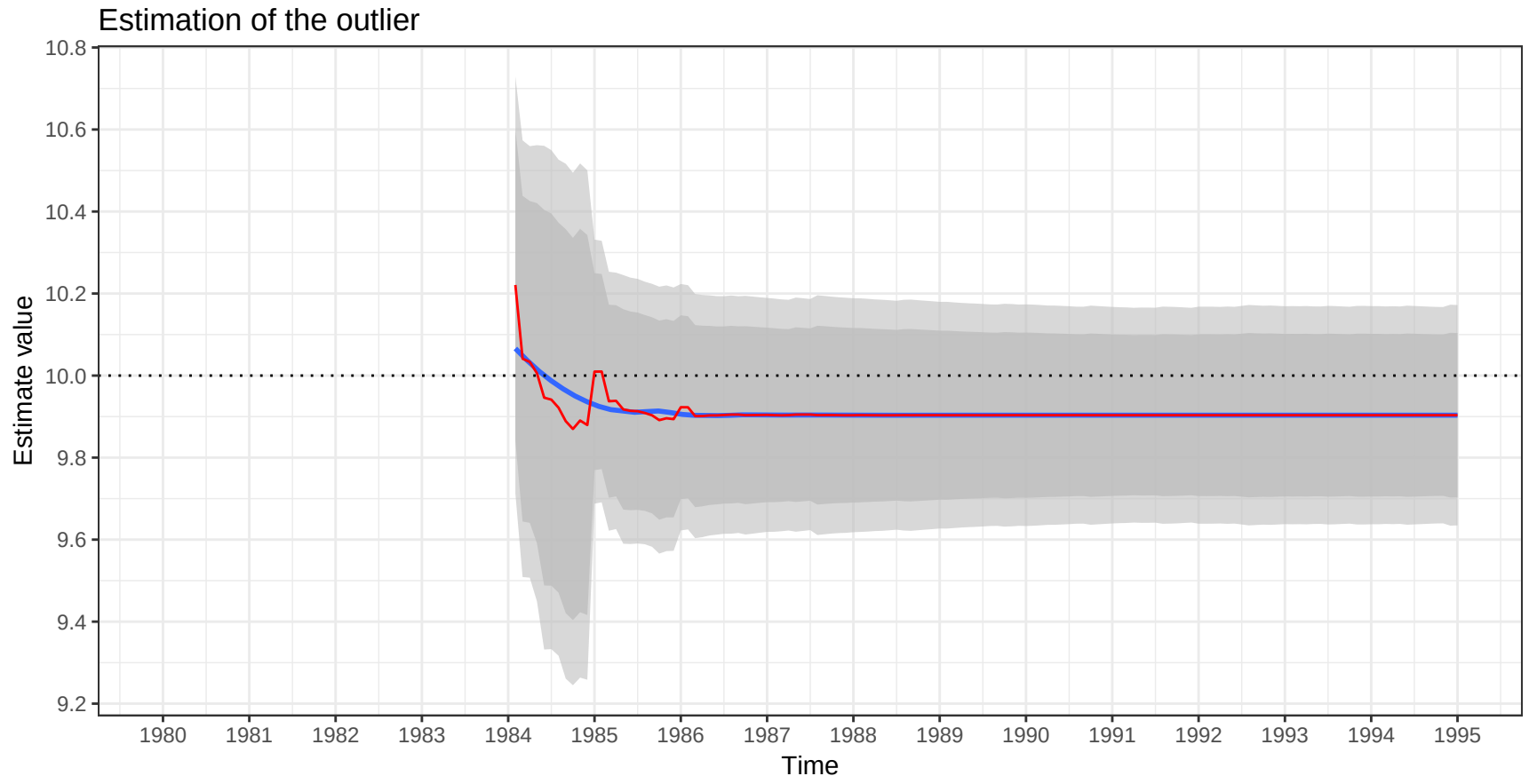
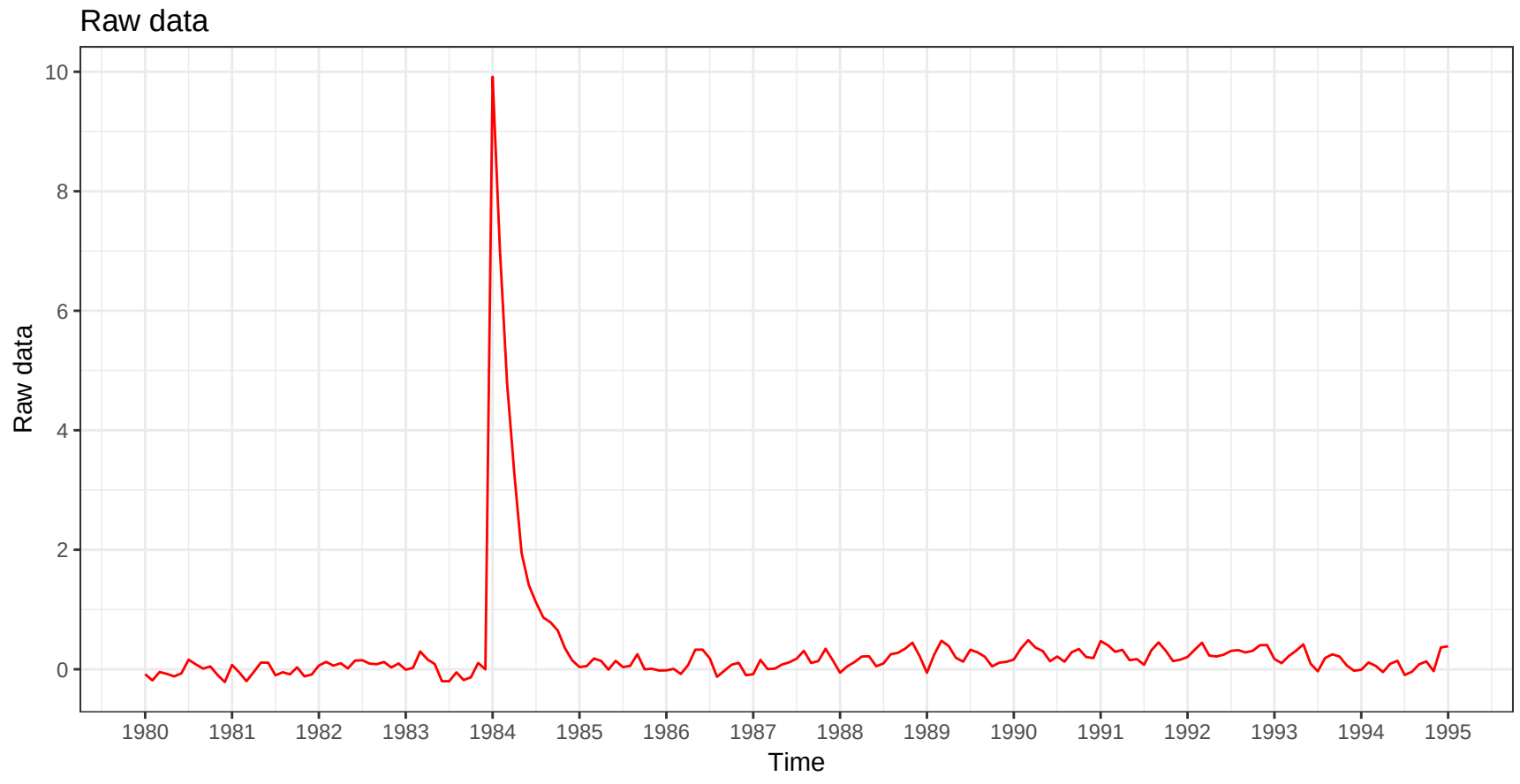
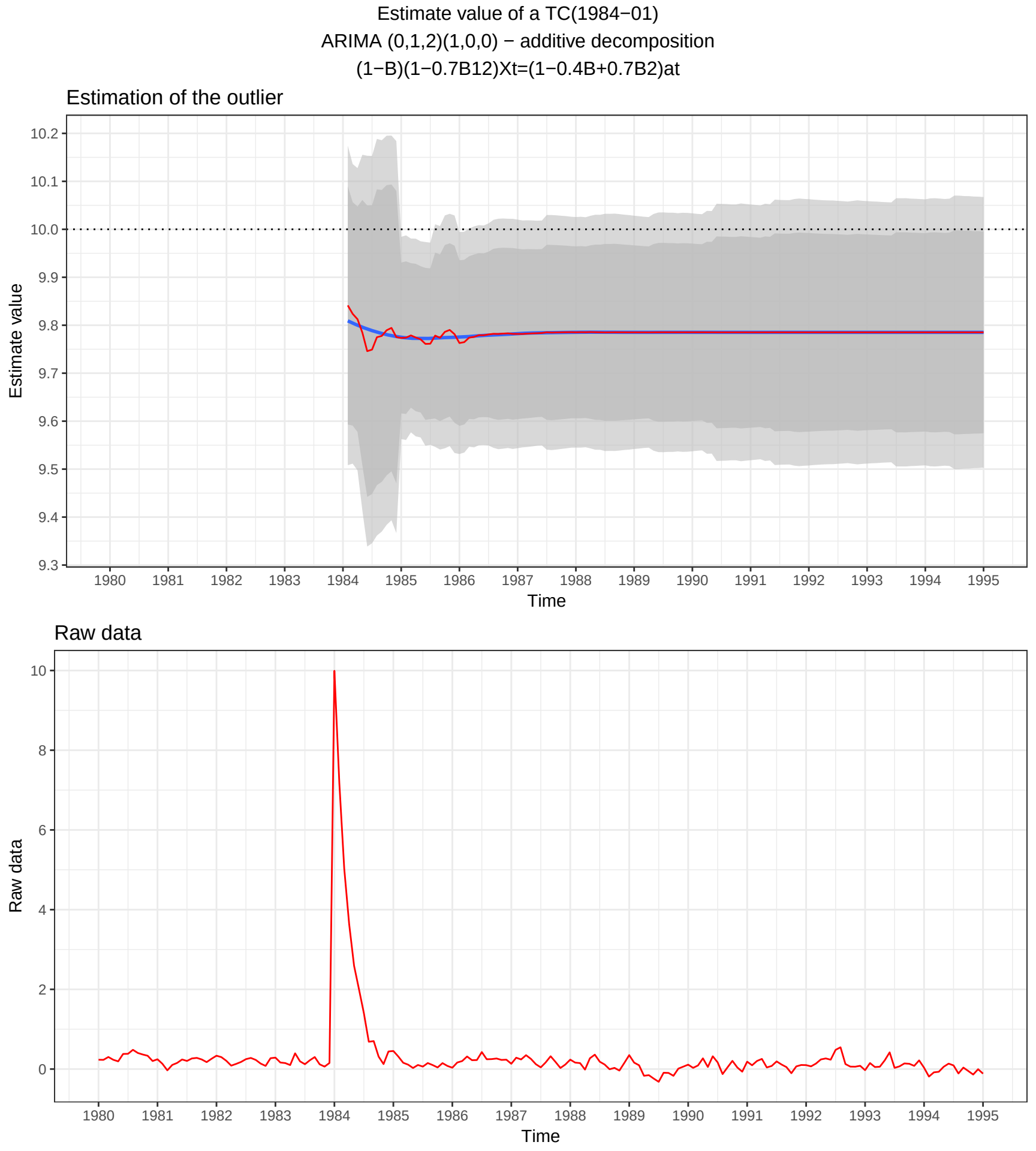




Estimate value of a TC(1984−01)
ARIMA (0,1,2)(1,0,0) − additive decomposition
(1−B)(1−0.7B12)Xt=(1−0.4B+0.7B2)at



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(1−B)(1−0.7B12)Xt=(1−0.4B+0.7B2)at
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Estimate value
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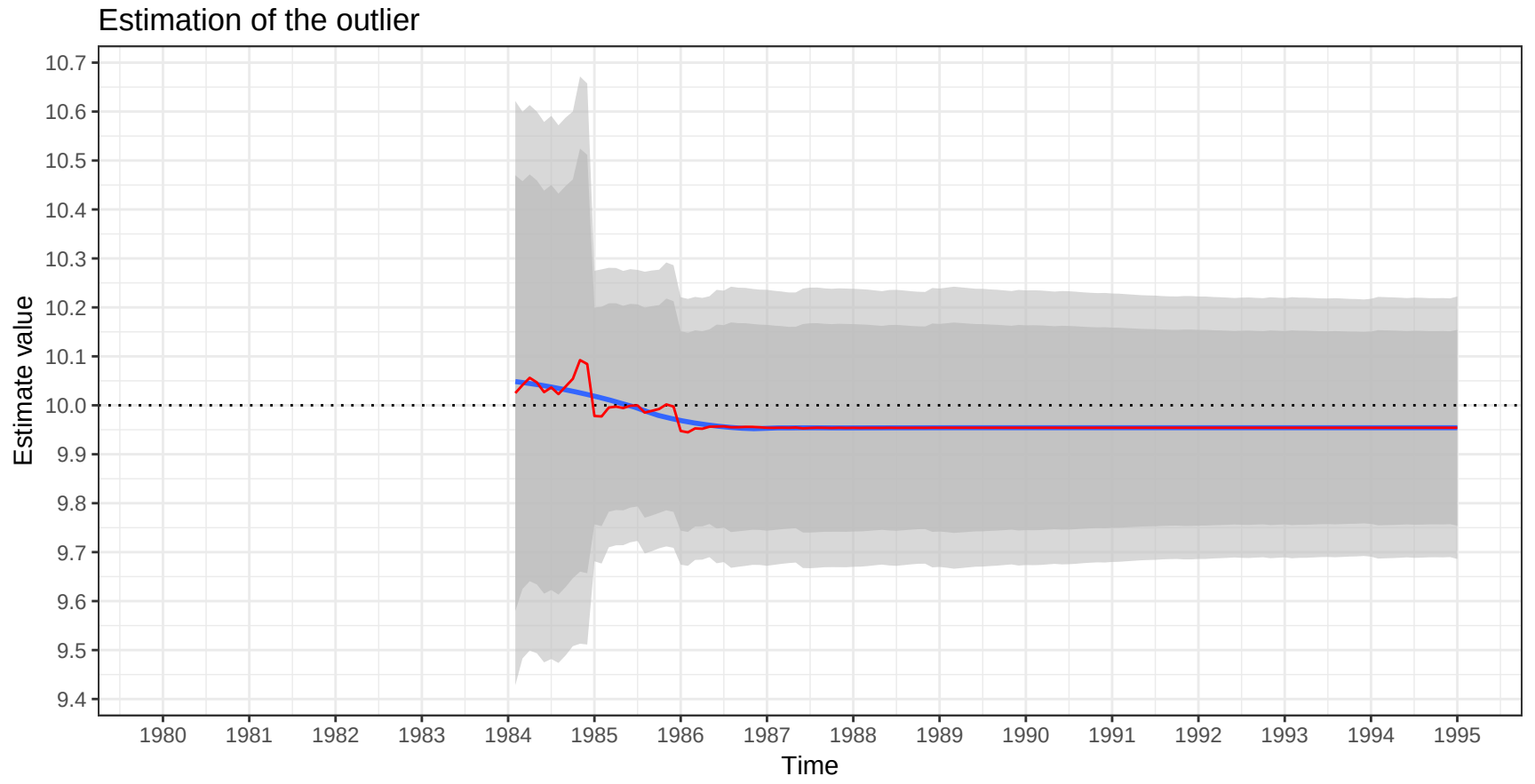
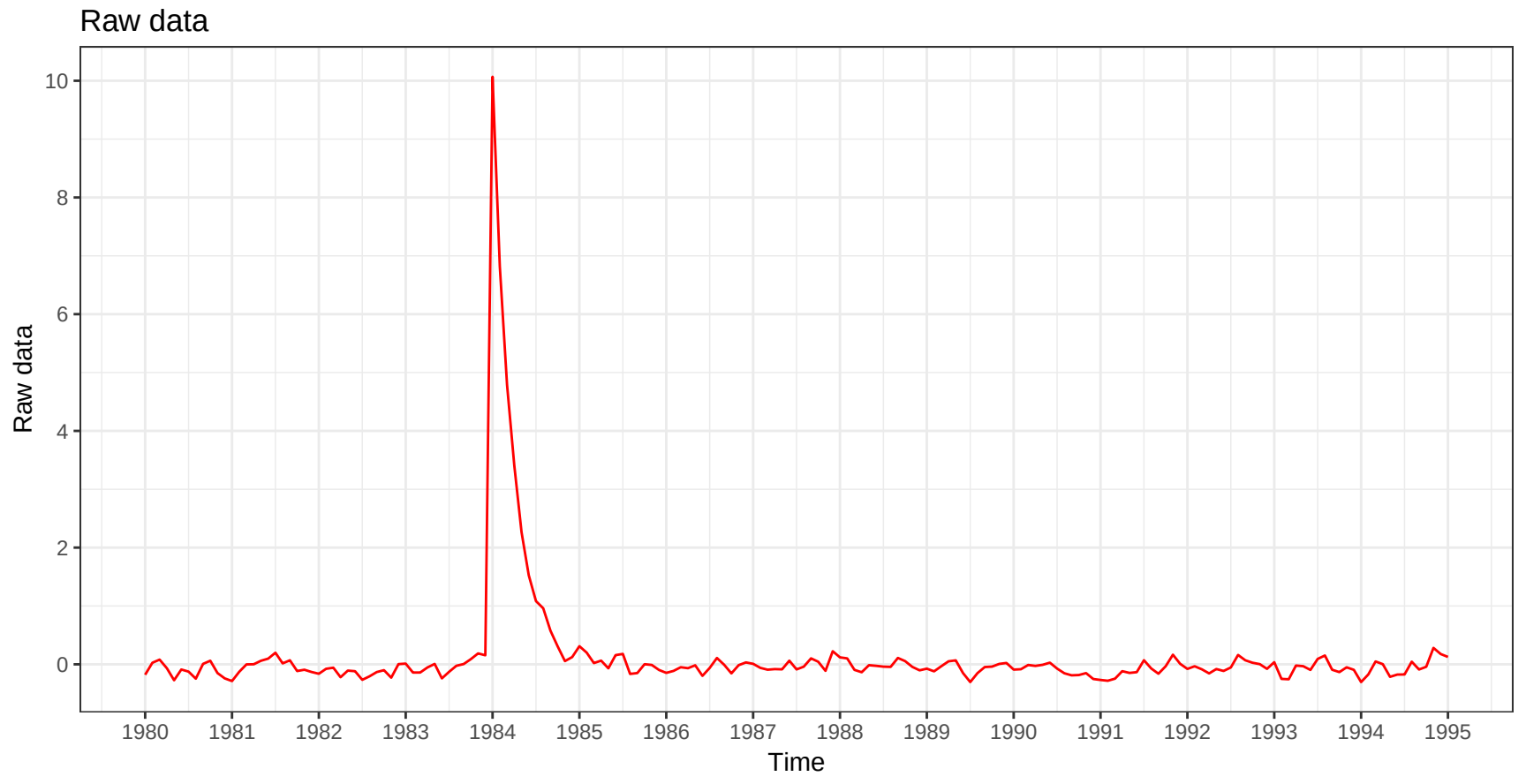
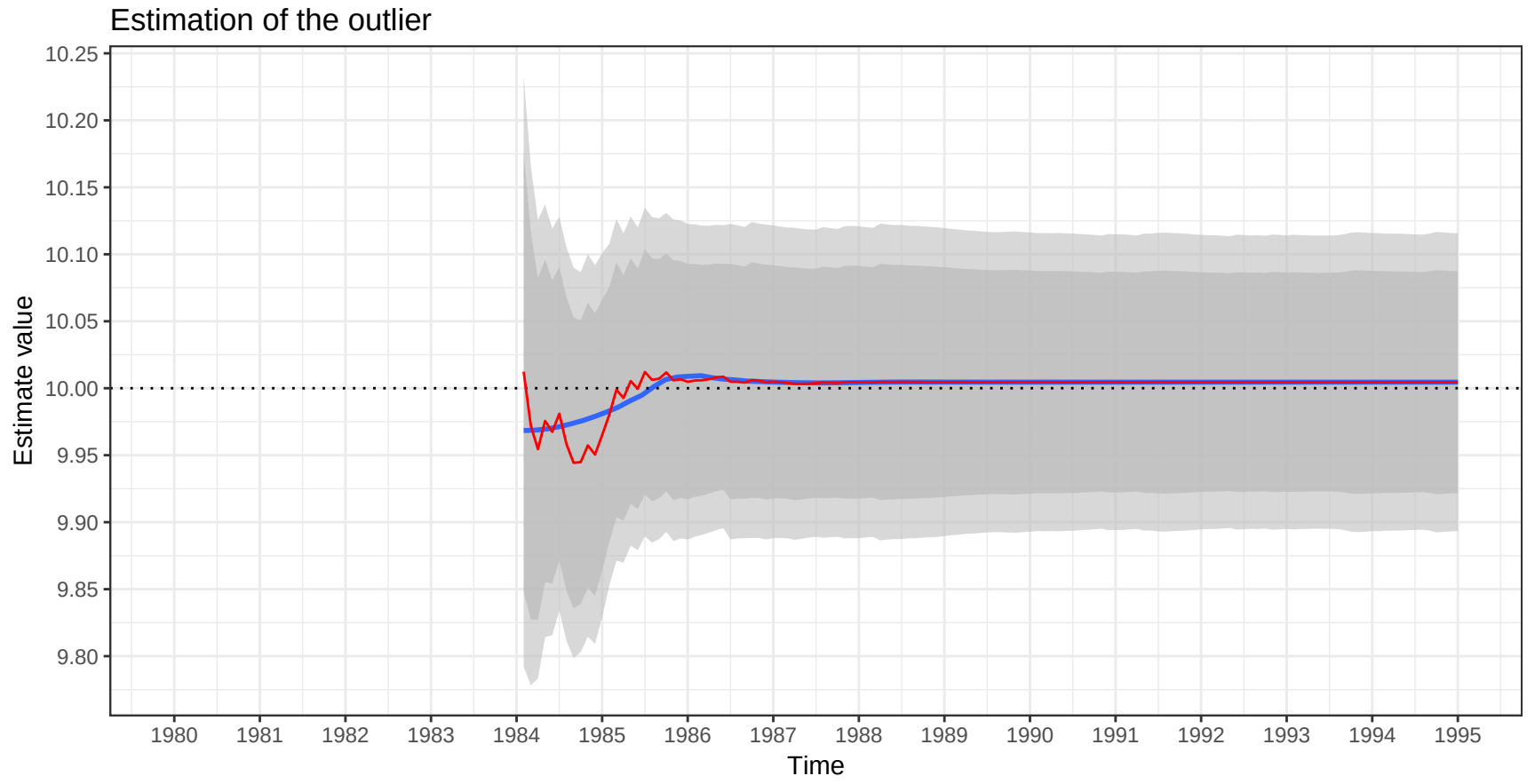
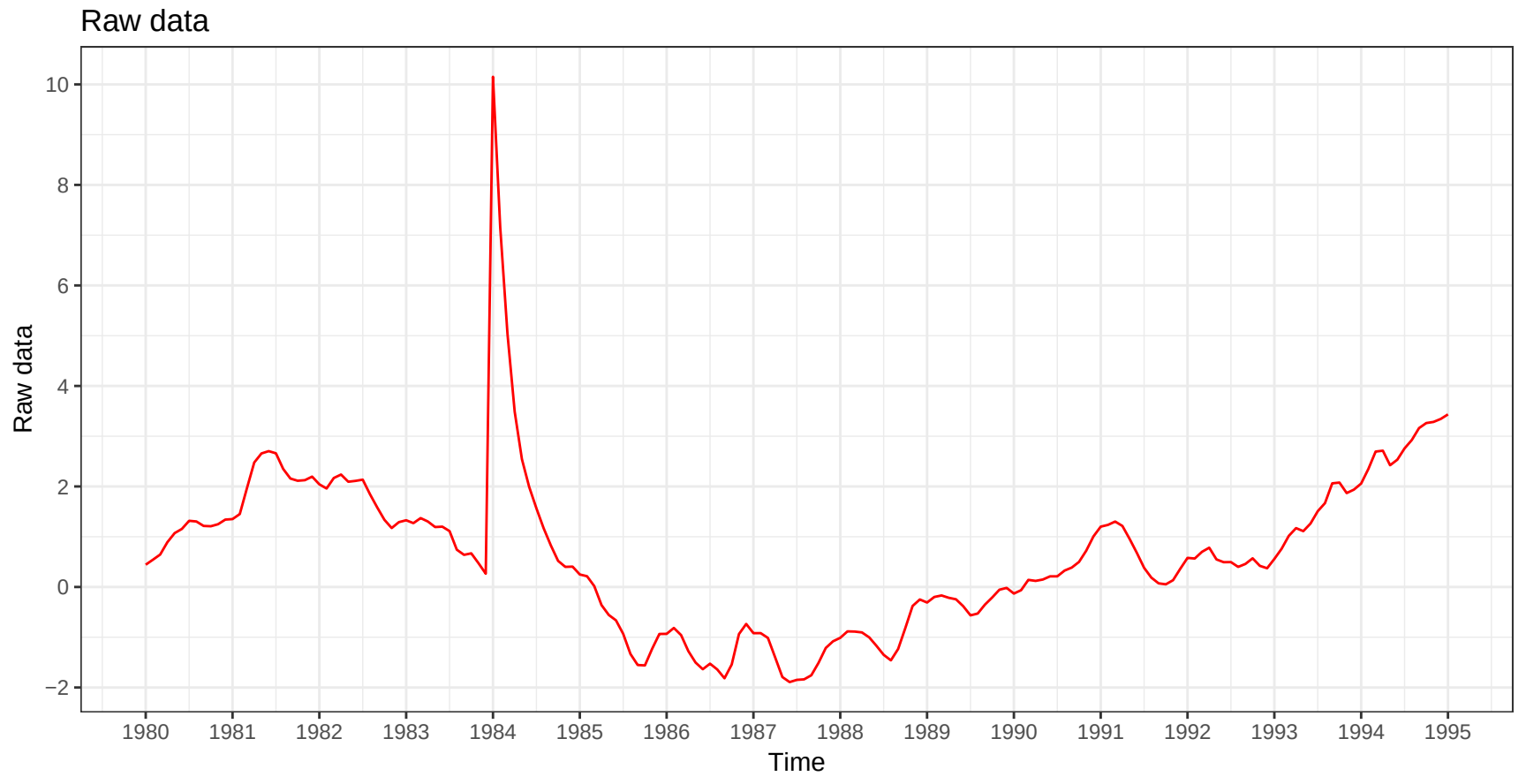
Estimate value of a TC(1984−01)
ARIMA (0,1,2)(1,0,0) − additive decomposition
(1−B)(1−0.7B12)Xt=(1−0.4B+0.7B2)at





Estimate value of a TC(1984−01)
ARIMA (1,1,2)(0,0,0) − additive decomposition
(1−B)(1−0.6B)Xt=(1+0.5B+0.7B2)at





Estimate value of a TC(1984−01)
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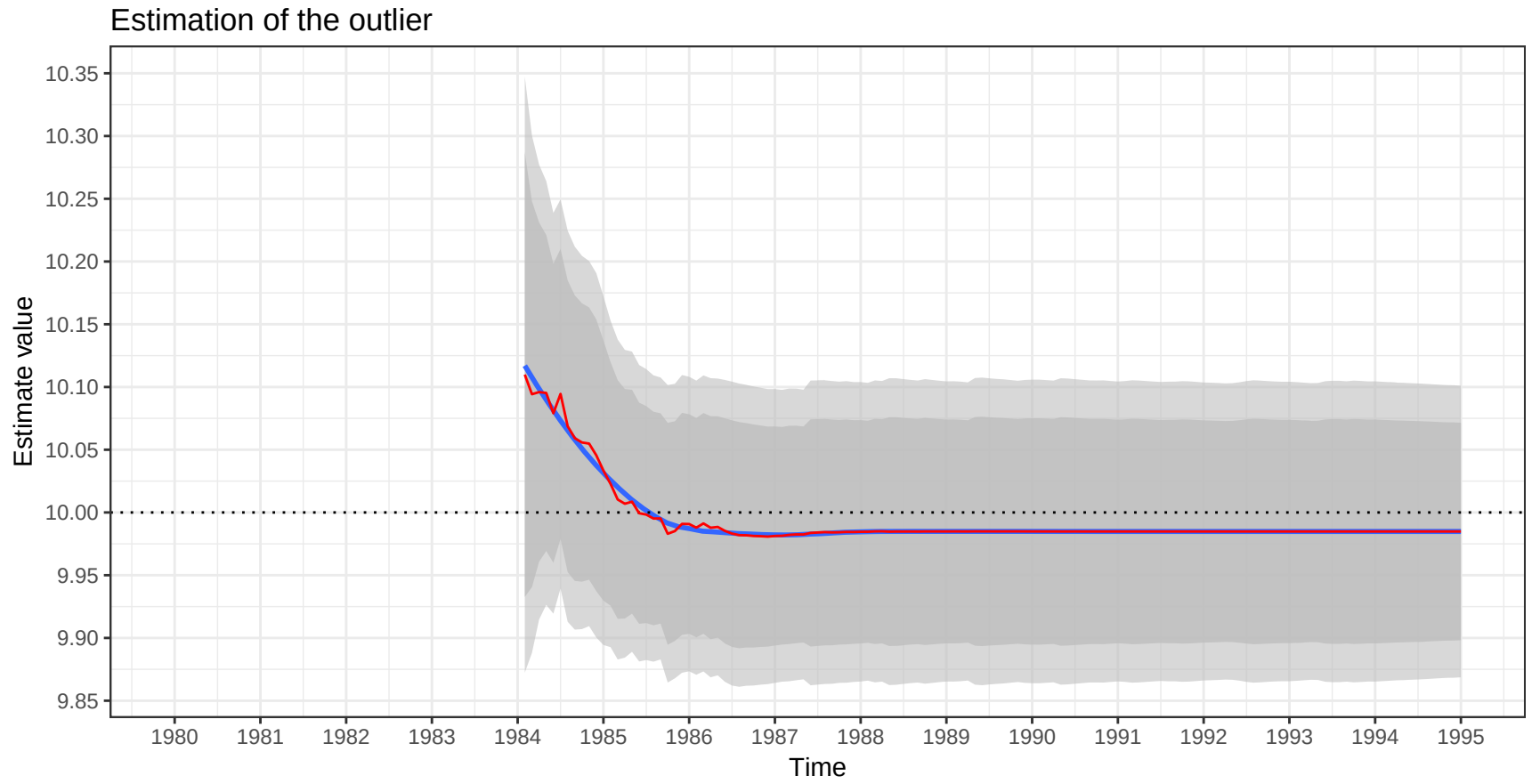
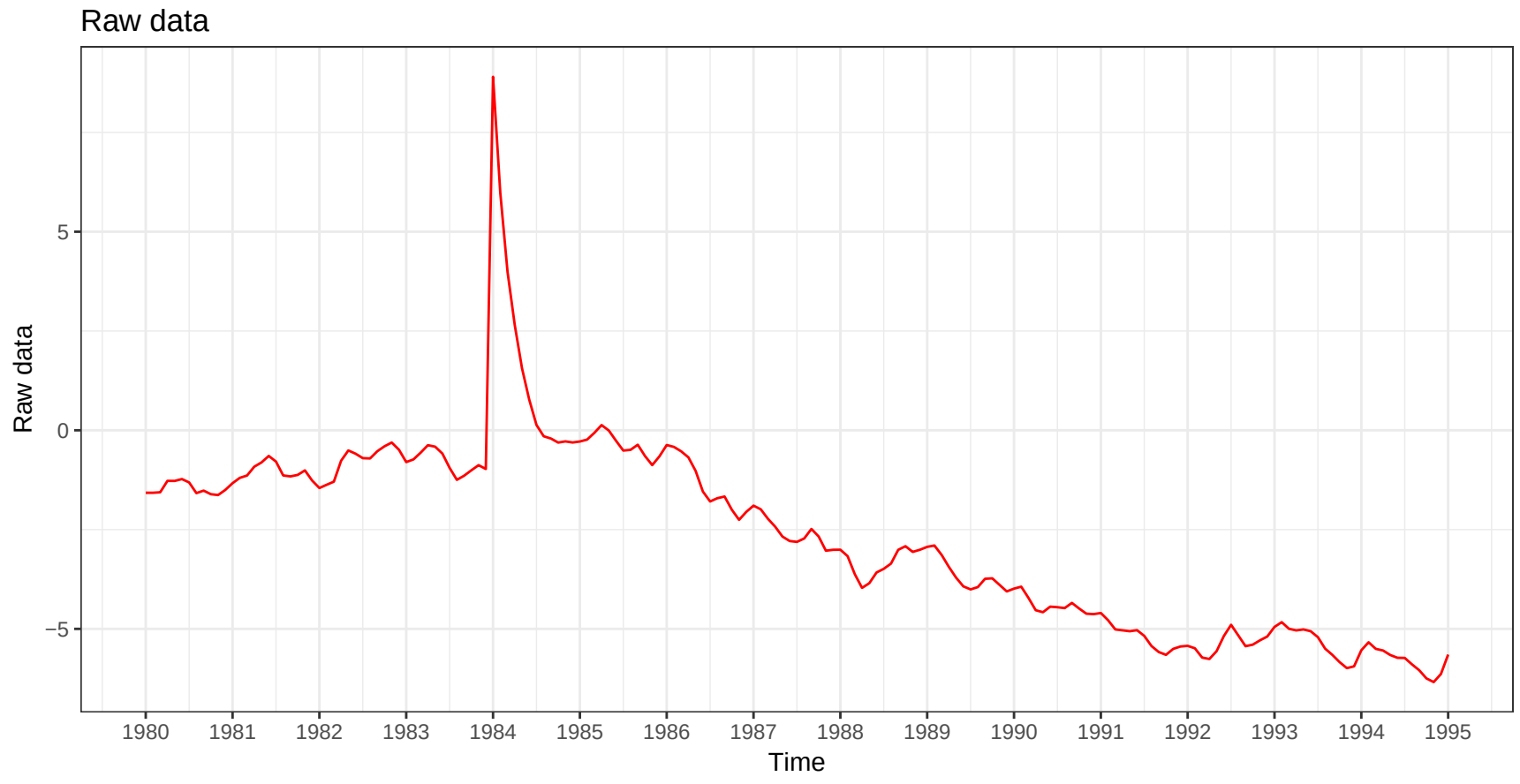
(1−B)(1−0.6B)Xt=(1+0.5B+0.7B2)at





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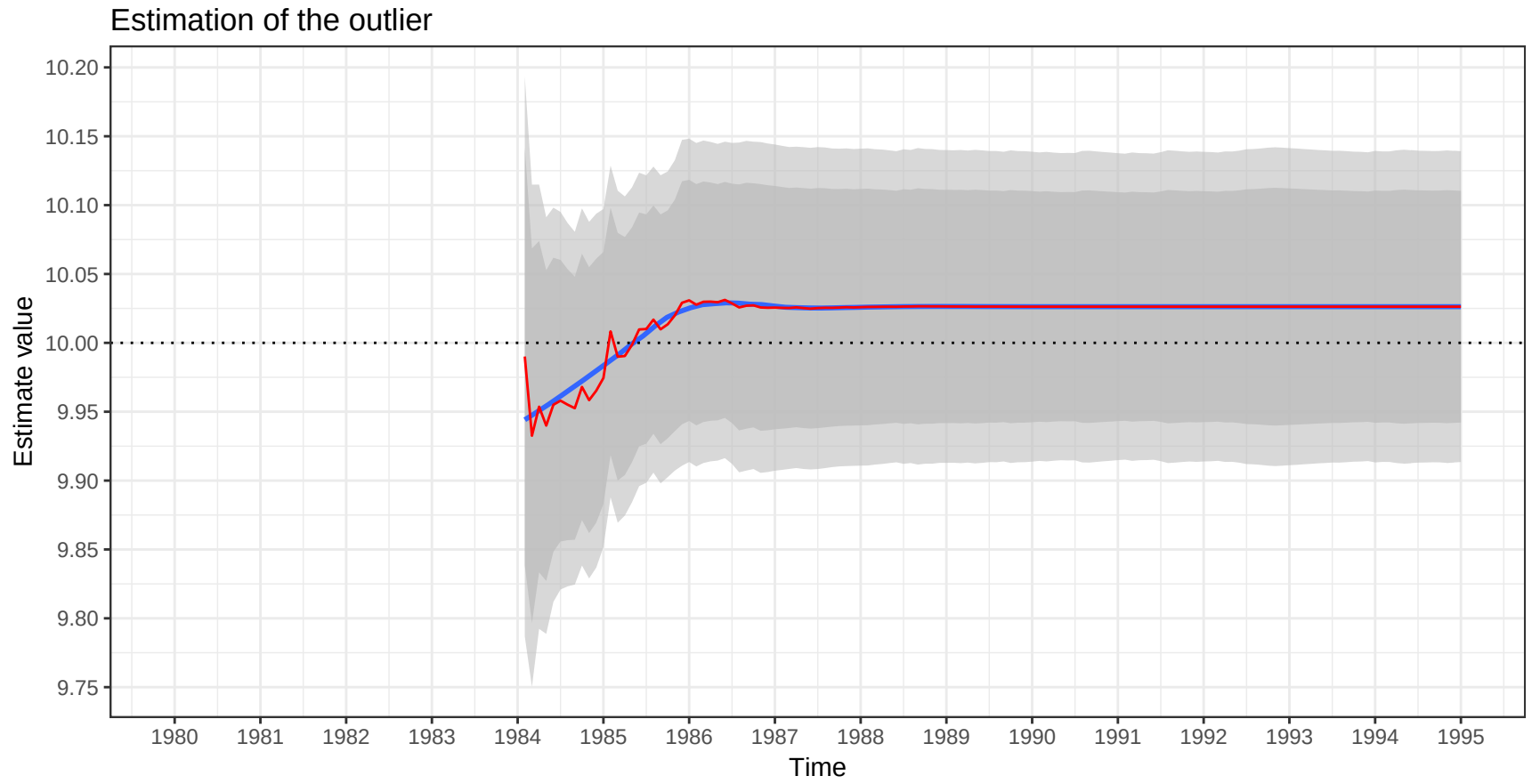

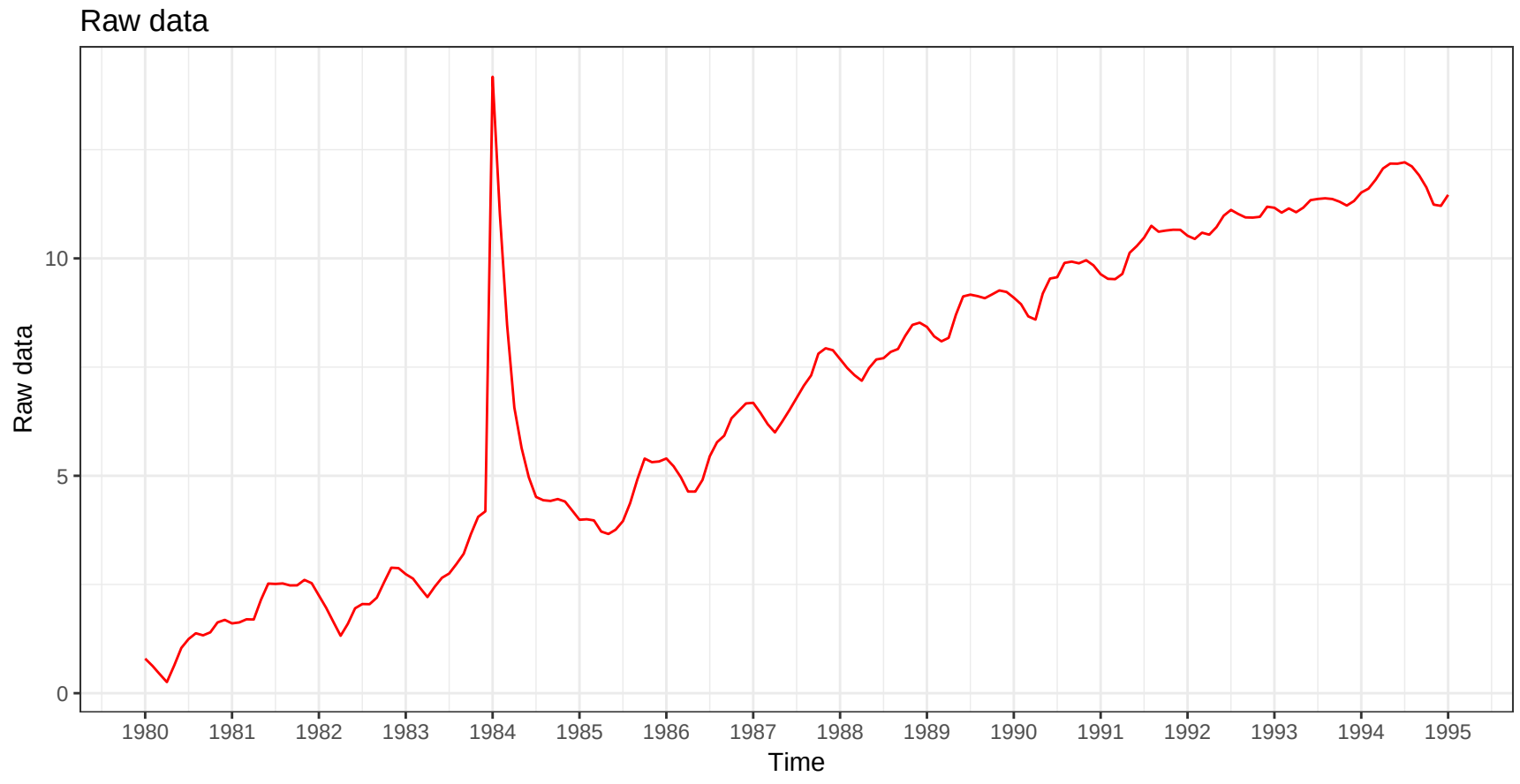

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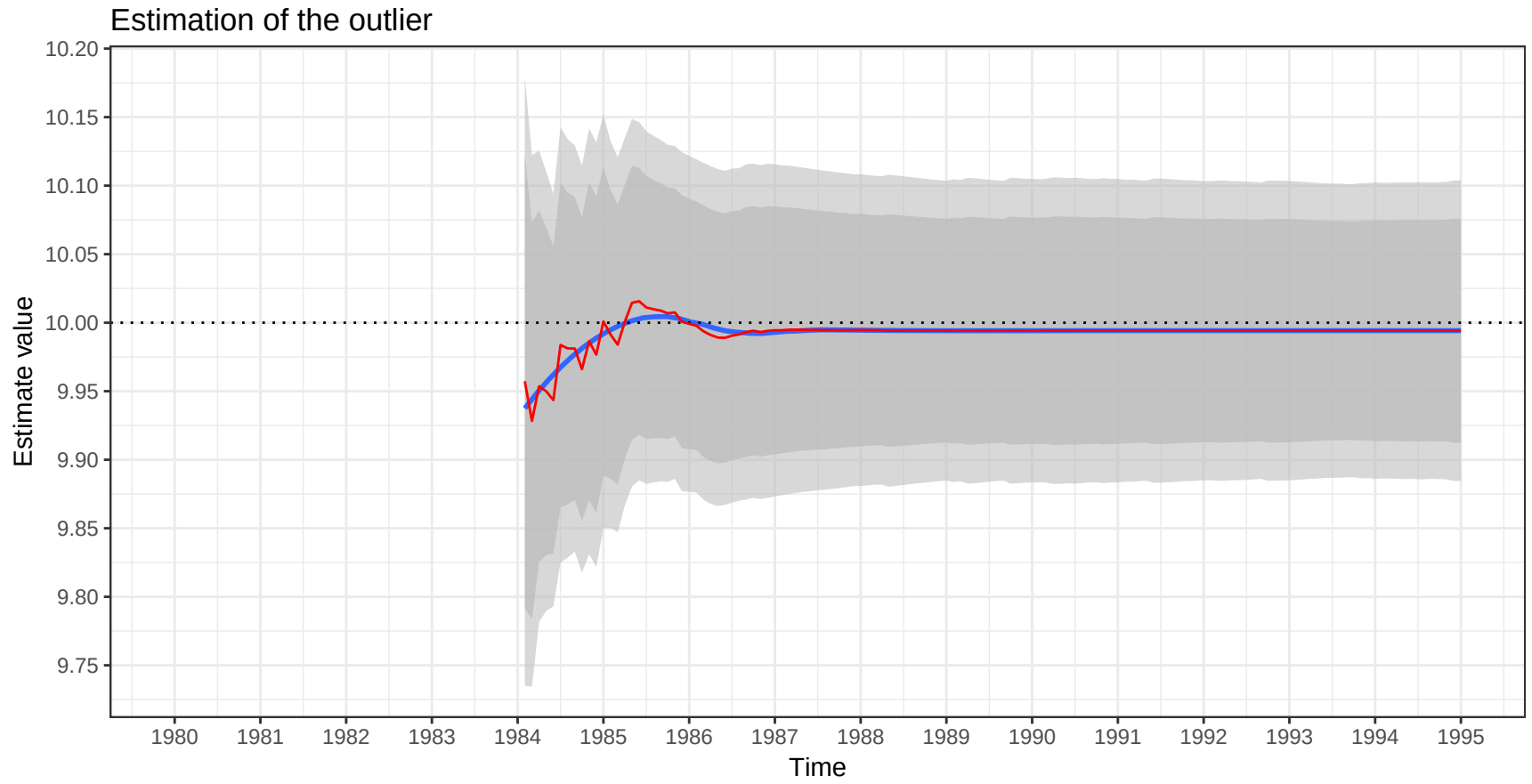

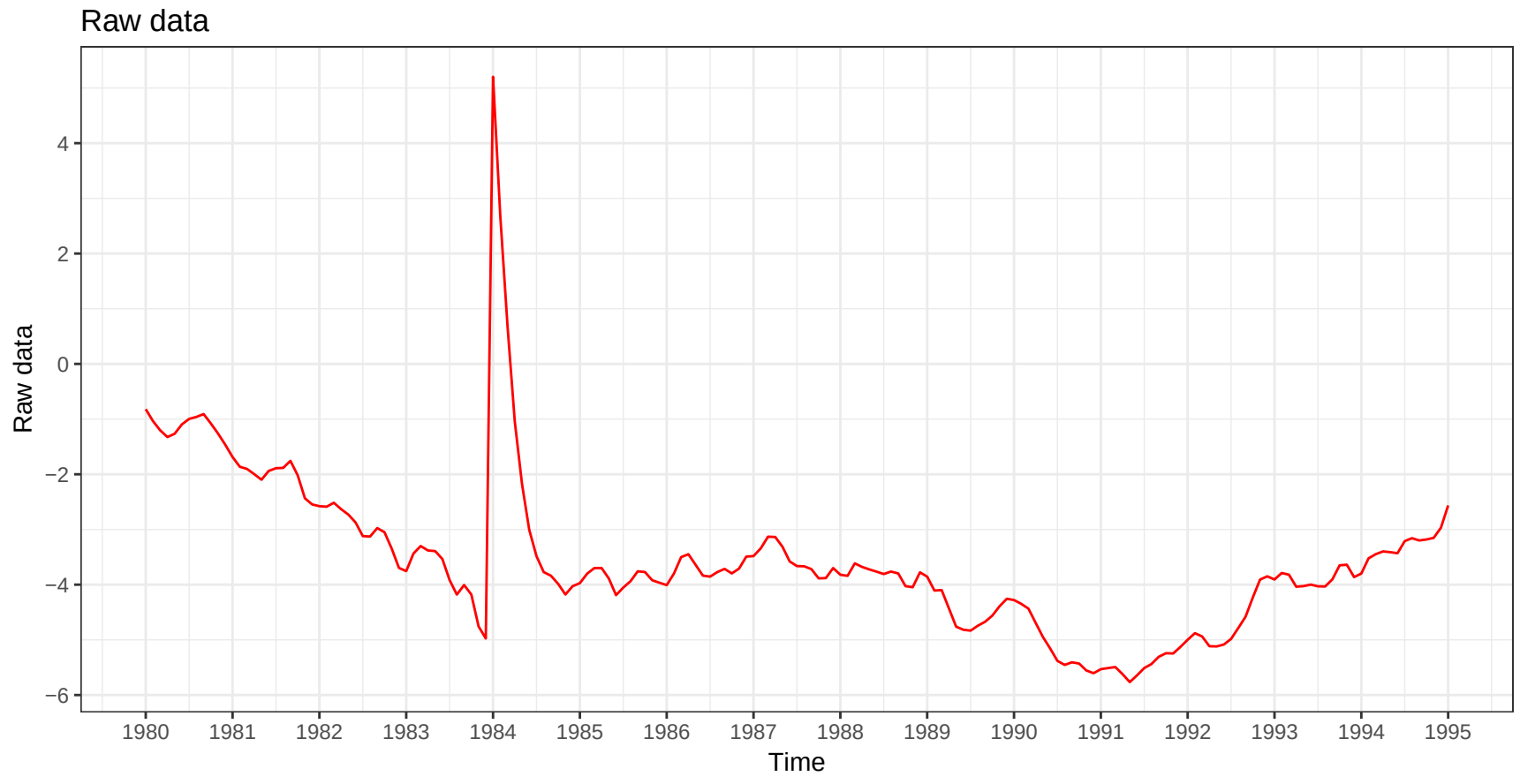

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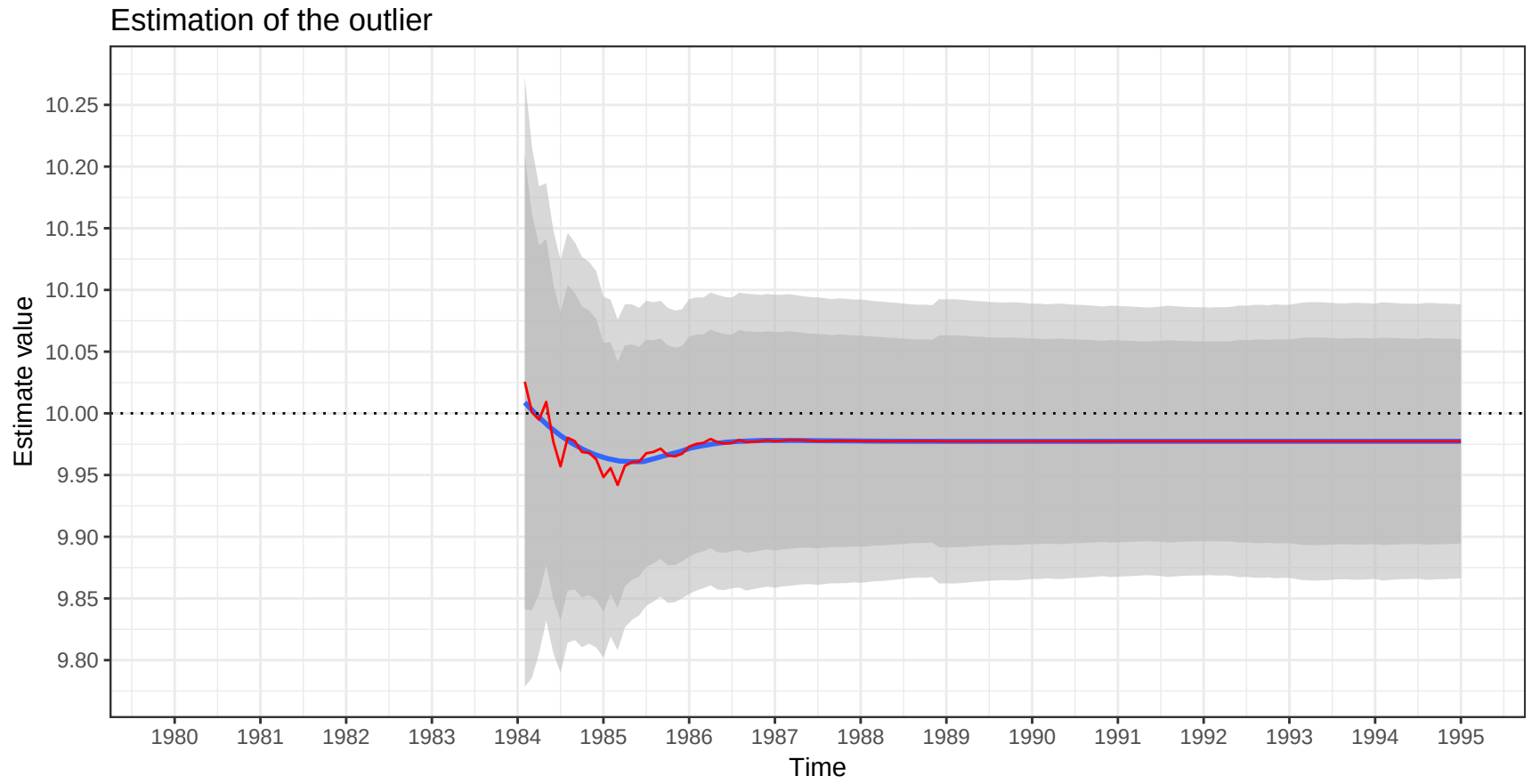
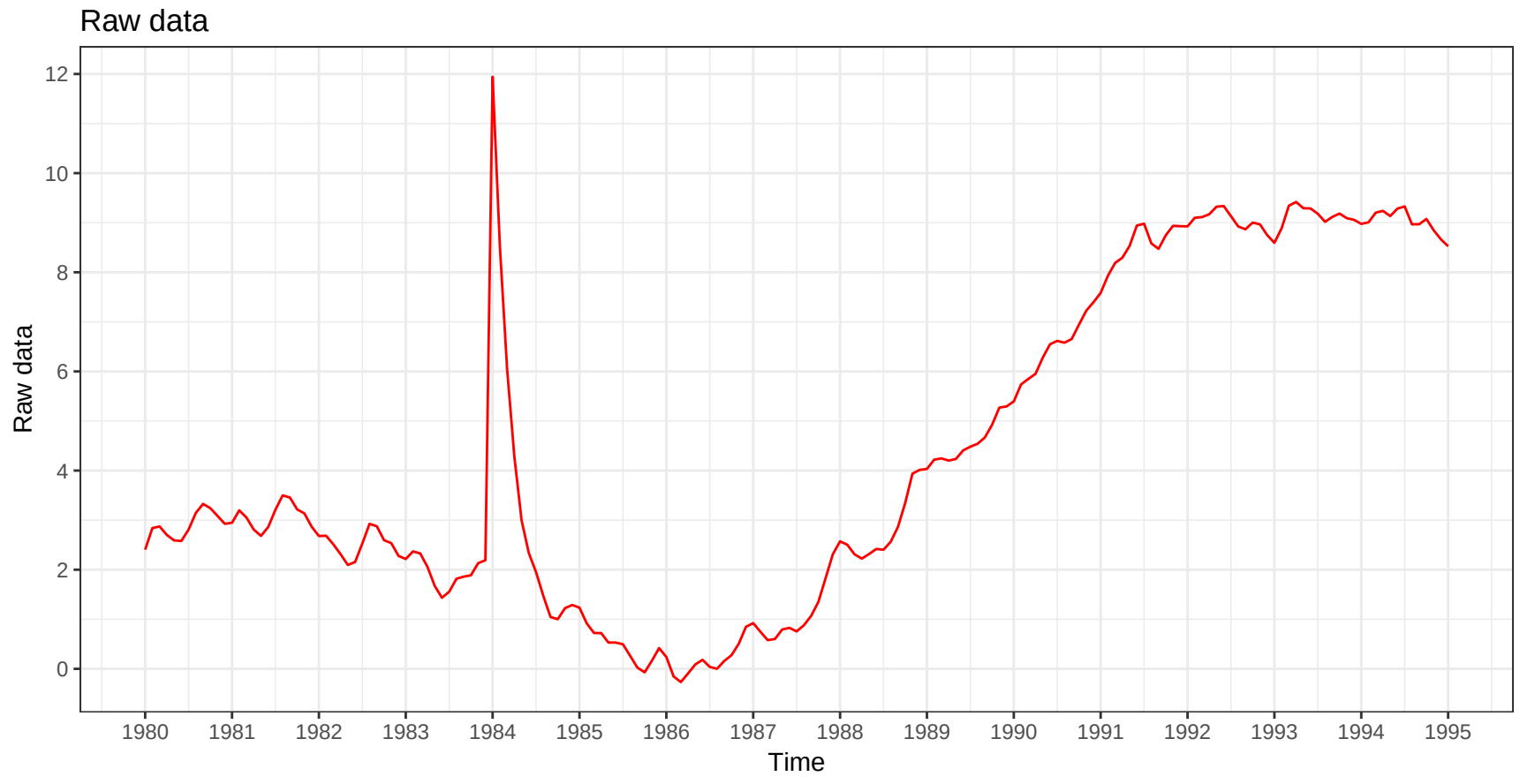
ARIMA (1,1,2)(0,0,0) − additive decomposition
(1−B)(1−0.6B)Xt=(1+0.5B+0.7B2)at





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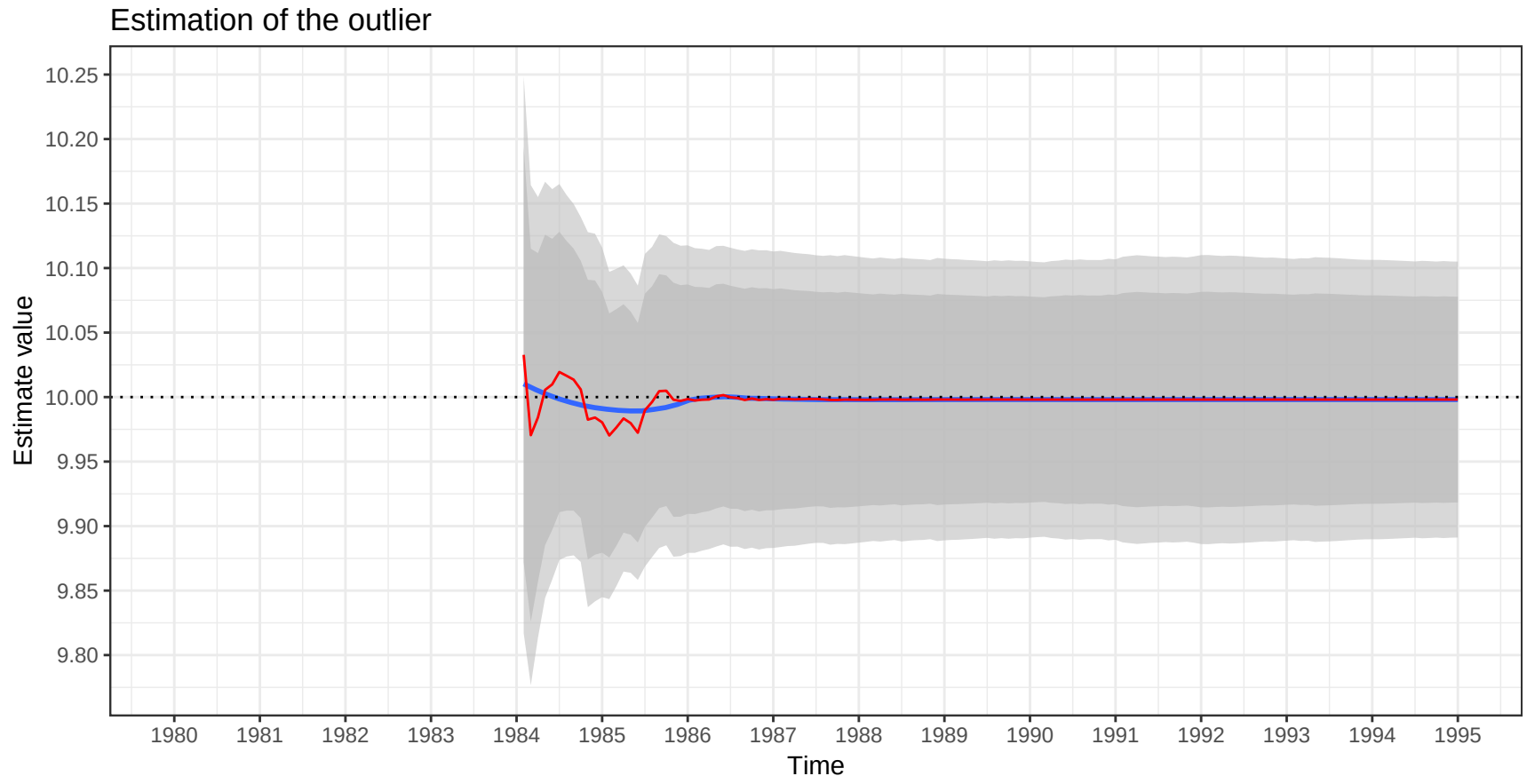

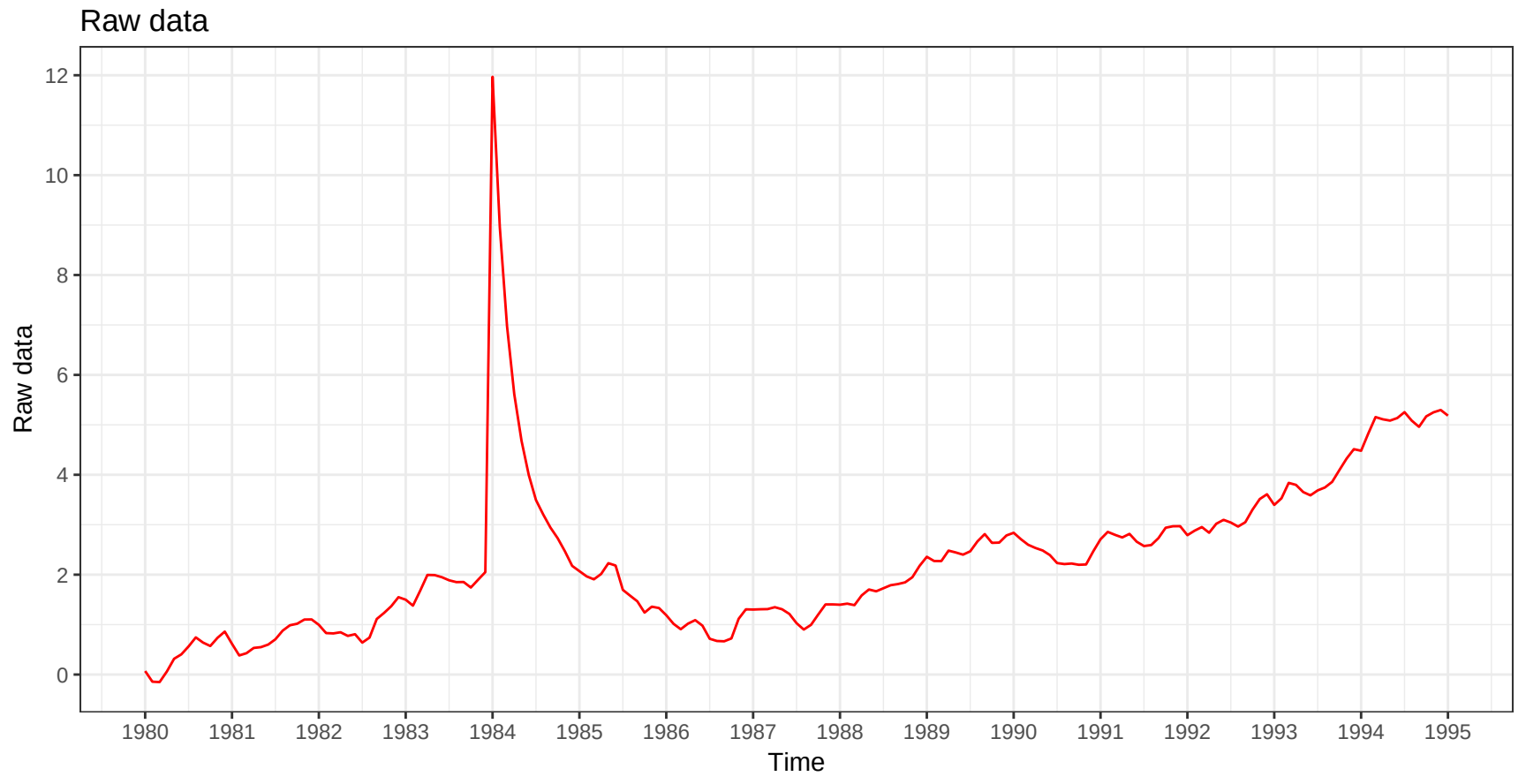

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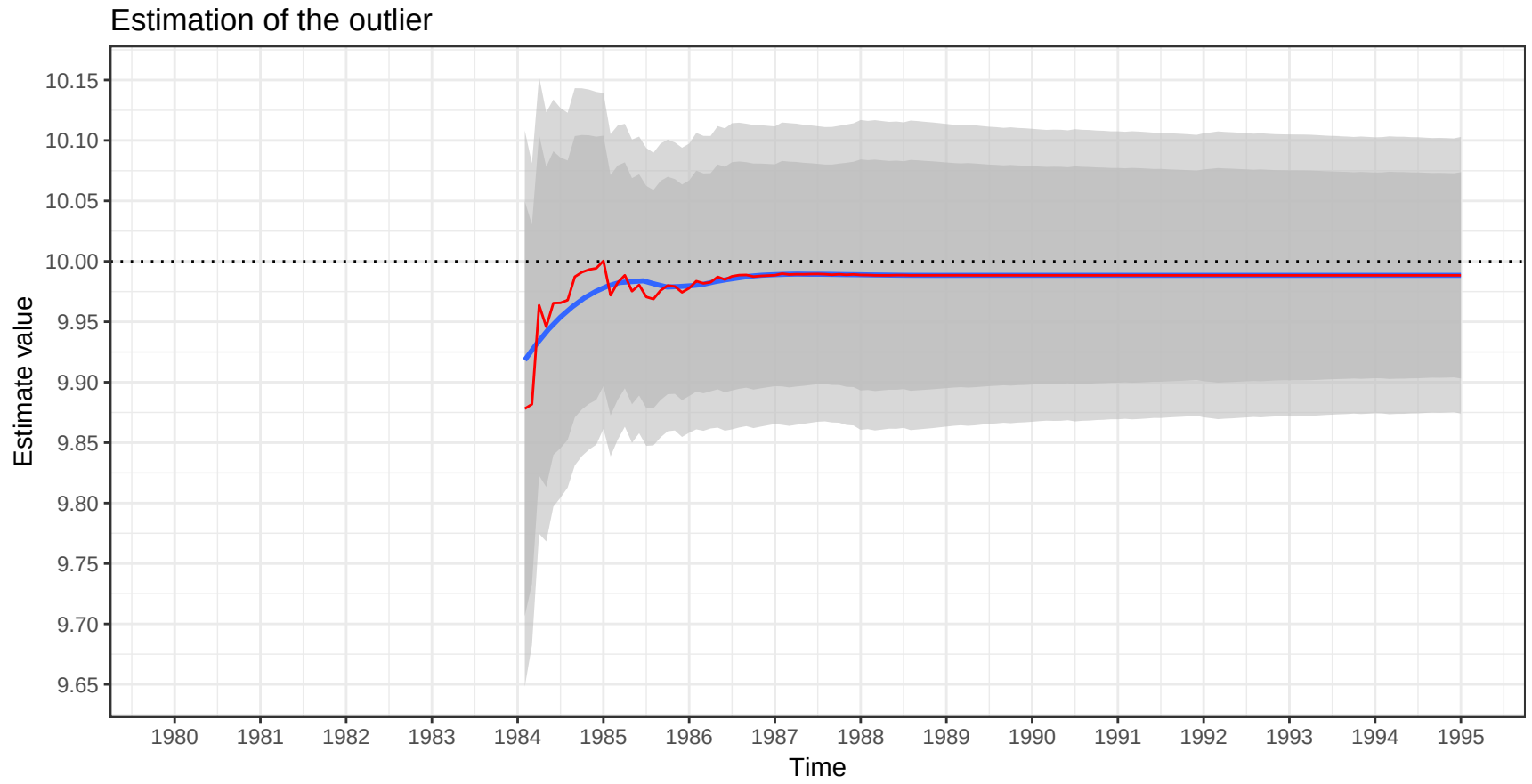
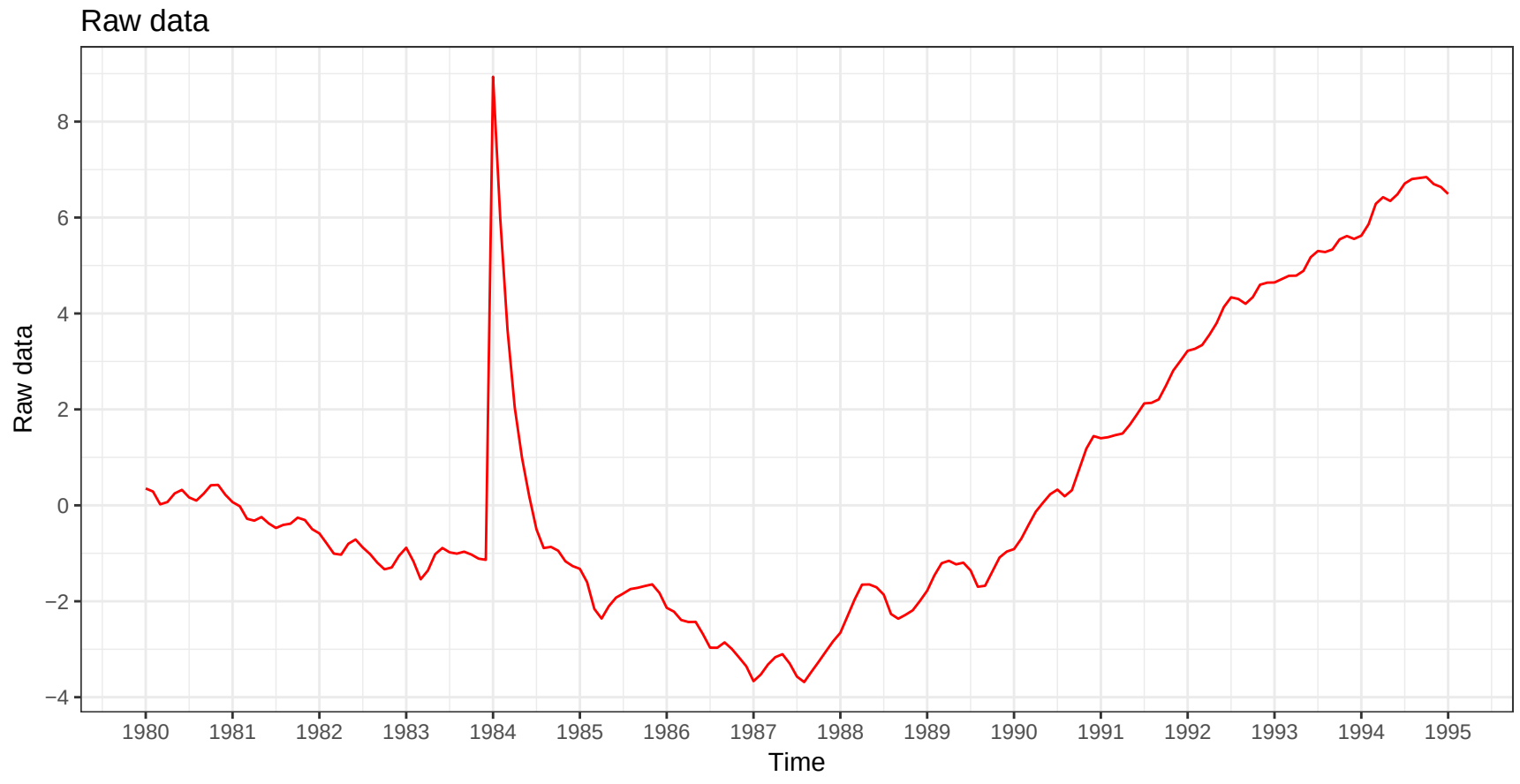
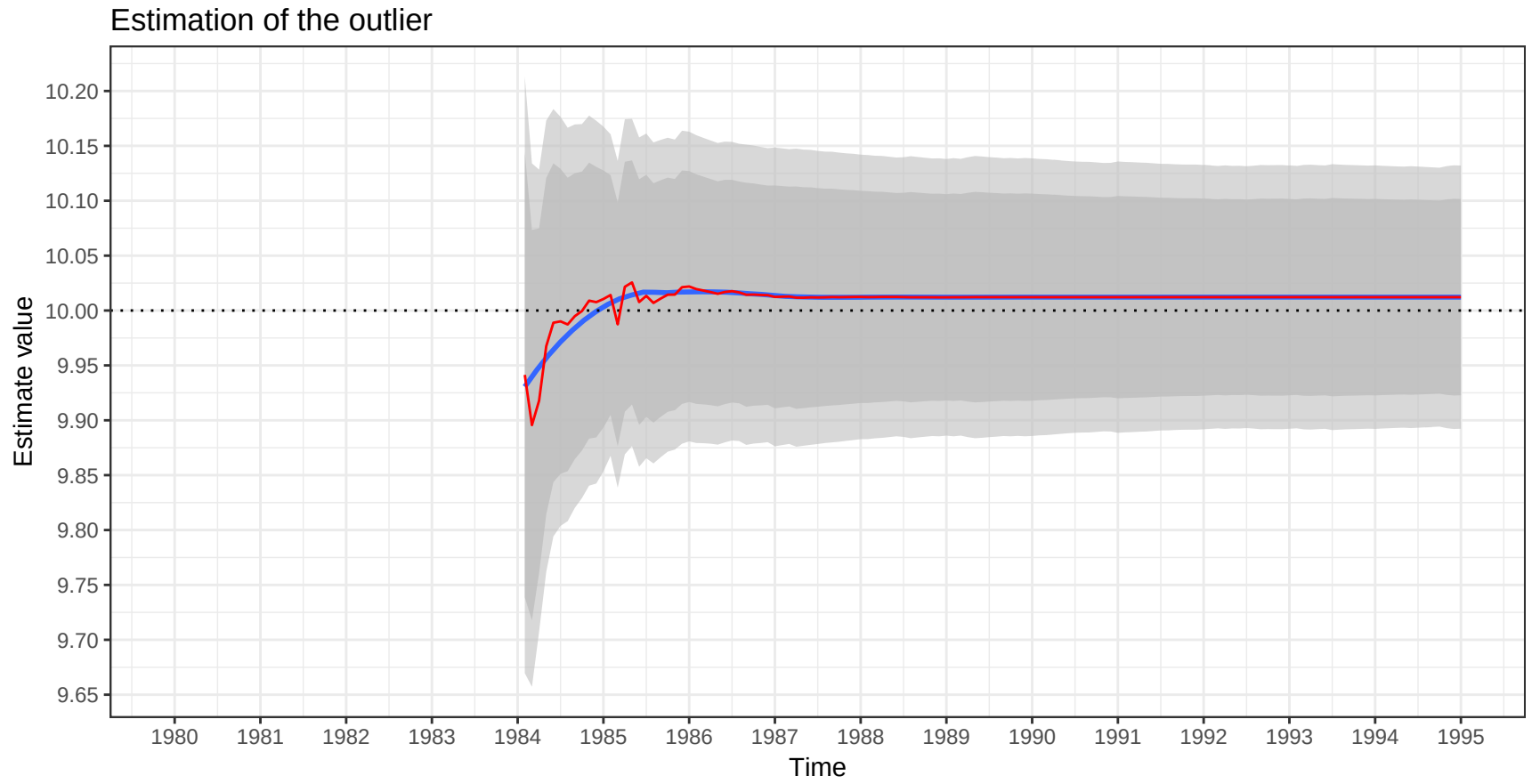
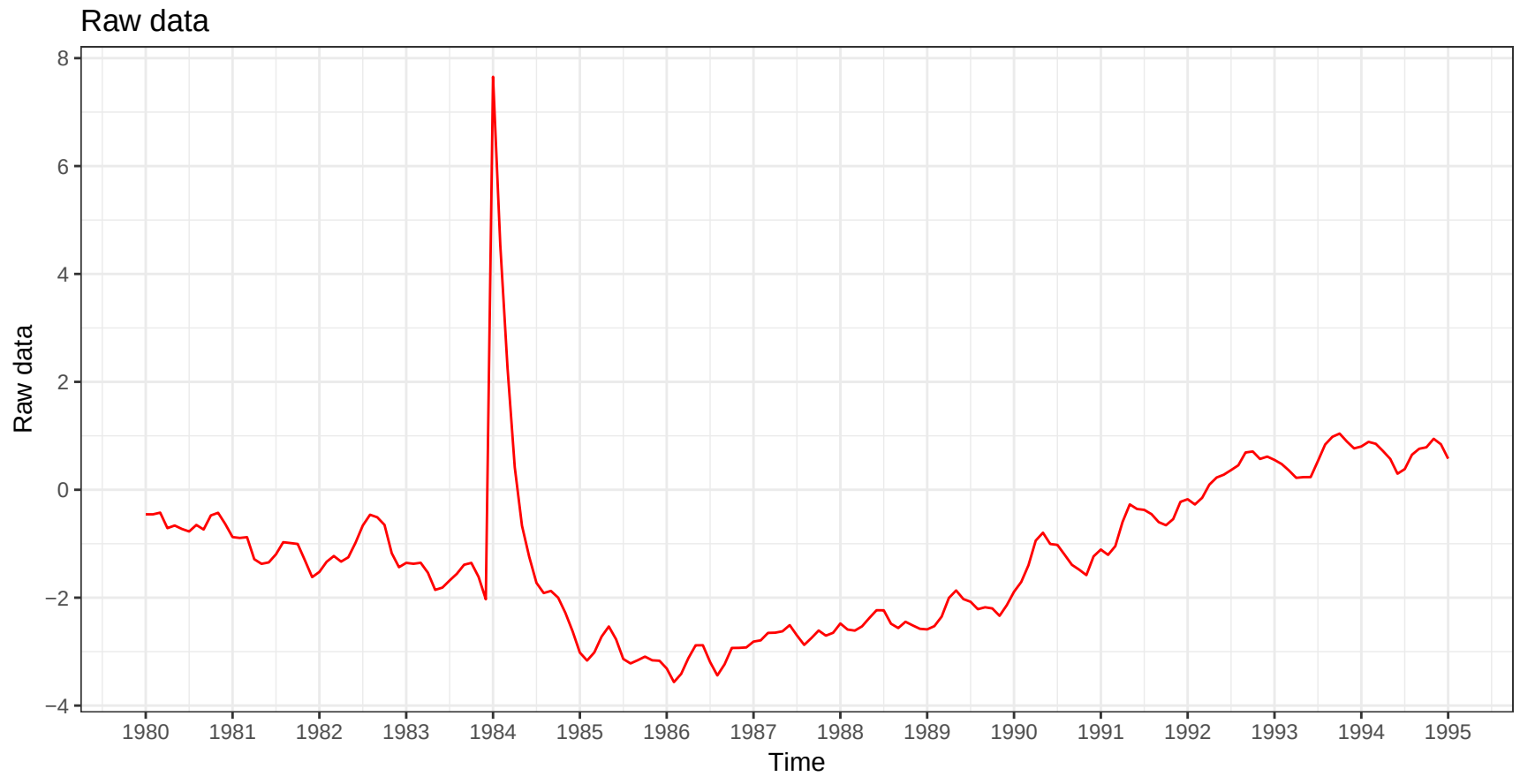


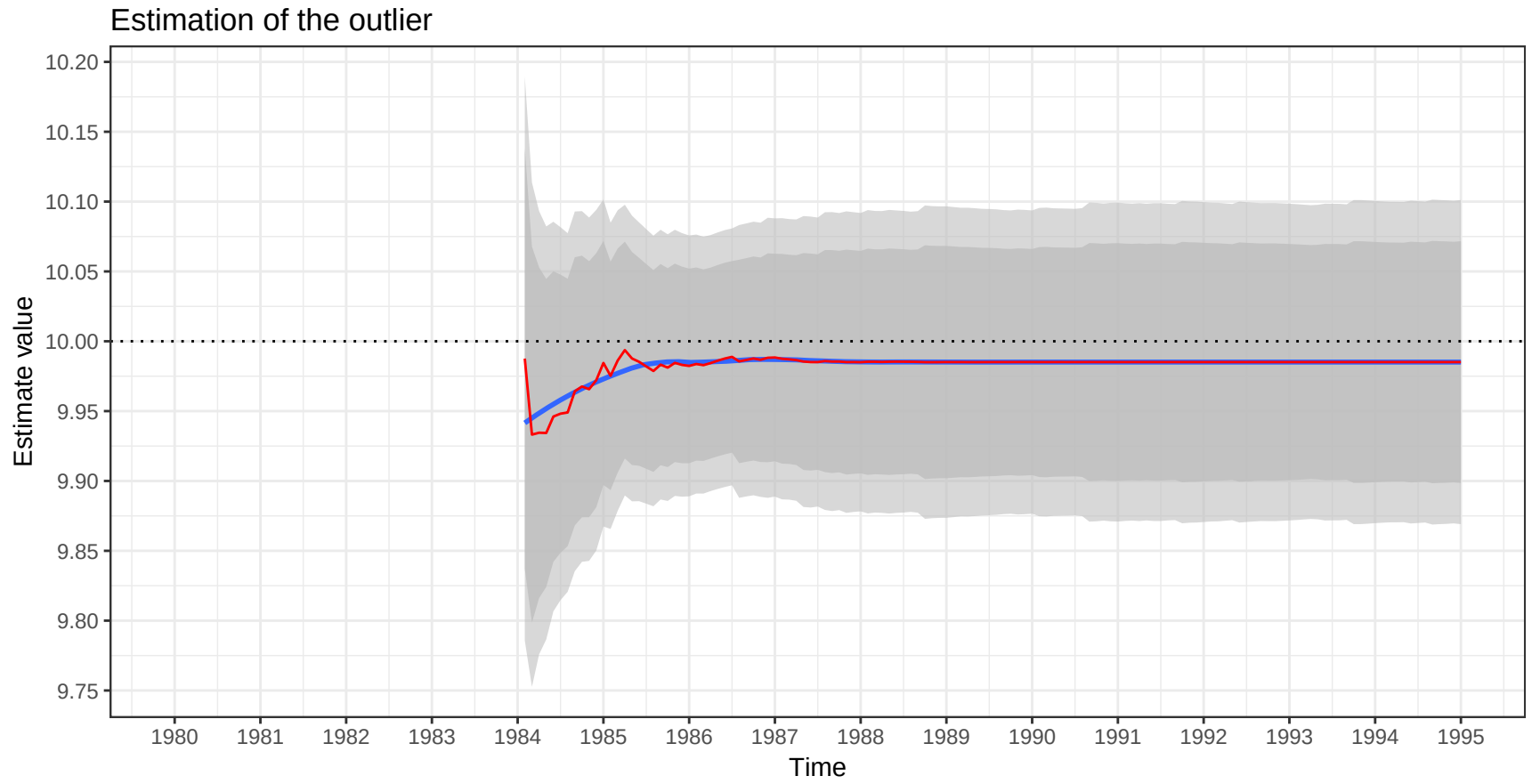


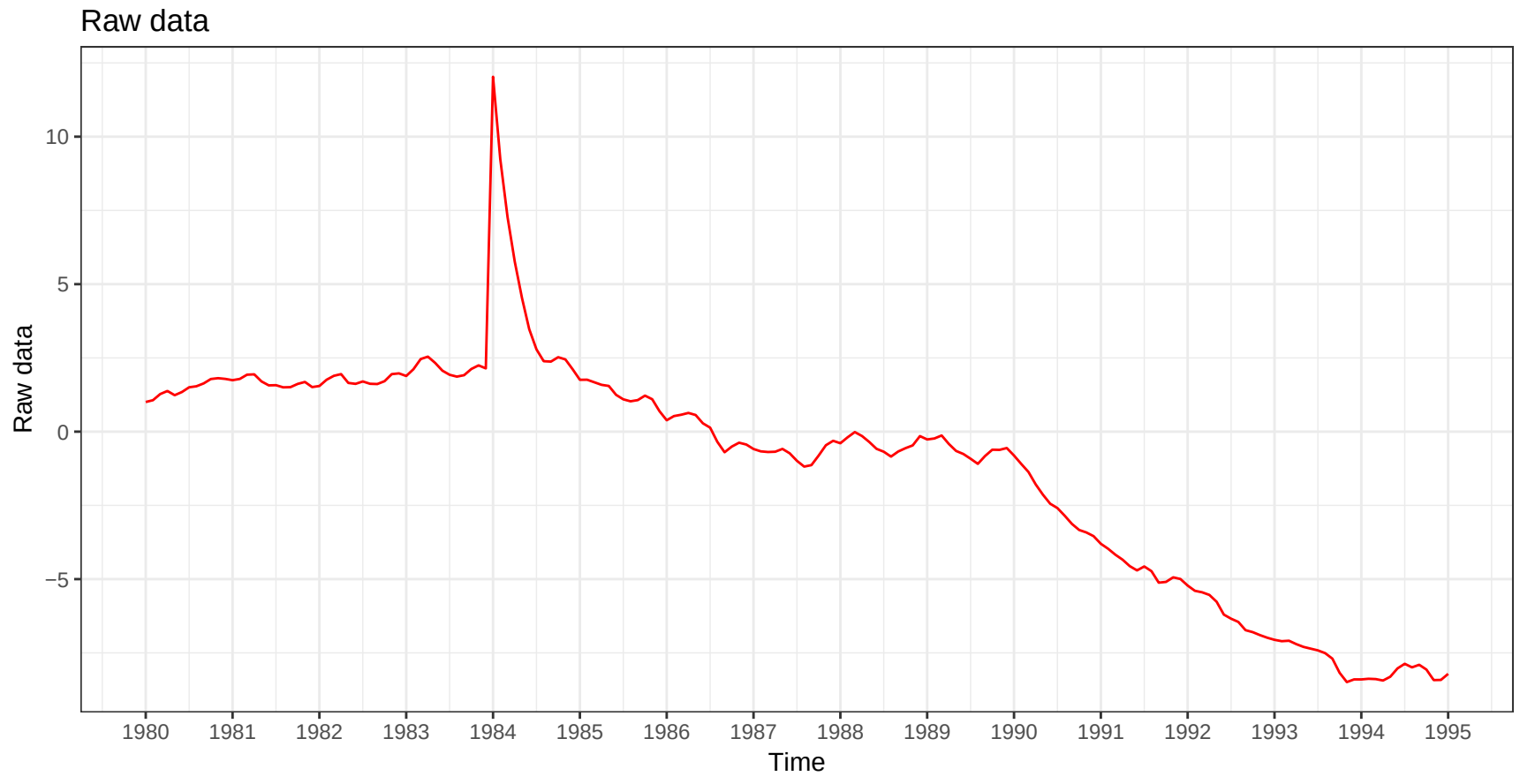
Estimate value of a TC(1984−01)
ARIMA (1,1,2)(0,0,0) − additive decomposition
(1−B)(1−0.6B)Xt=(1+0.5B+0.7B2)at



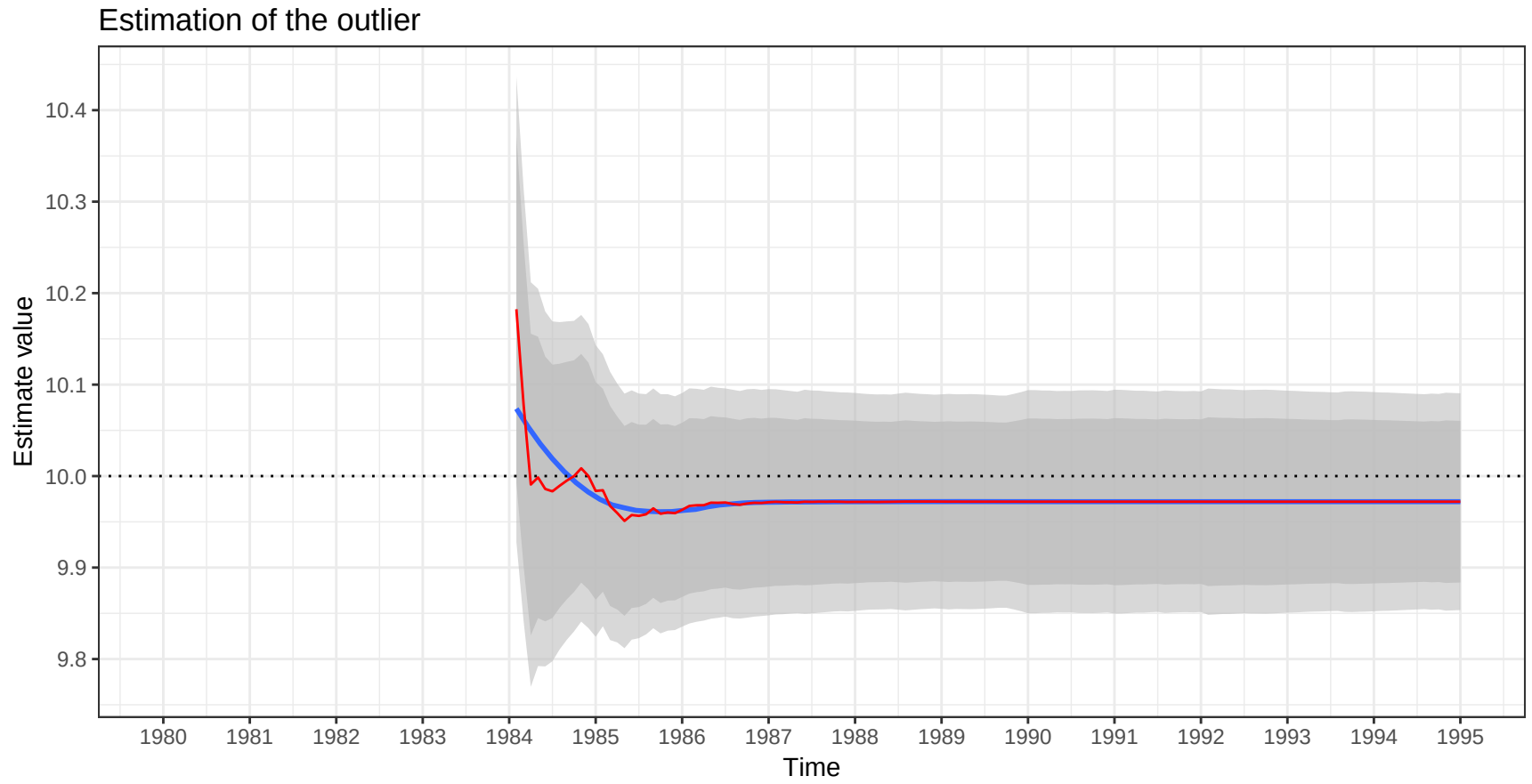


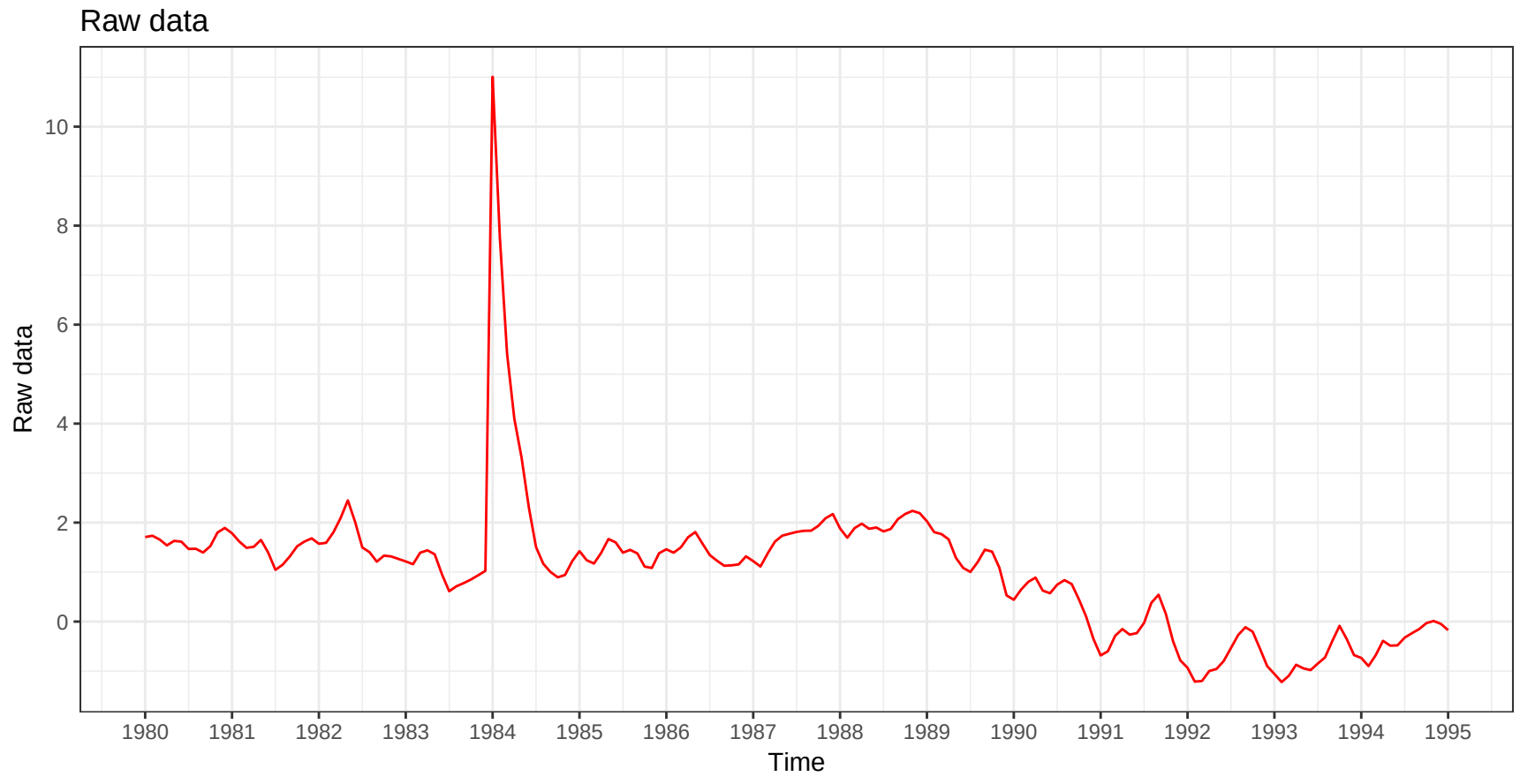
Estimate value of a TC(1984−01)
ARIMA (1,1,2)(0,0,0) − additive decomposition
(1−B)(1−0.6B)Xt=(1+0.5B+0.7B2)at



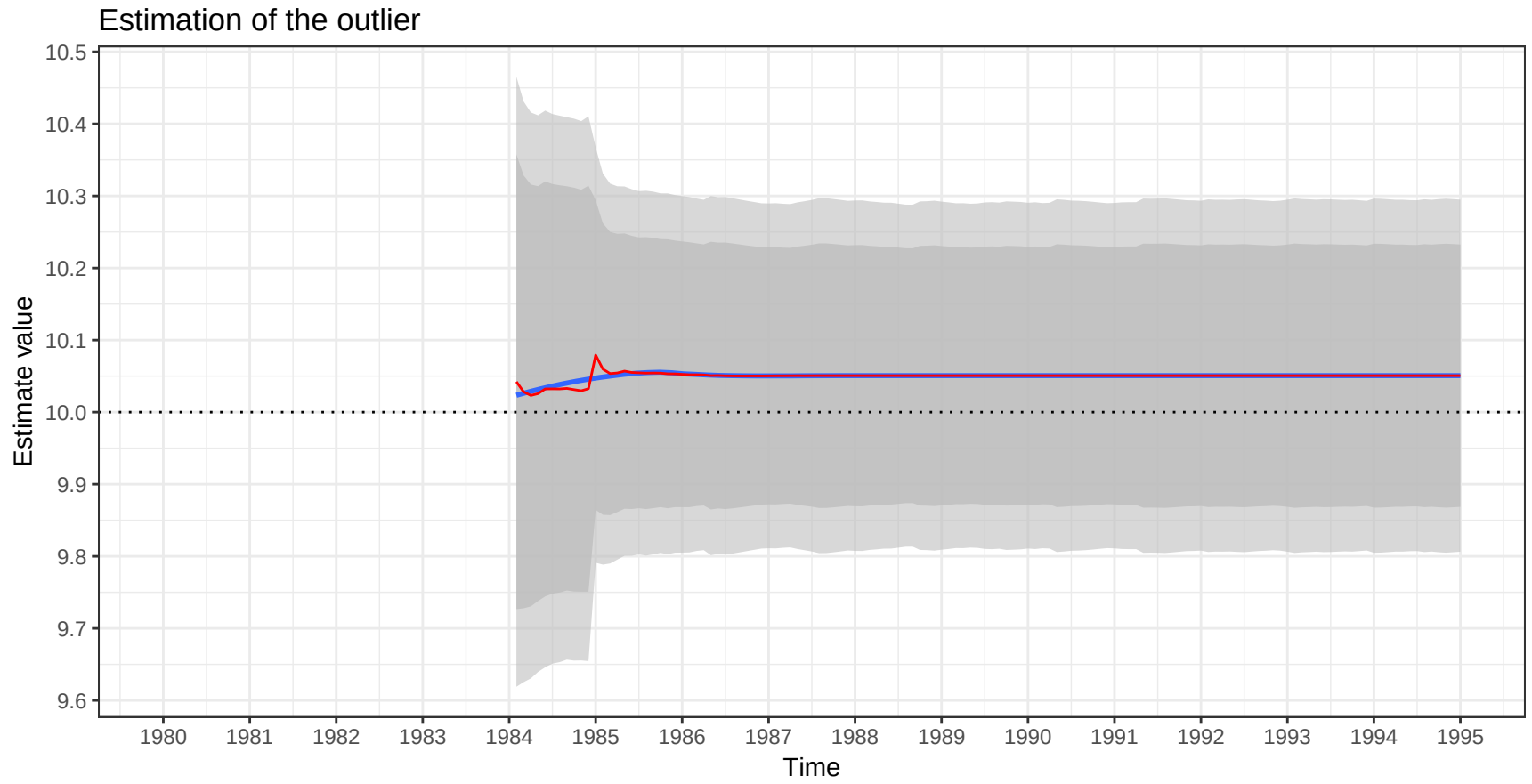


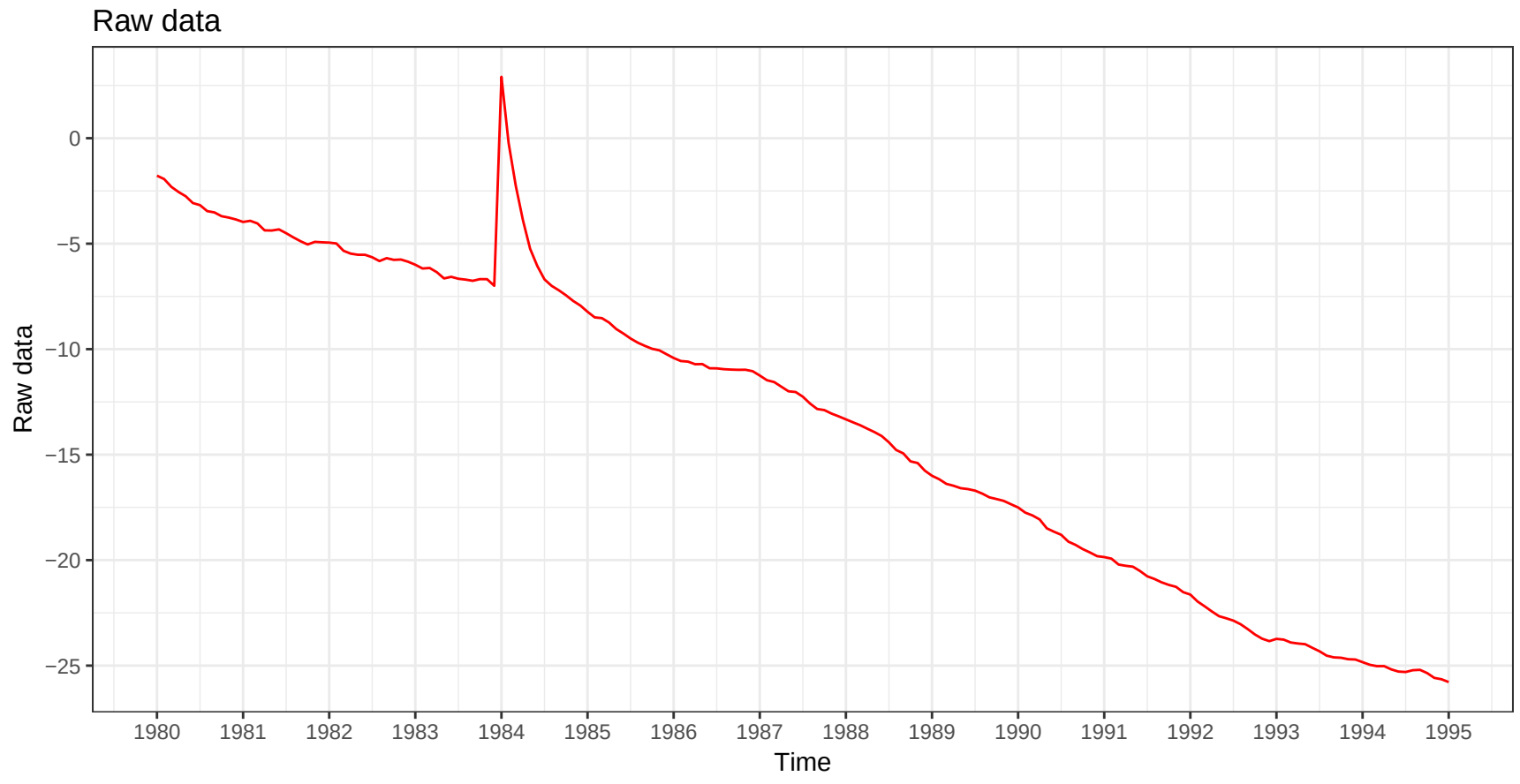
Estimate value of a TC(1984−01)
ARIMA (1,1,2)(0,0,0) − additive decomposition
(1−B)(1−0.6B)Xt=(1+0.5B+0.7B2)at



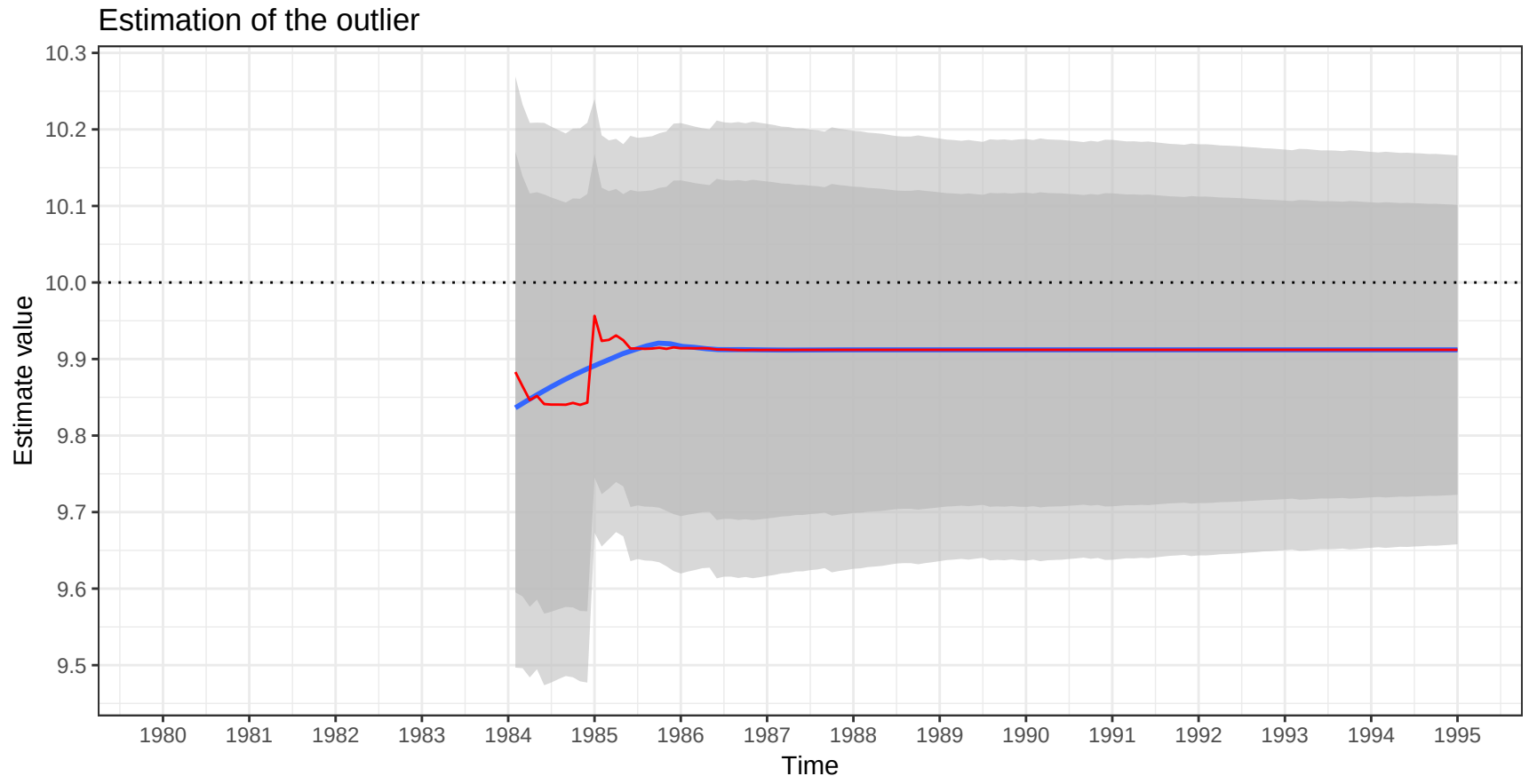


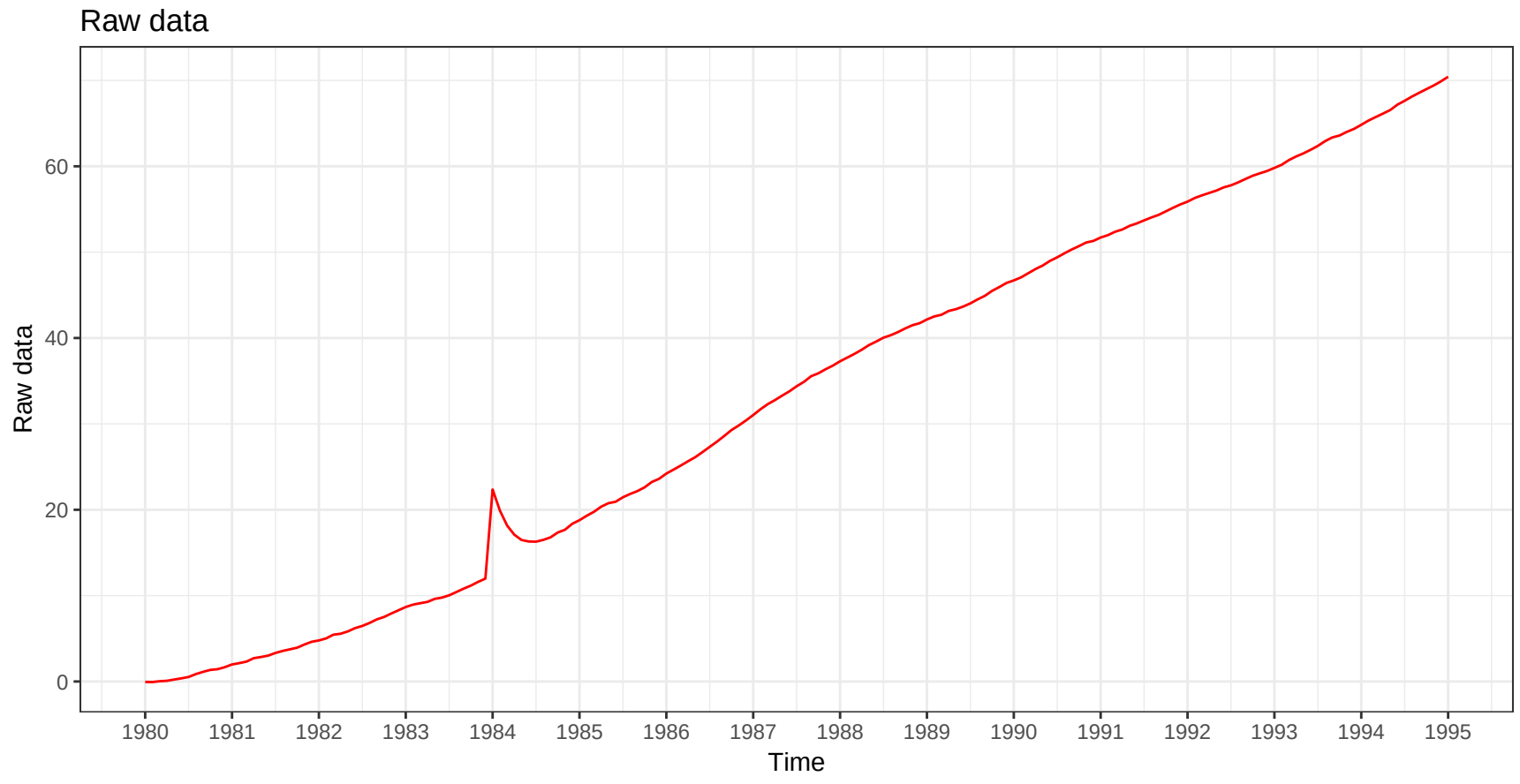
Estimate value of a TC(1984−01)
ARIMA (0,2,1)(0,0,0) − additive decomposition
(1−B)2Xt=(1−0.8B)at



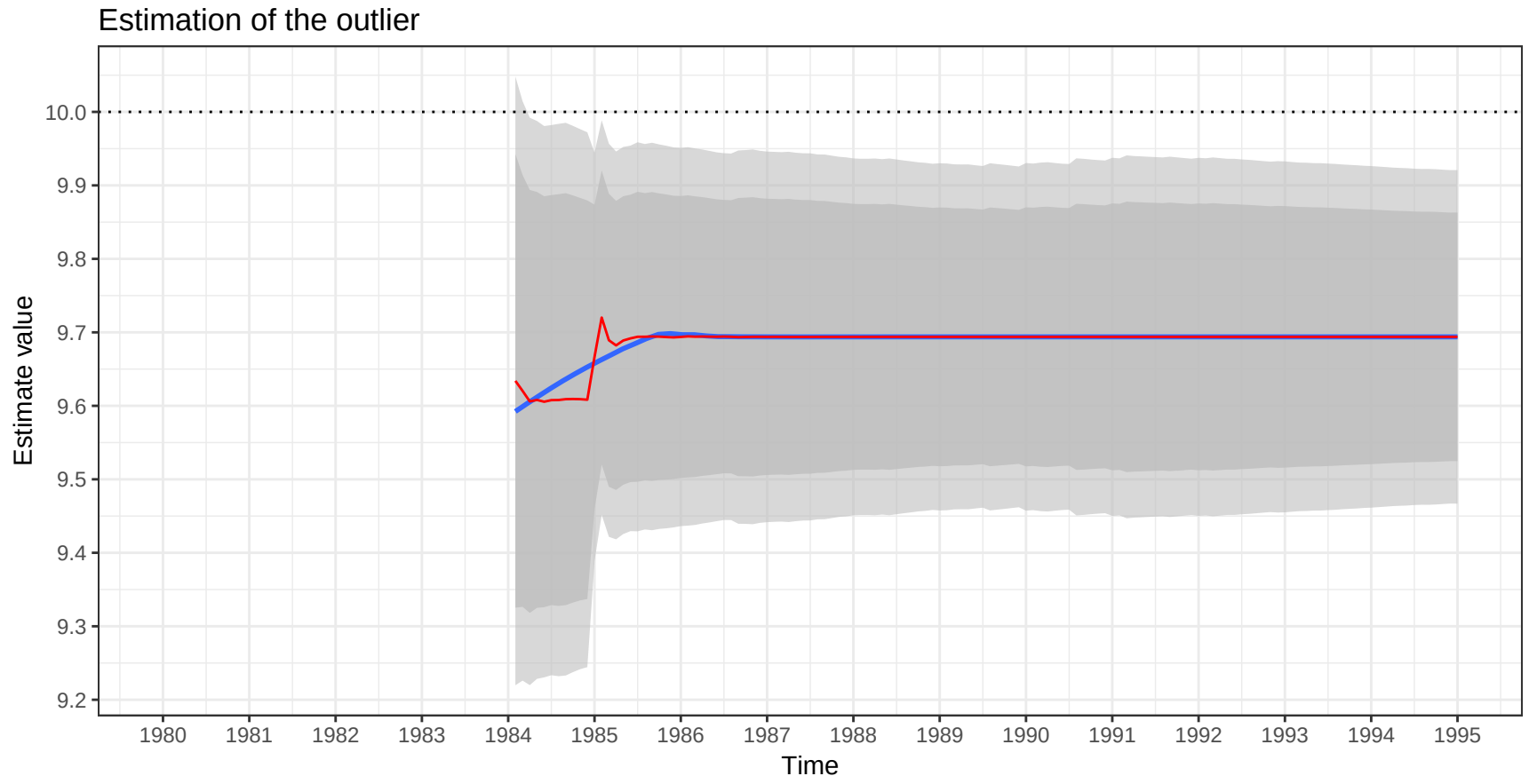


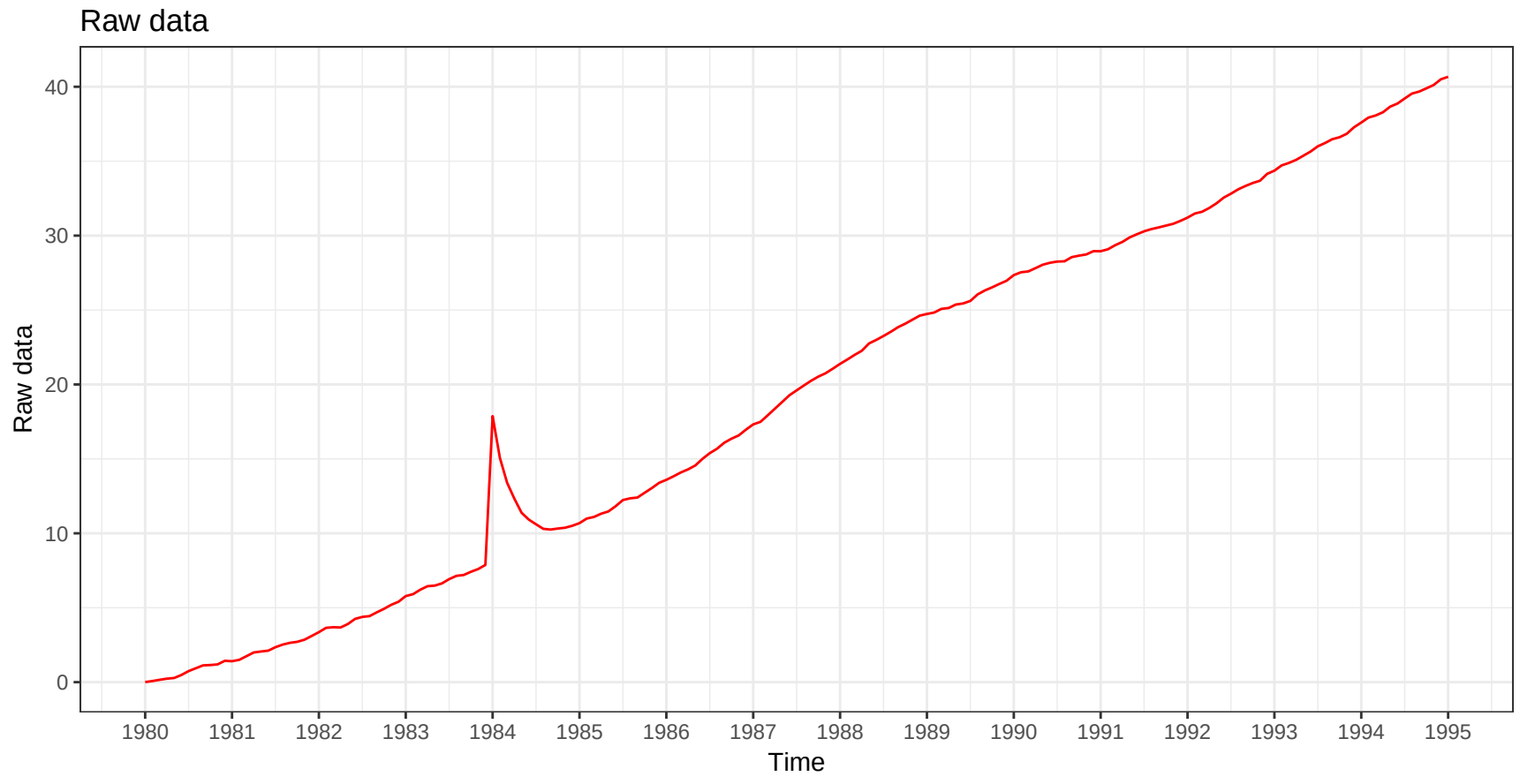
Estimate value of a TC(1984−01)
ARIMA (0,2,1)(0,0,0) − additive decomposition
(1−B)2Xt=(1−0.8B)at





Estimate value of a TC(1984−01)
ARIMA (0,2,1)(0,0,0) − additive decomposition
(1−B)2Xt=(1−0.8B)at





Estimate value of a TC(1984−01)
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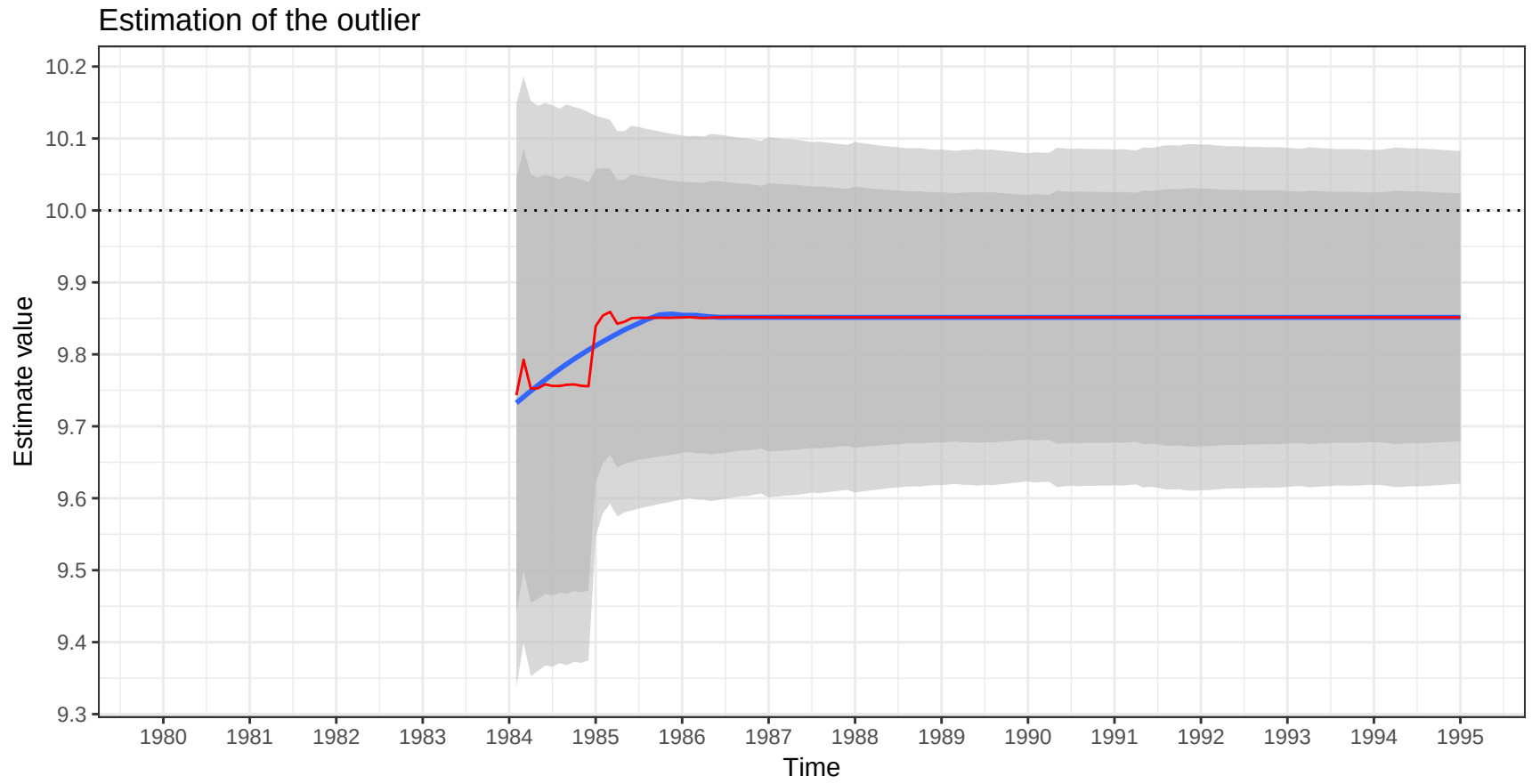
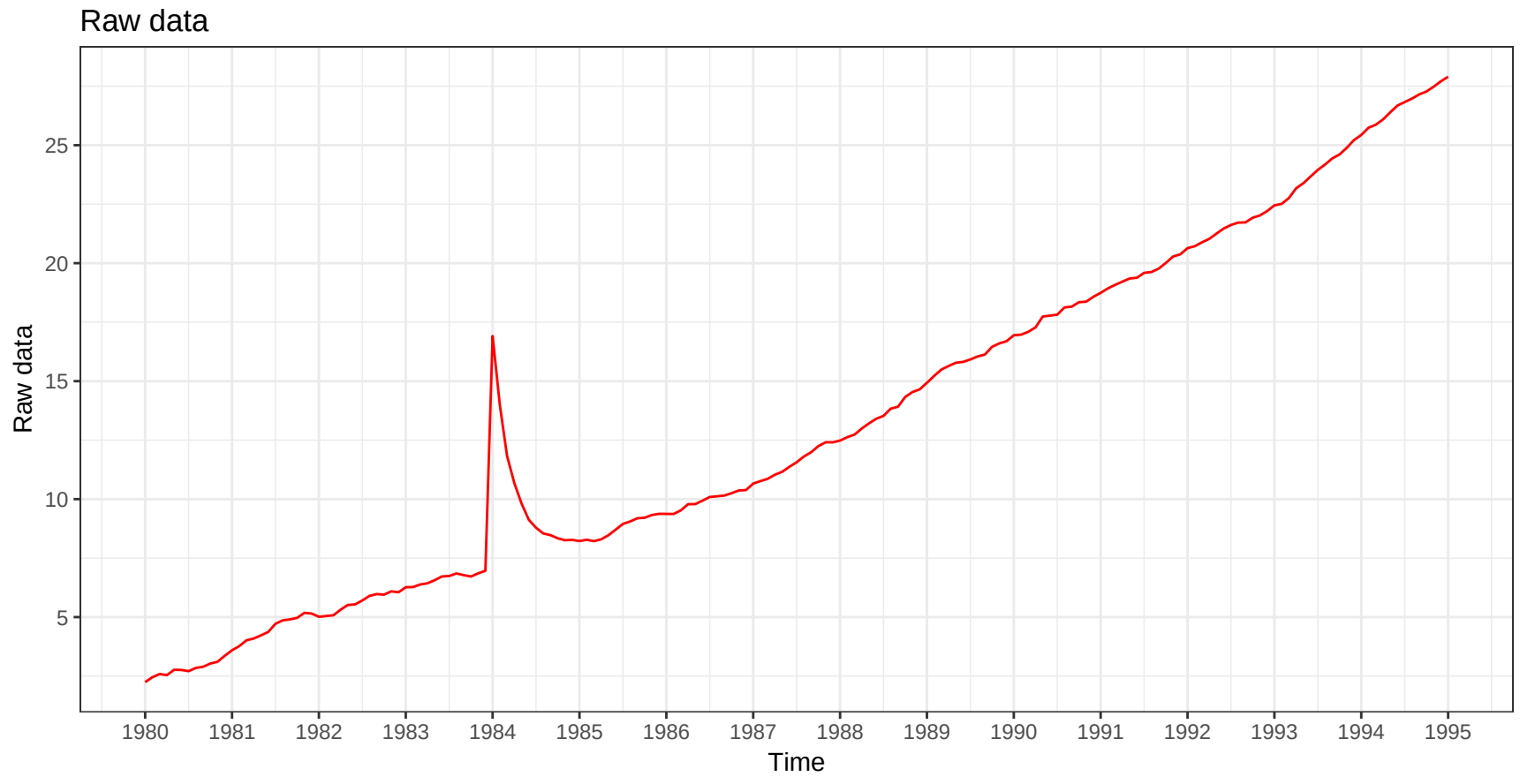
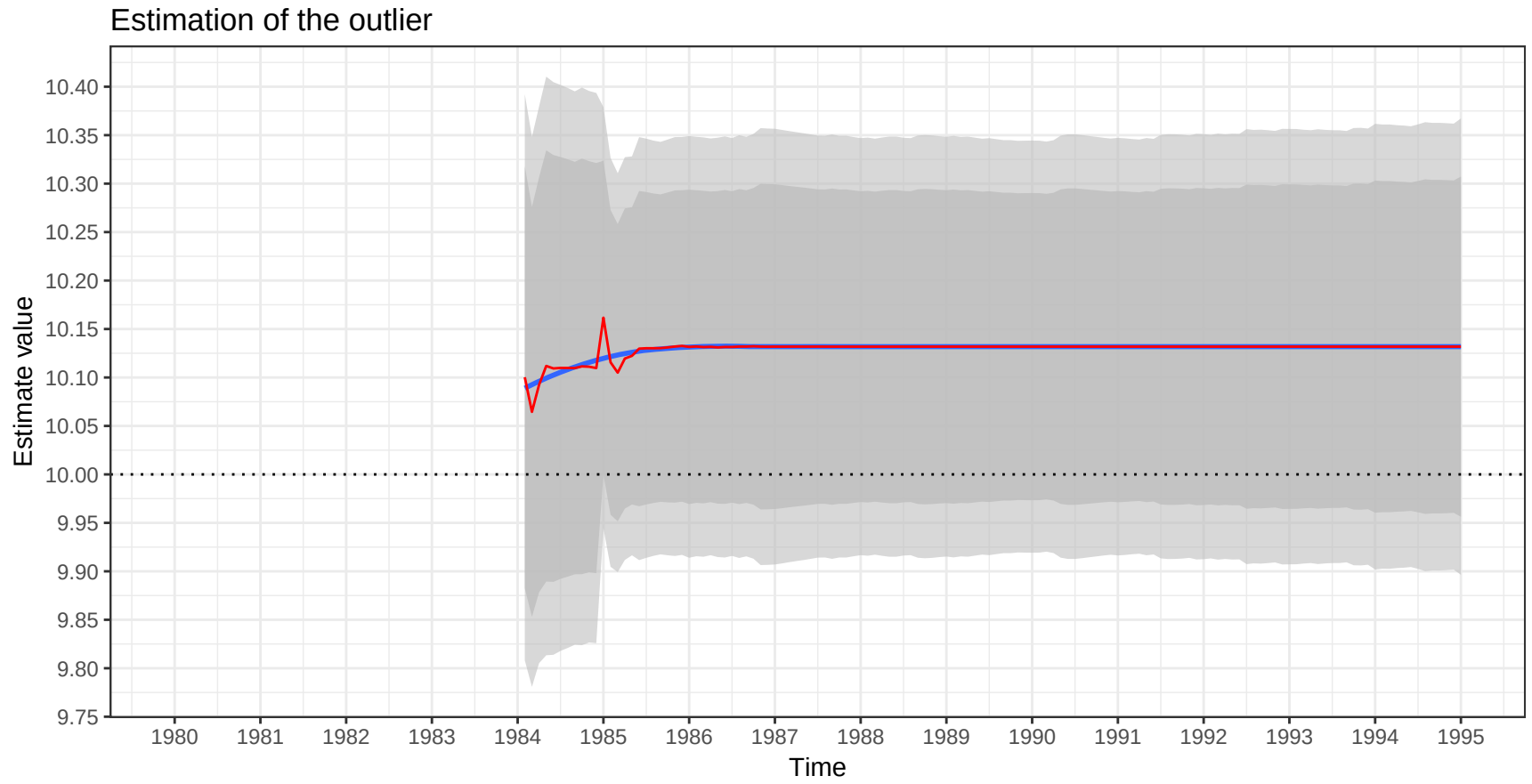
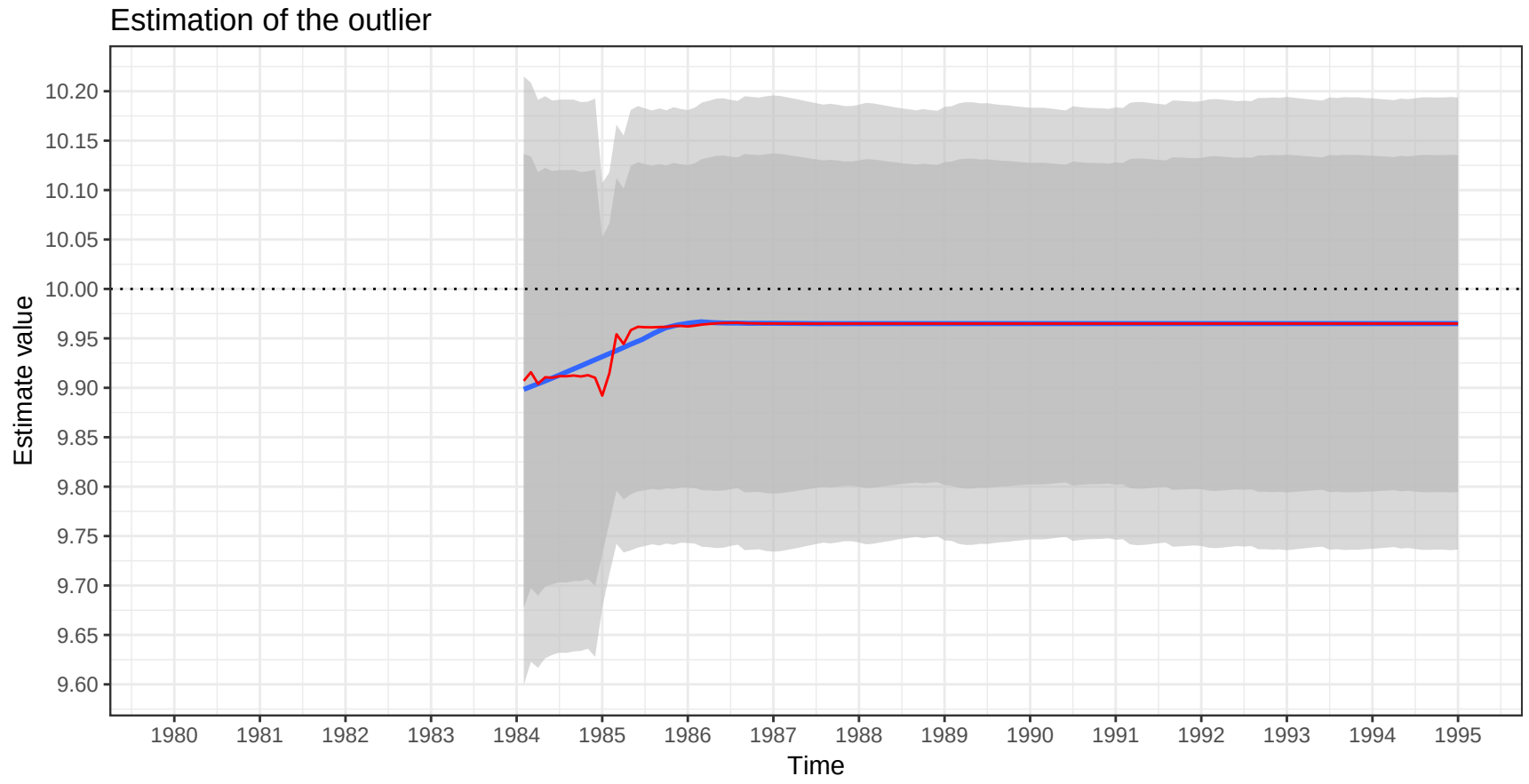


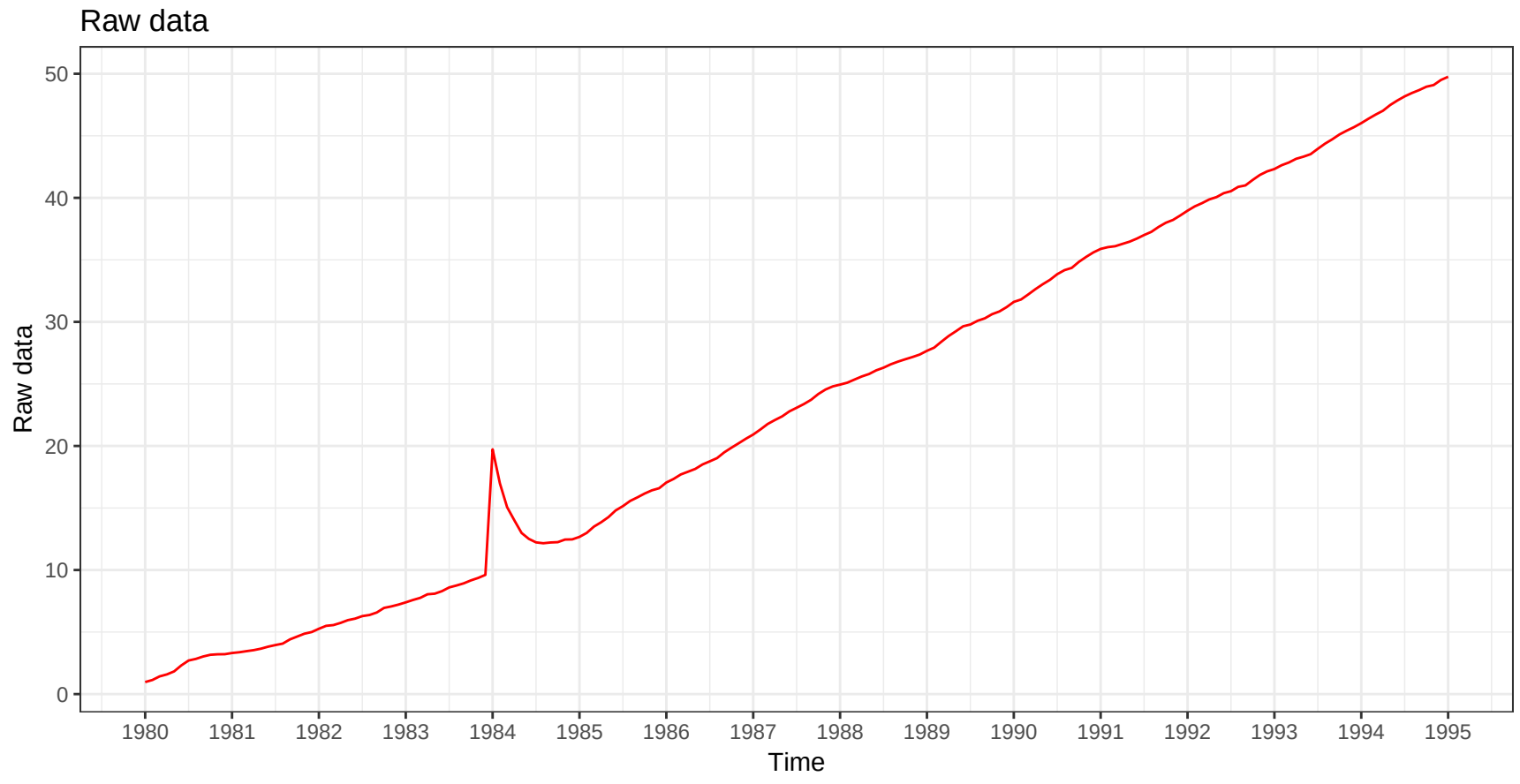


Estimate value of a TC(1984−01)
ARIMA (0,2,1)(0,0,0) − additive decomposition
(1−B)2Xt=(1−0.8B)at

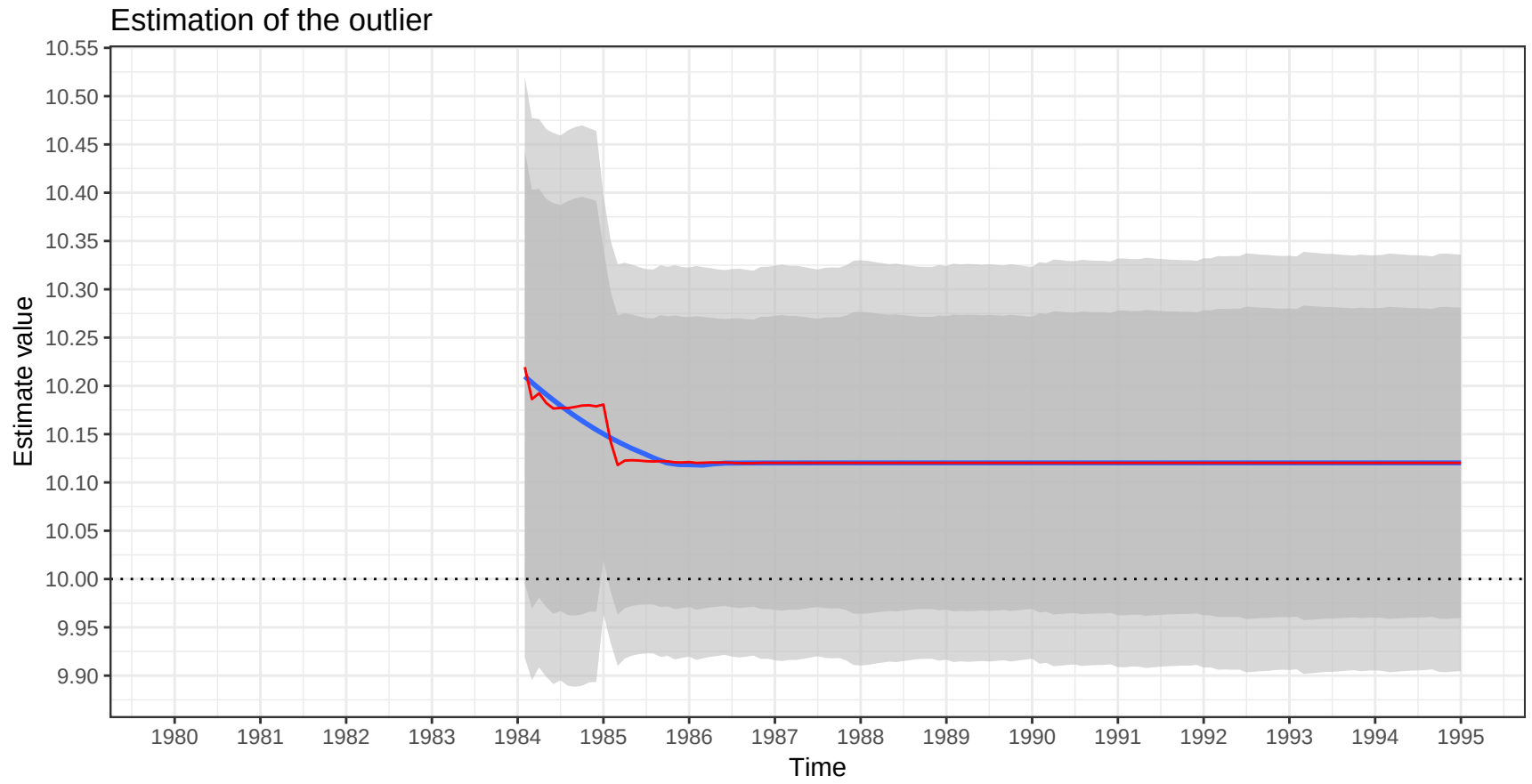


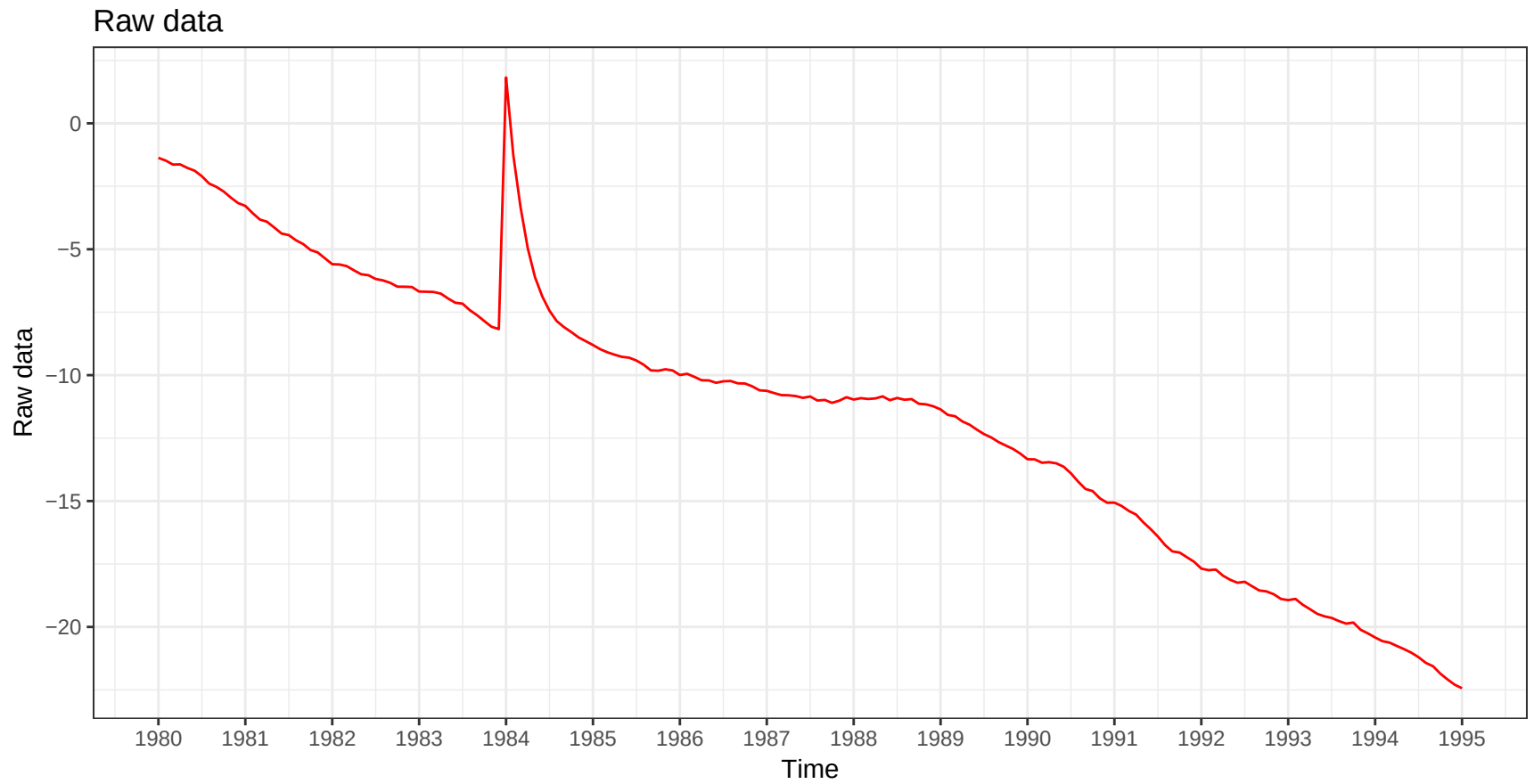
Estimate value of a TC(1984−01)
ARIMA (0,2,1)(0,0,0) − additive decomposition
(1−B)2Xt=(1−0.8B)at





Estimate value of a TC(1984−01)
ARIMA (0,2,1)(0,0,0) − additive decomposition
(1−B)2Xt=(1−0.8B)at





Estimate value of a TC(1984−01)
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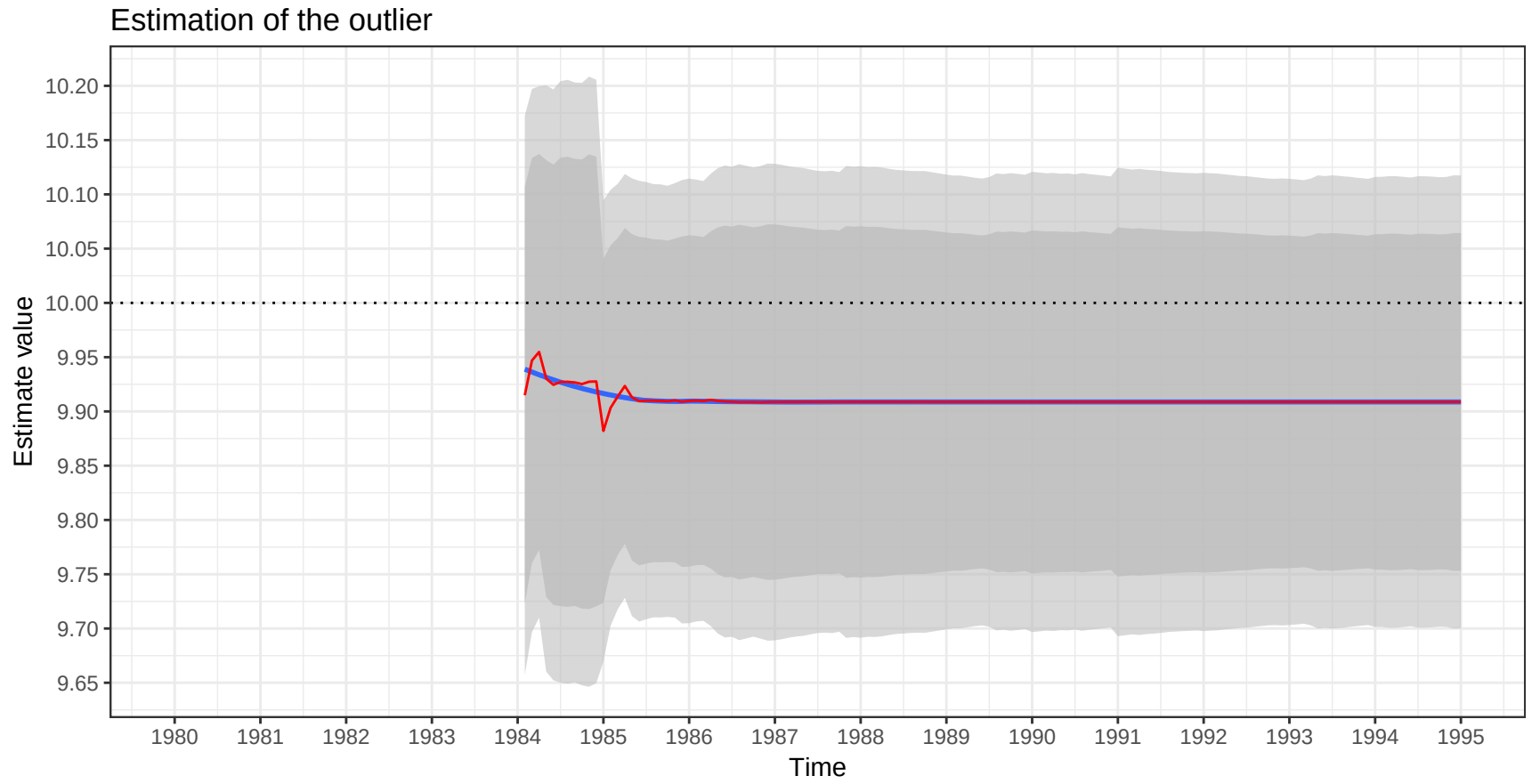
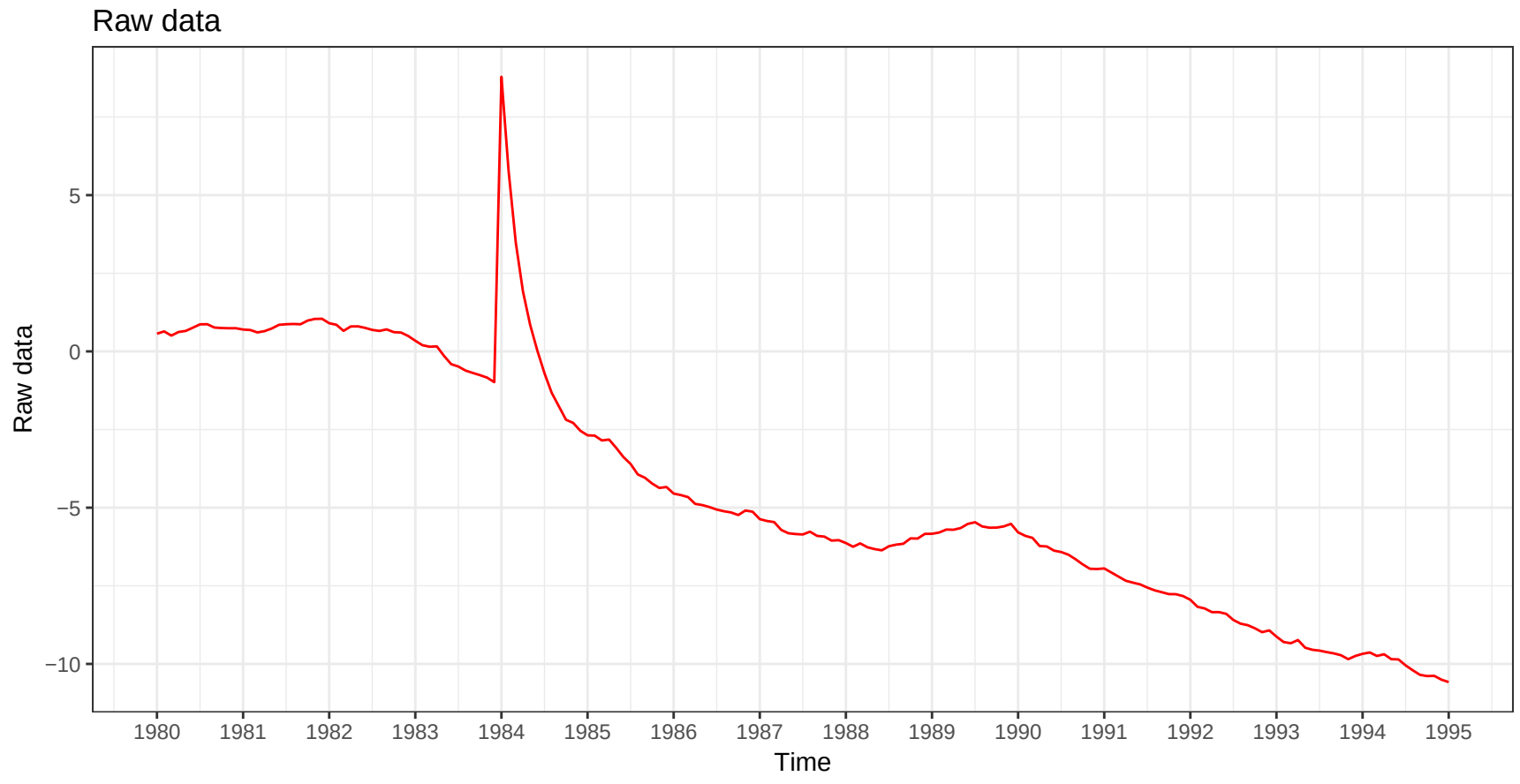
(1−B)2Xt=(1−0.8B)at





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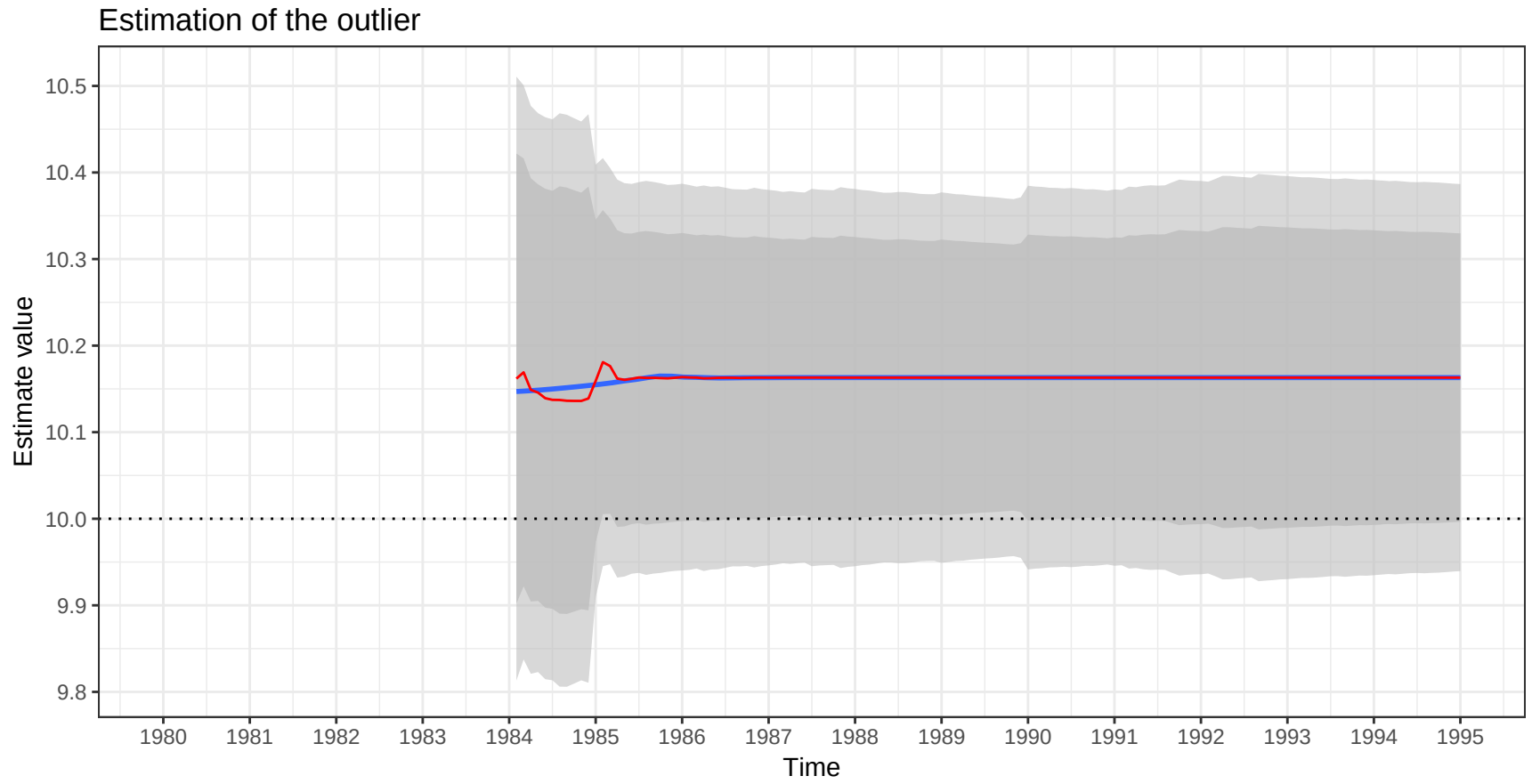
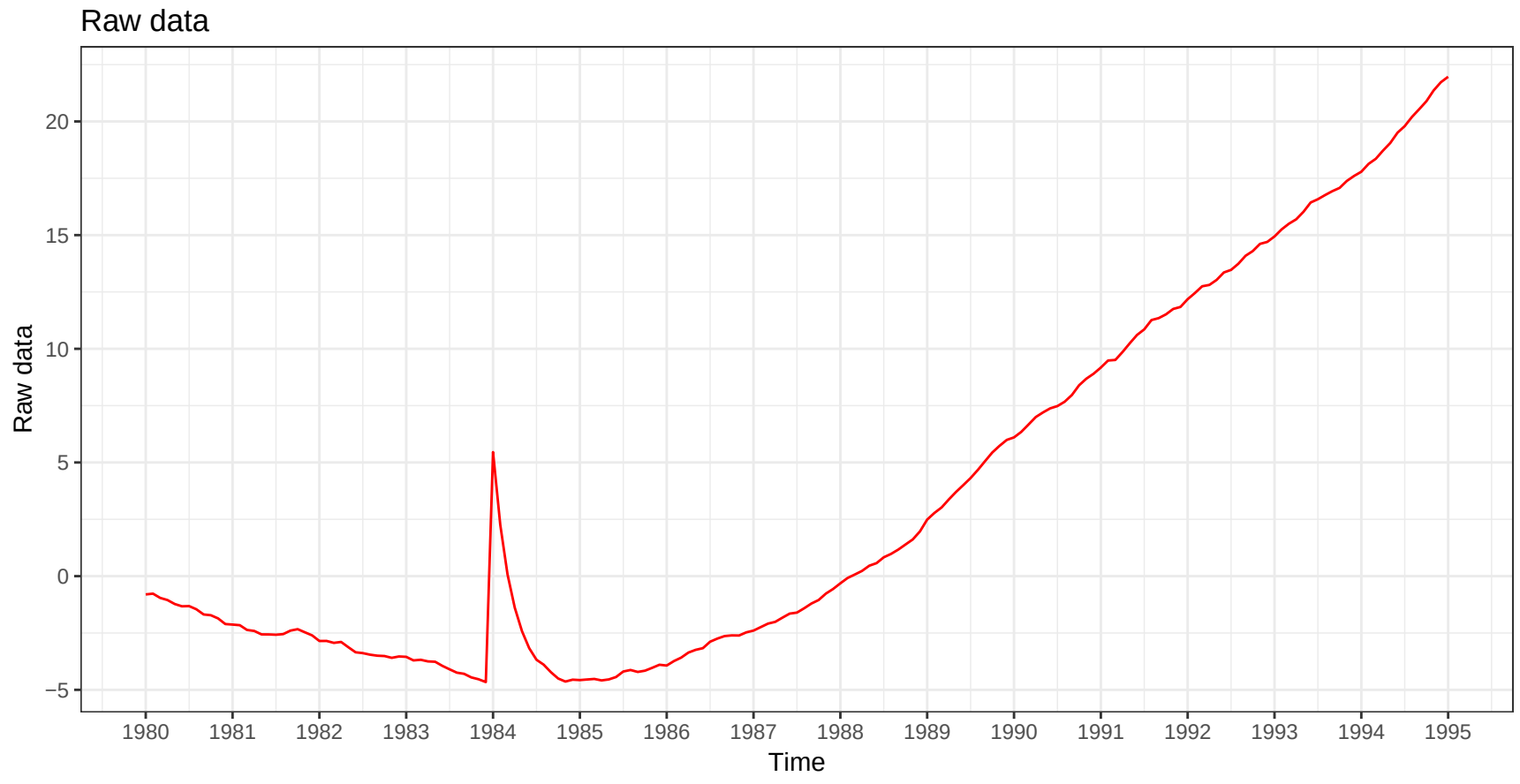
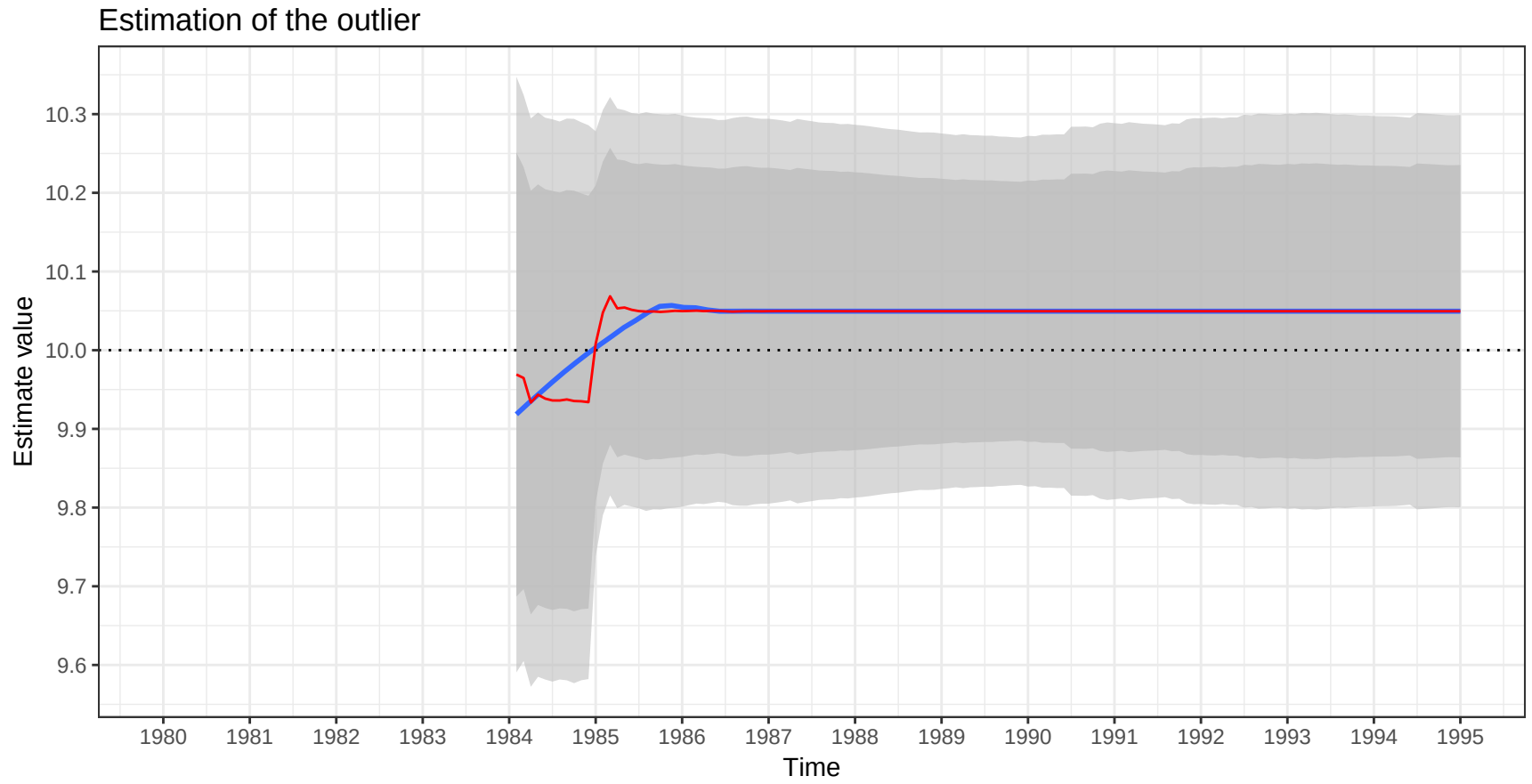
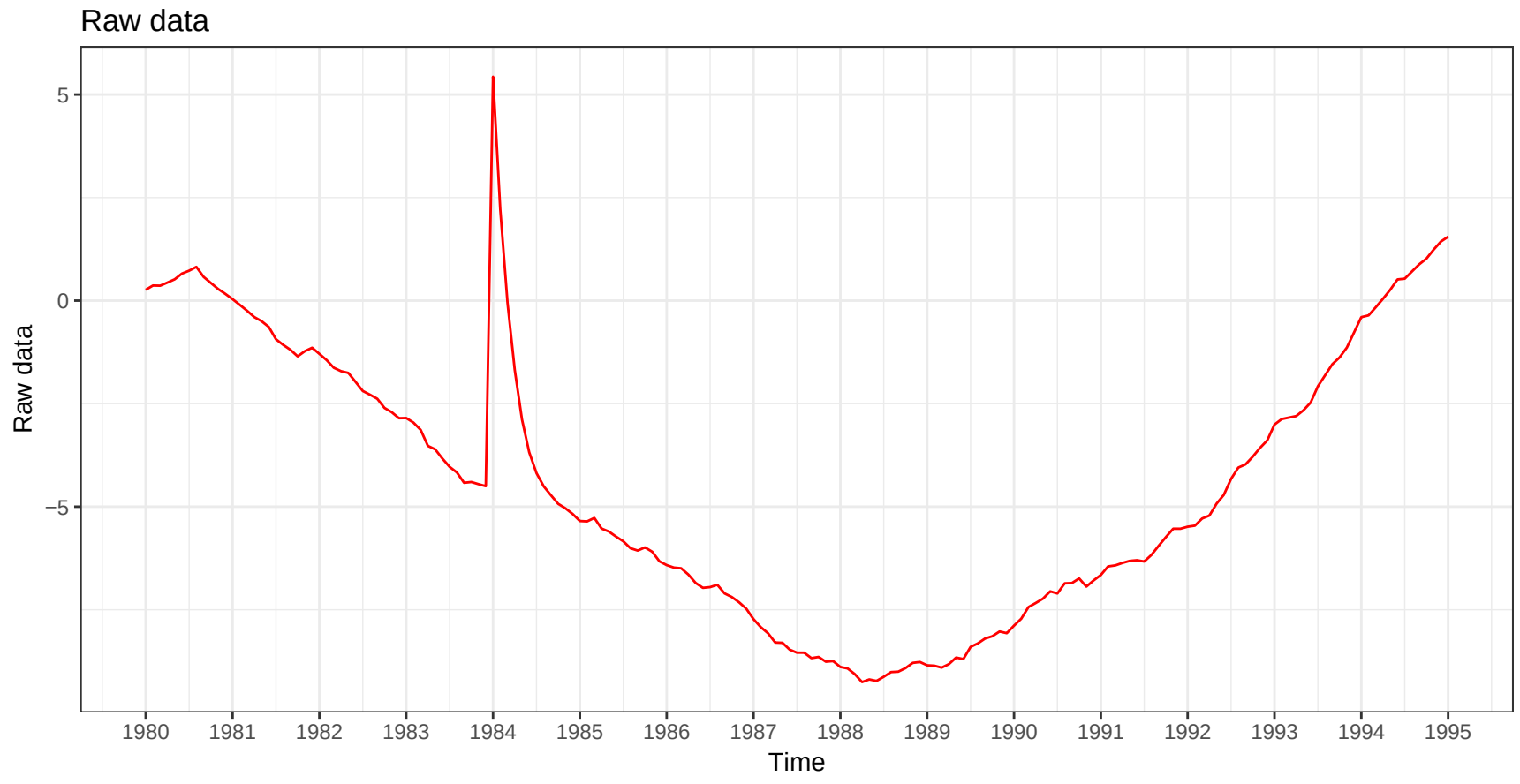
(1−B)2Xt=(1−0.8B)at



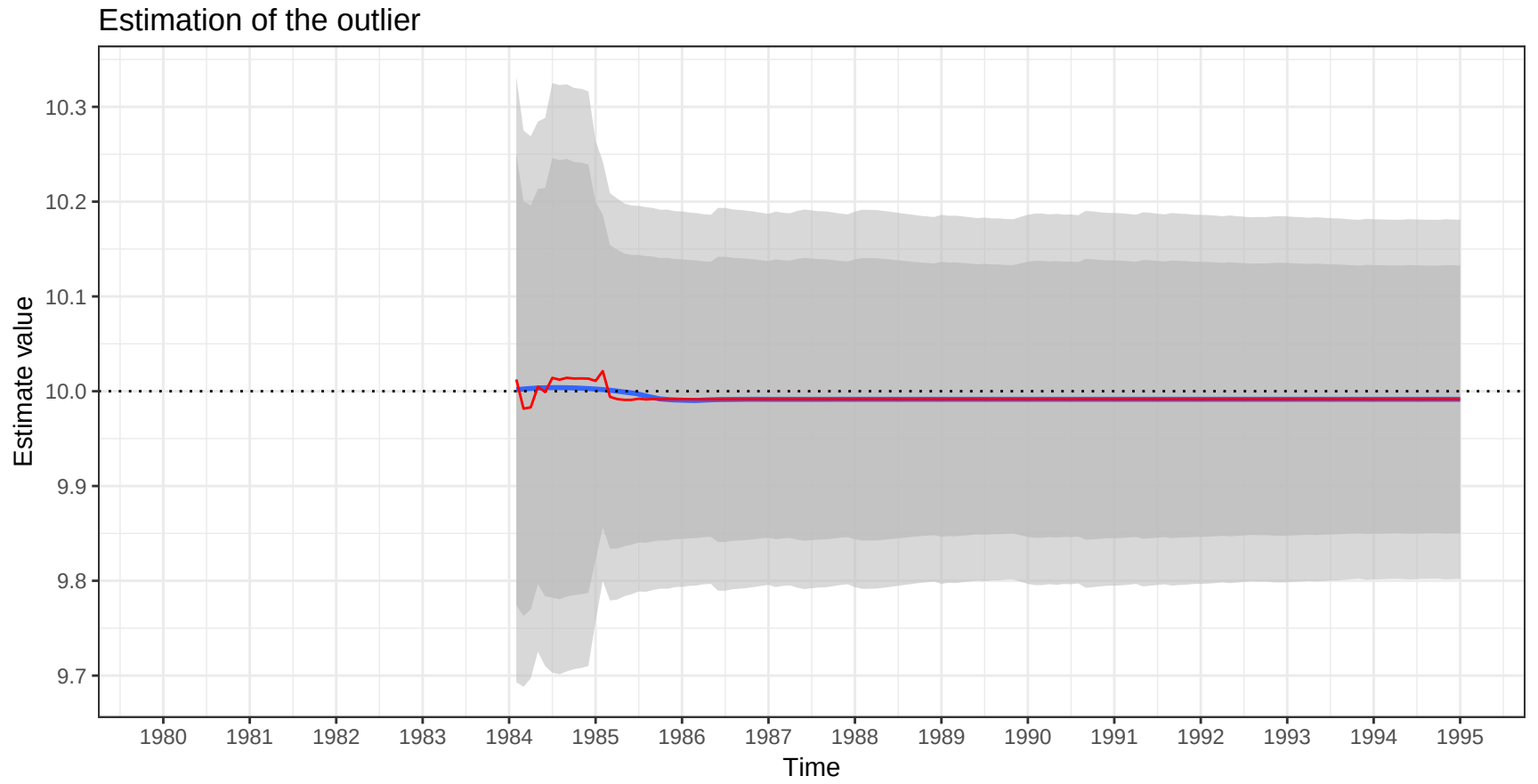


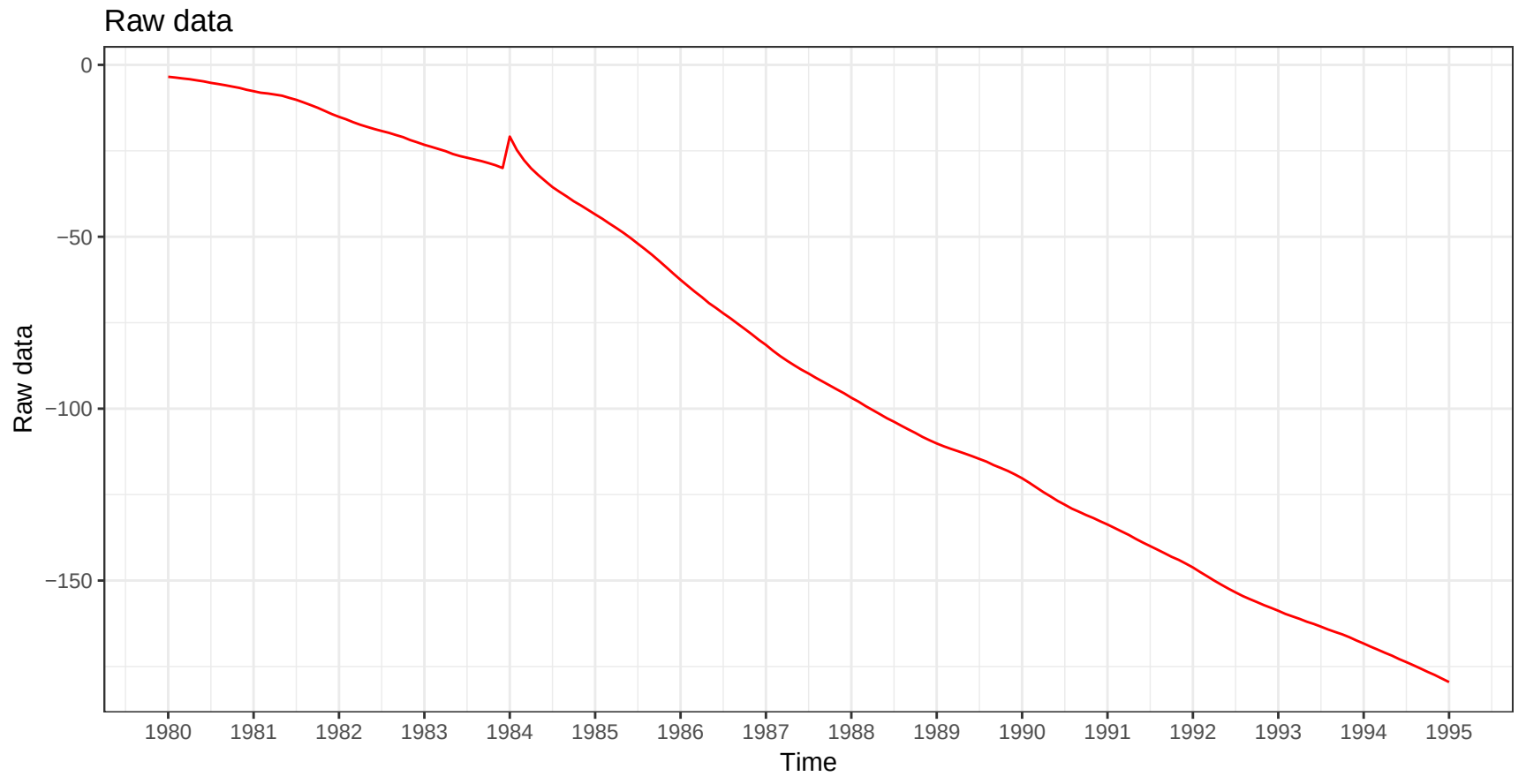
Estimate value of a TC(1984−01)
ARIMA (0,2,1)(0,0,0) − additive decomposition
(1−B)2Xt=(1−0.8B)at



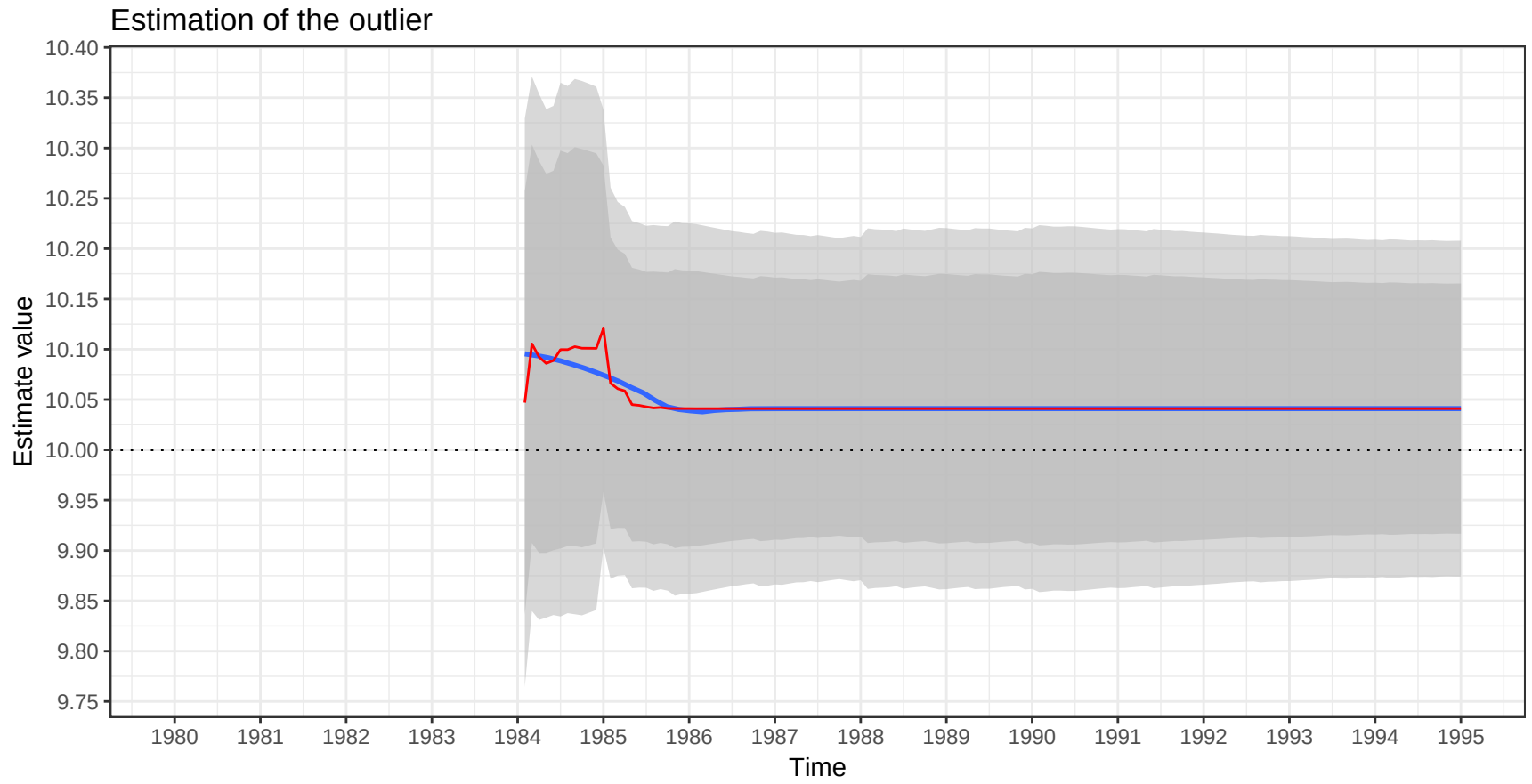


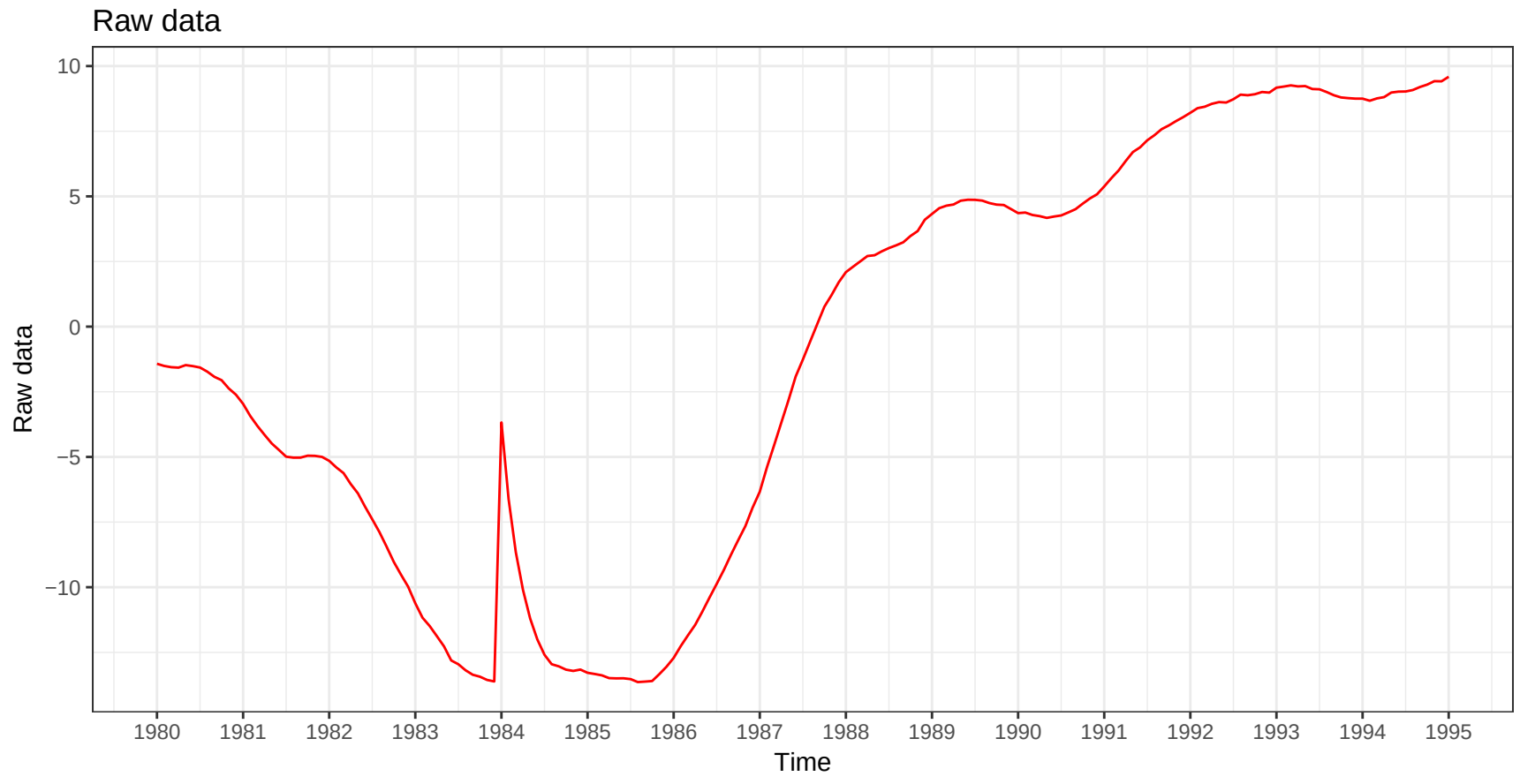
Estimate value of a TC(1984−01)
ARIMA (0,2,2)(0,0,0) − additive decomposition
(1−B)2Xt=(1−0.31058B+0.36B2)at



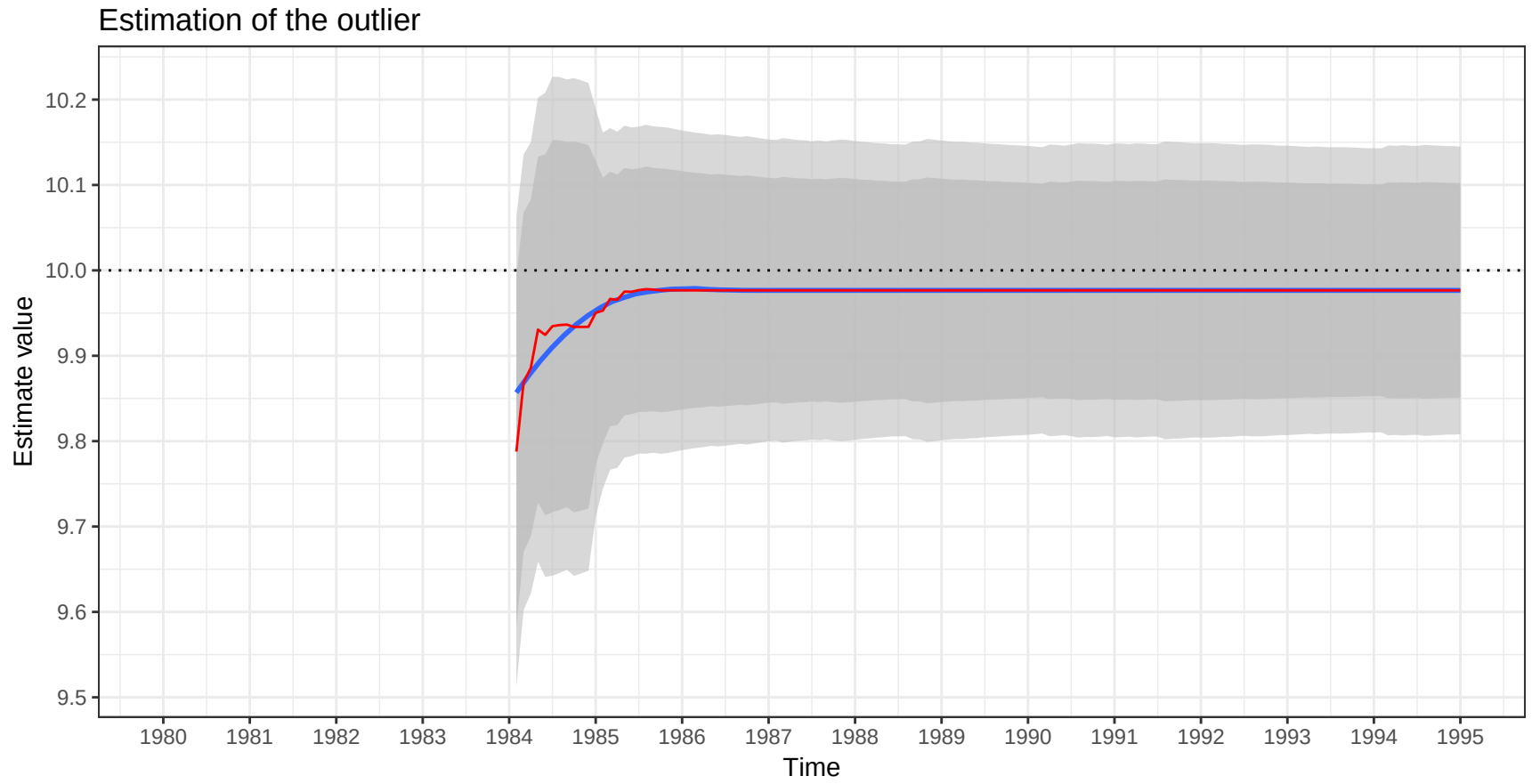


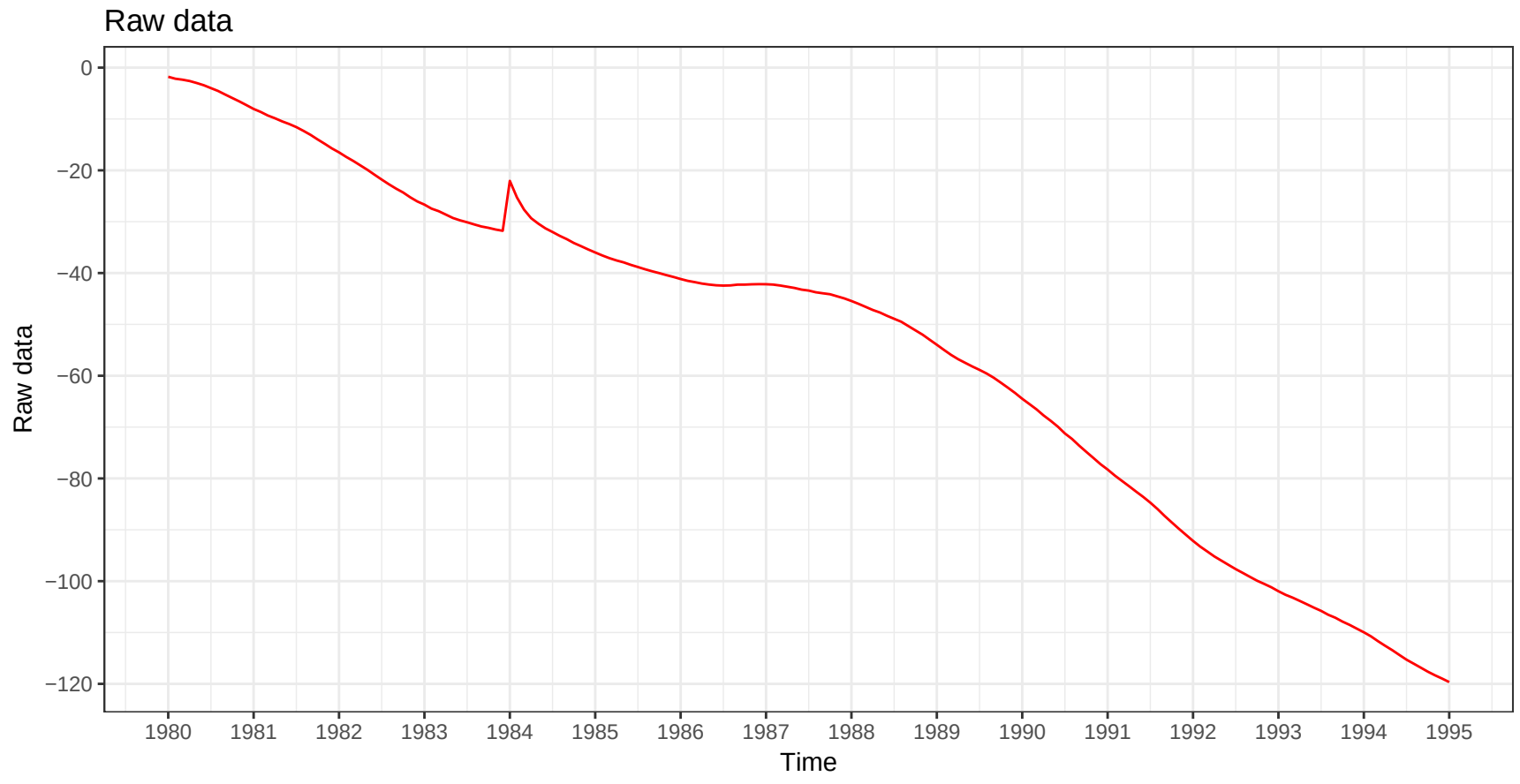
Estimate value of a TC(1984−01)
ARIMA (0,2,2)(0,0,0) − additive decomposition
(1−B)2Xt=(1−0.31058B+0.36B2)at

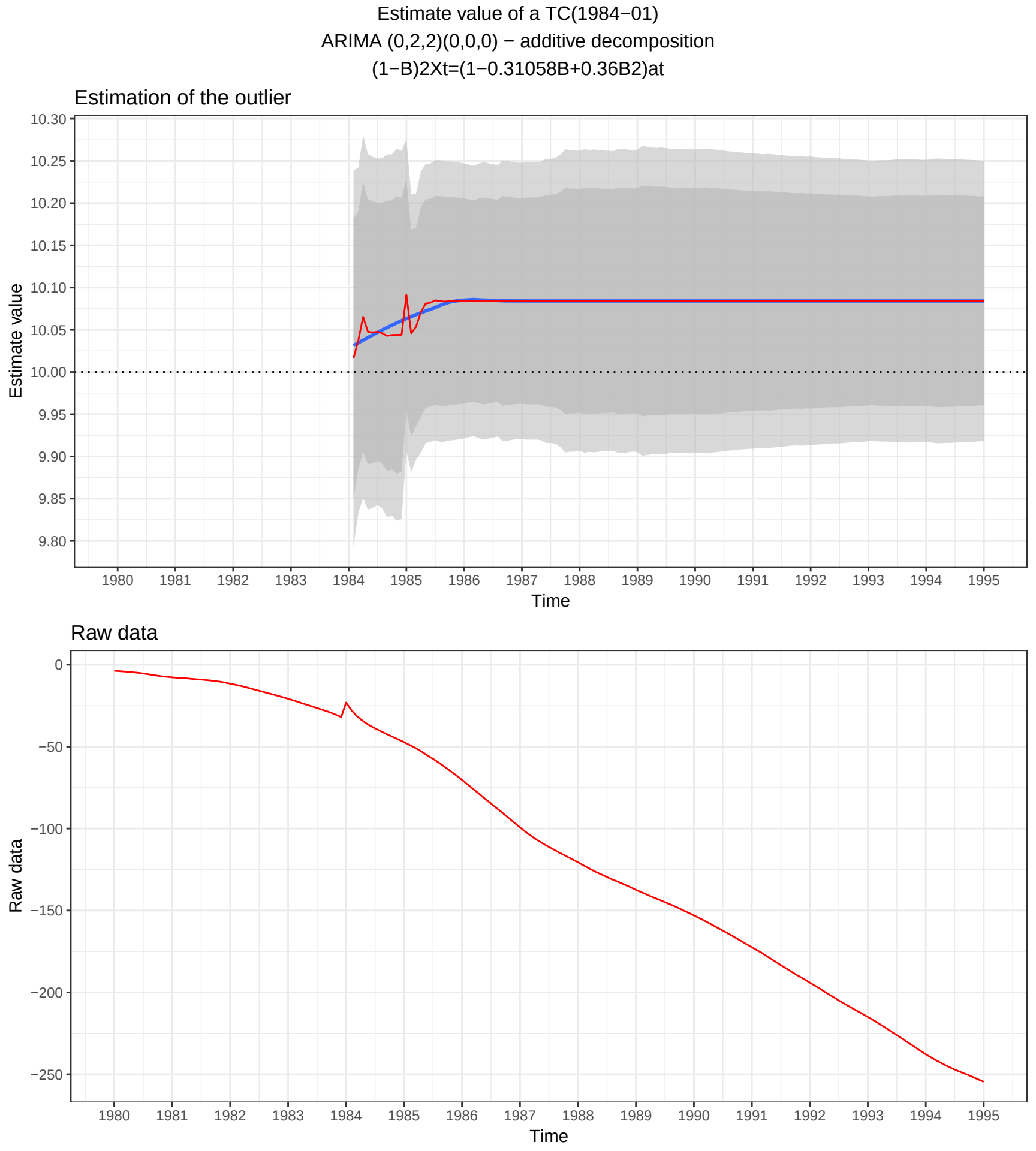




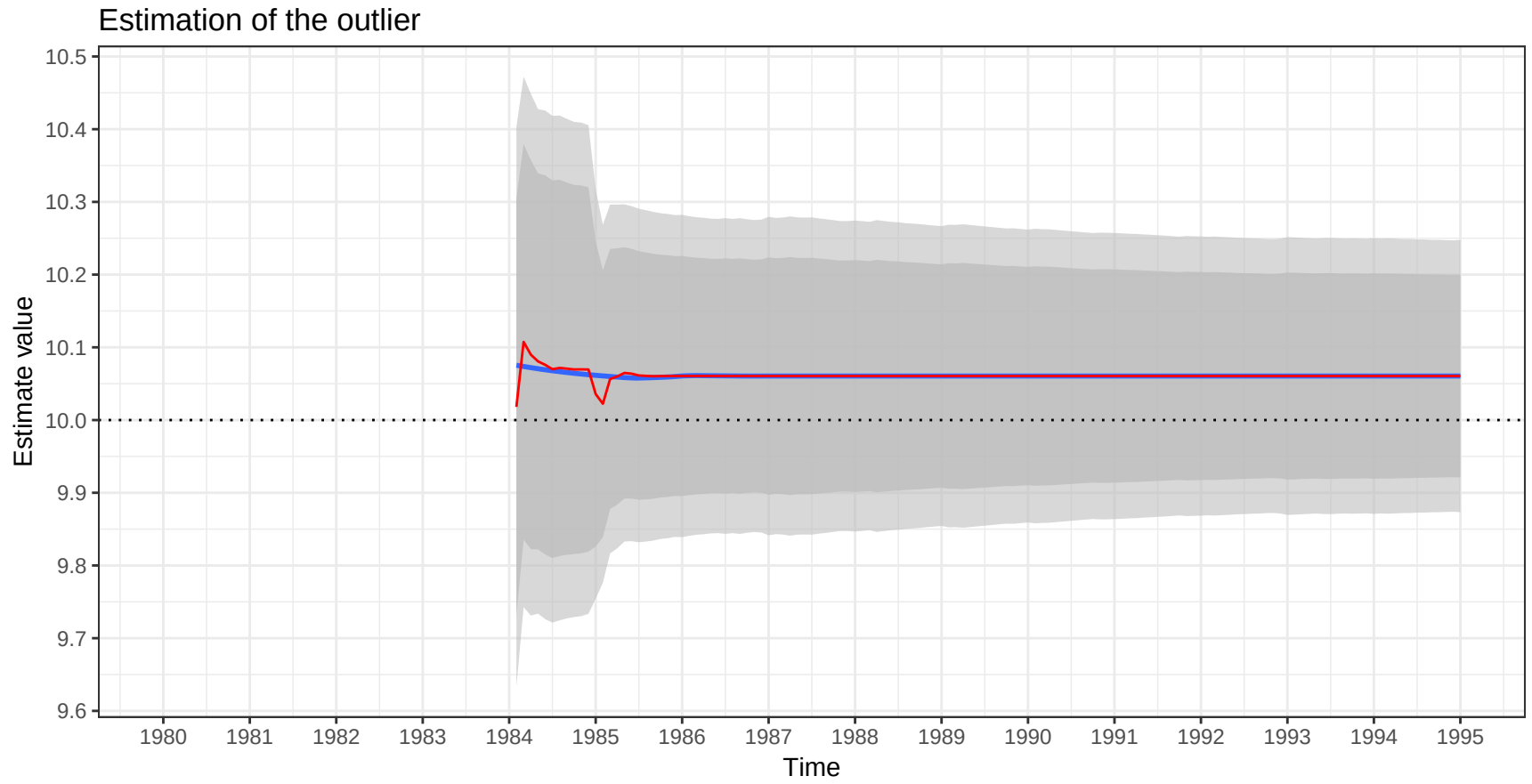
Estimate value of a TC(1984−01)
ARIMA (0,2,2)(0,0,0) − additive decomposition
(1−B)2Xt=(1−0.31058B+0.36B2)at

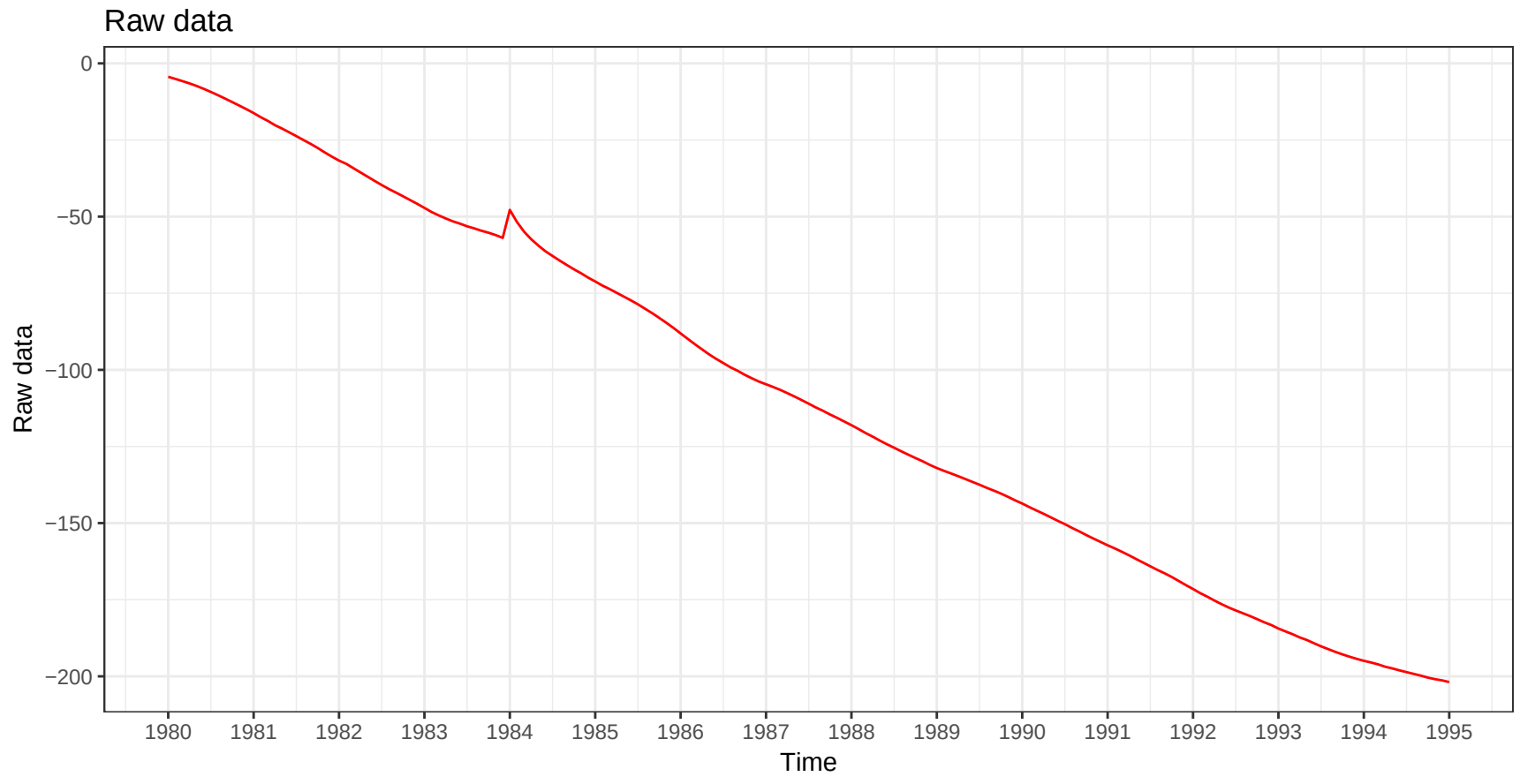





Estimate value of a TC(1984−01)
ARIMA (0,2,2)(0,0,0) − additive decomposition
(1−B)2Xt=(1−0.31058B+0.36B2)at
Estimation of the outlier
Estimate value
10.30
10.25
10.20
10.15
10.10
10.05
10.00
9.95
9.90
9.85
9.80
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time
Raw data
Raw data
0
−50
−100
−150
−200
−250
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time

Estimate value of a TC(1984−01)
ARIMA (0,2,2)(0,0,0) − additive decomposition
(1−B)2Xt=(1−0.31058B+0.36B2)at





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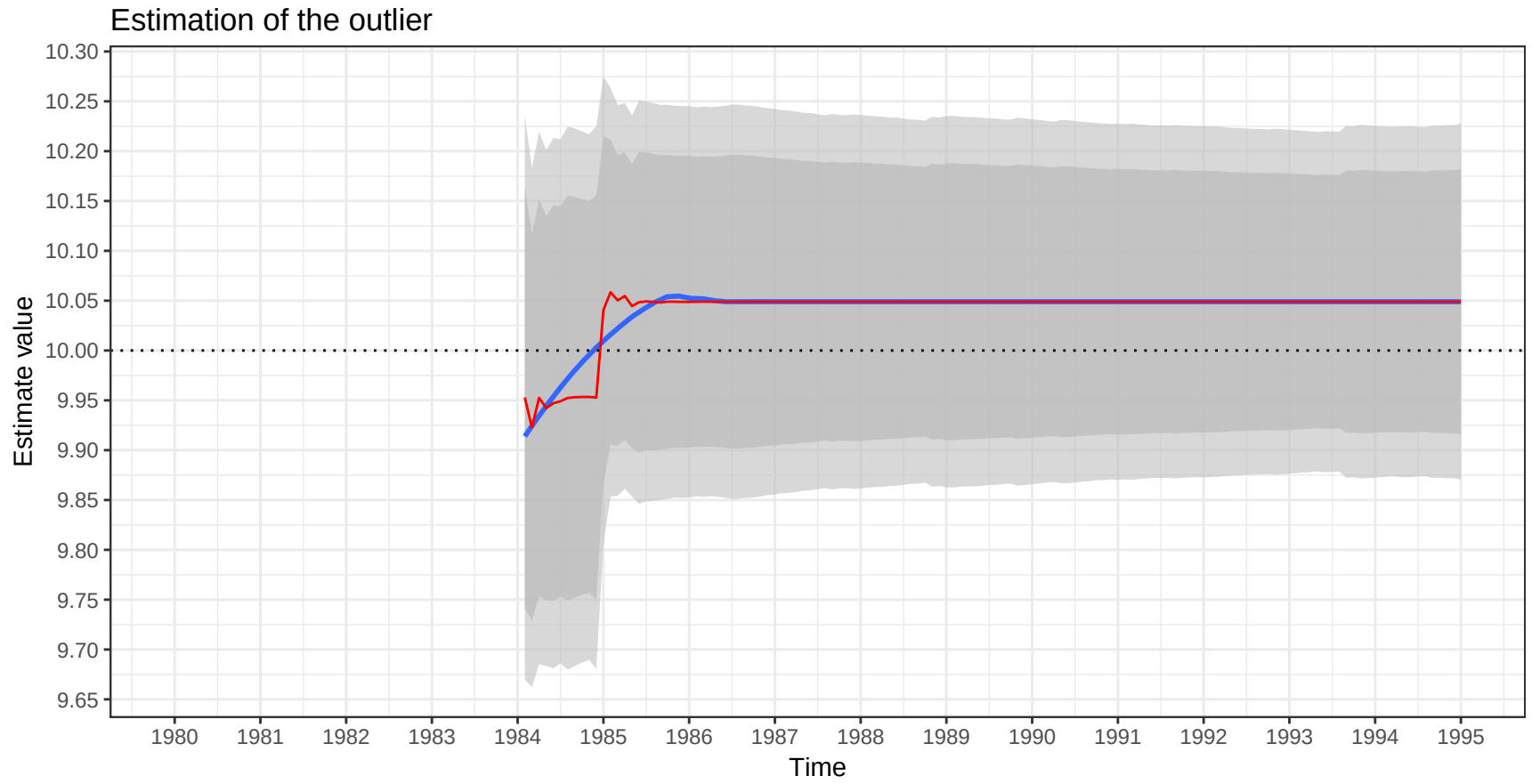

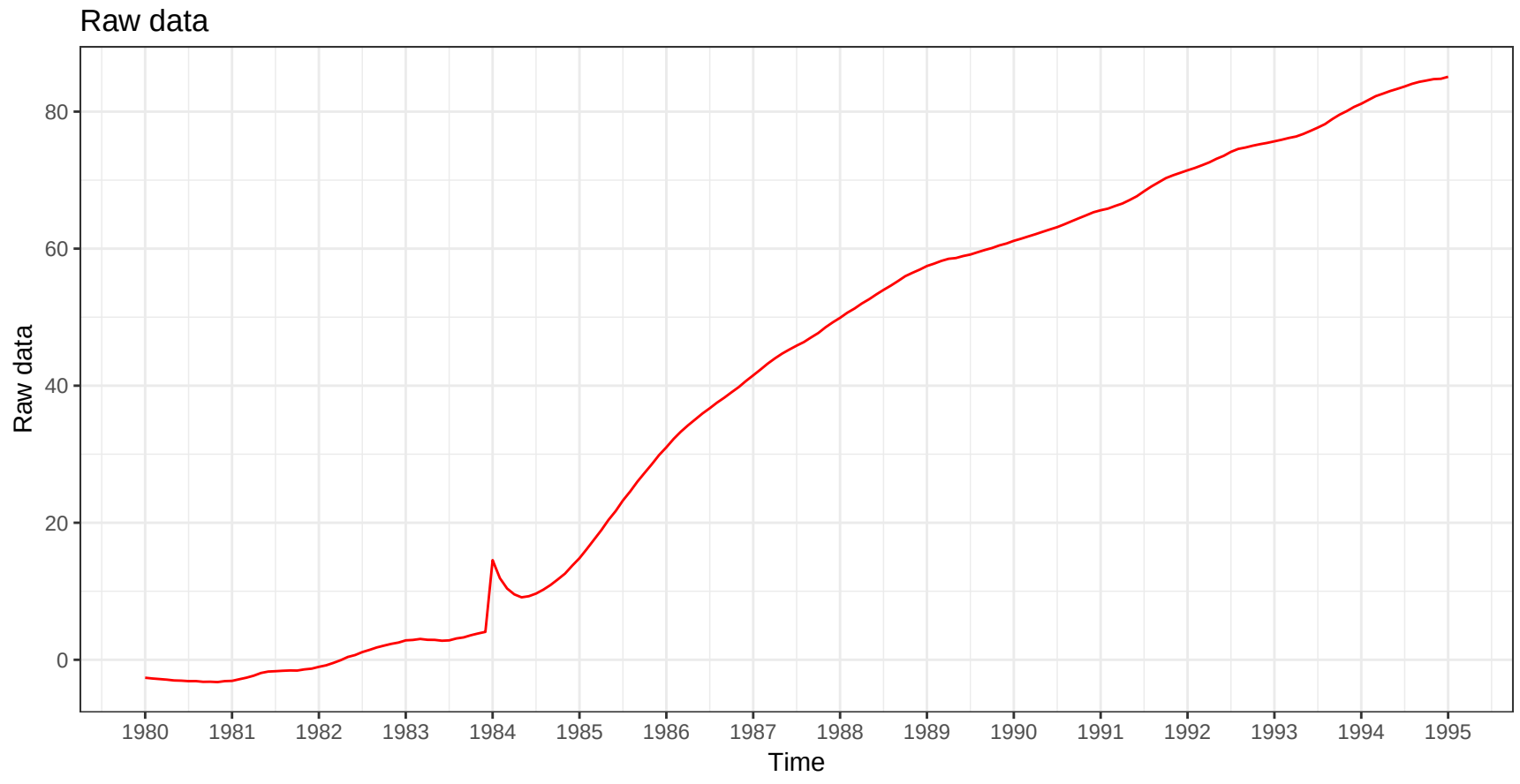

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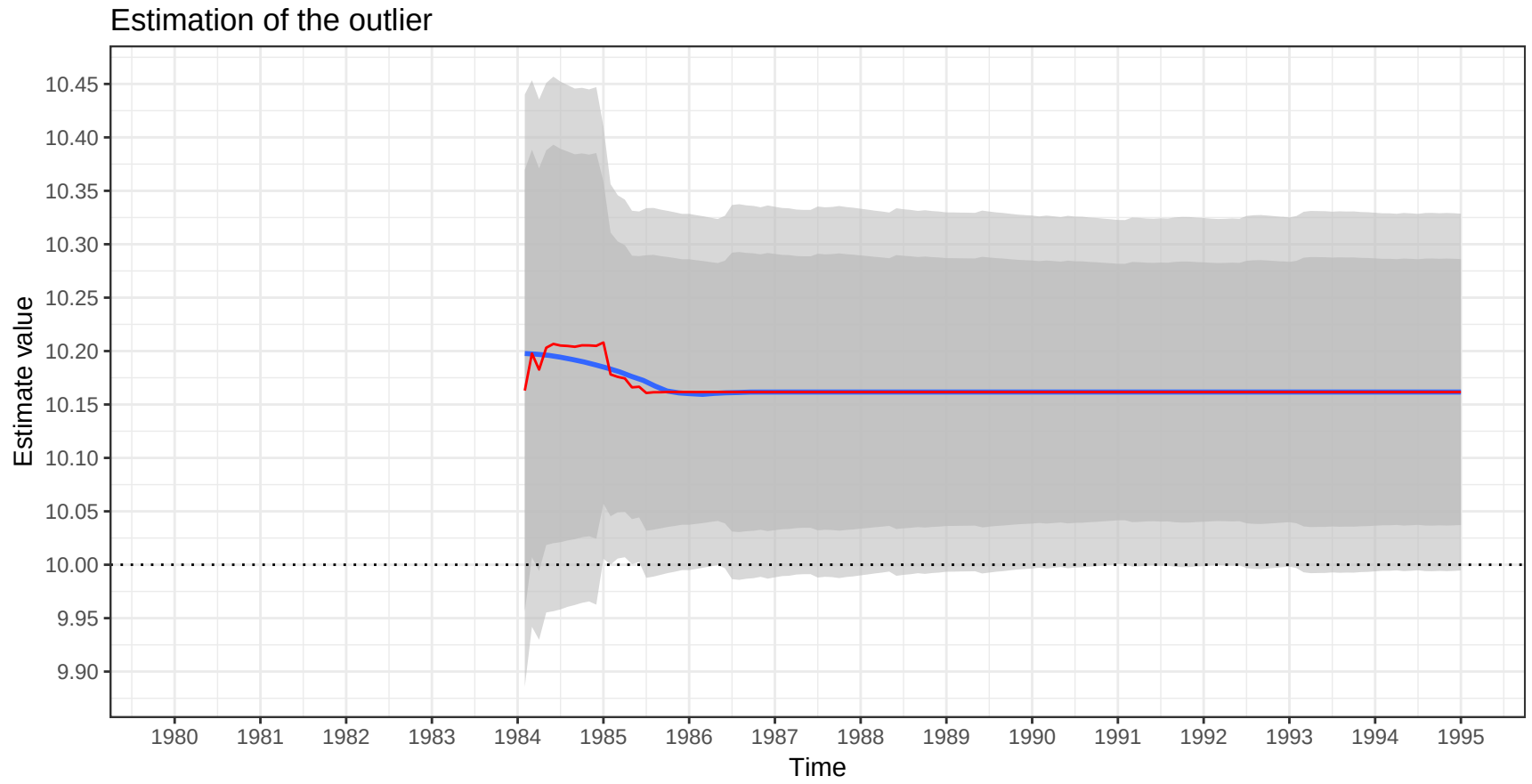

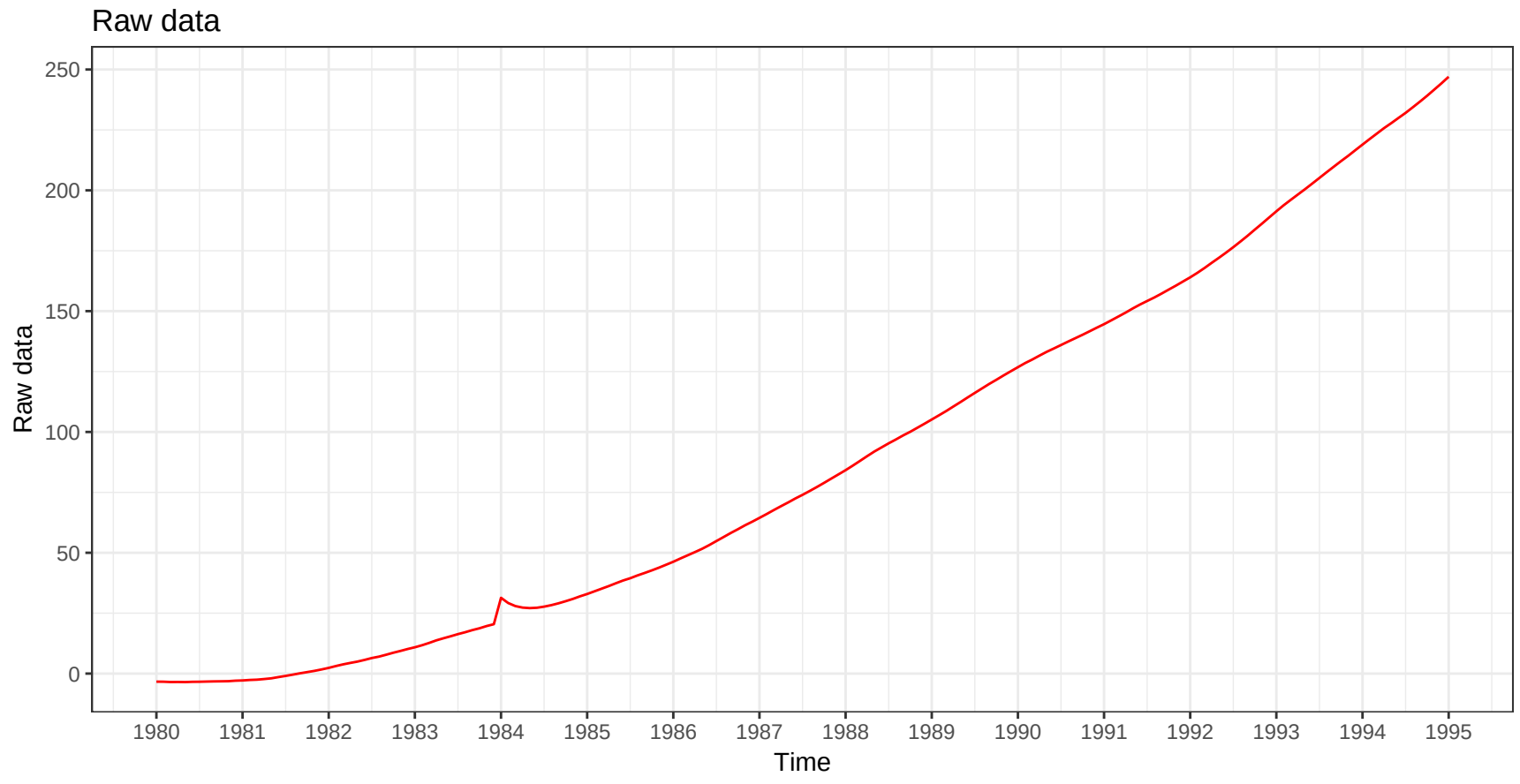

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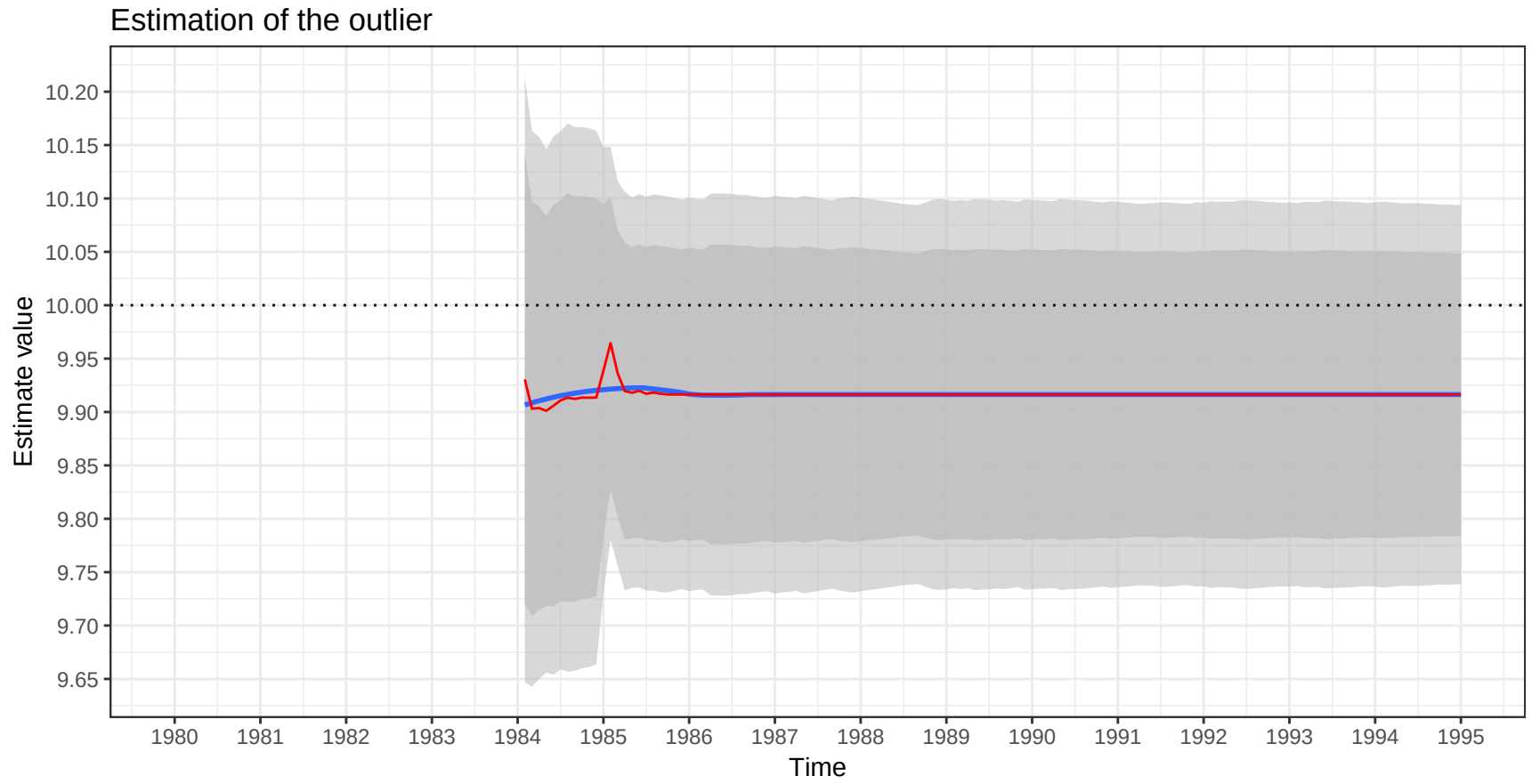

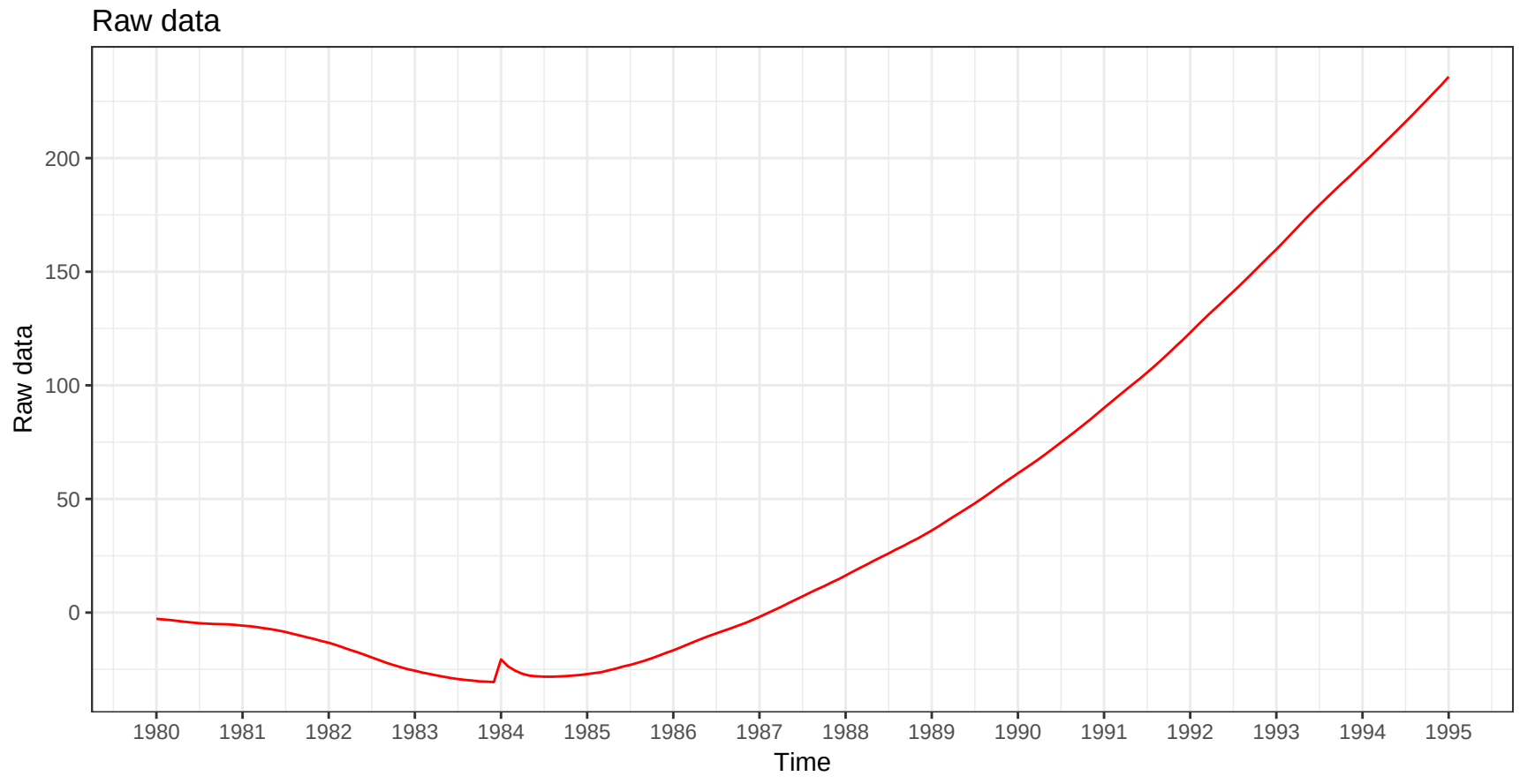

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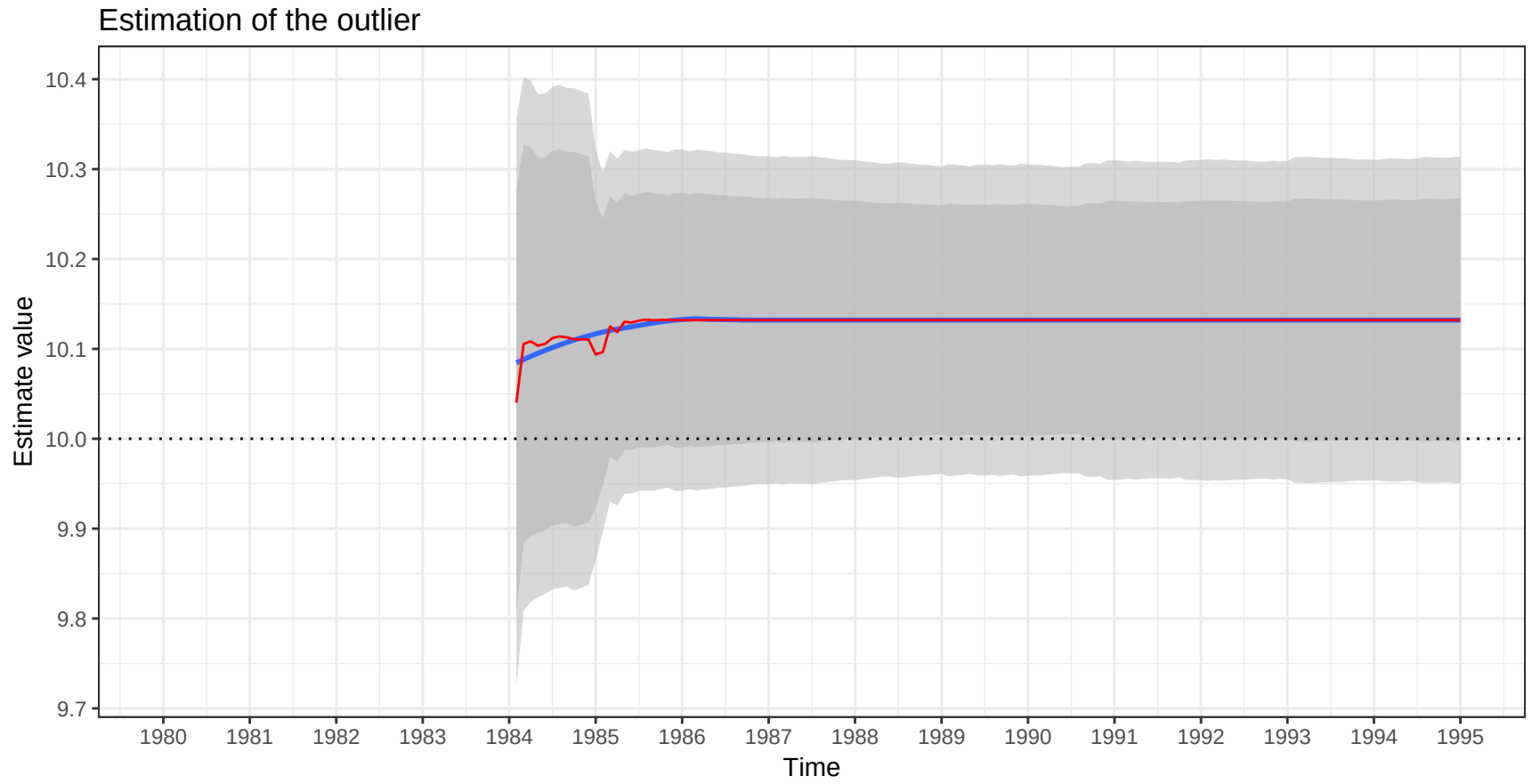
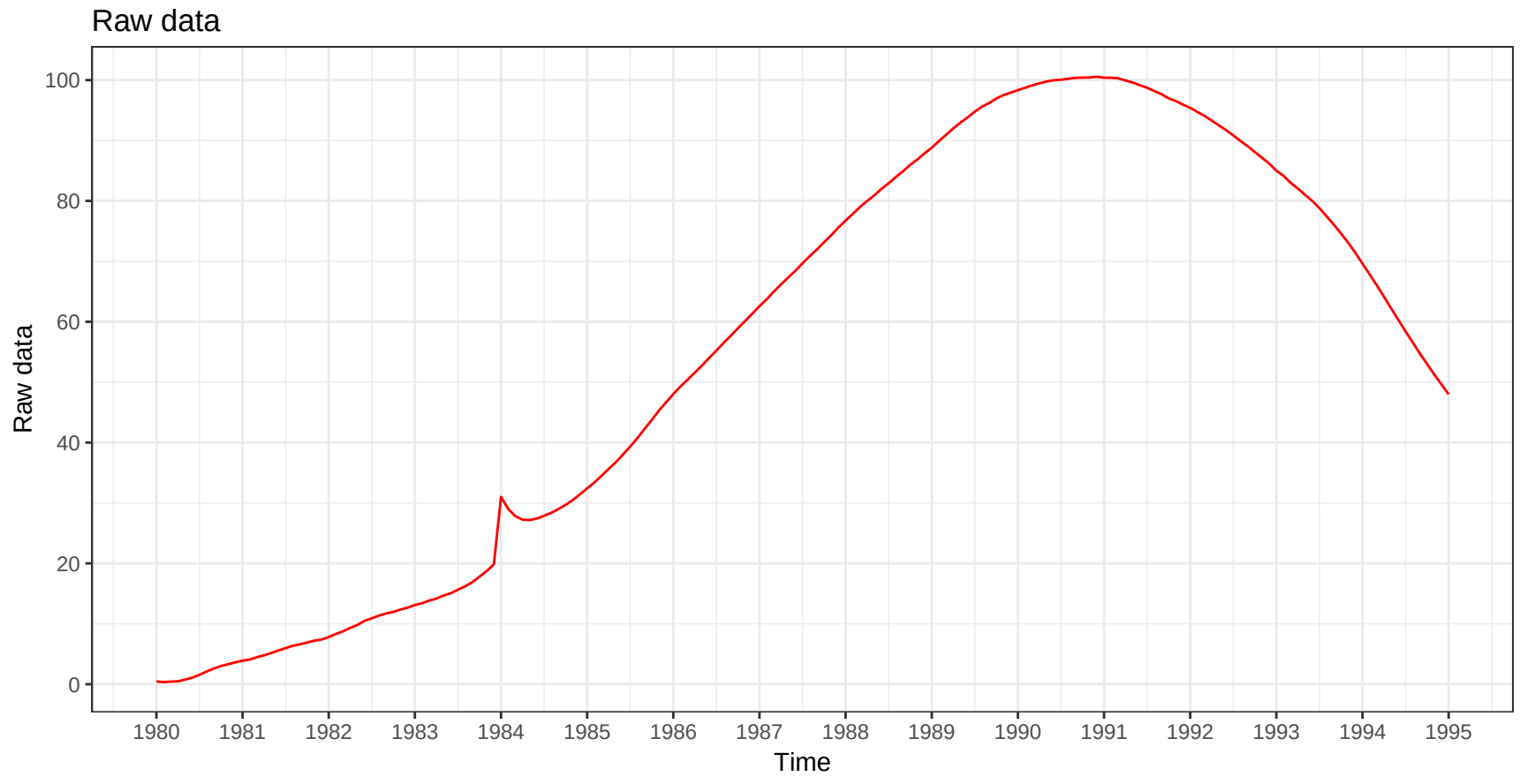
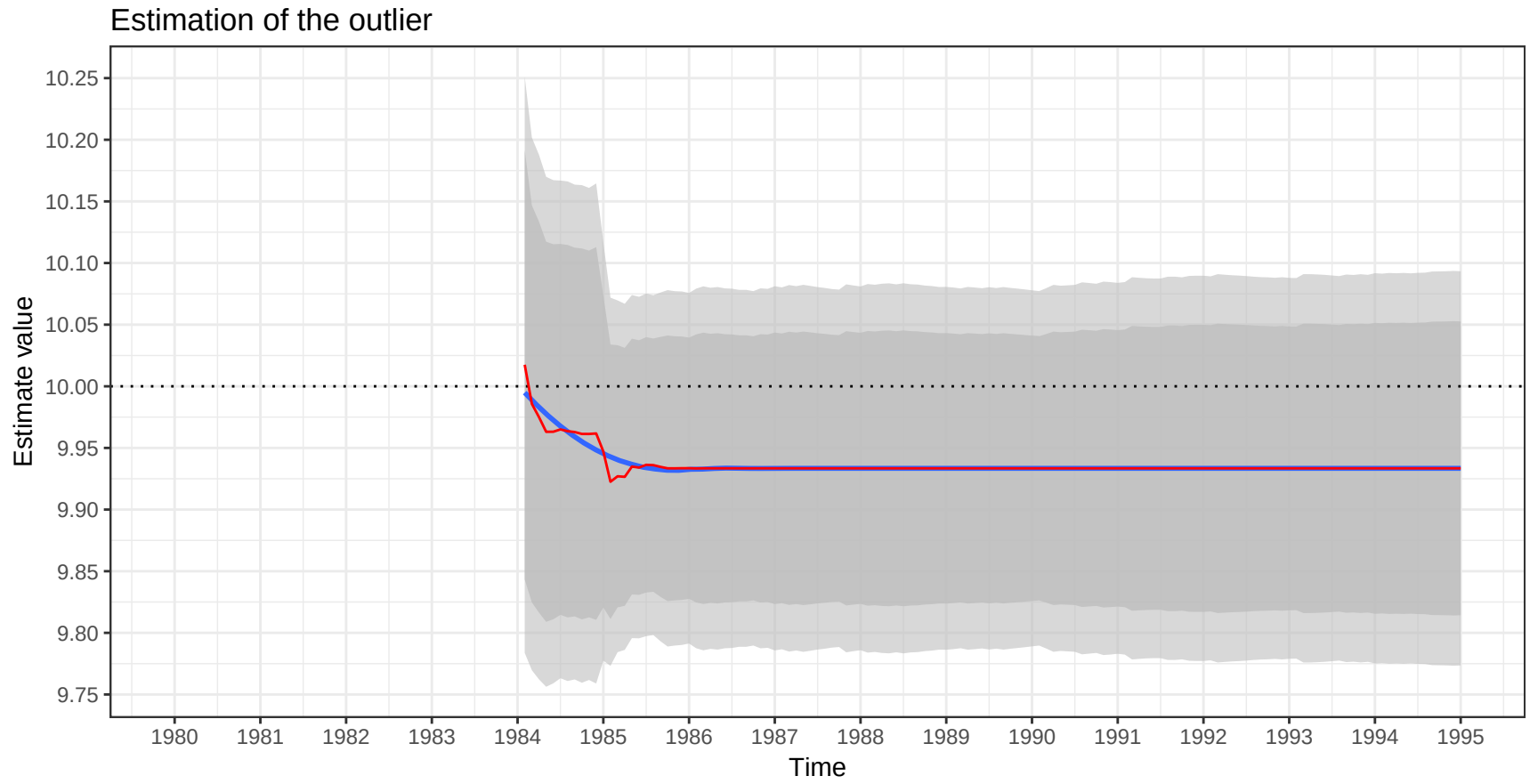
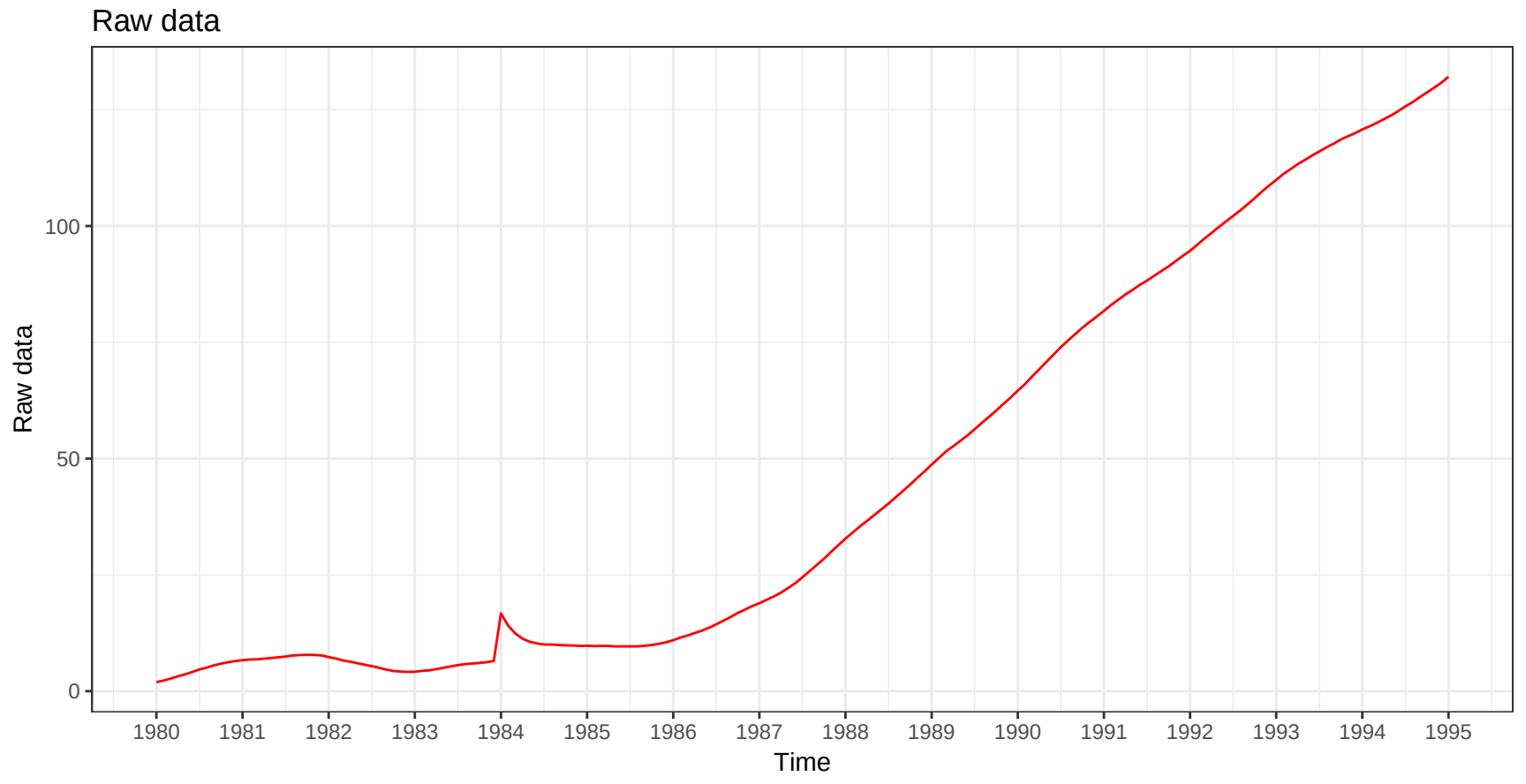
(1−B)2Xt=(1−0.31058B+0.36B2)at



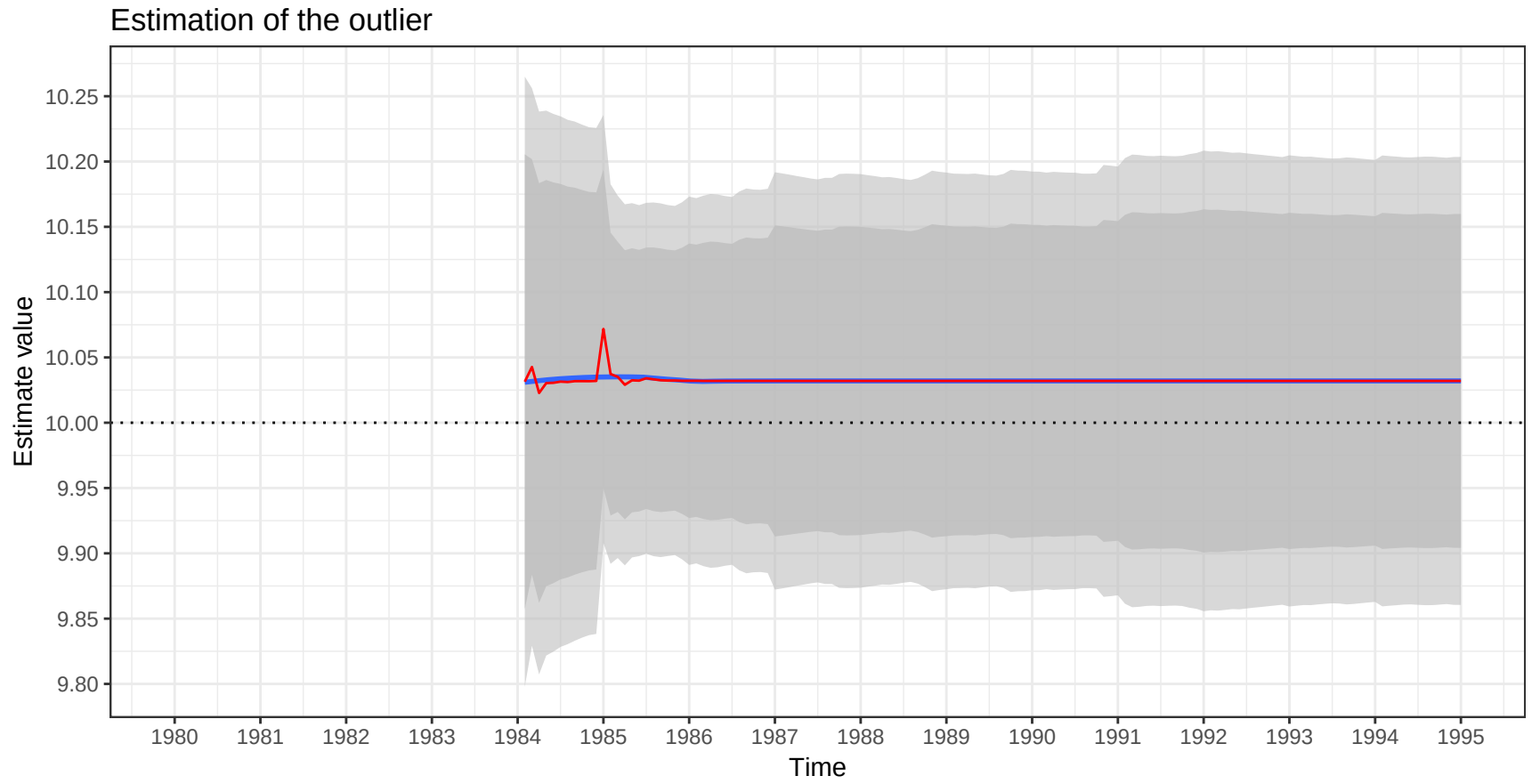


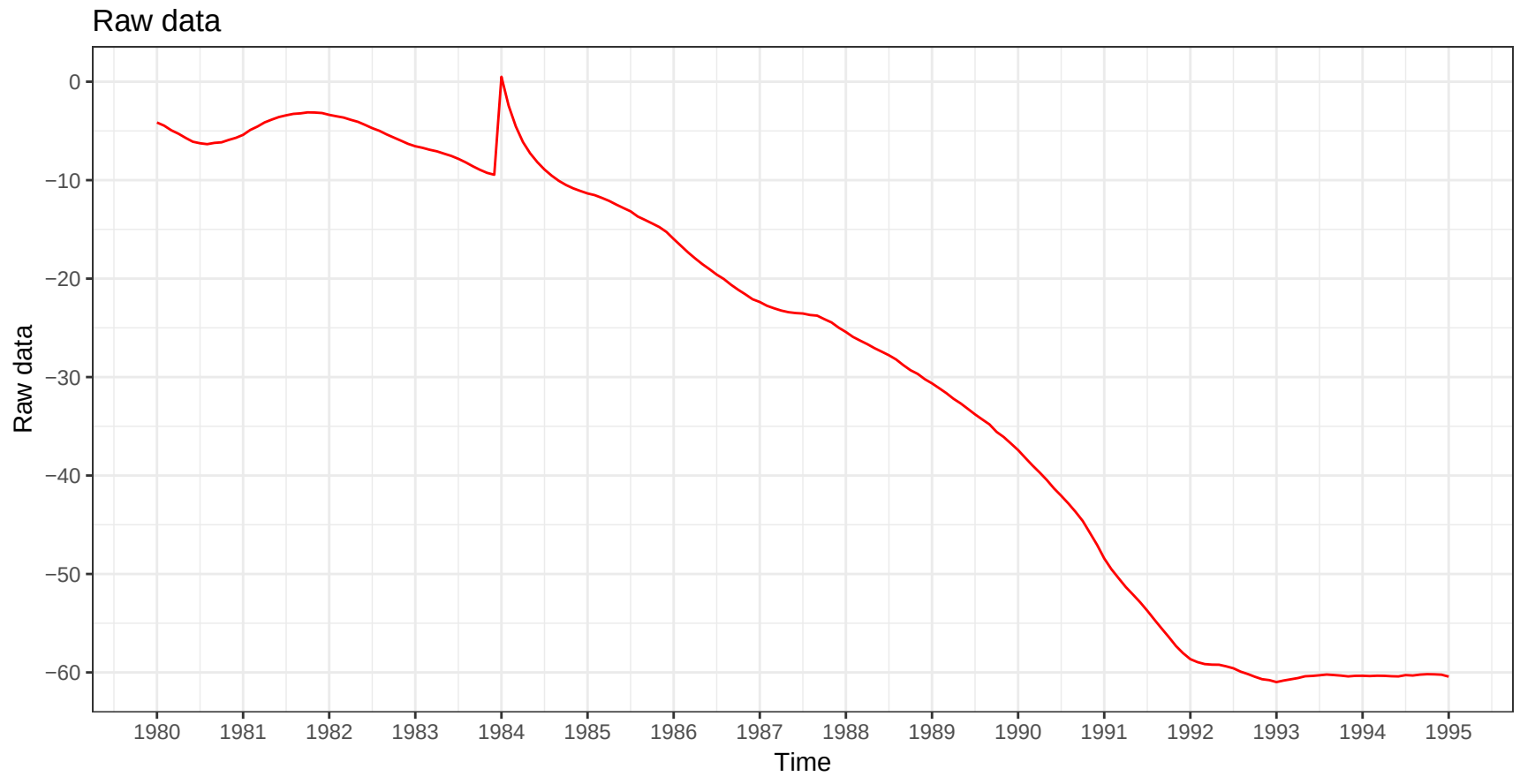
Estimate value of a TC(1984−01)
ARIMA (0,2,2)(0,0,0) − additive decomposition
(1−B)2Xt=(1−0.31058B+0.36B2)at



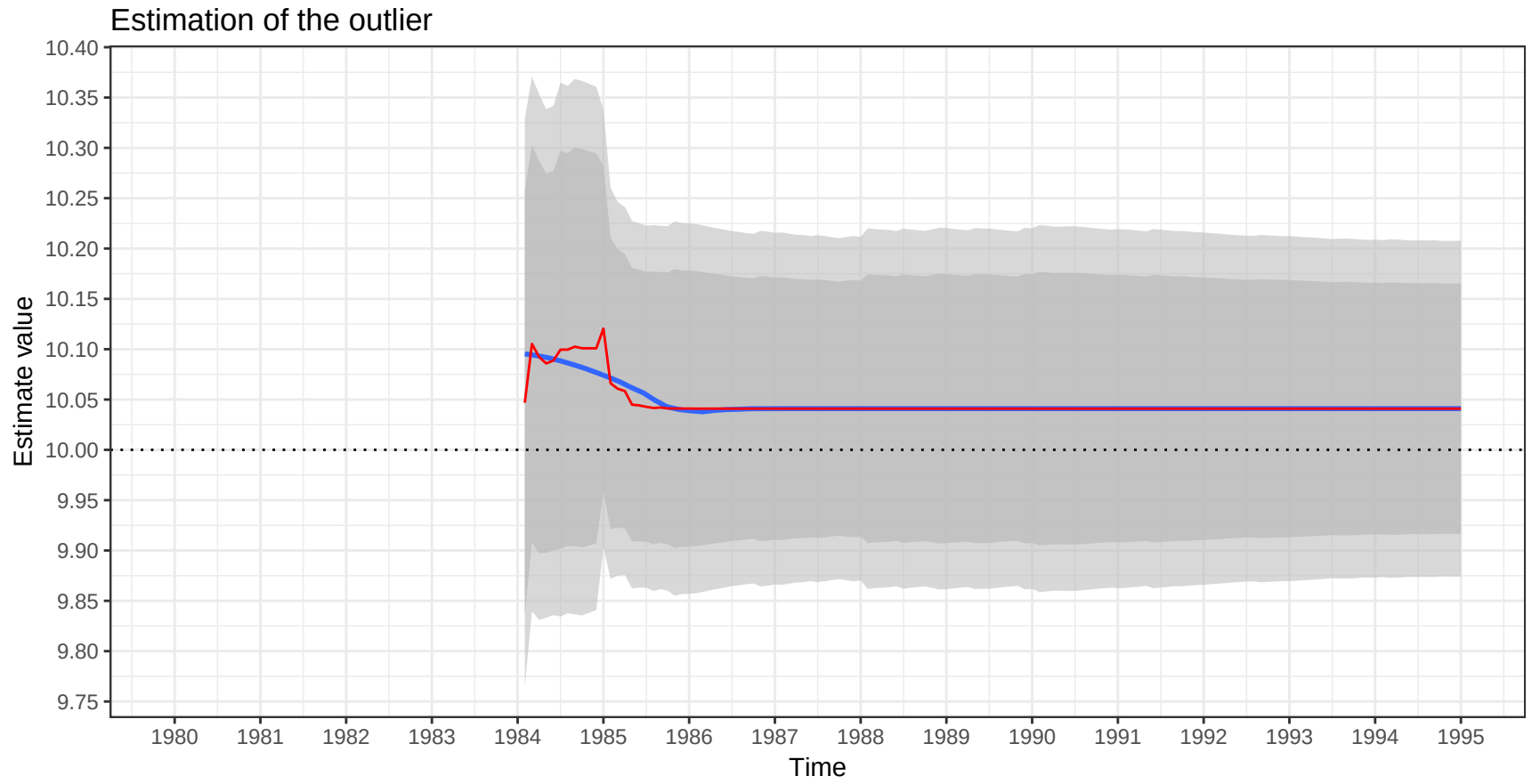


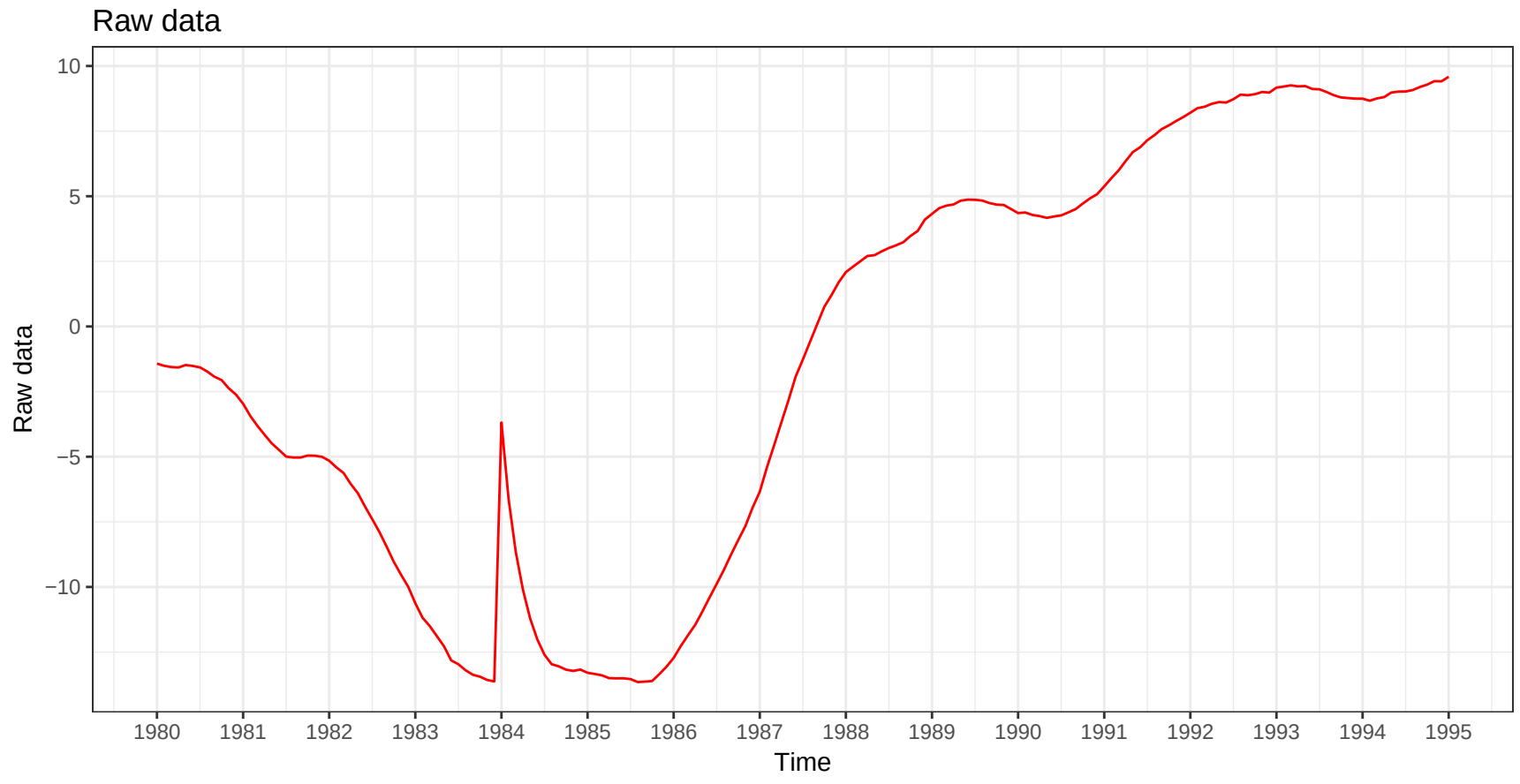
Estimate value of a TC(1984−01)
ARIMA (0,2,2)(0,0,0) − additive decomposition
(1−B)2Xt=(1−0.31B+0.36B2)at



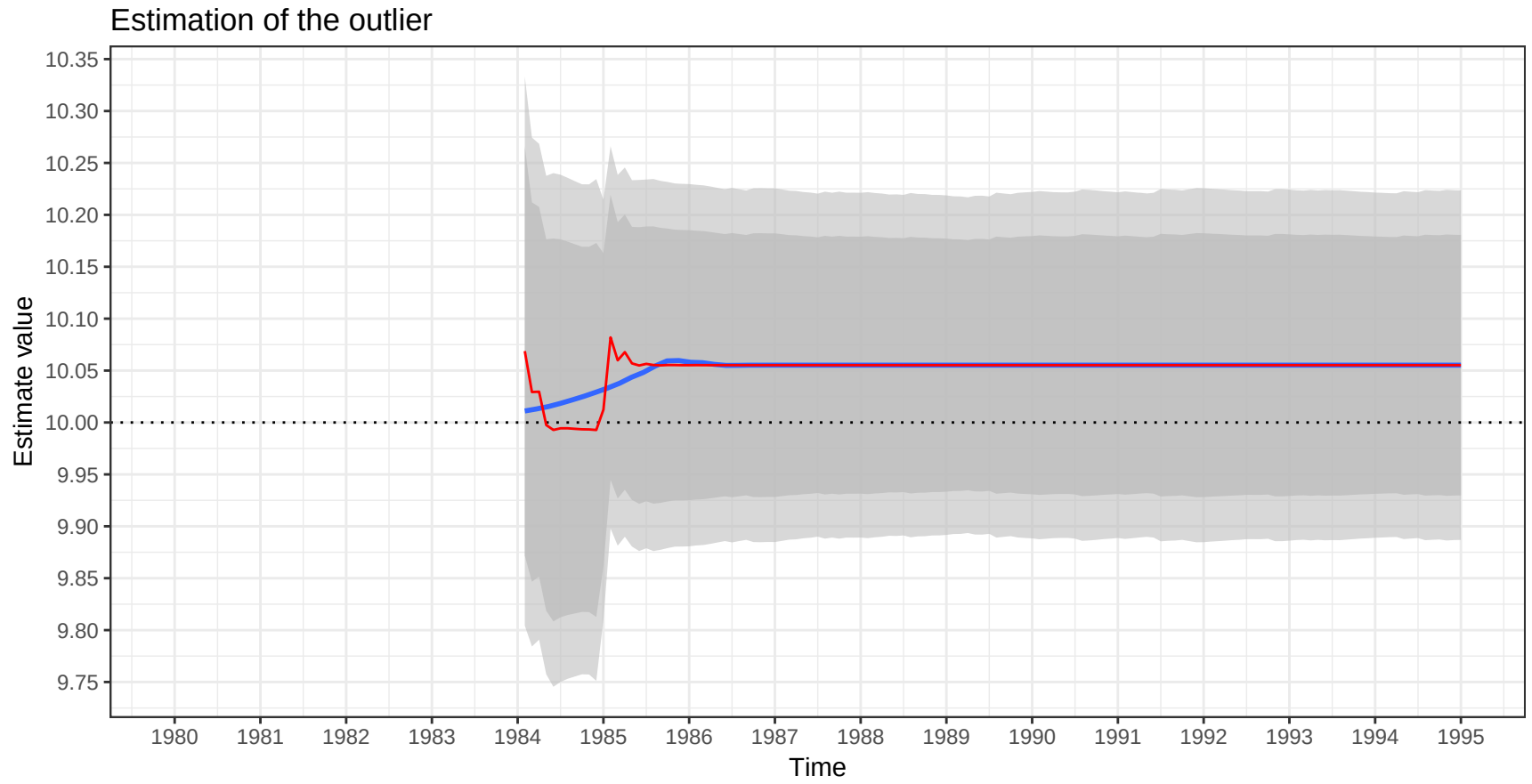


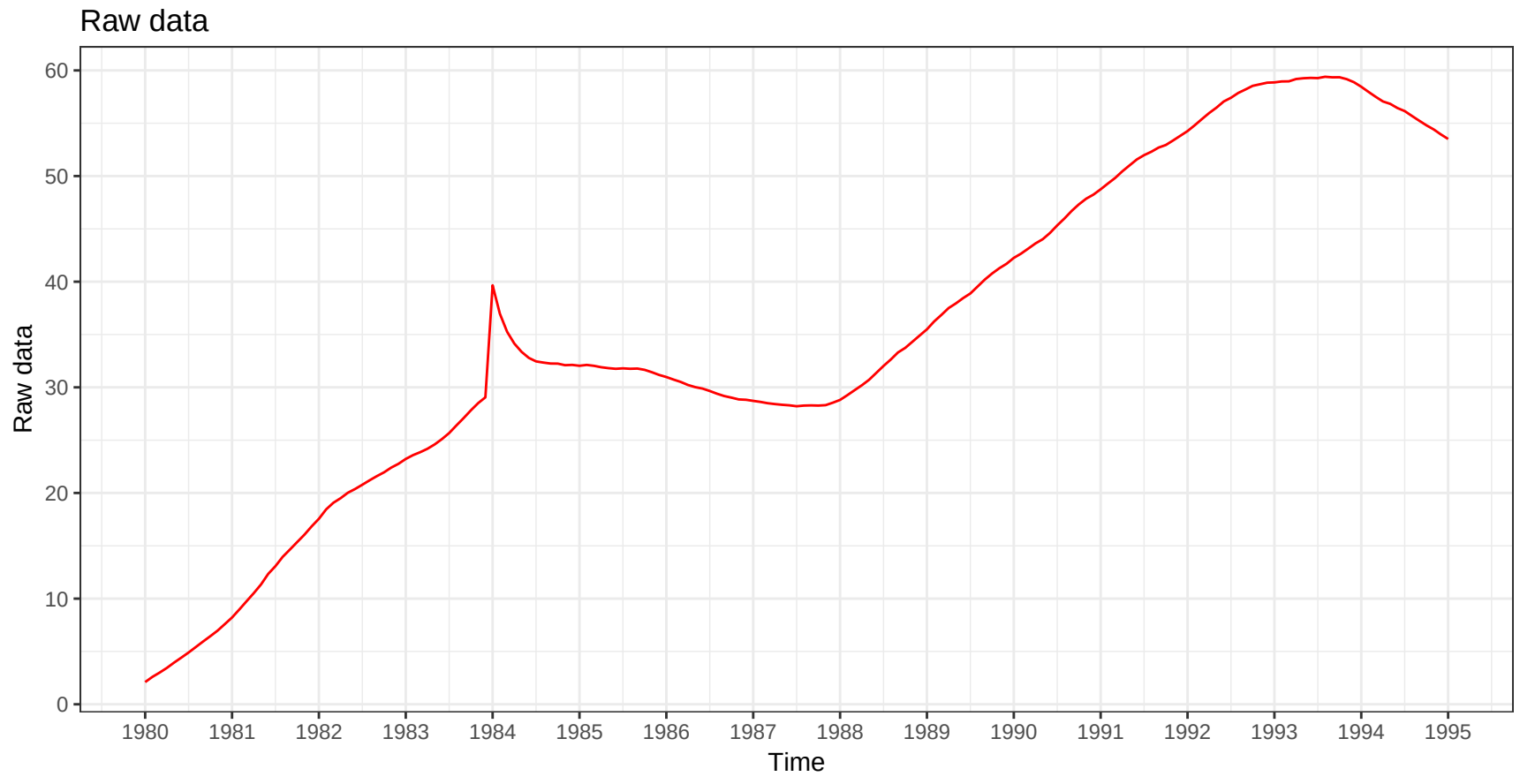
Estimate value of a TC(1984−01)
ARIMA (0,2,2)(0,0,0) − additive decomposition
(1−B)2Xt=(1−0.31B+0.36B2)at



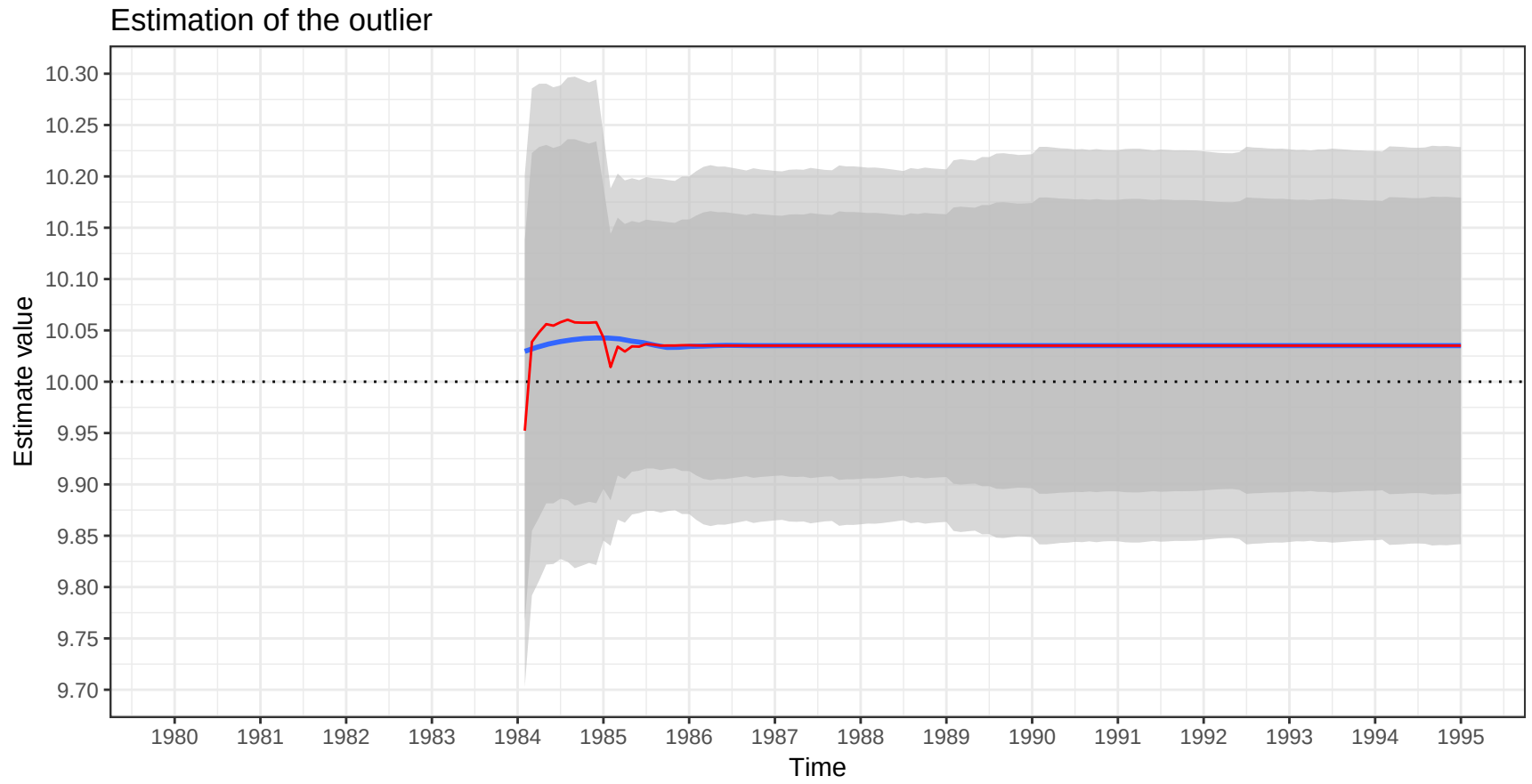


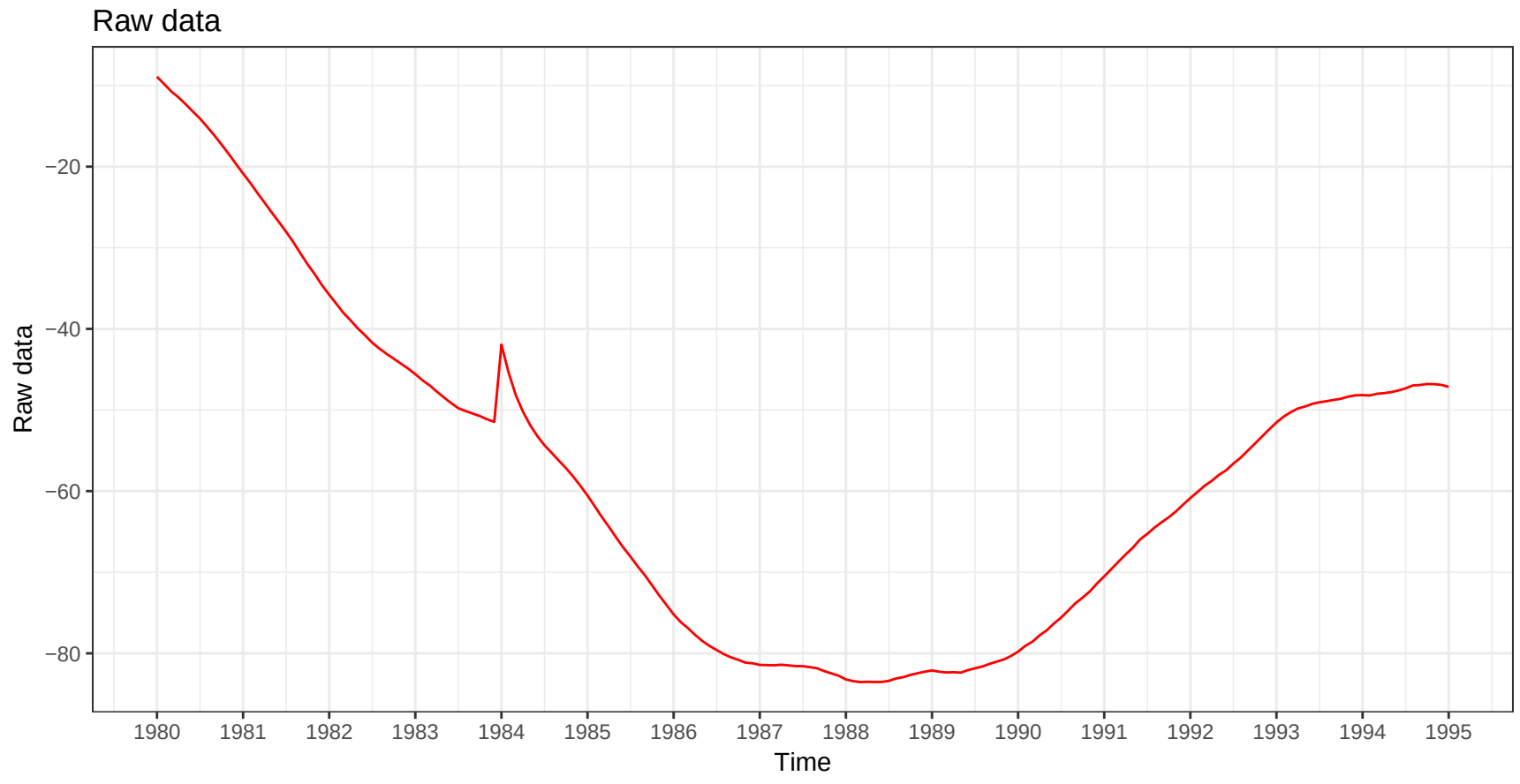
Estimate value of a TC(1984−01)
ARIMA (0,2,2)(0,0,0) − additive decomposition
(1−B)2Xt=(1−0.31B+0.36B2)at



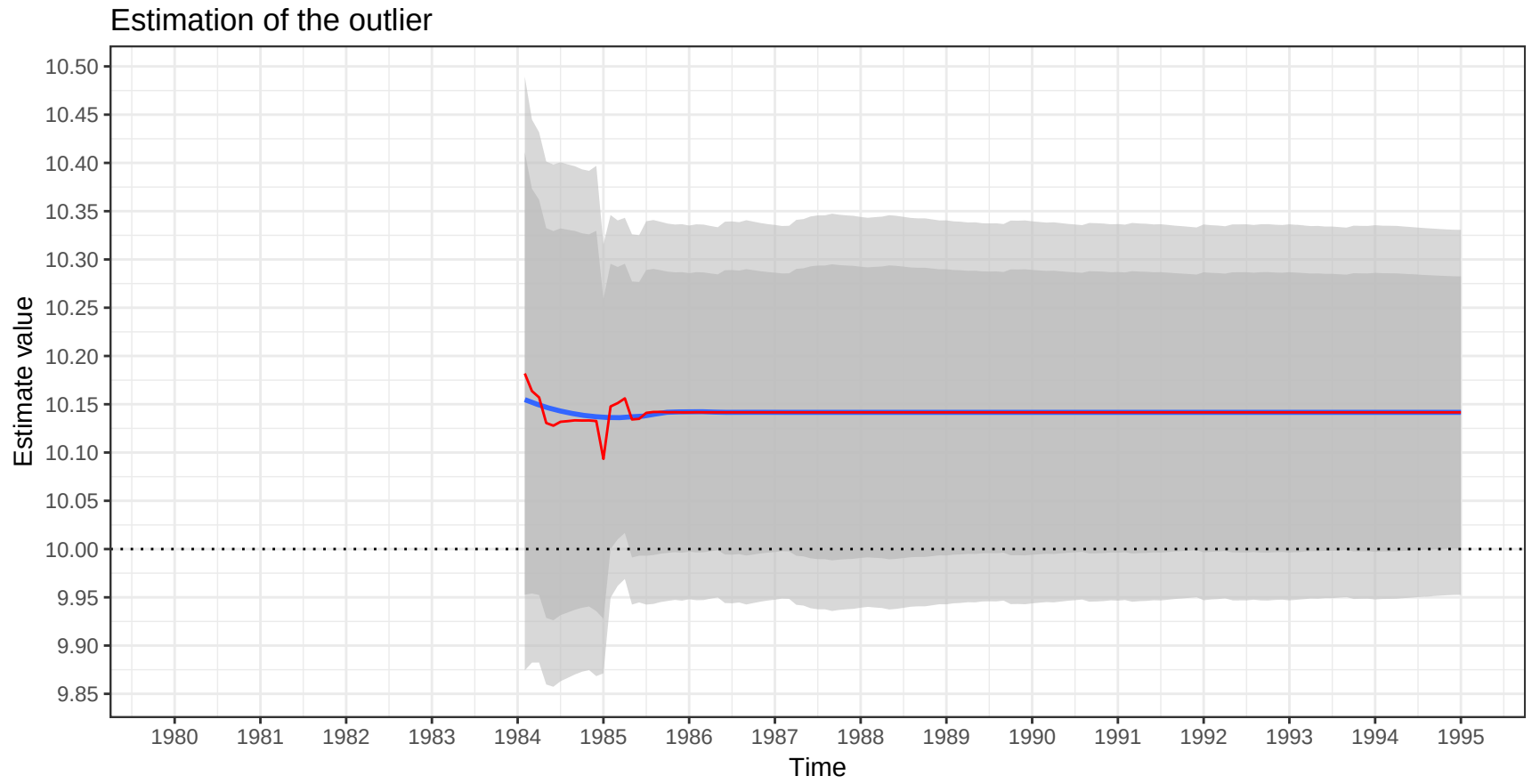


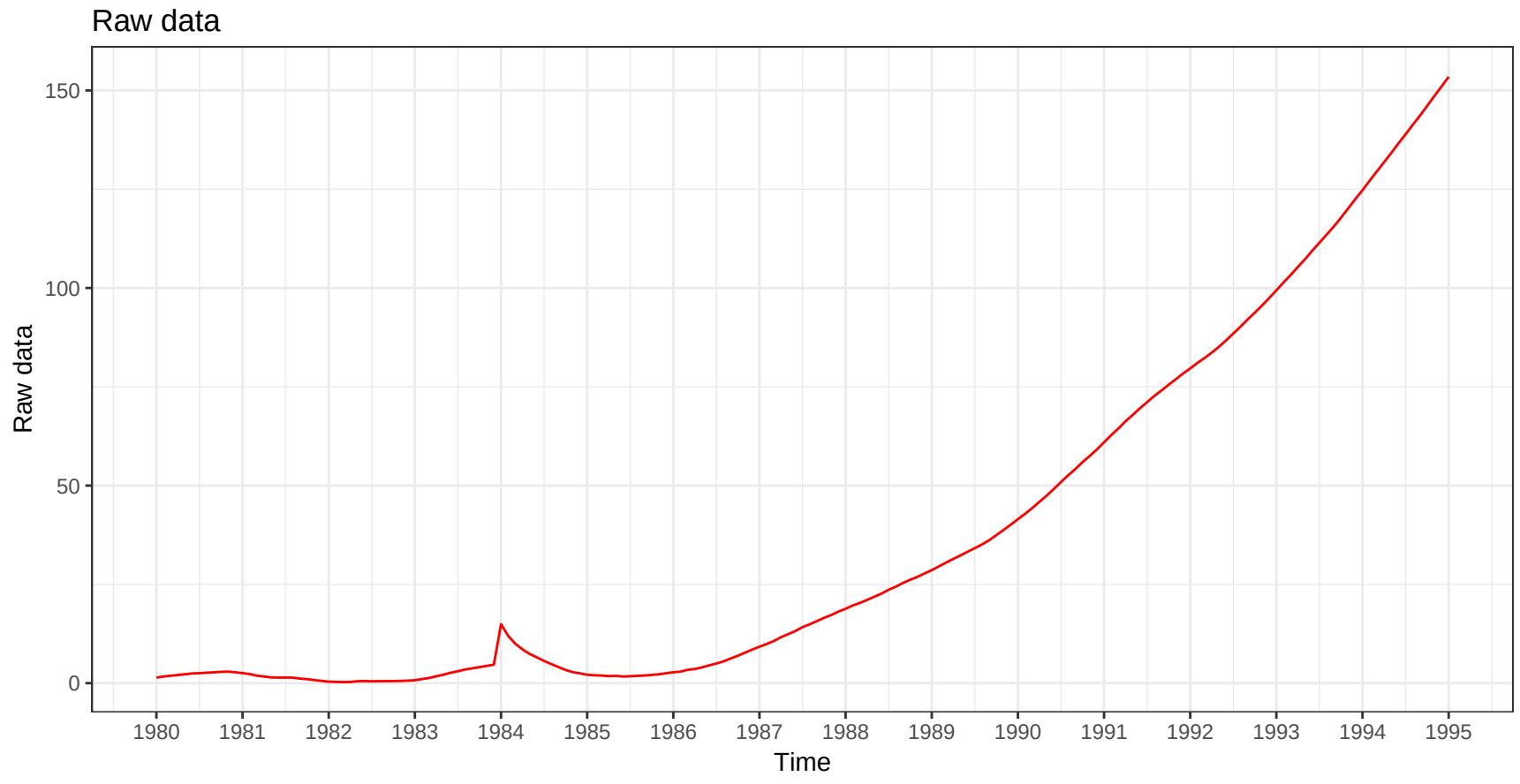
Estimate value of a TC(1984−01)
ARIMA (0,2,2)(0,0,0) − additive decomposition
(1−B)2Xt=(1−0.31B+0.36B2)at



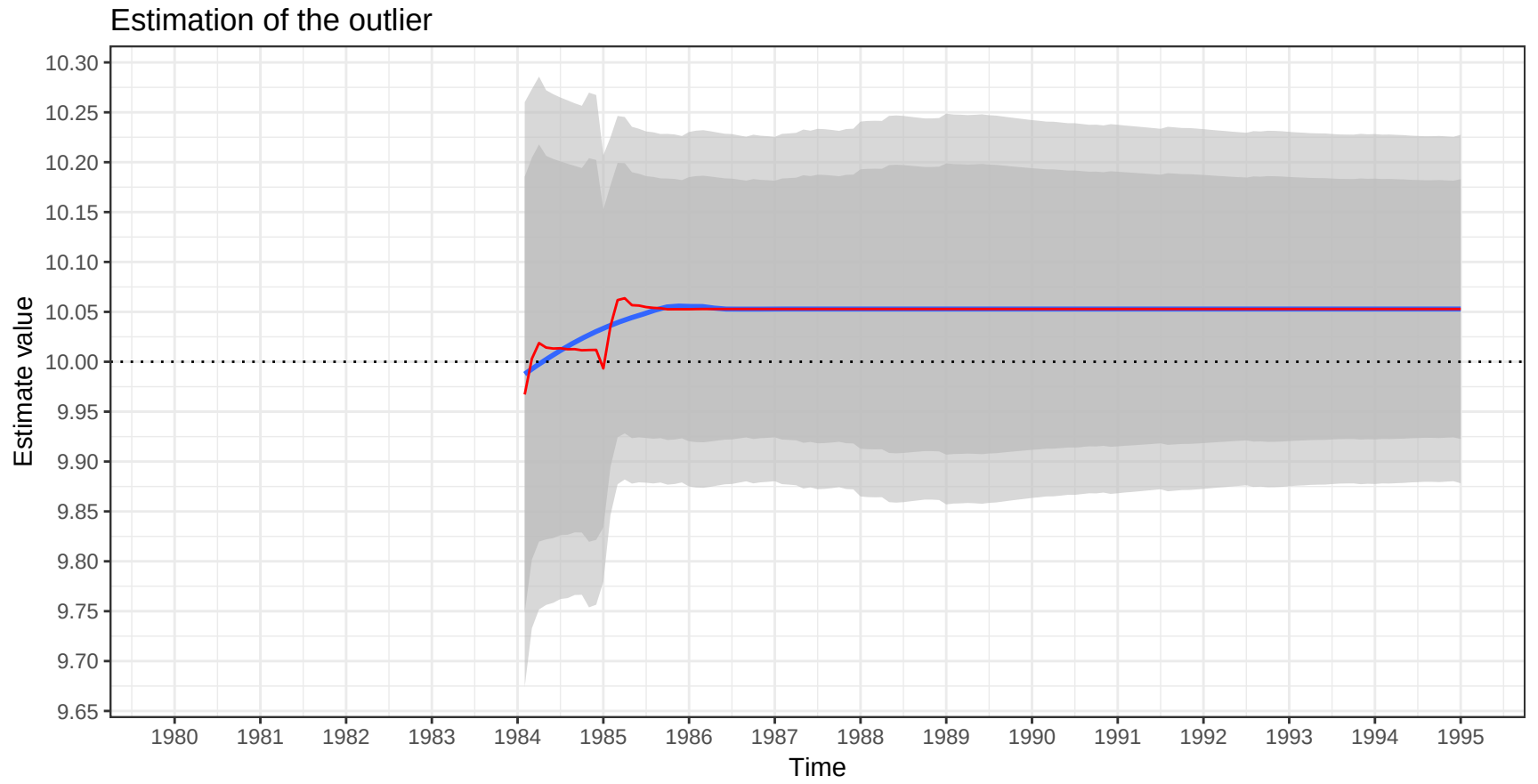


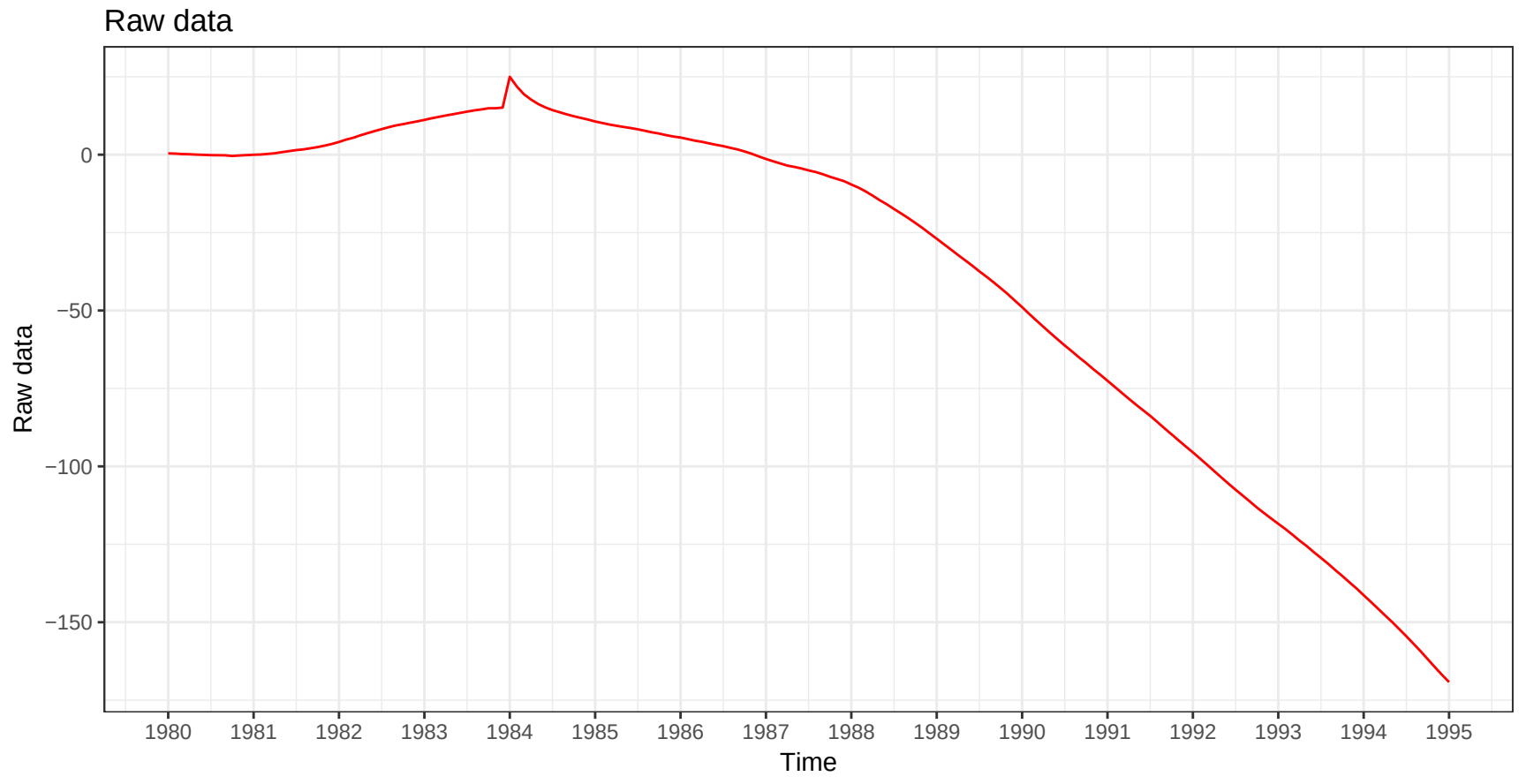
Estimate value of a TC(1984−01)
ARIMA (0,2,2)(0,0,0) − additive decomposition
(1−B)2Xt=(1−0.31B+0.36B2)at



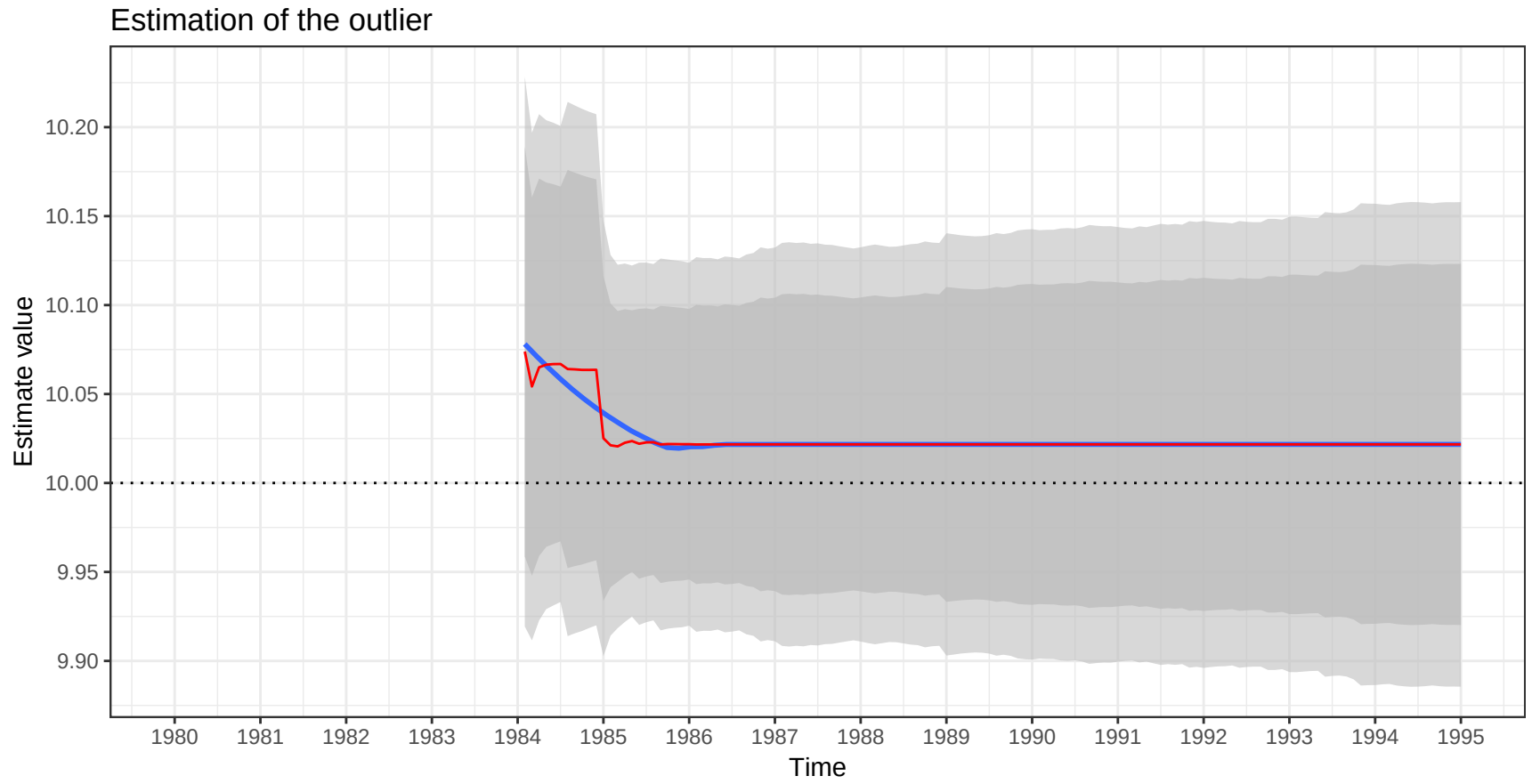


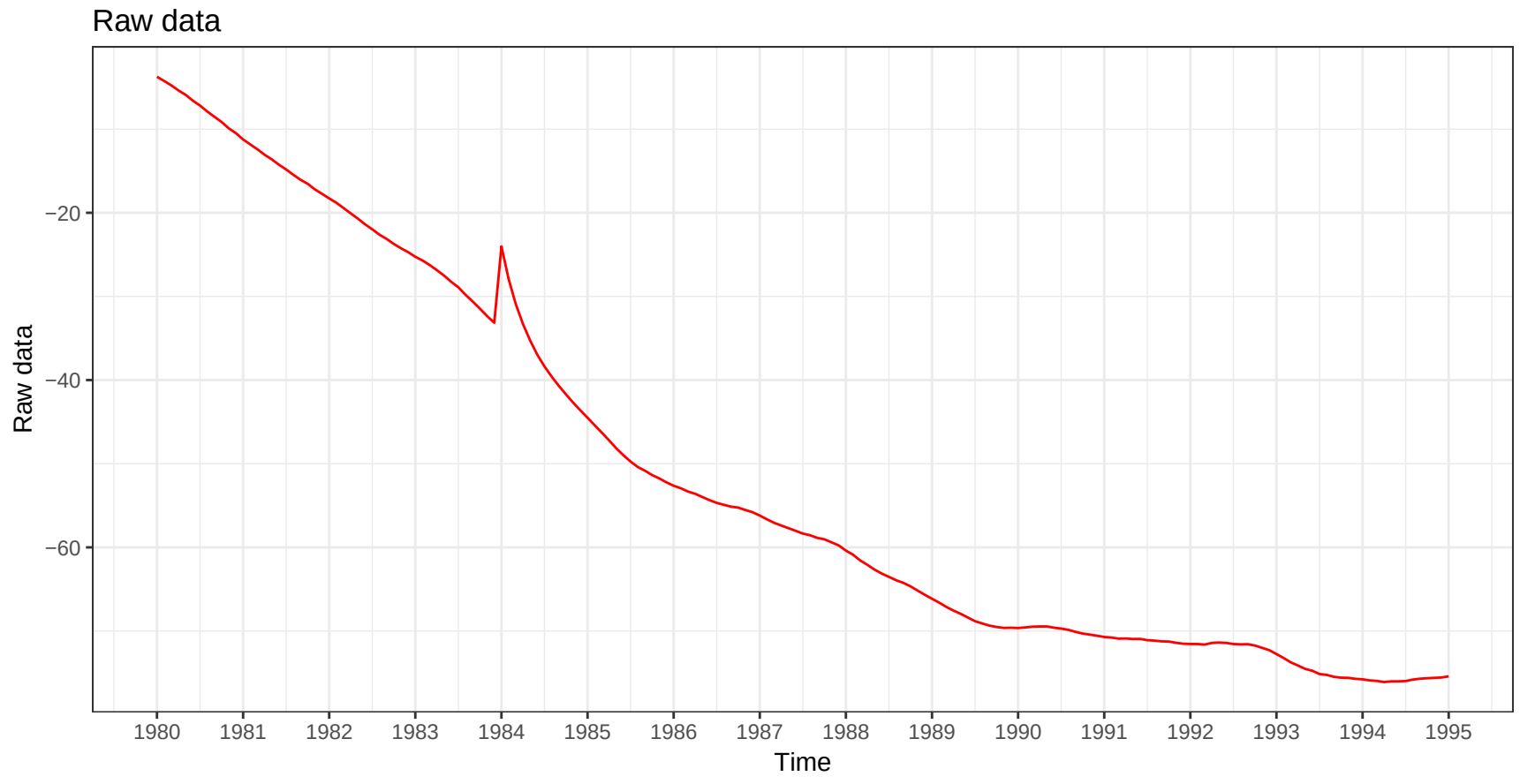
Estimate value of a TC(1984−01)
ARIMA (0,2,2)(0,0,0) − additive decomposition
(1−B)2Xt=(1−0.31B+0.36B2)at



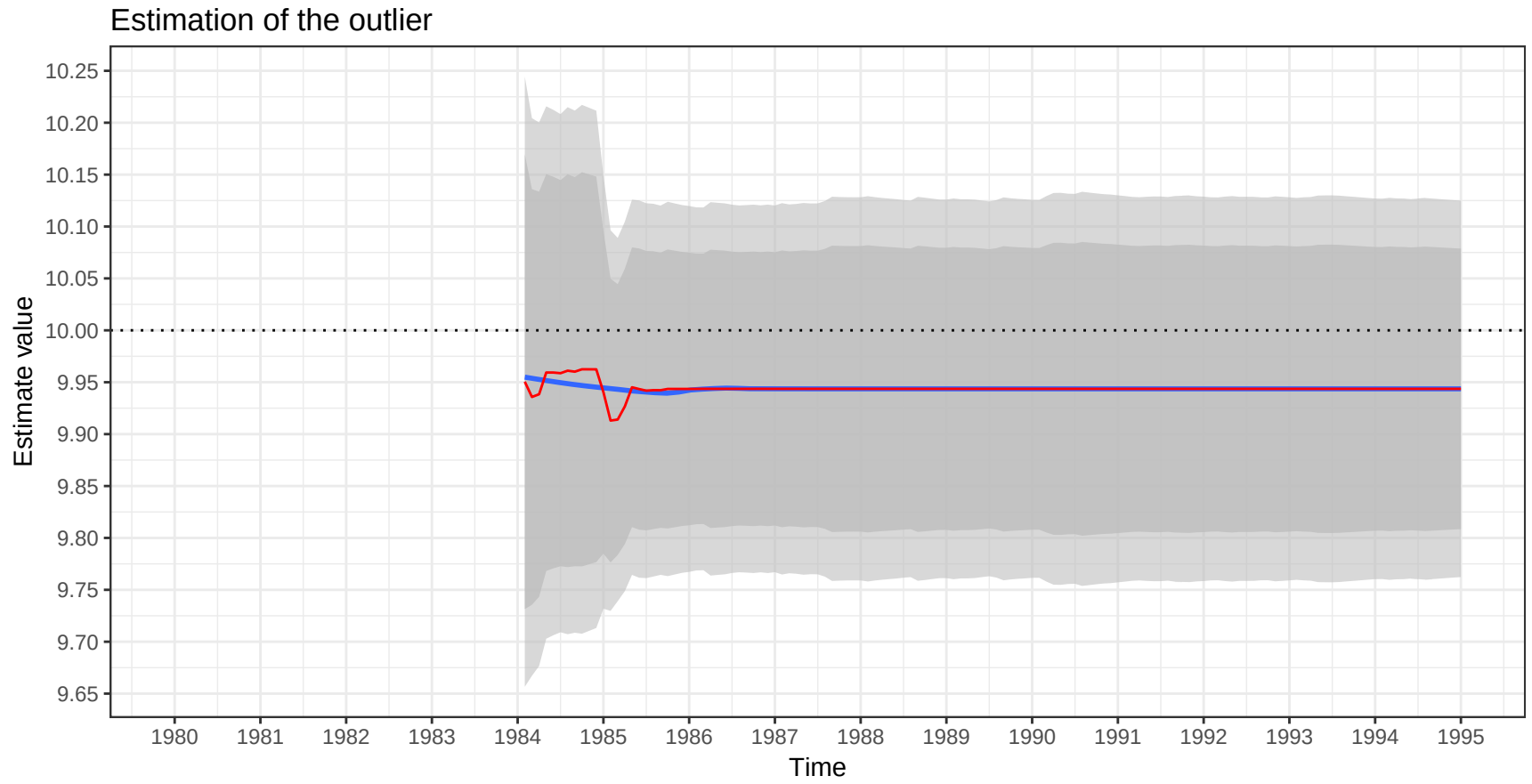


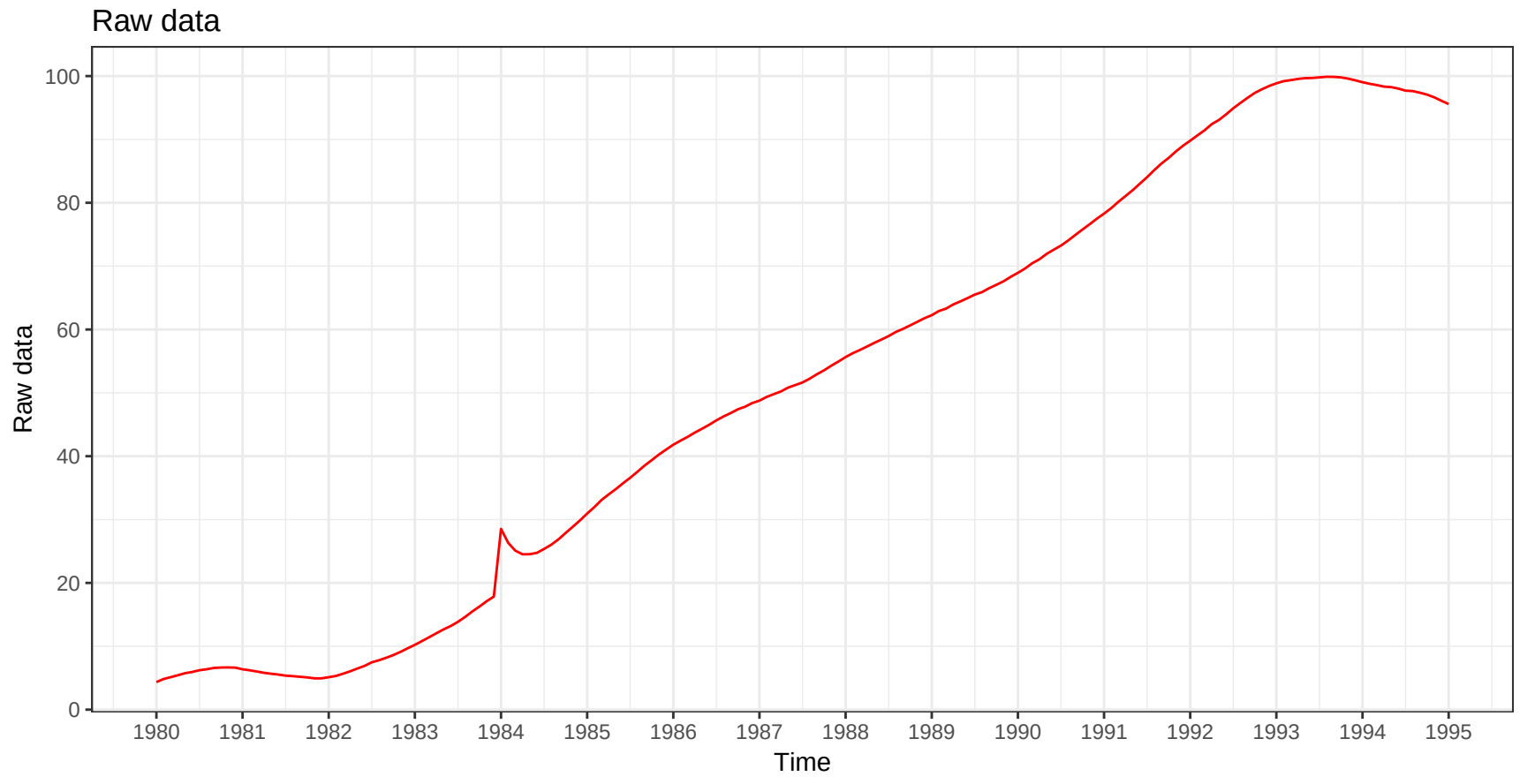
Estimate value of a TC(1984−01)
ARIMA (0,2,2)(0,0,0) − additive decomposition
(1−B)2Xt=(1−0.31B+0.36B2)at



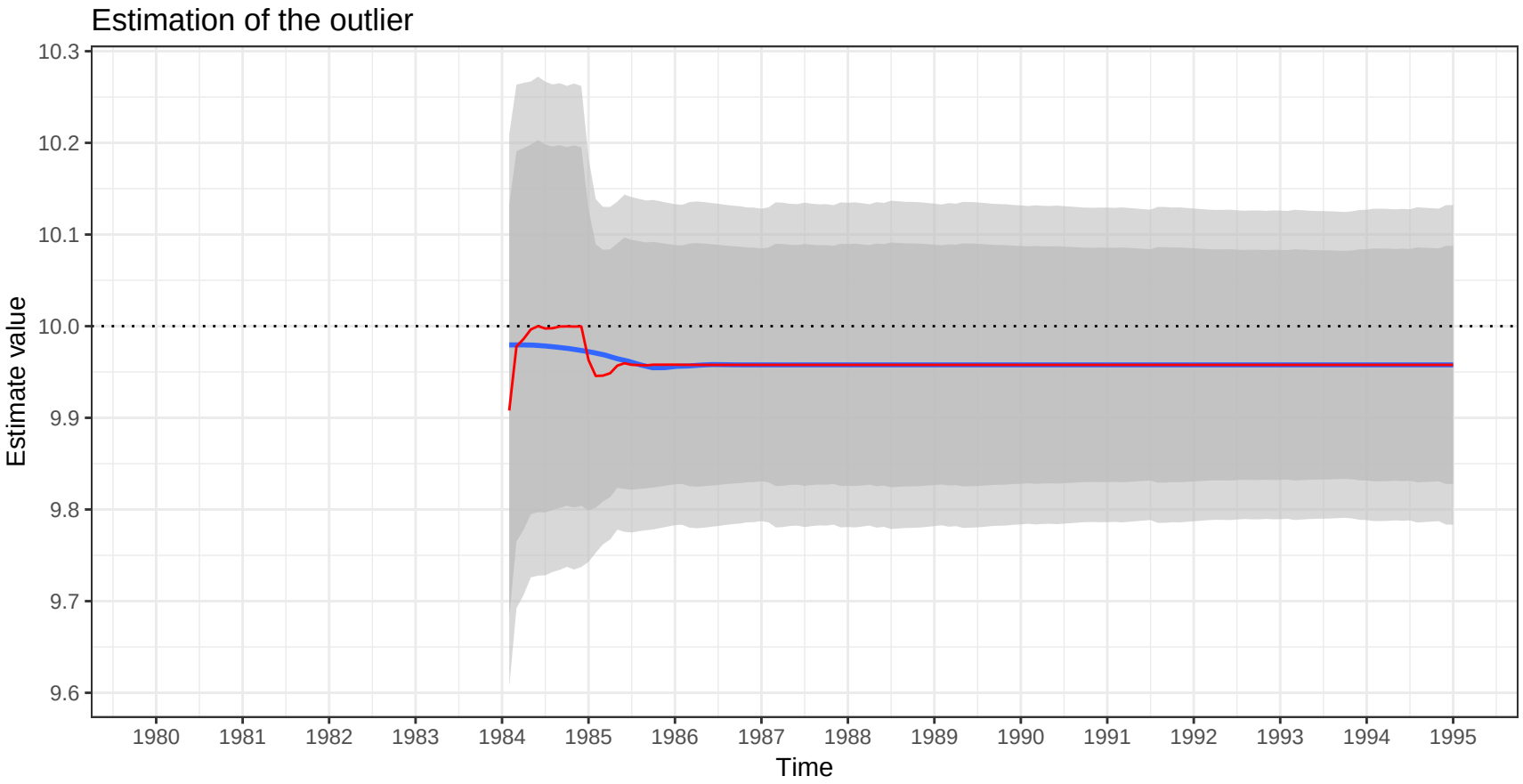


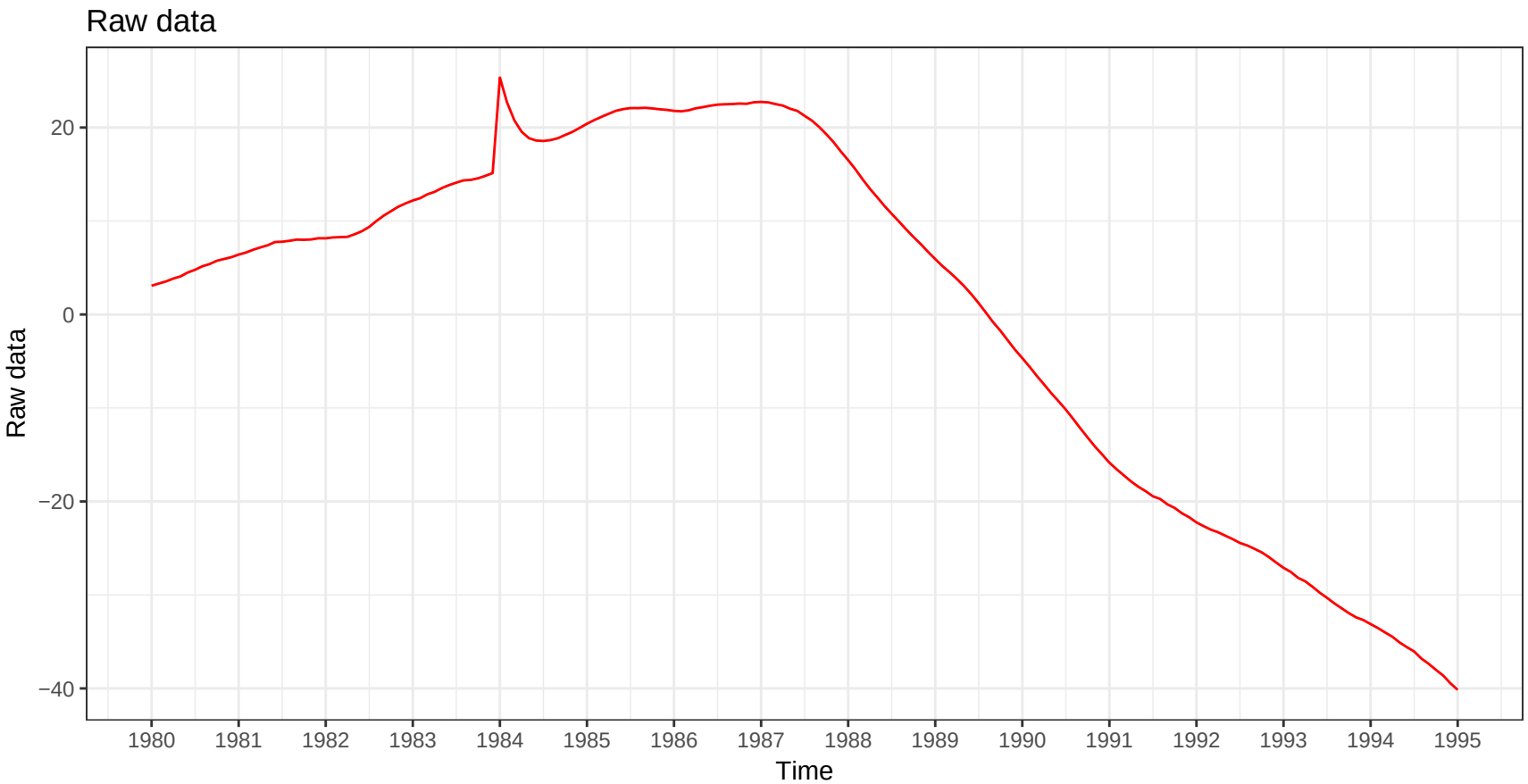
Estimate value of a TC(1984−01)
ARIMA (0,2,2)(0,0,0) − additive decomposition
(1−B)2Xt=(1−0.31B+0.36B2)at

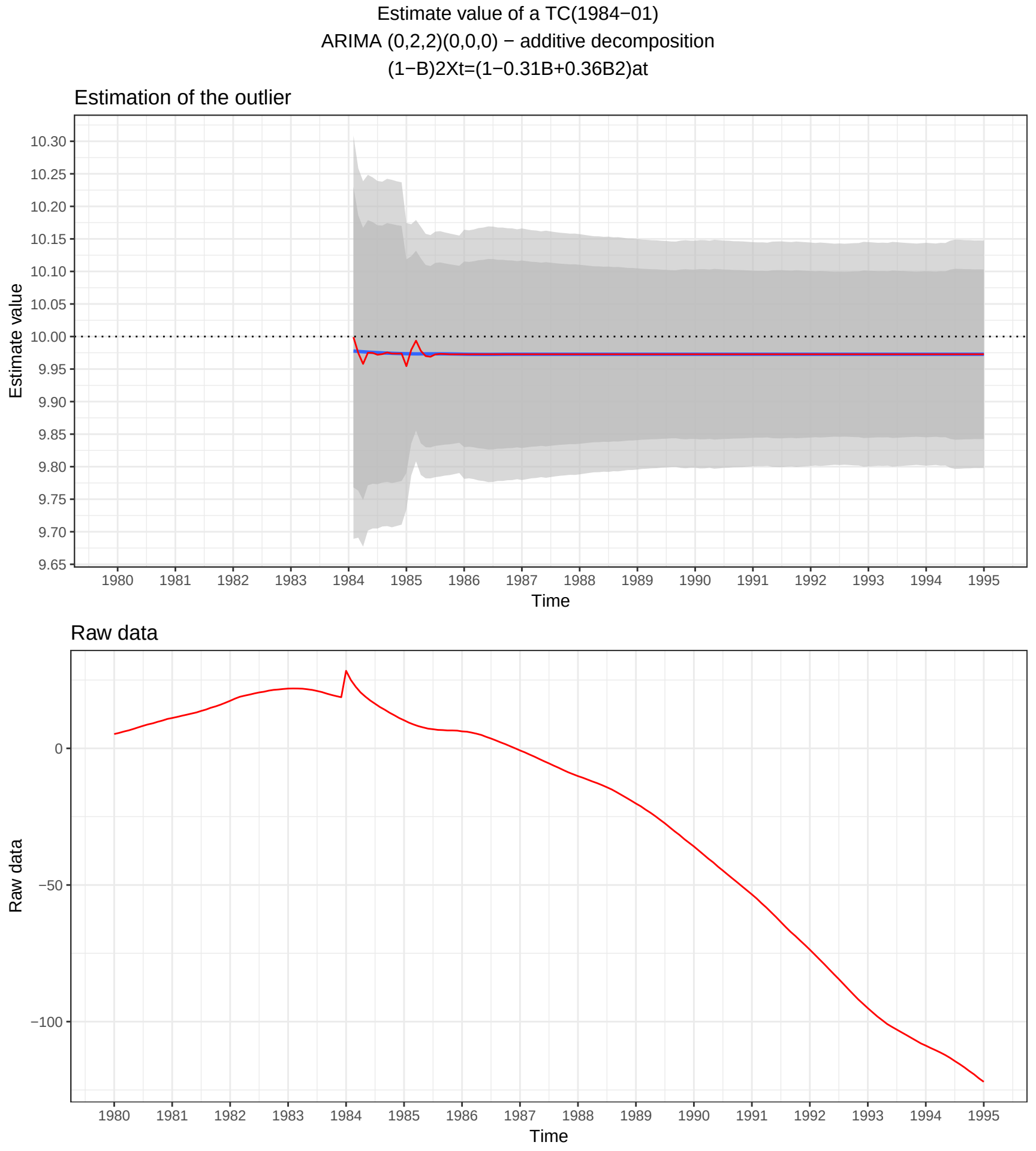




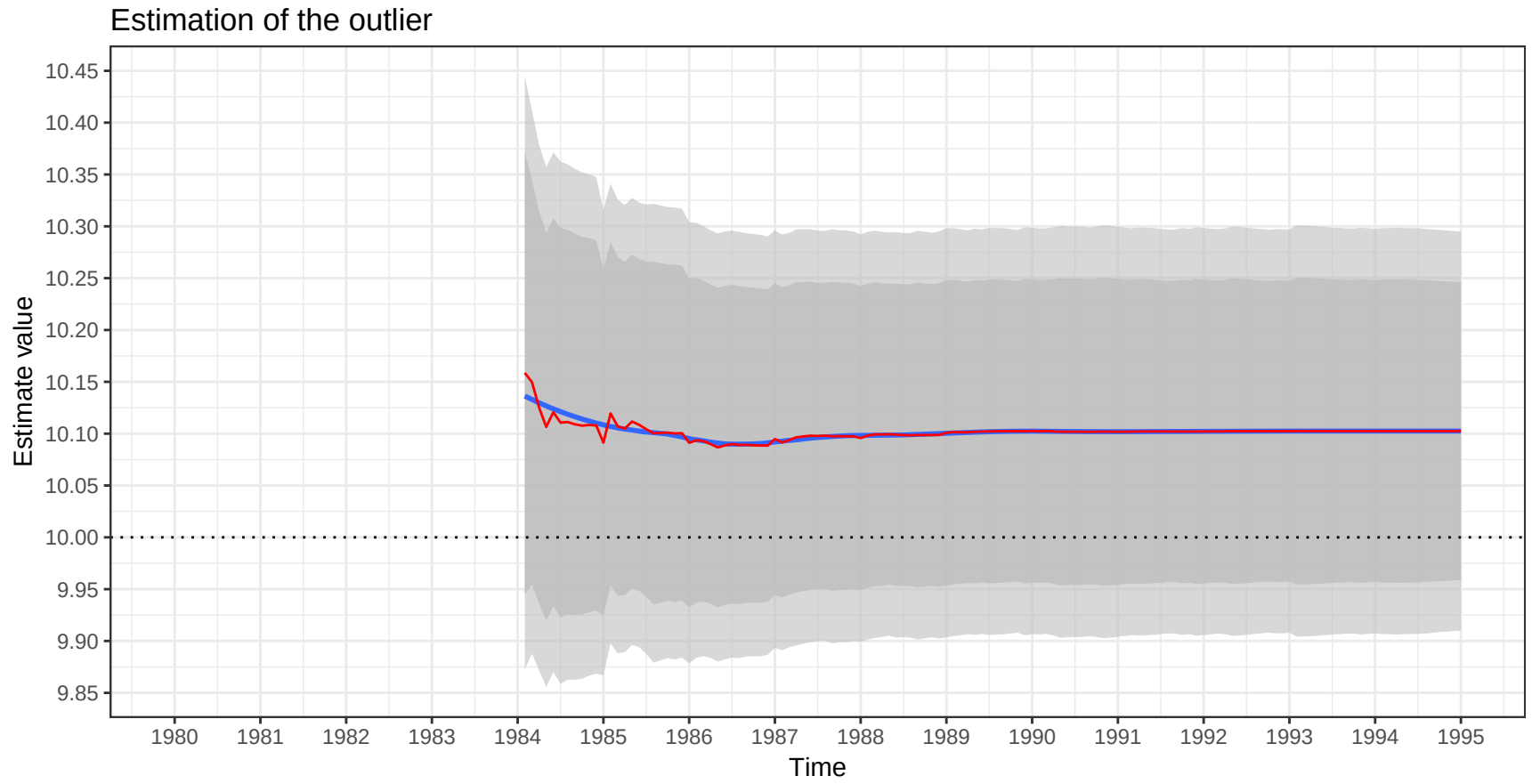
Estimate value of a TC(1984−01)
ARIMA (0,2,2)(0,0,0) − additive decomposition
(1−B)2Xt=(1−0.31B+0.36B2)at

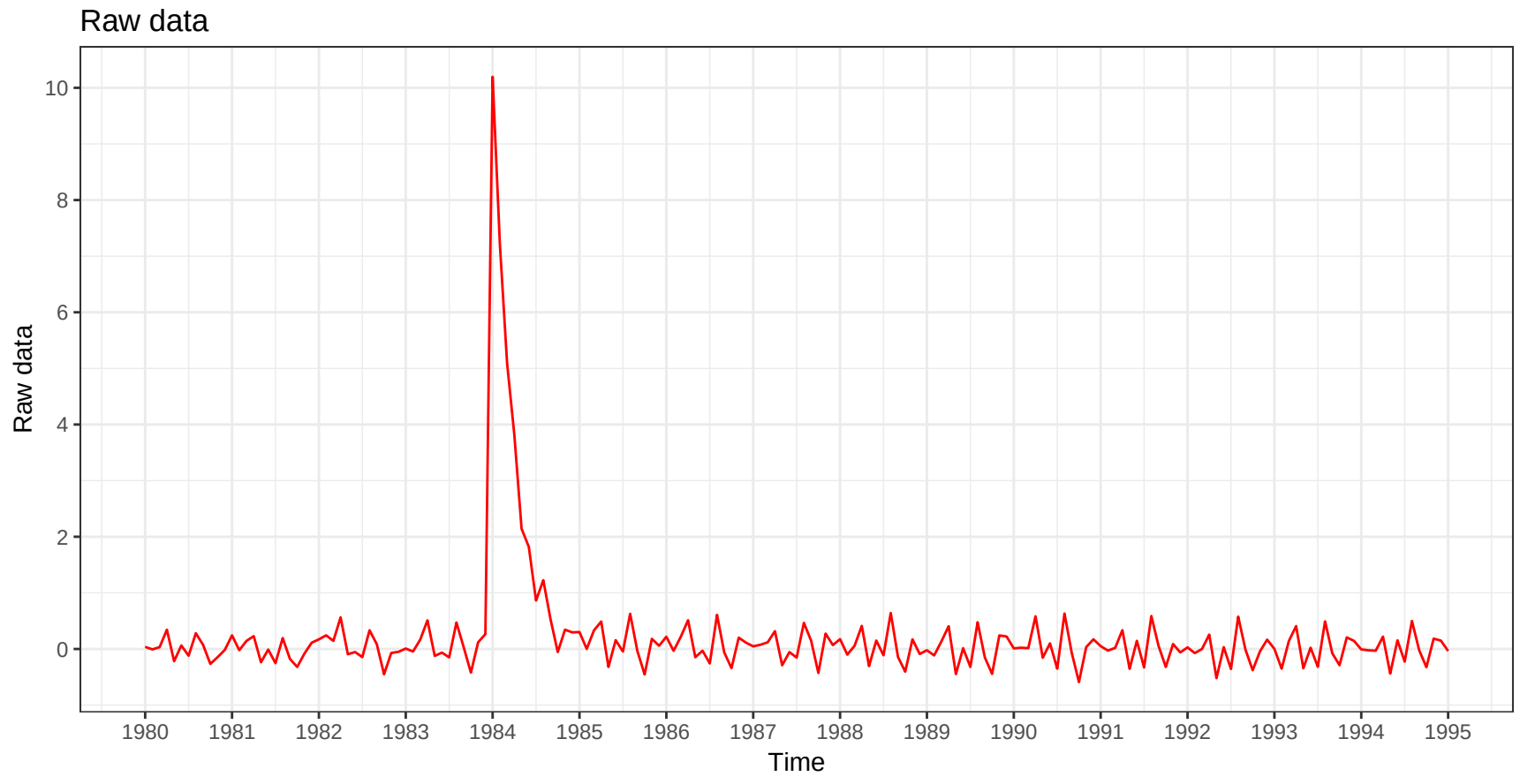


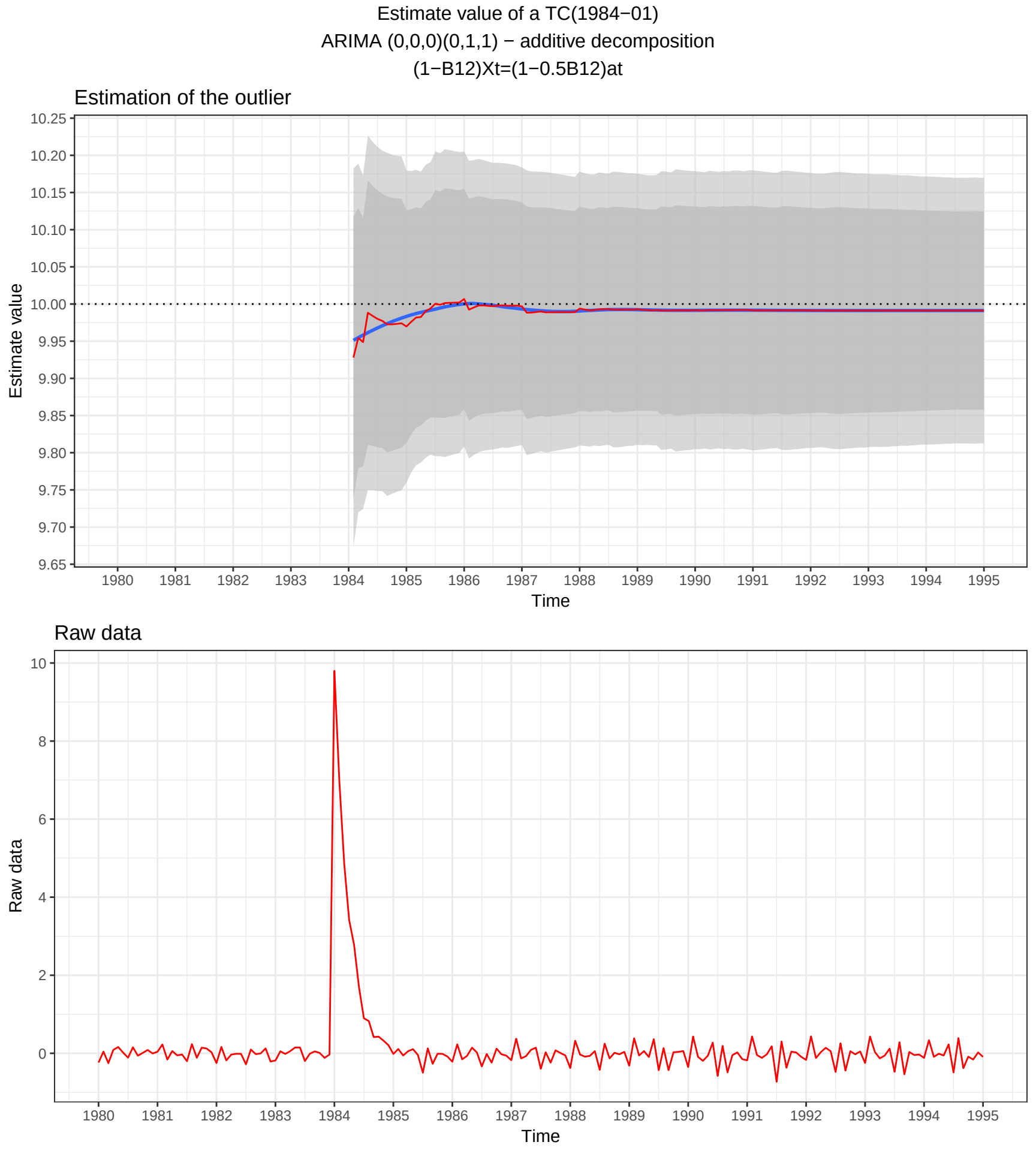



Estimate value of a TC(1984−01)
ARIMA (0,2,2)(0,0,0) − additive decomposition
(1−B)2Xt=(1−0.31B+0.36B2)at
Estimation of the outlier
Estimate value
10.30
10.25
10.20
10.15
10.10
10.05
10.00
9.95
9.90
9.85
9.80
9.75
9.70
9.65
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time
Raw data
Raw data
0
−50
−100
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time

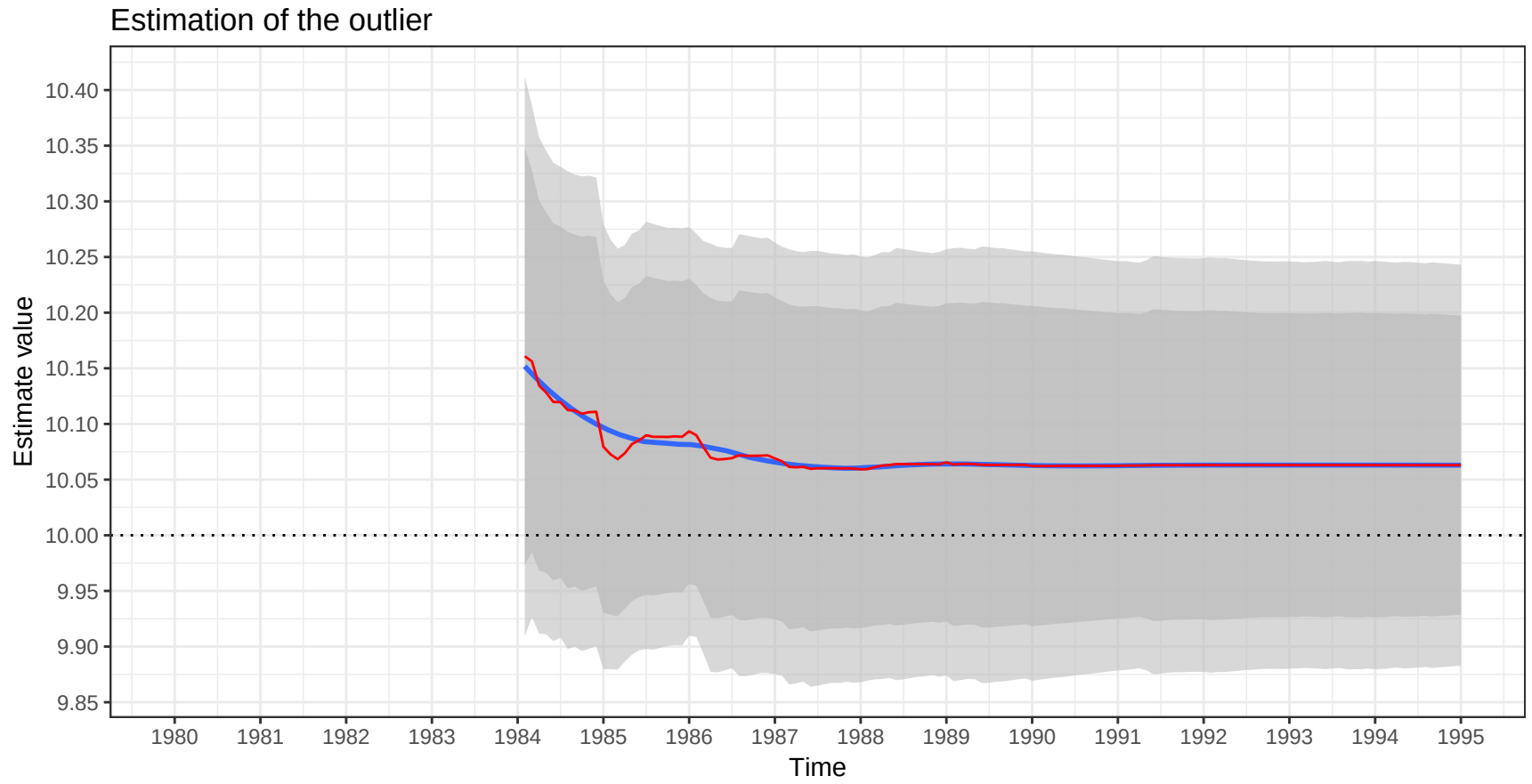
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(0,1,1) − additive decomposition
(1−B12)Xt=(1−0.5B12)at

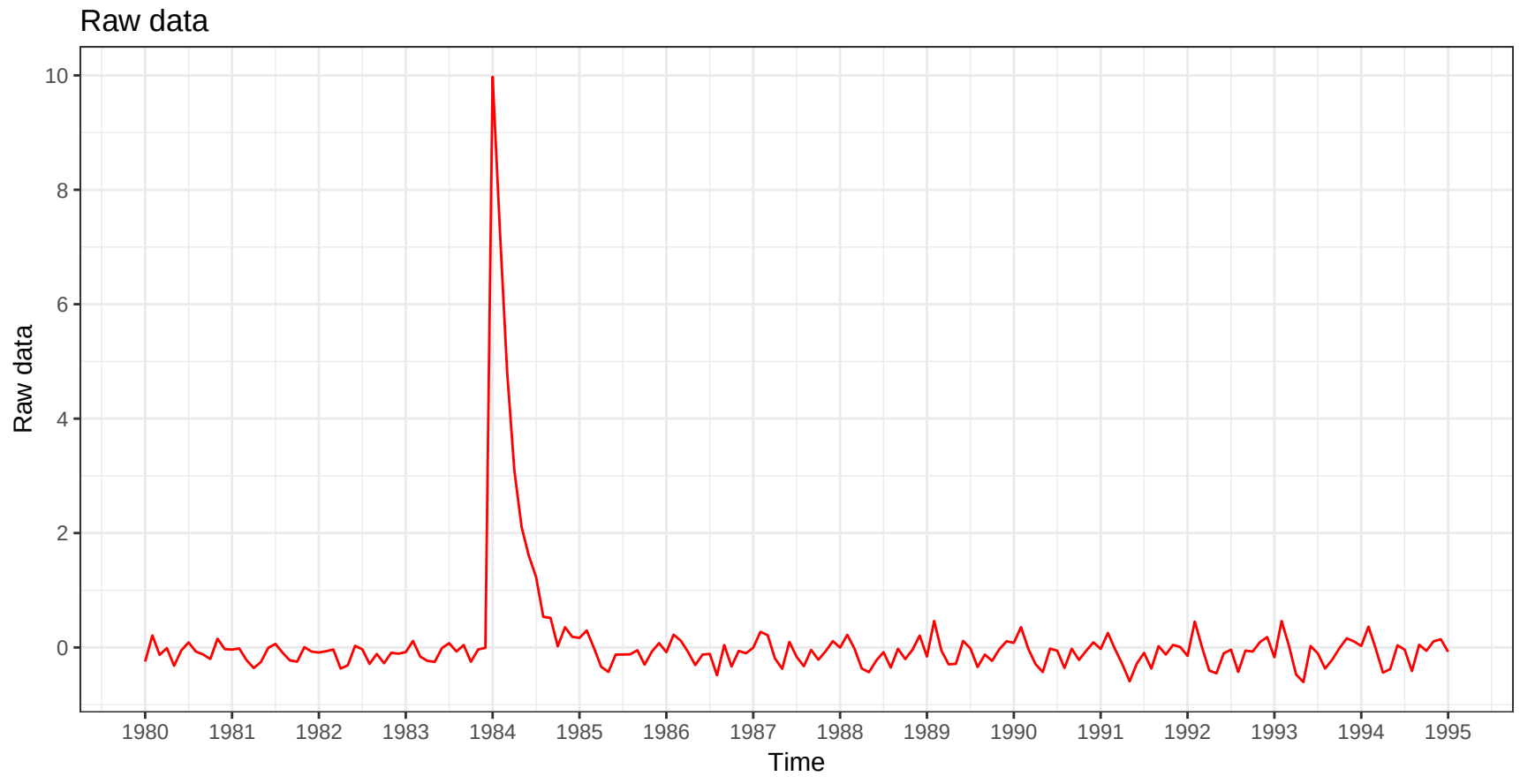


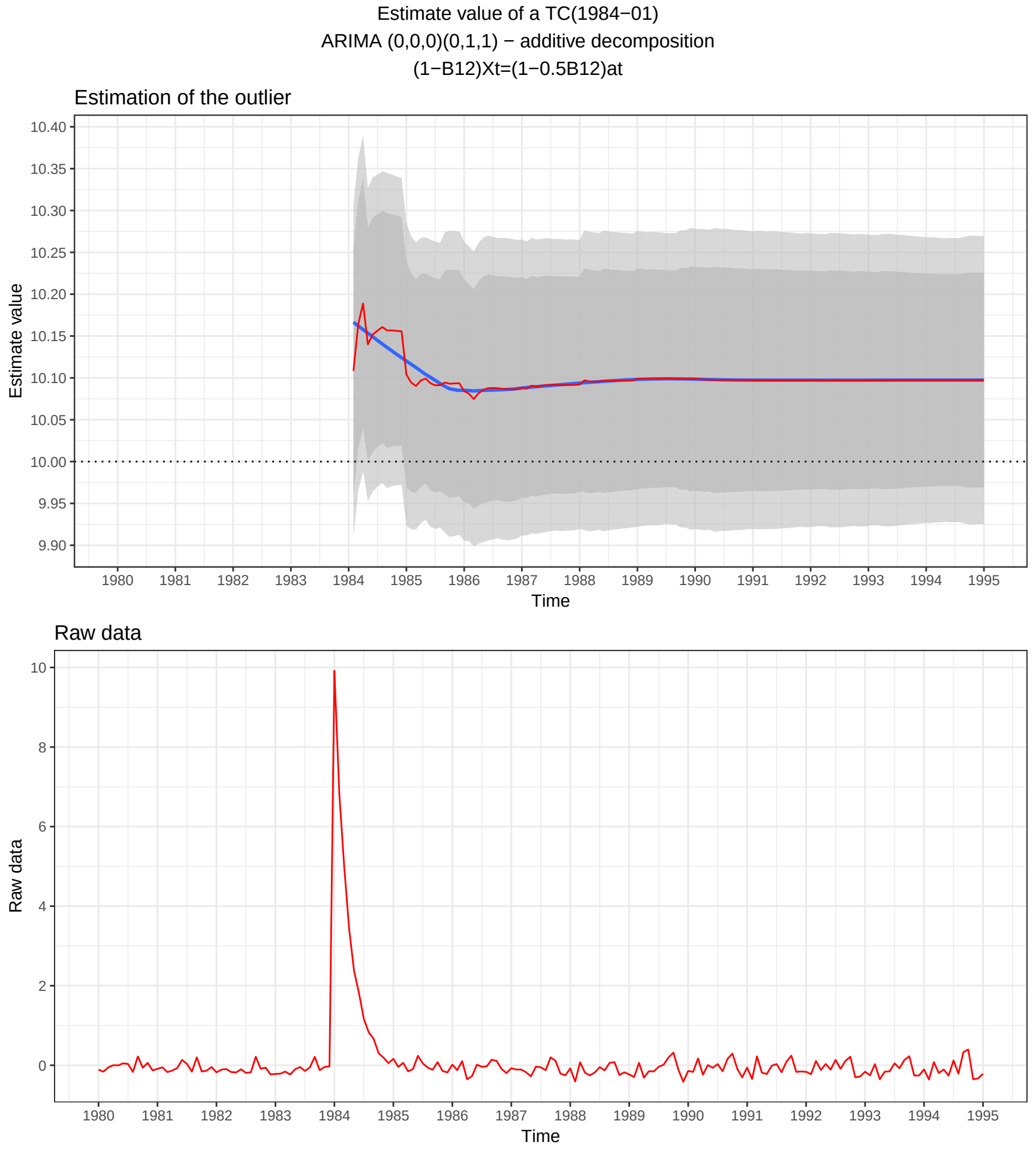



Estimate value of a TC(1984−01)
ARIMA (0,0,0)(0,1,1) − additive decomposition
(1−B12)Xt=(1−0.5B12)at
Estimation of the outlier
Estimate value
10.25
10.20
10.15
10.10
10.05
10.00
9.95
9.90
9.85
9.80
9.75
9.70
9.65
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time
Raw data
Raw data
10
8
6
4
2
0
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time

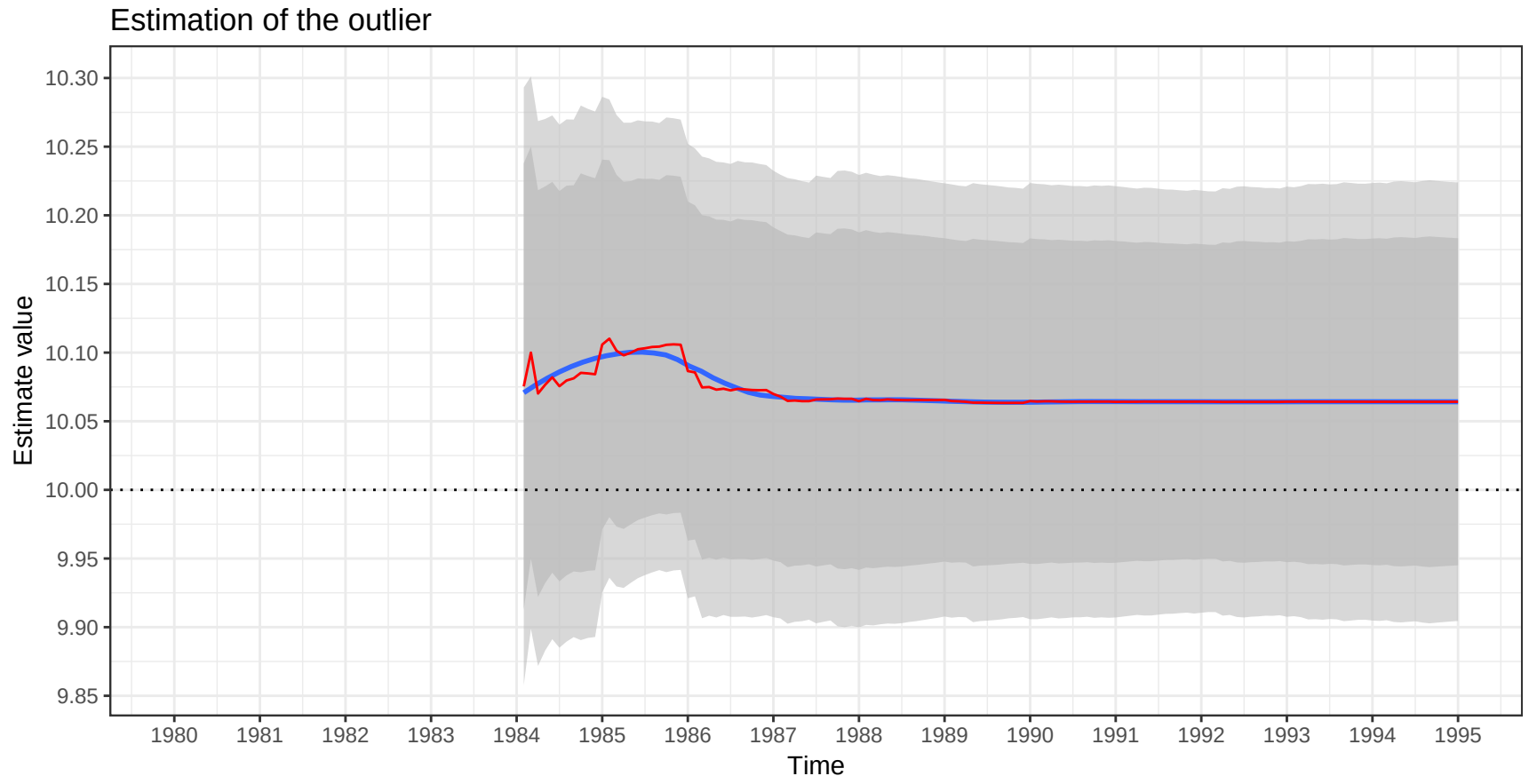
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(0,1,1) − additive decomposition
(1−B12)Xt=(1−0.5B12)at

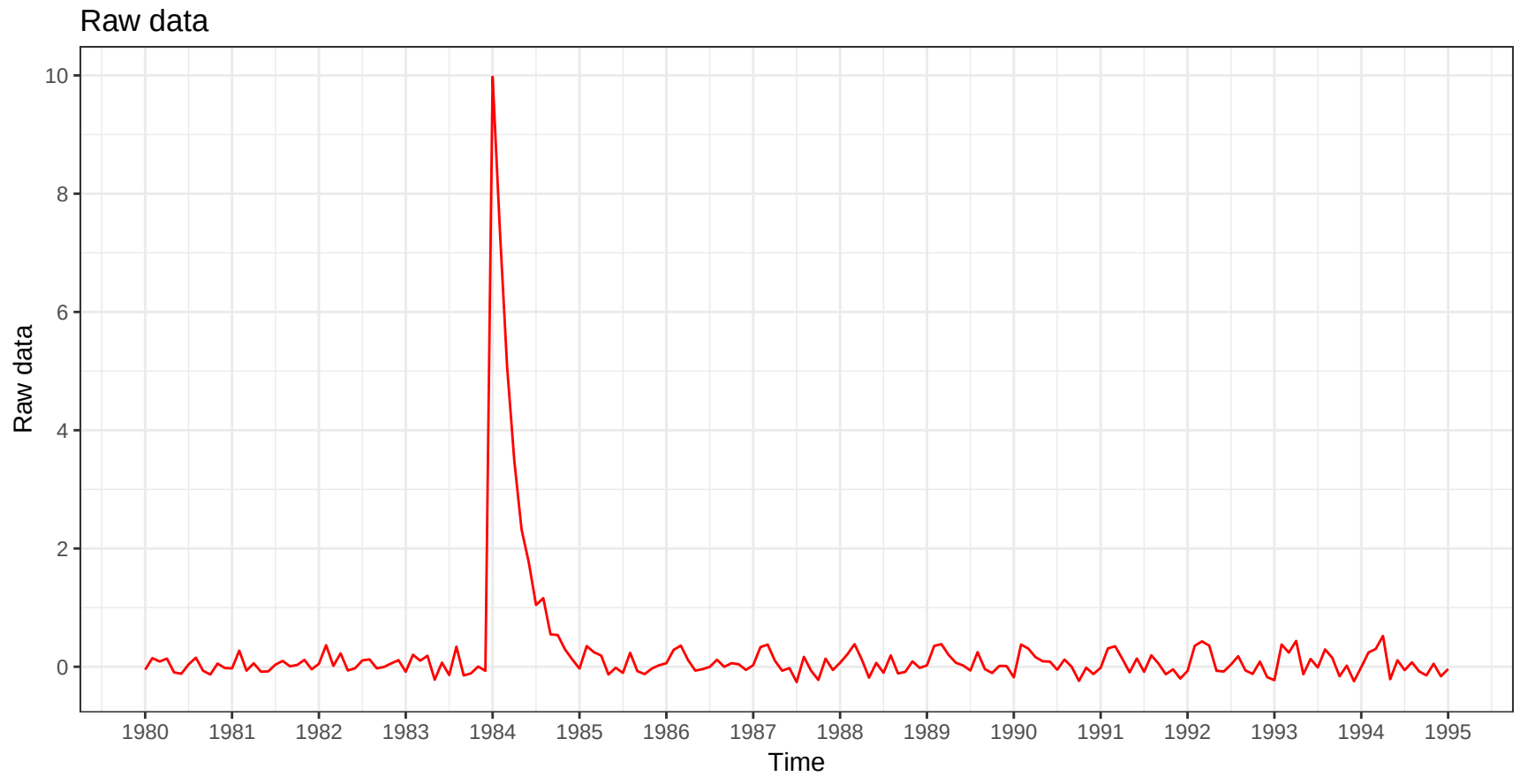




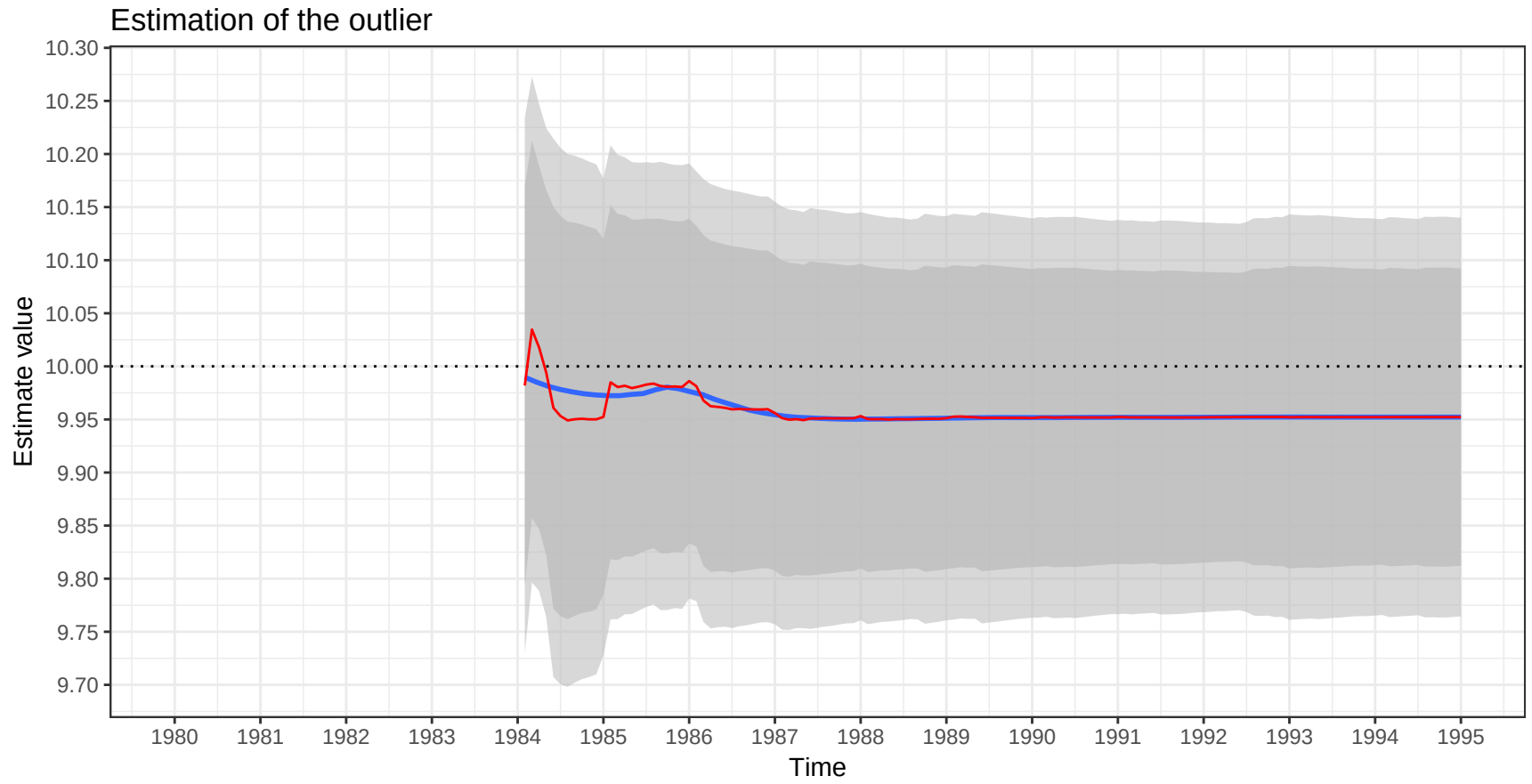

Estimate value of a TC(1984−01)
ARIMA (0,0,0)(0,1,1) − additive decomposition
(1−B12)Xt=(1−0.5B12)at
Estimation of the outlier
Estimate value
10.40
10.35
10.30
10.25
10.20
10.15
10.10
10.05
10.00
9.95
9.90
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time
Raw data
Raw data
10
8
6
4
2
0
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time

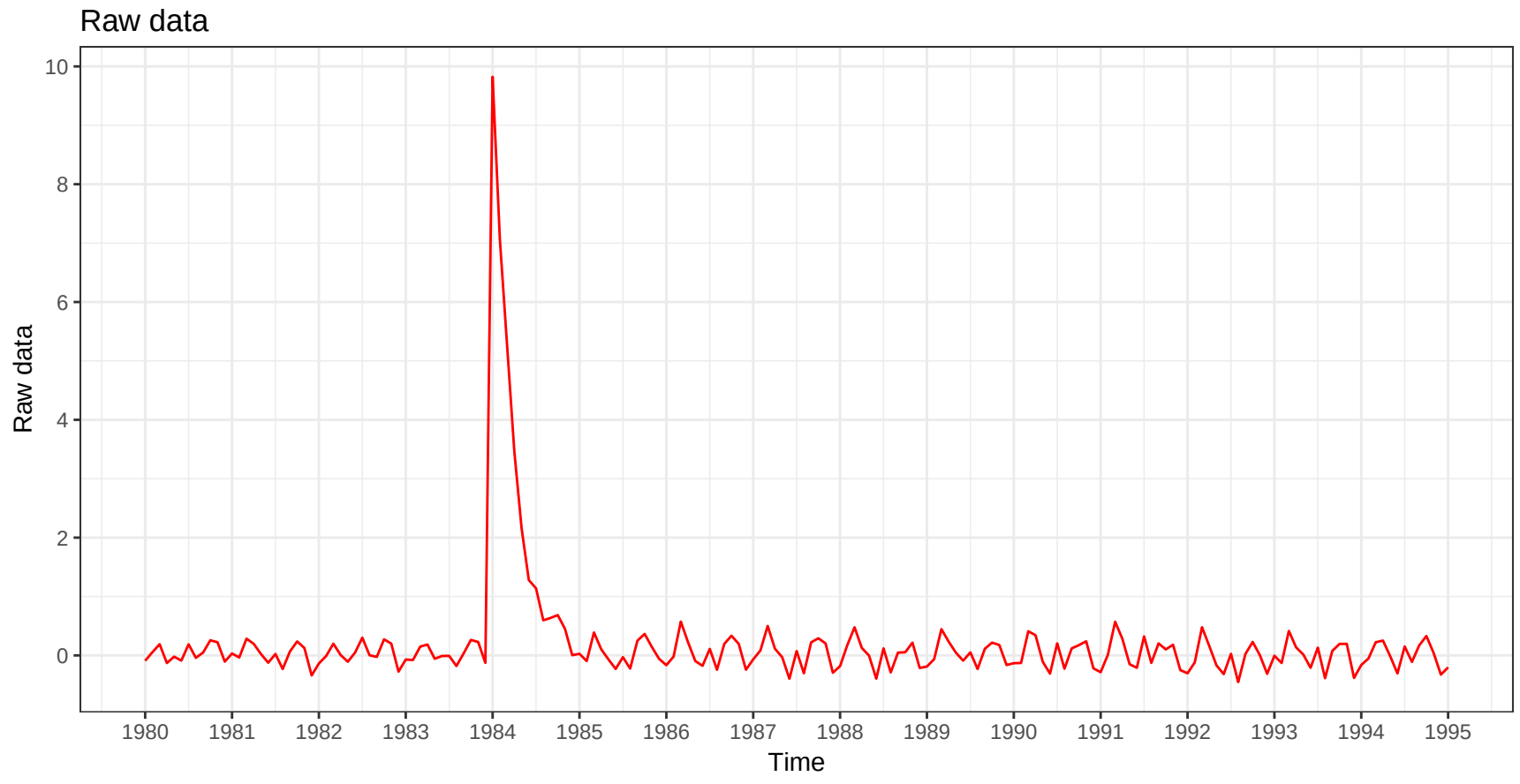
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(0,1,1) − additive decomposition
(1−B12)Xt=(1−0.5B12)at



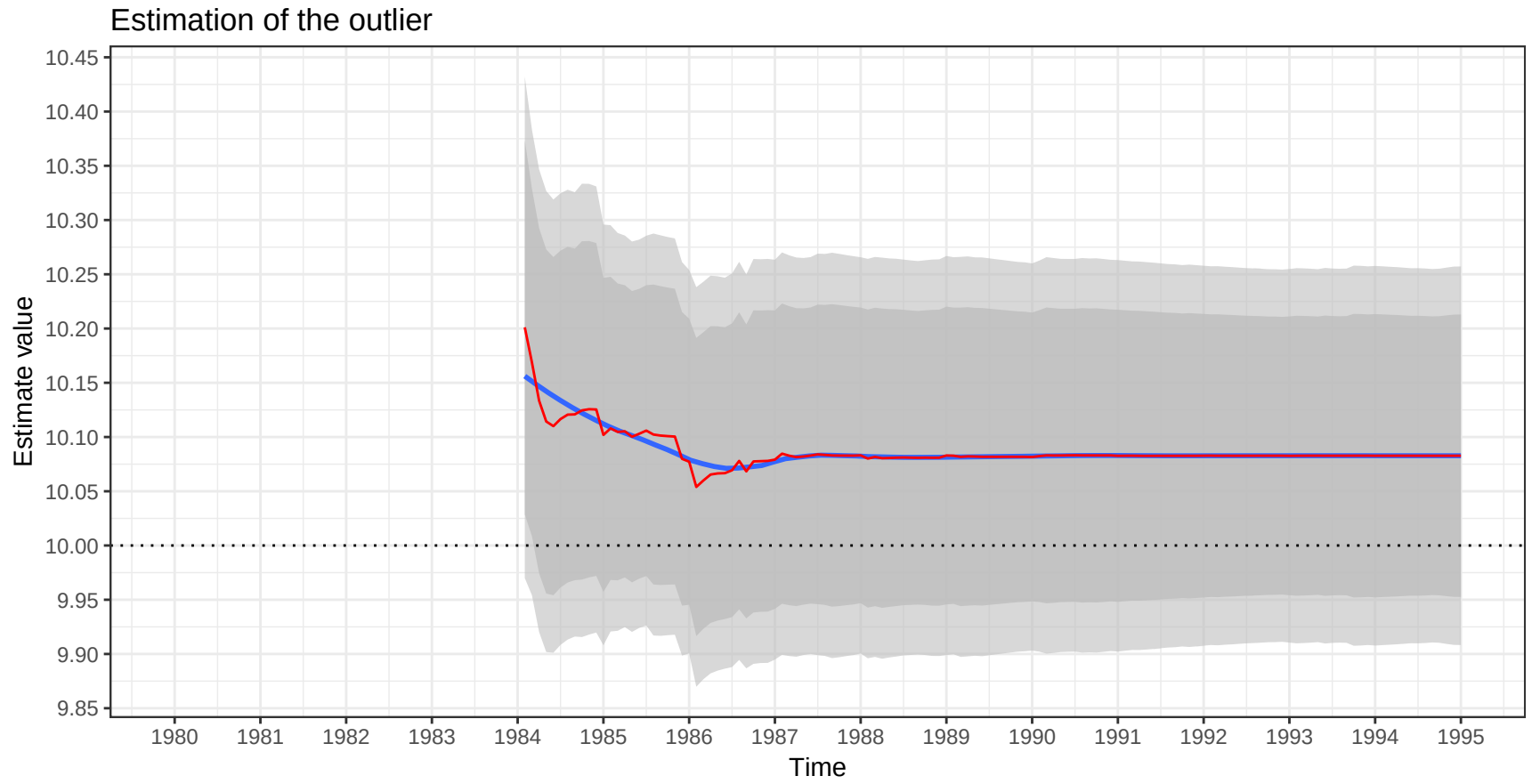


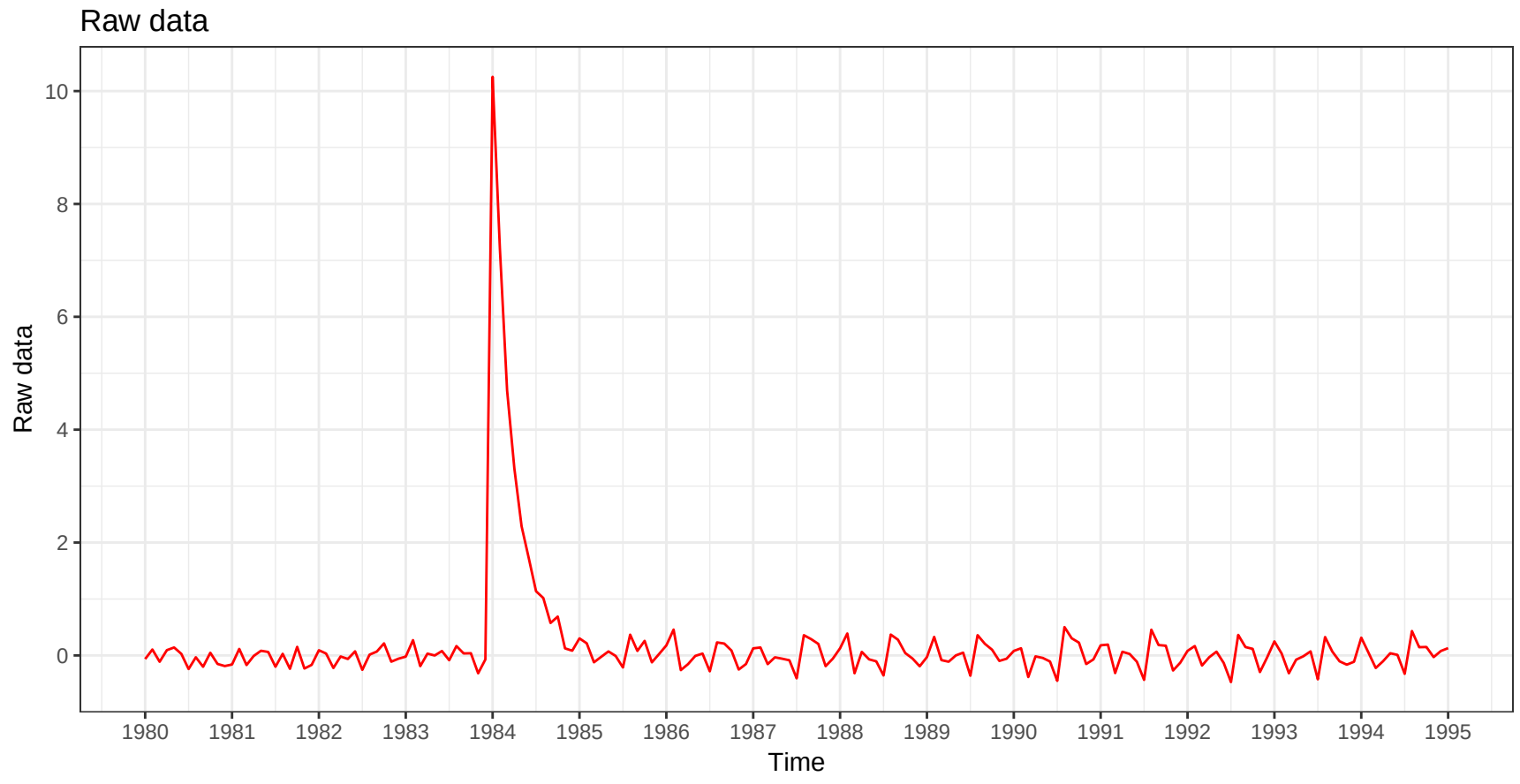
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(0,1,1) − additive decomposition
(1−B12)Xt=(1−0.5B12)at



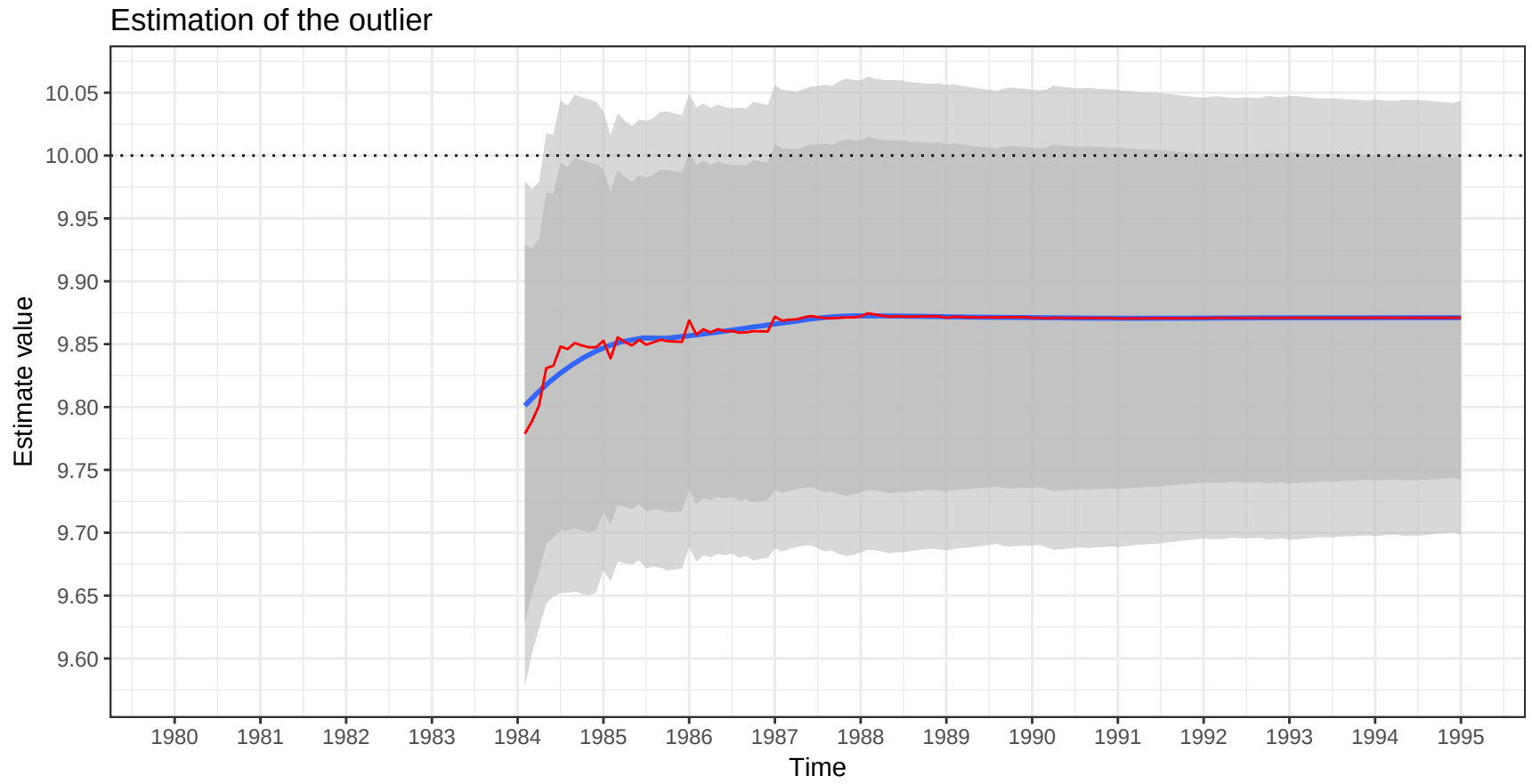


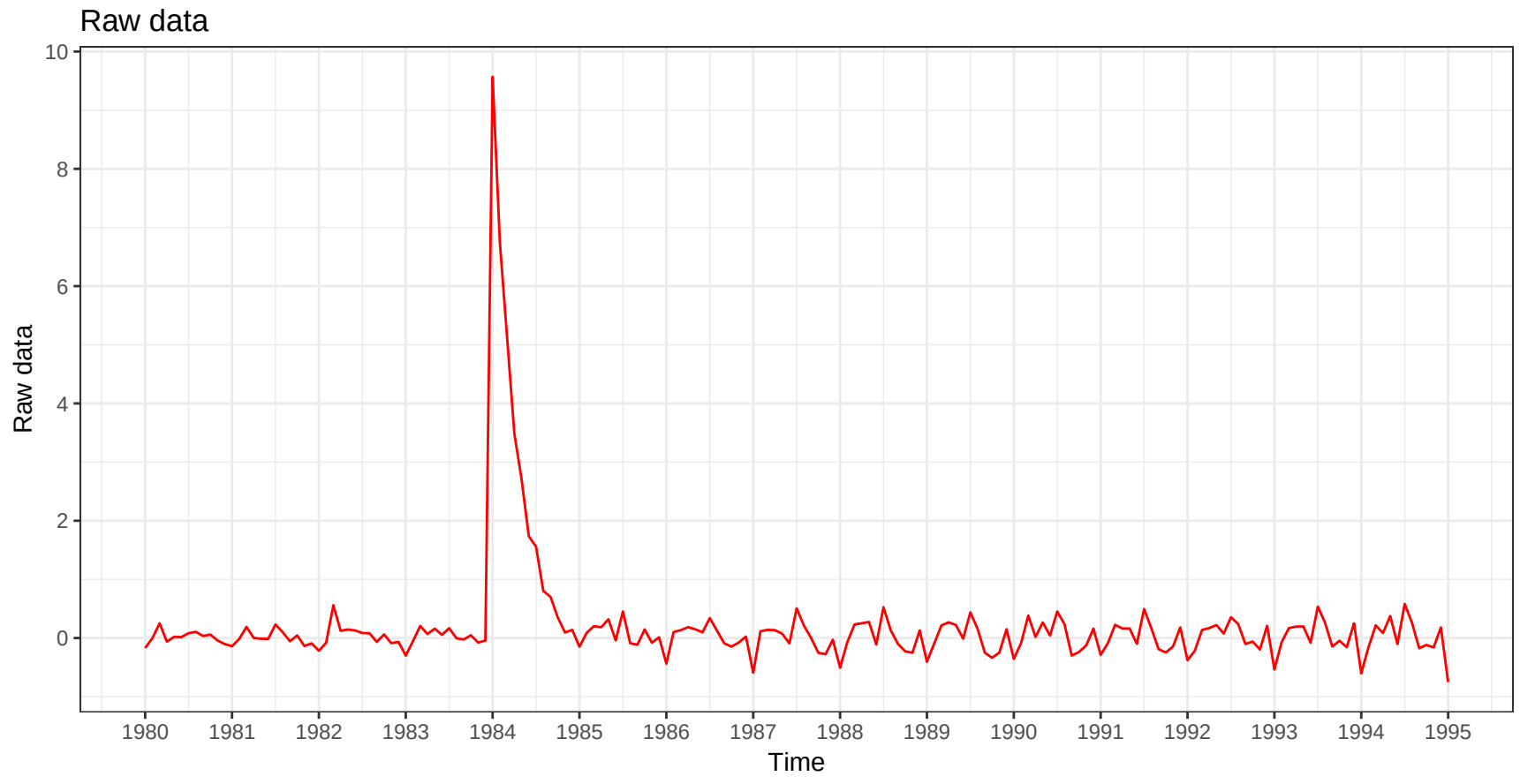
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(0,1,1) − additive decomposition
(1−B12)Xt=(1−0.5B12)at



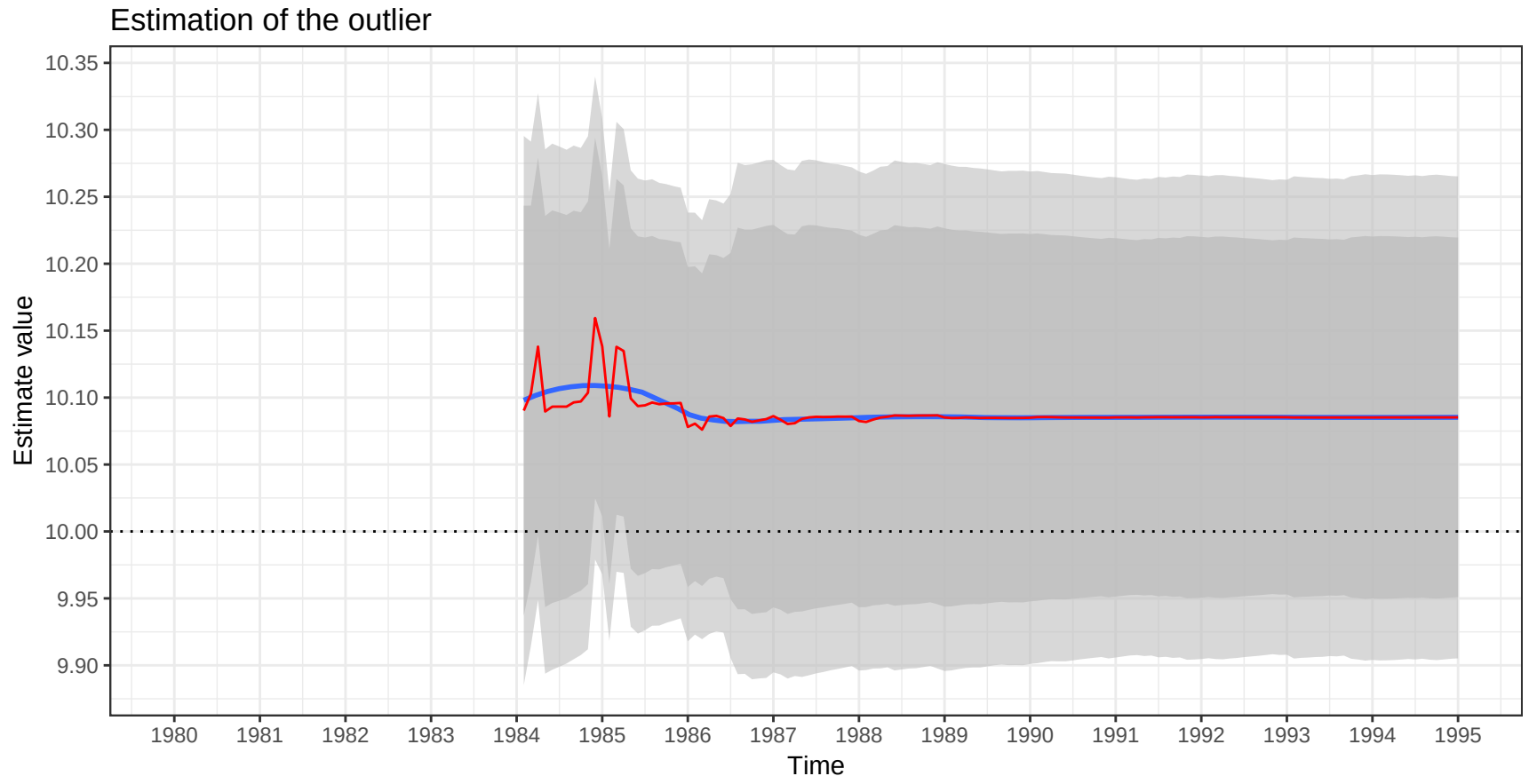


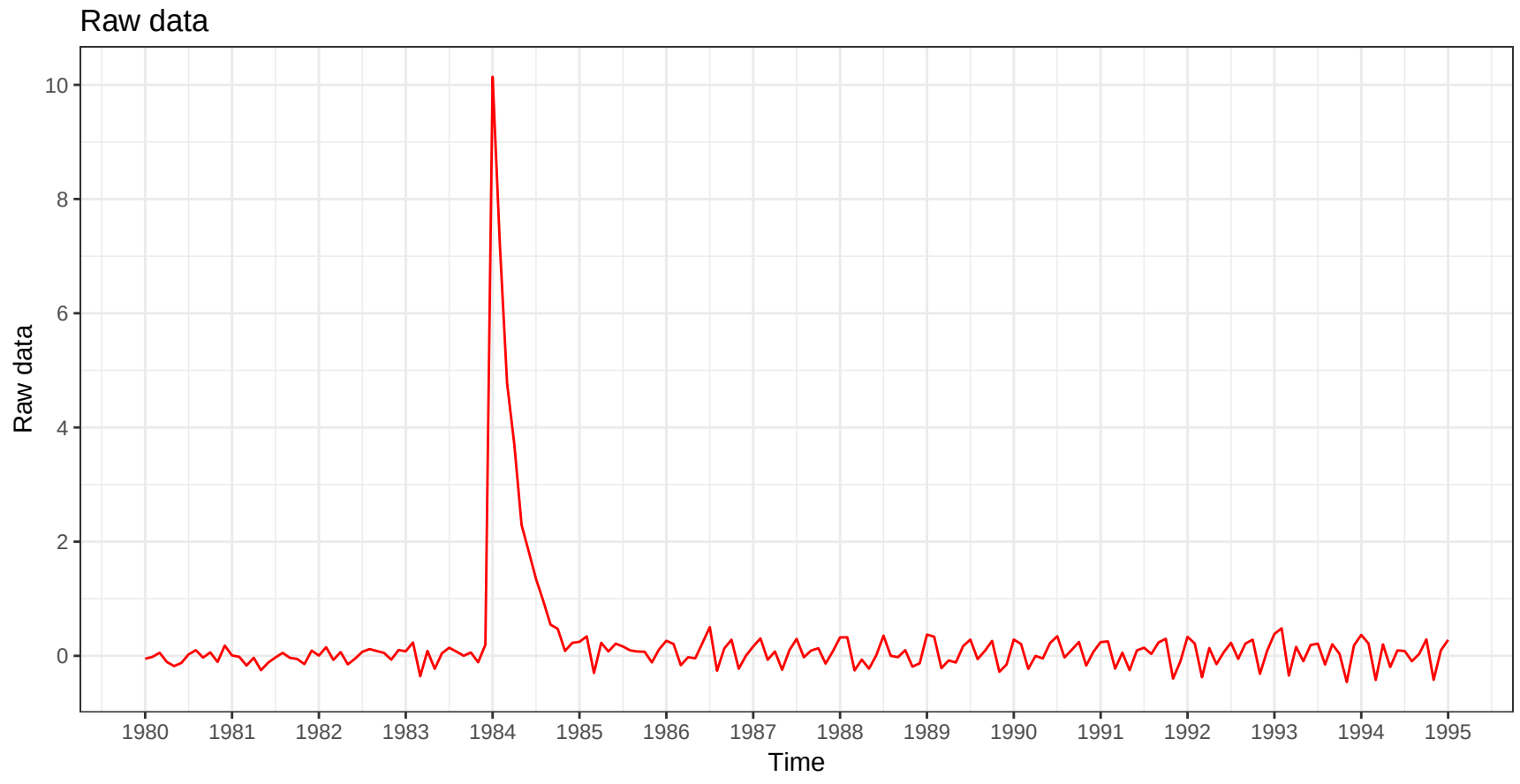
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(0,1,1) − additive decomposition
(1−B12)Xt=(1−0.5B12)at



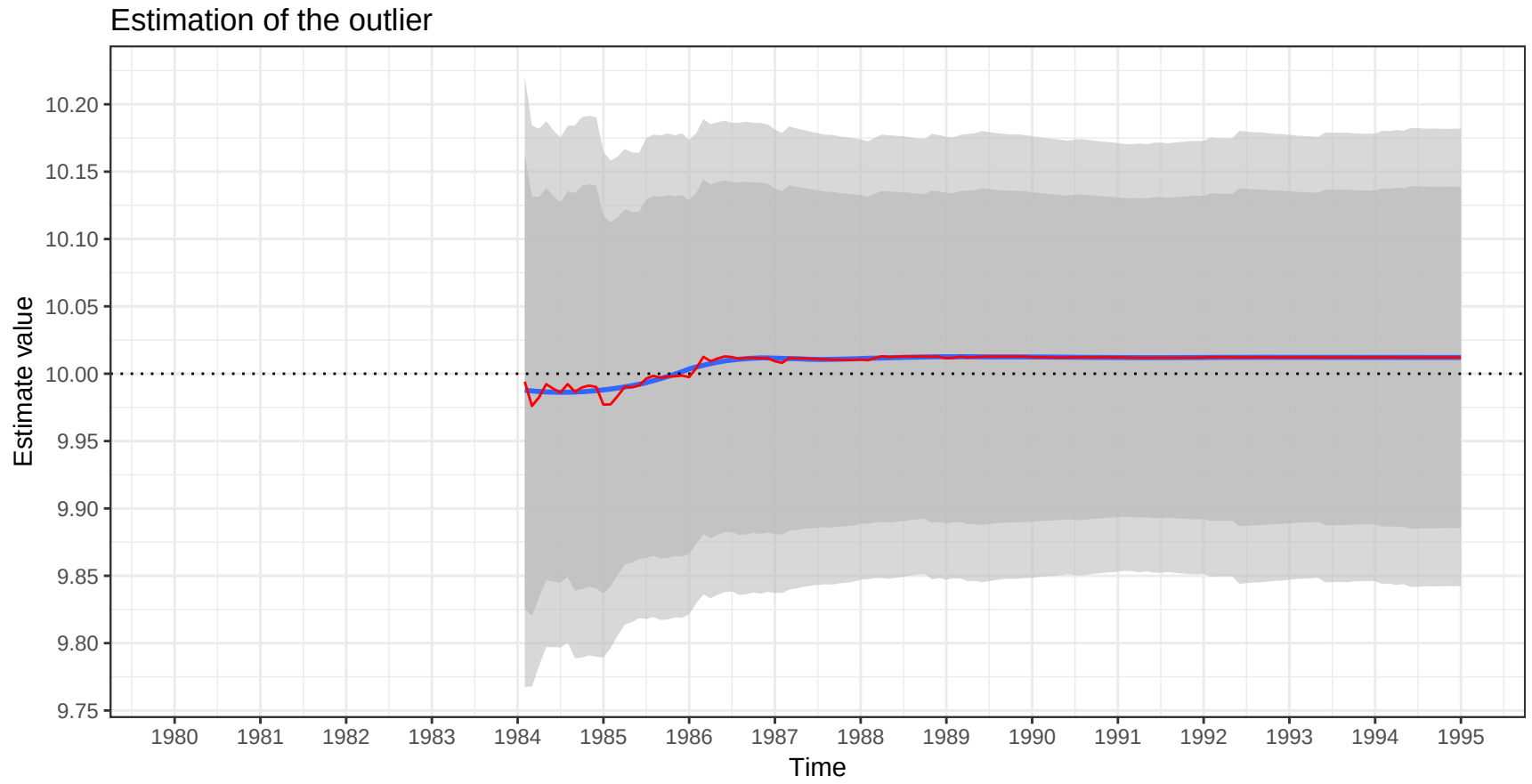


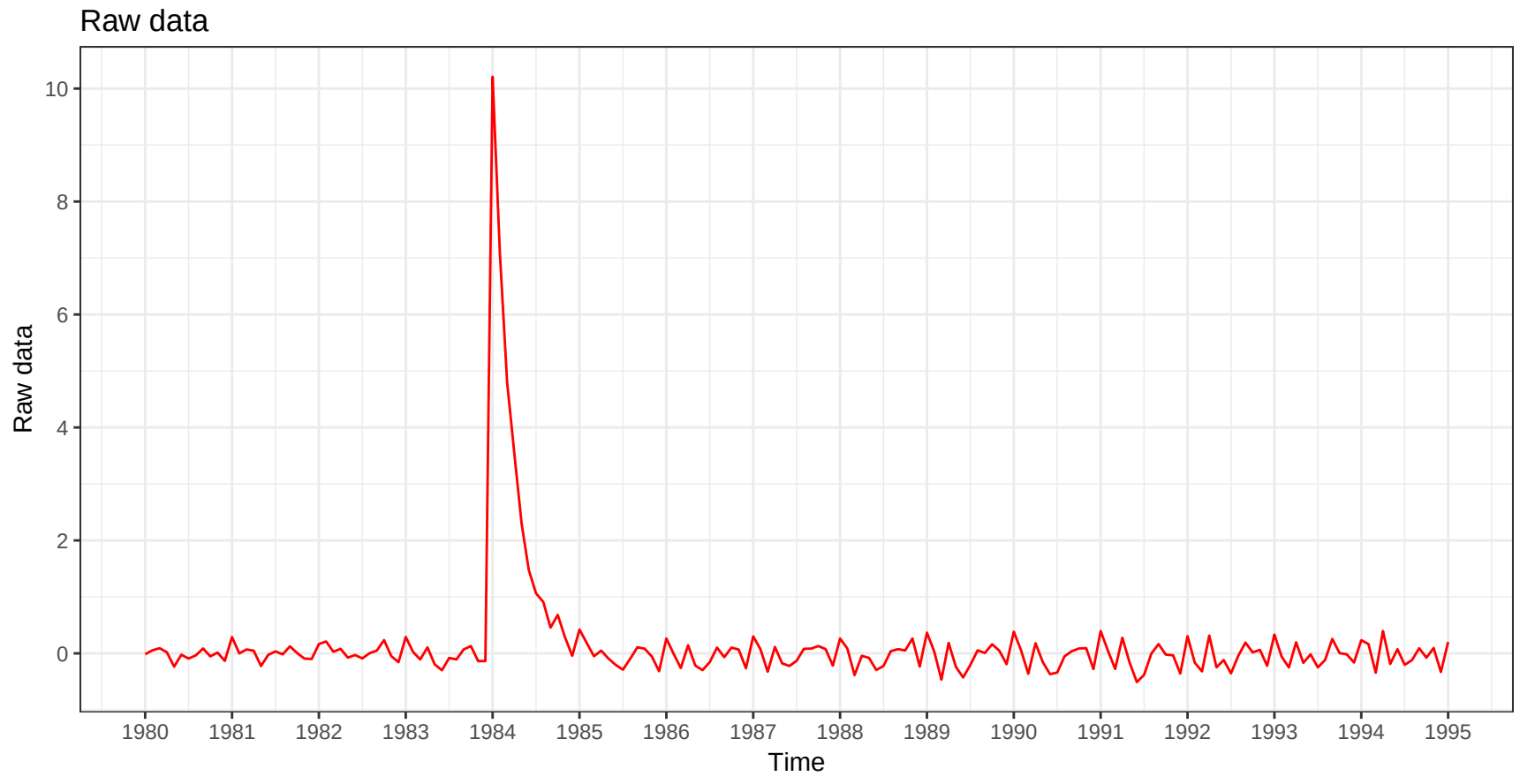
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(0,1,1) − additive decomposition
(1−B12)Xt=(1−0.5B12)at



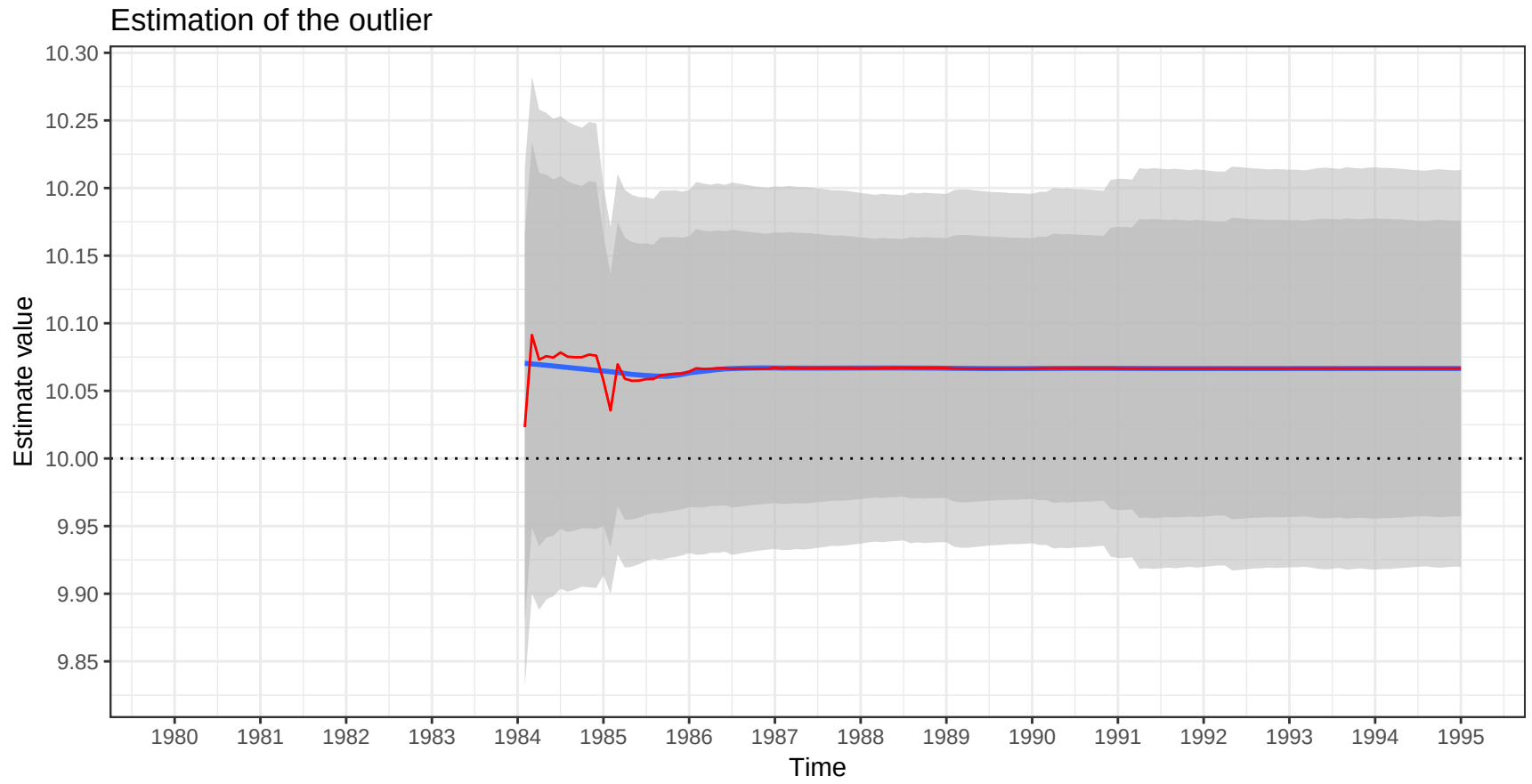


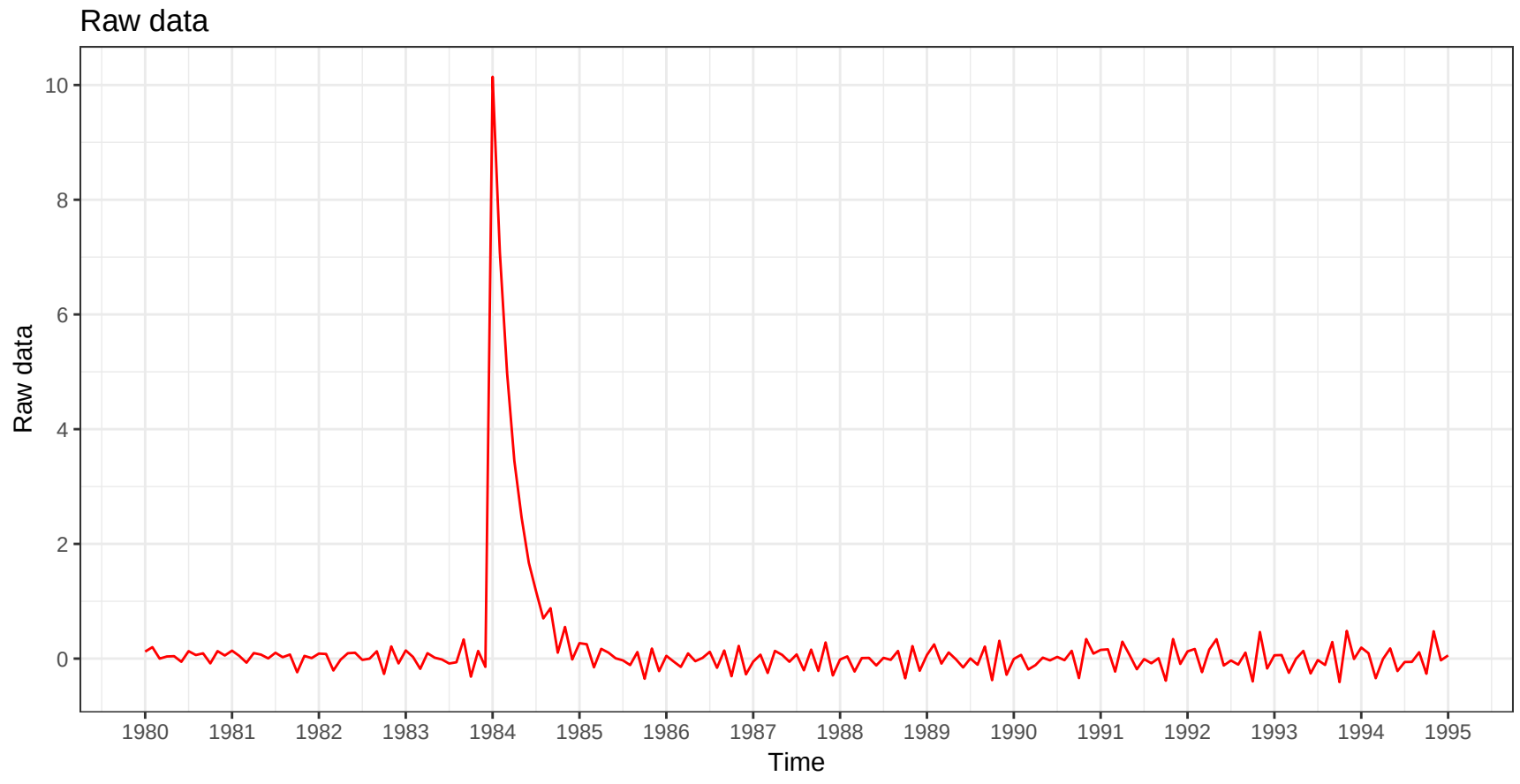
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(0,1,1) − additive decomposition
(1−B12)Xt=(1−0.5B12)at



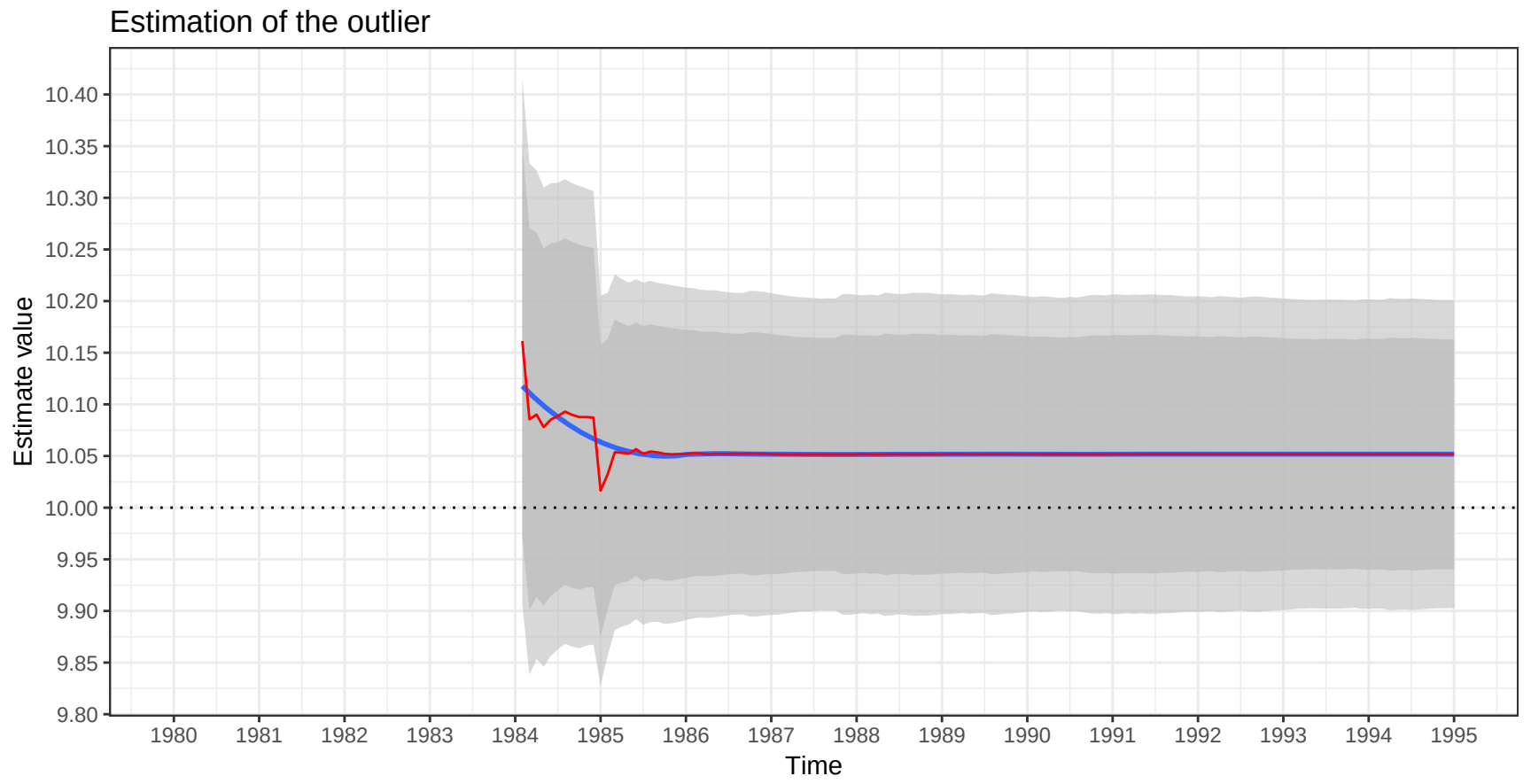


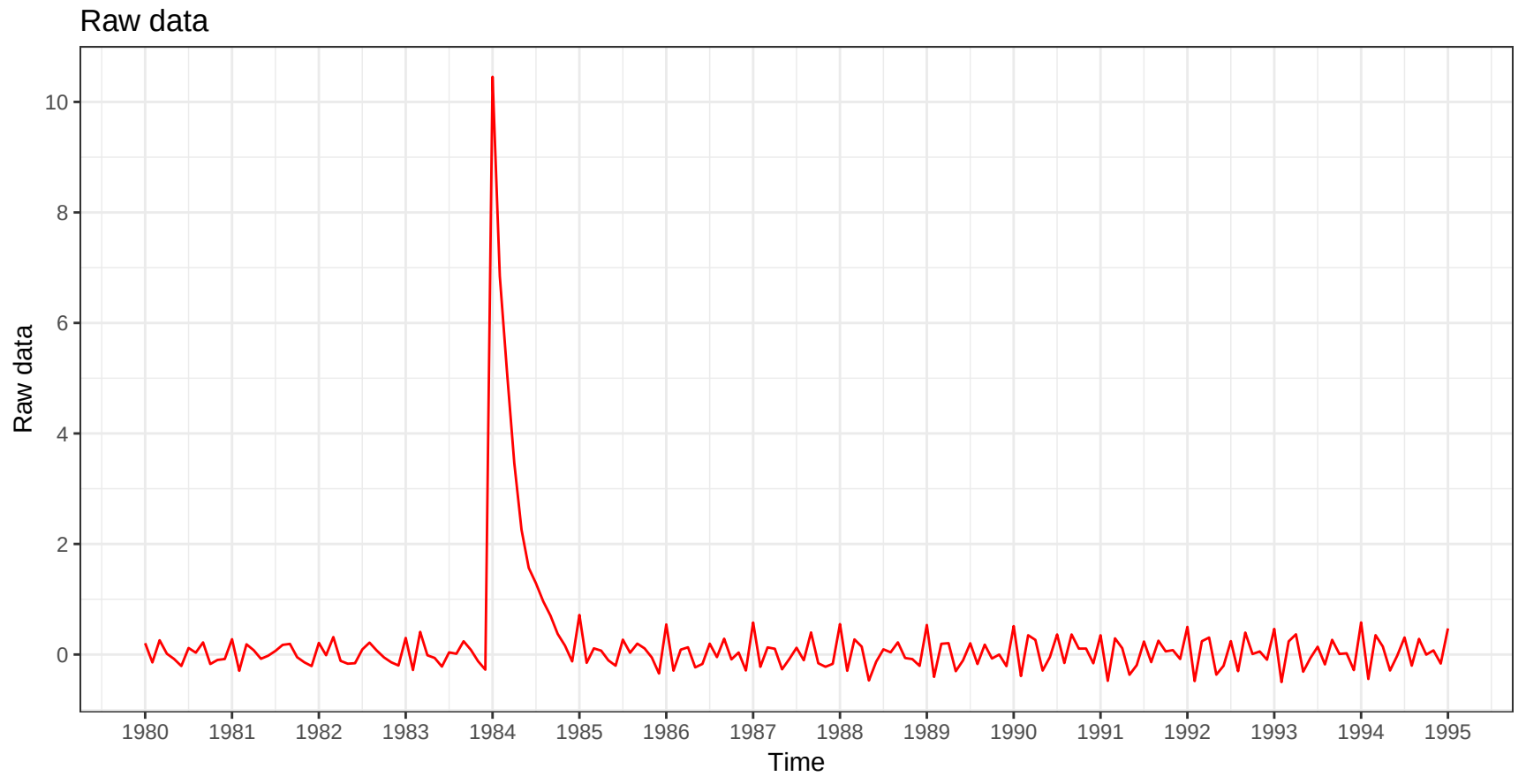
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(1,1,1) − additive decomposition
(1−B12)(1+0.4B12)Xt=(1−0.5B12)at



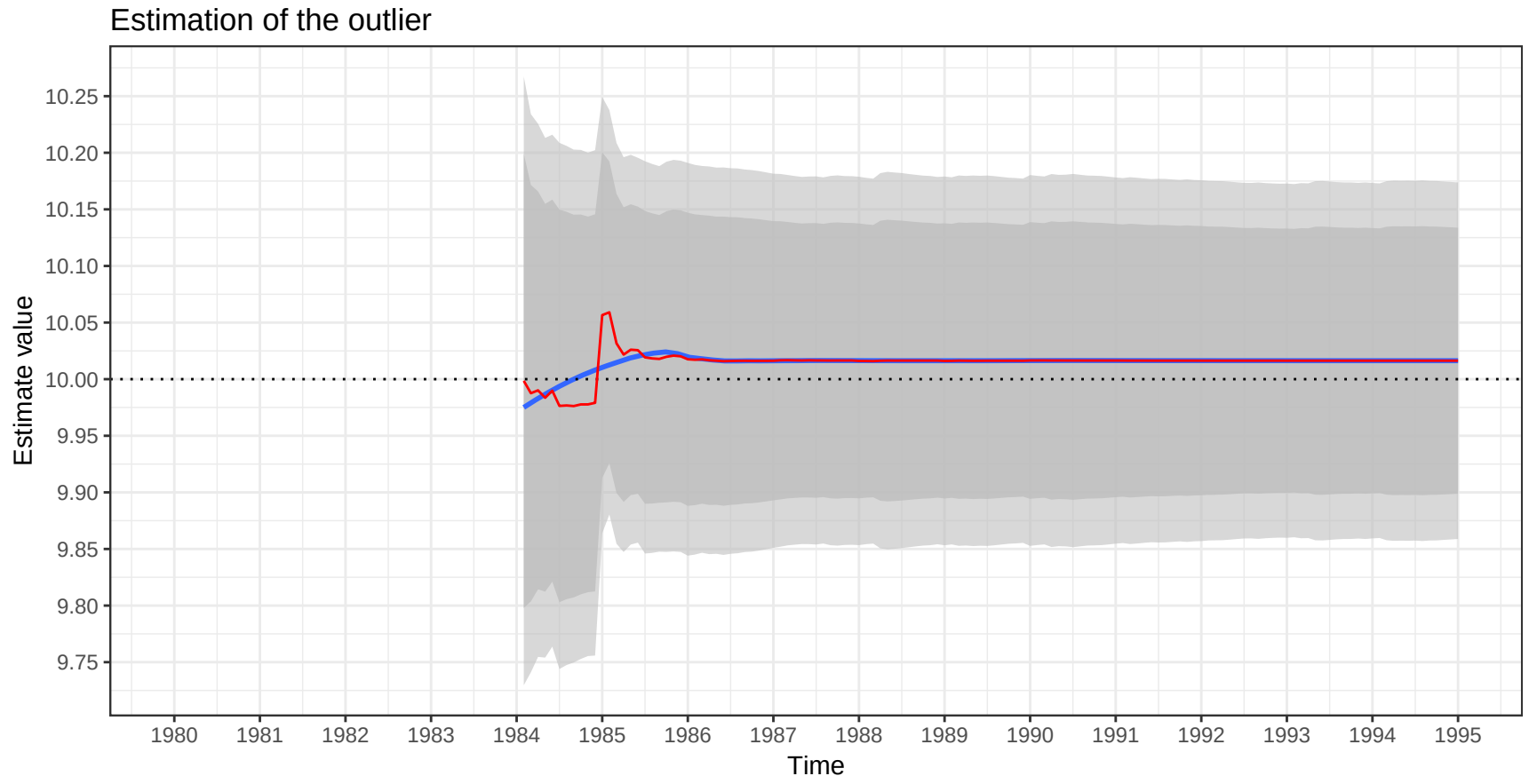


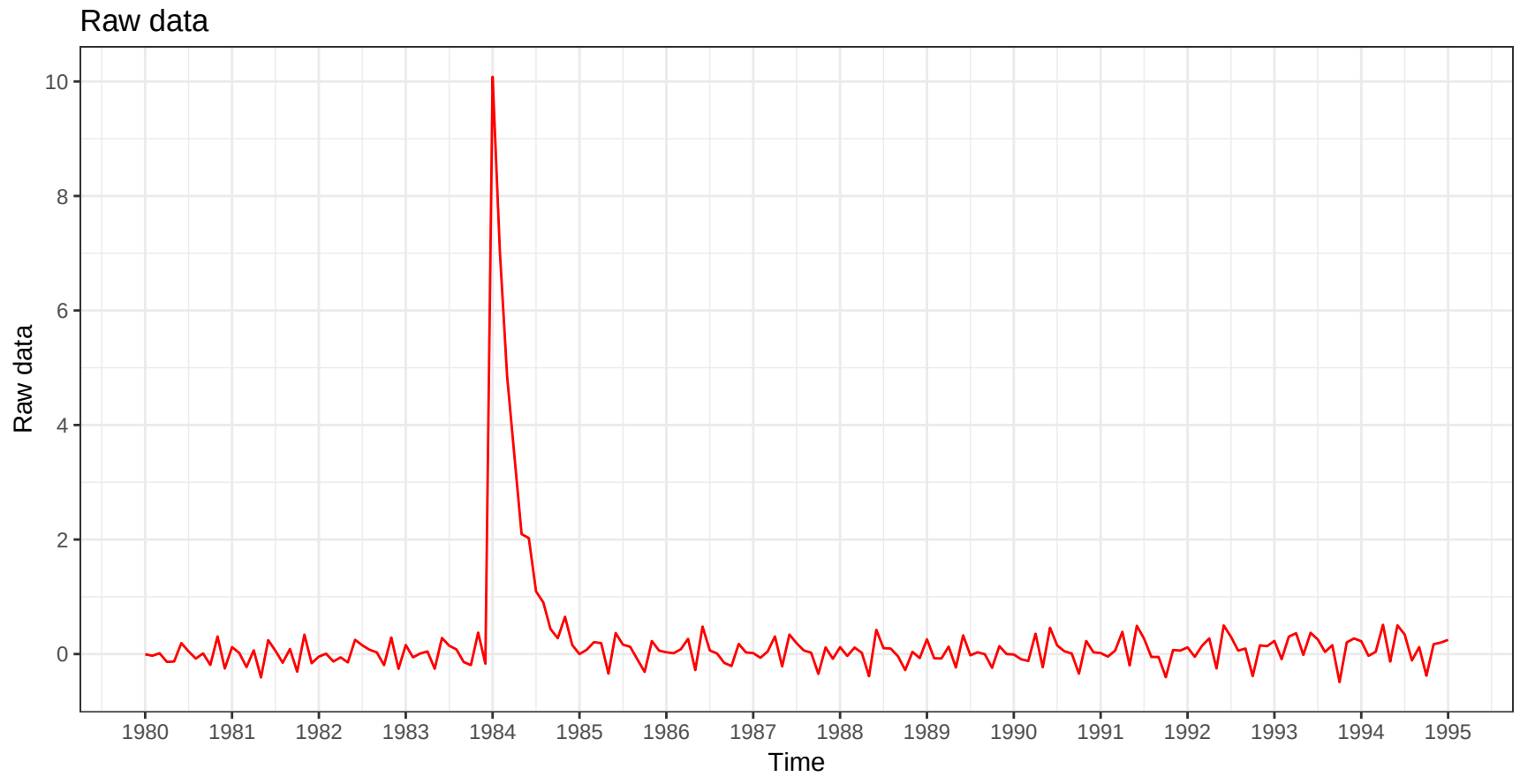
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(1,1,1) − additive decomposition
(1−B12)(1+0.4B12)Xt=(1−0.5B12)at



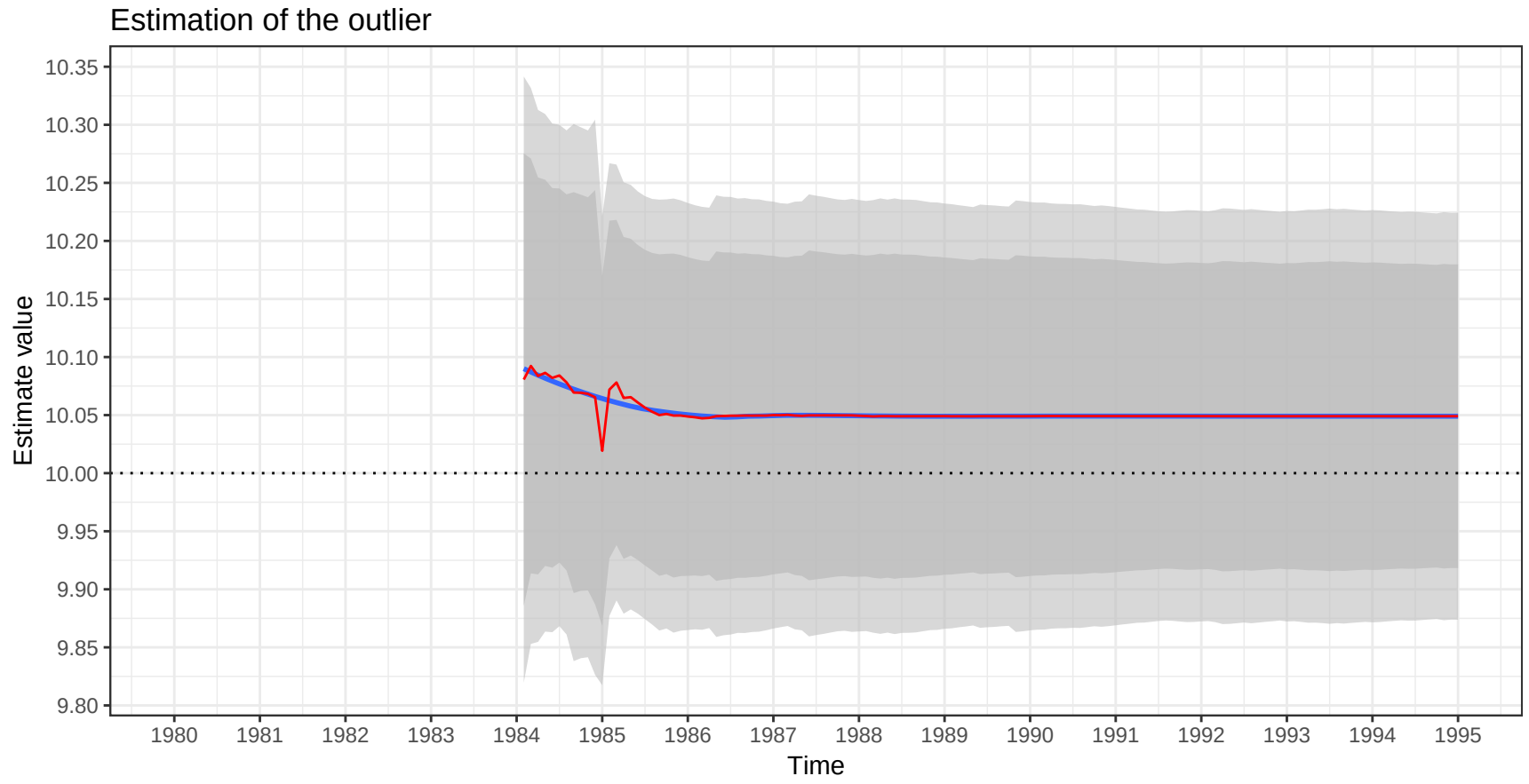


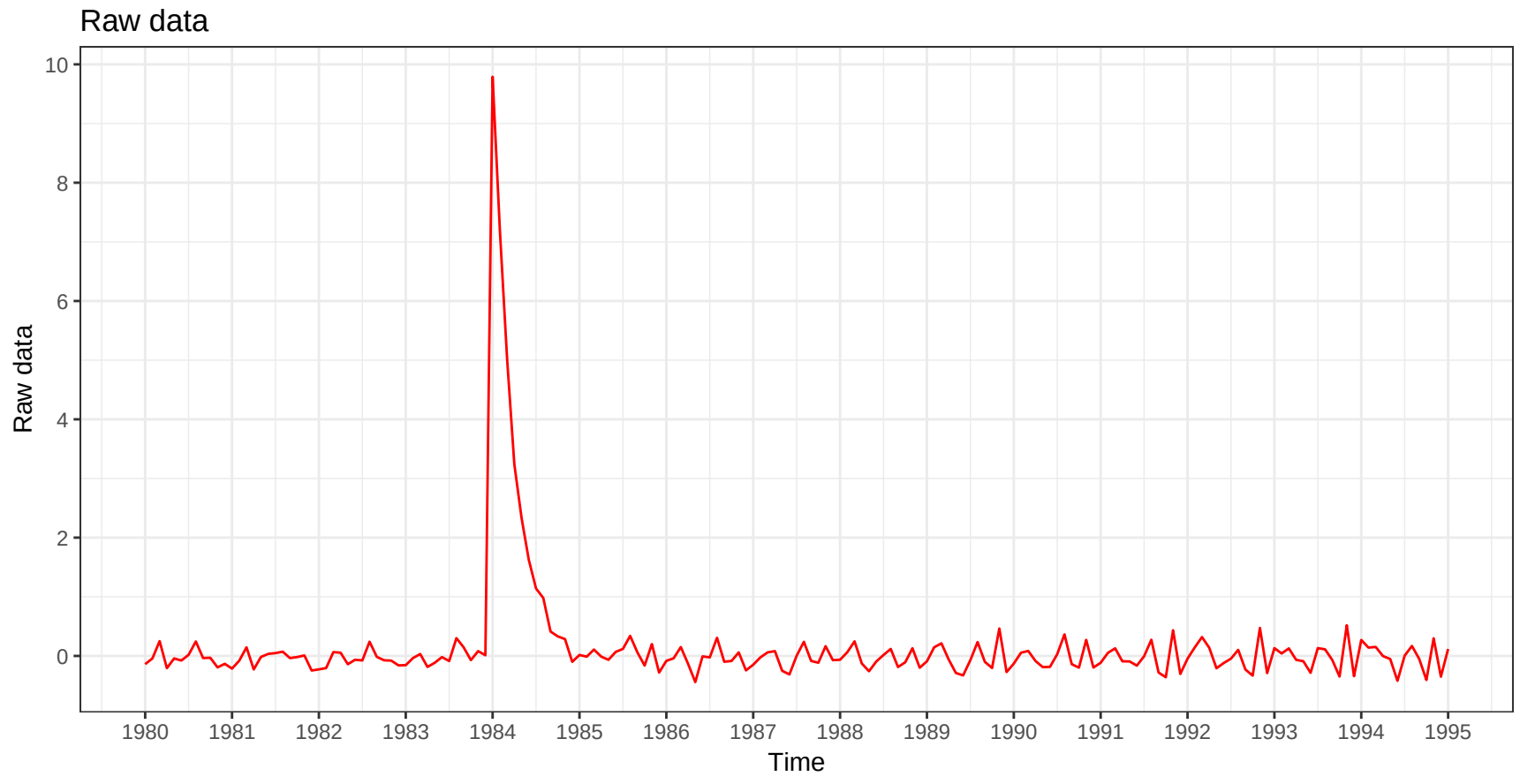
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(1,1,1) − additive decomposition
(1−B12)(1+0.4B12)Xt=(1−0.5B12)at



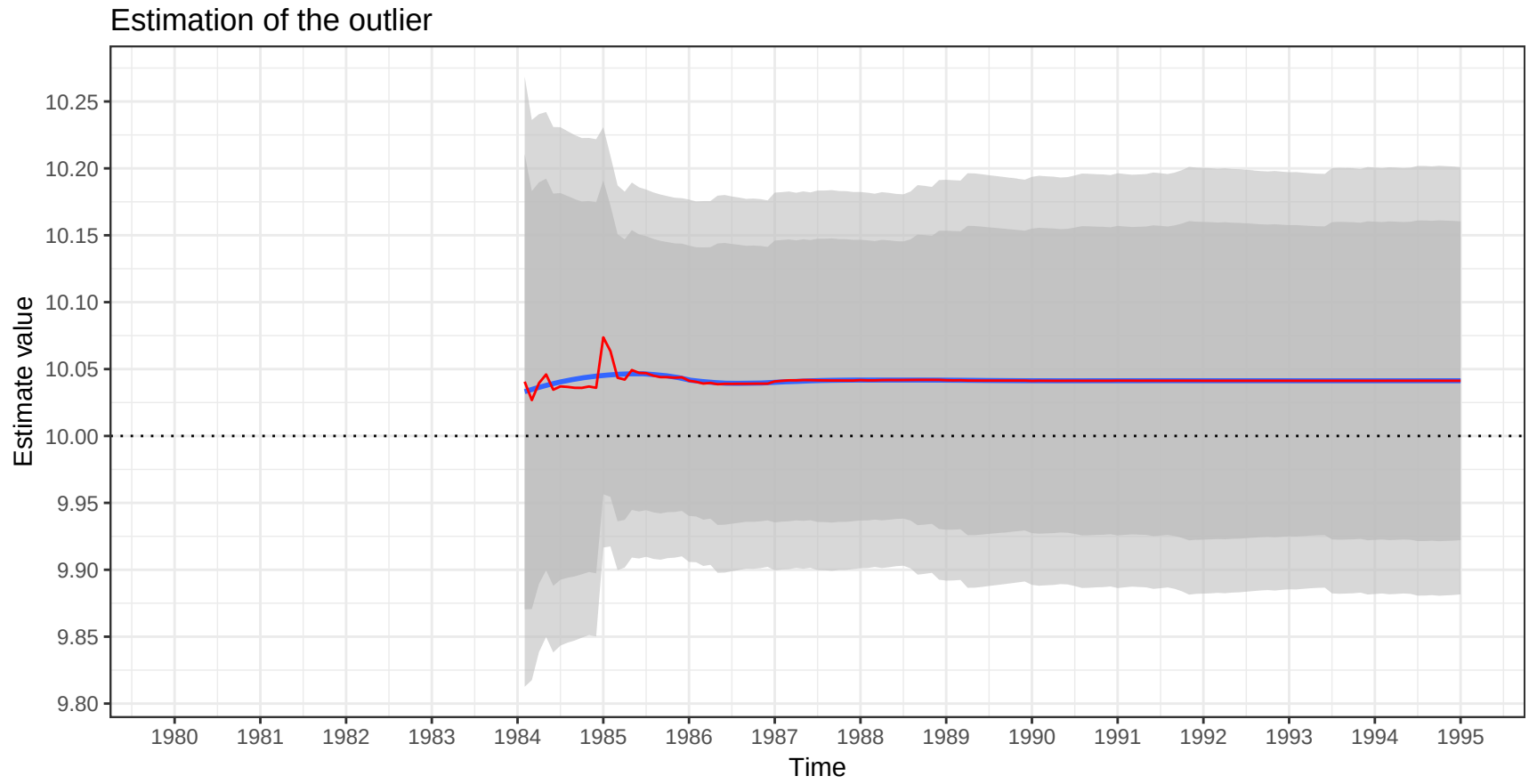


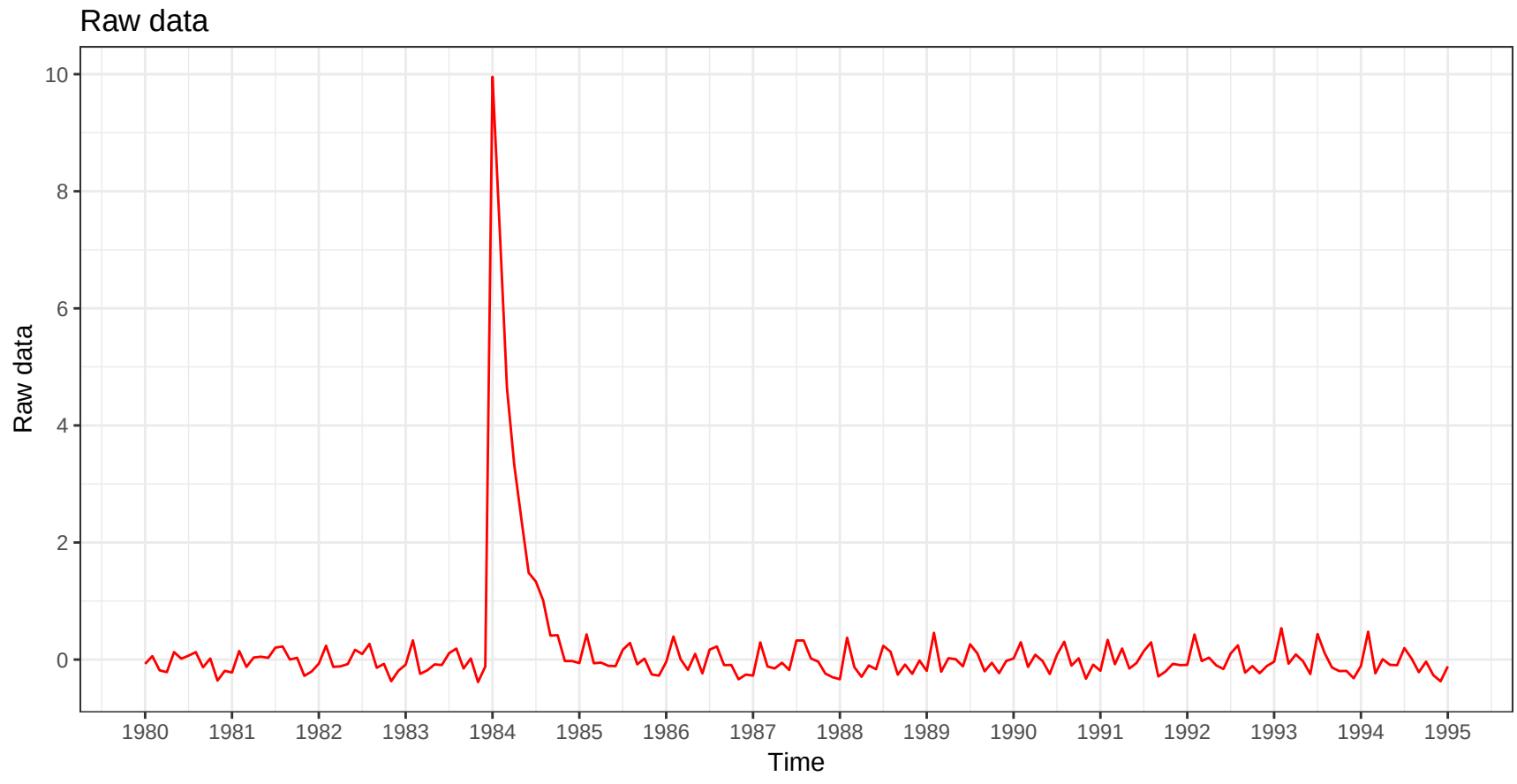
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(1,1,1) − additive decomposition
(1−B12)(1+0.4B12)Xt=(1−0.5B12)at



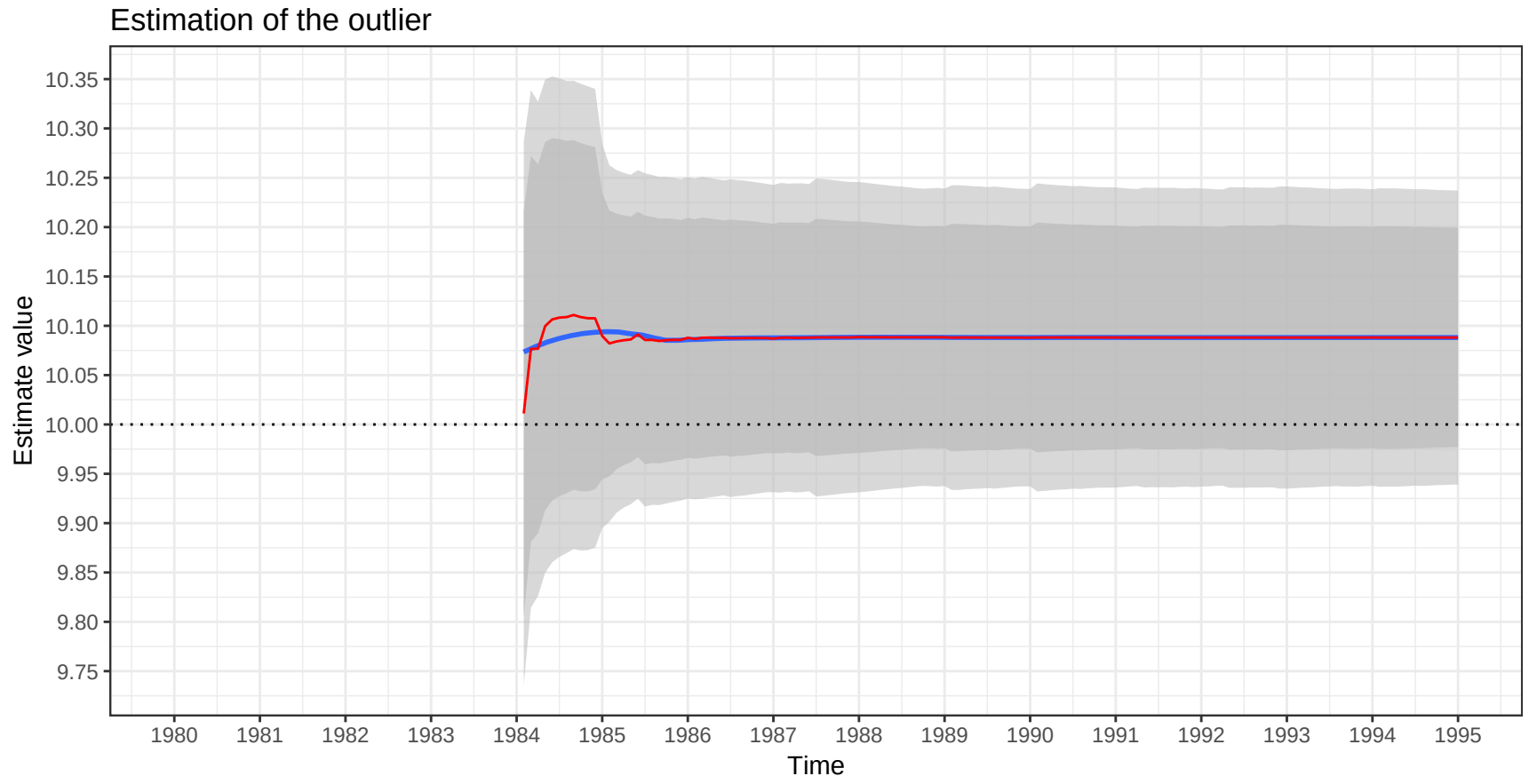


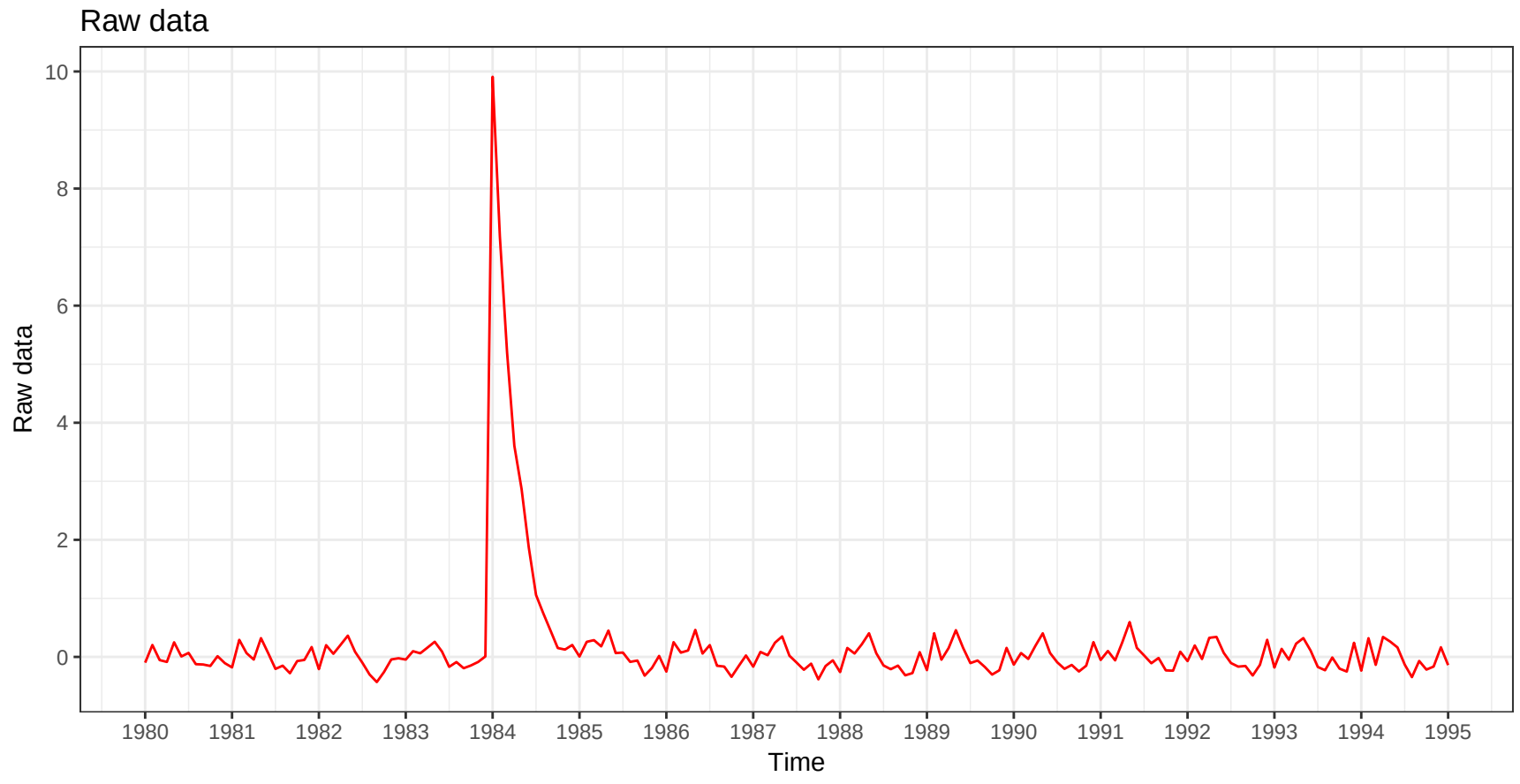
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(1,1,1) − additive decomposition
(1−B12)(1+0.4B12)Xt=(1−0.5B12)at



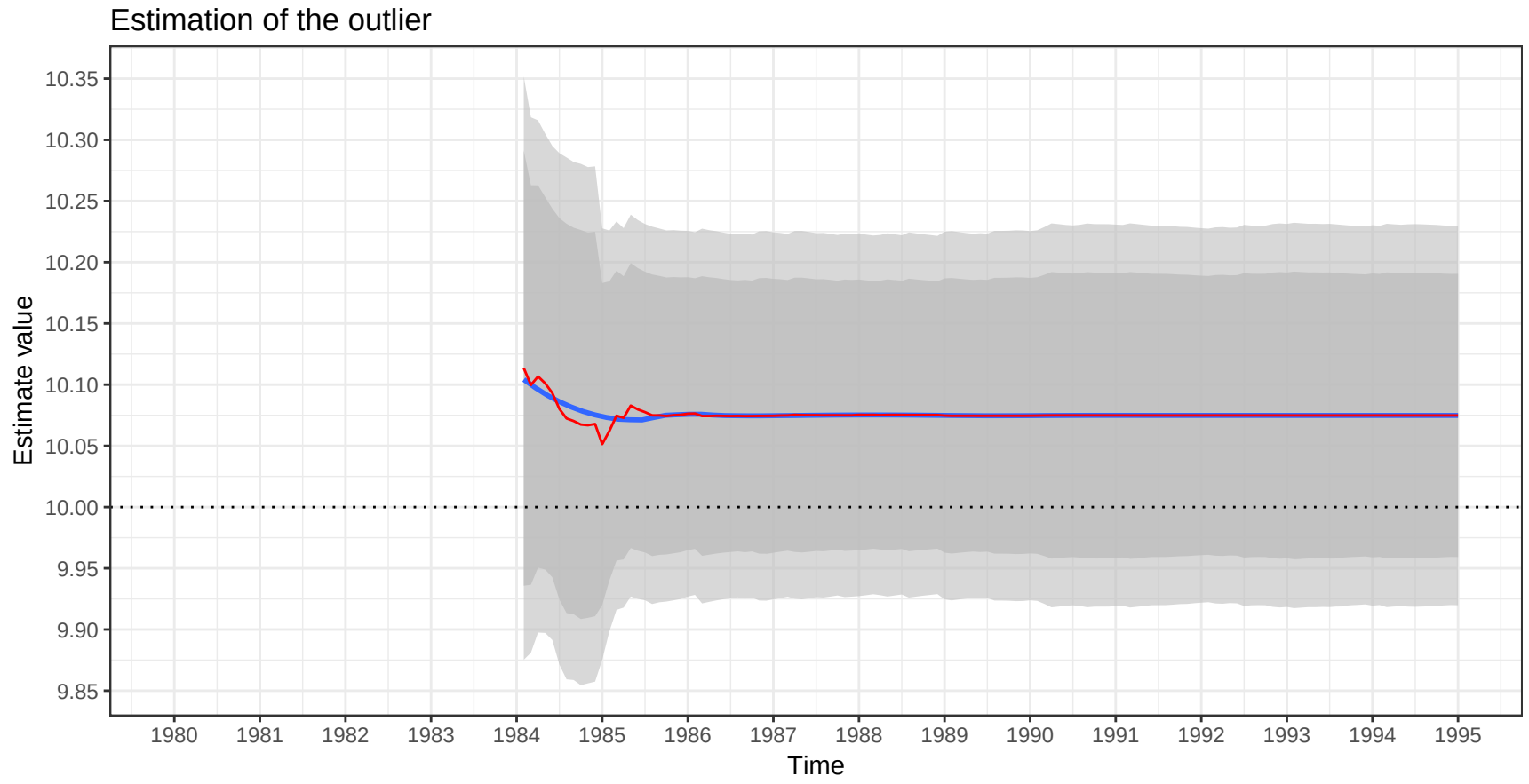


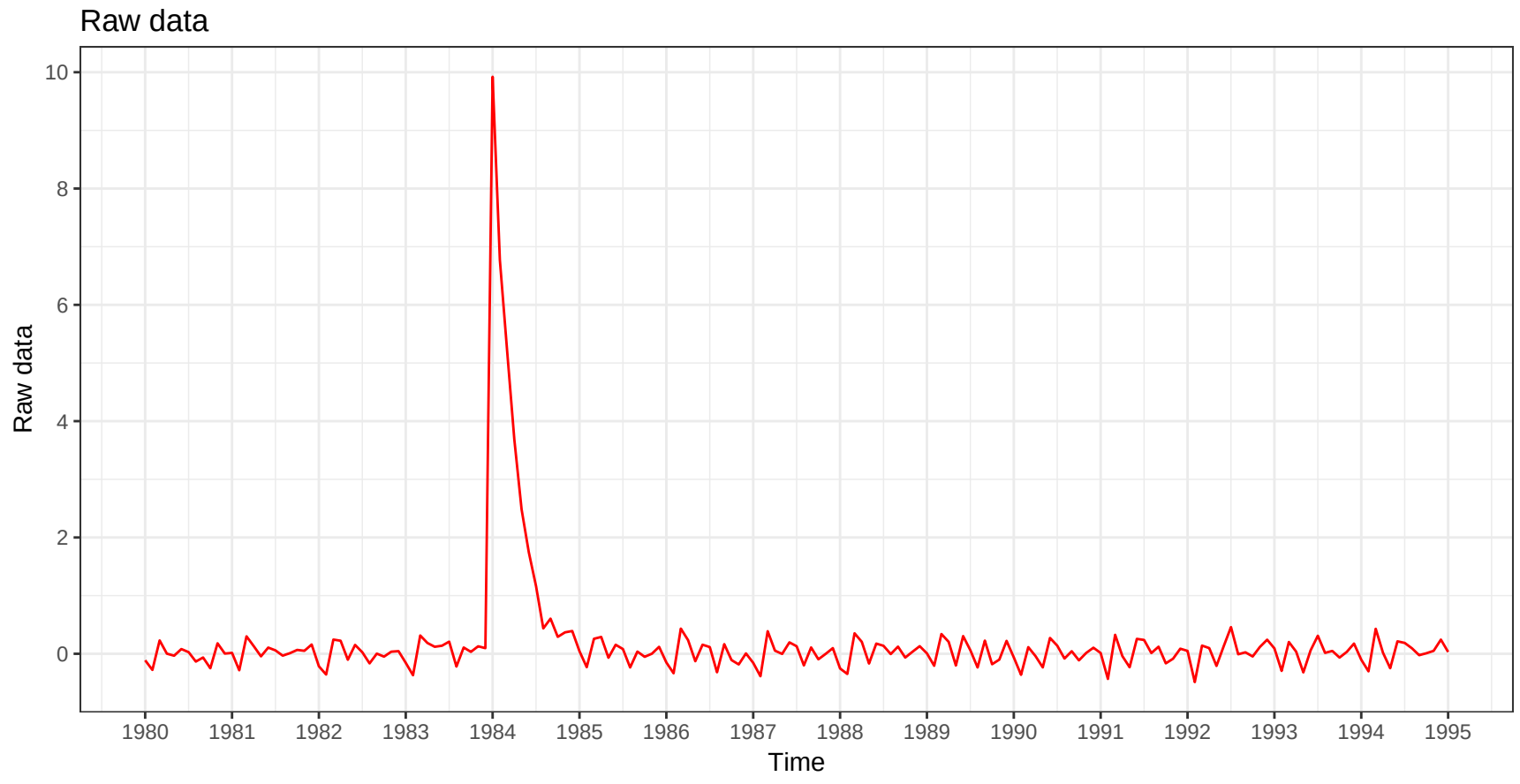
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(1,1,1) − additive decomposition
(1−B12)(1+0.4B12)Xt=(1−0.5B12)at



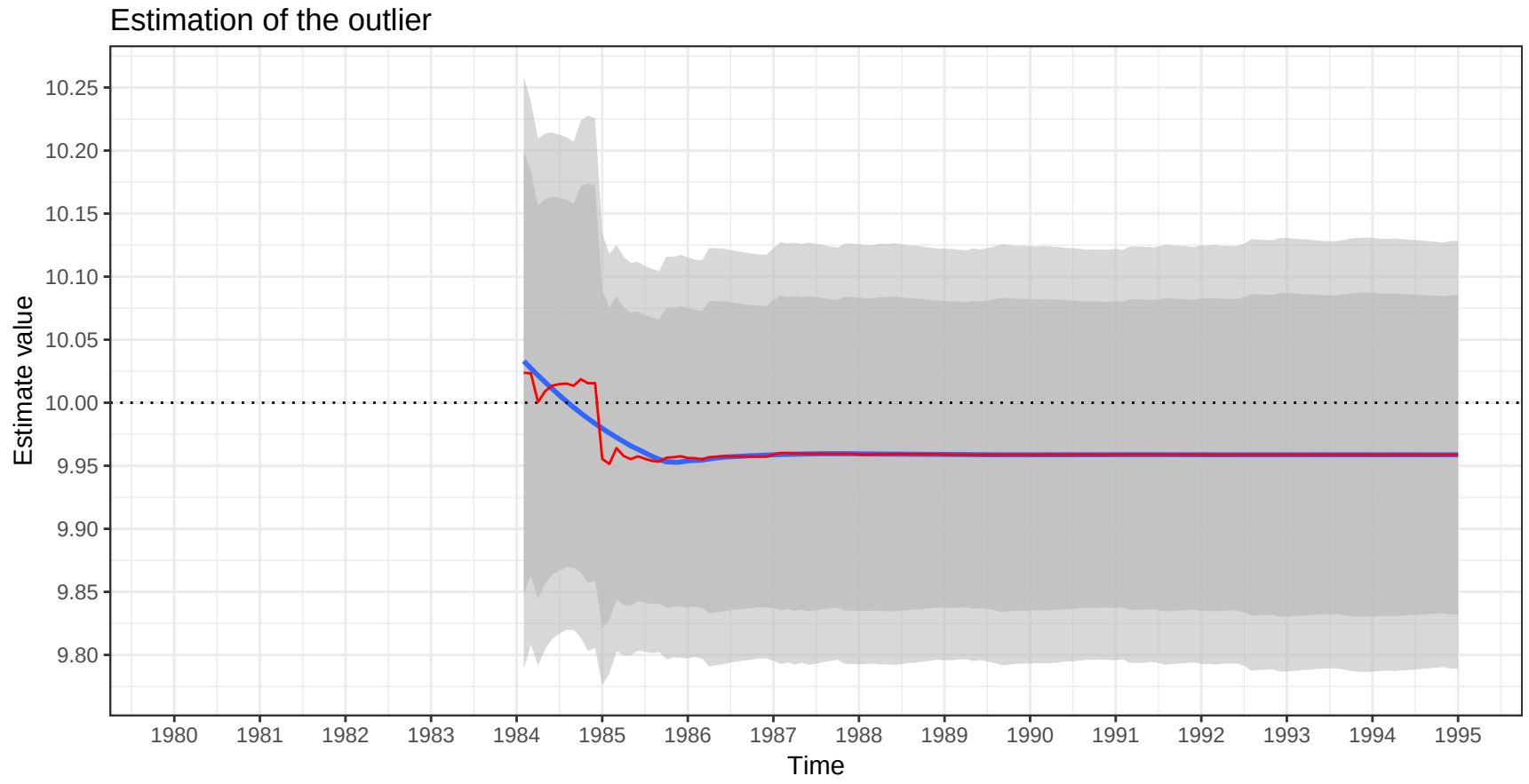


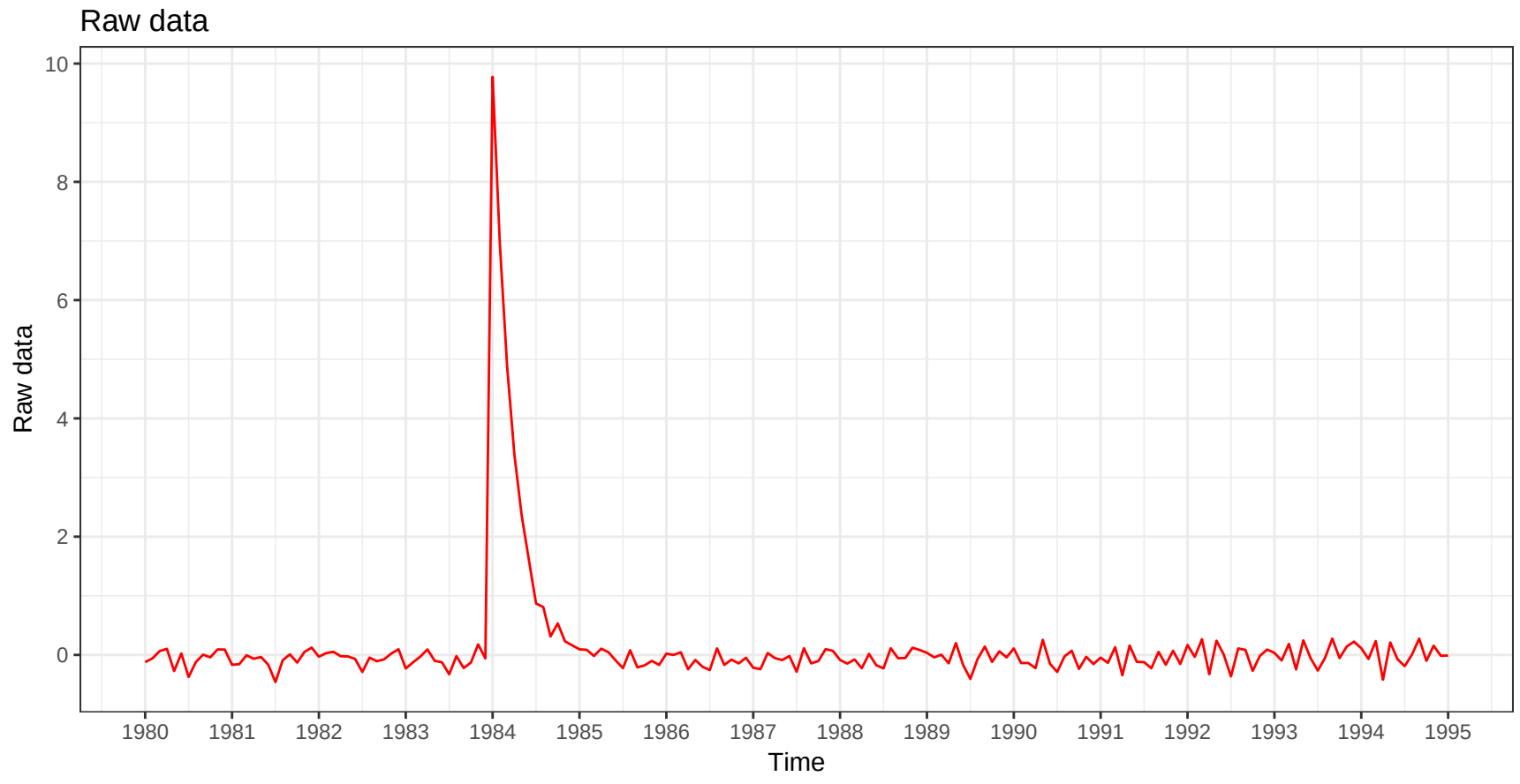
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(1,1,1) − additive decomposition
(1−B12)(1+0.4B12)Xt=(1−0.5B12)at



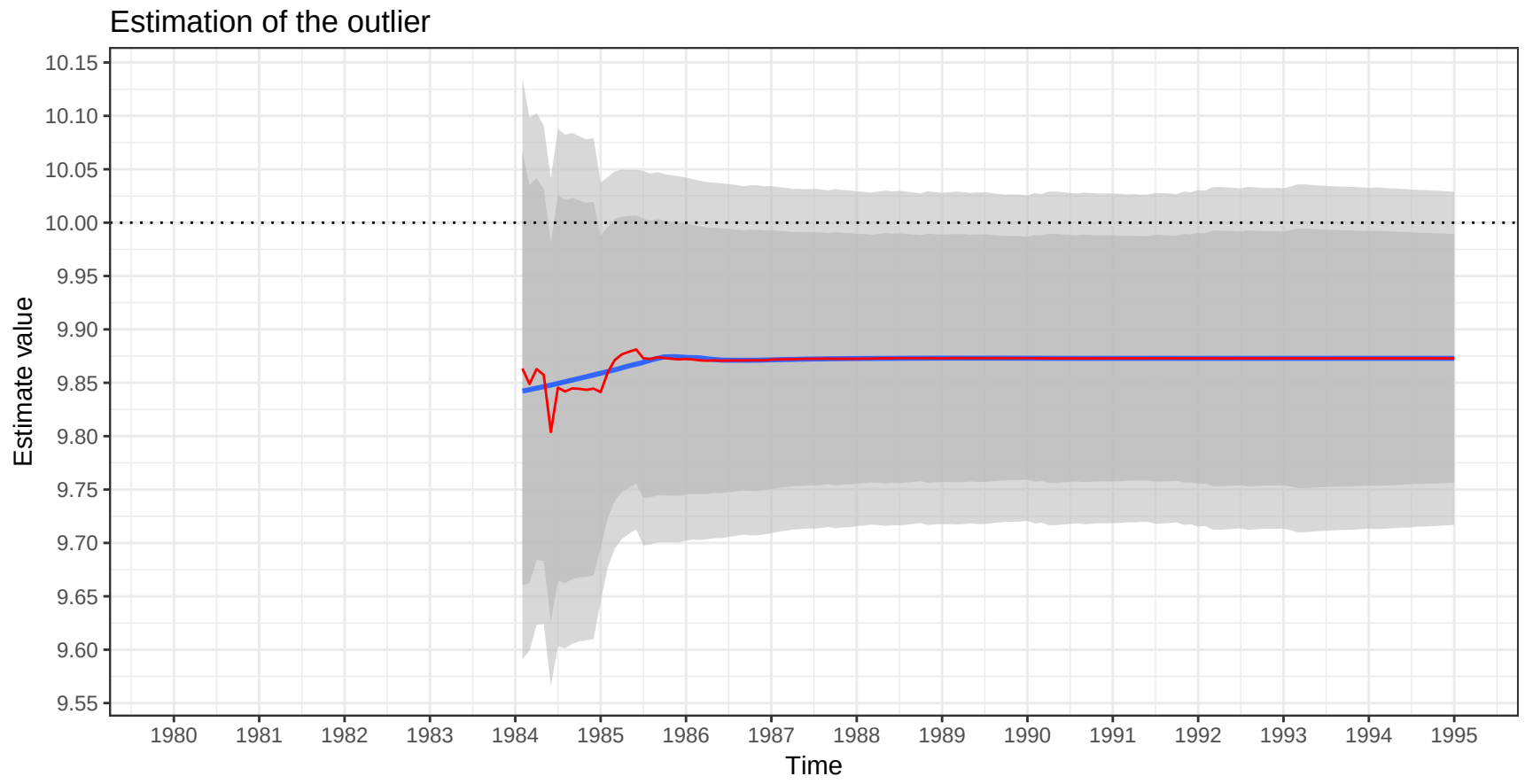


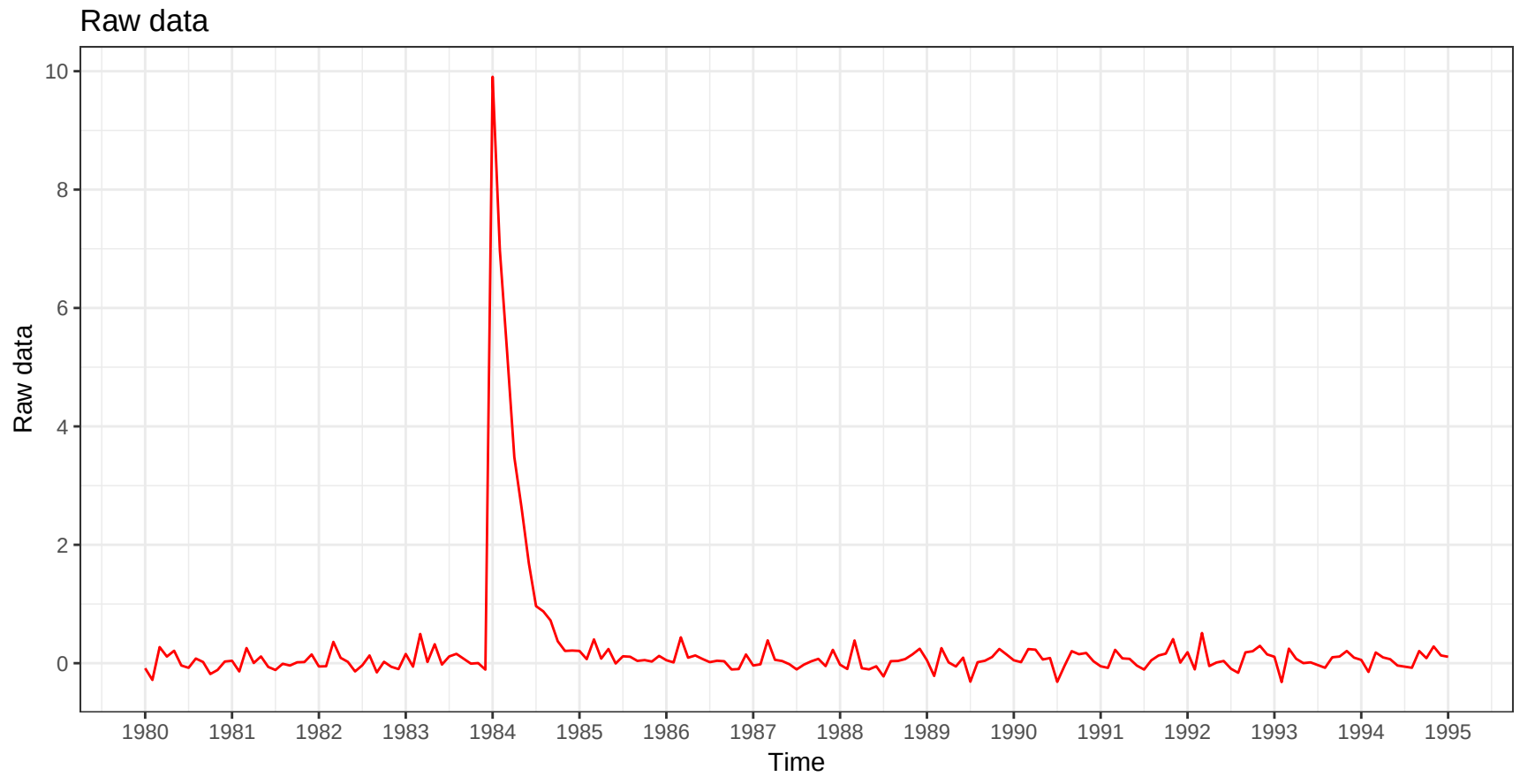
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(1,1,1) − additive decomposition
(1−B12)(1+0.4B12)Xt=(1−0.5B12)at



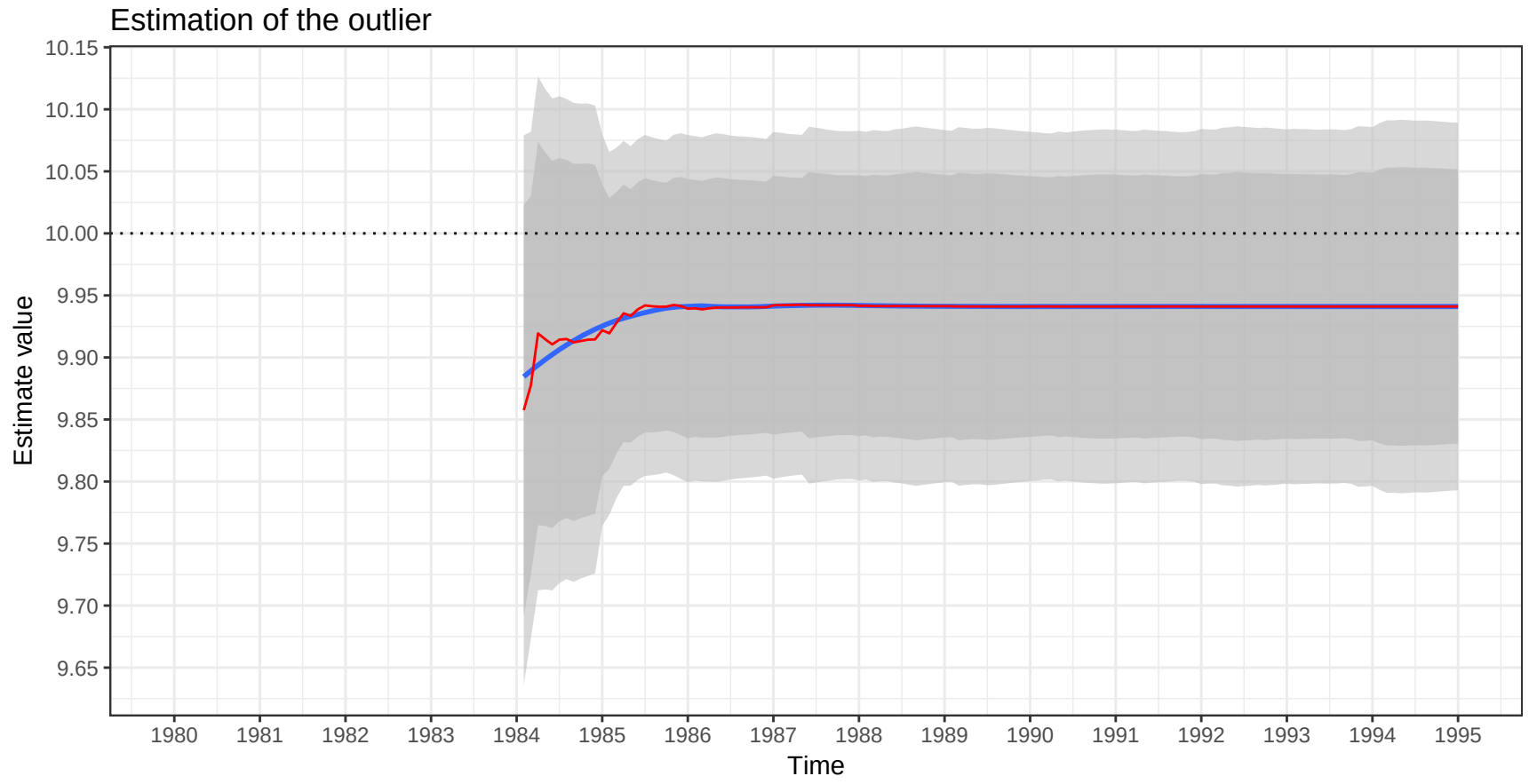


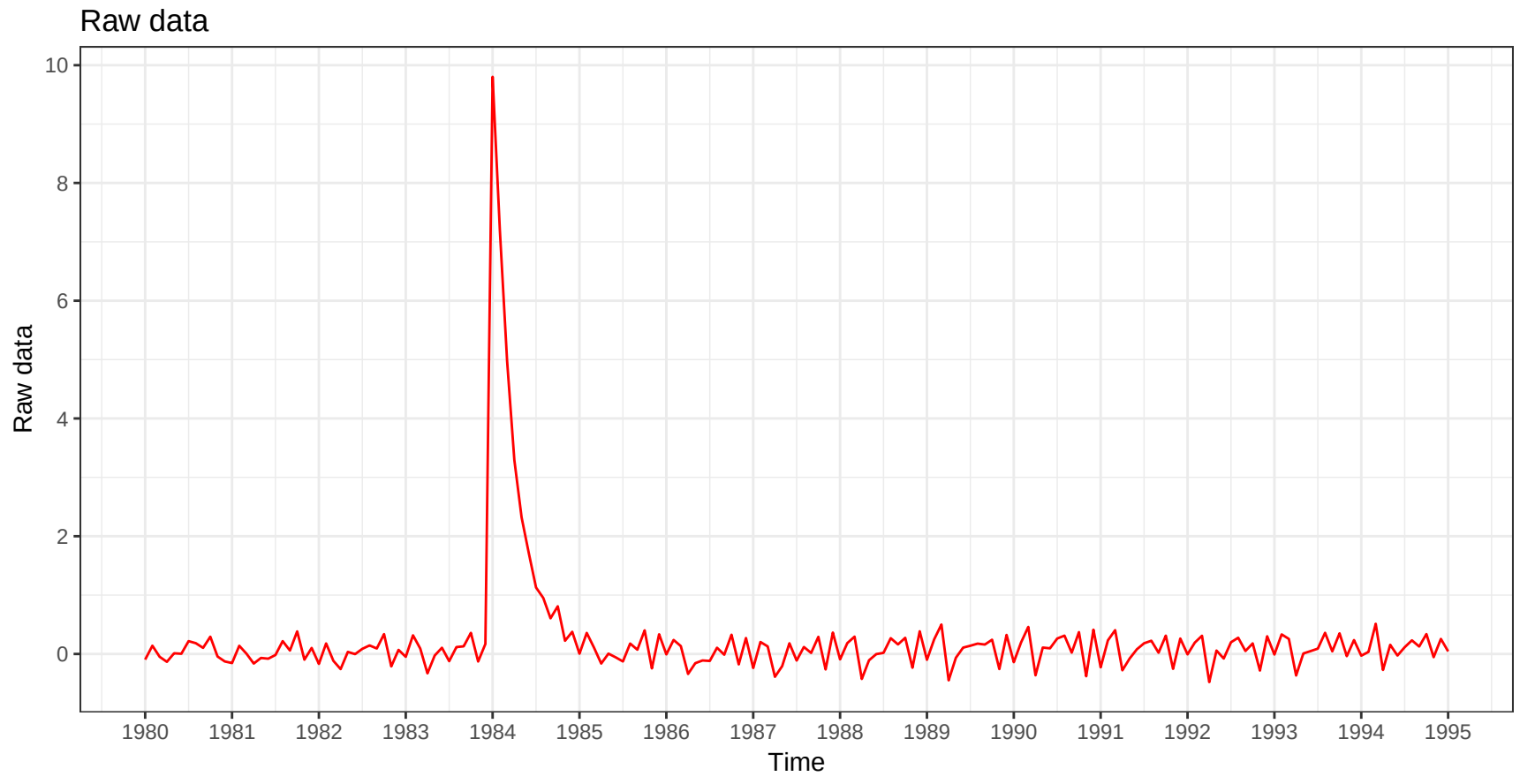
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(1,1,1) − additive decomposition
(1−B12)(1+0.4B12)Xt=(1−0.5B12)at



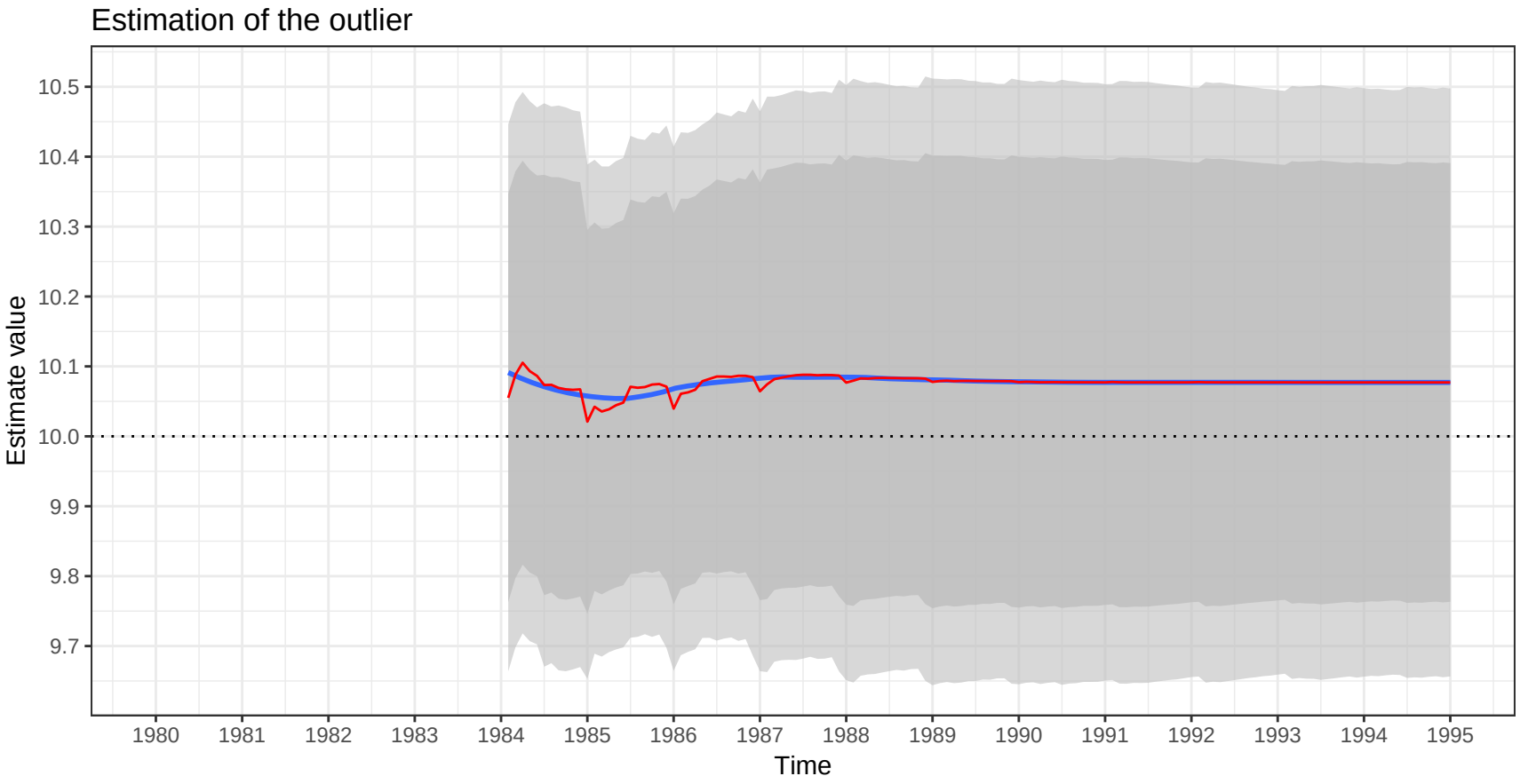


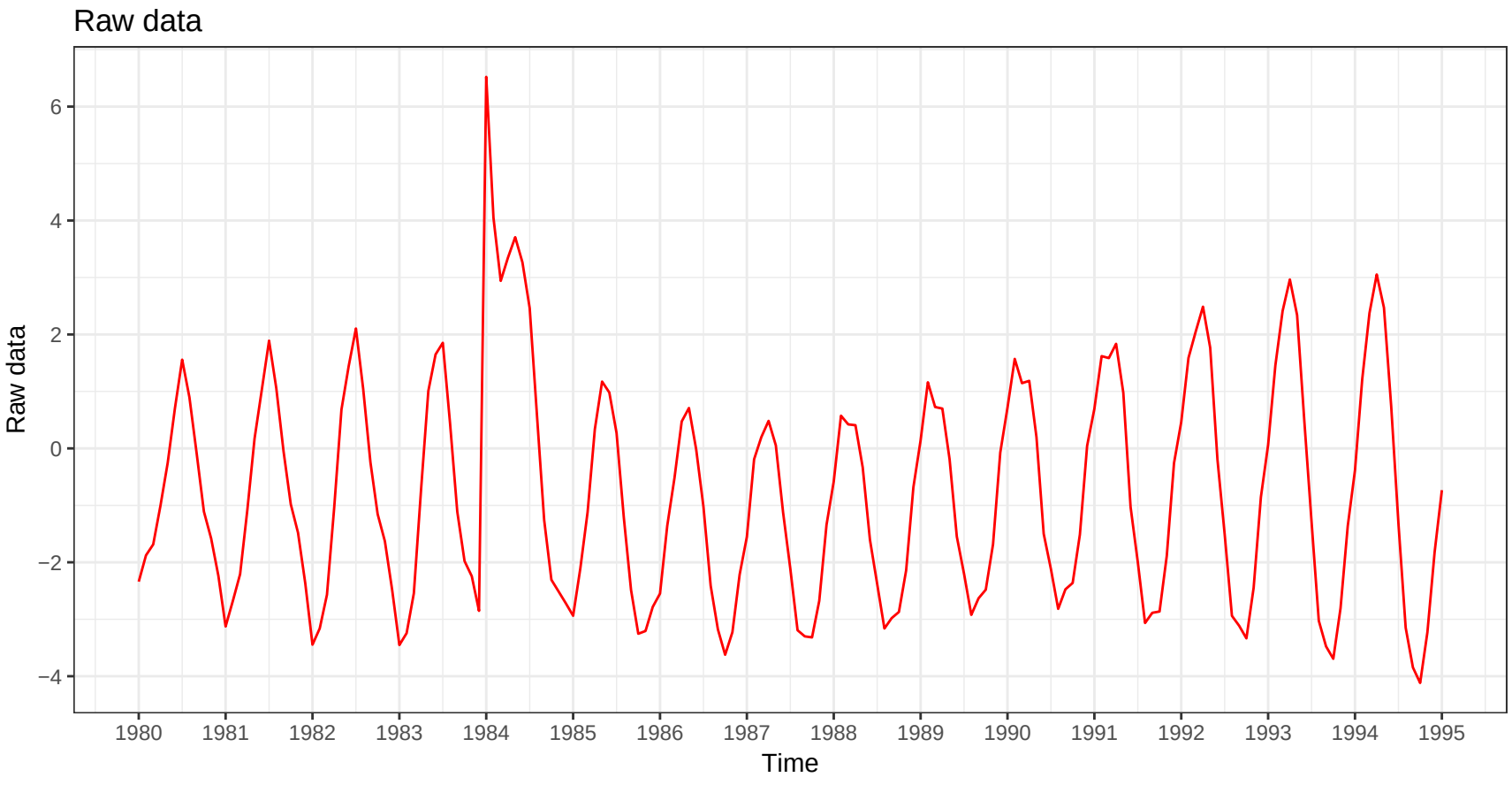
Estimate value of a TC(1984−01)
ARIMA (0,0,0)(1,1,1) − additive decomposition
(1−B12)(1+0.4B12)Xt=(1−0.5B12)at

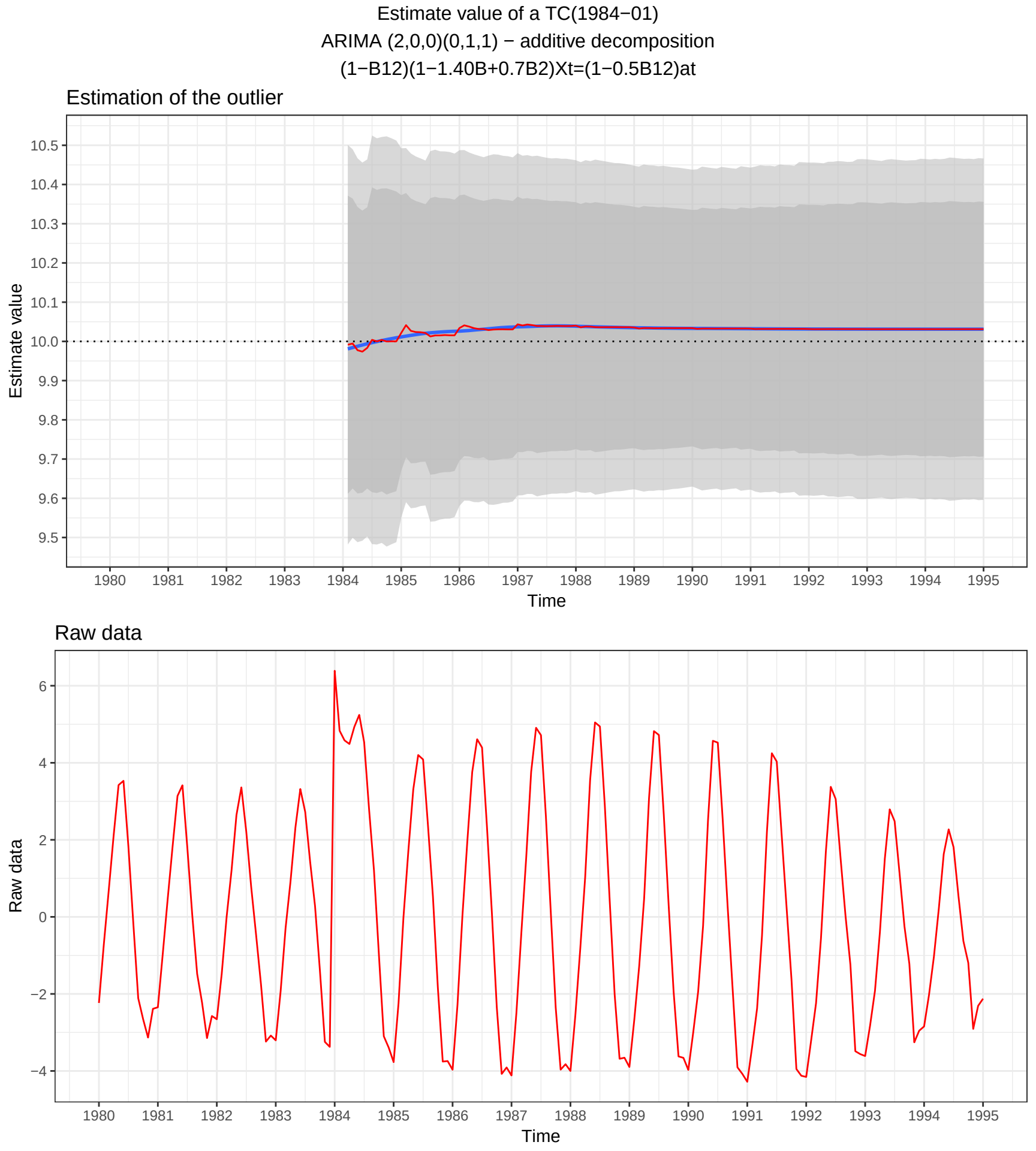




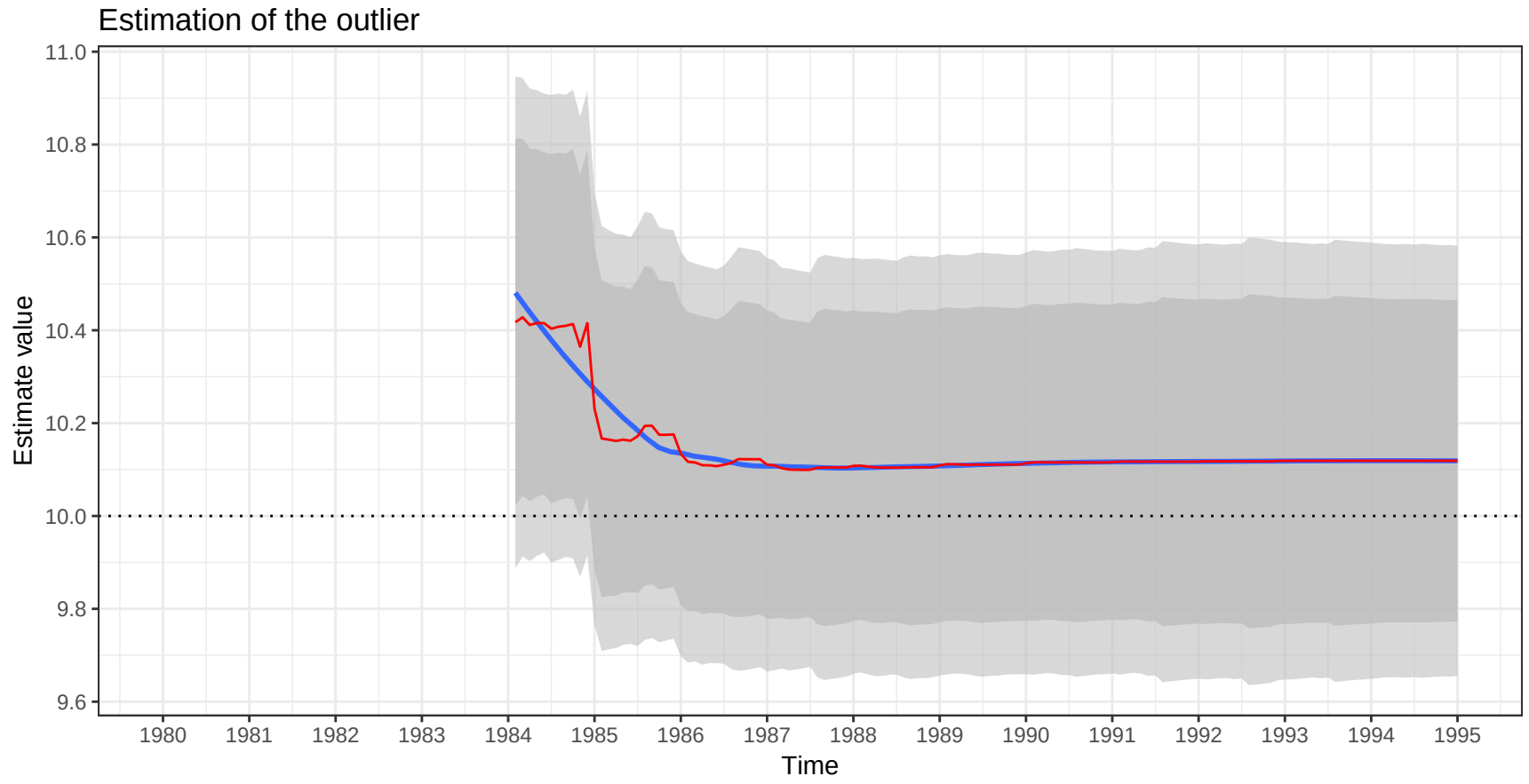
Estimate value of a TC(1984−01)
ARIMA (2,0,0)(0,1,1) − additive decomposition
(1−B12)(1−1.40B+0.7B2)Xt=(1−0.5B12)at

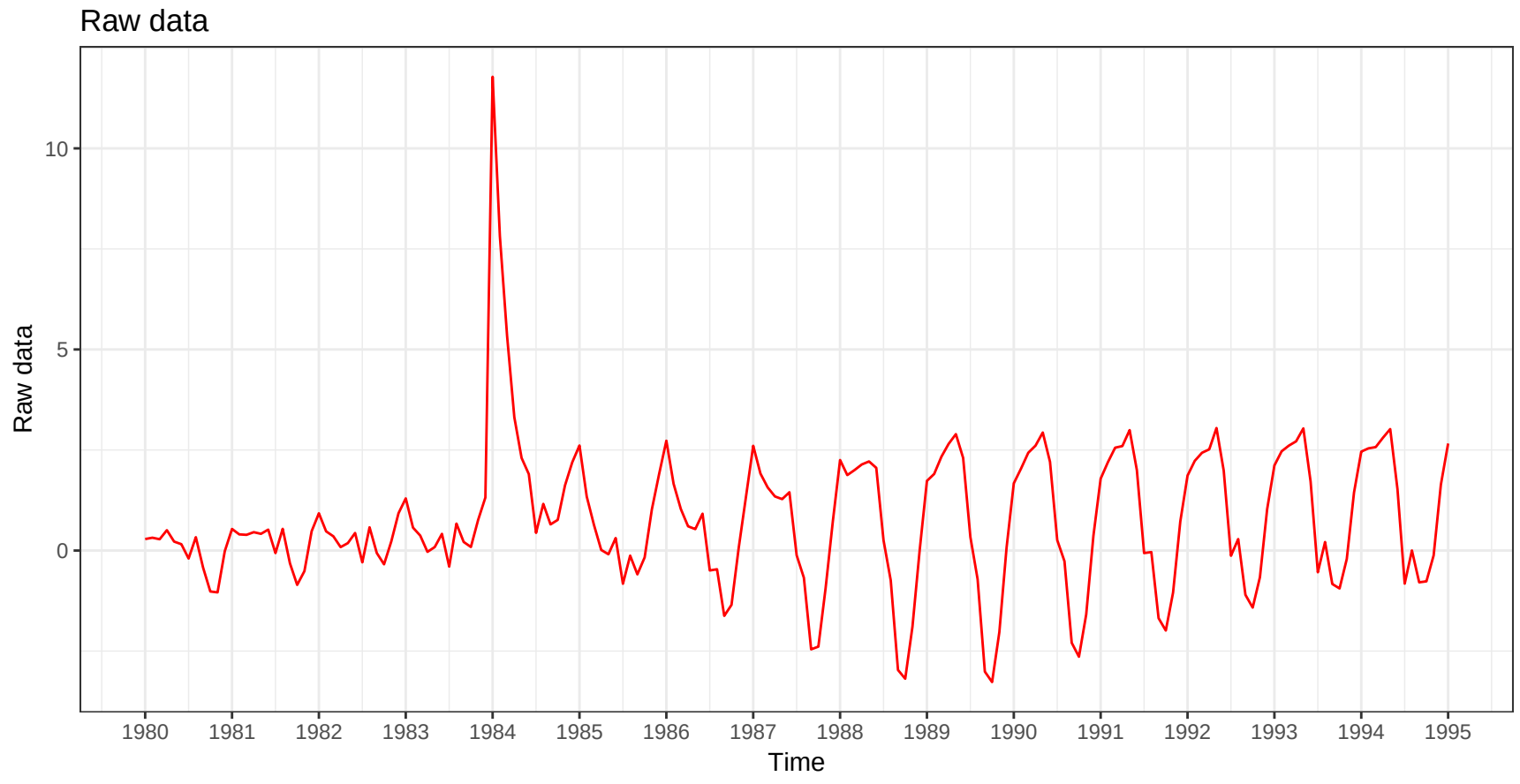




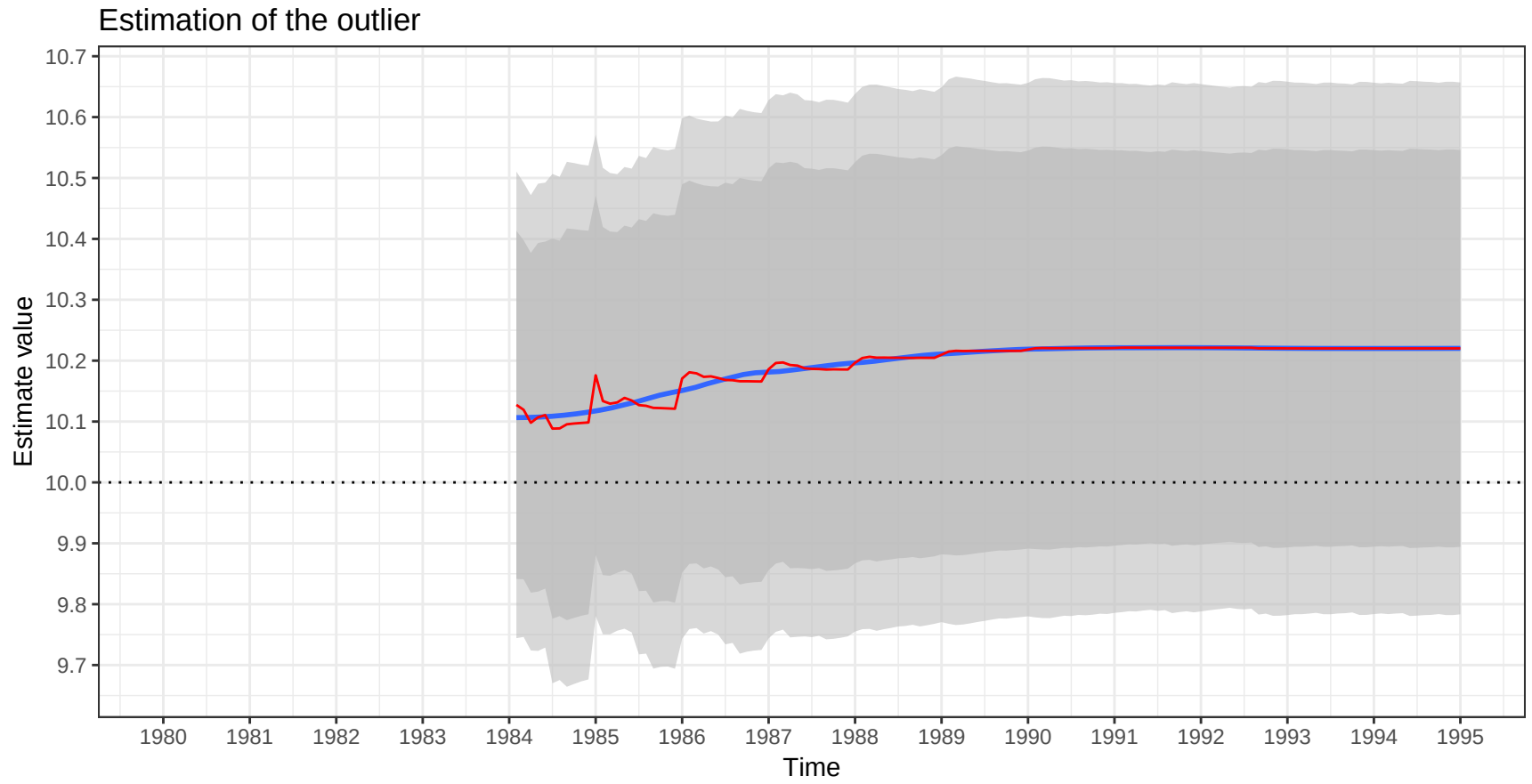

Estimate value of a TC(1984−01)
ARIMA (2,0,0)(0,1,1) − additive decomposition
(1−B12)(1−1.40B+0.7B2)Xt=(1−0.5B12)at
Estimation of the outlier
Estimate value
10.5
10.4
10.3
10.2
10.1
10.0
9.9
9.8
9.7
9.6
9.5
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time
Raw data
Raw data
6
4
2
0
−2
−4
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time

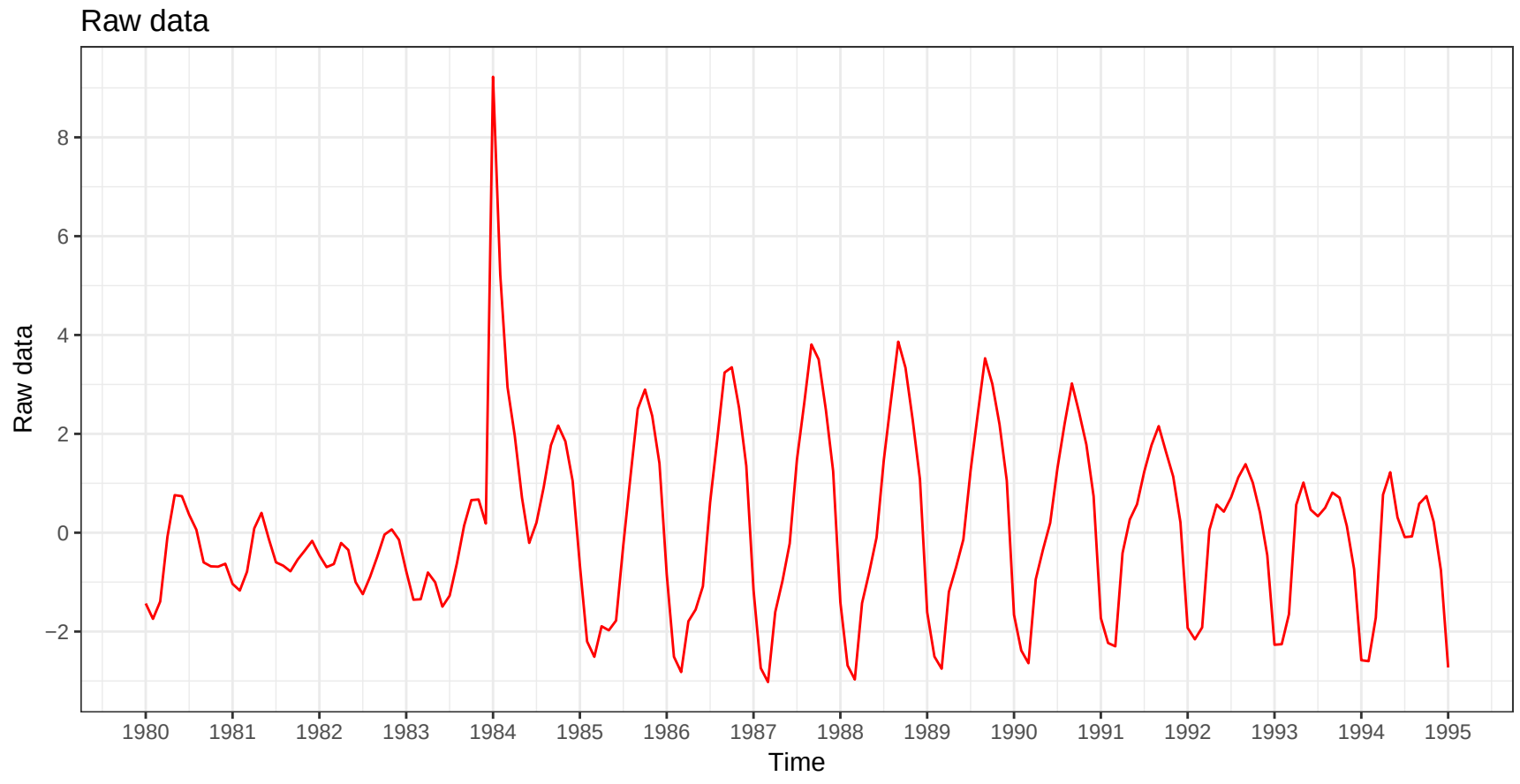
Estimate value of a TC(1984−01)
ARIMA (2,0,0)(0,1,1) − additive decomposition
(1−B12)(1−1.40B+0.7B2)Xt=(1−0.5B12)at



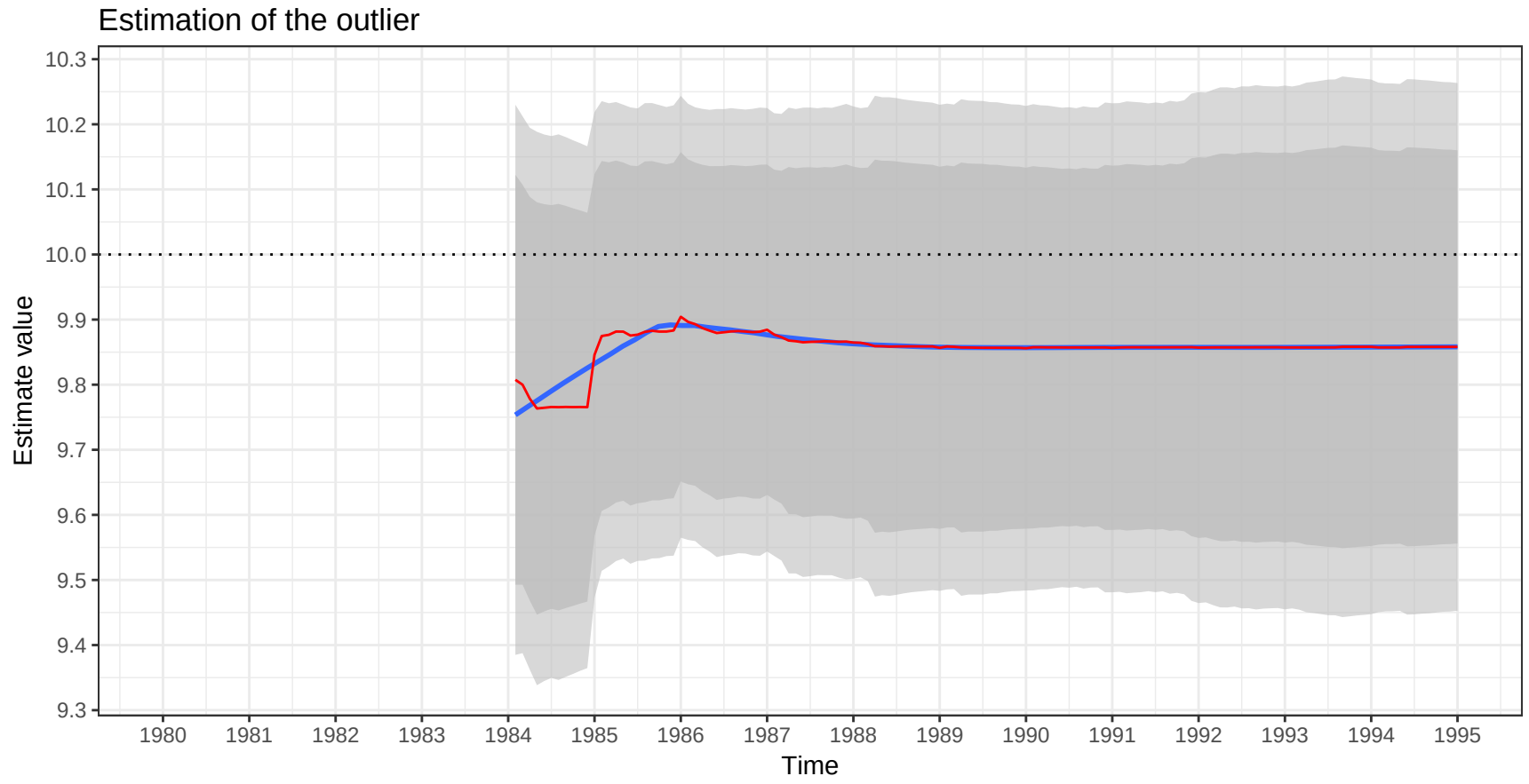


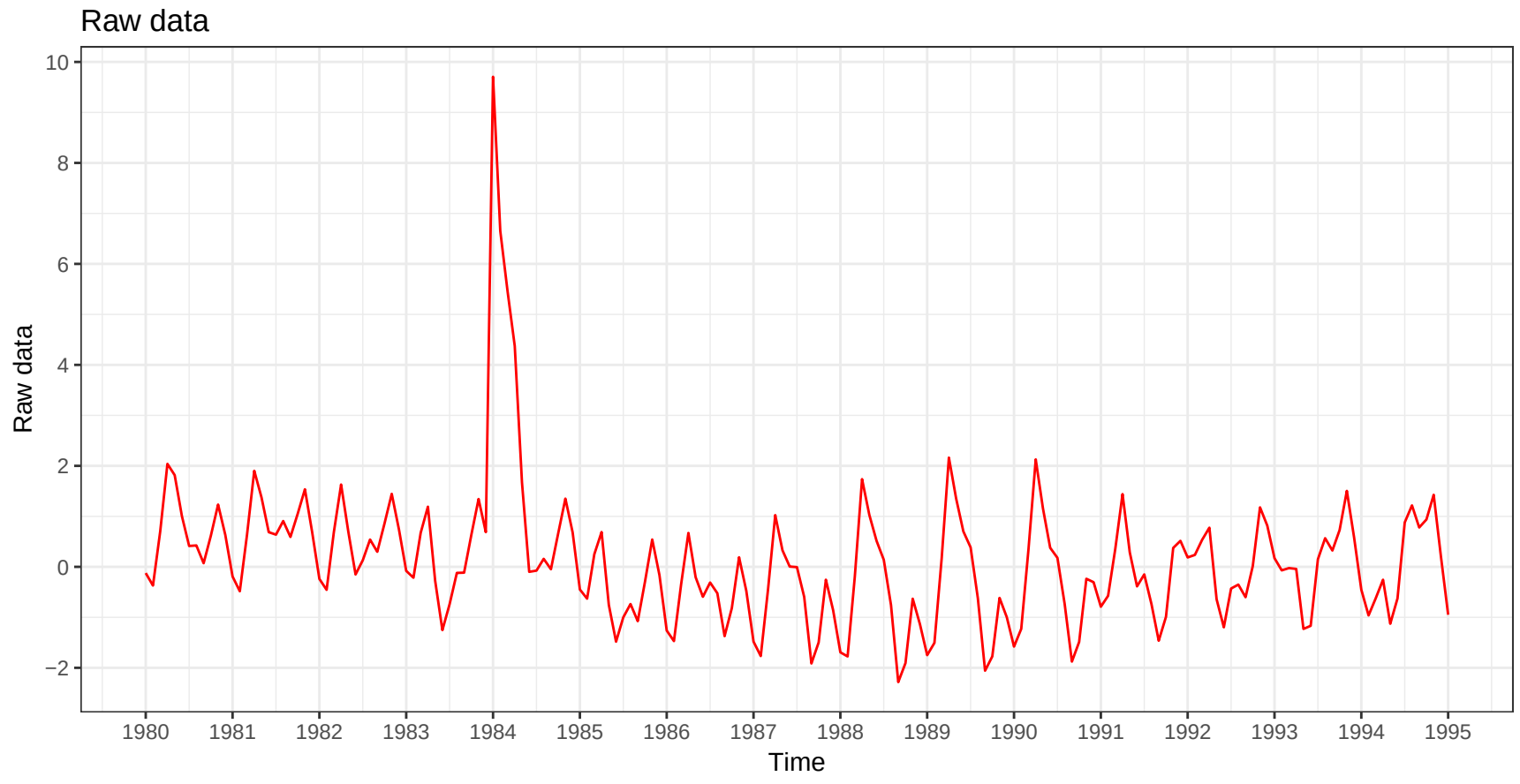
Estimate value of a TC(1984−01)
ARIMA (2,0,0)(0,1,1) − additive decomposition
(1−B12)(1−1.40B+0.7B2)Xt=(1−0.5B12)at



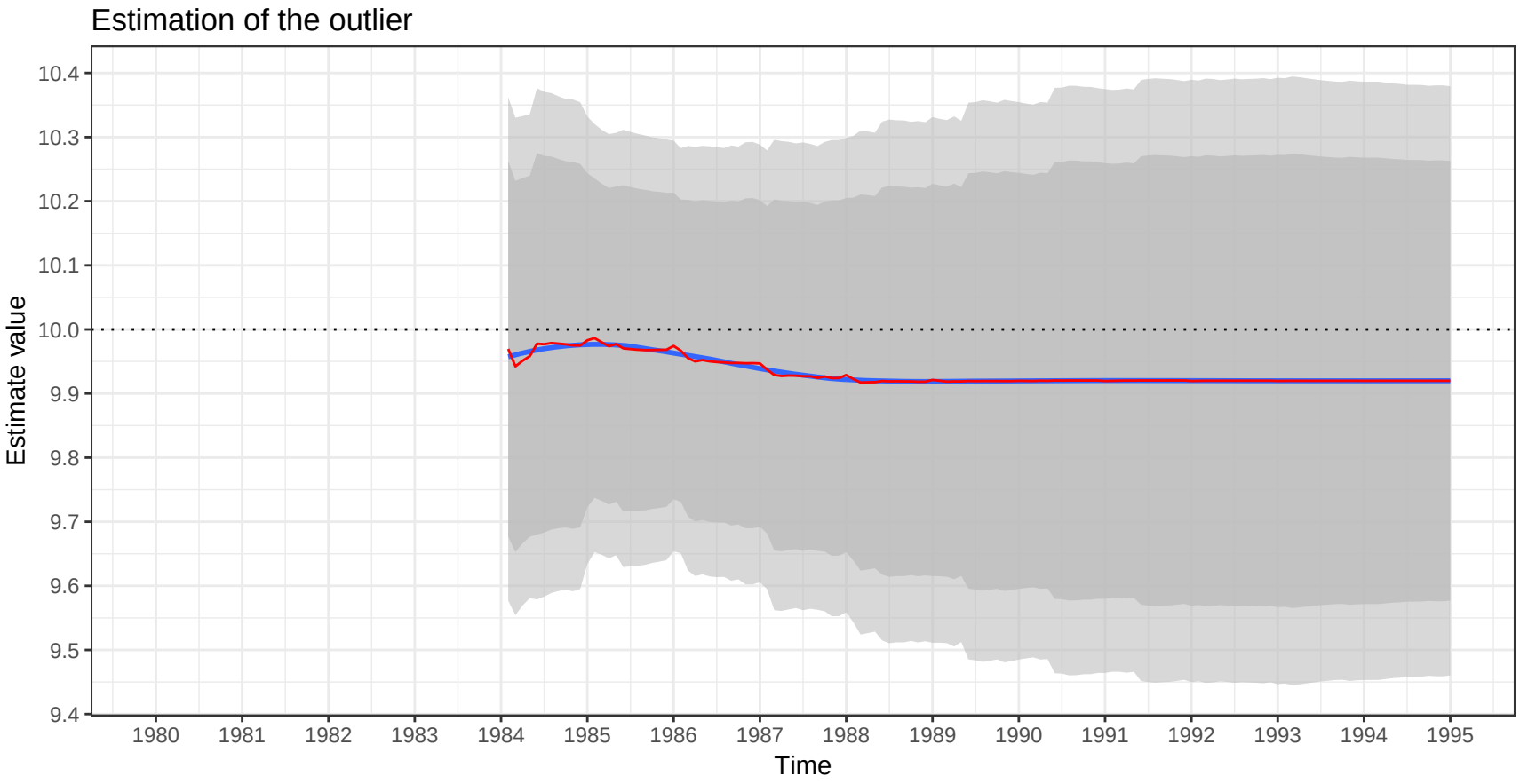


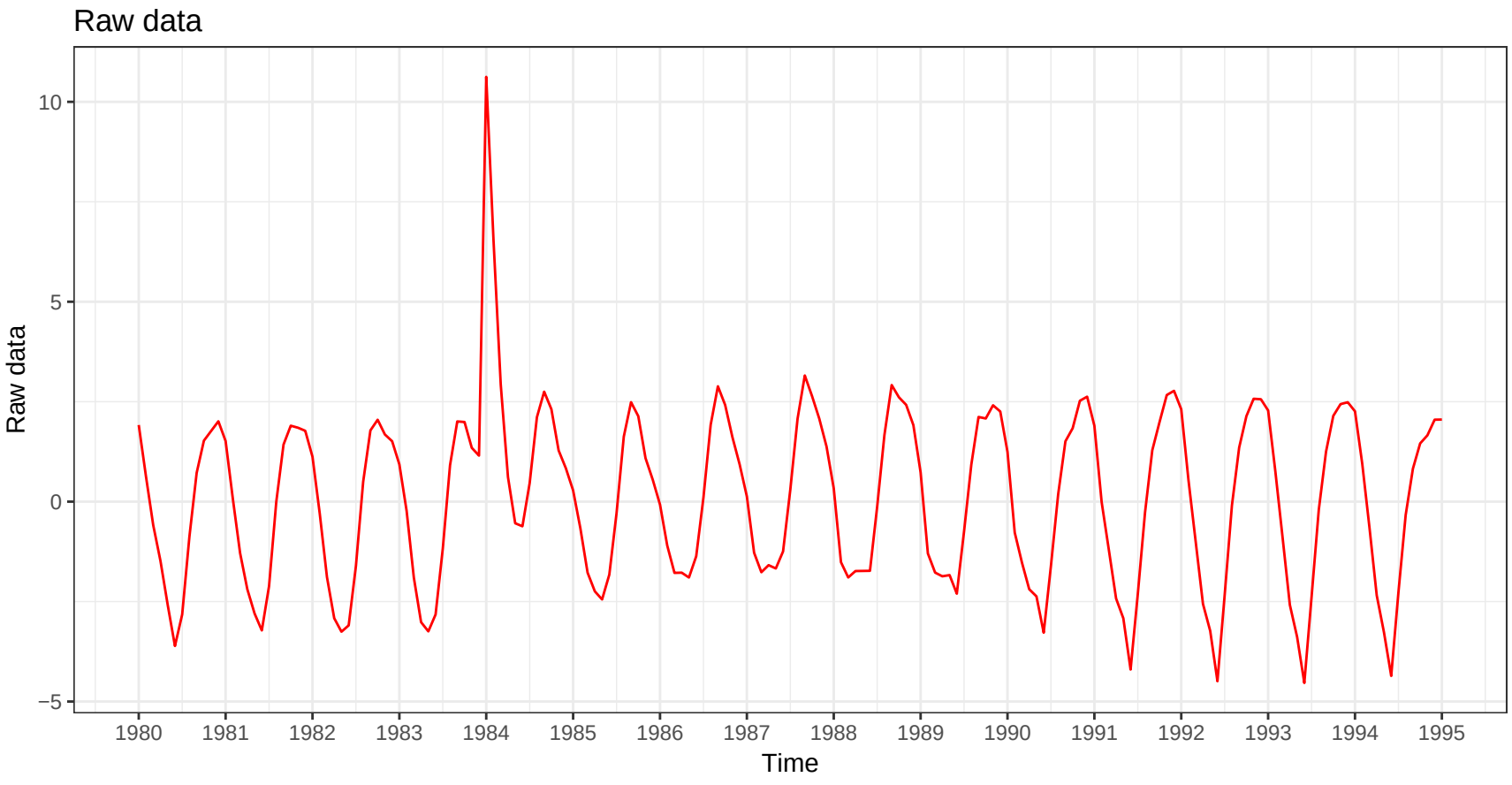
Estimate value of a TC(1984−01)
ARIMA (2,0,0)(0,1,1) − additive decomposition
(1−B12)(1−1.40B+0.7B2)Xt=(1−0.5B12)at



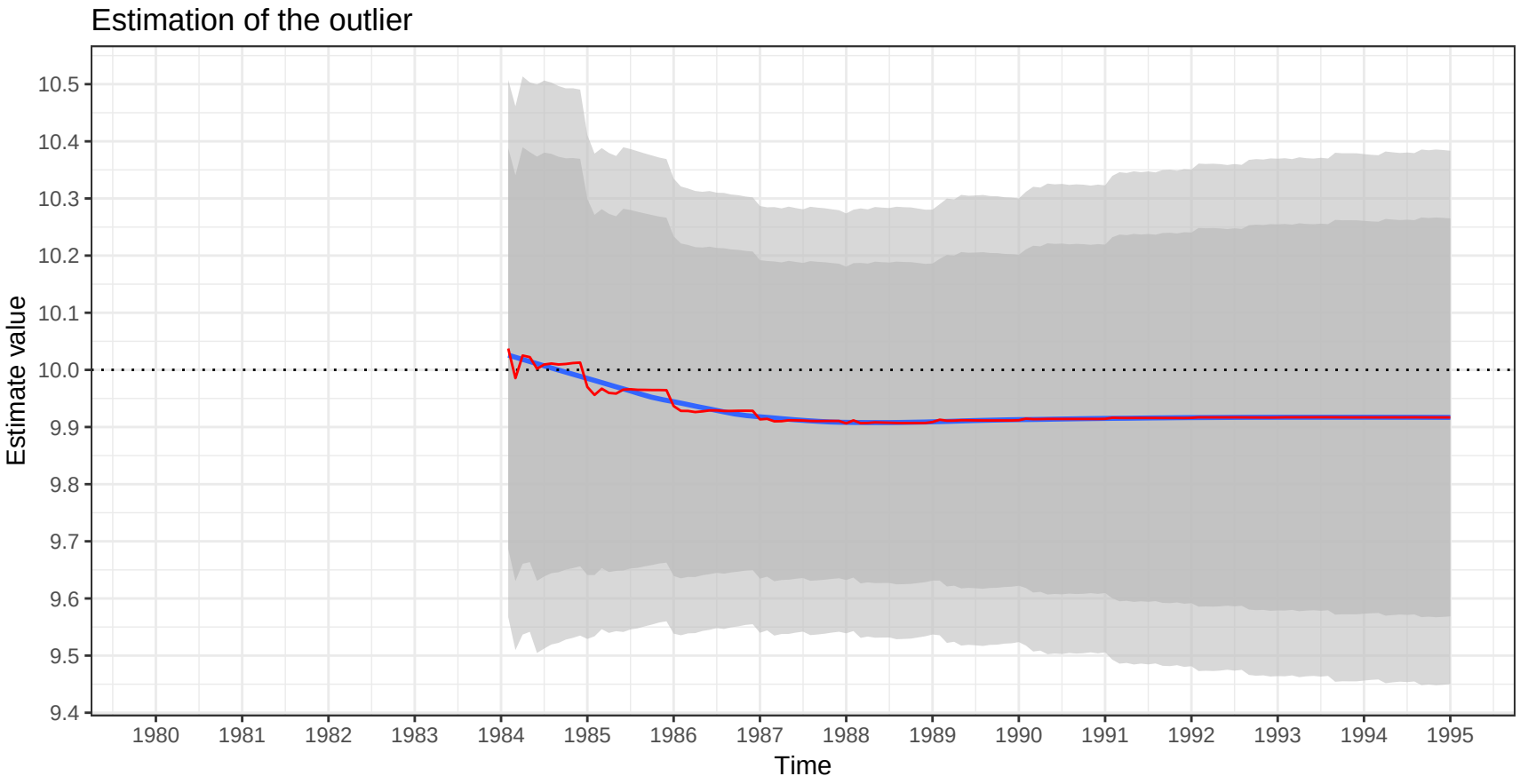


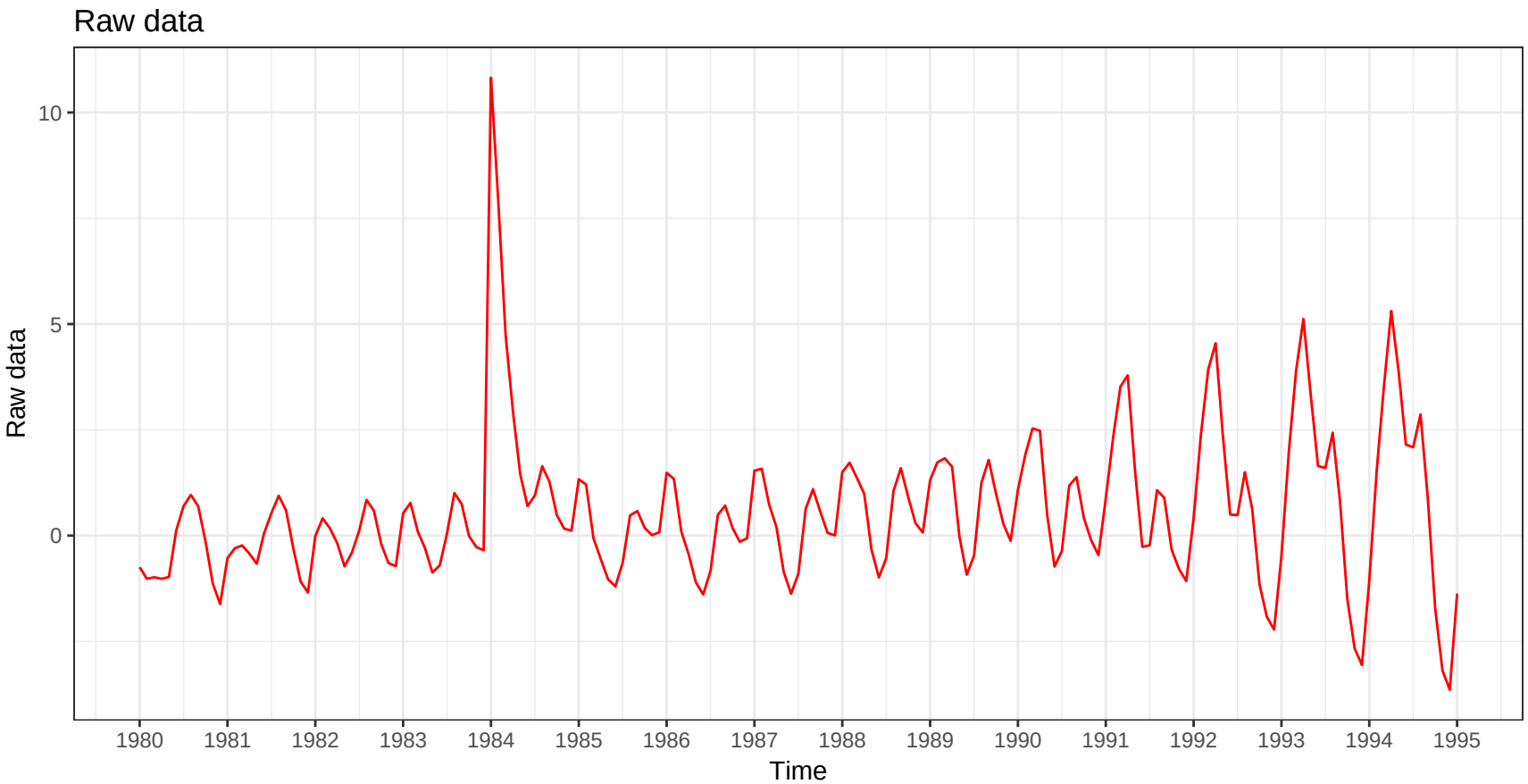
Estimate value of a TC(1984−01)
ARIMA (2,0,0)(0,1,1) − additive decomposition
(1−B12)(1−1.40B+0.7B2)Xt=(1−0.5B12)at



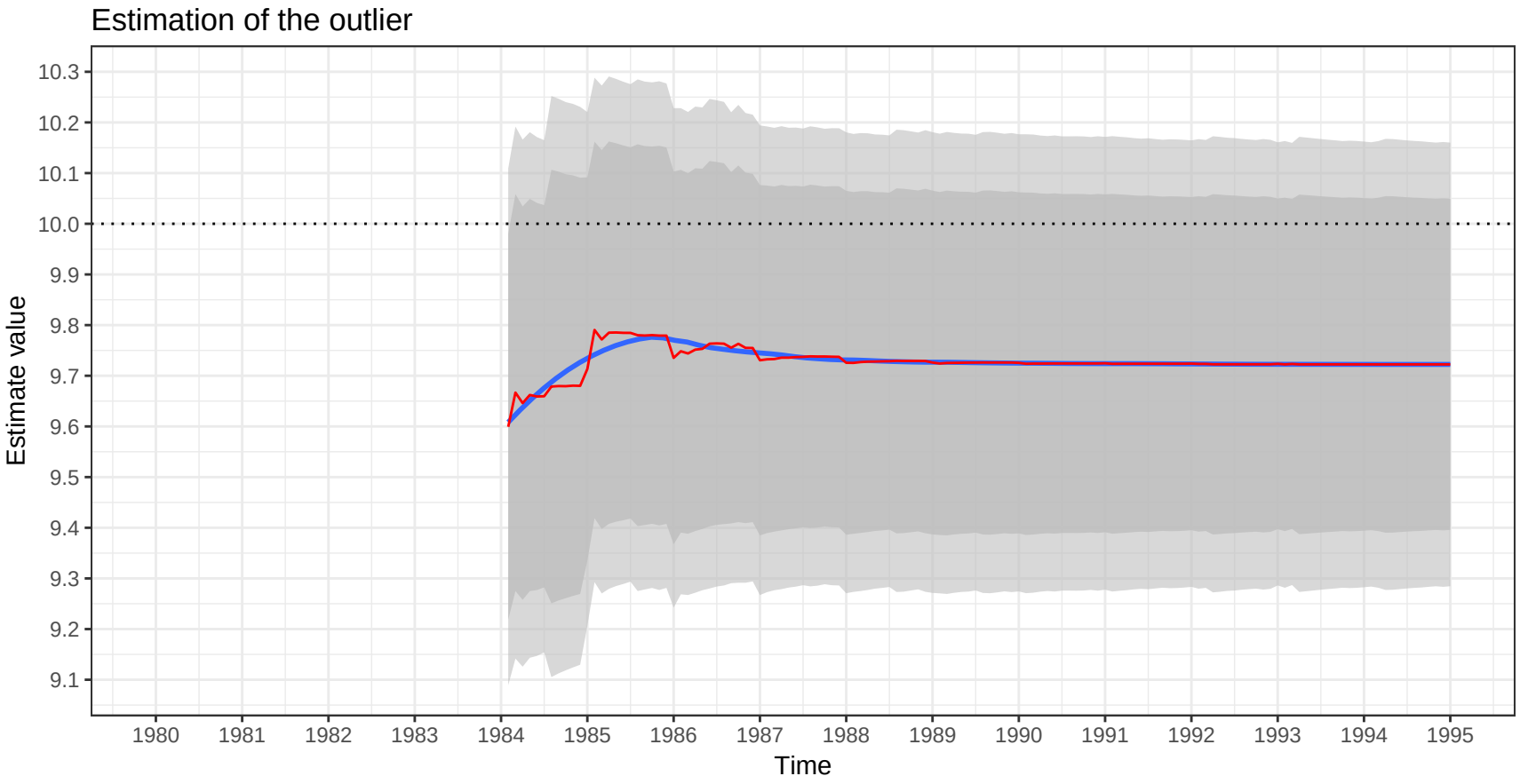


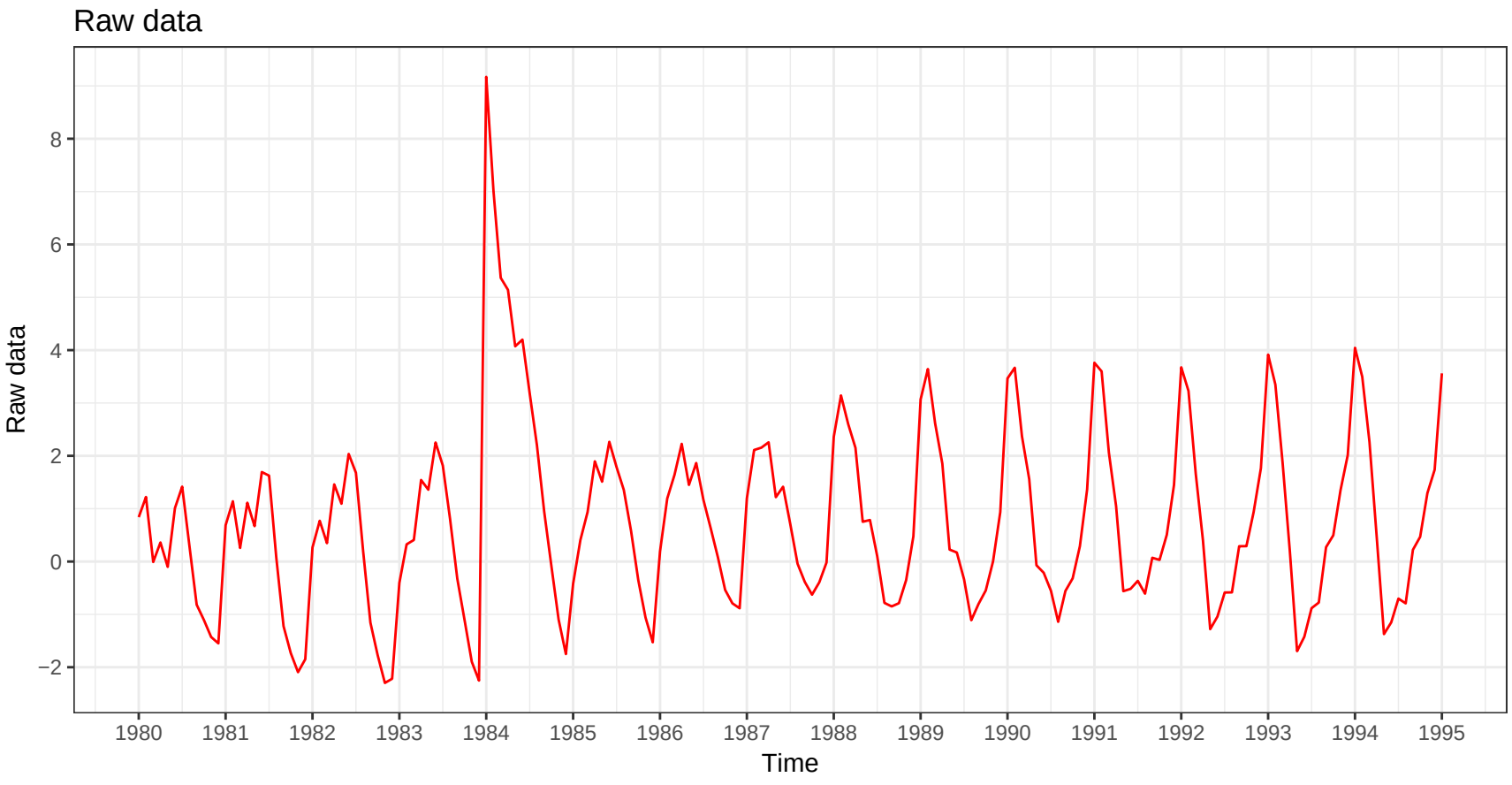
Estimate value of a TC(1984−01)
ARIMA (2,0,0)(0,1,1) − additive decomposition
(1−B12)(1−1.40B+0.7B2)Xt=(1−0.5B12)at



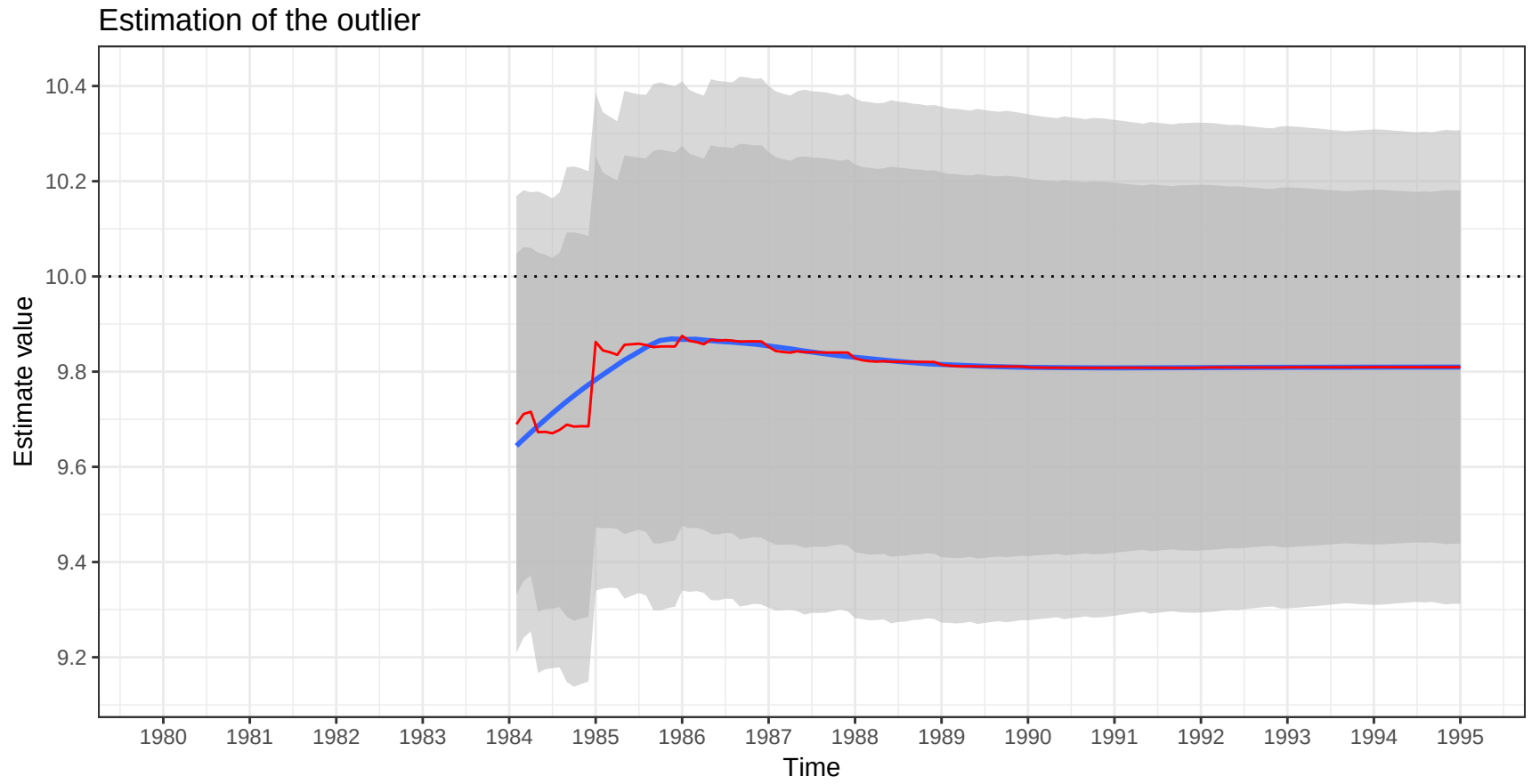


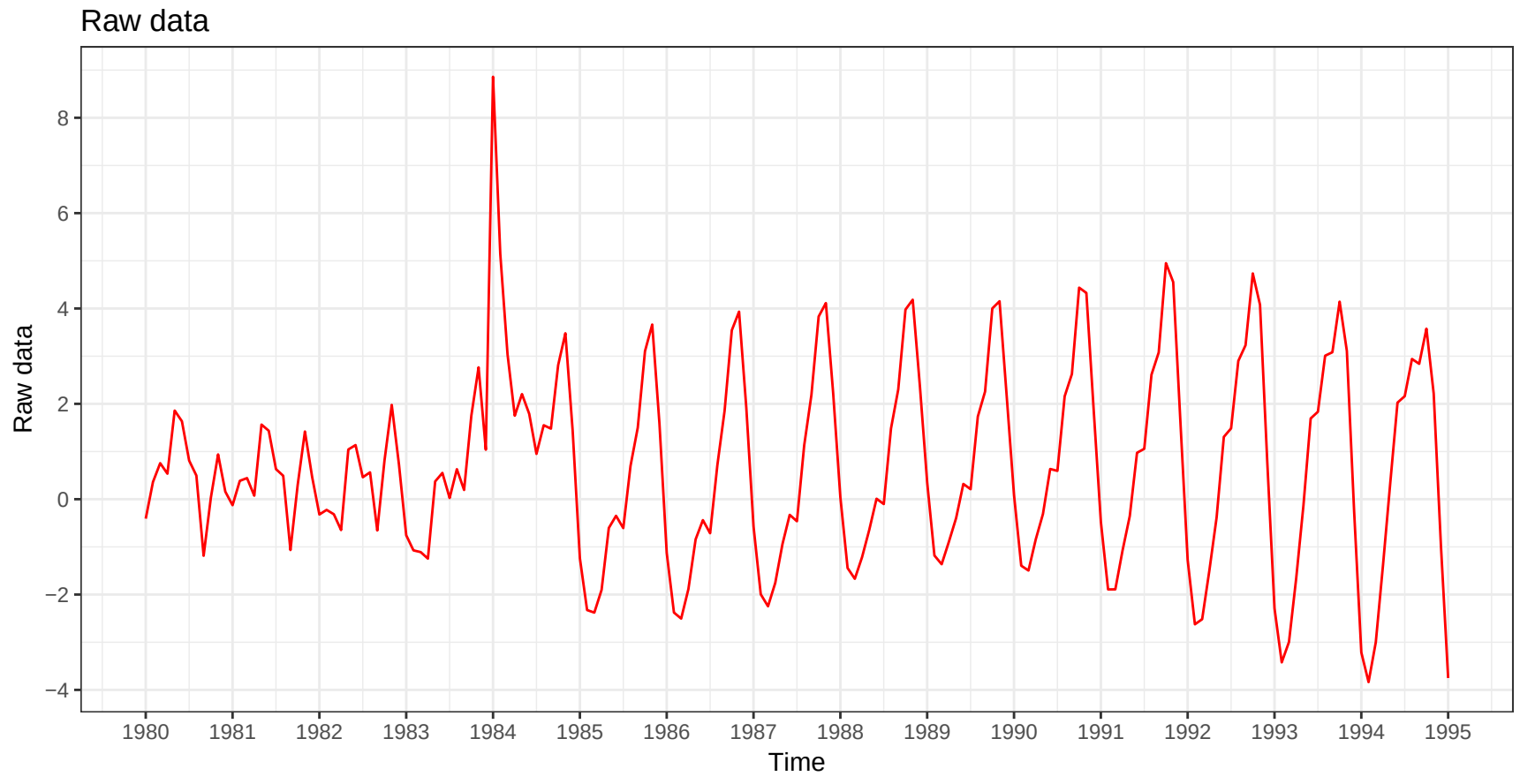
Estimate value of a TC(1984−01)
ARIMA (2,0,0)(0,1,1) − additive decomposition
(1−B12)(1−1.40B+0.7B2)Xt=(1−0.5B12)at



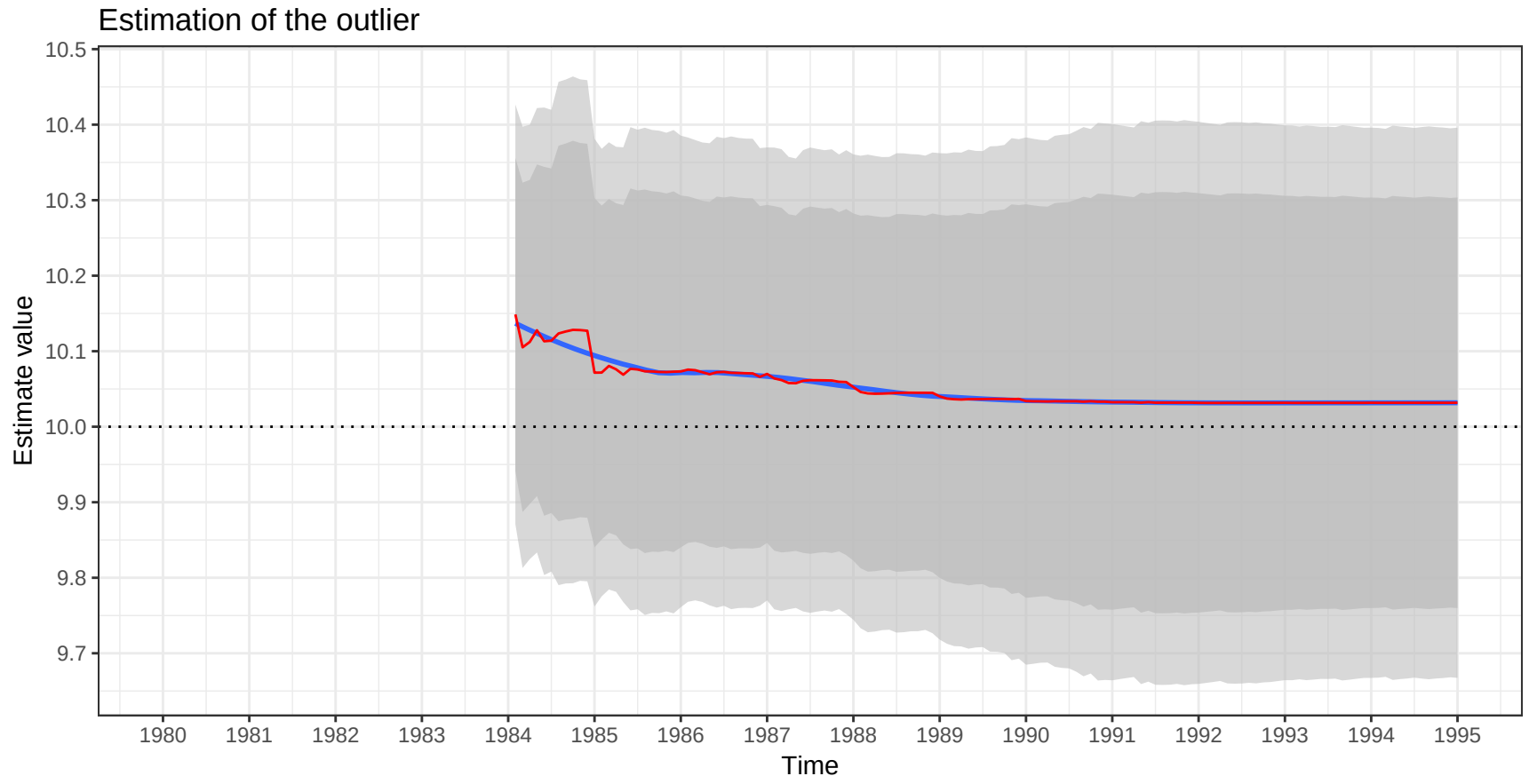


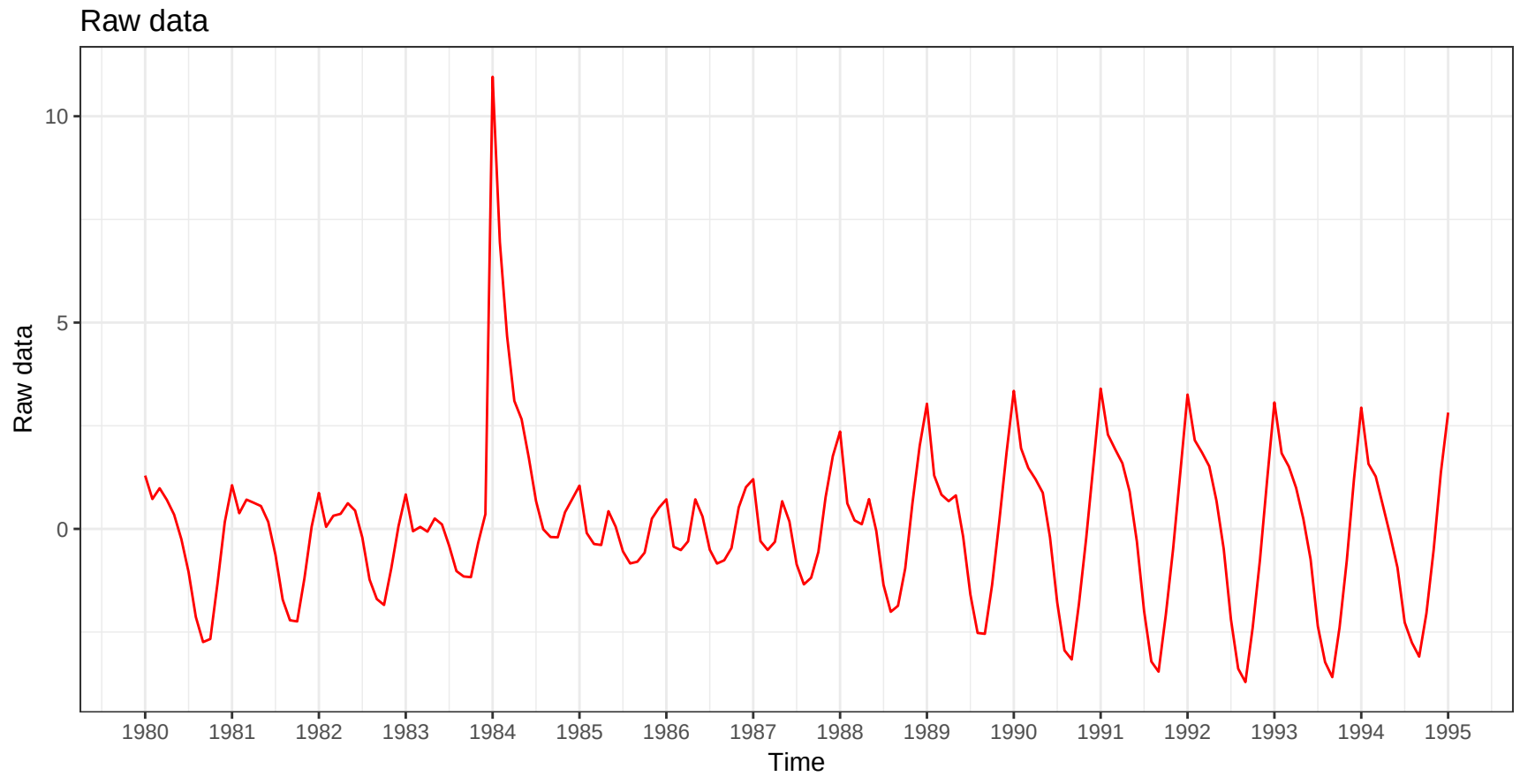
Estimate value of a TC(1984−01)
ARIMA (2,0,0)(0,1,1) − additive decomposition
(1−B12)(1−1.40B+0.7B2)Xt=(1−0.5B12)at



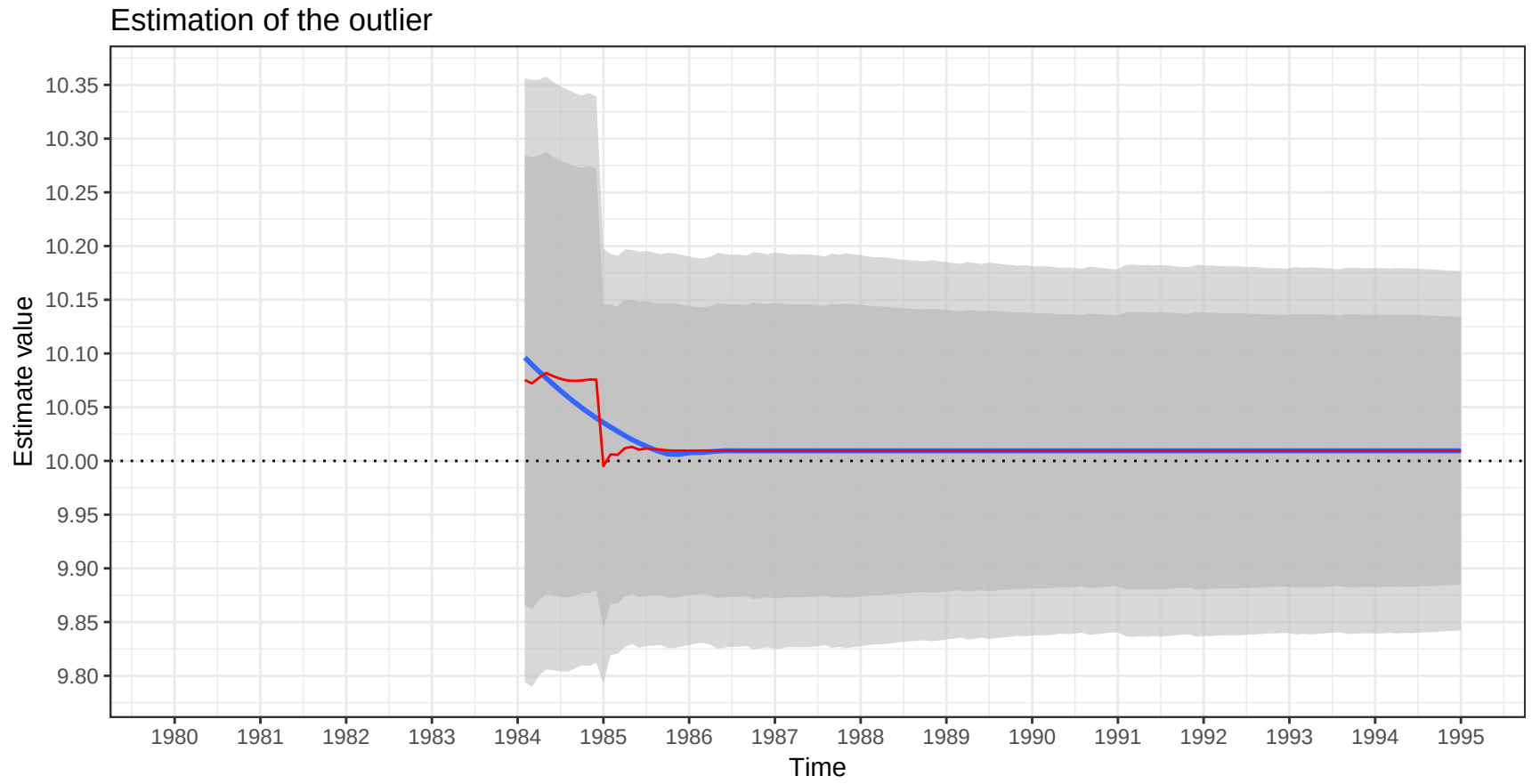


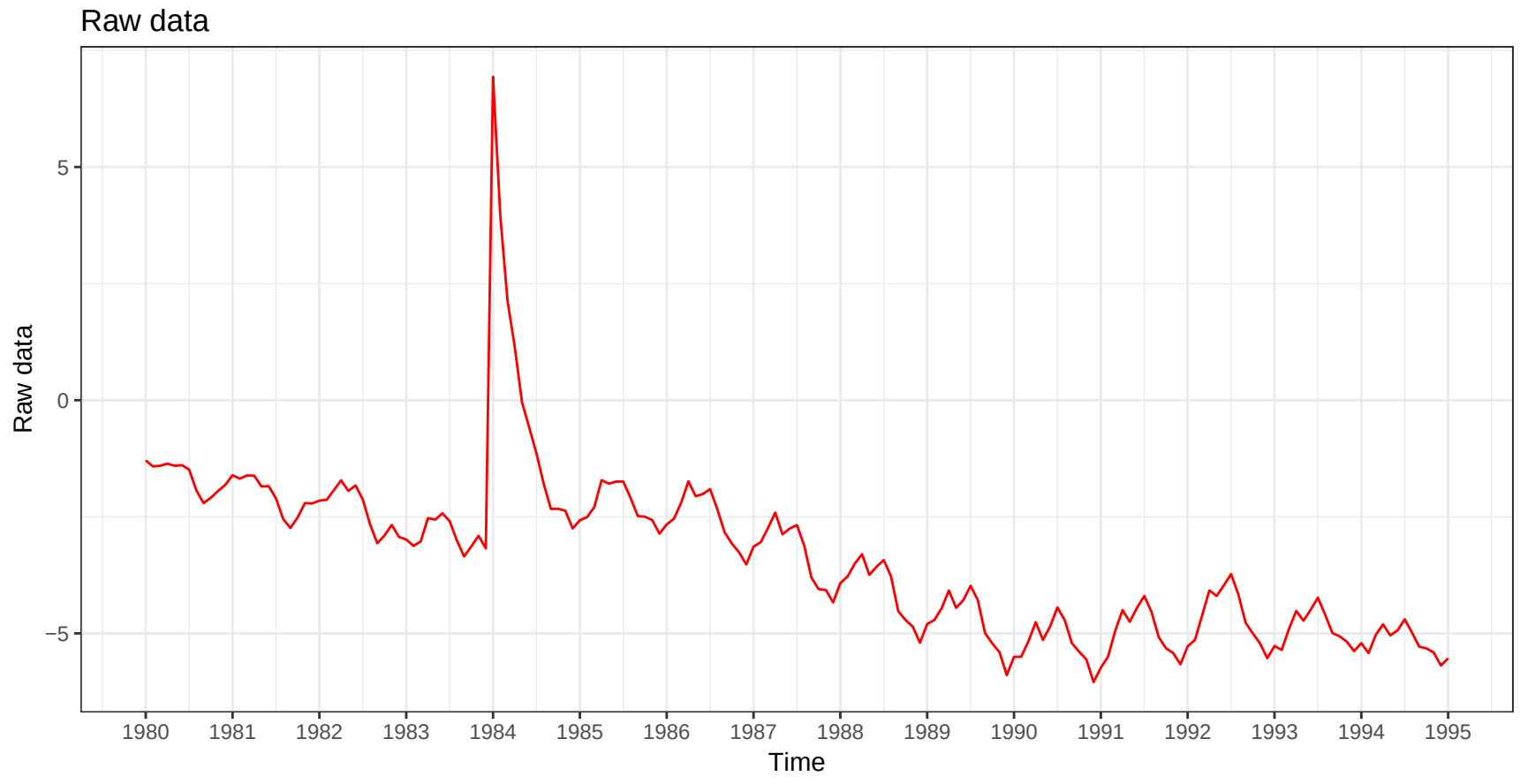
Estimate value of a TC(1984−01)
ARIMA (2,0,0)(0,1,1) − additive decomposition
(1−B12)(1−1.40B+0.7B2)Xt=(1−0.5B12)at



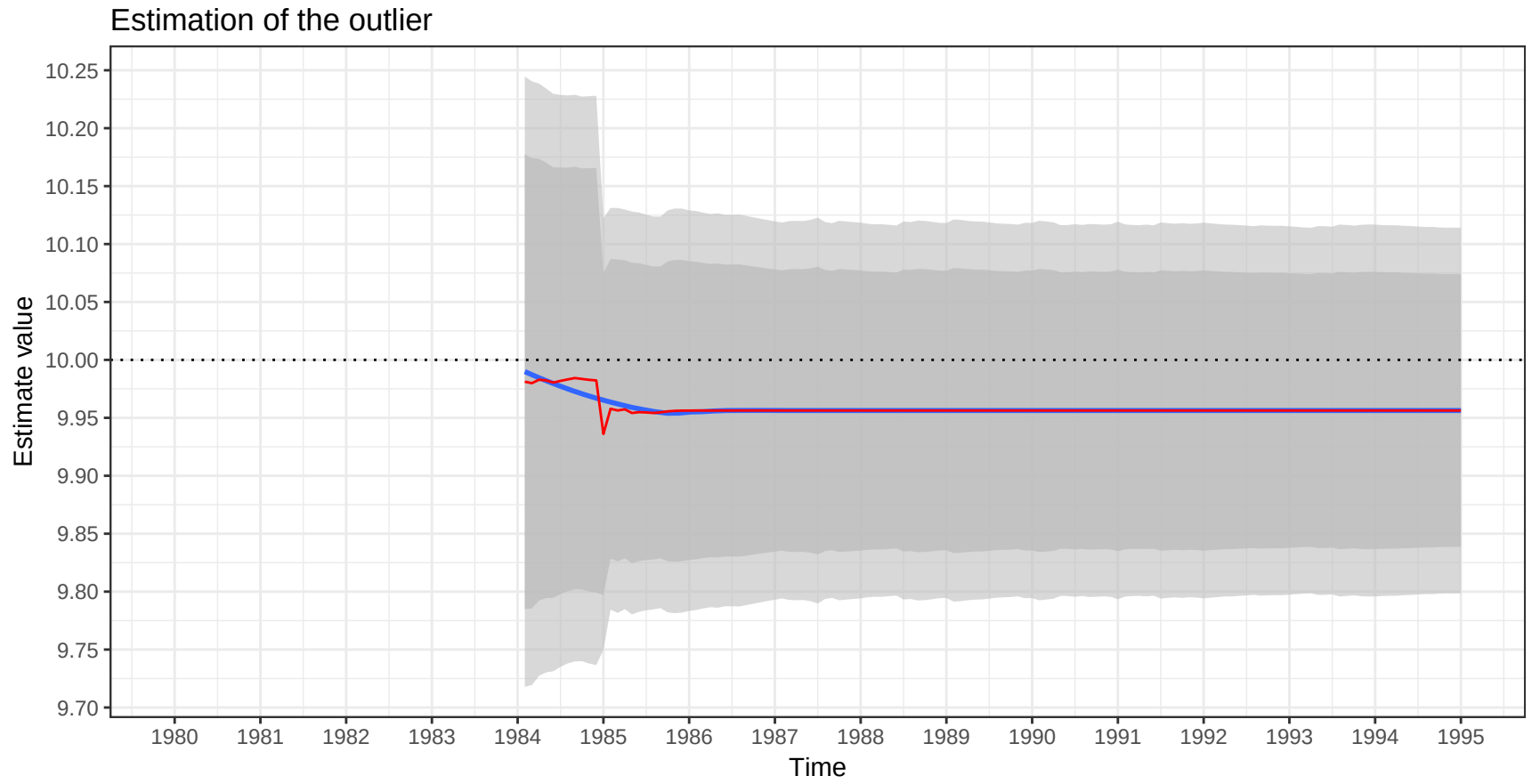


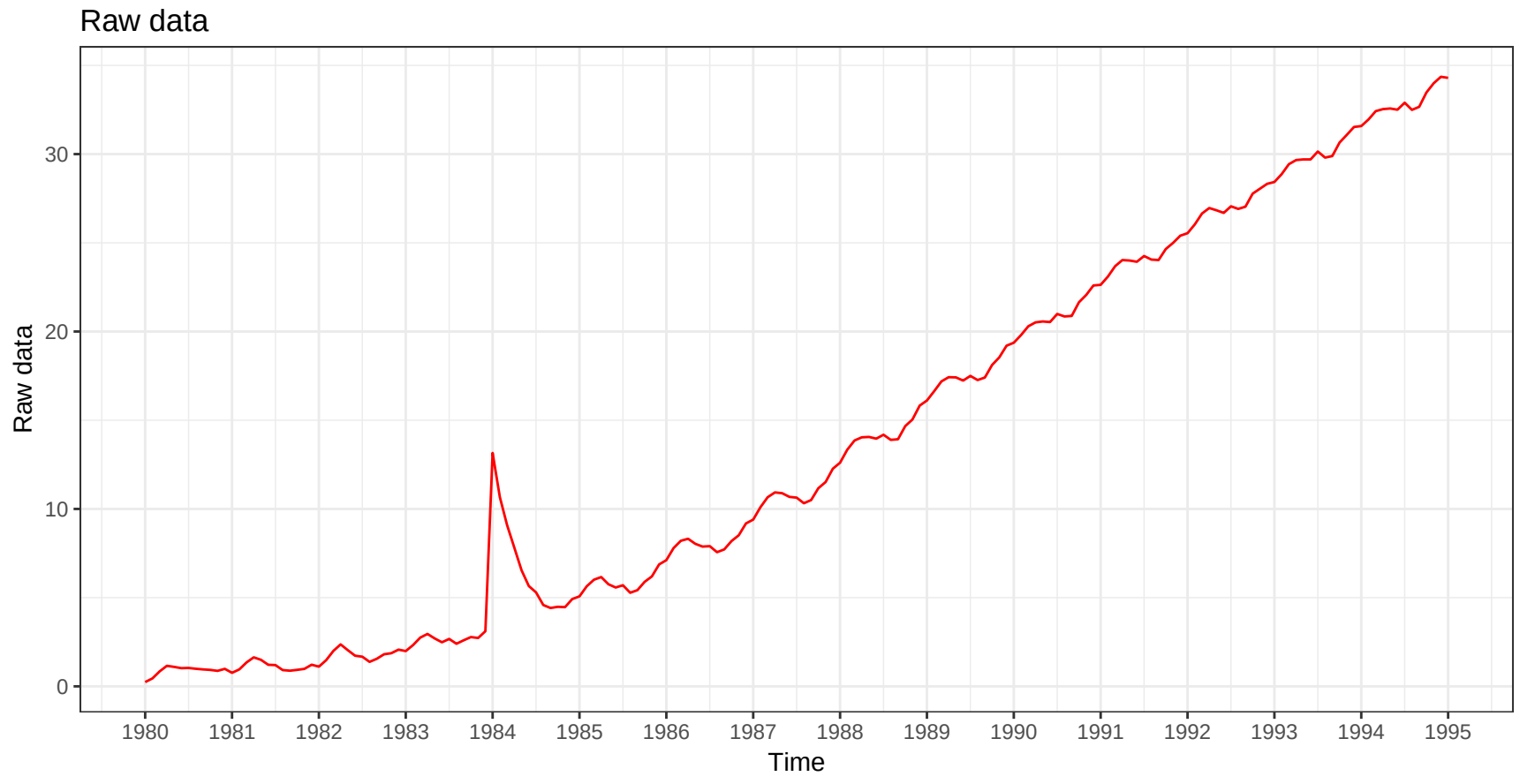
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1+0.3B)at



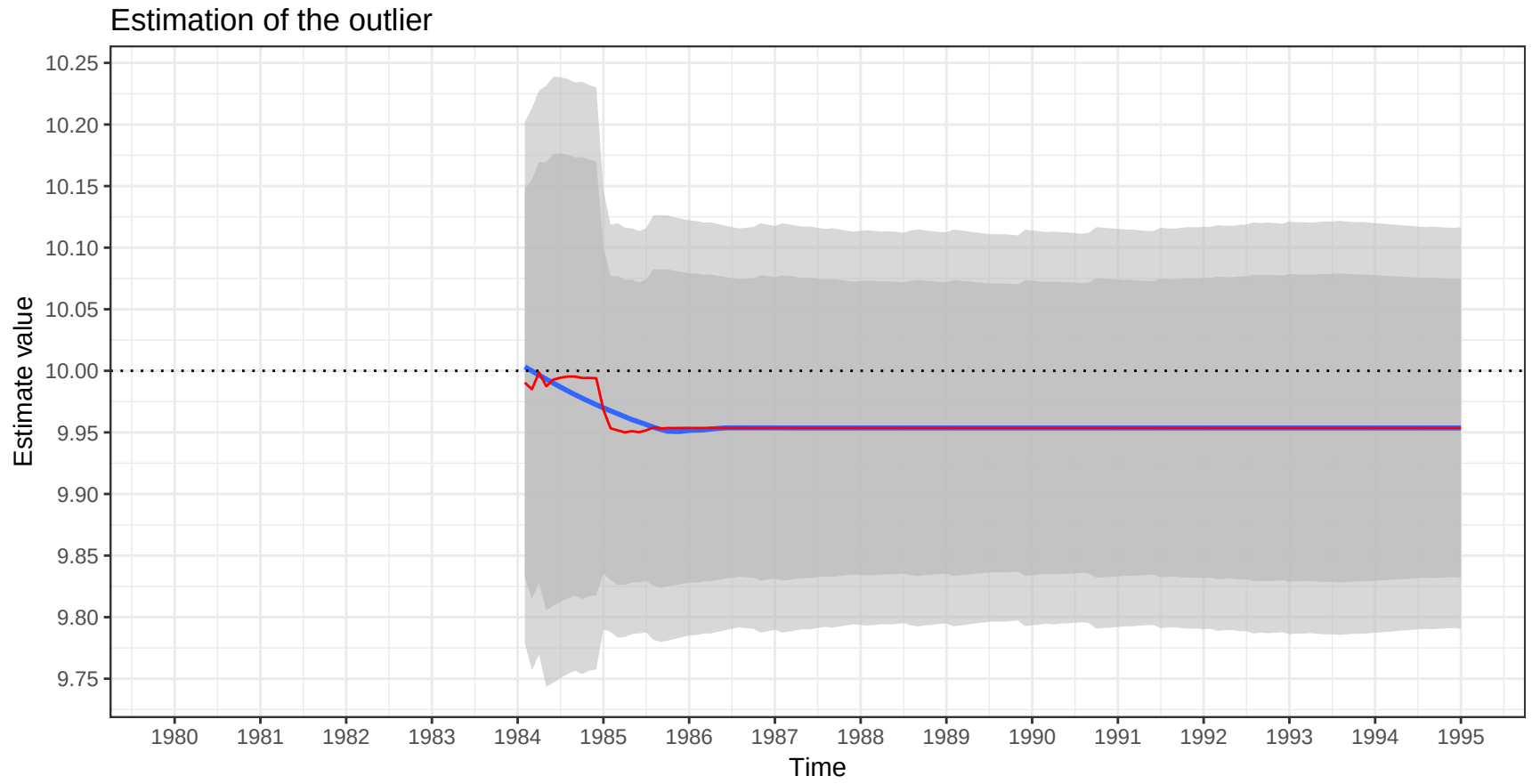


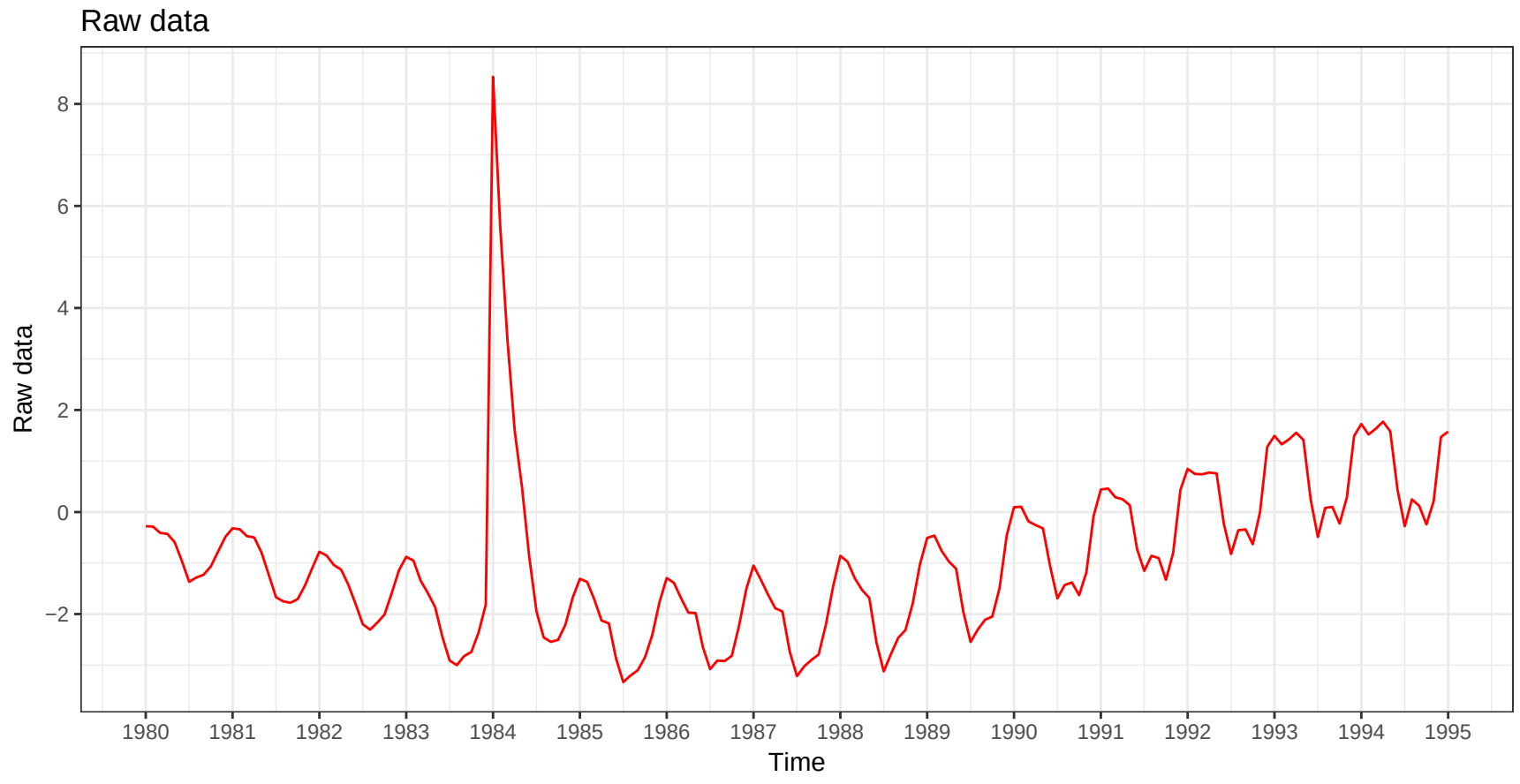
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1+0.3B)at



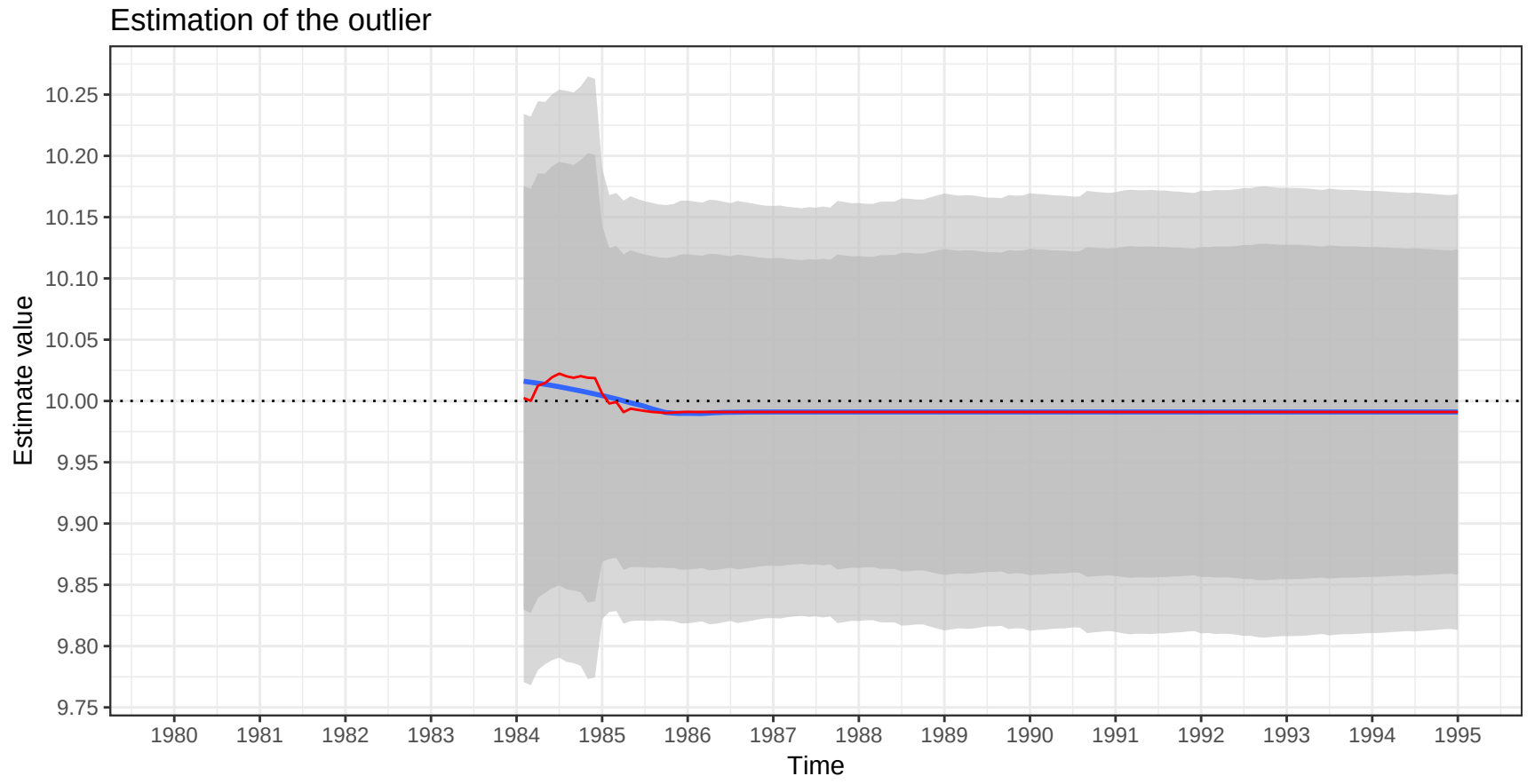


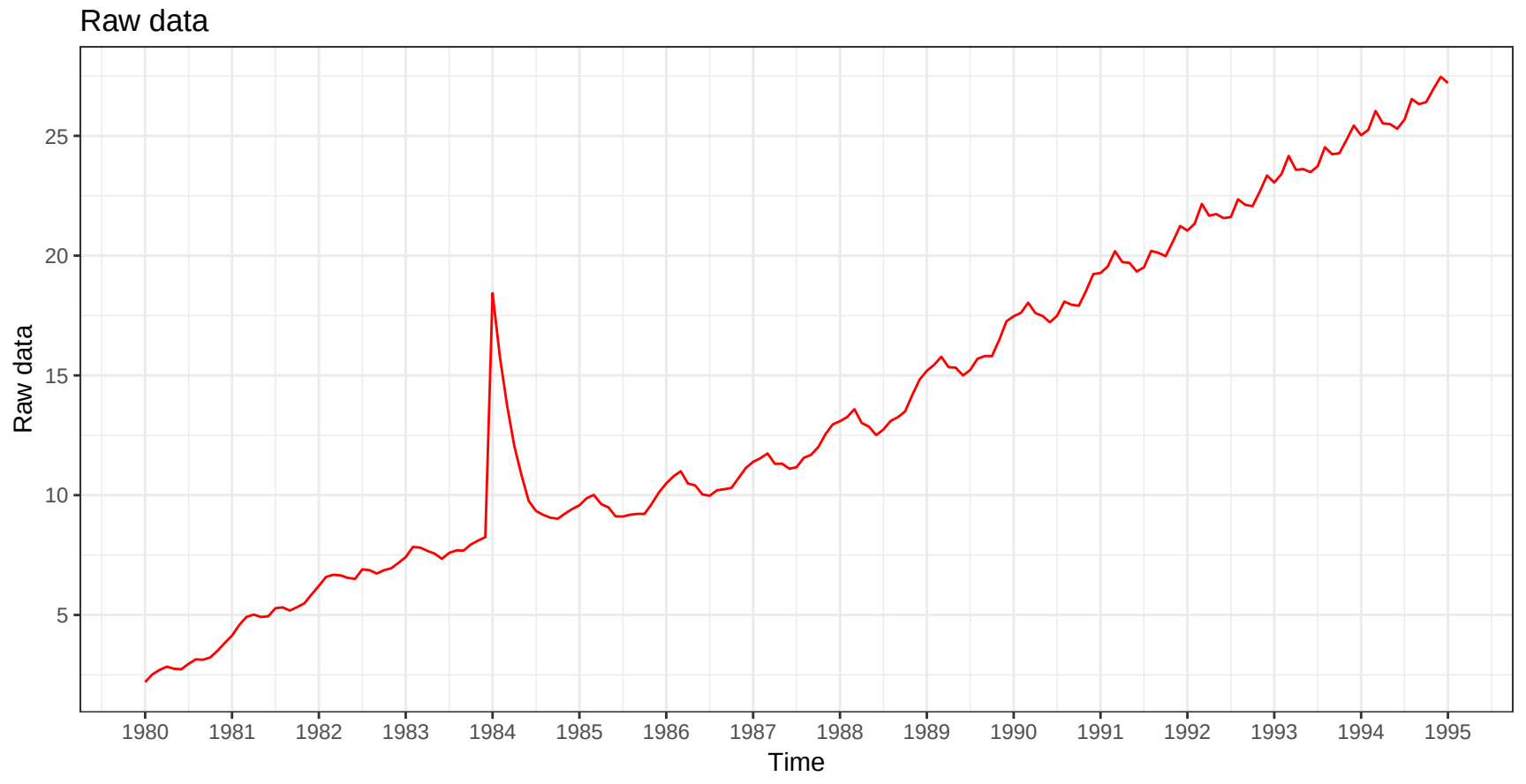
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1+0.3B)at



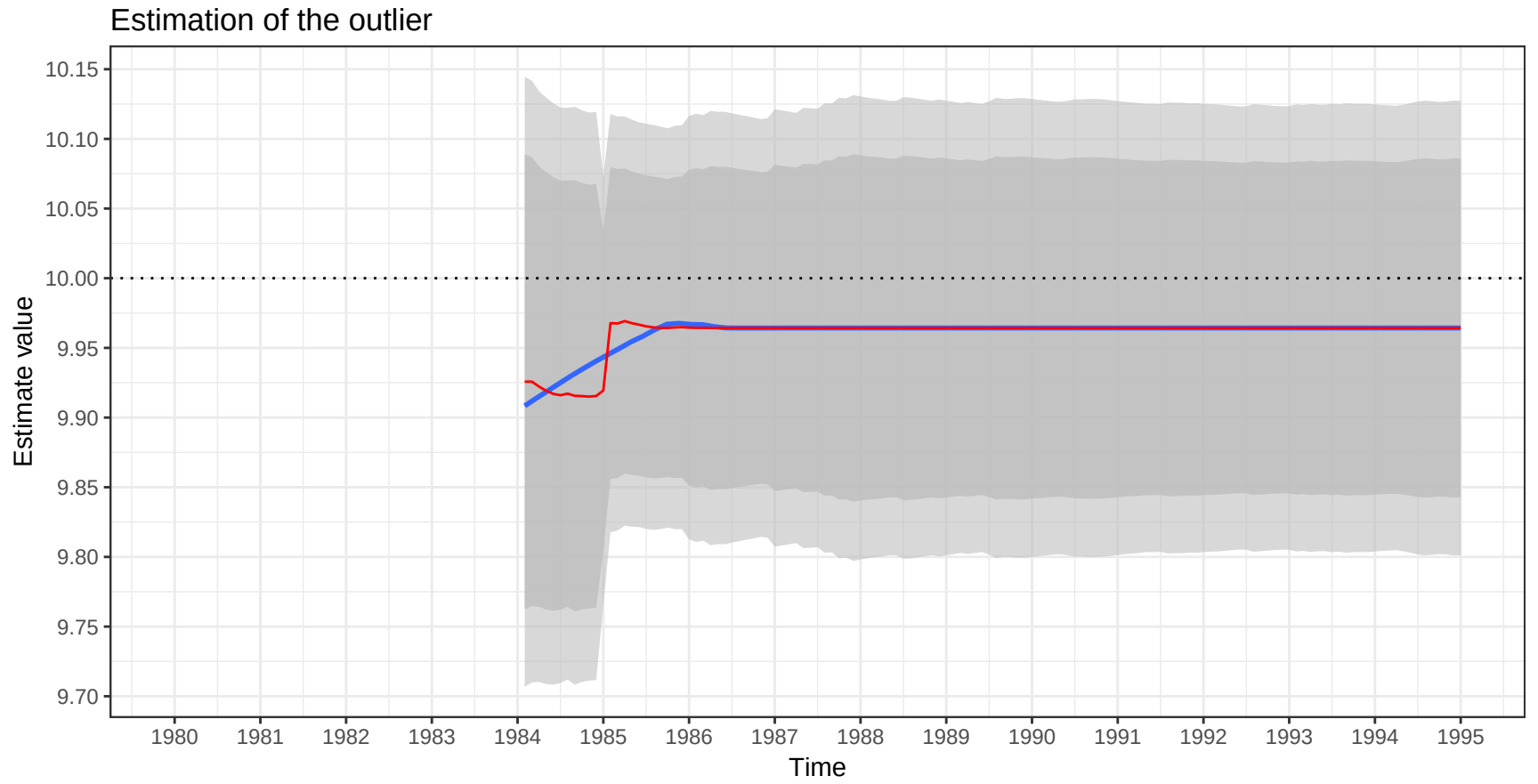


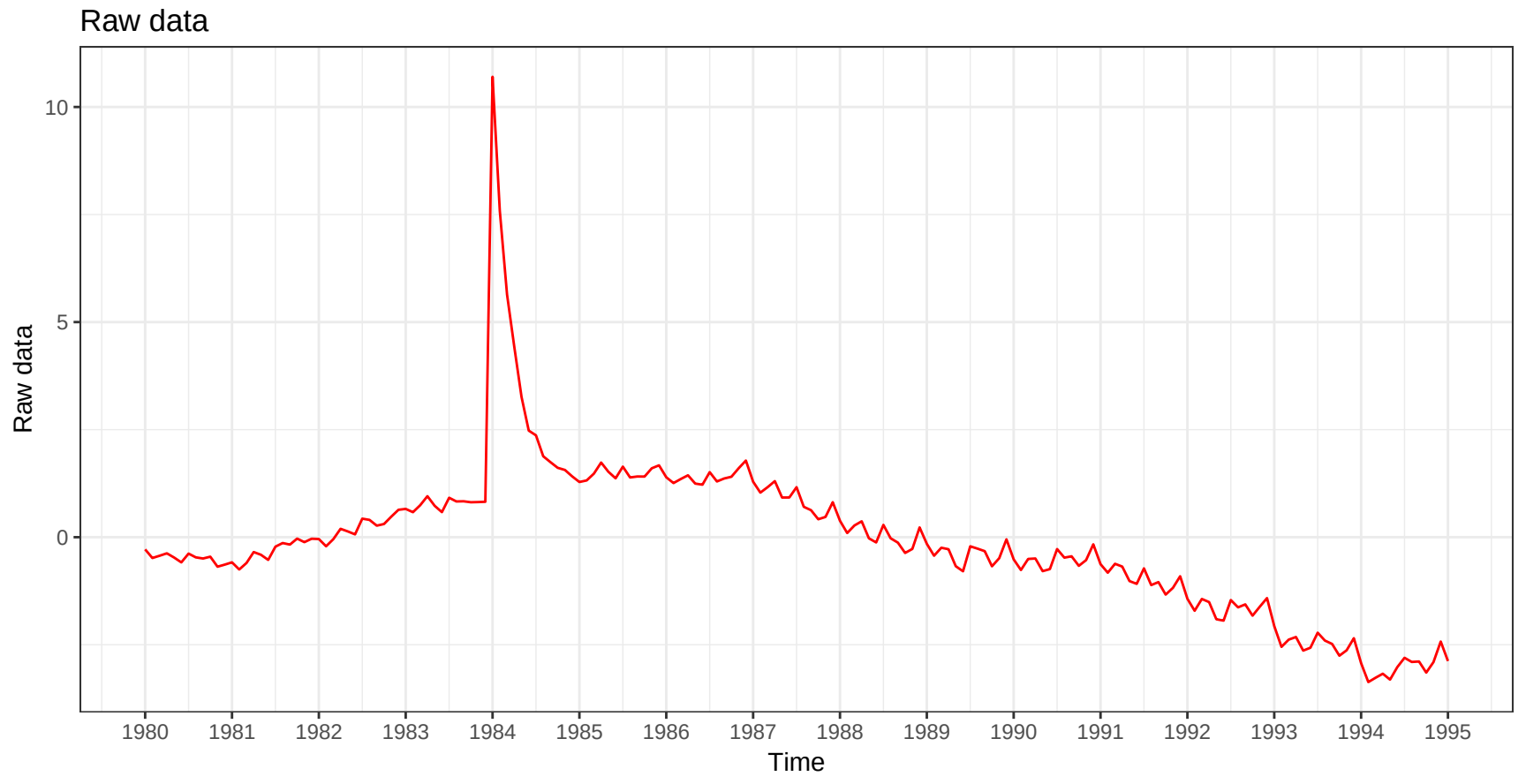
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1+0.3B)at



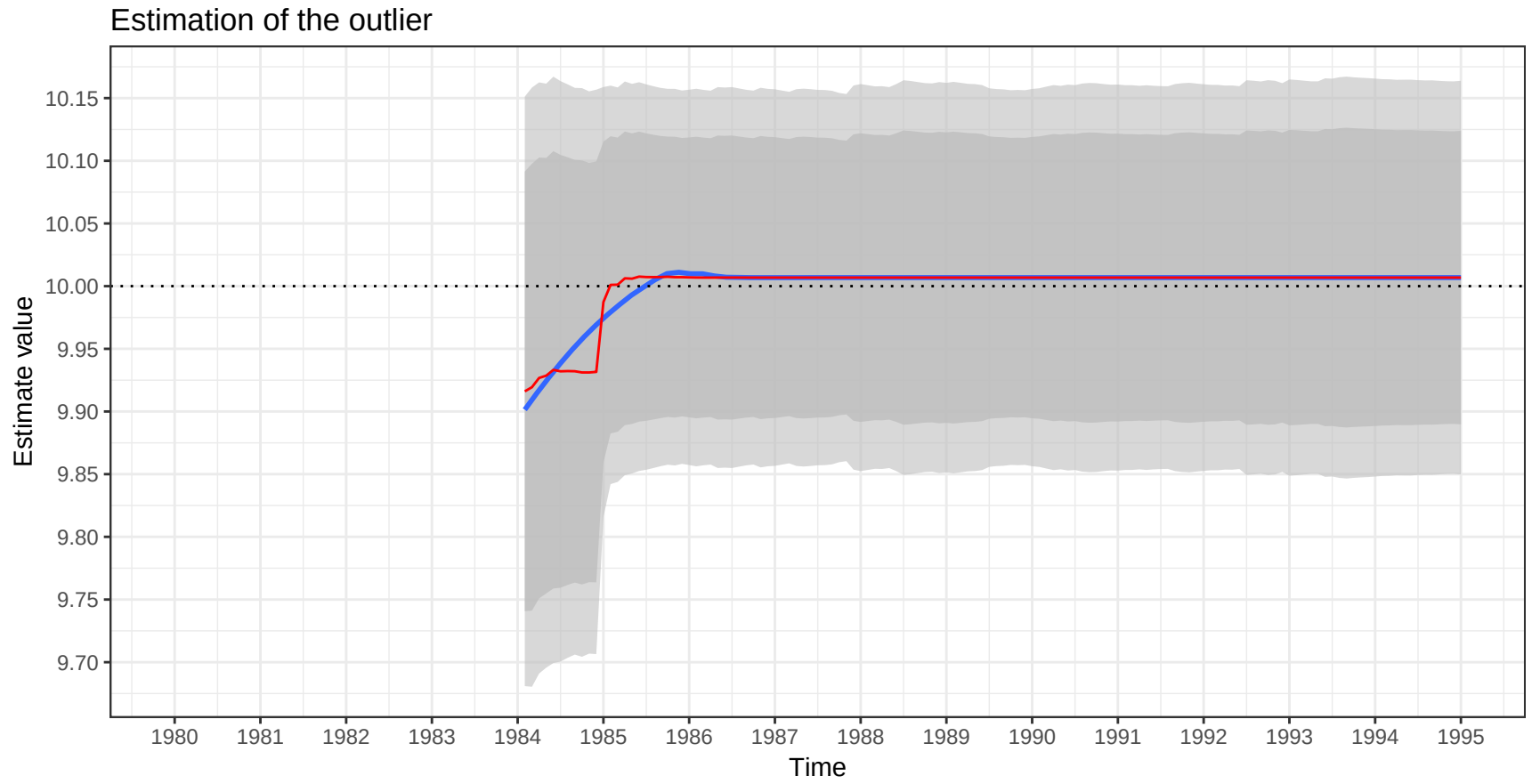


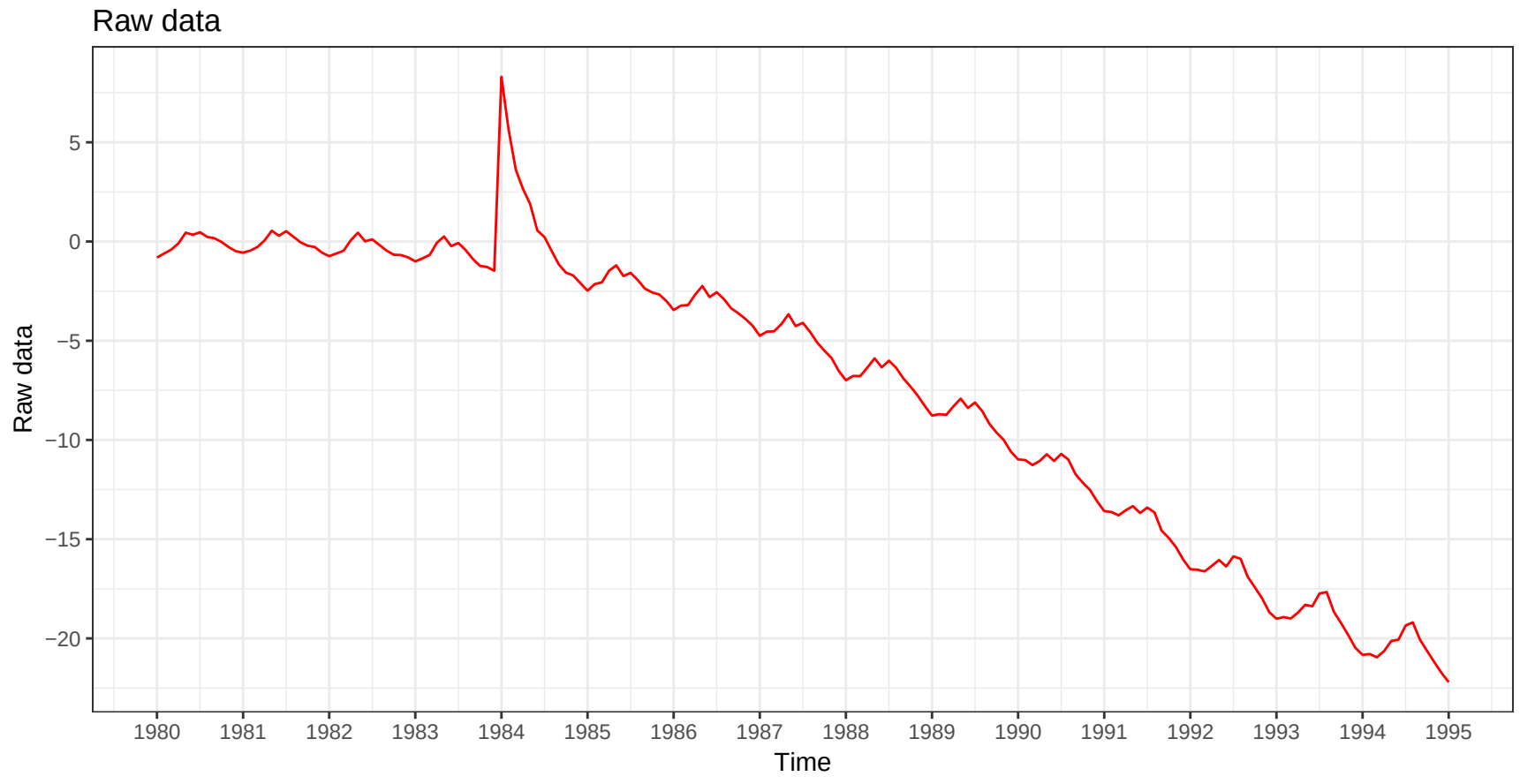
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1+0.3B)at



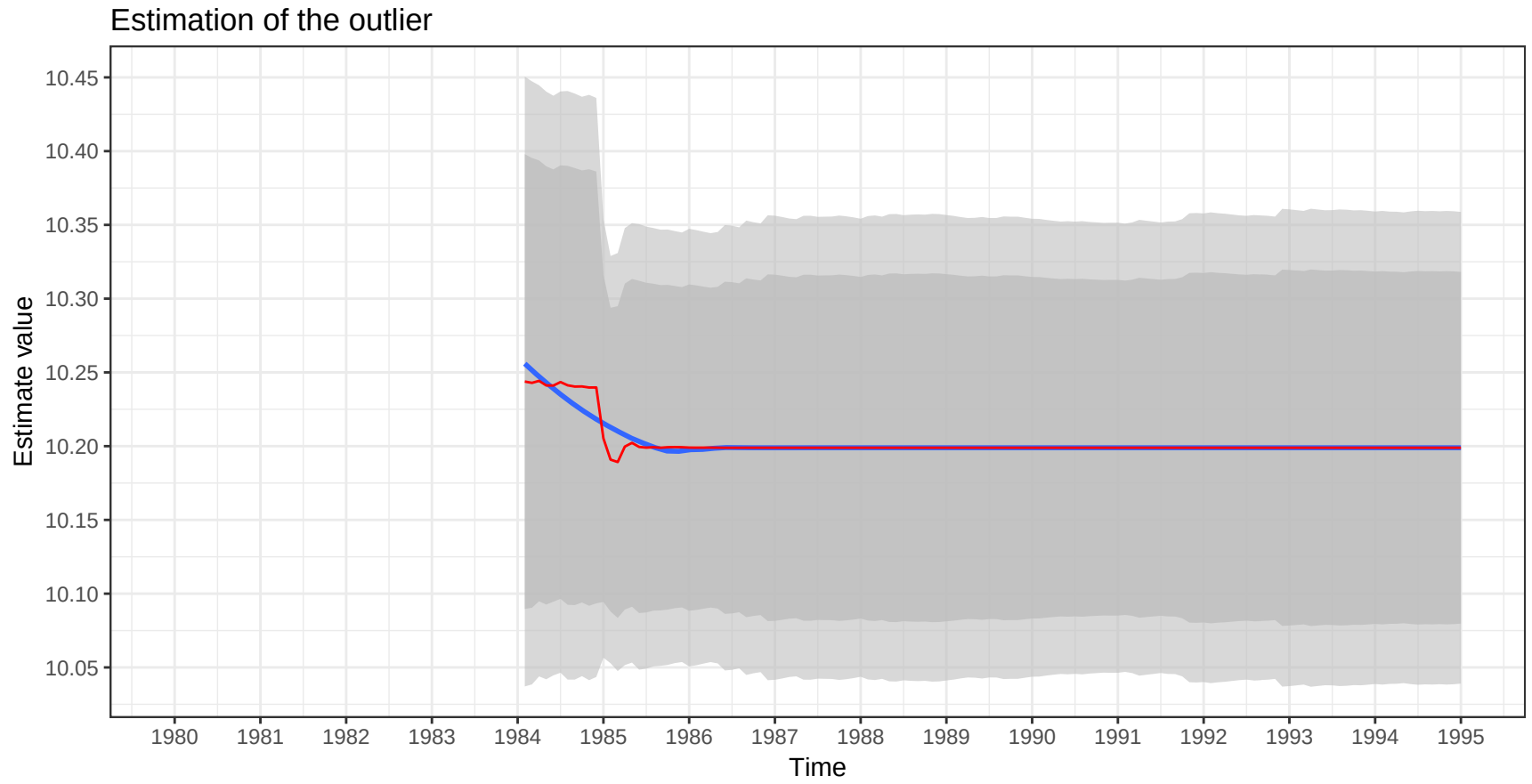


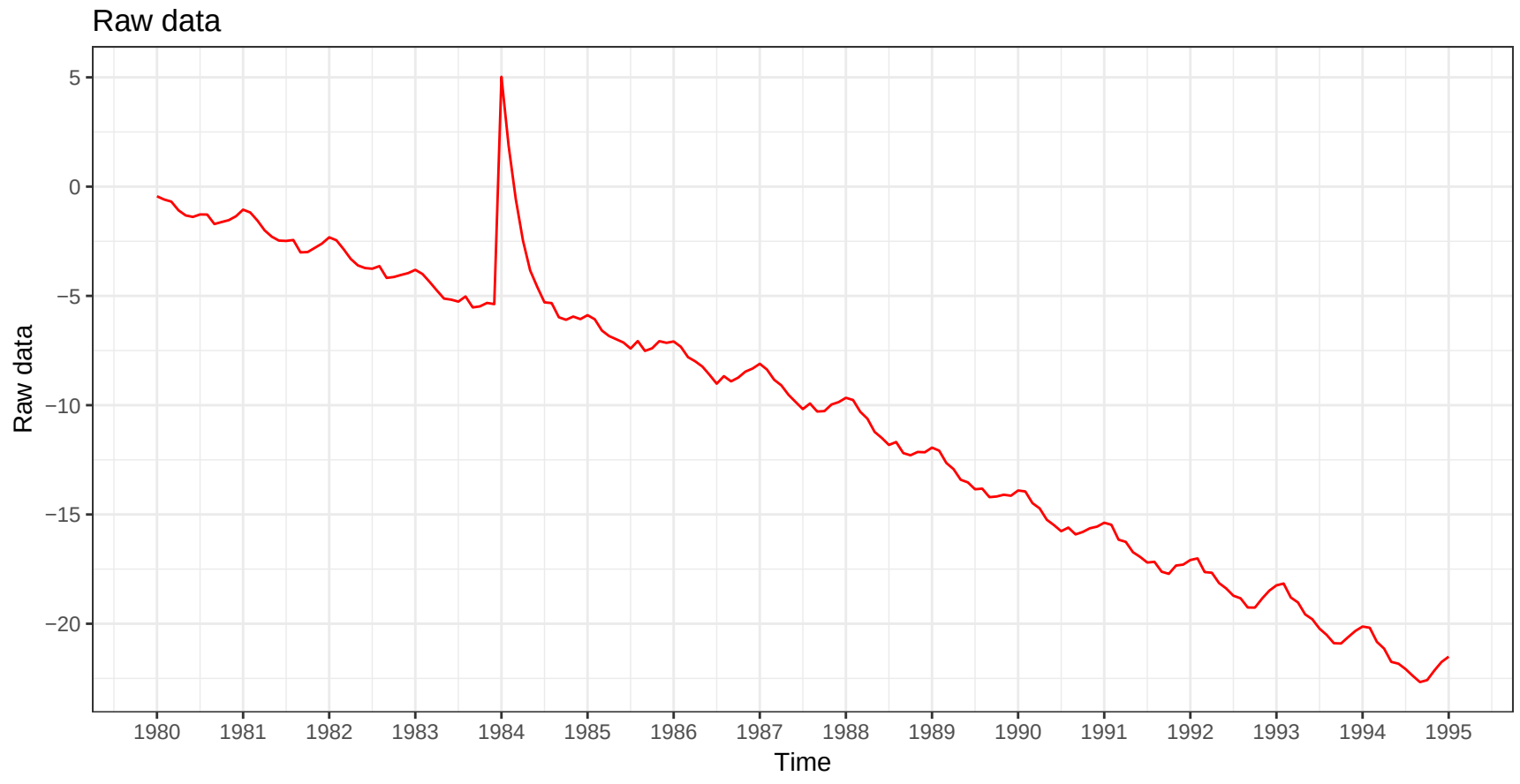
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1+0.3B)at

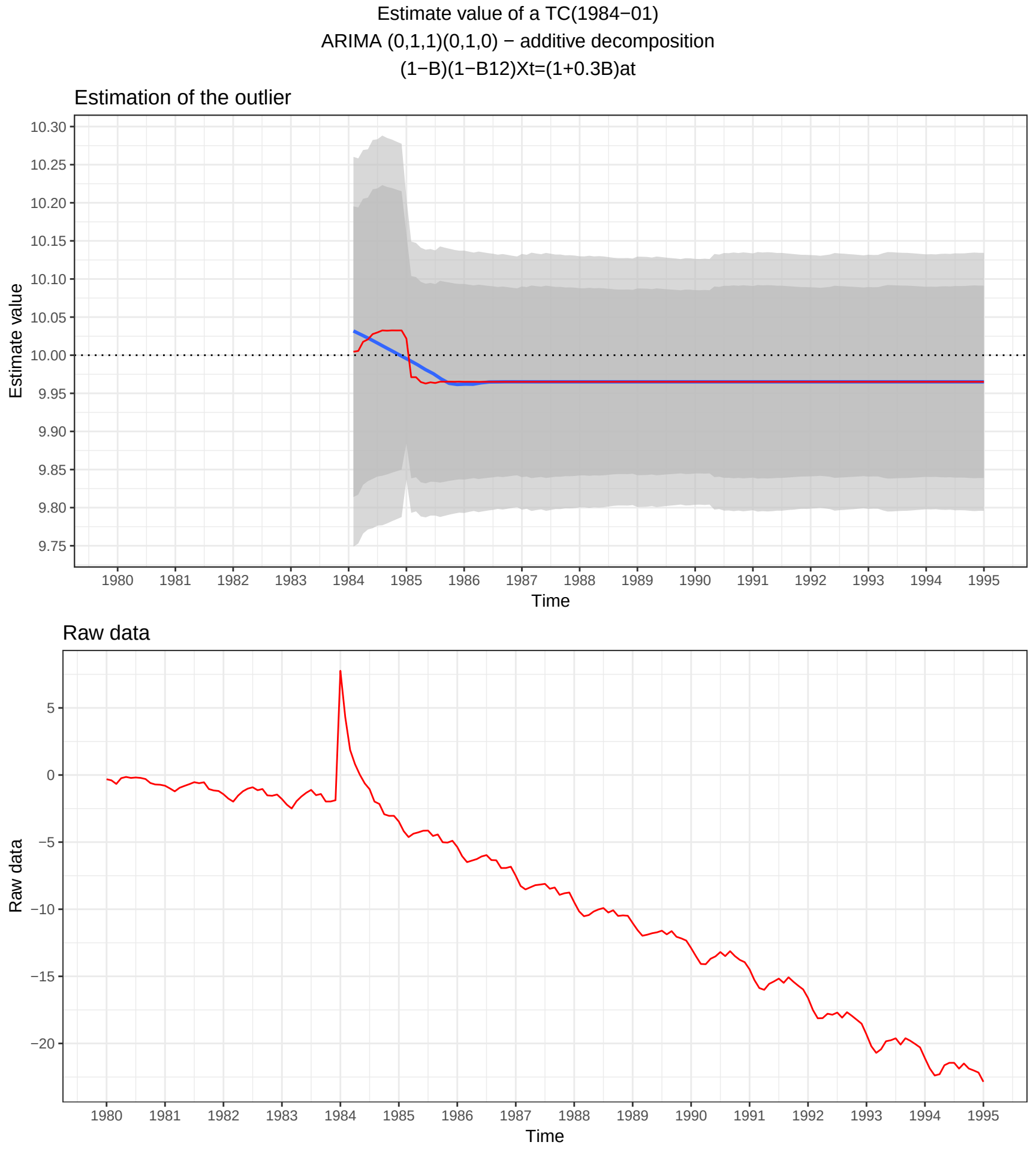




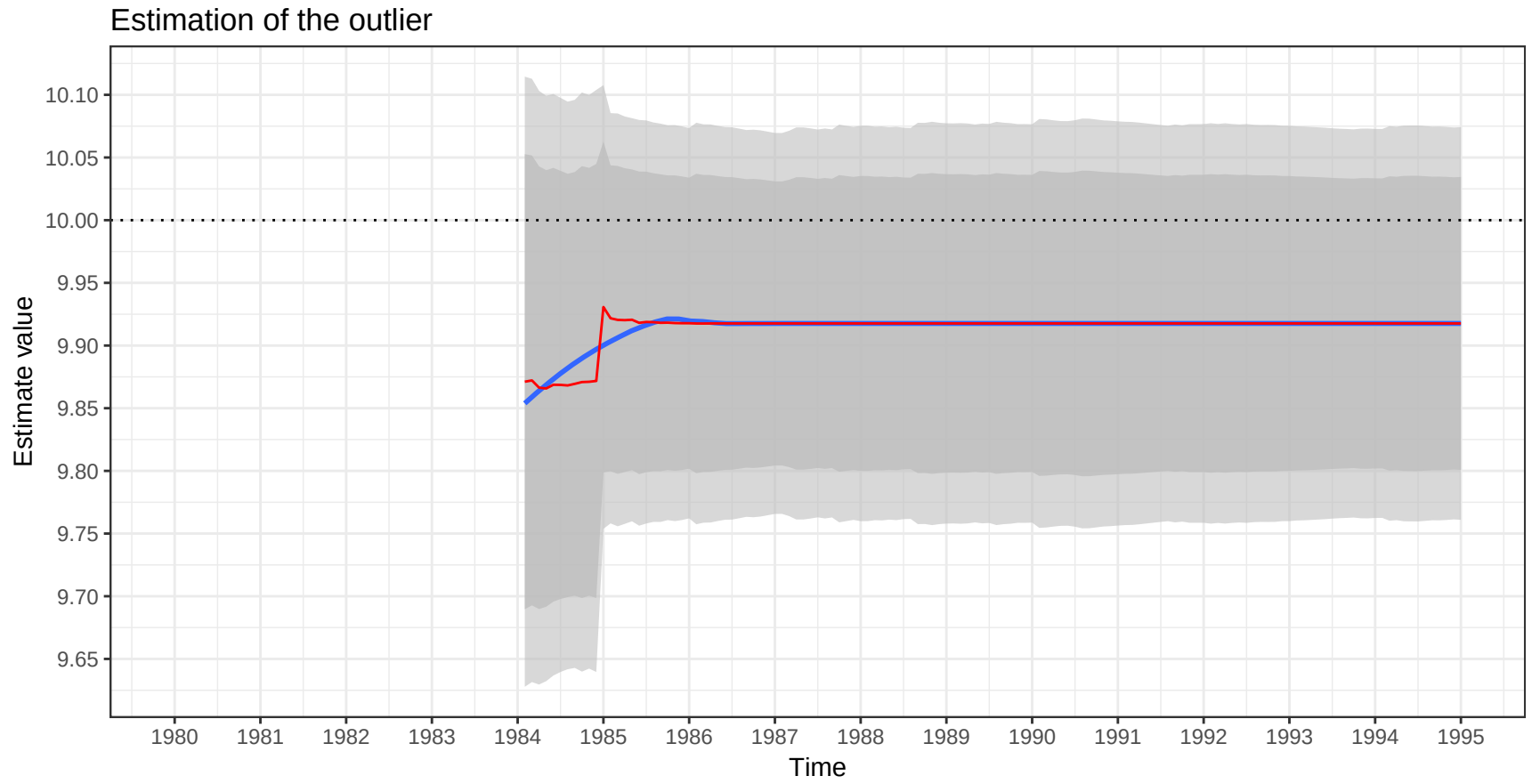
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1+0.3B)at

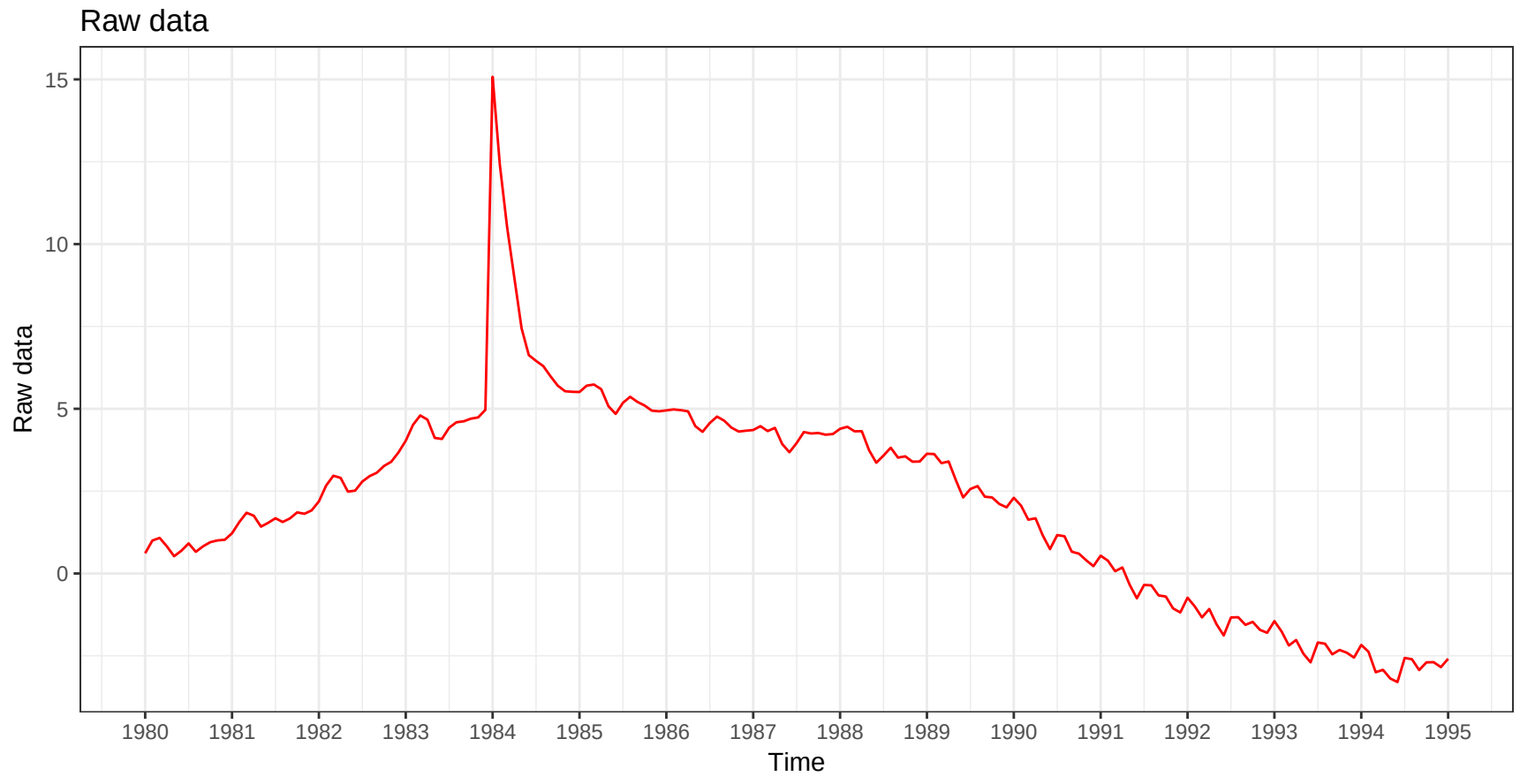




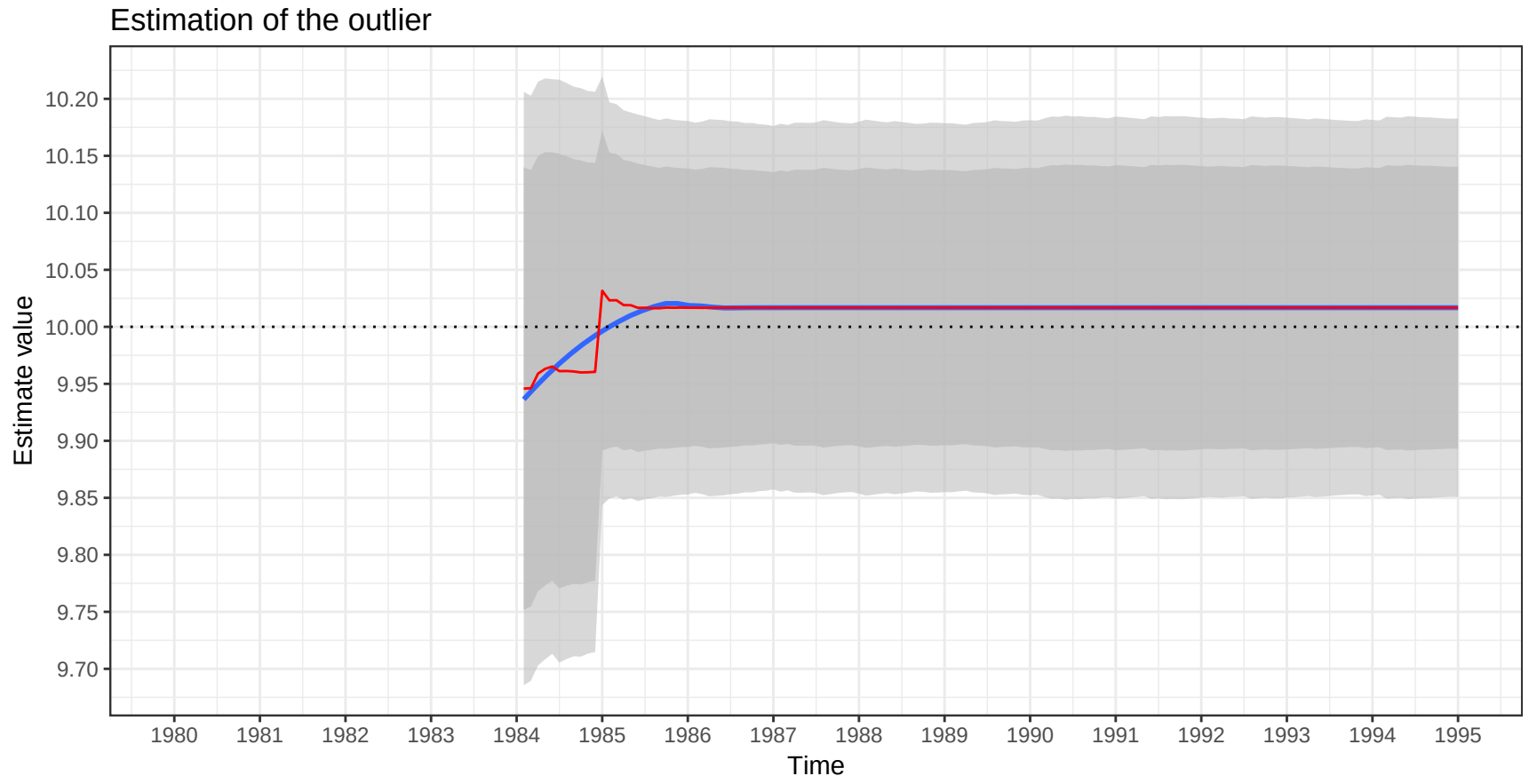

Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1+0.3B)at
Estimation of the outlier
Estimate value
10.30
10.25
10.20
10.15
10.10
10.05
10.00
9.95
9.90
9.85
9.80
9.75
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time
Raw data
Raw data
5
0
−5
−10
−15
−20
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time

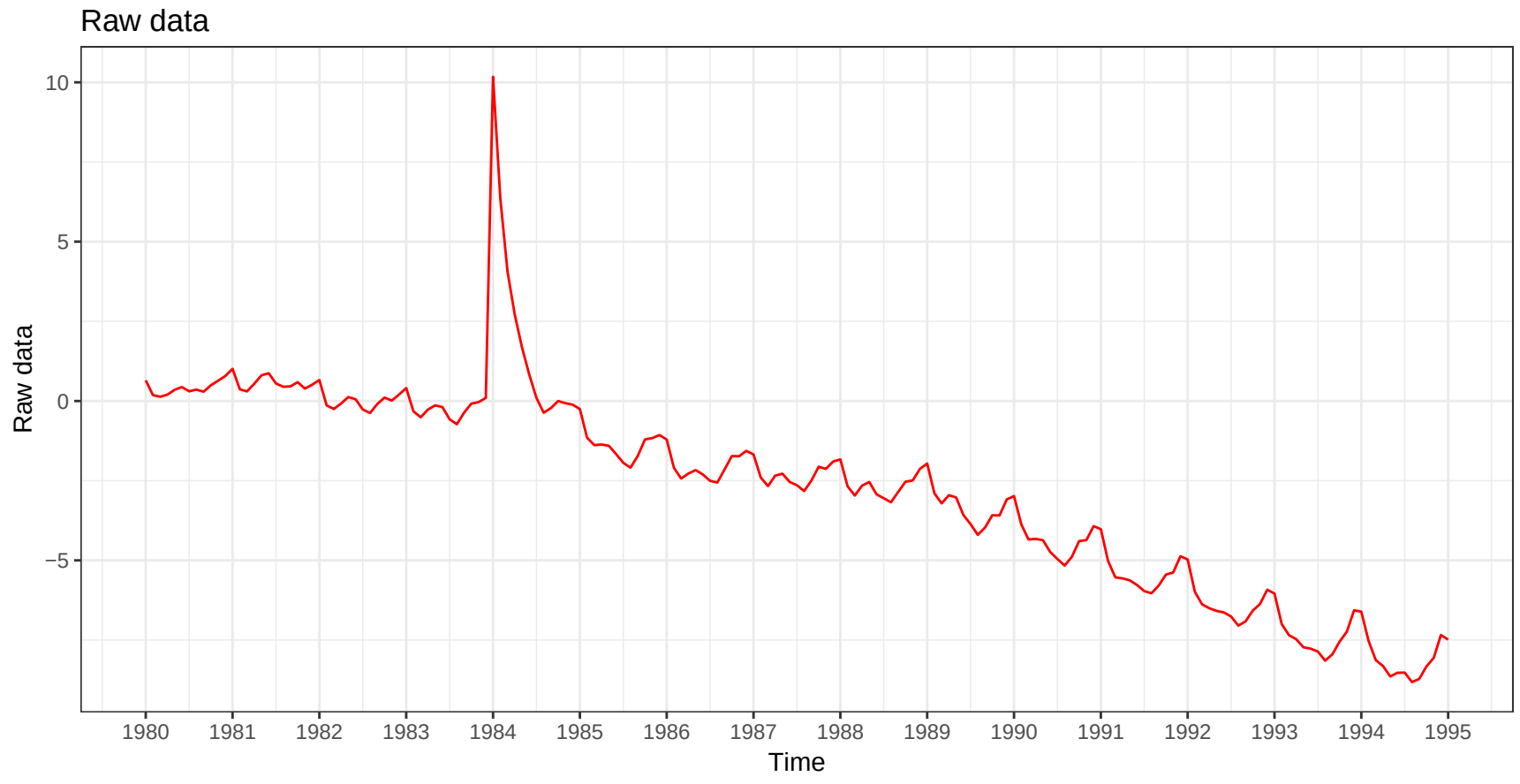
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1+0.3B)at



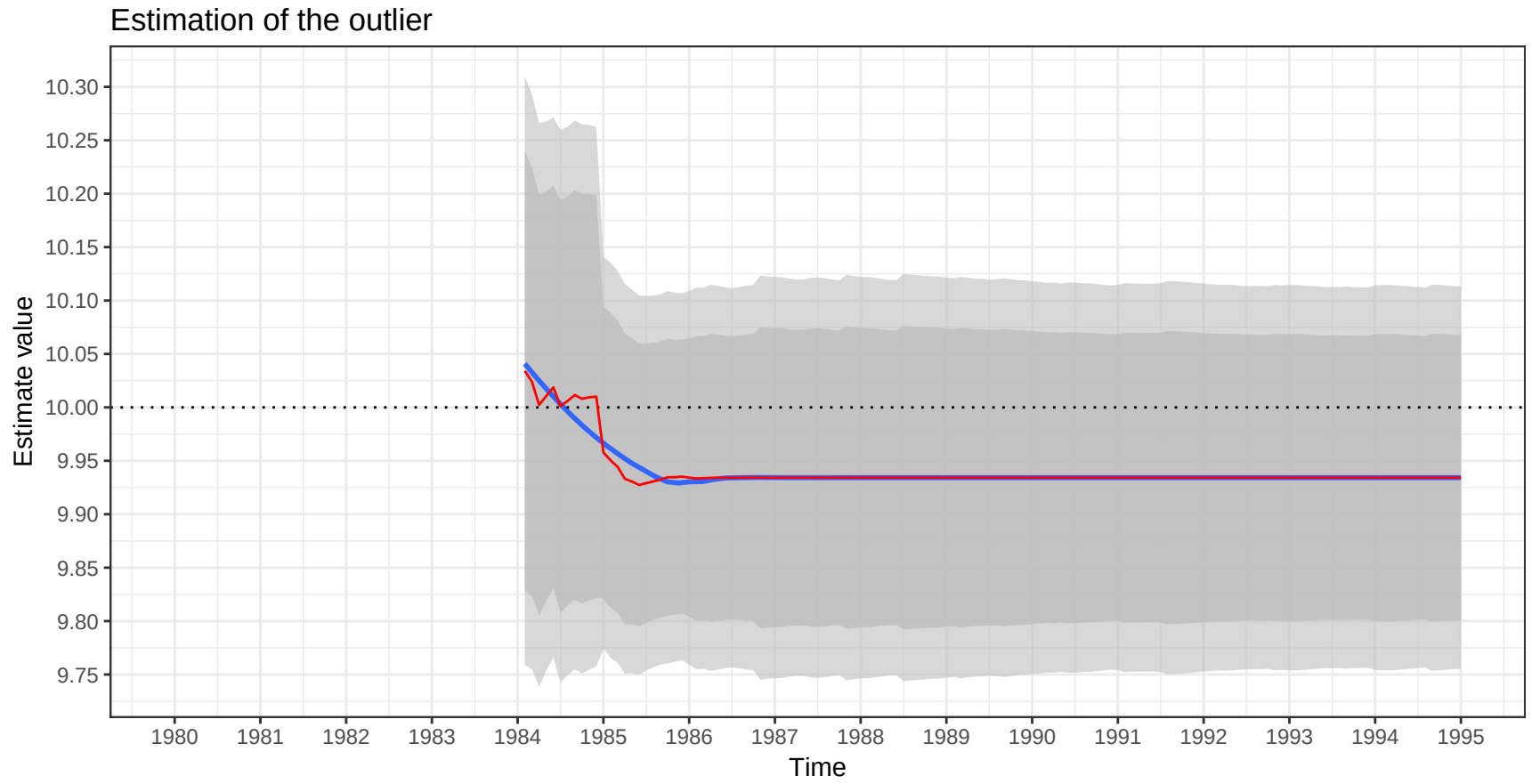


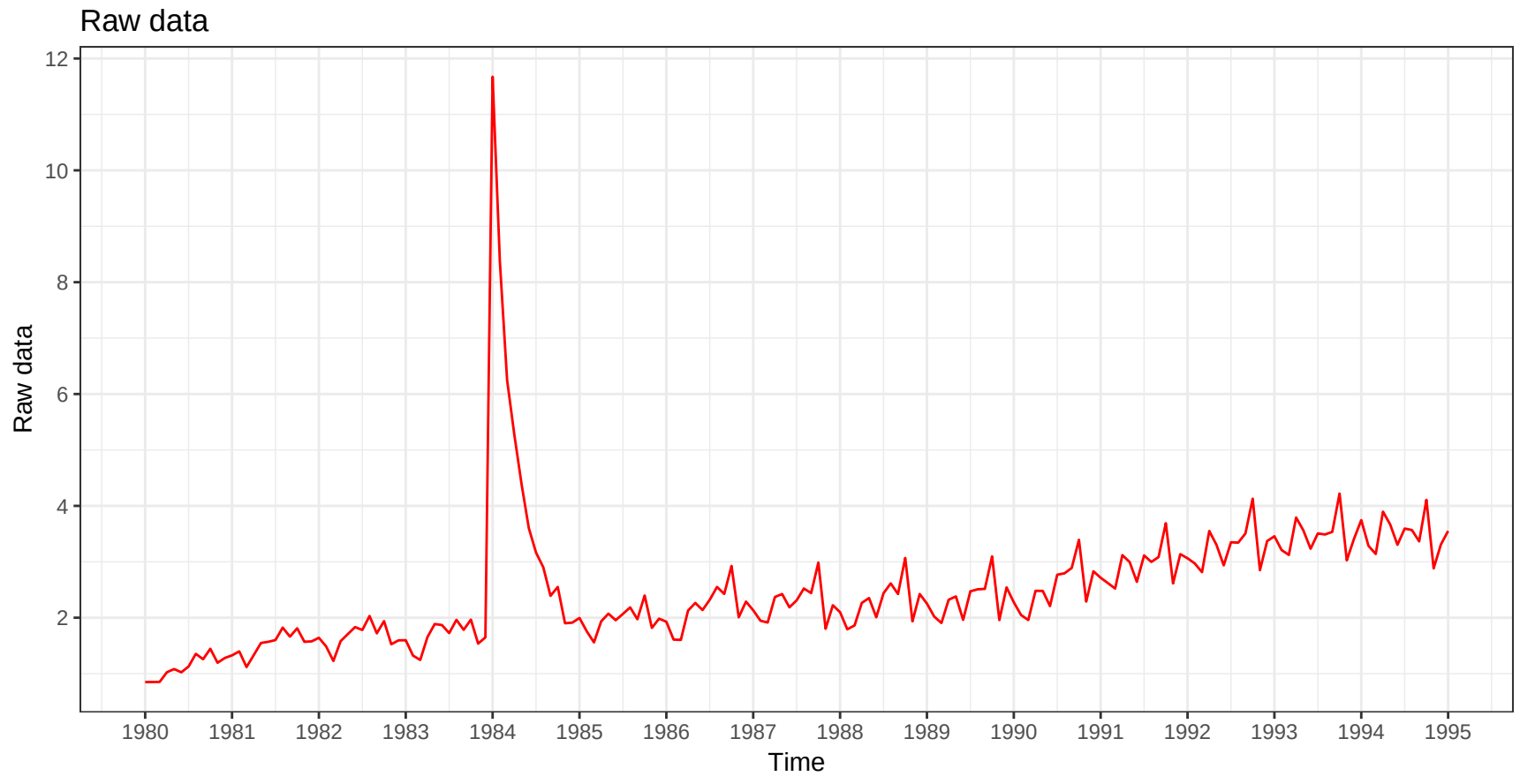
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1+0.3B)at



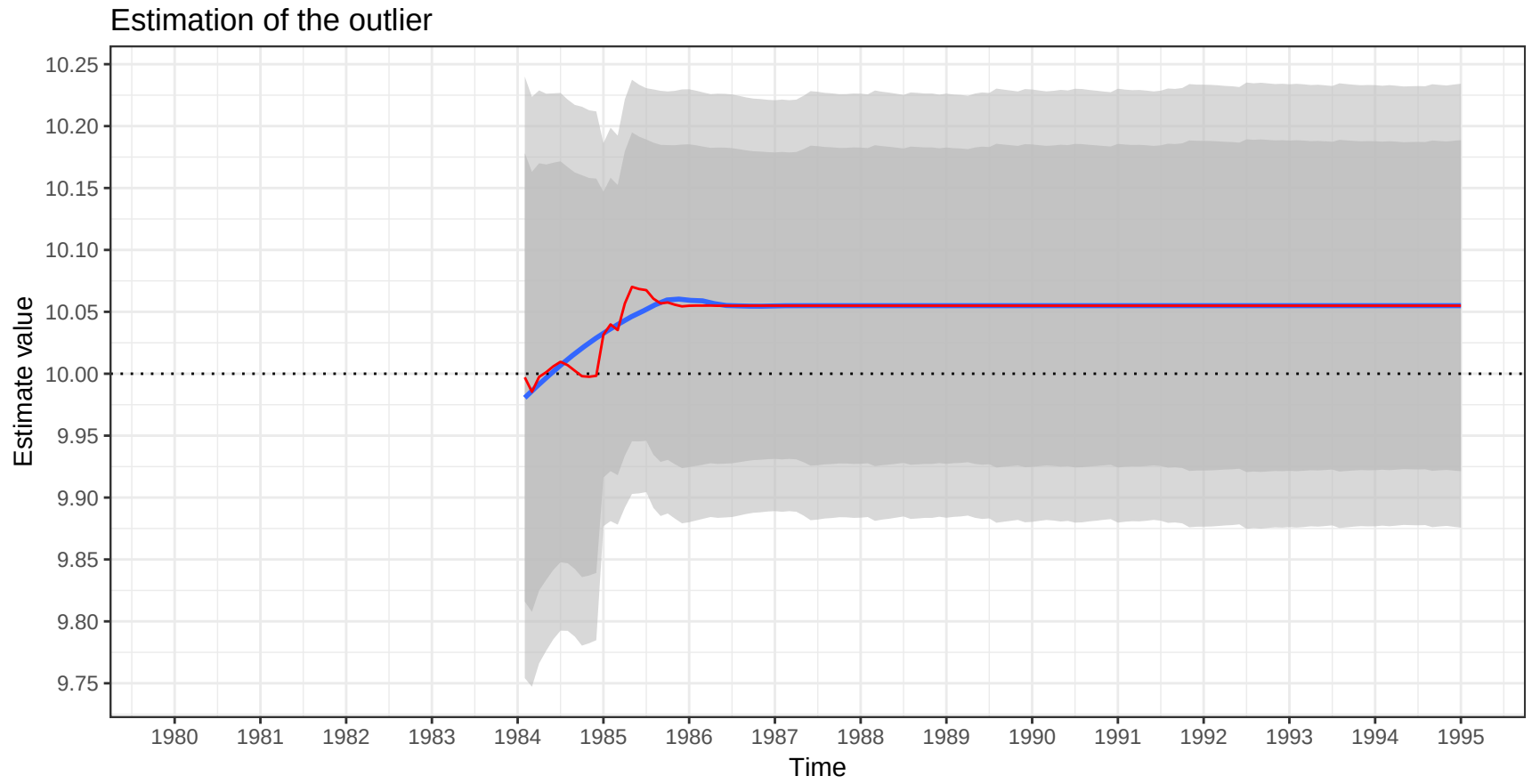


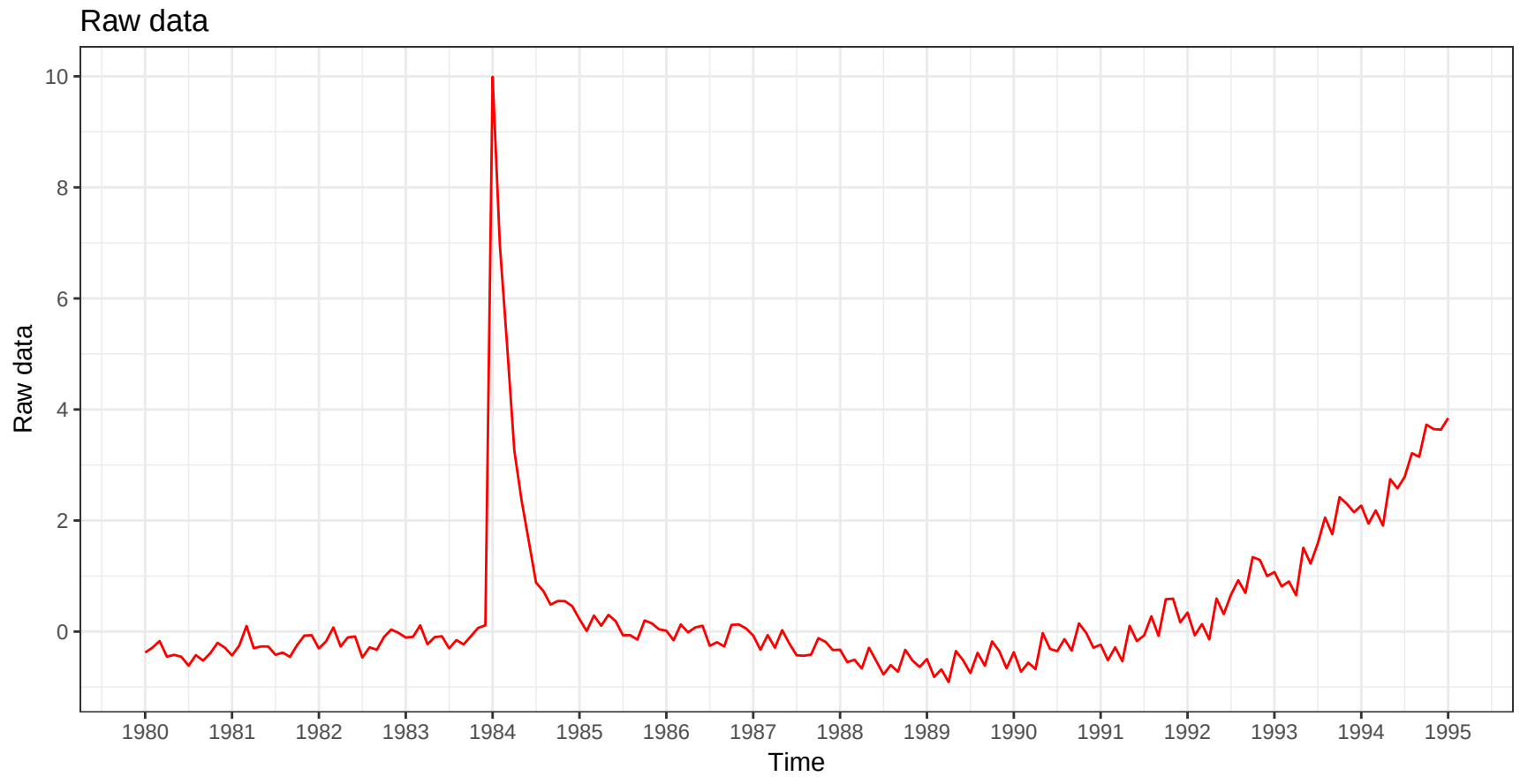
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1−0.4B)at



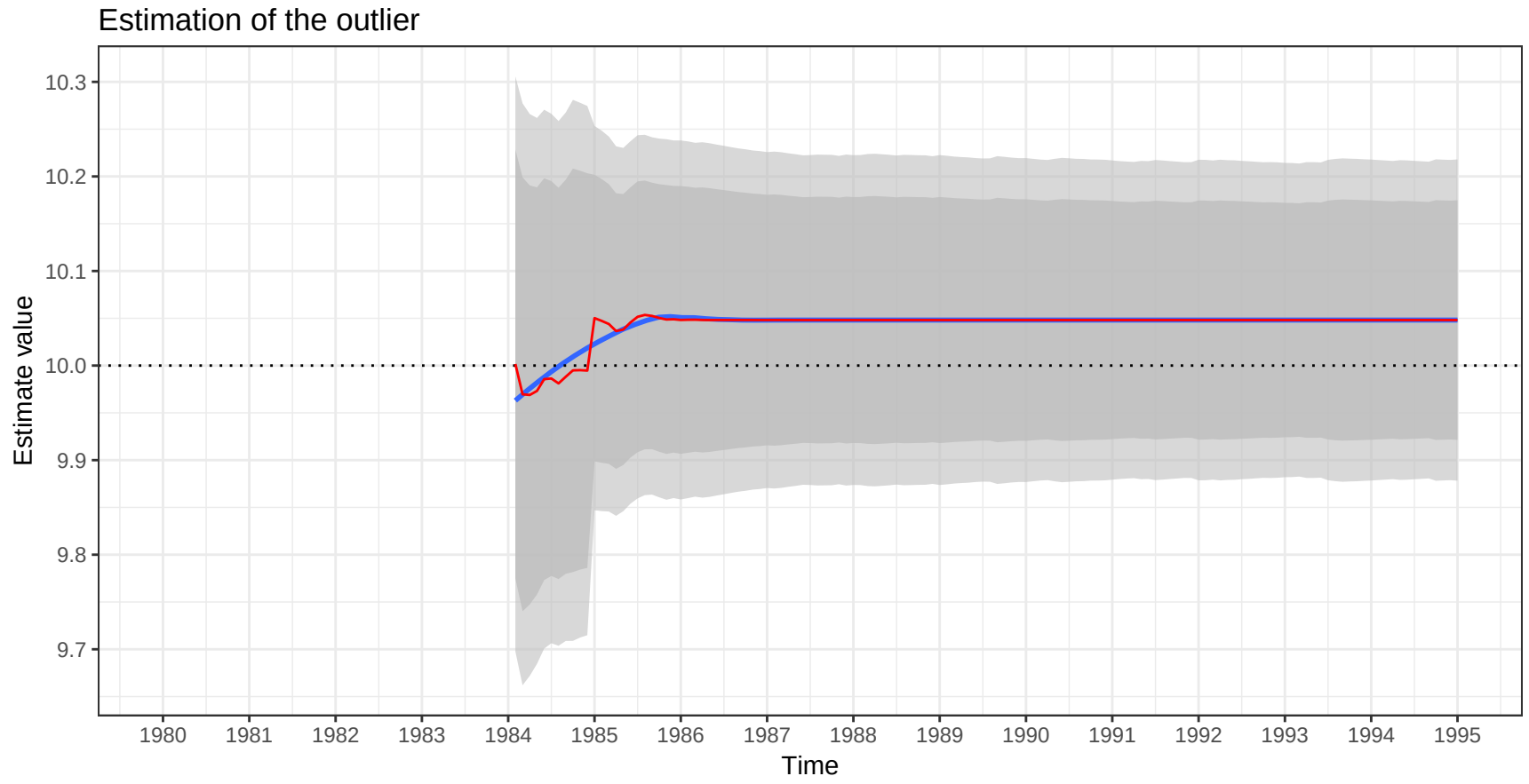


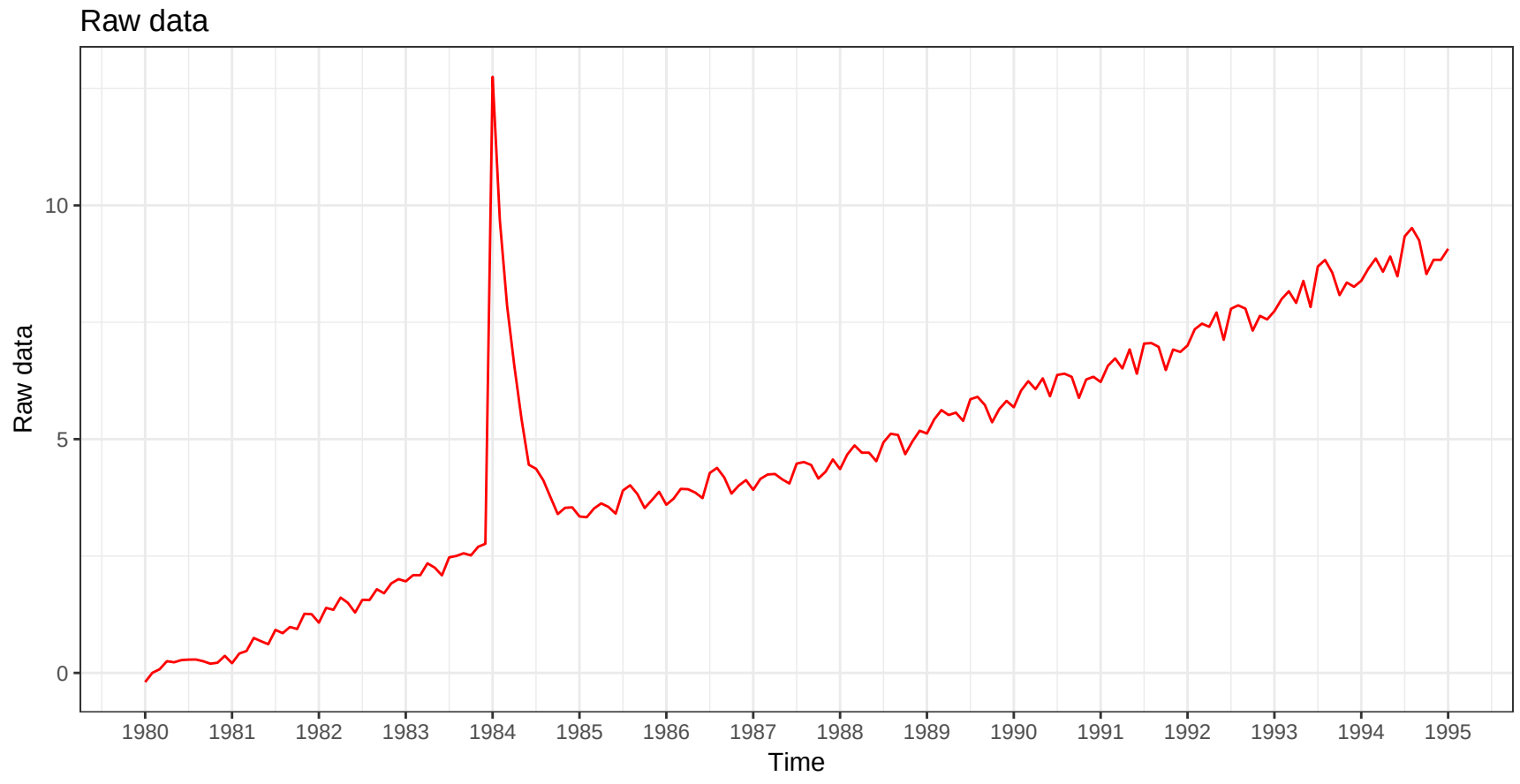
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1−0.4B)at



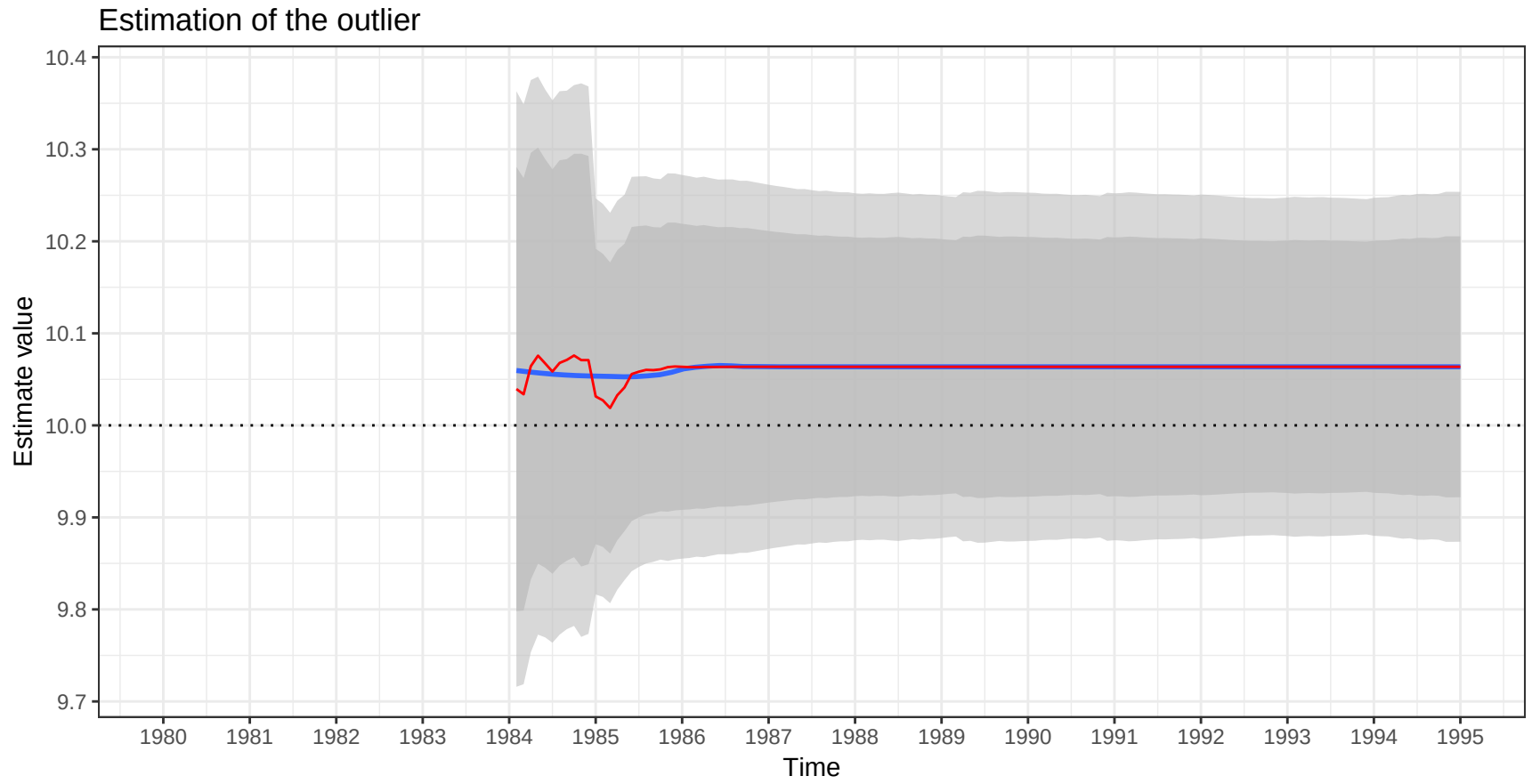


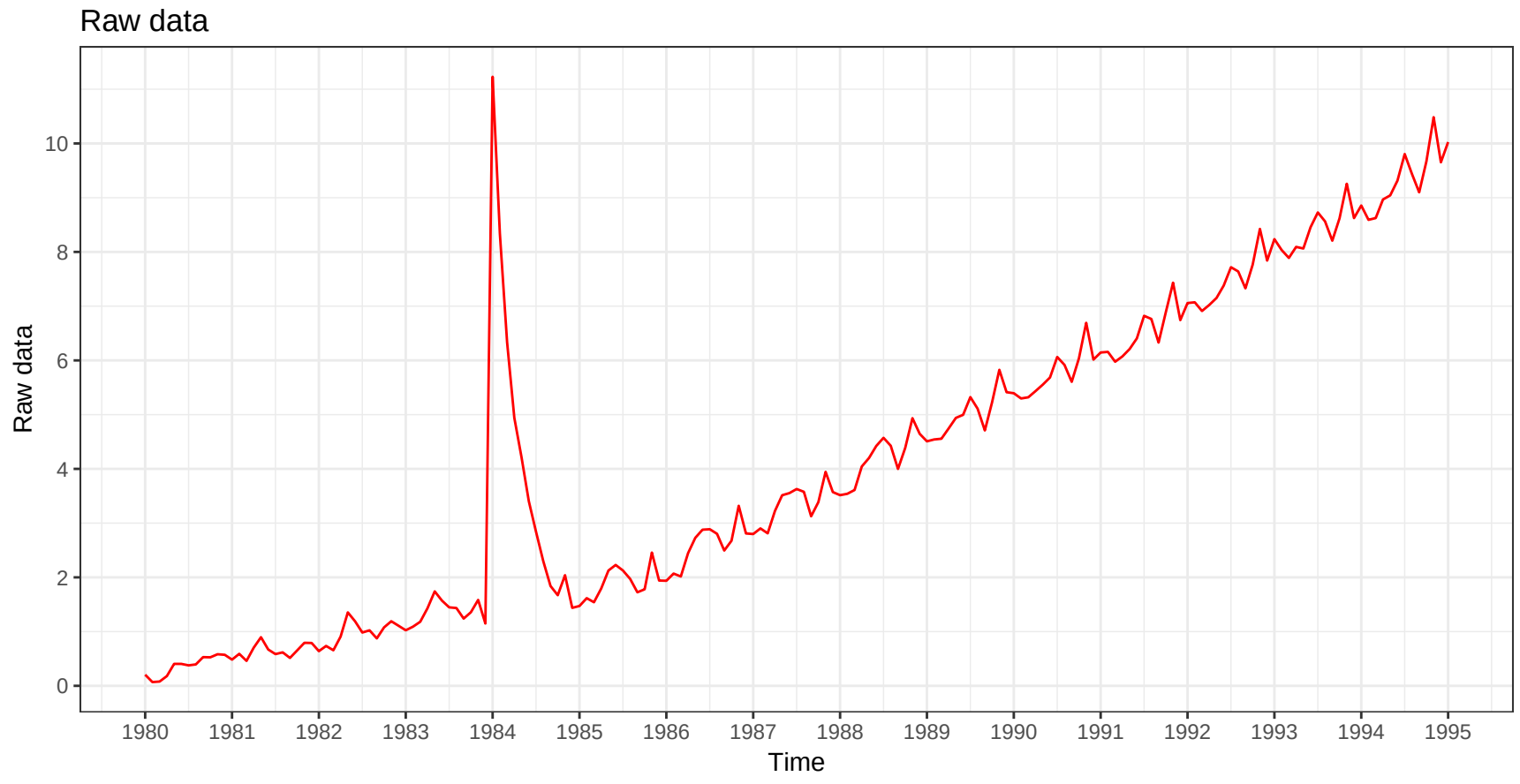
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1−0.4B)at



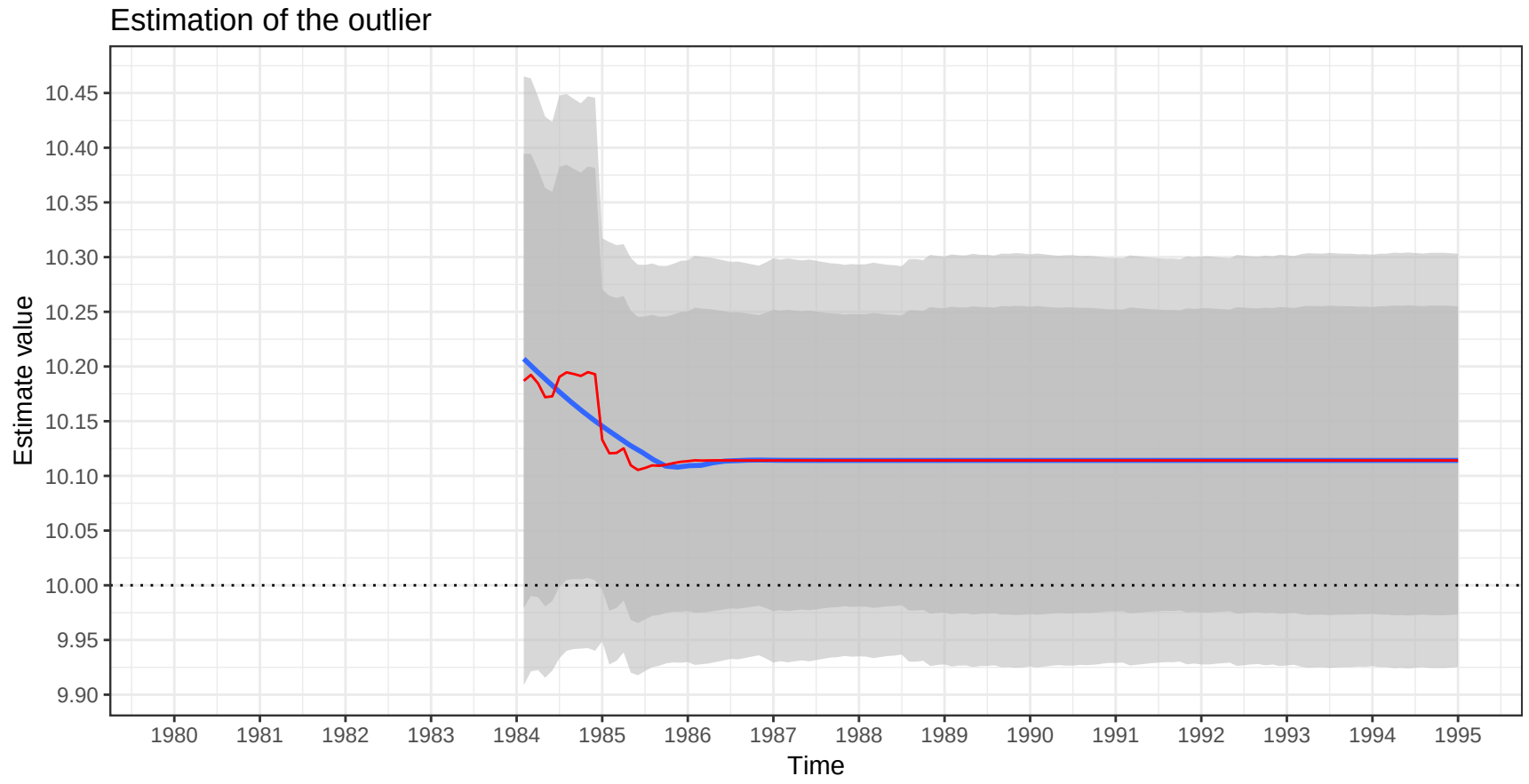


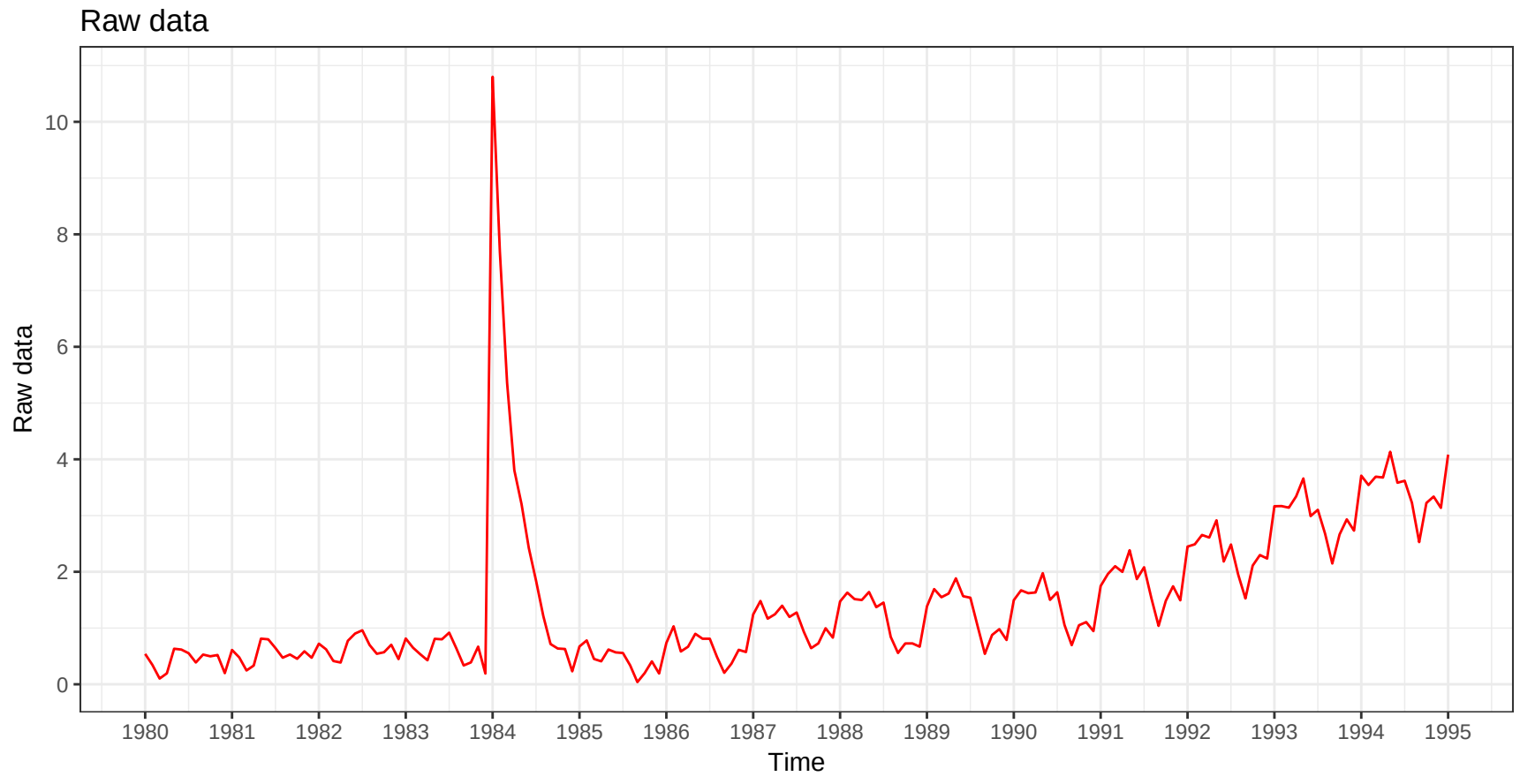
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1−0.4B)at



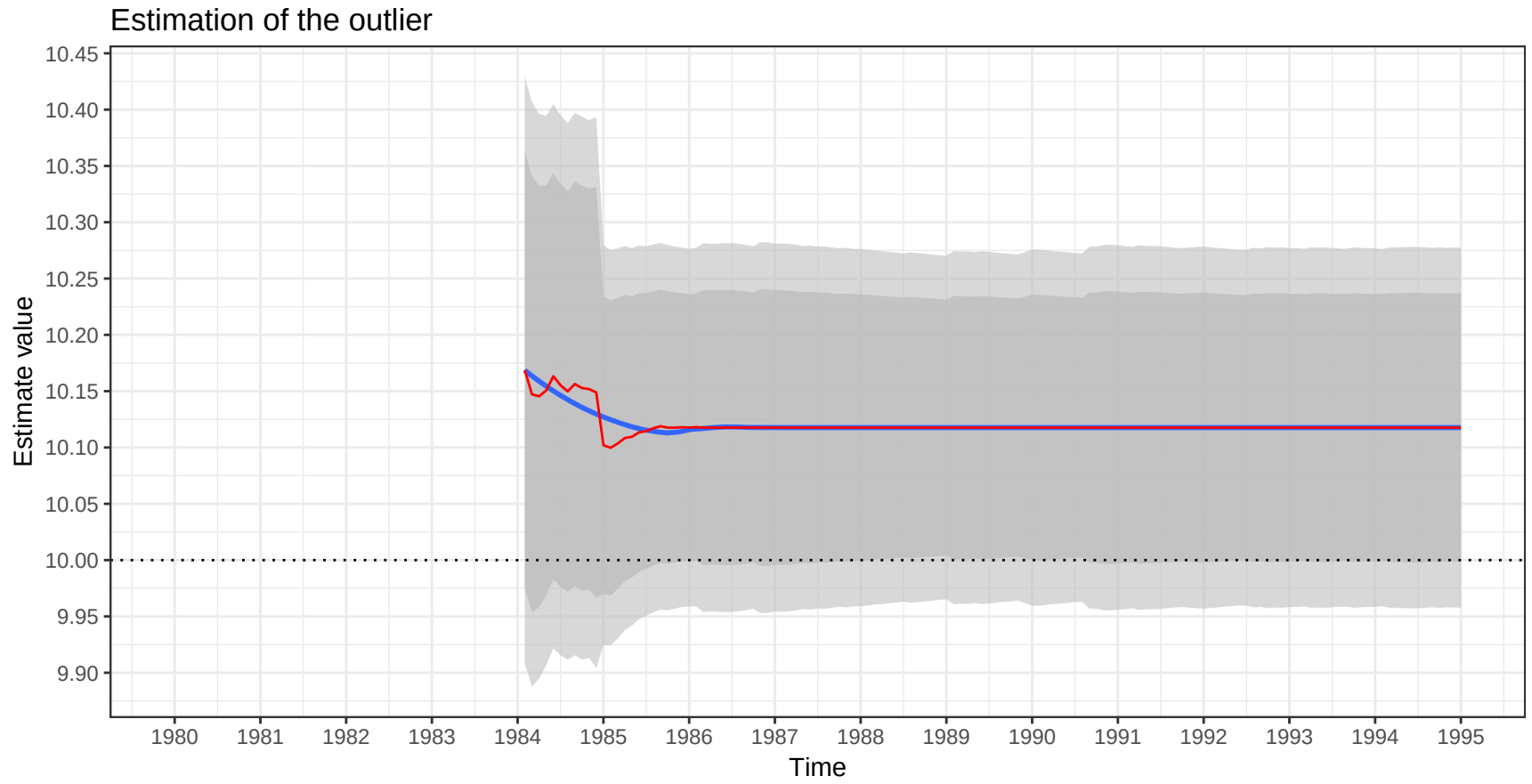


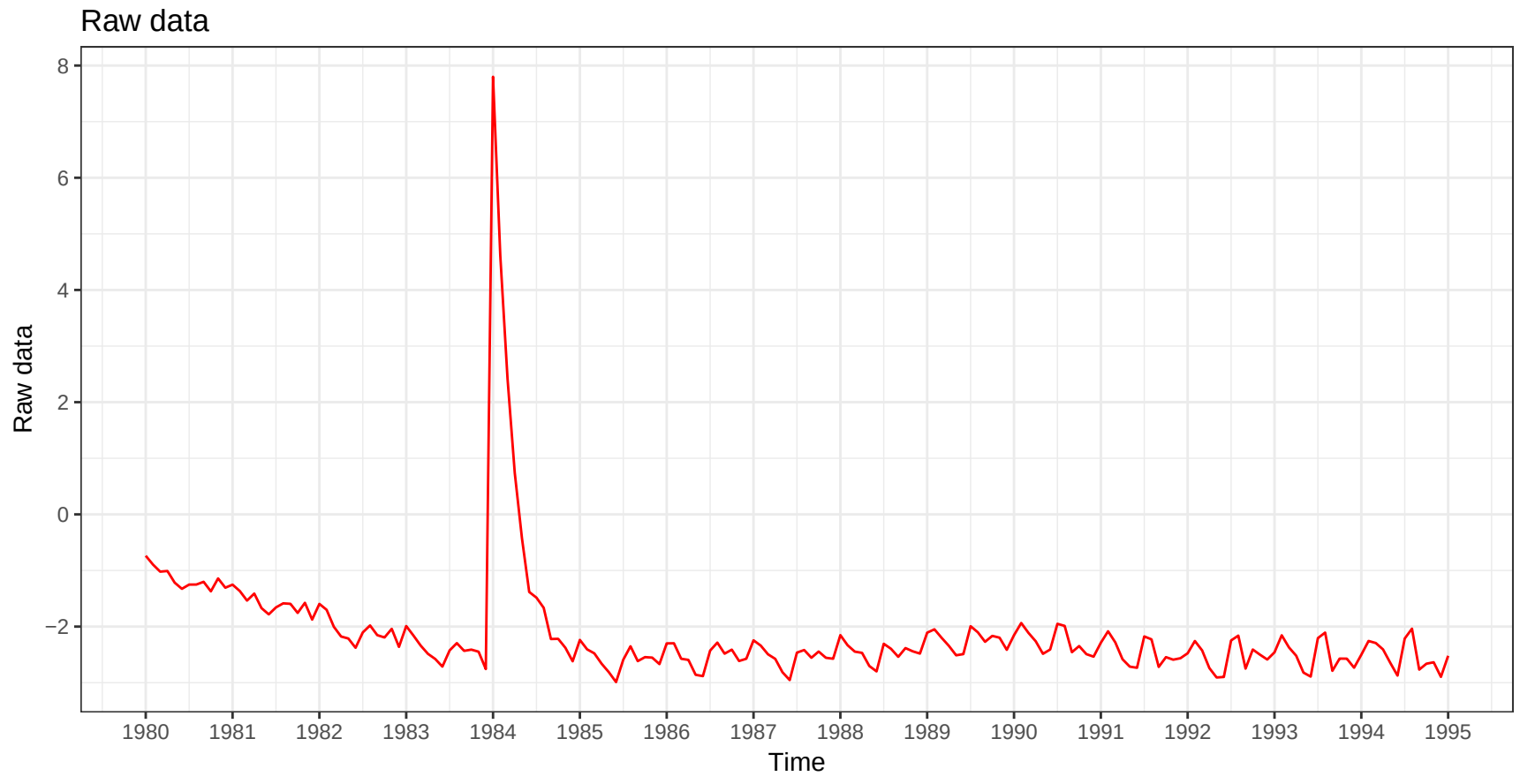
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1−0.4B)at



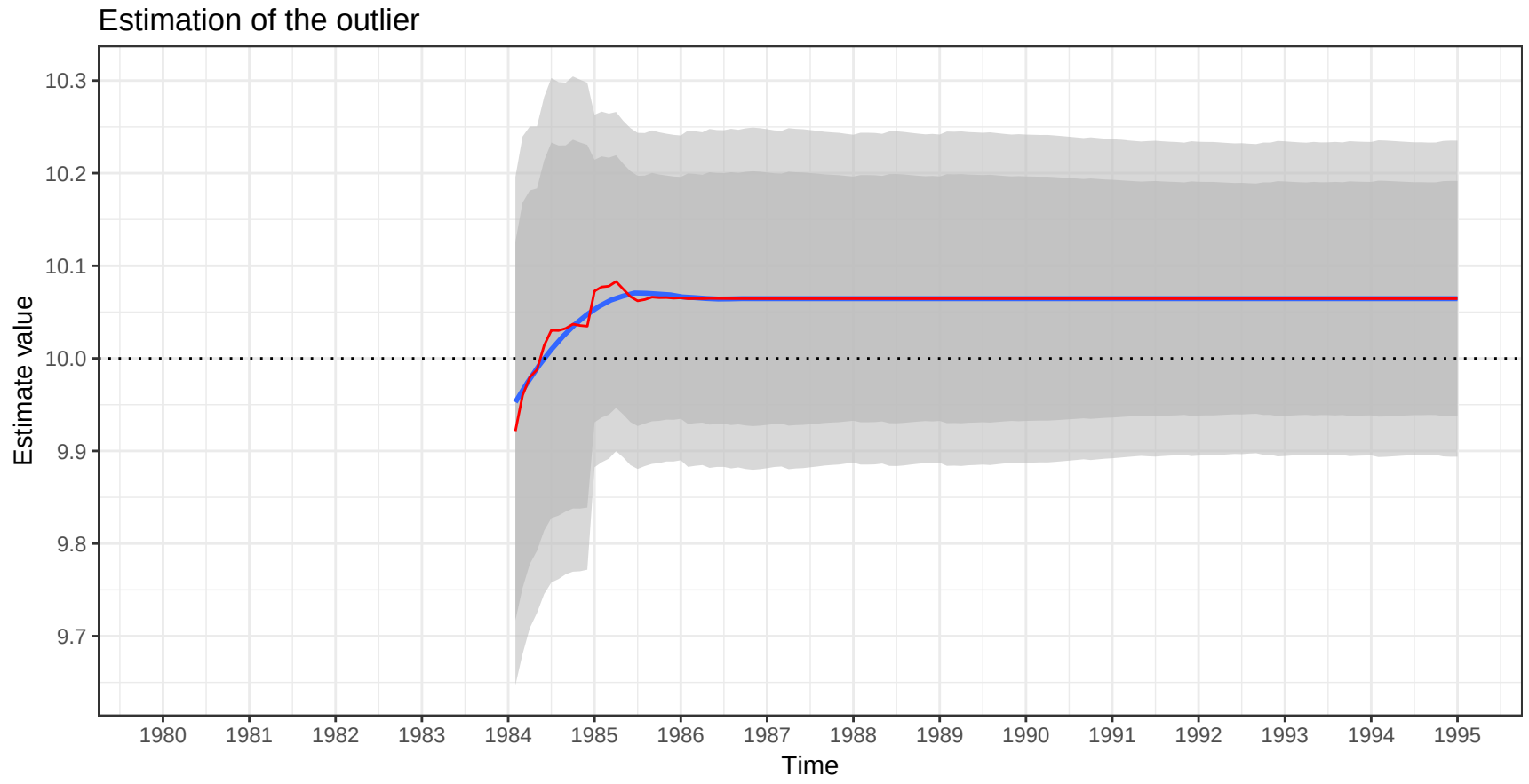


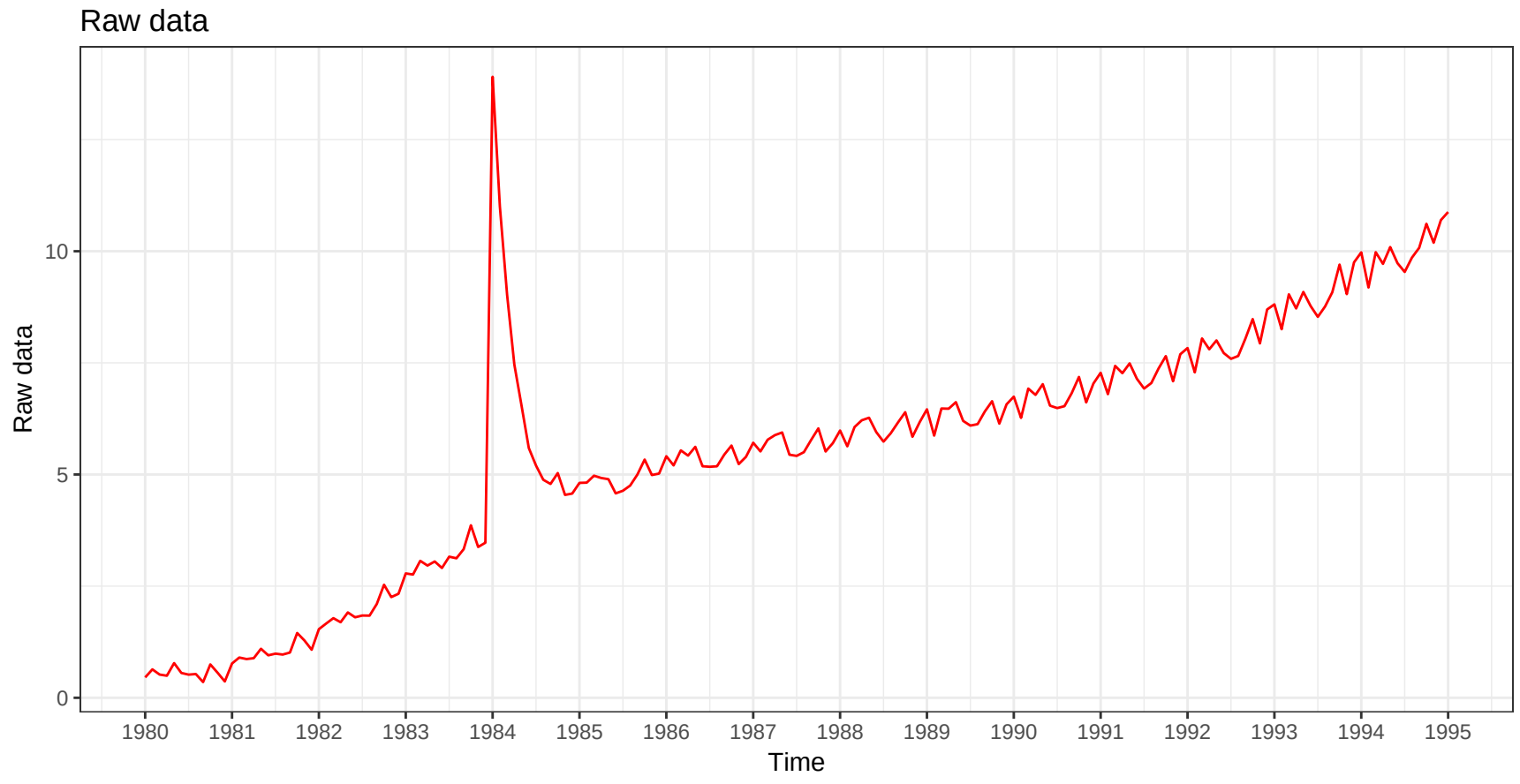
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1−0.4B)at



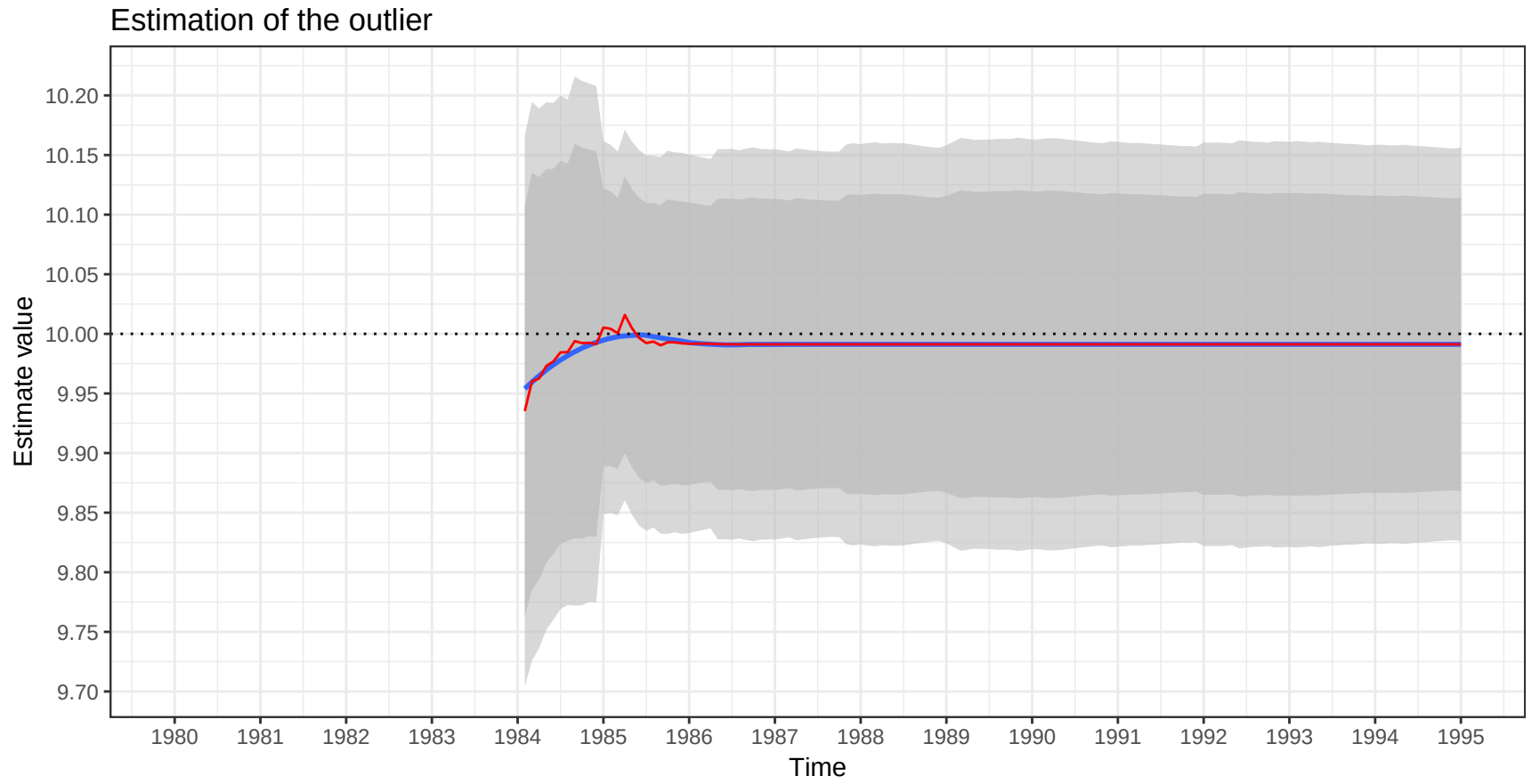


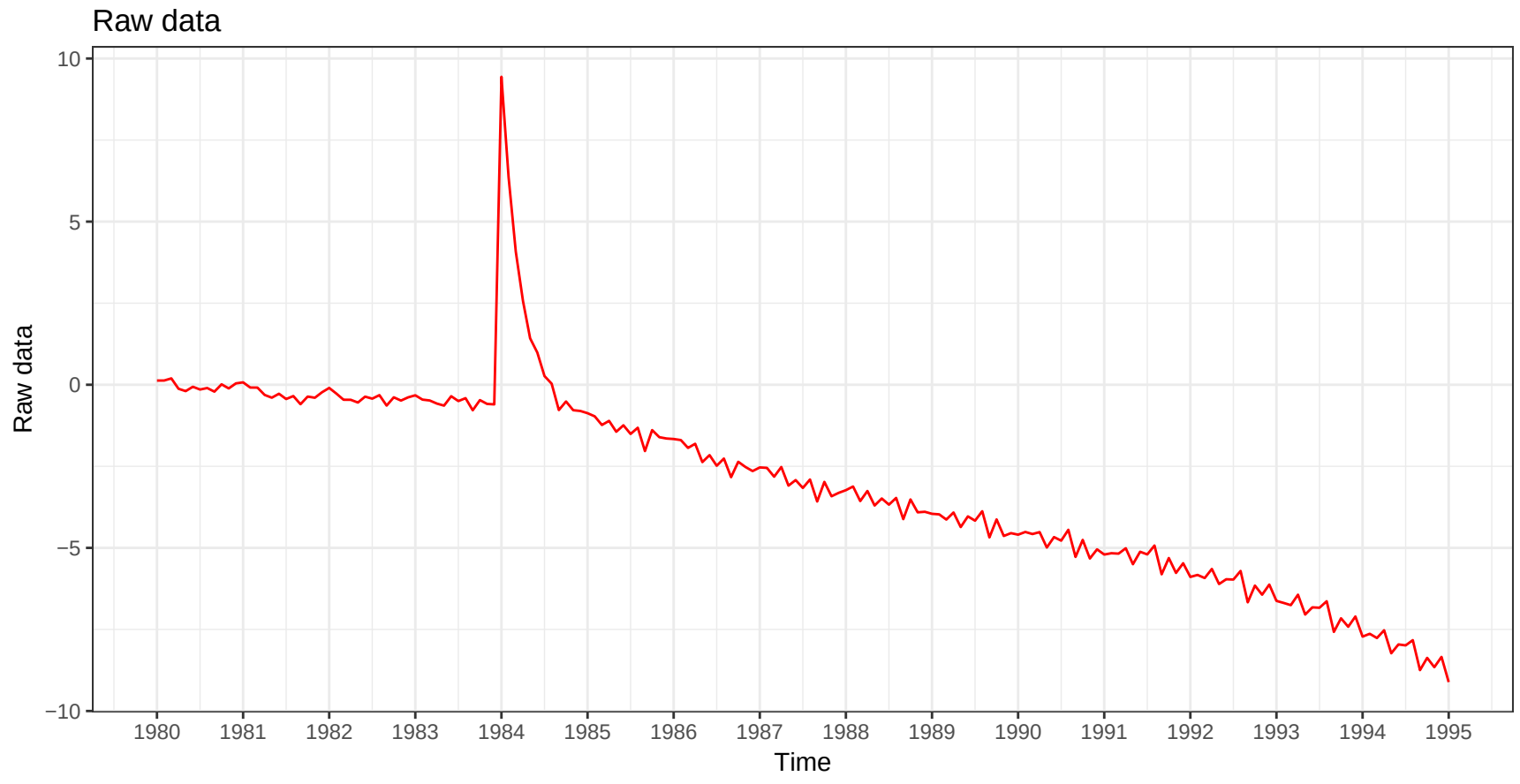
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1−0.4B)at



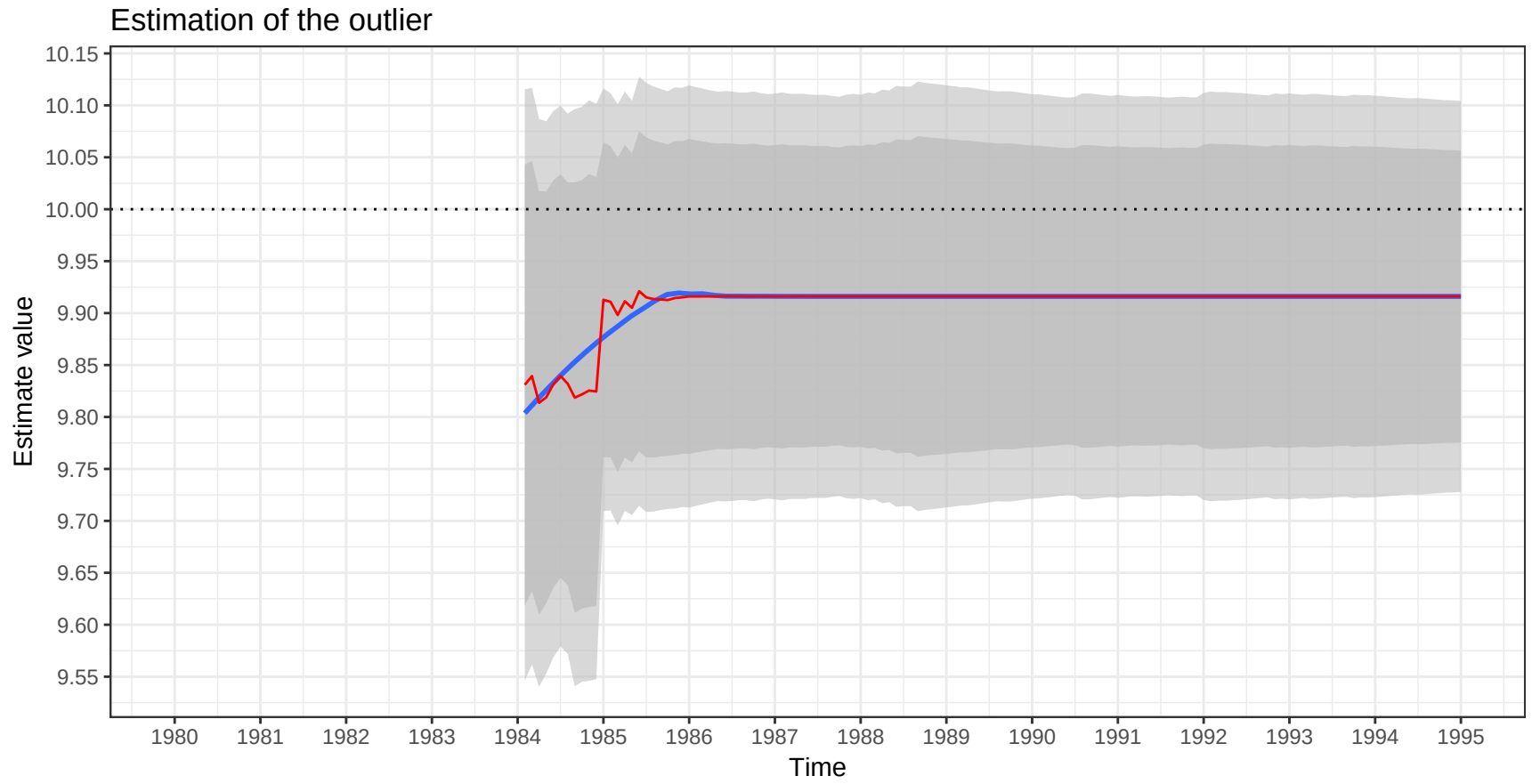


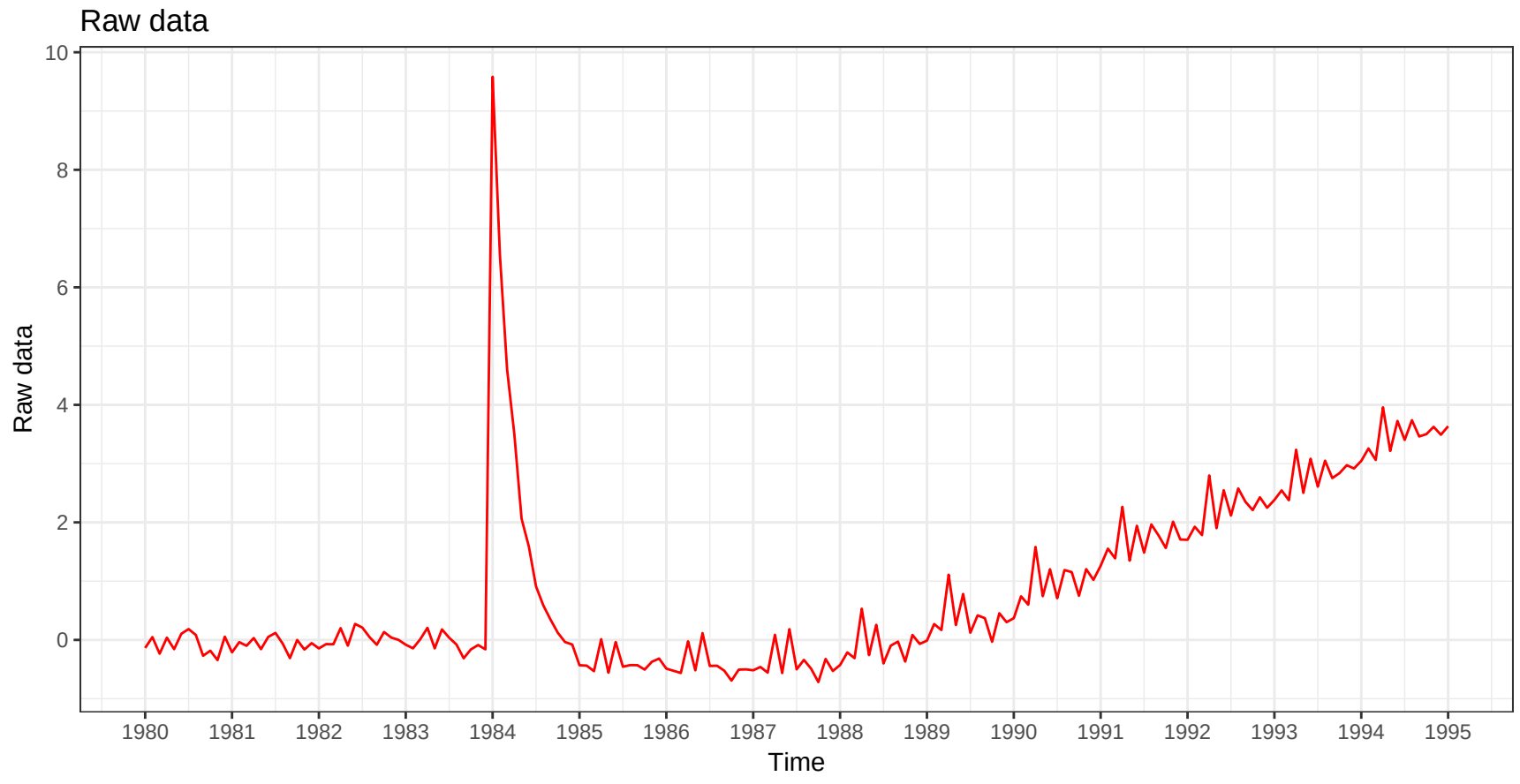
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1−0.4B)at



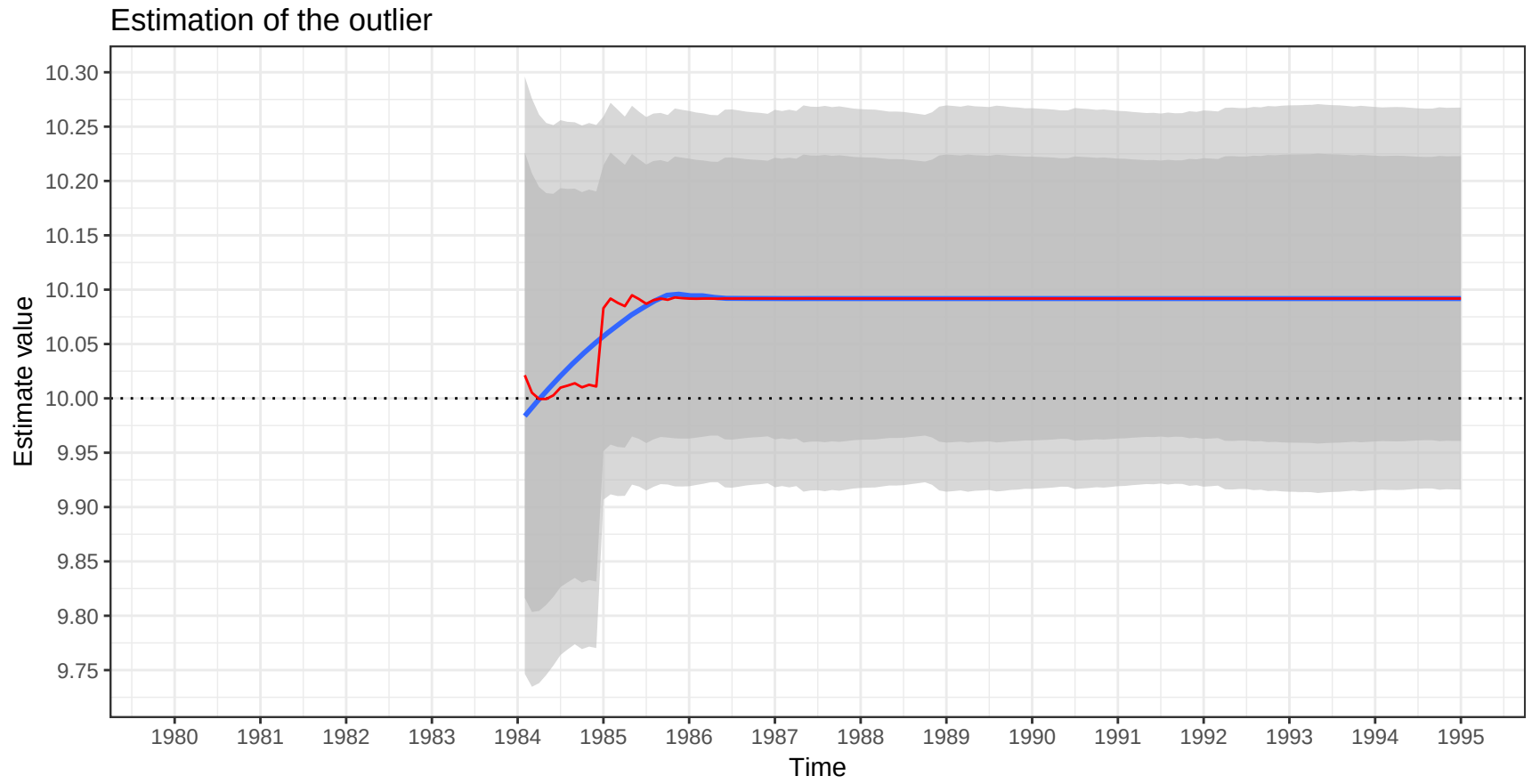


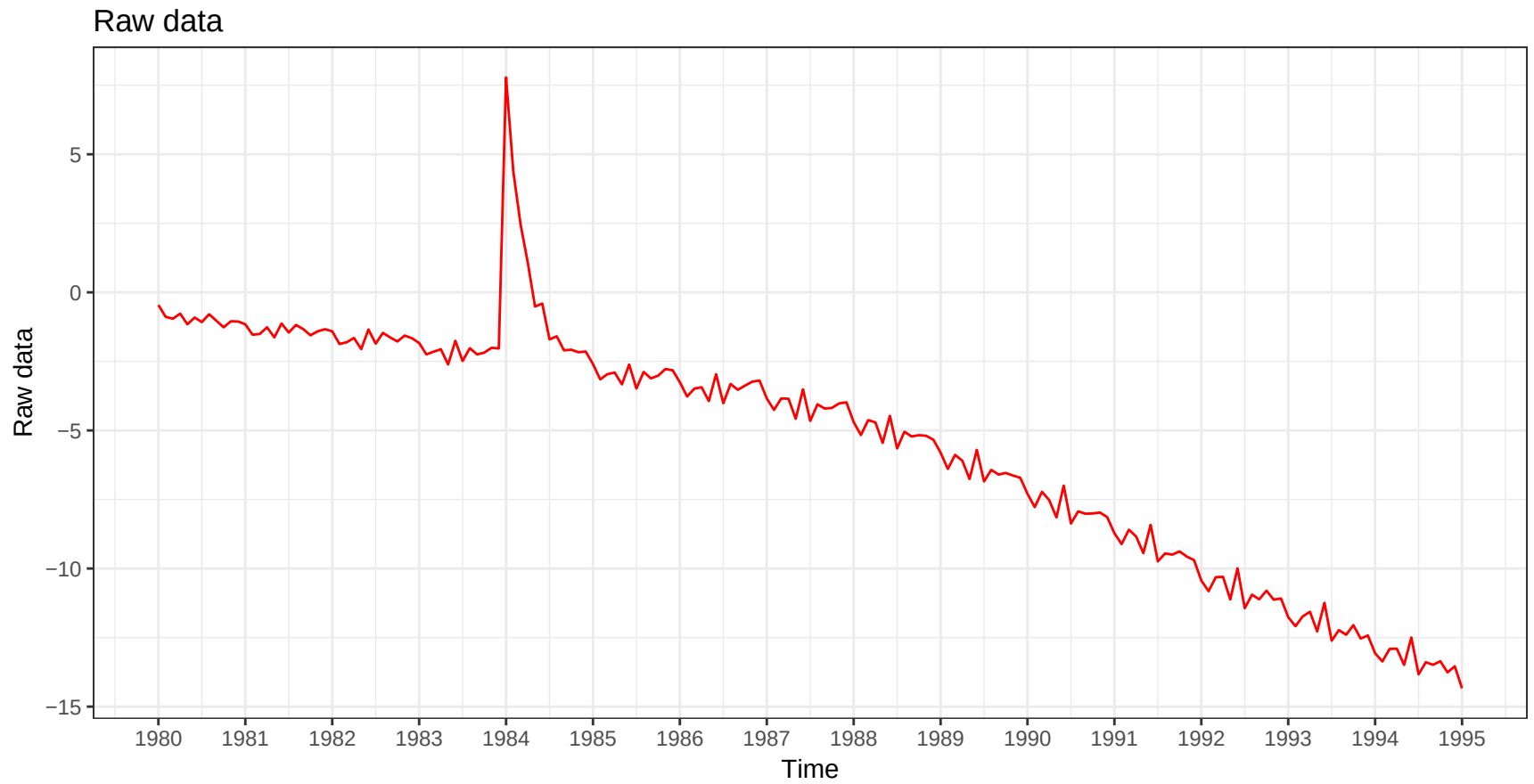
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1−0.4B)at



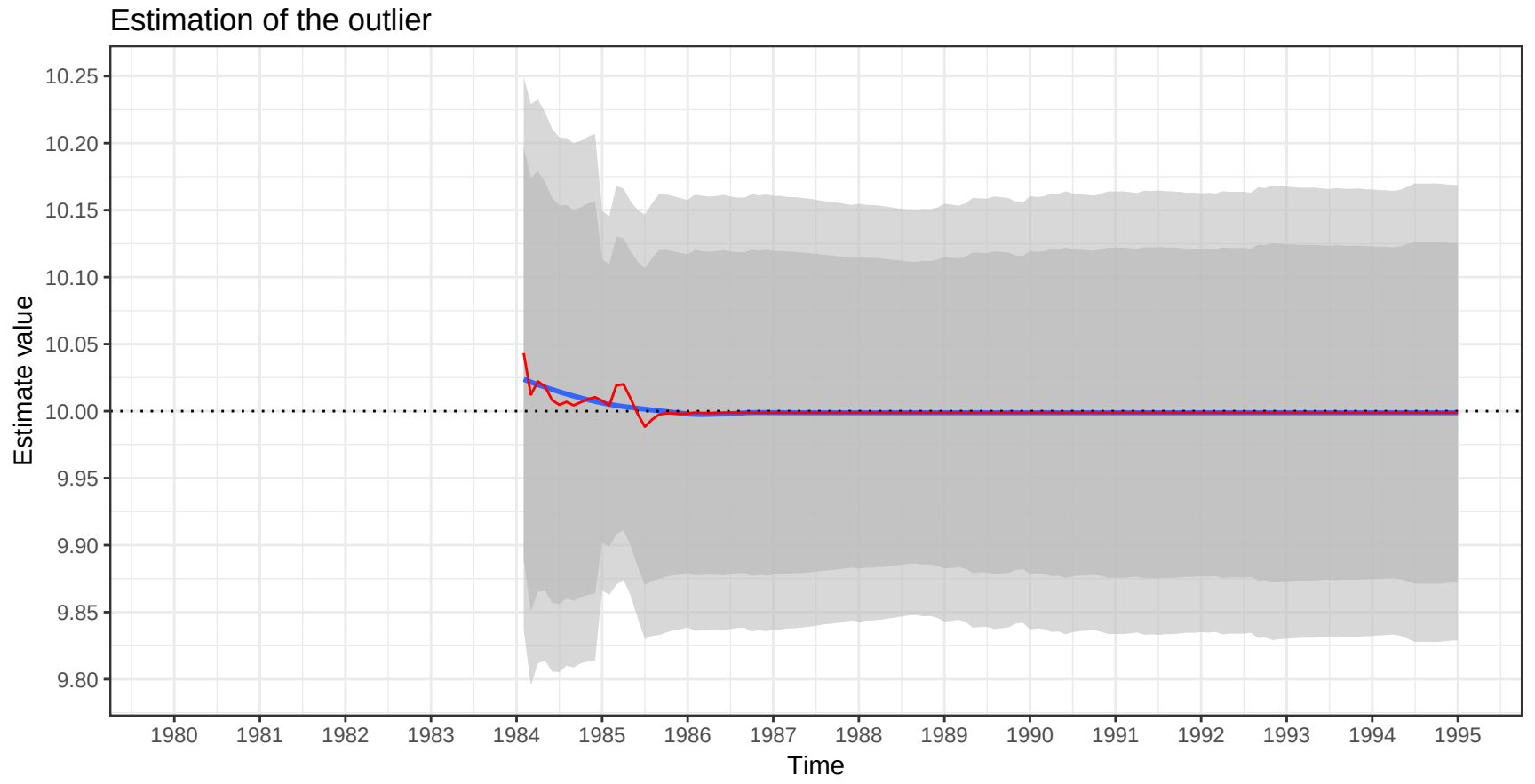


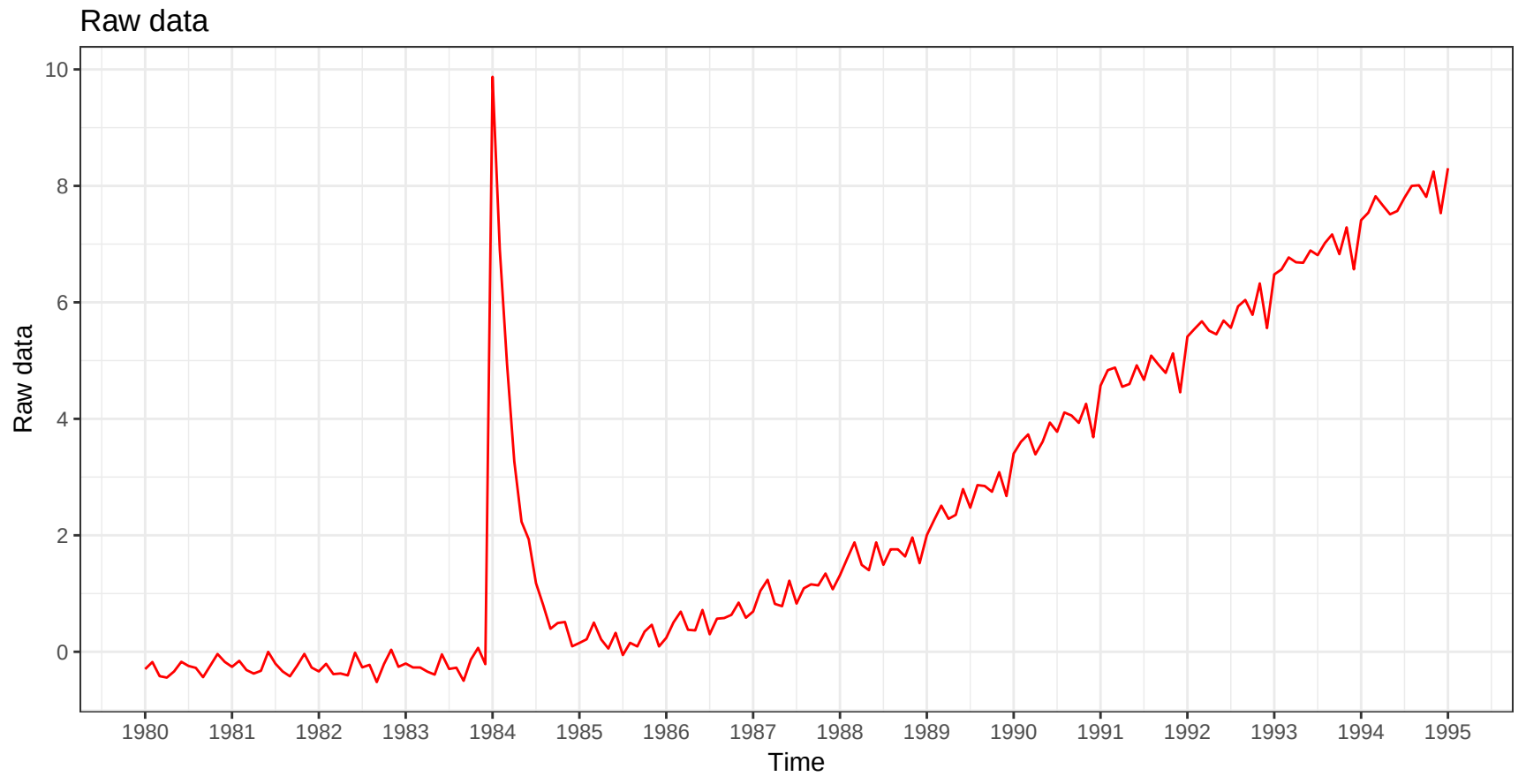
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1−0.4B)at



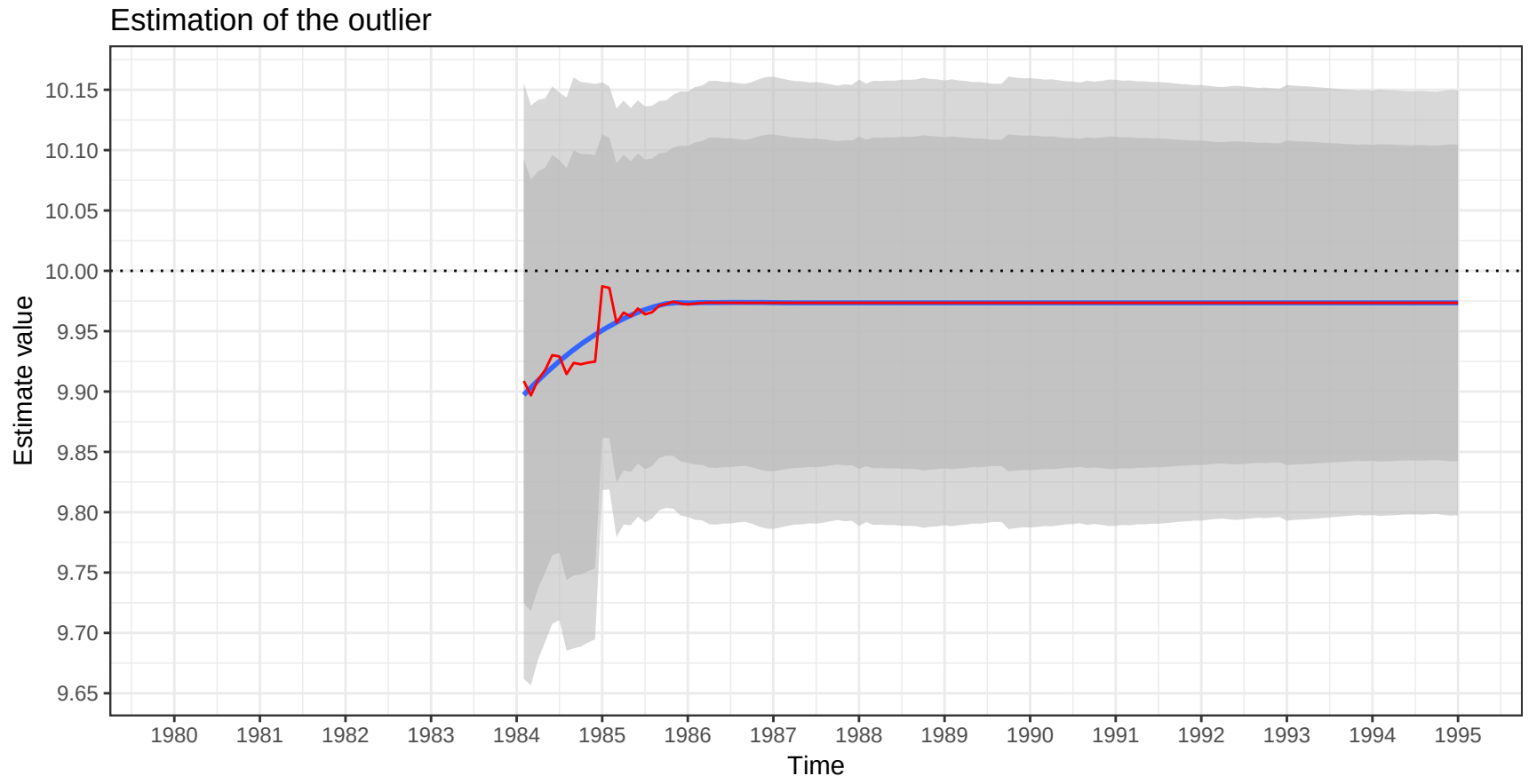


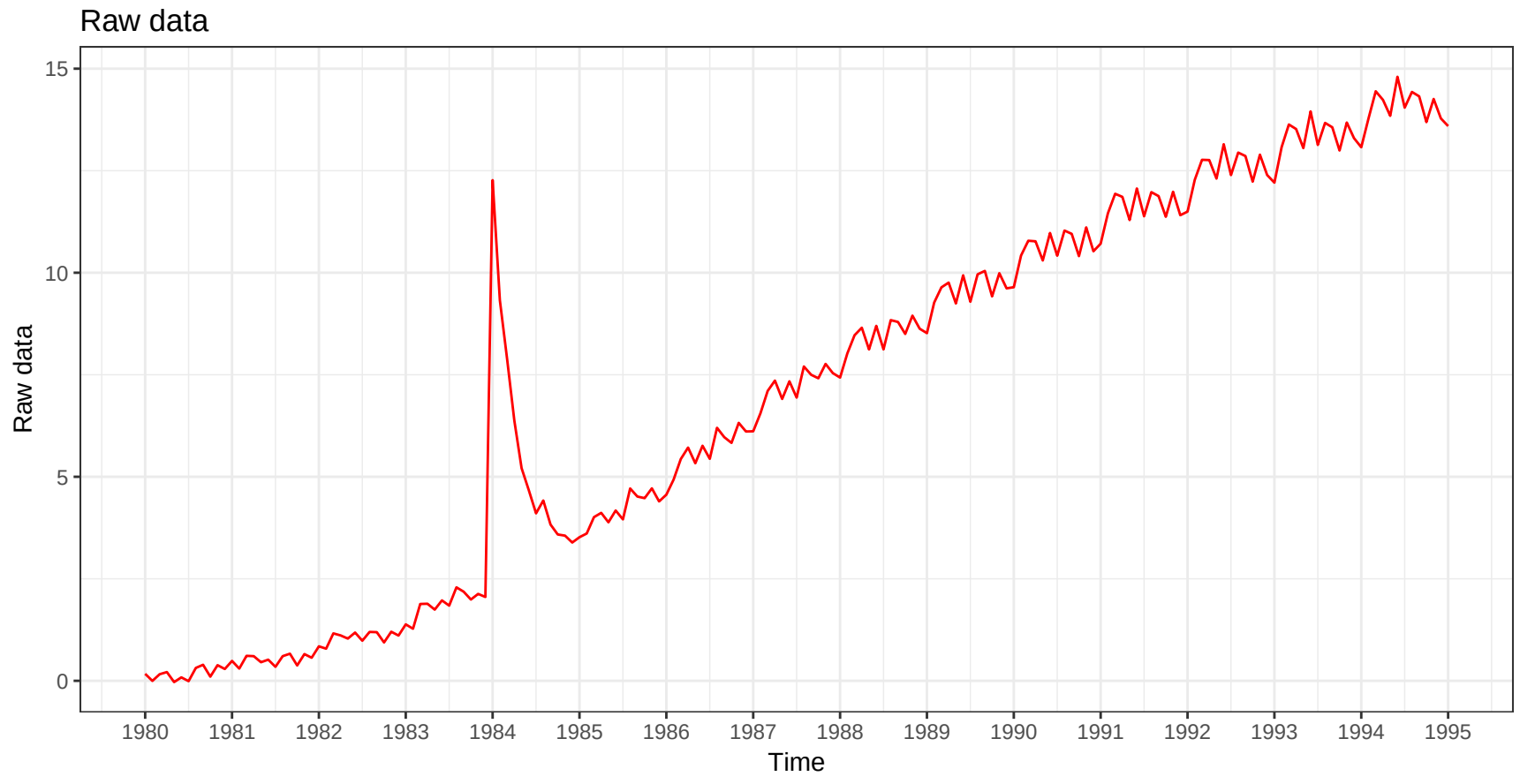
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1−0.6B)at



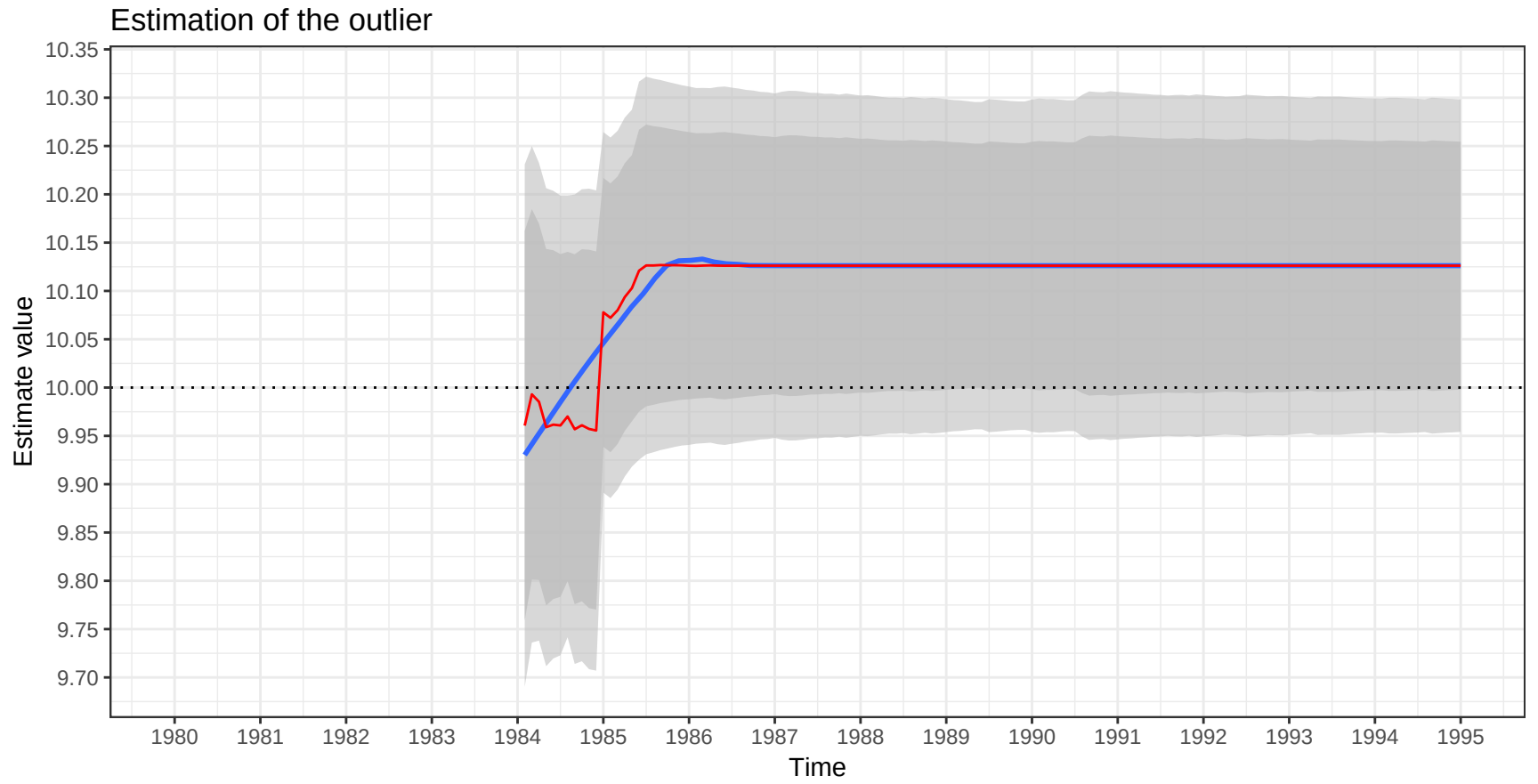


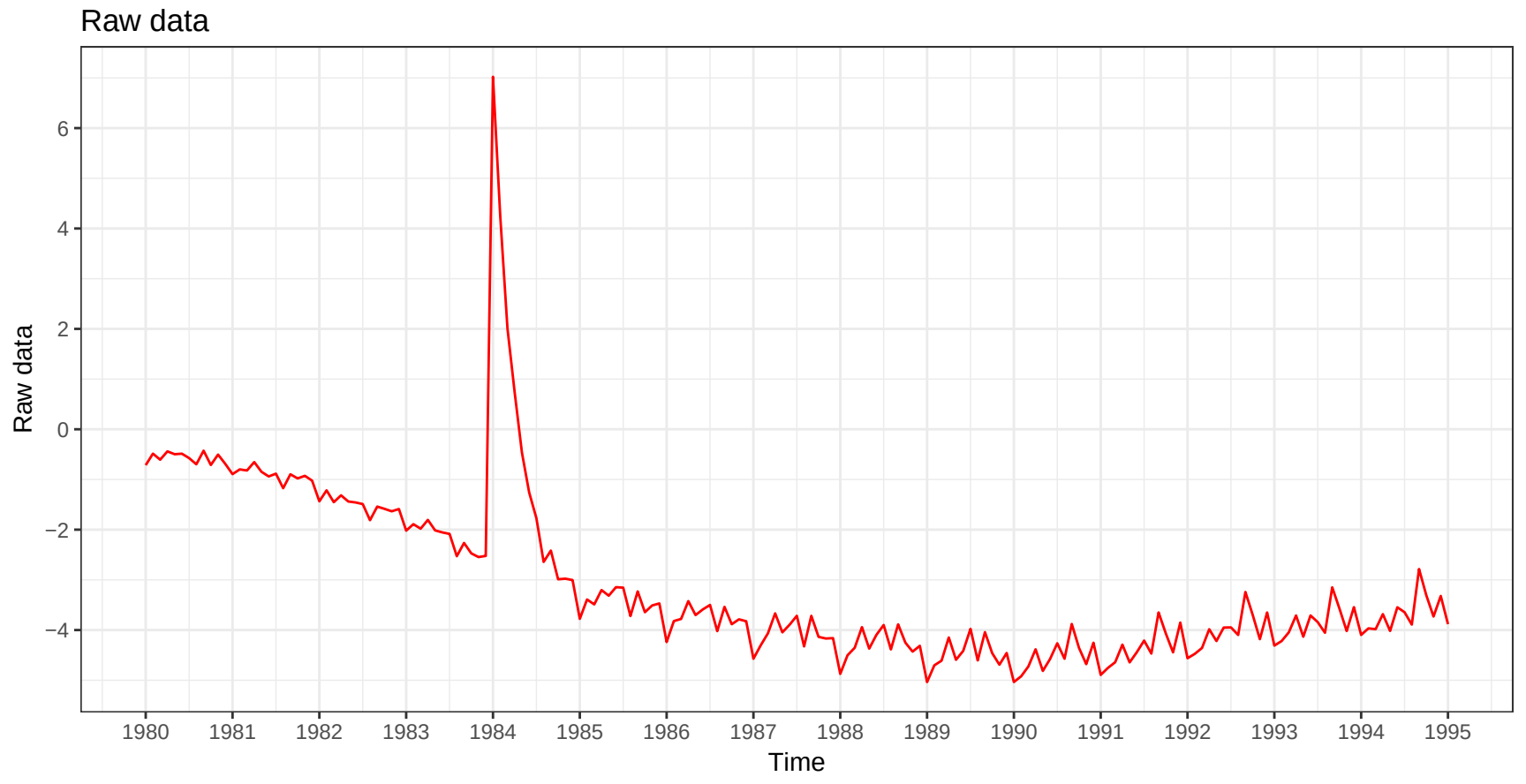
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1−0.6B)at



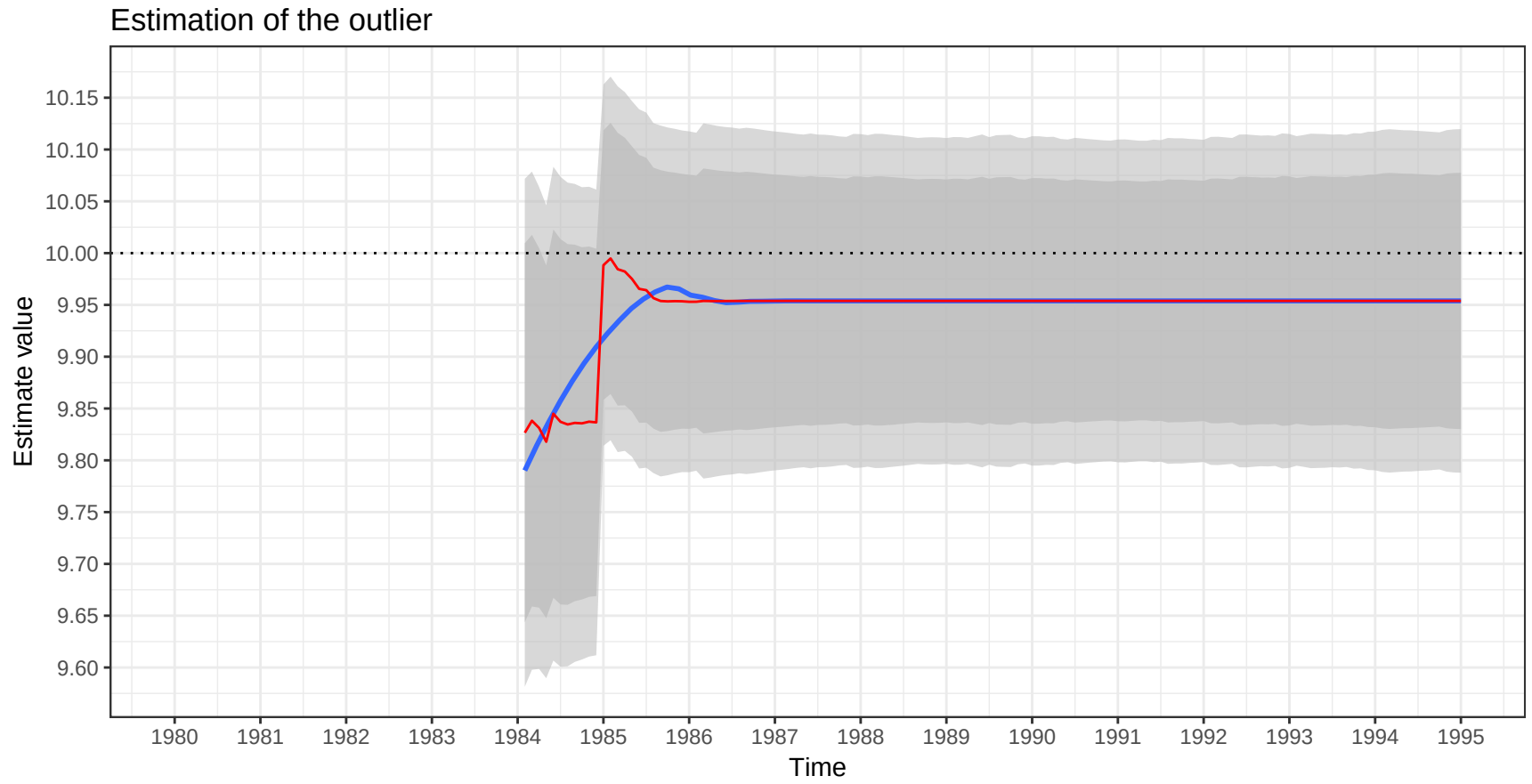


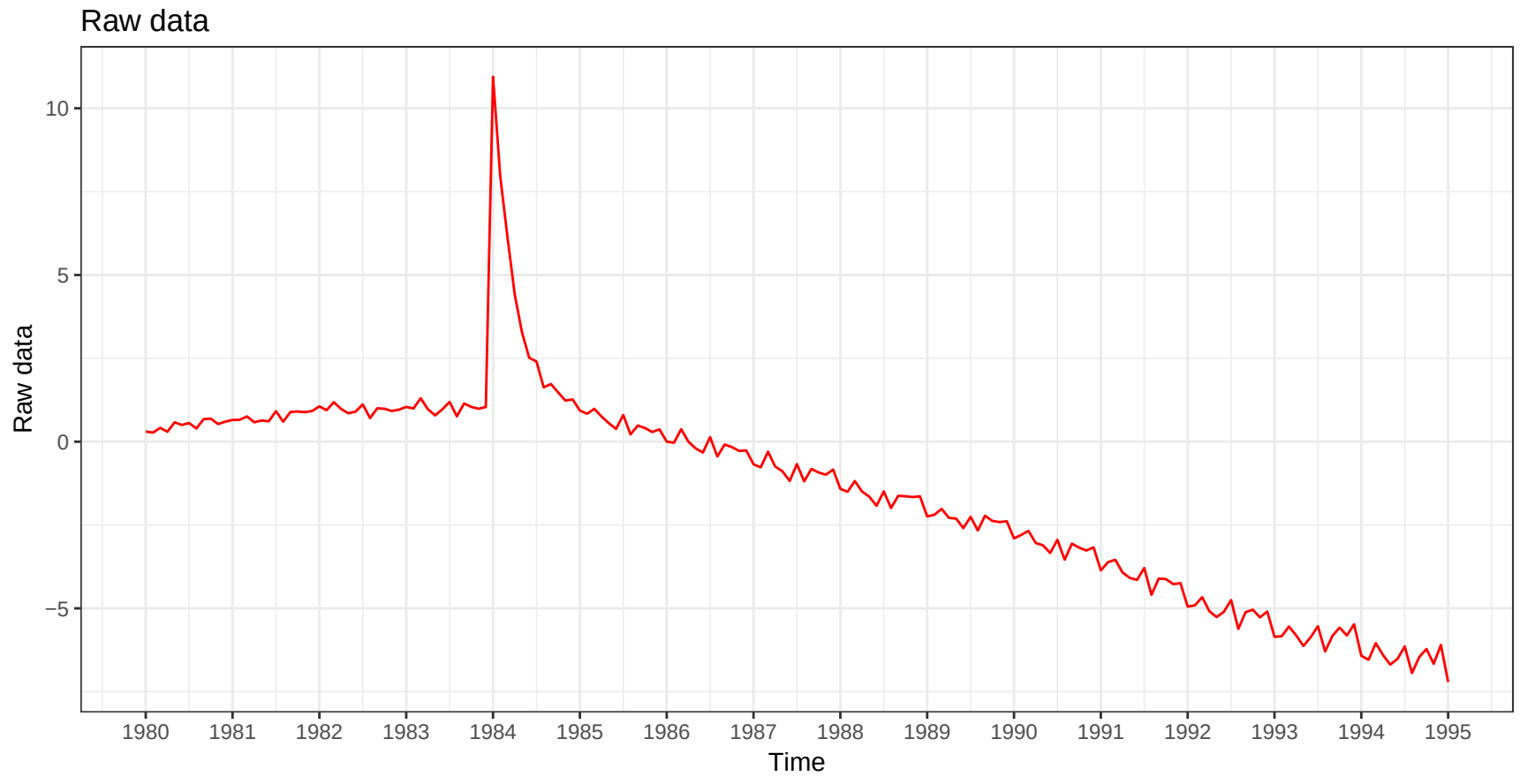
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1−0.6B)at

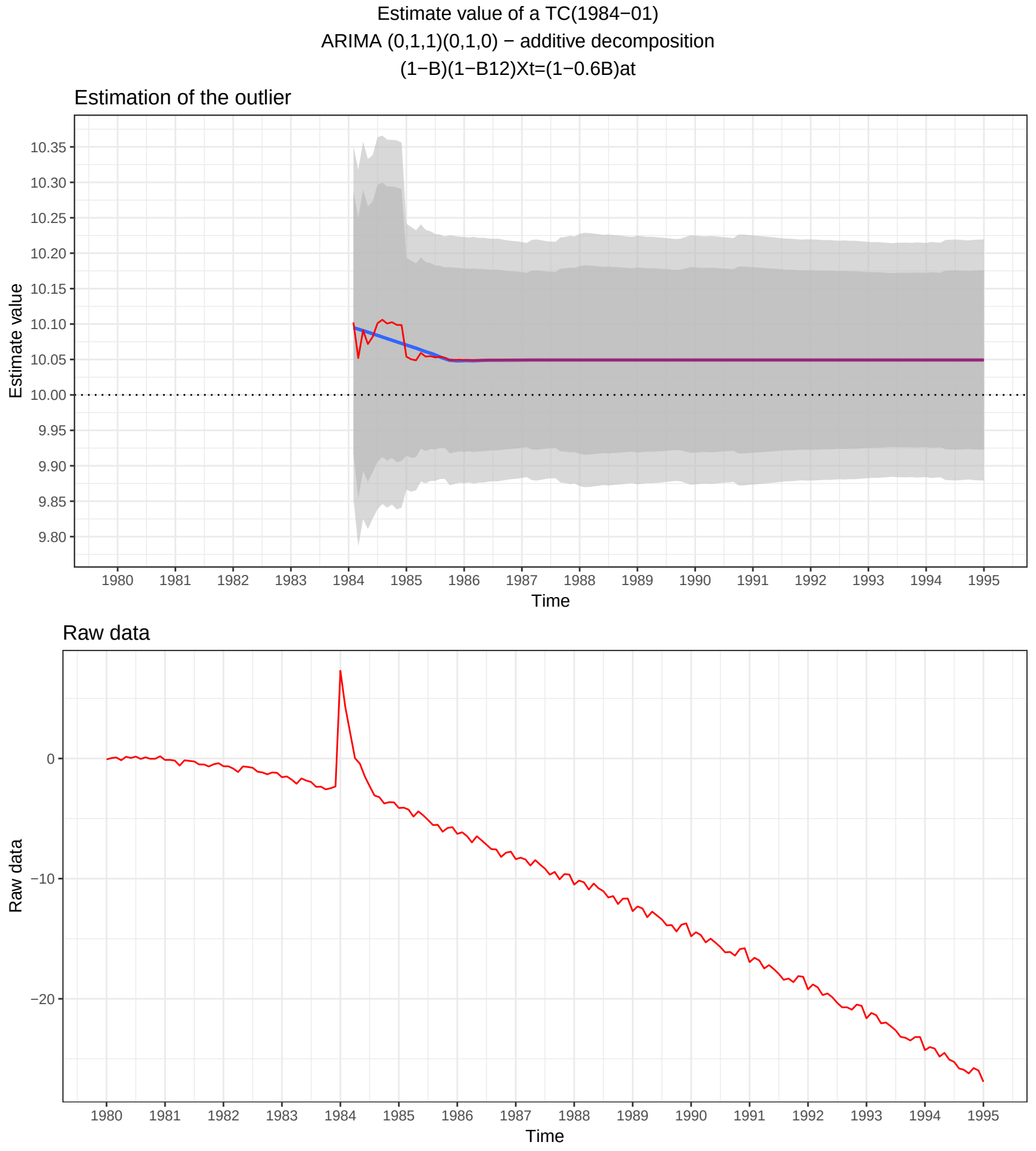




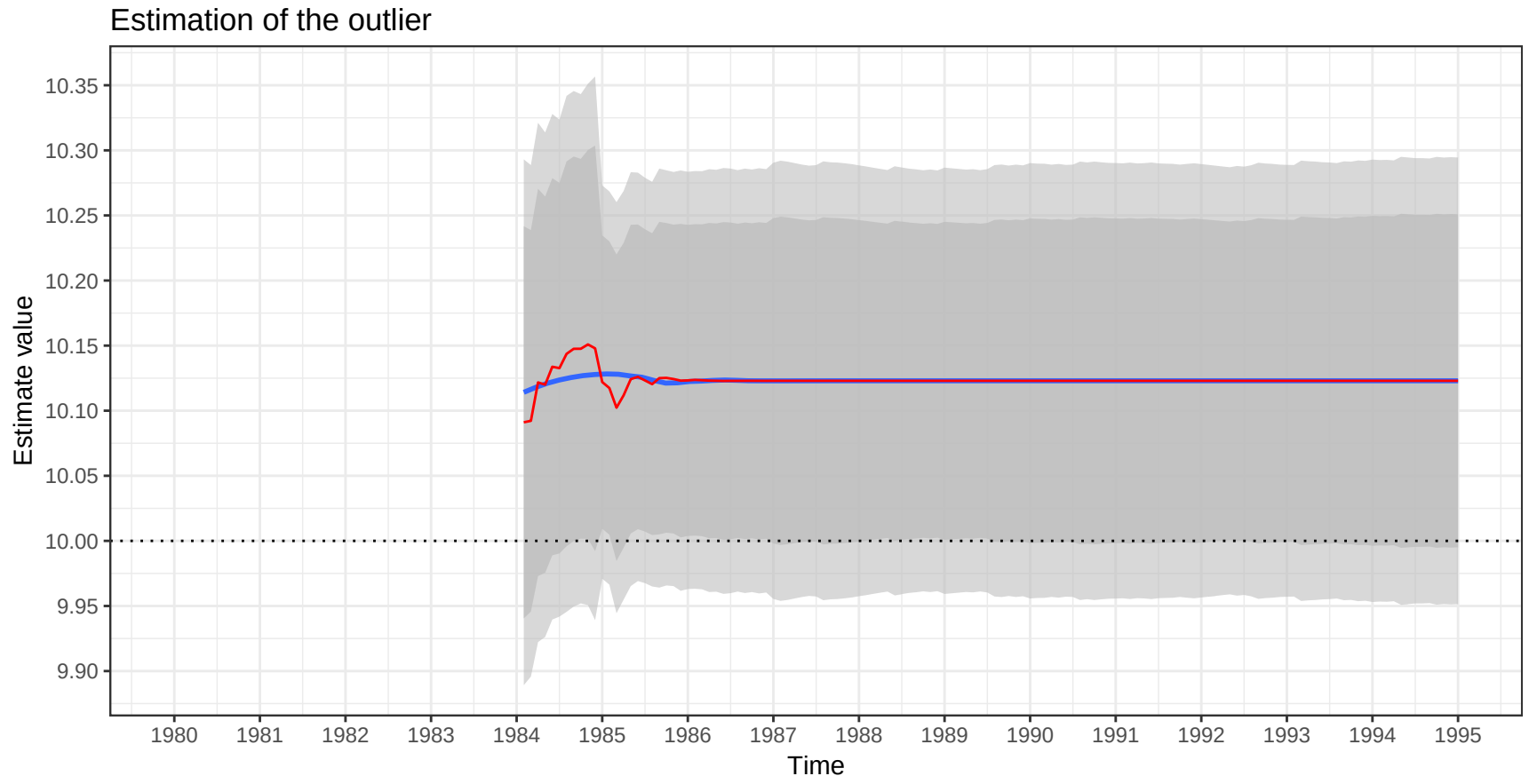
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1−0.6B)at

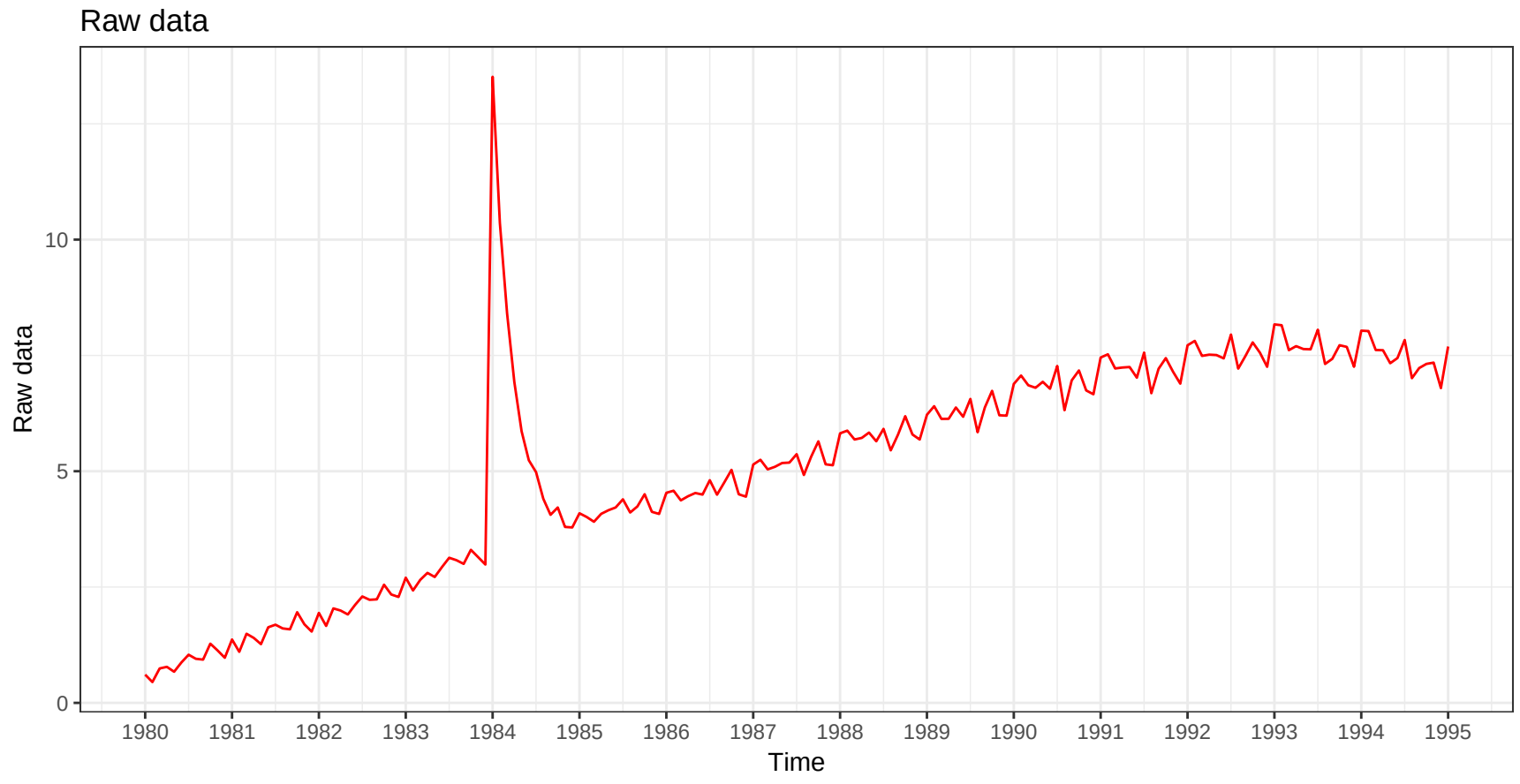




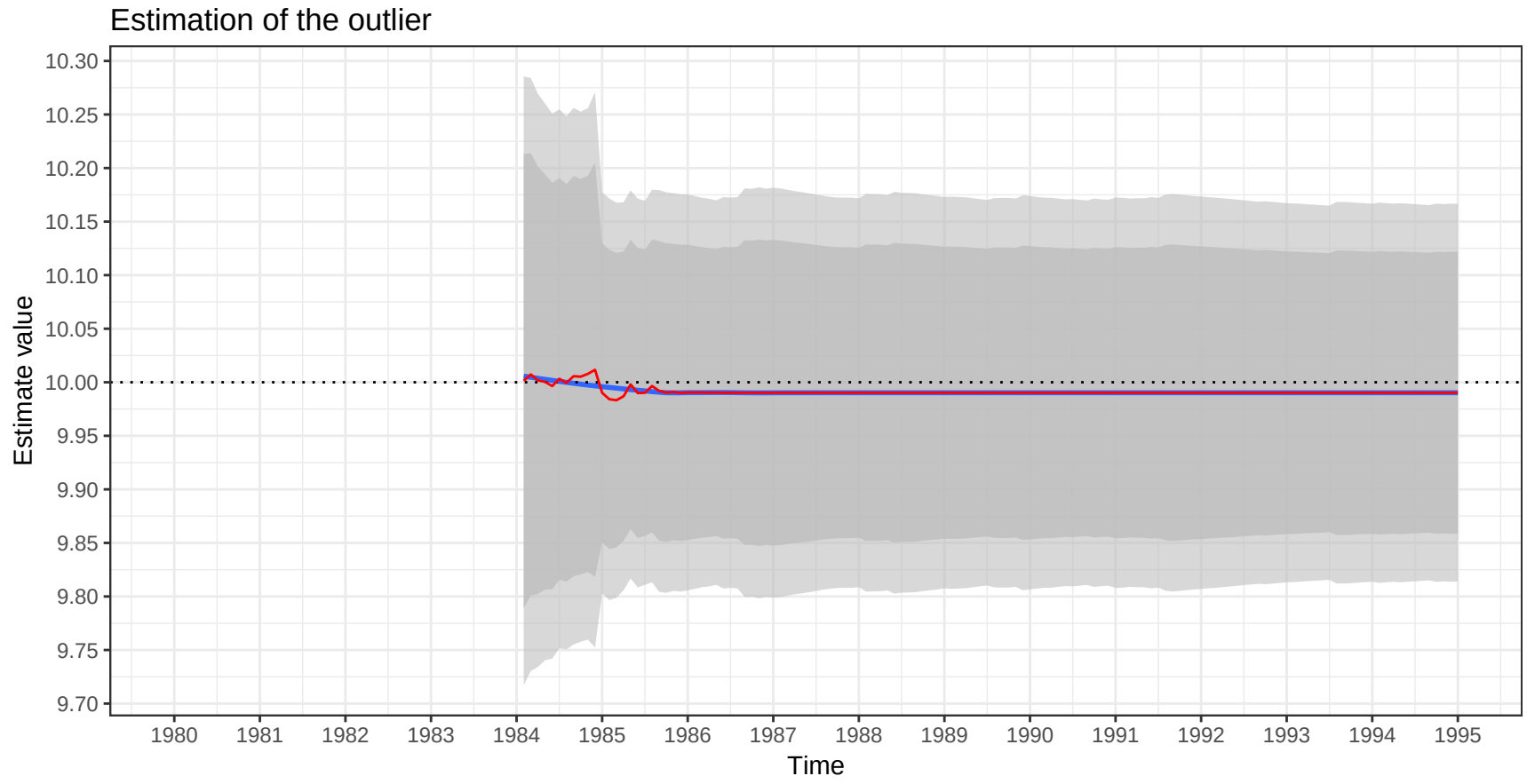

Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1−0.6B)at
Estimation of the outlier
Estimate value
10.35
10.30
10.25
10.20
10.15
10.10
10.05
10.00
9.95
9.90
9.85
9.80
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time
Raw data
Raw data
0
−10
−20
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time

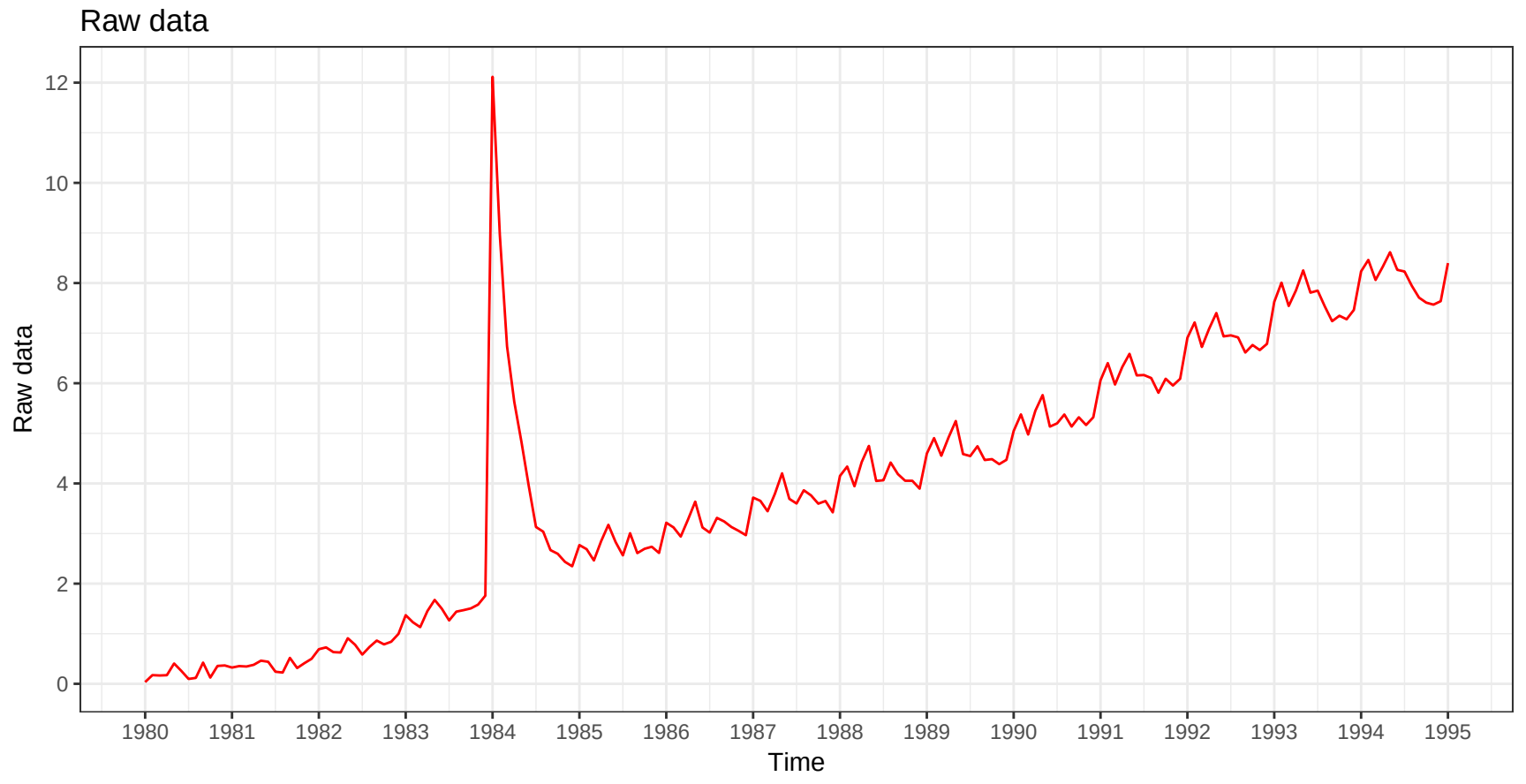
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1−0.6B)at



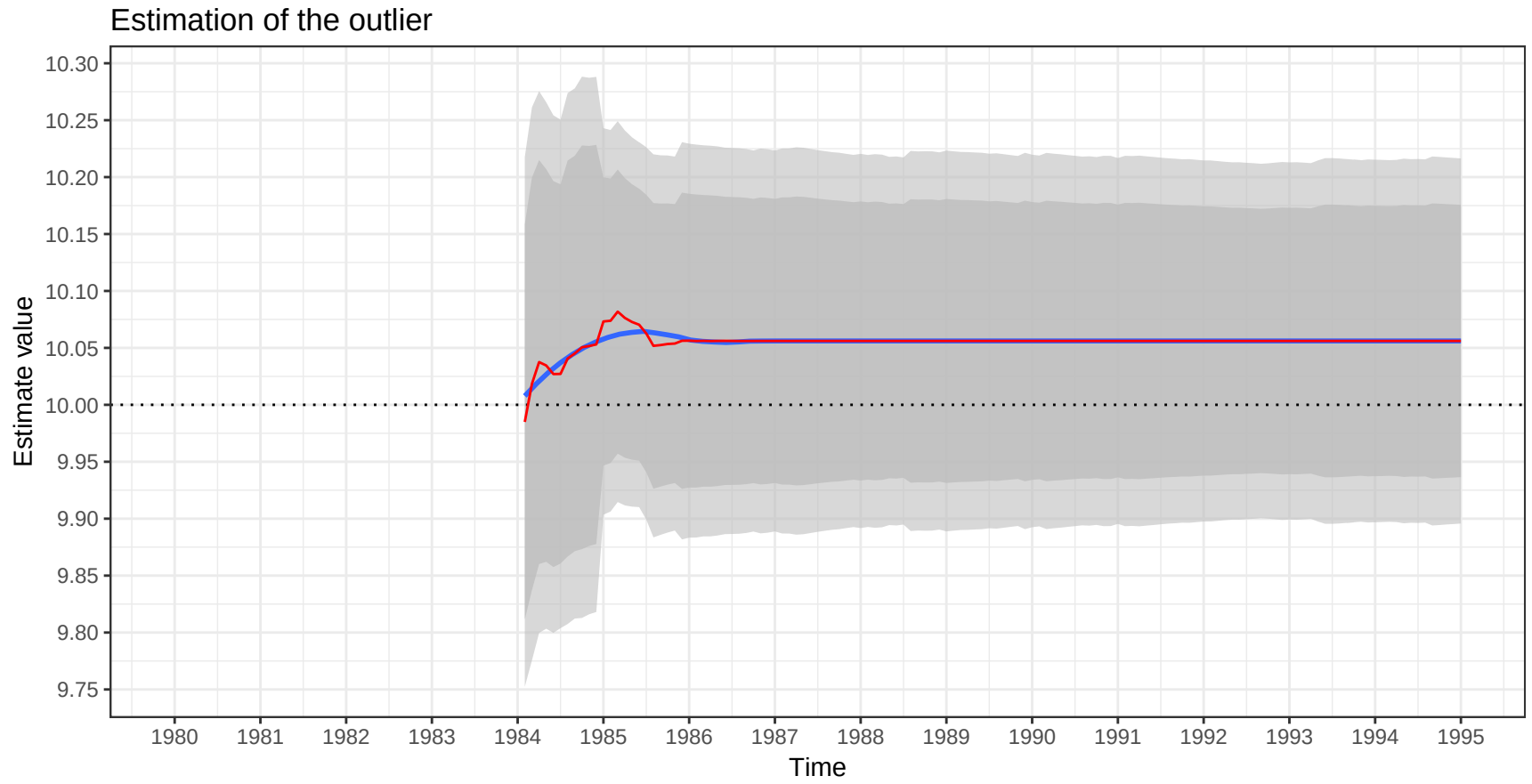


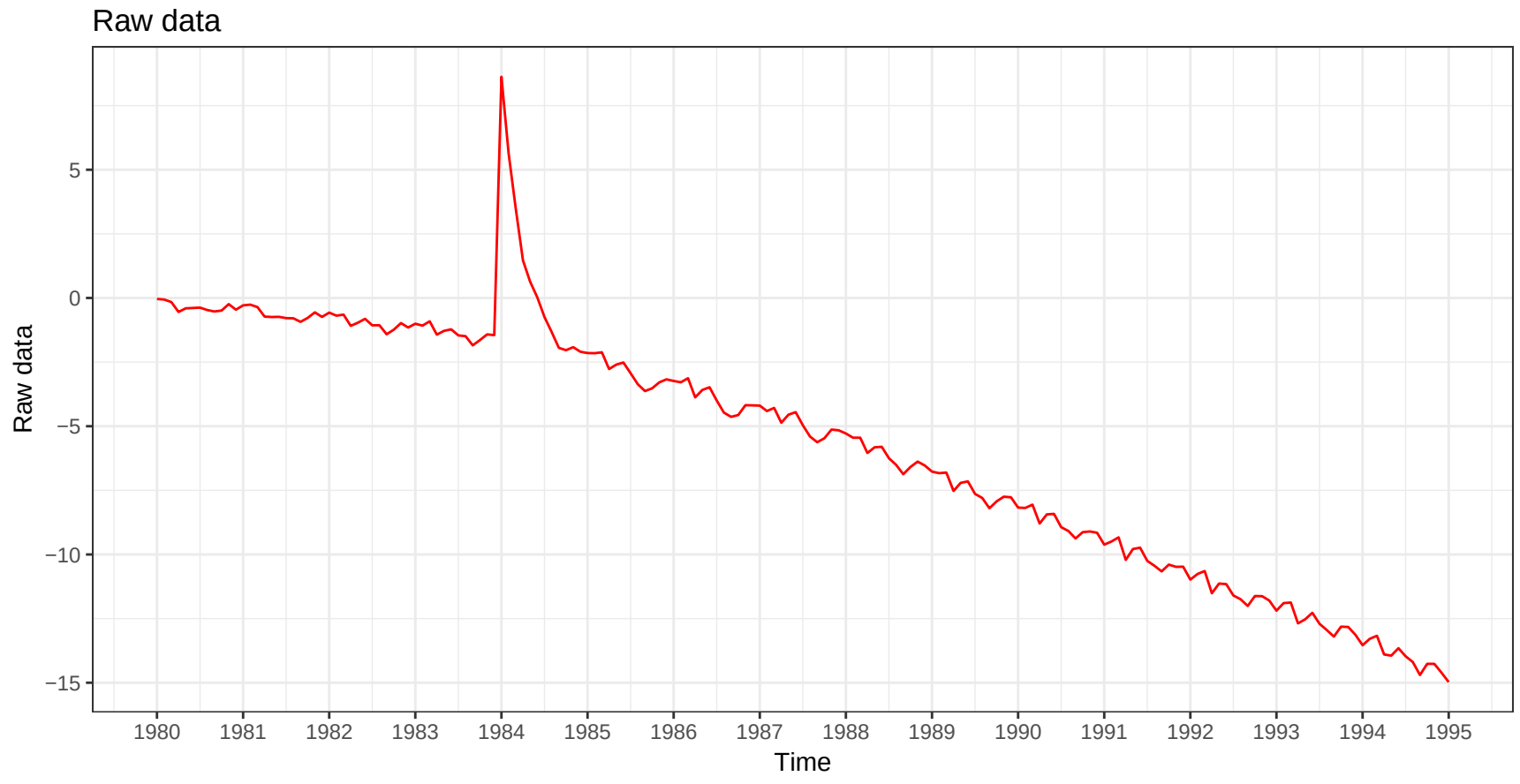
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1−0.6B)at



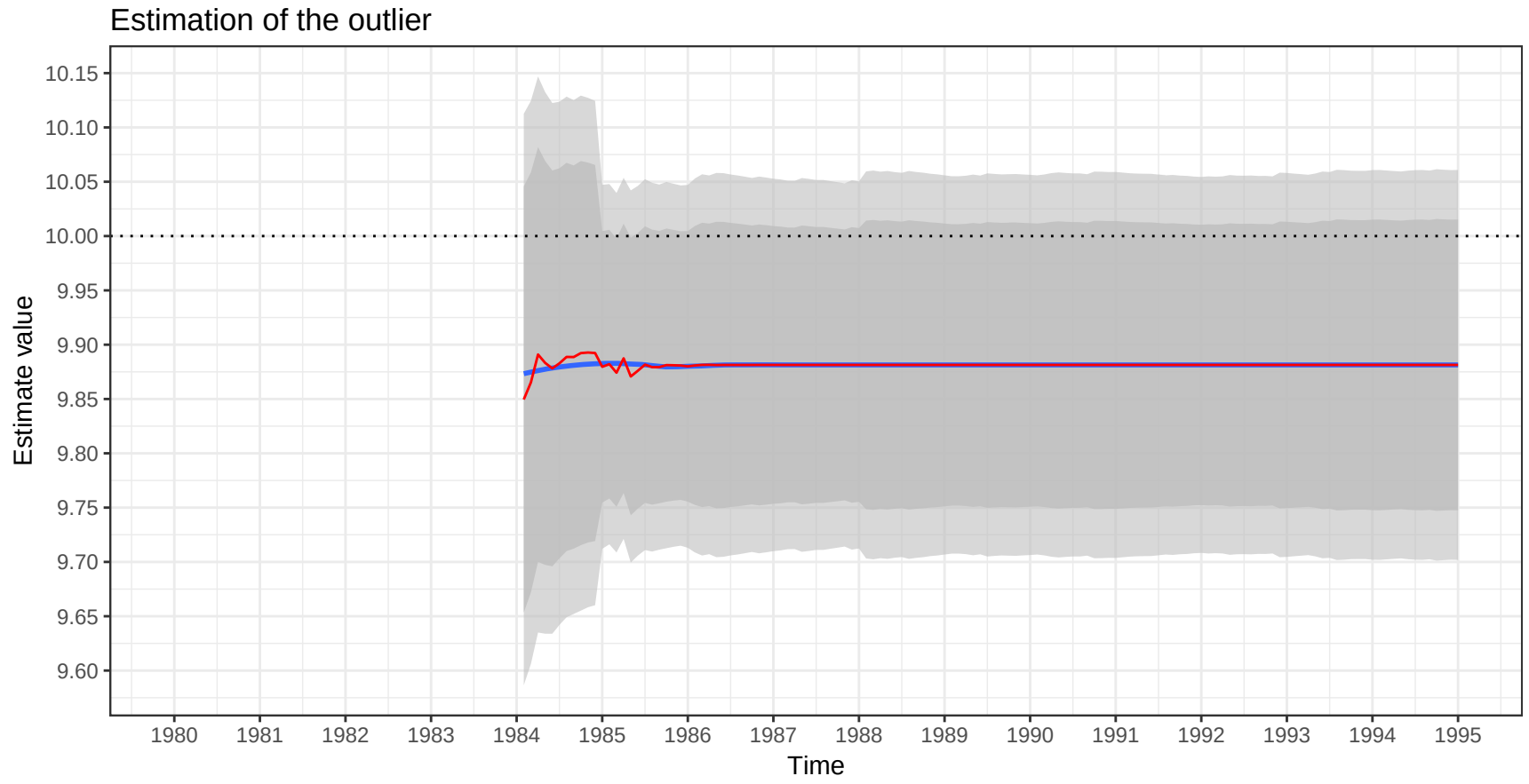


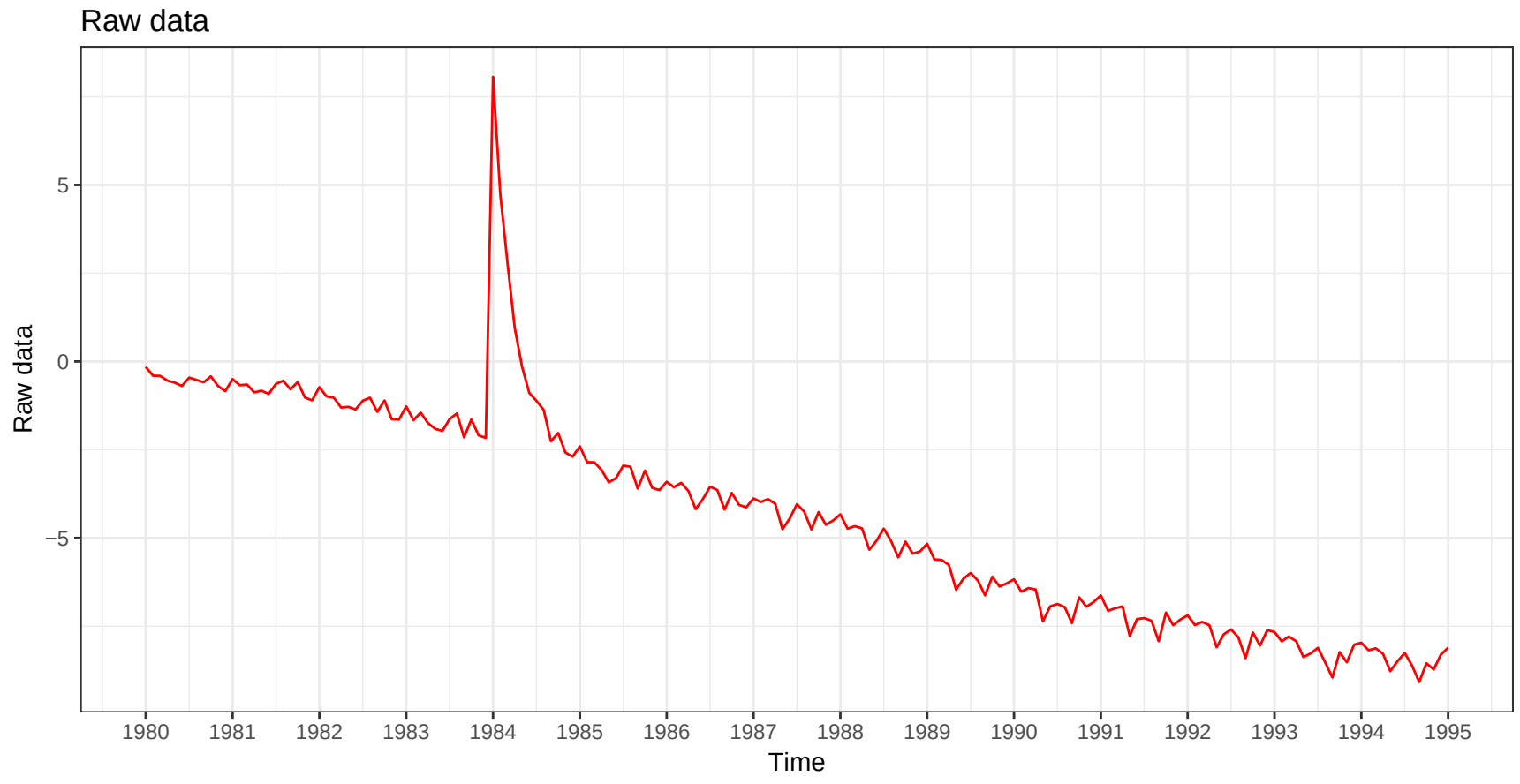
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1−0.6B)at



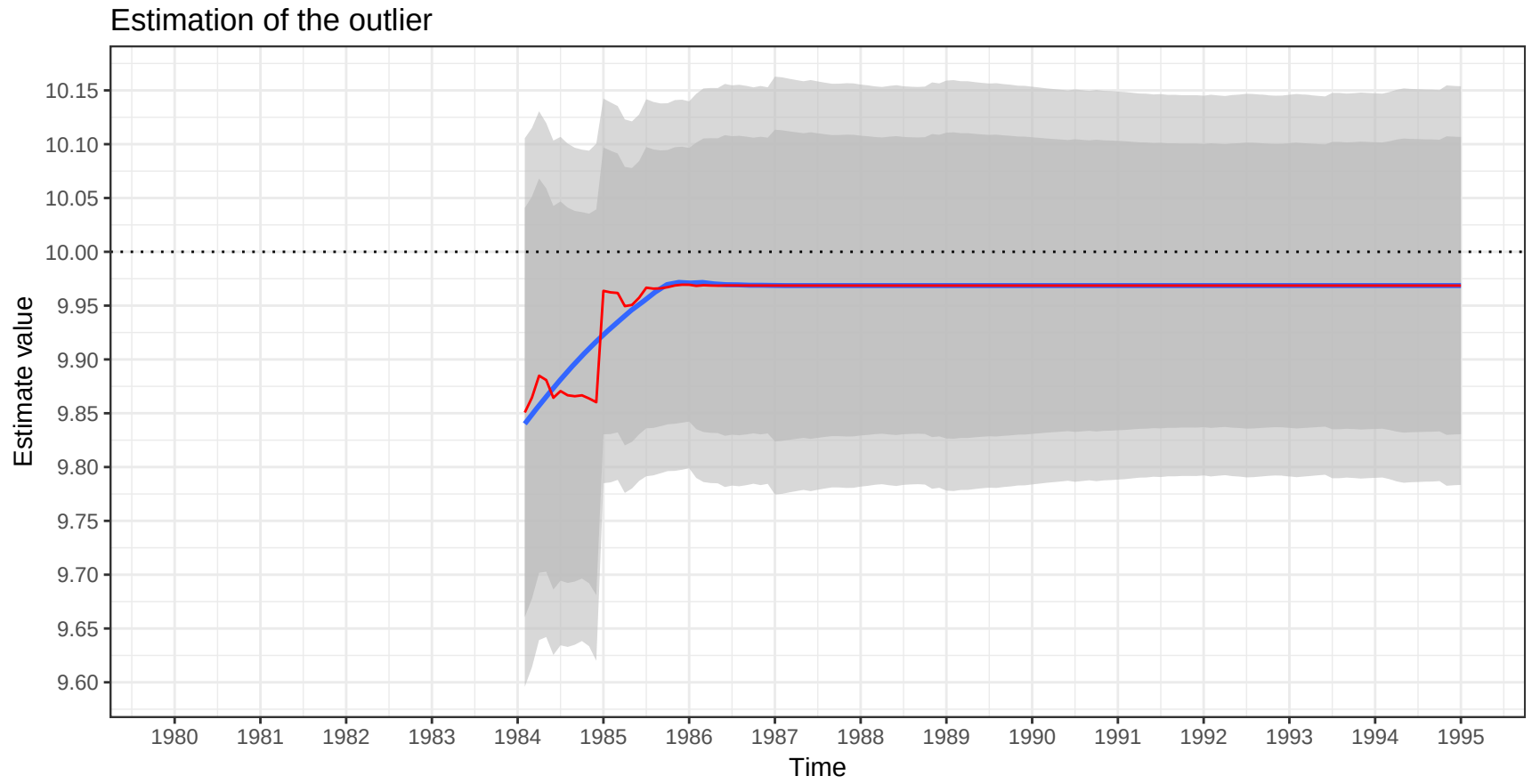


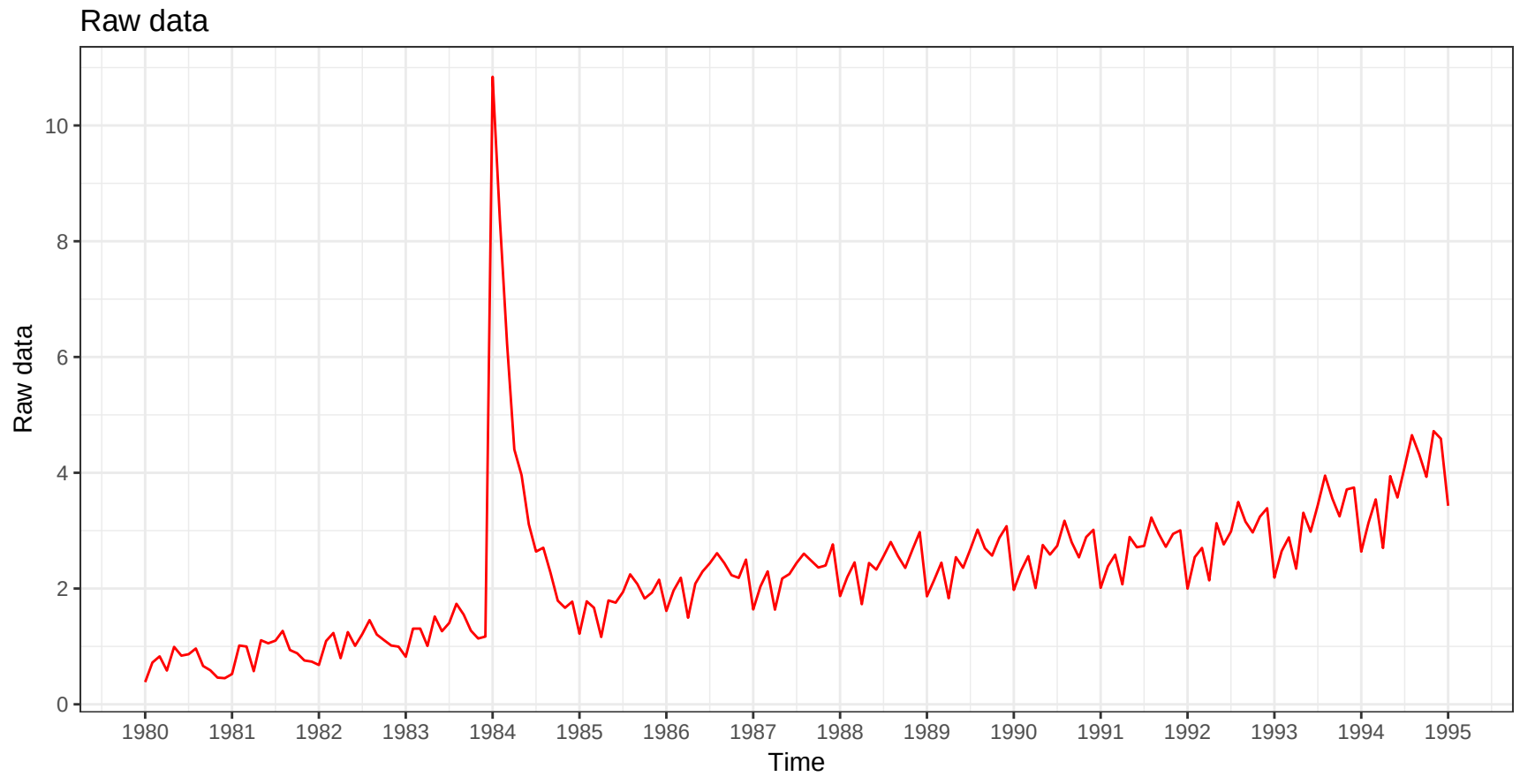
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1−0.6B)at



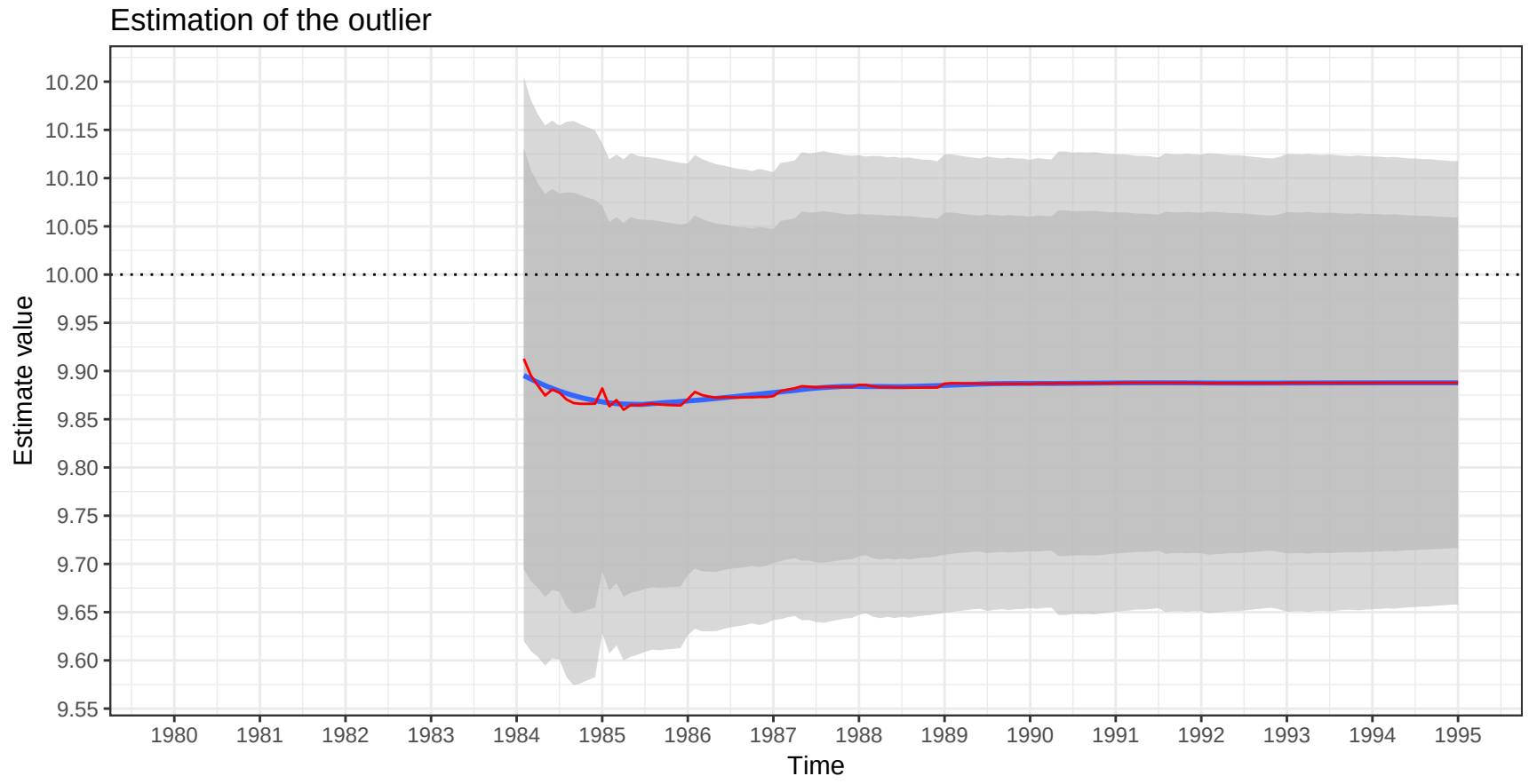


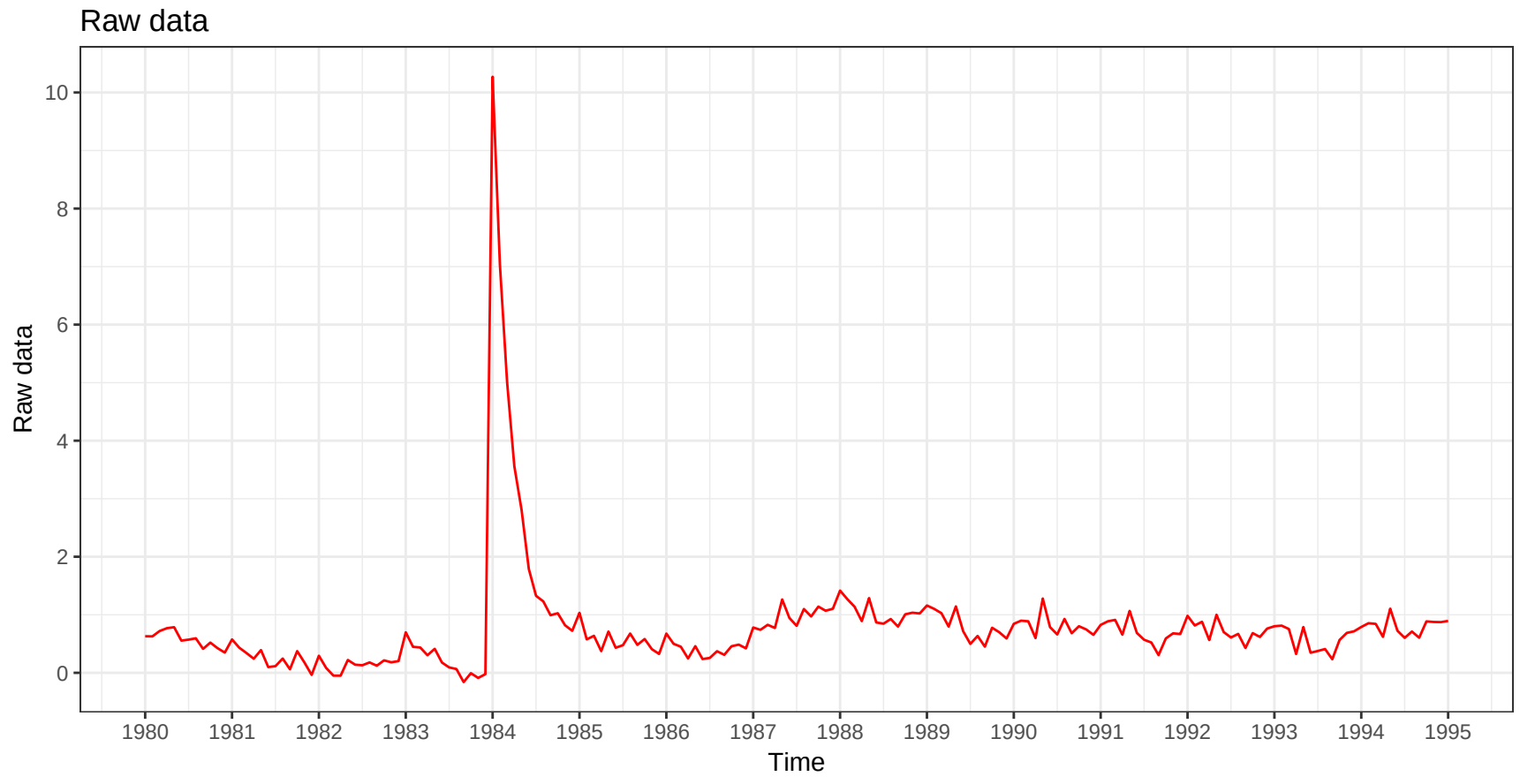
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,0) − additive decomposition
(1−B)(1−B12)Xt=(1−0.6B)at



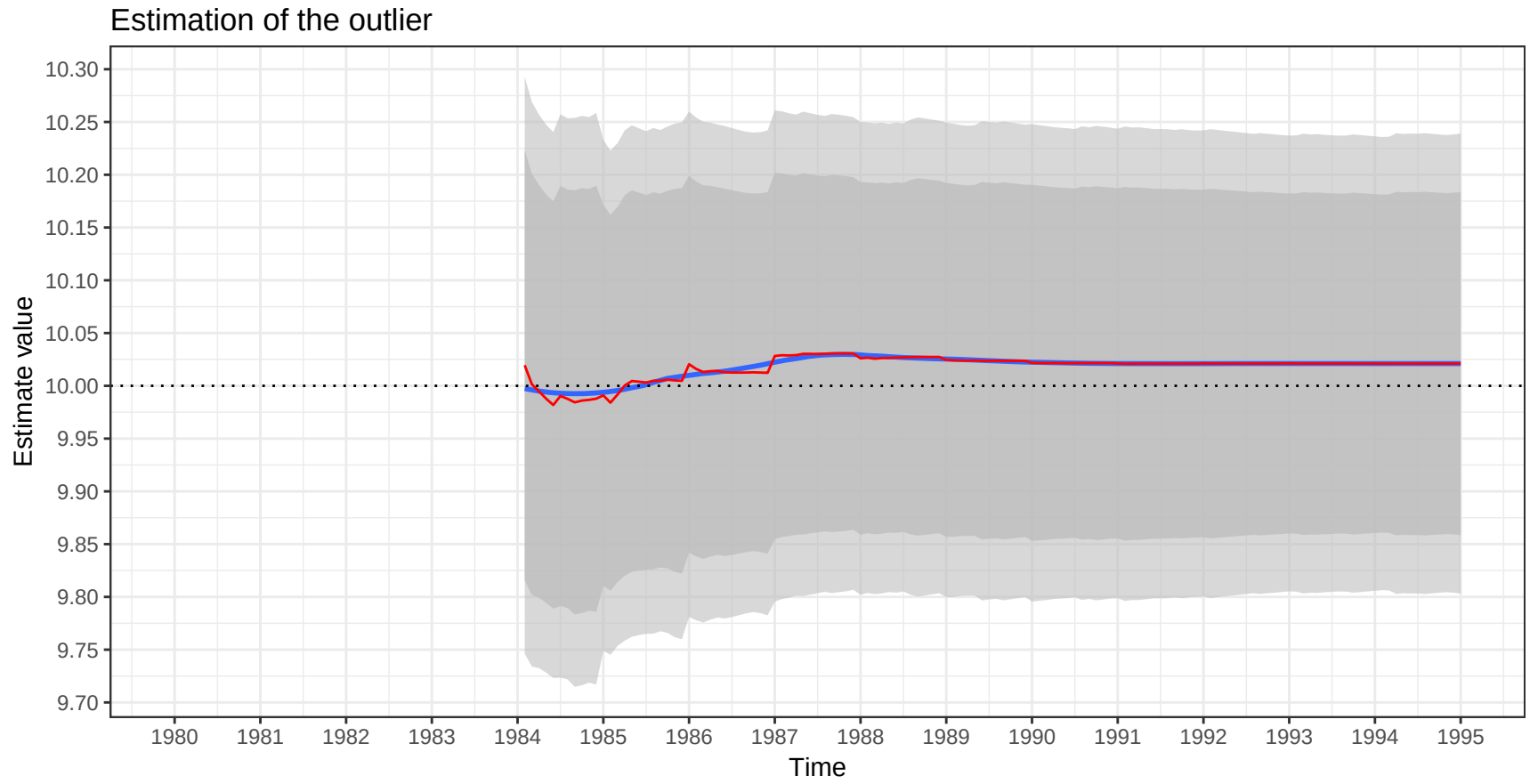


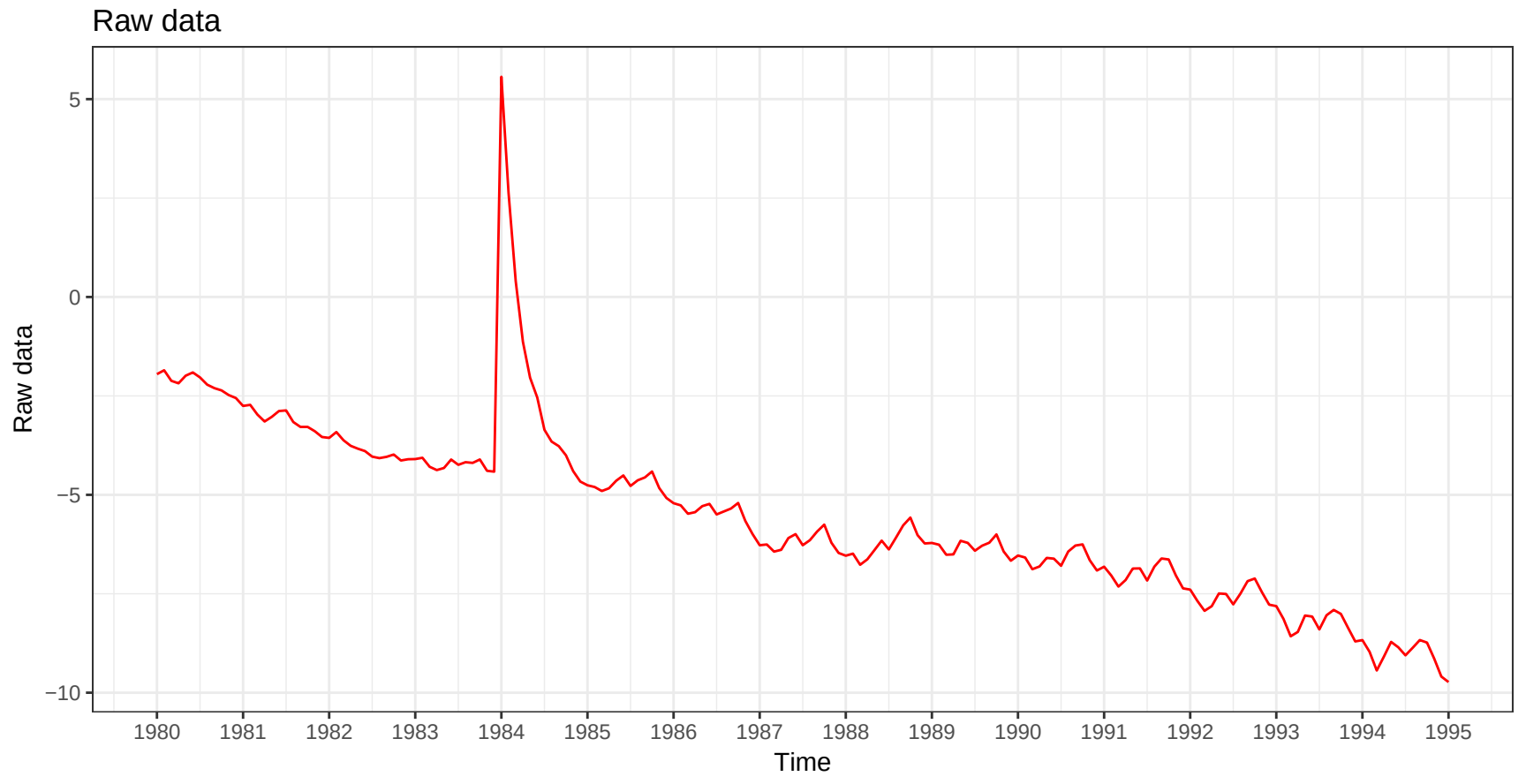
Estimate value of a TC(1984−01)
ARIMA (0,1,0)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.5B12)at



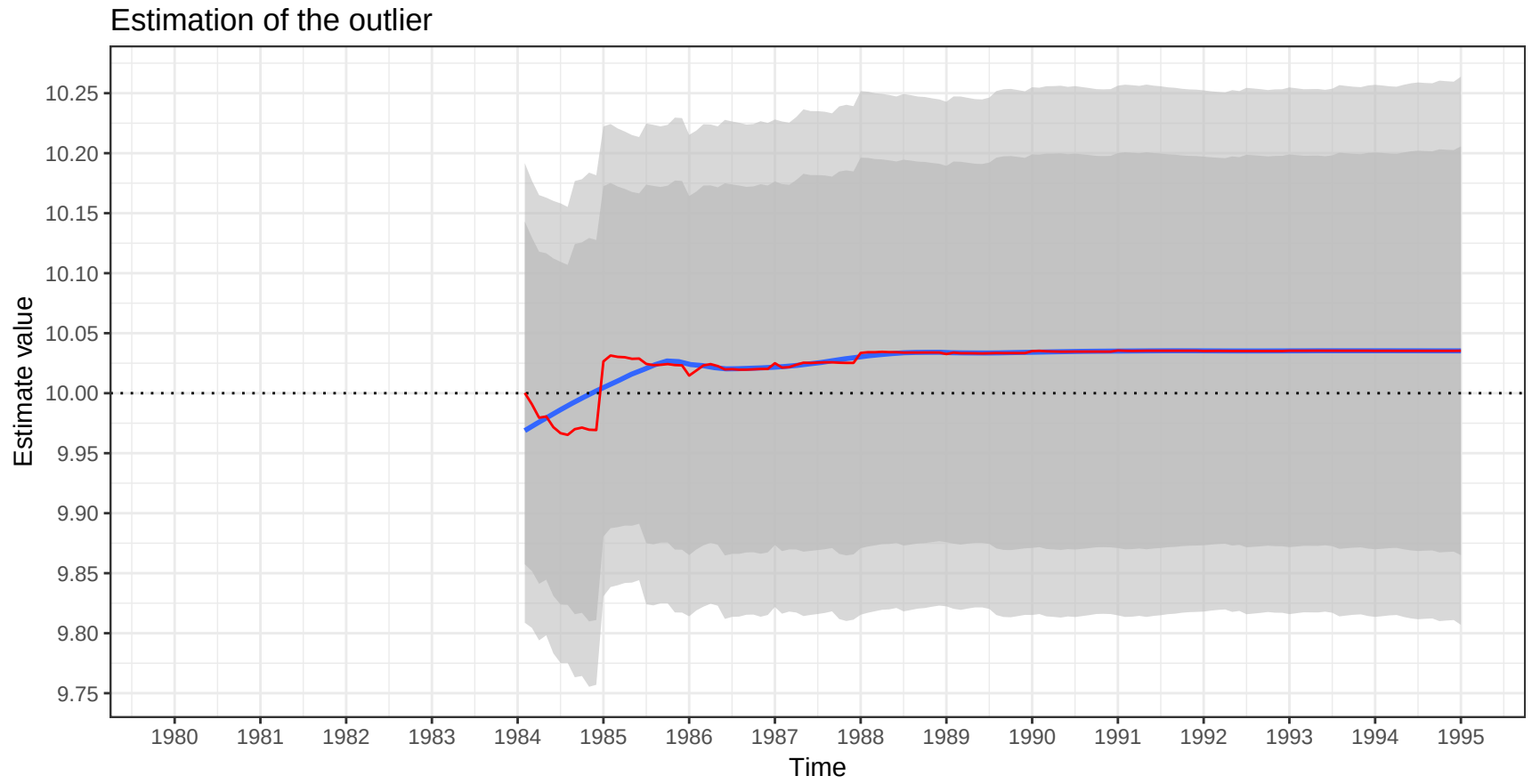


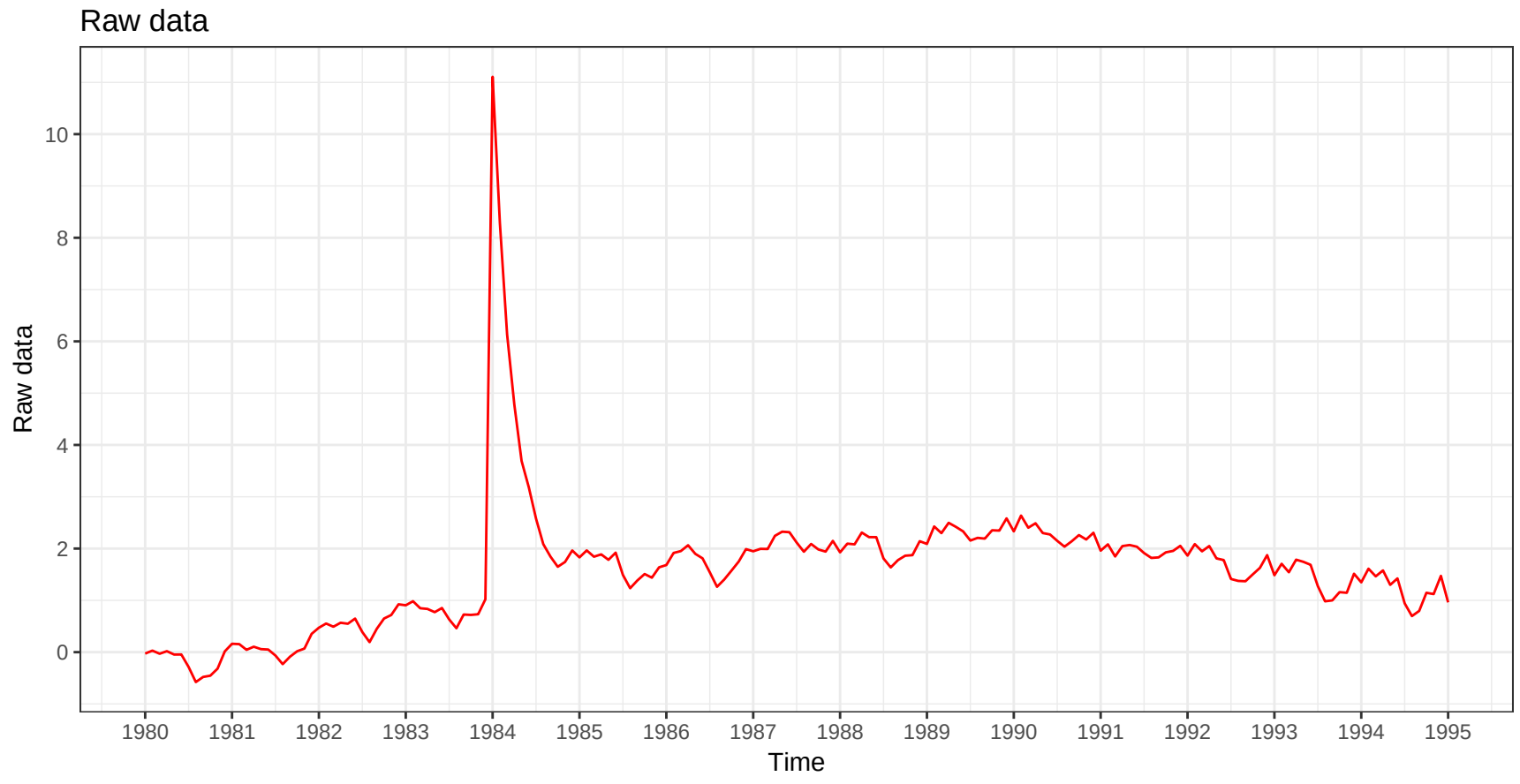
Estimate value of a TC(1984−01)
ARIMA (0,1,0)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.5B12)at



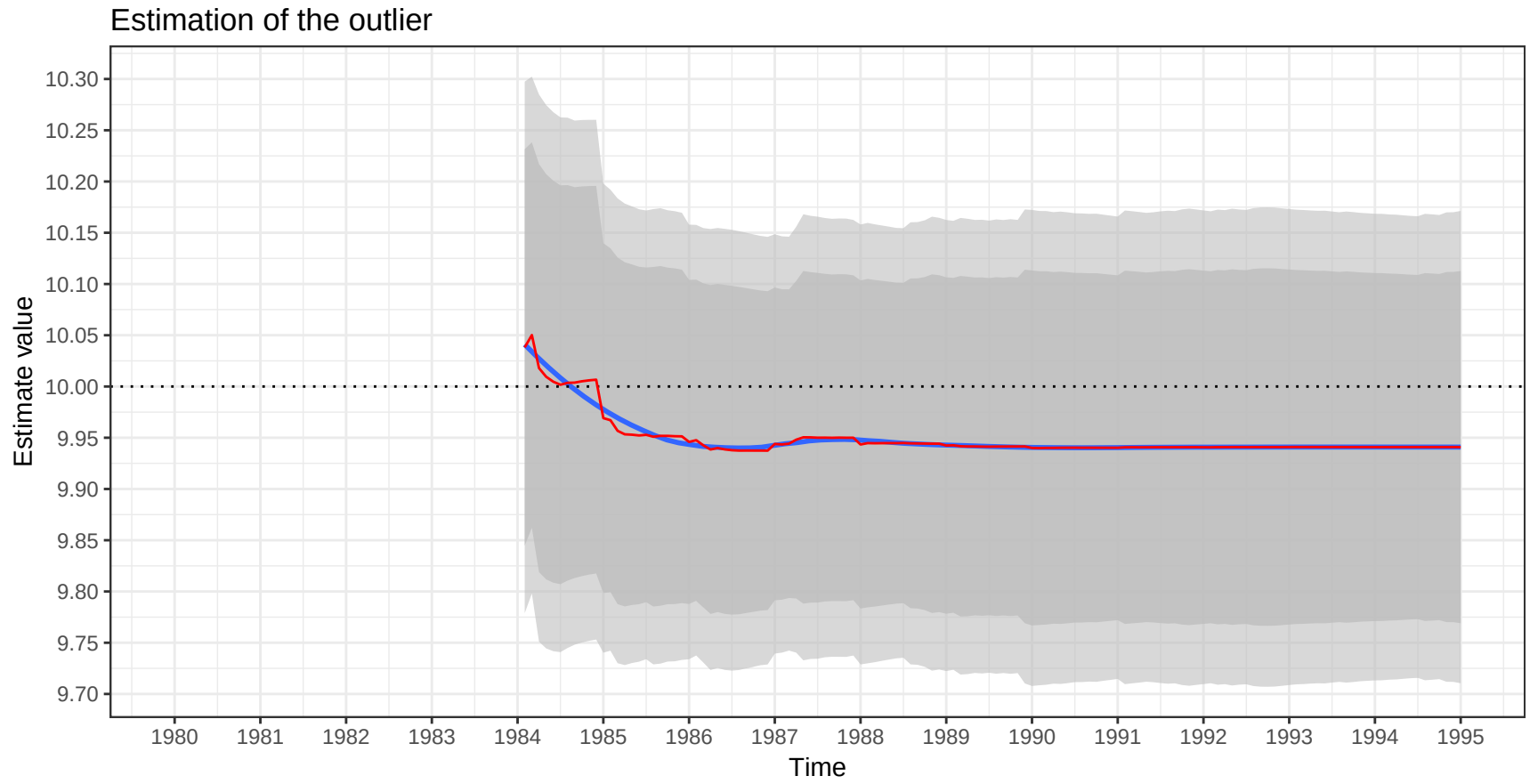


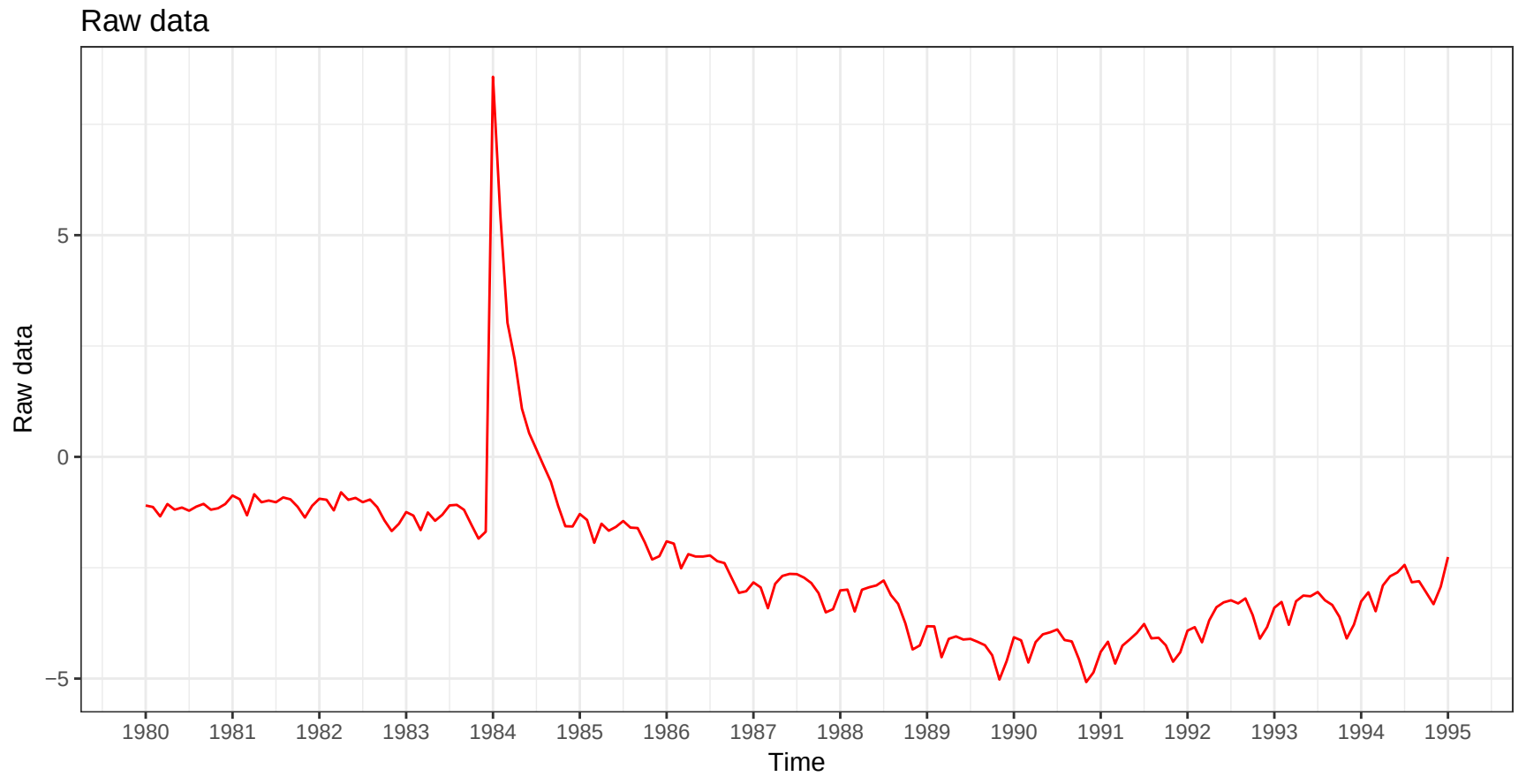
Estimate value of a TC(1984−01)
ARIMA (0,1,0)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.5B12)at





Estimate value of a TC(1984−01)
ARIMA (0,1,0)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.5B12)at





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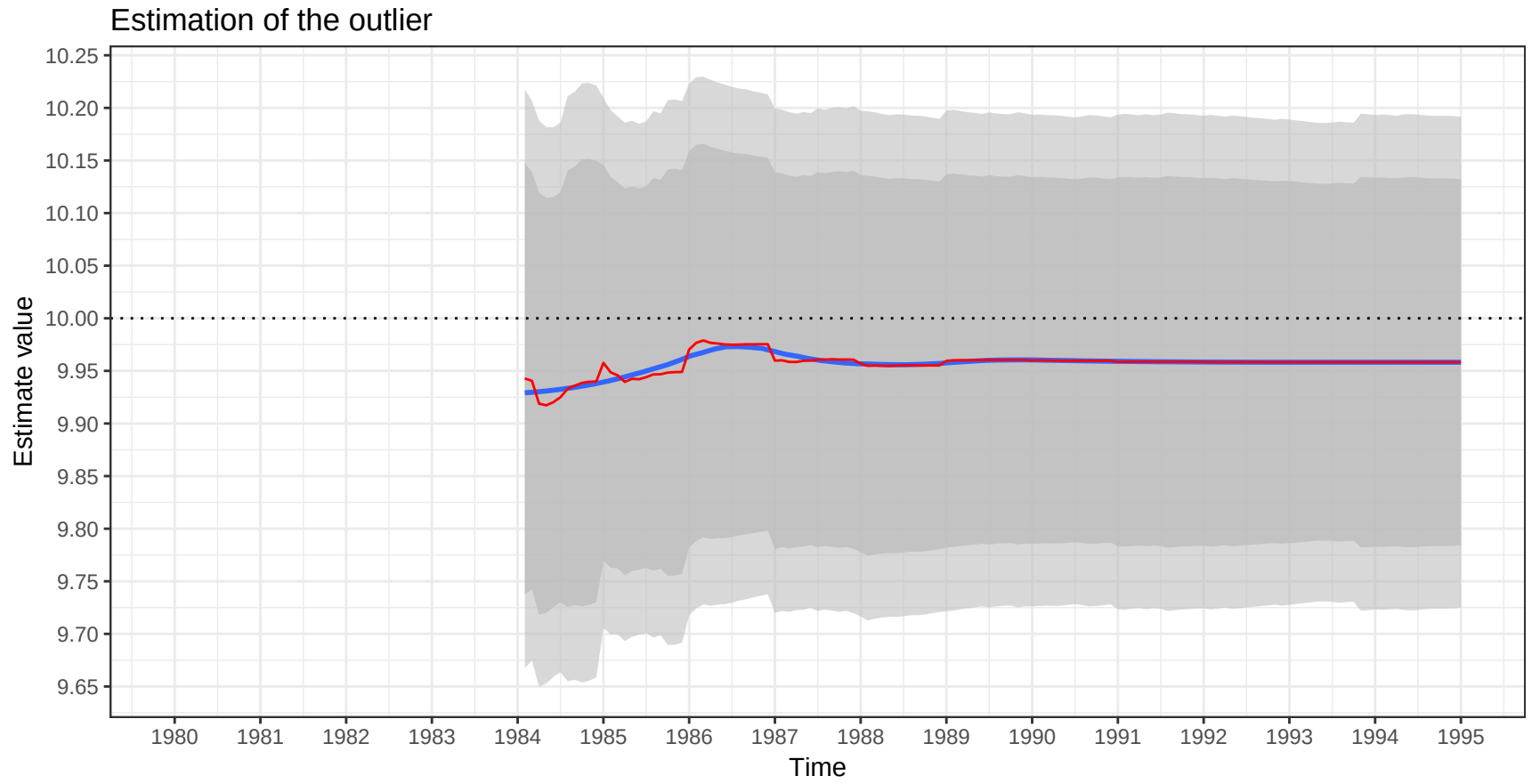

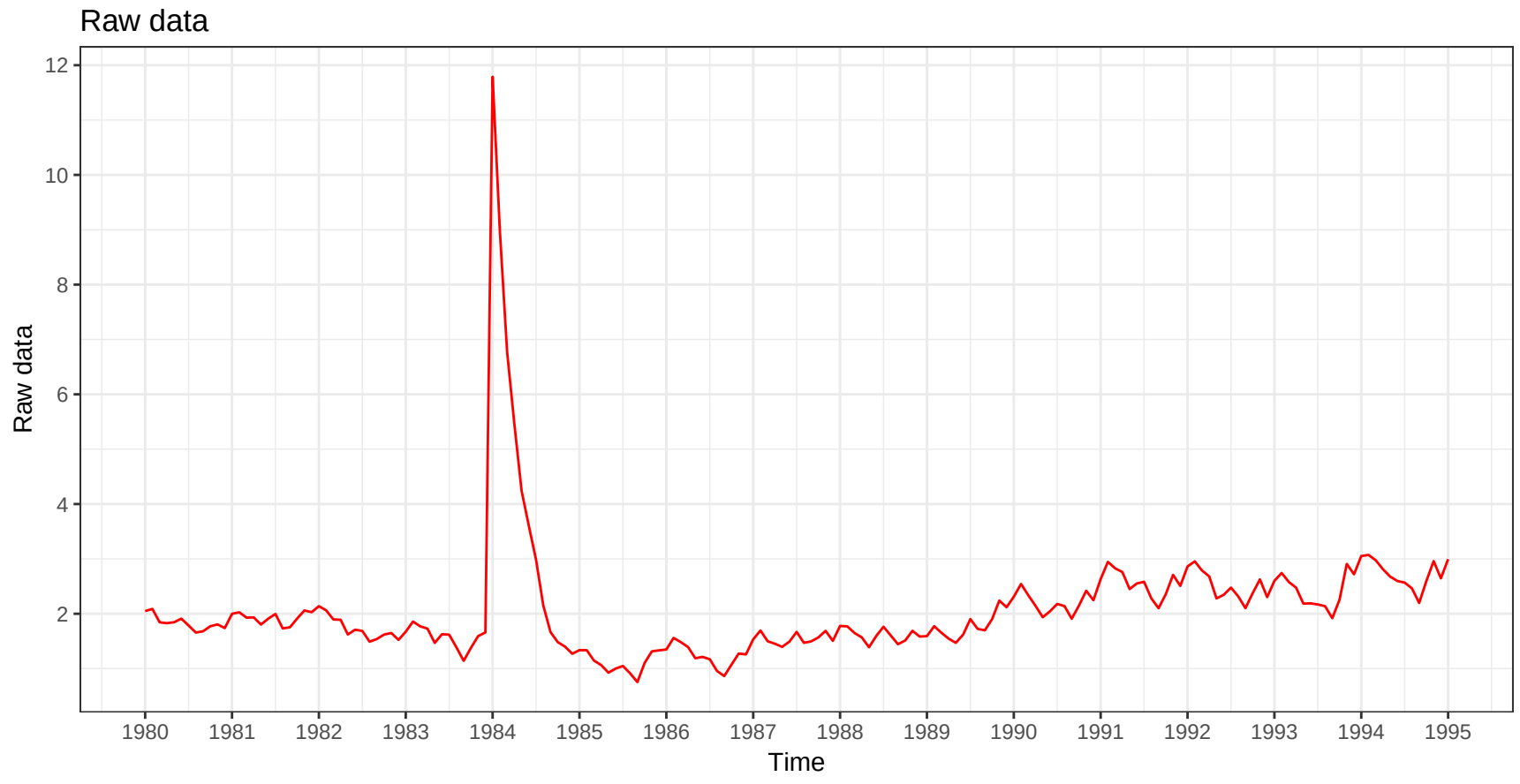

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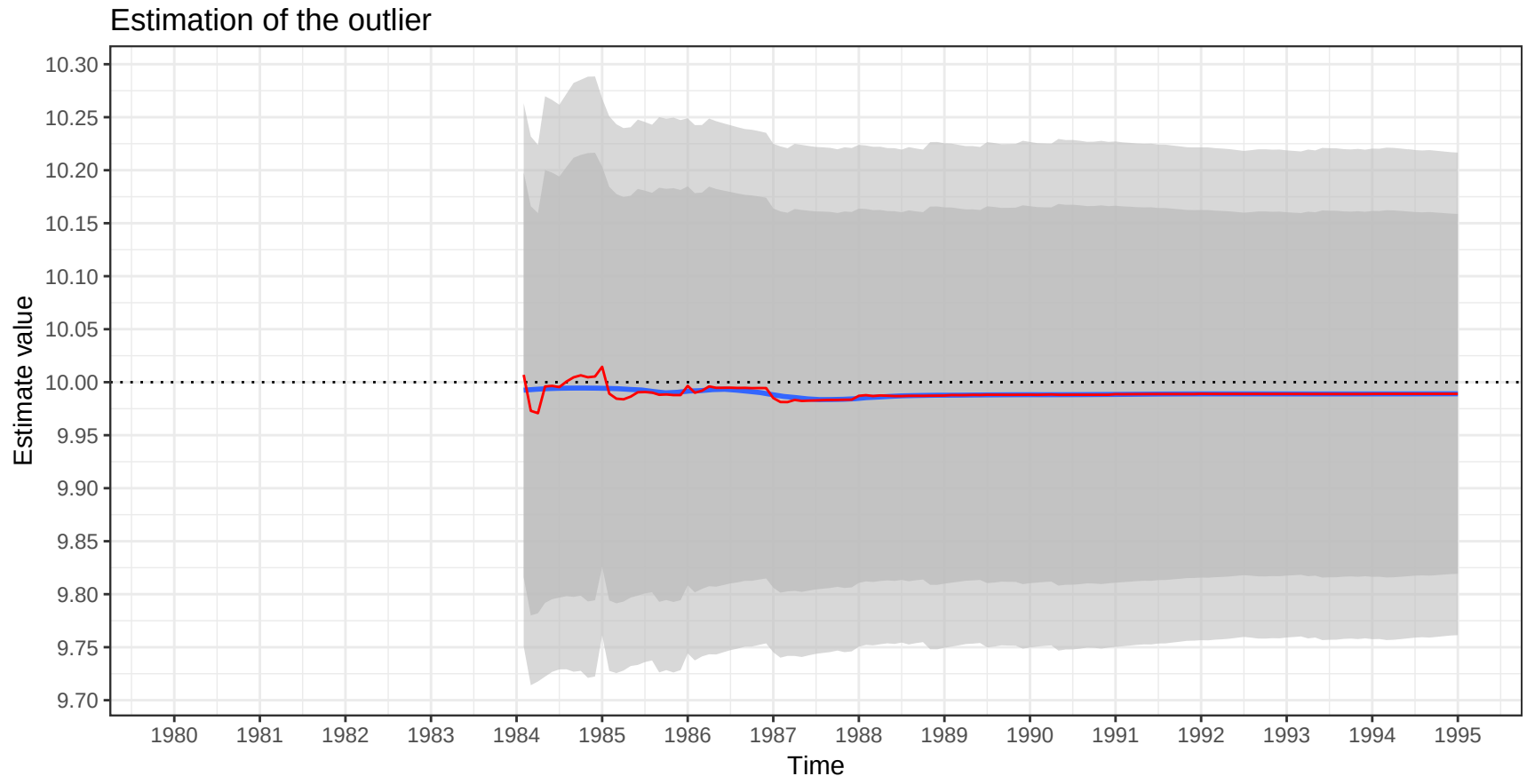

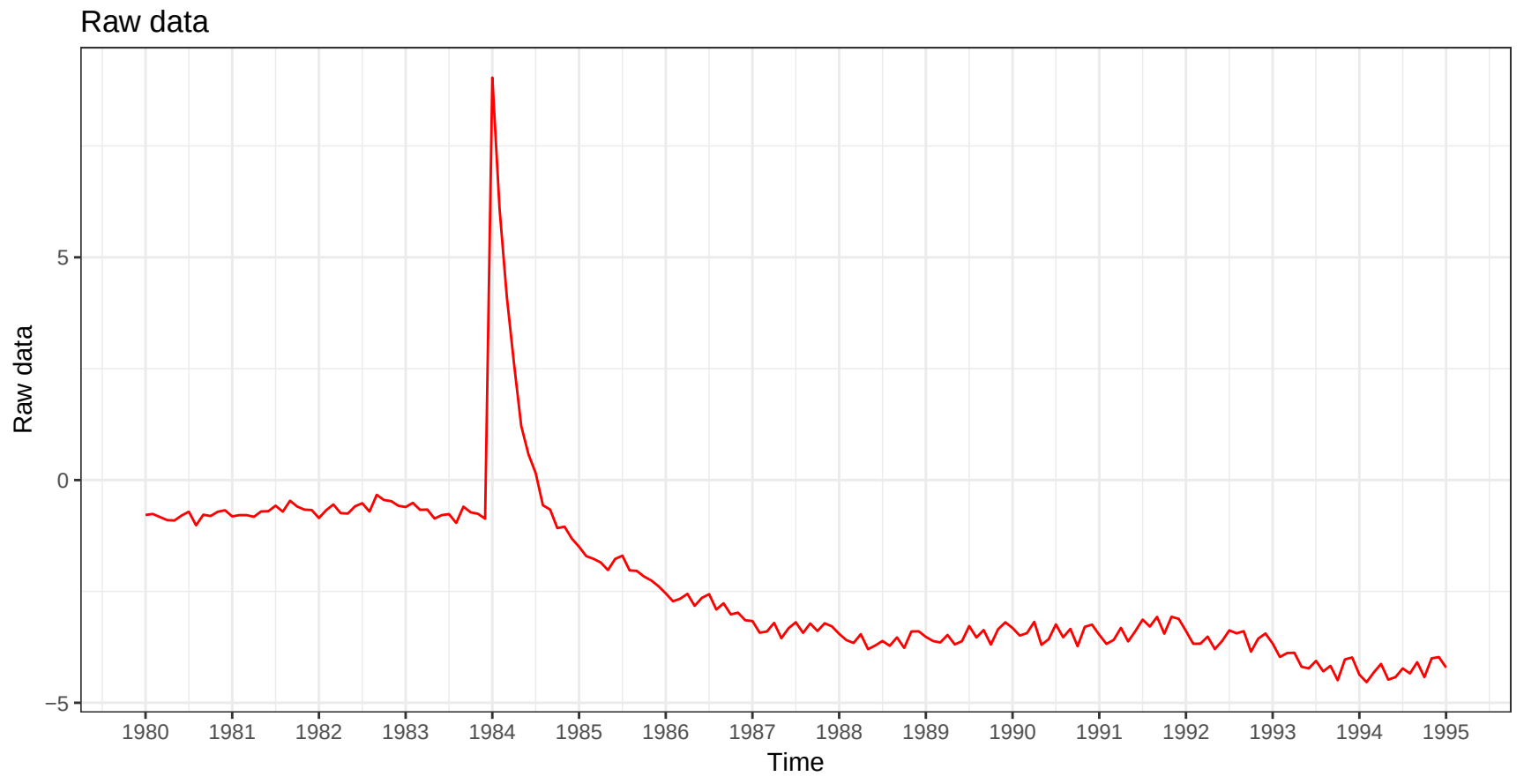

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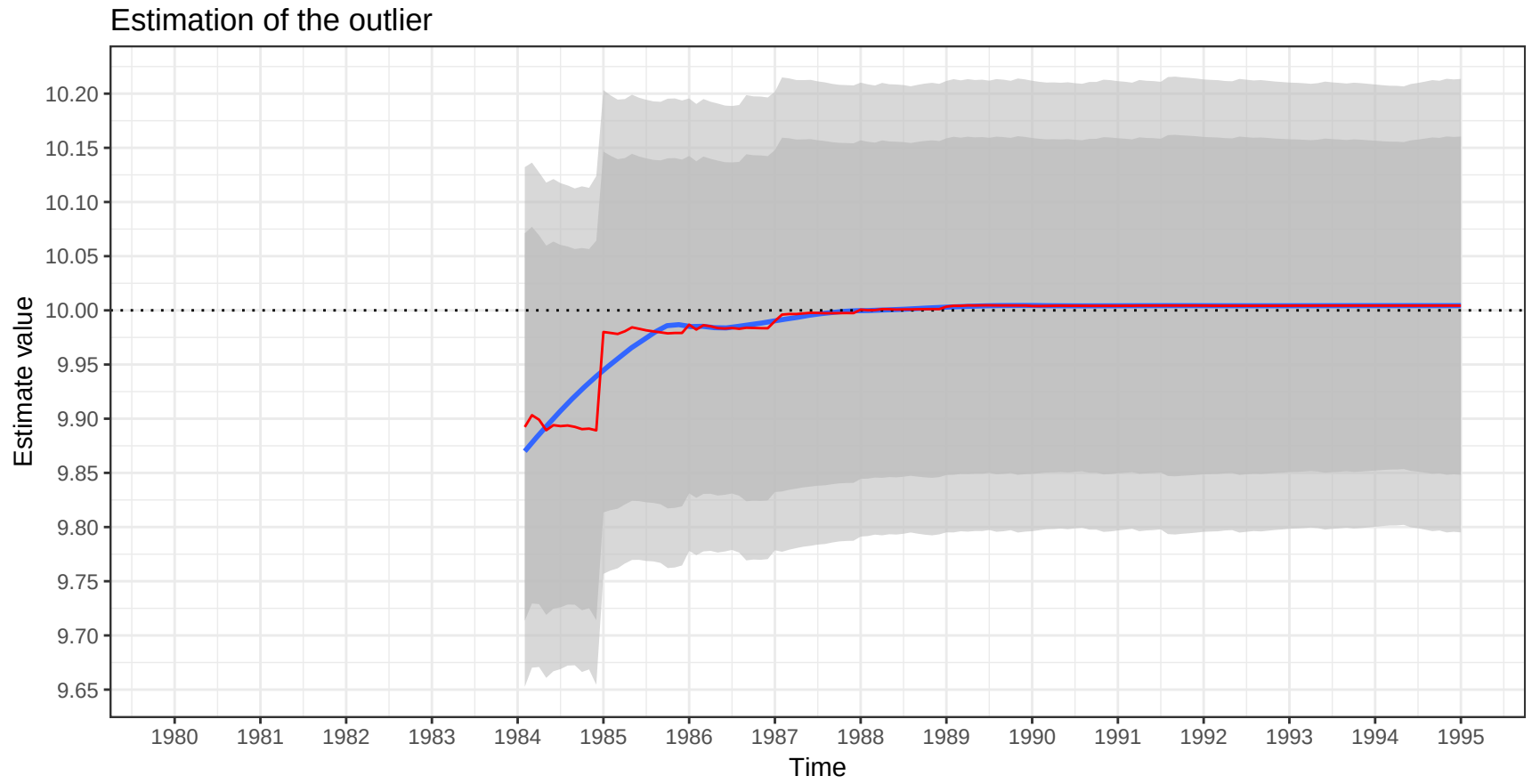

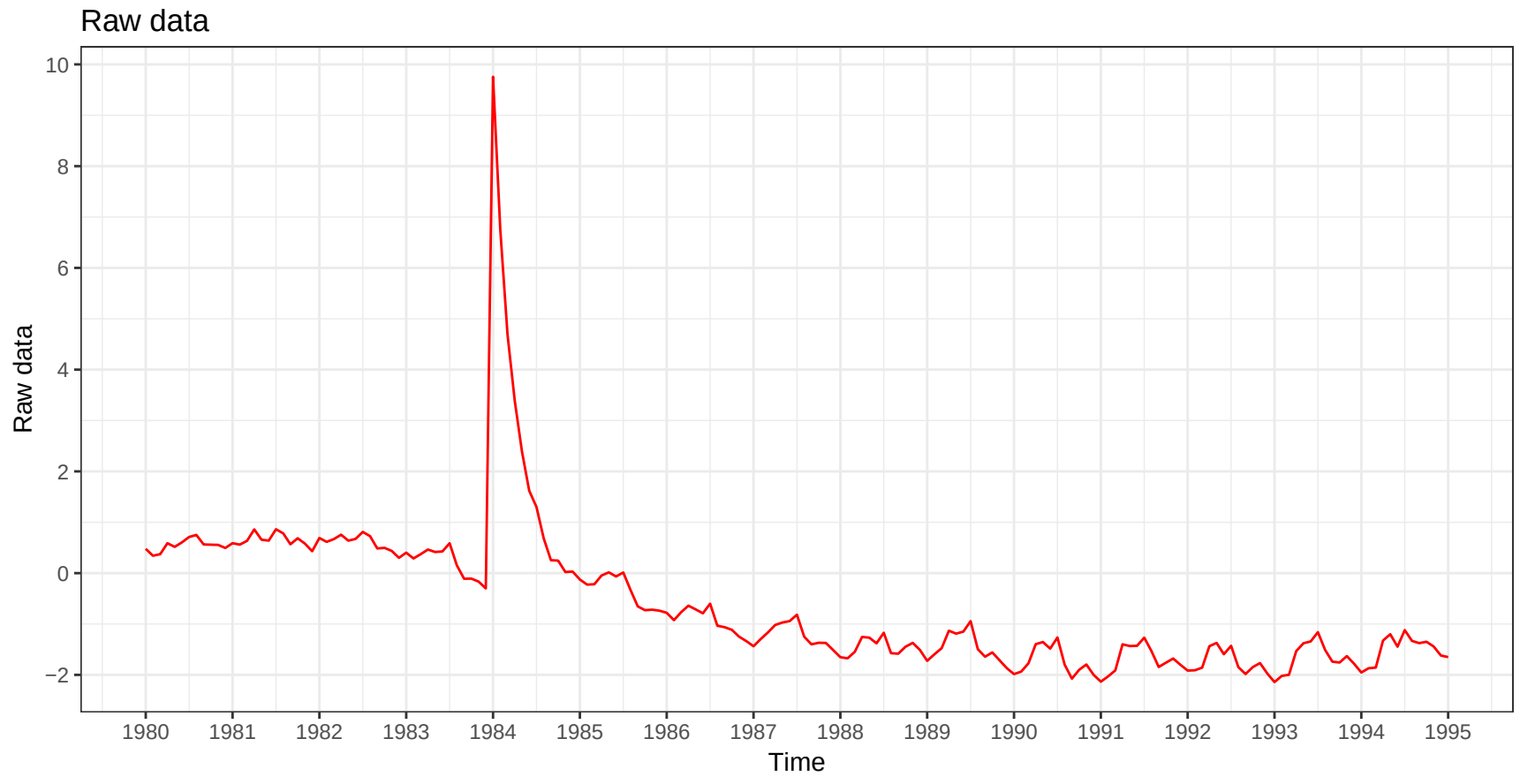

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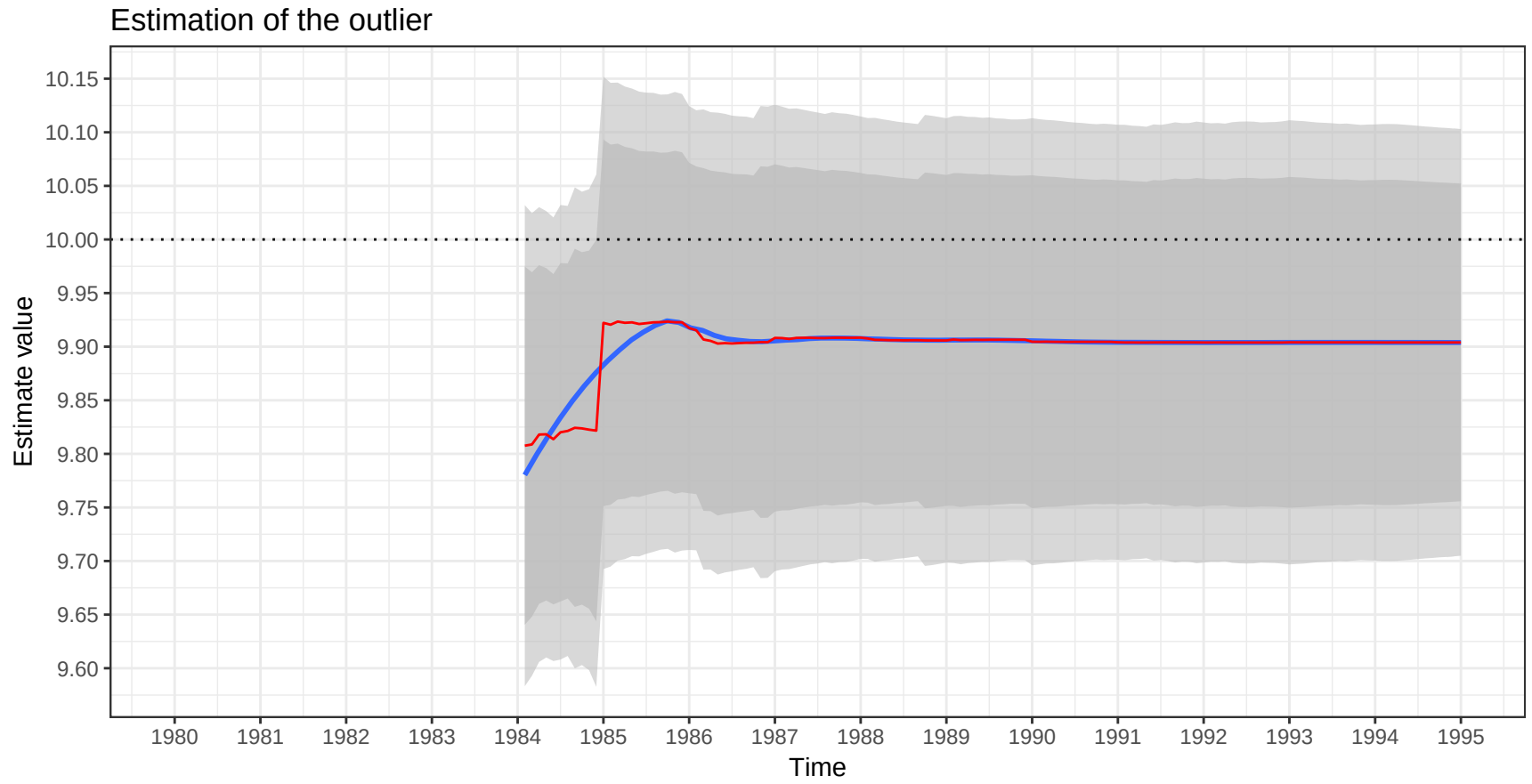

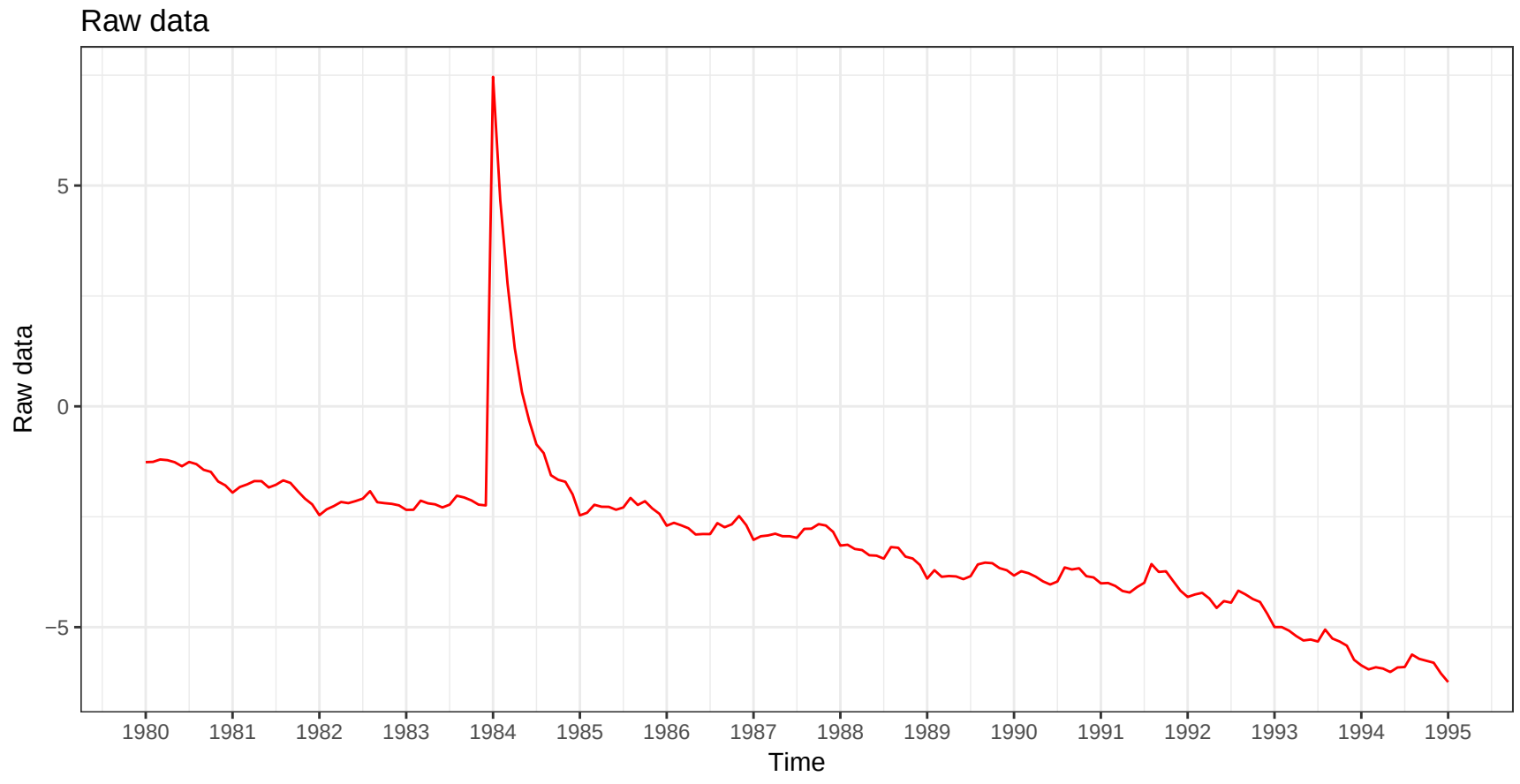

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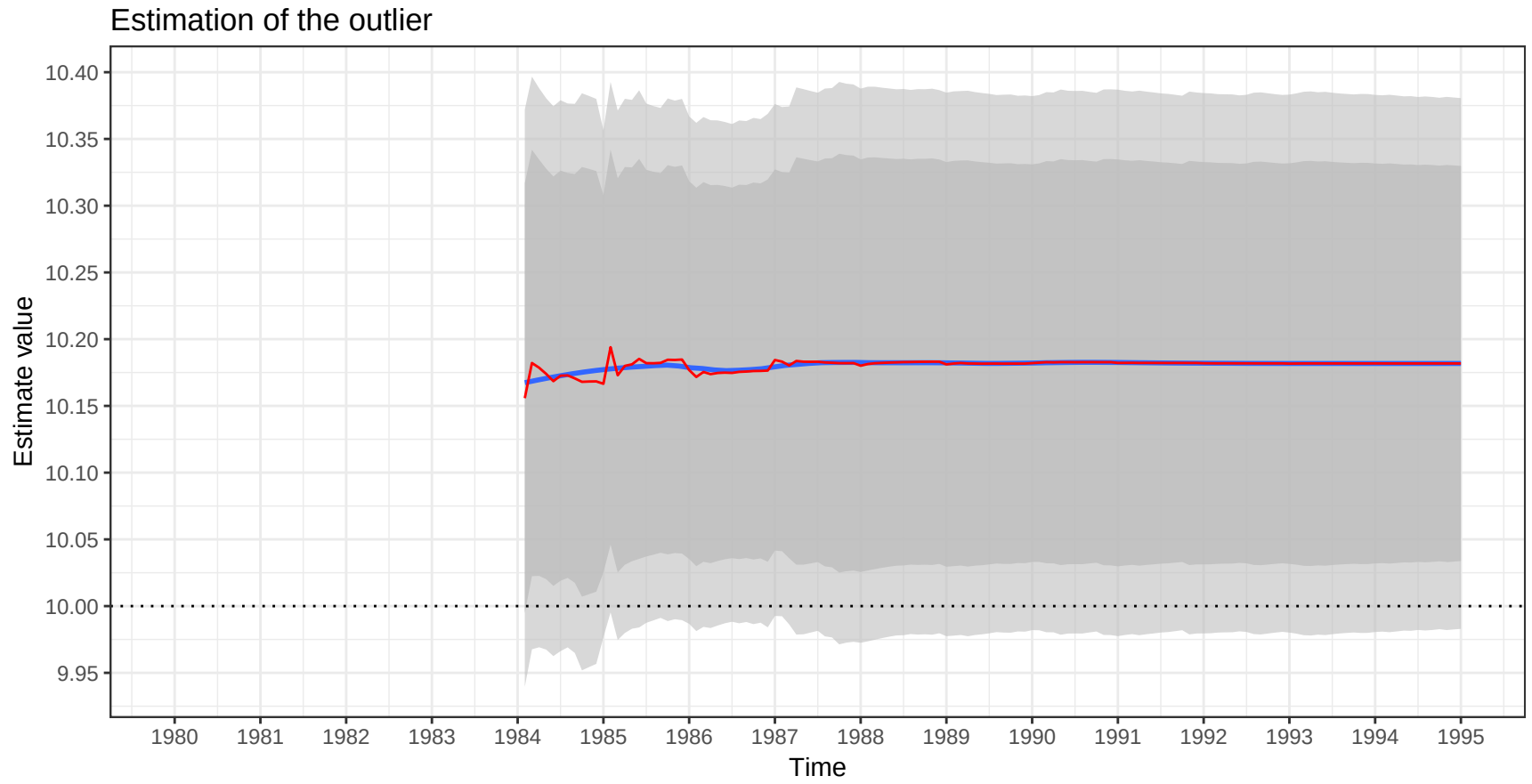

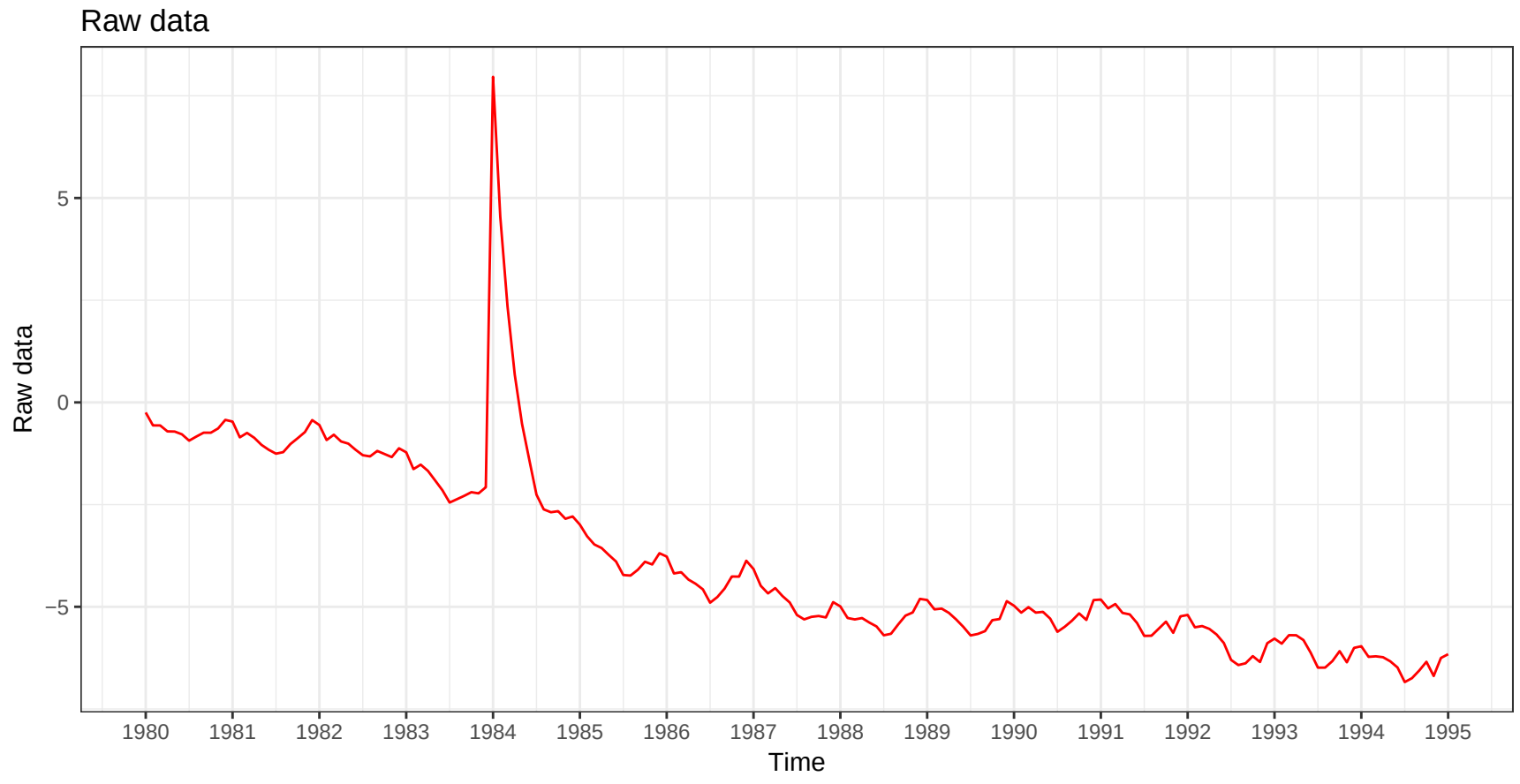

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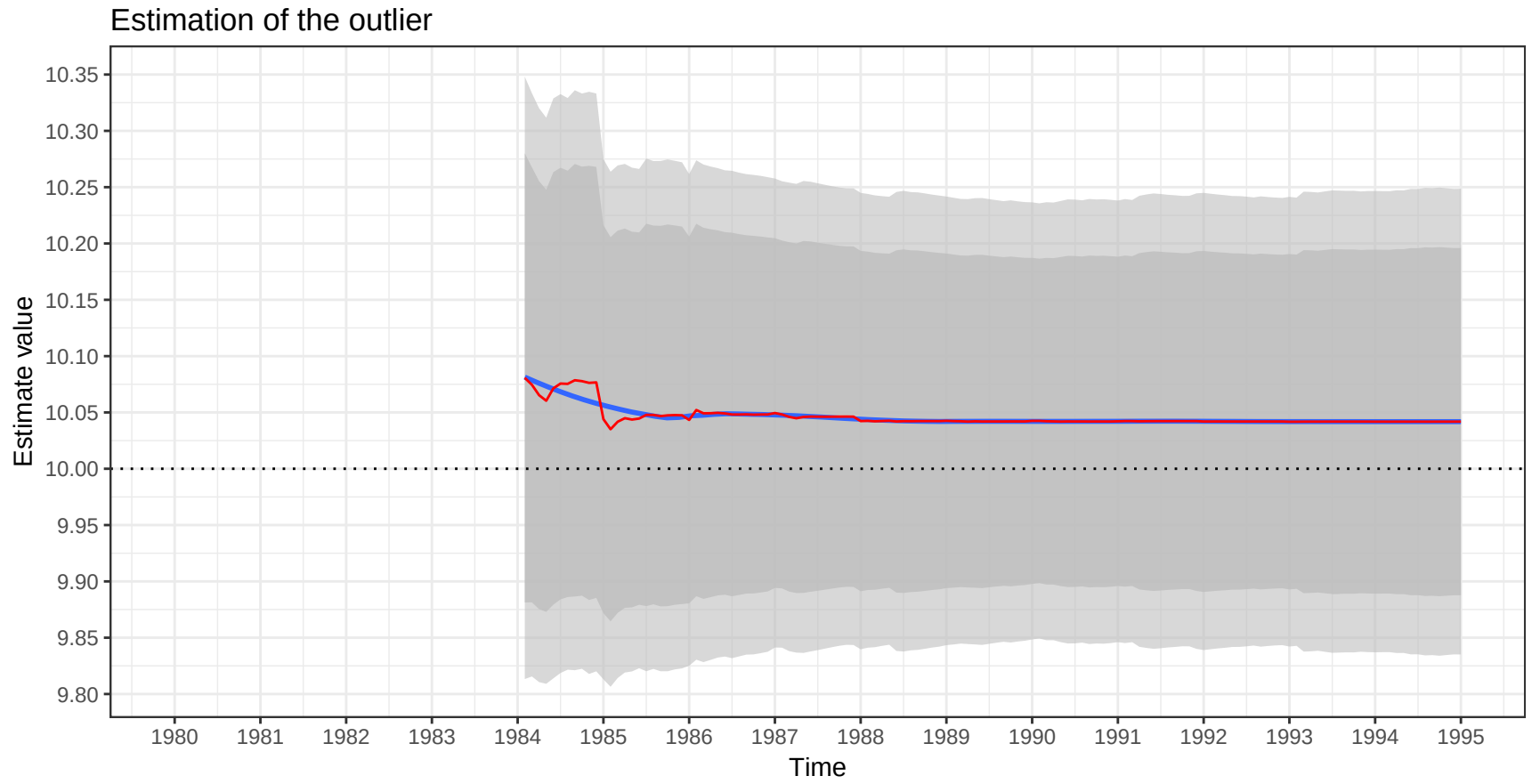
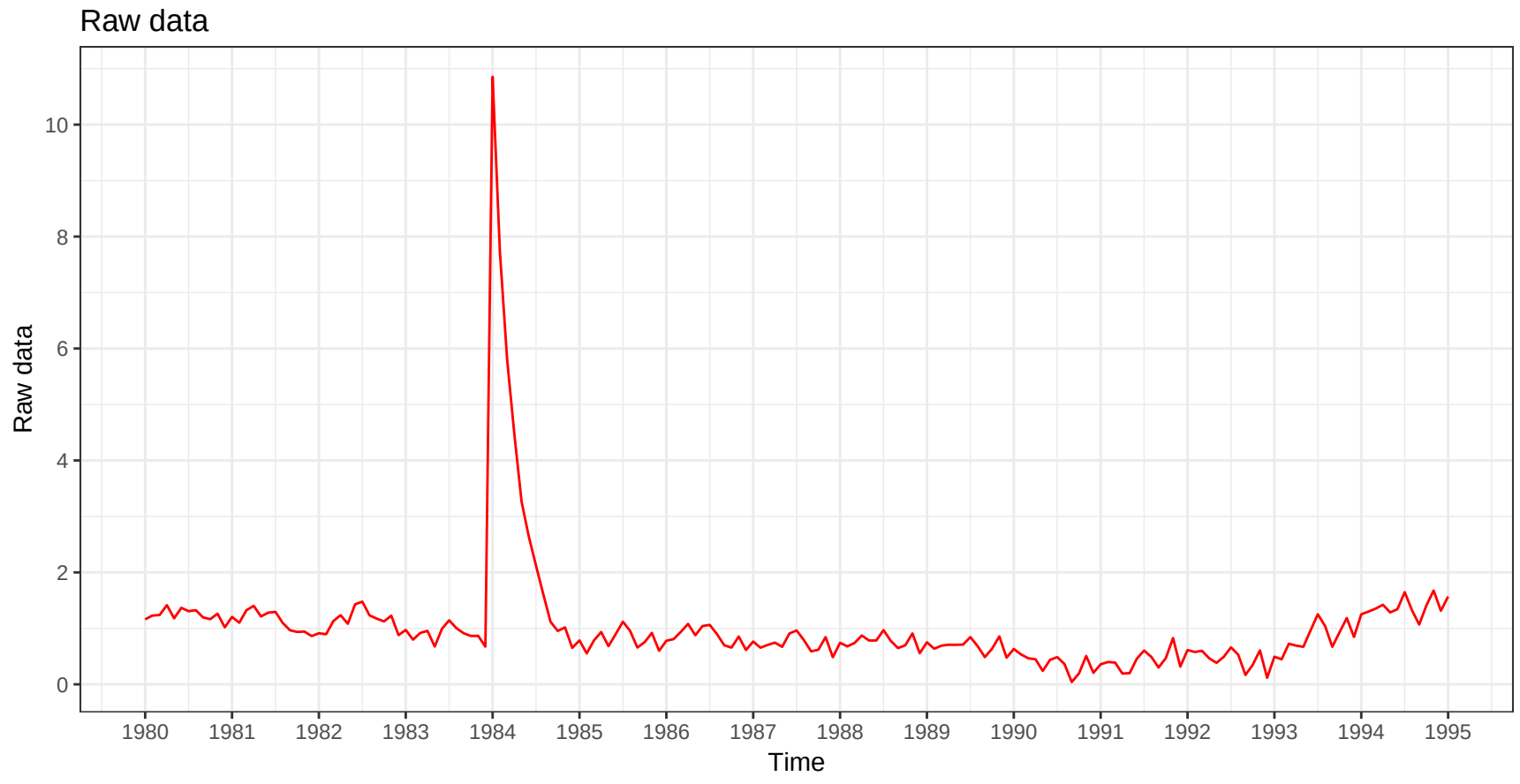
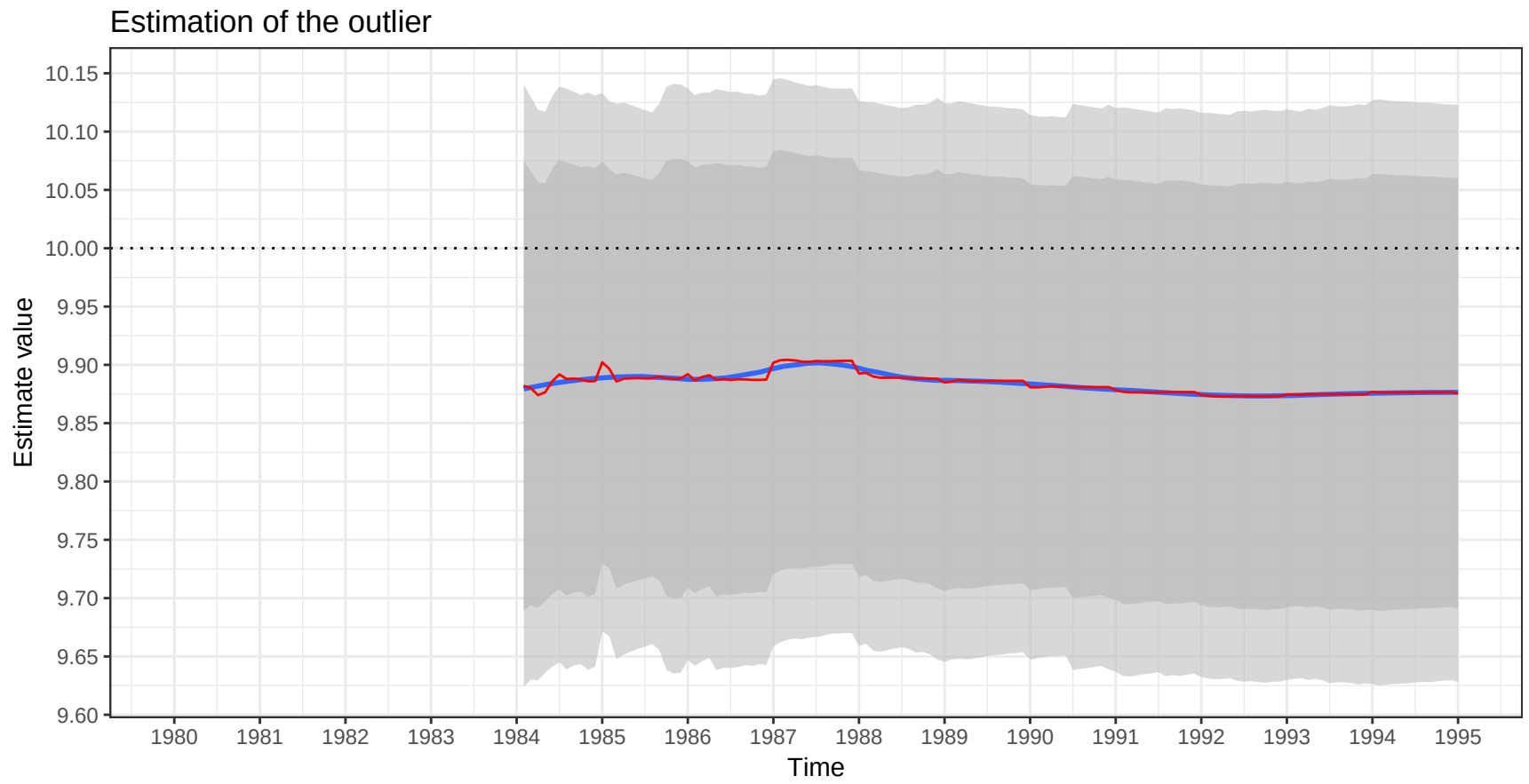
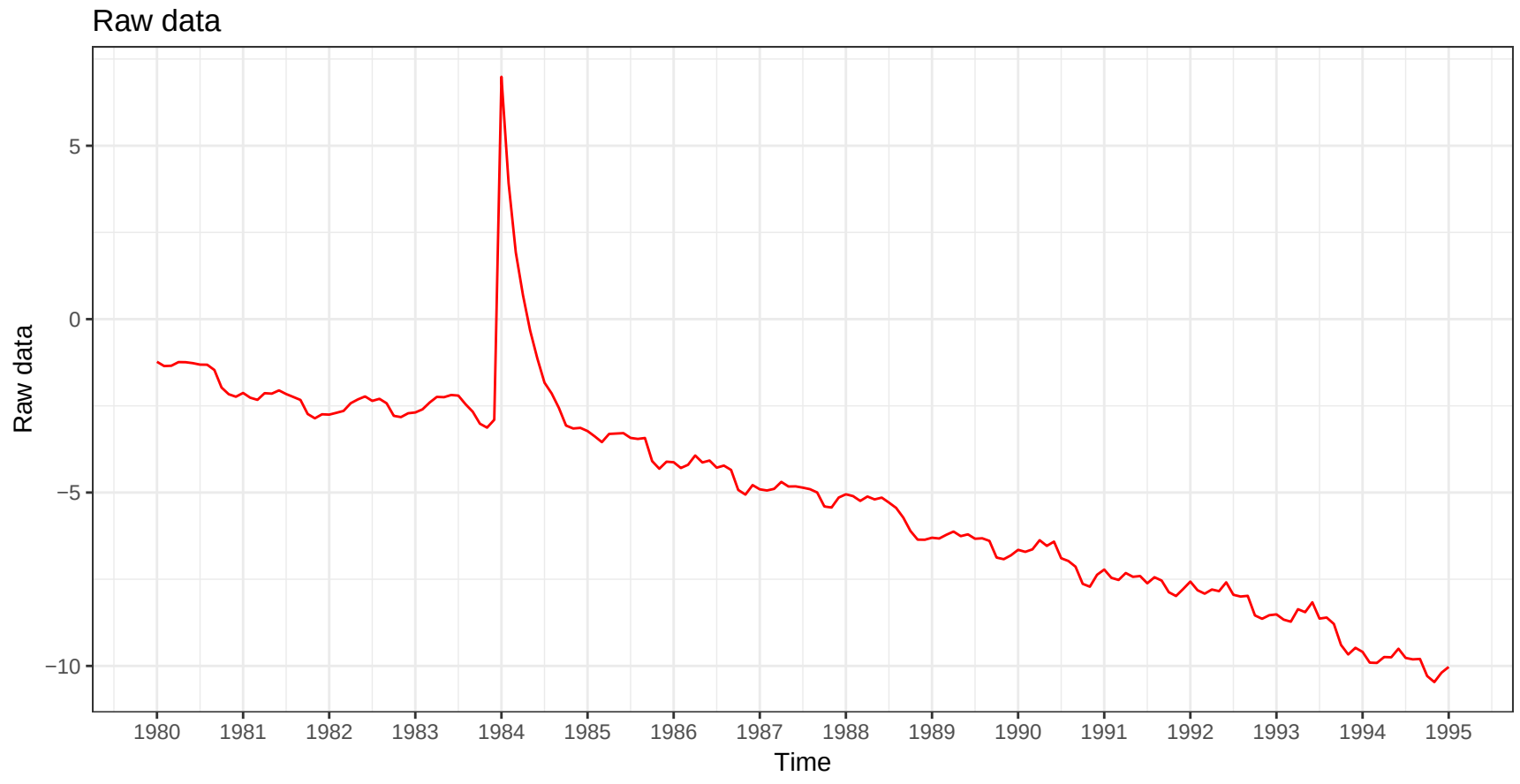




Estimate value of a TC(1984−01)
ARIMA (0,1,0)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.7B12)at





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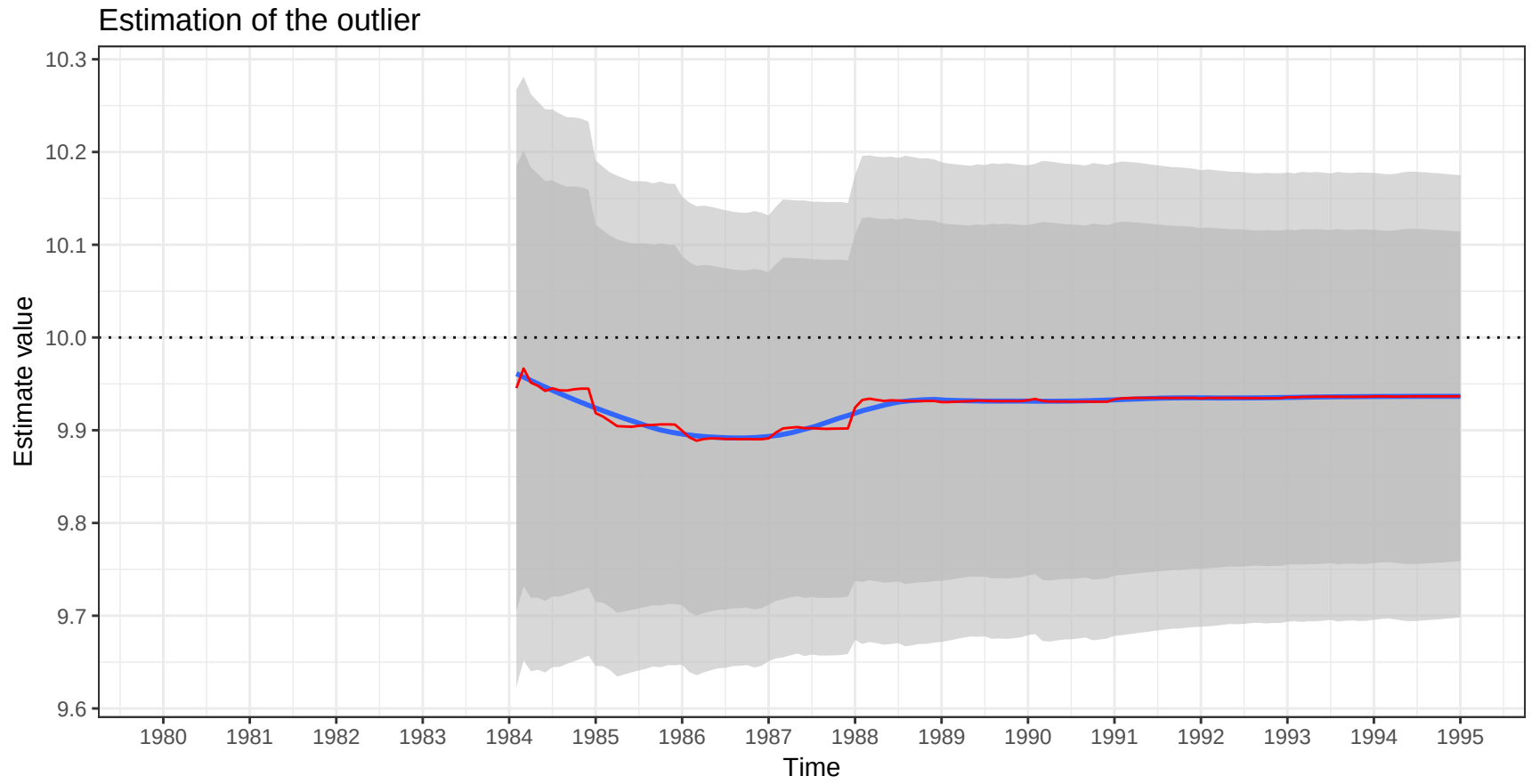

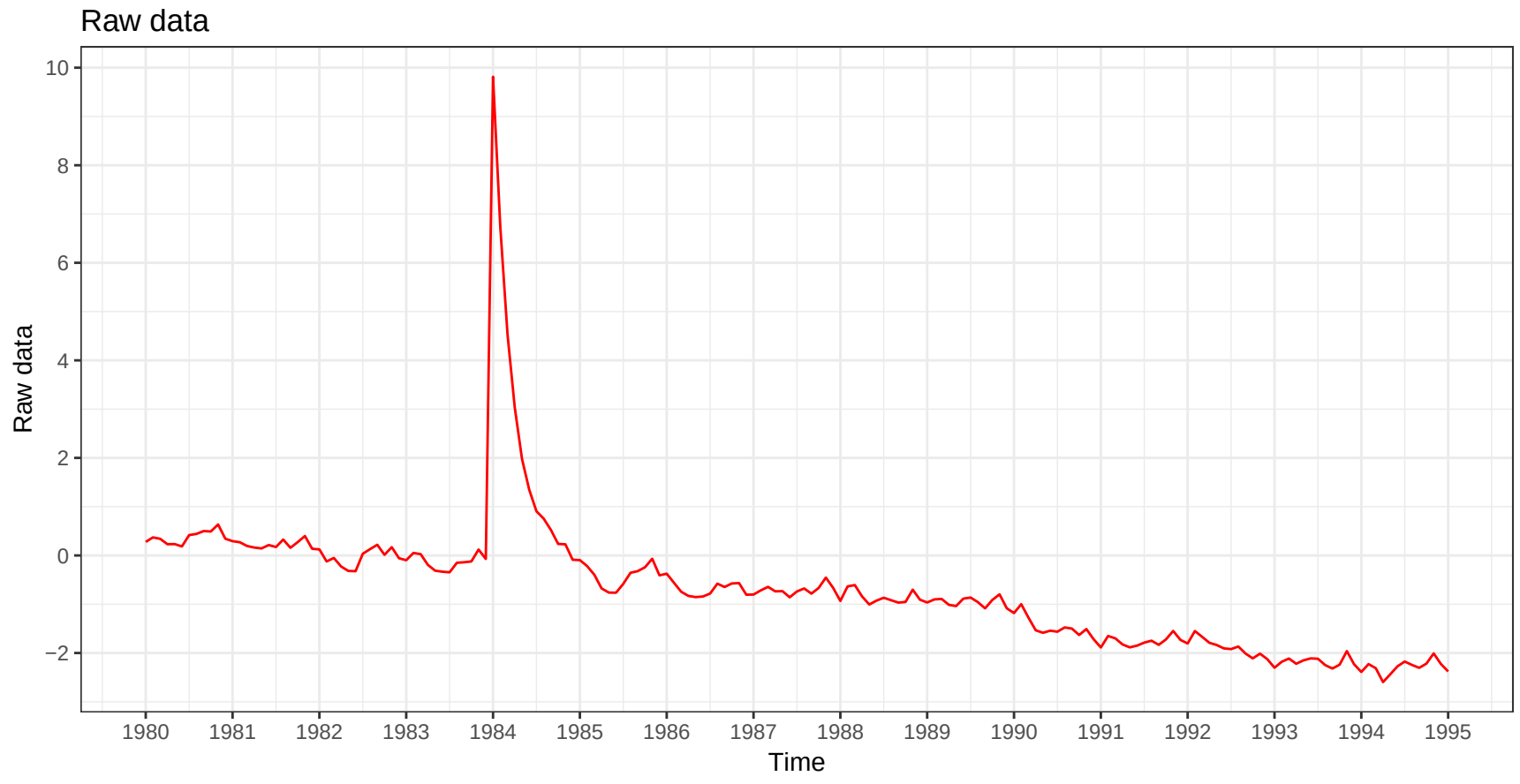

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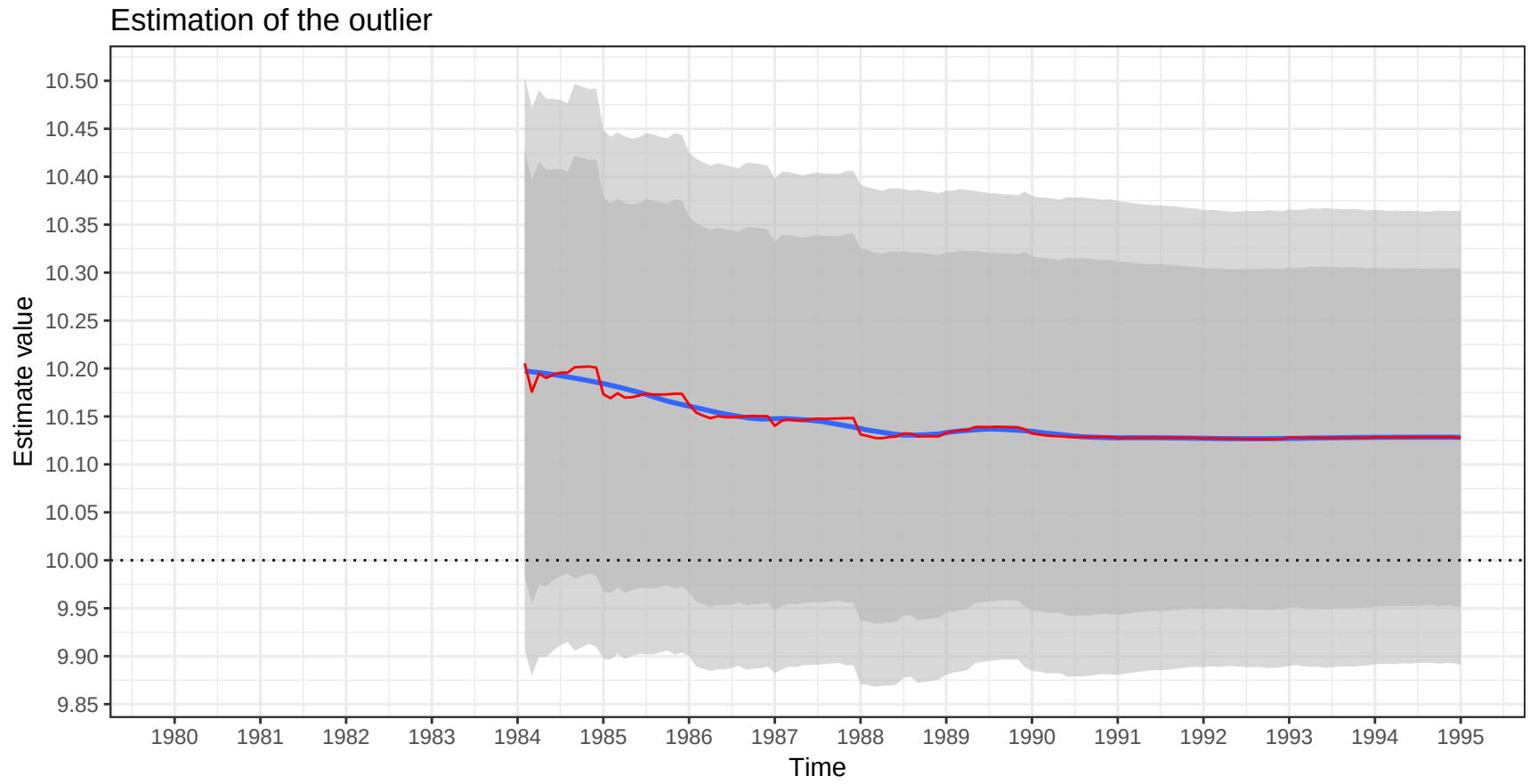

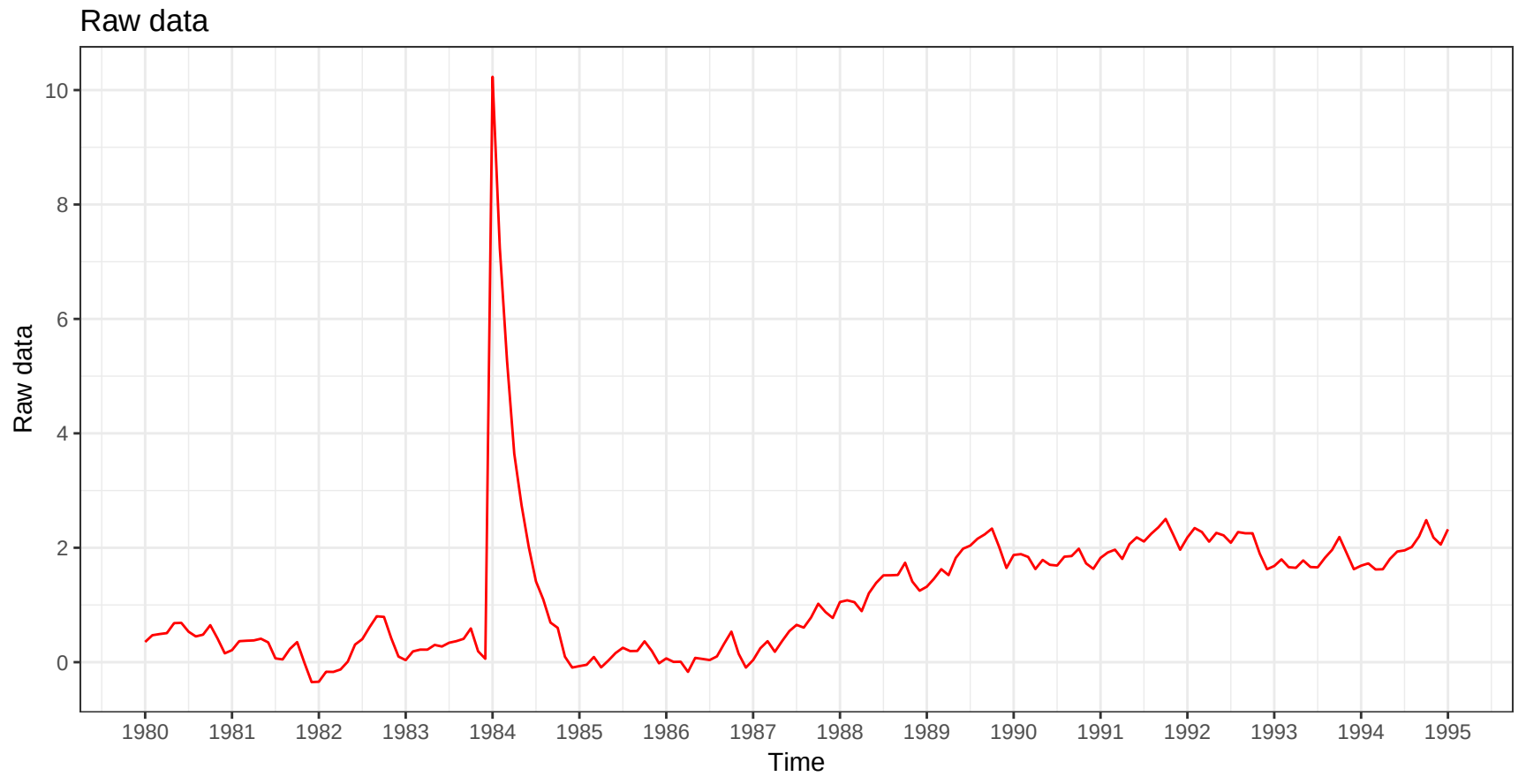

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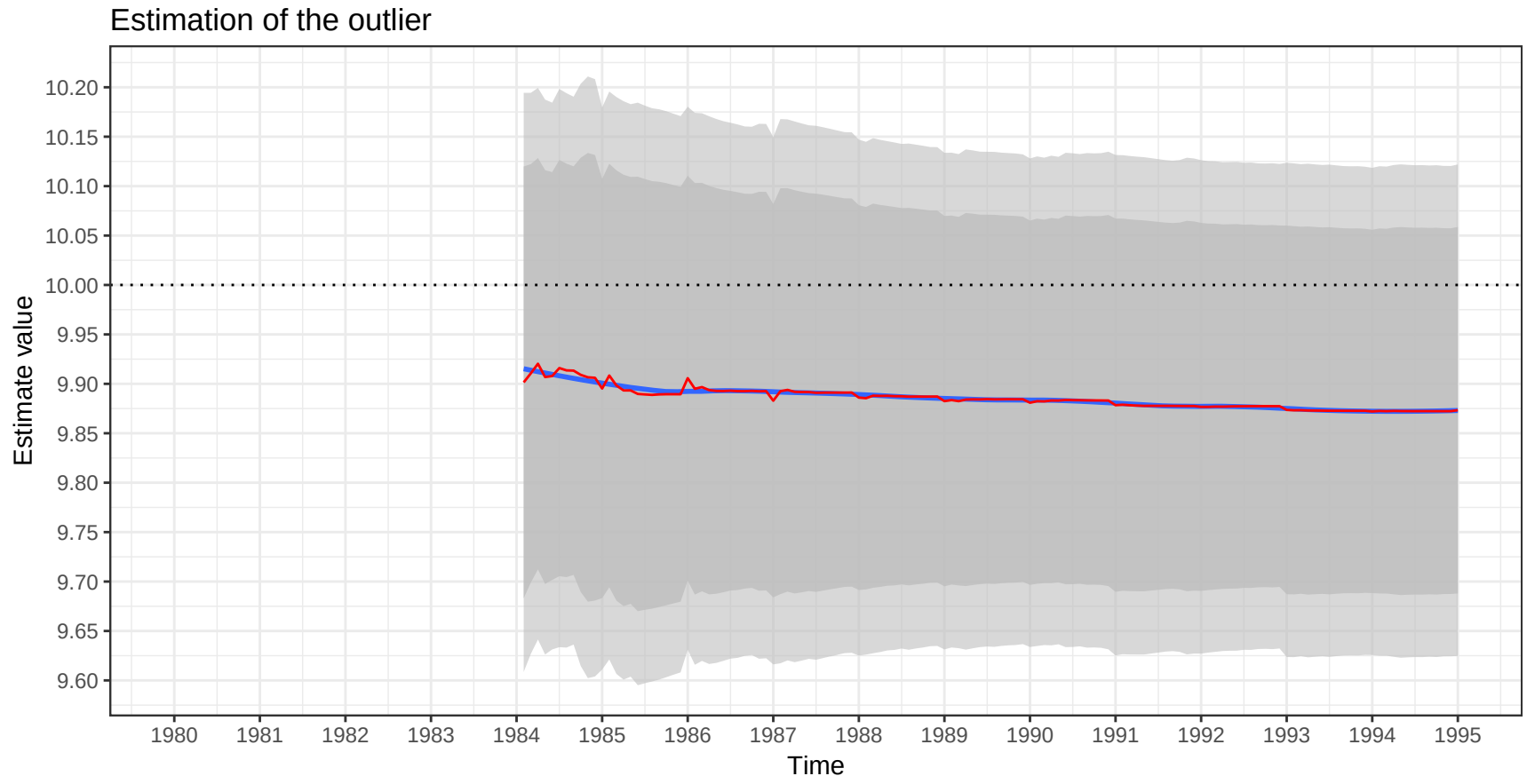

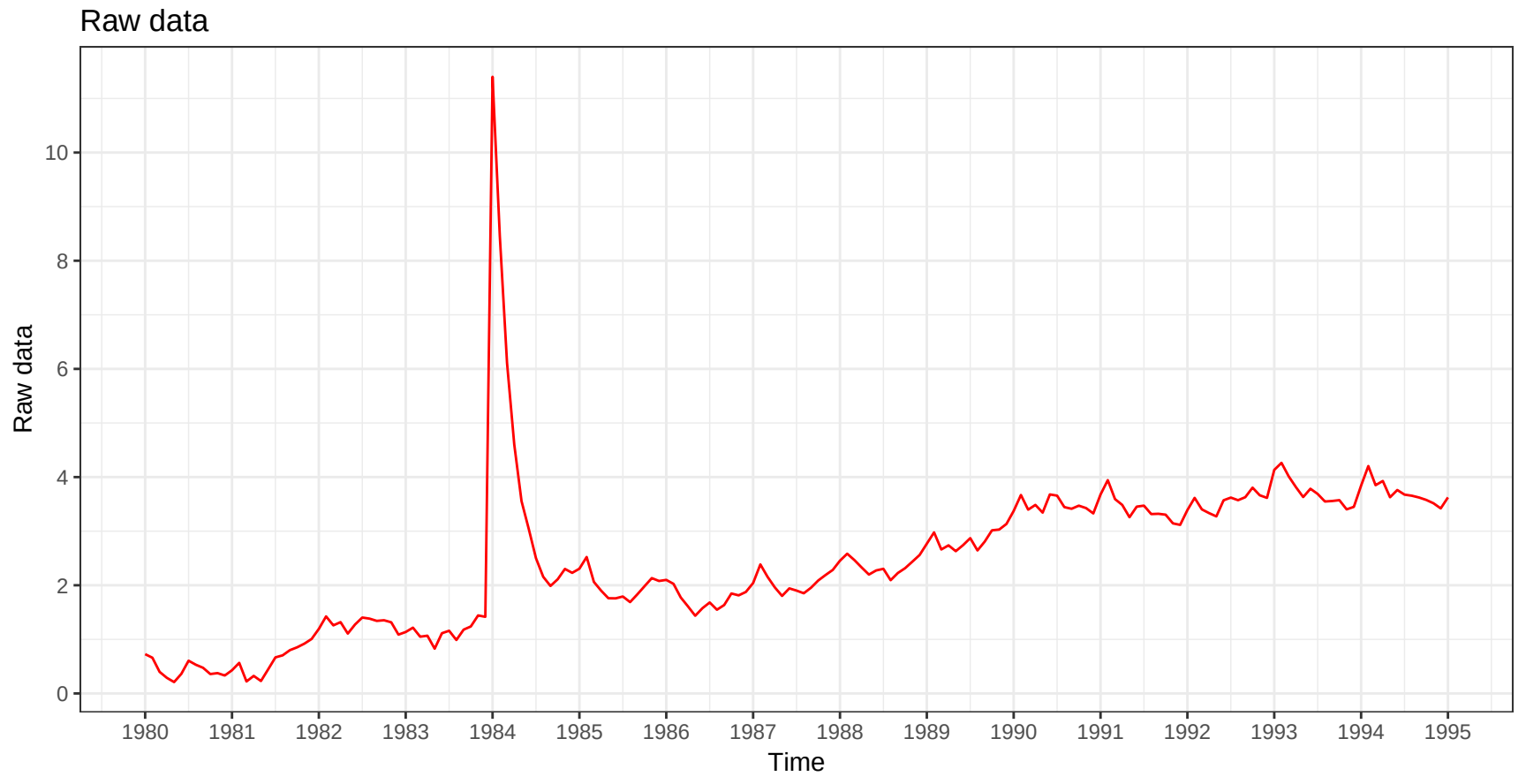

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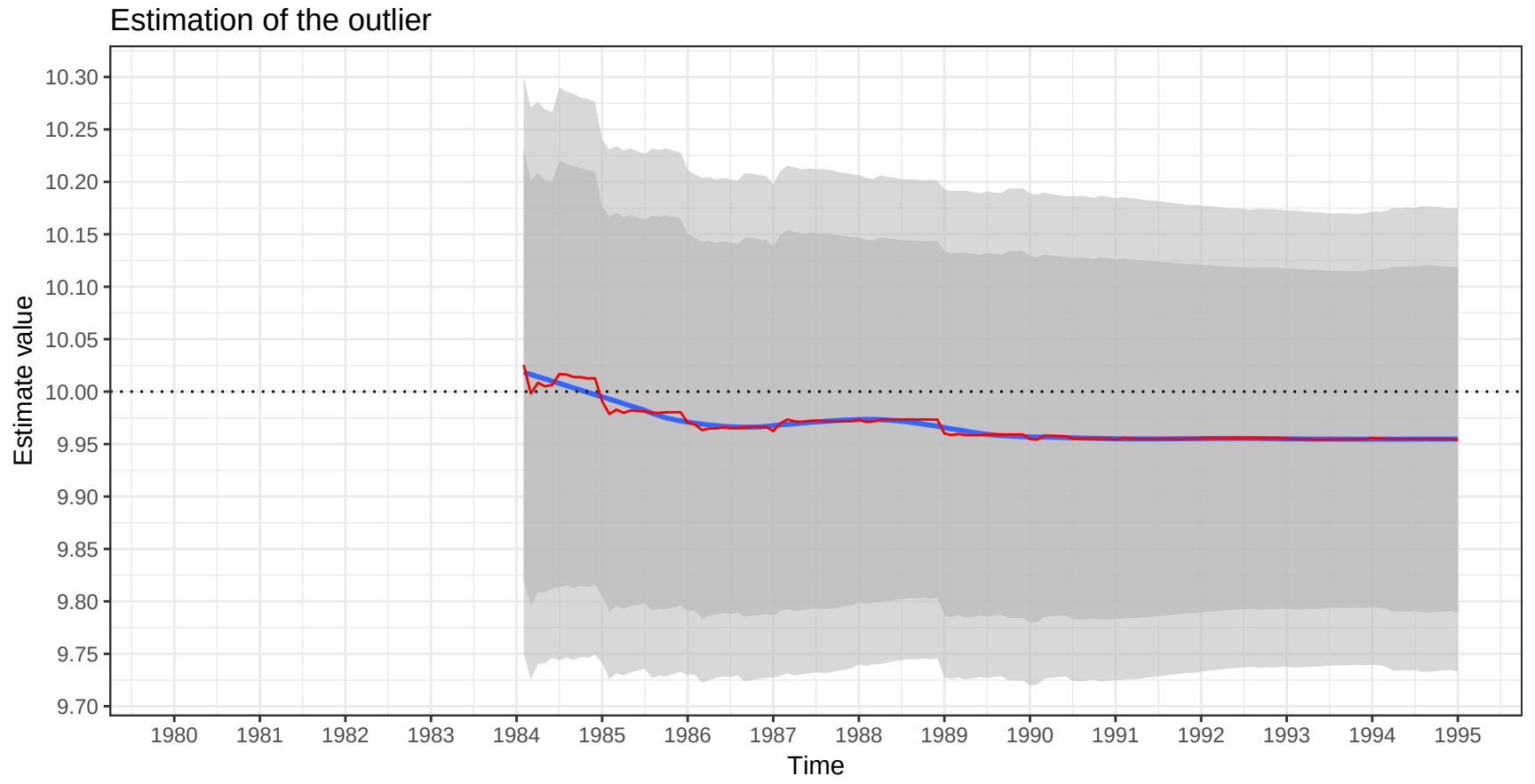

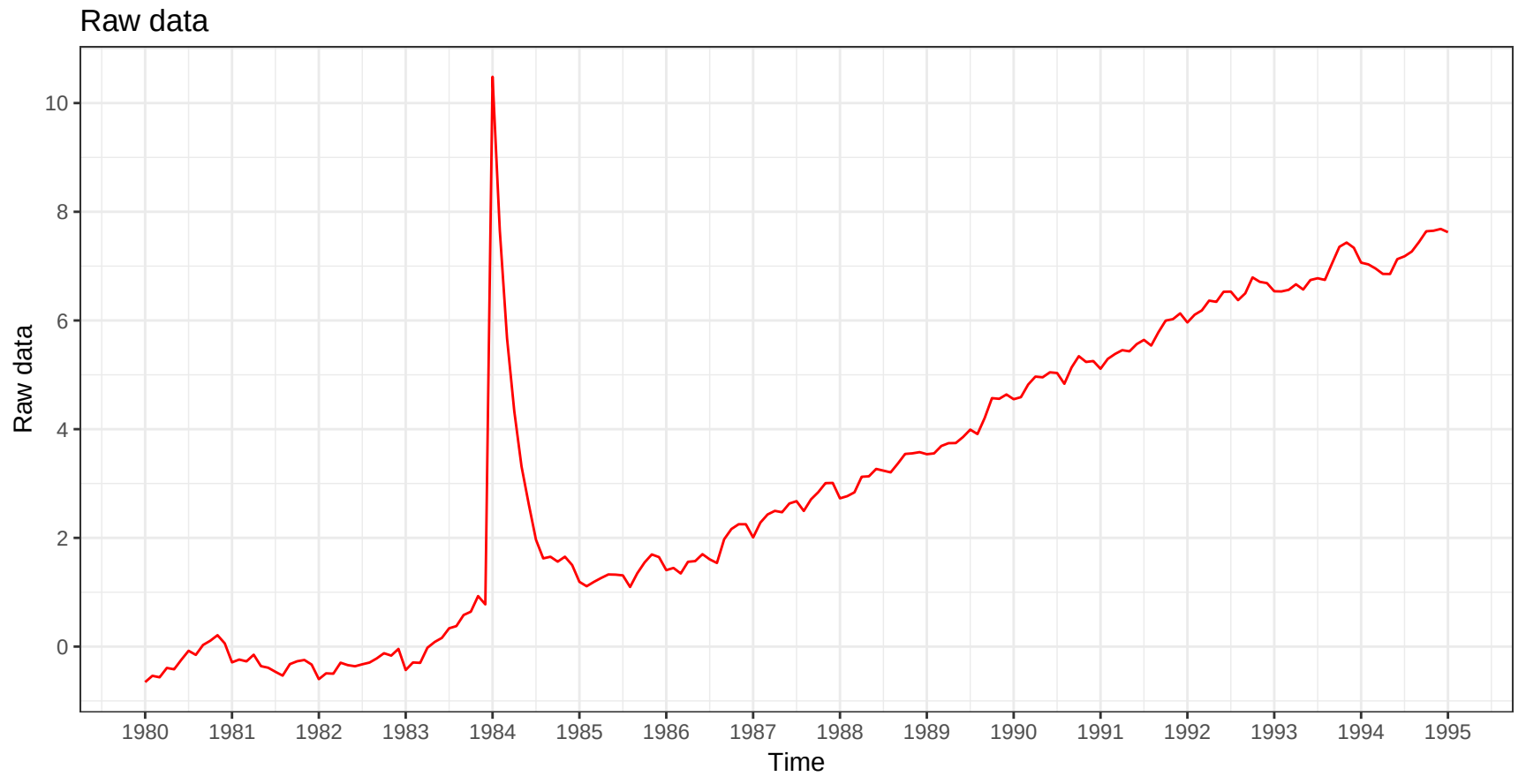

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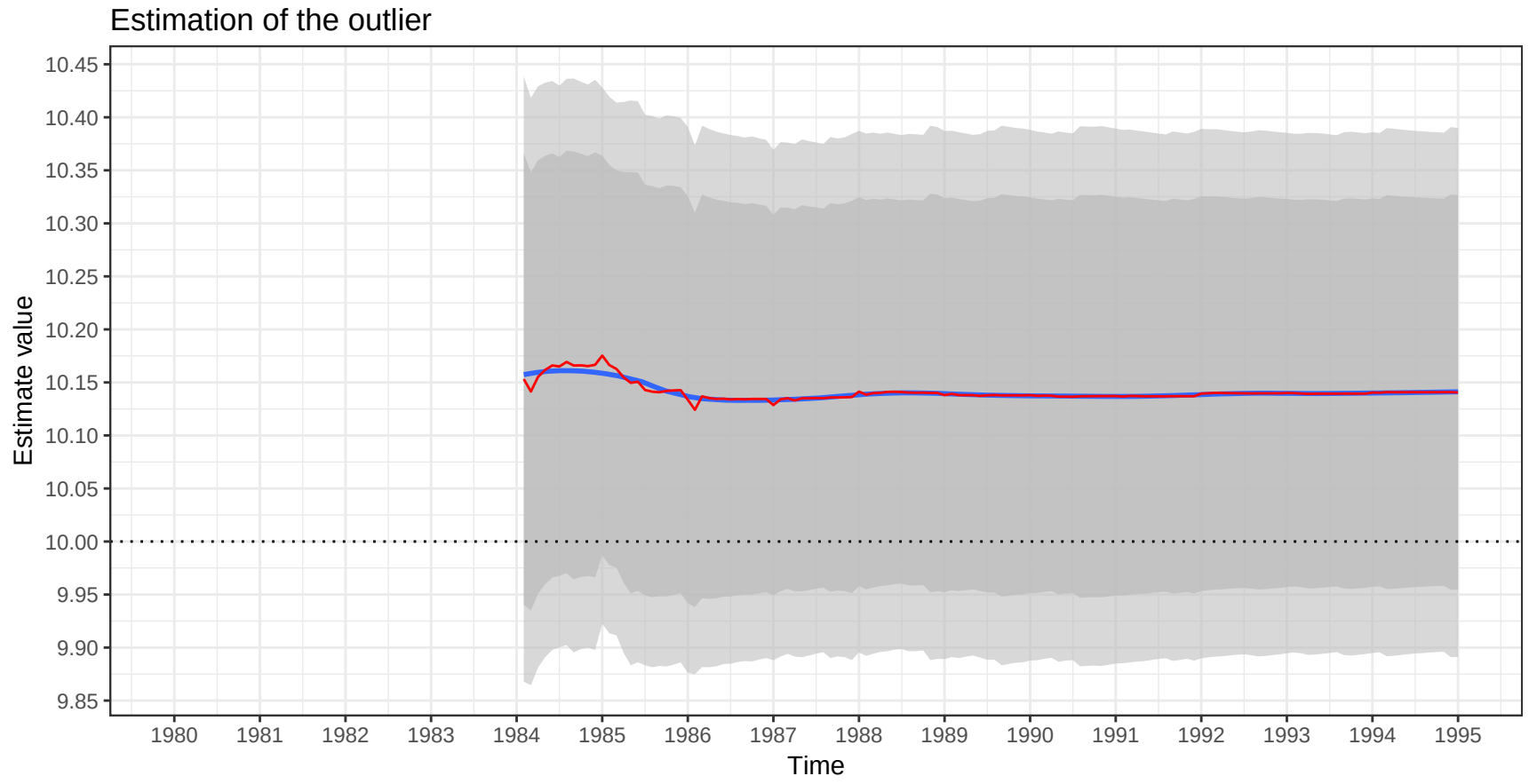

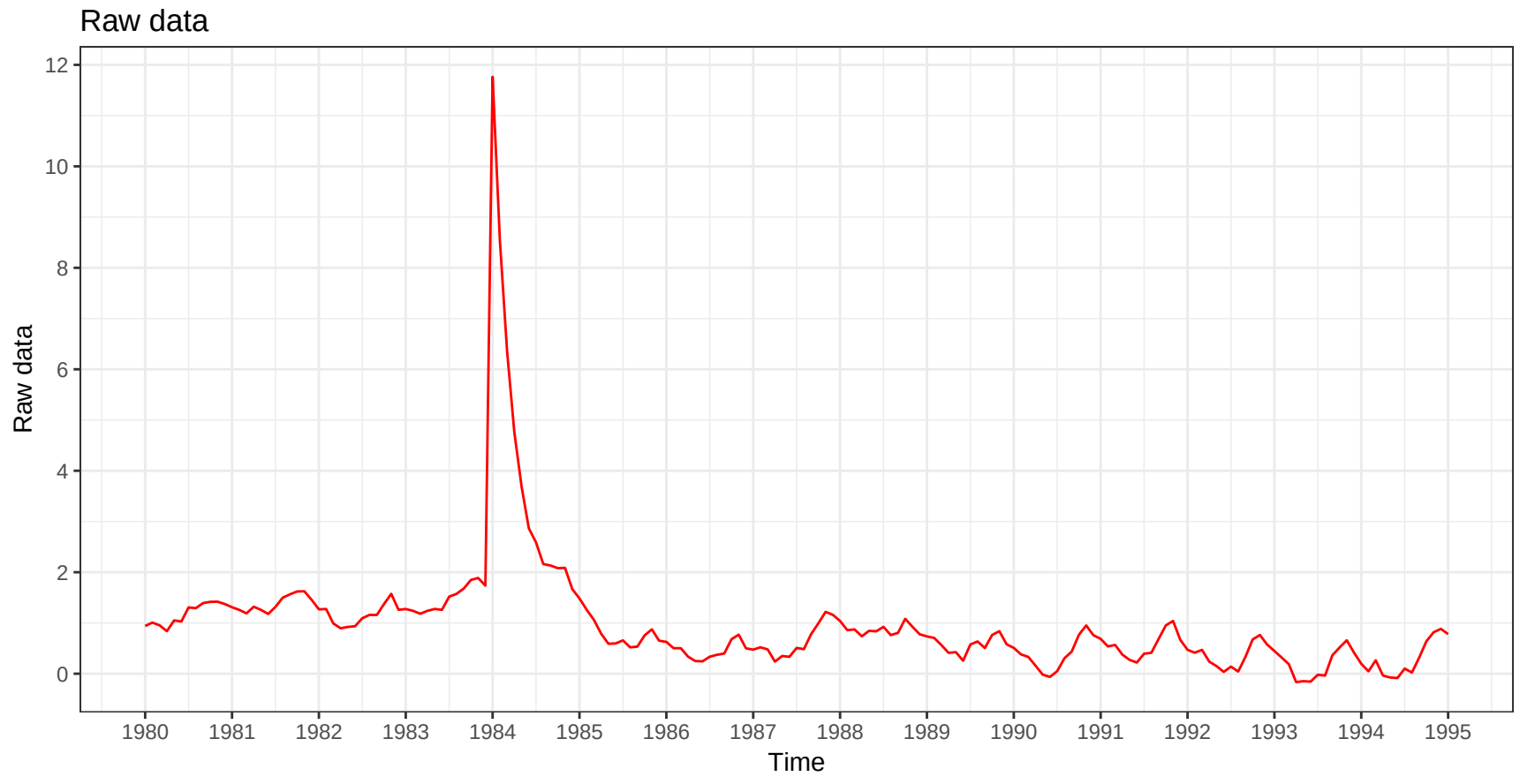

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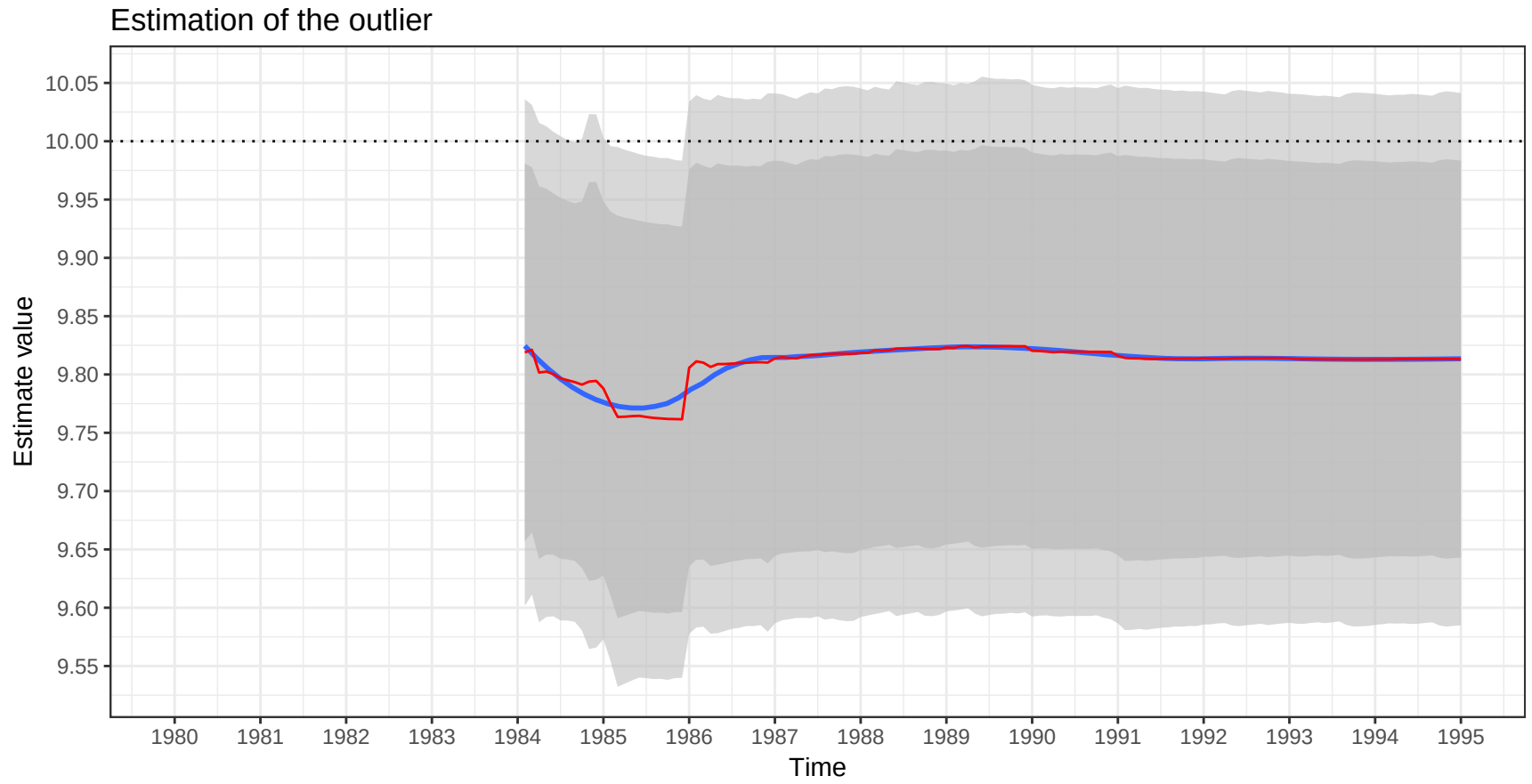

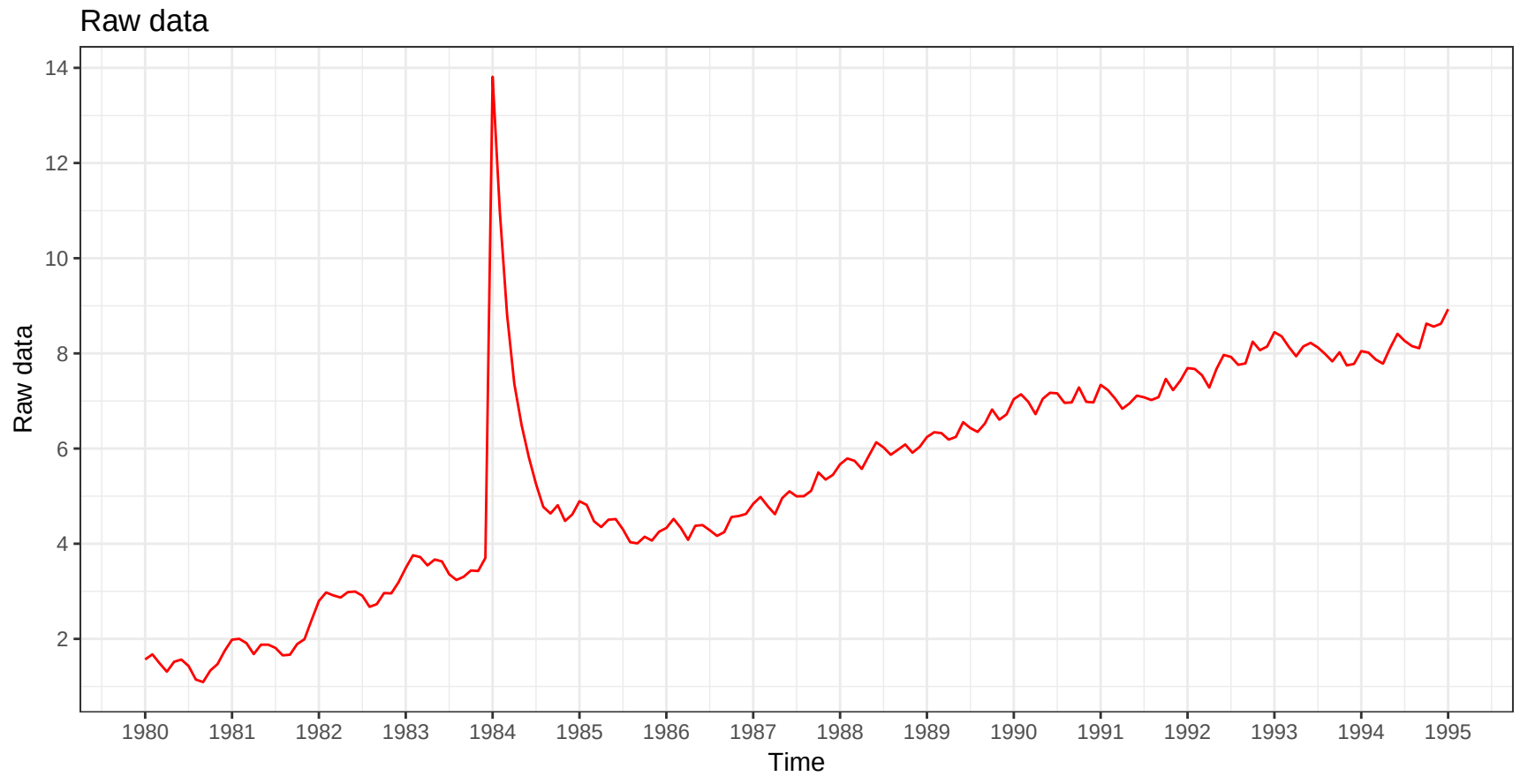

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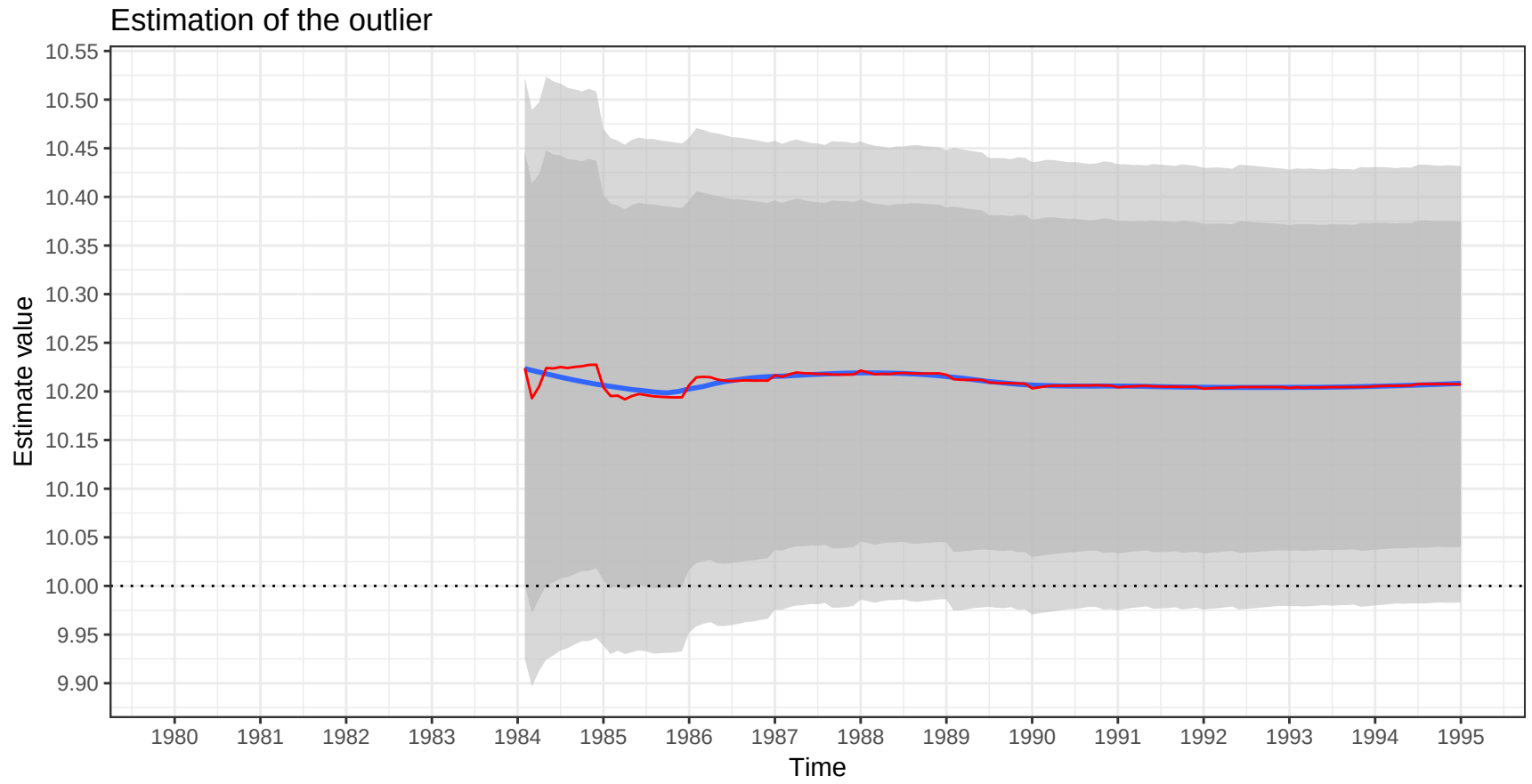

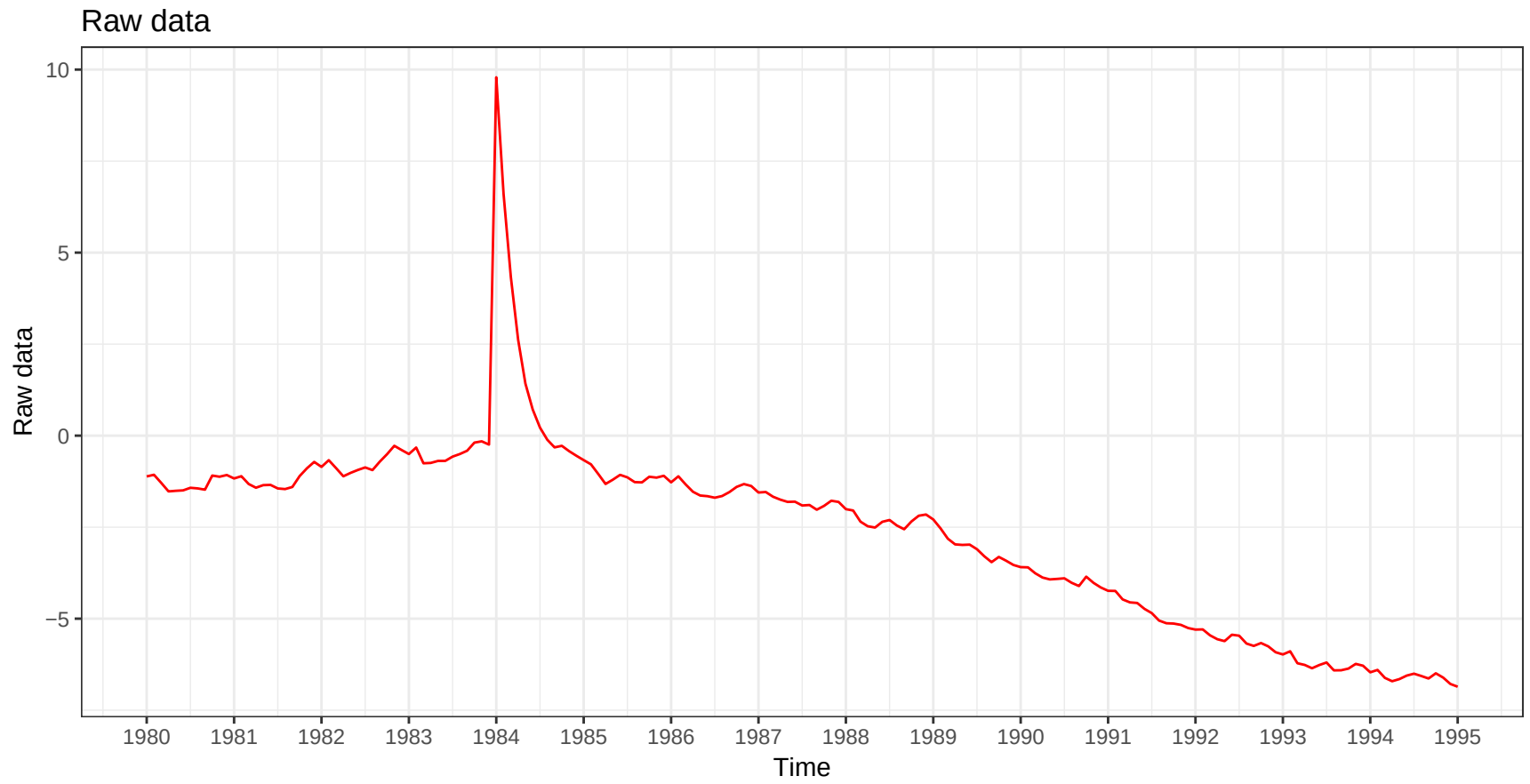

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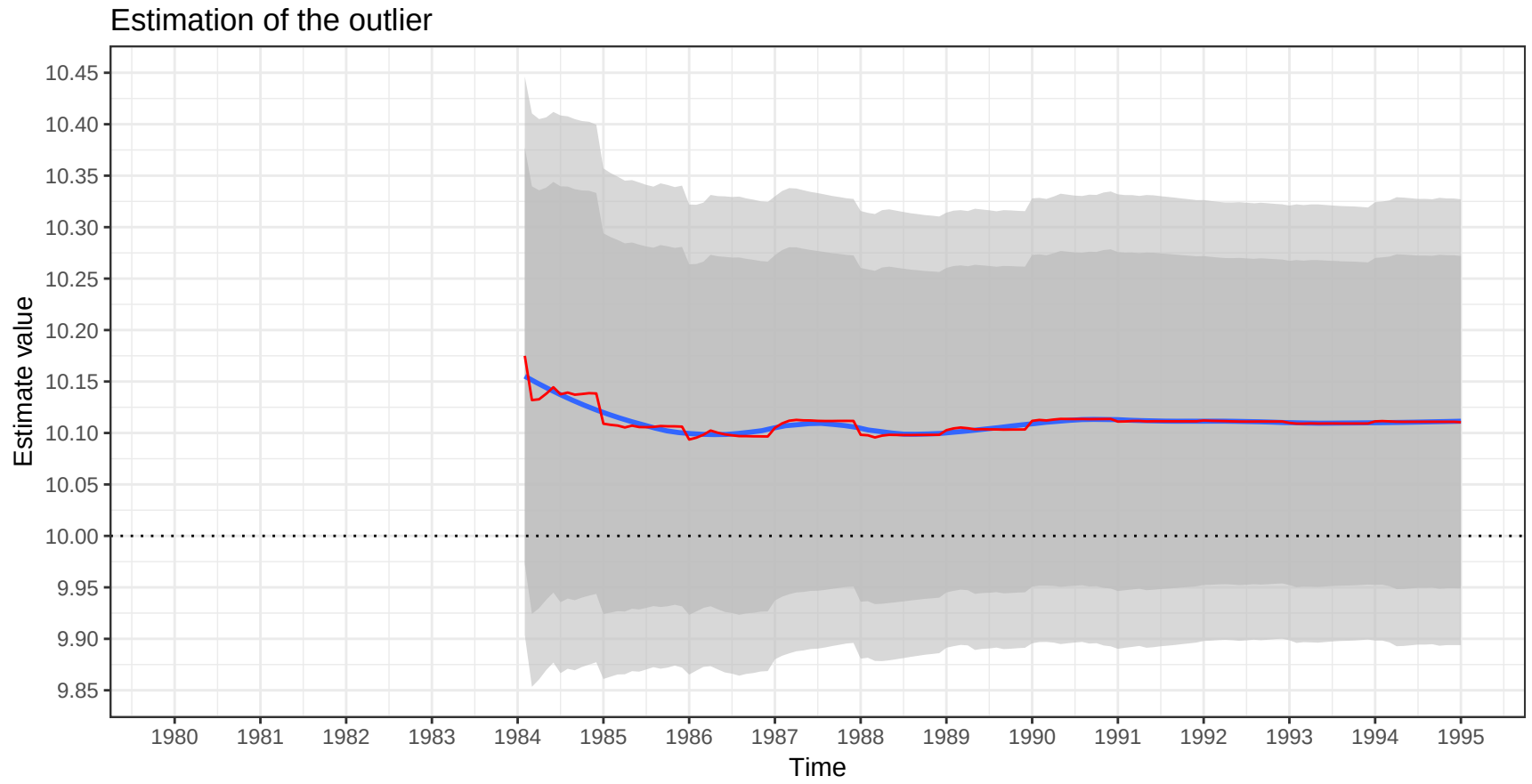

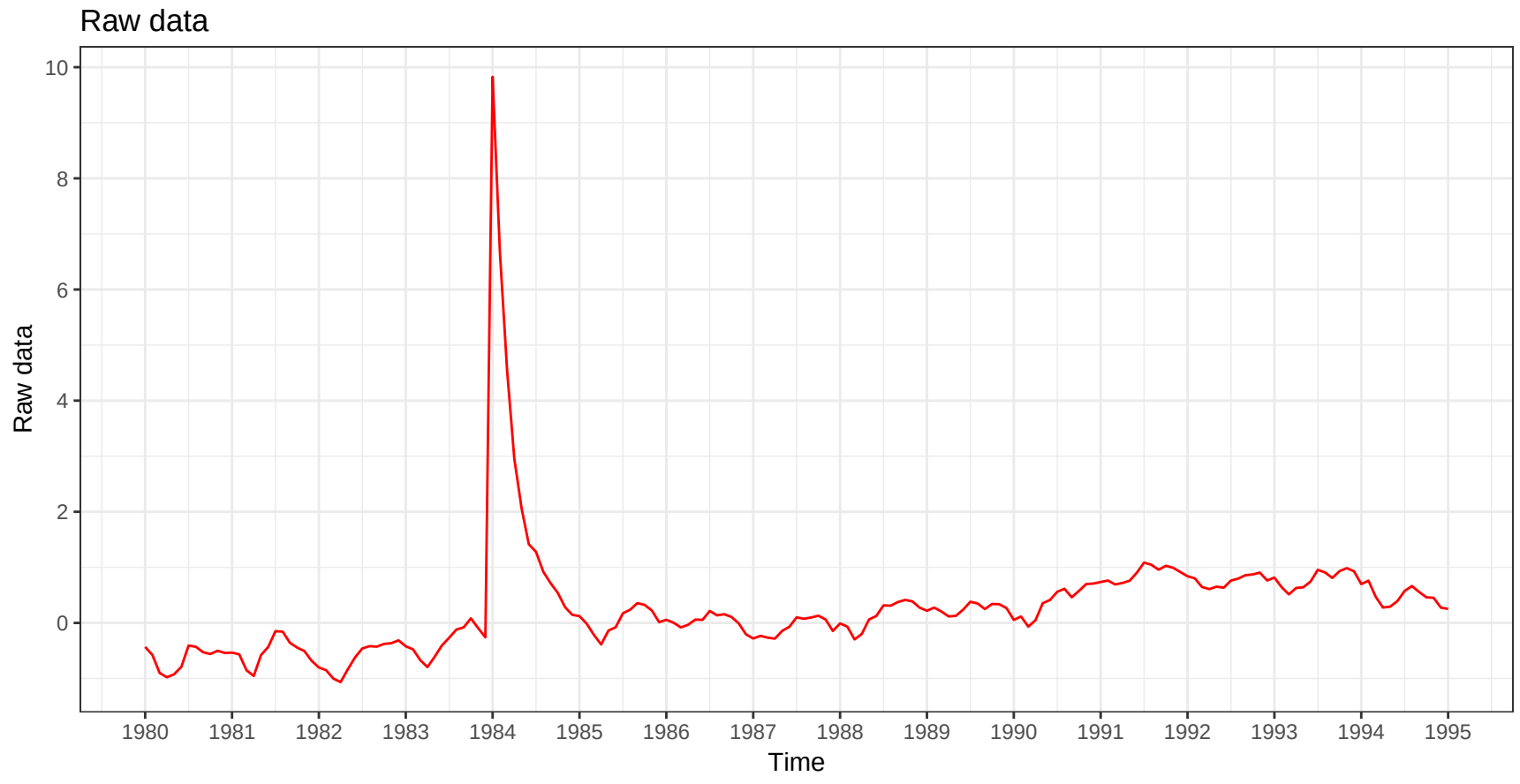

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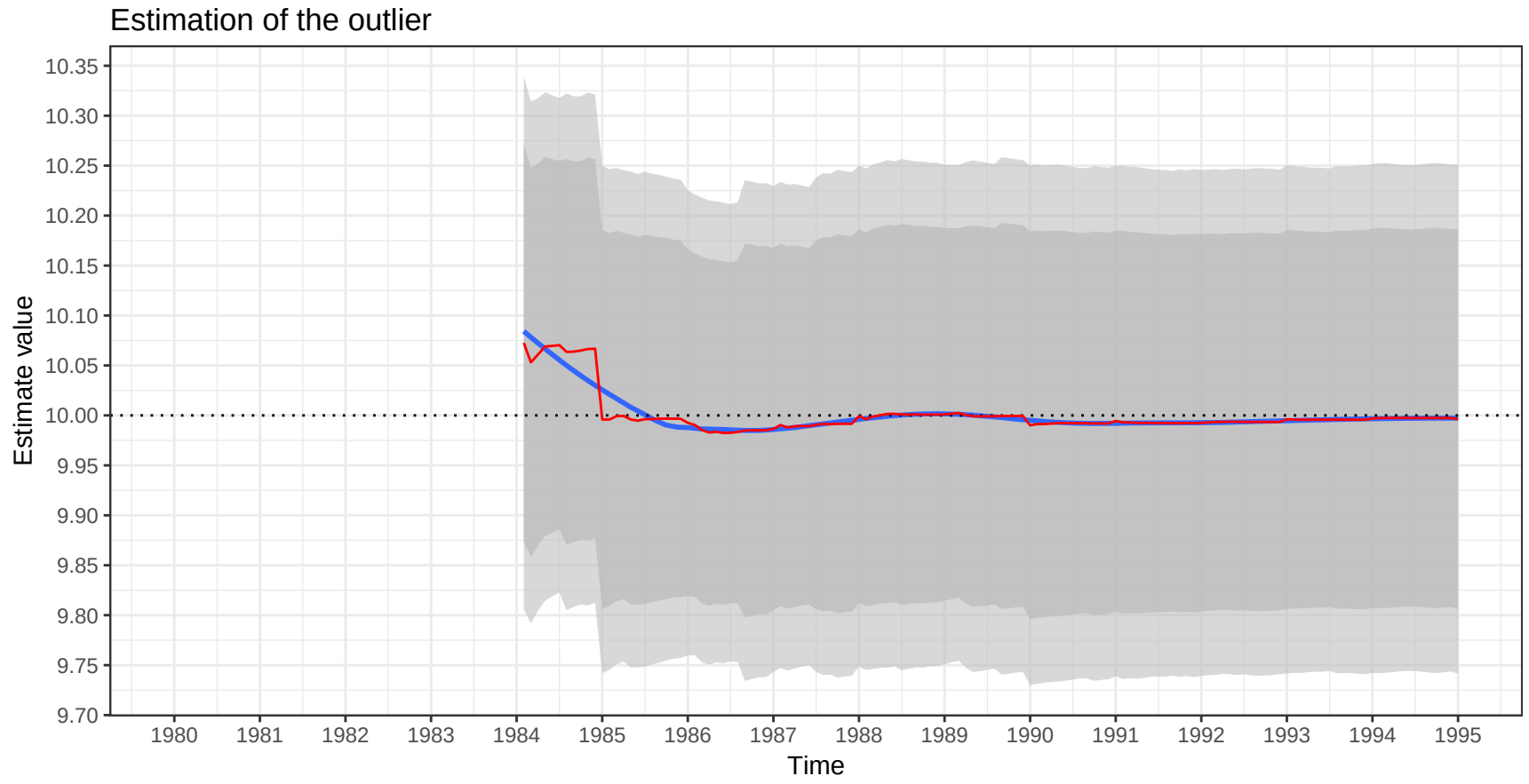
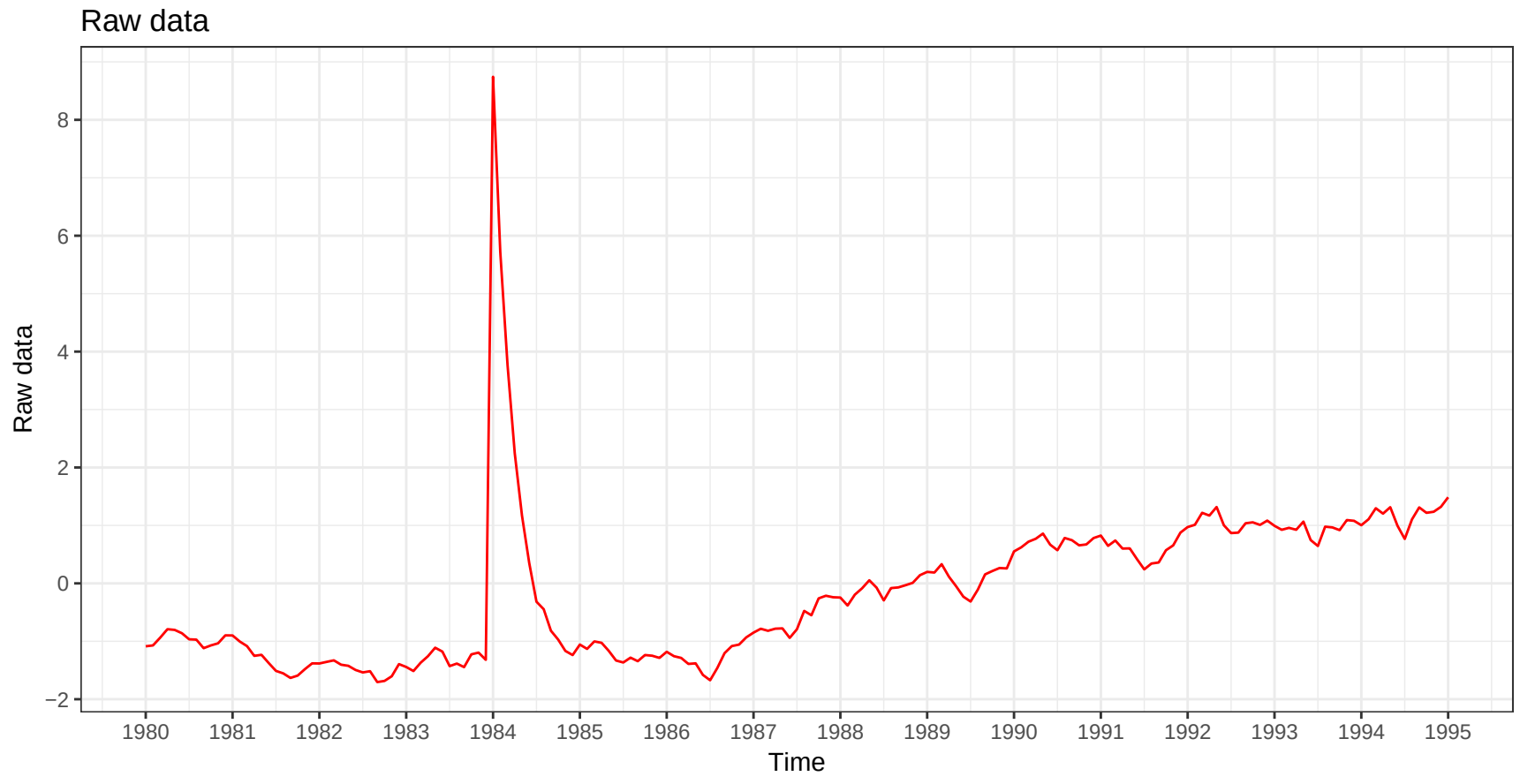
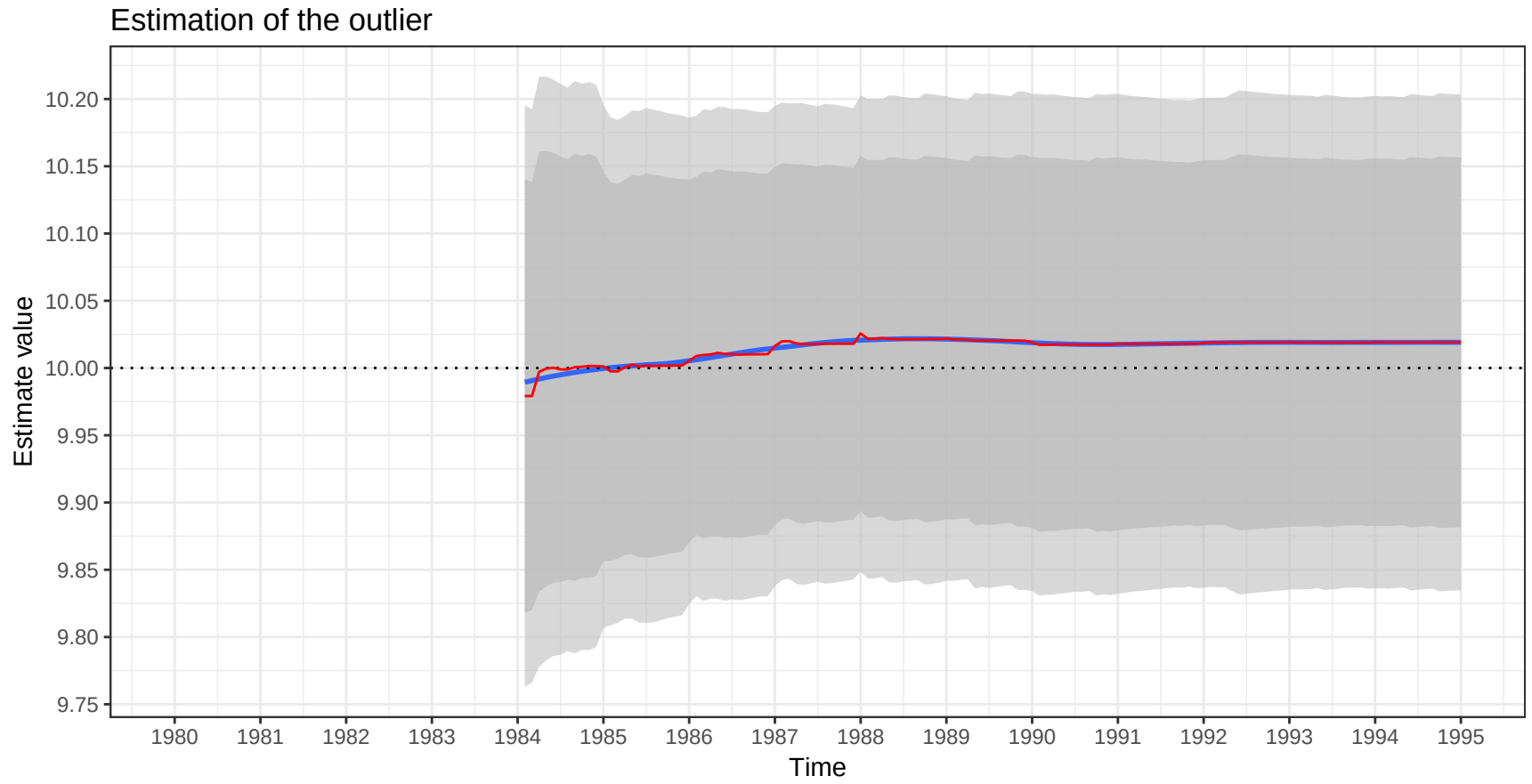
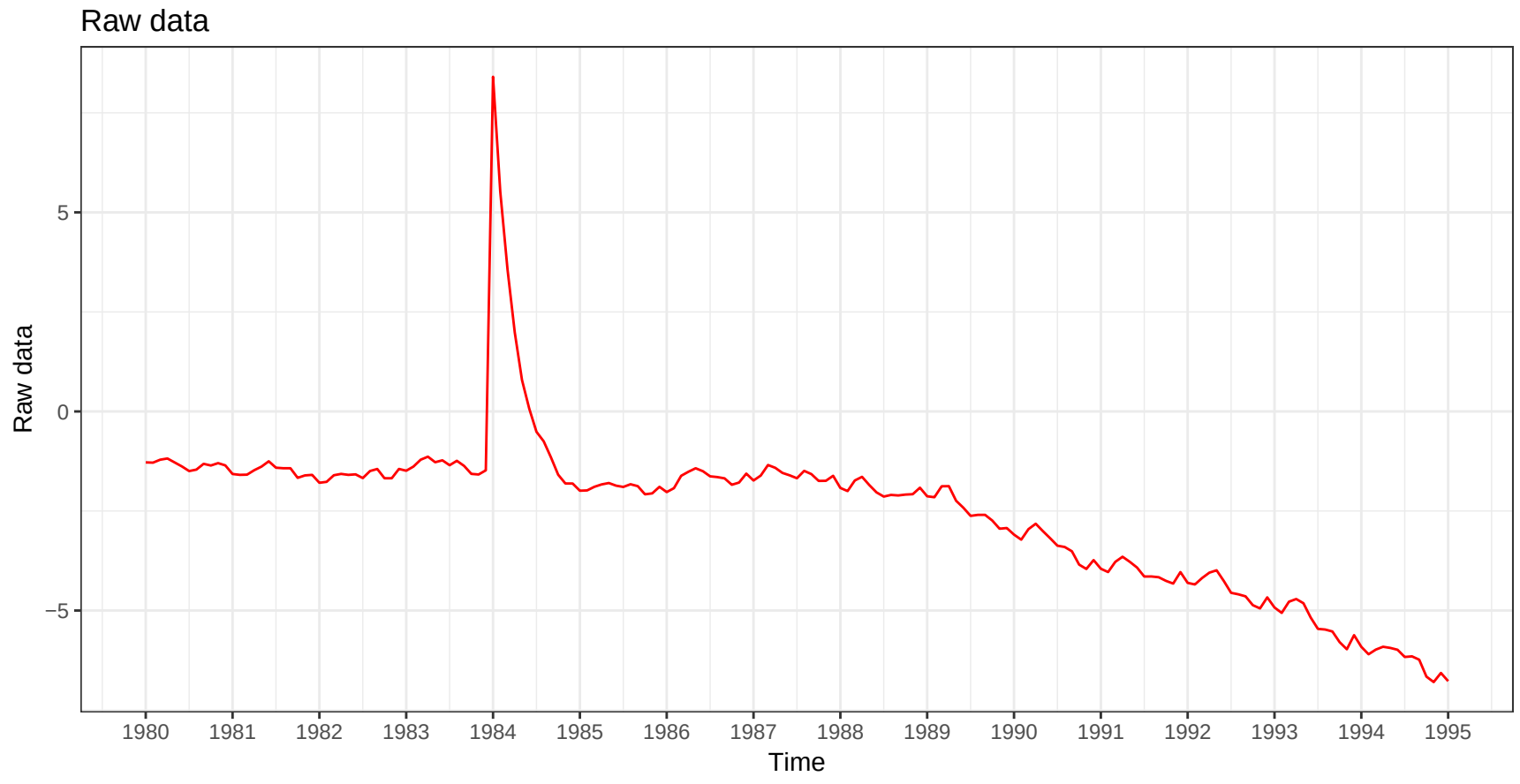




Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1+0.3B)(1−0.6B12)at





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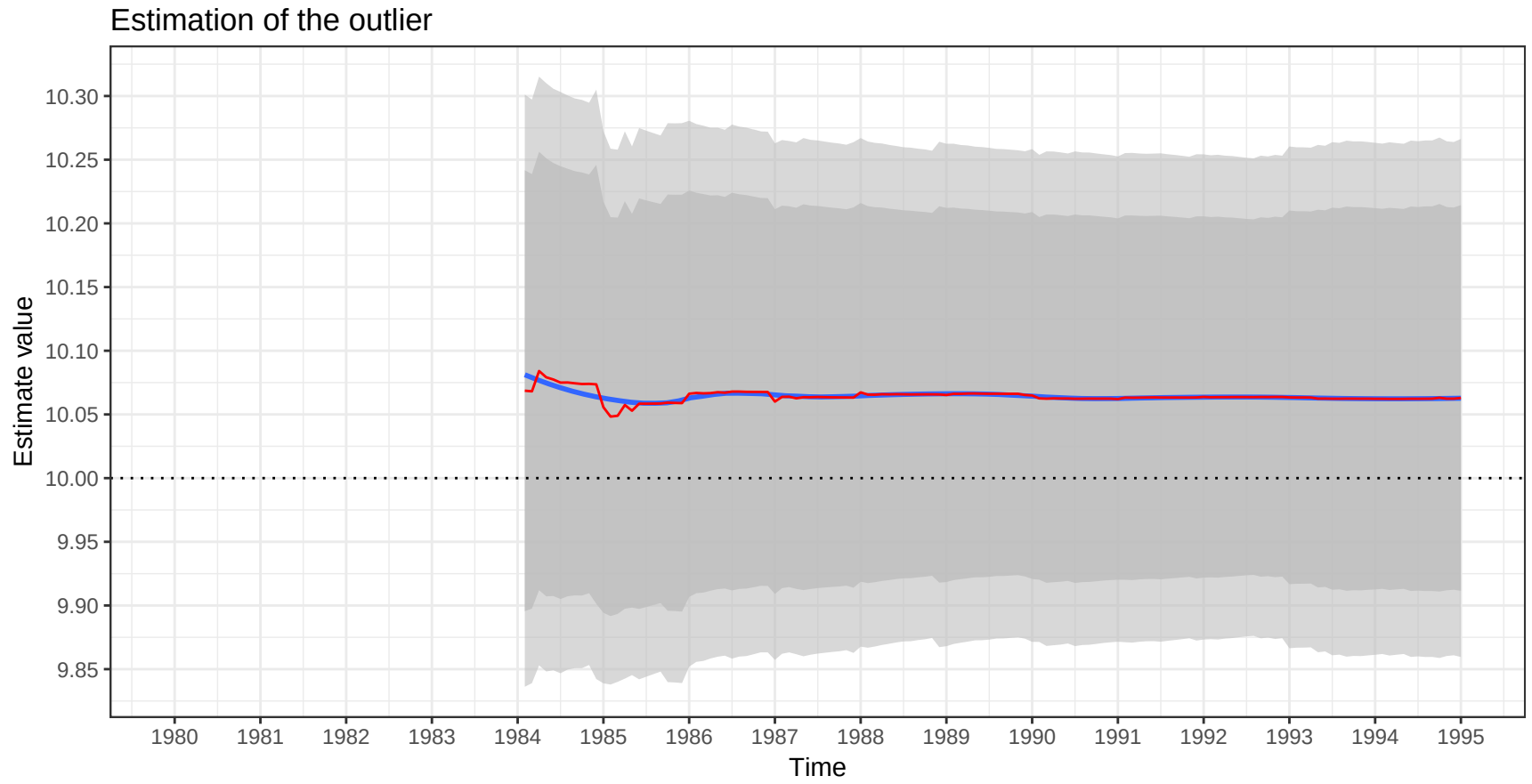

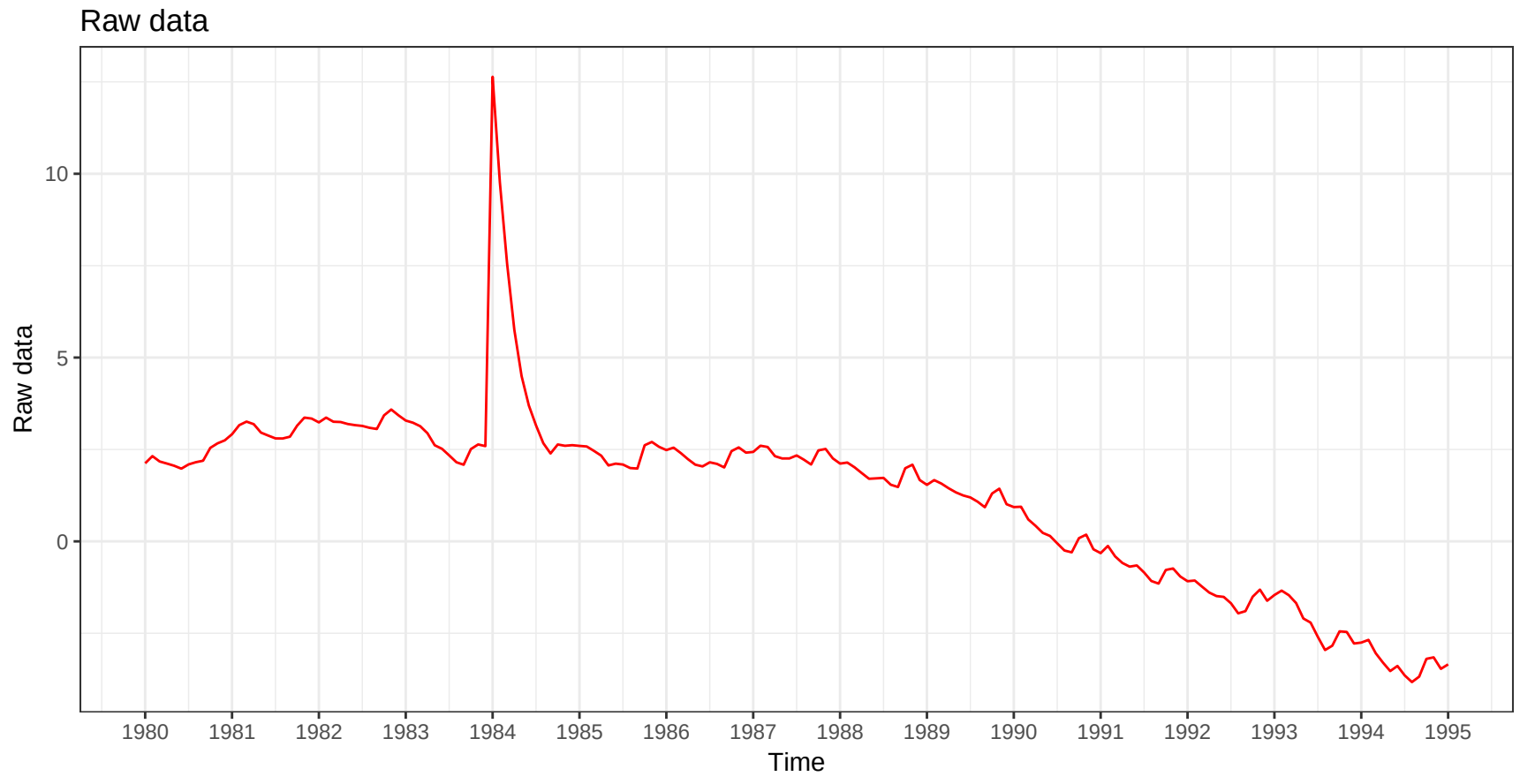

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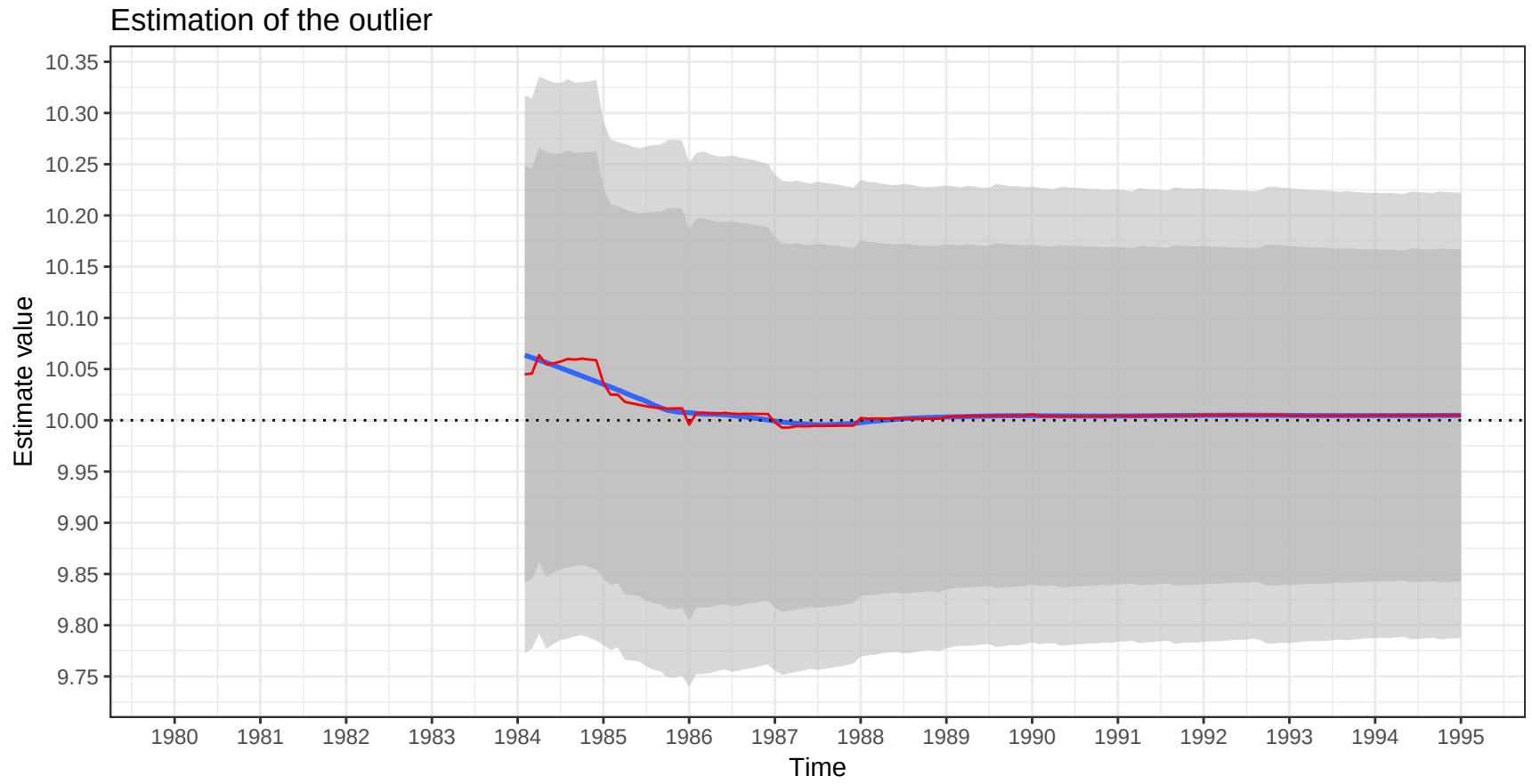

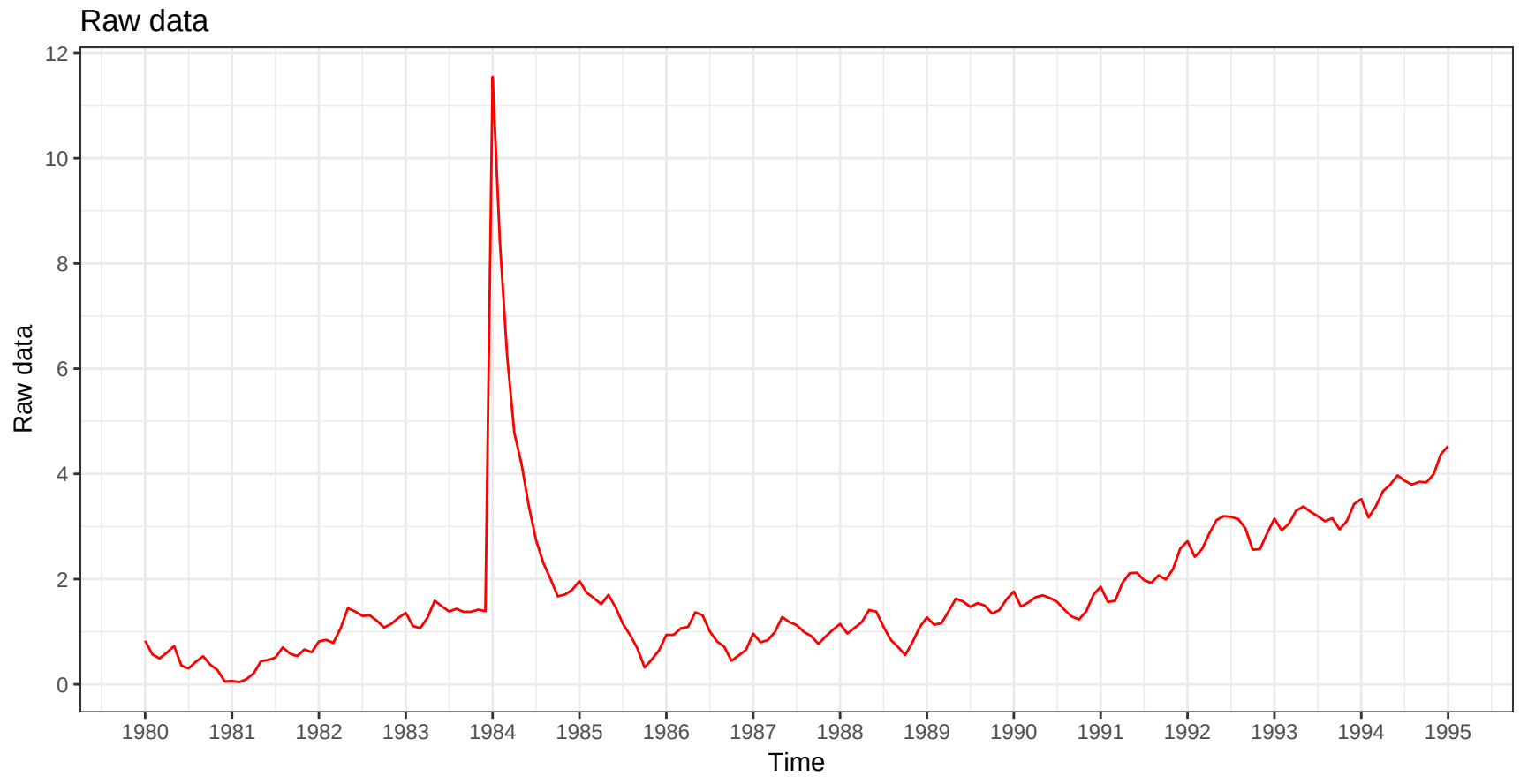

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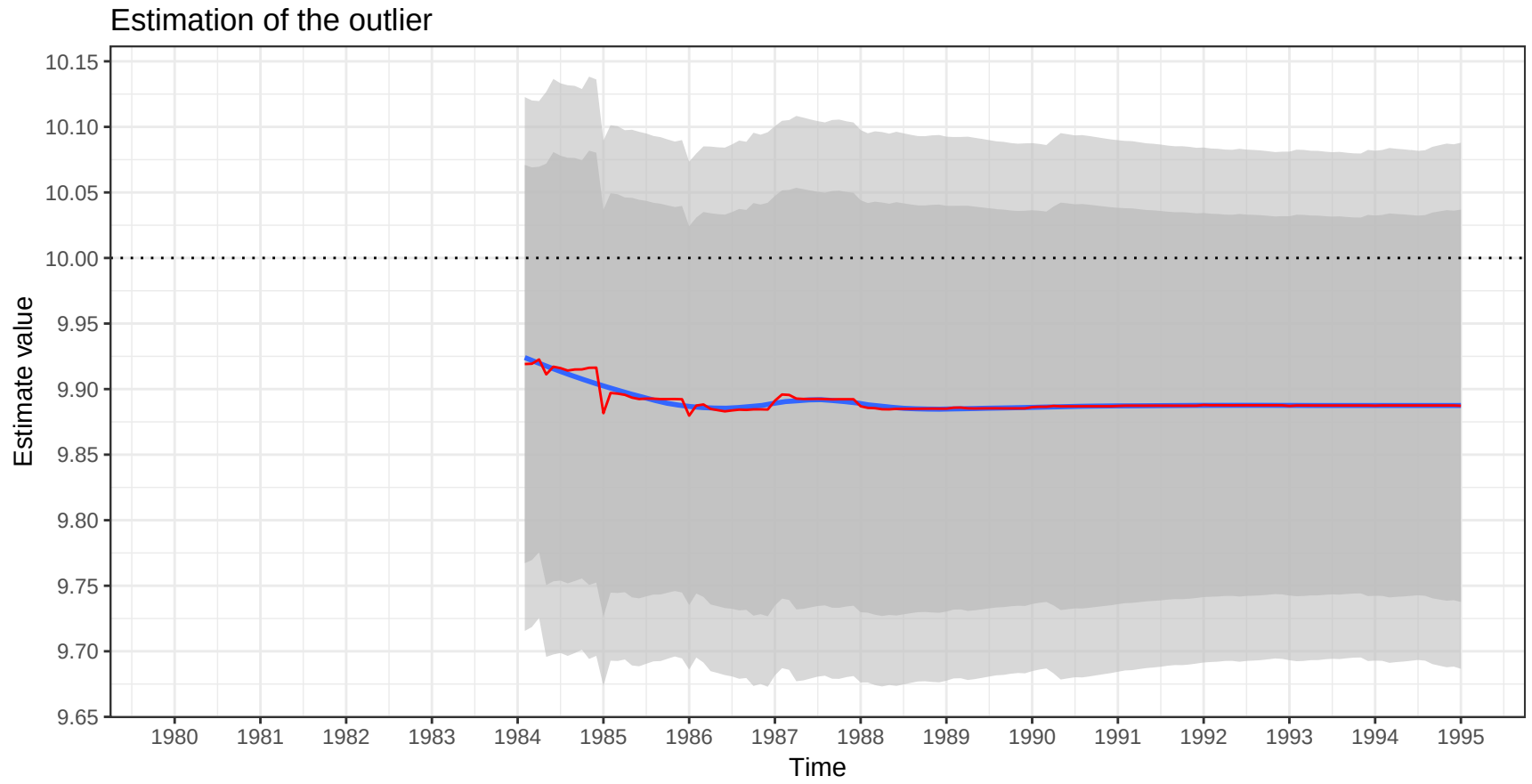
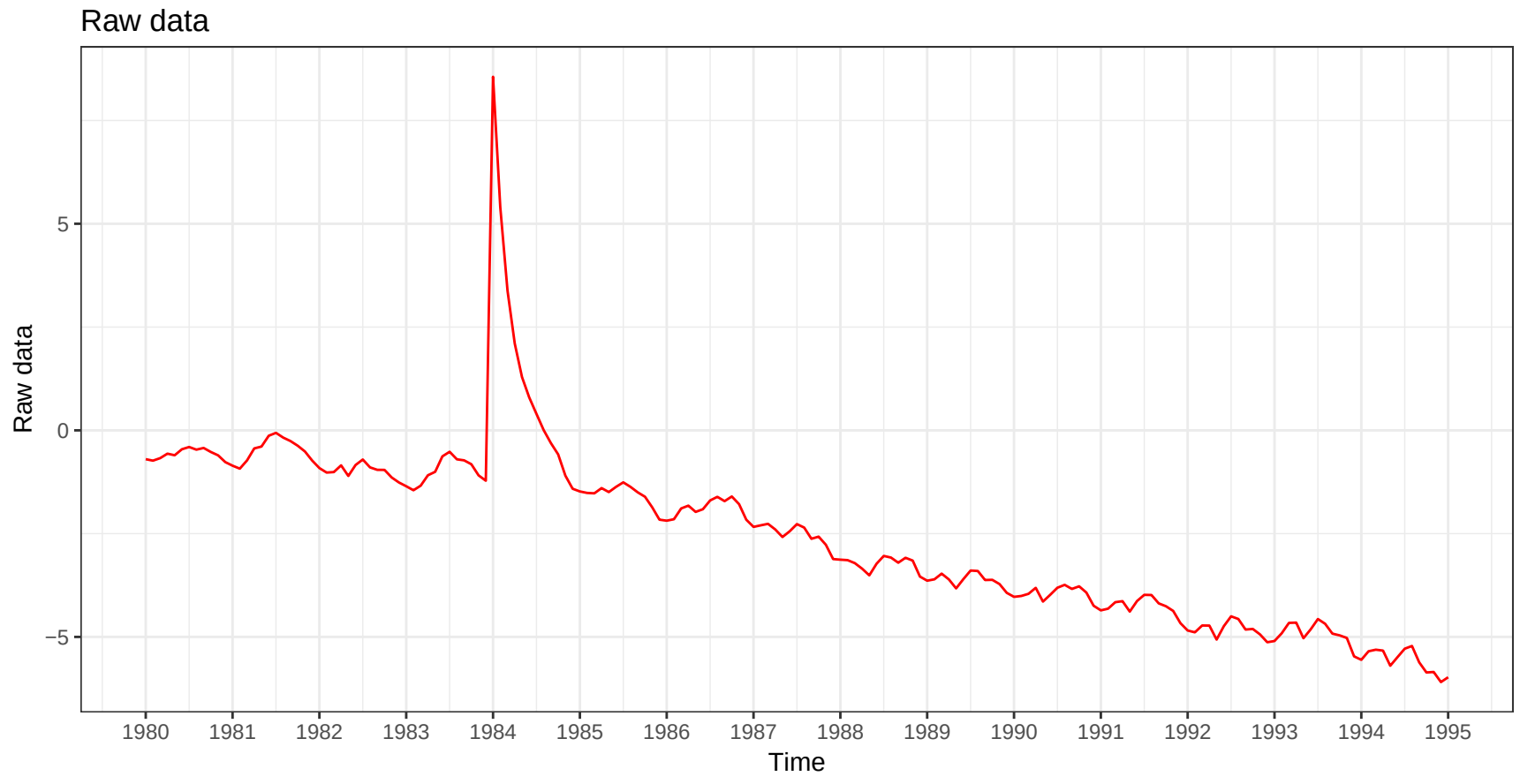
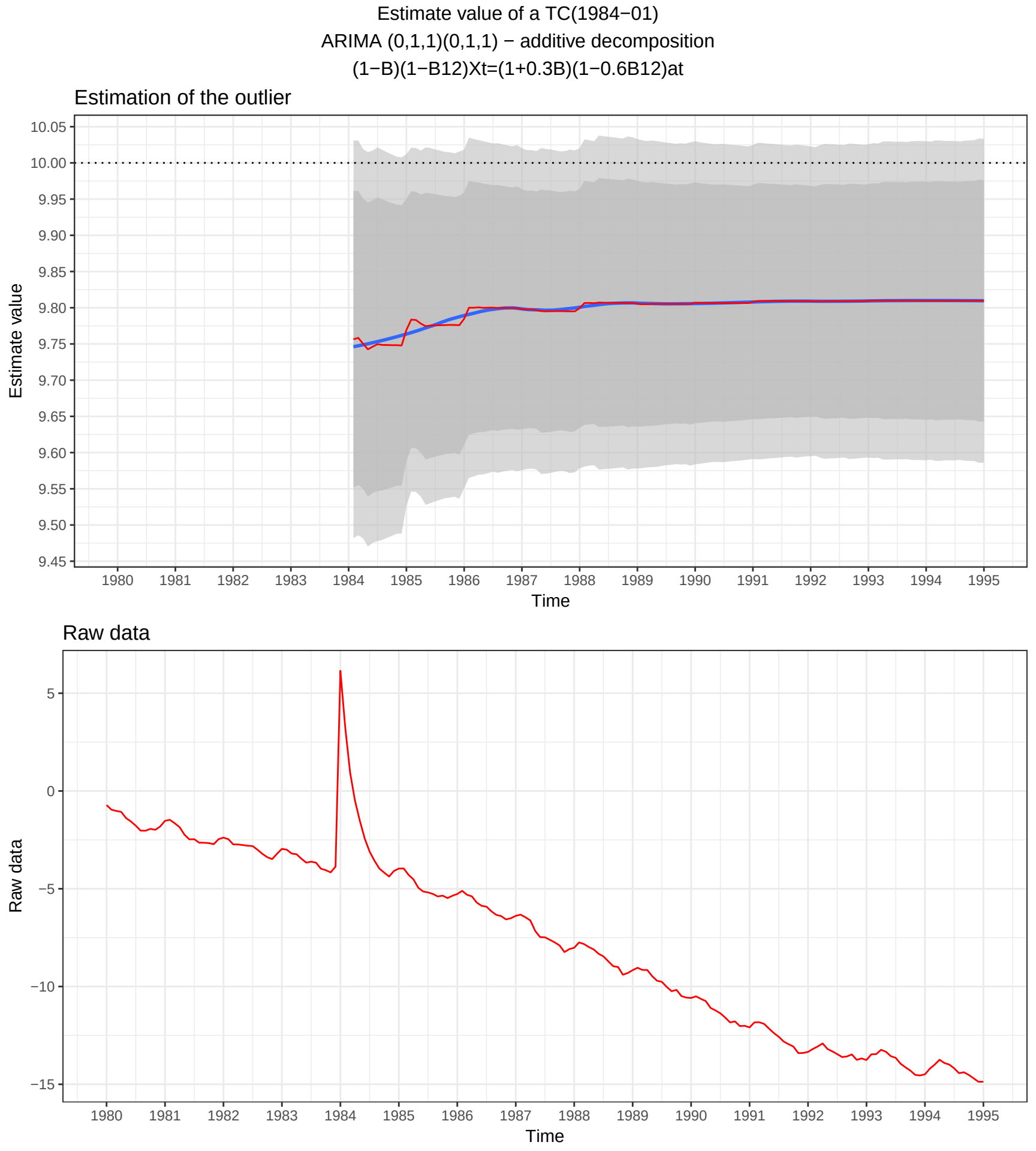
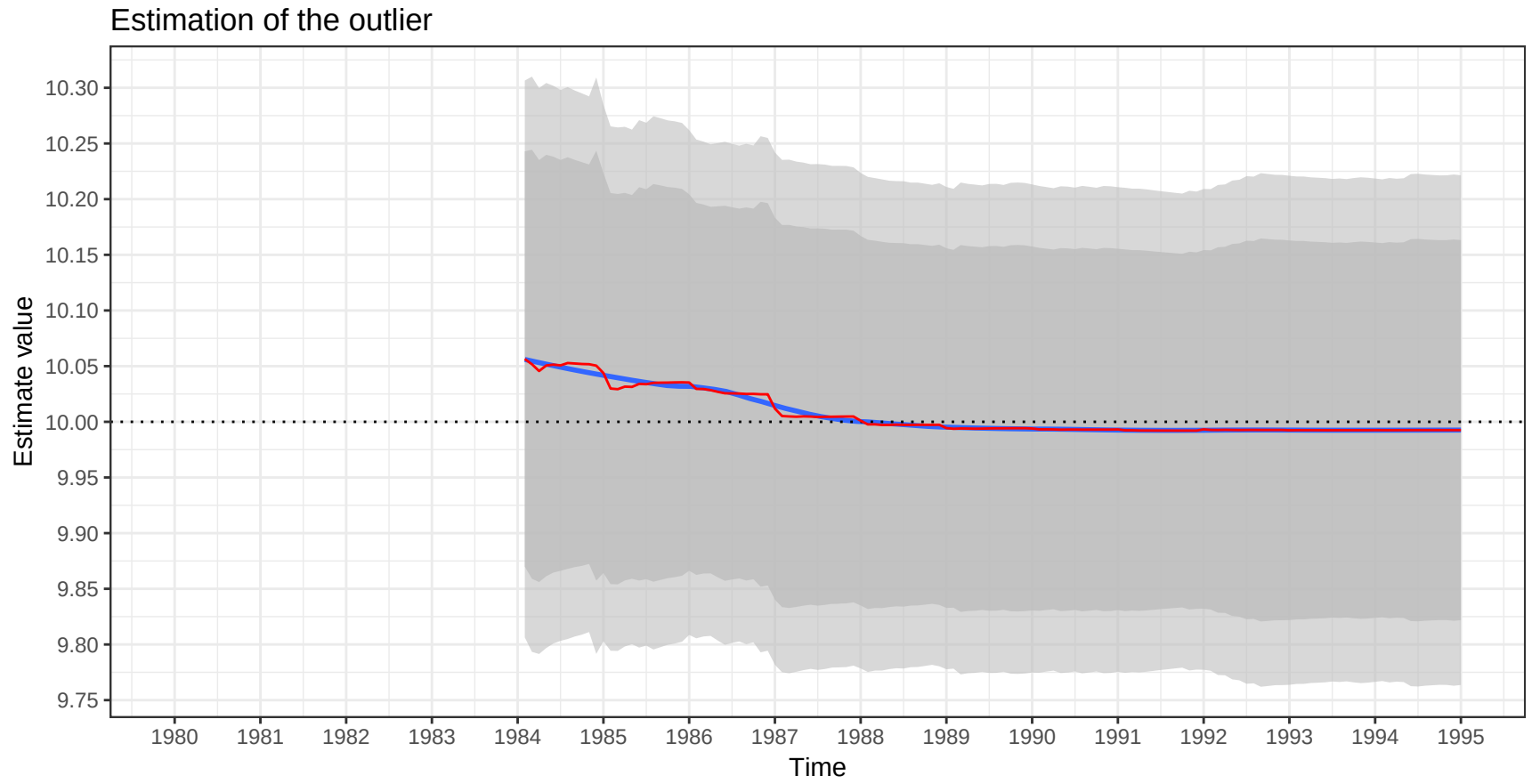
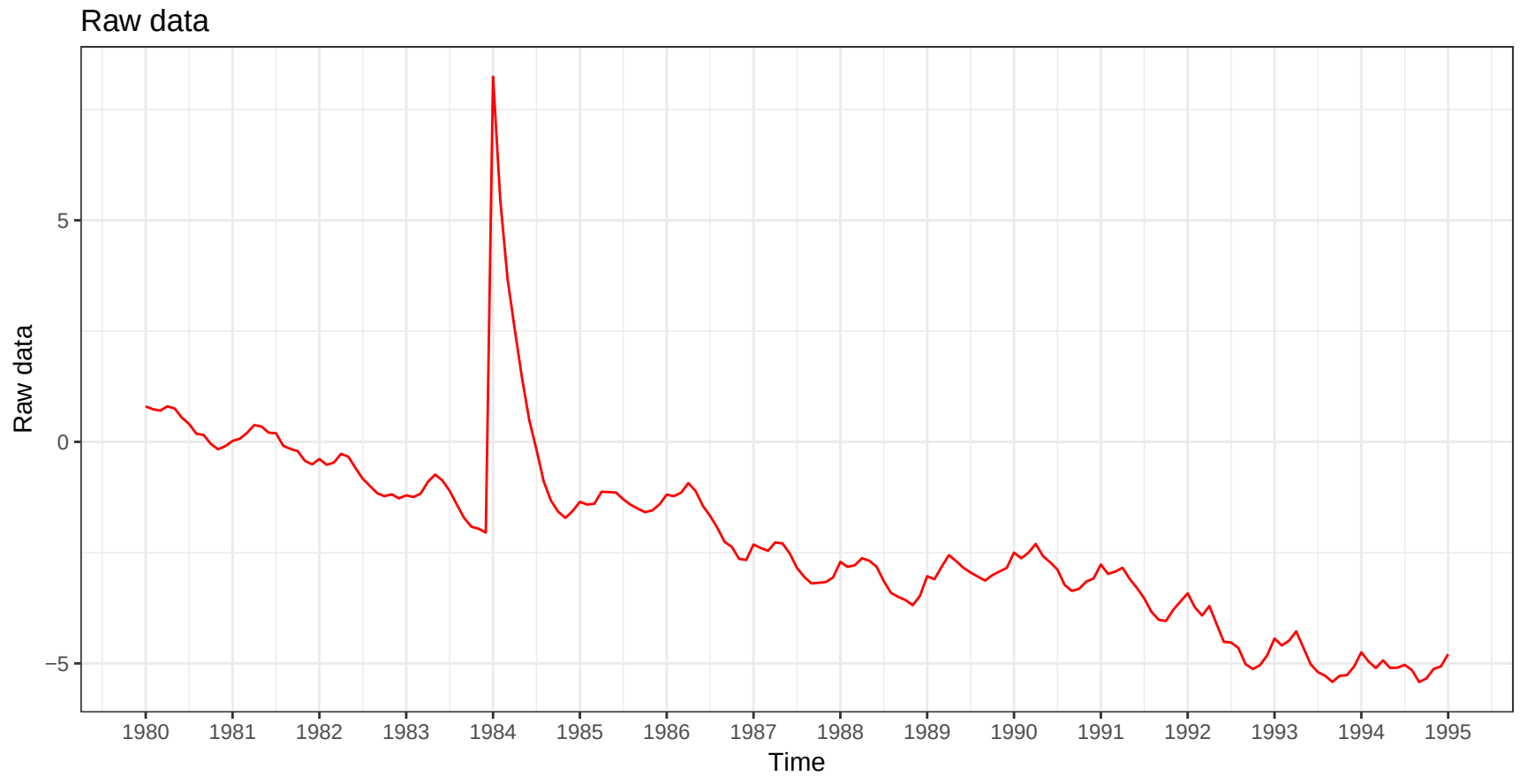





Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1+0.3B)(1−0.6B12)at
Estimation of the outlier
Estimate value
10.05
10.00
9.95
9.90
9.85
9.80
9.75
9.70
9.65
9.60
9.55
9.50
9.45
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time
Raw data
Raw data
5
0
−5
−10
−15
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time

Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1+0.3B)(1−0.6B12)at





Estimate value of a TC(1984−01)
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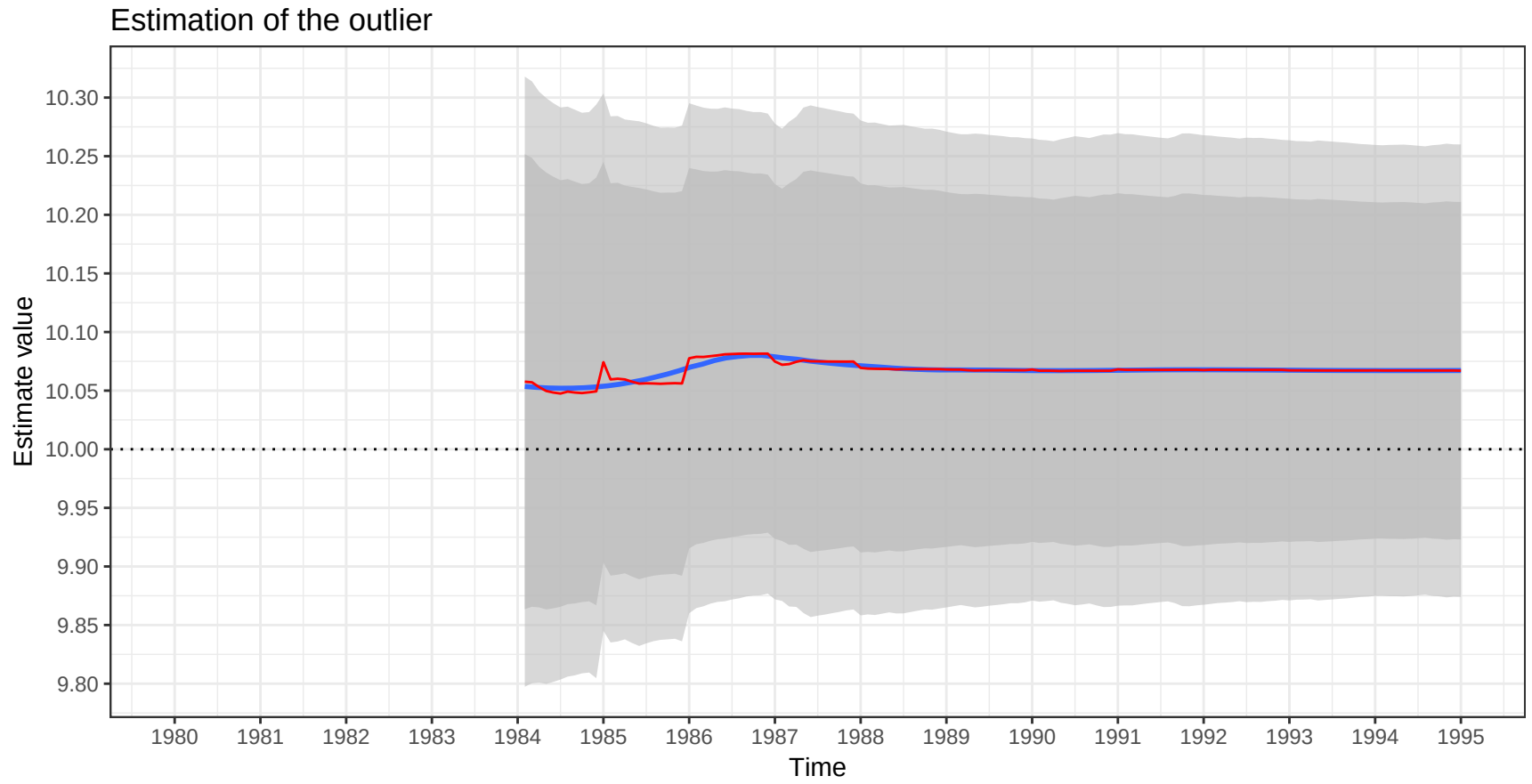
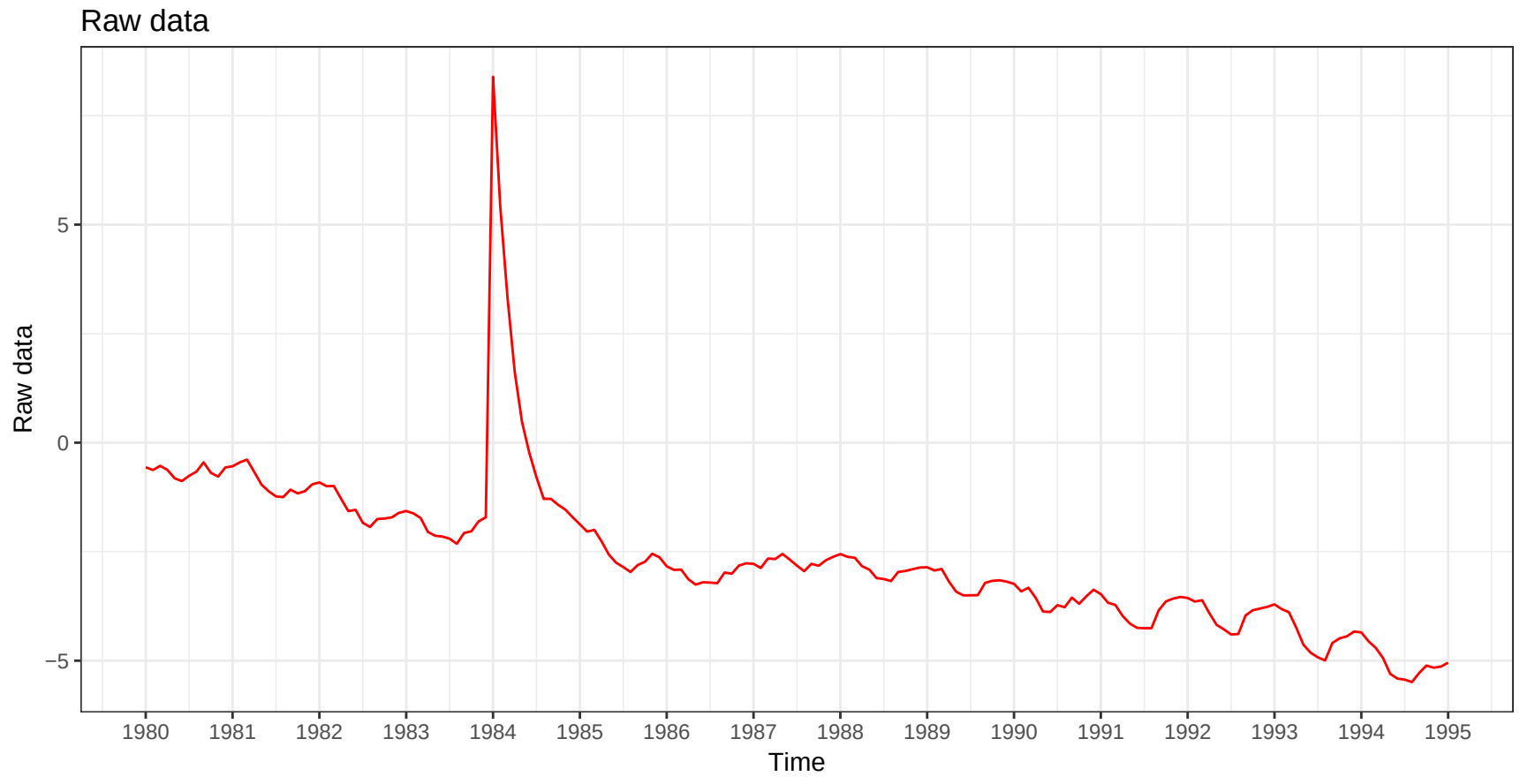
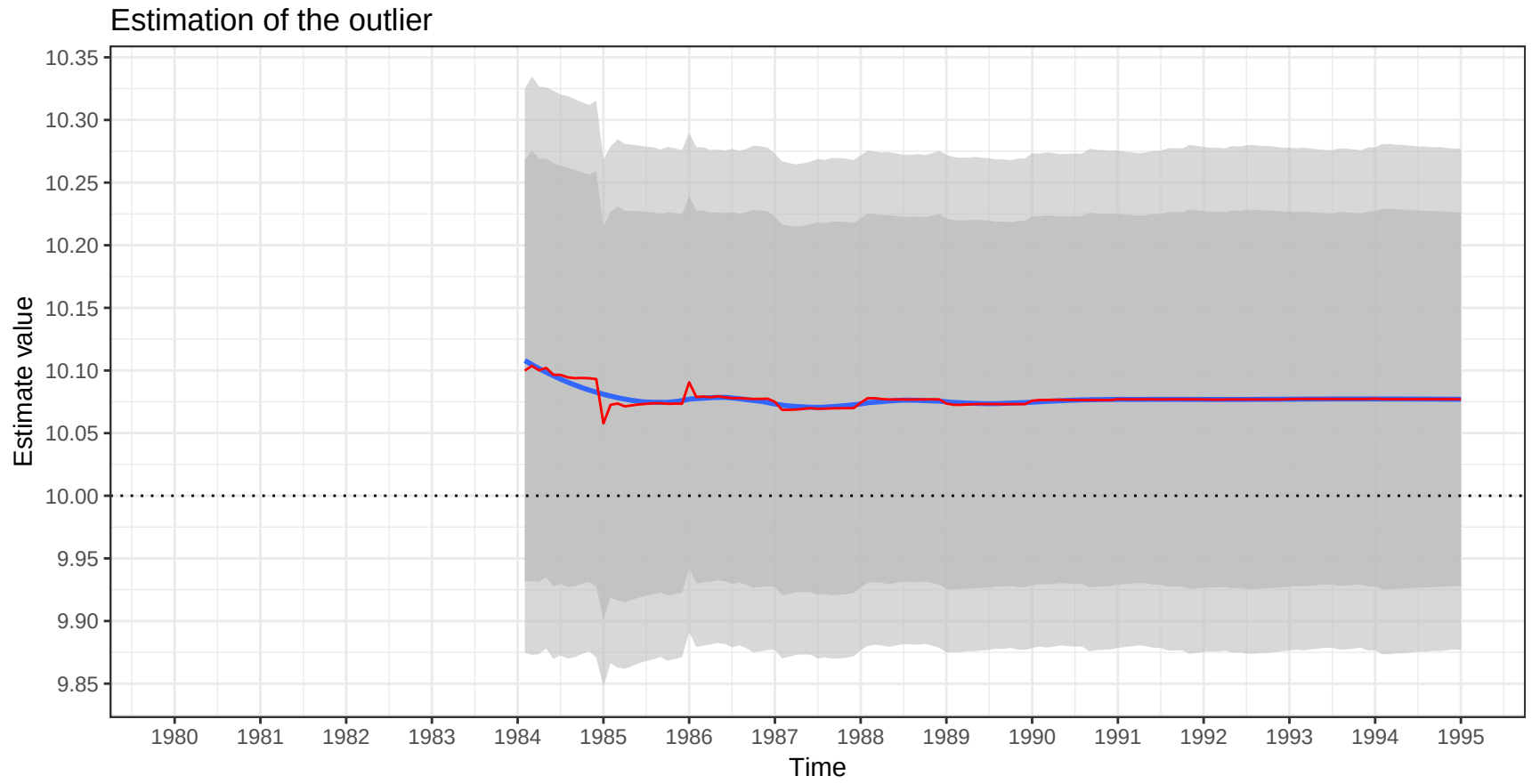
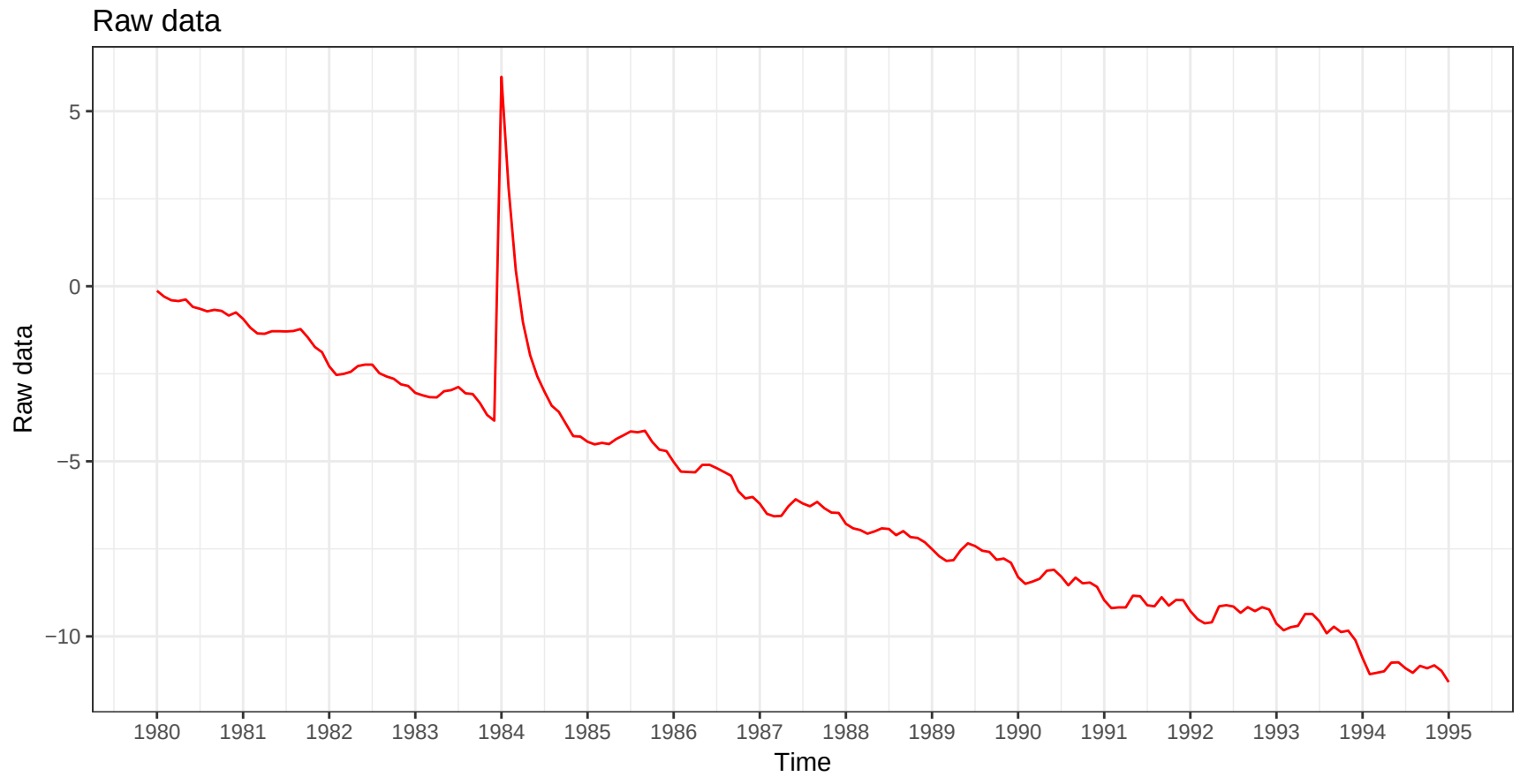
(1−B)(1−B12)Xt=(1+0.3B)(1−0.6B12)at





Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1+0.3B)(1−0.6B12)at





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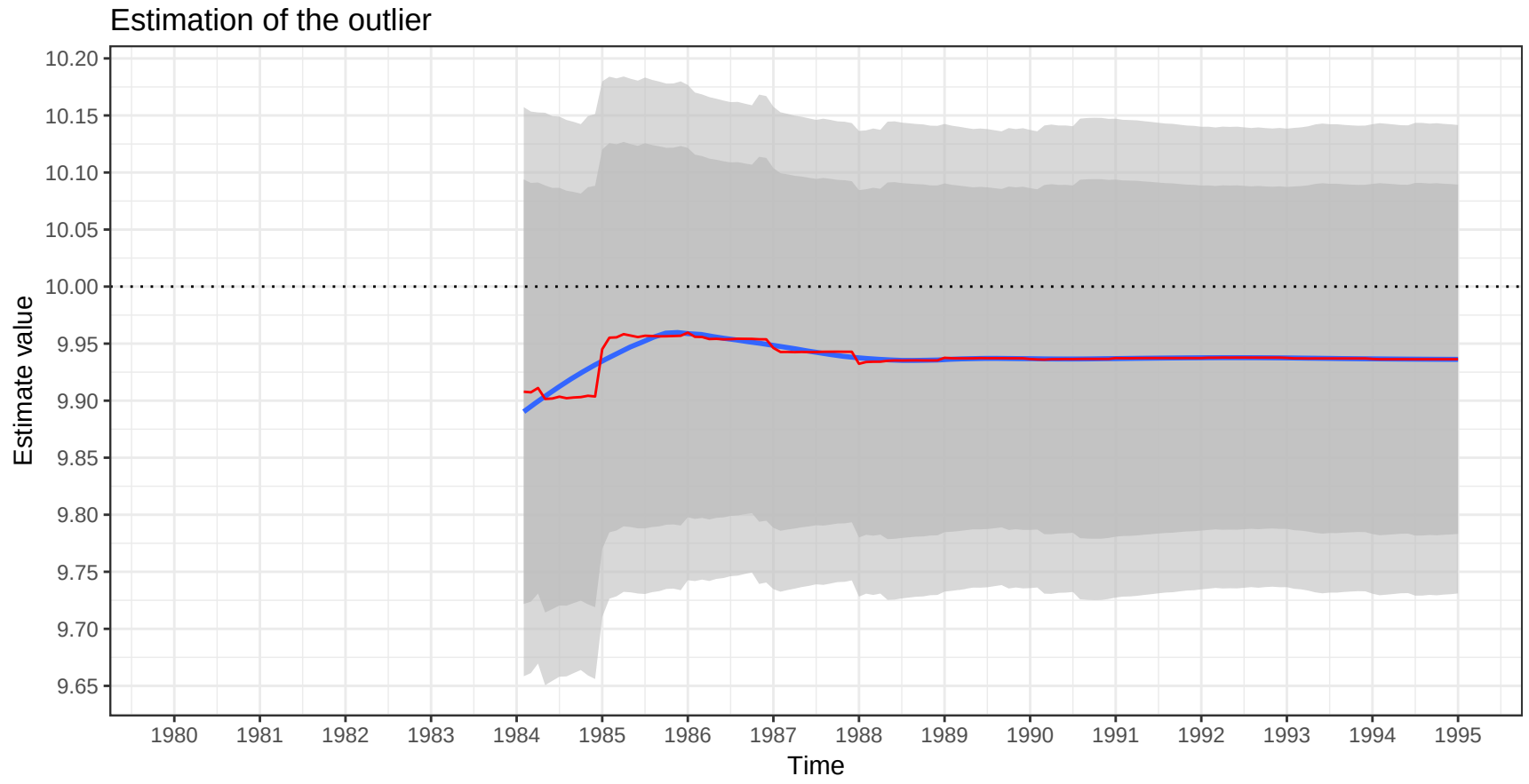

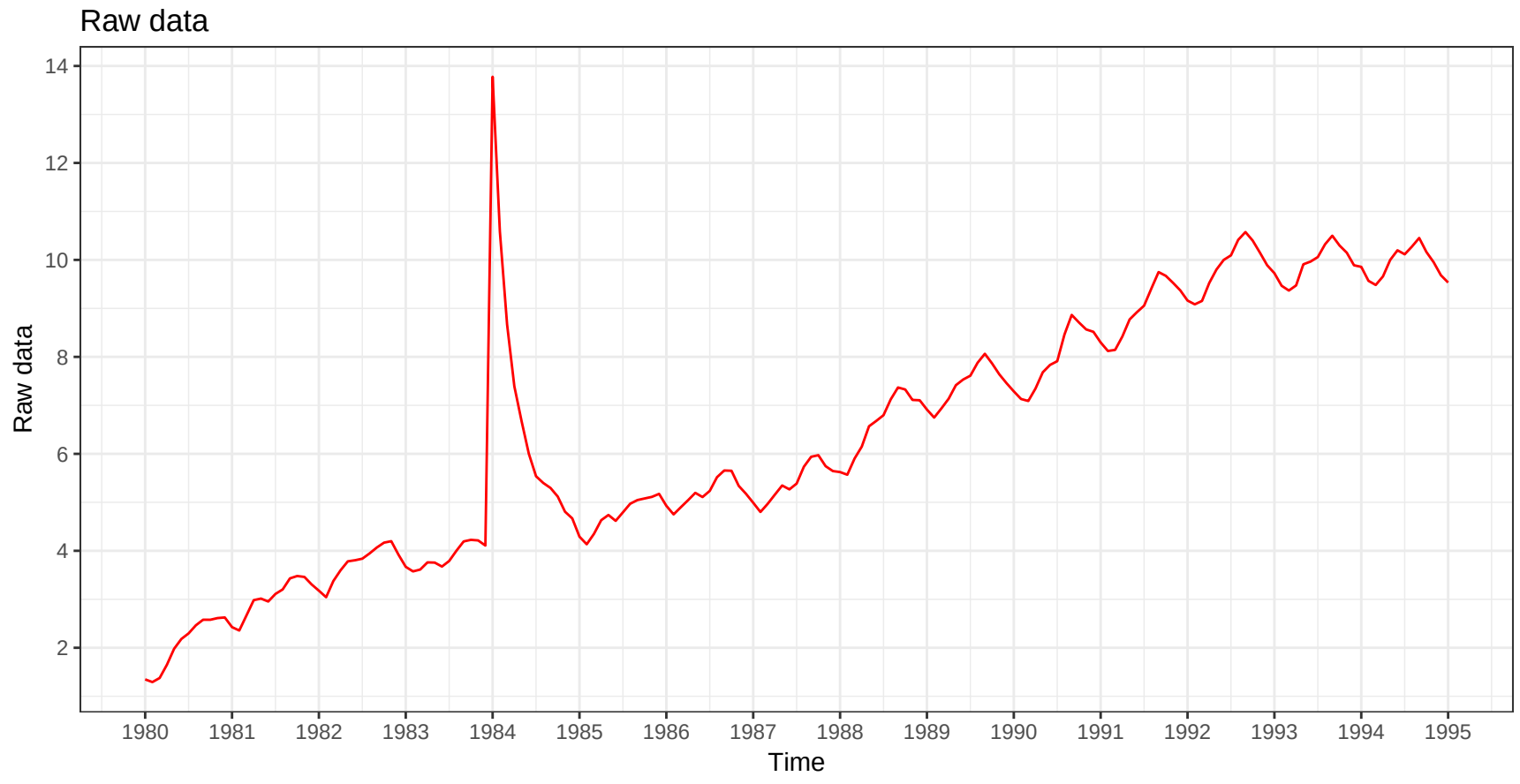

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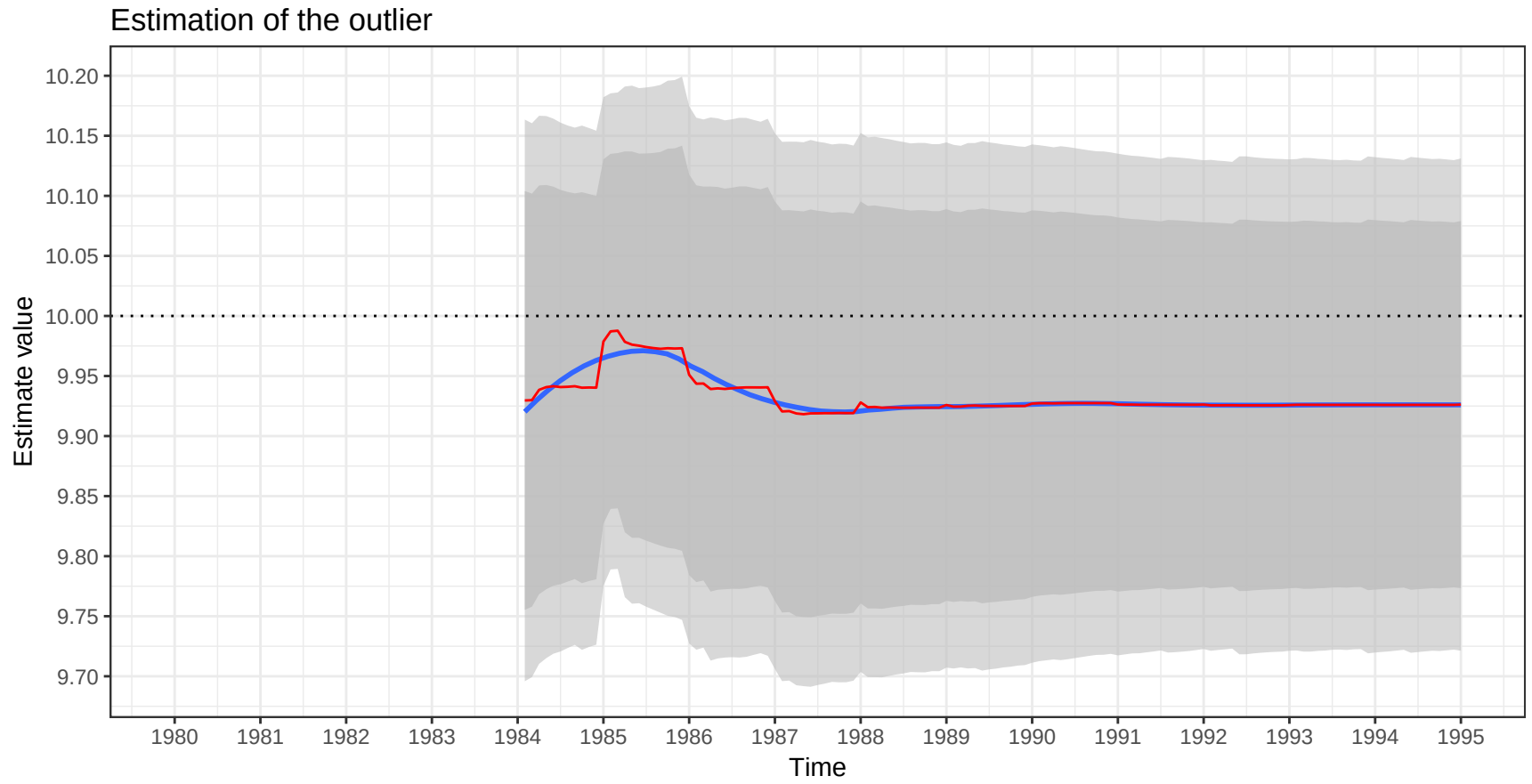
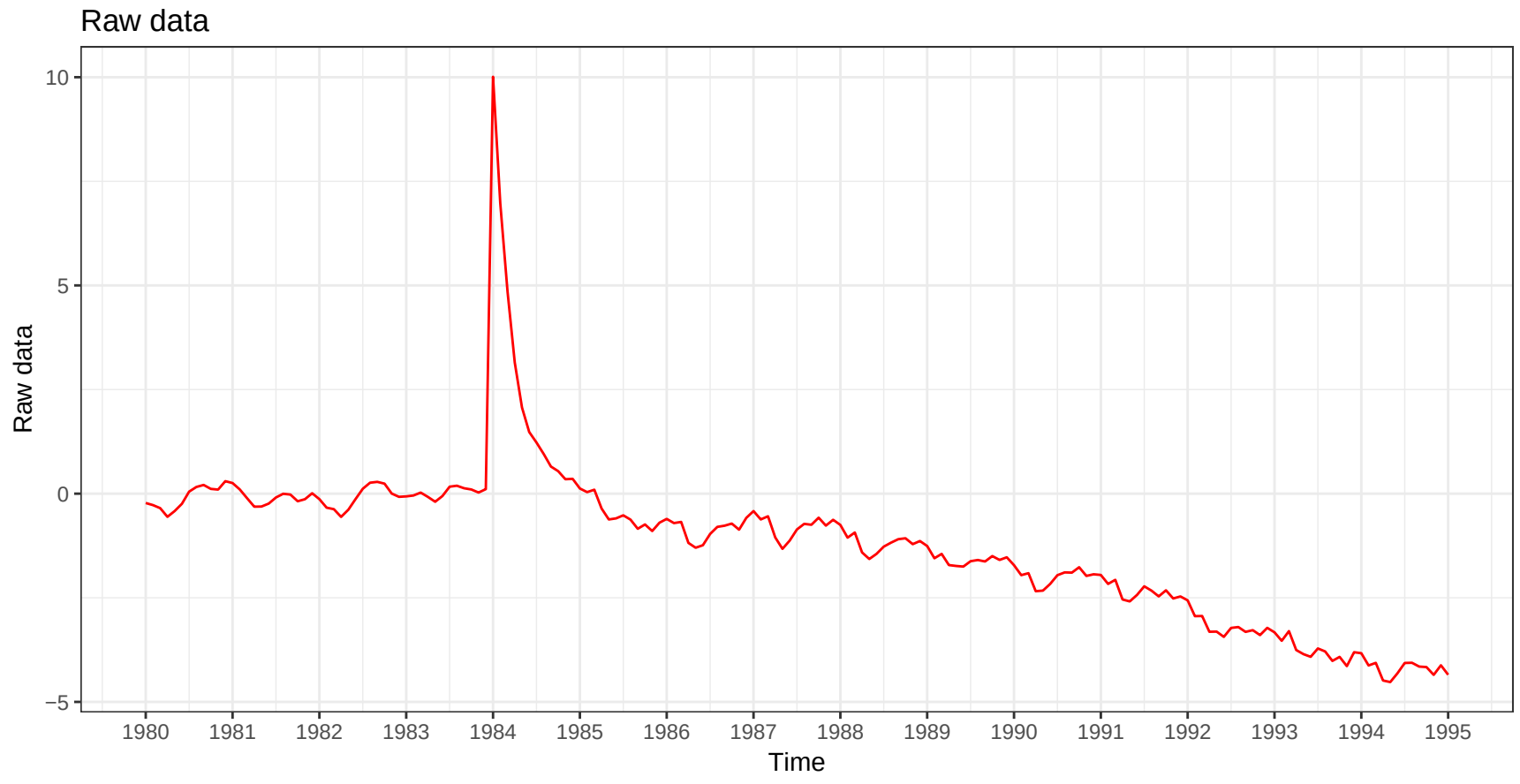
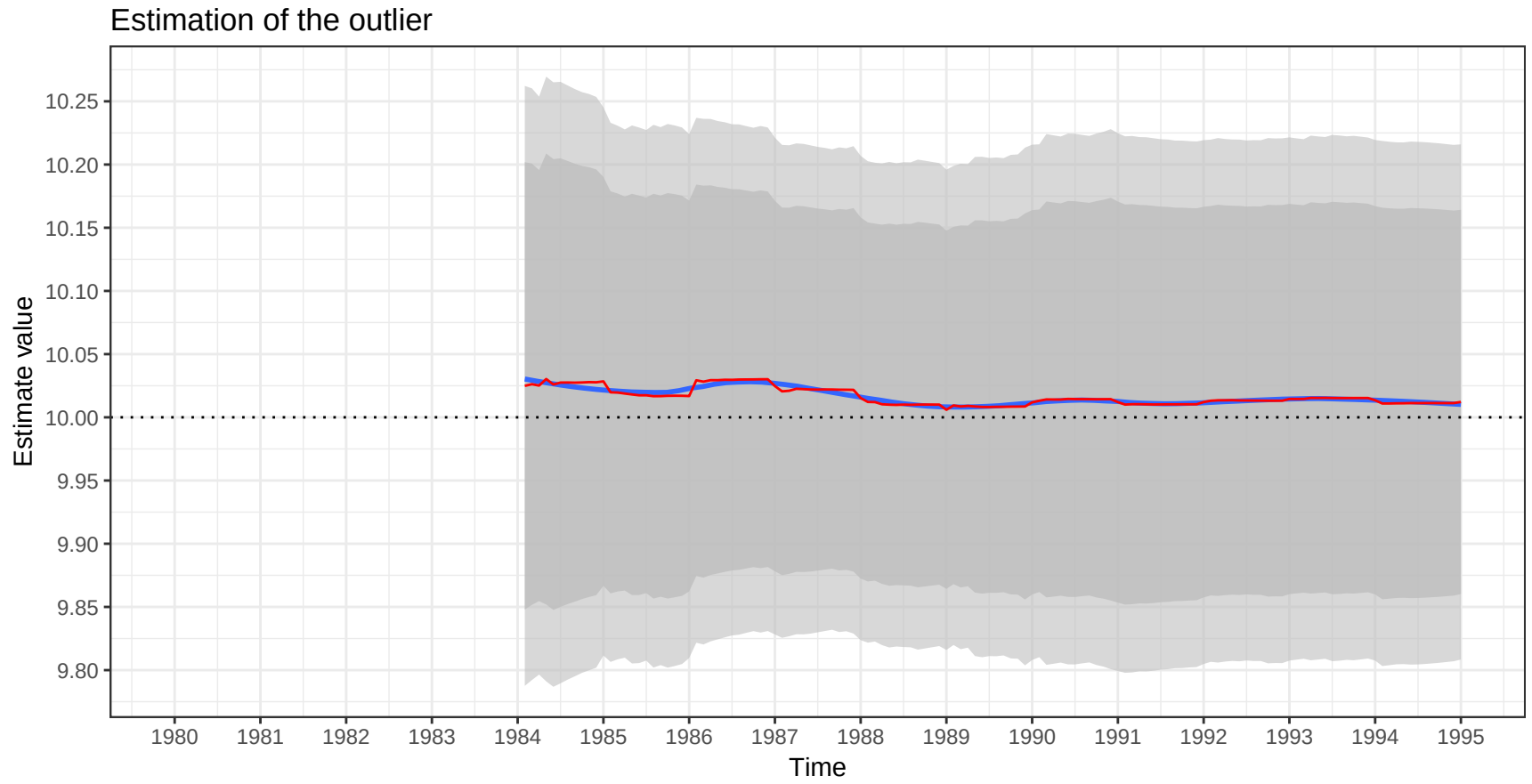
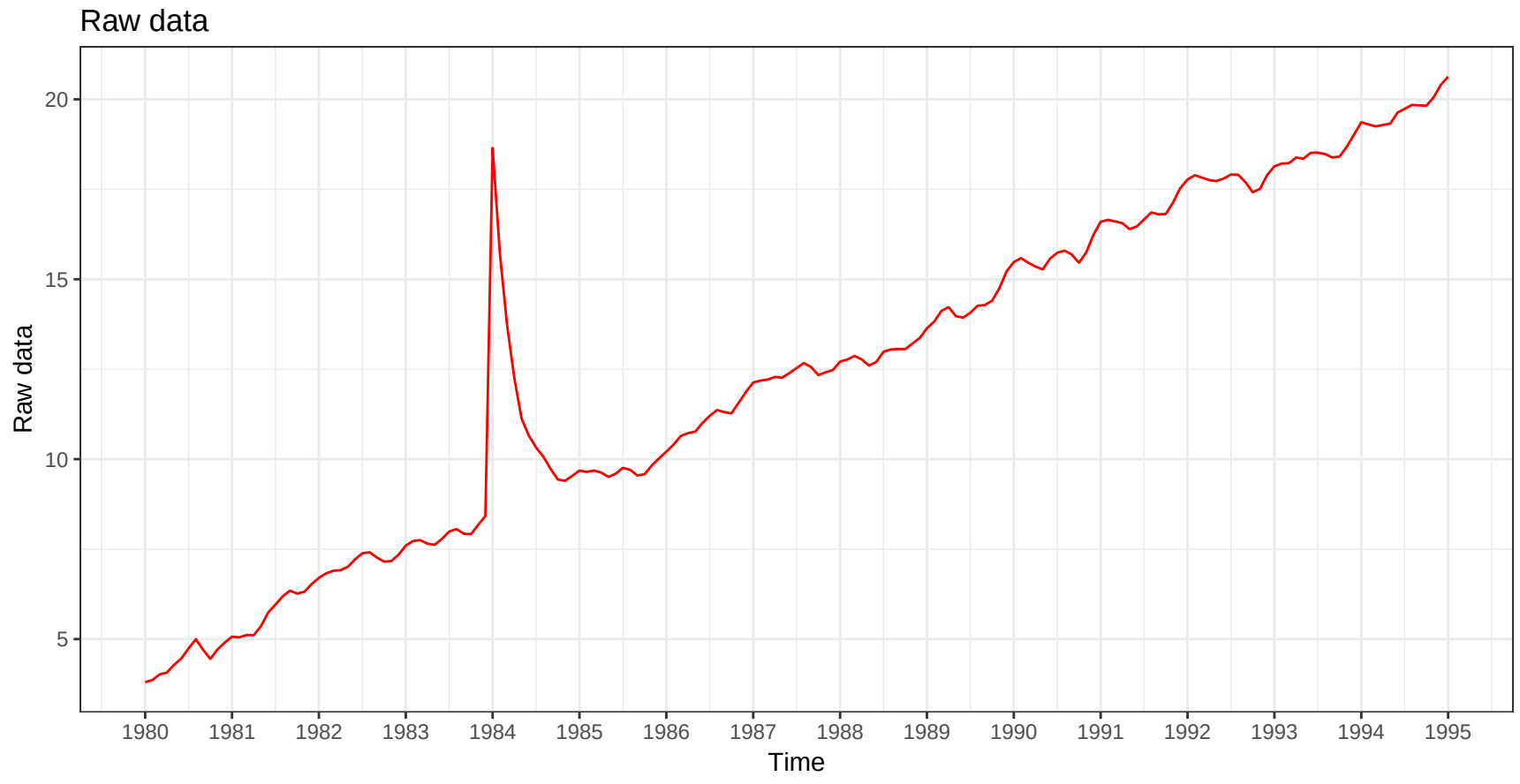




Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1+0.4B)(1−0.8B12)at





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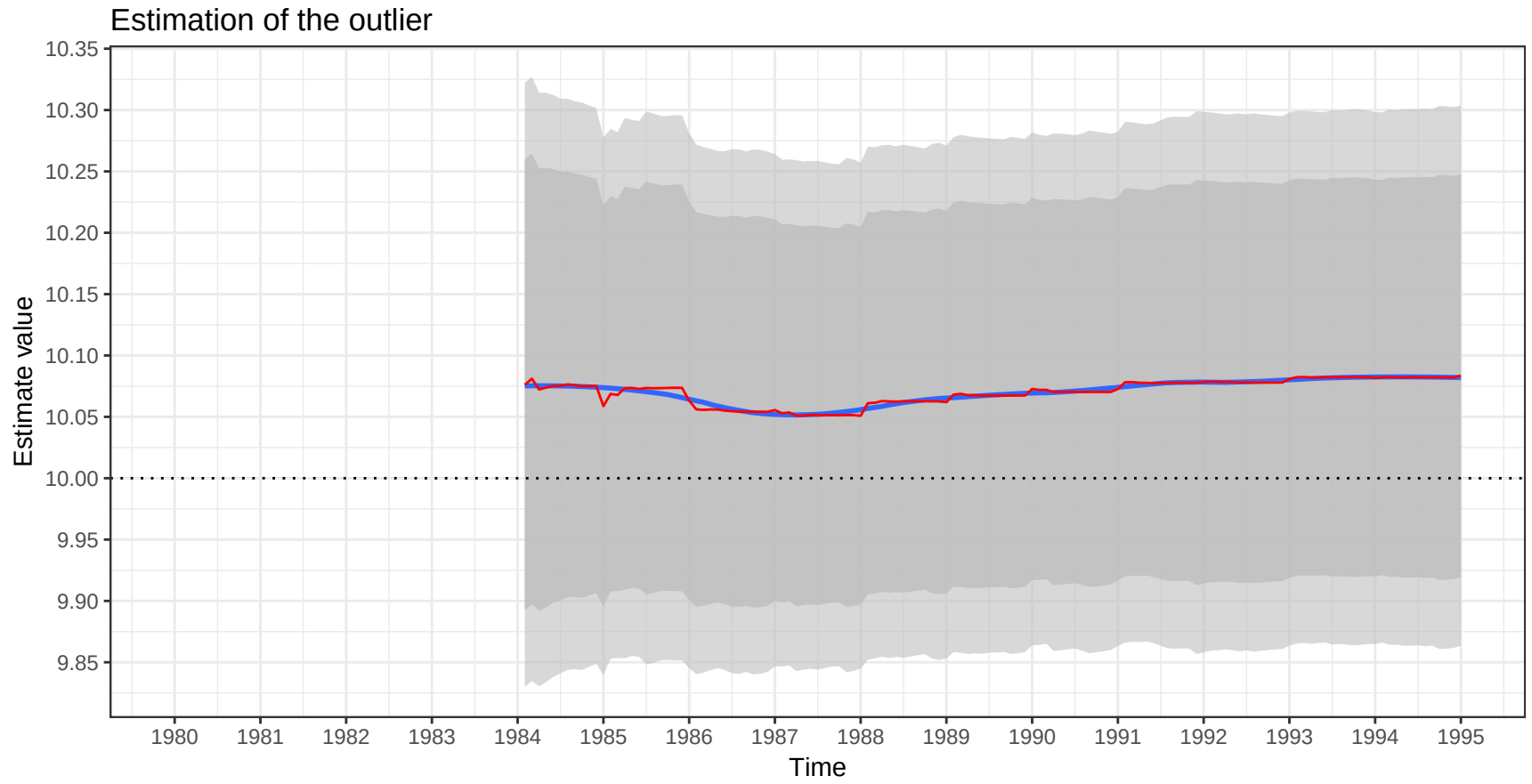
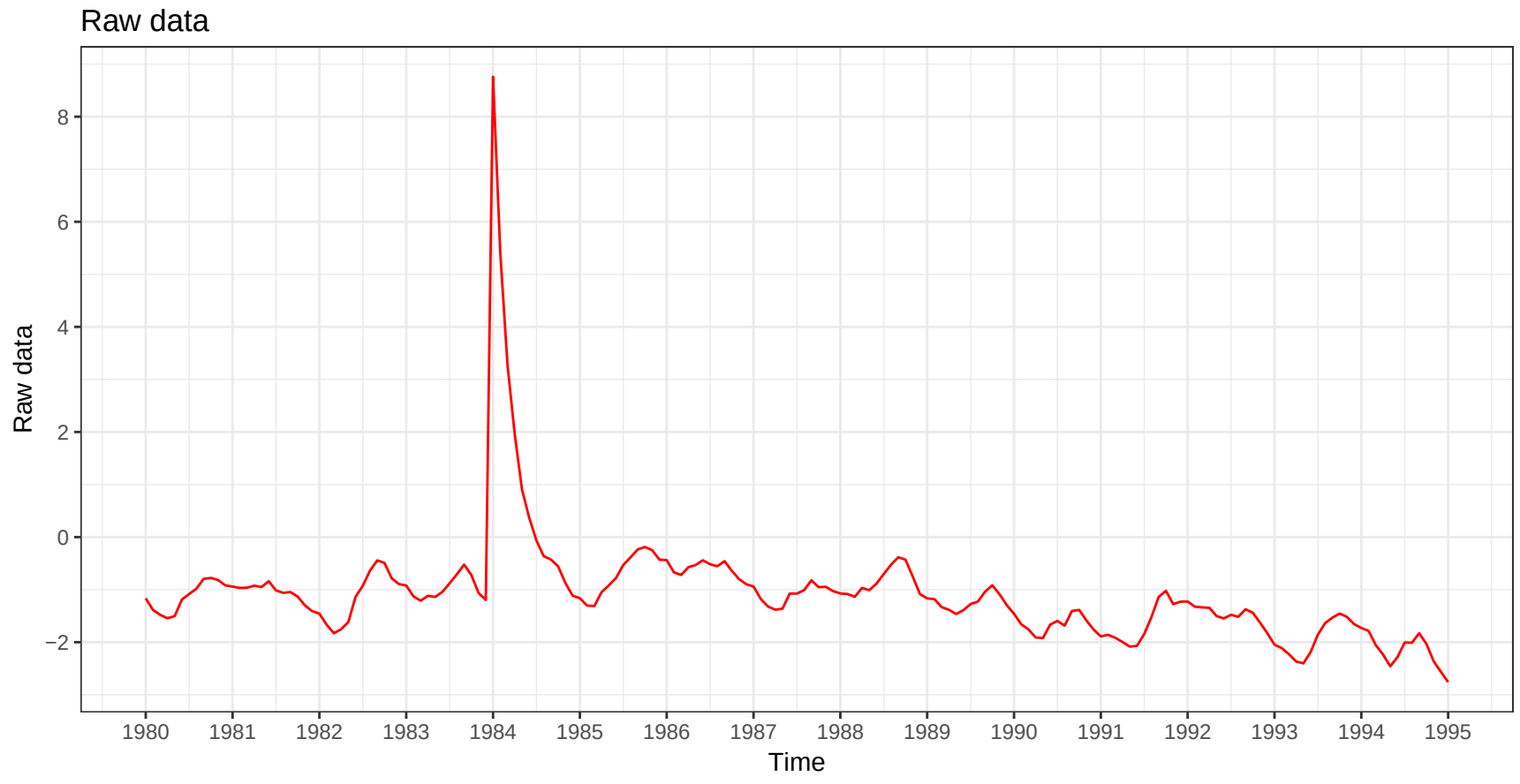
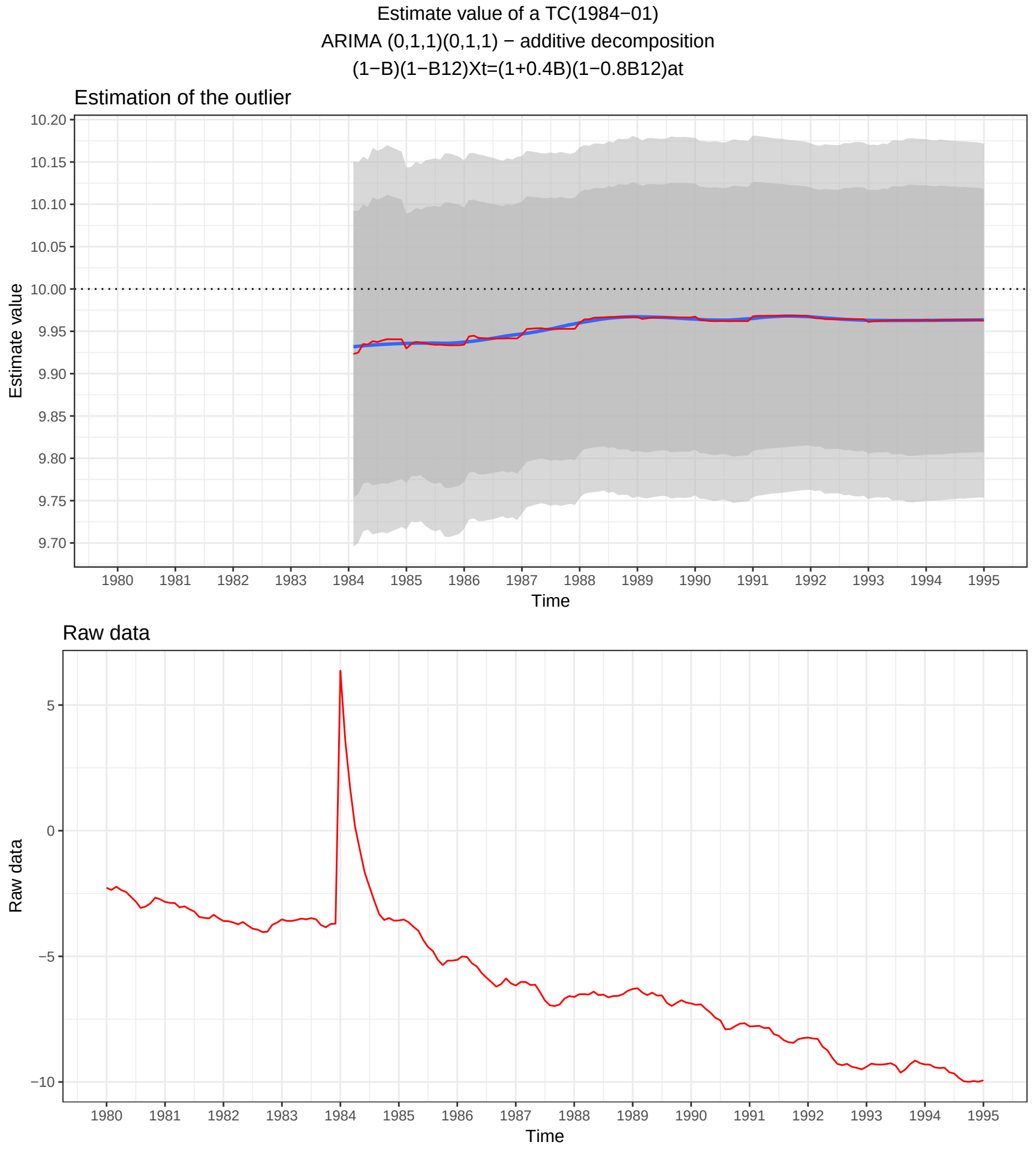
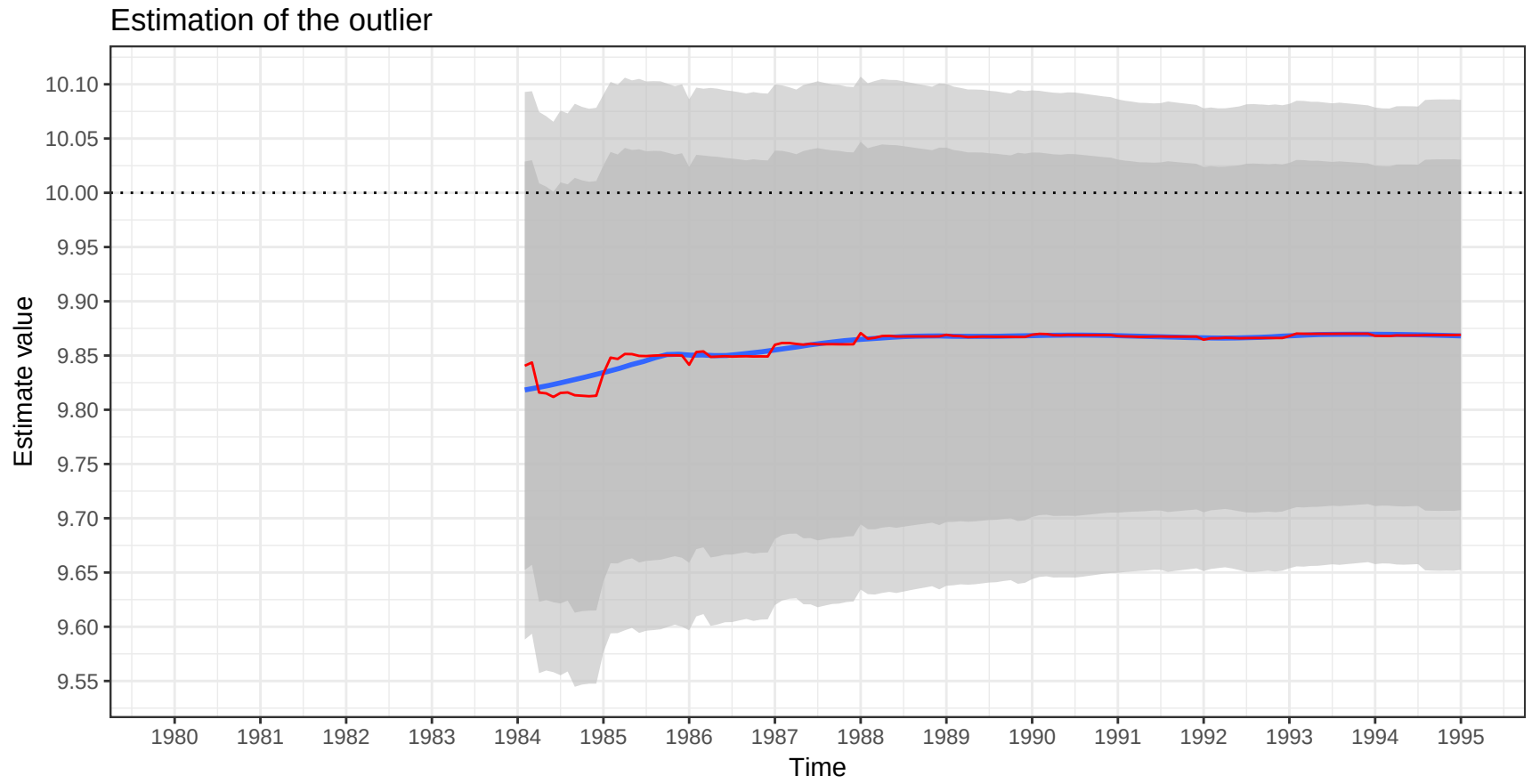
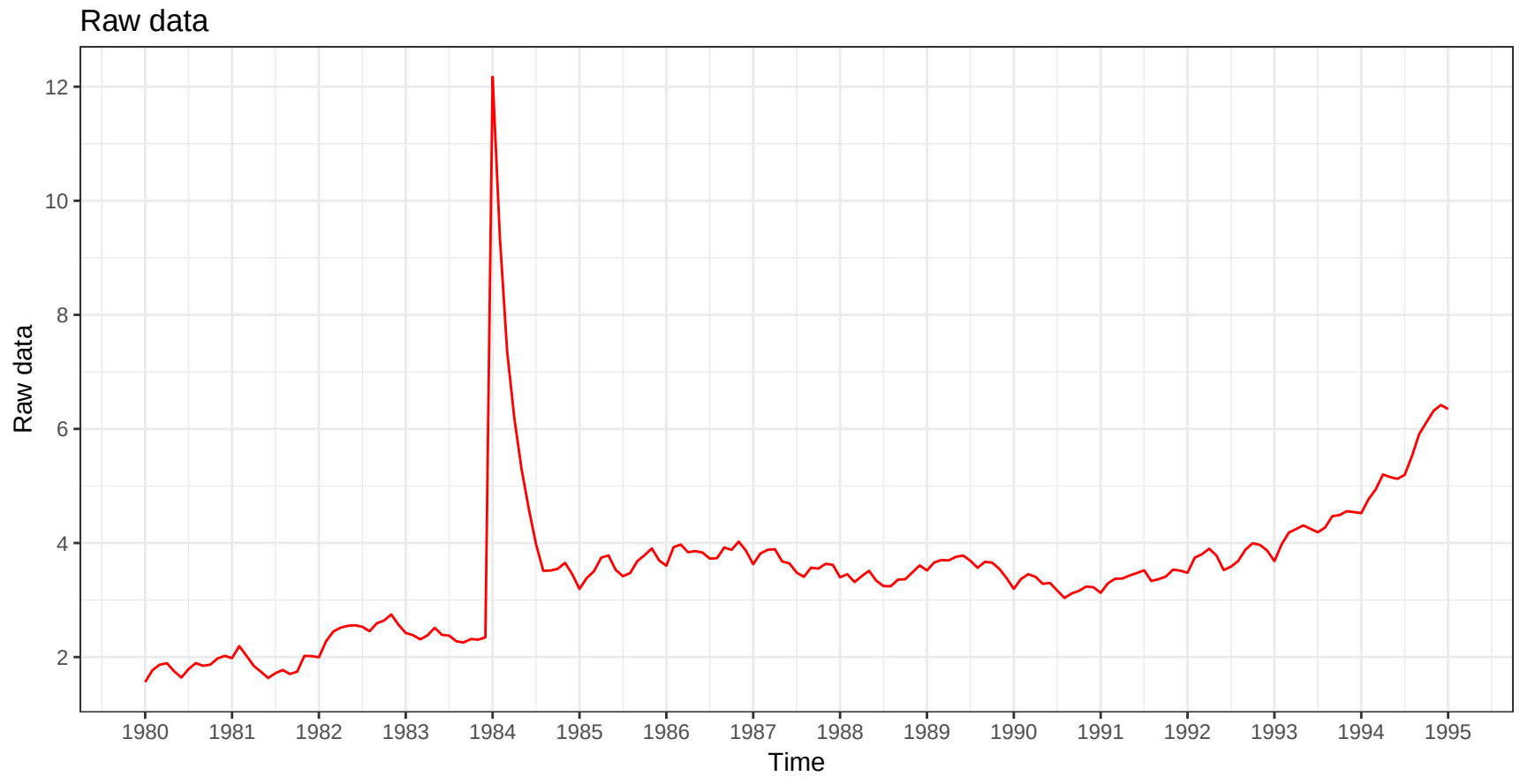





Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1+0.4B)(1−0.8B12)at
Estimation of the outlier
Estimate value
10.20
10.15
10.10
10.05
10.00
9.95
9.90
9.85
9.80
9.75
9.70
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time
Raw data
Raw data
5
0
−5
−10
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time

Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1+0.4B)(1−0.8B12)at





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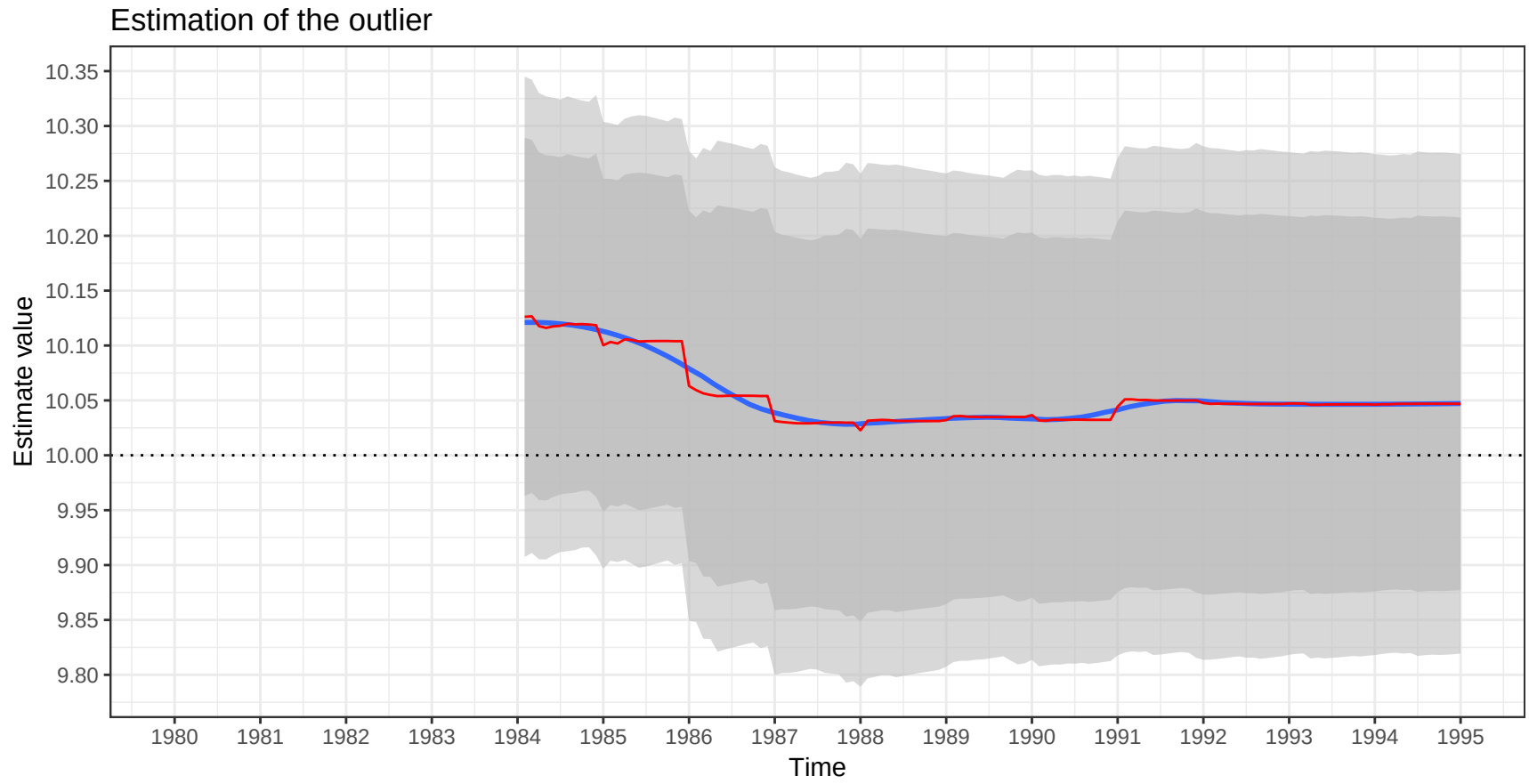

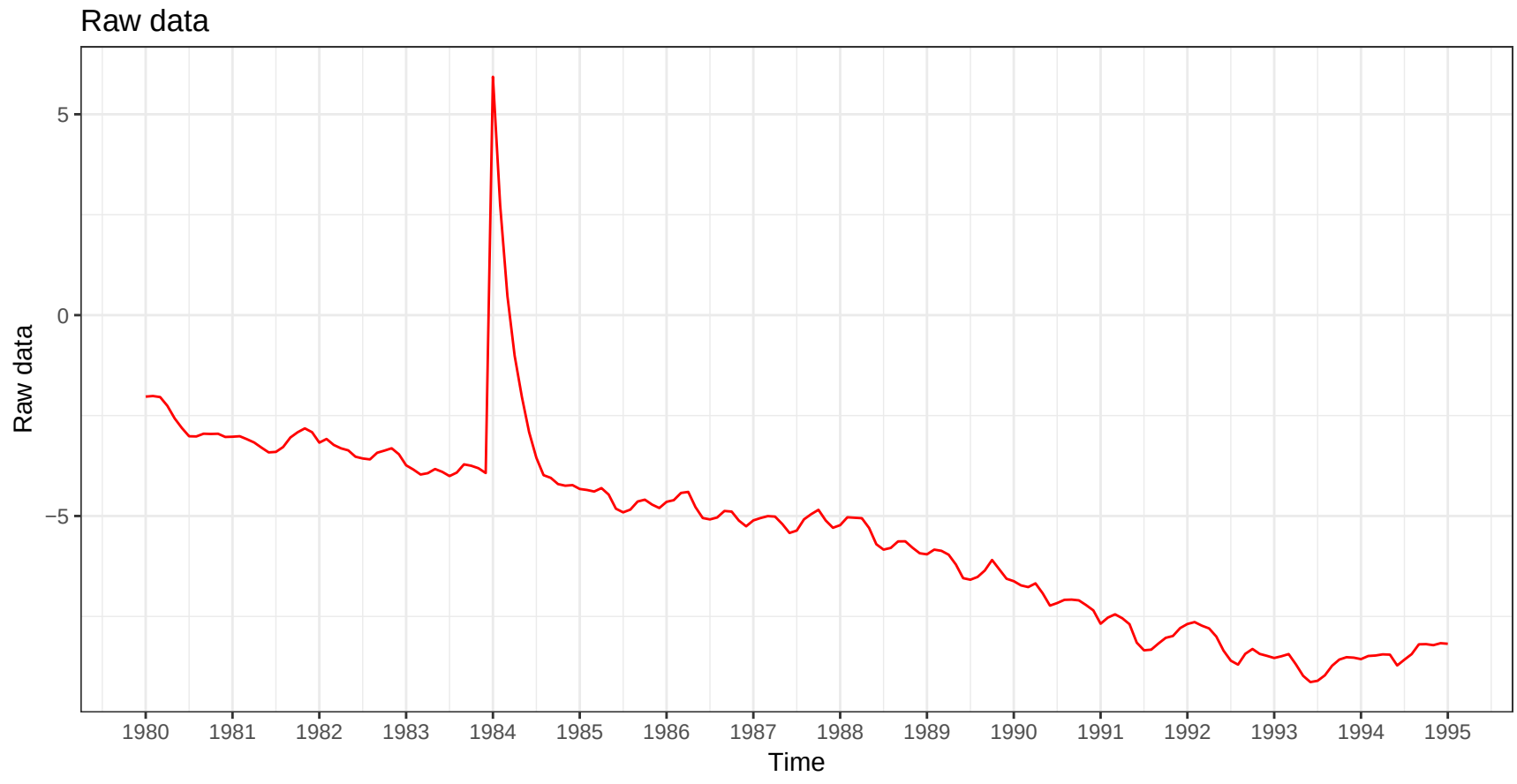

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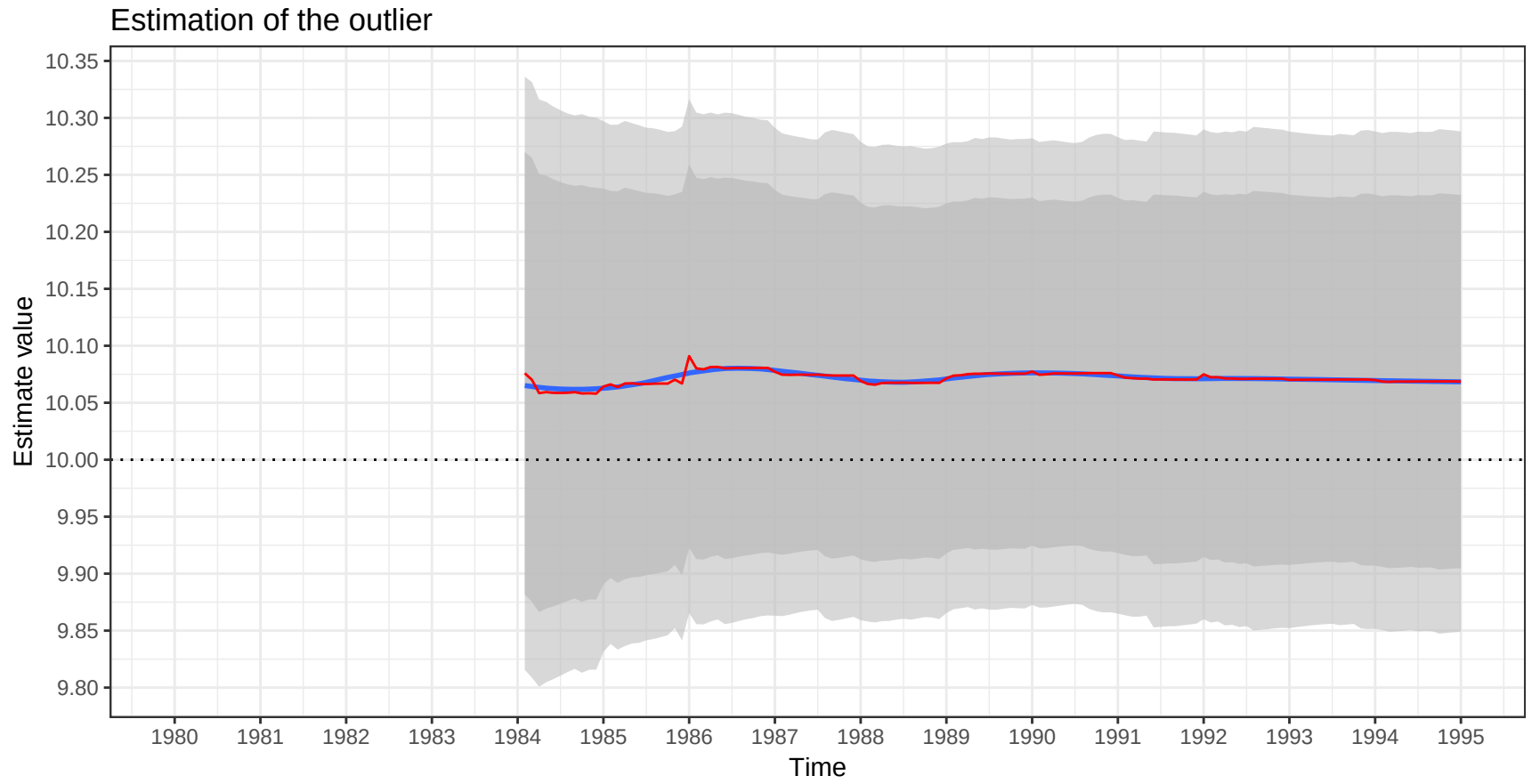

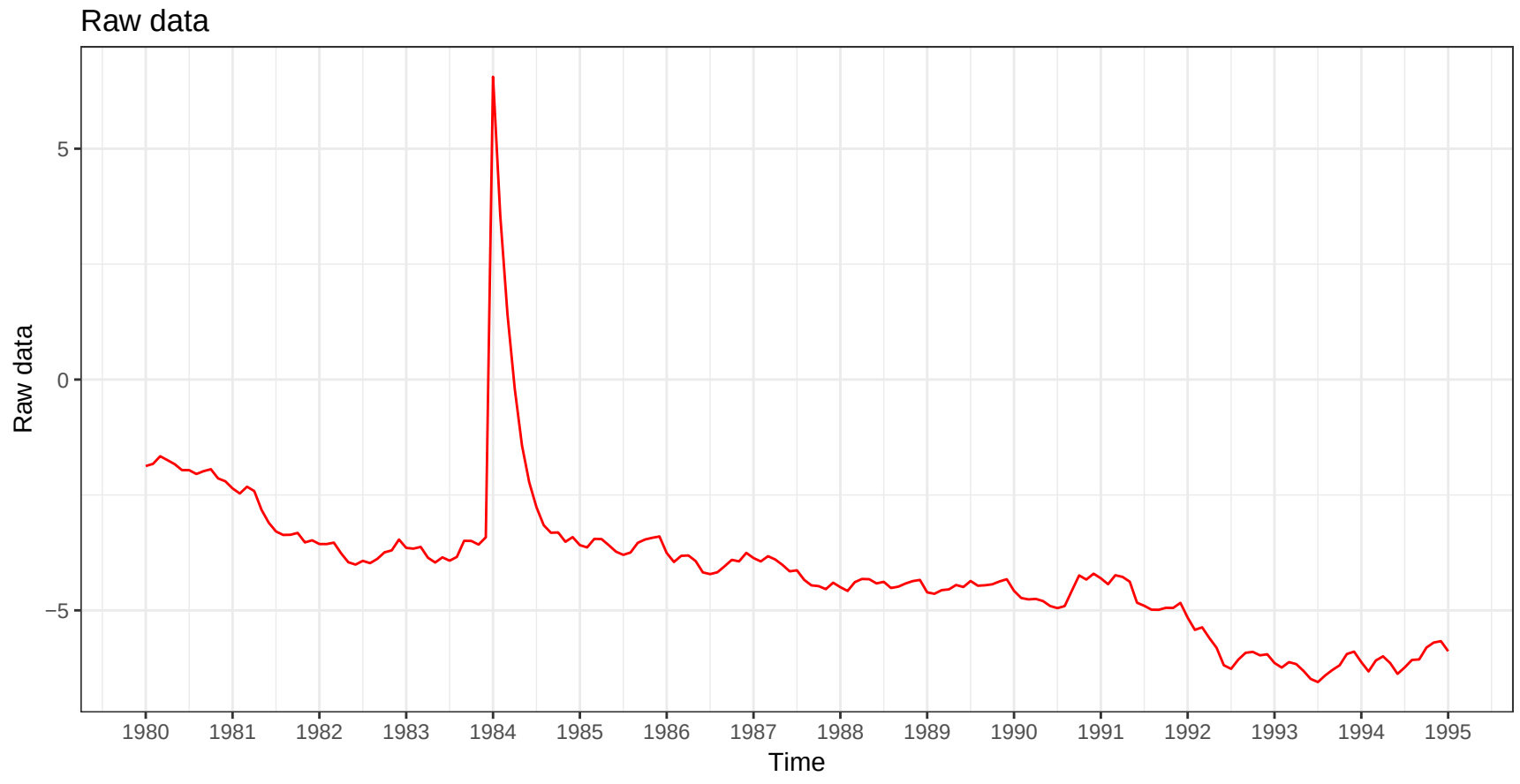

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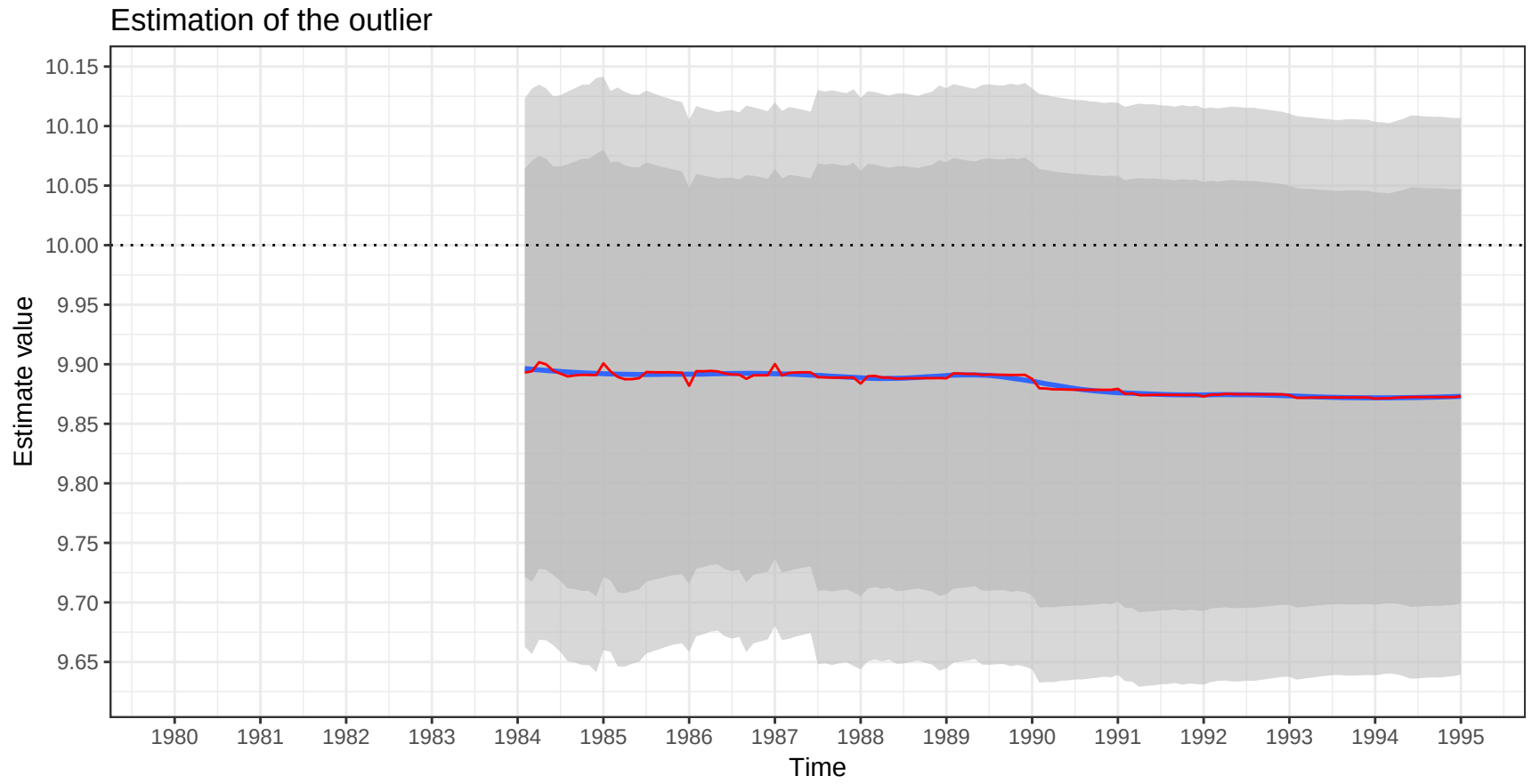

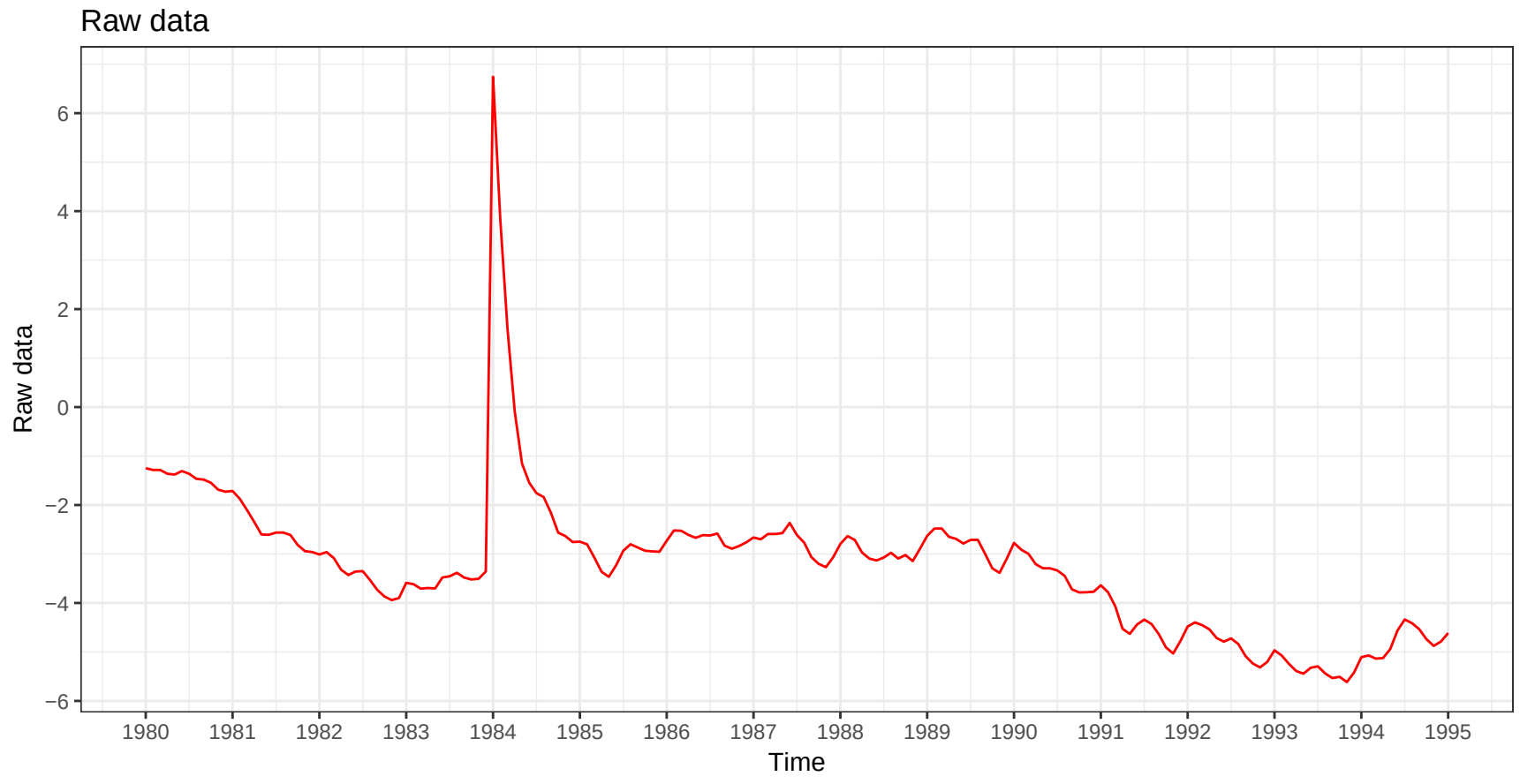

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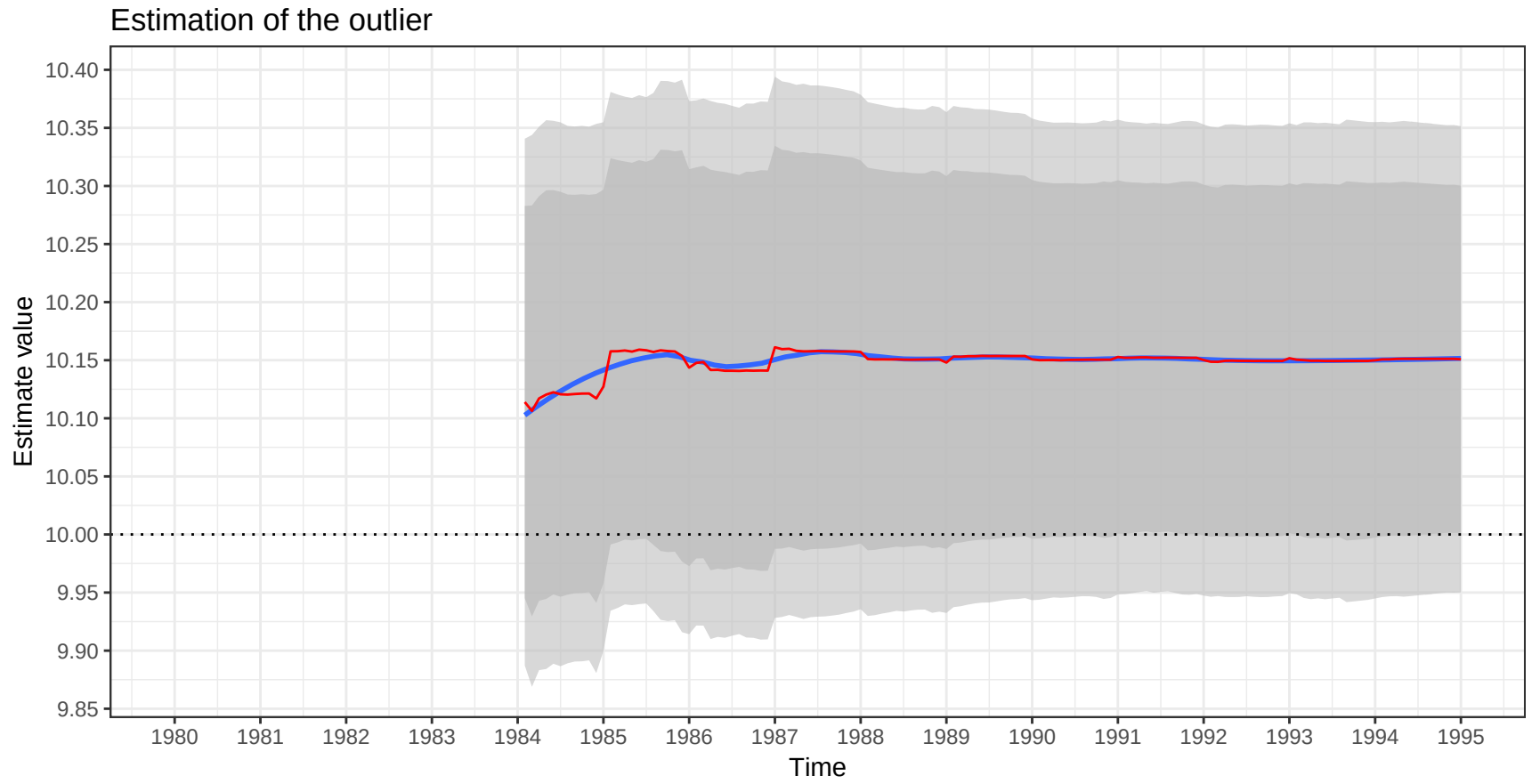

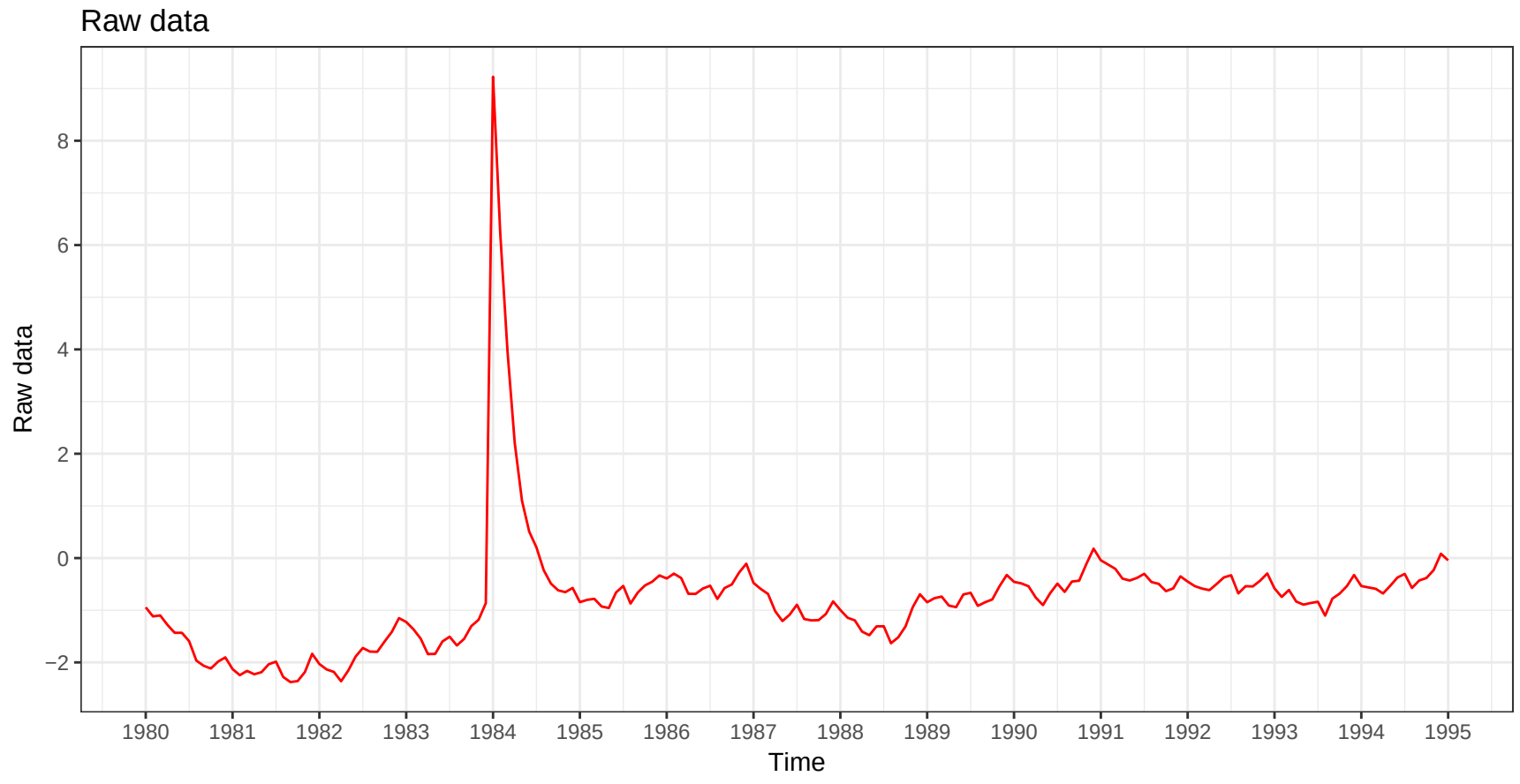

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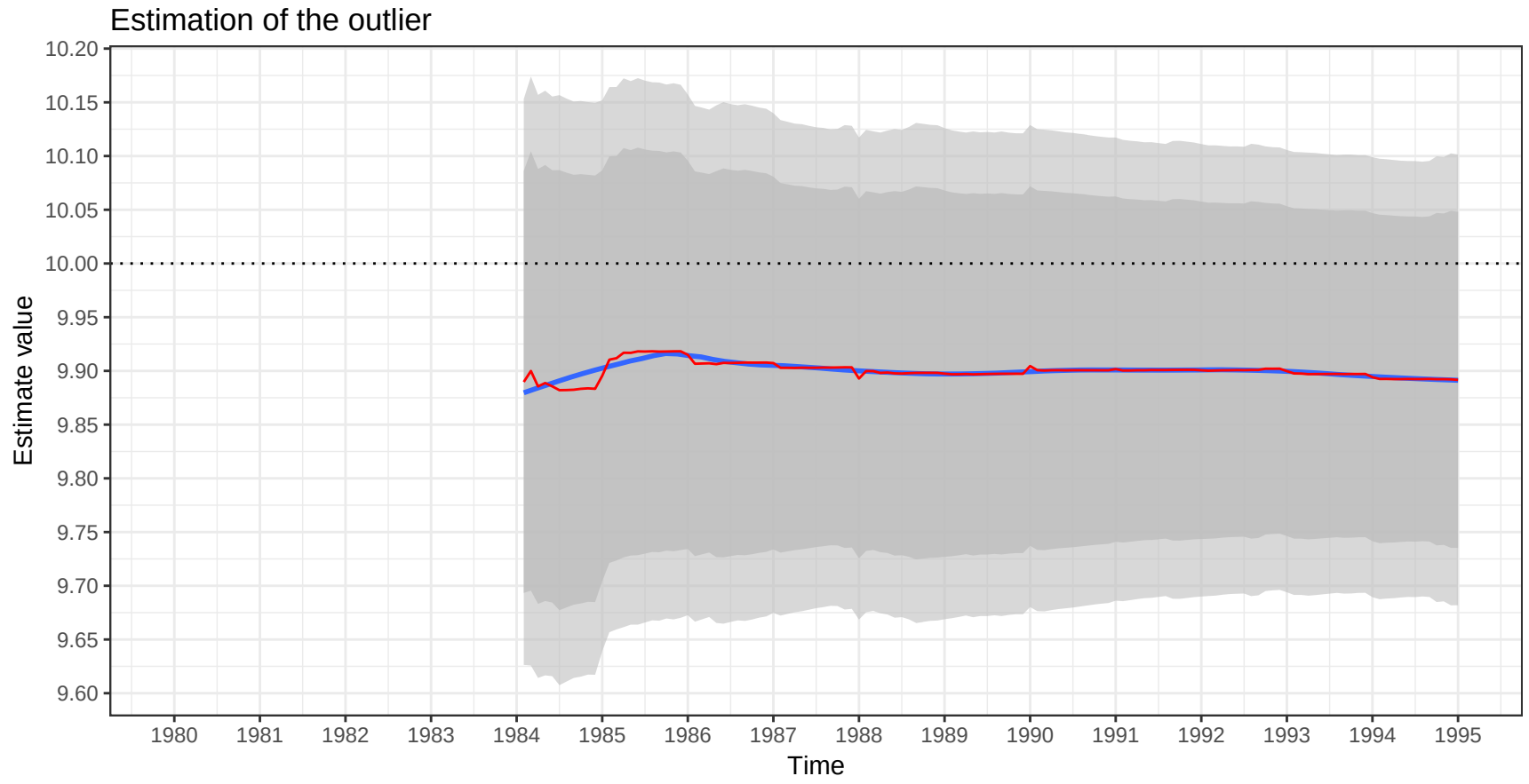

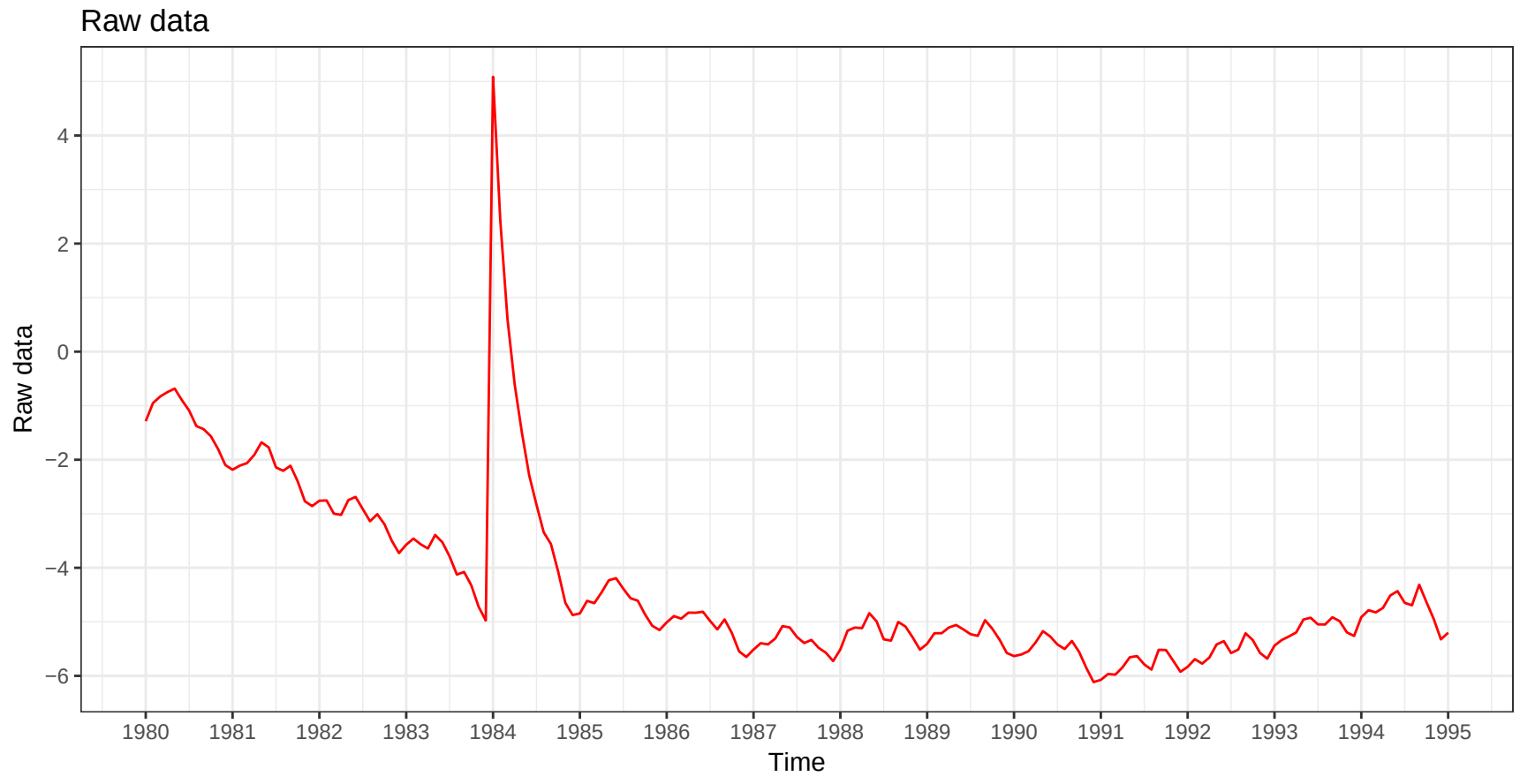

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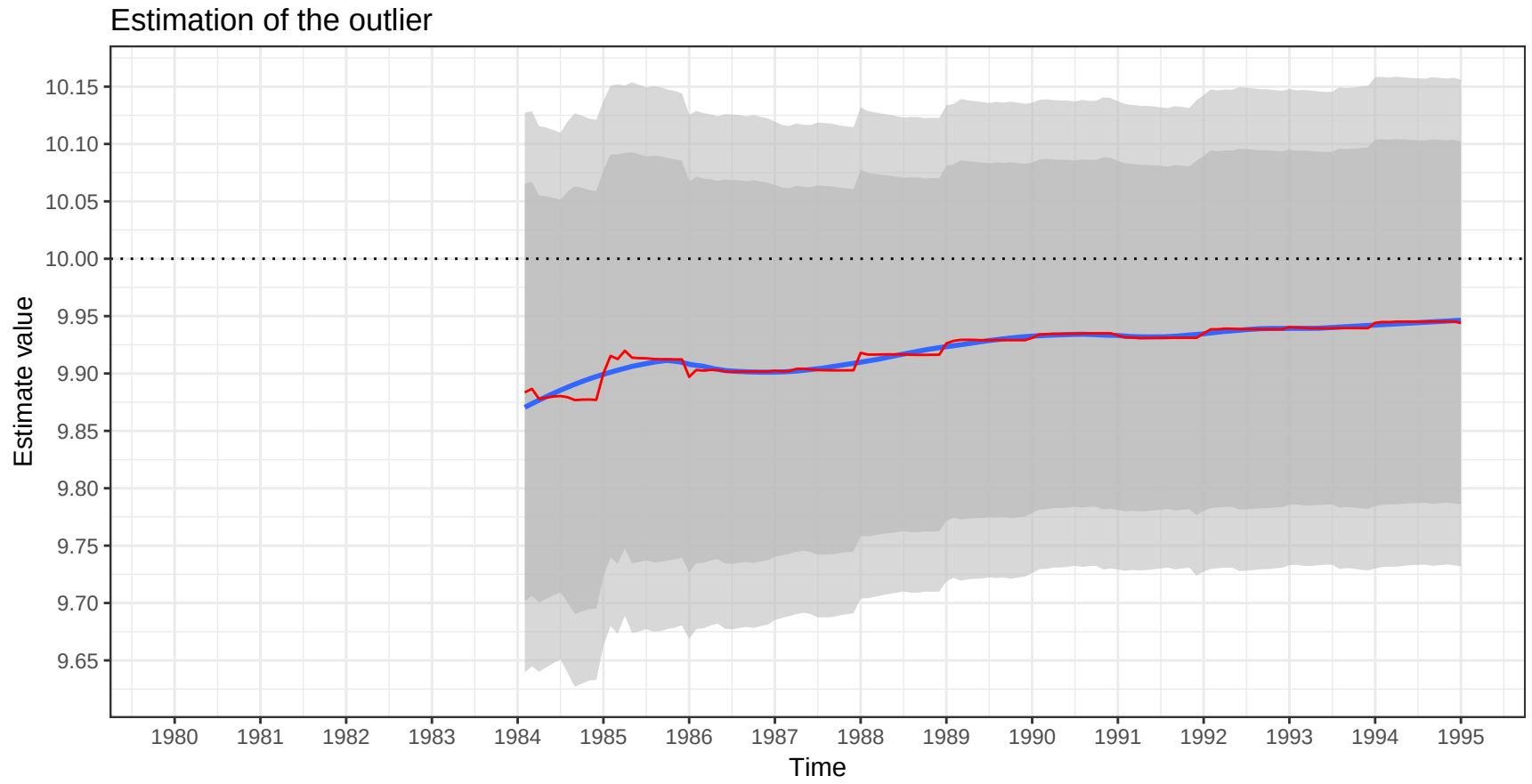
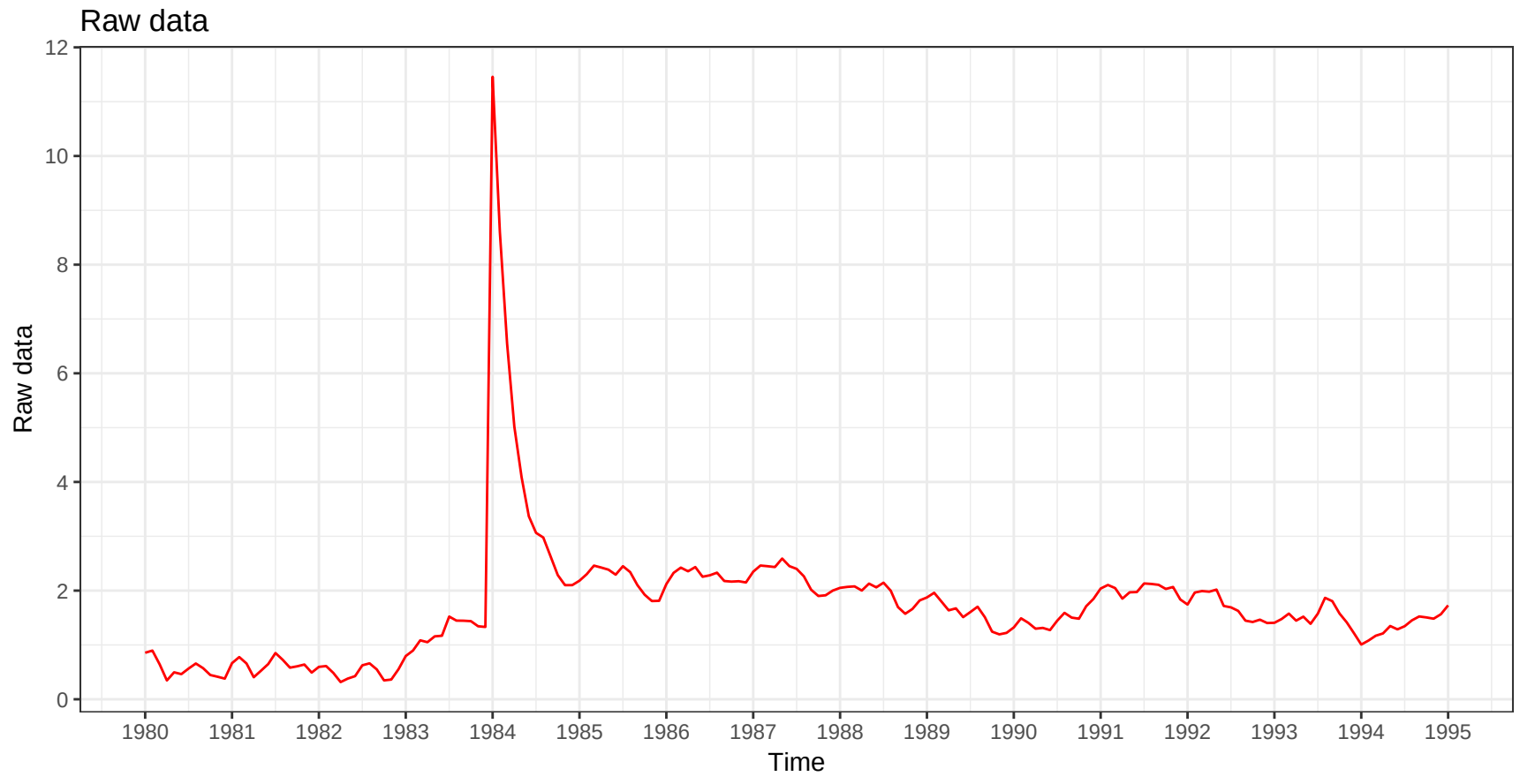
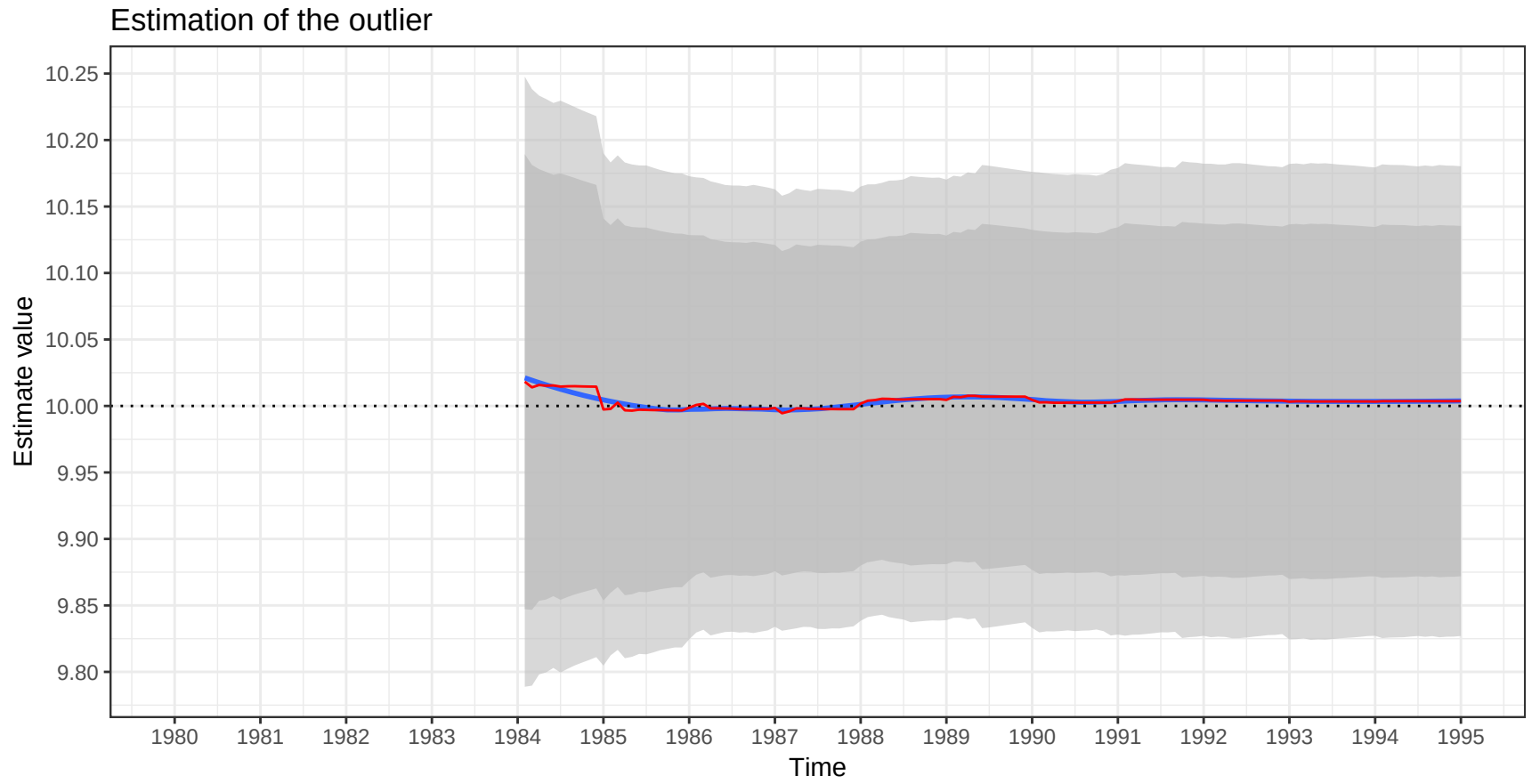
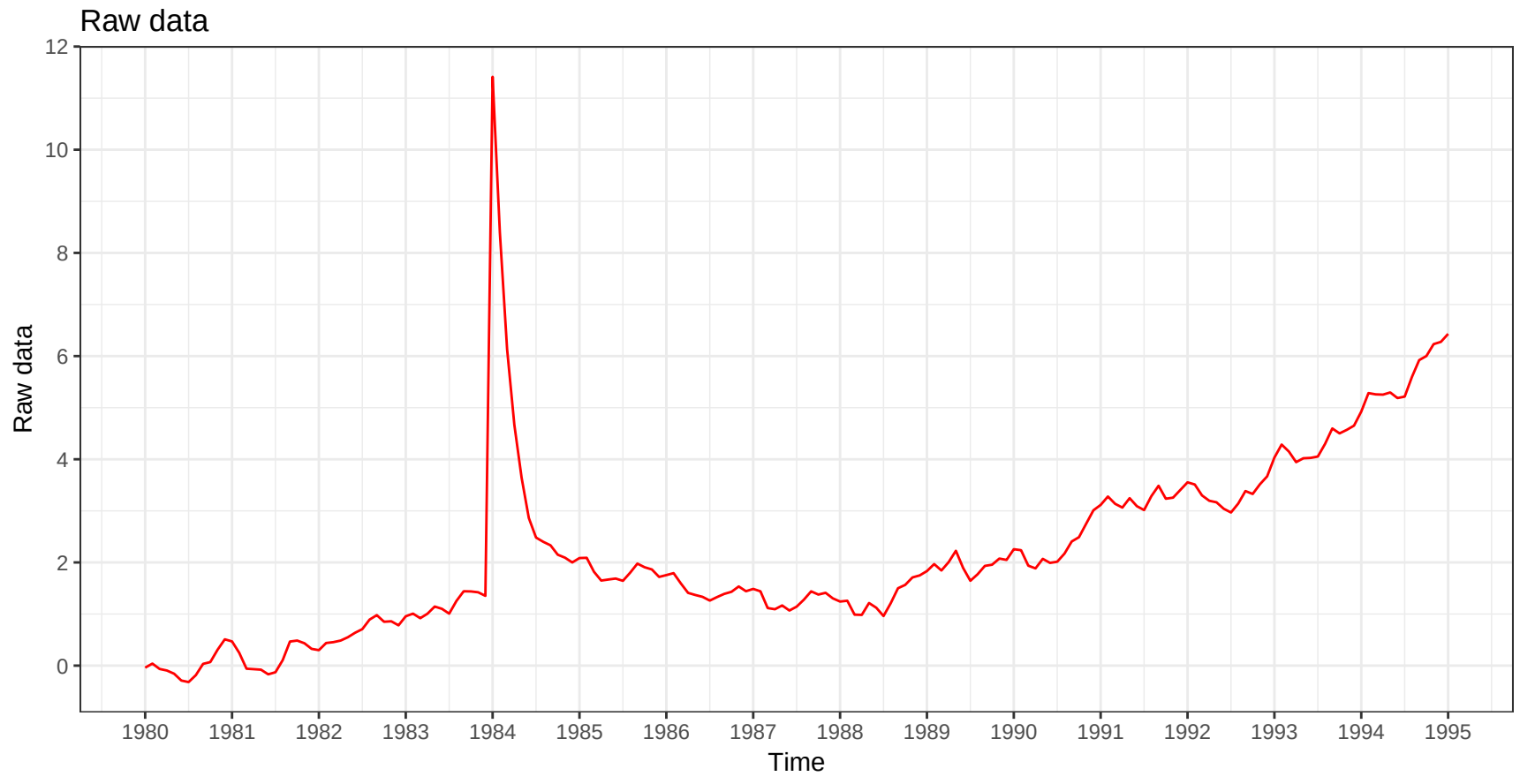




Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1+0.5B)(1−0.6B12)at





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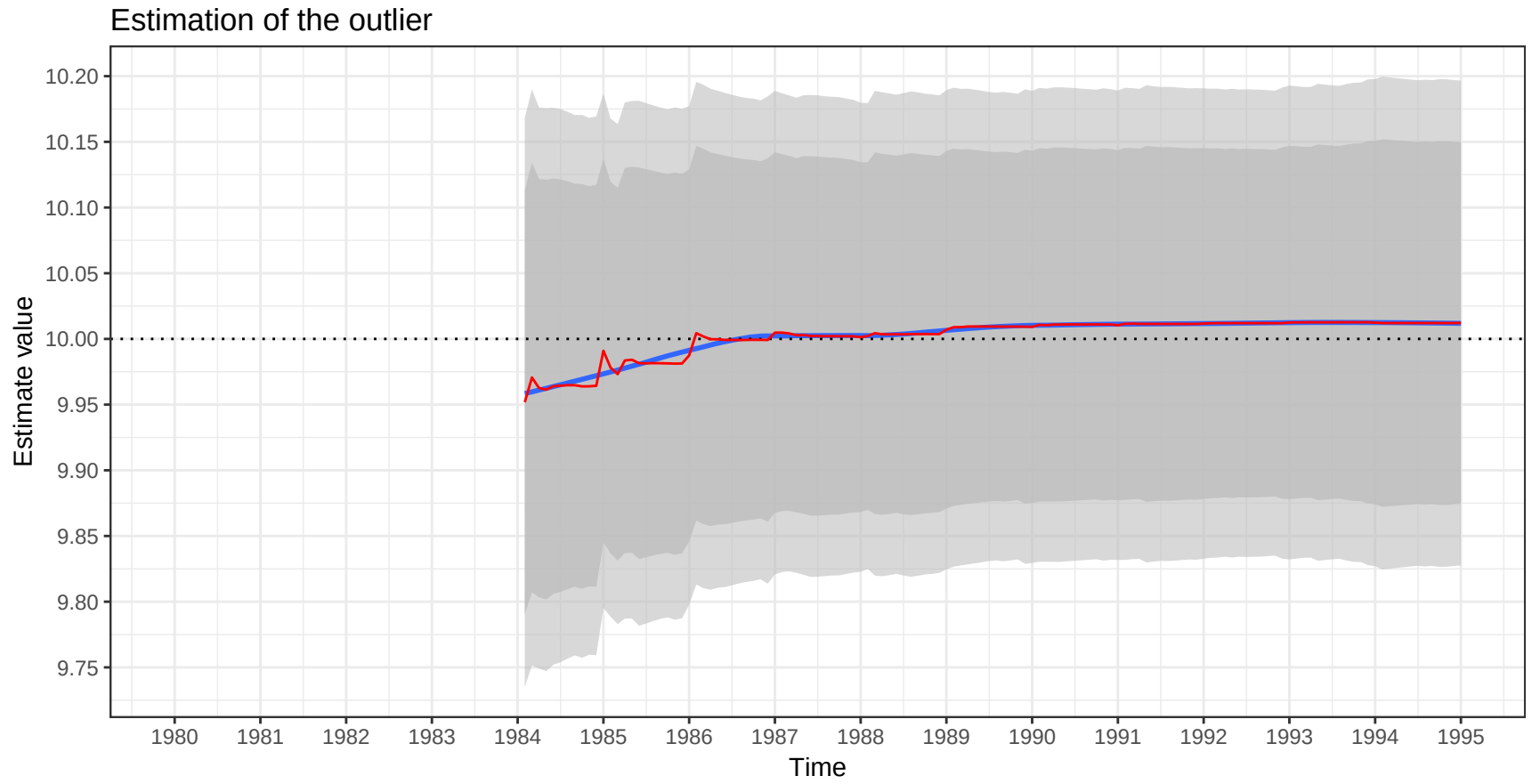

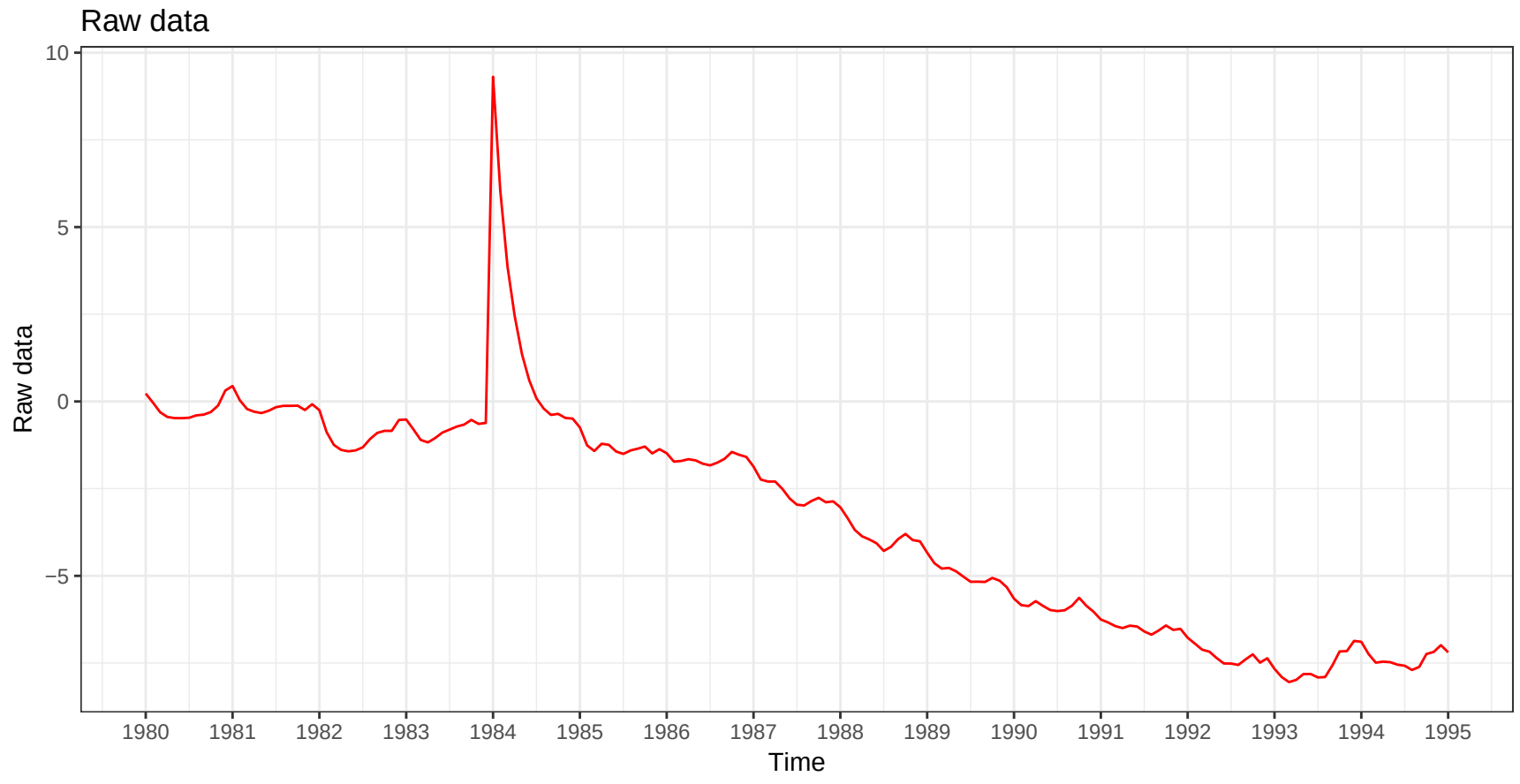

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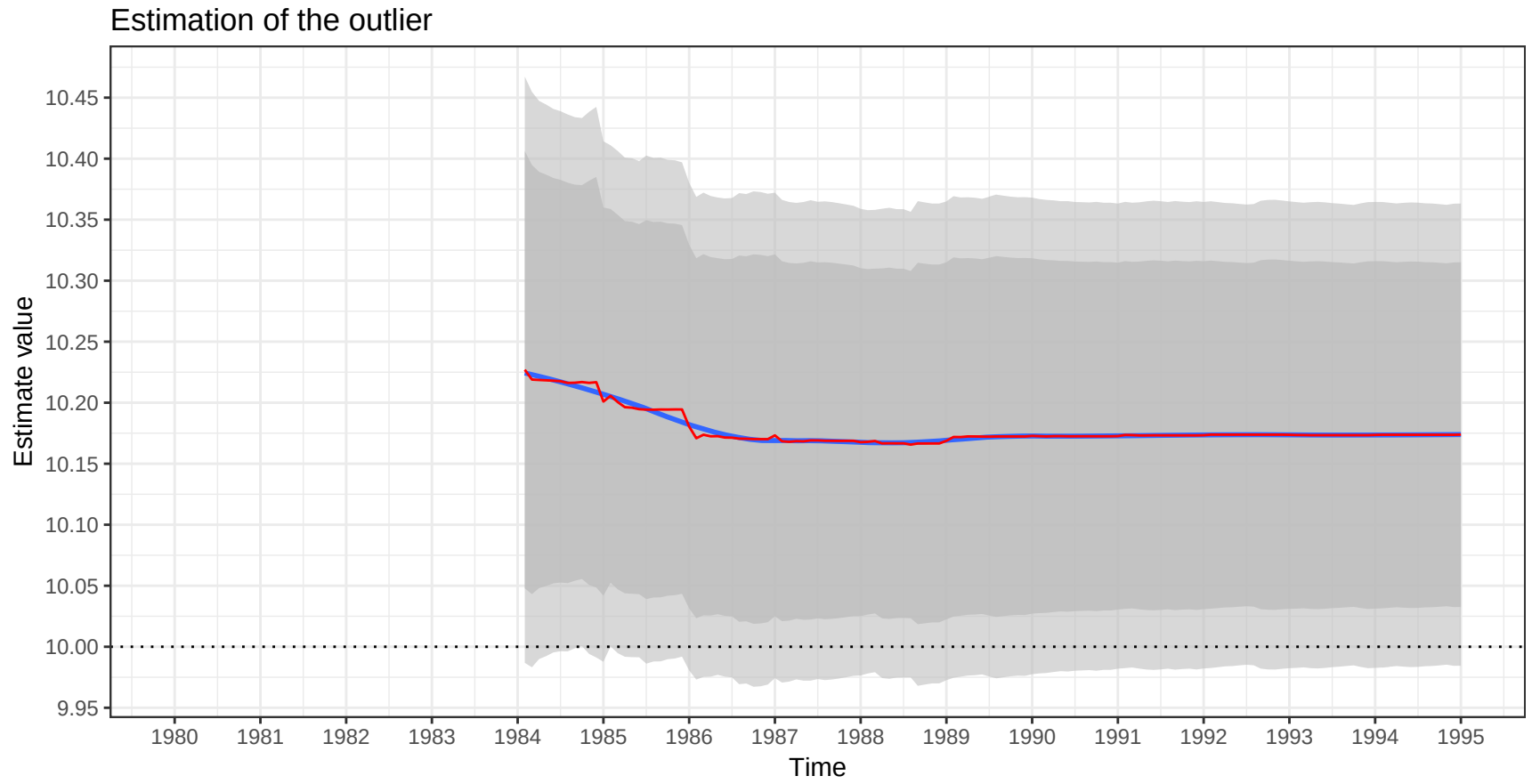

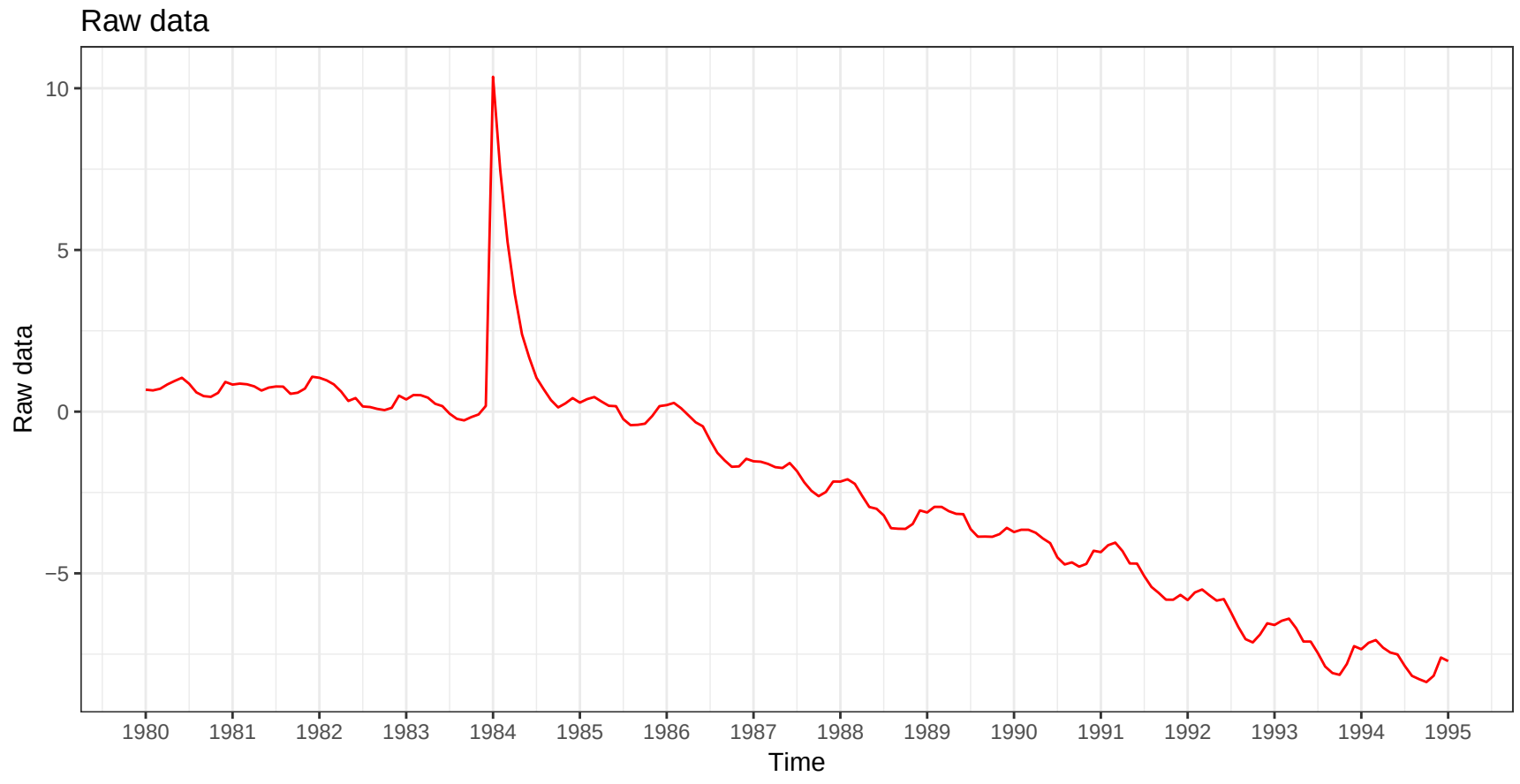

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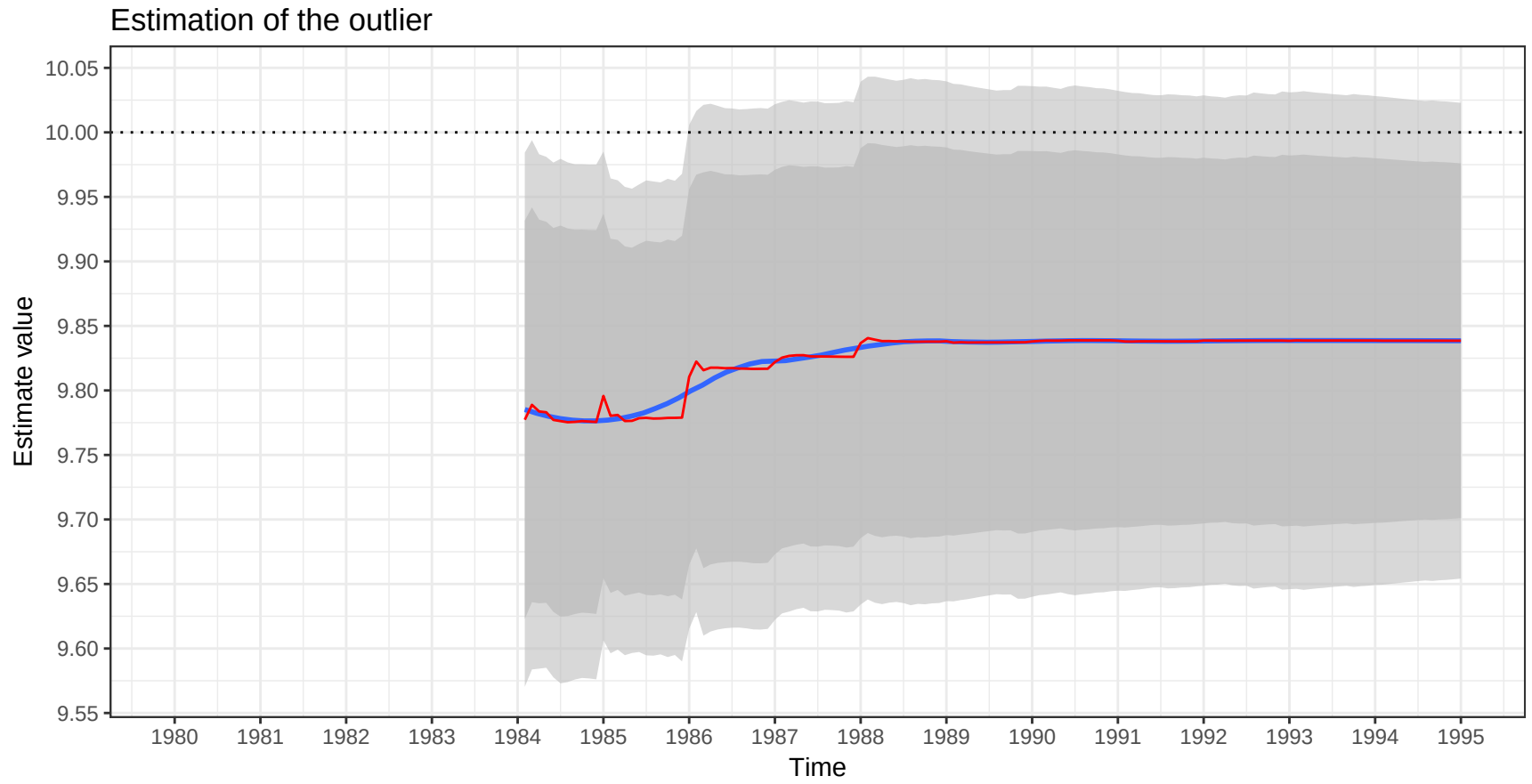

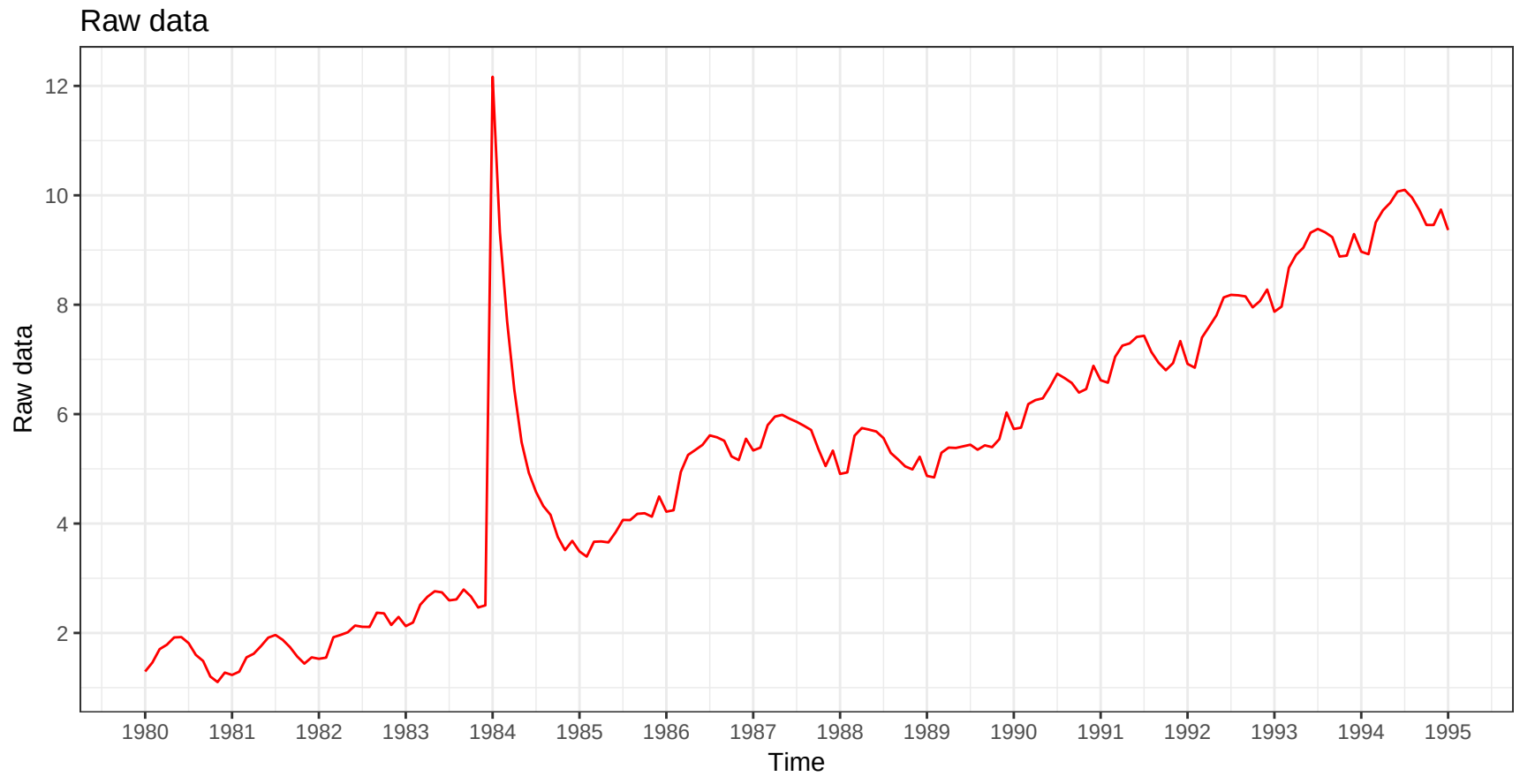

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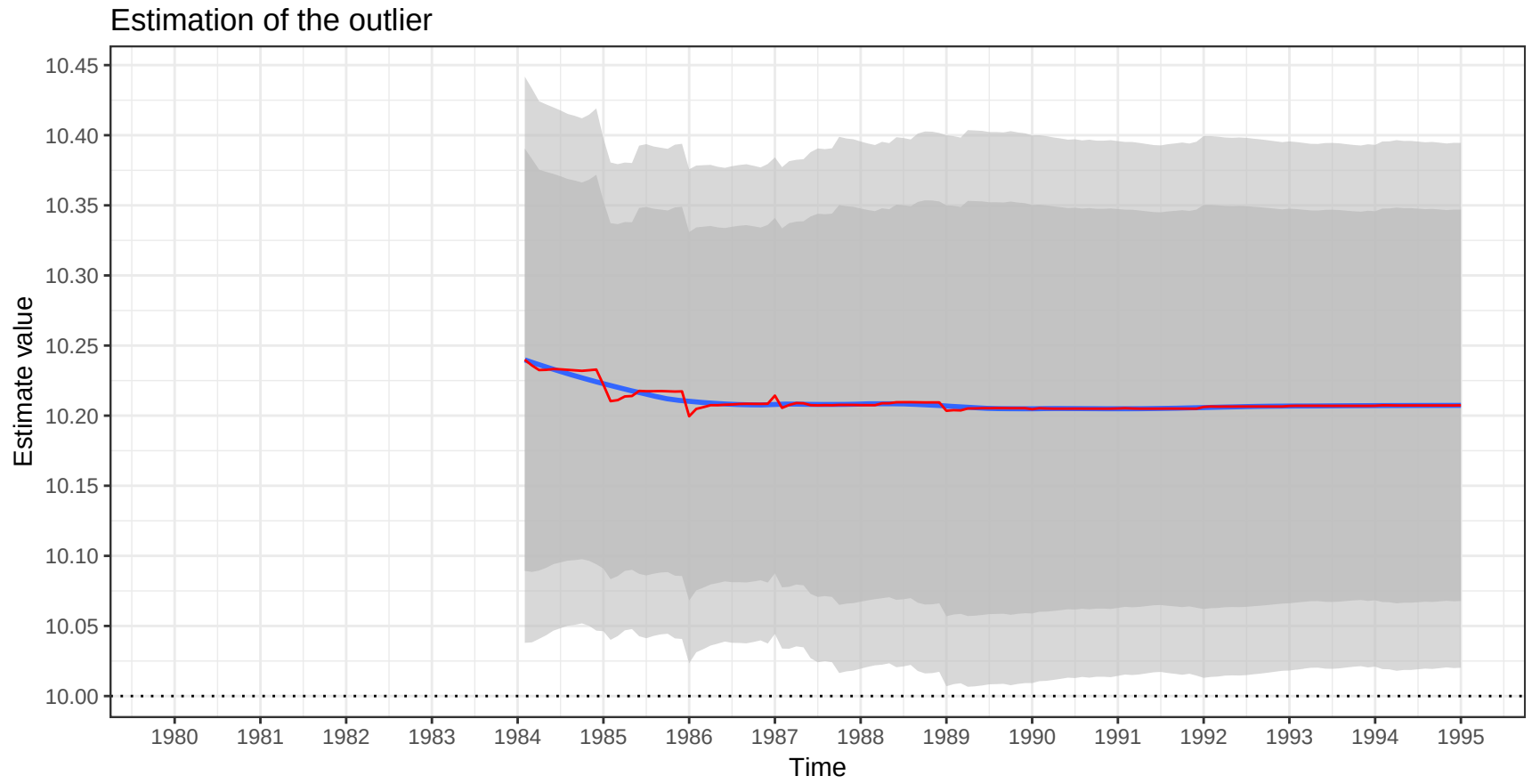

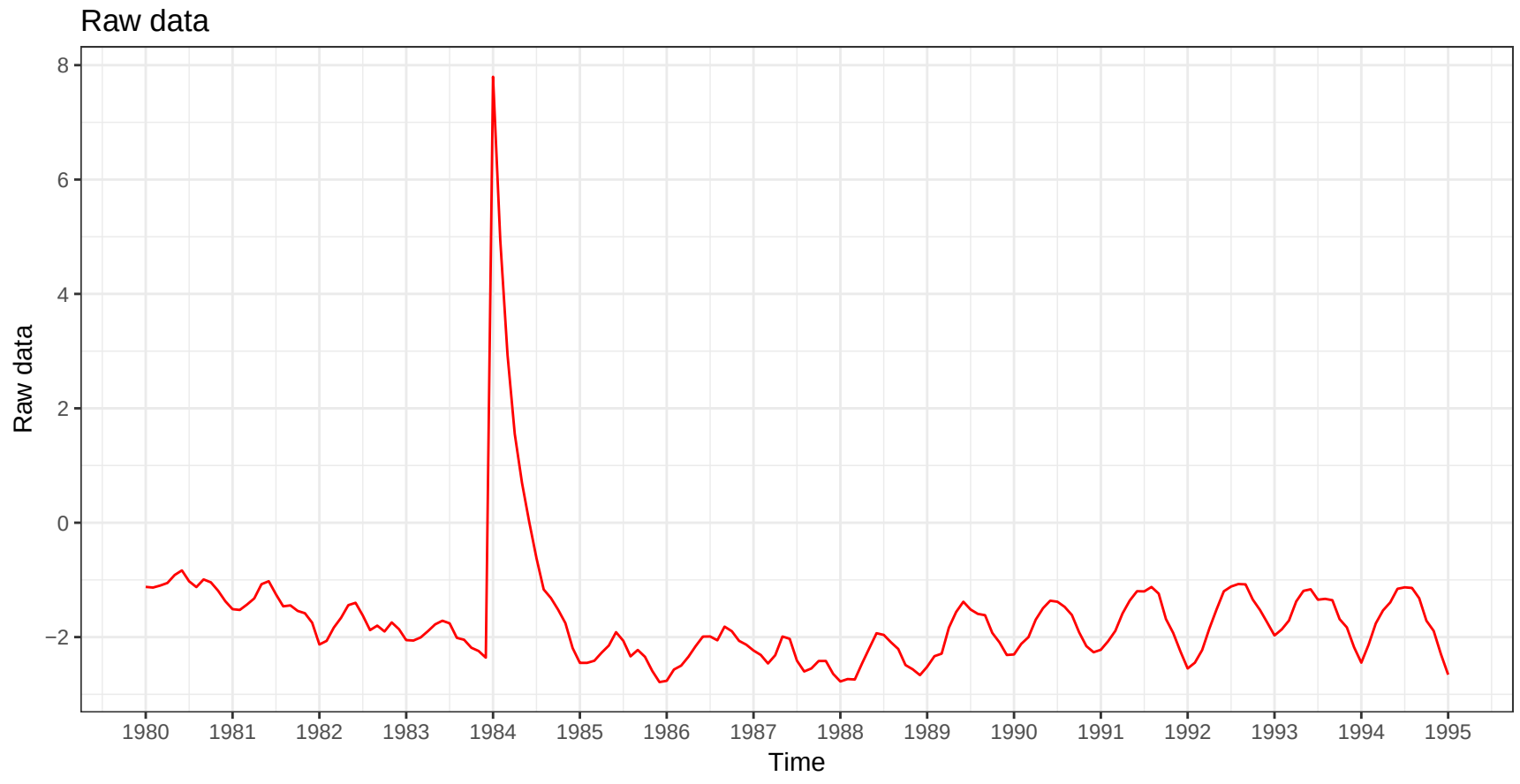

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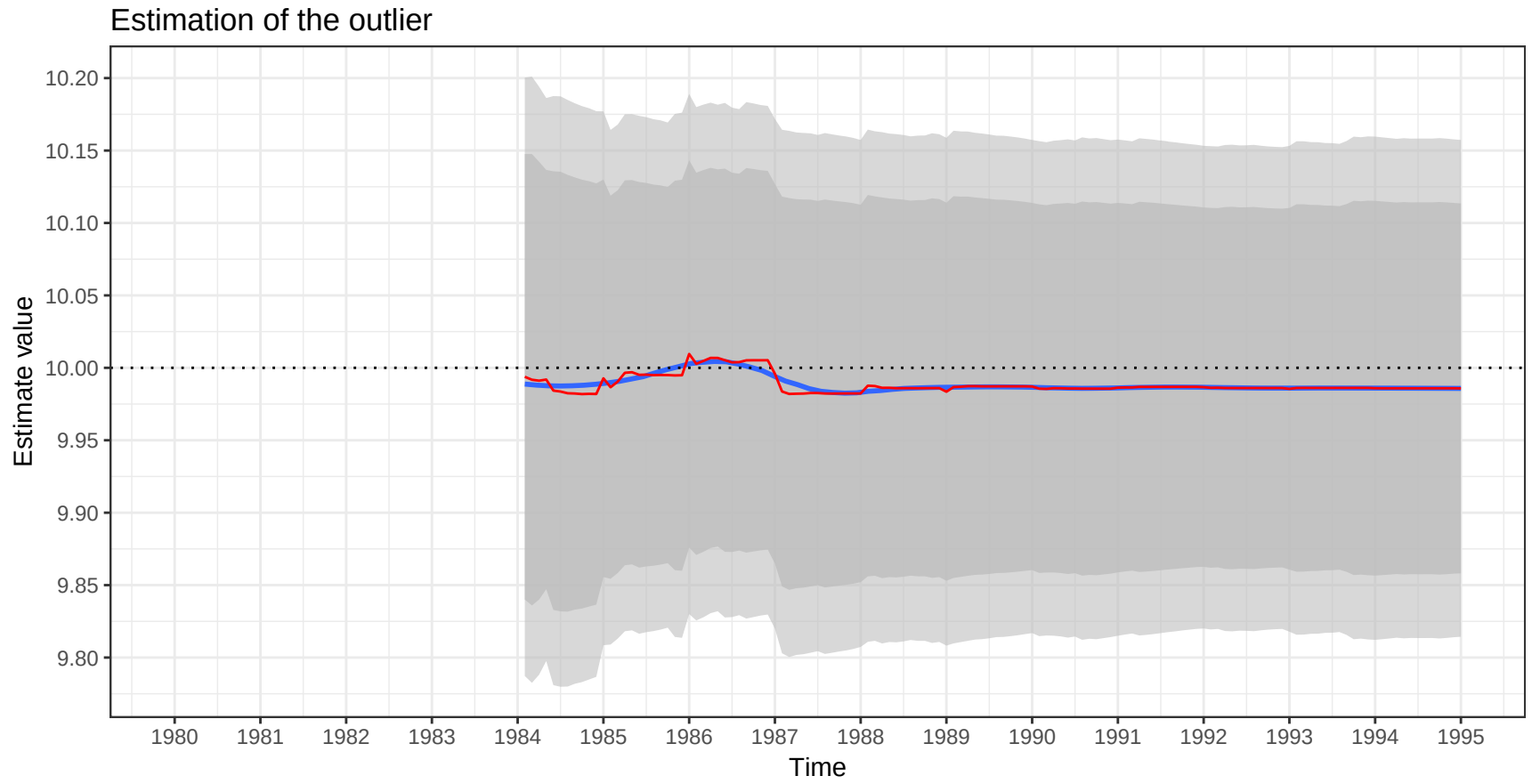

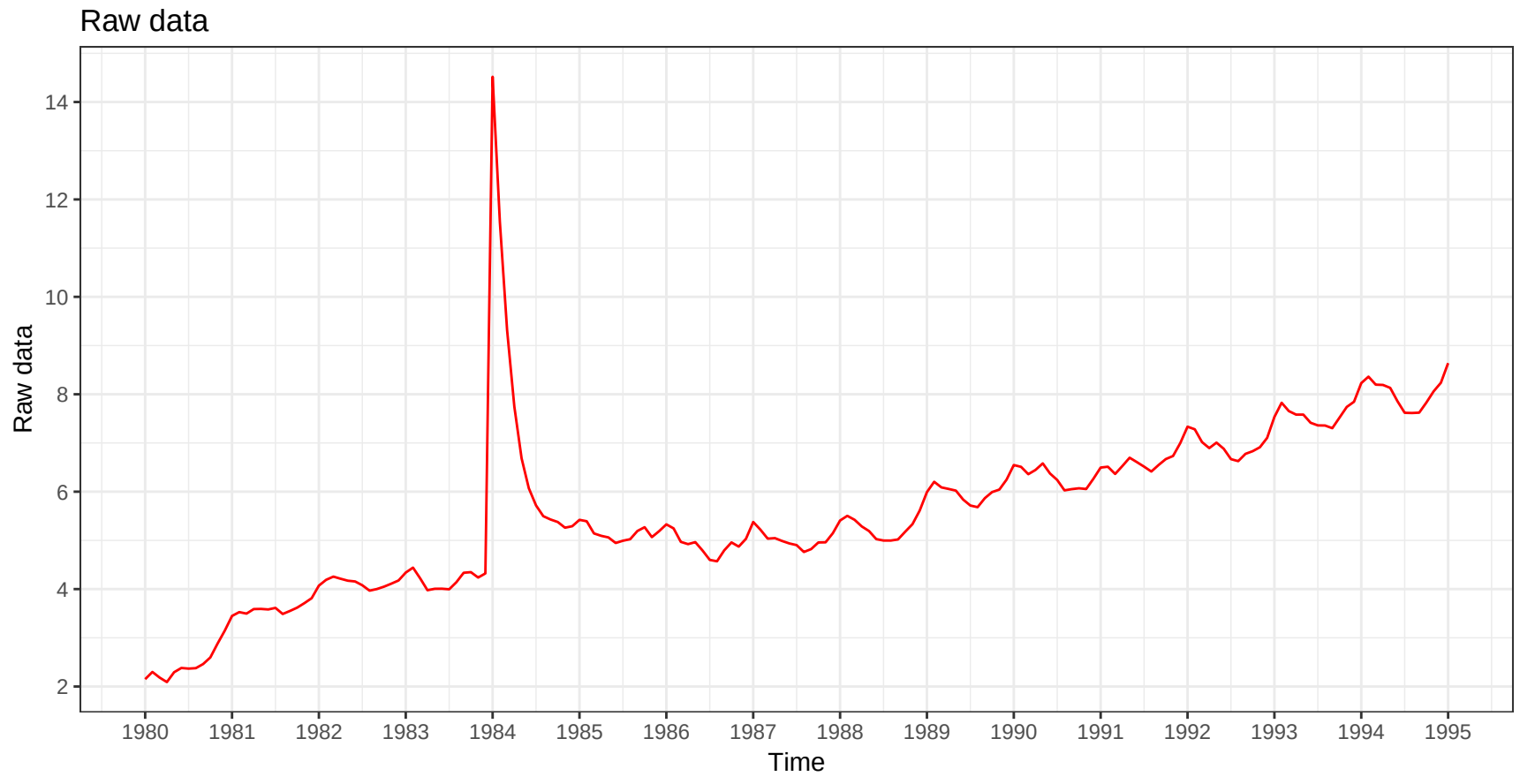

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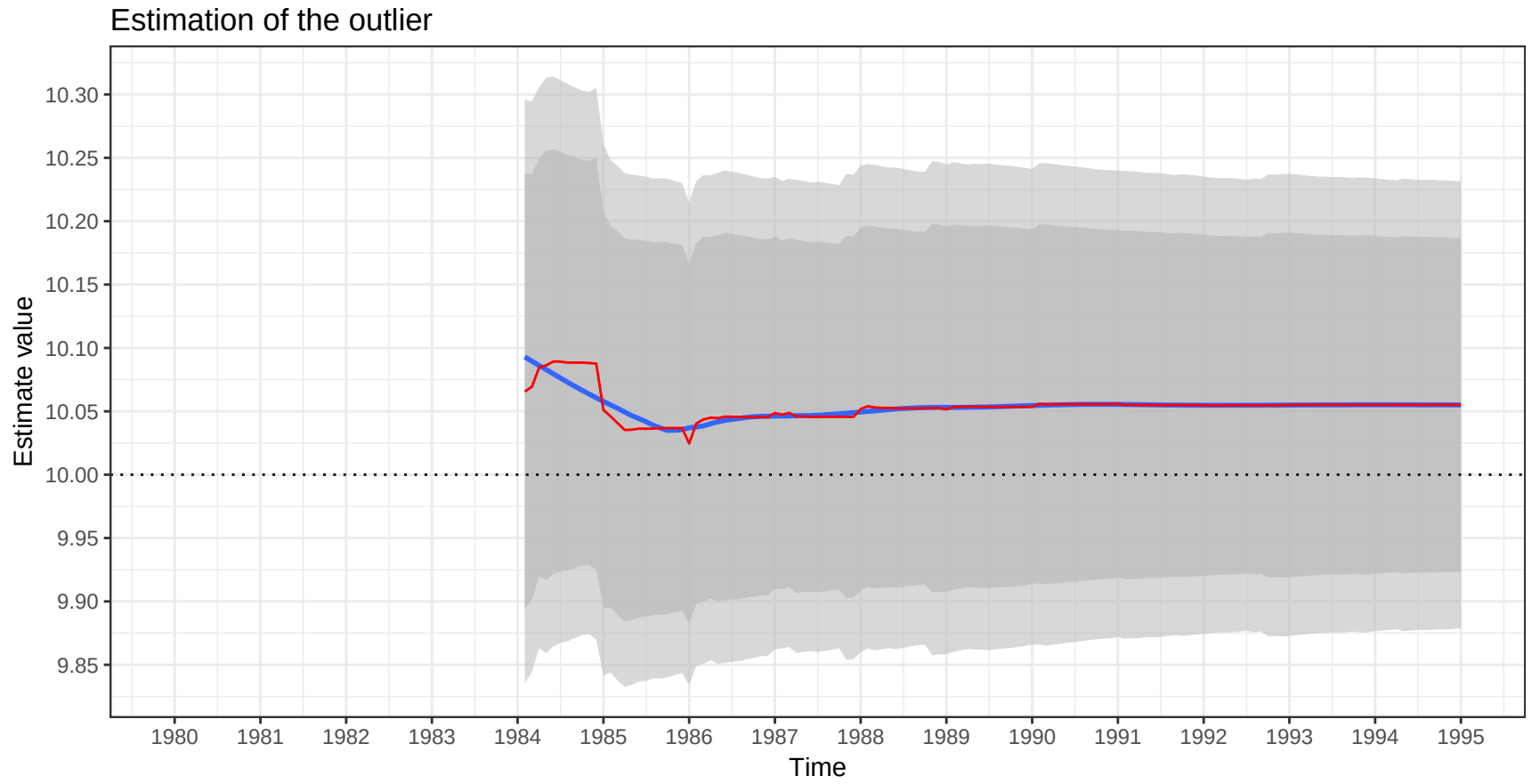

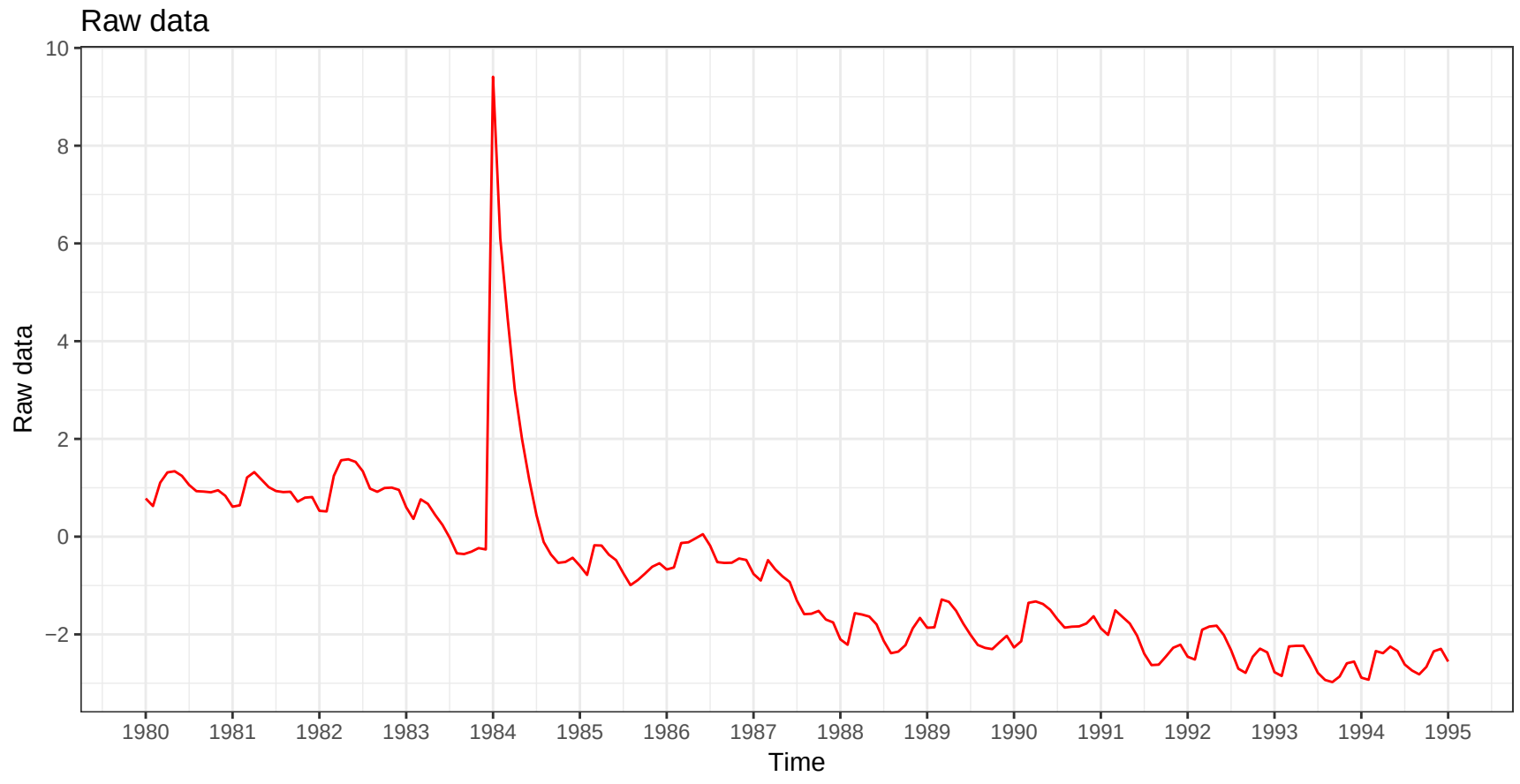

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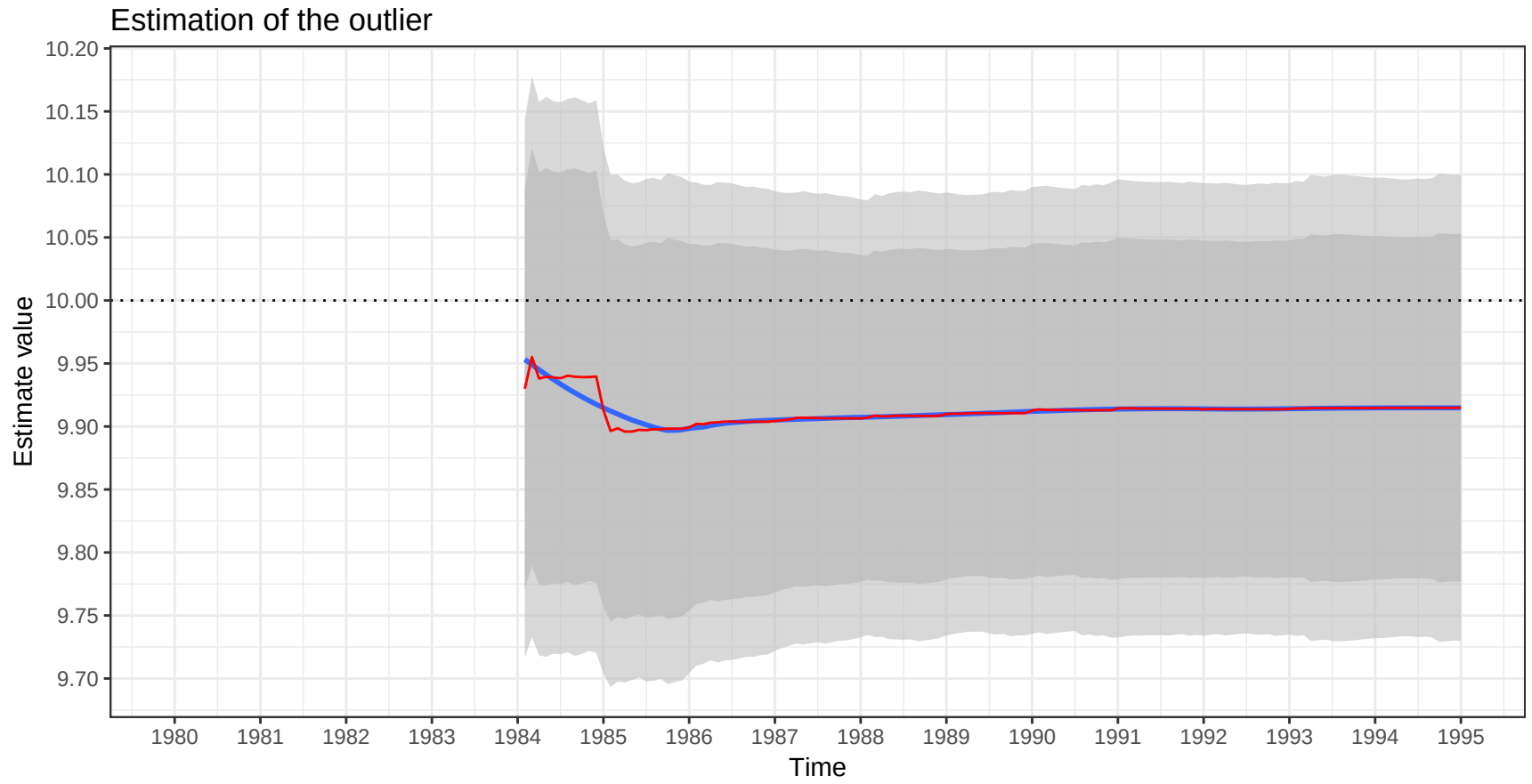

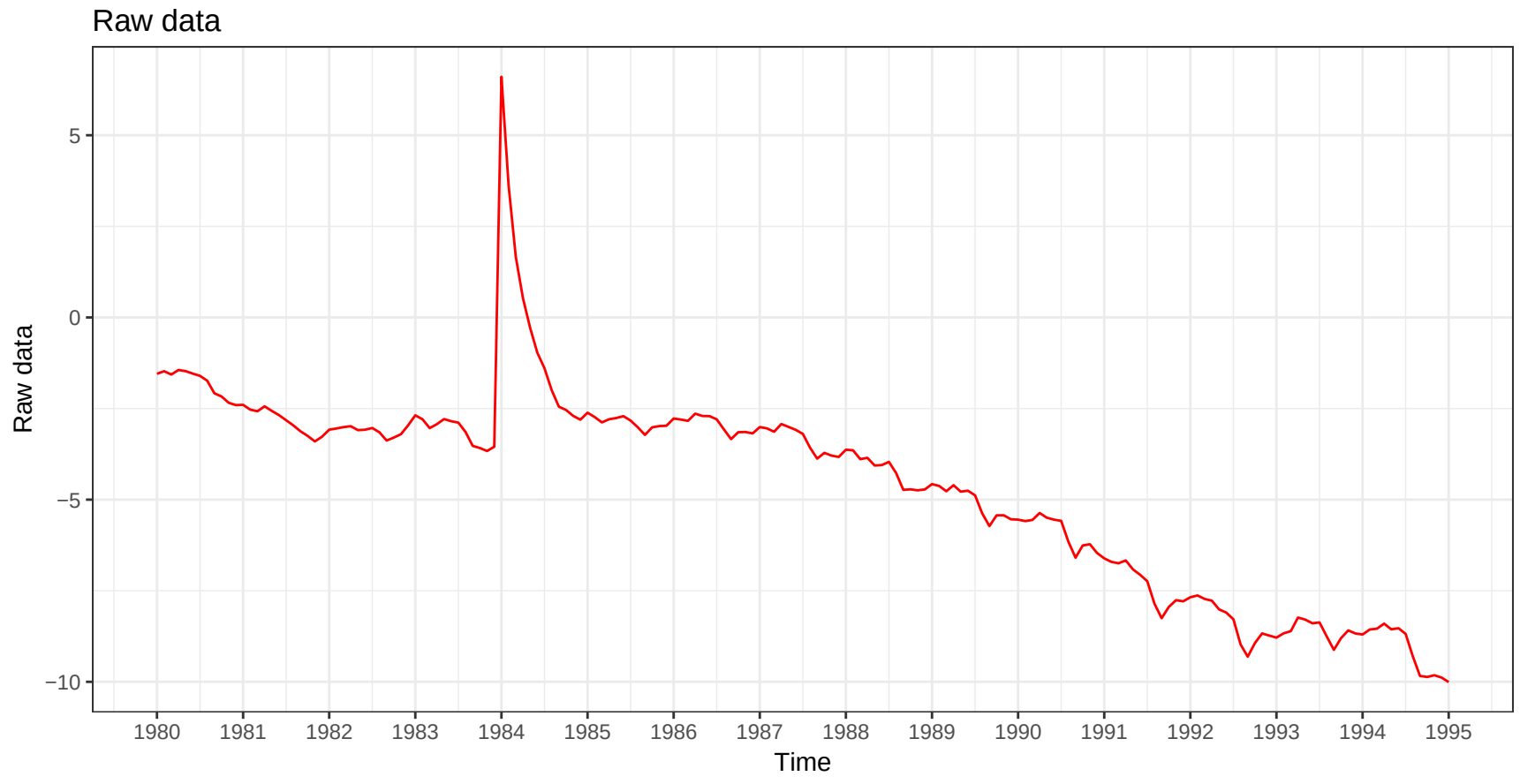

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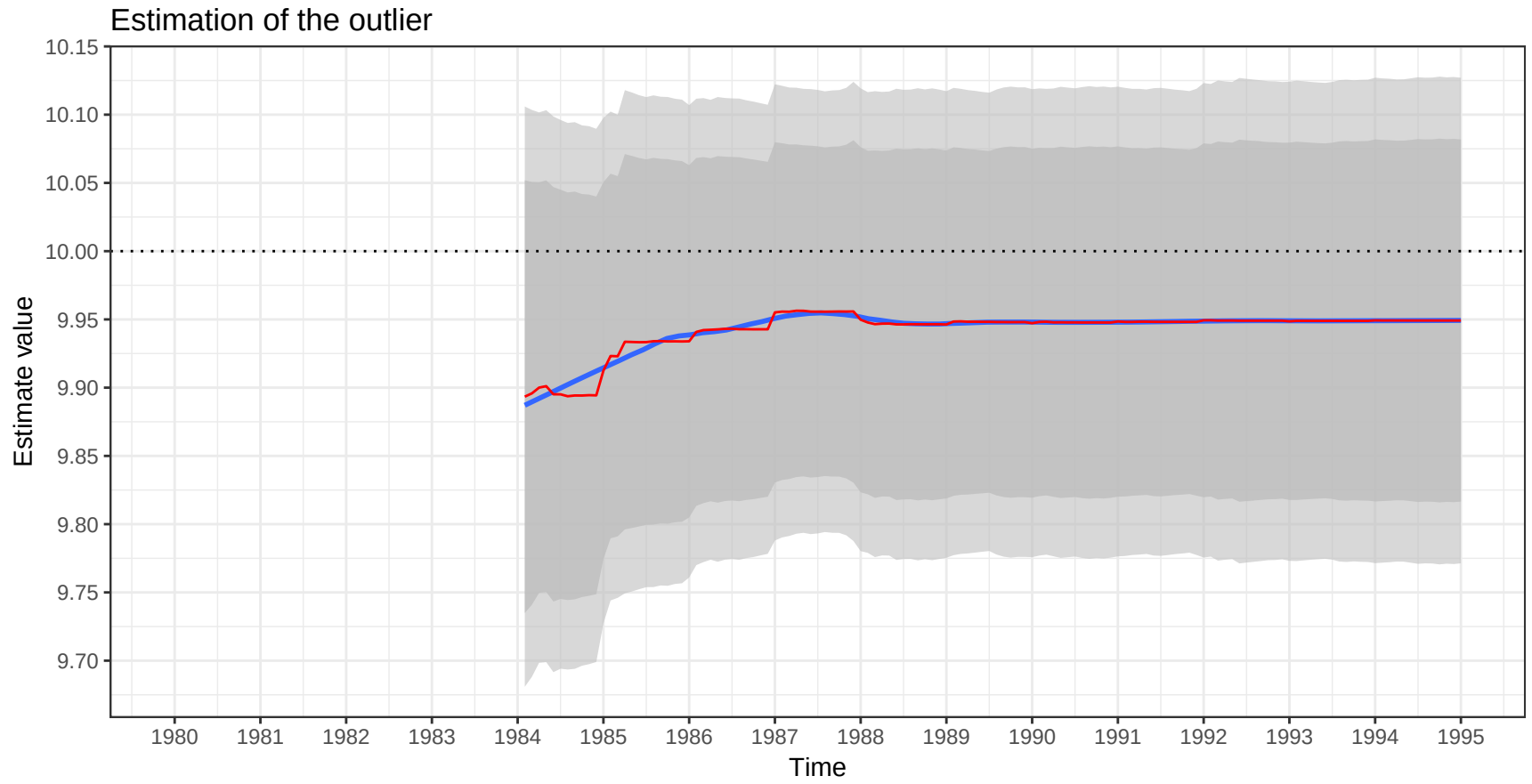

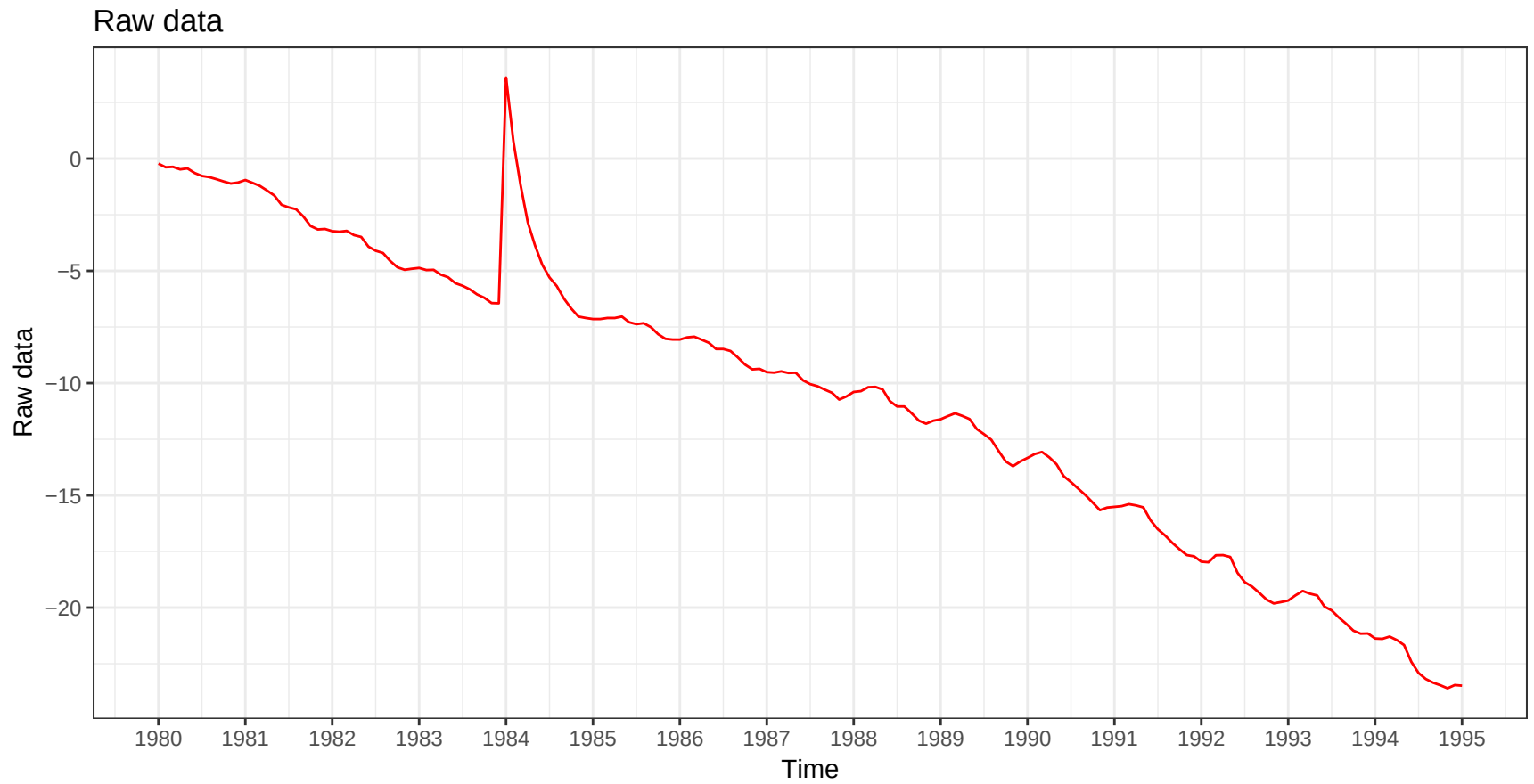

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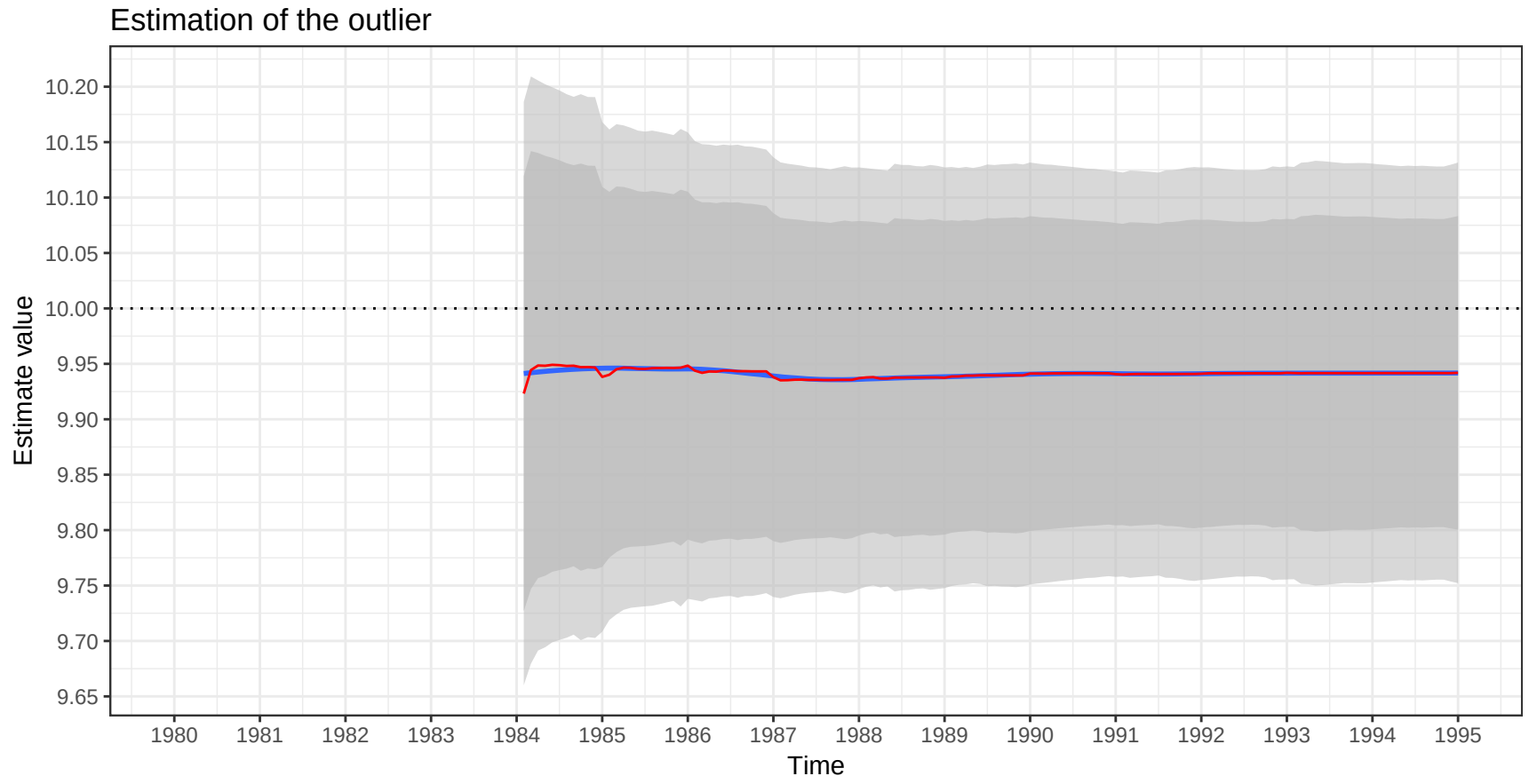
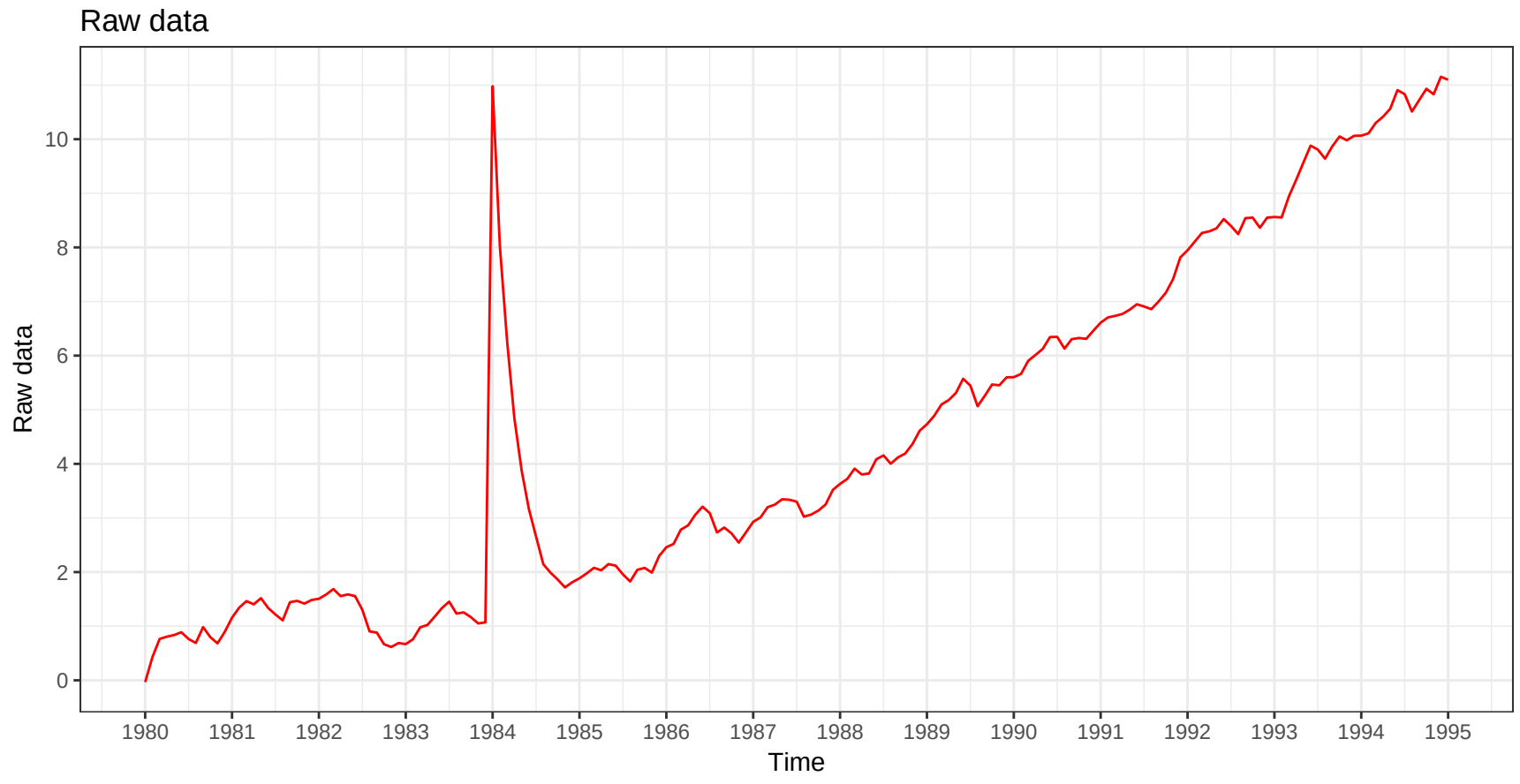
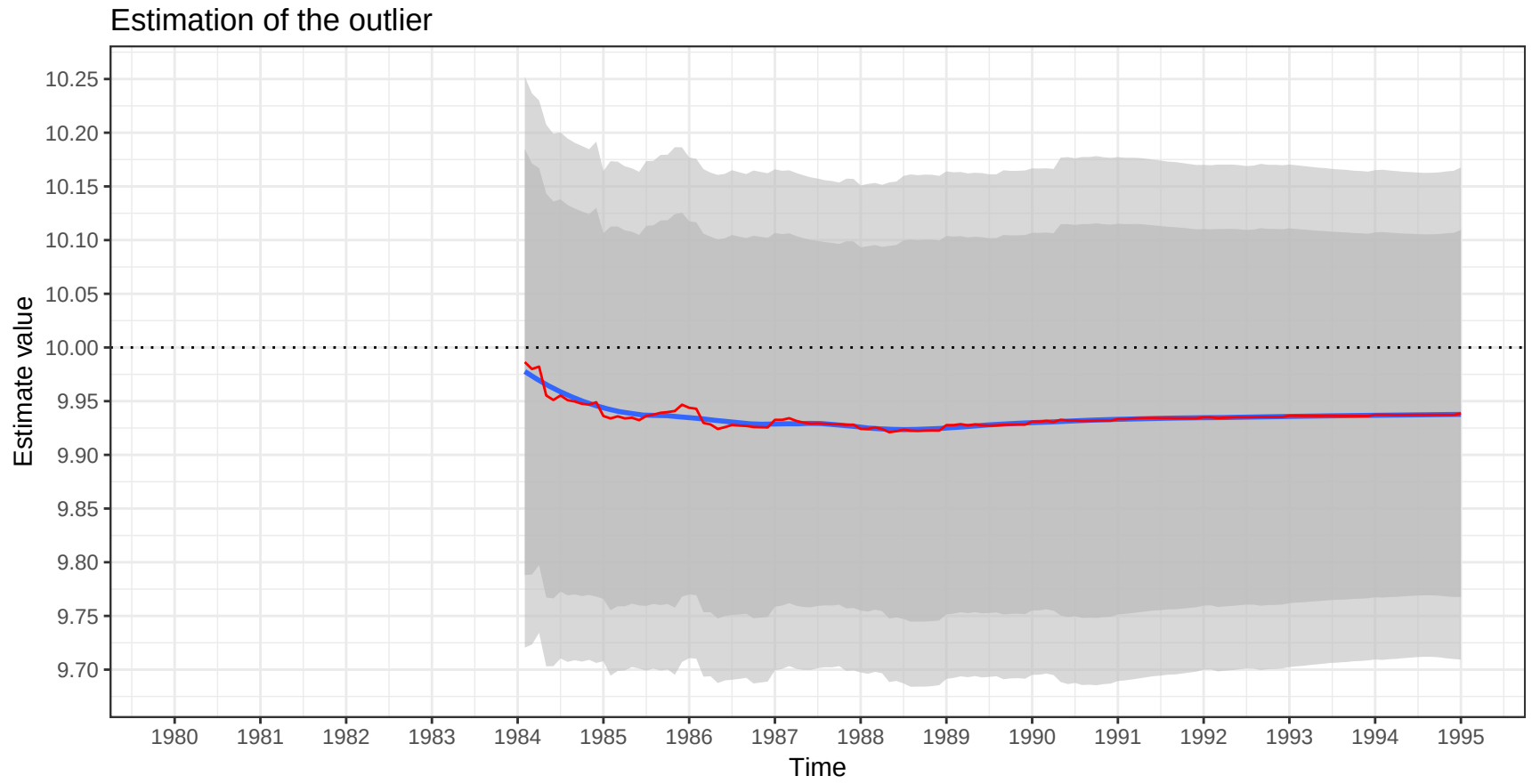
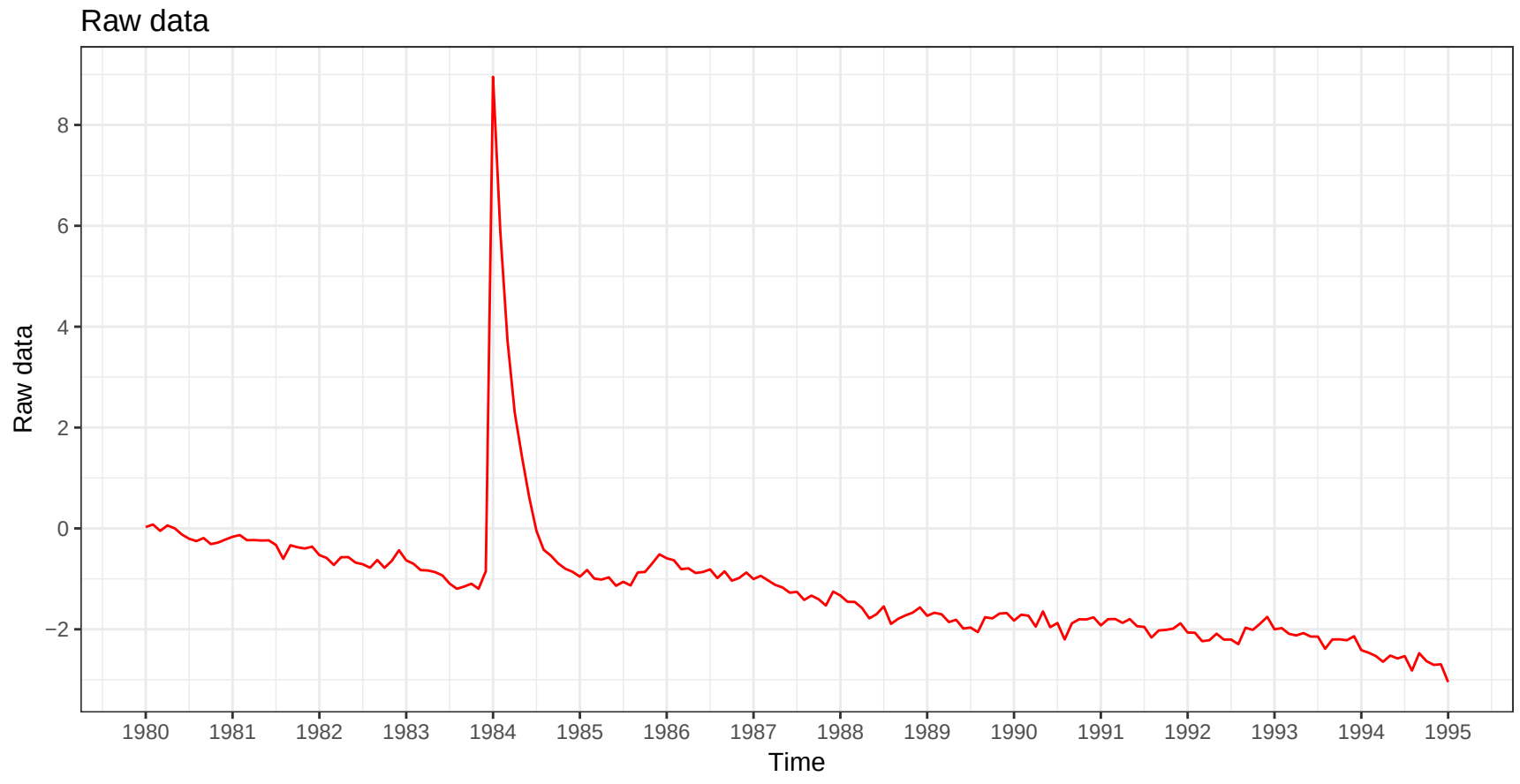
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1+0.5B)(1−0.6B12)at



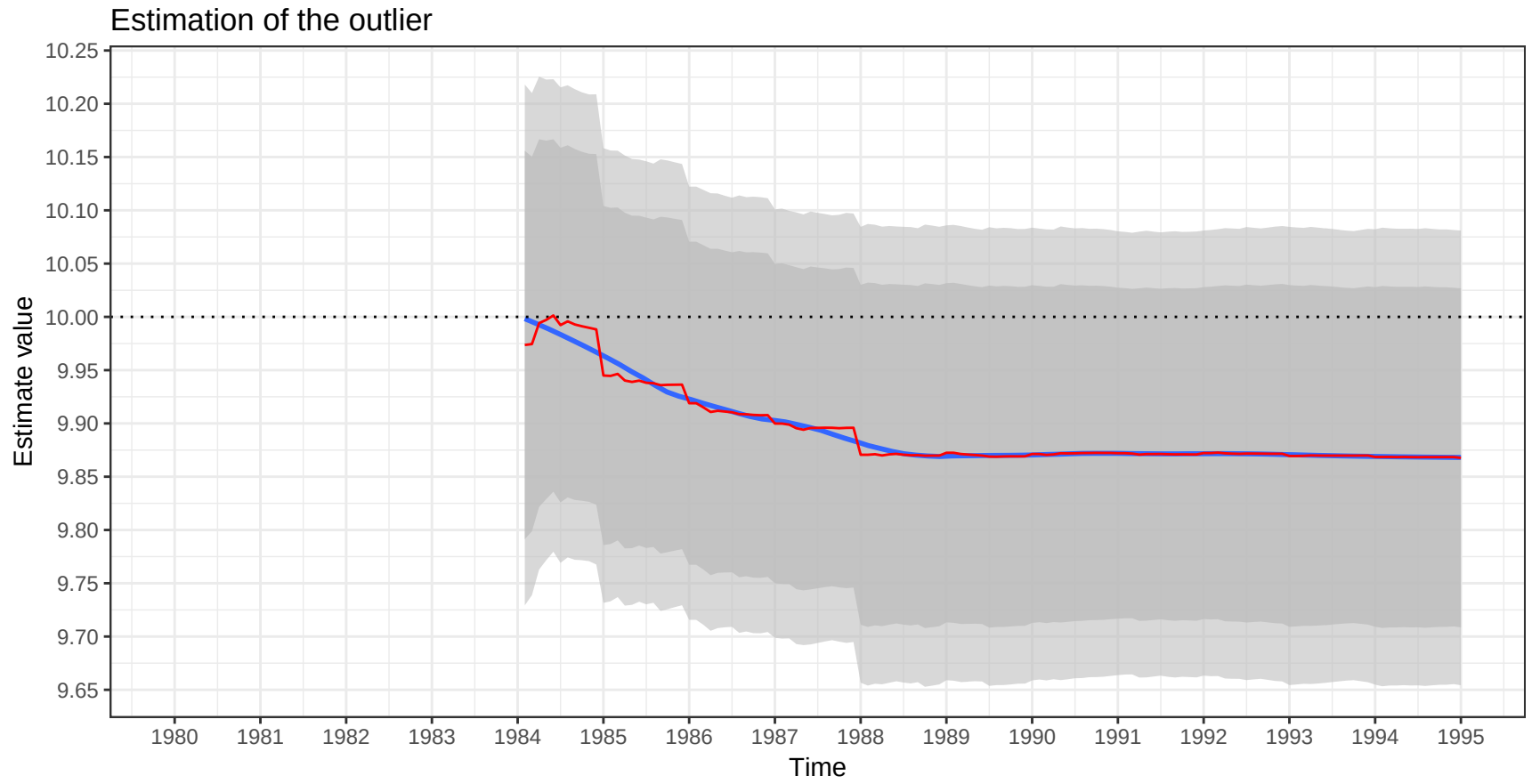


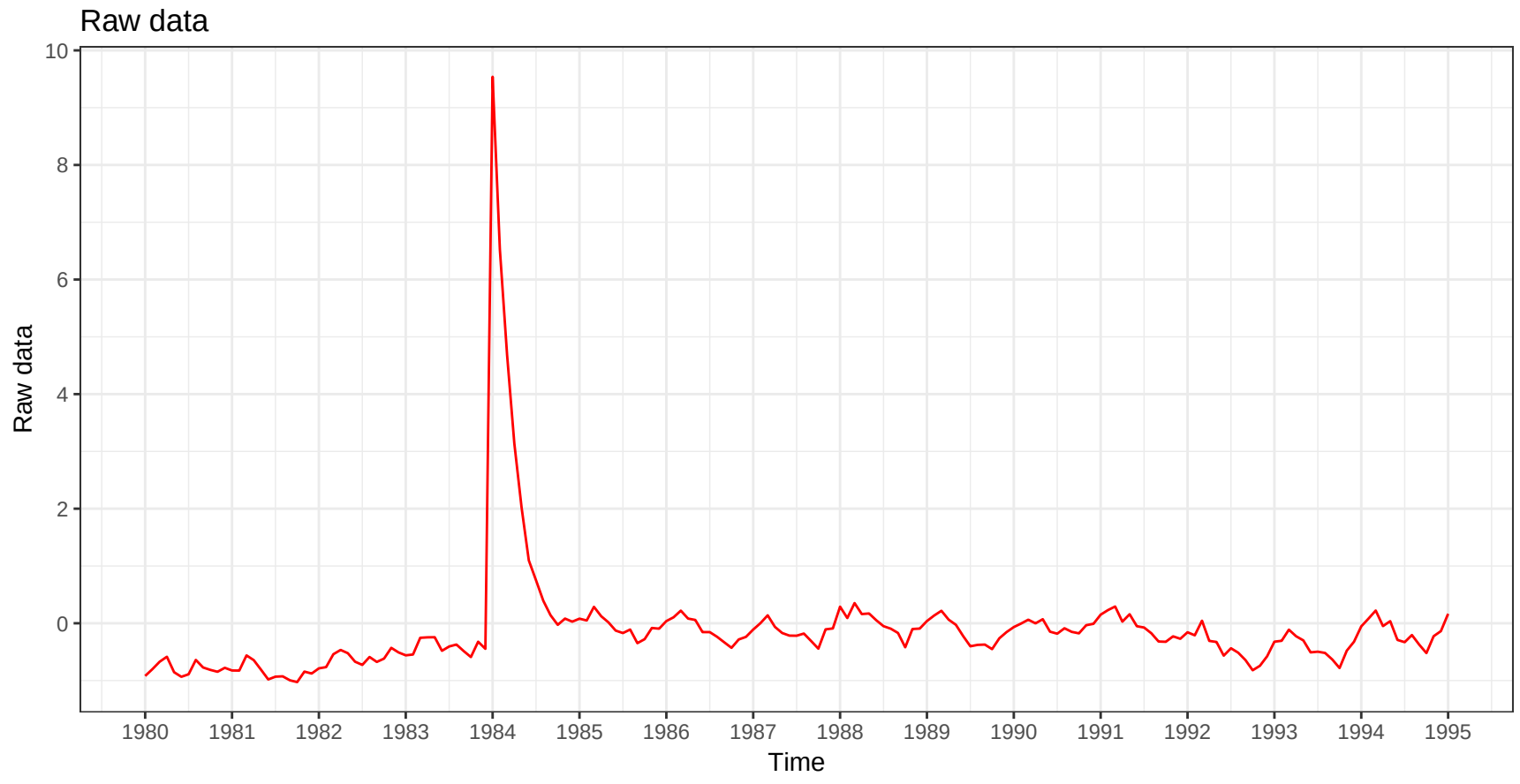
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.3B)(1−0.7B12)at



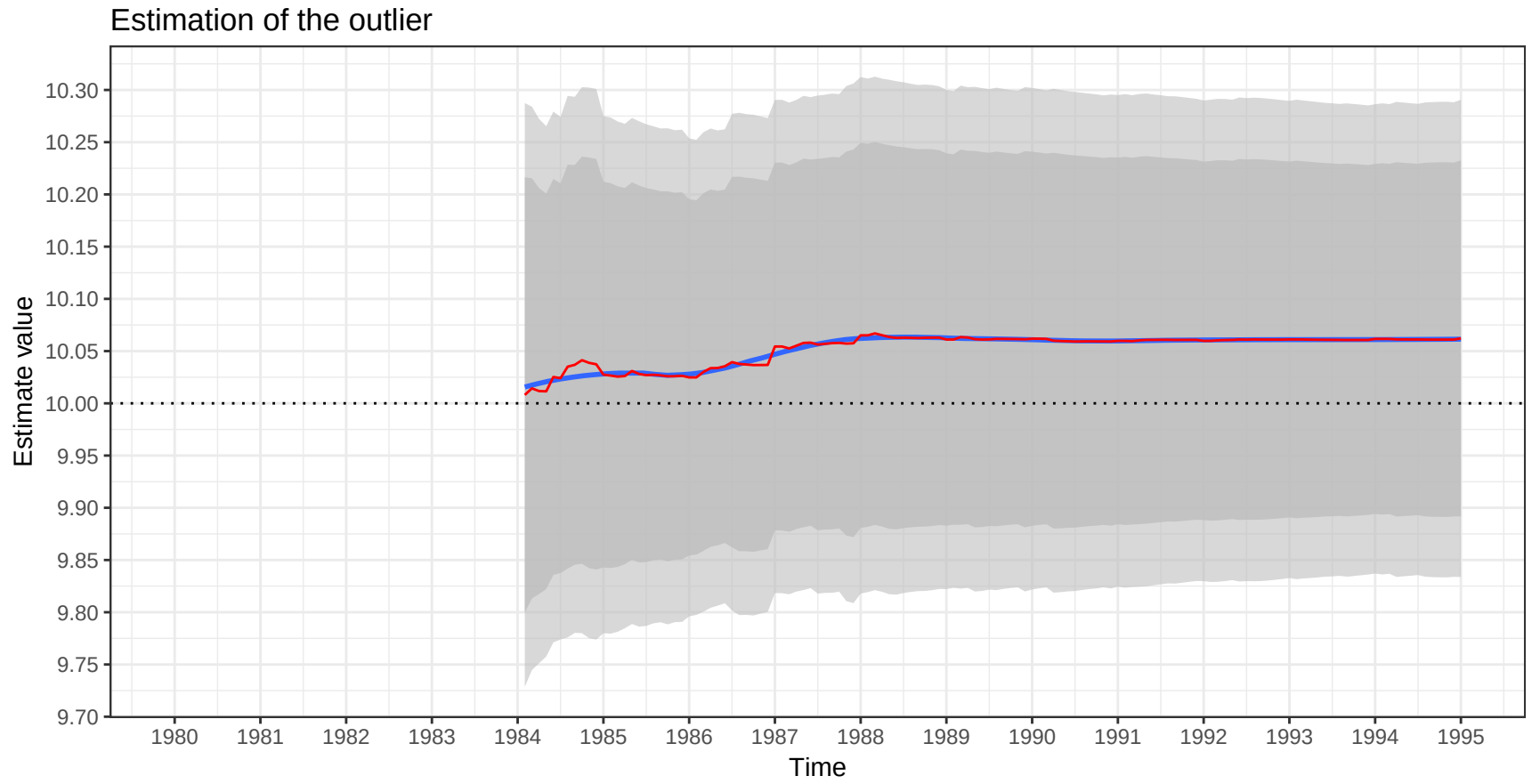


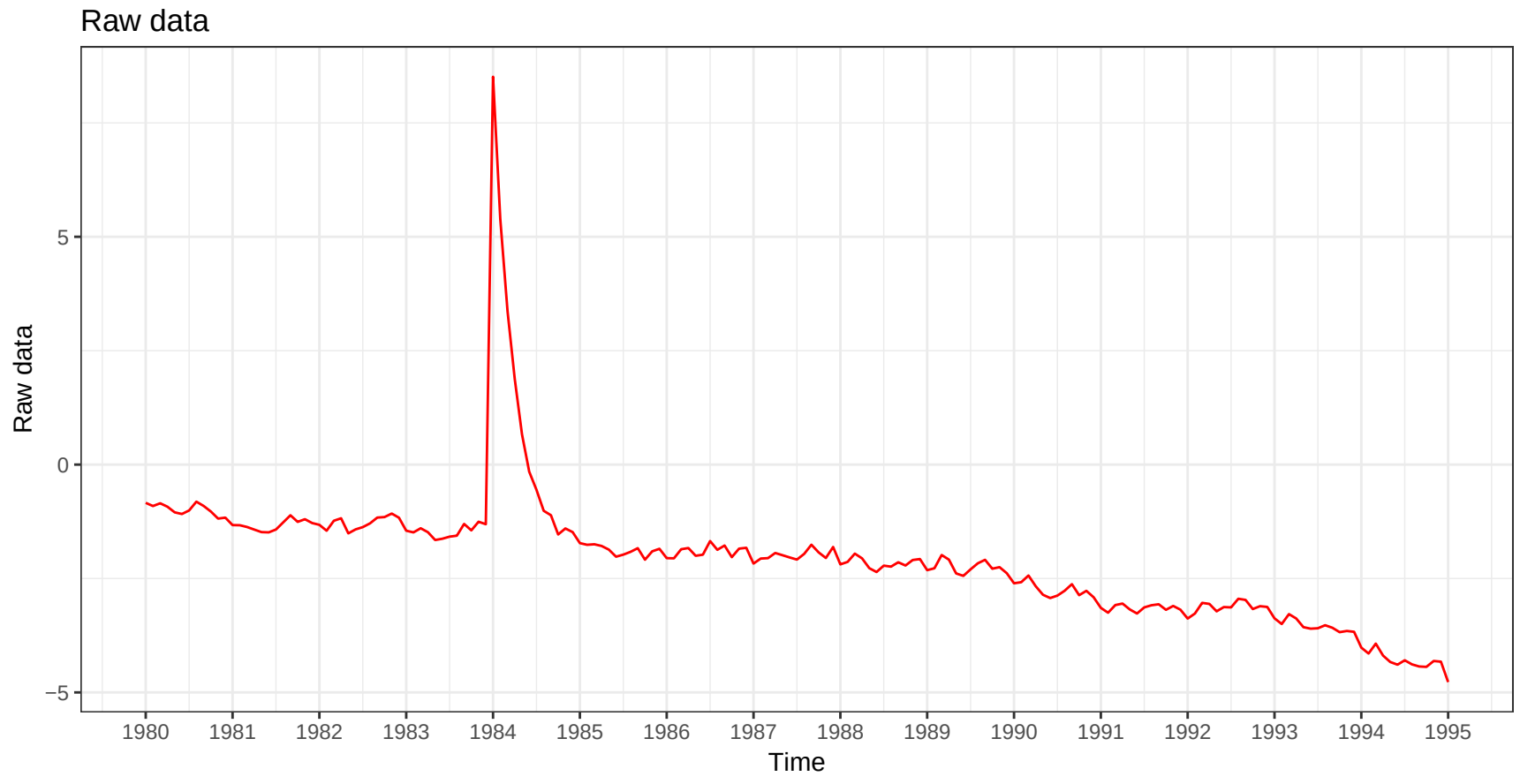
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.3B)(1−0.7B12)at



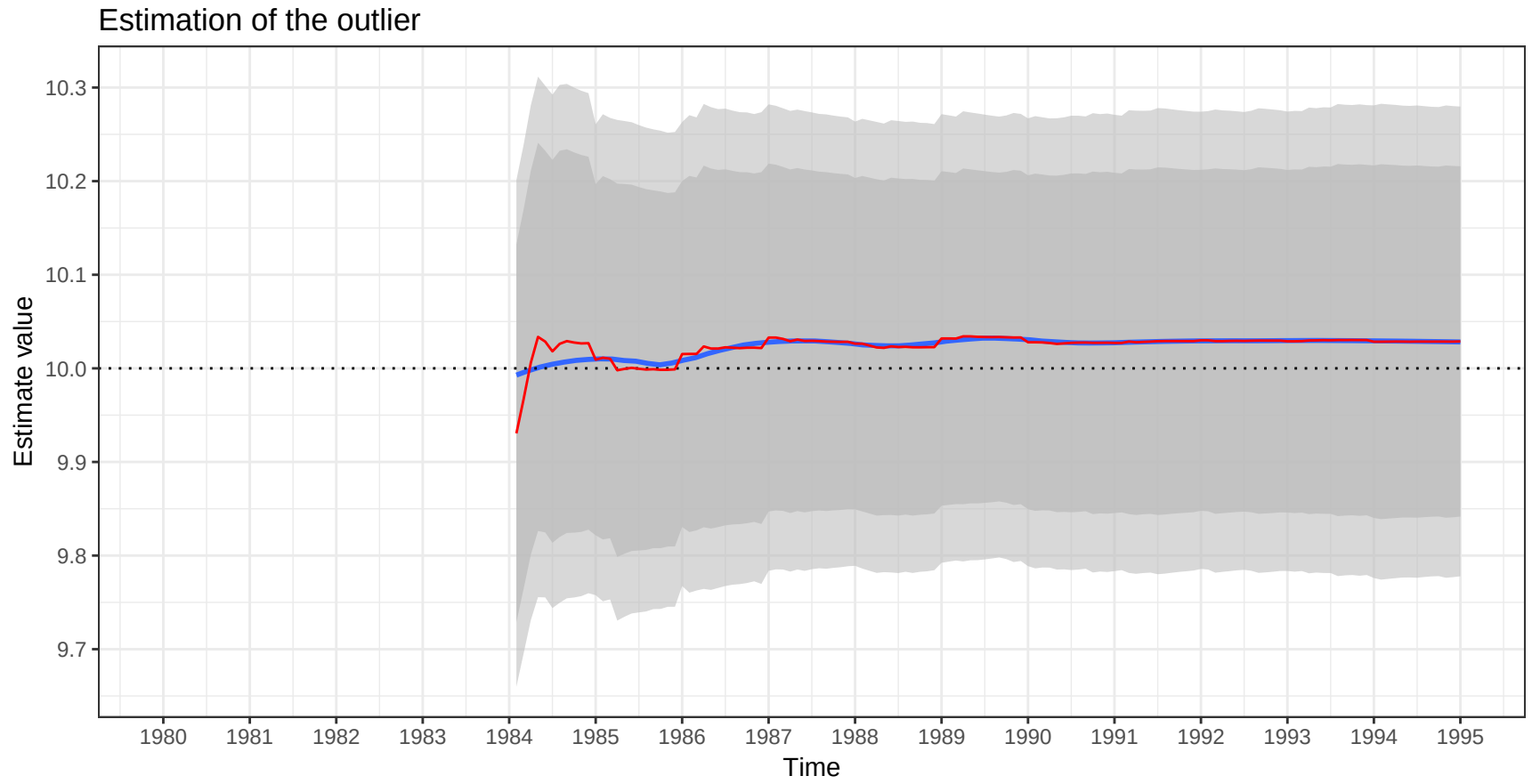


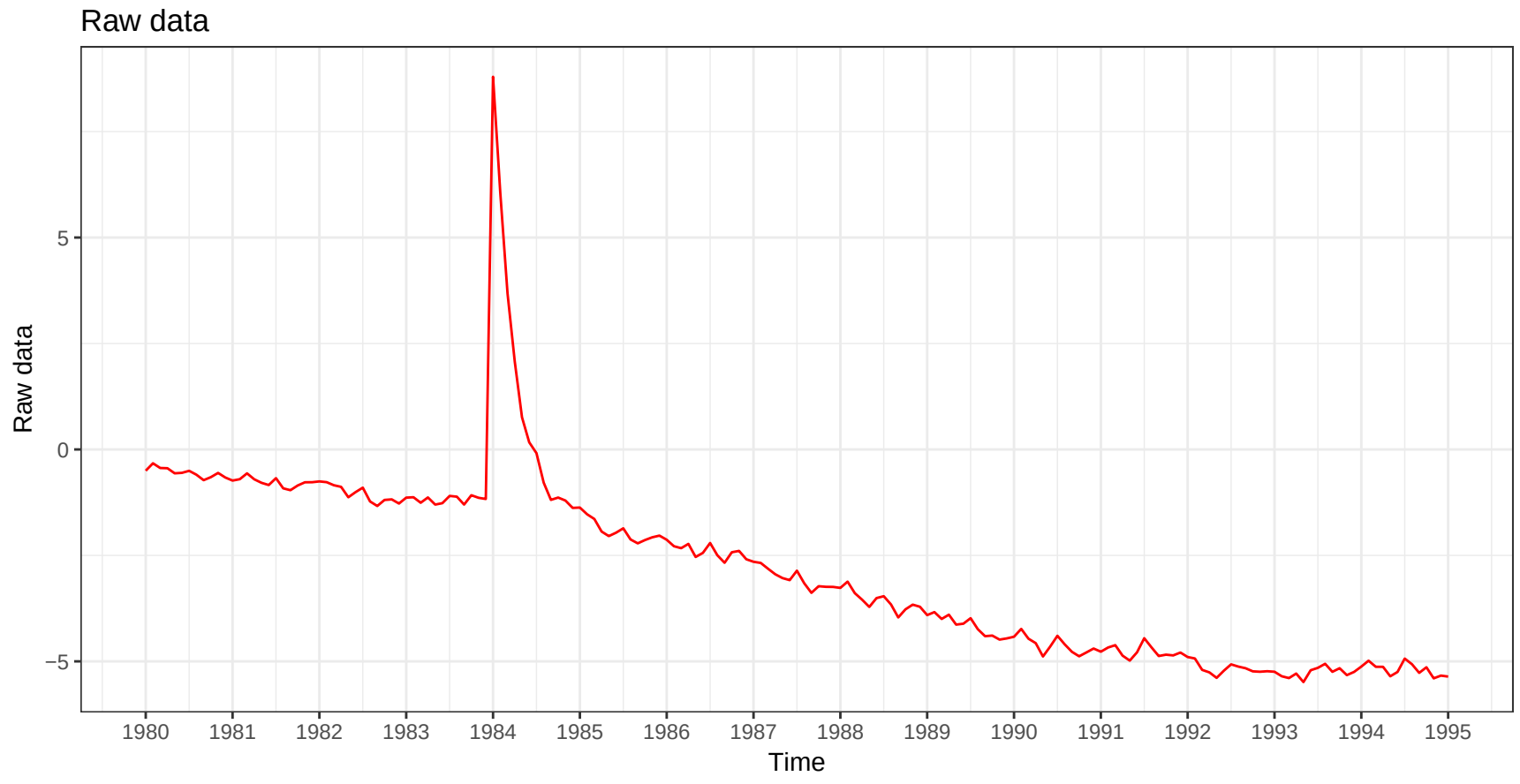
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.3B)(1−0.7B12)at



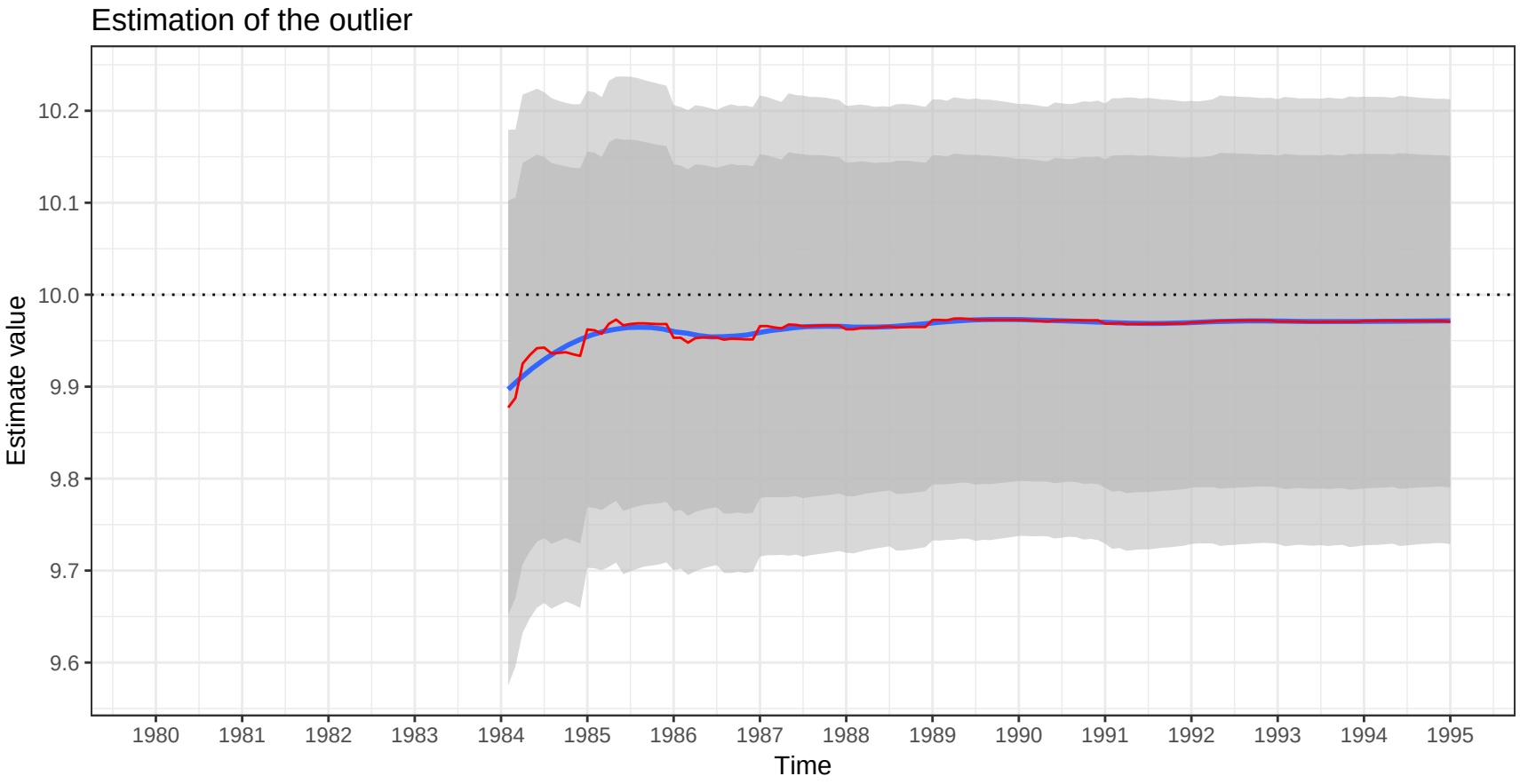


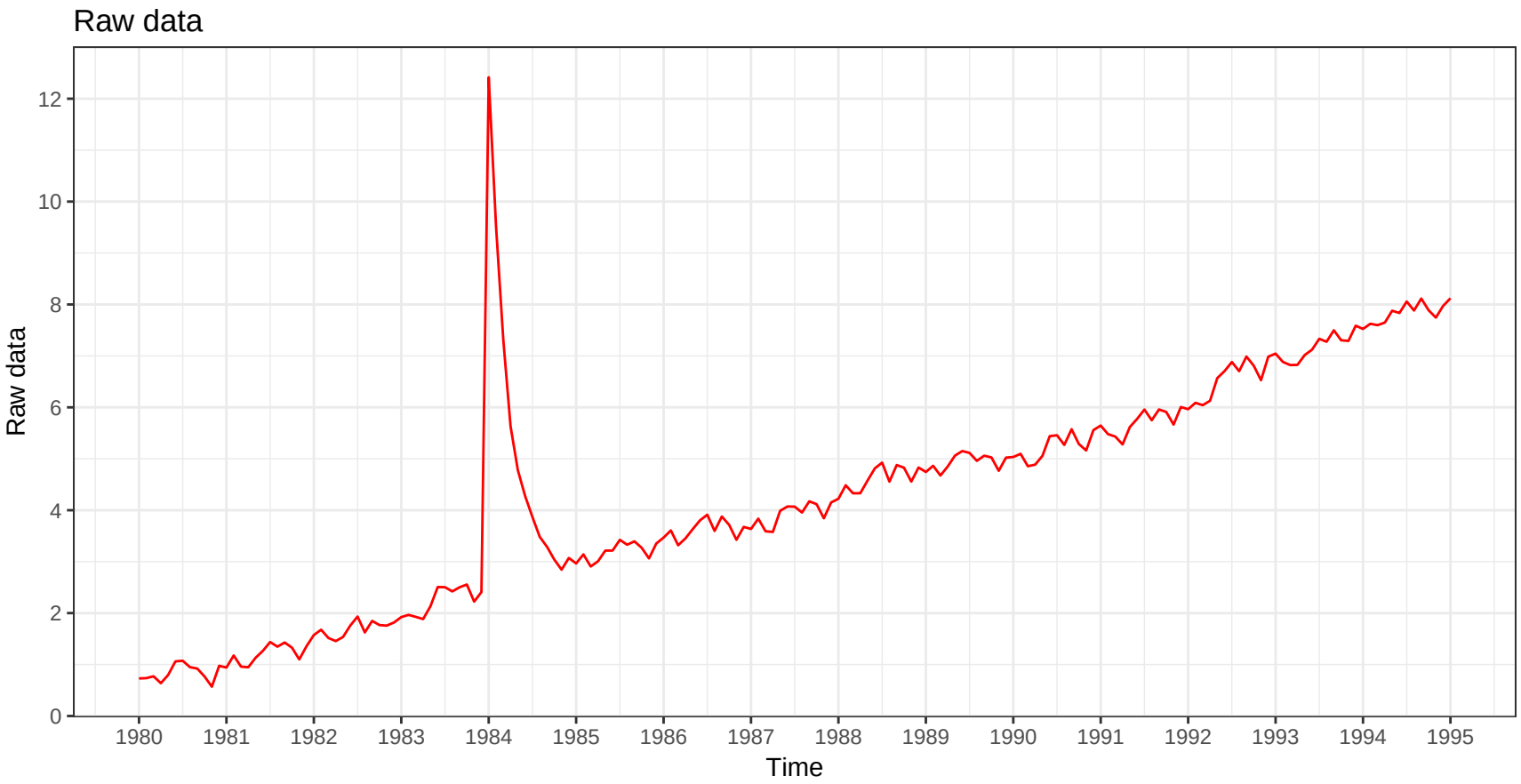
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.3B)(1−0.7B12)at



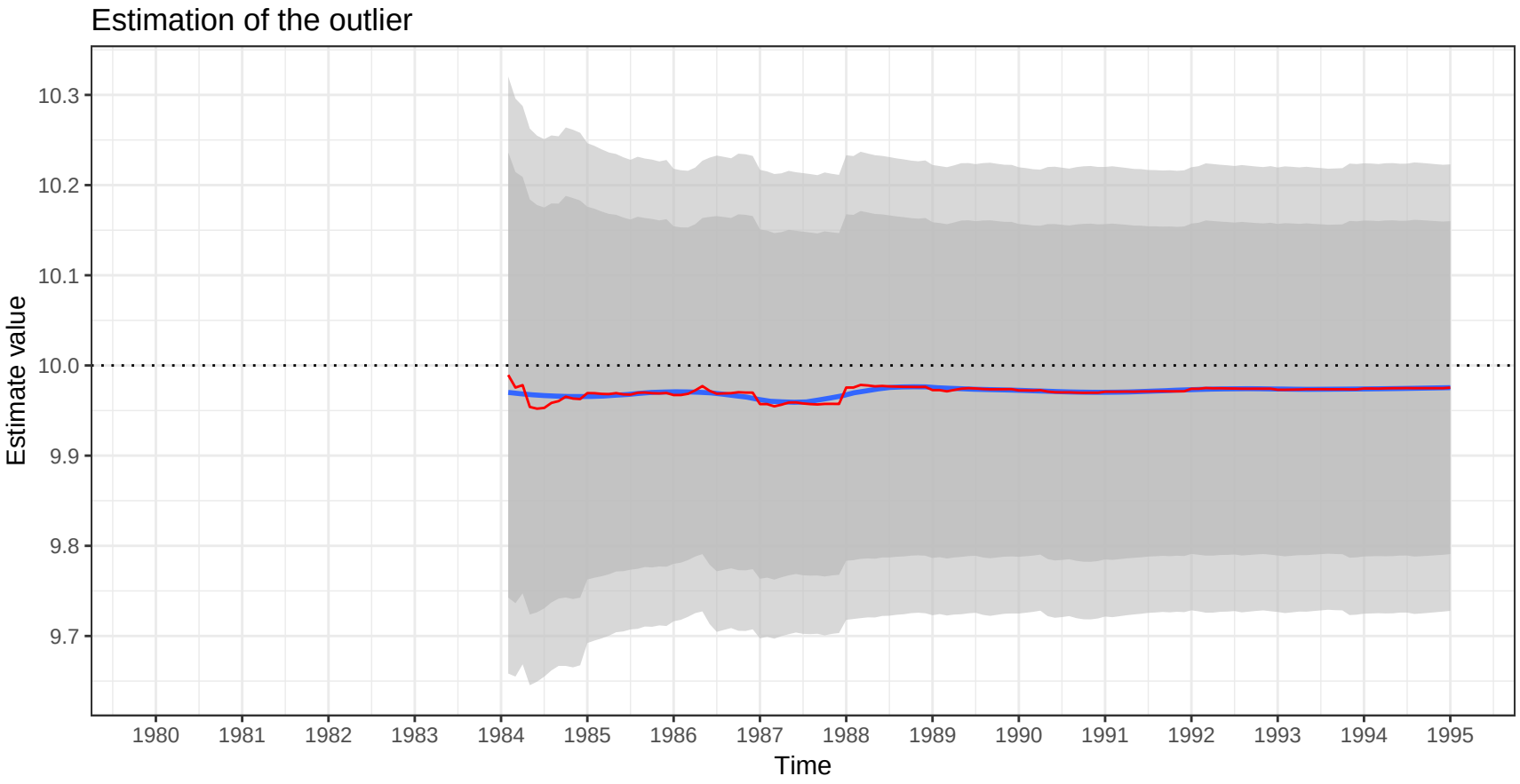


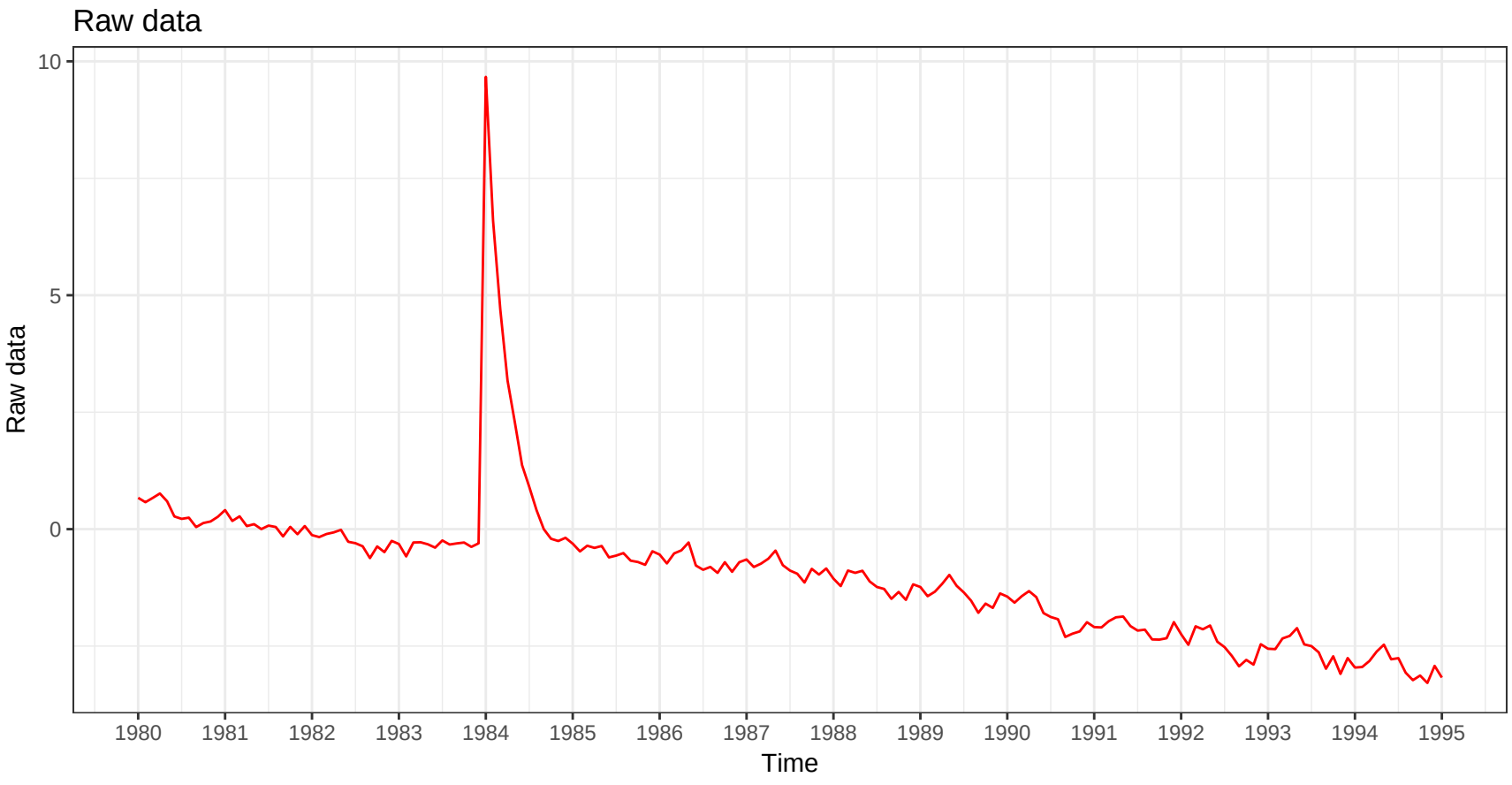
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.3B)(1−0.7B12)at



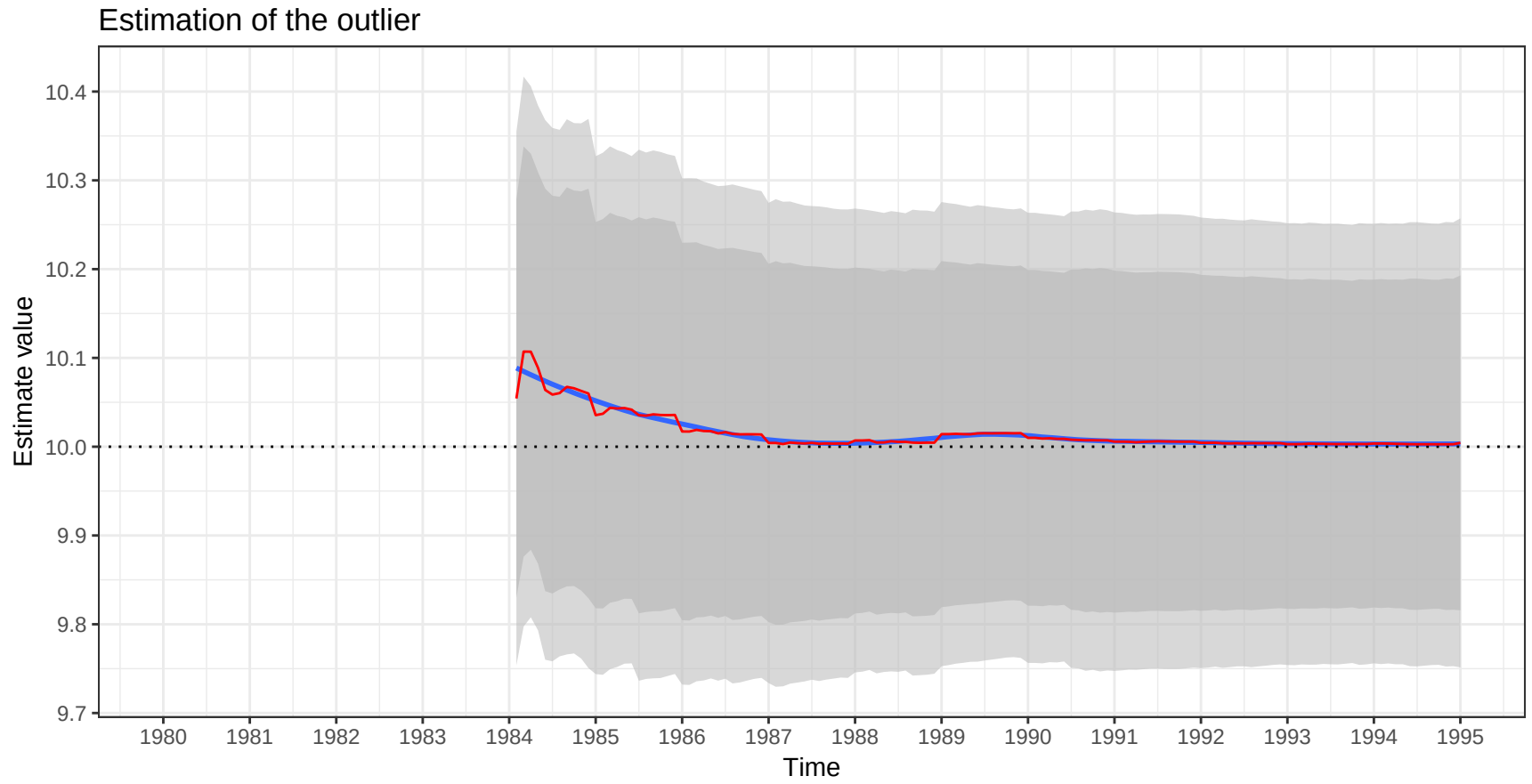


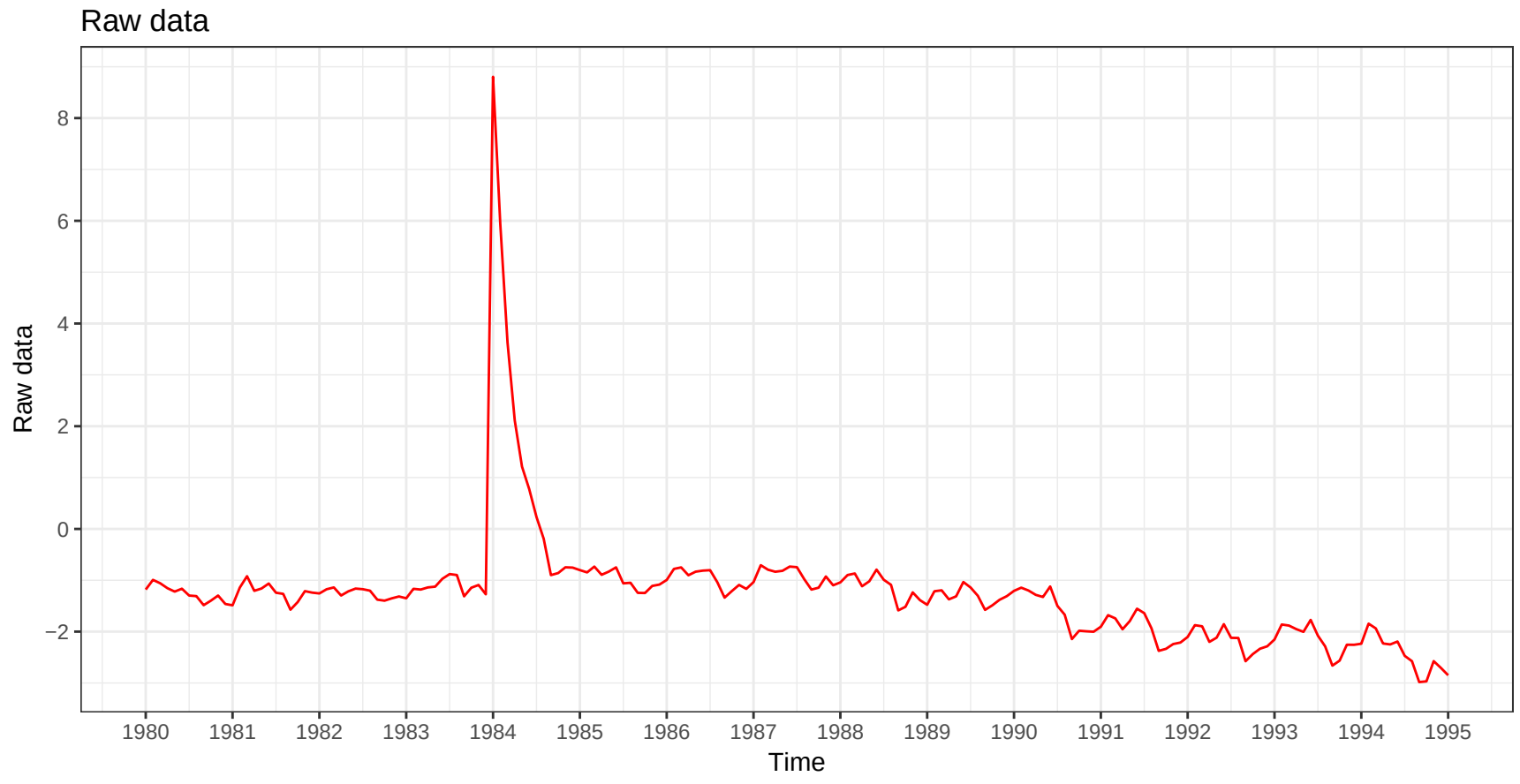
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.3B)(1−0.7B12)at



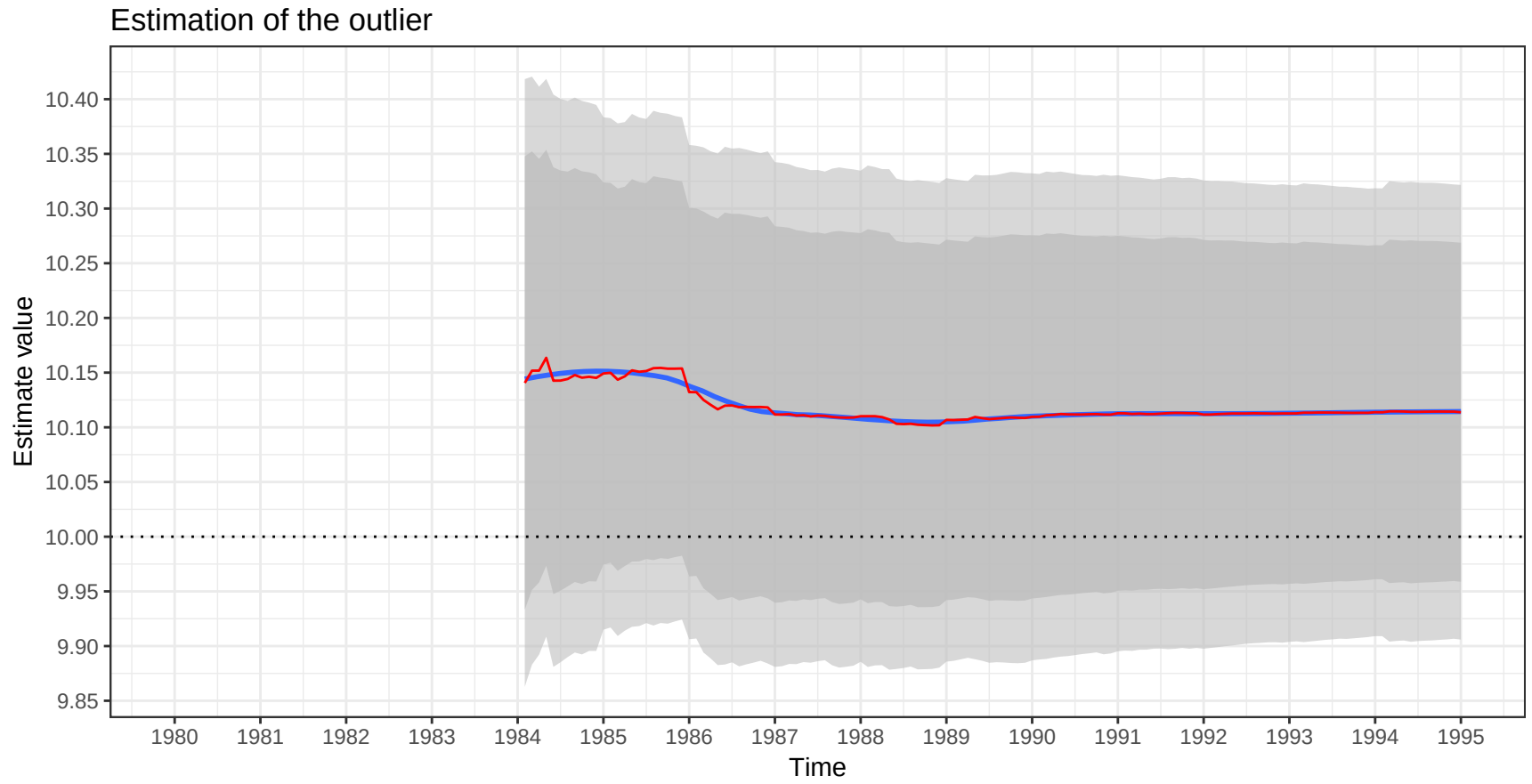


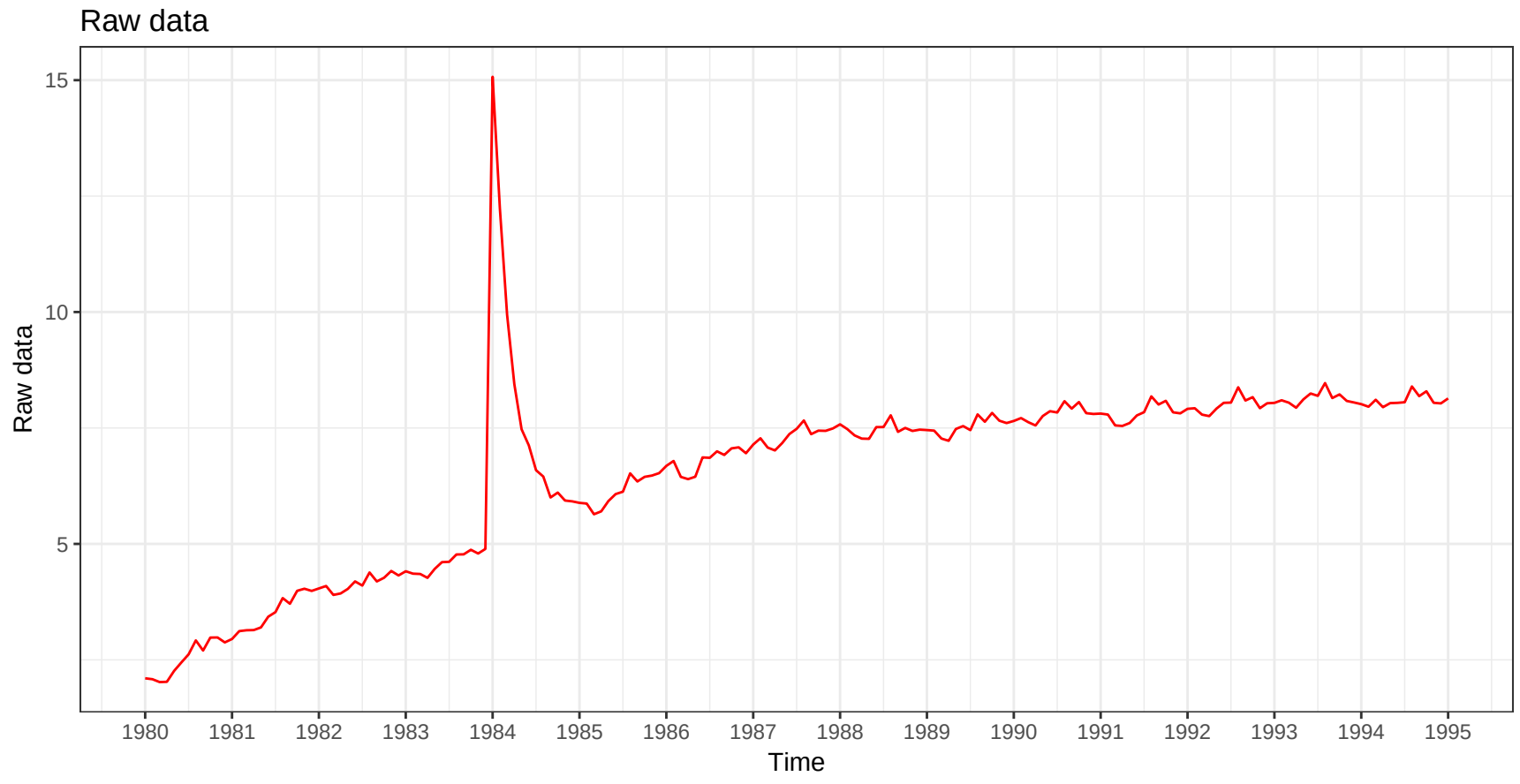
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.3B)(1−0.7B12)at



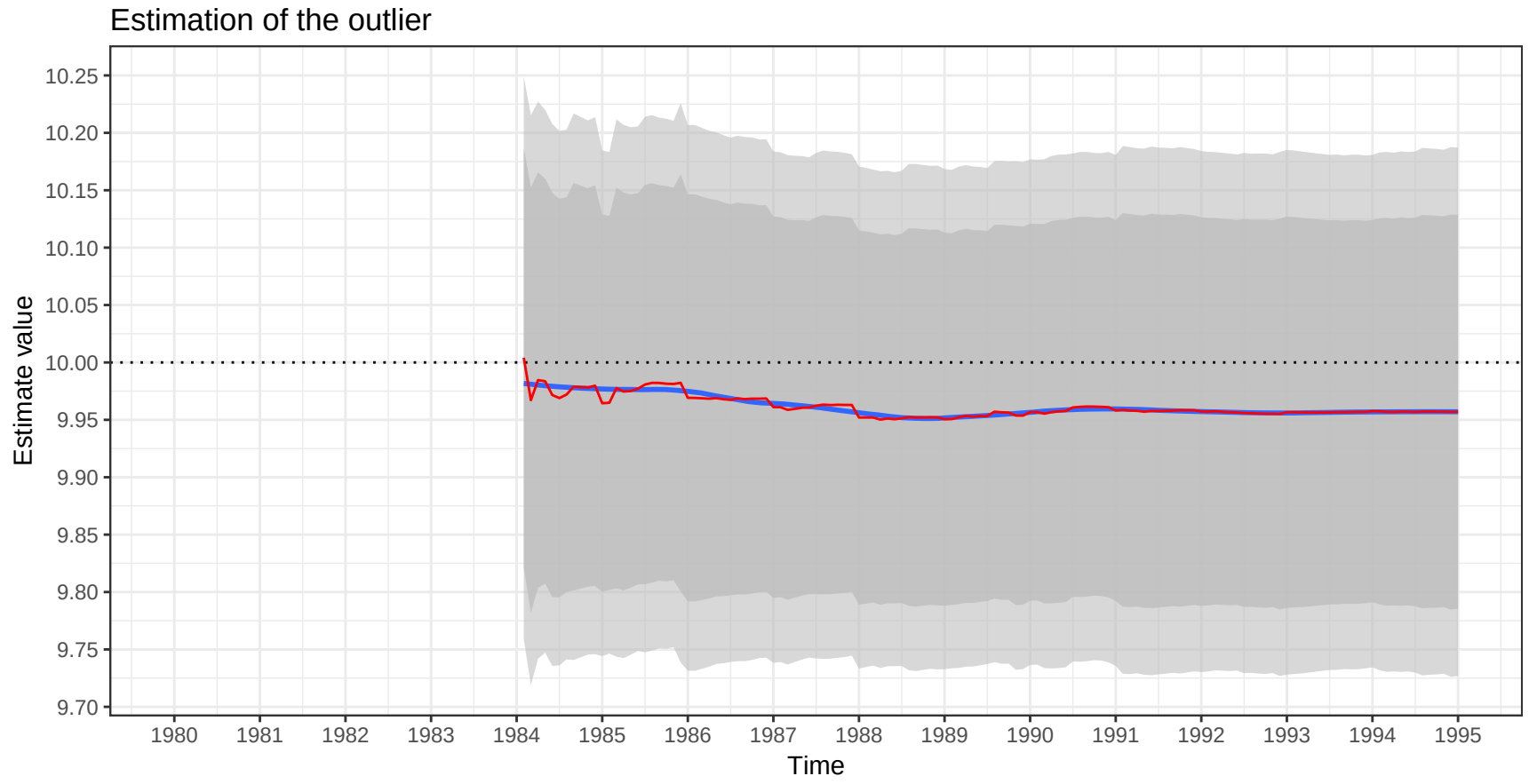


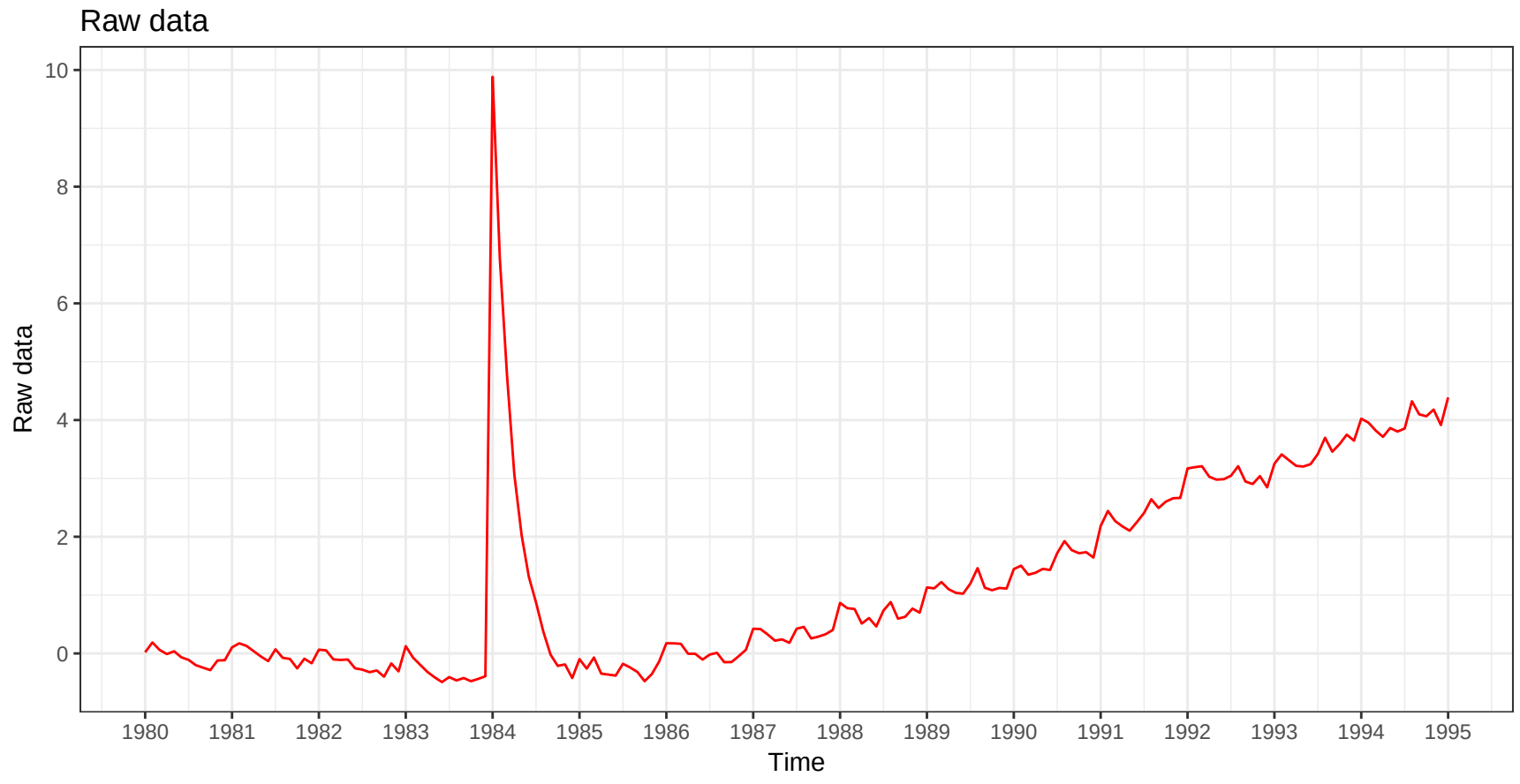
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.3B)(1−0.7B12)at



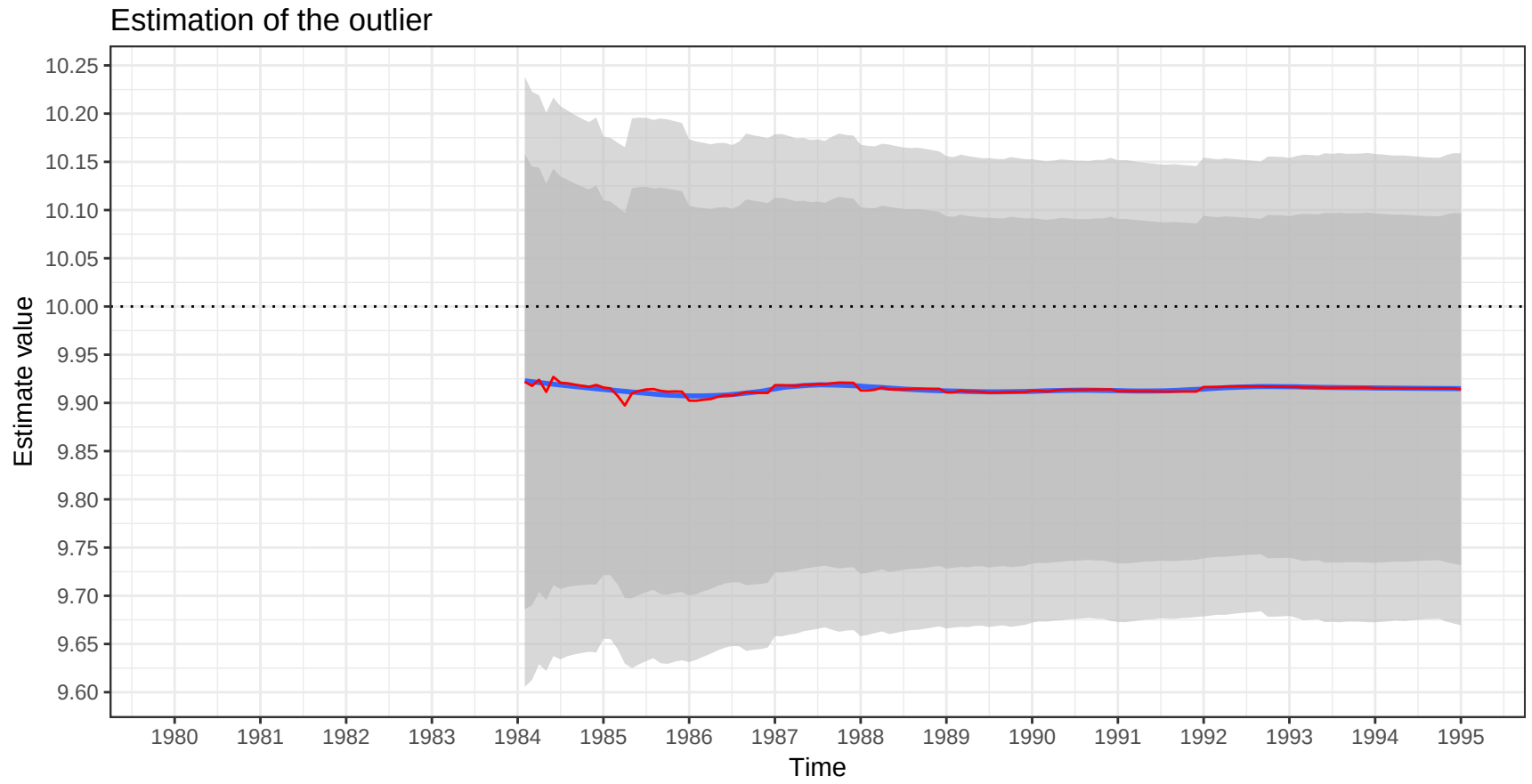


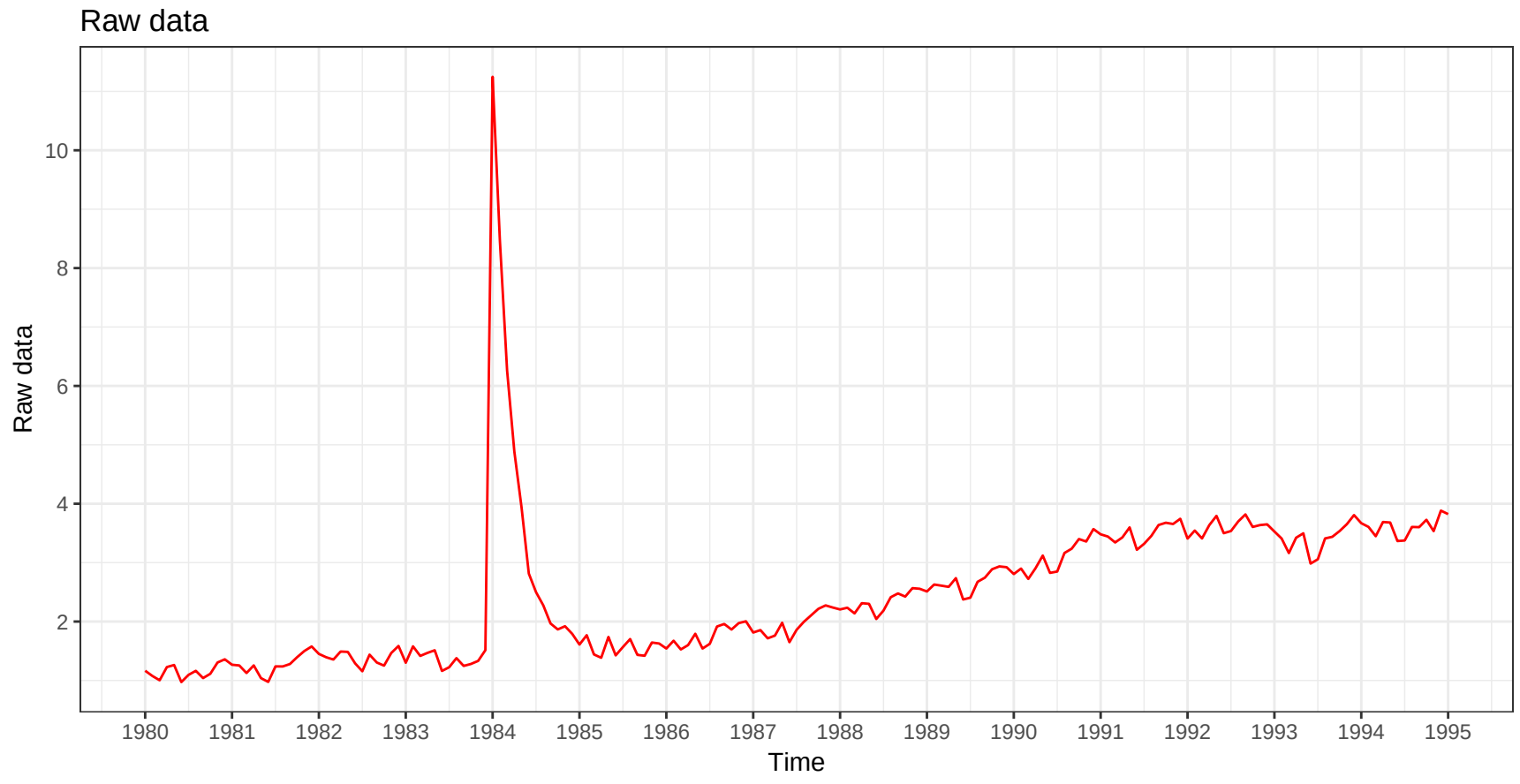
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.3B)(1−0.7B12)at

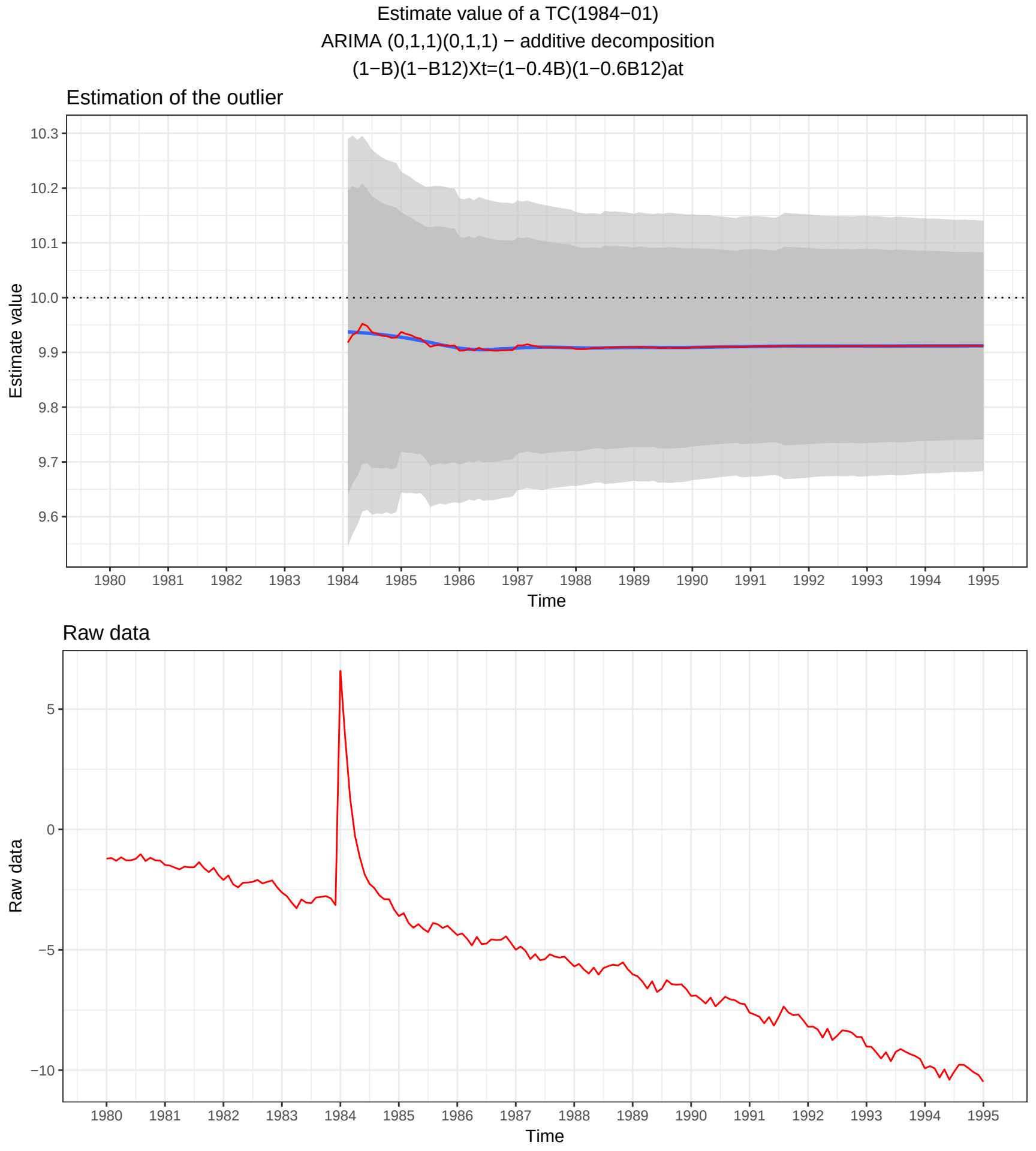




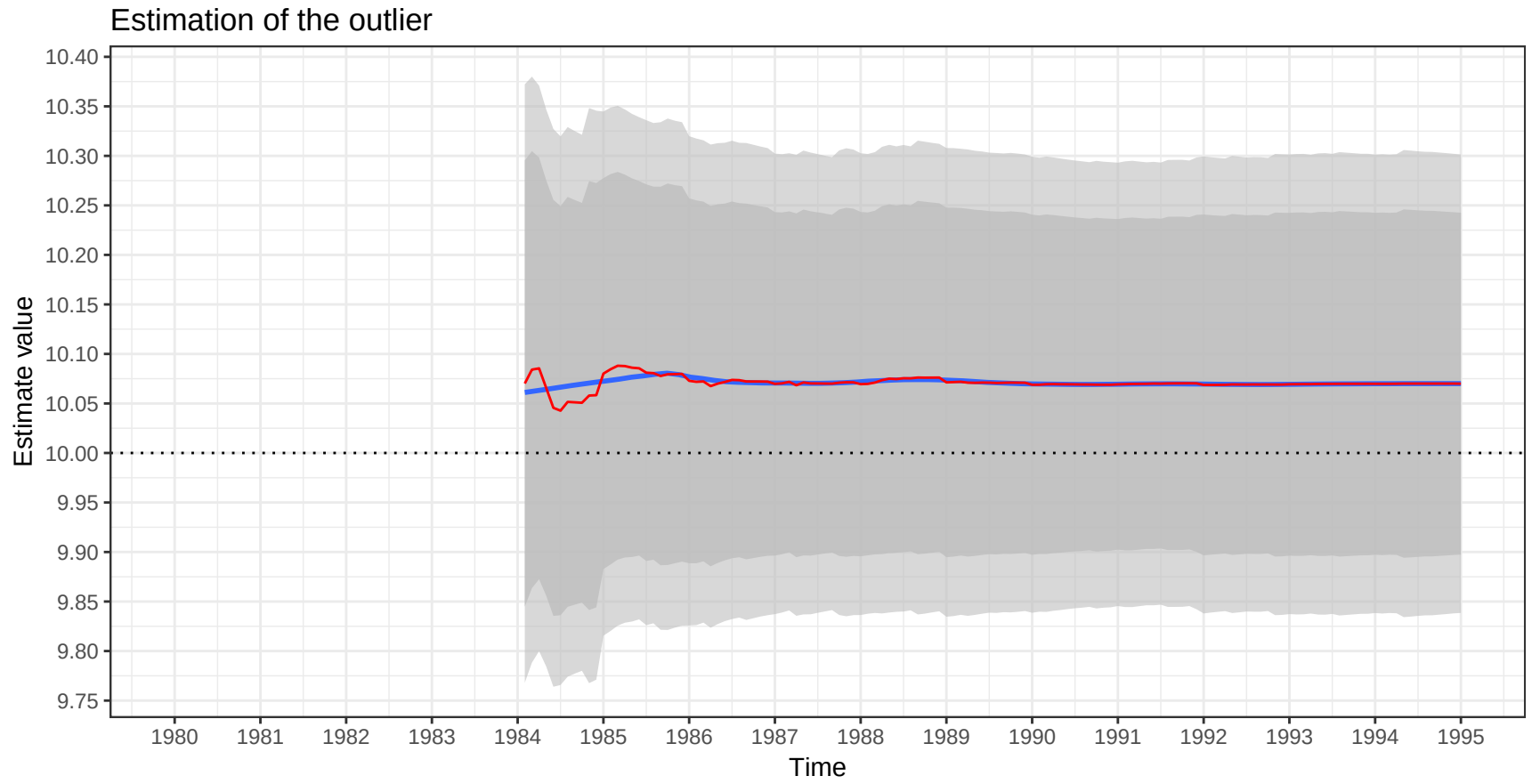
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.3B)(1−0.7B12)at

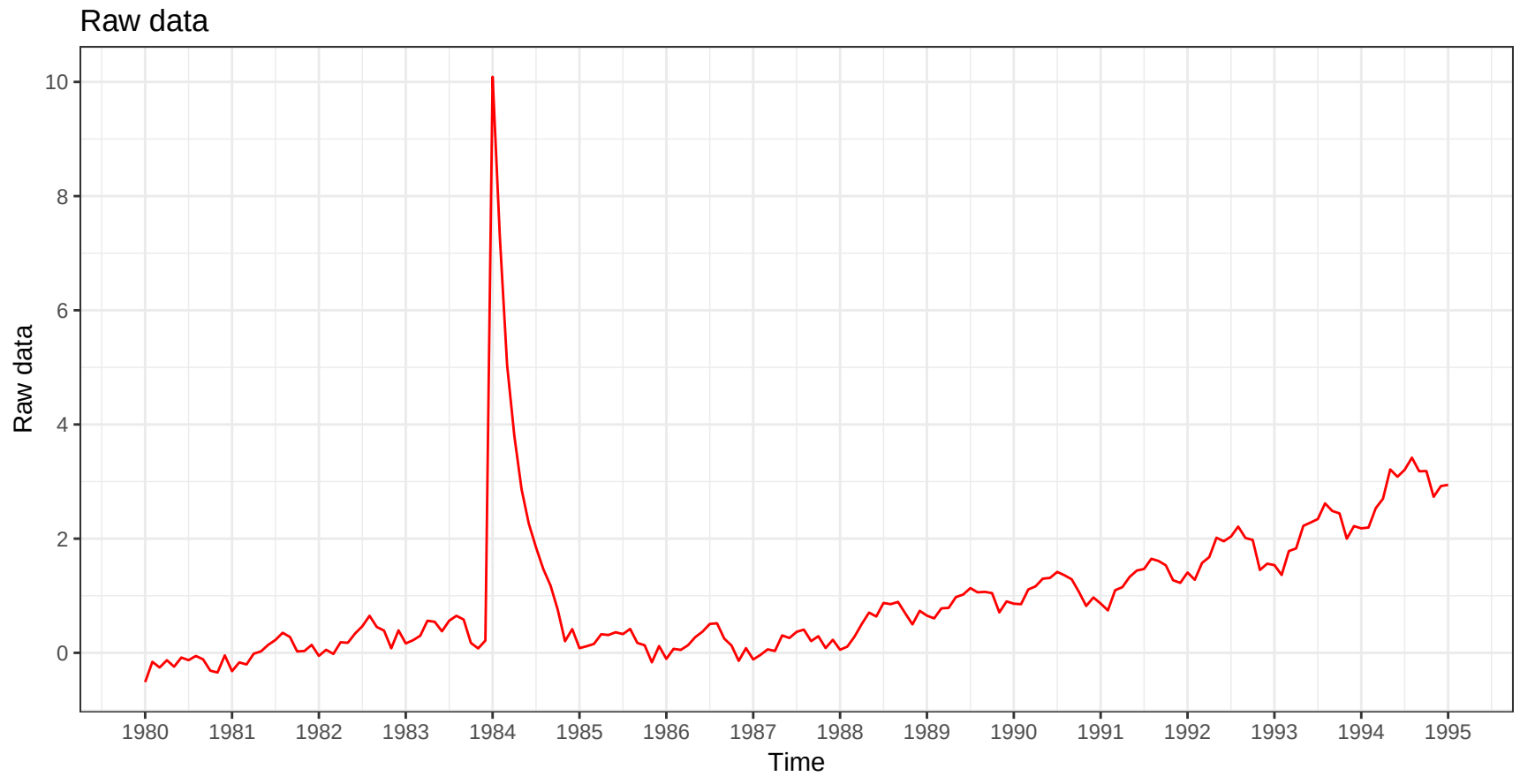




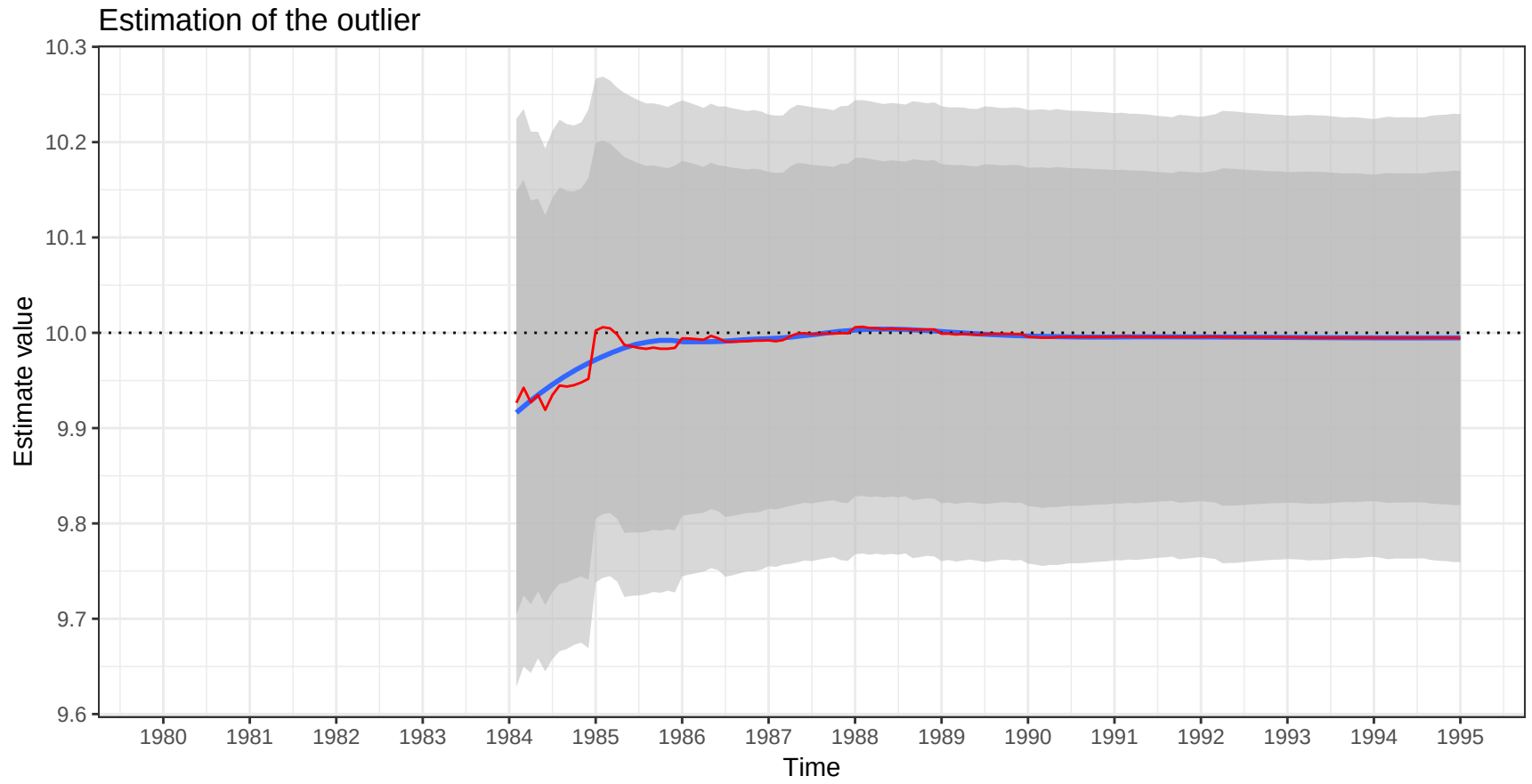

Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.4B)(1−0.6B12)at
Estimation of the outlier
Estimate value
10.3
10.2
10.1
10.0
9.9
9.8
9.7
9.6
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time
Raw data
Raw data
5
0
−5
−10
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time

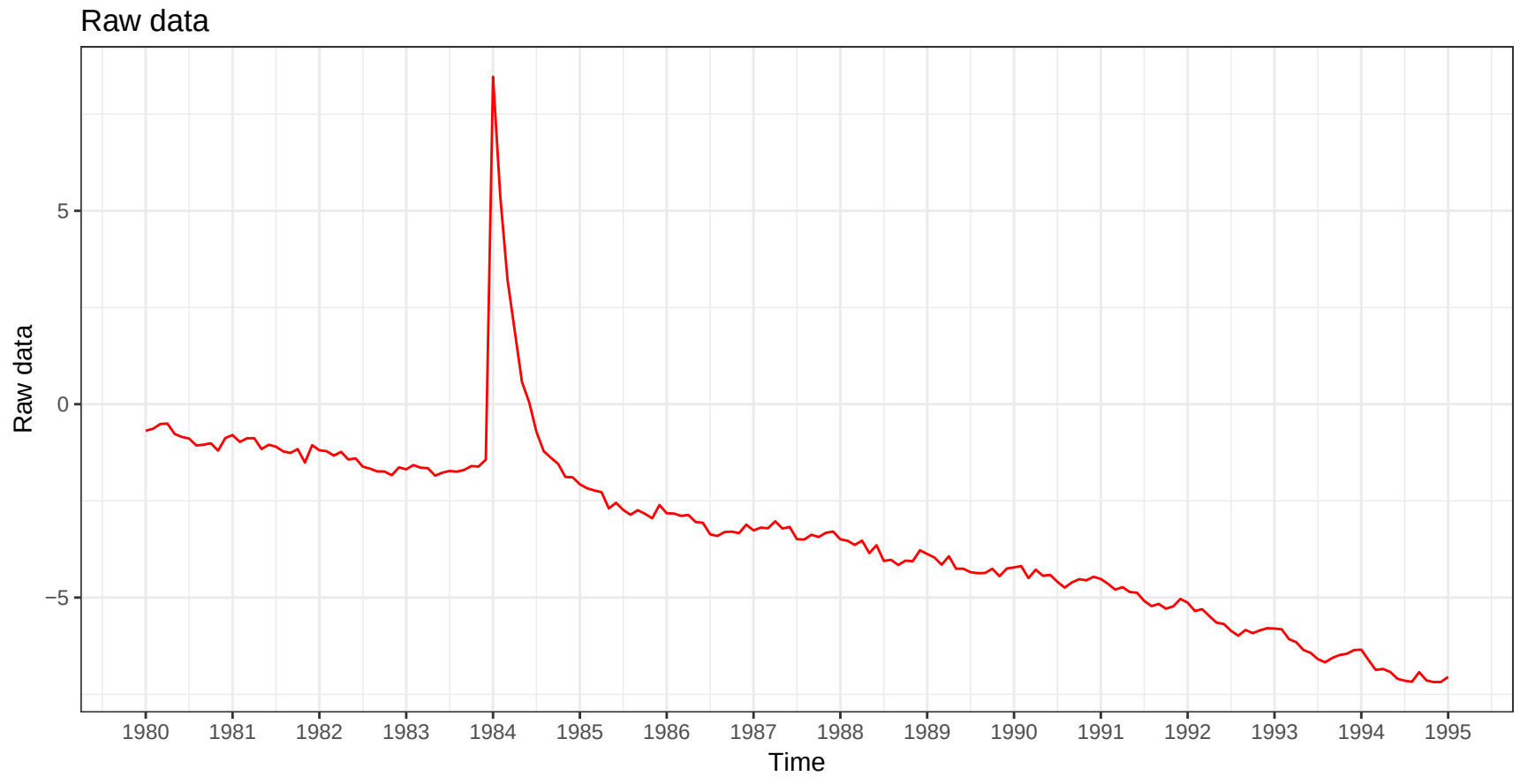
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.4B)(1−0.6B12)at



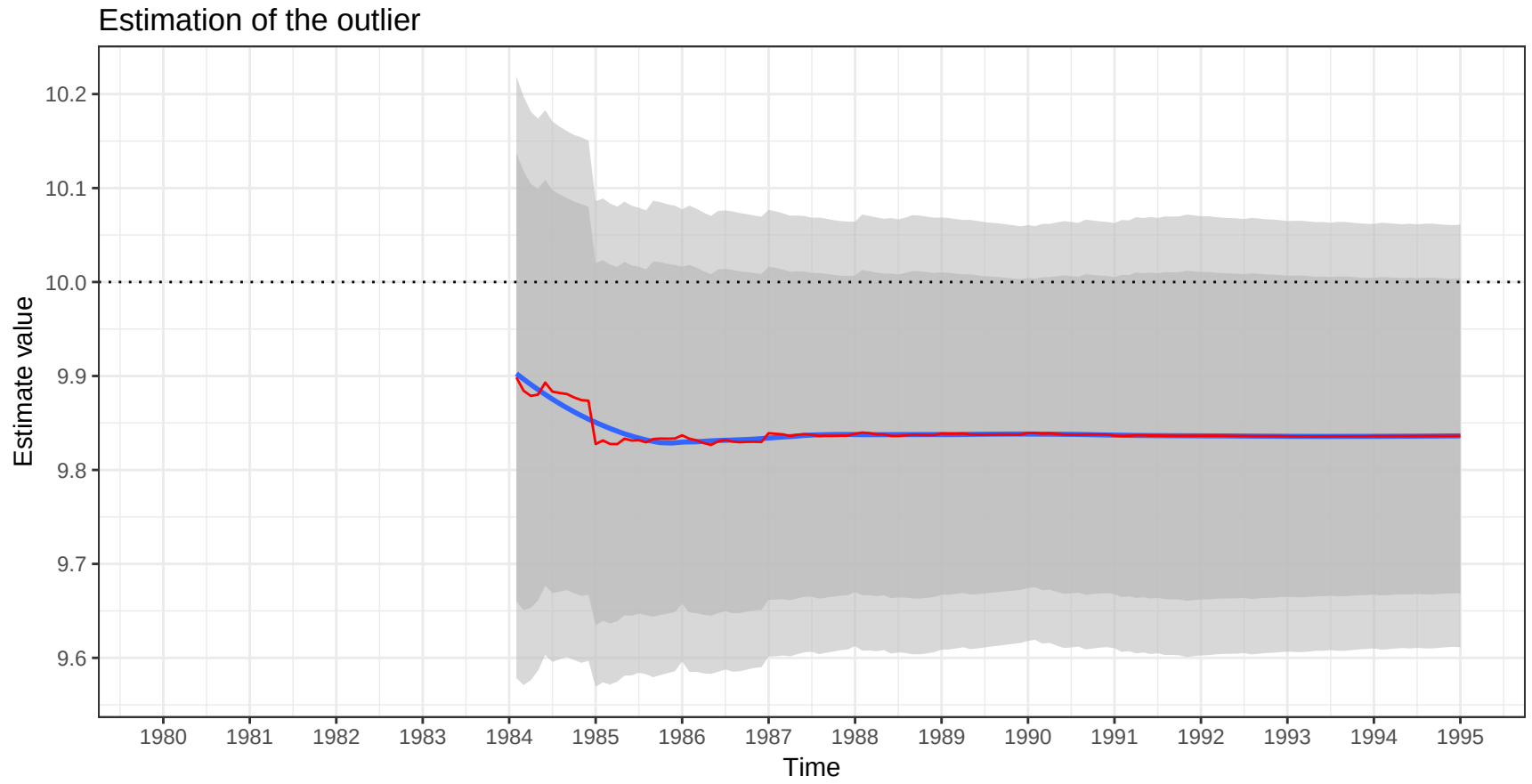


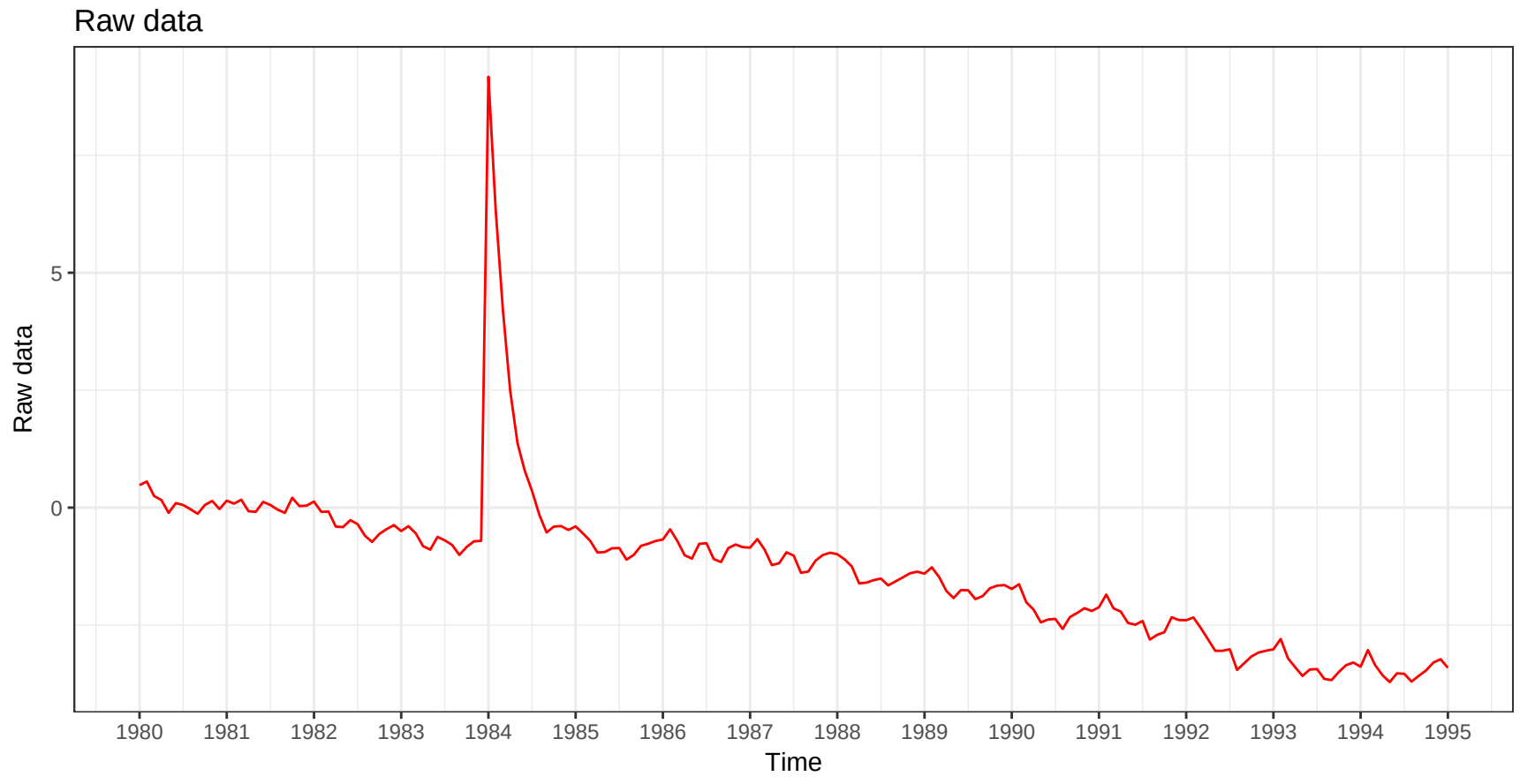
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.4B)(1−0.6B12)at

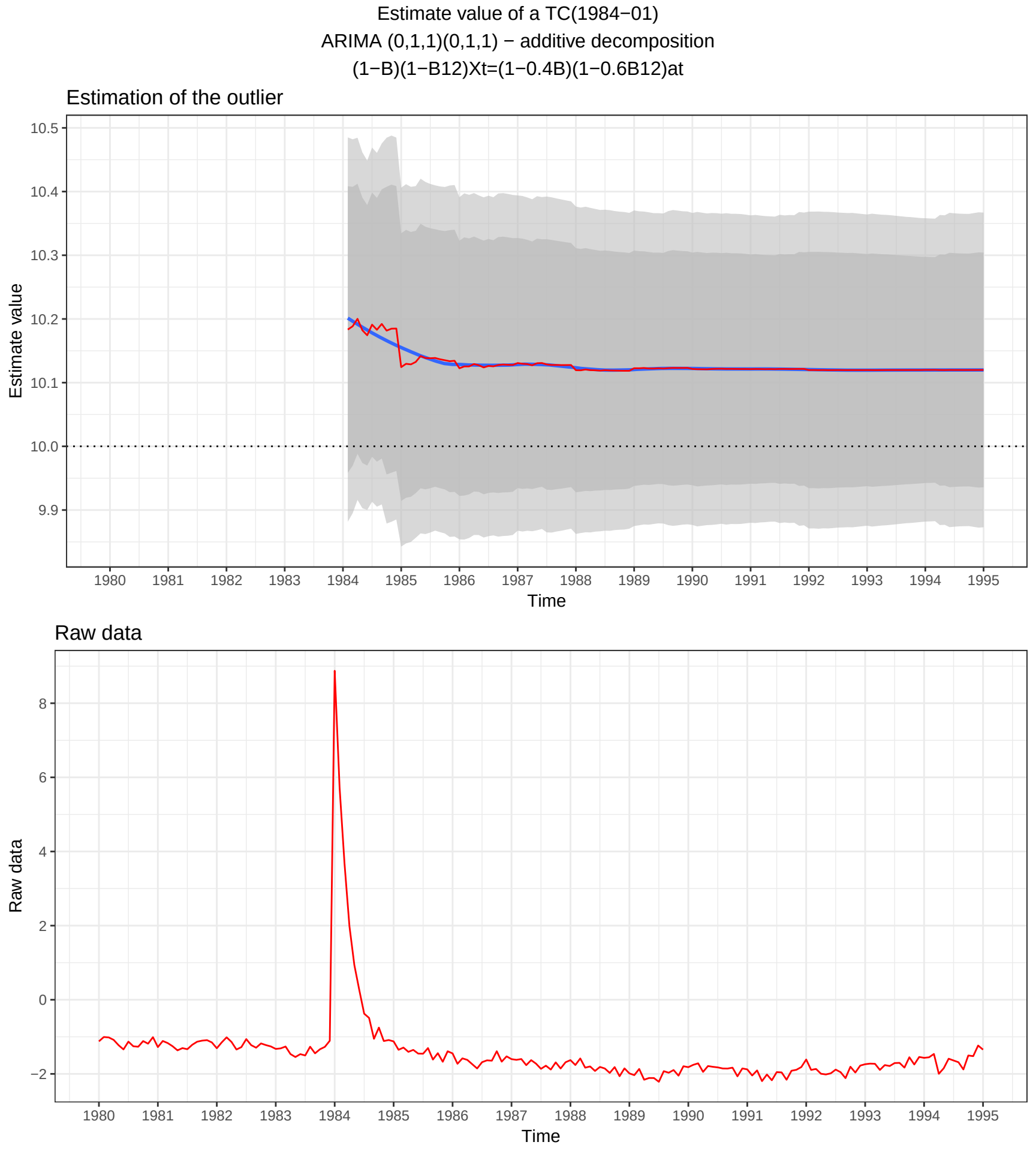




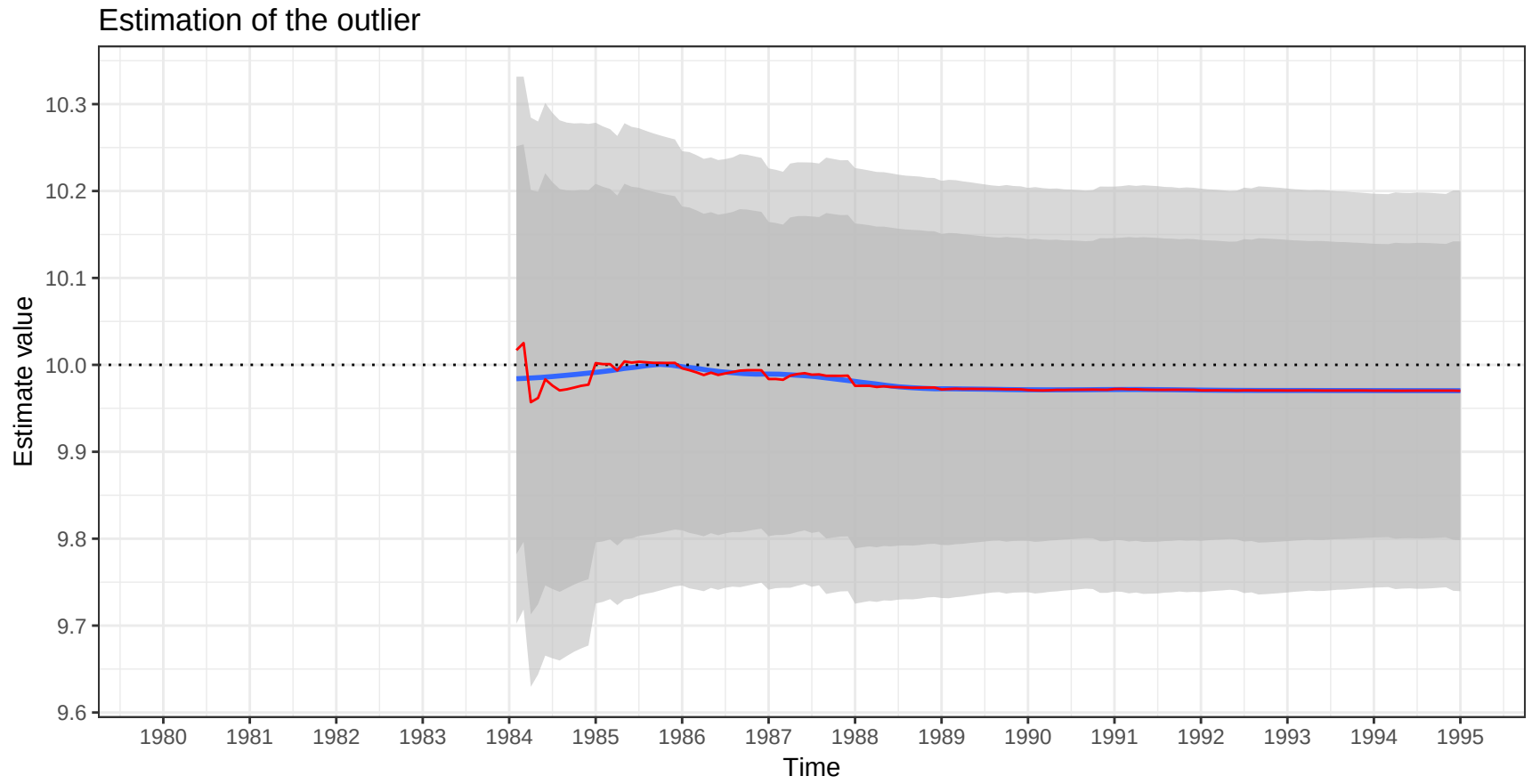
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.4B)(1−0.6B12)at

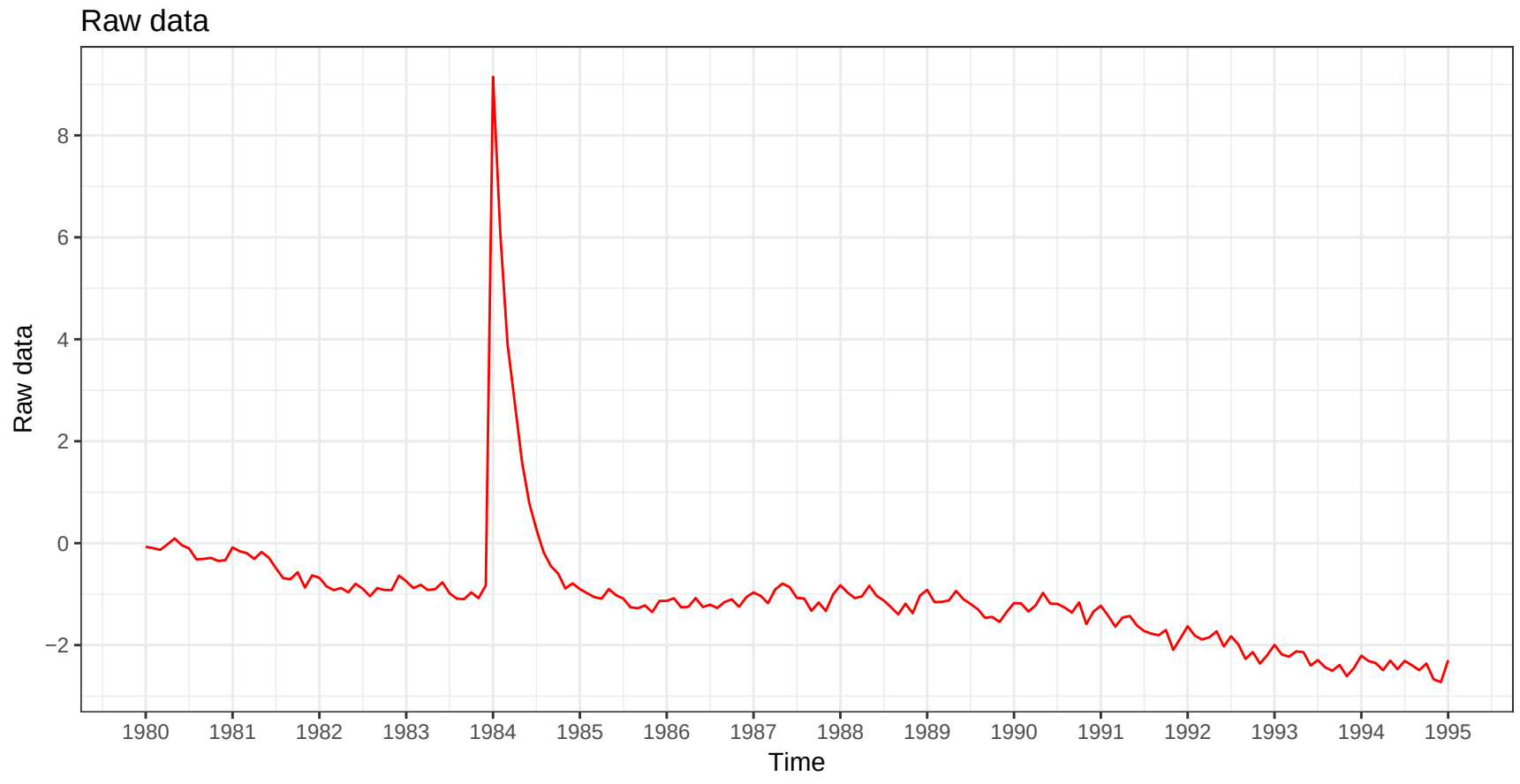





Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.4B)(1−0.6B12)at
Estimation of the outlier
Estimate value
10.5
10.4
10.3
10.2
10.1
10.0
9.9
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time
Raw data
Raw data
8
6
4
2
0
−2
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time

Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.4B)(1−0.6B12)at





Estimate value of a TC(1984−01)
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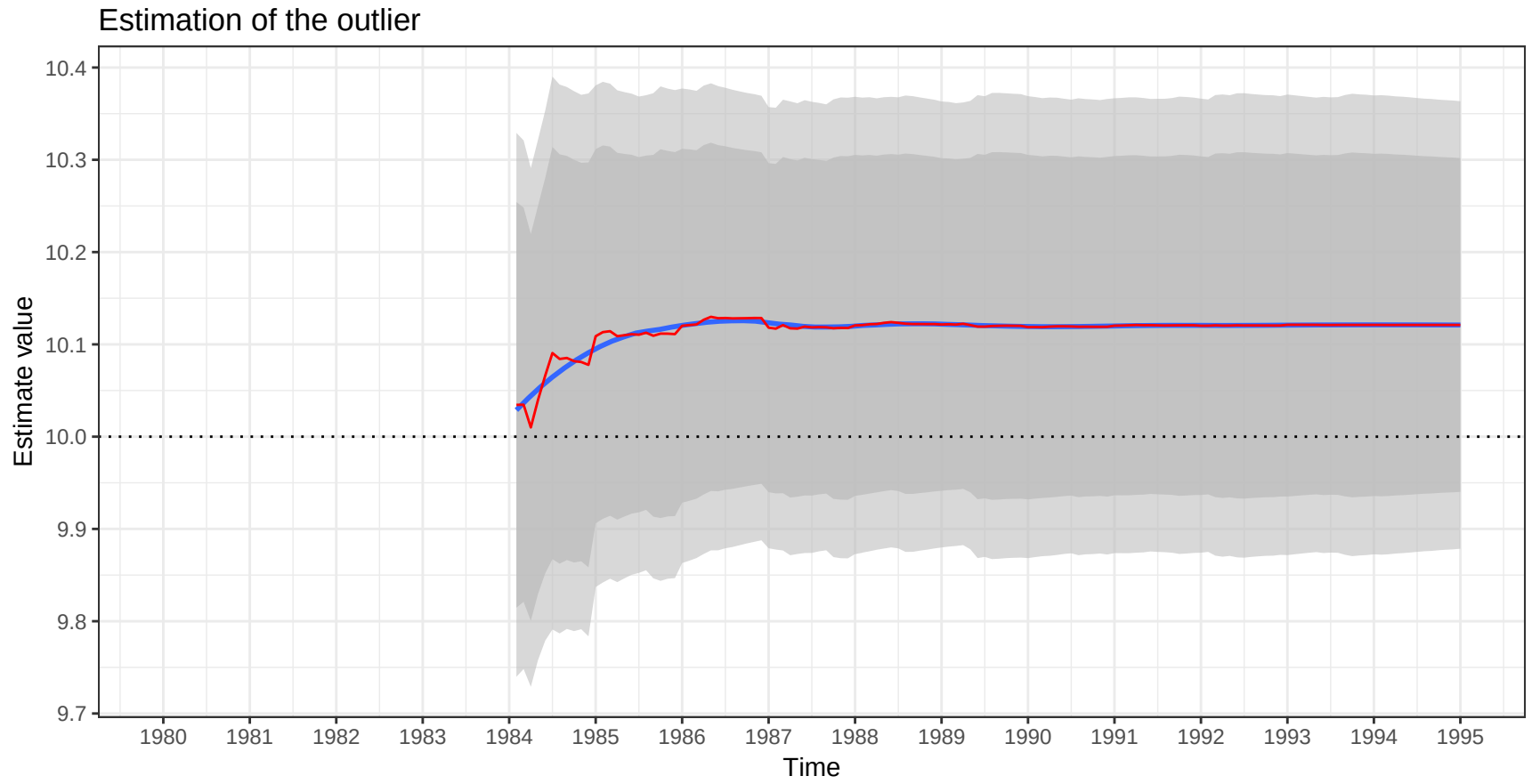

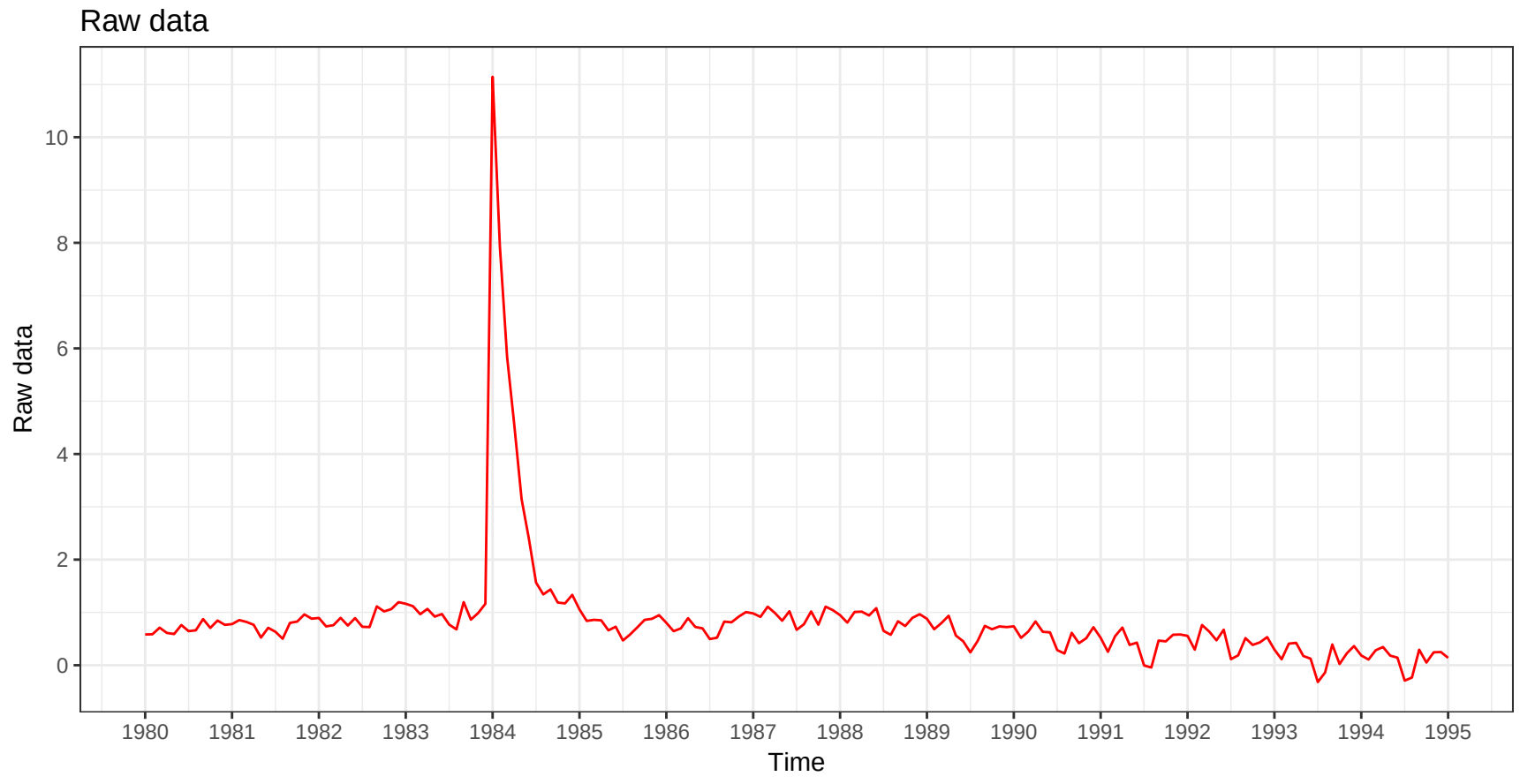

Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
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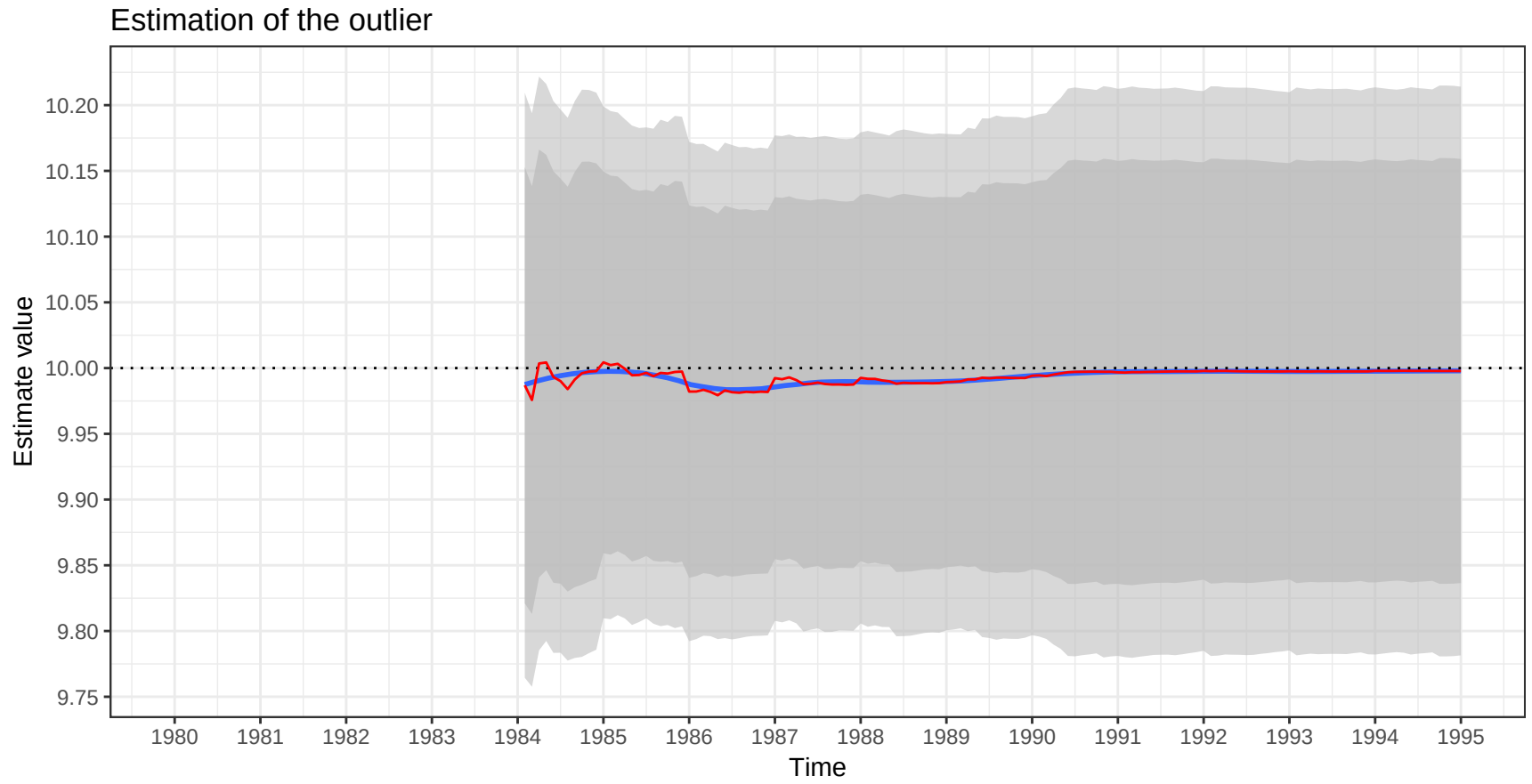
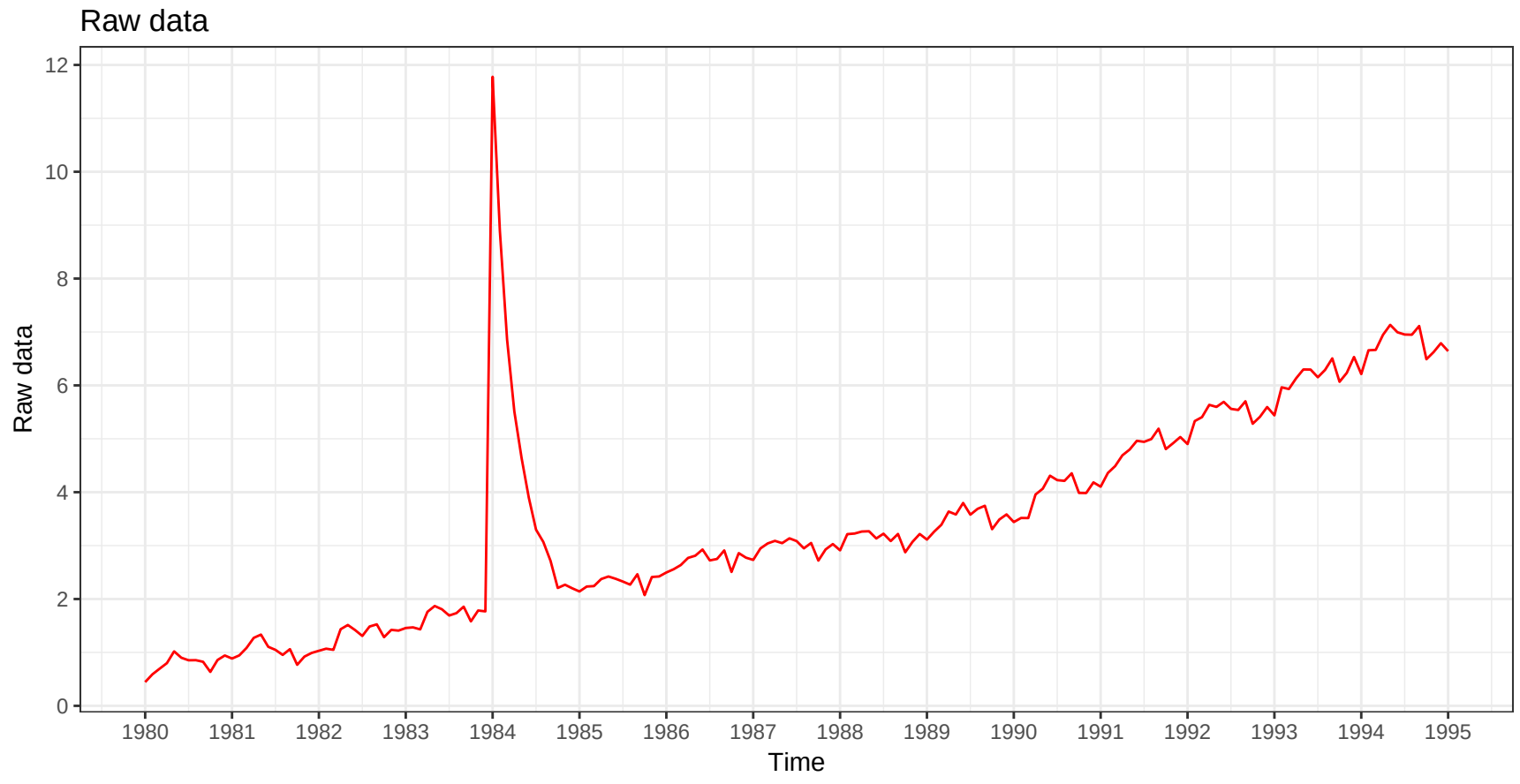
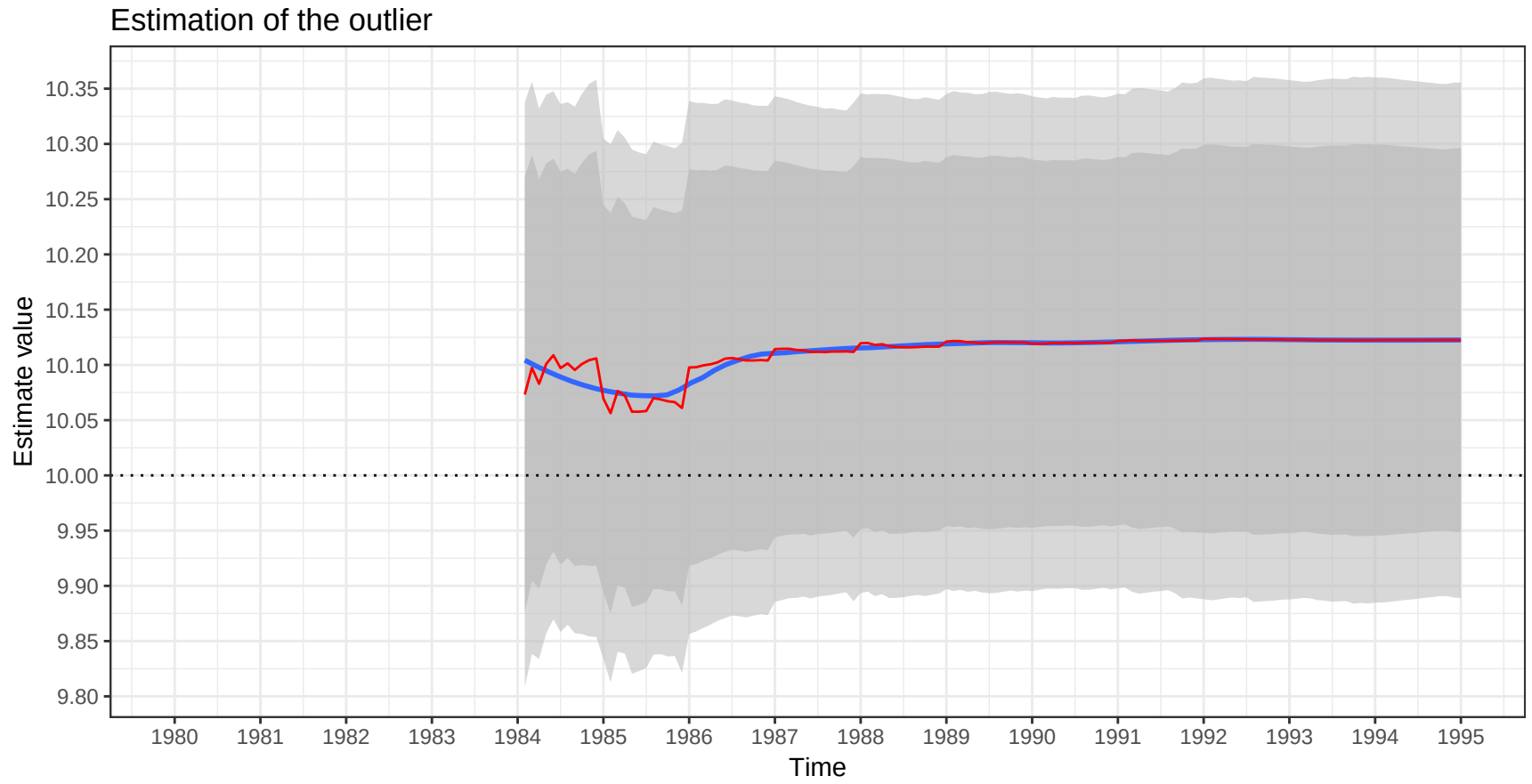
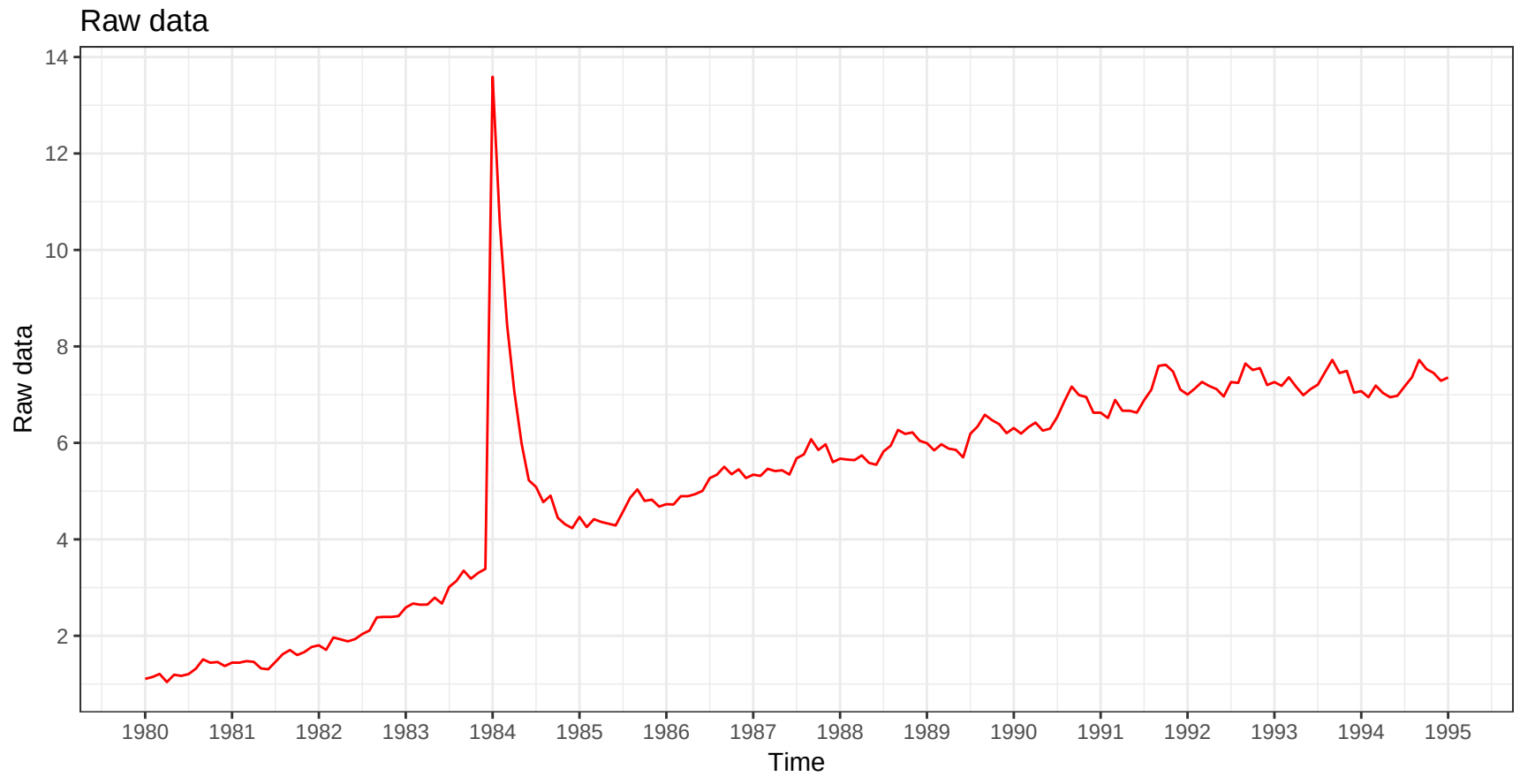


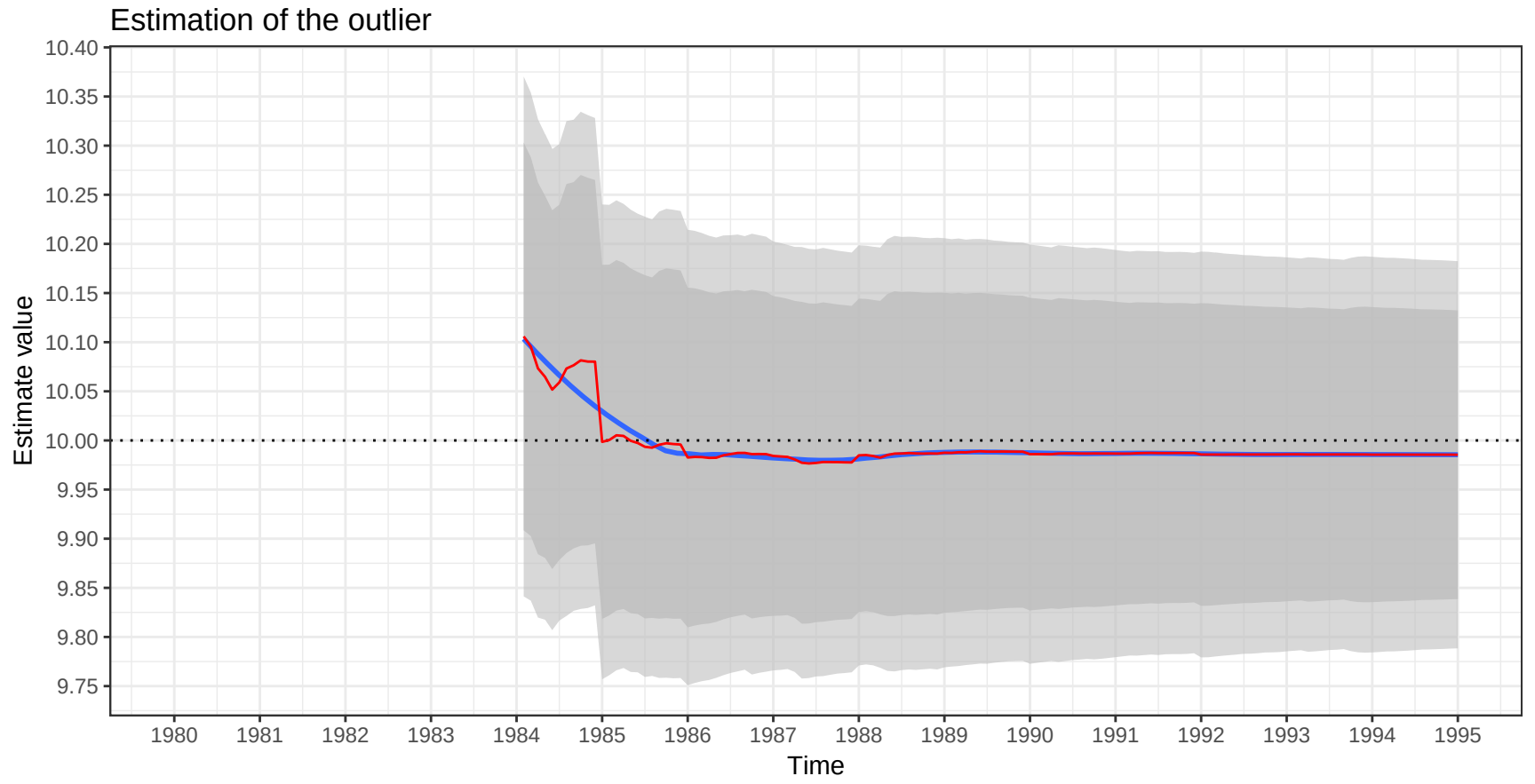


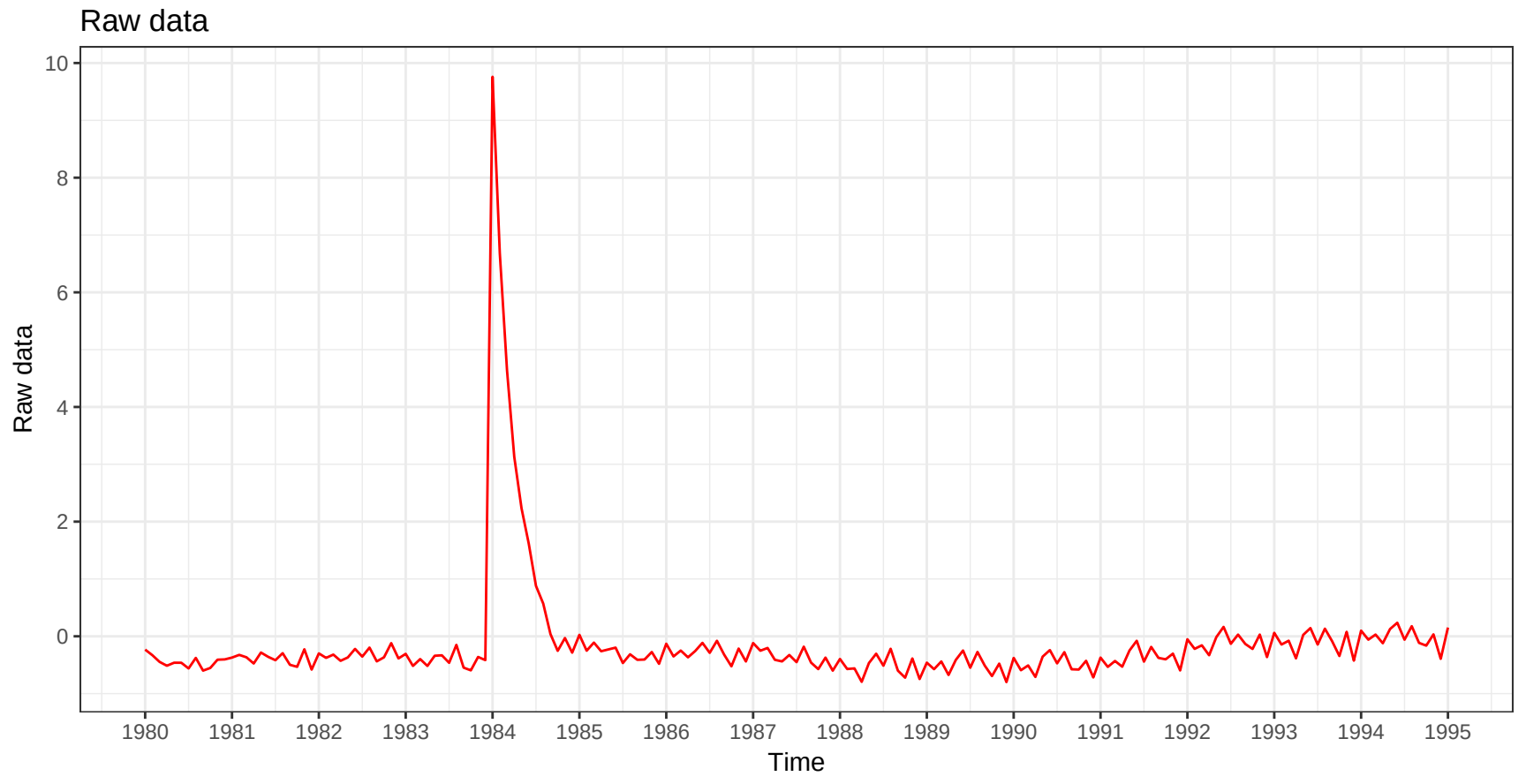
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.4B)(1−0.6B12)at



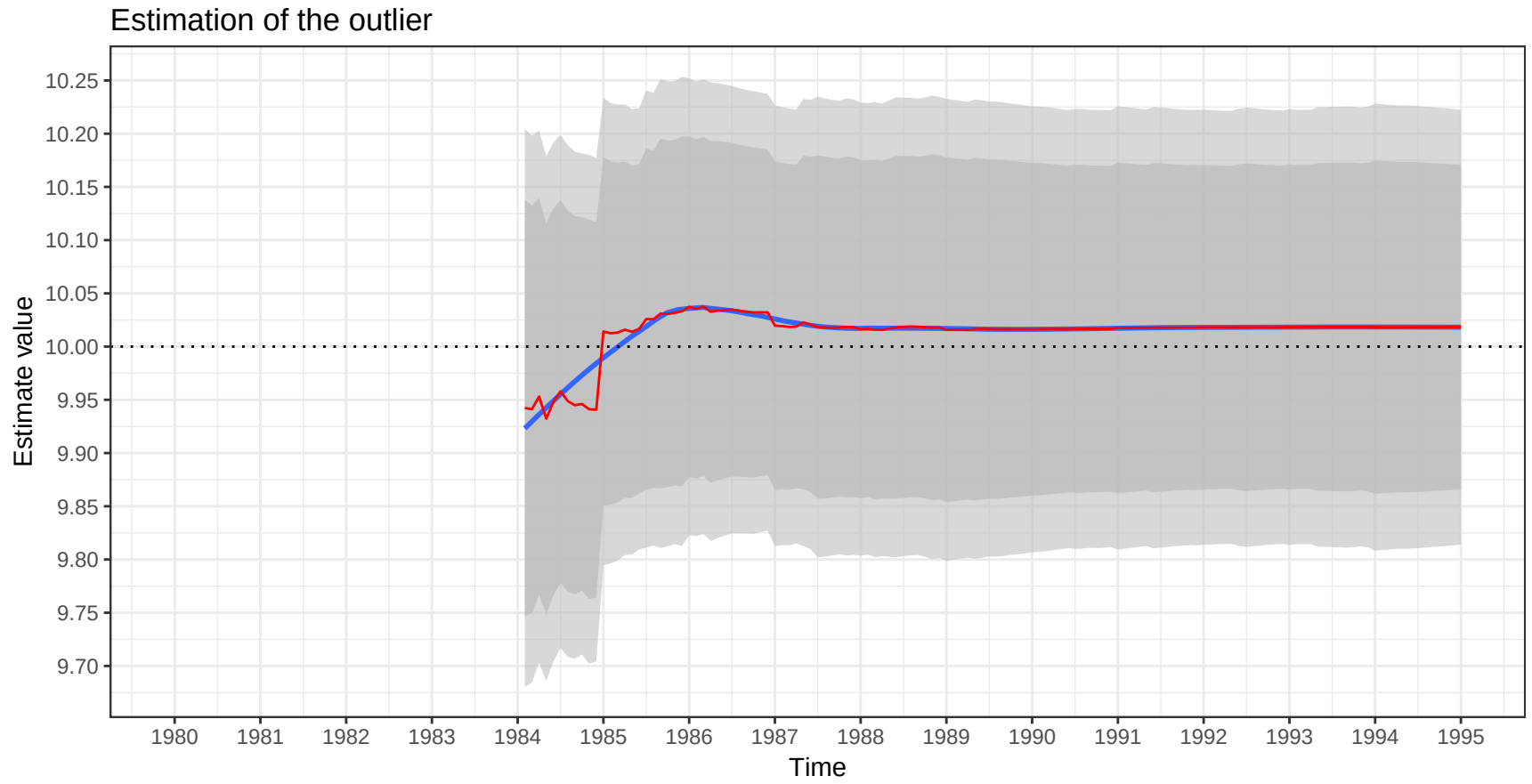


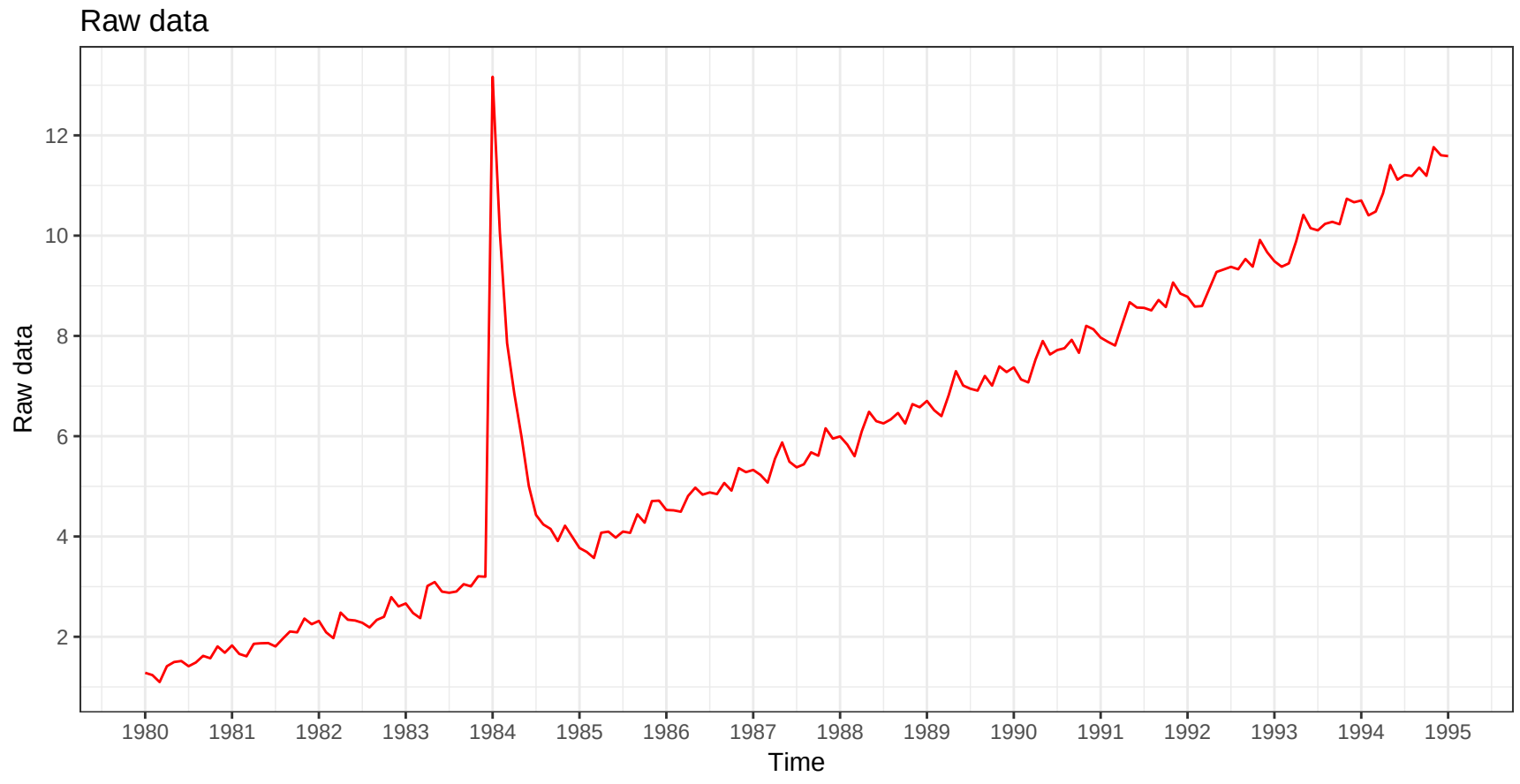
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.4B)(1−0.6B12)at



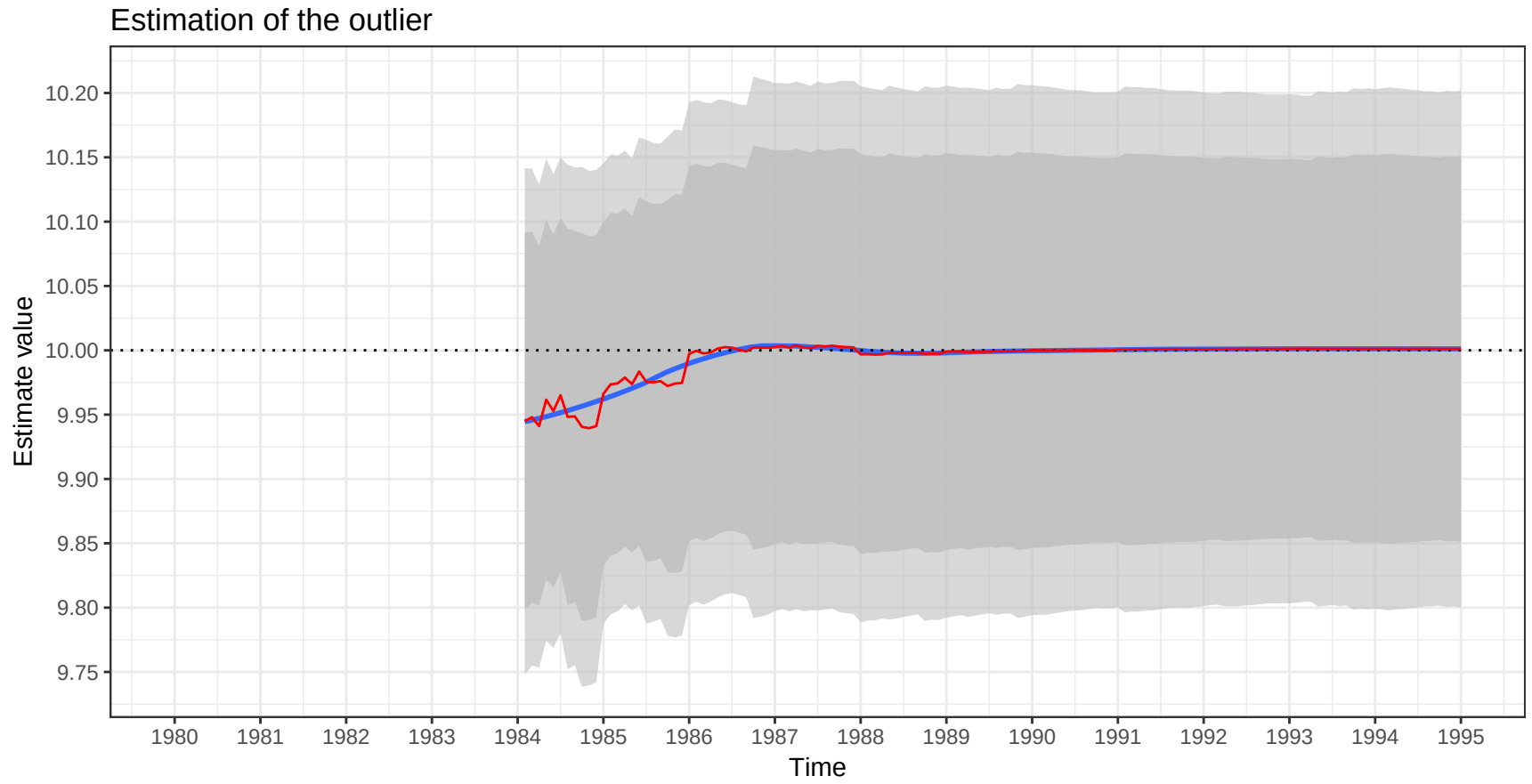


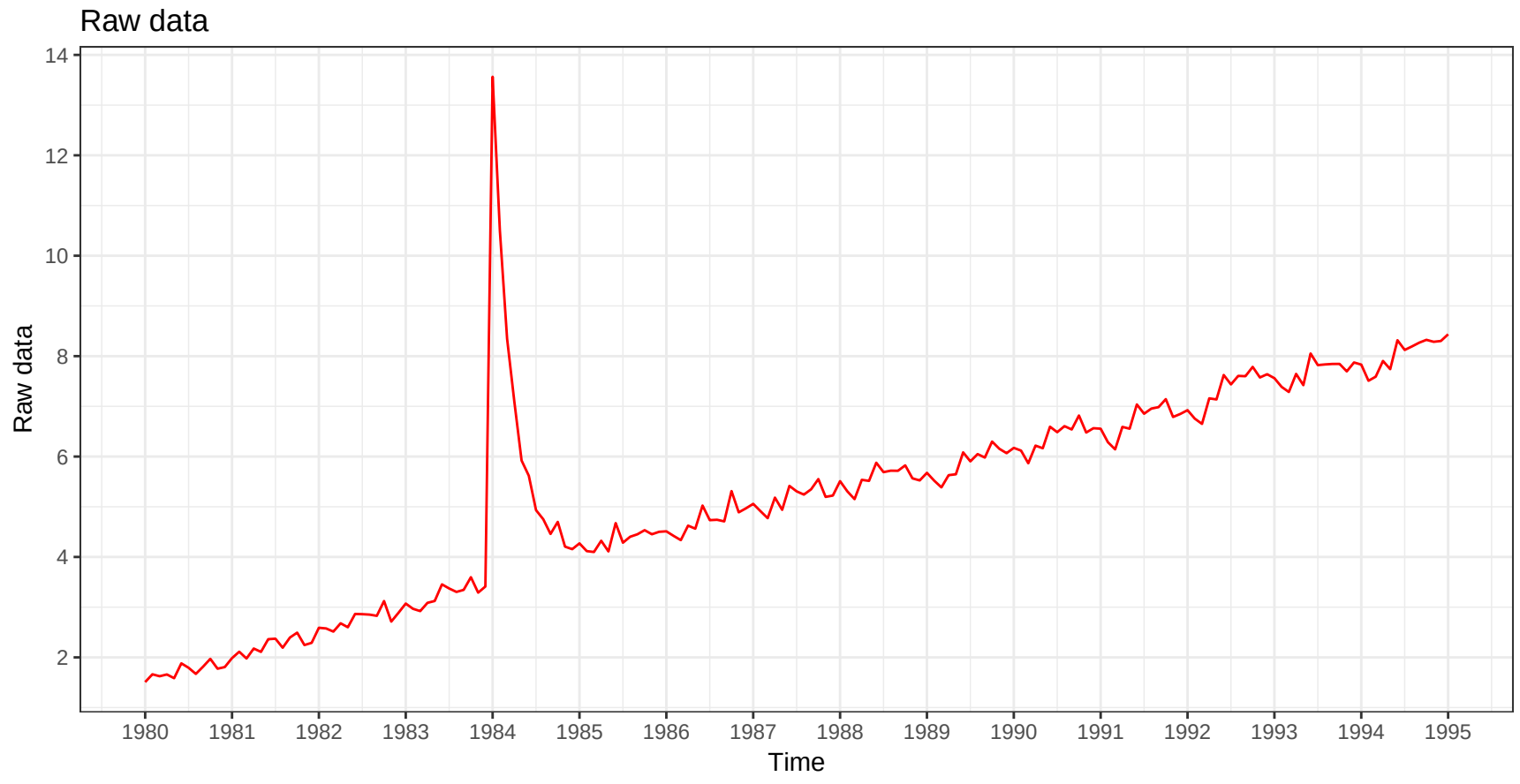
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.5B)(1−0.5B12)at



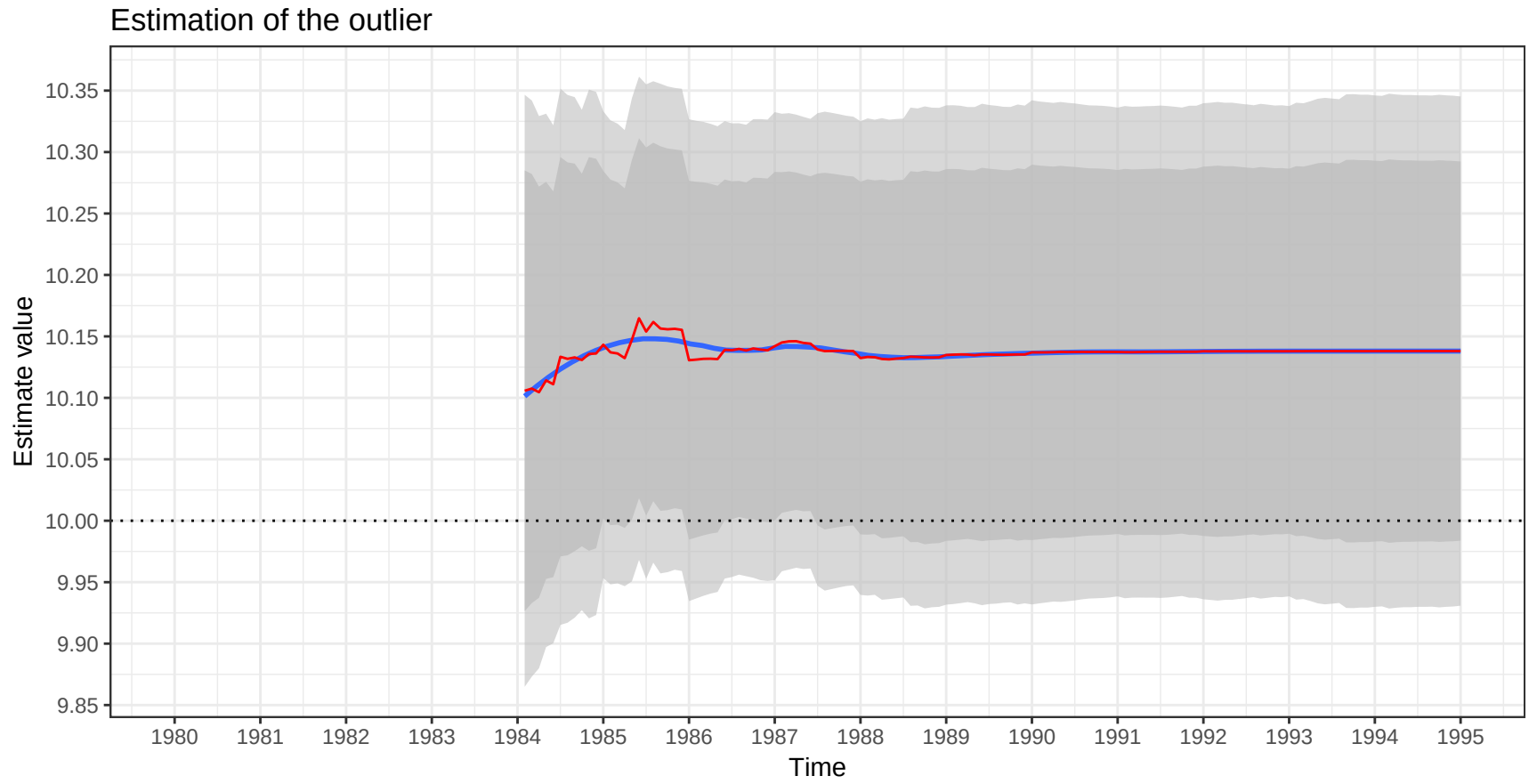


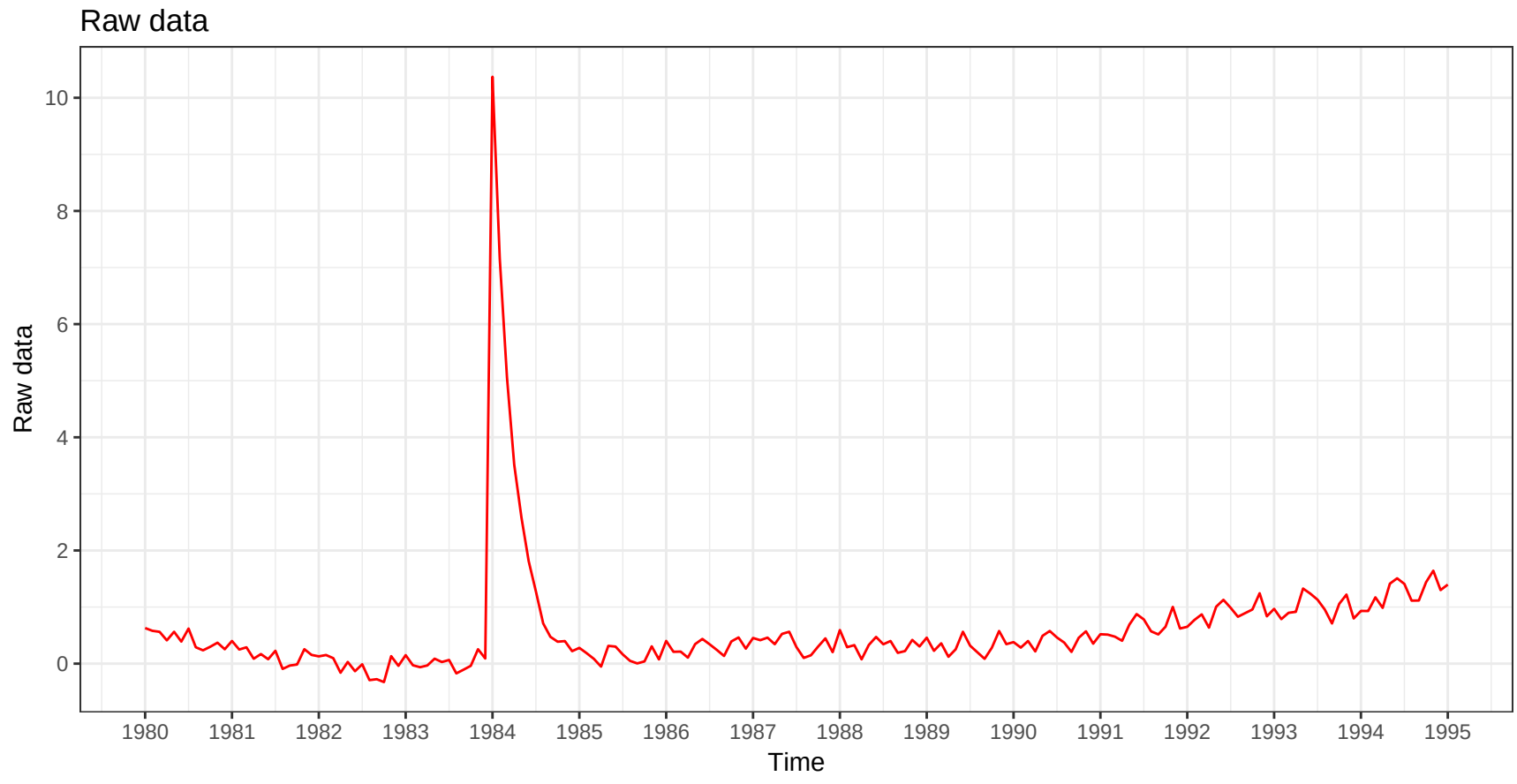
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.5B)(1−0.5B12)at





Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.5B)(1−0.5B12)at





Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
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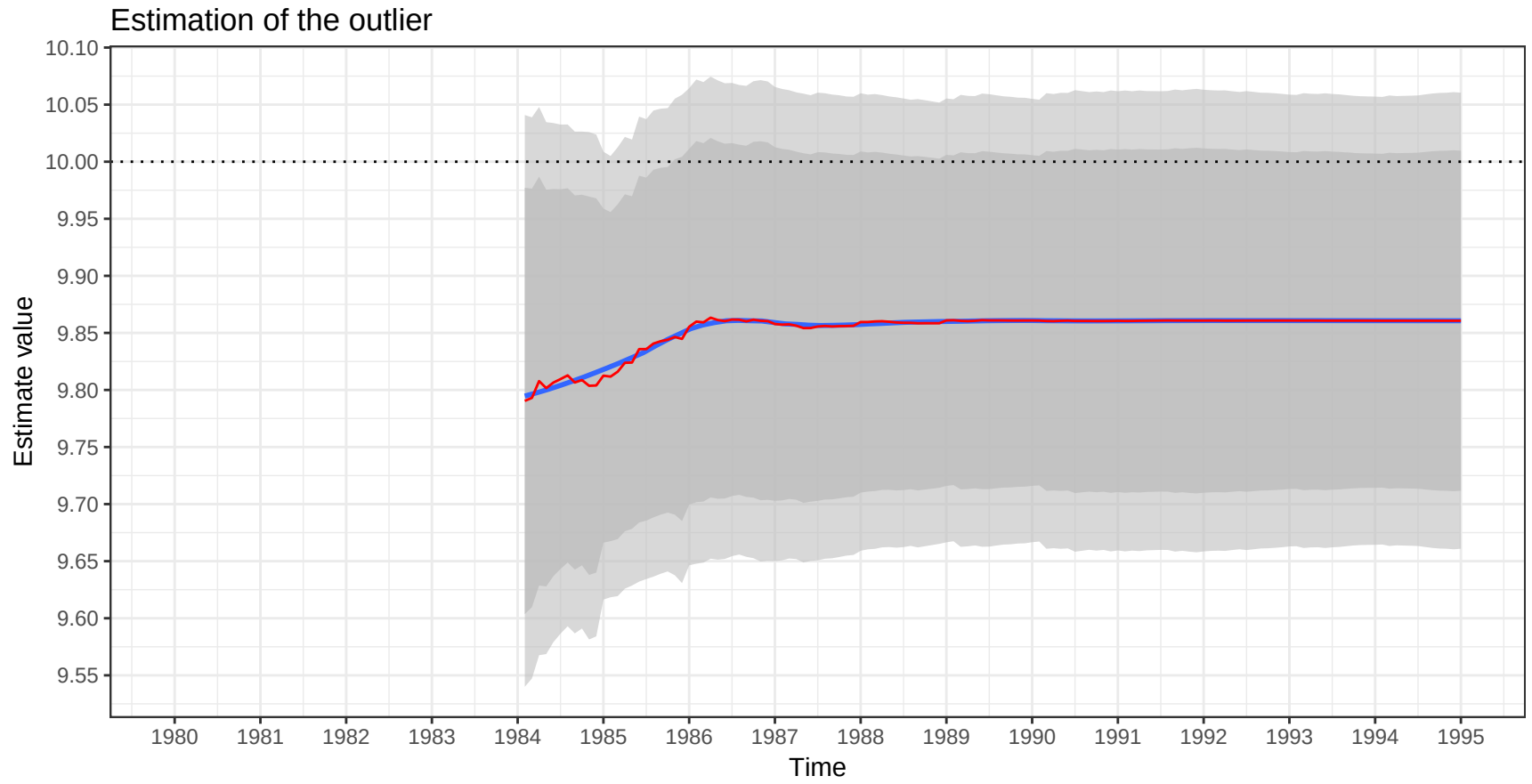

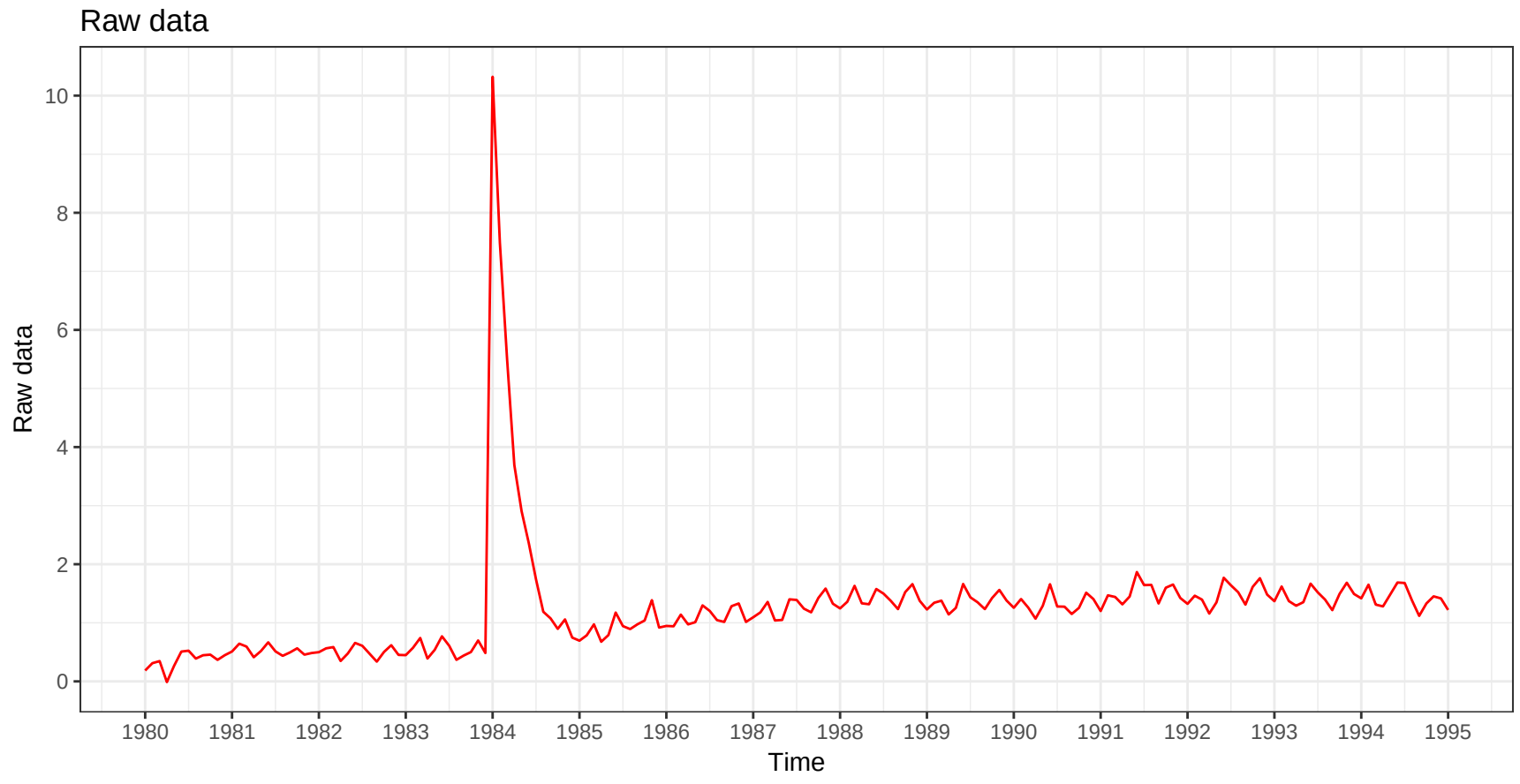

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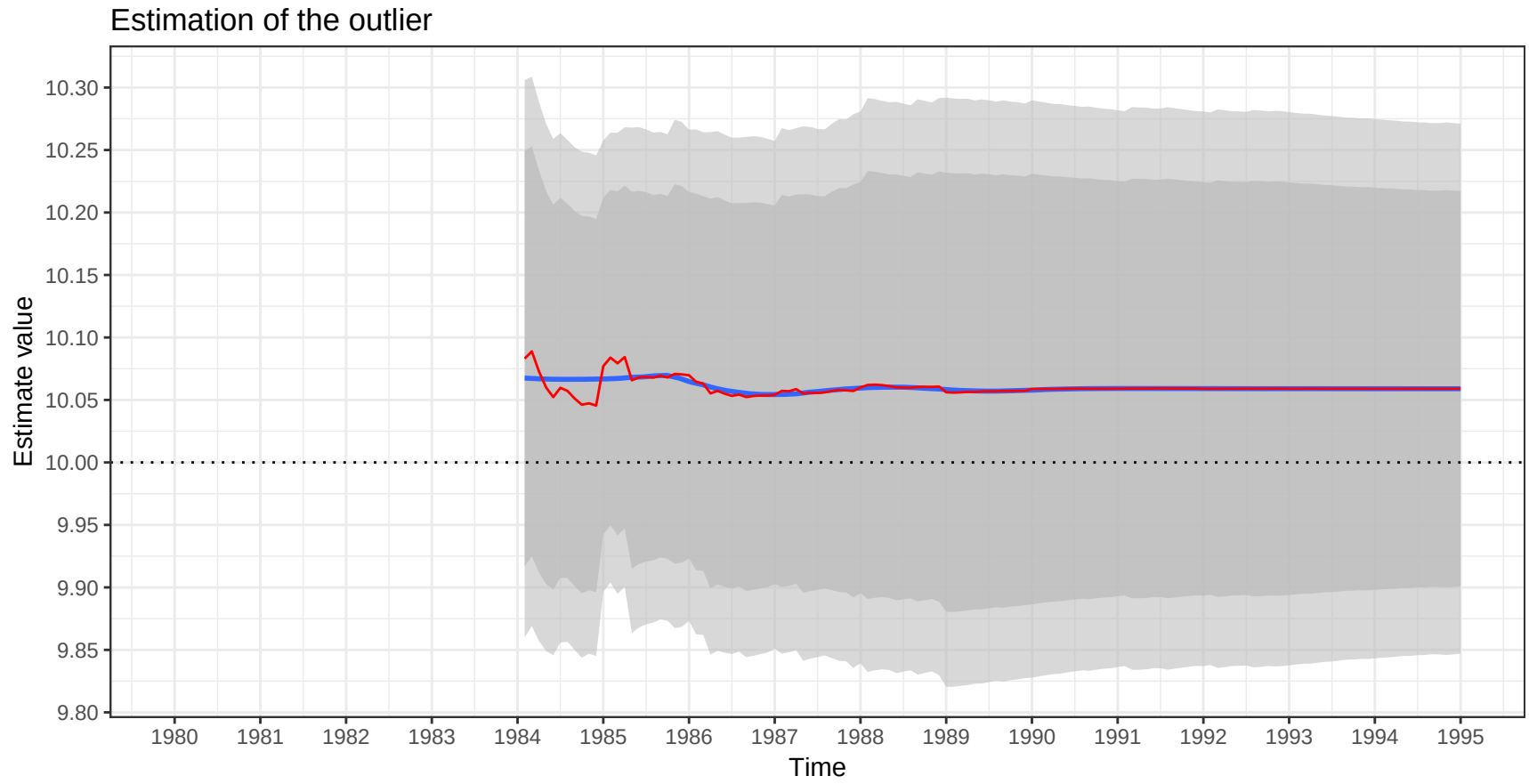

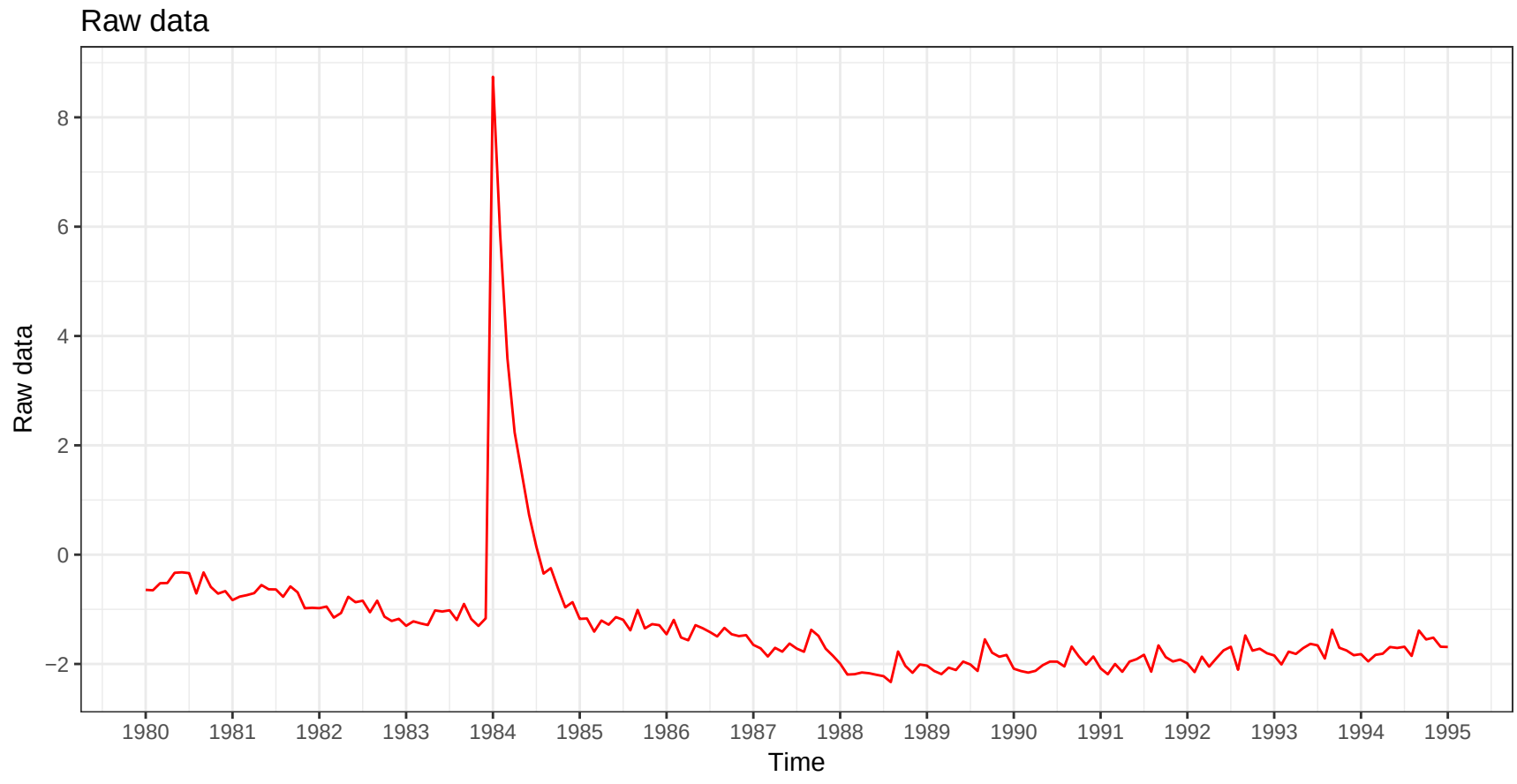

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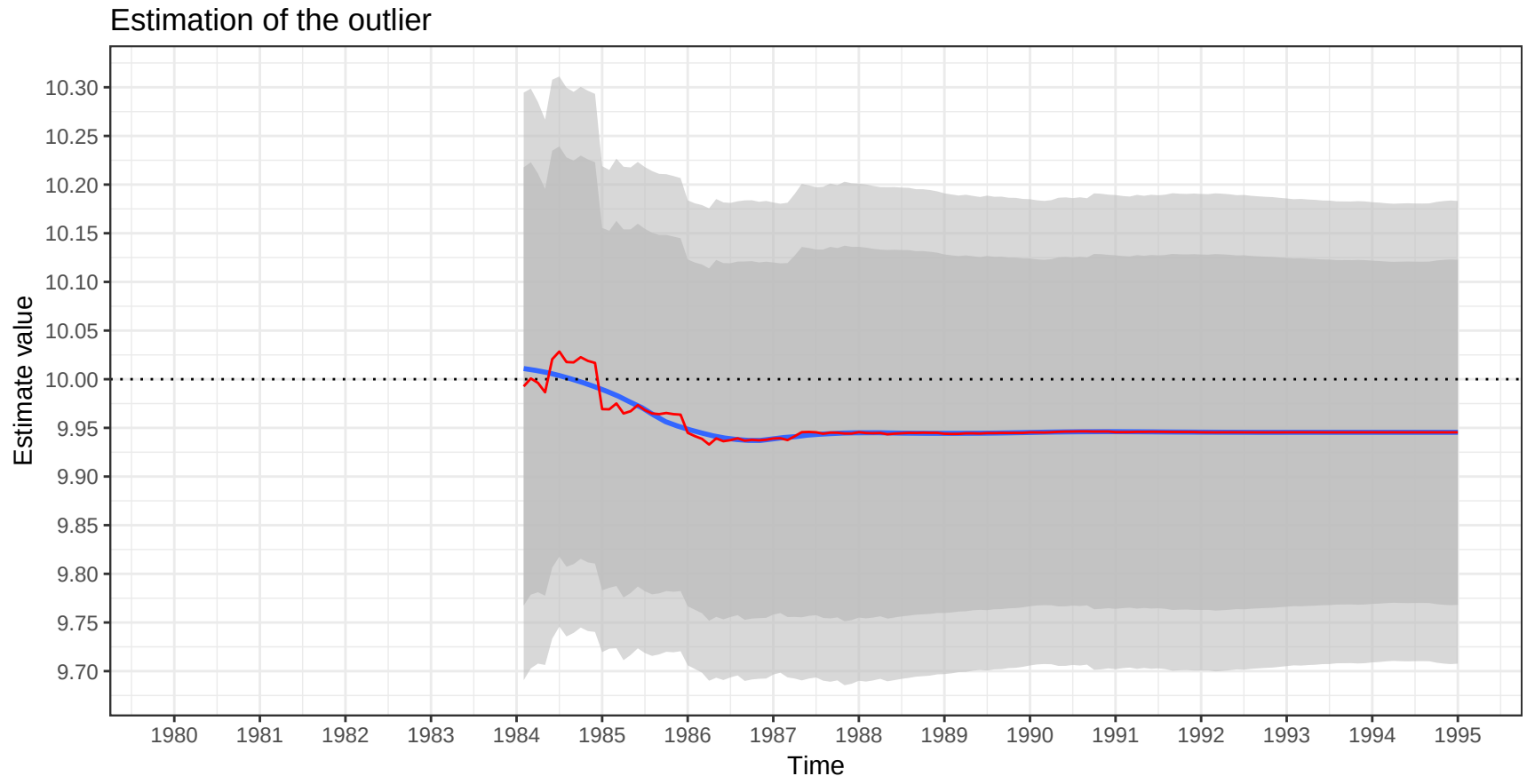

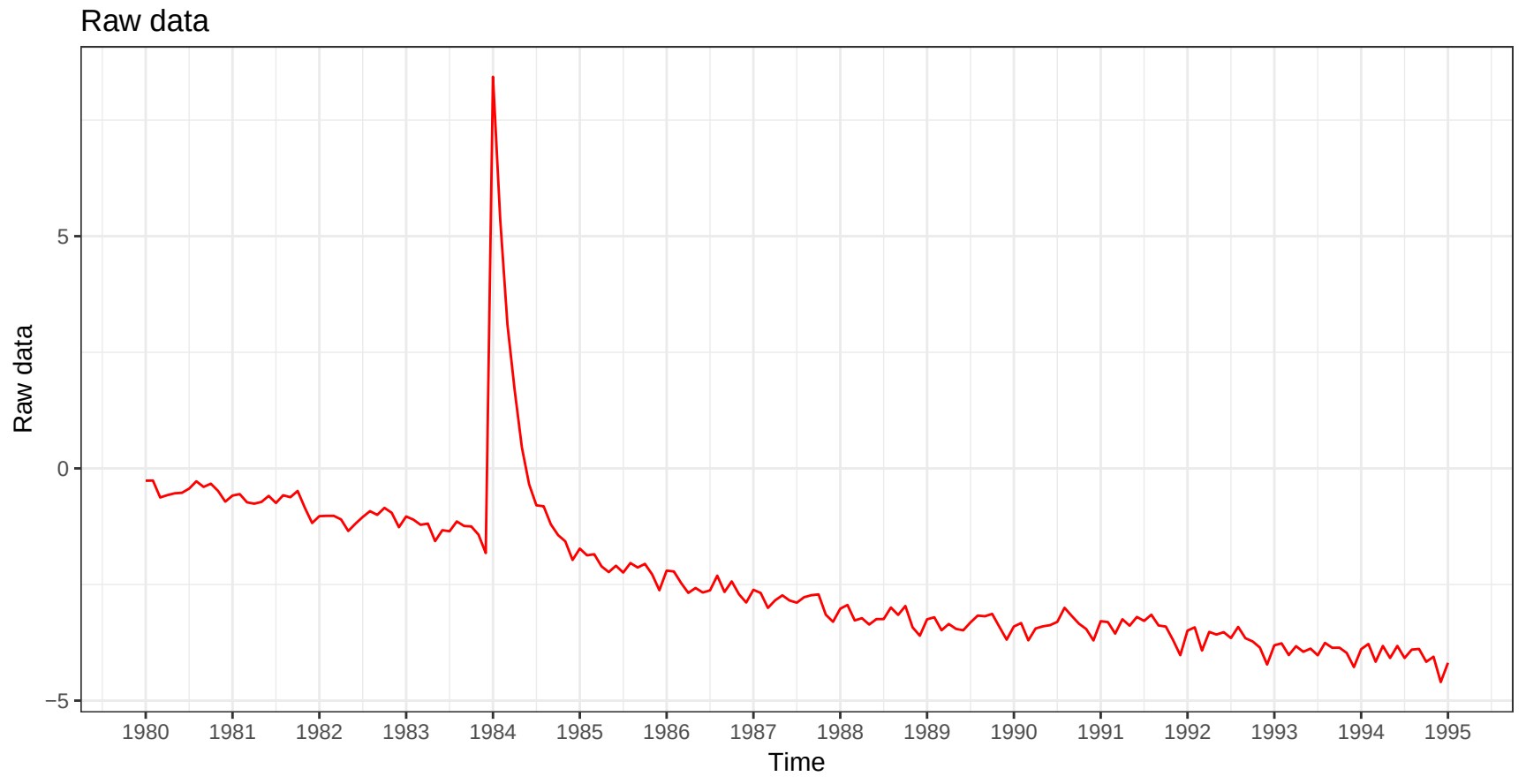

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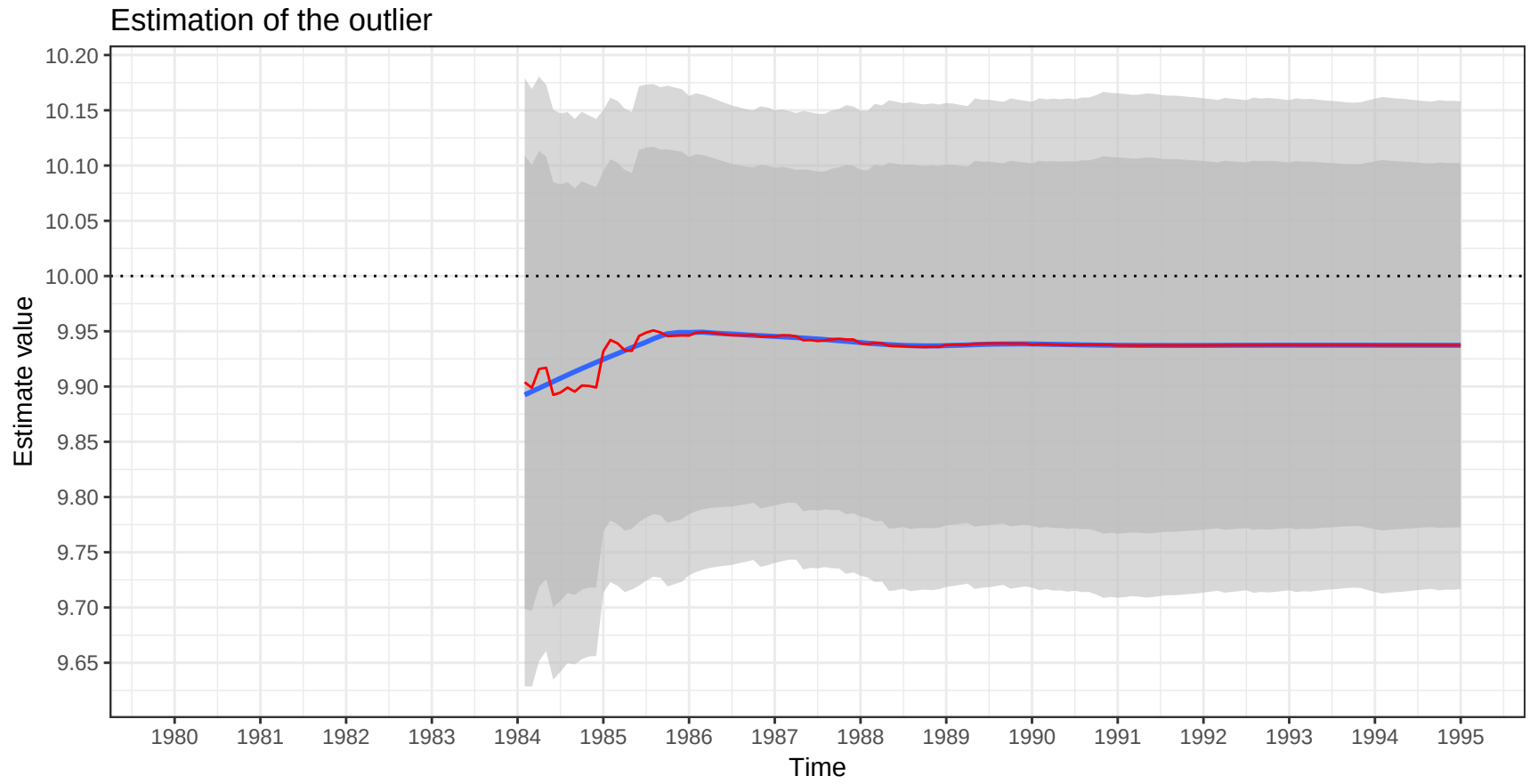

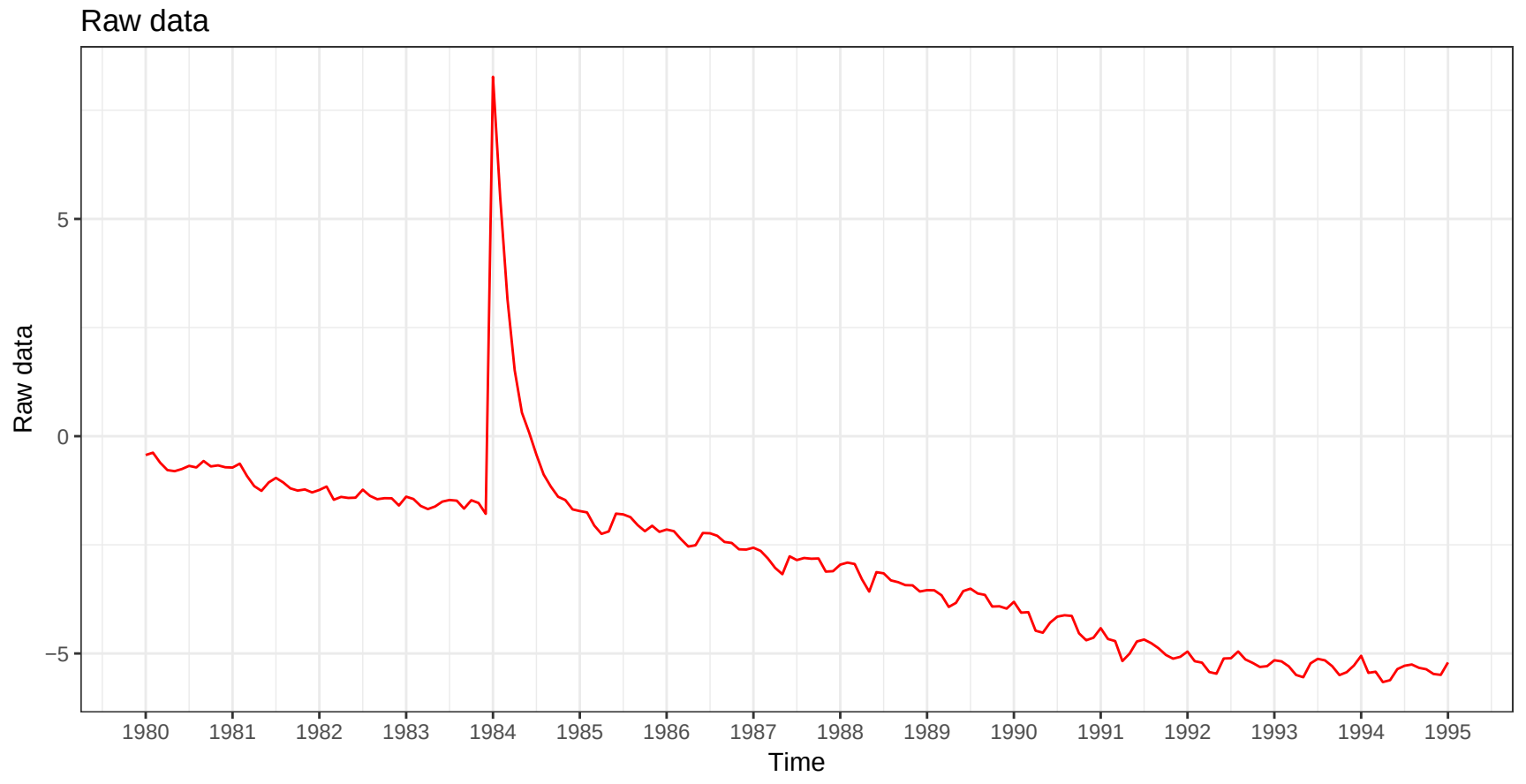

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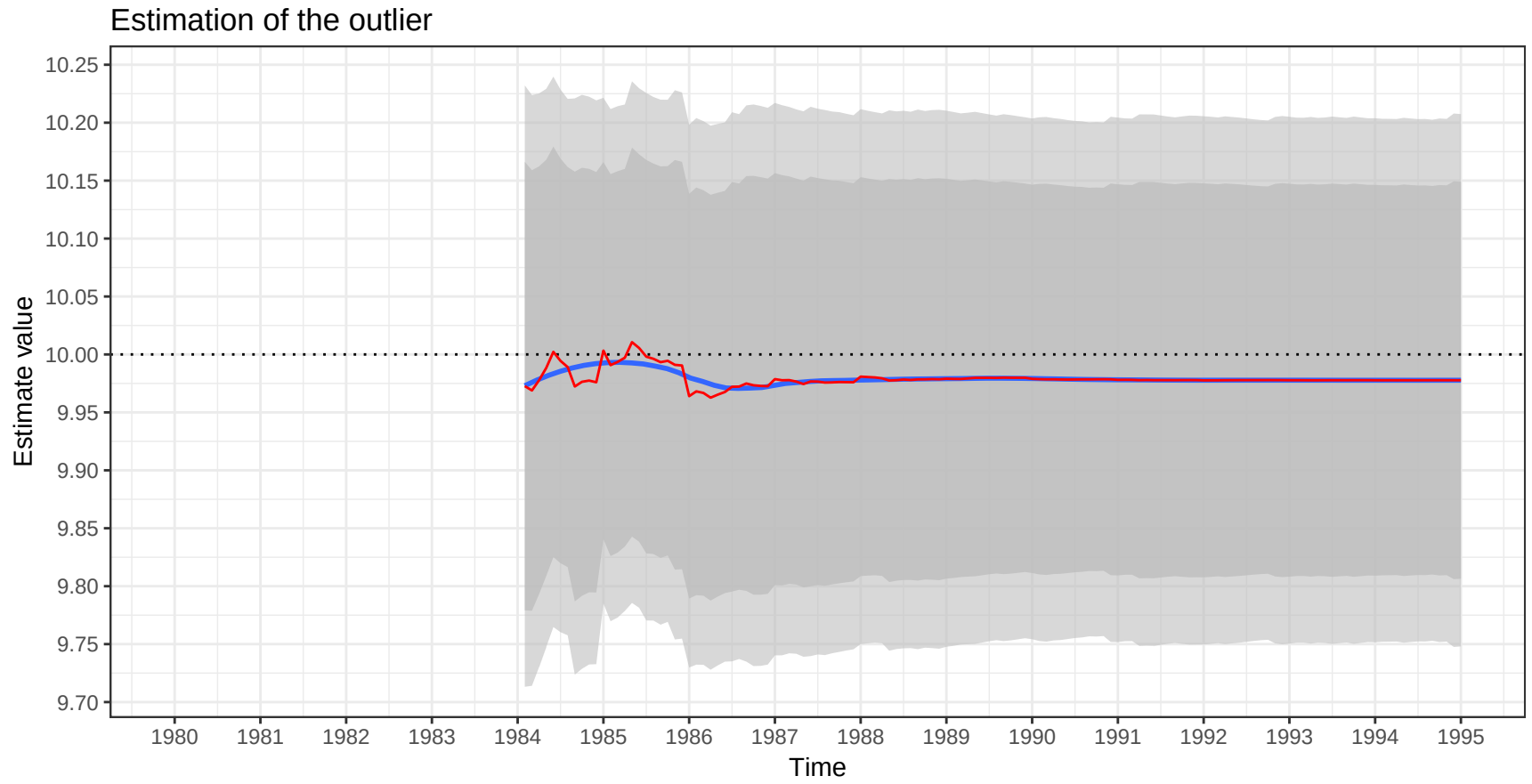

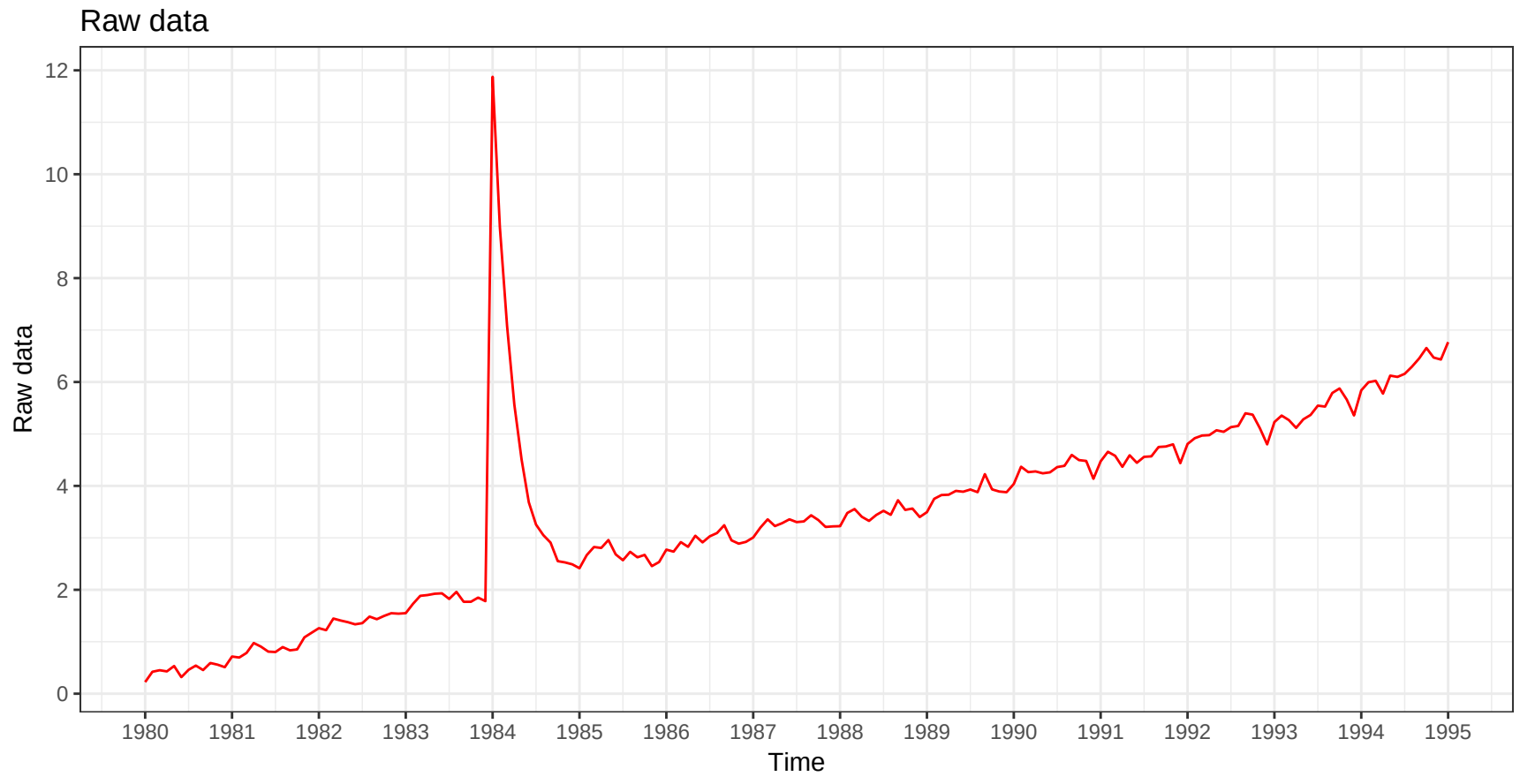

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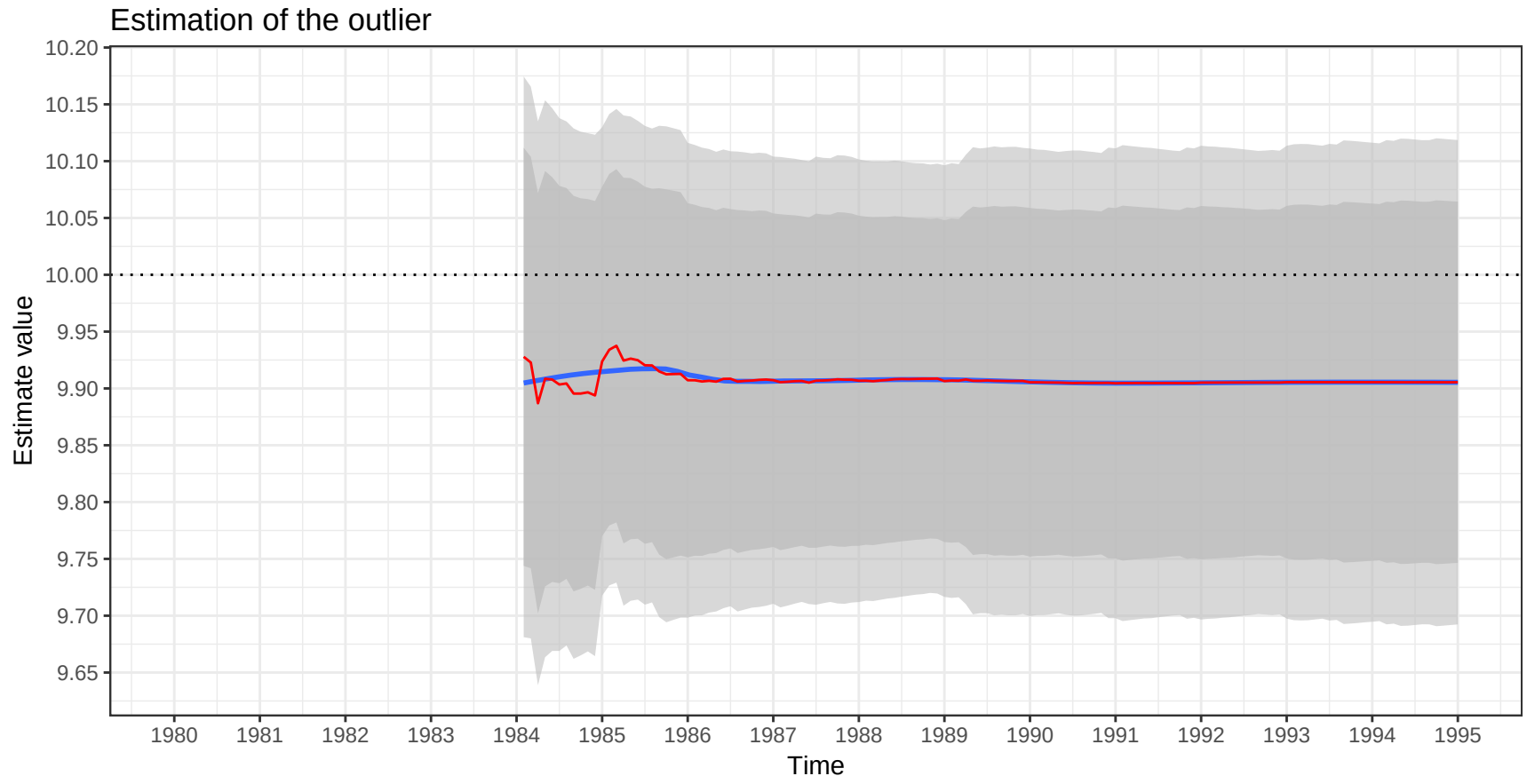

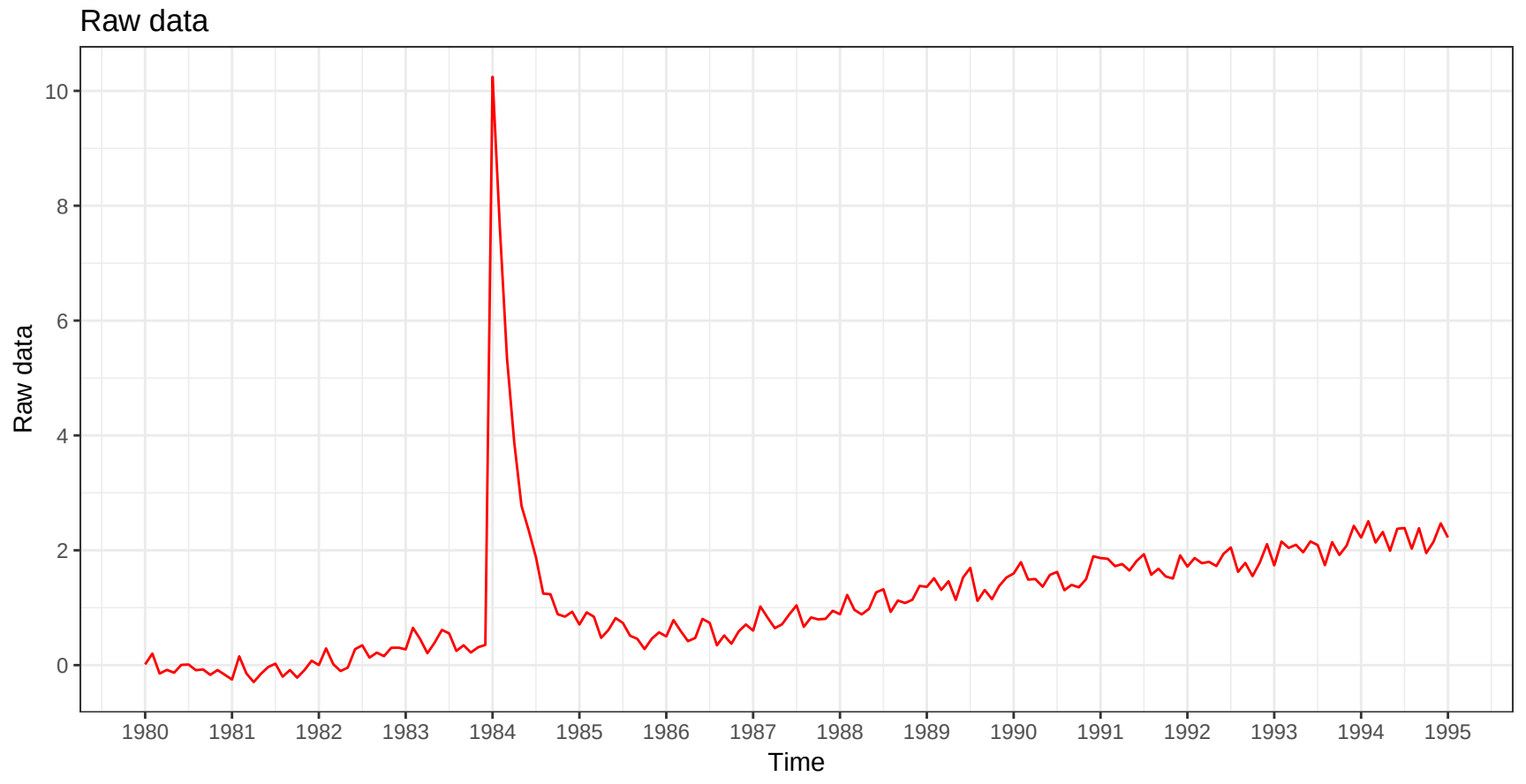

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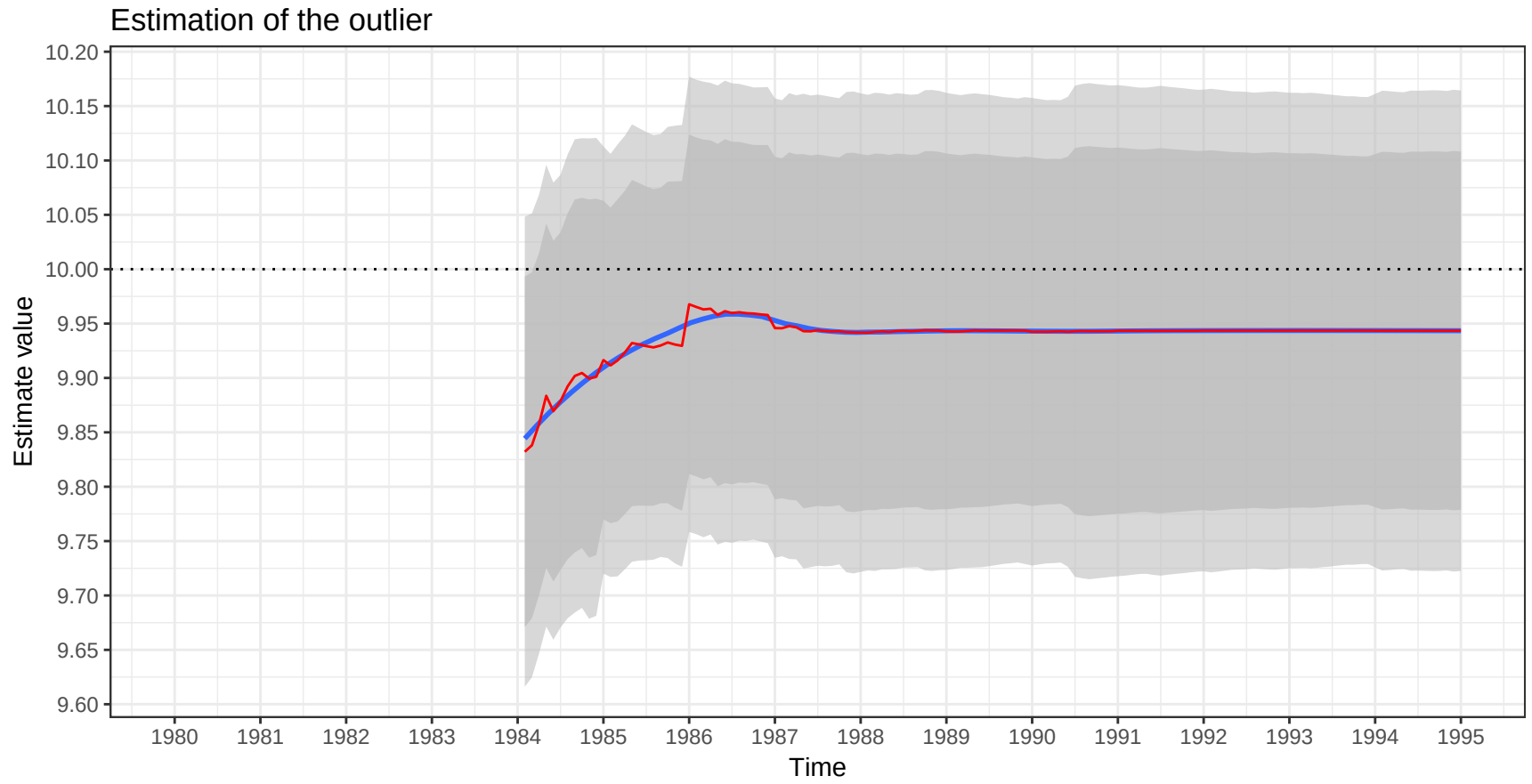

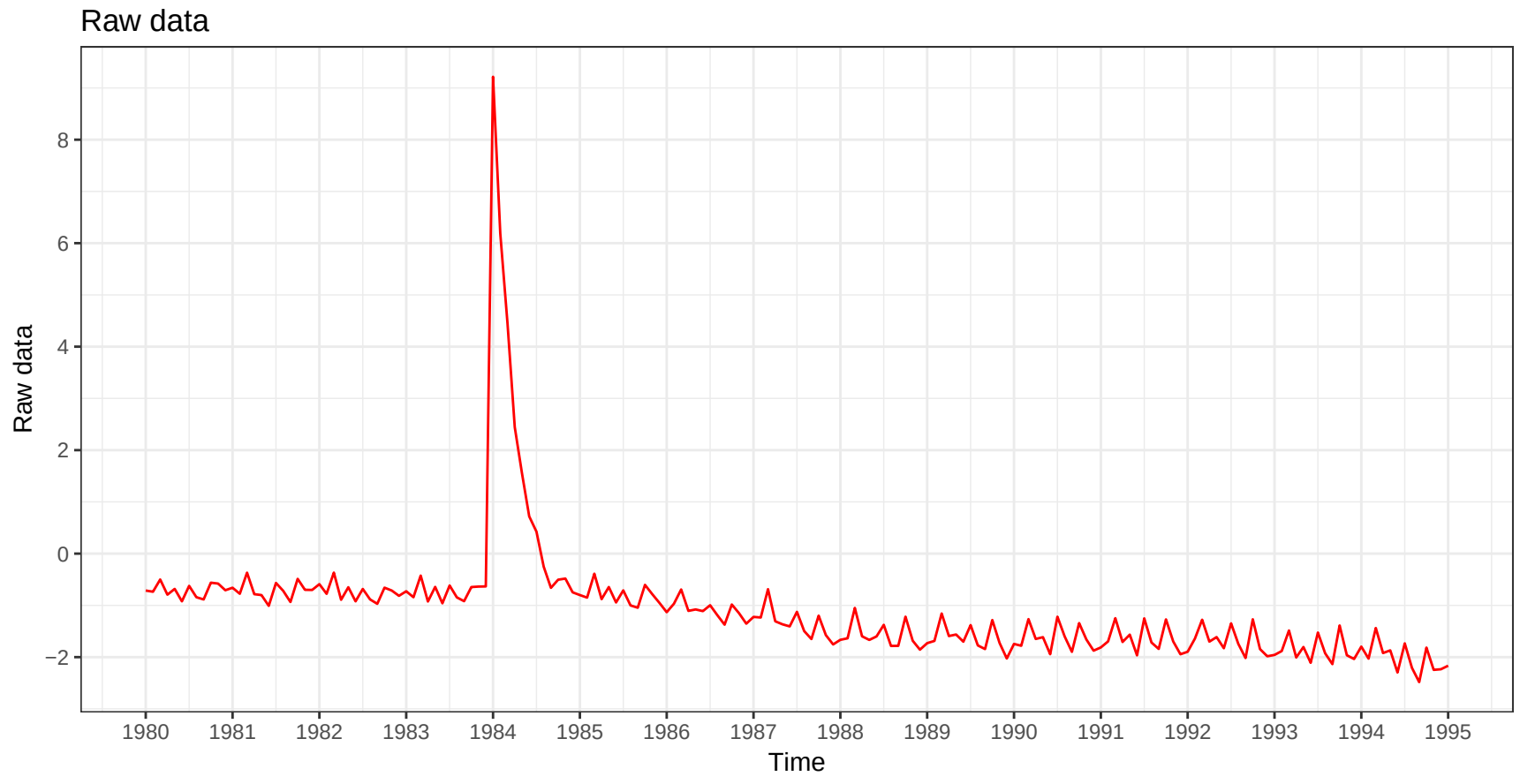

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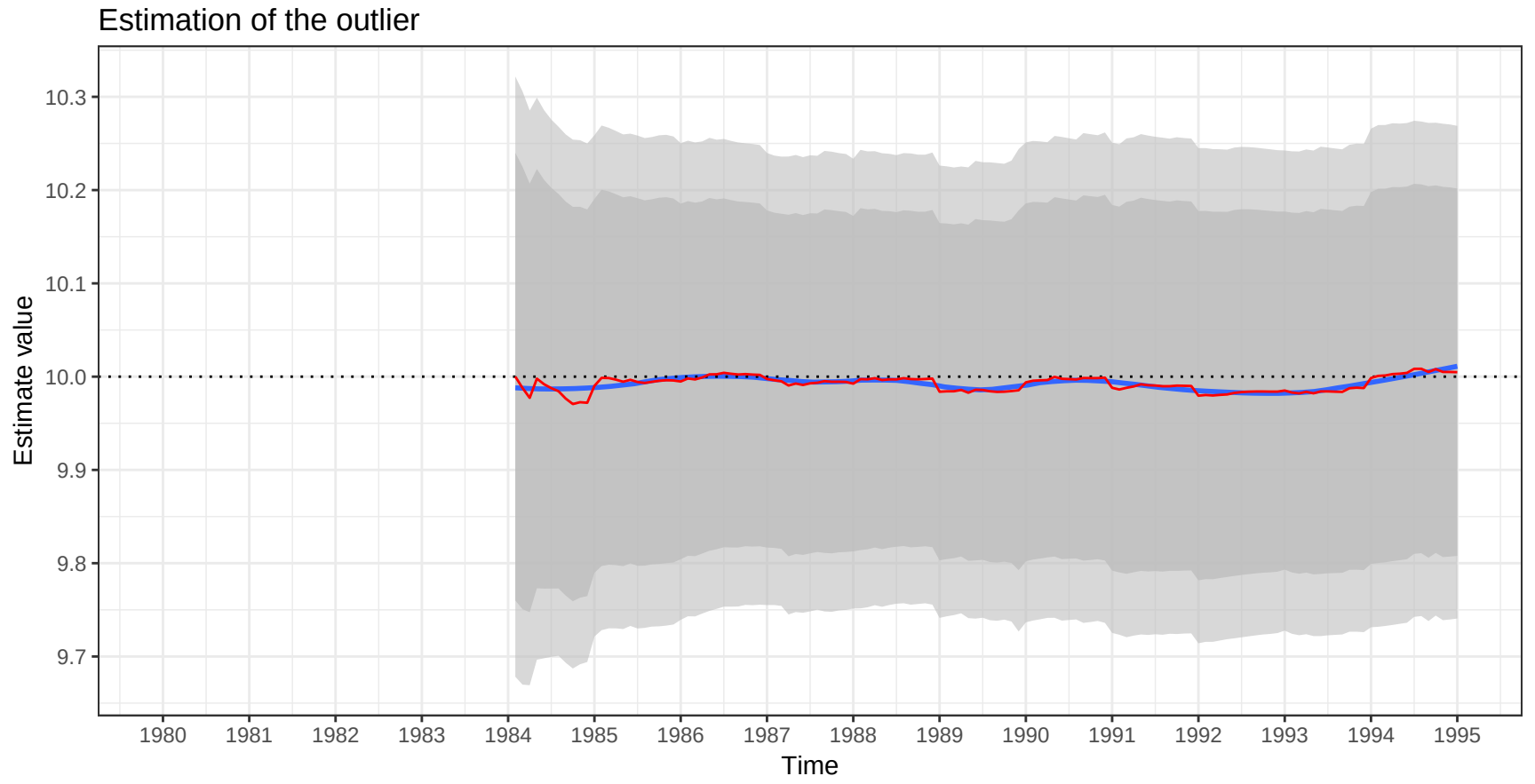

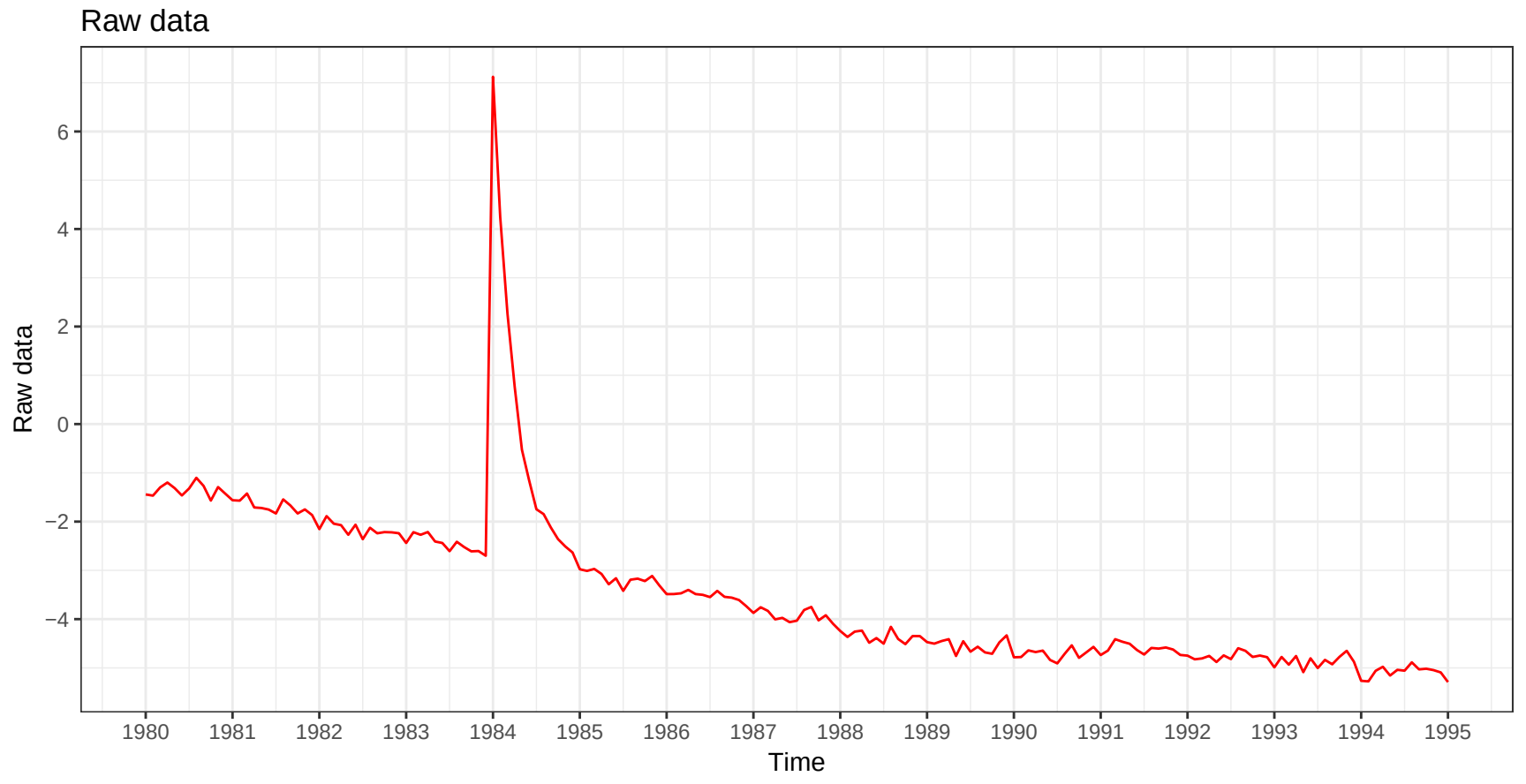

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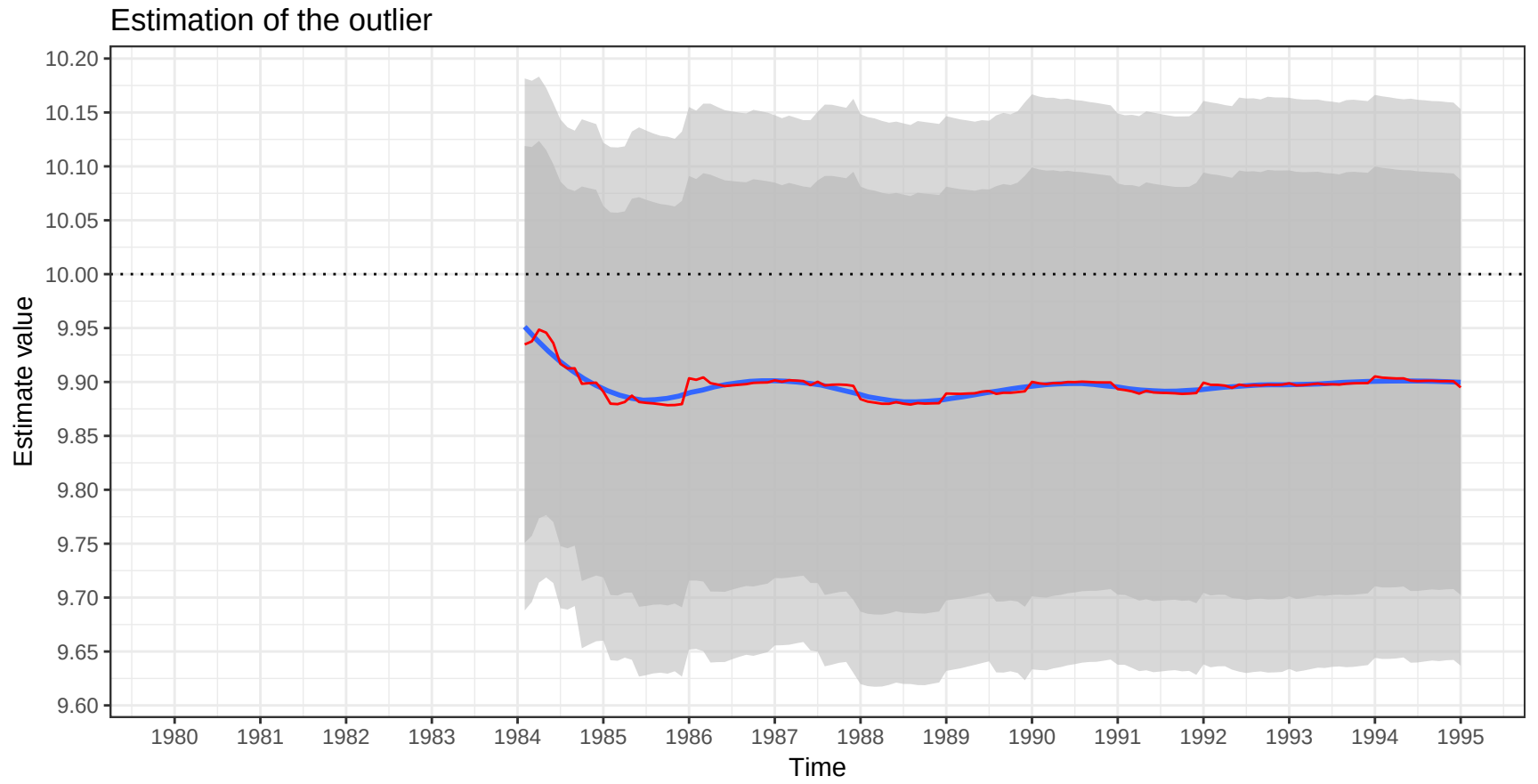

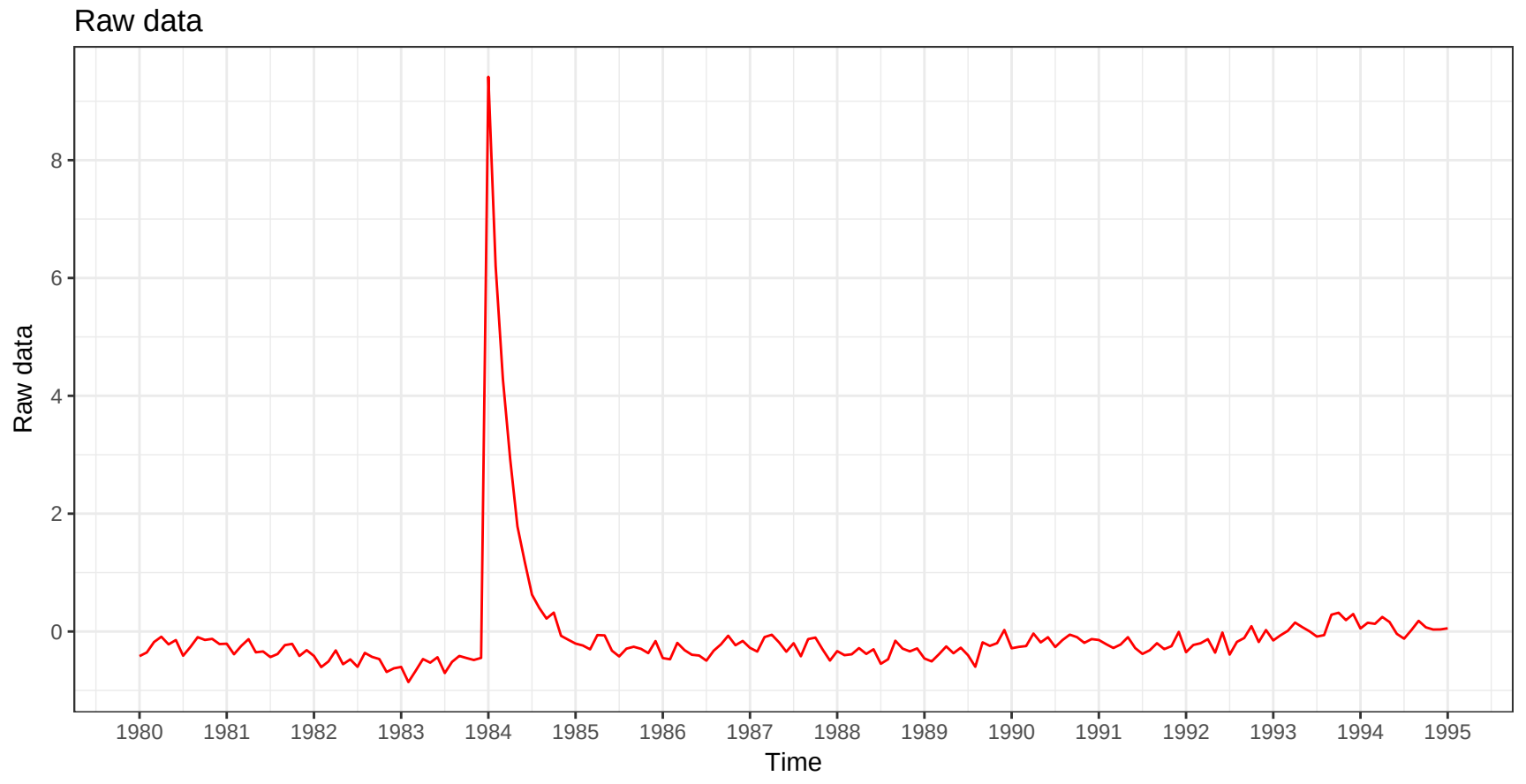

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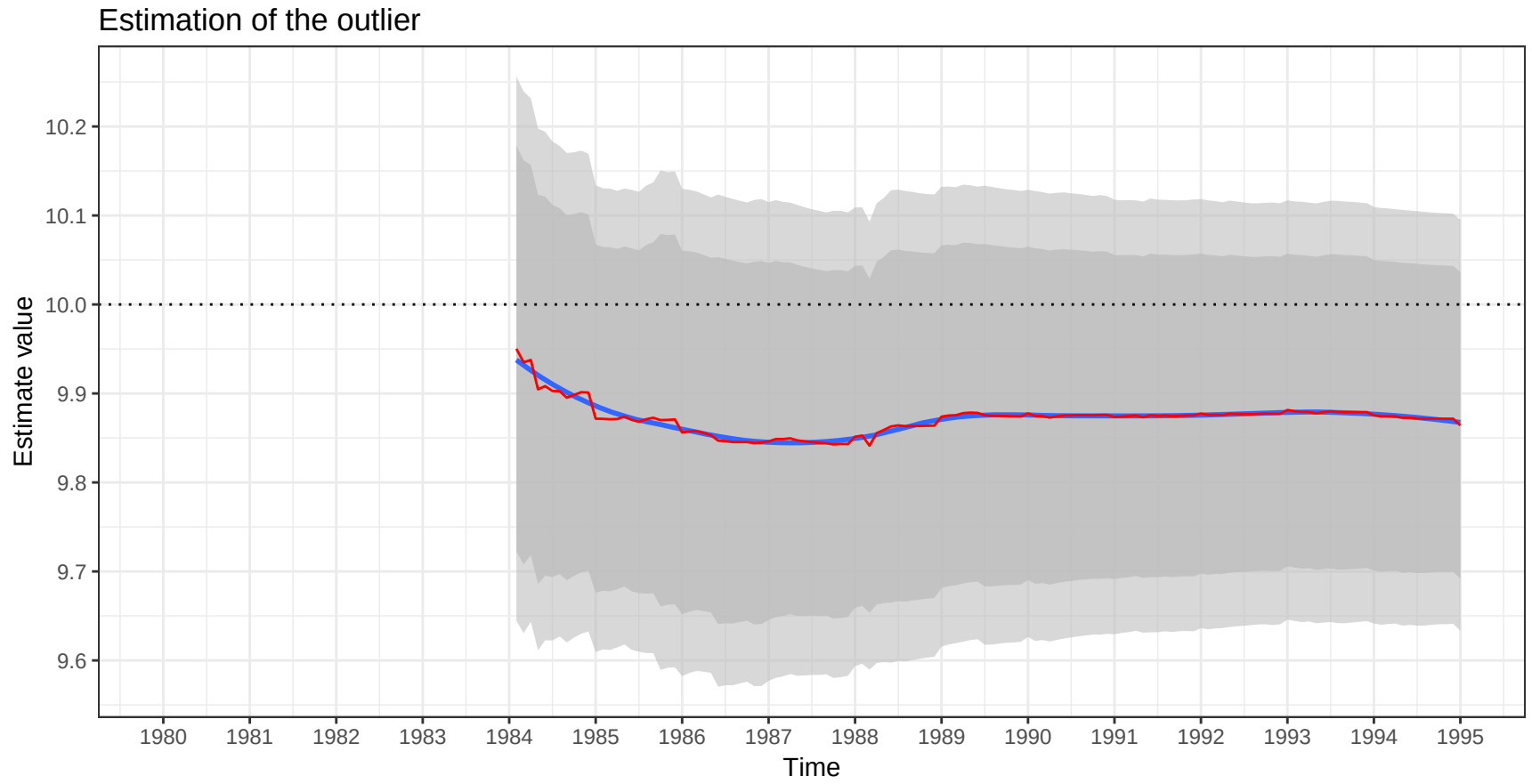

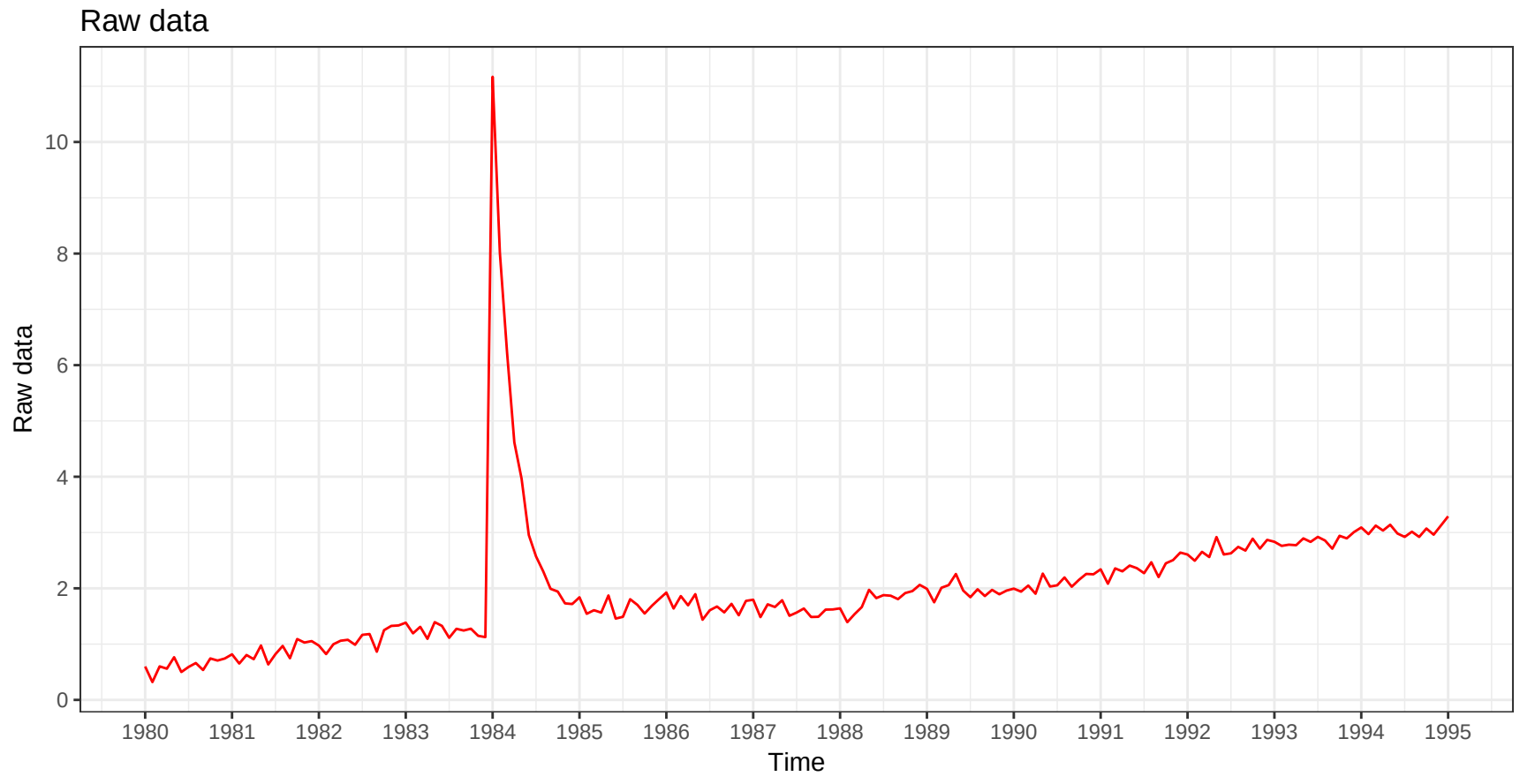

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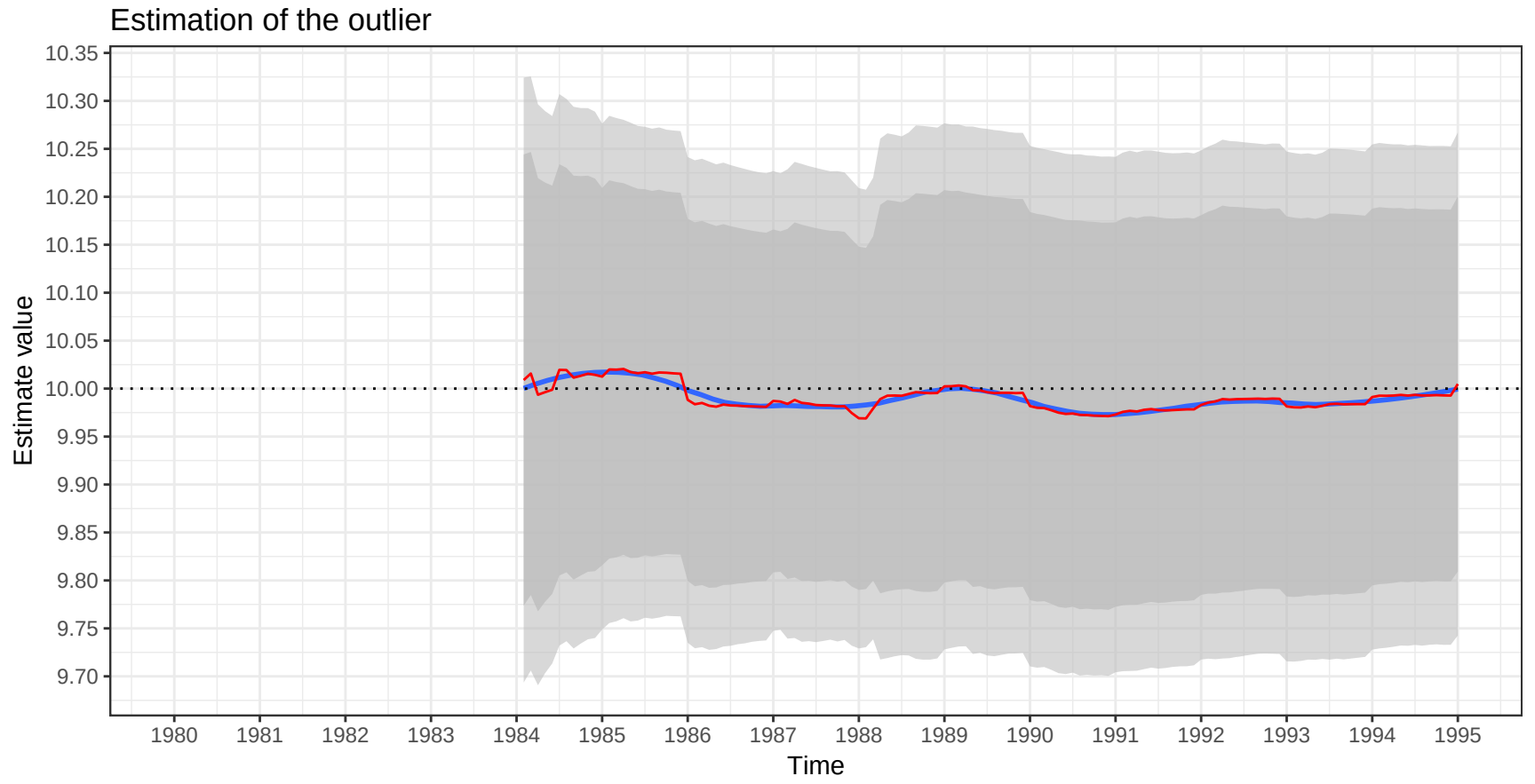

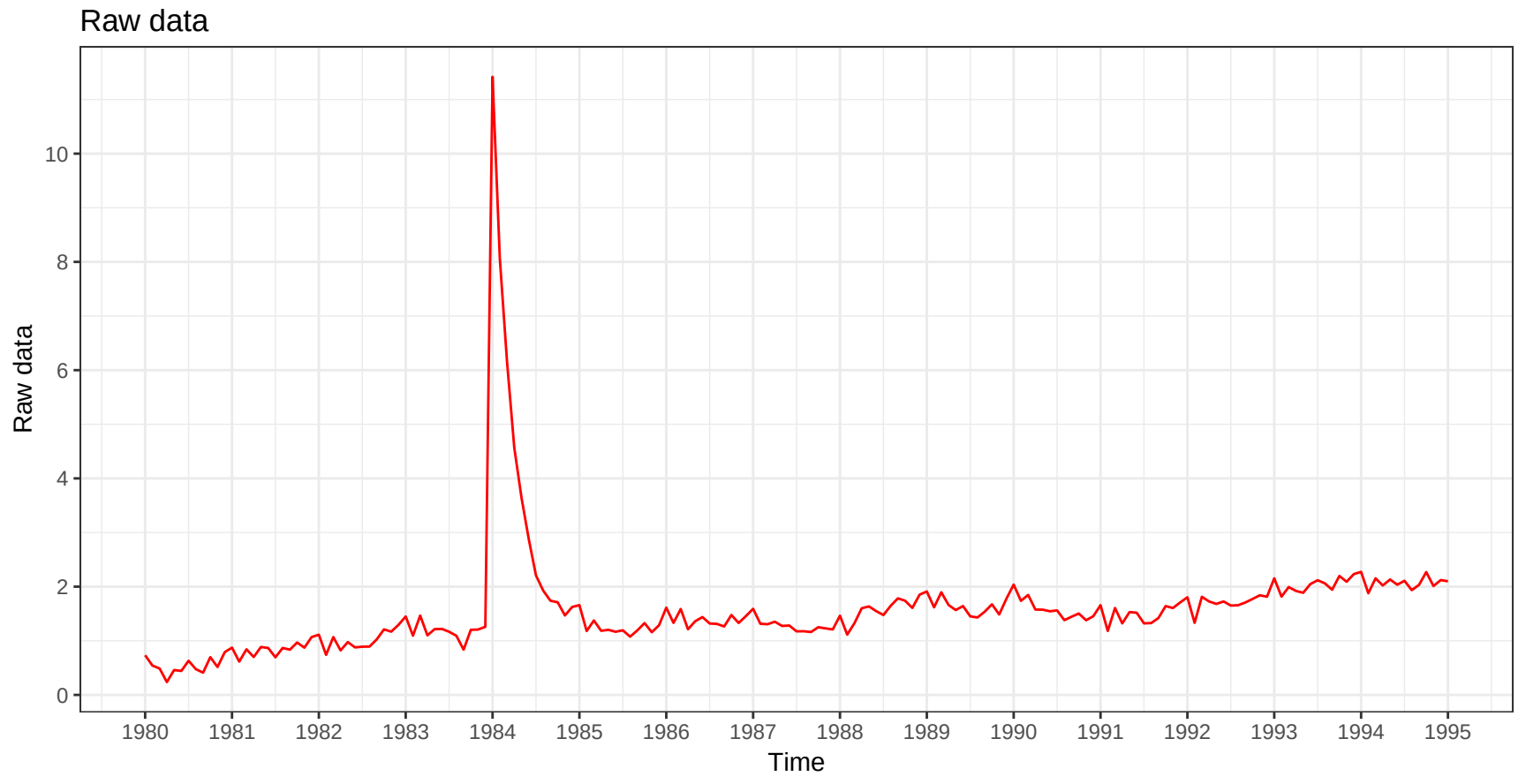

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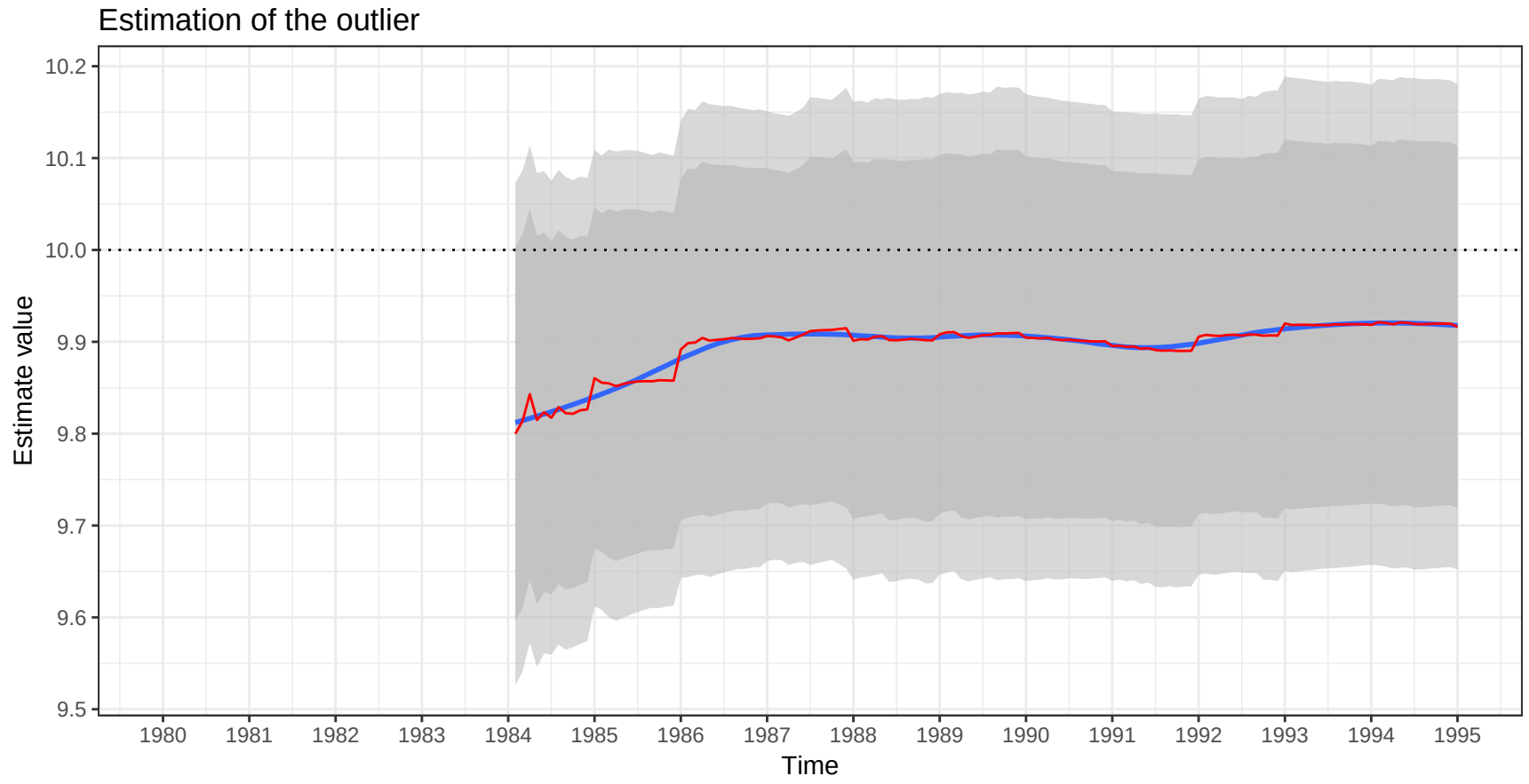

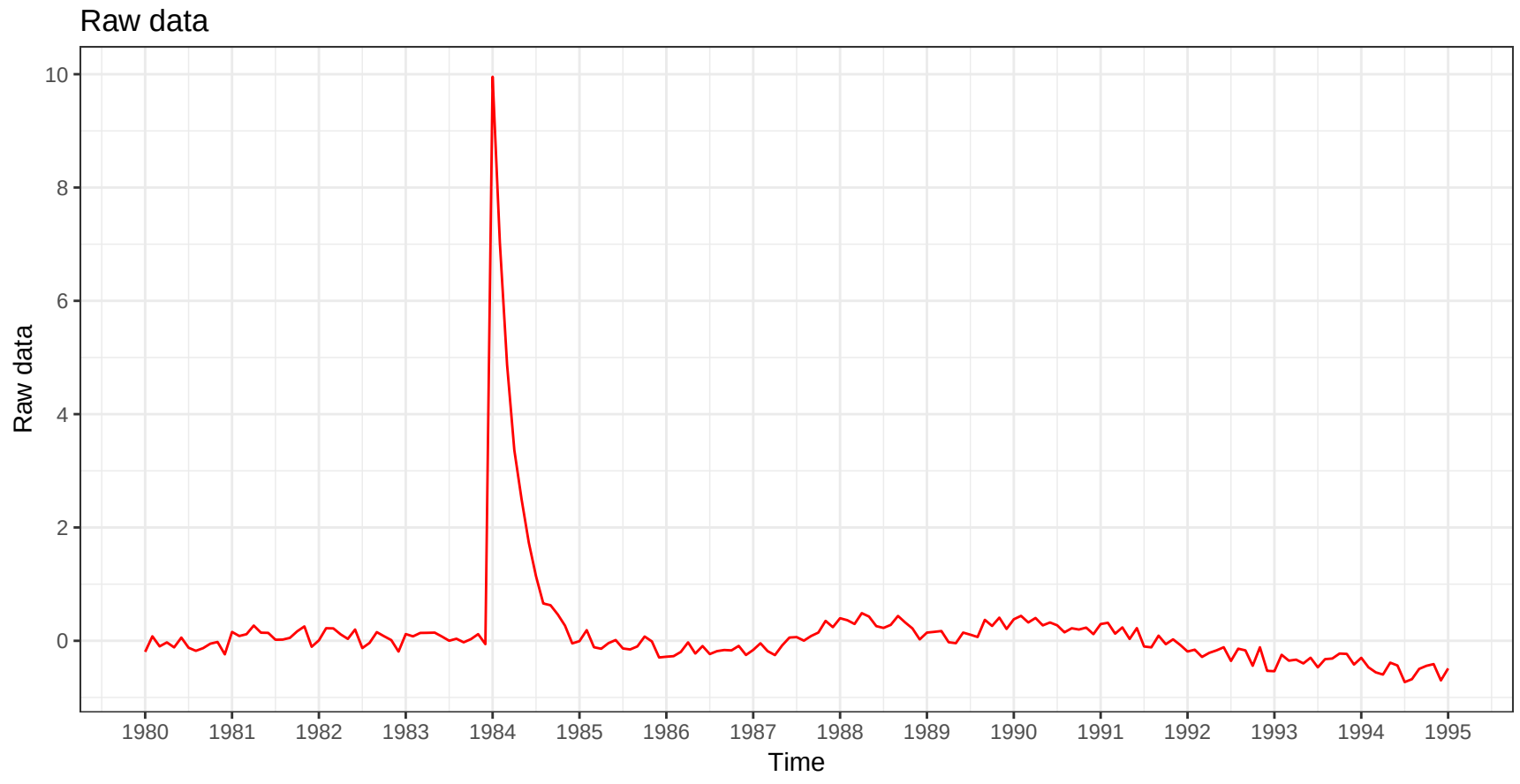

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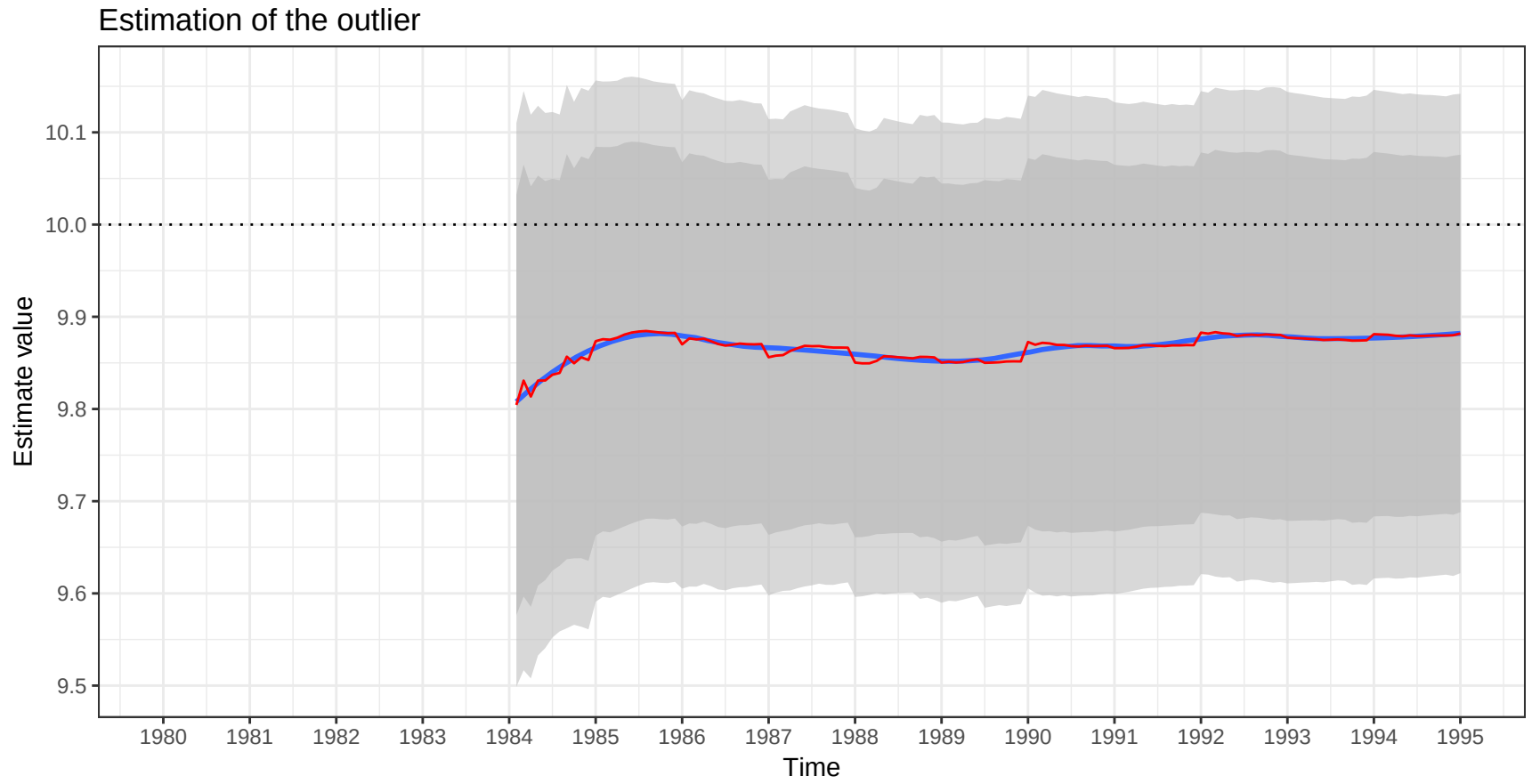

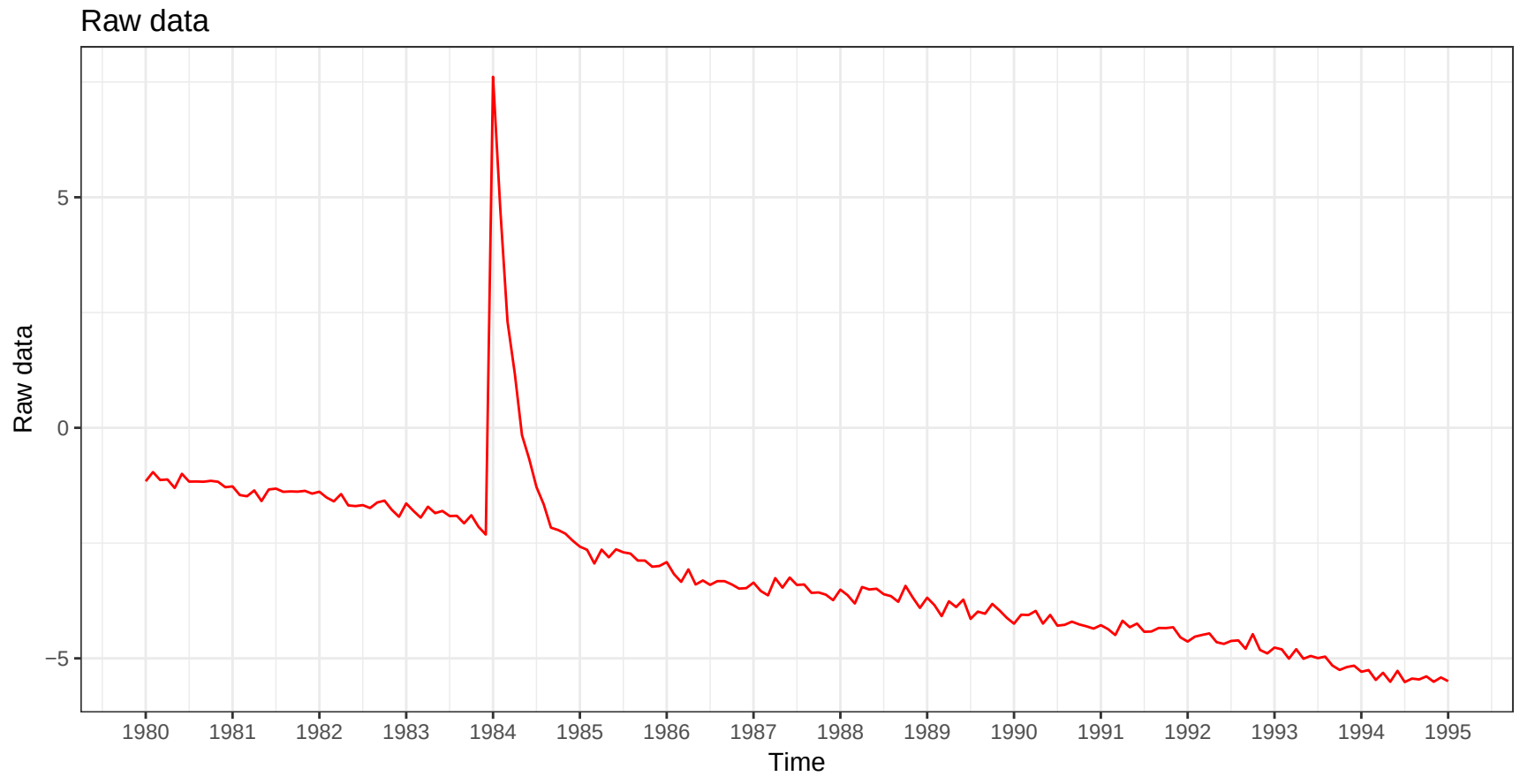

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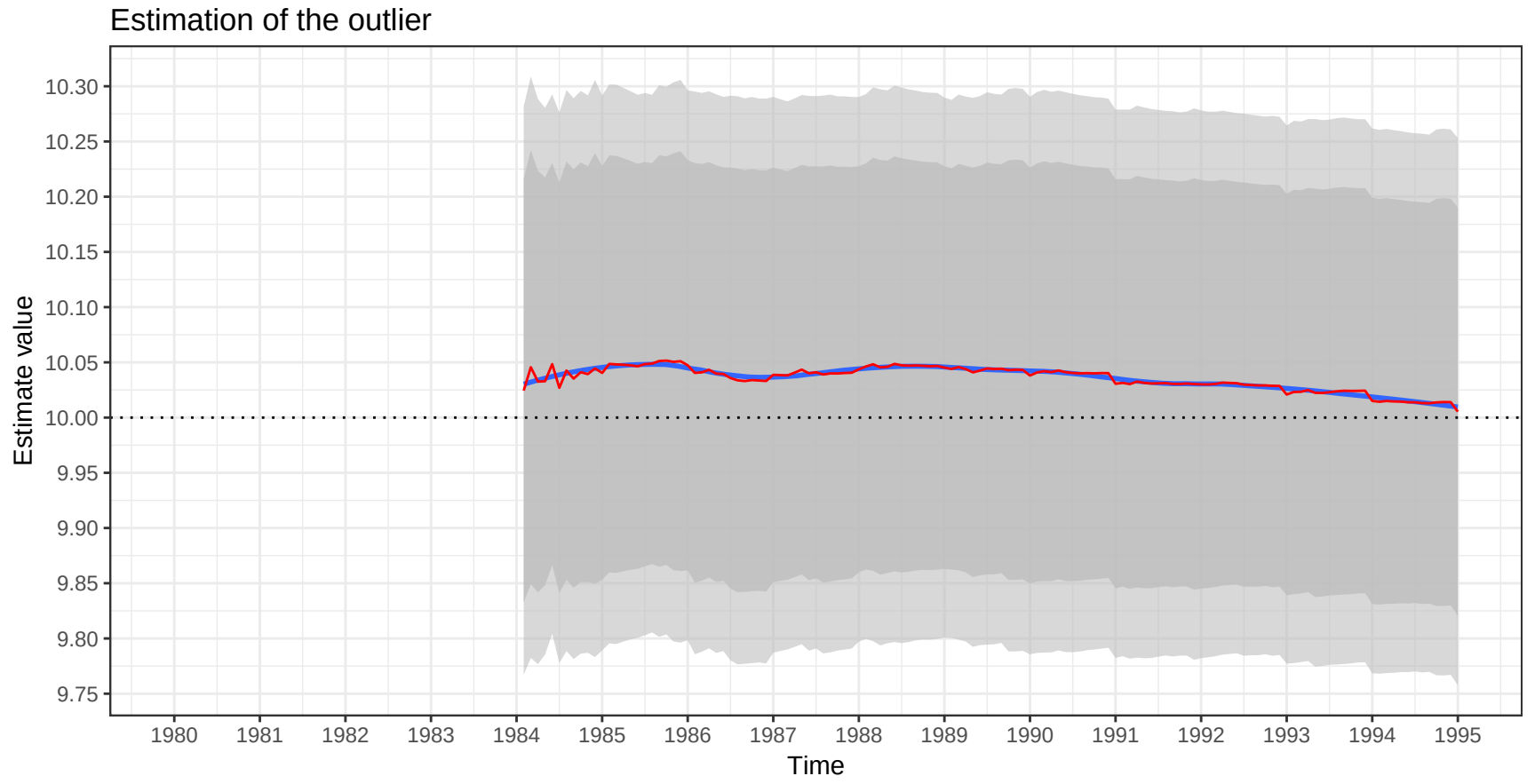

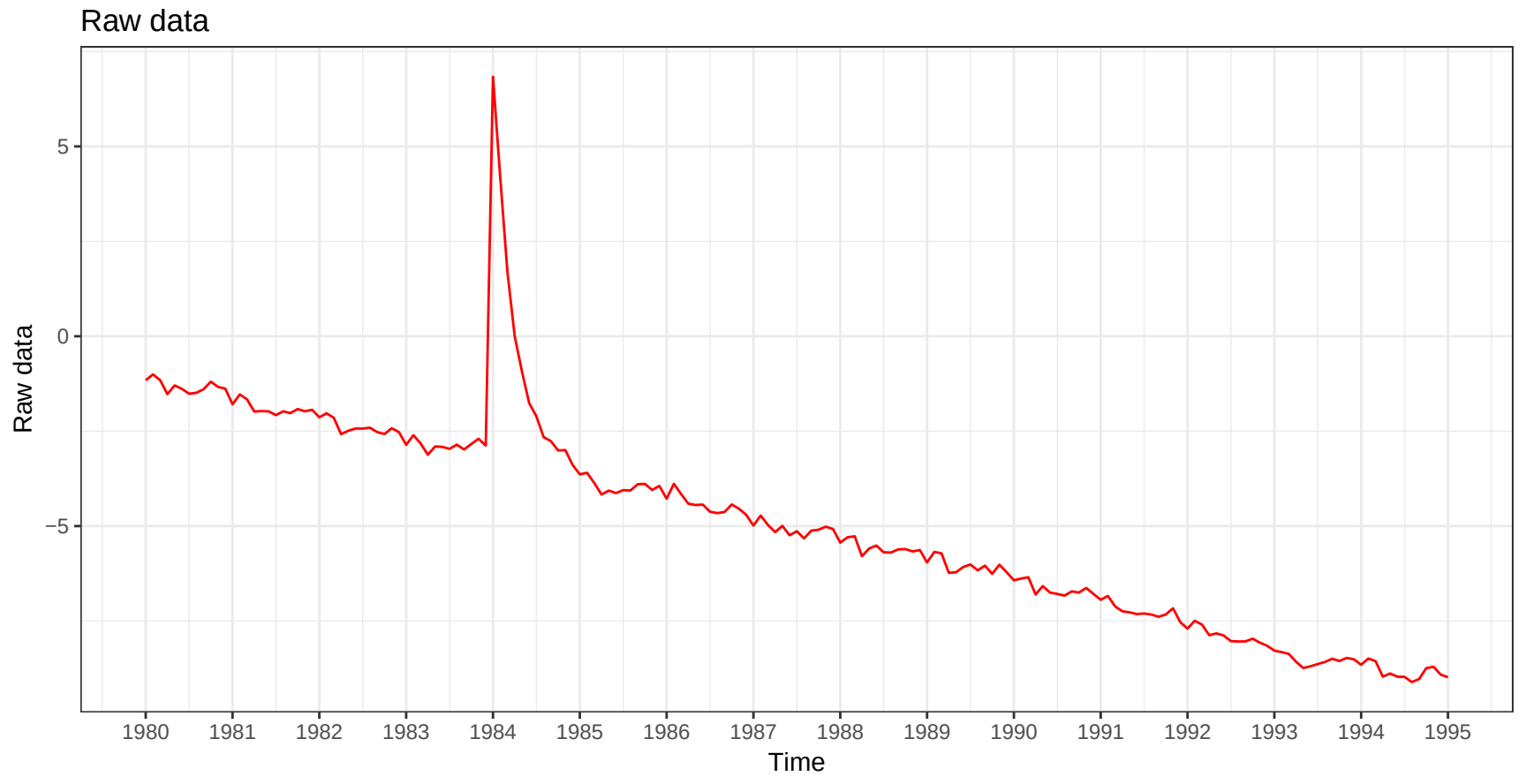

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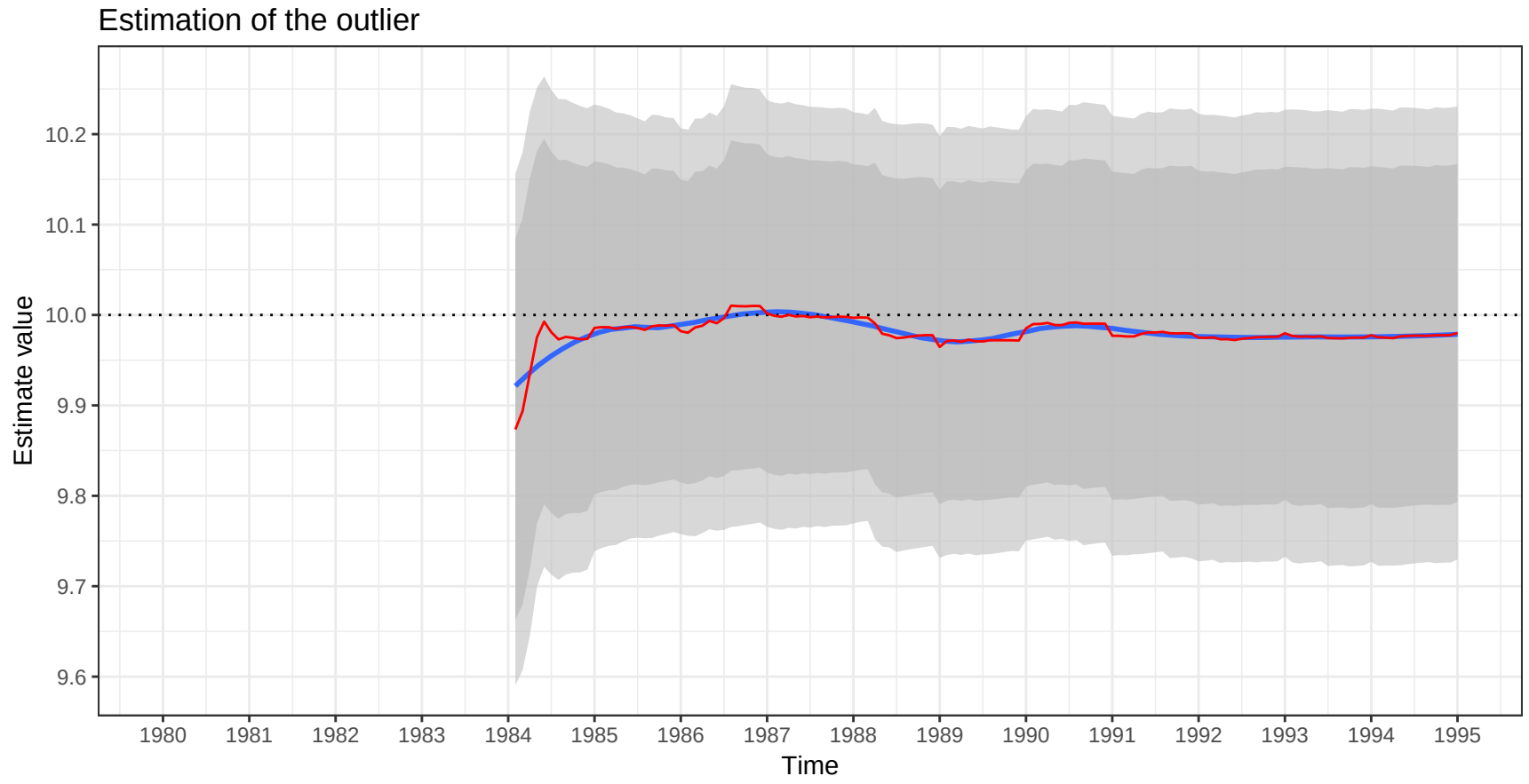

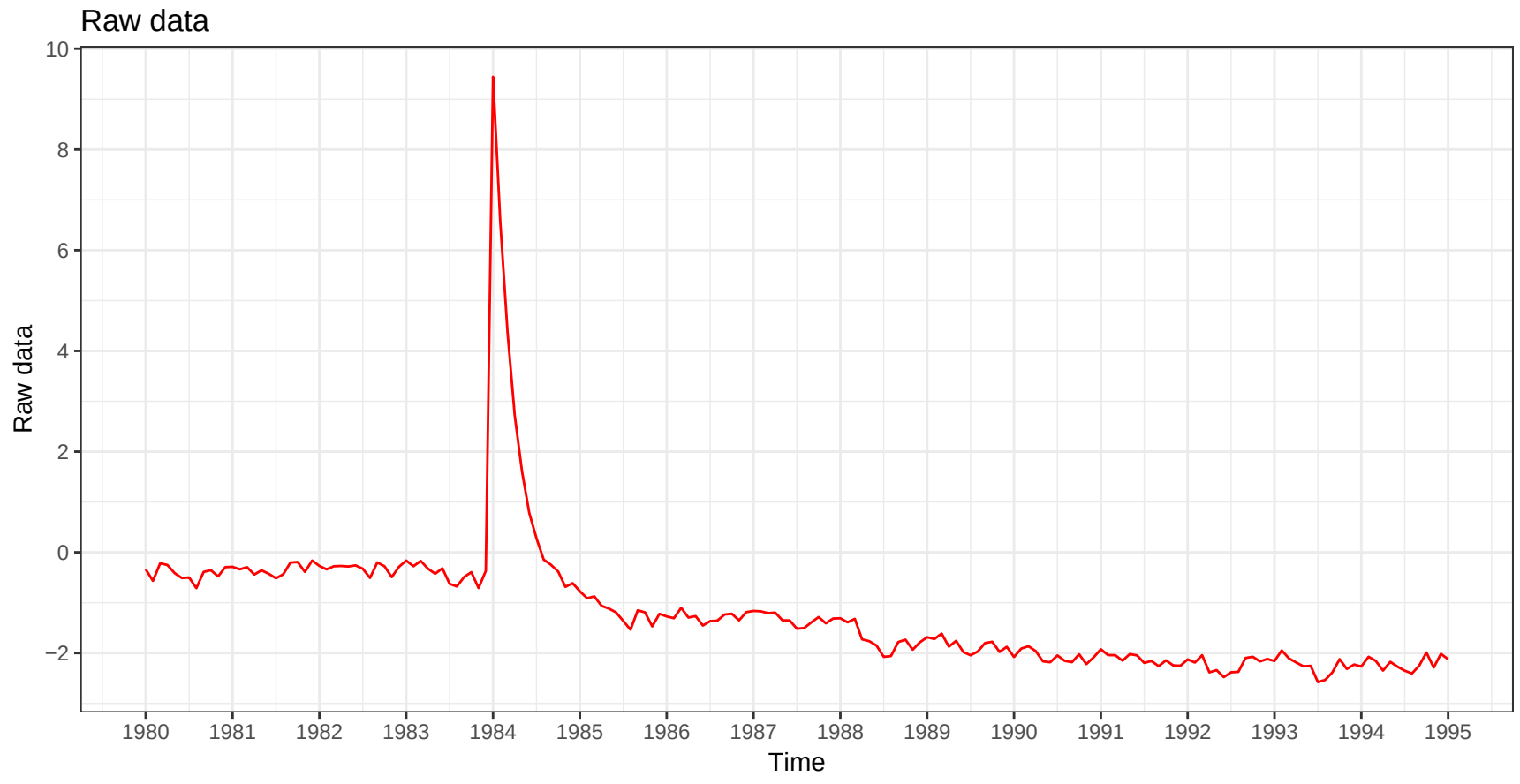

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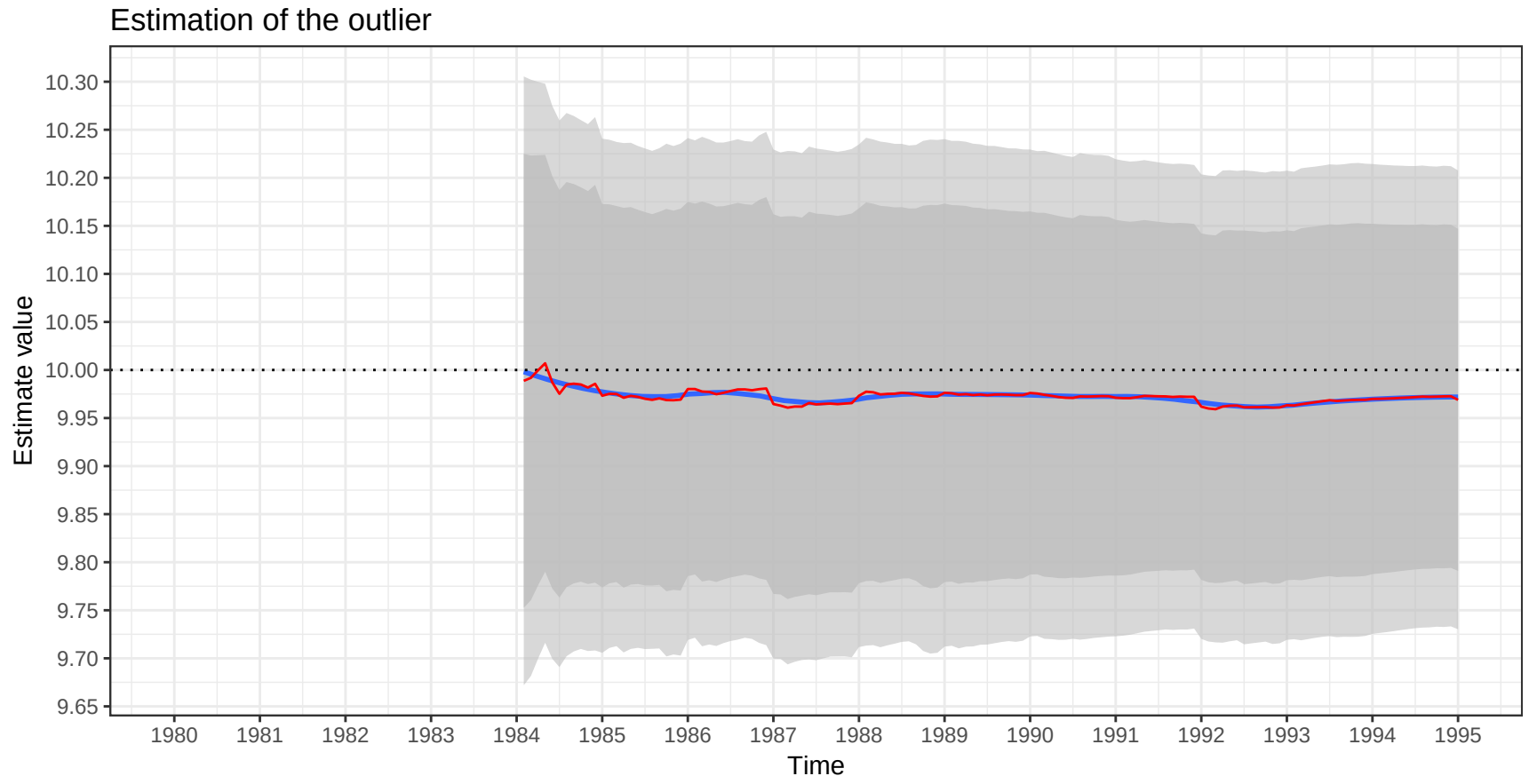

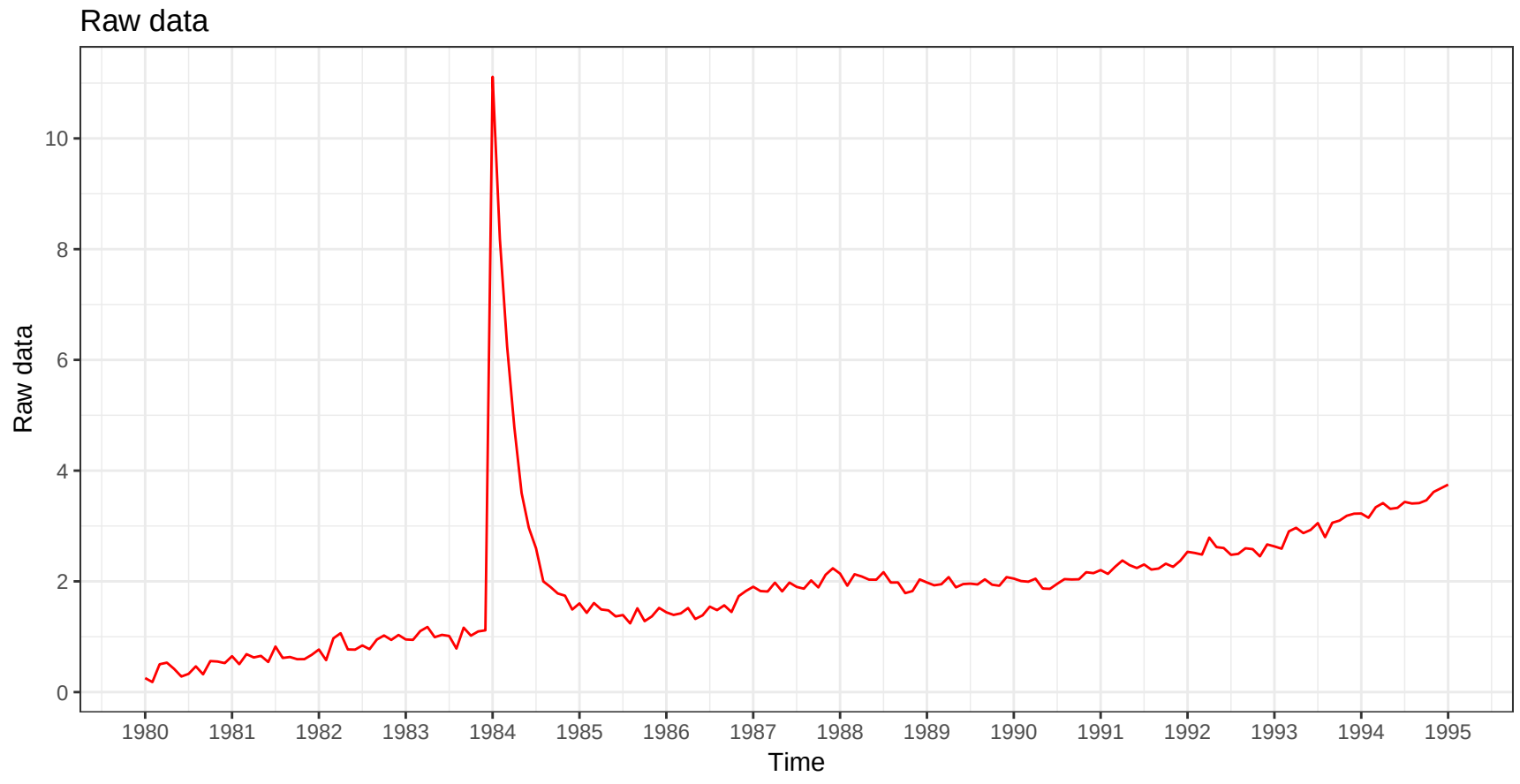

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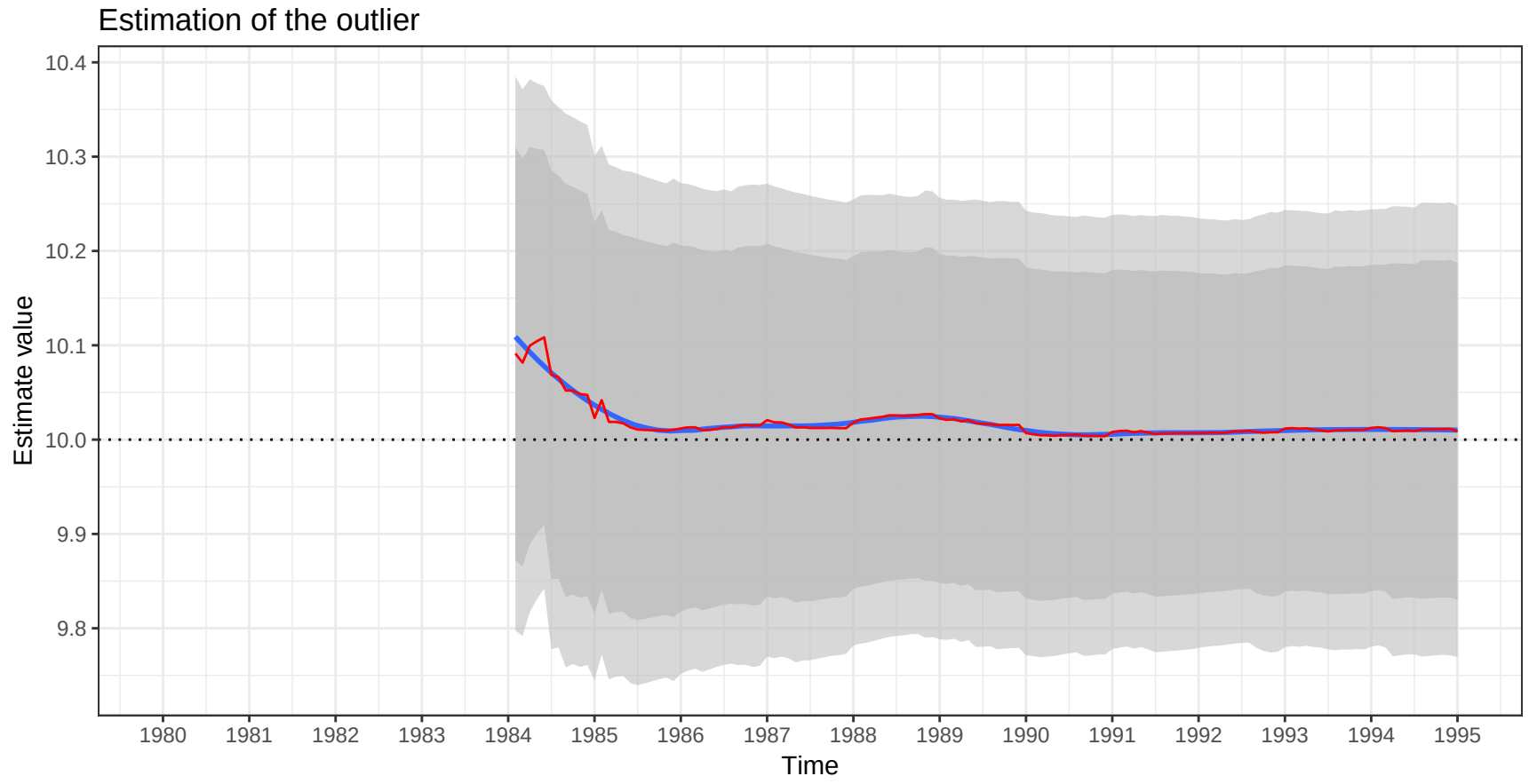

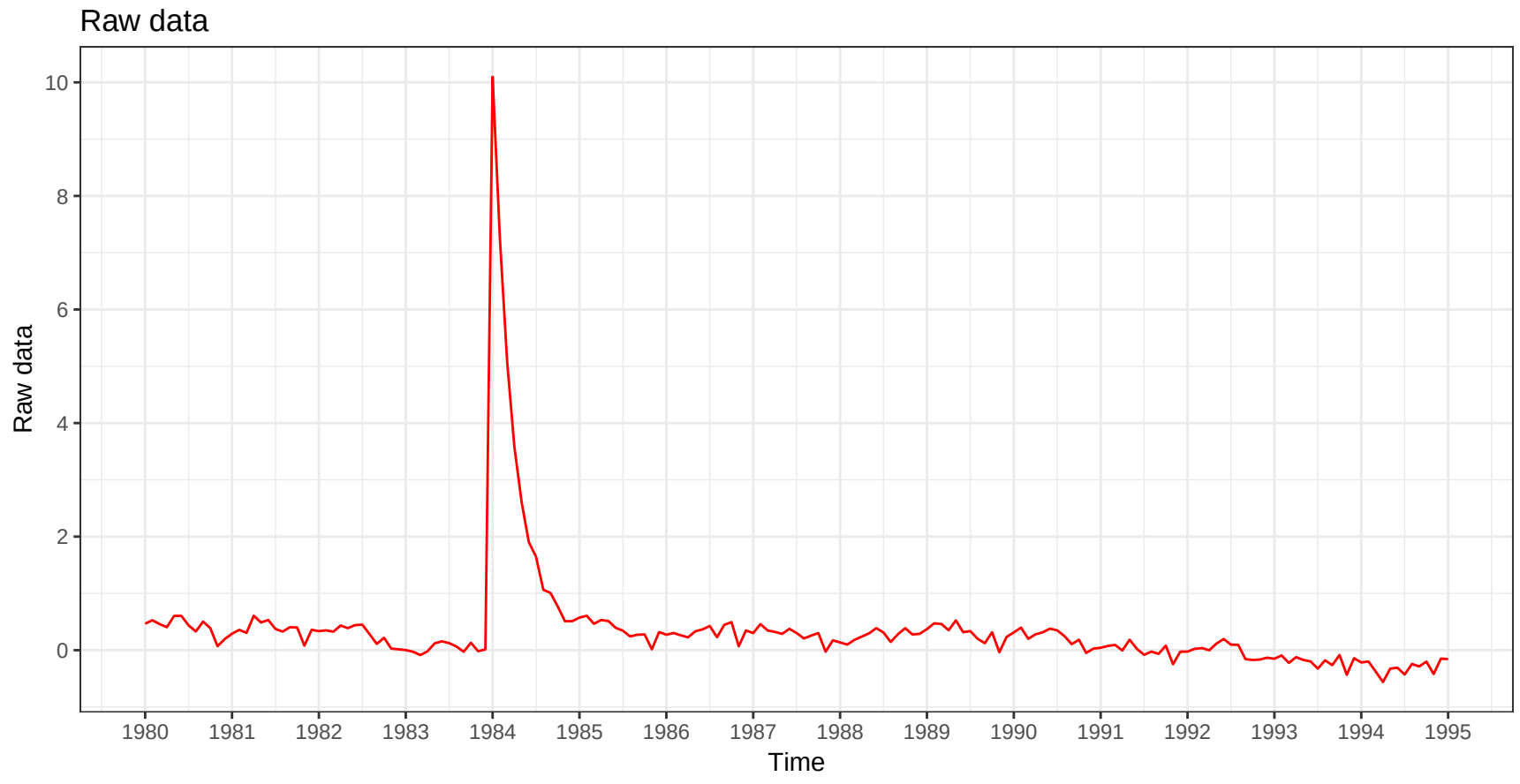

Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
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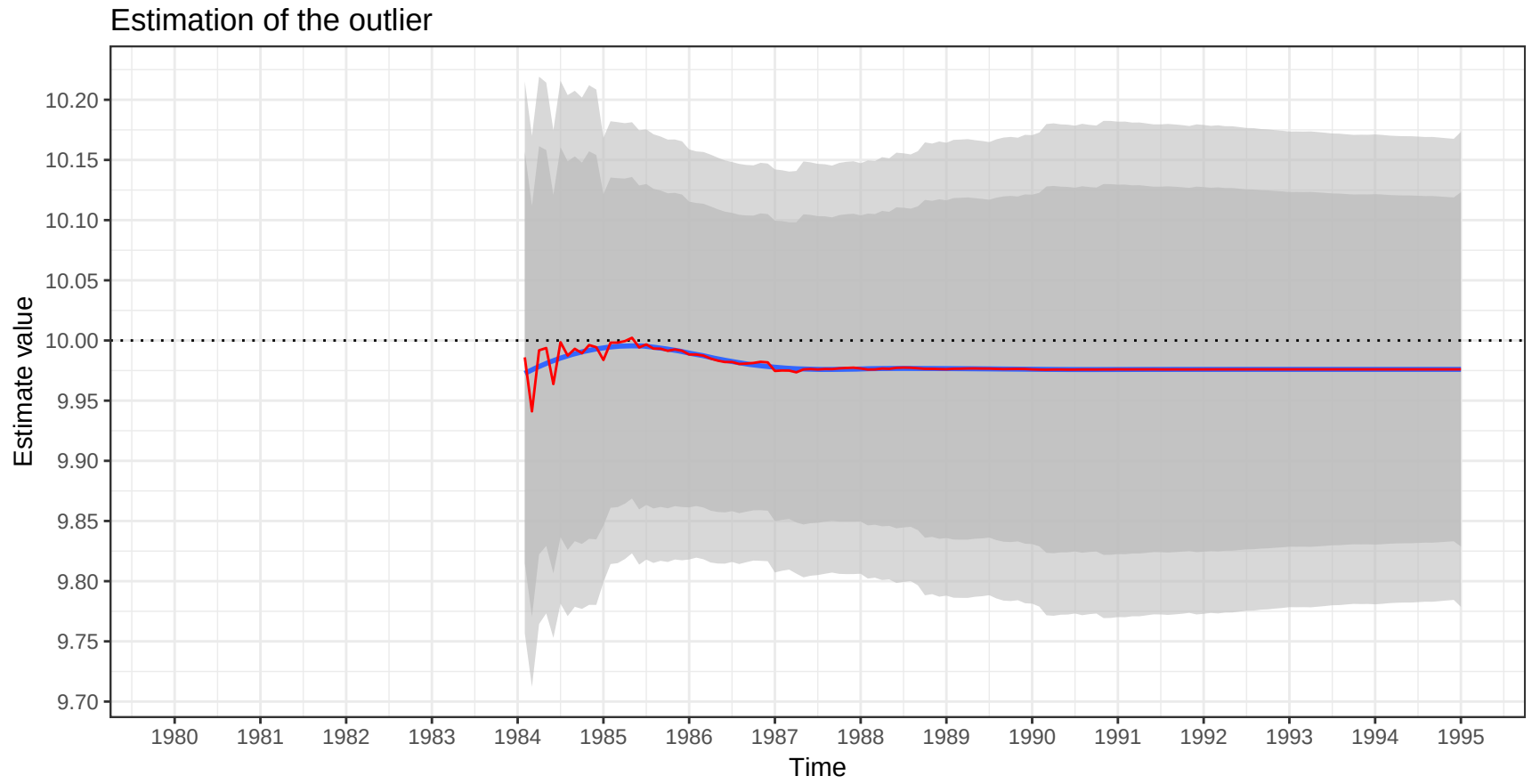

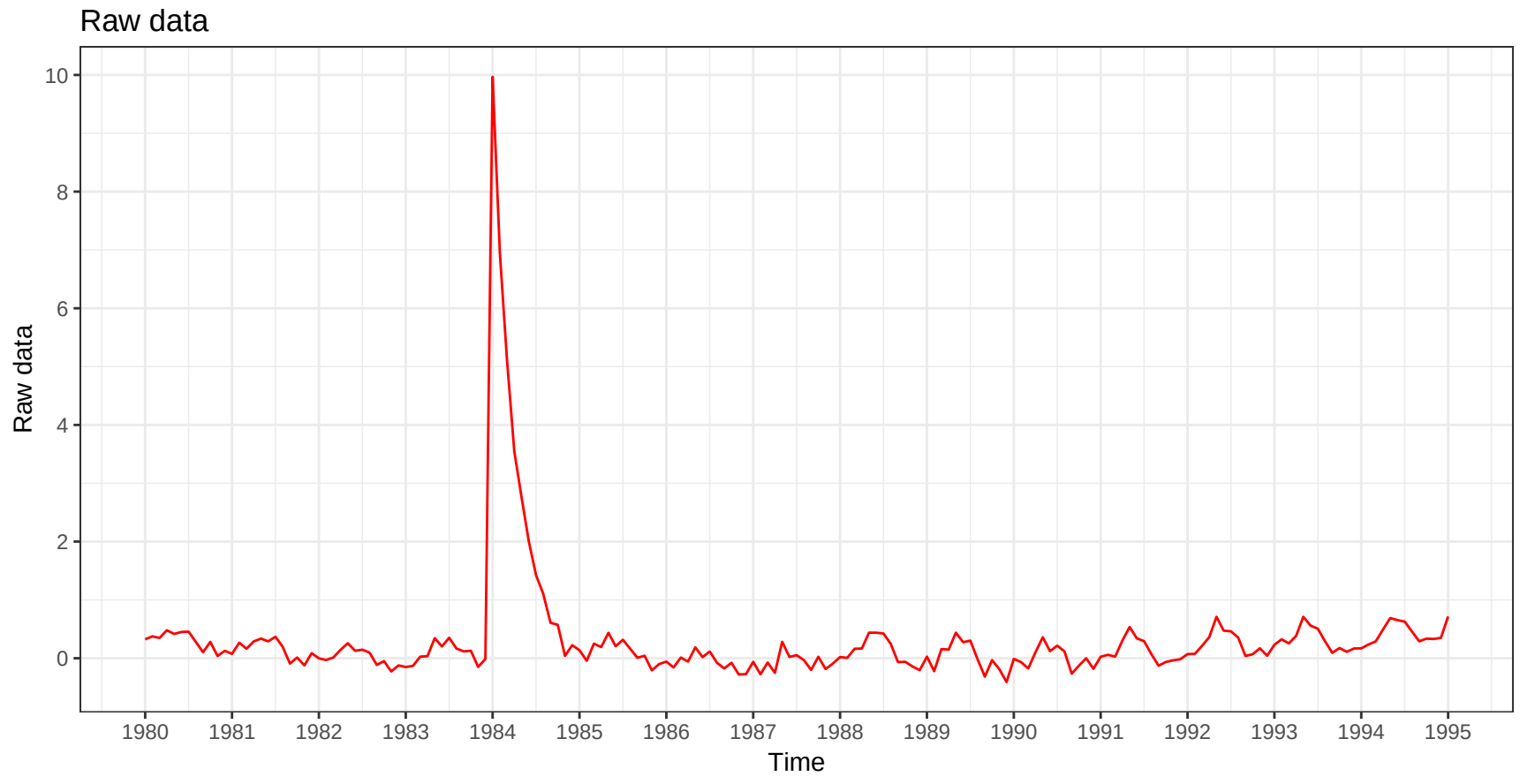

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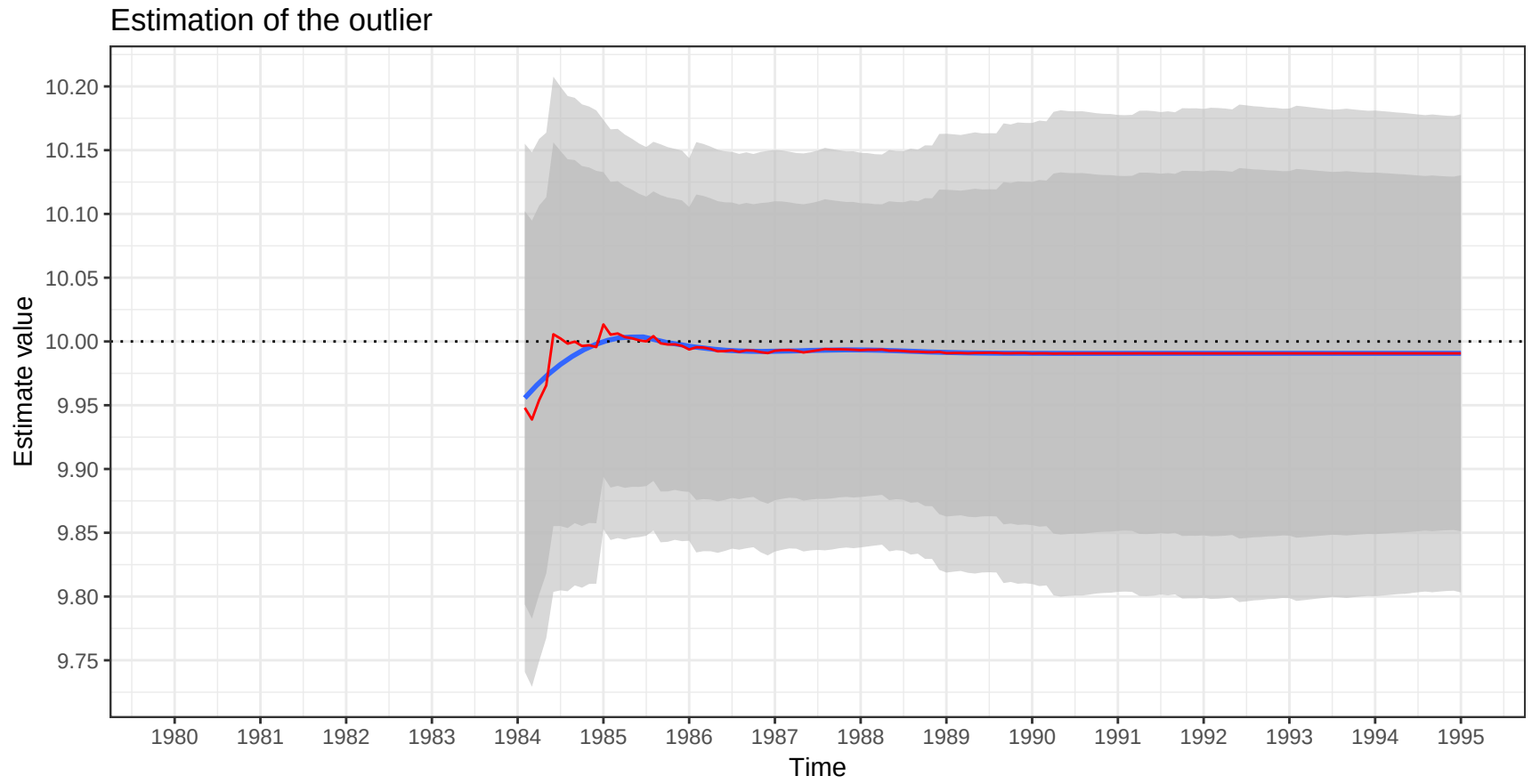

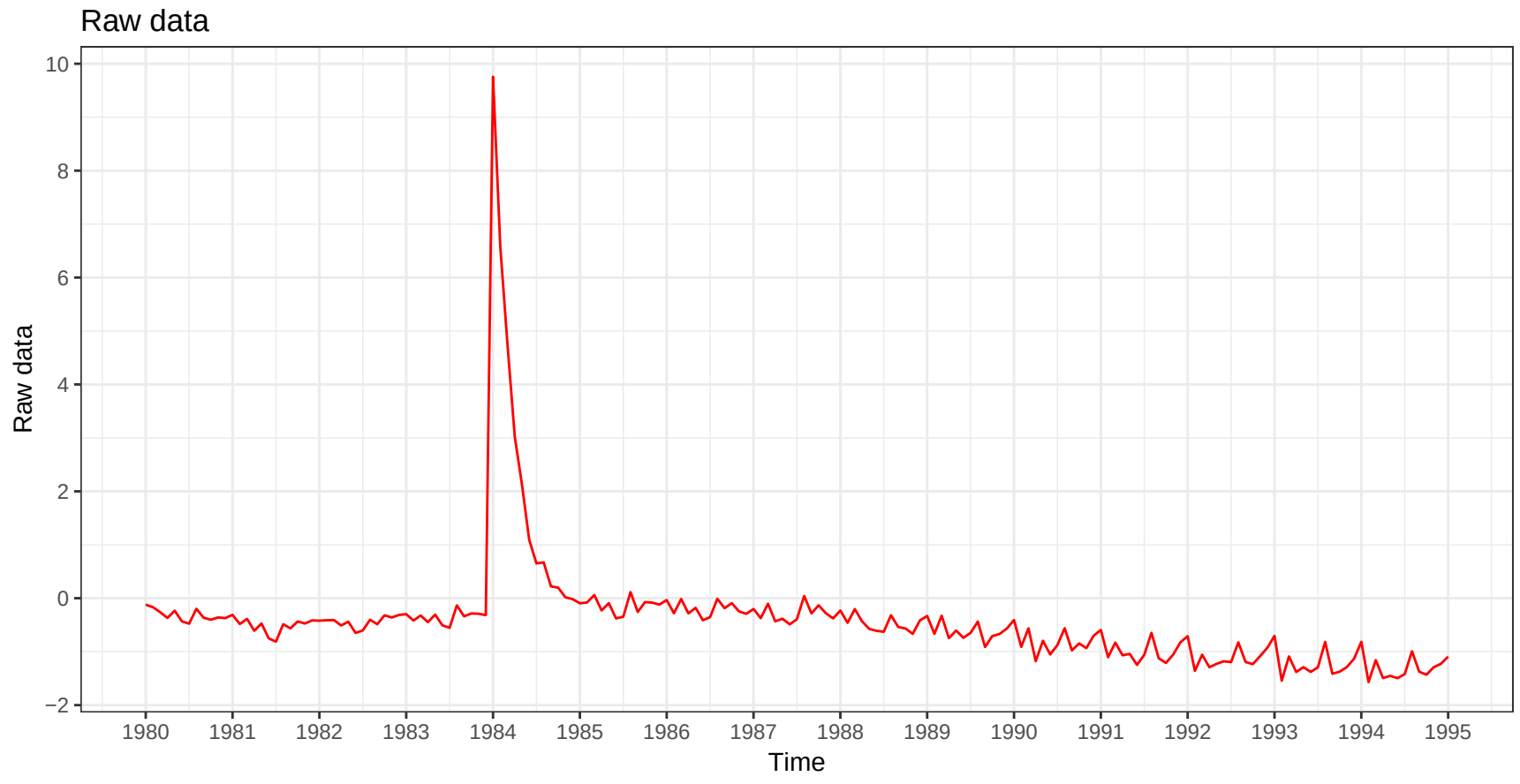

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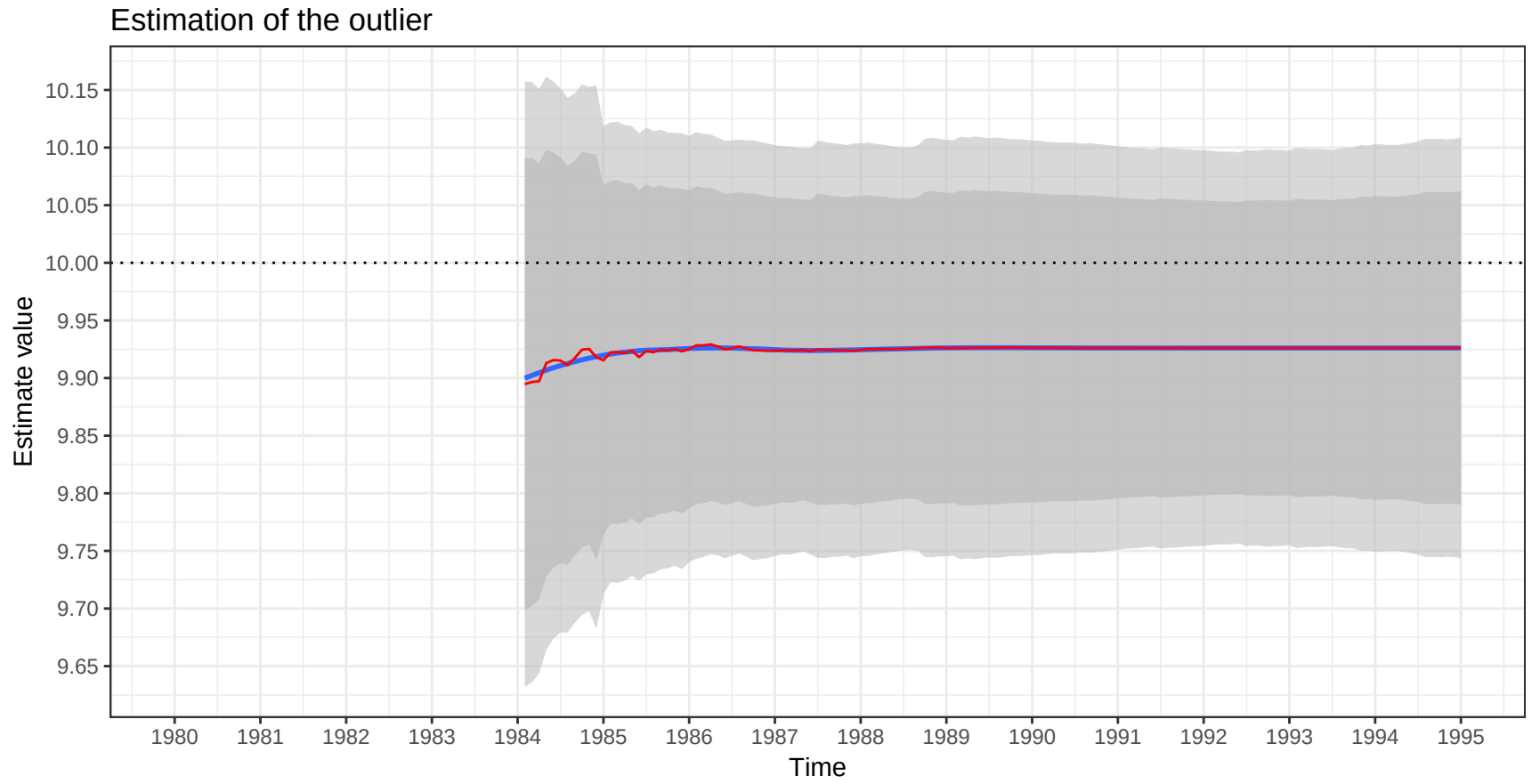

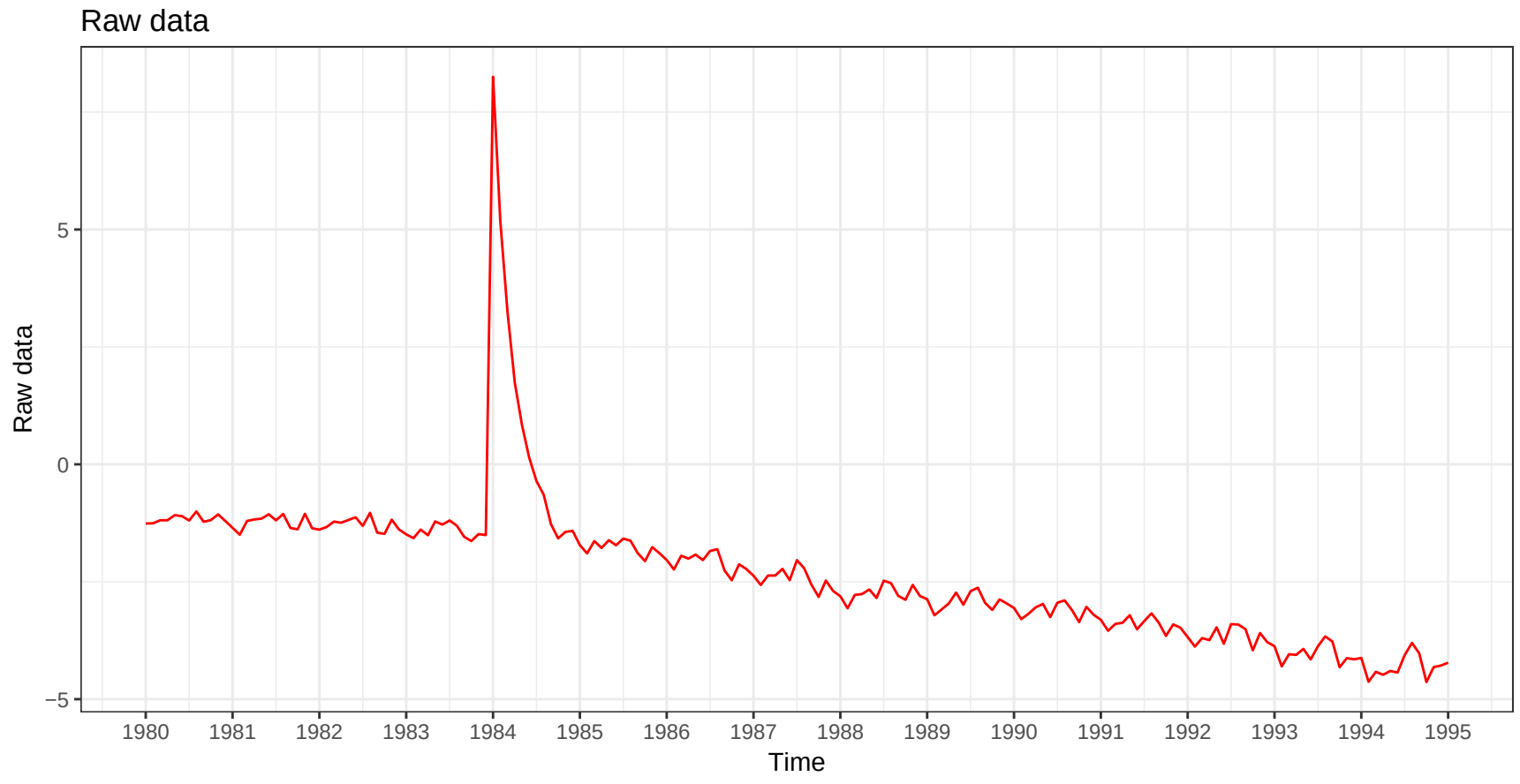

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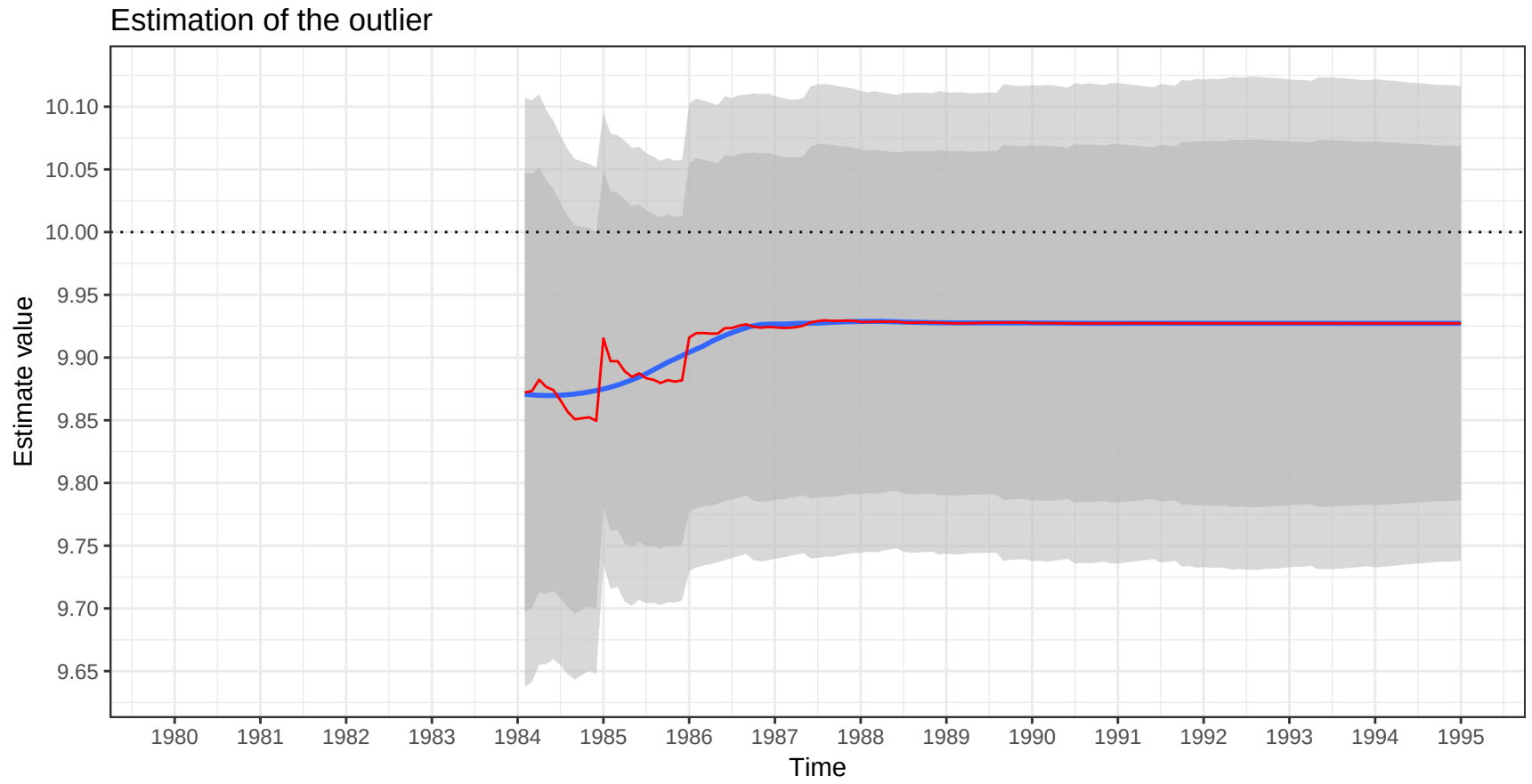

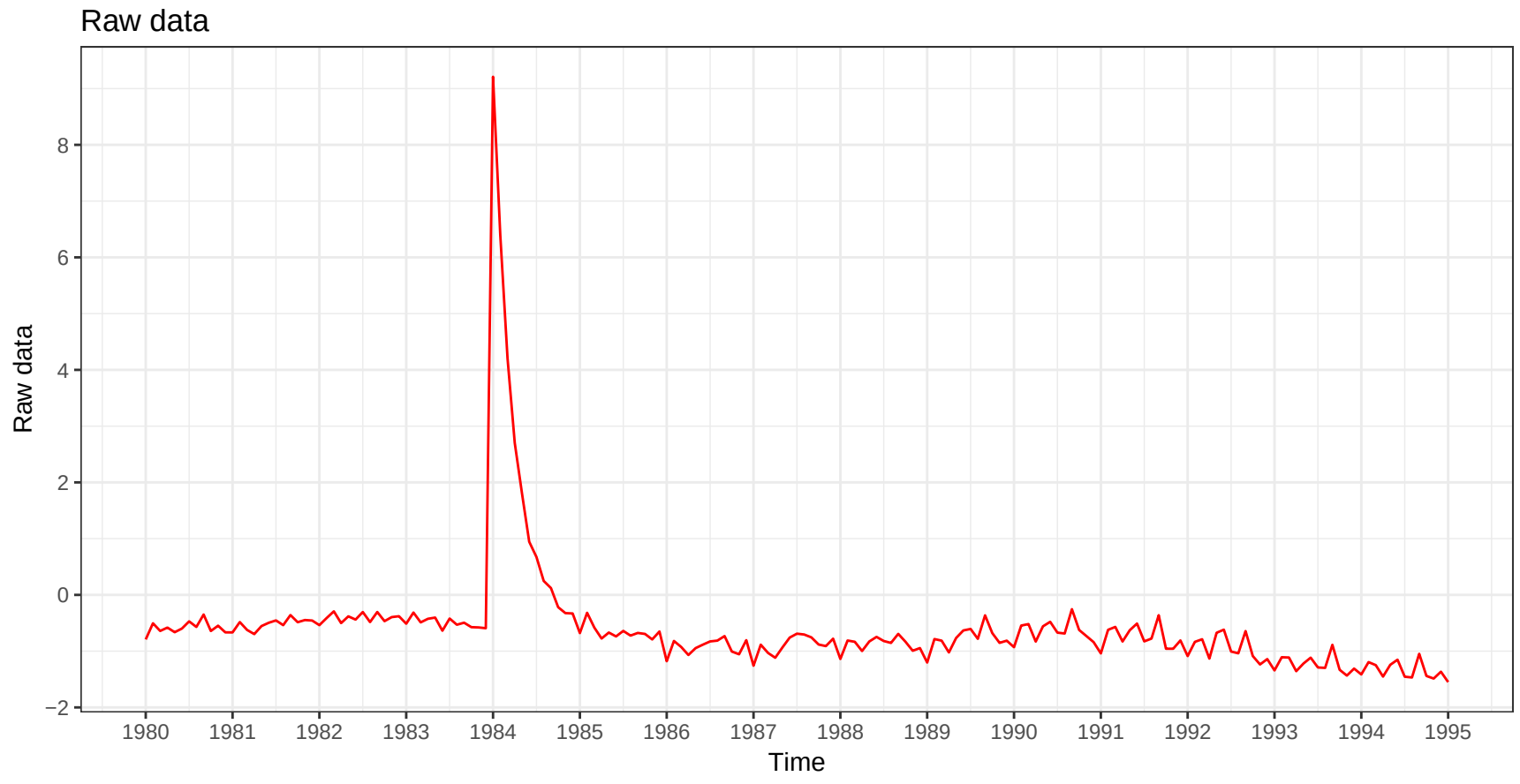

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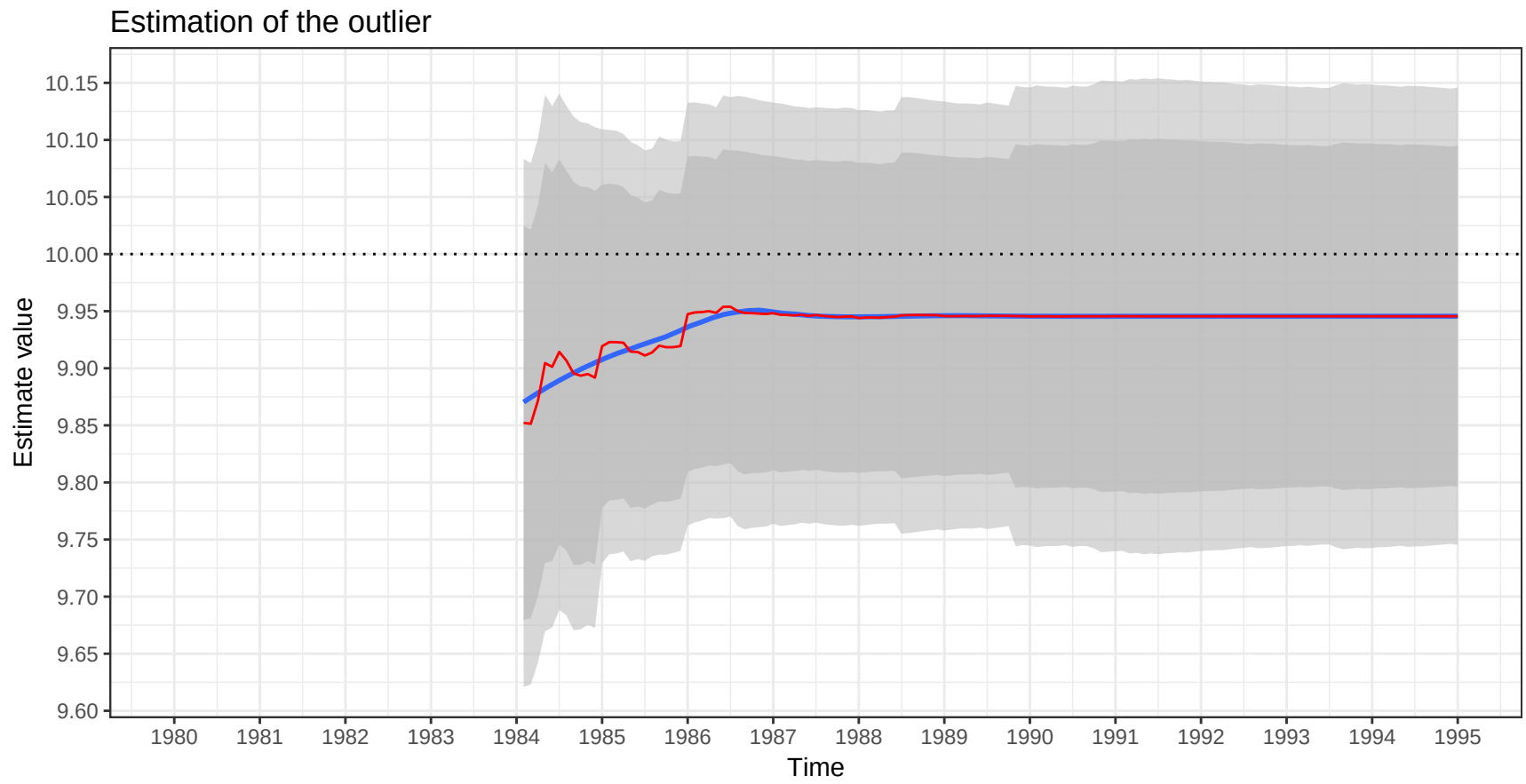

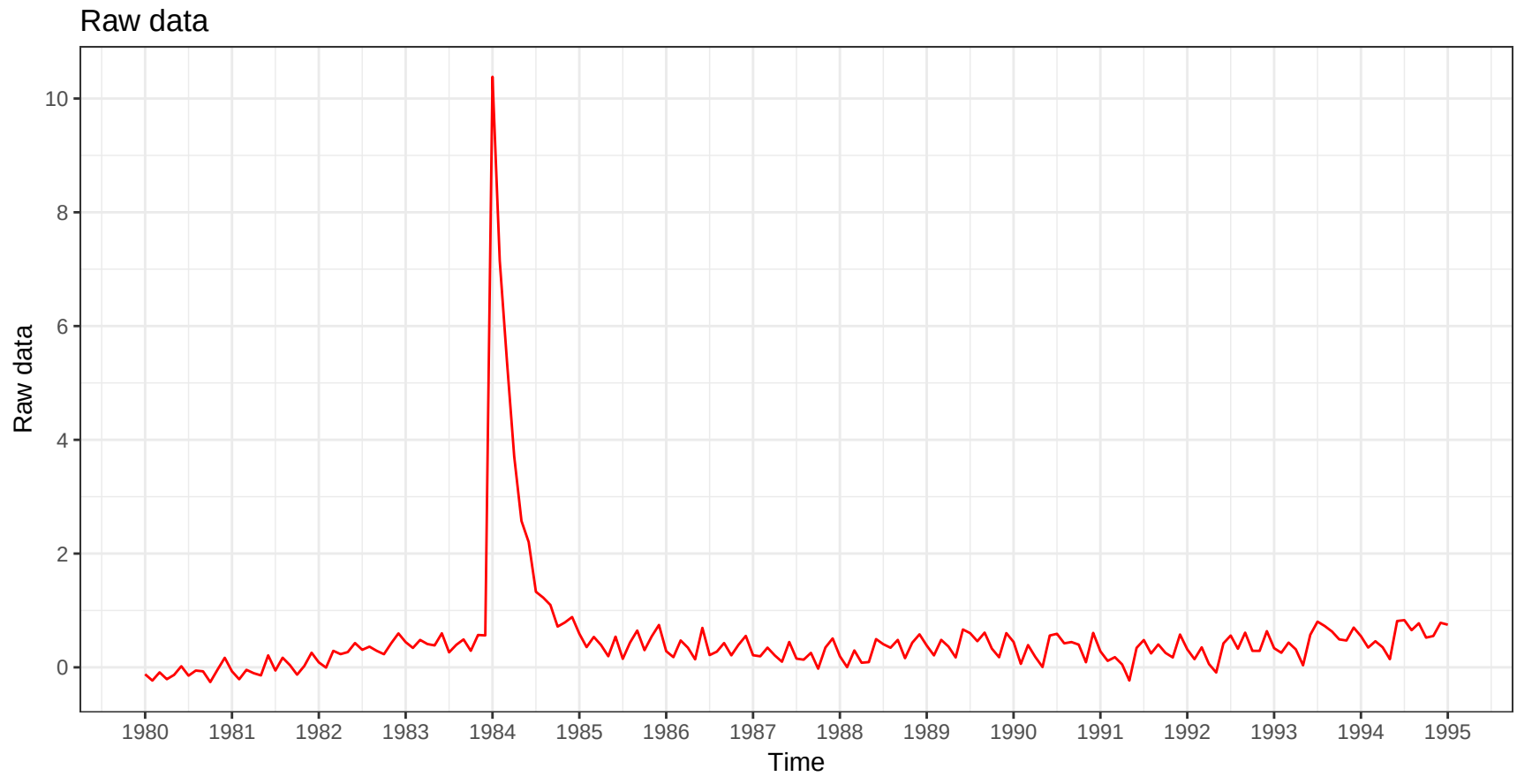

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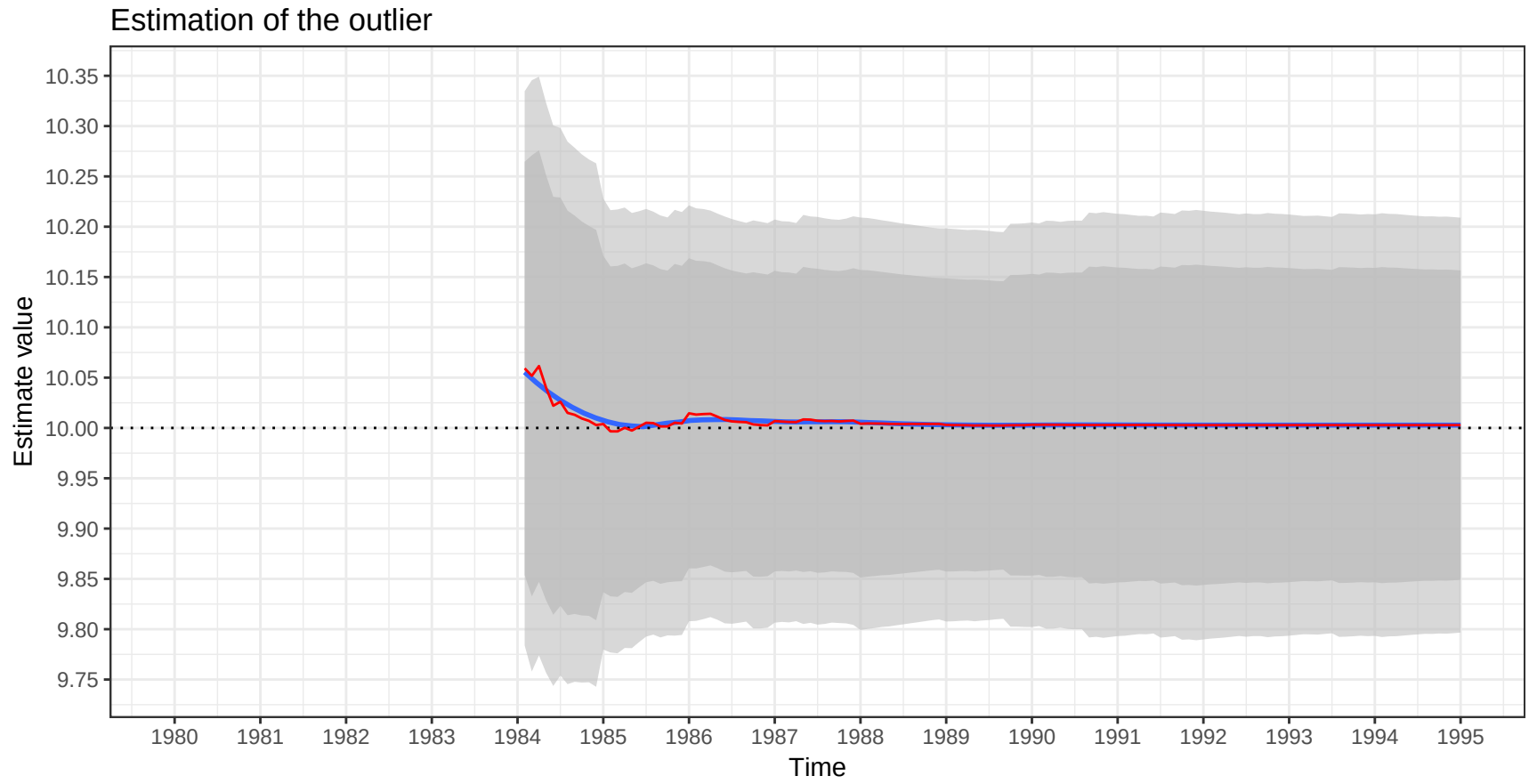
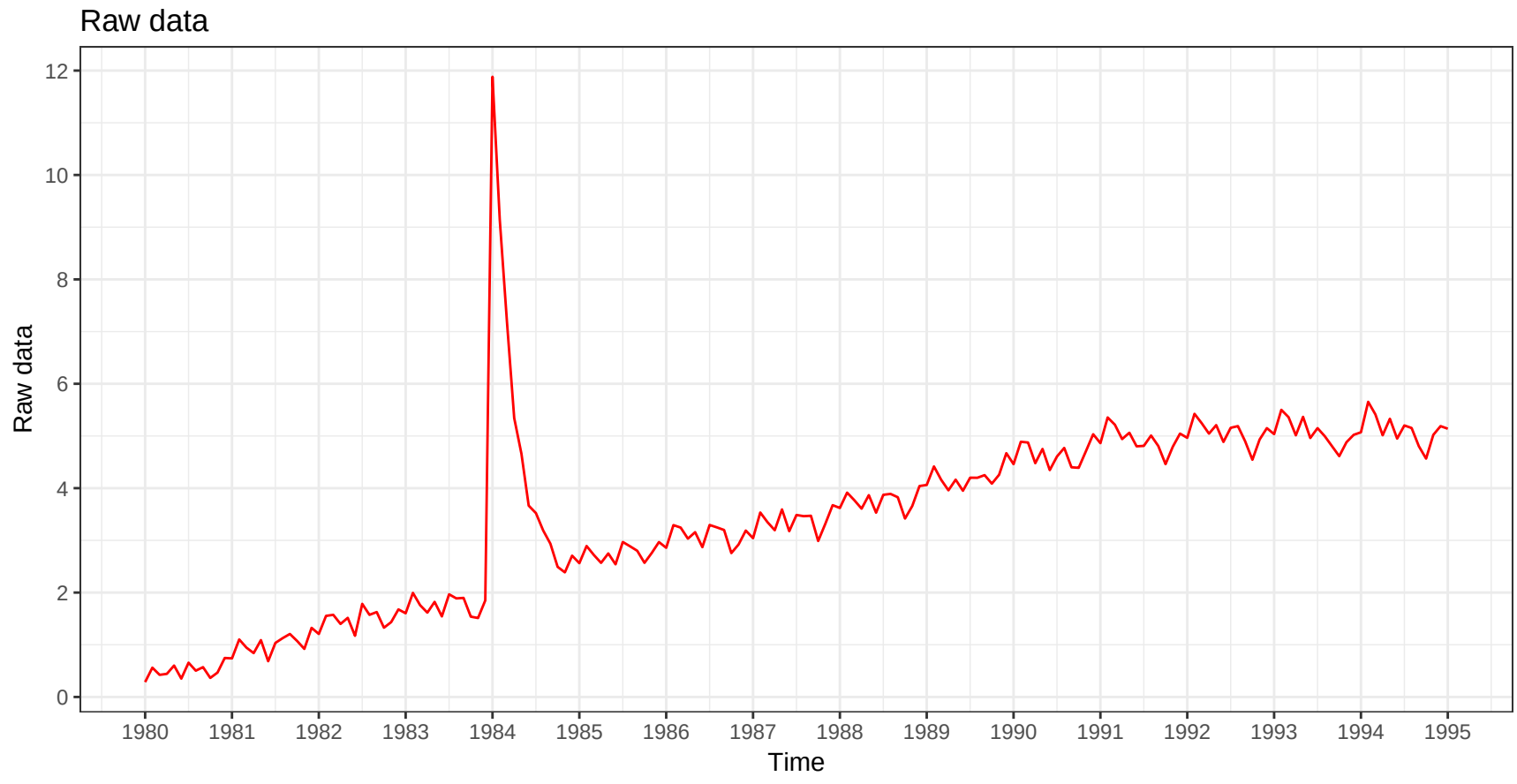
(1−B)(1−B12)Xt=(1−0.6B)(1−0.4B12)at





Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
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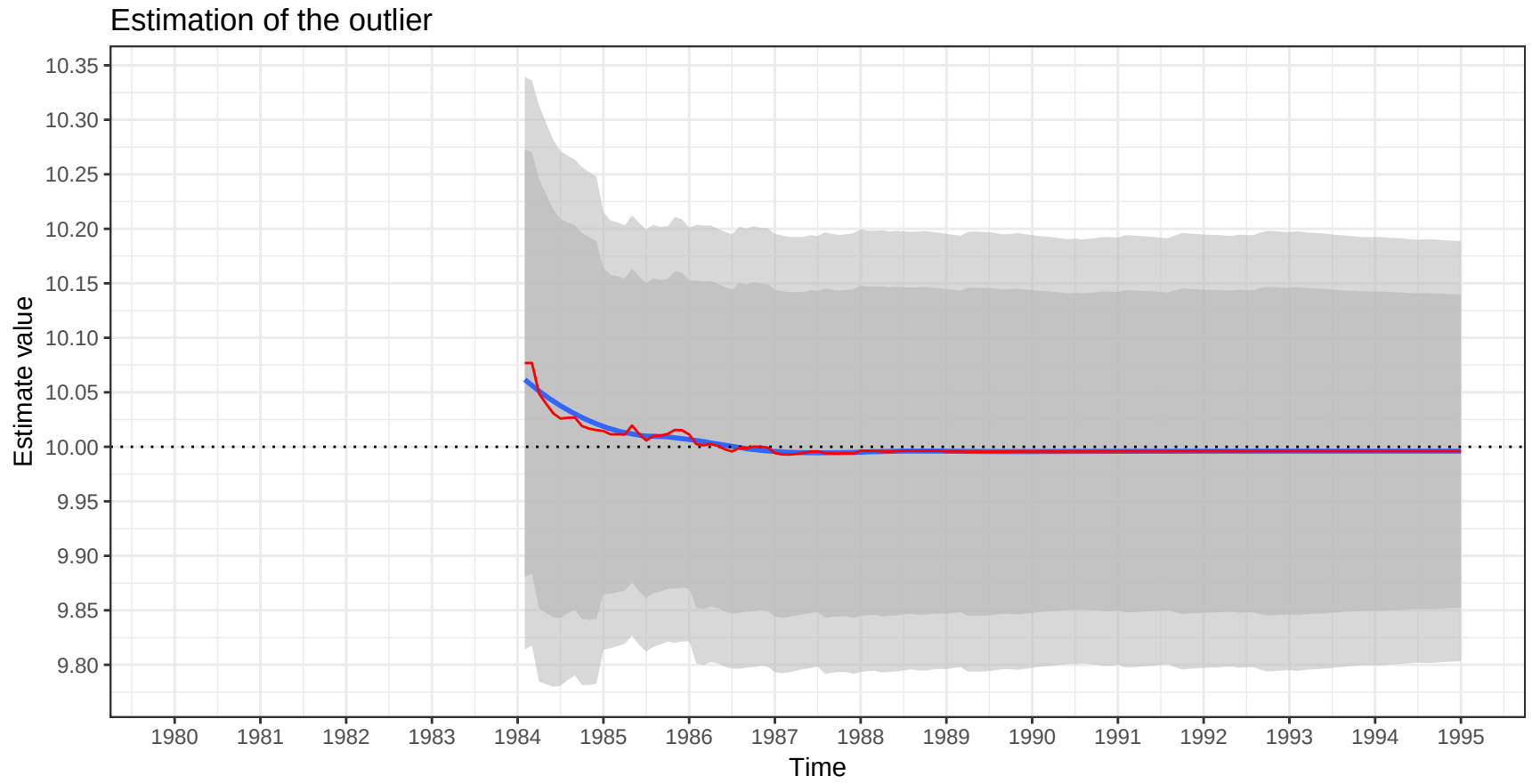

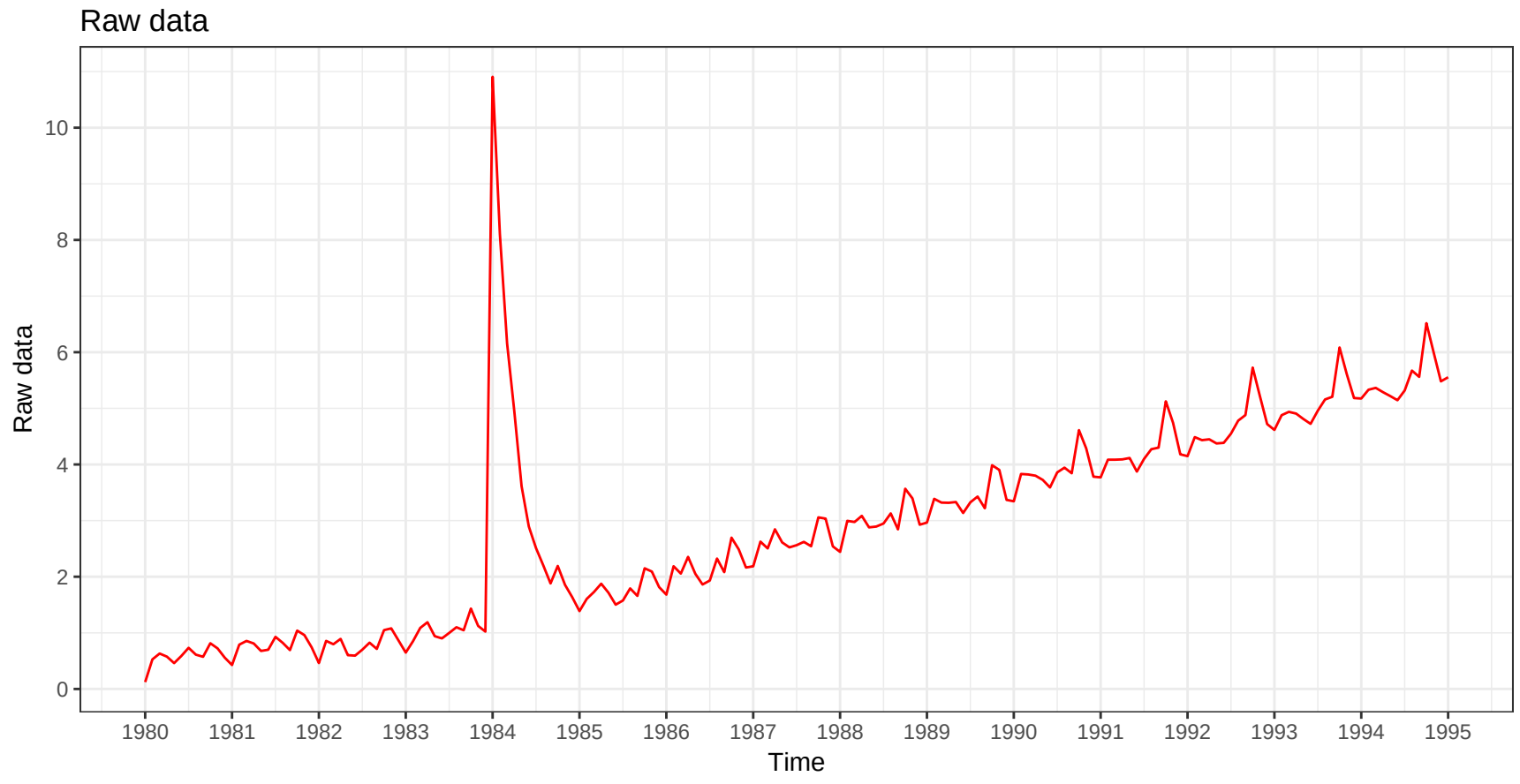

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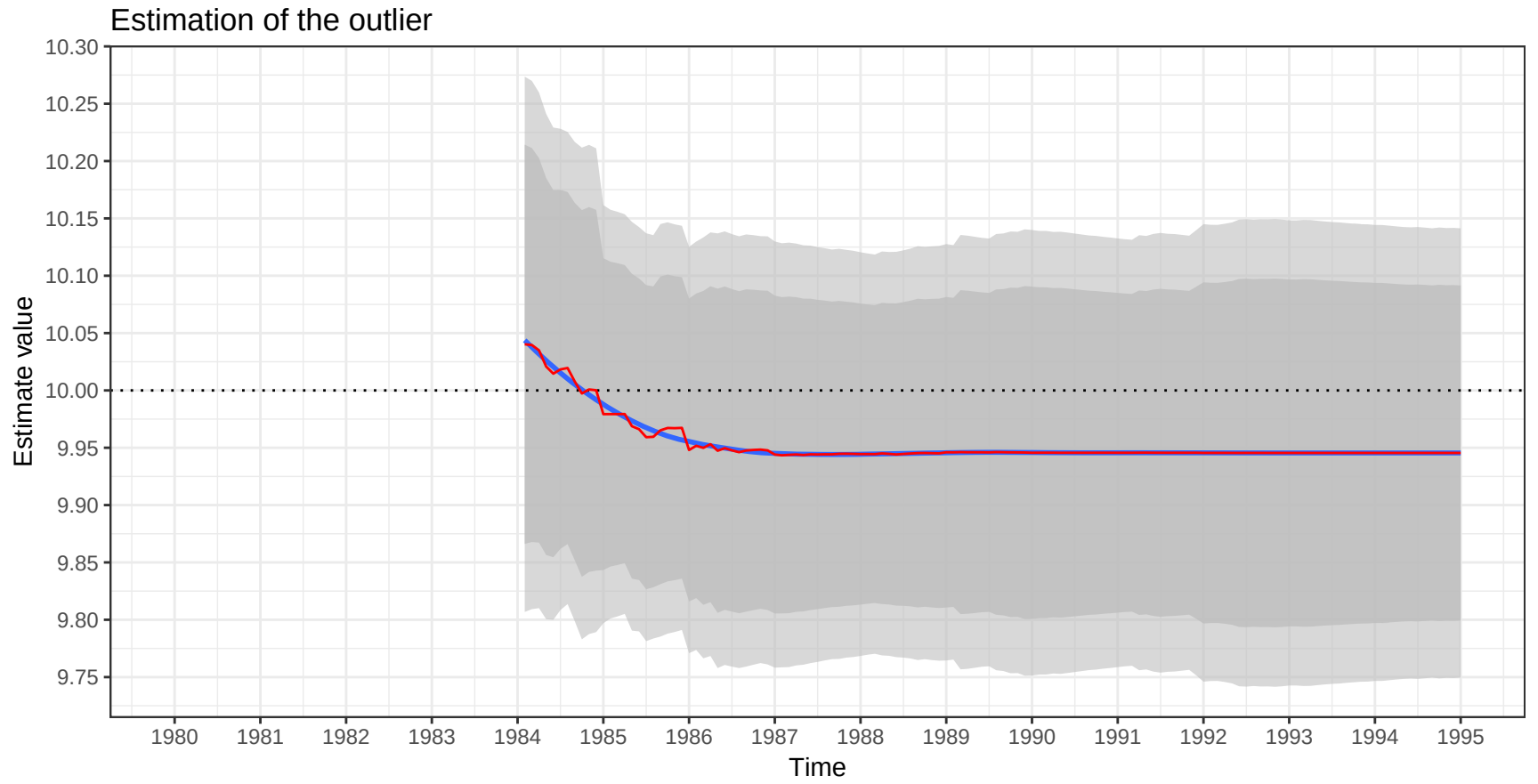

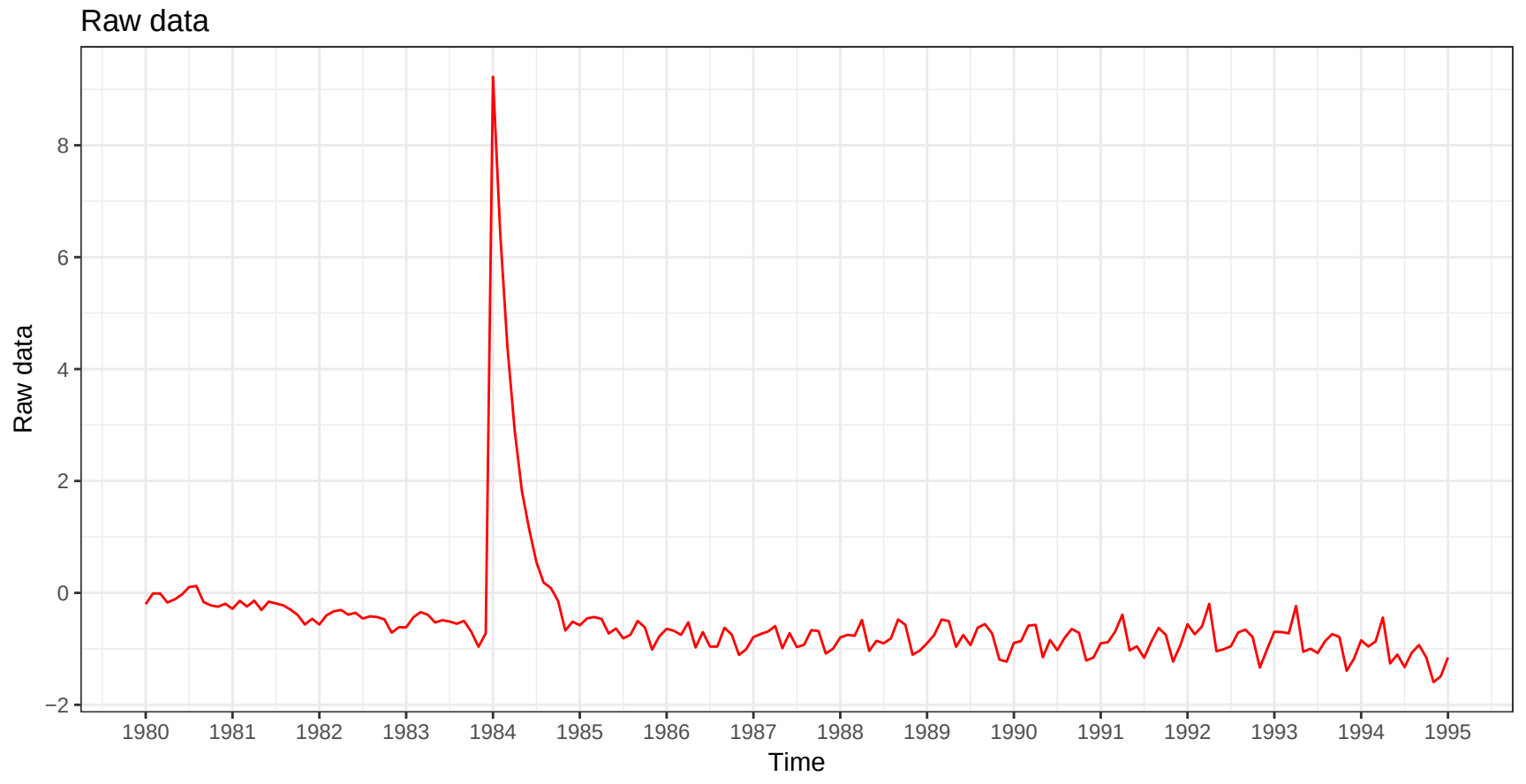

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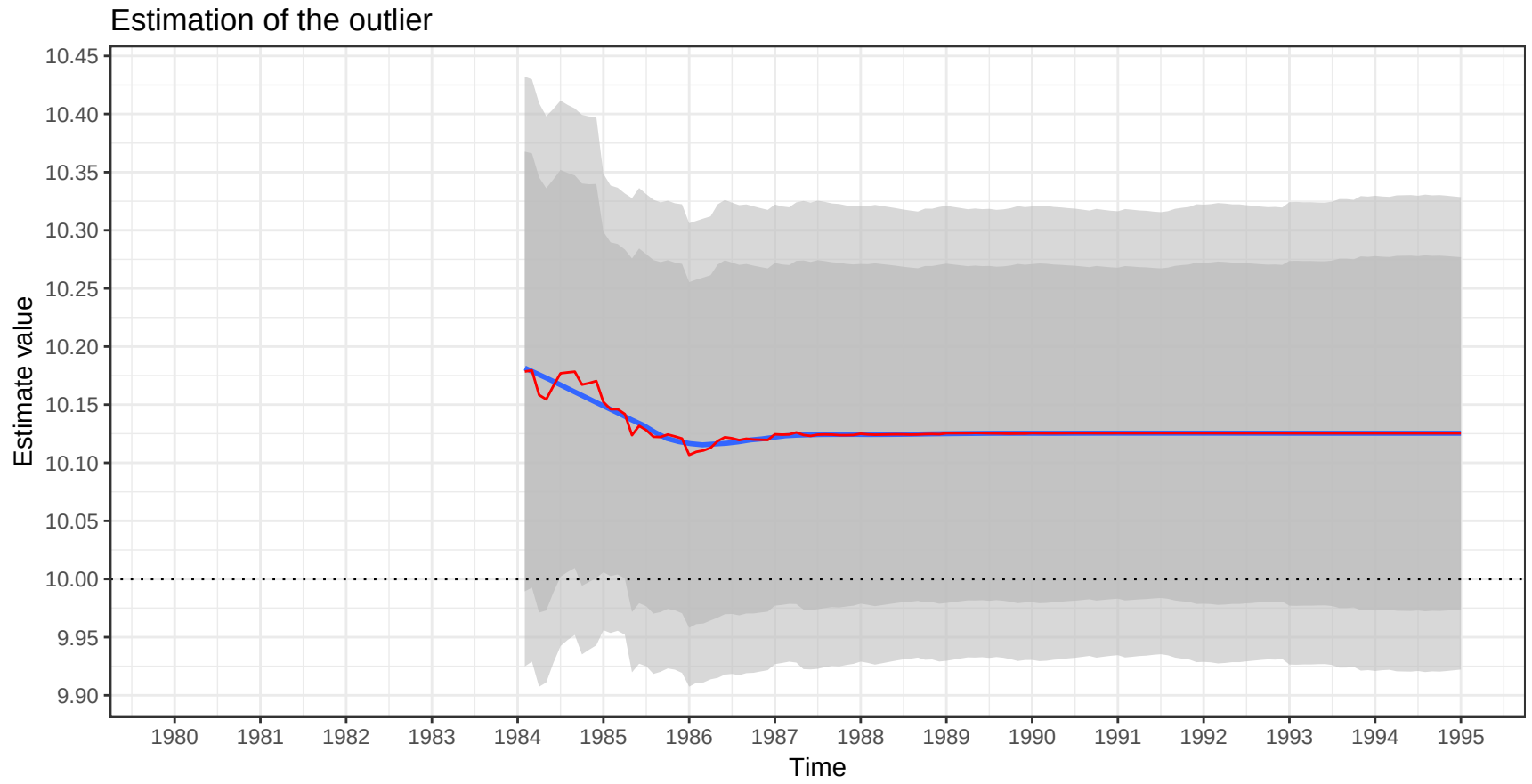

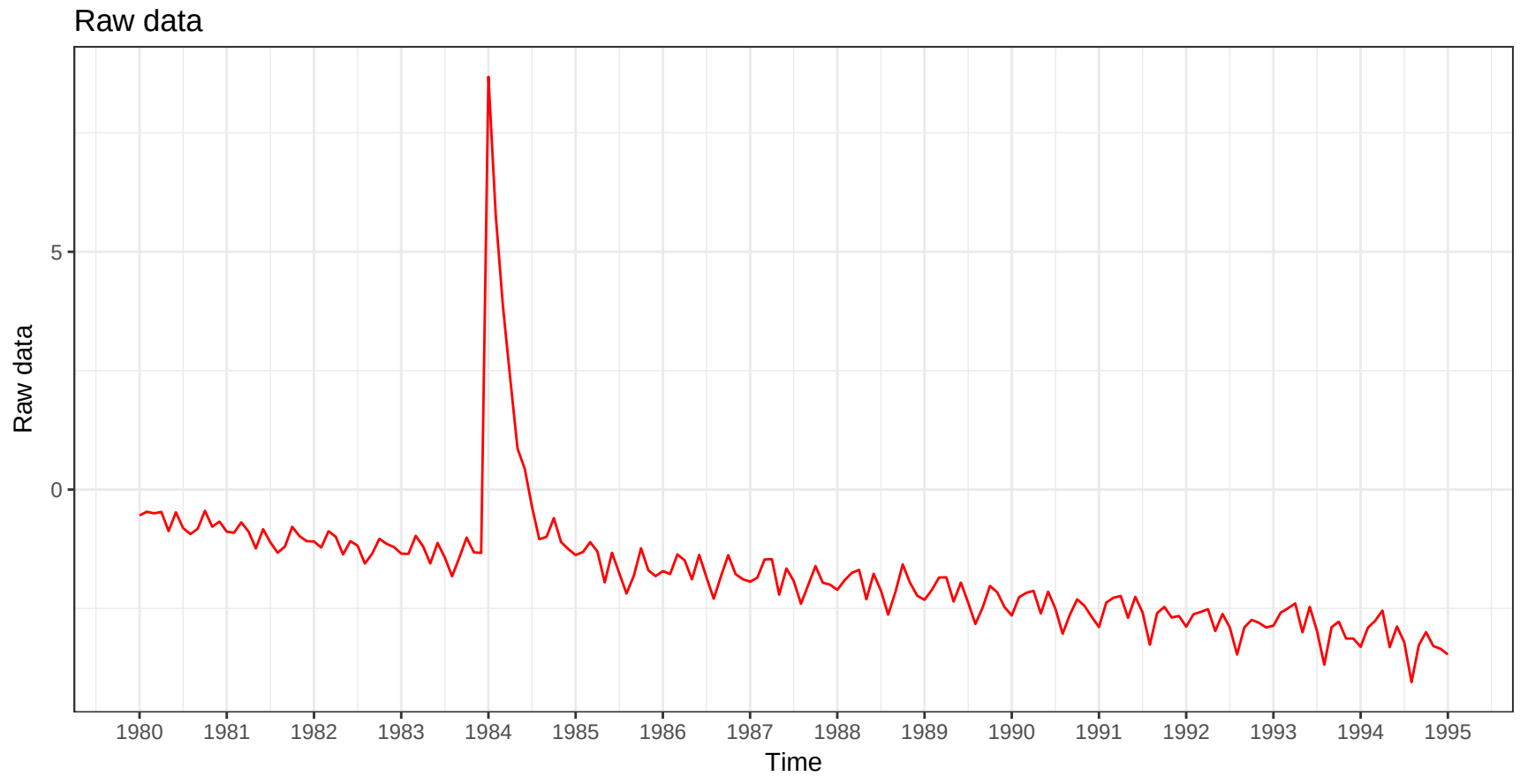

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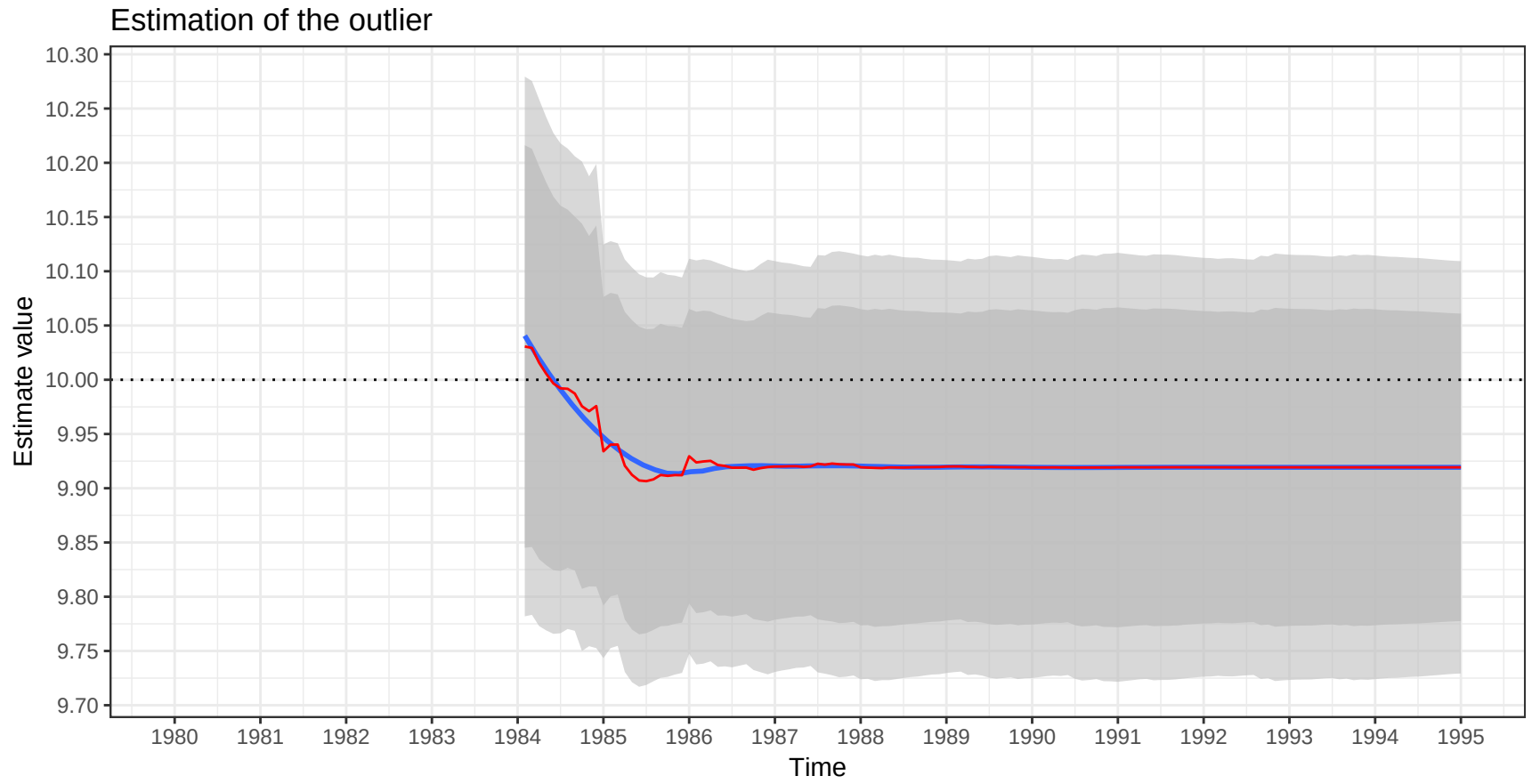

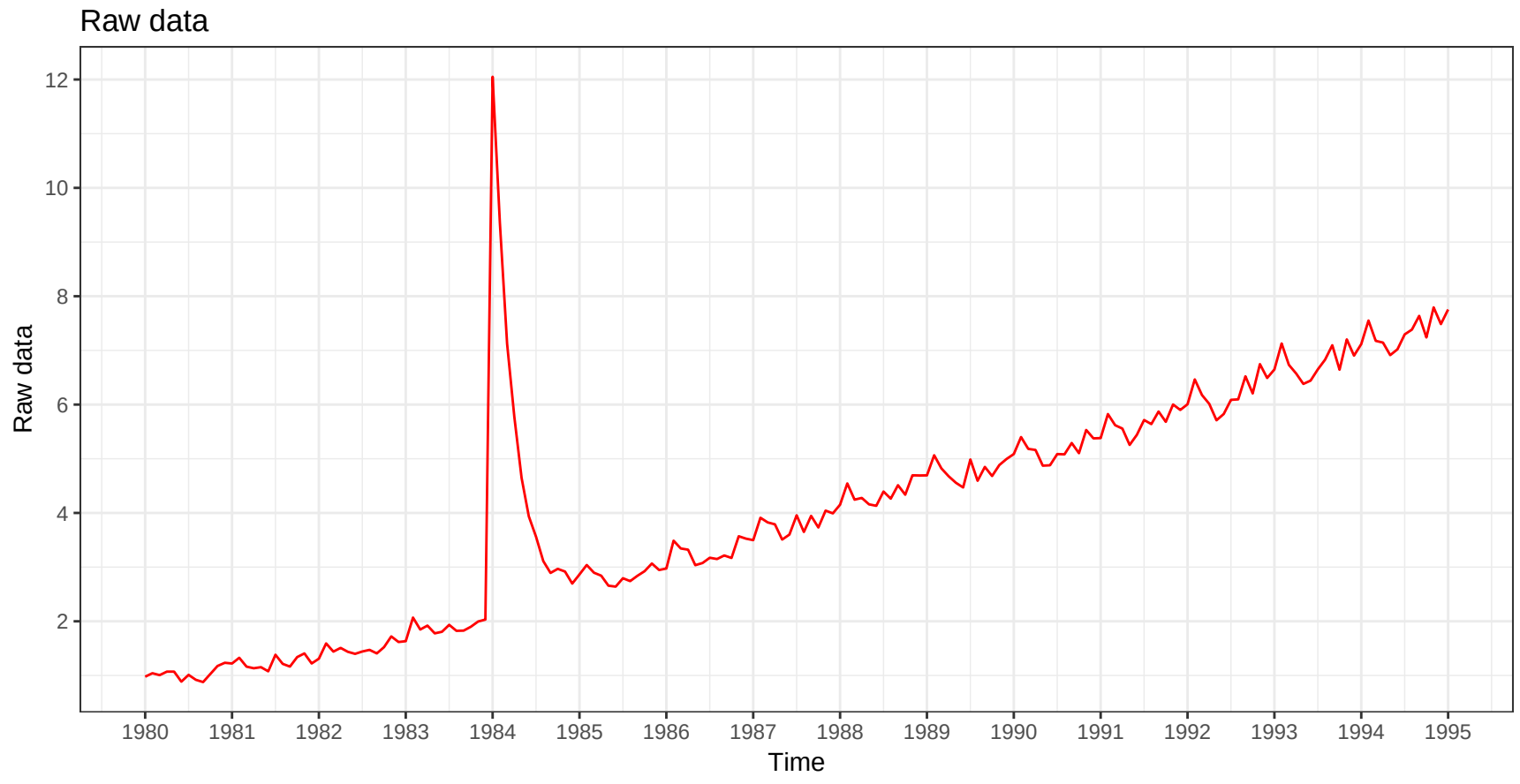

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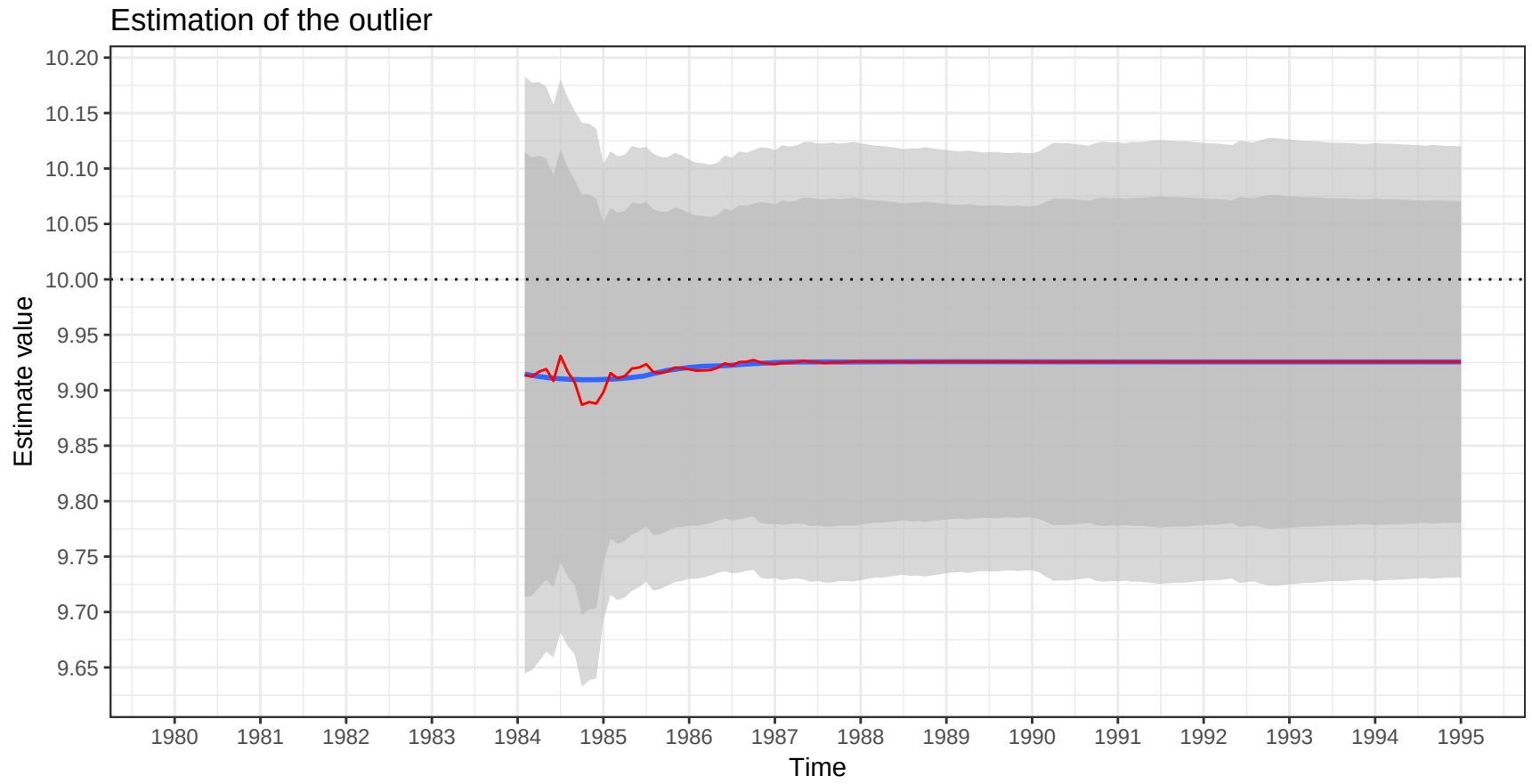

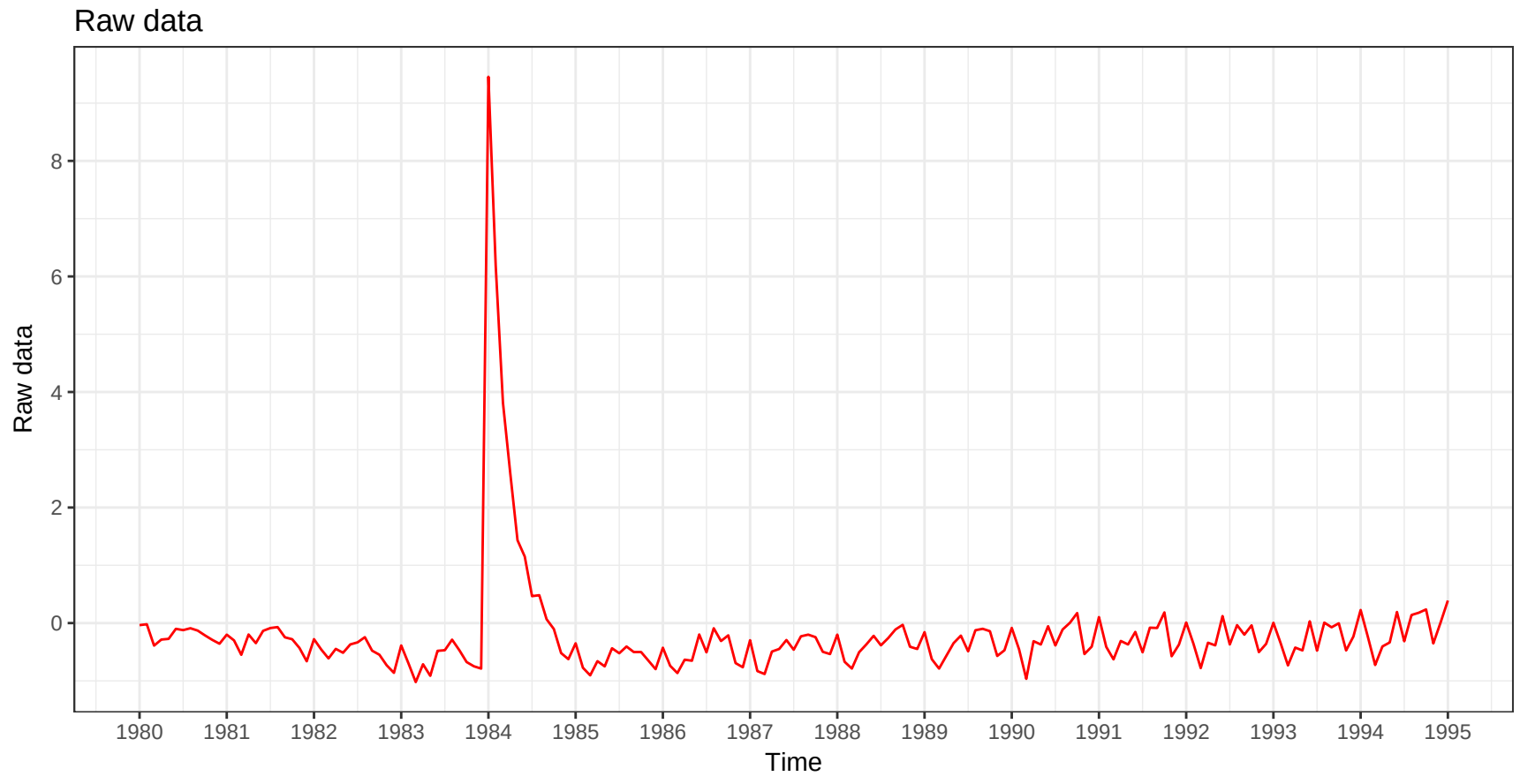

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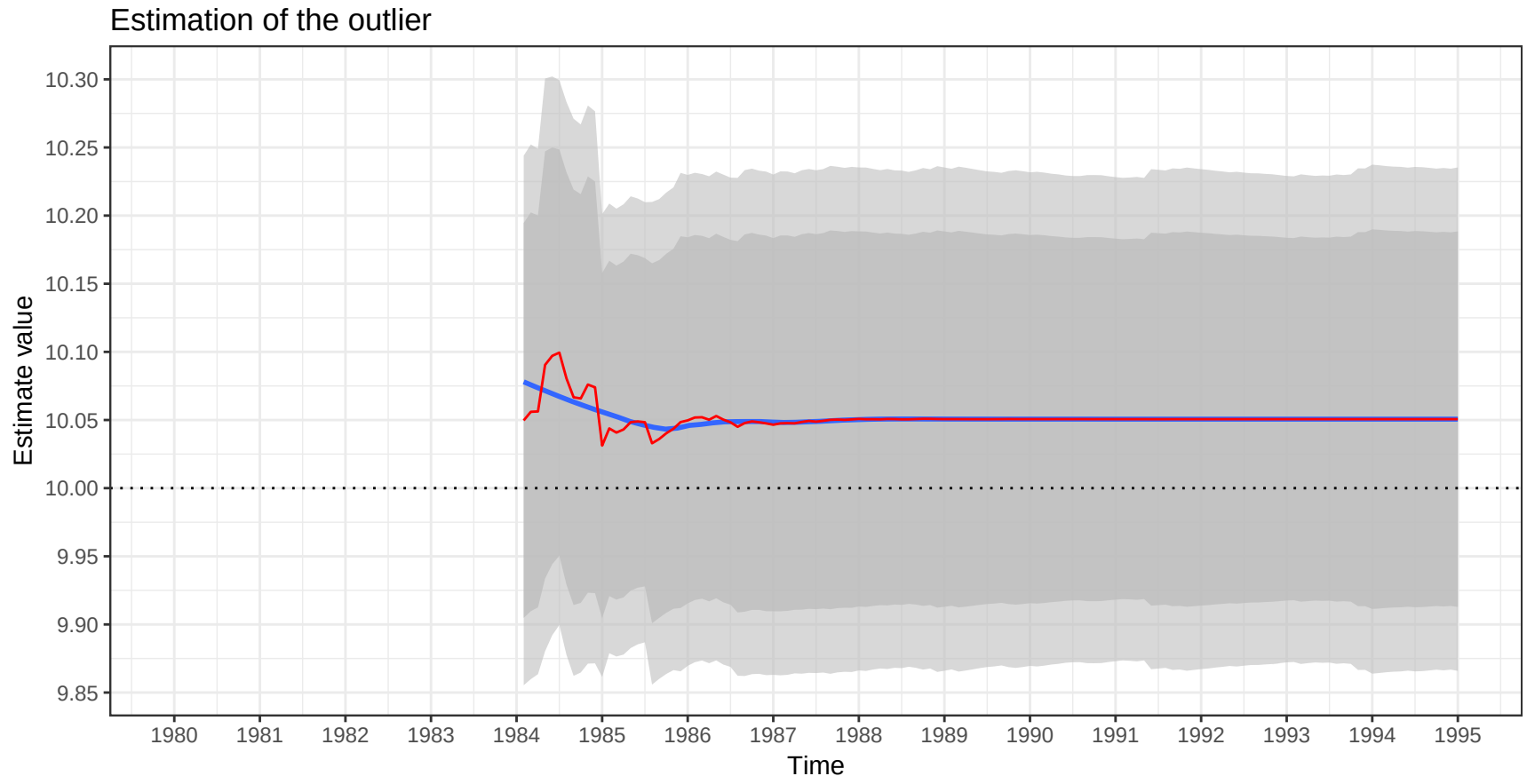

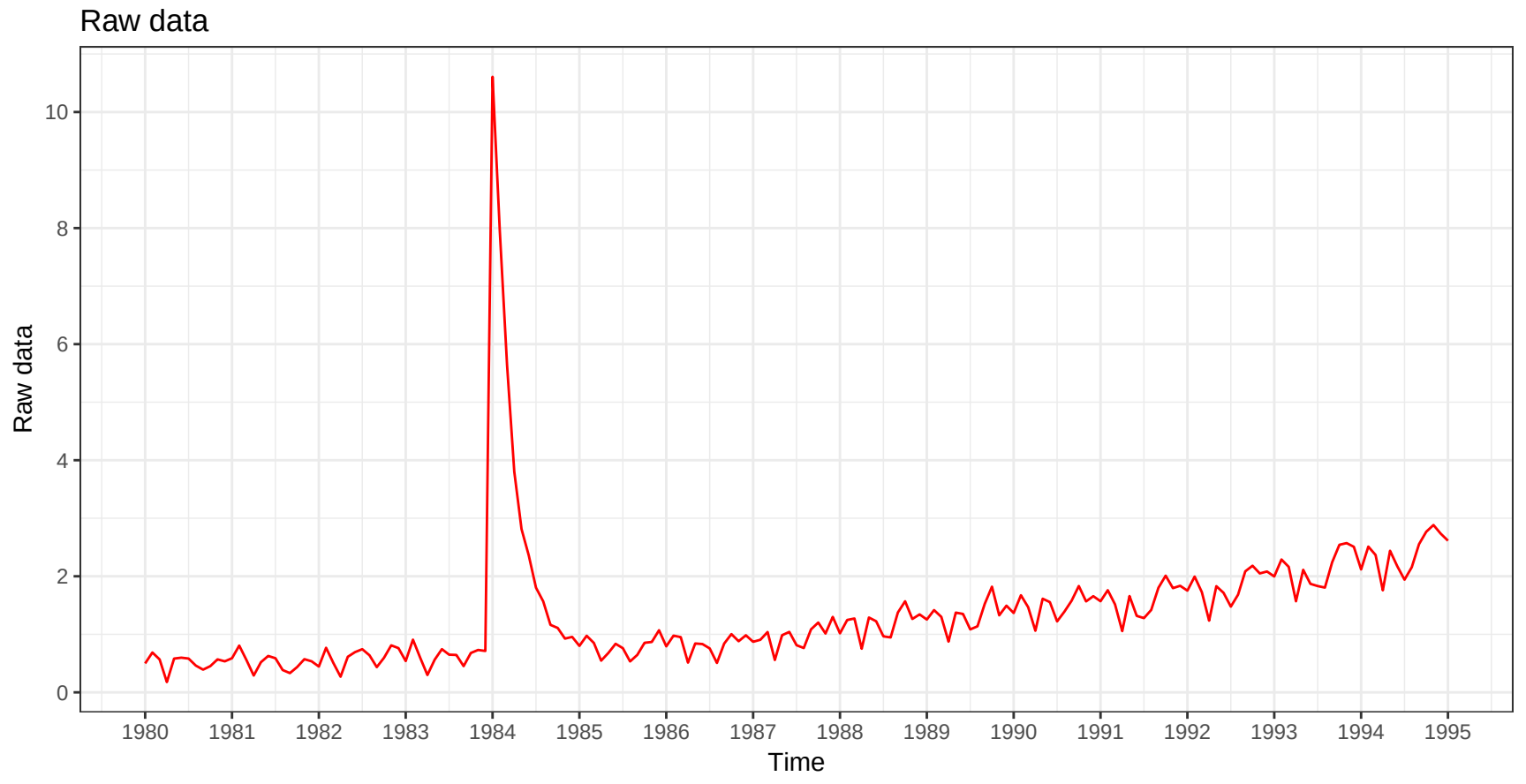

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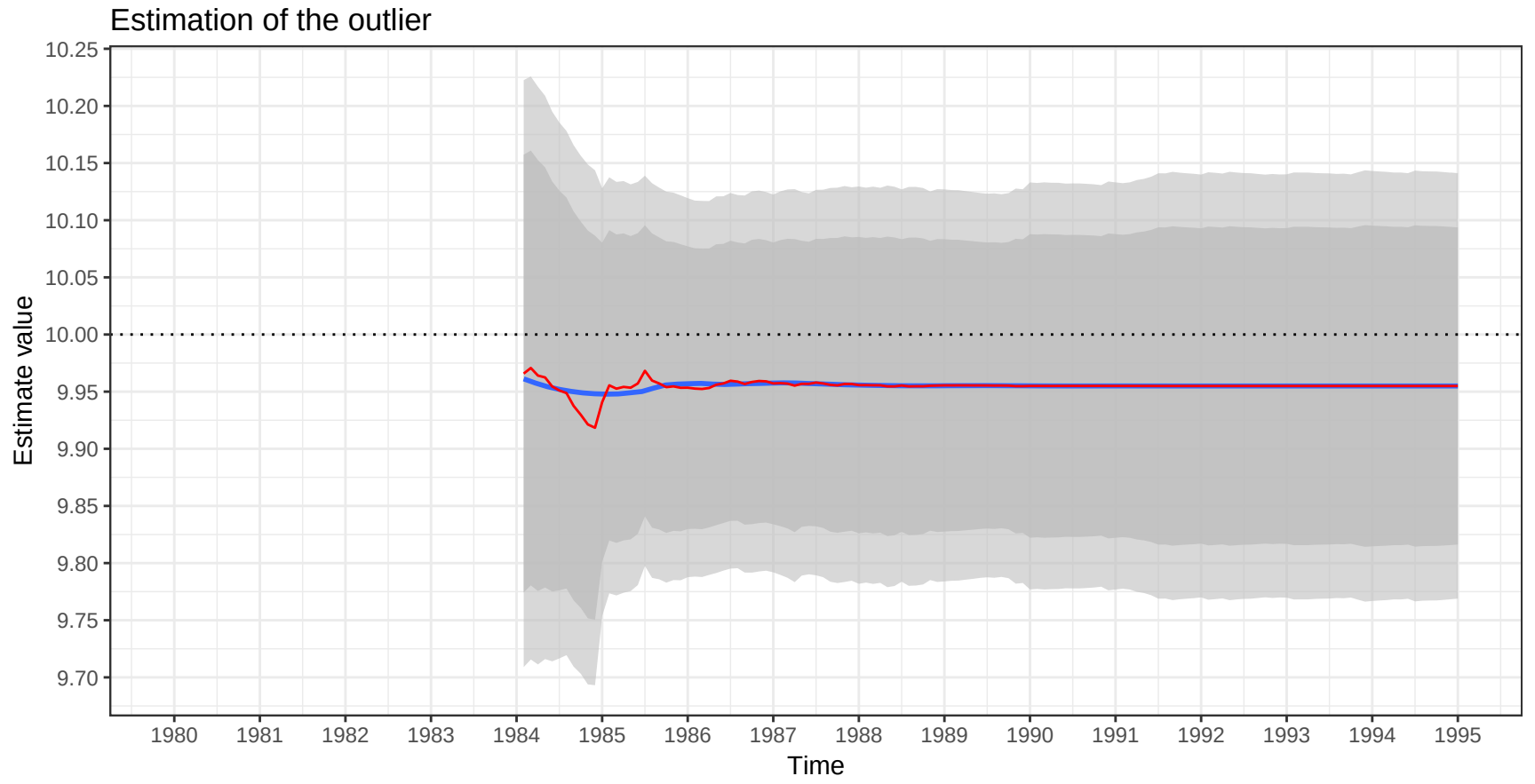

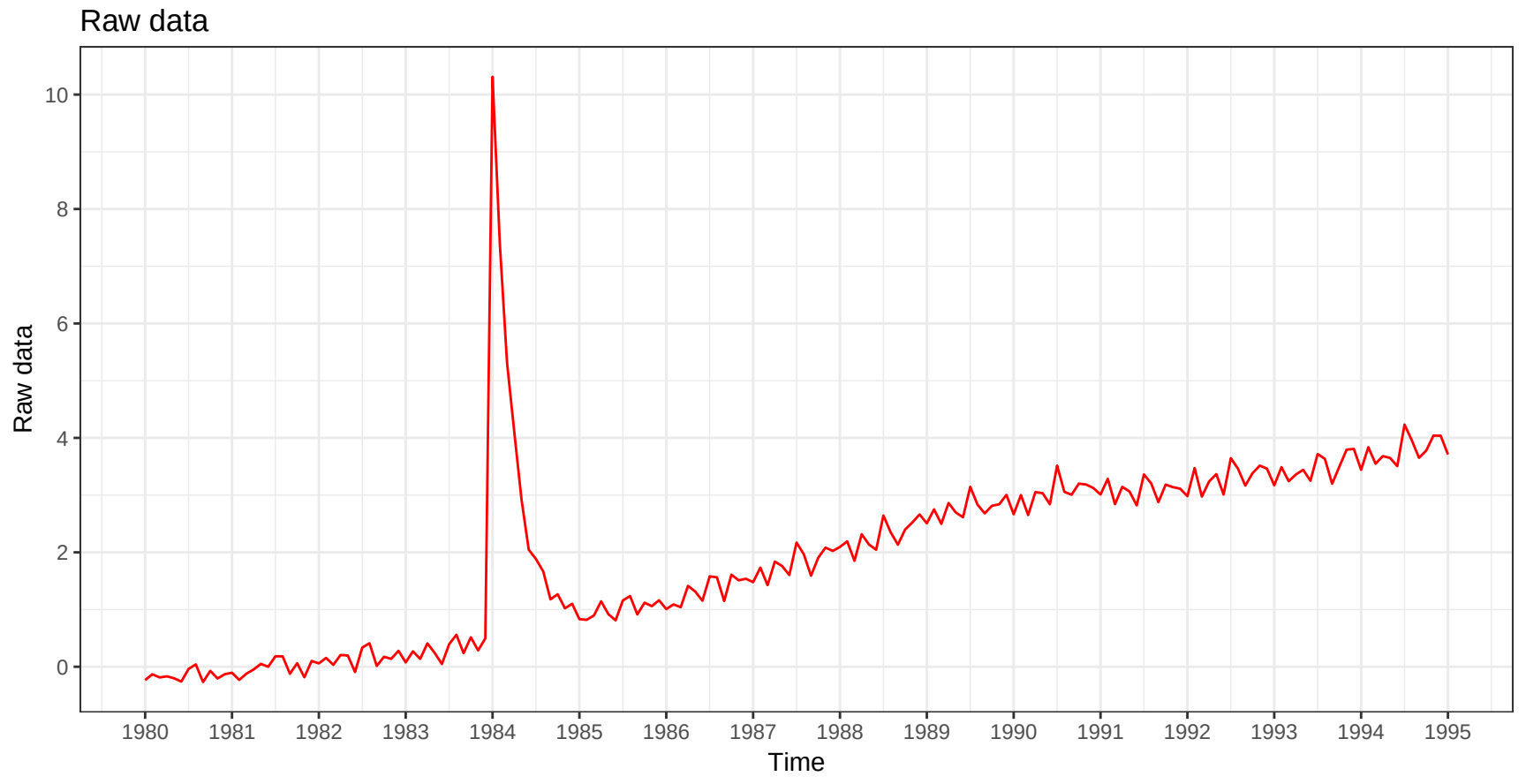

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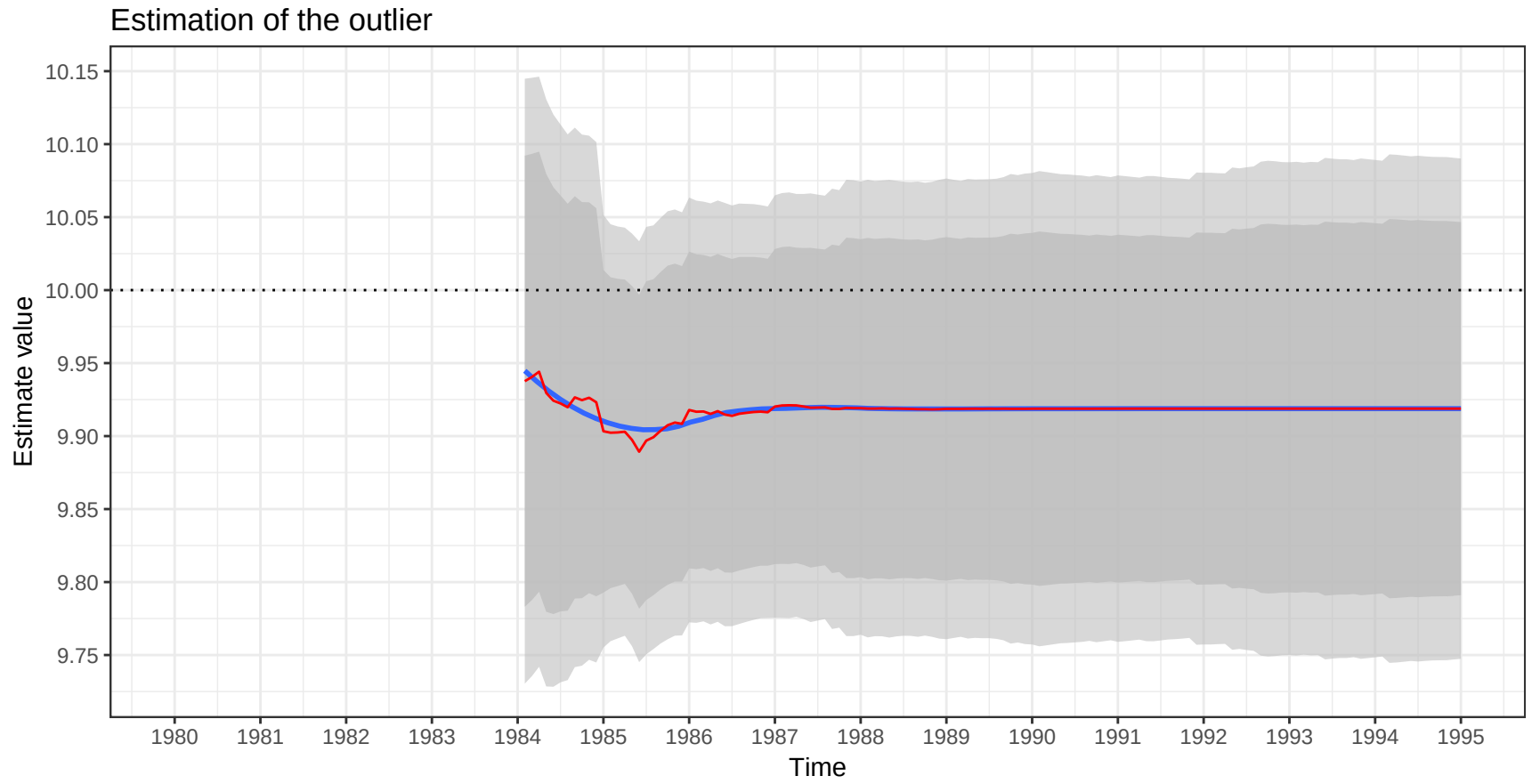

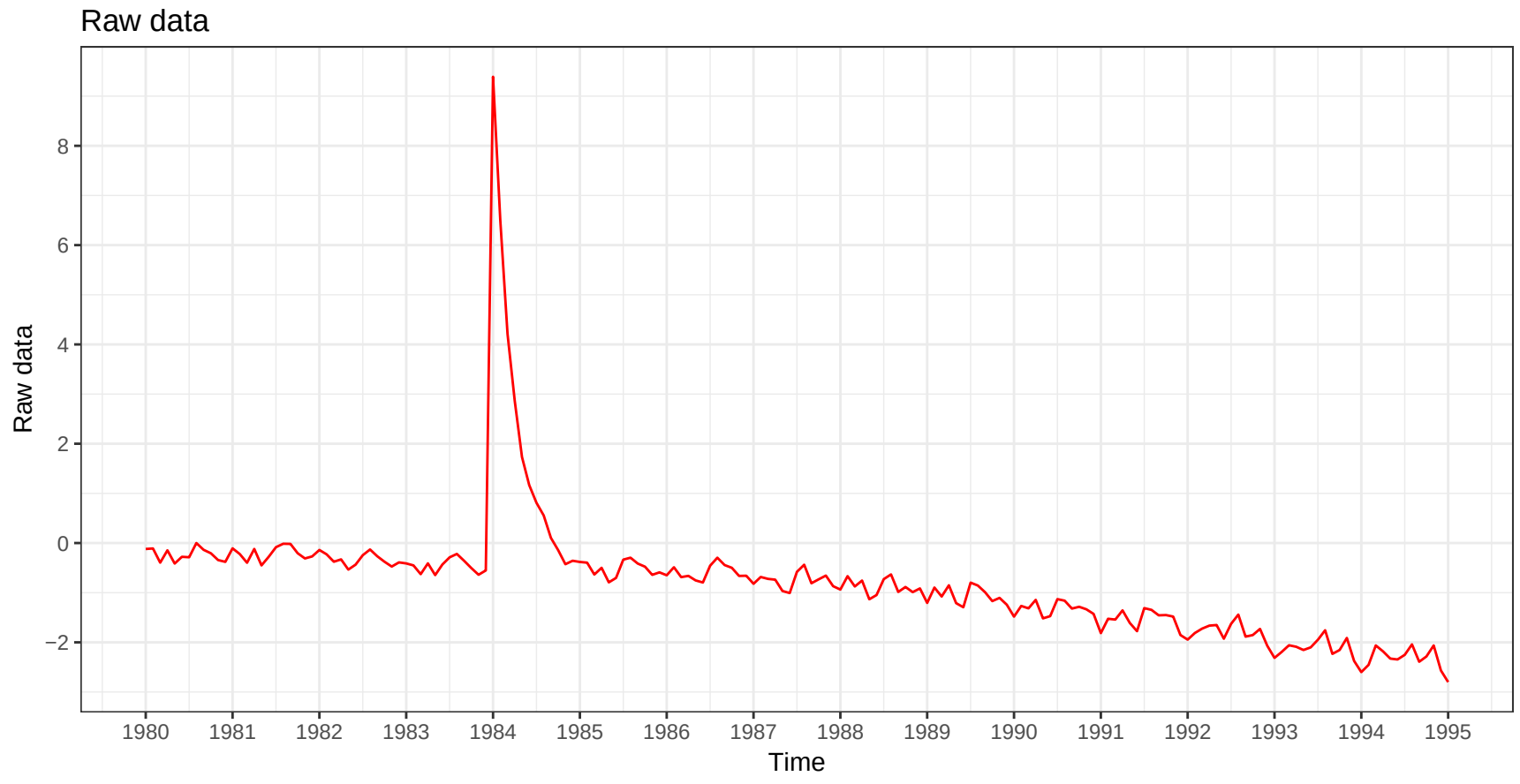

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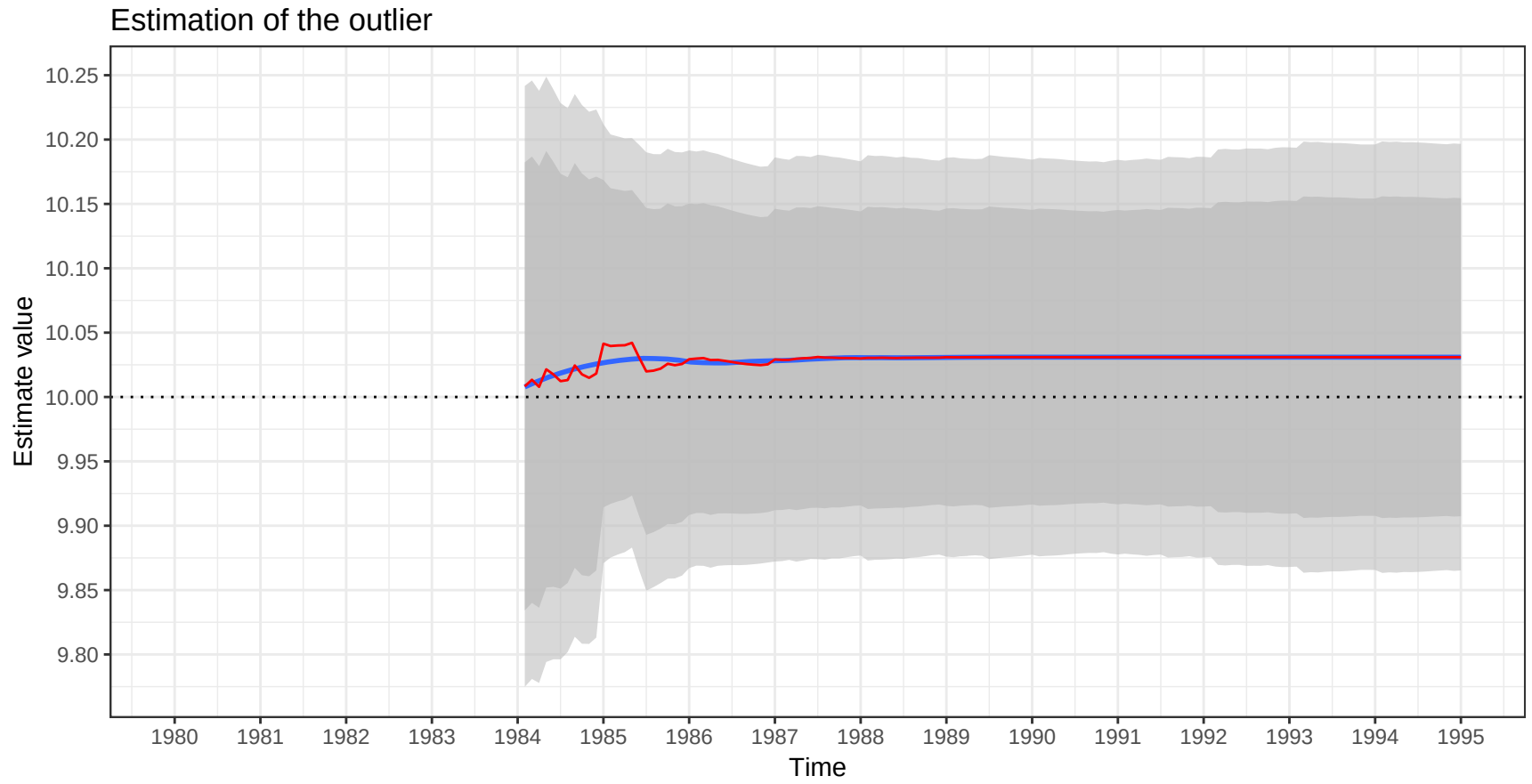

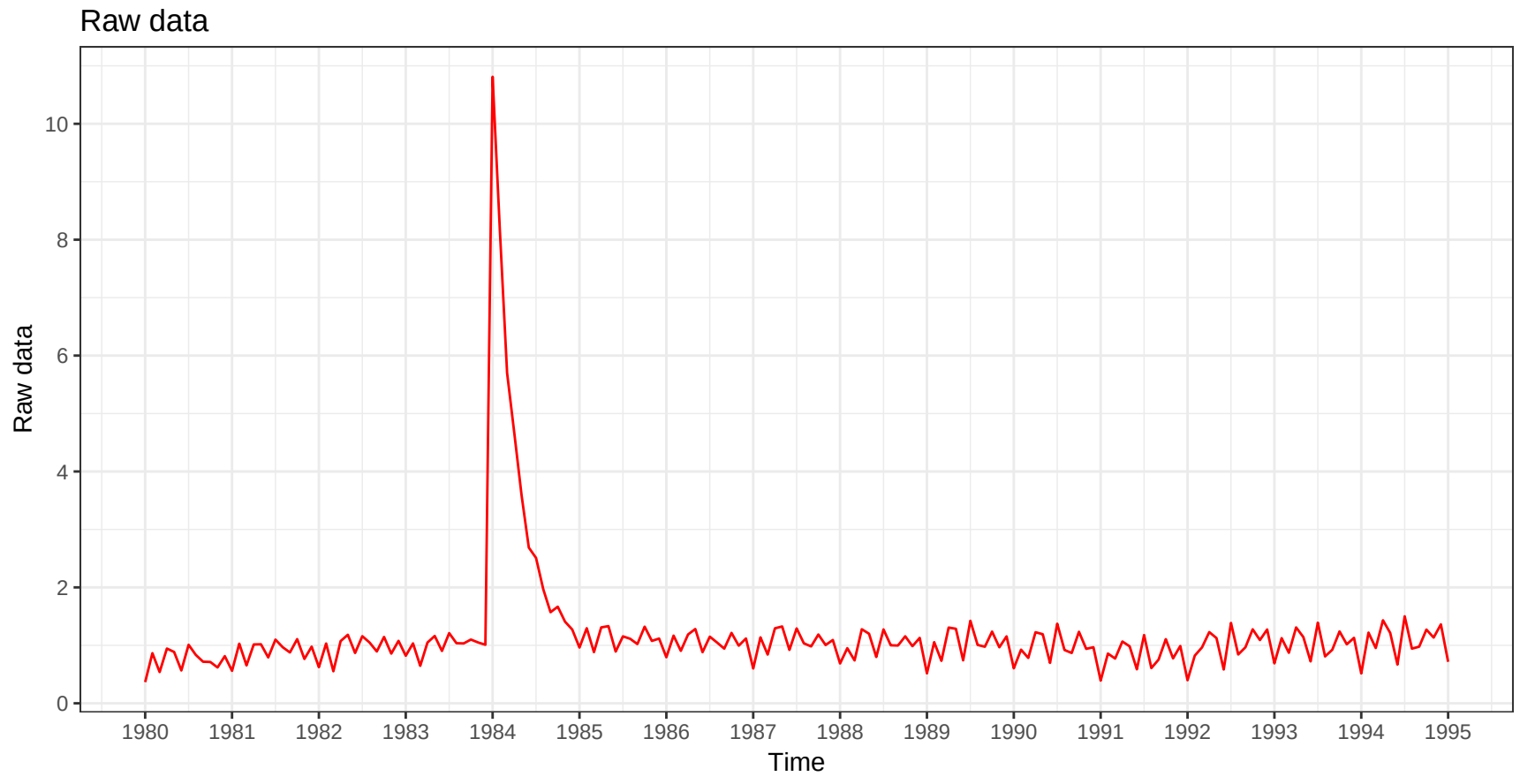

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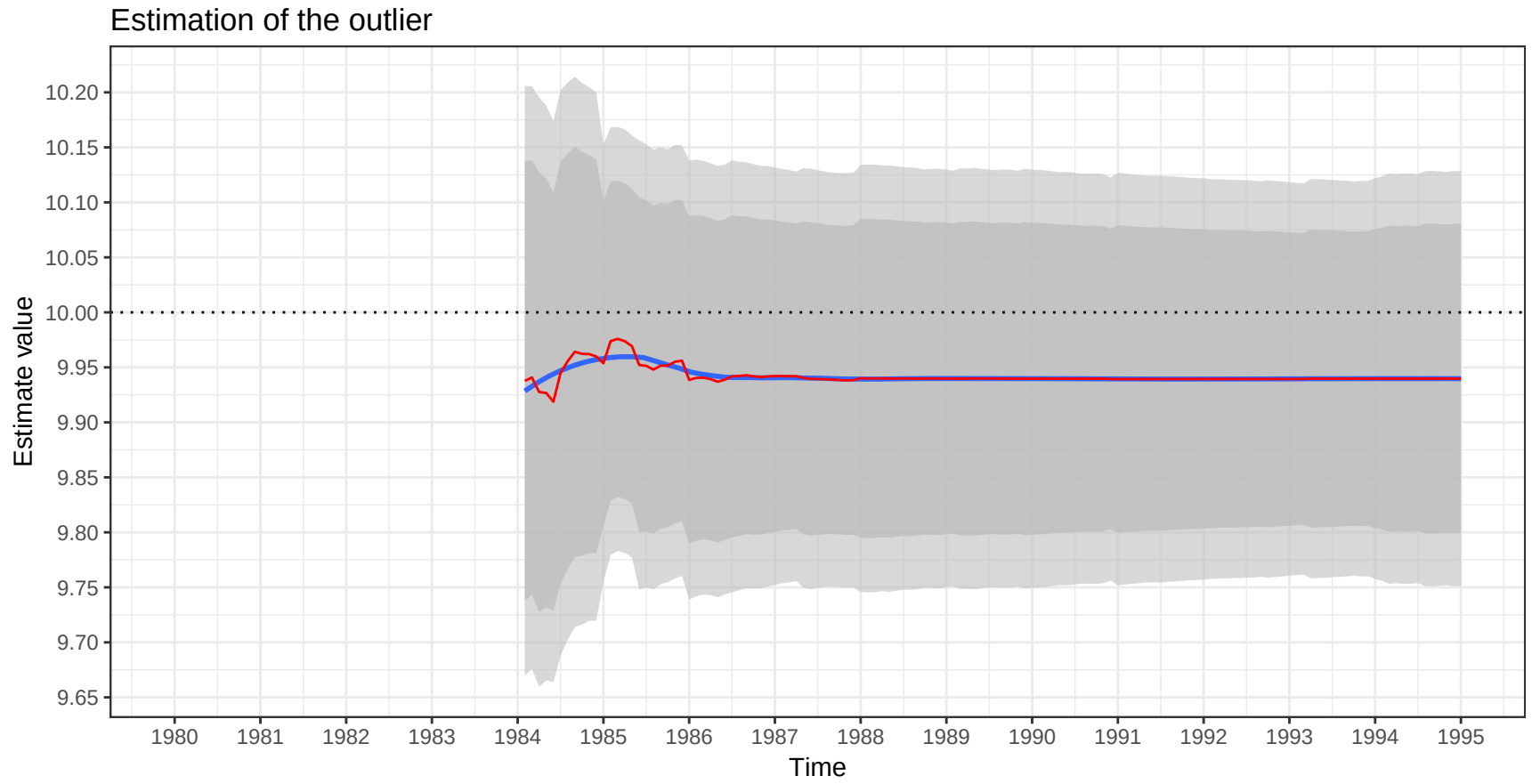

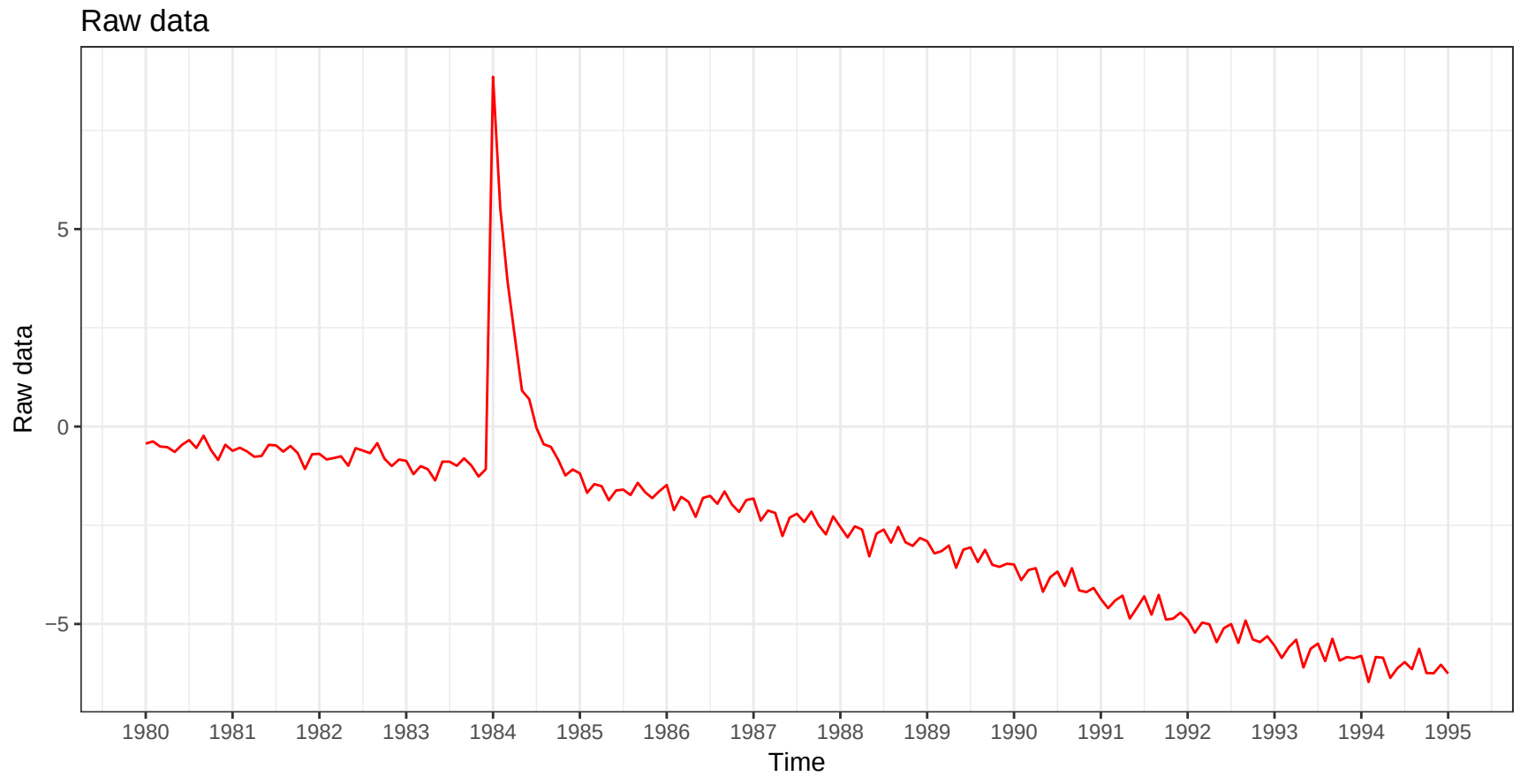

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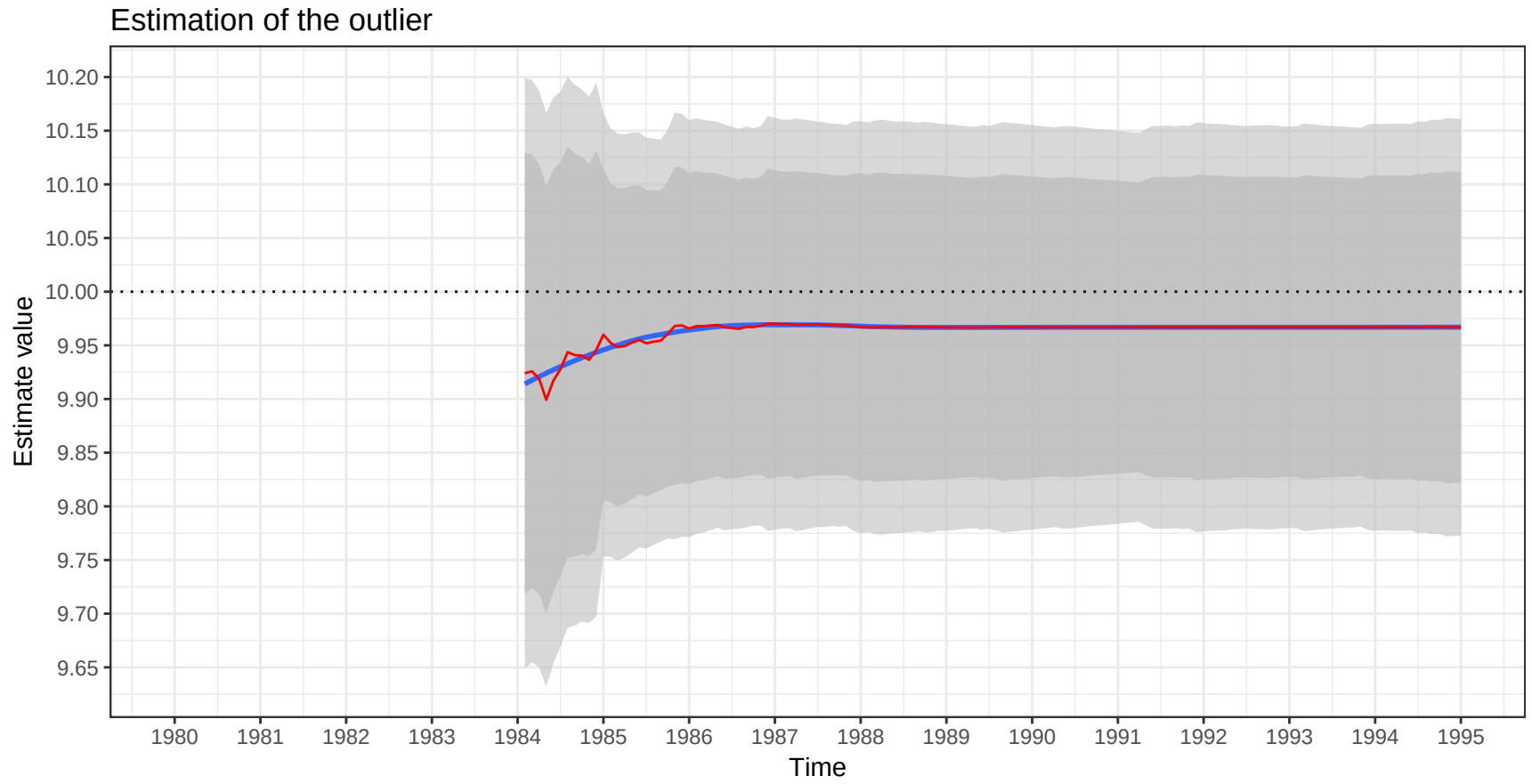

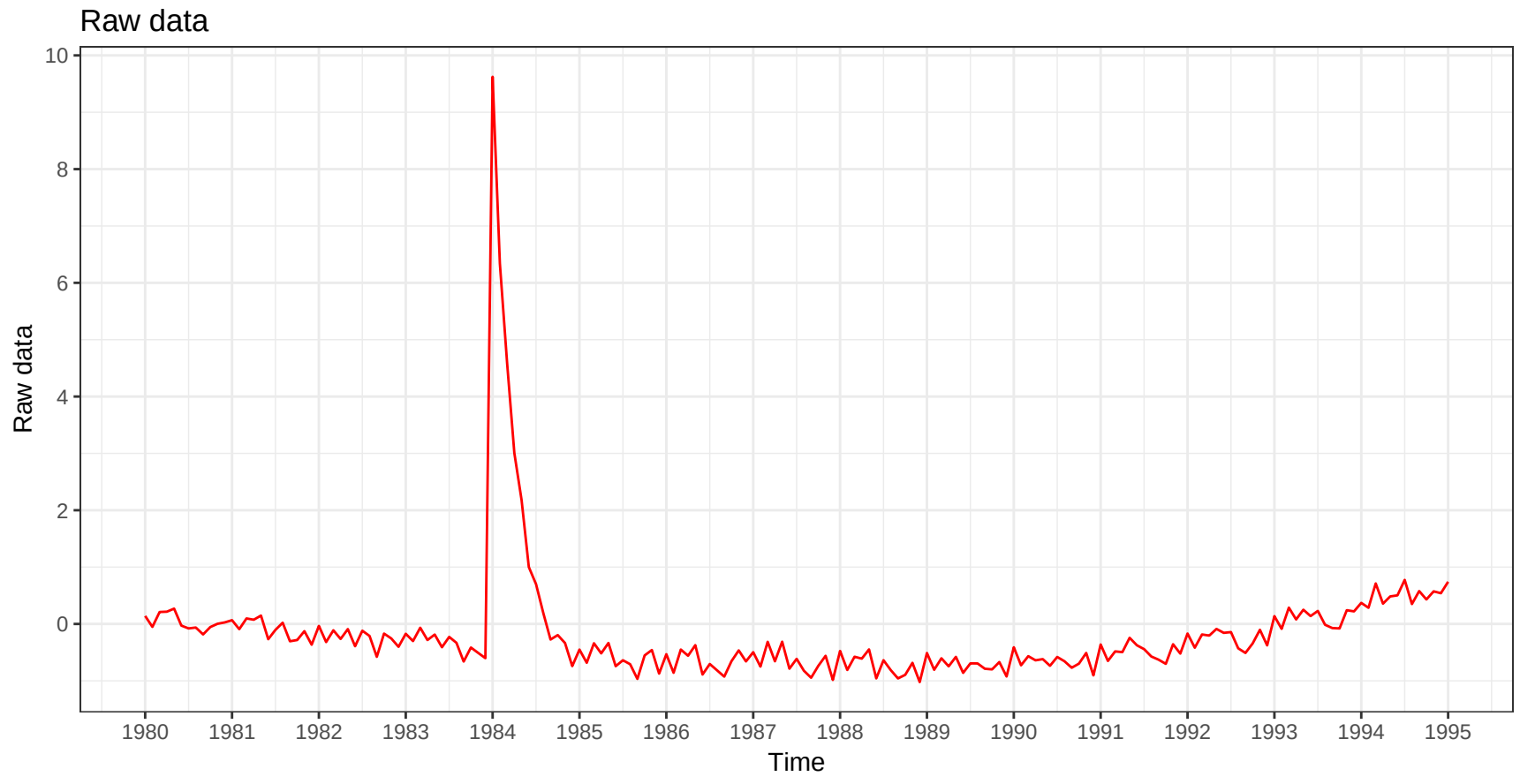

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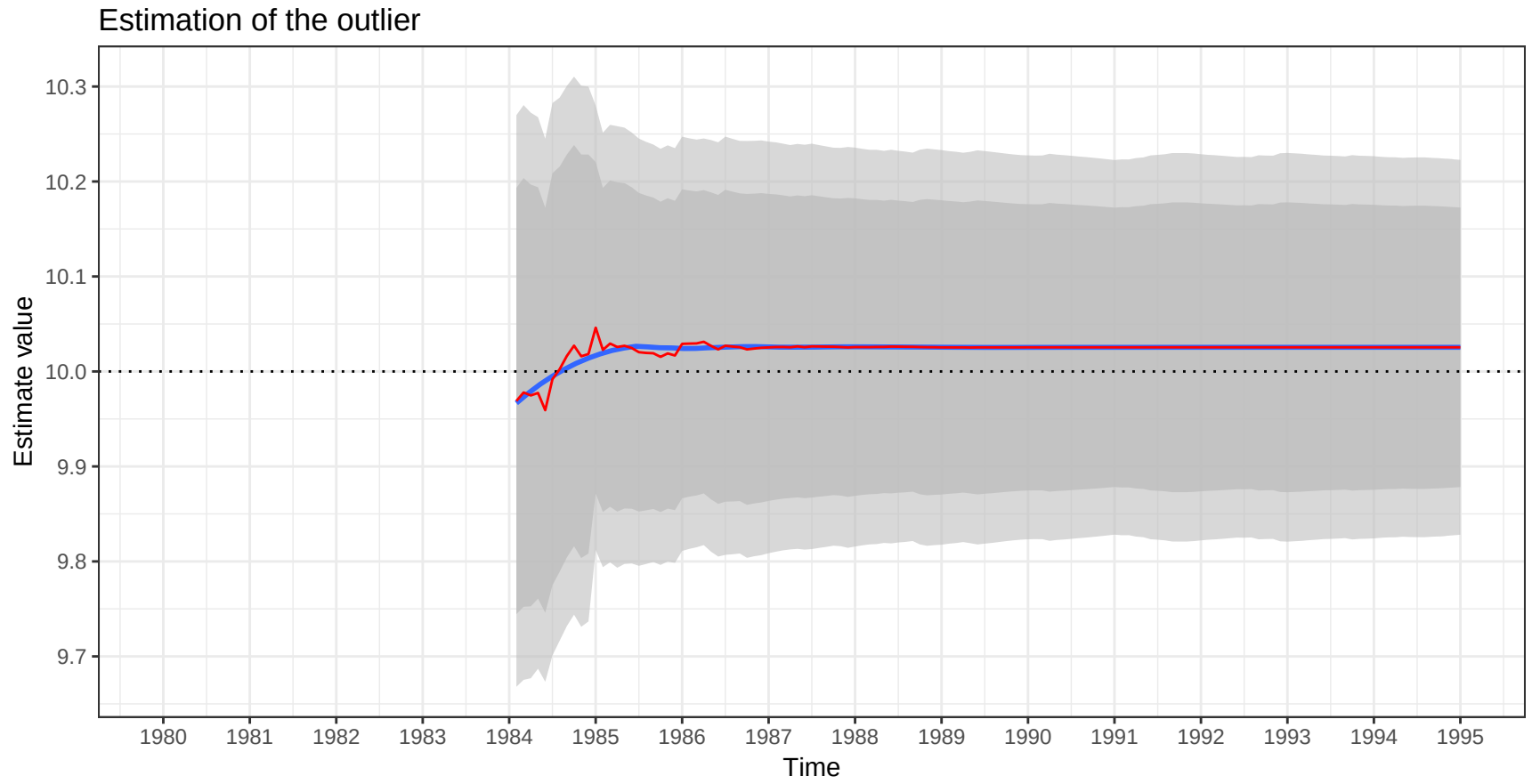

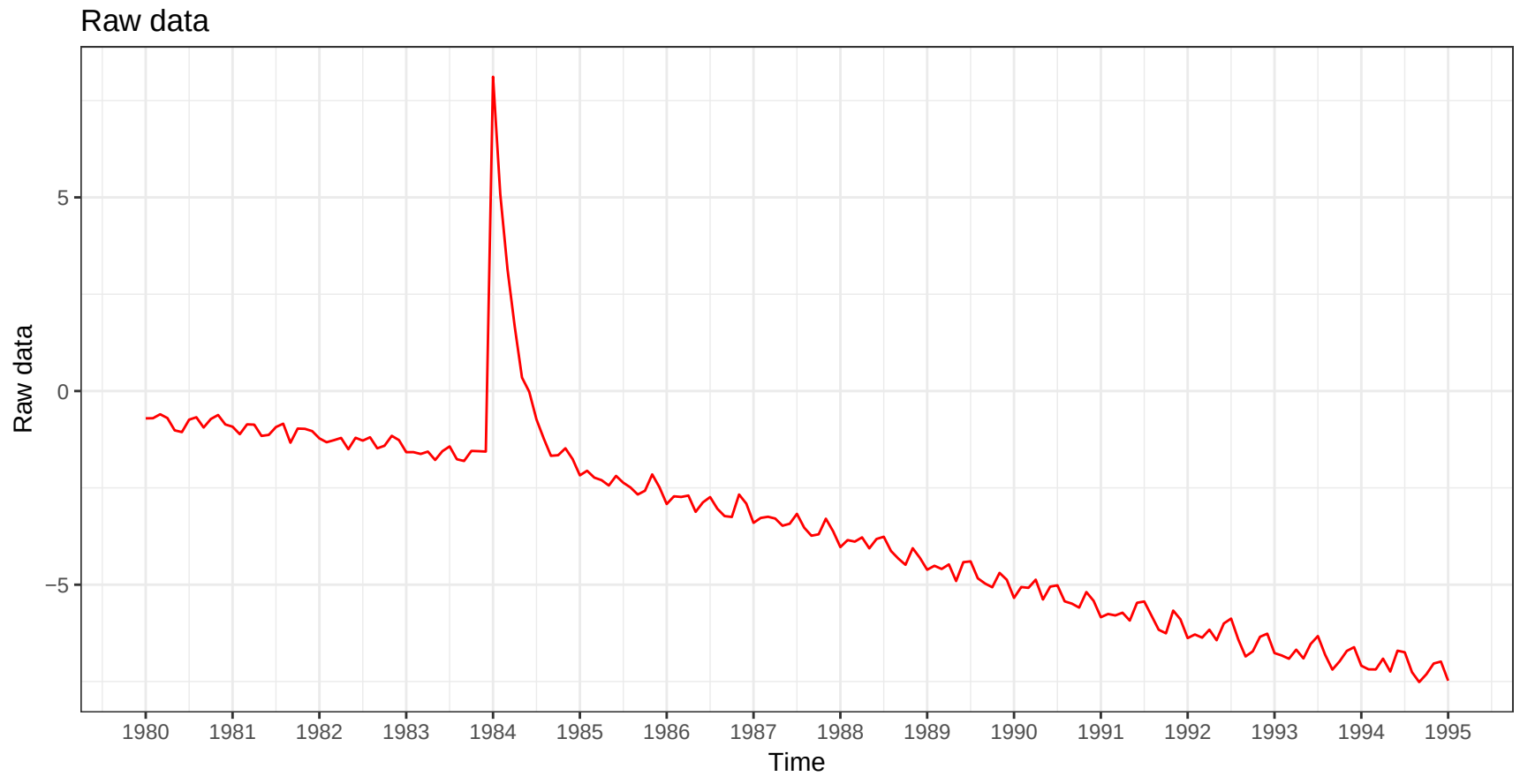

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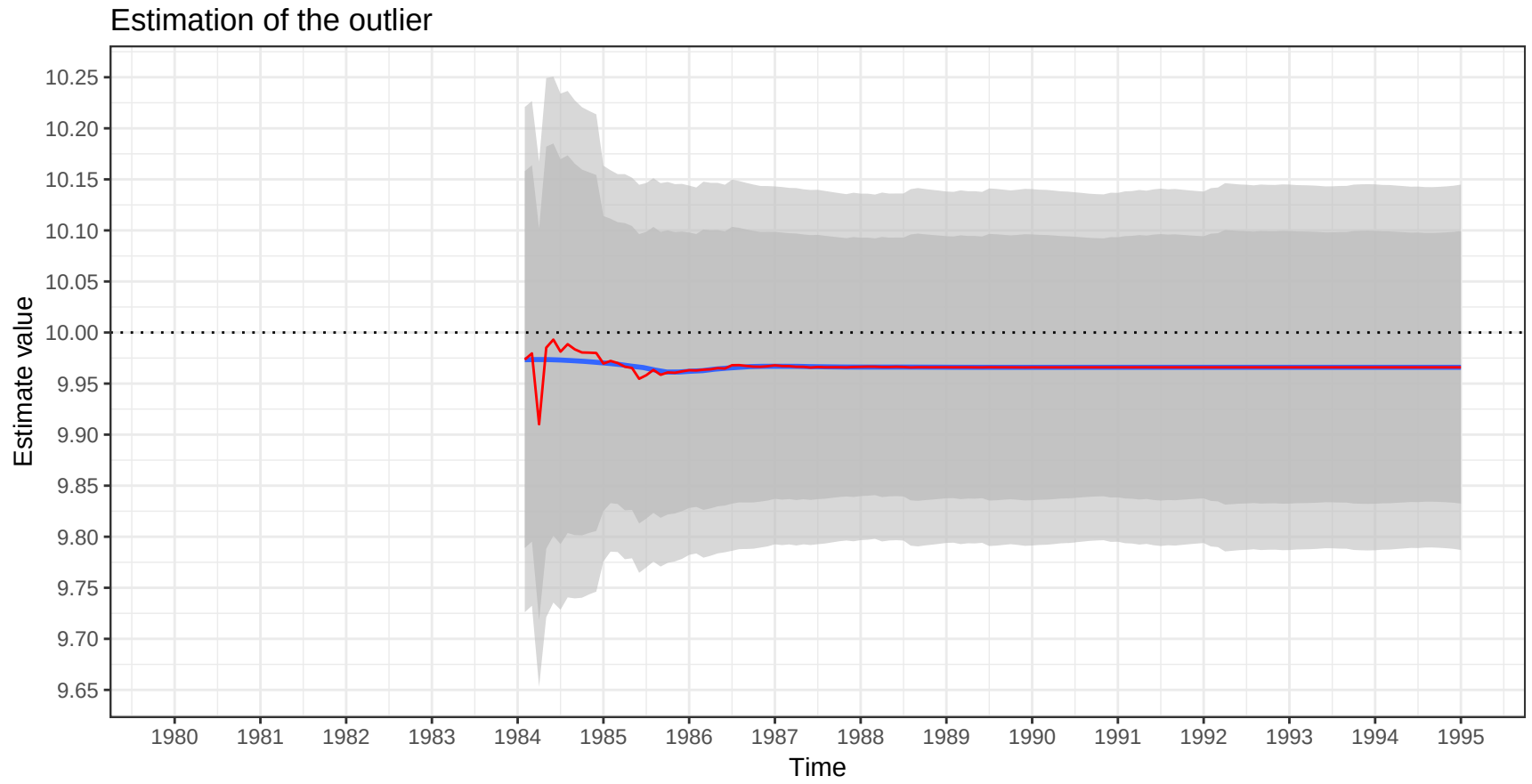

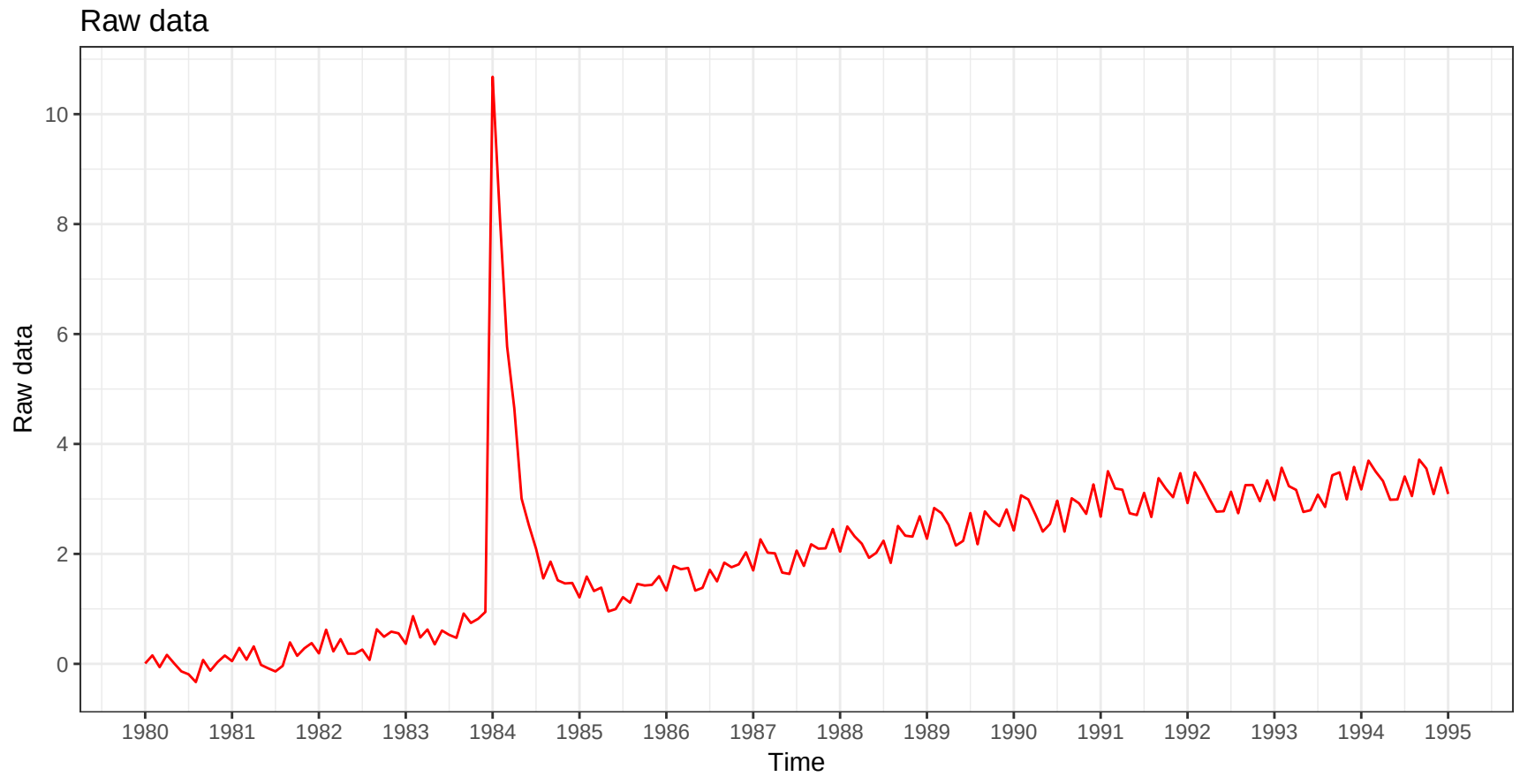

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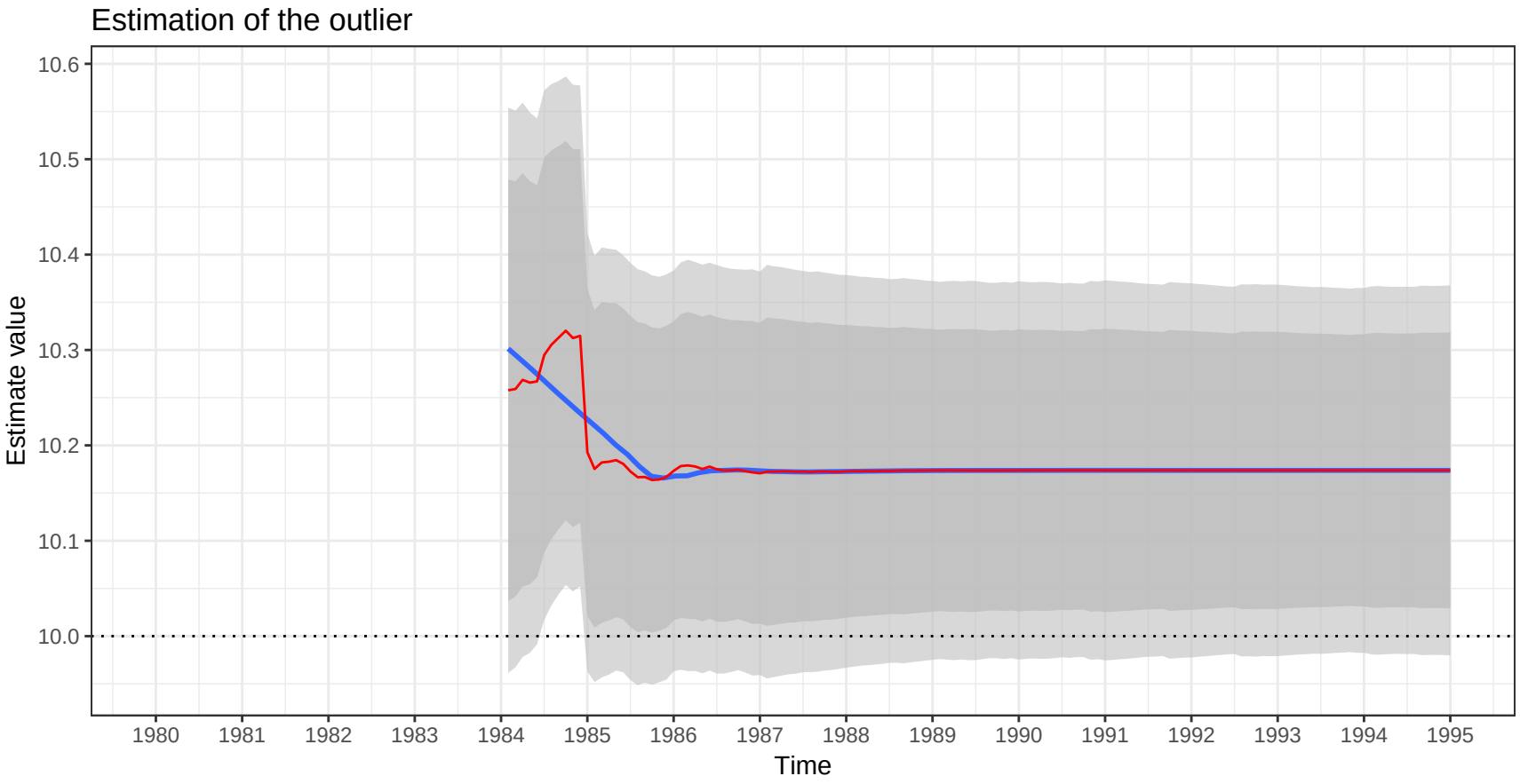
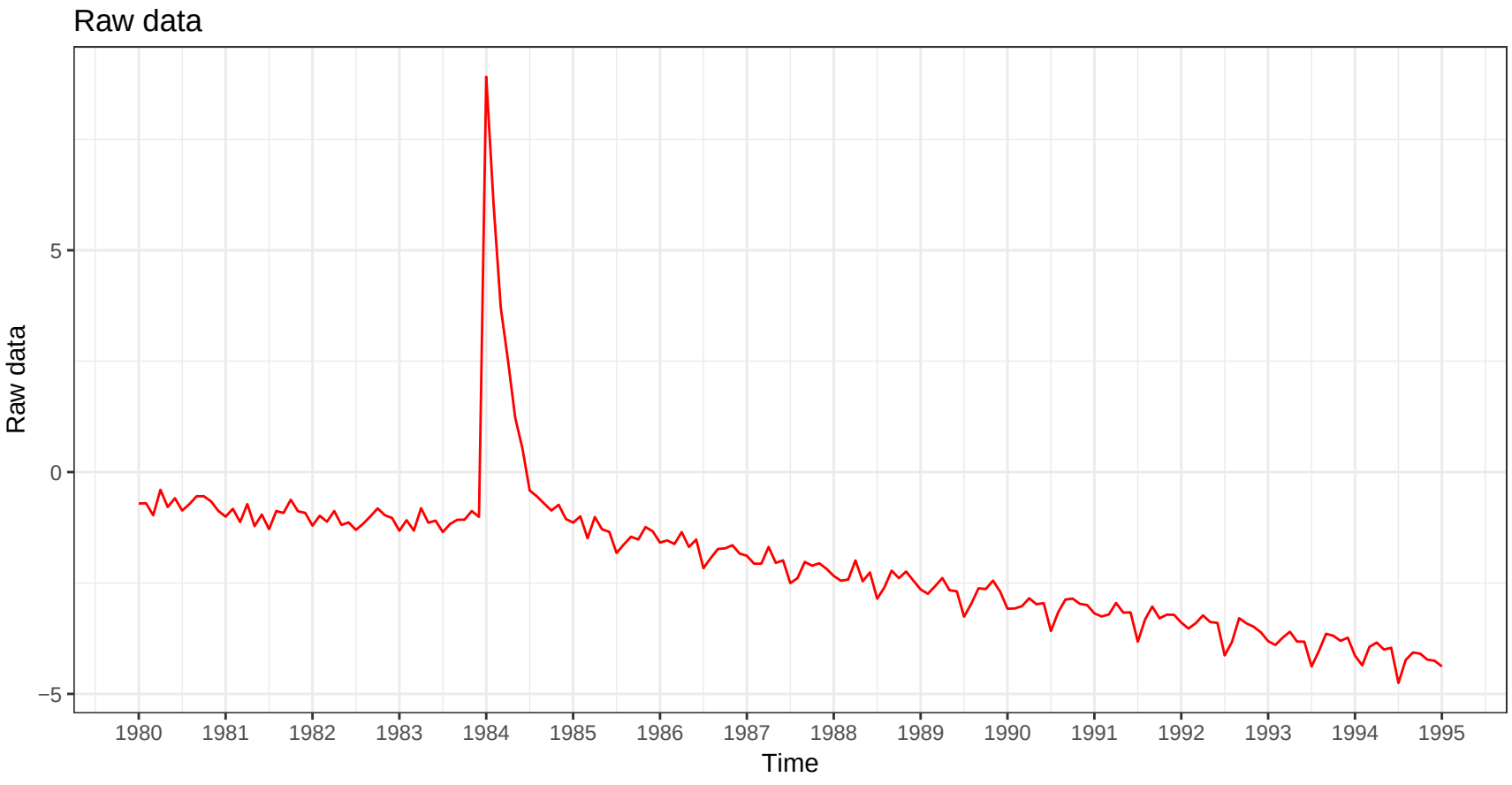
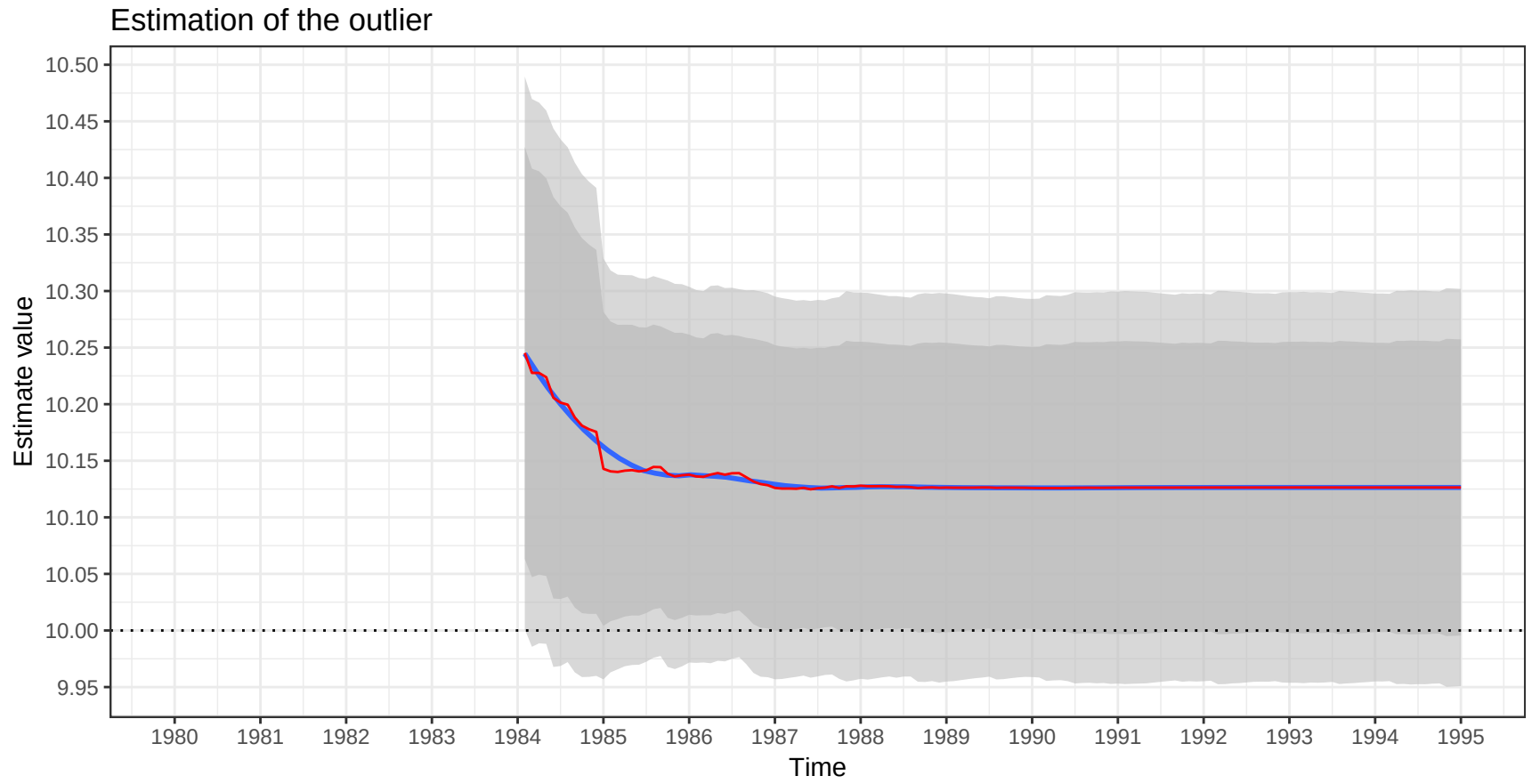
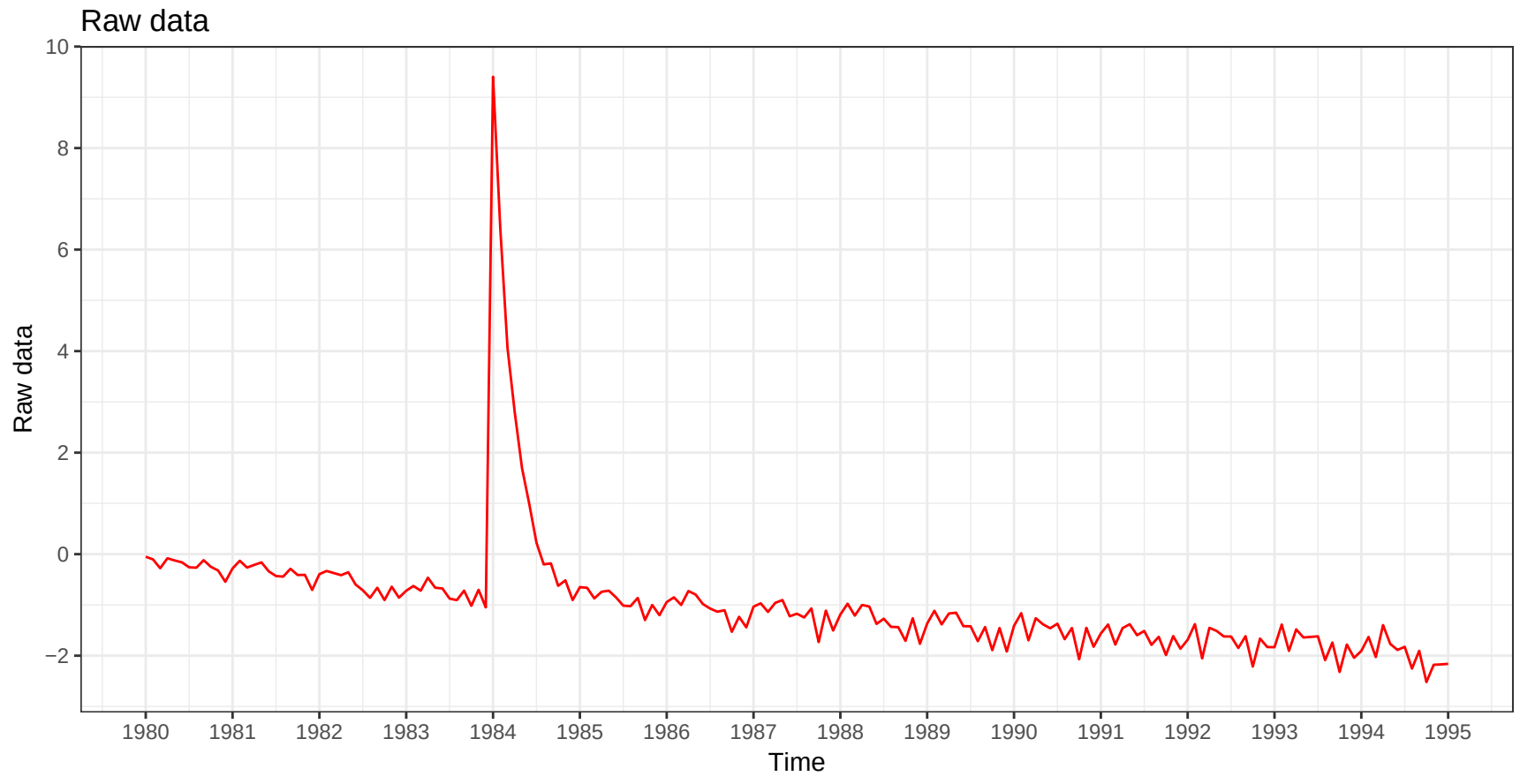




Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.8B)(1−0.4B12)at





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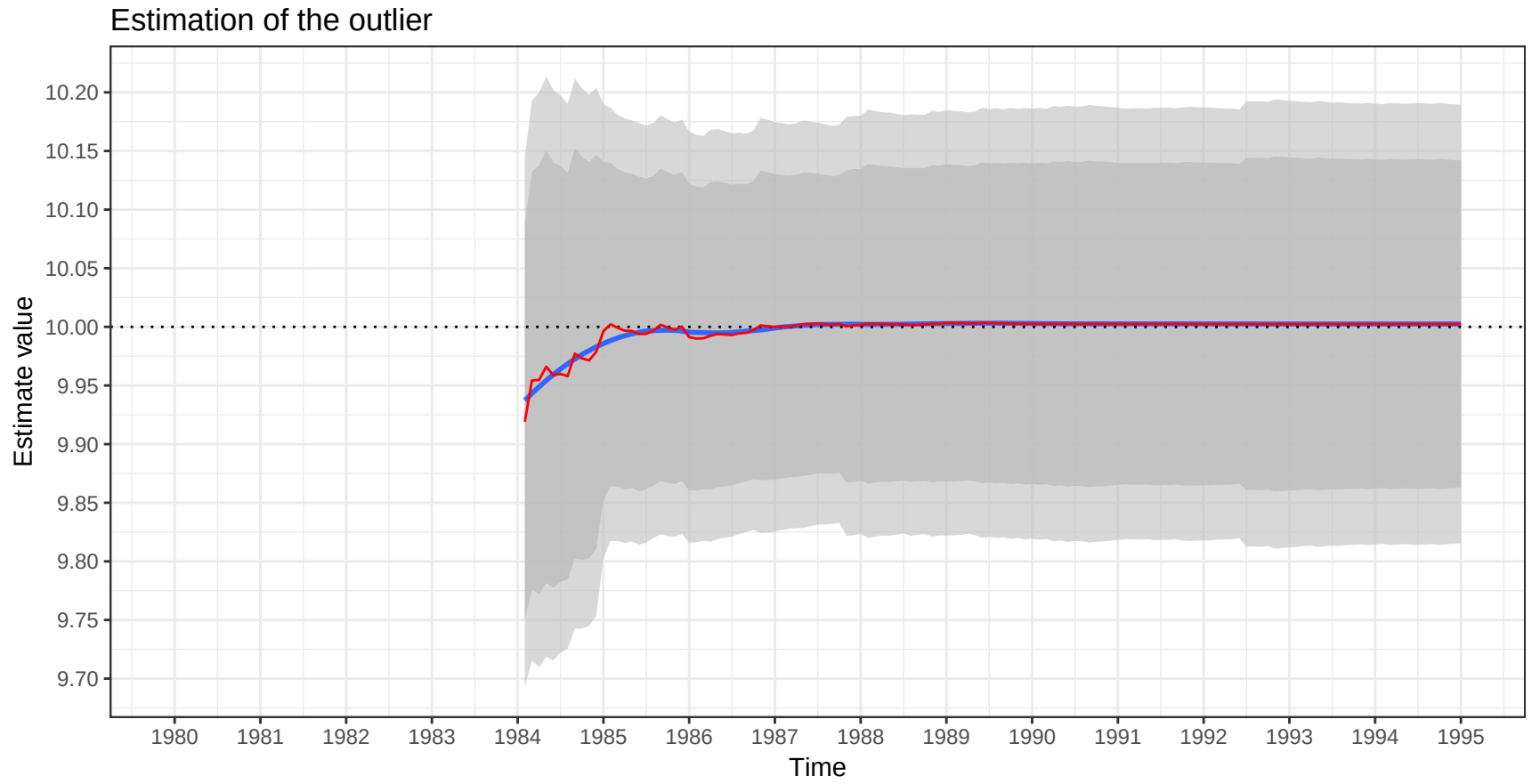

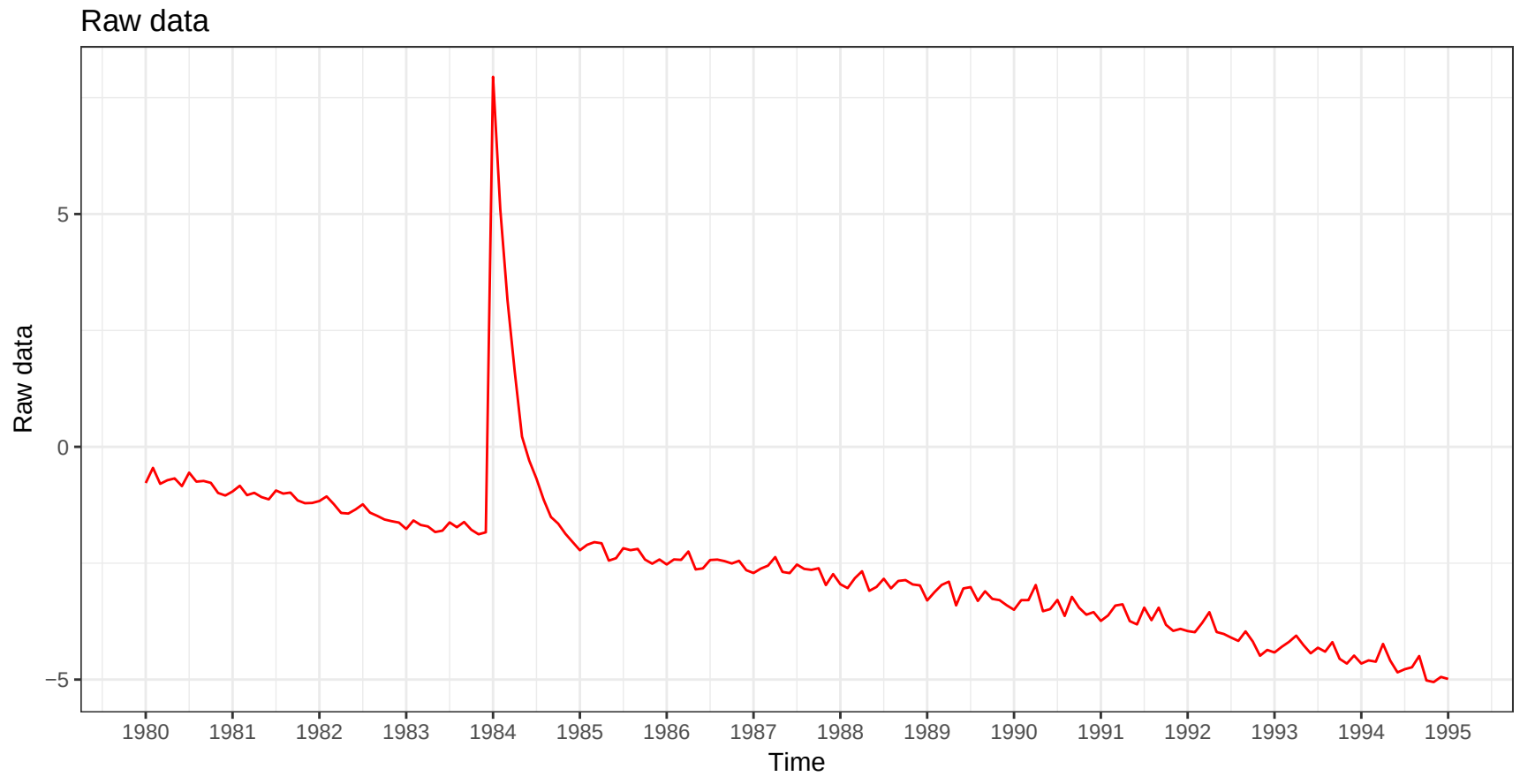

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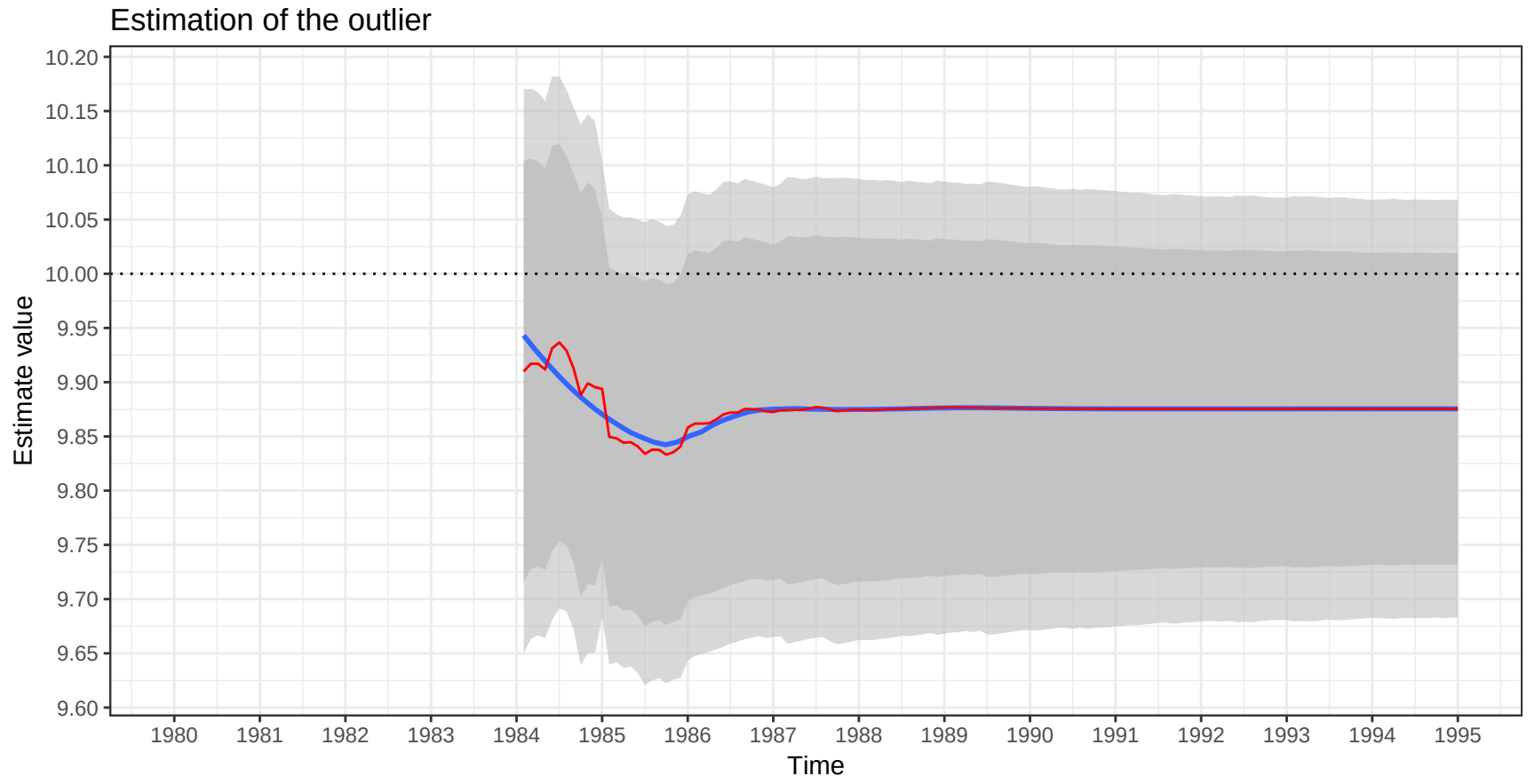

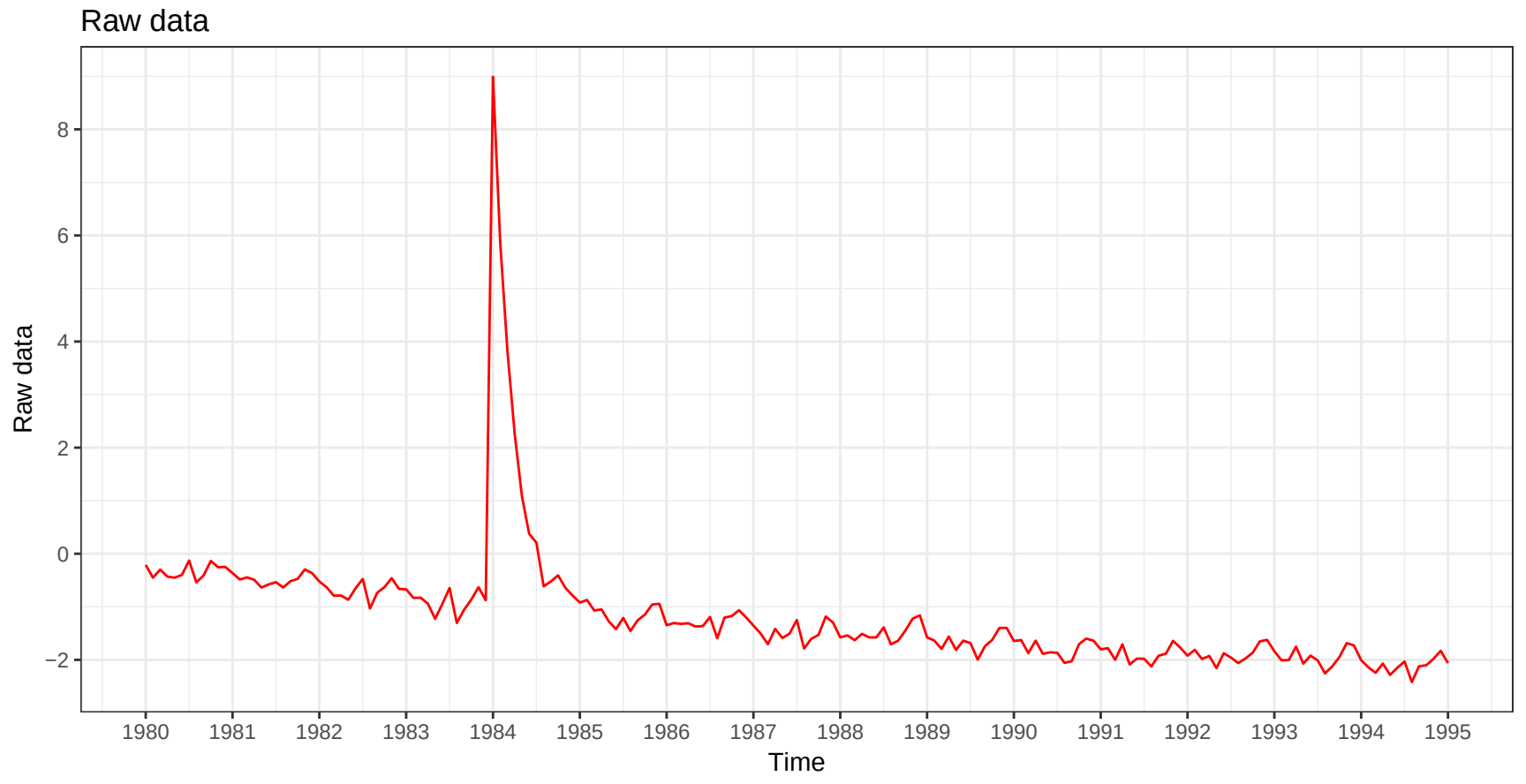

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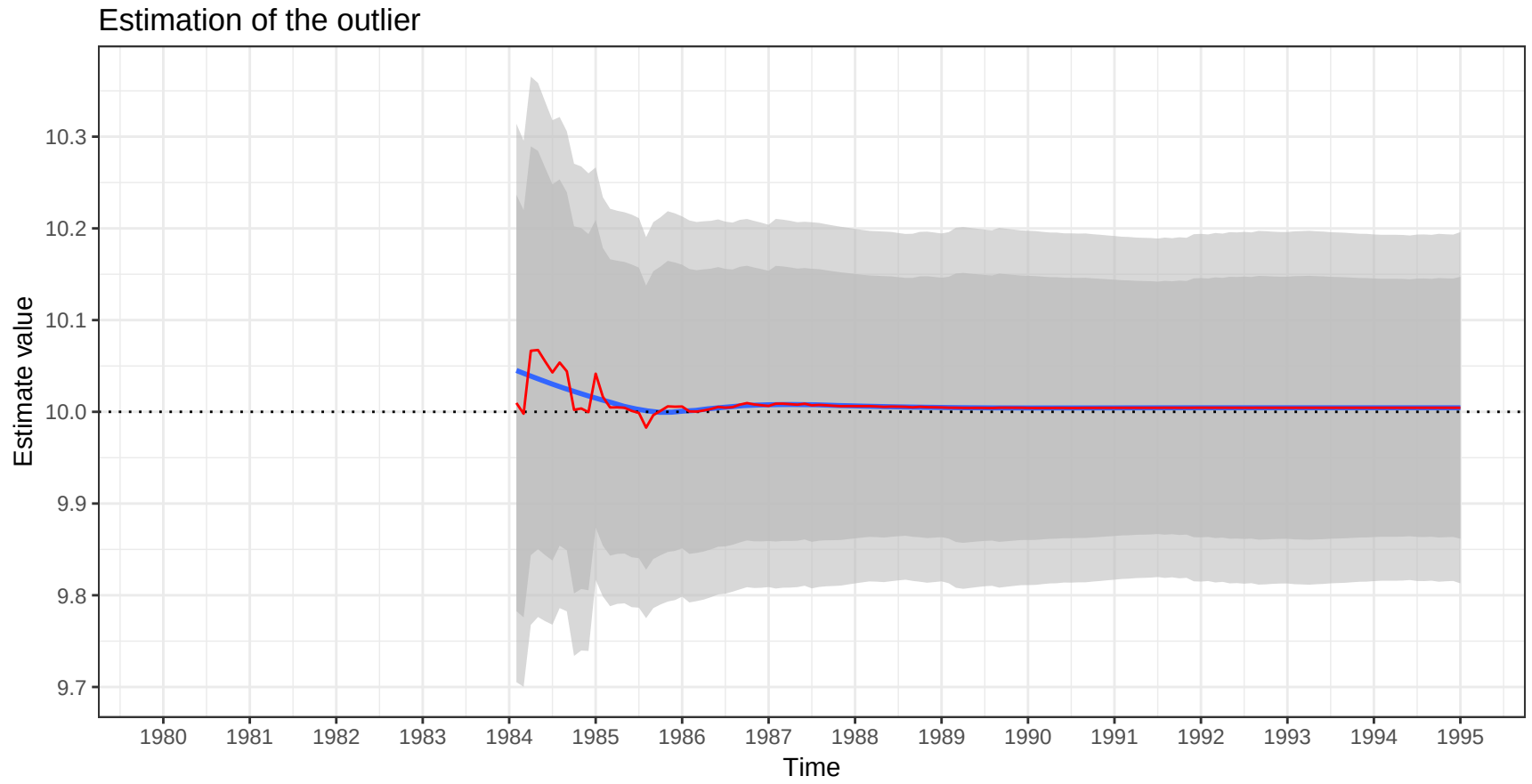

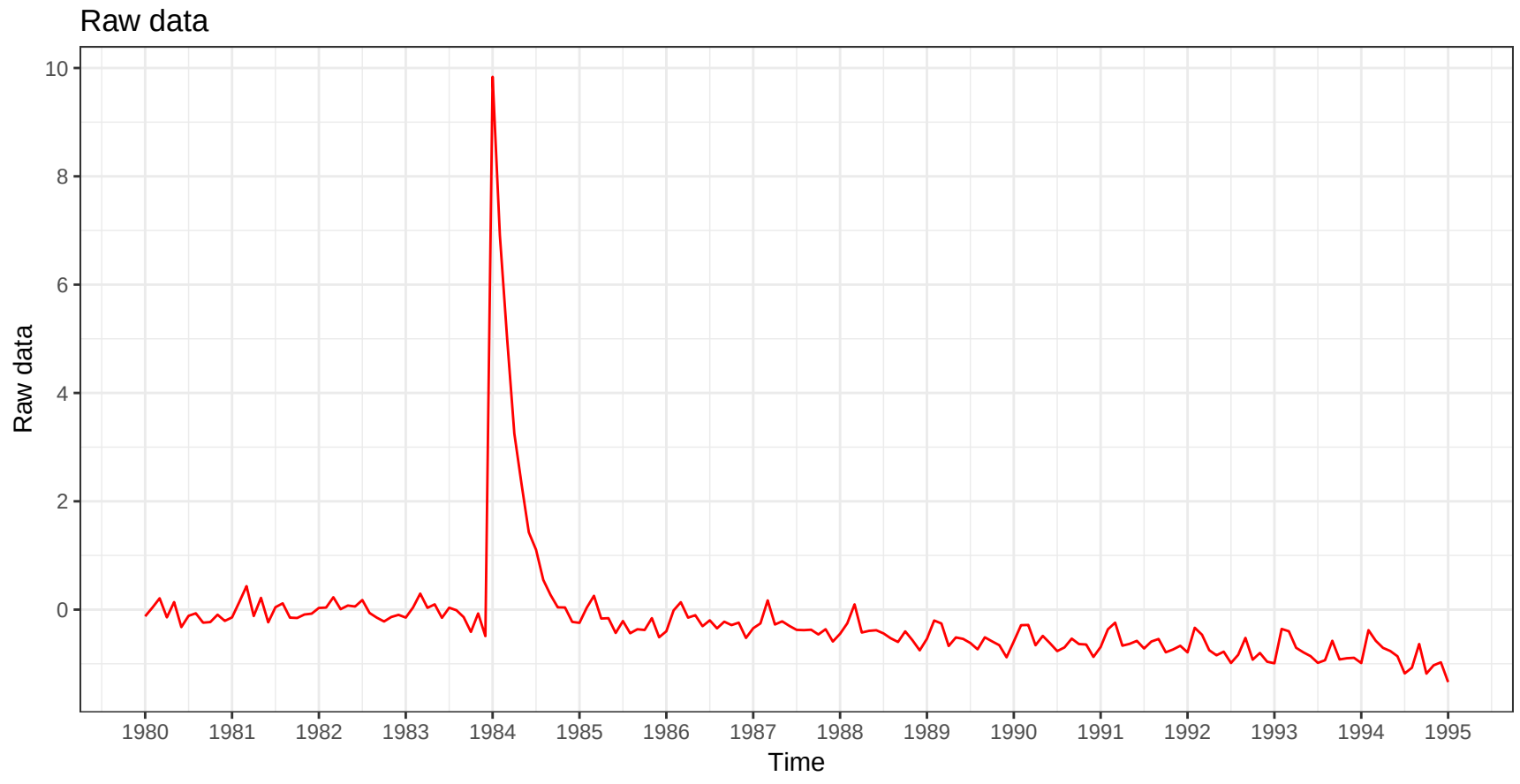

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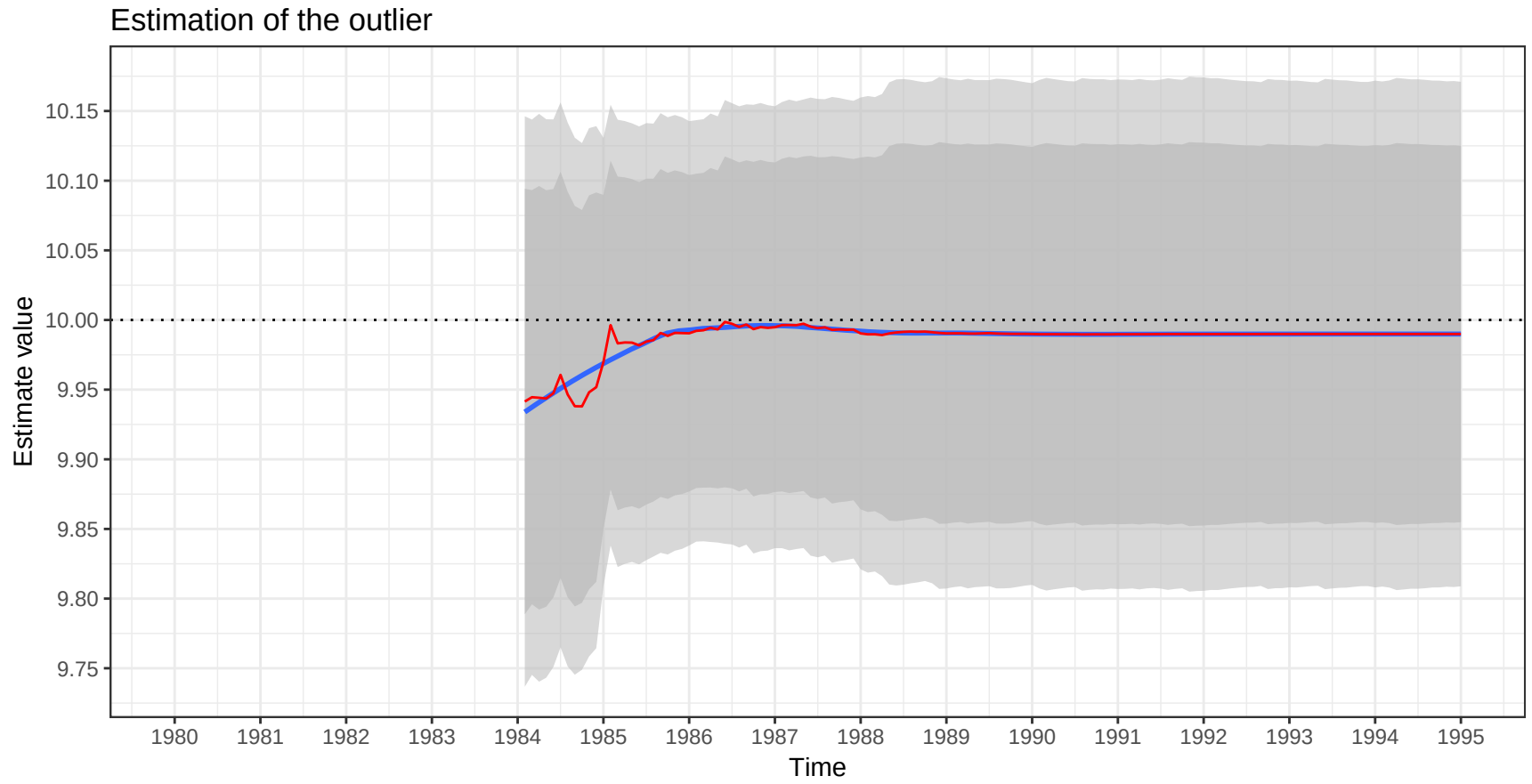

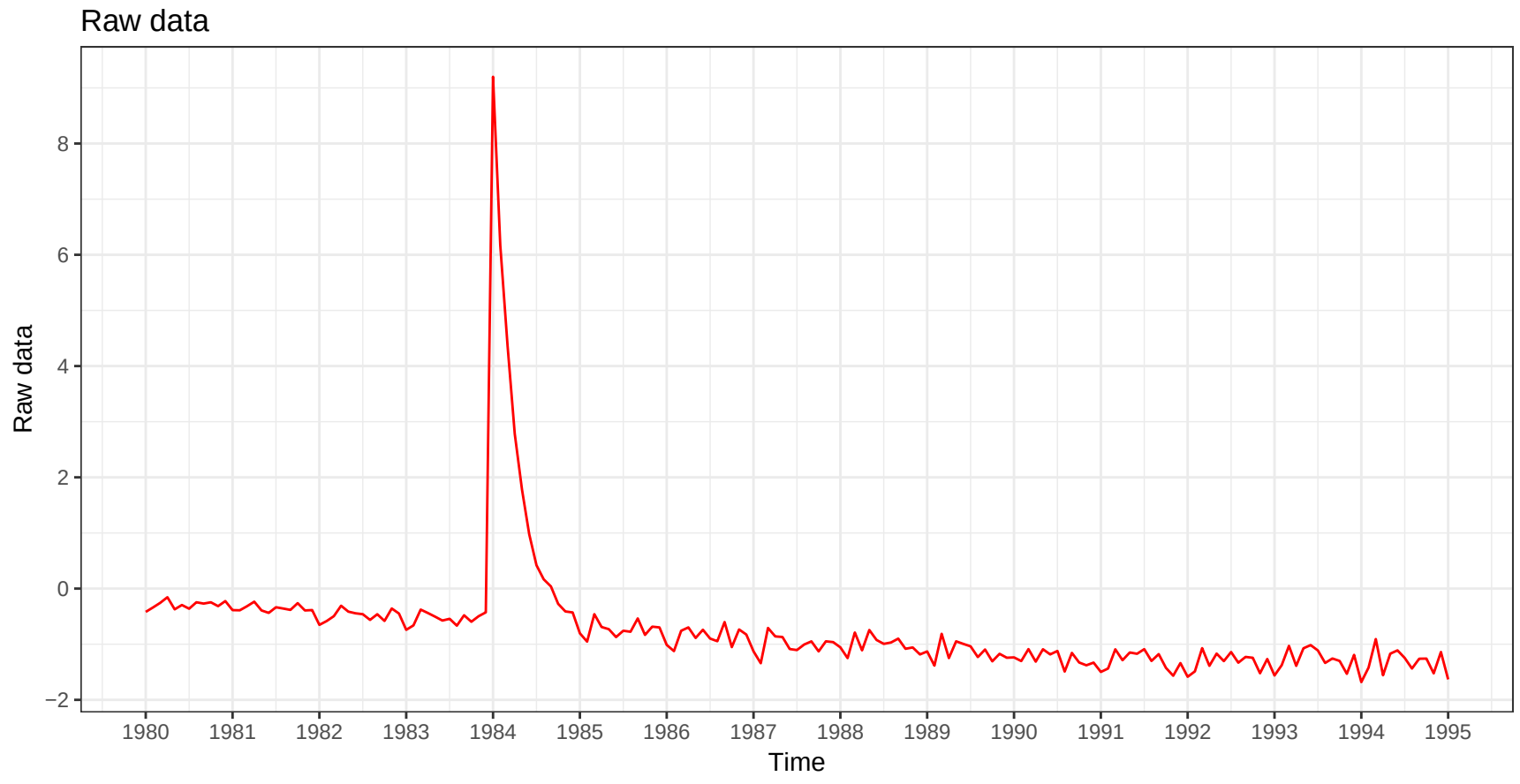

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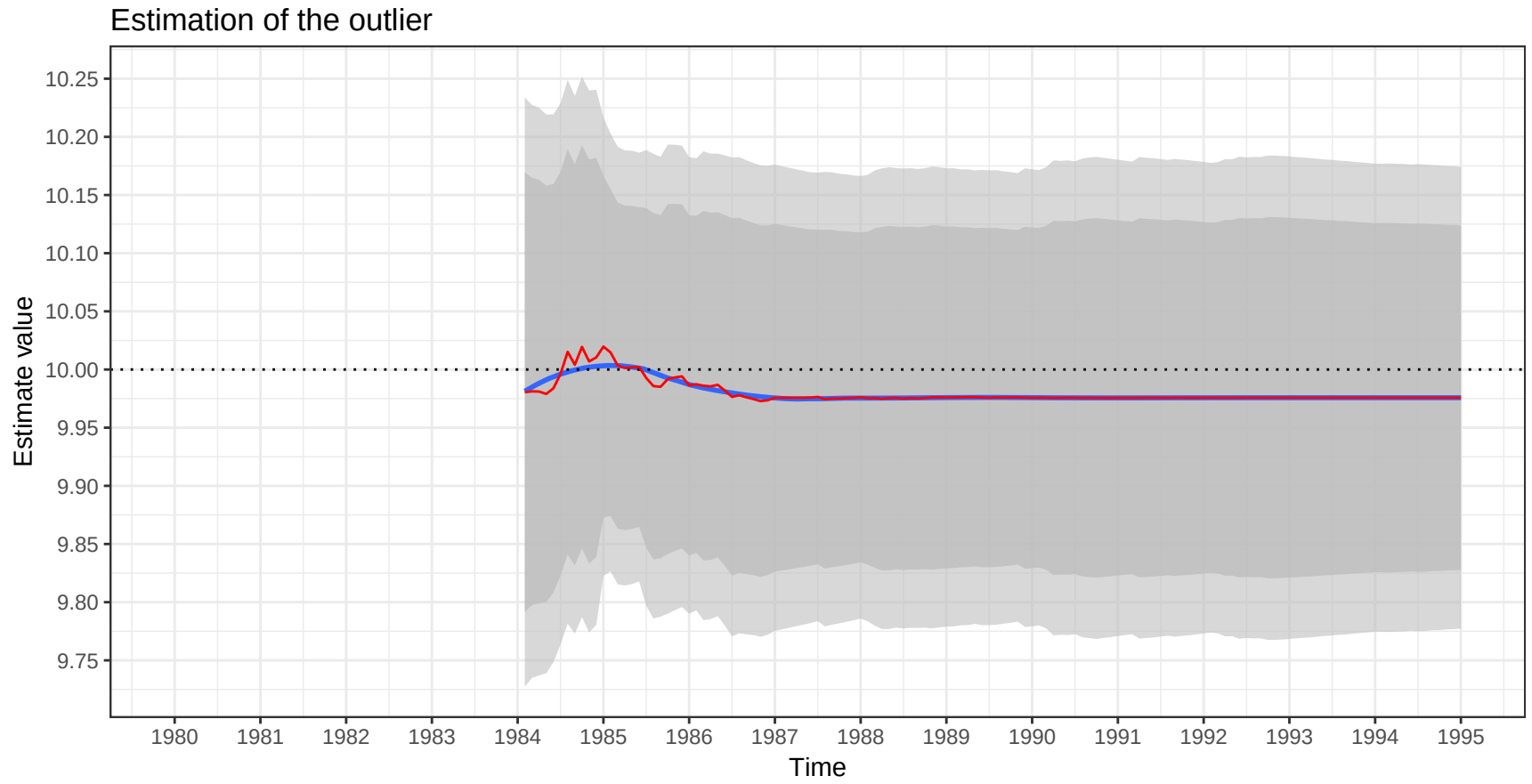

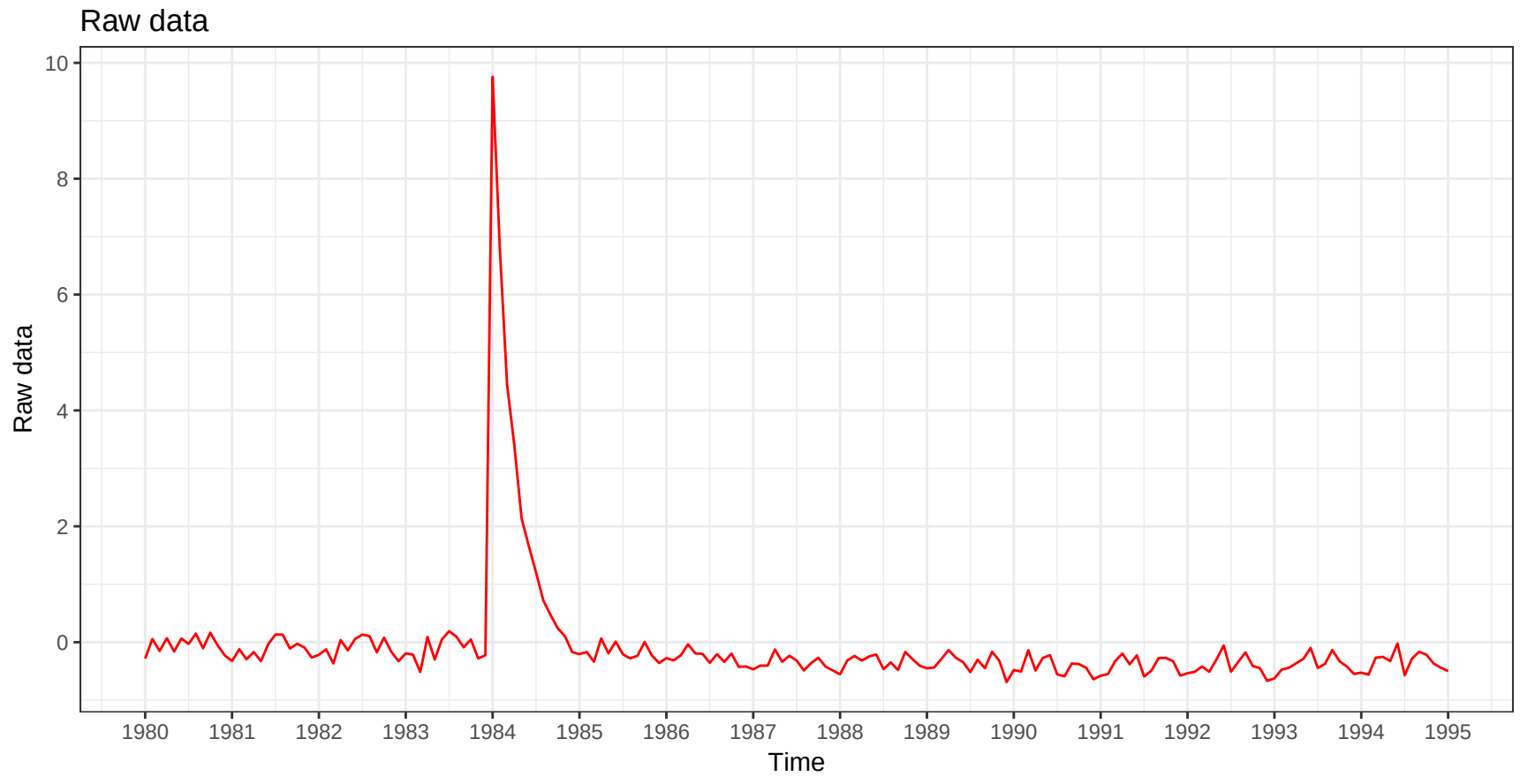

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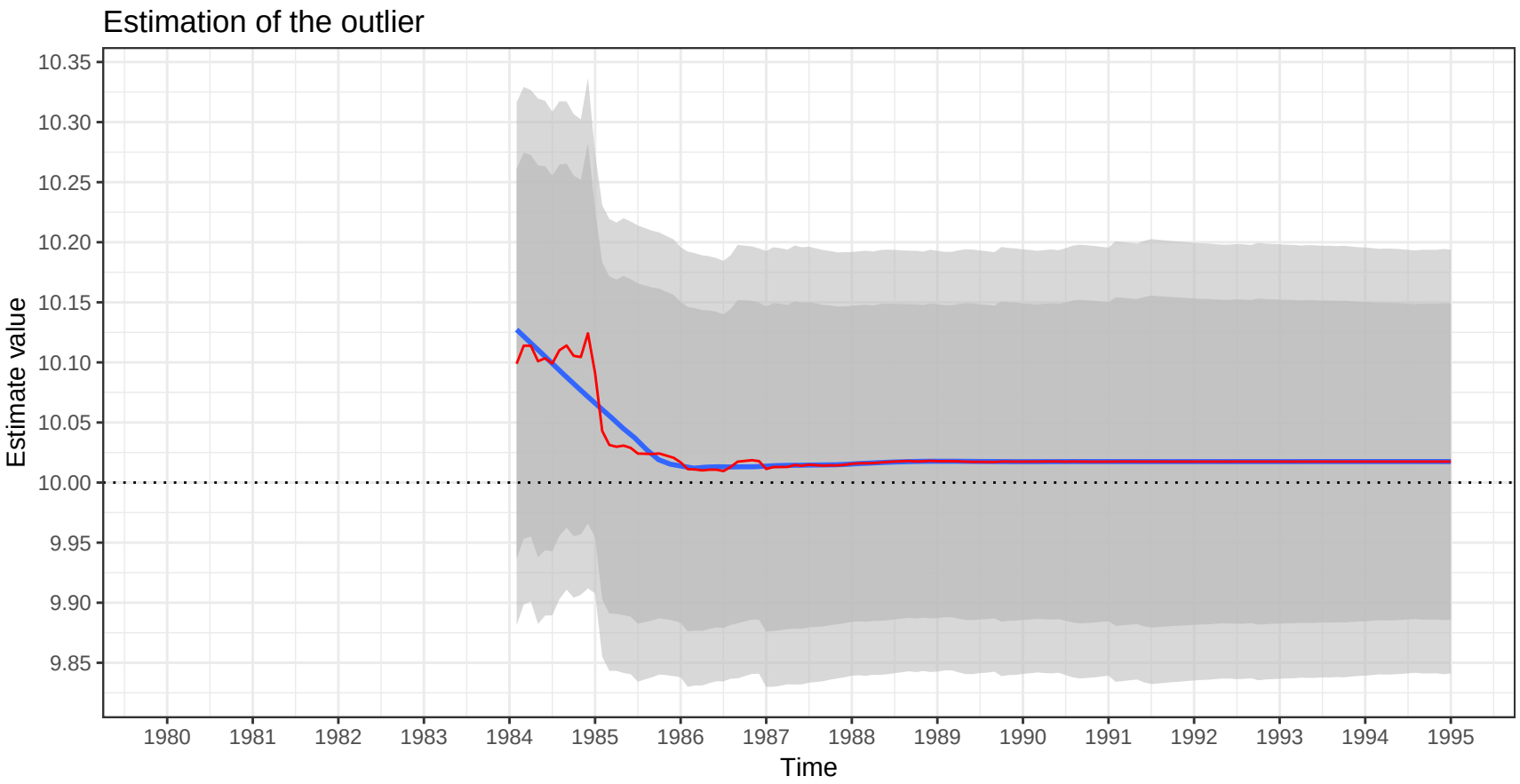

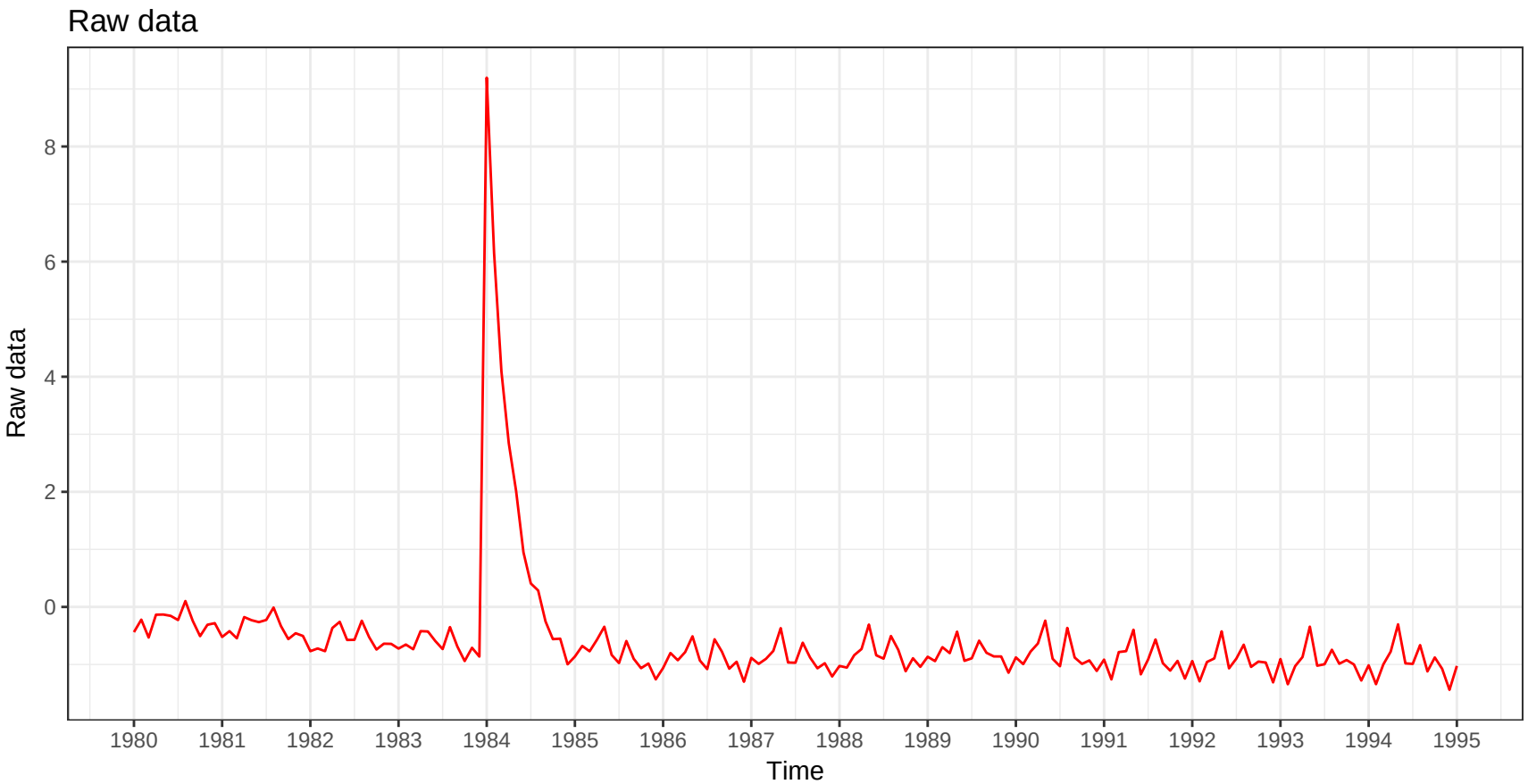

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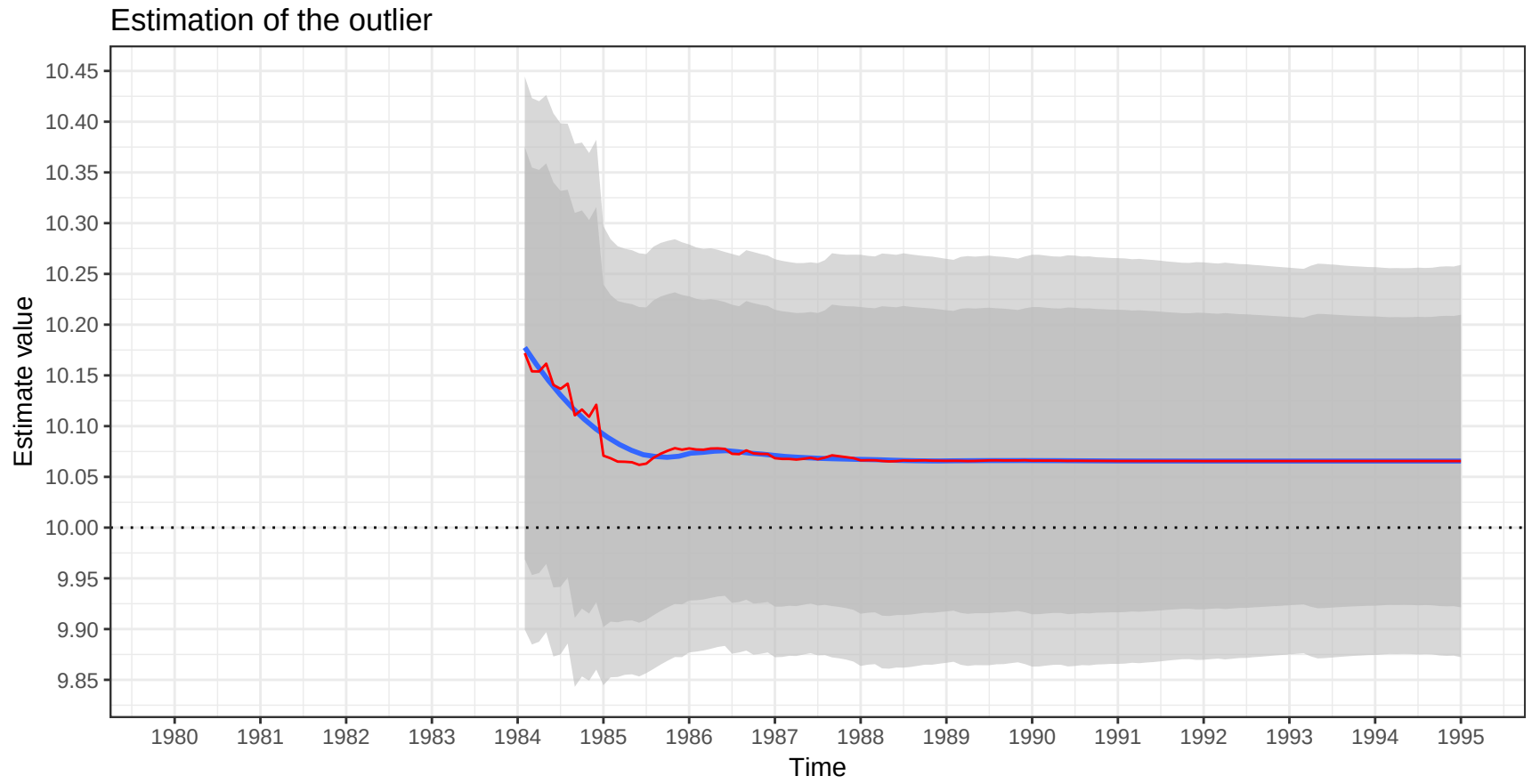

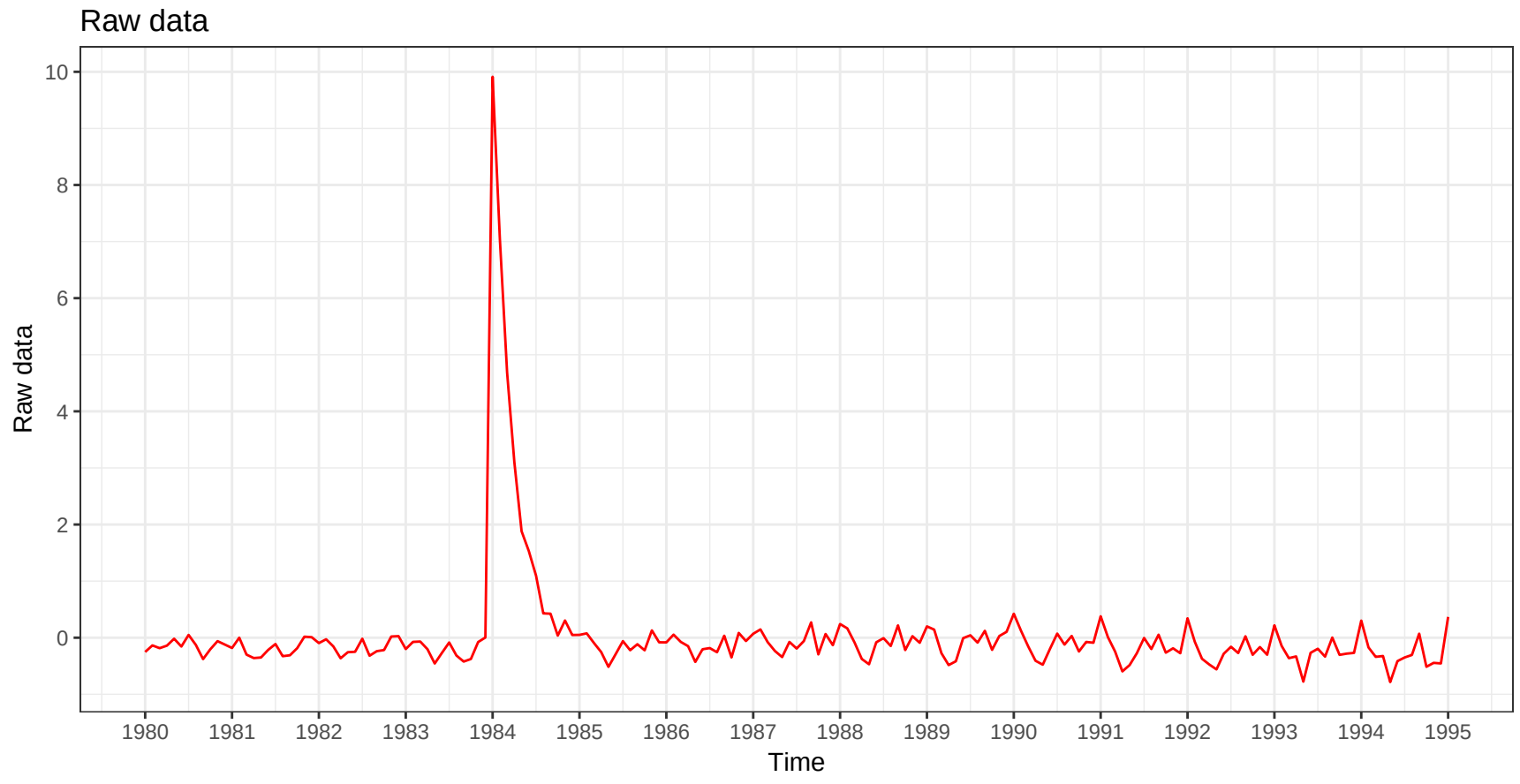

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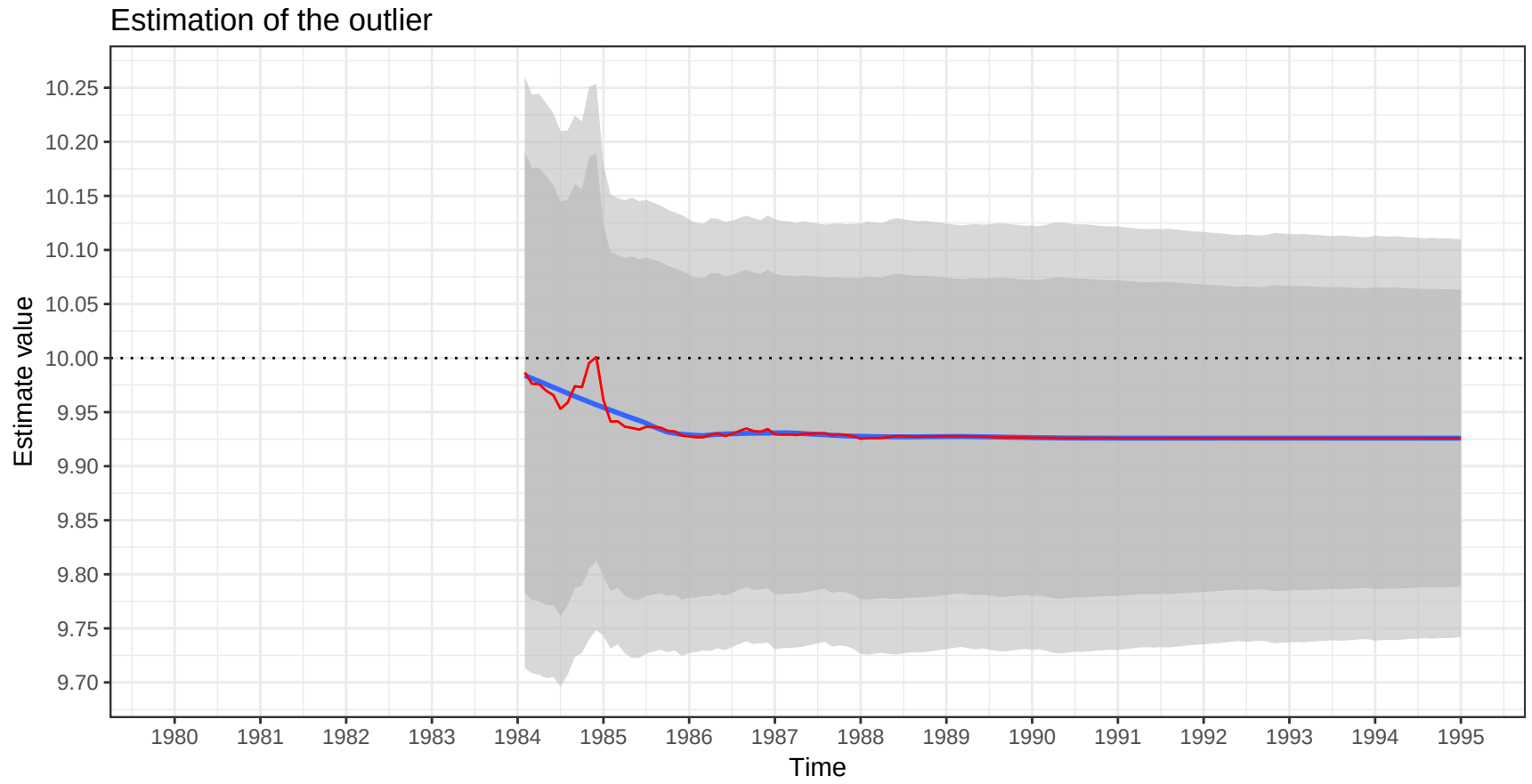
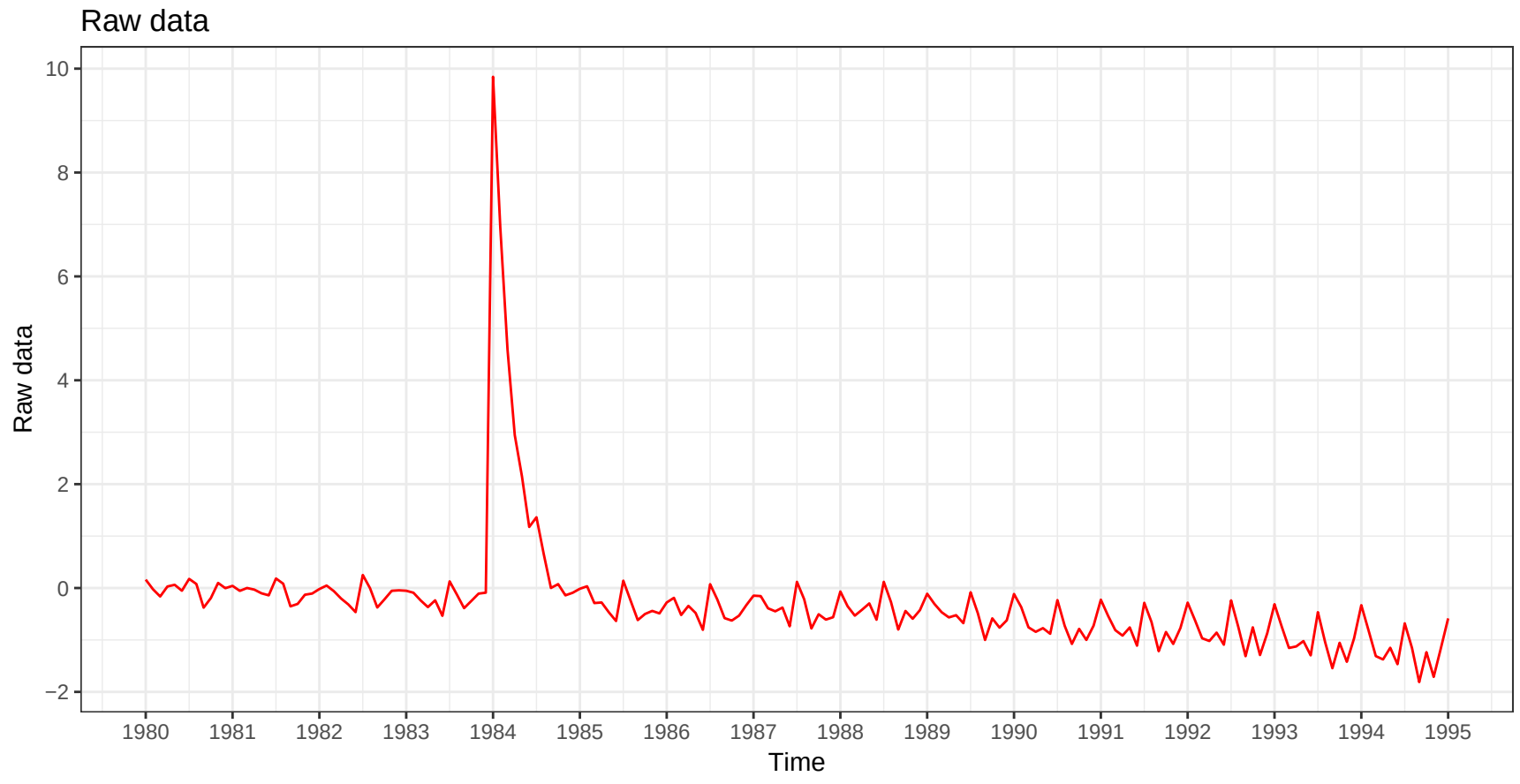
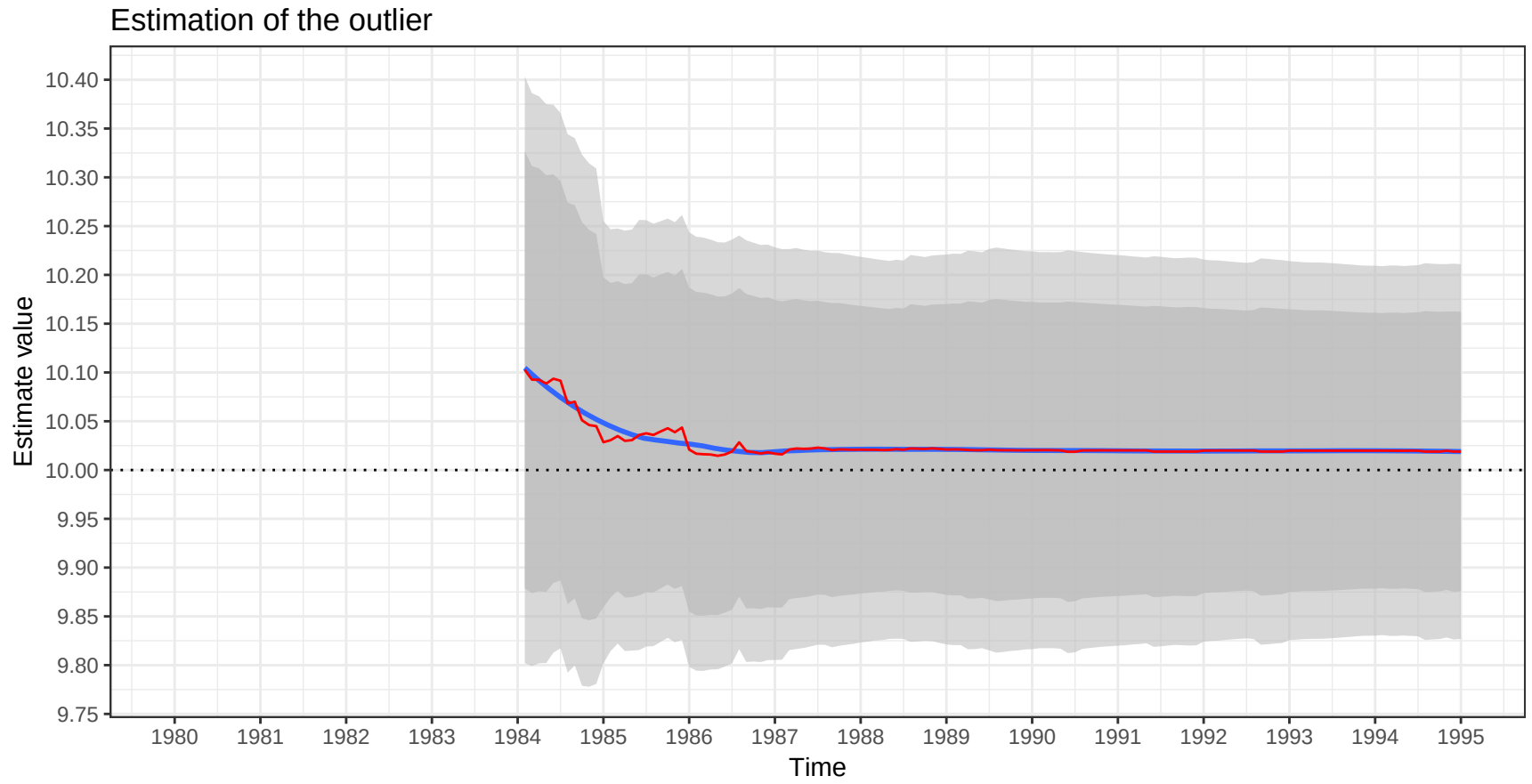
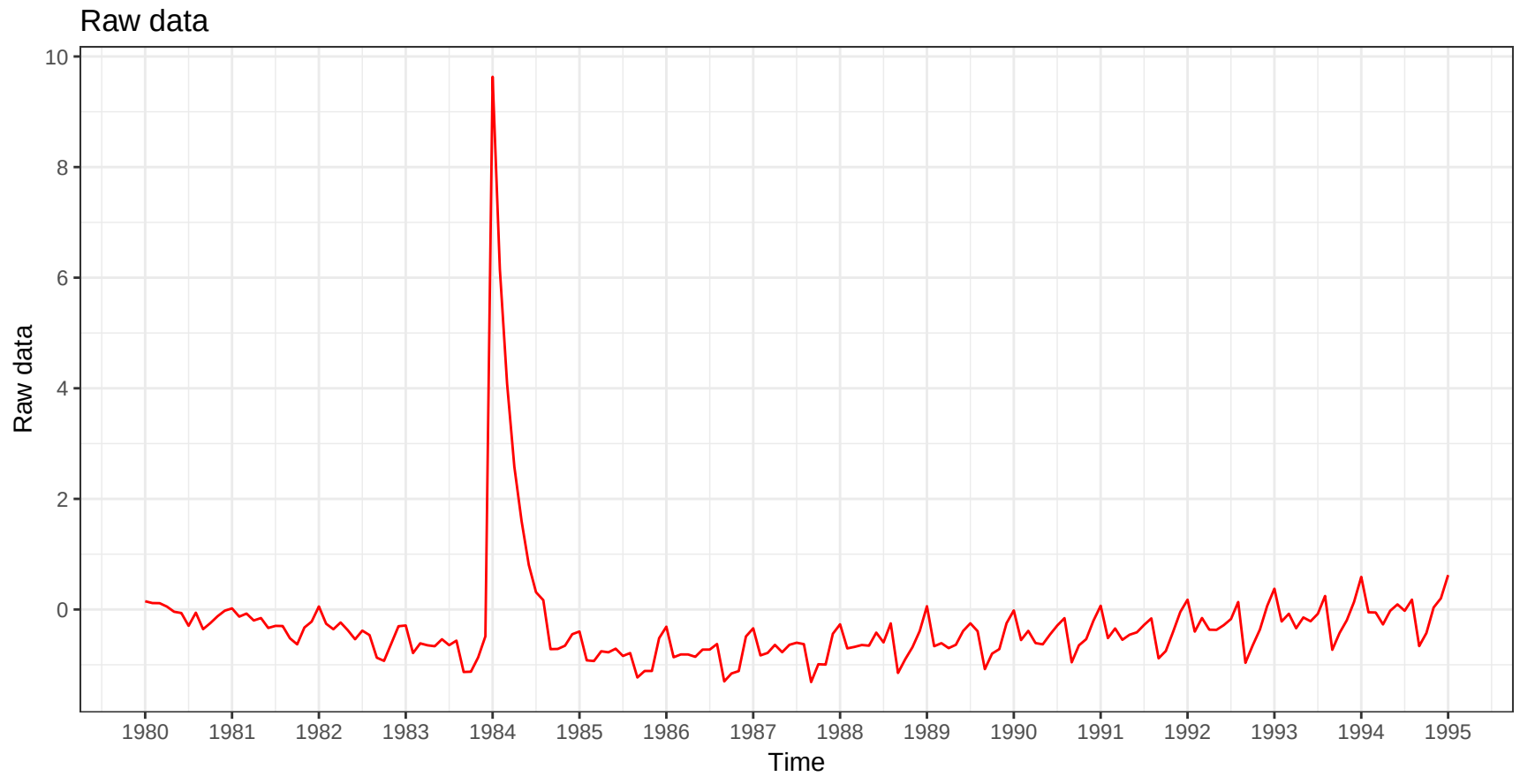
(1−B)(1−B12)Xt=(1−0.8B)(1−0.4B12)at



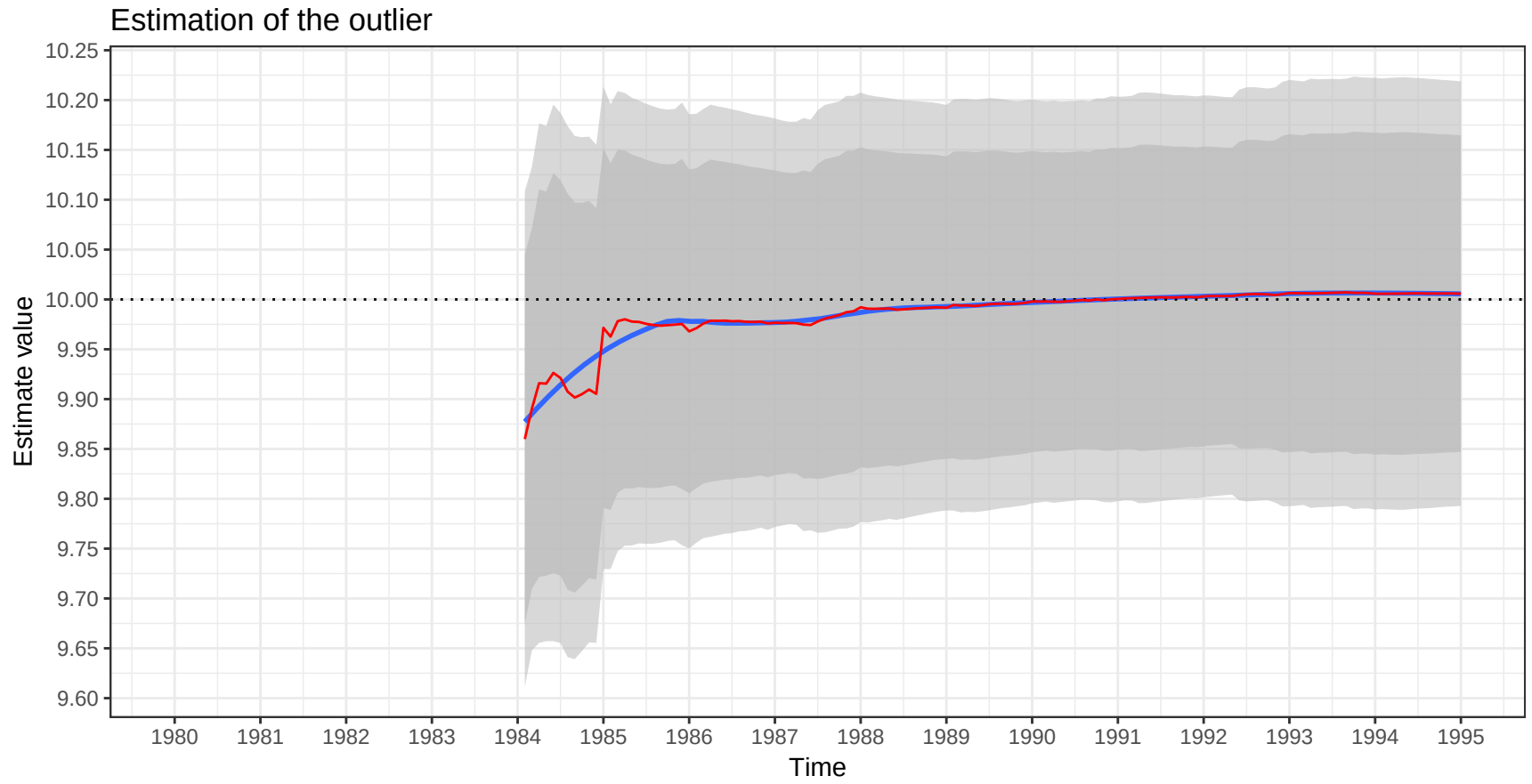


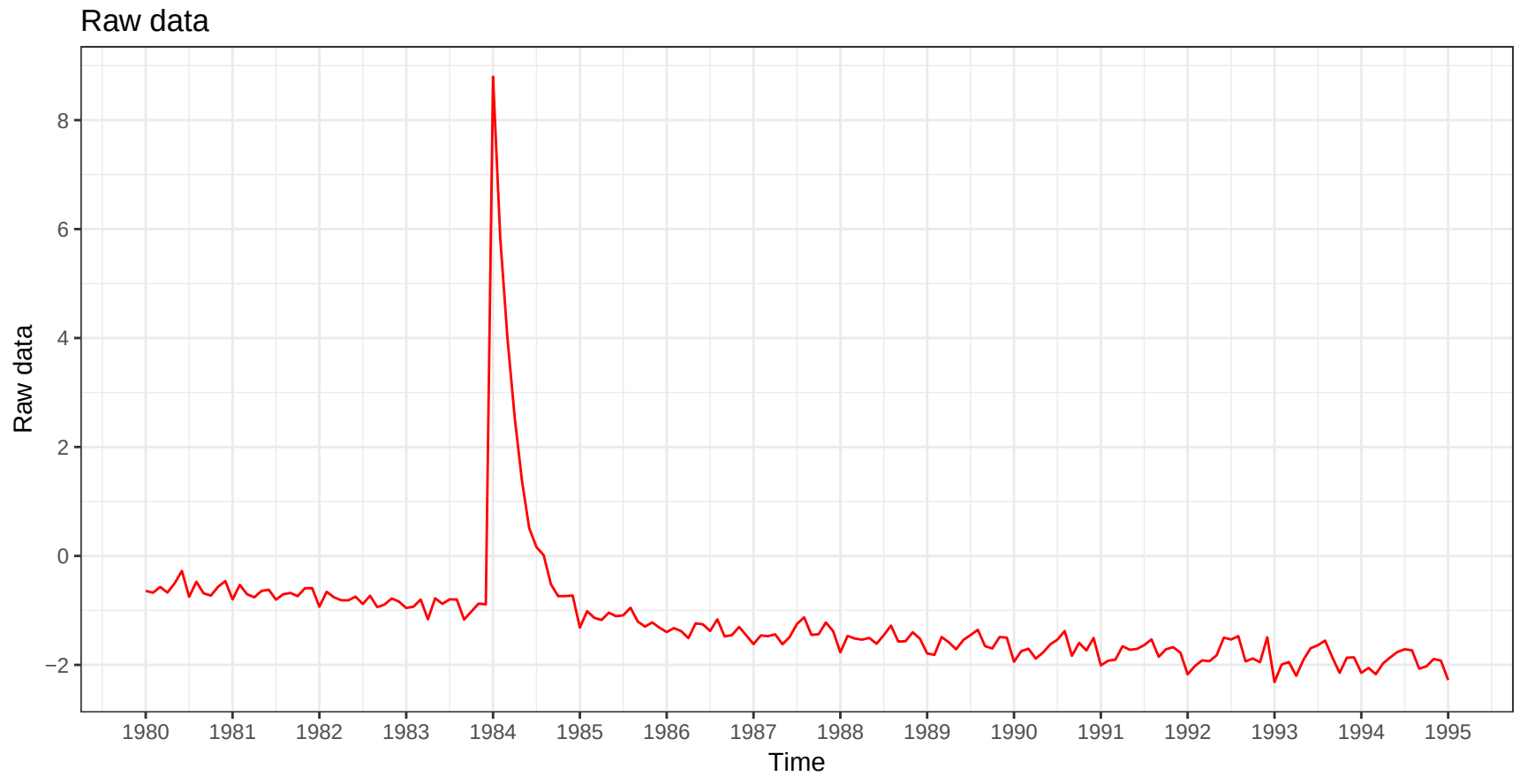
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.8B)(1−0.4B12)at

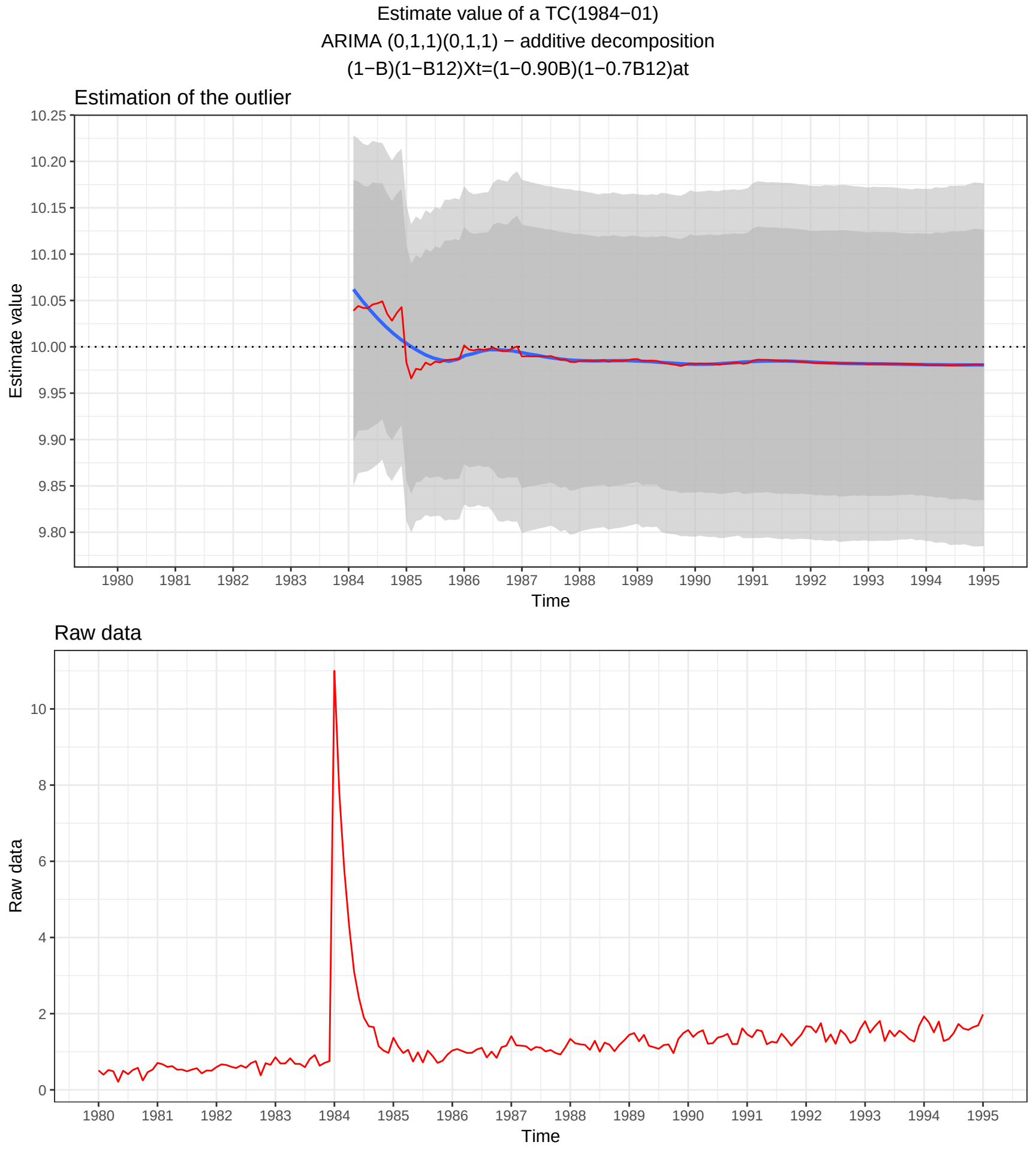




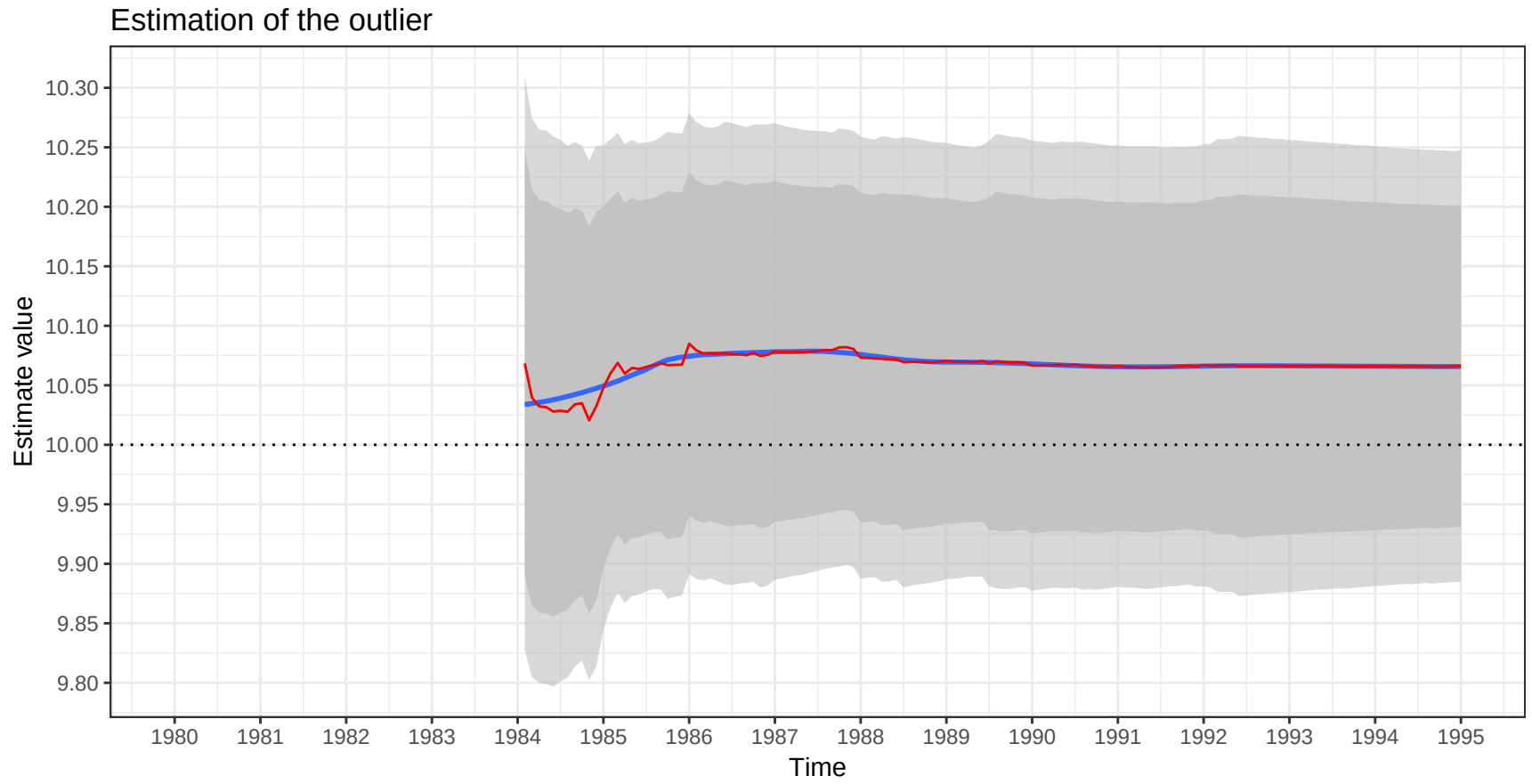
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.90B)(1−0.7B12)at

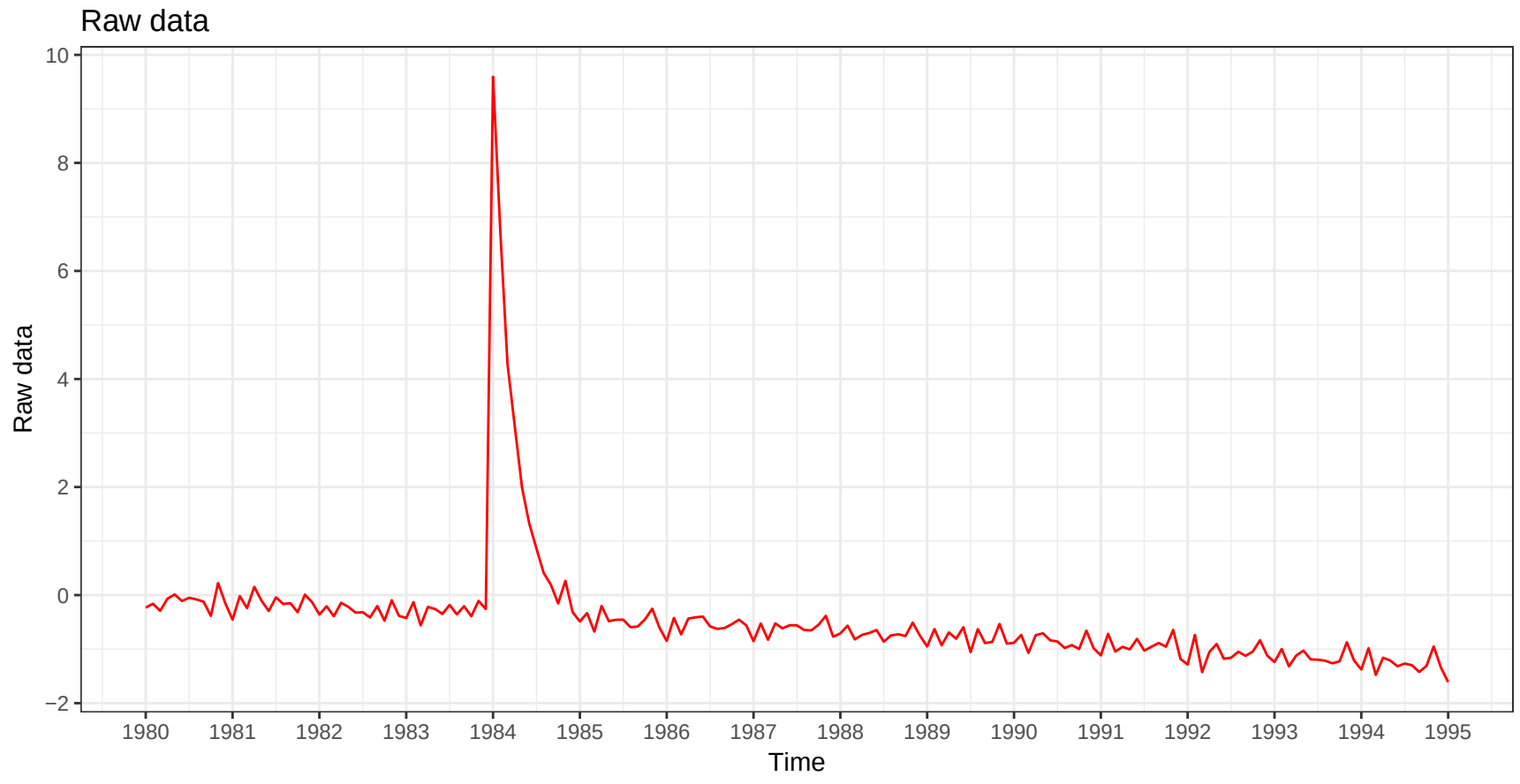




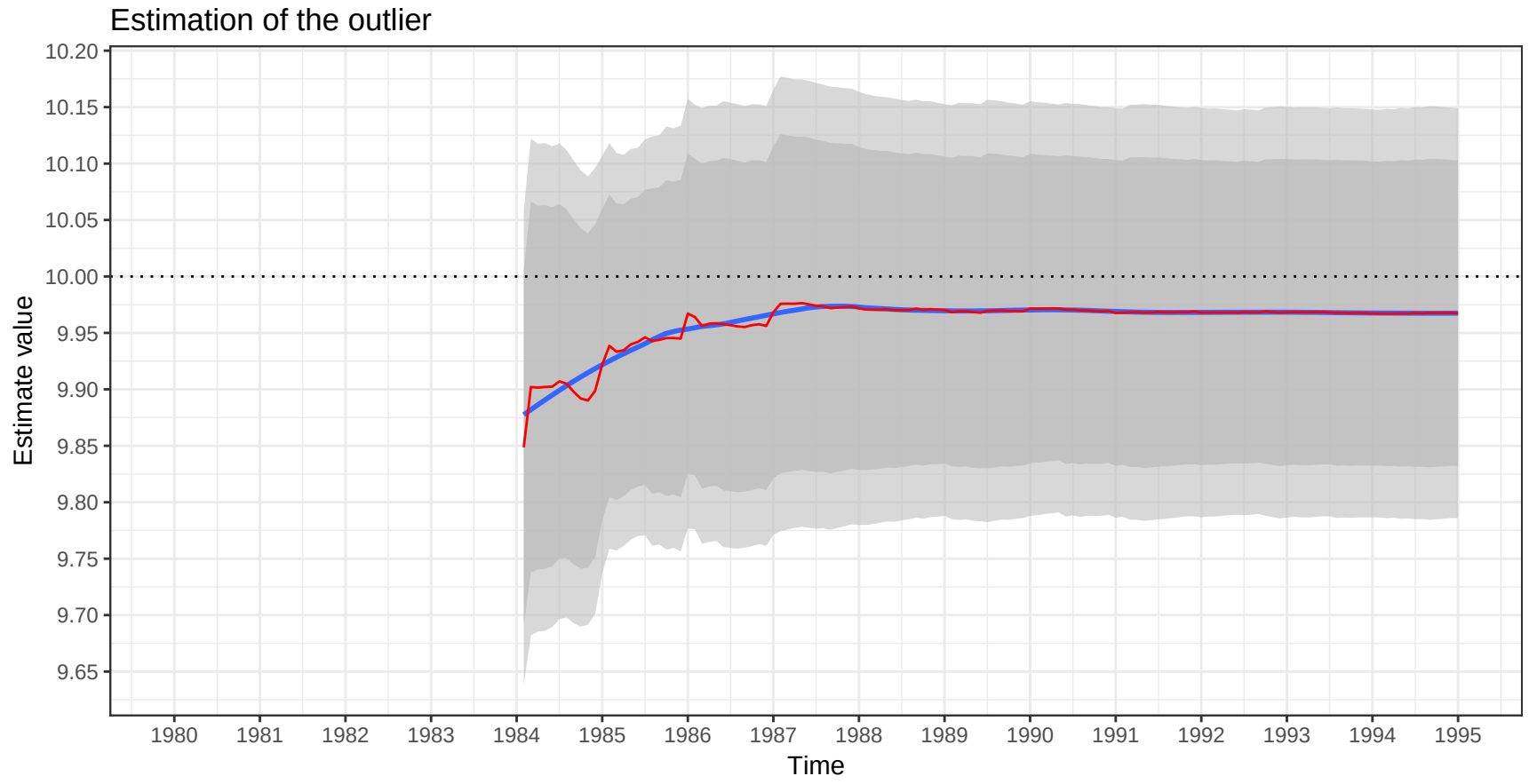

Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.90B)(1−0.7B12)at
Estimation of the outlier
Estimate value
10.25
10.20
10.15
10.10
10.05
10.00
9.95
9.90
9.85
9.80
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time
Raw data
Raw data
10
8
6
4
2
0
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time

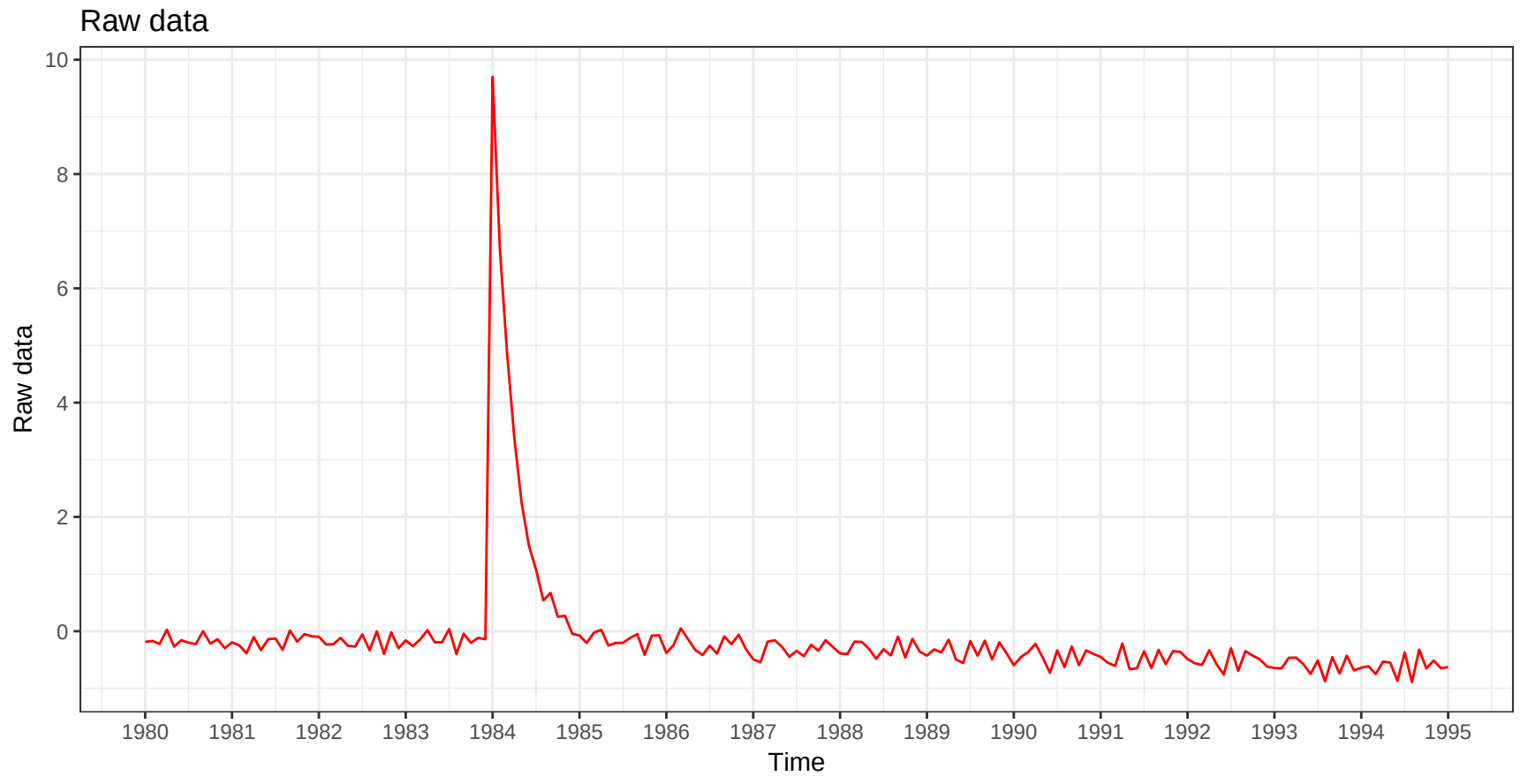
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.90B)(1−0.7B12)at



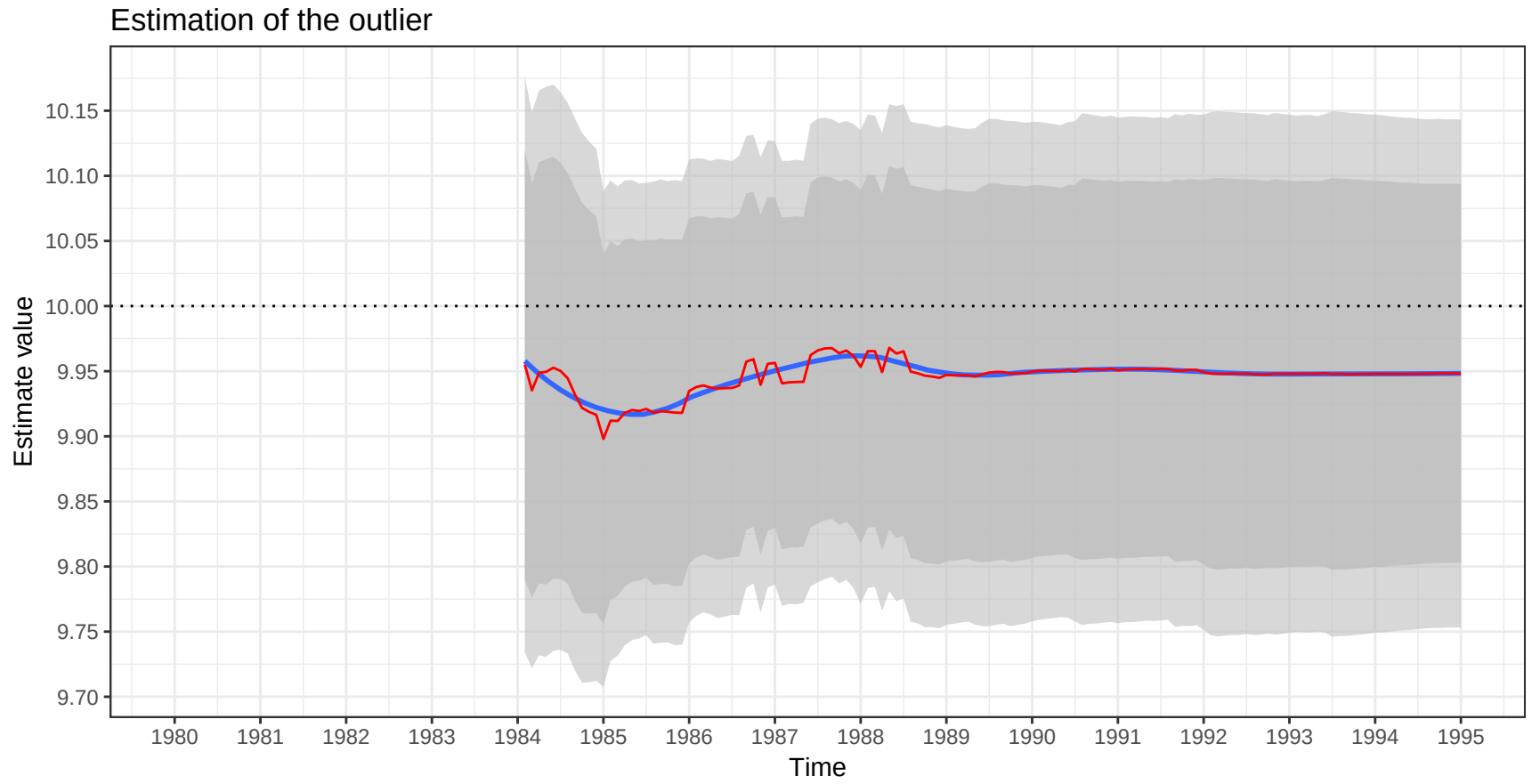


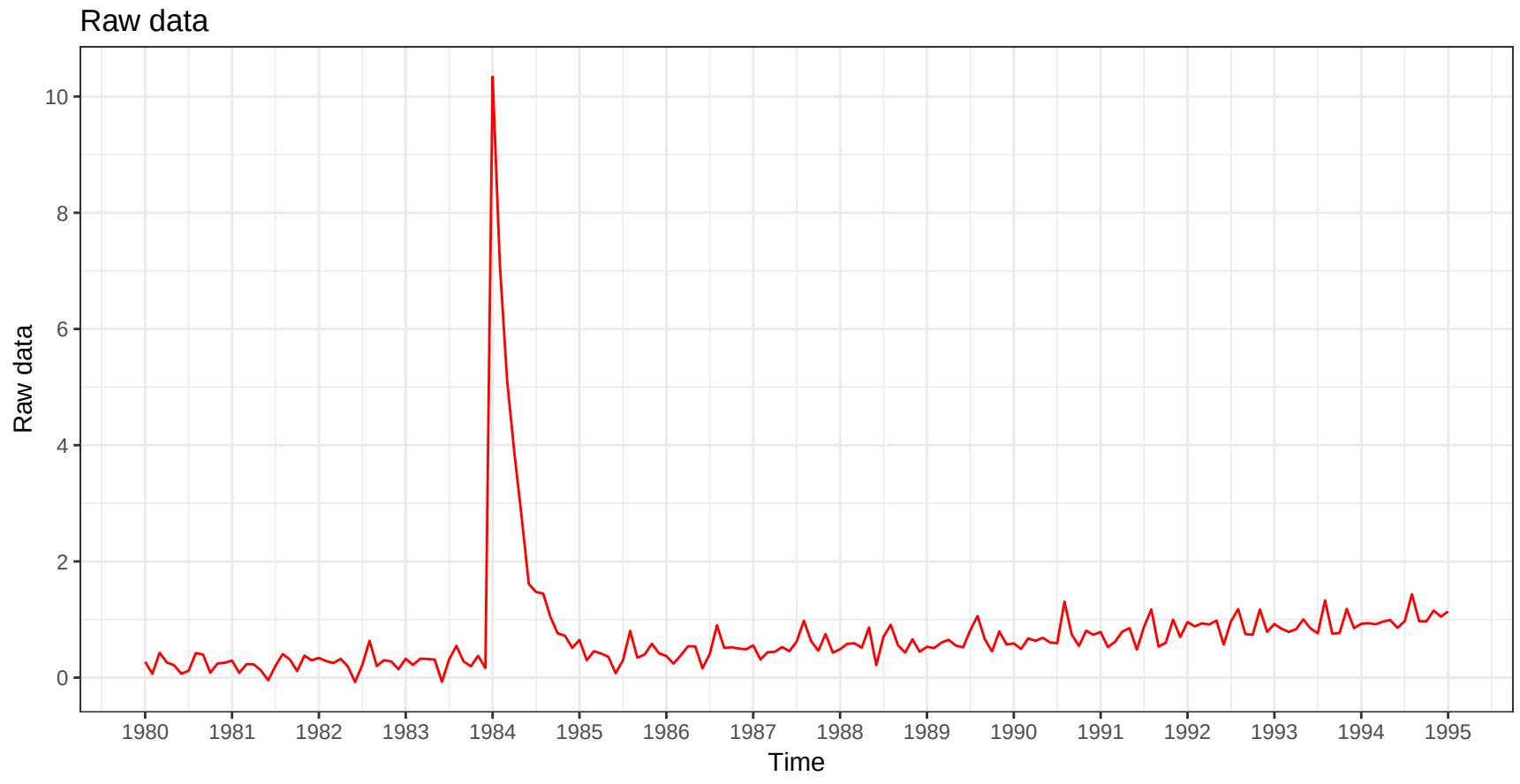
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.90B)(1−0.7B12)at



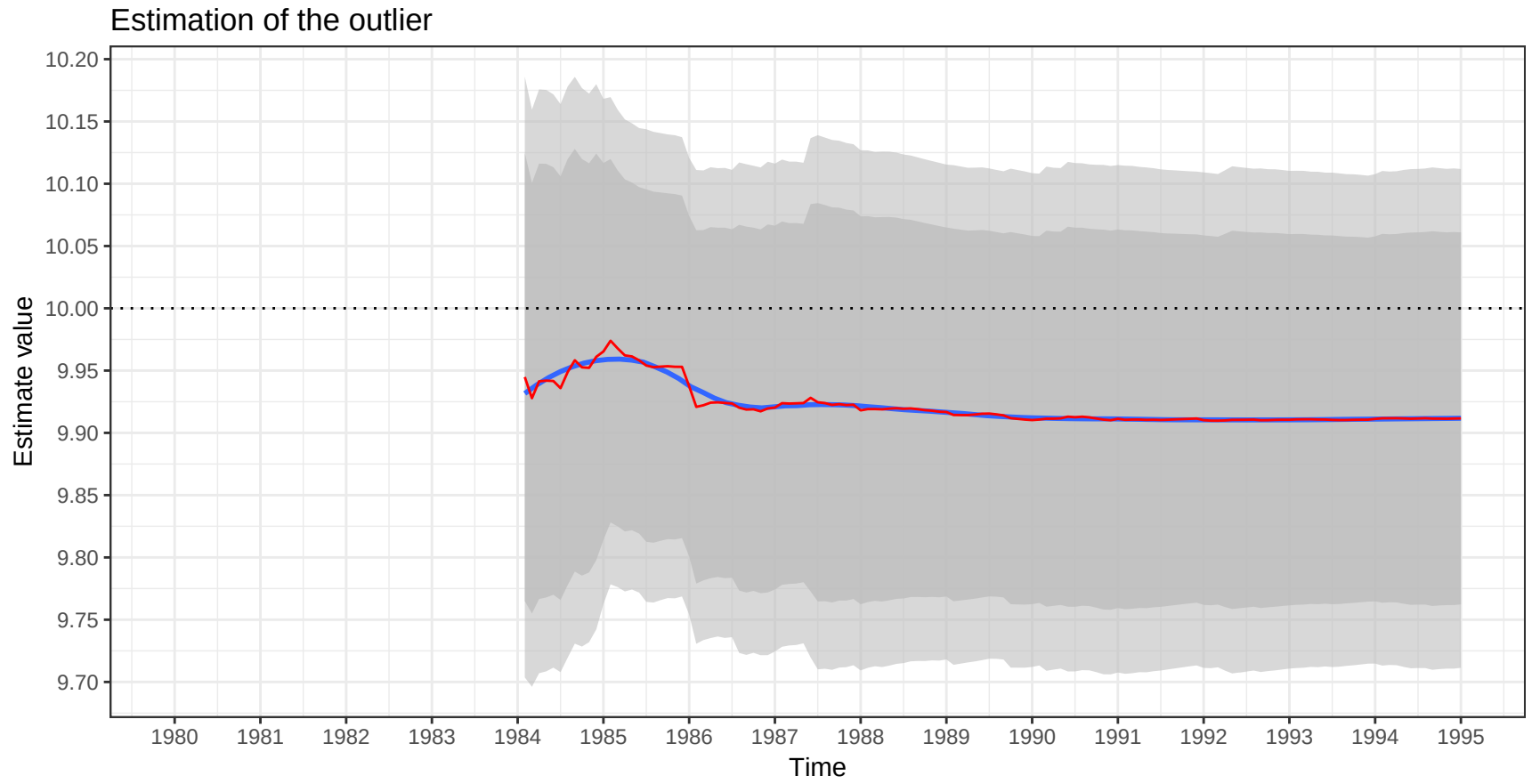


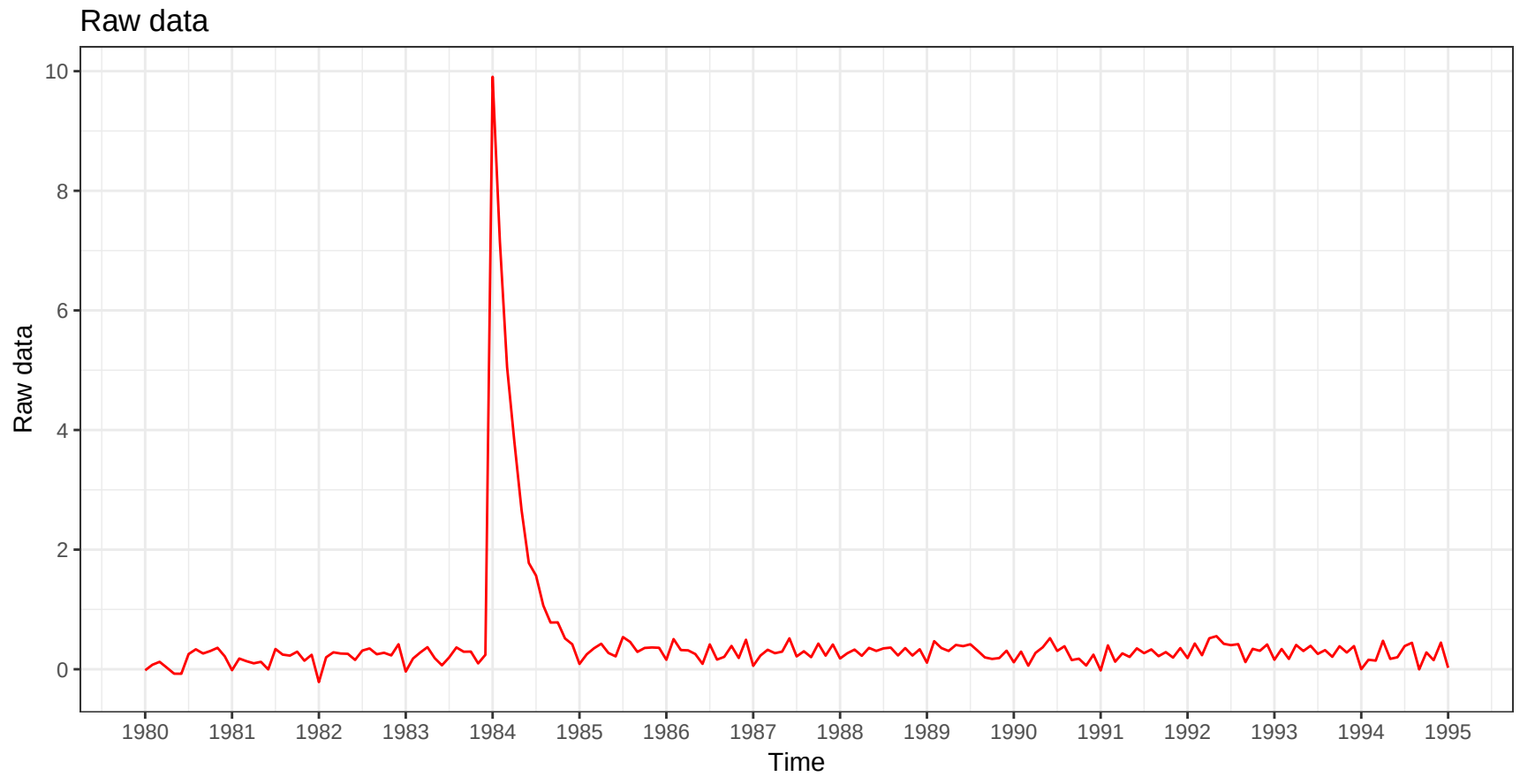
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.90B)(1−0.7B12)at



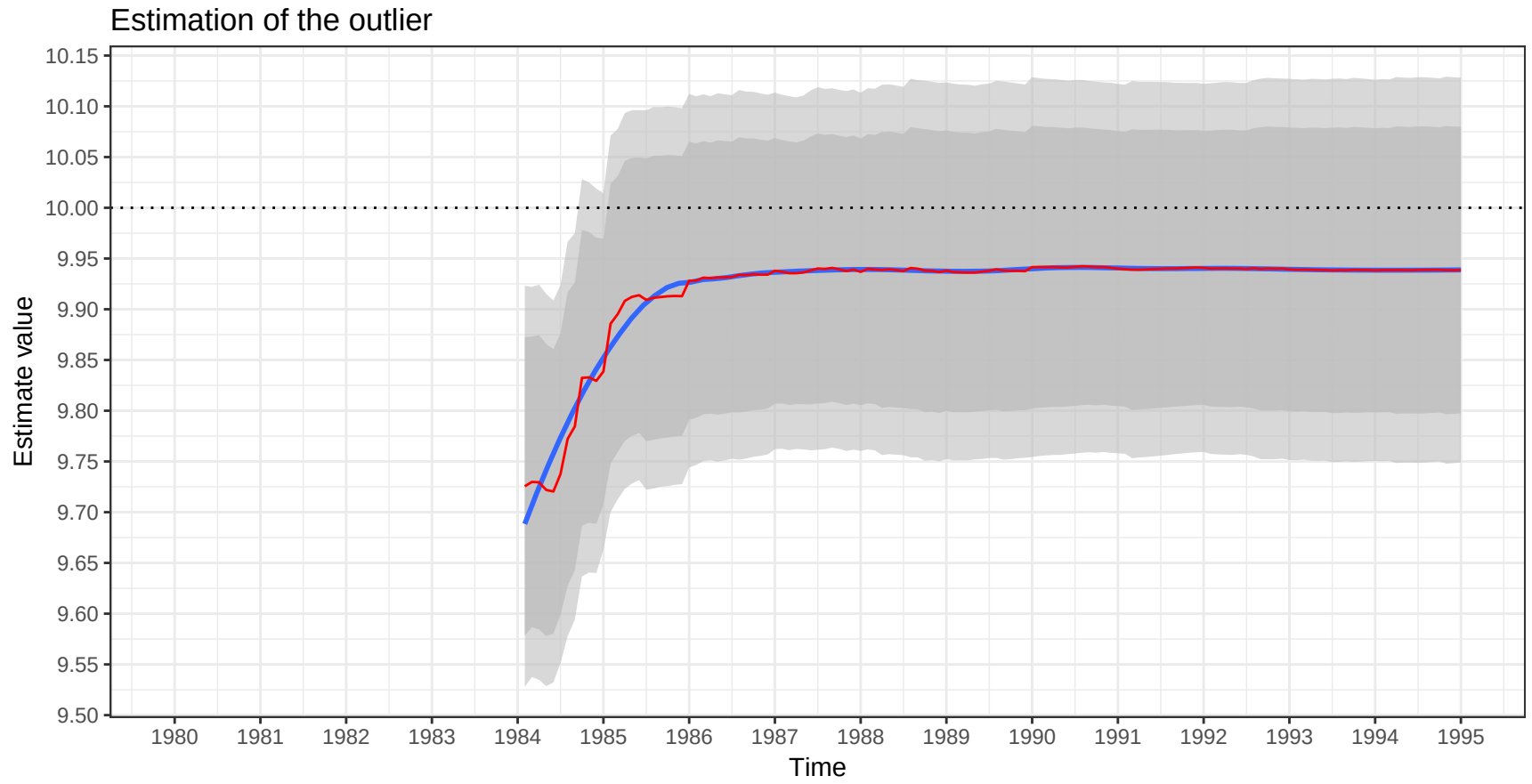


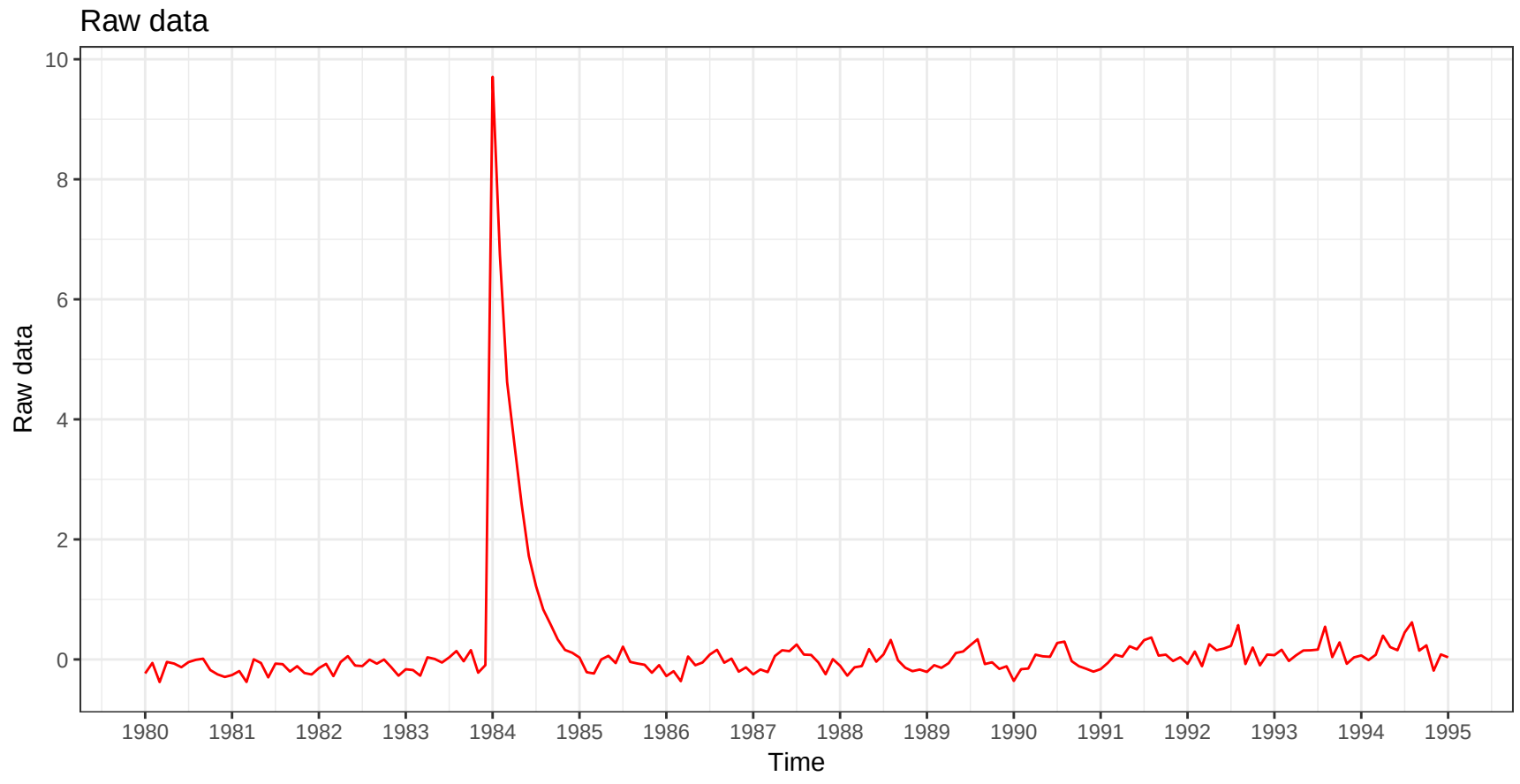
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.90B)(1−0.7B12)at



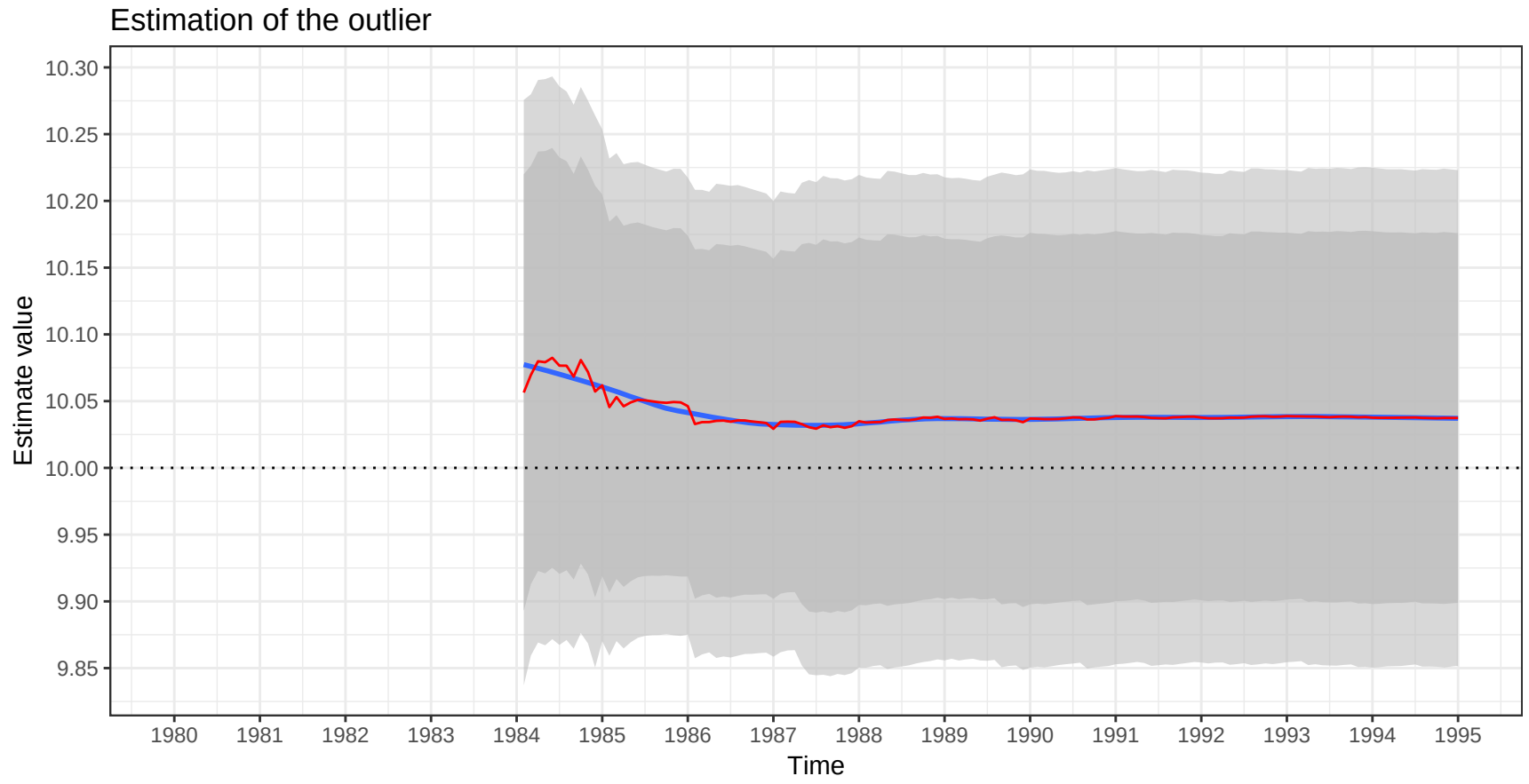


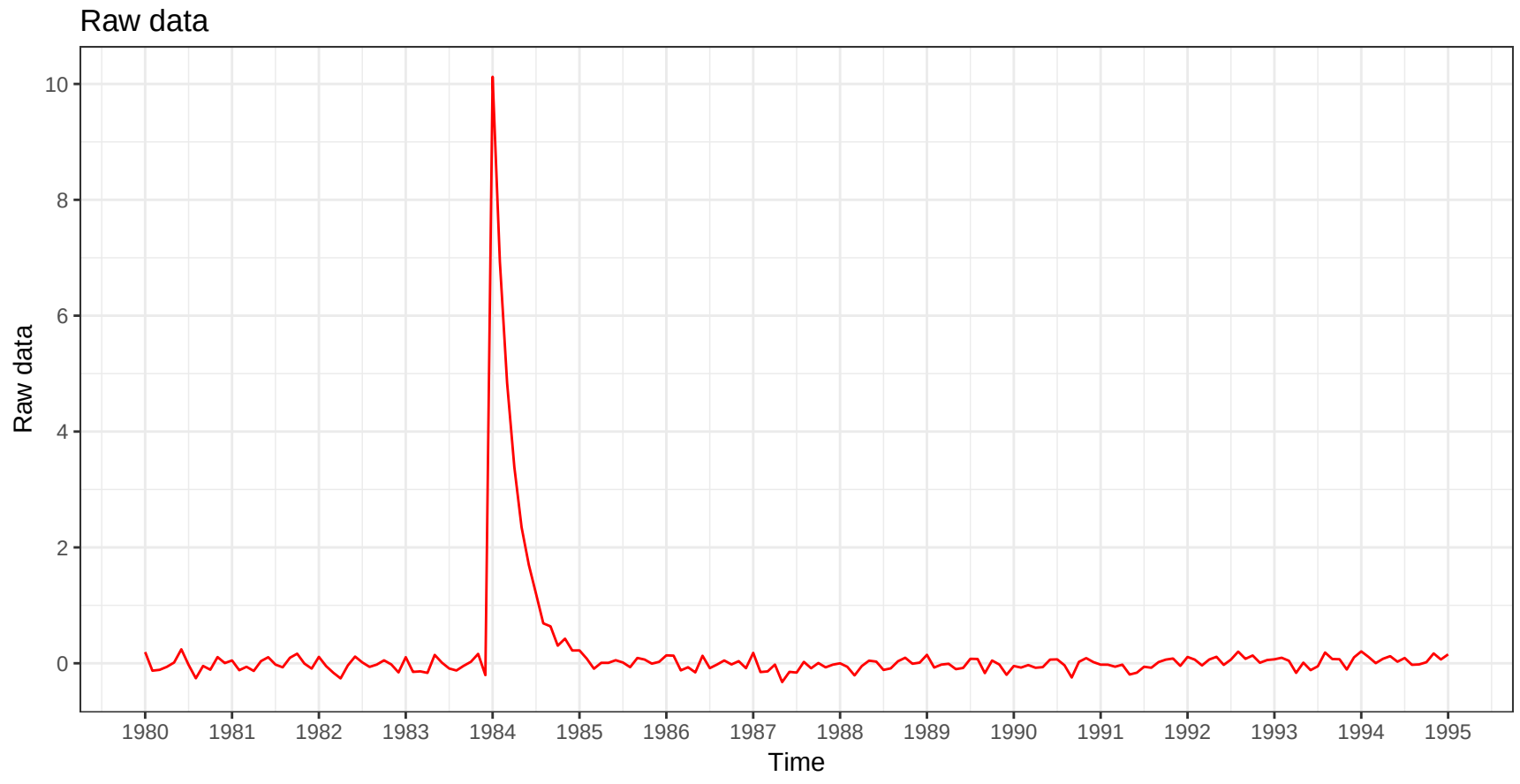
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.90B)(1−0.7B12)at



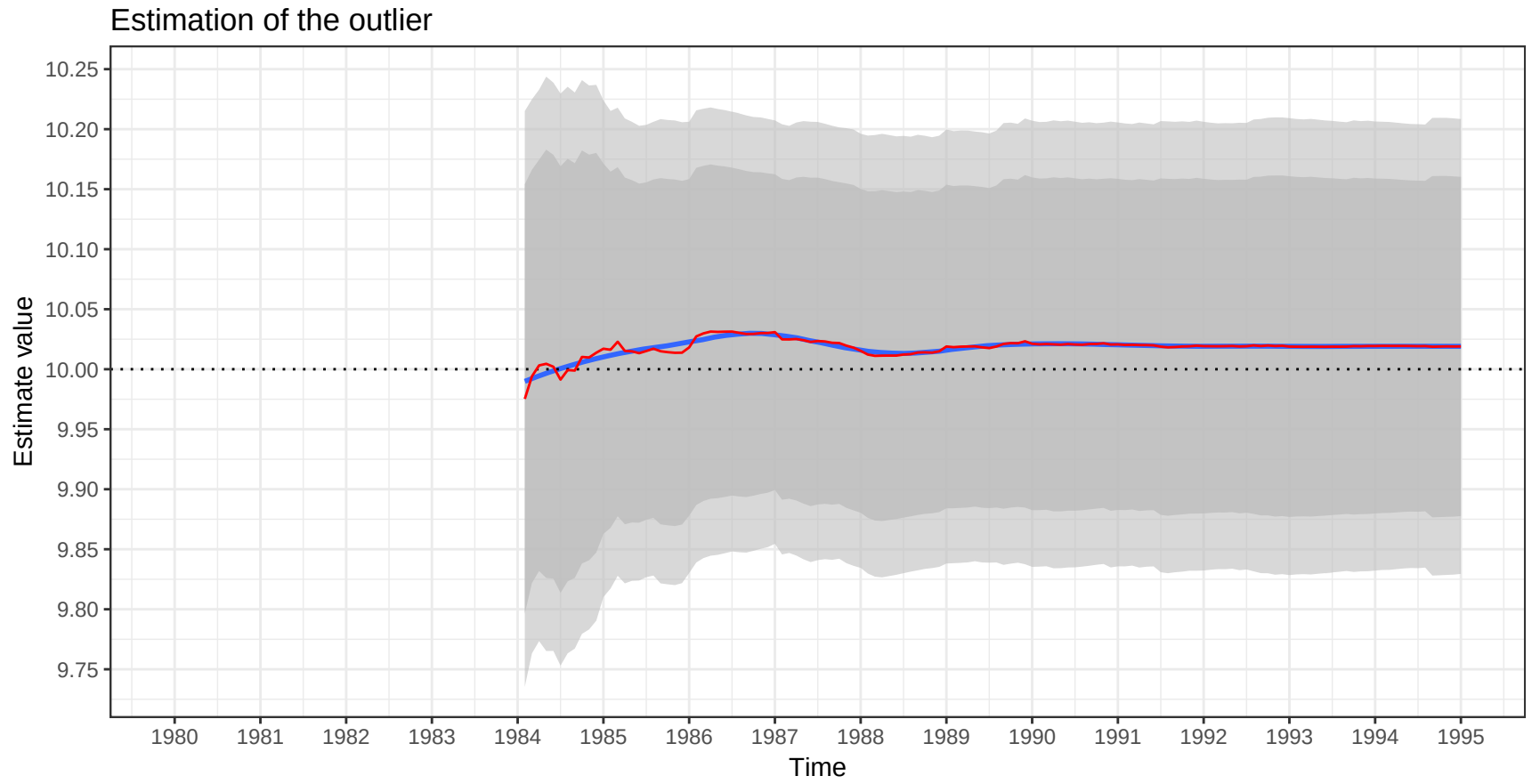


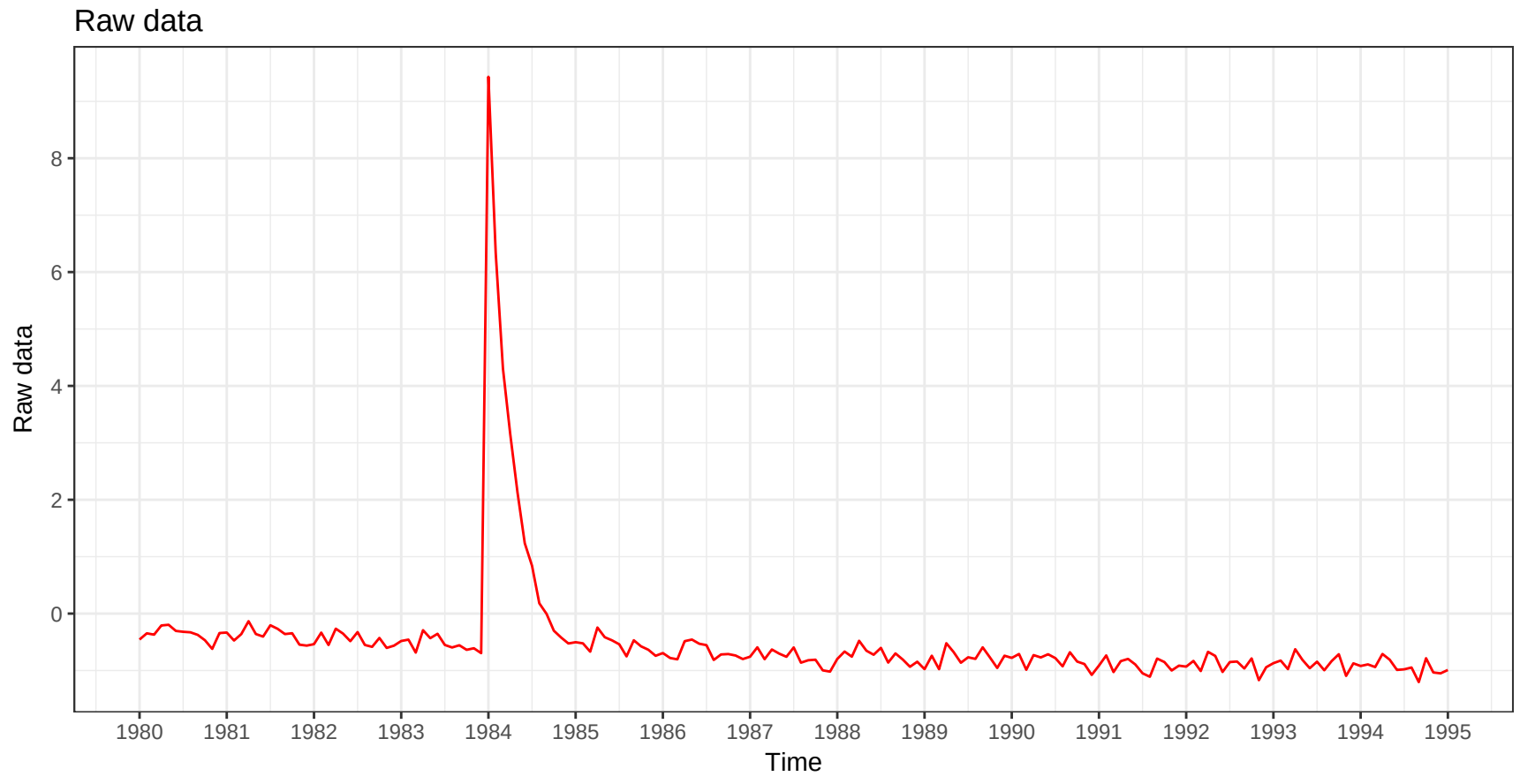
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.90B)(1−0.7B12)at



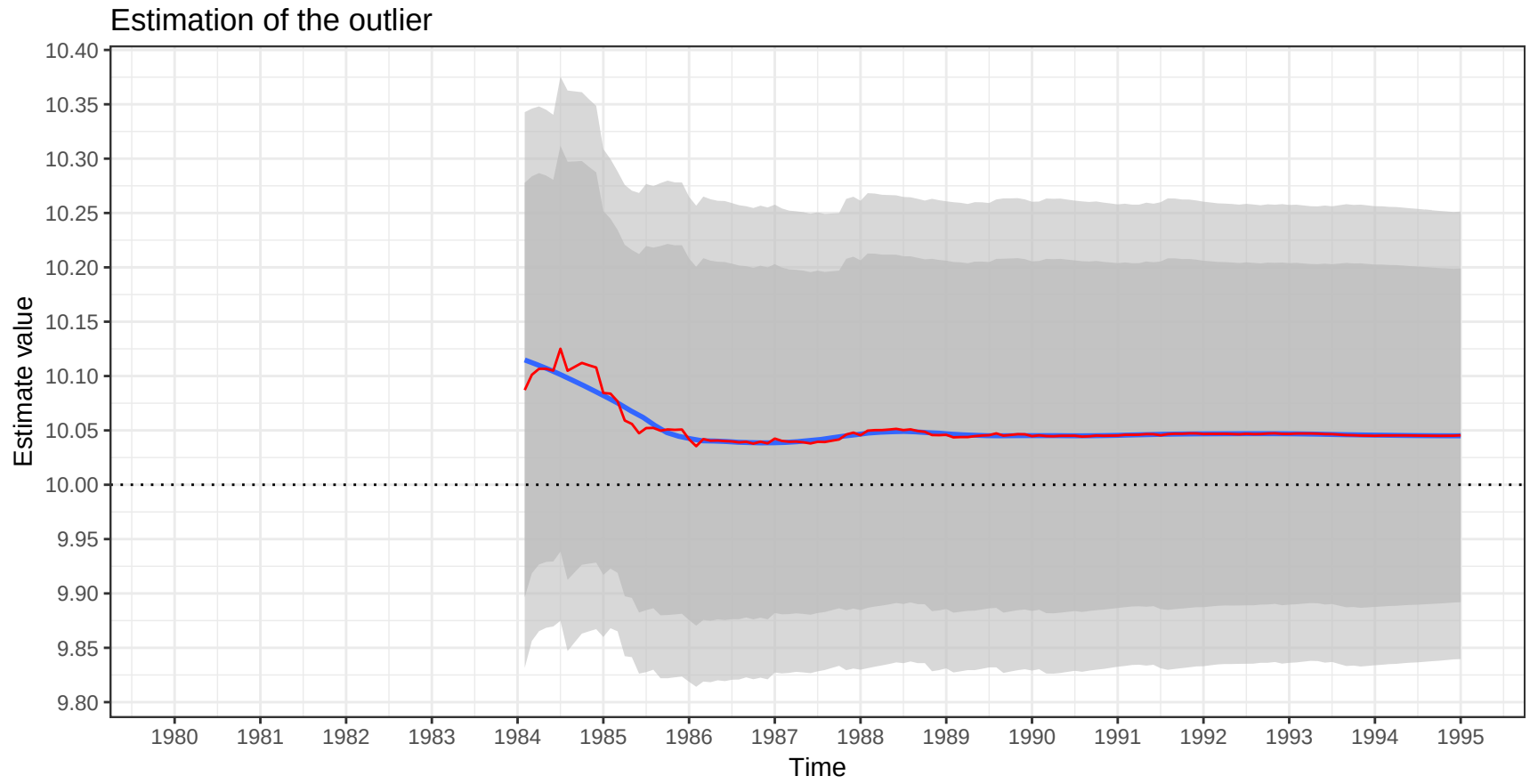


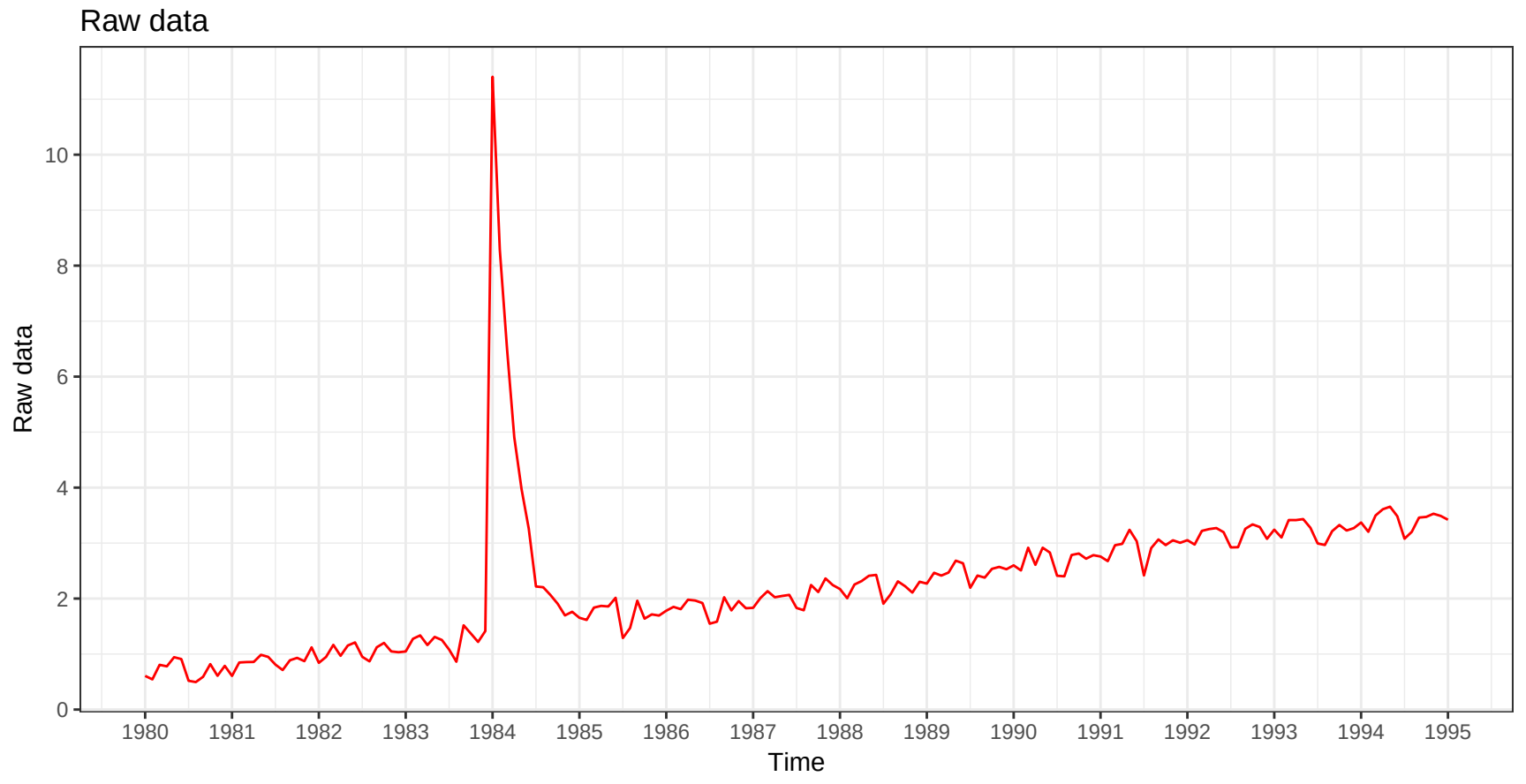
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.90B)(1−0.7B12)at



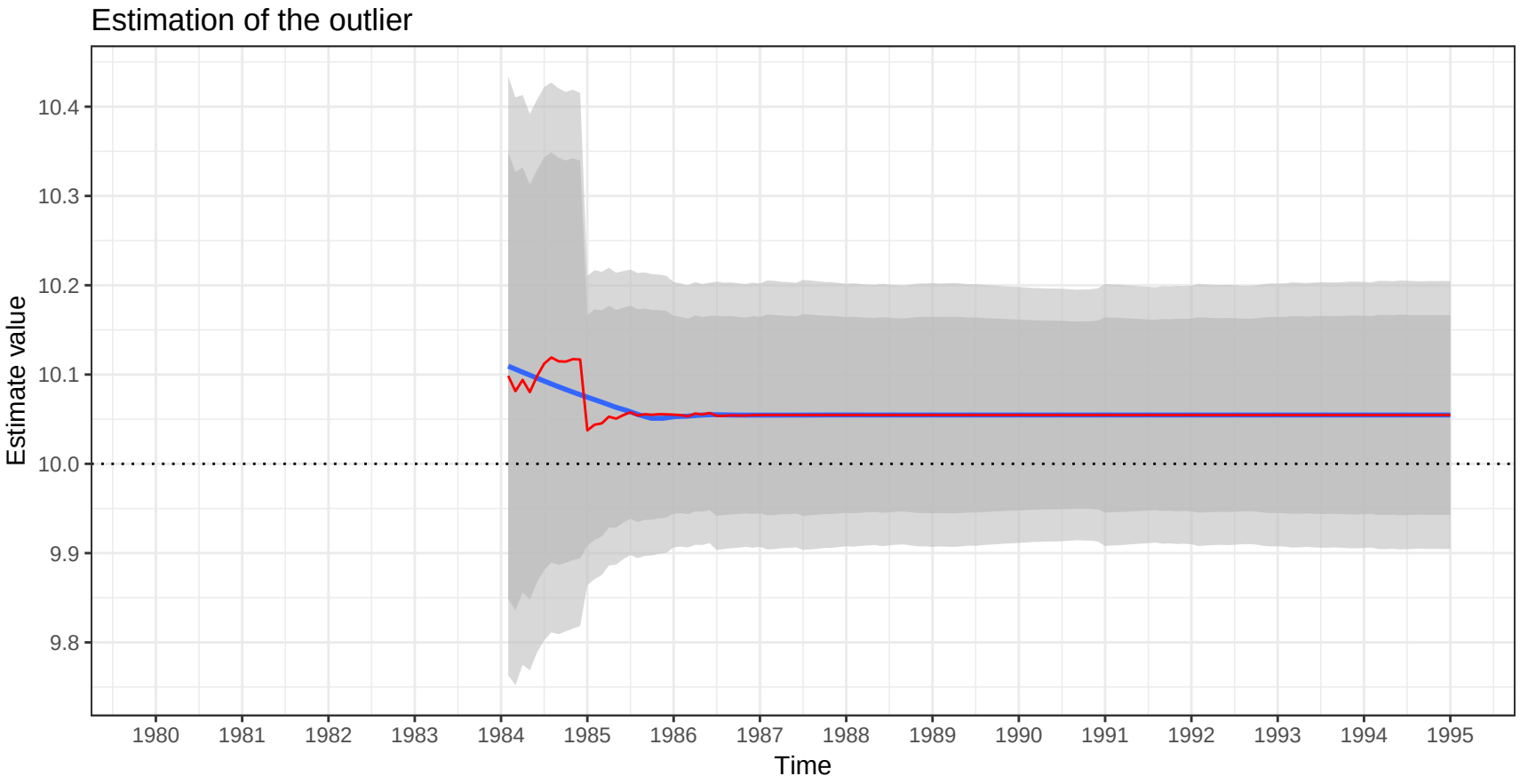


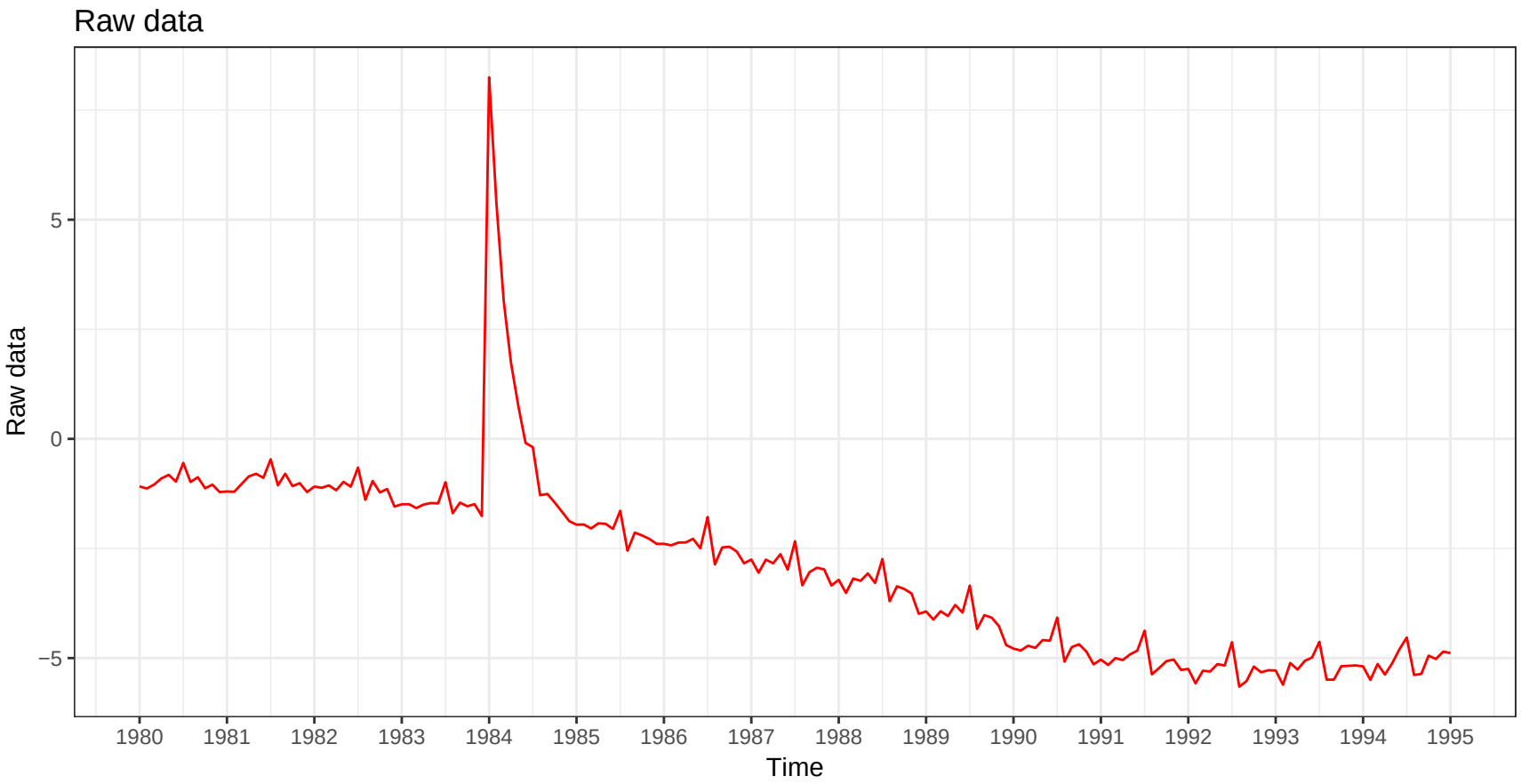
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.90B)(1−0.7B12)at

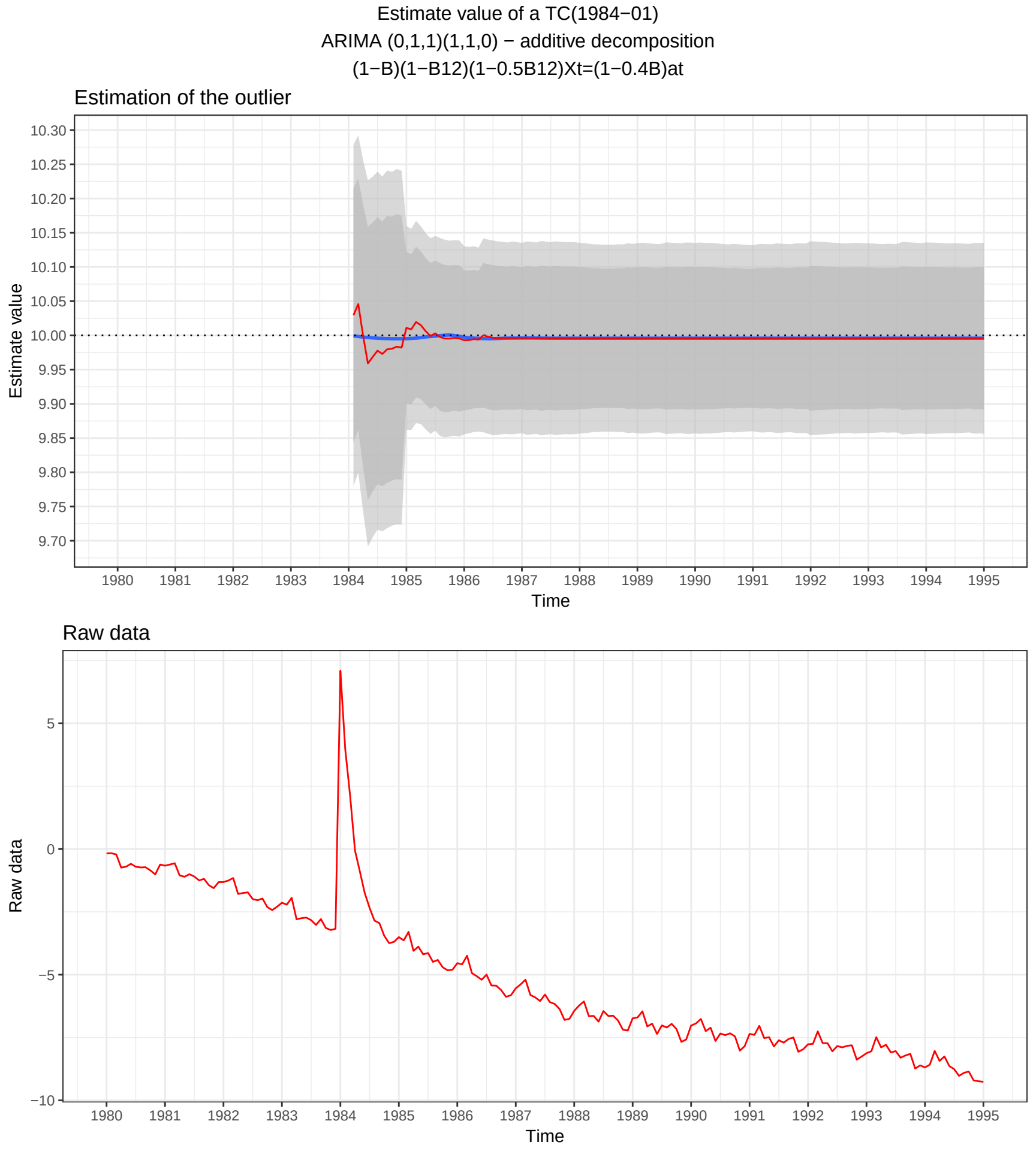




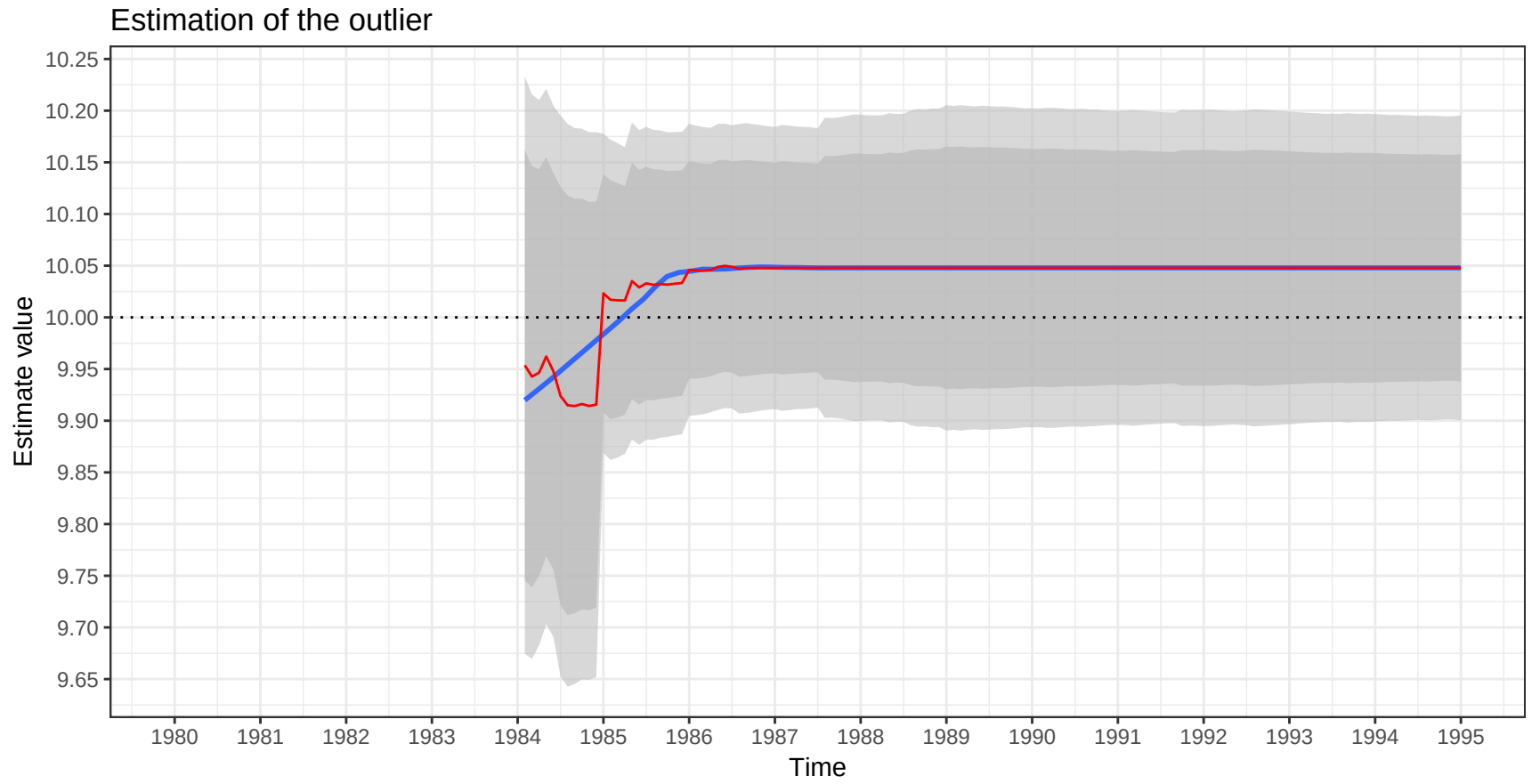
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(1,1,0) − additive decomposition
(1−B)(1−B12)(1−0.5B12)Xt=(1−0.4B)at

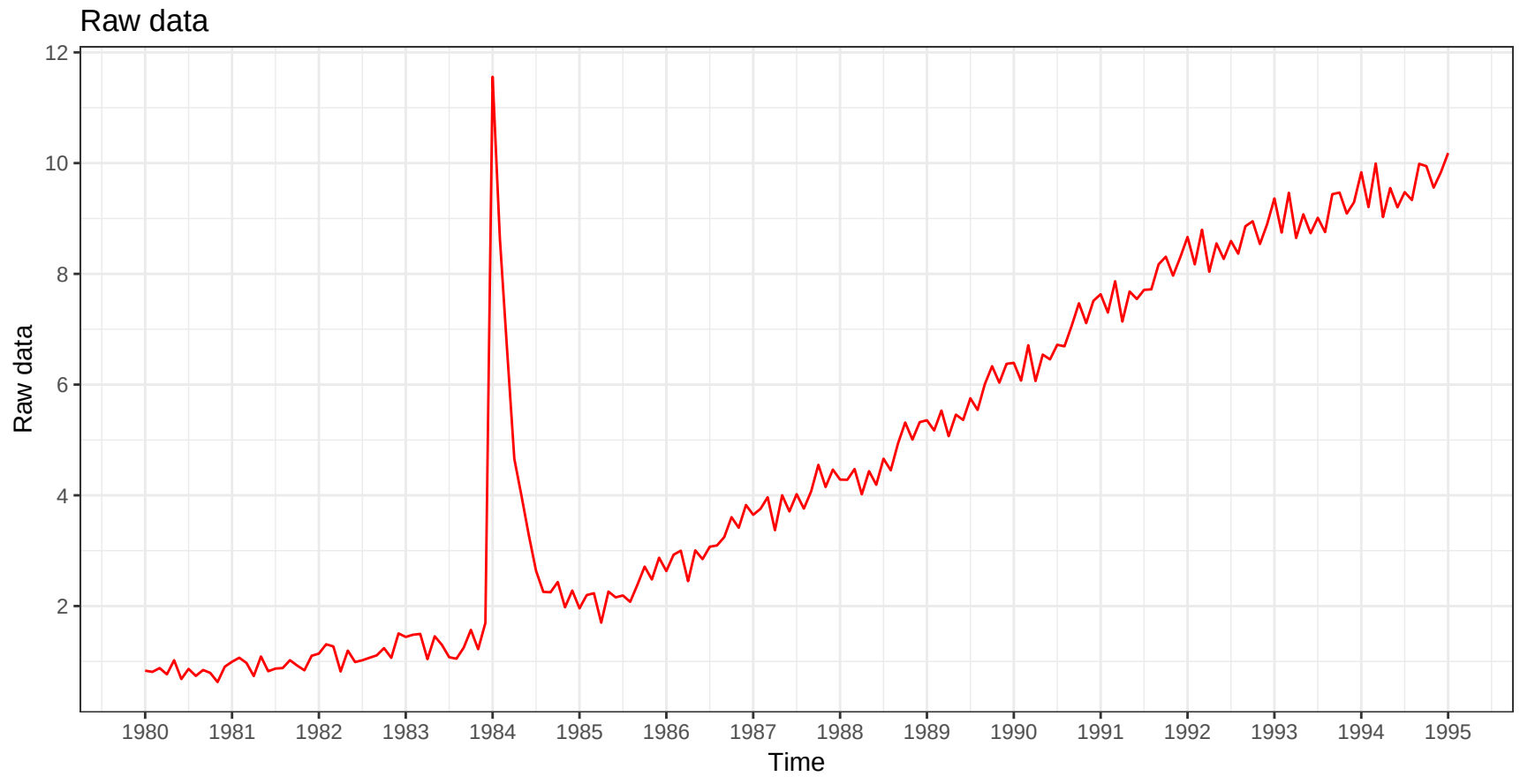




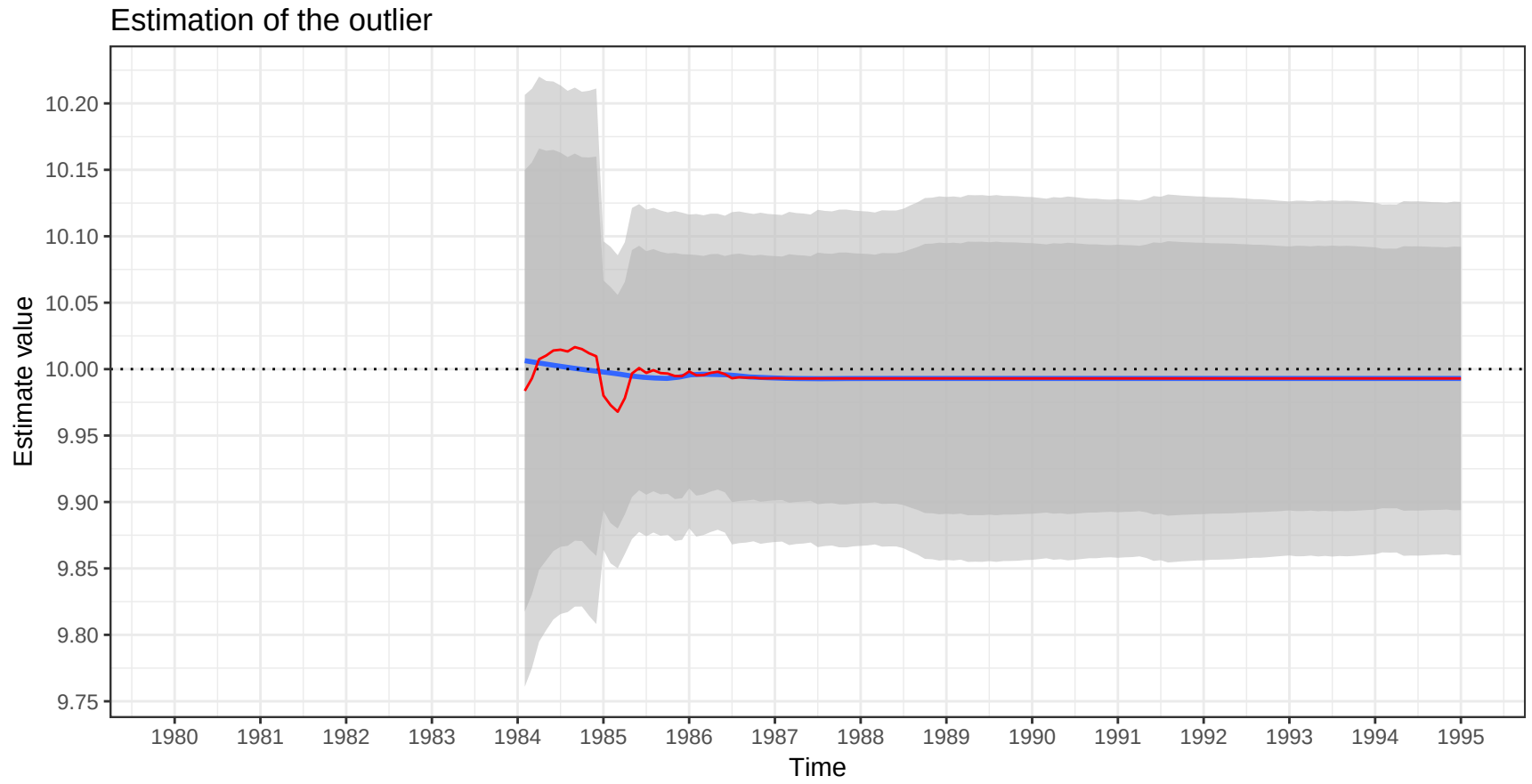

Estimate value of a TC(1984−01)
ARIMA (0,1,1)(1,1,0) − additive decomposition
(1−B)(1−B12)(1−0.5B12)Xt=(1−0.4B)at
Estimation of the outlier
Estimate value
10.30
10.25
10.20
10.15
10.10
10.05
10.00
9.95
9.90
9.85
9.80
9.75
9.70
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time
Raw data
Raw data
5
0
−5
−10
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time

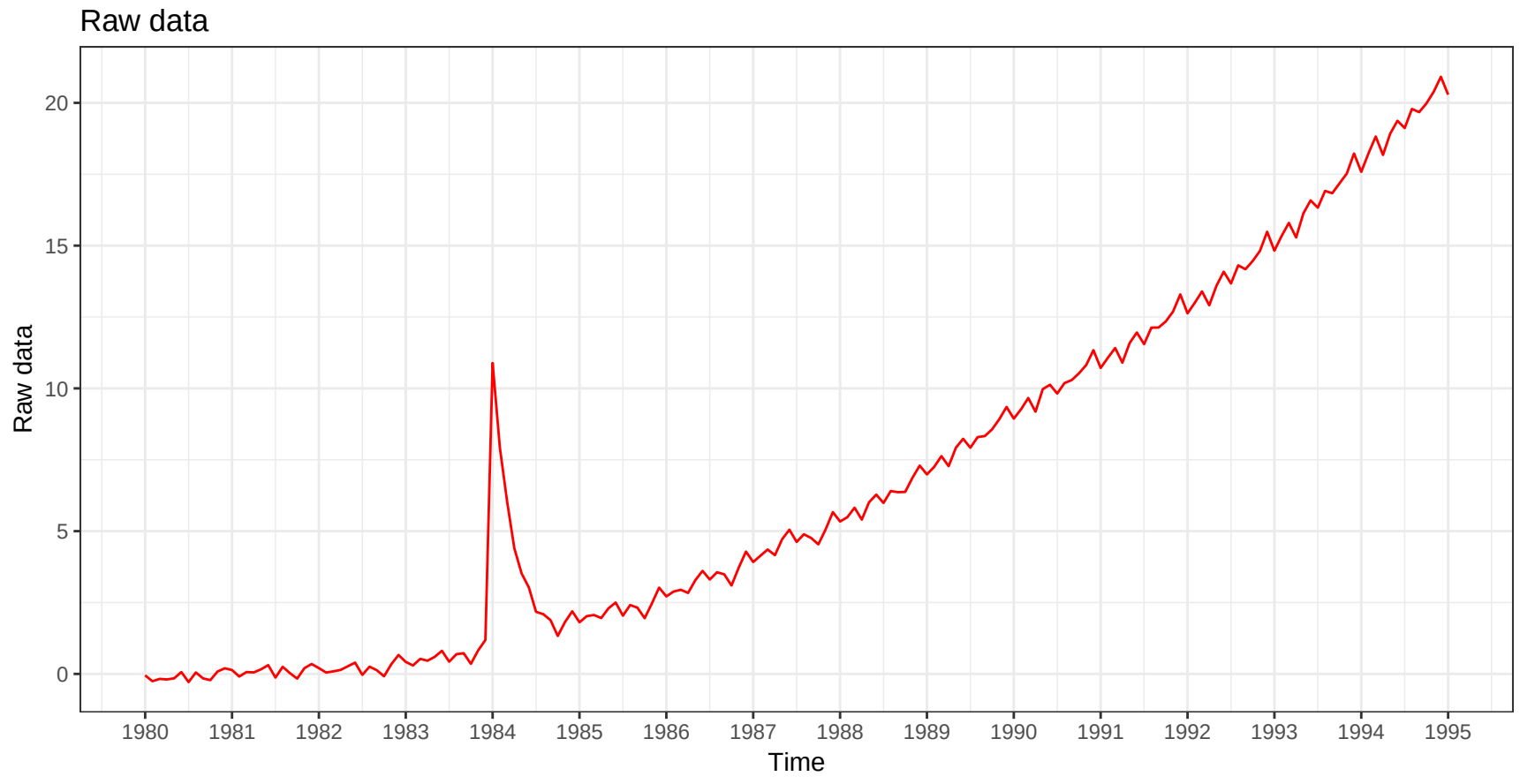
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(1,1,0) − additive decomposition
(1−B)(1−B12)(1−0.5B12)Xt=(1−0.4B)at



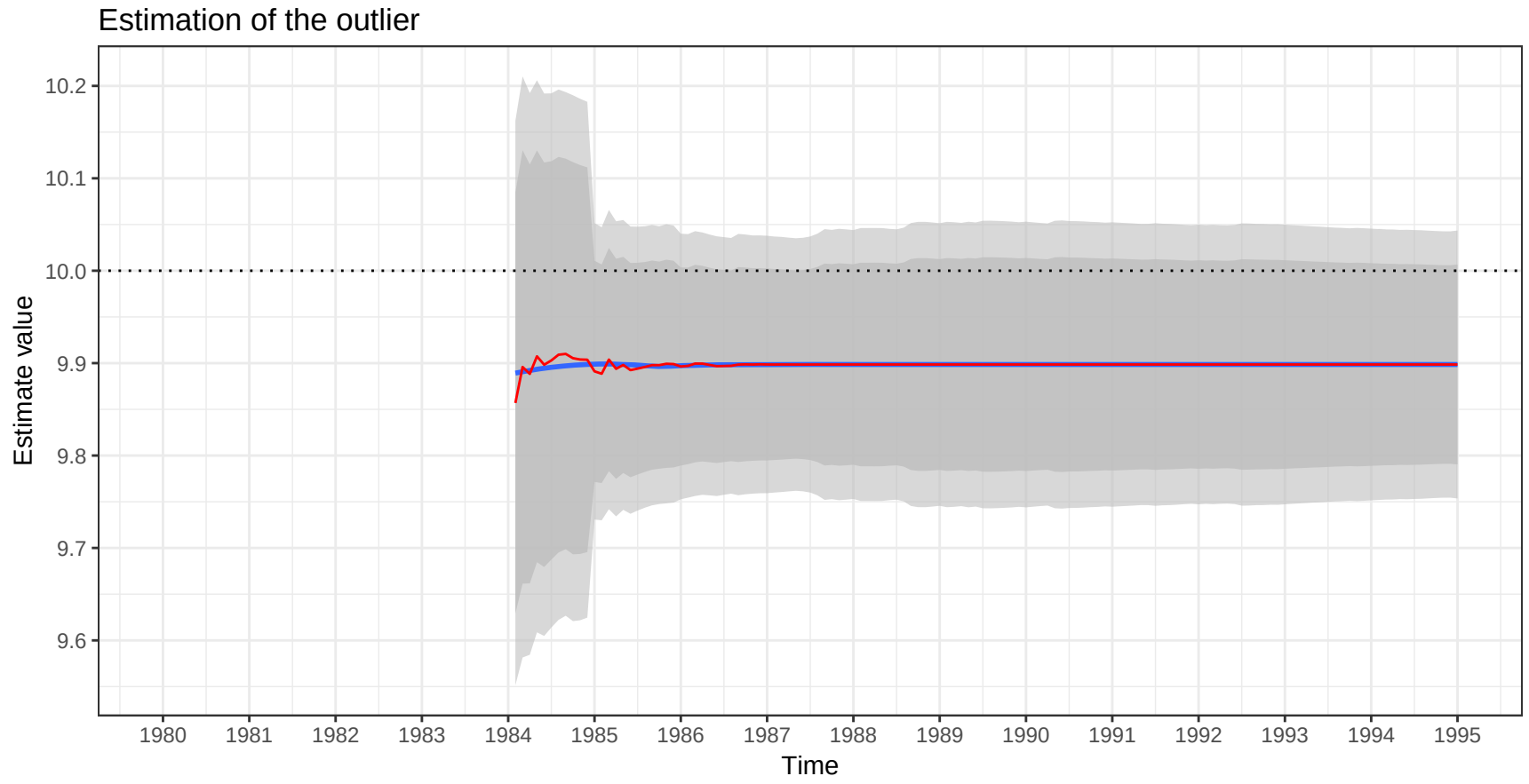


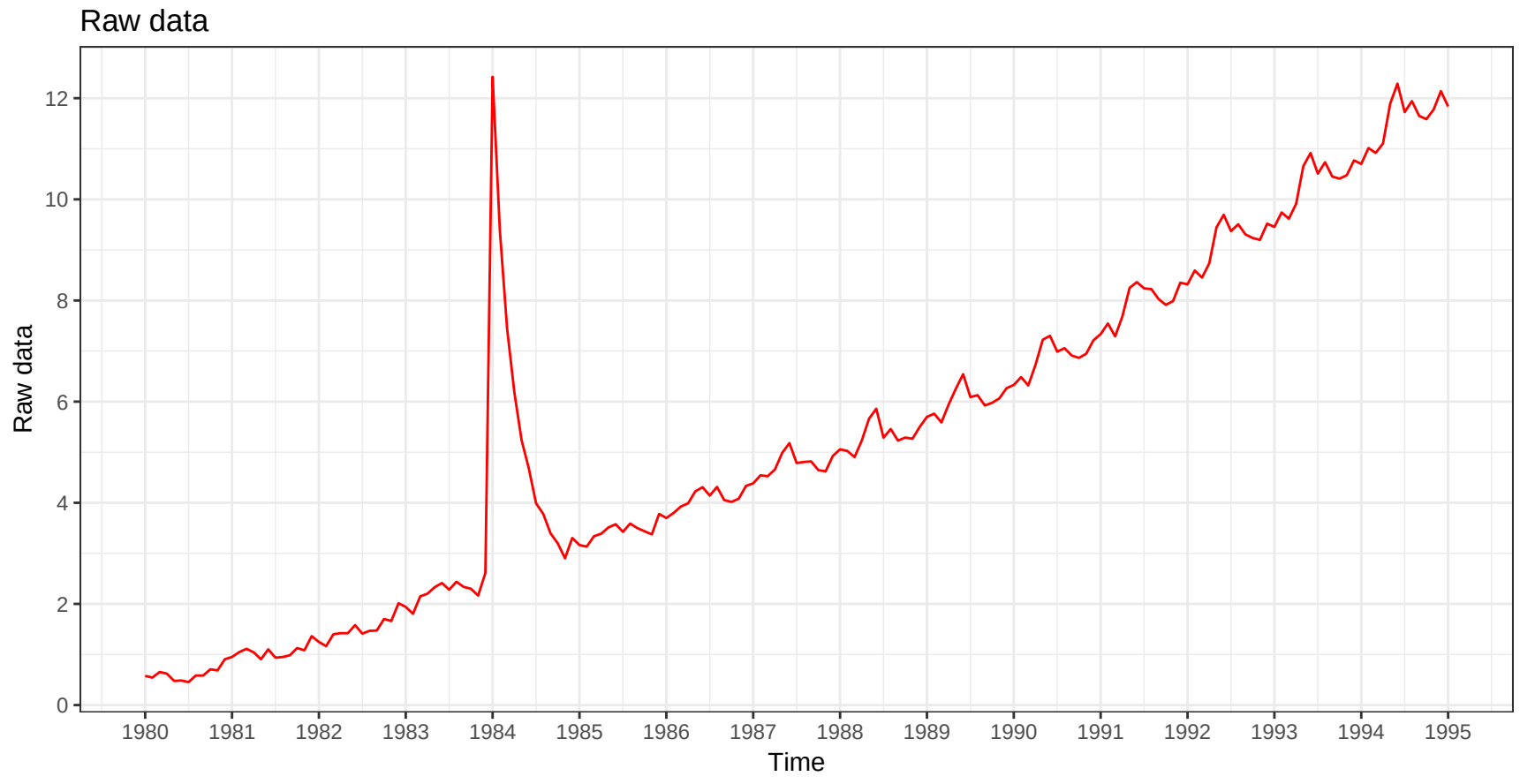
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(1,1,0) − additive decomposition
(1−B)(1−B12)(1−0.5B12)Xt=(1−0.4B)at



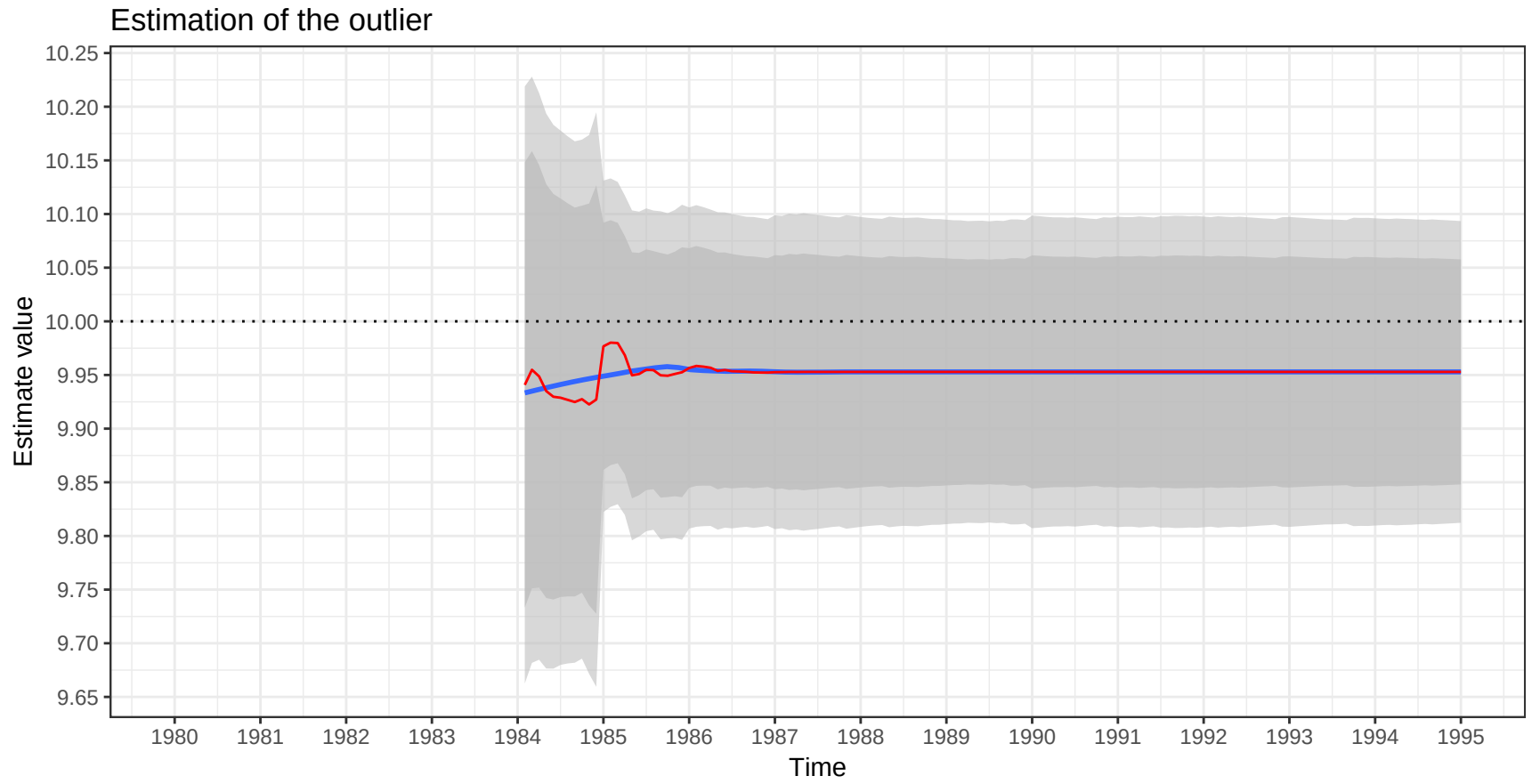


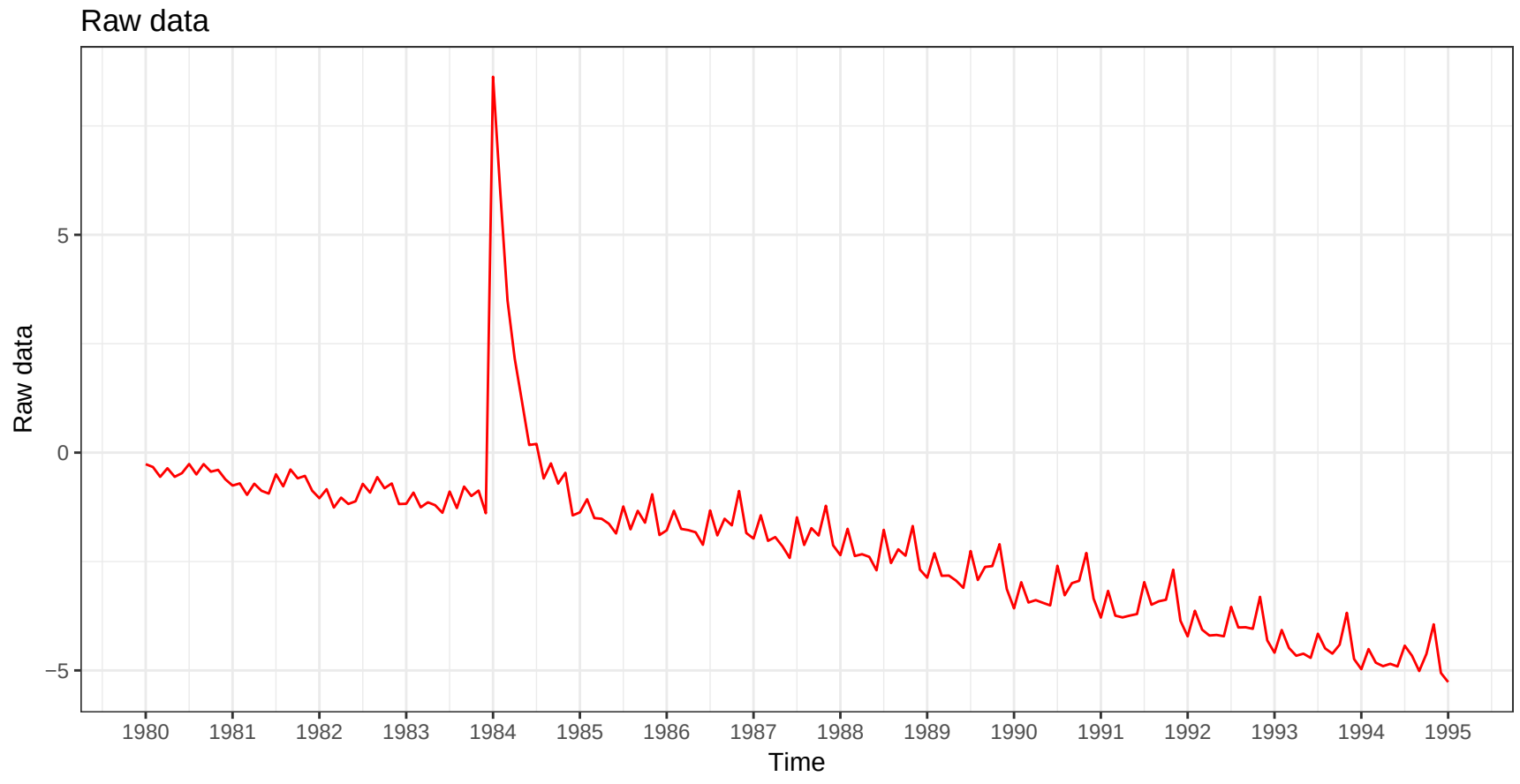
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(1,1,0) − additive decomposition
(1−B)(1−B12)(1−0.5B12)Xt=(1−0.4B)at



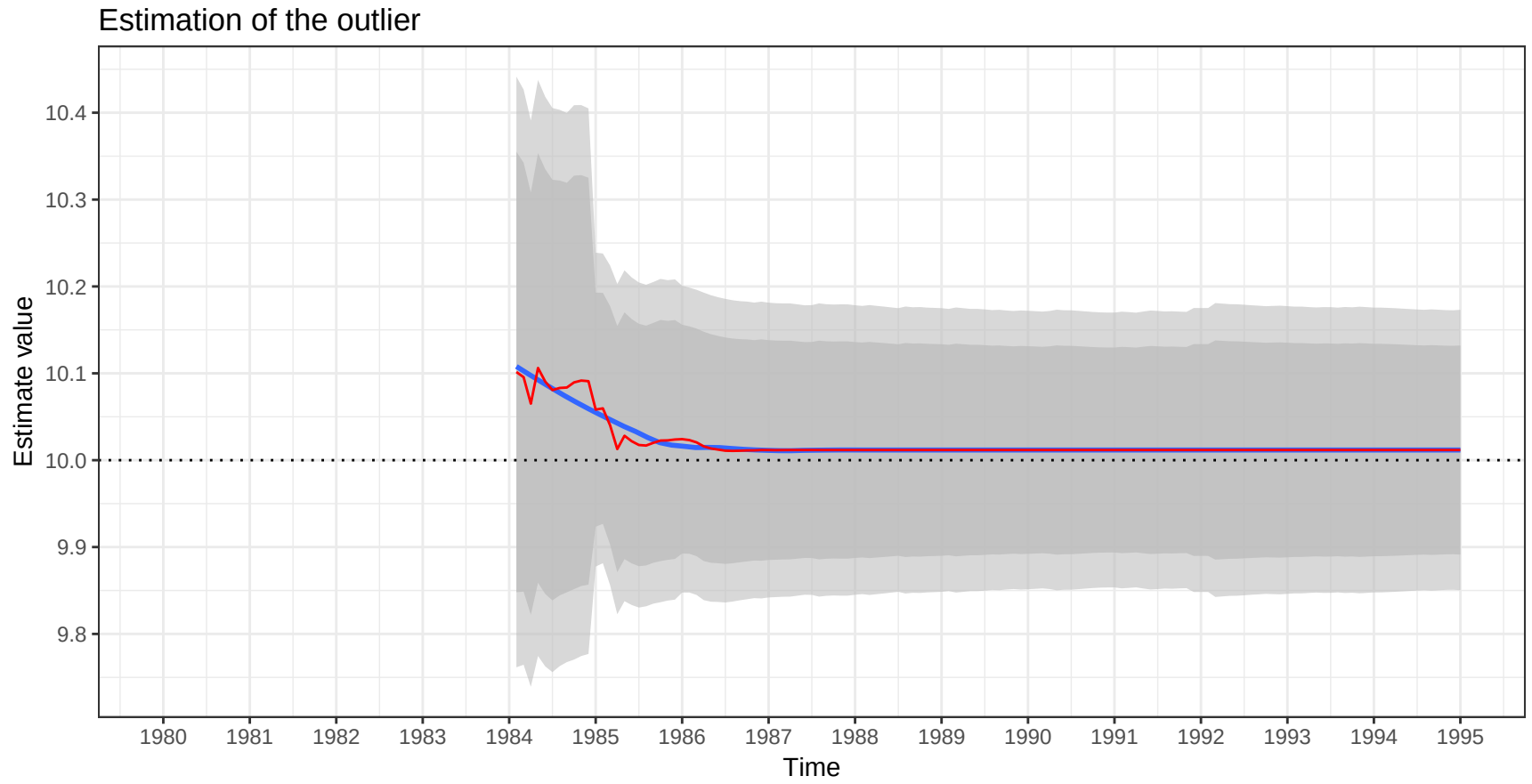


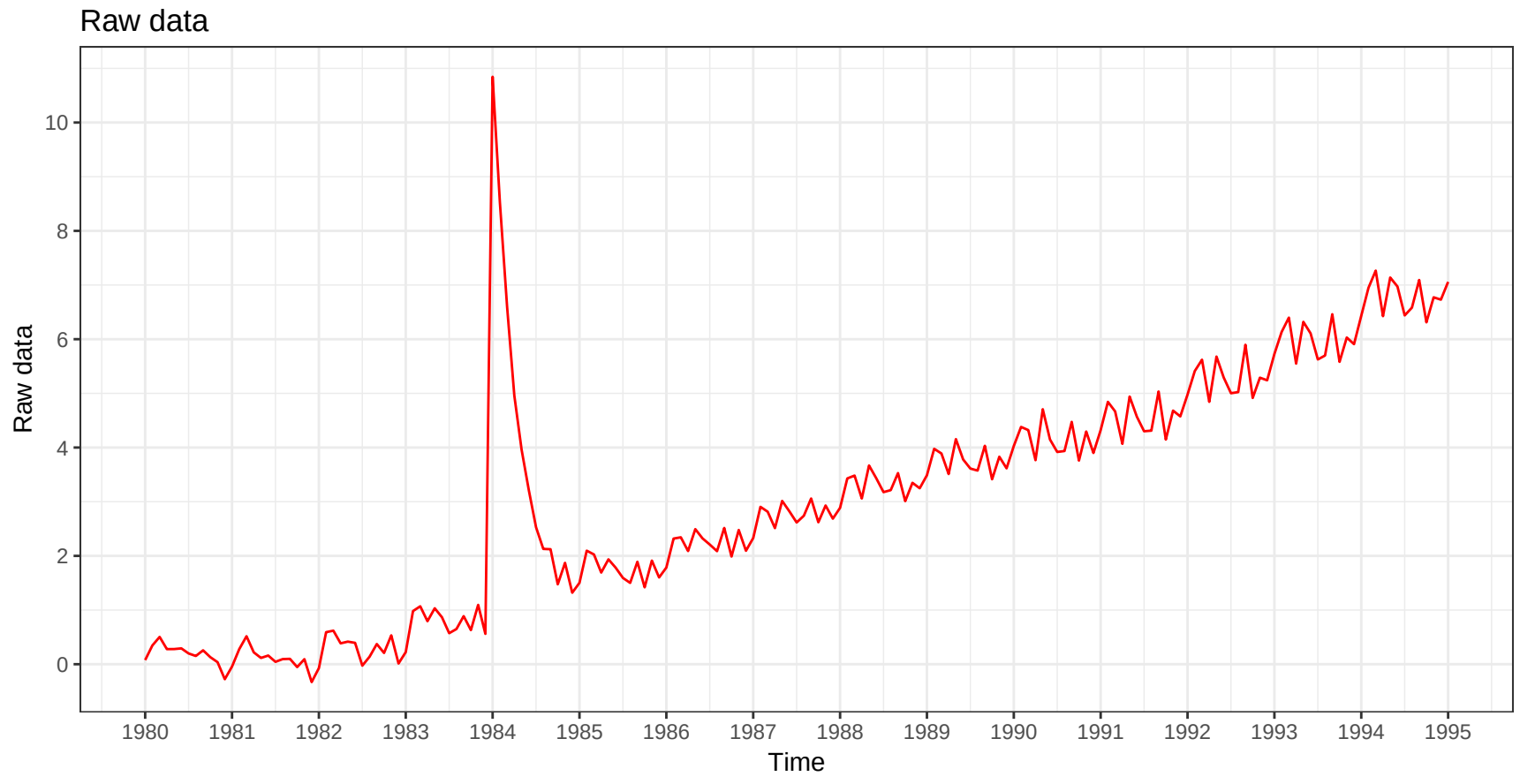
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(1,1,0) − additive decomposition
(1−B)(1−B12)(1−0.5B12)Xt=(1−0.4B)at



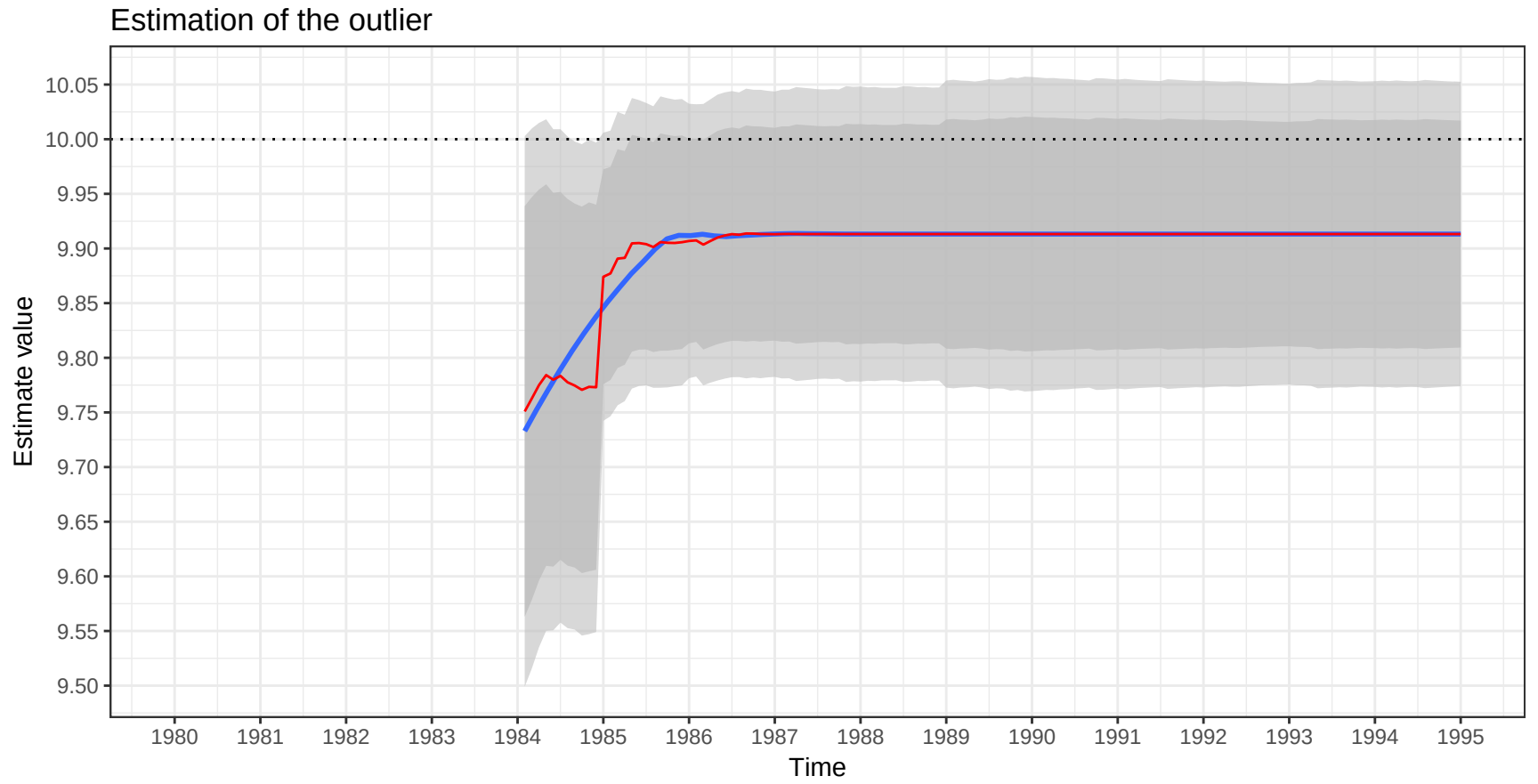


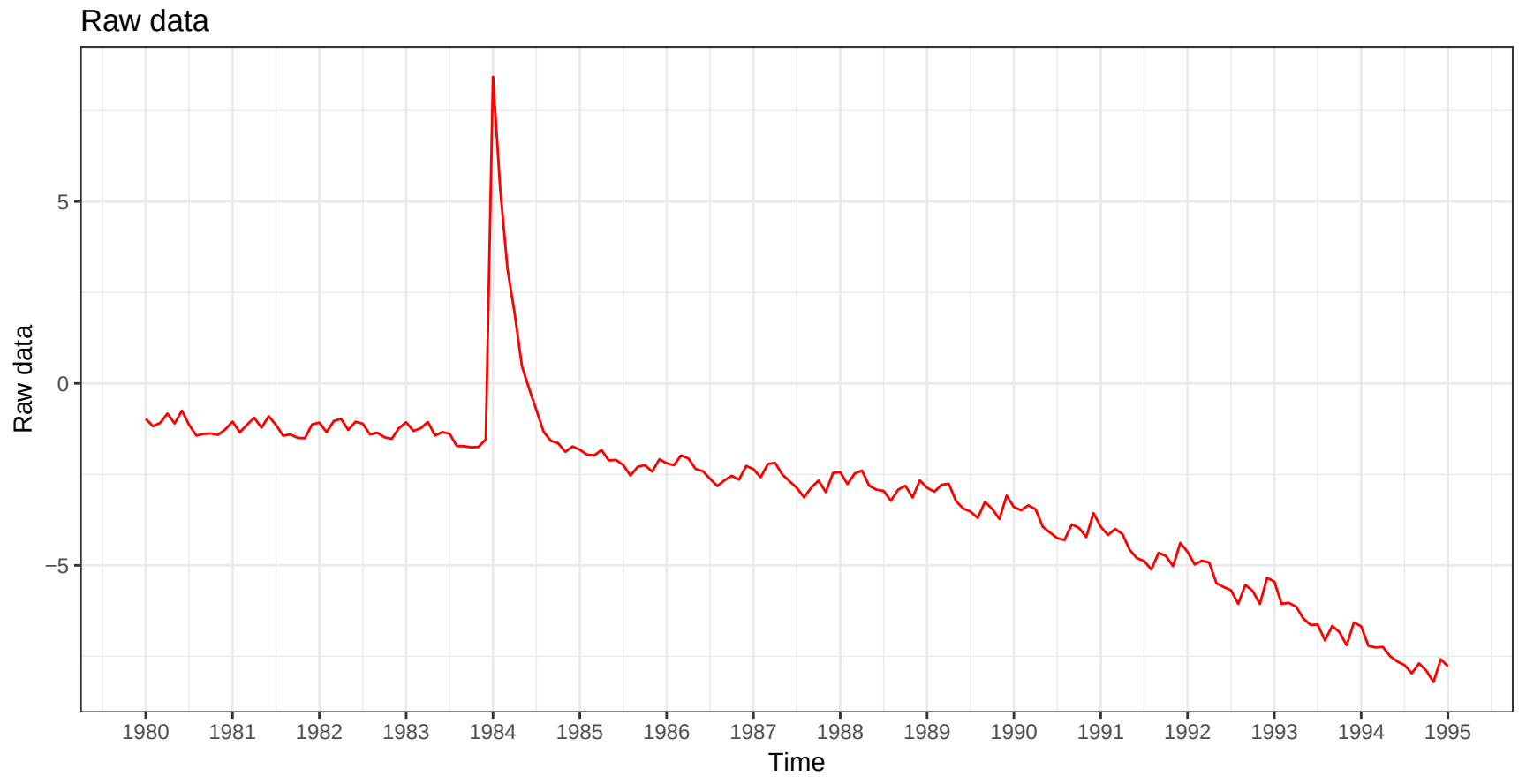
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(1,1,0) − additive decomposition
(1−B)(1−B12)(1−0.5B12)Xt=(1−0.4B)at



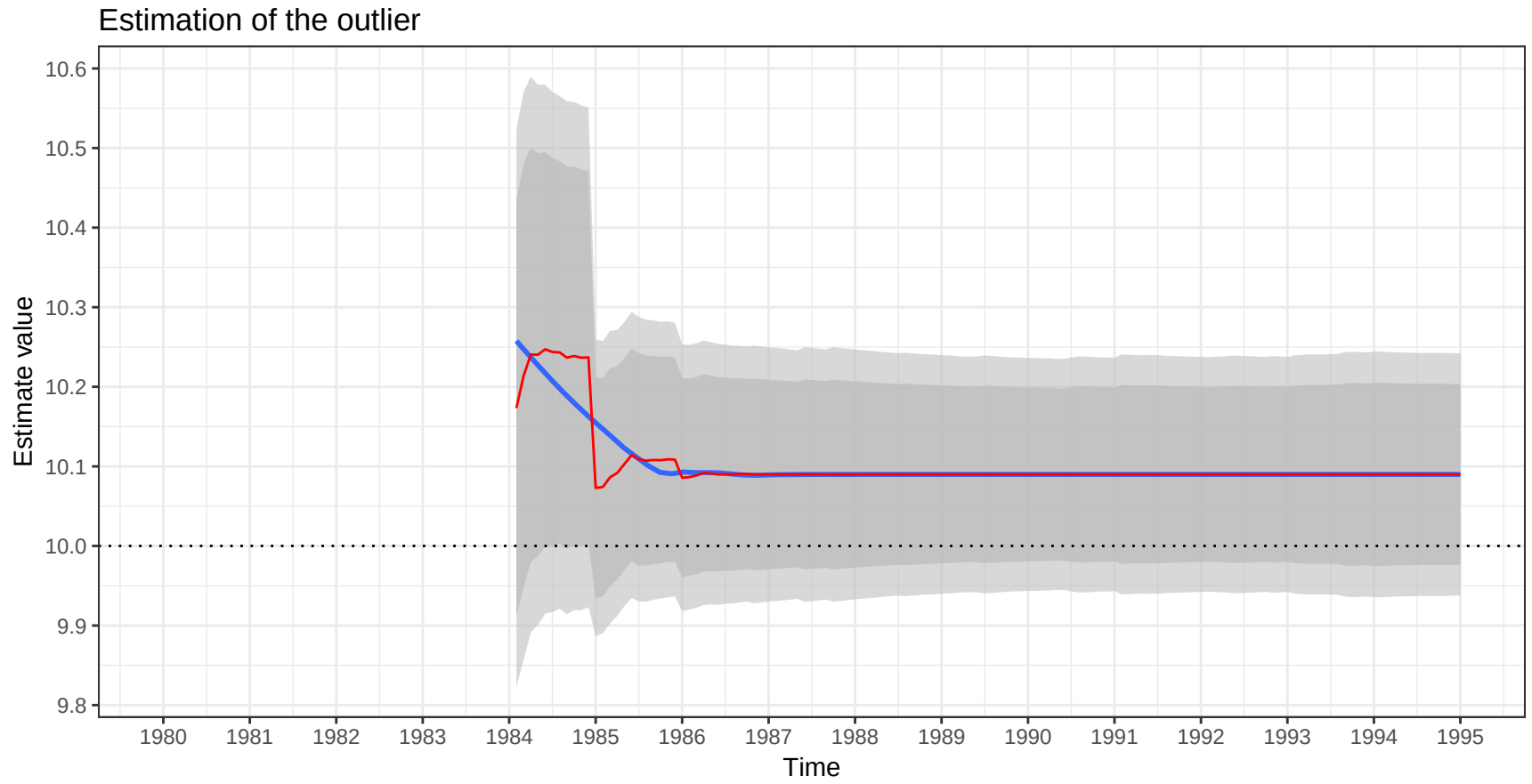


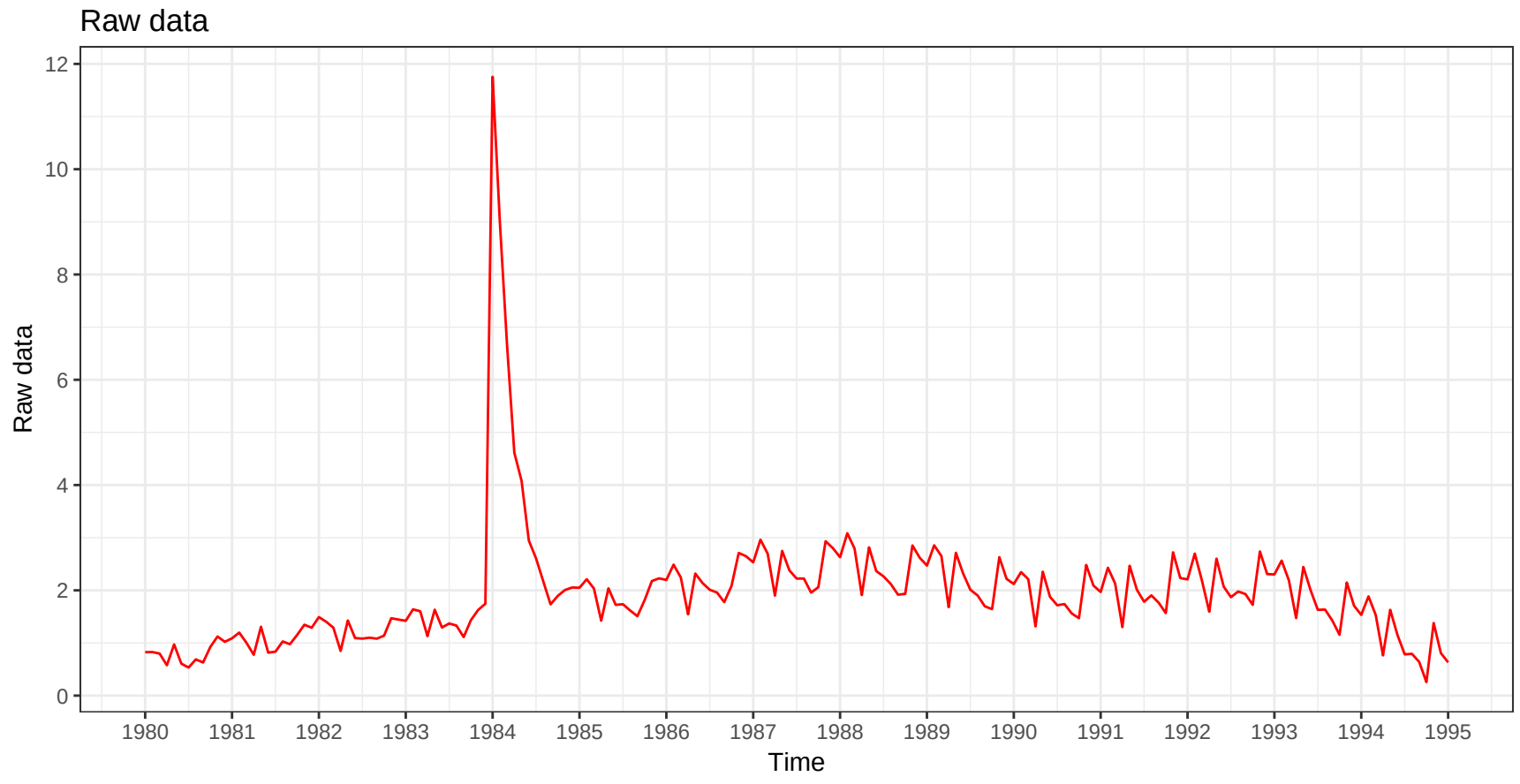
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(1,1,0) − additive decomposition
(1−B)(1−B12)(1−0.5B12)Xt=(1−0.4B)at



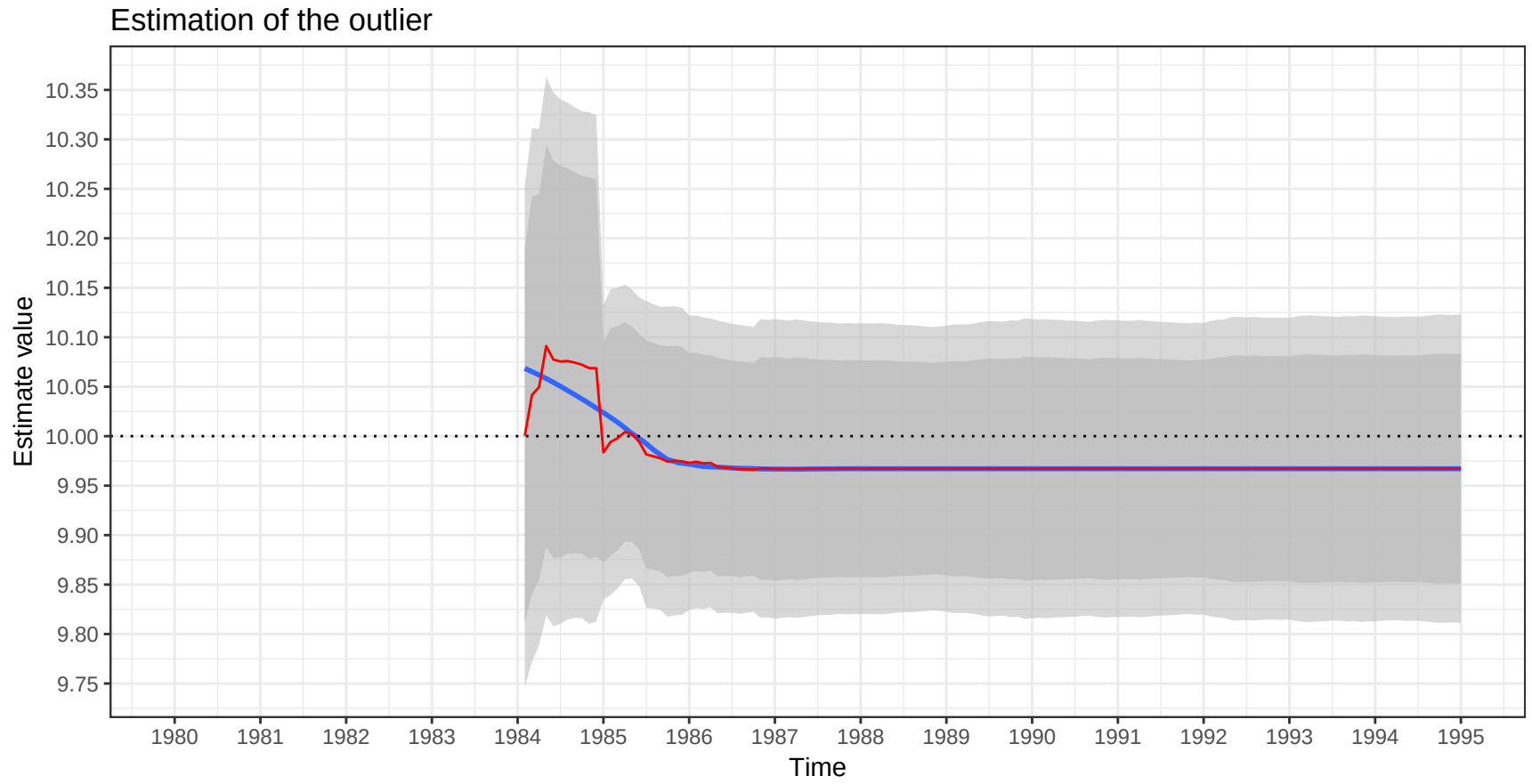


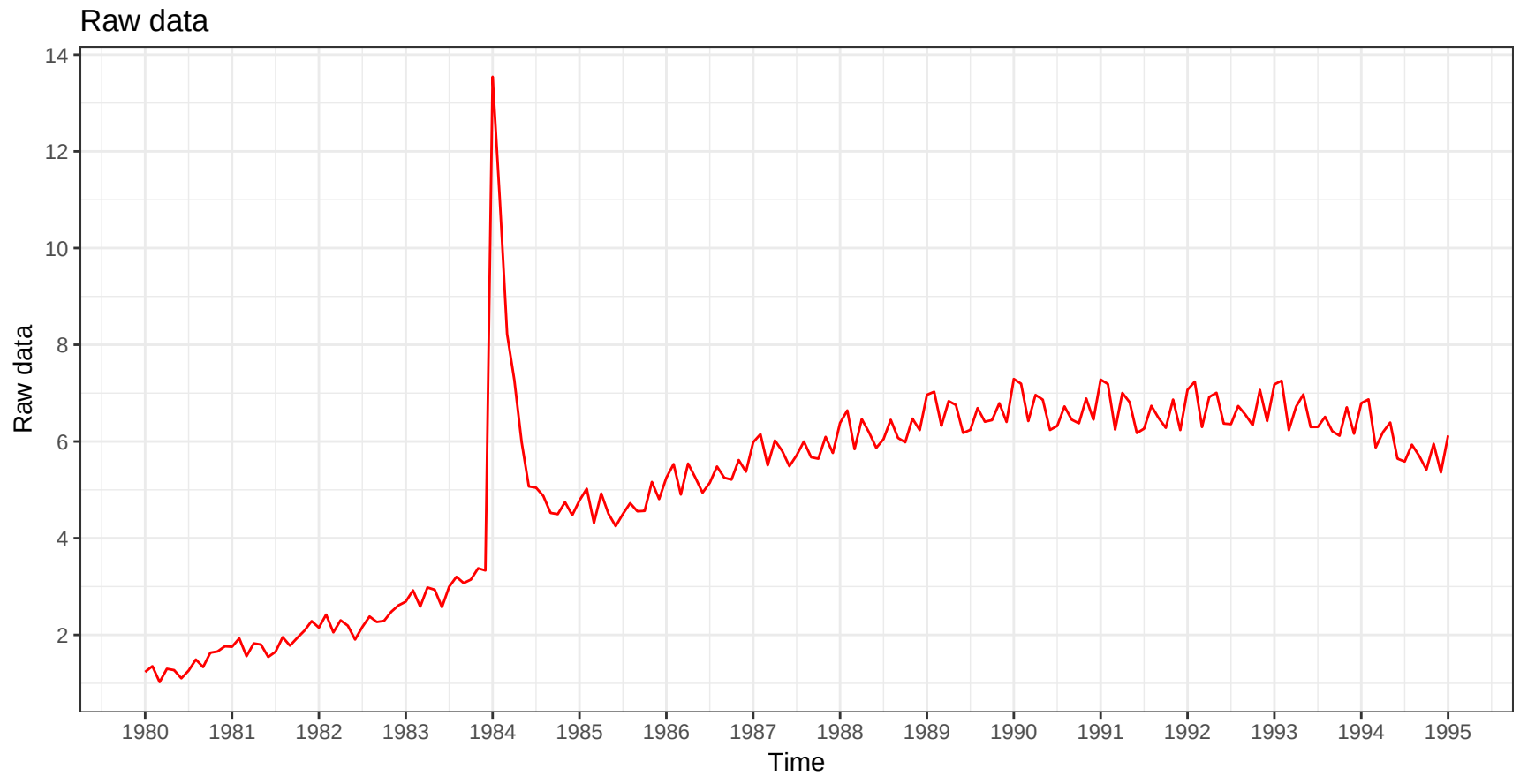
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(1,1,0) − additive decomposition
(1−B)(1−B12)(1−0.5B12)Xt=(1−0.4B)at



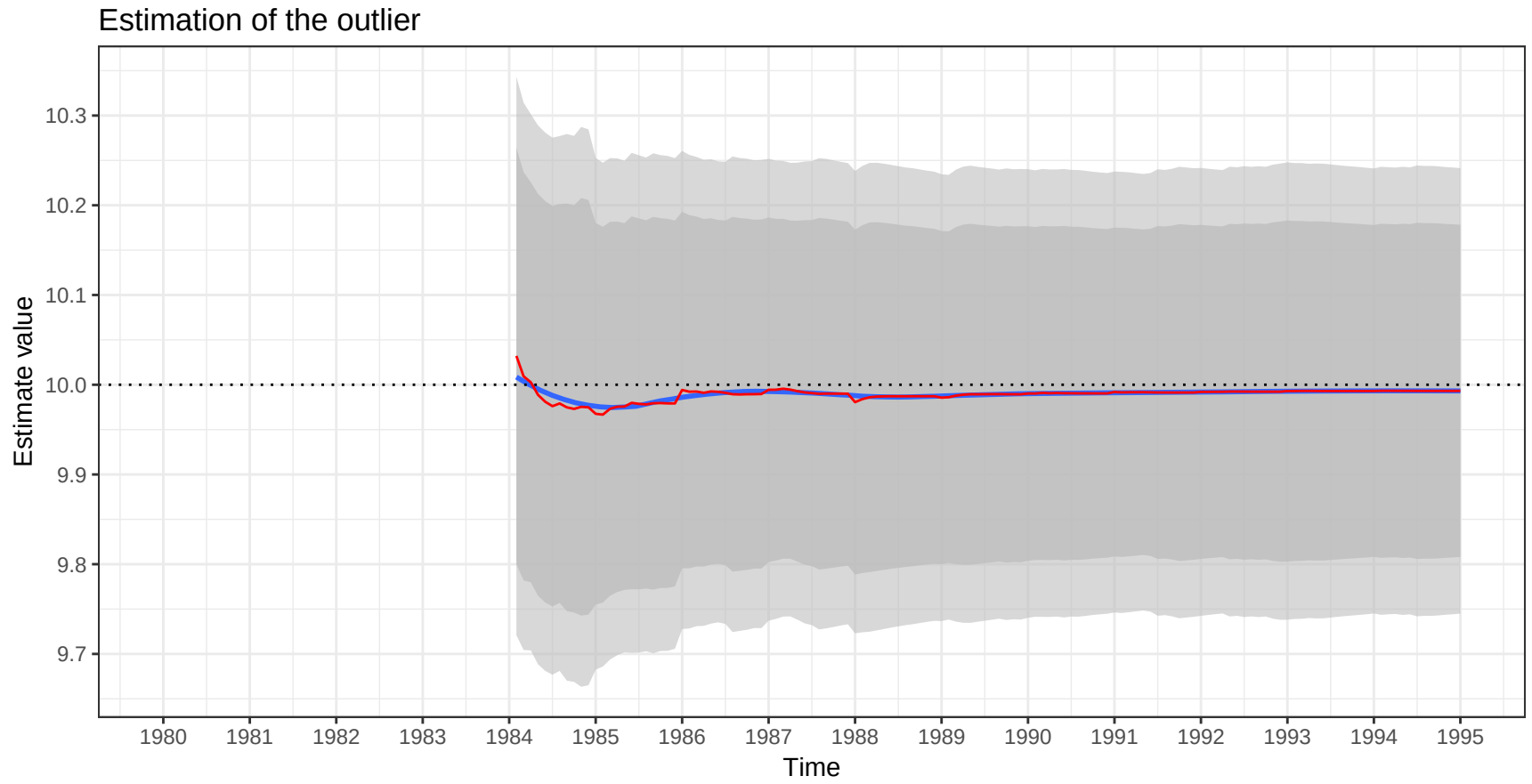


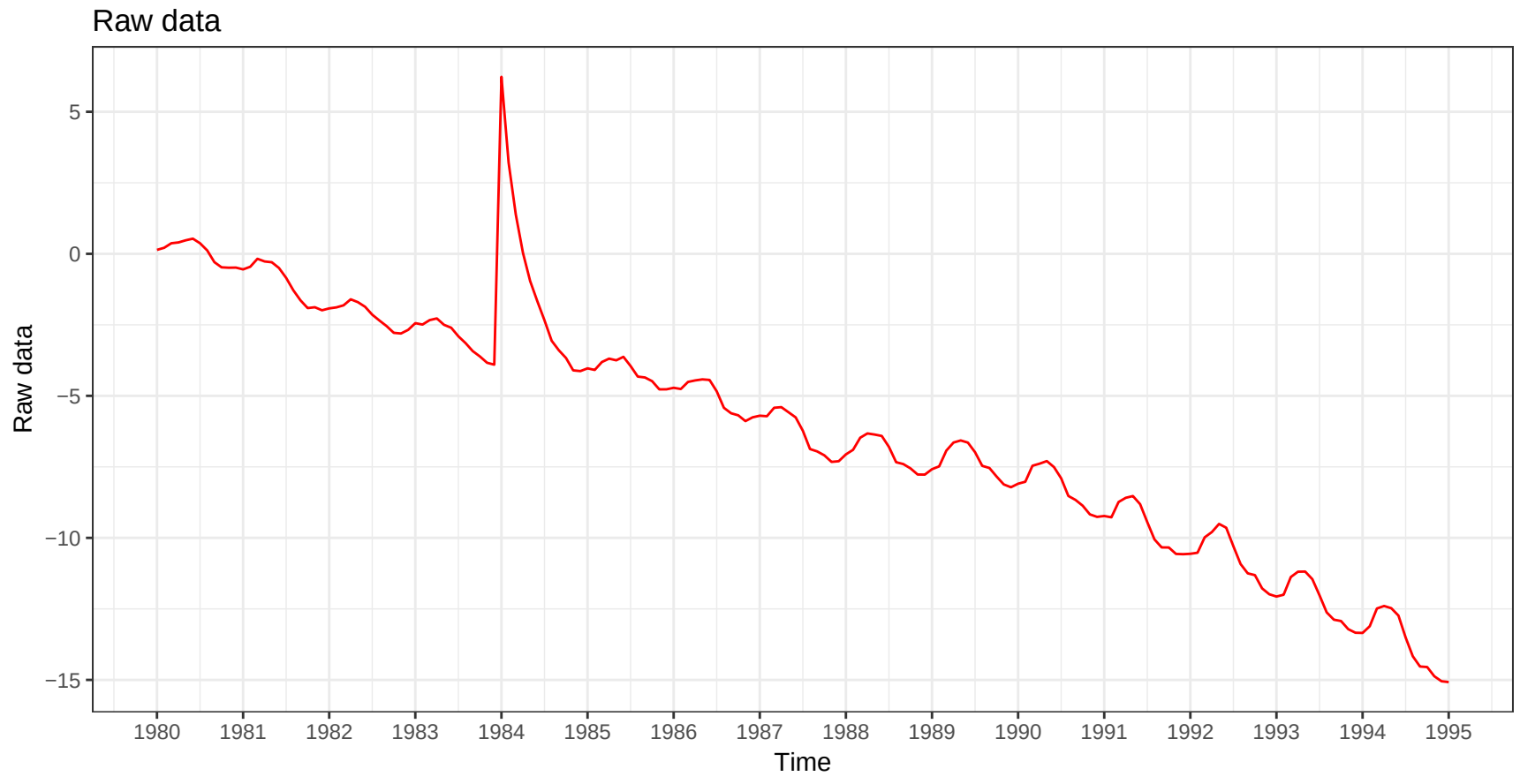
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(1,1,0) − additive decomposition
(1−B)(1−B12)(1−0.5B12)Xt=(1−0.4B)at



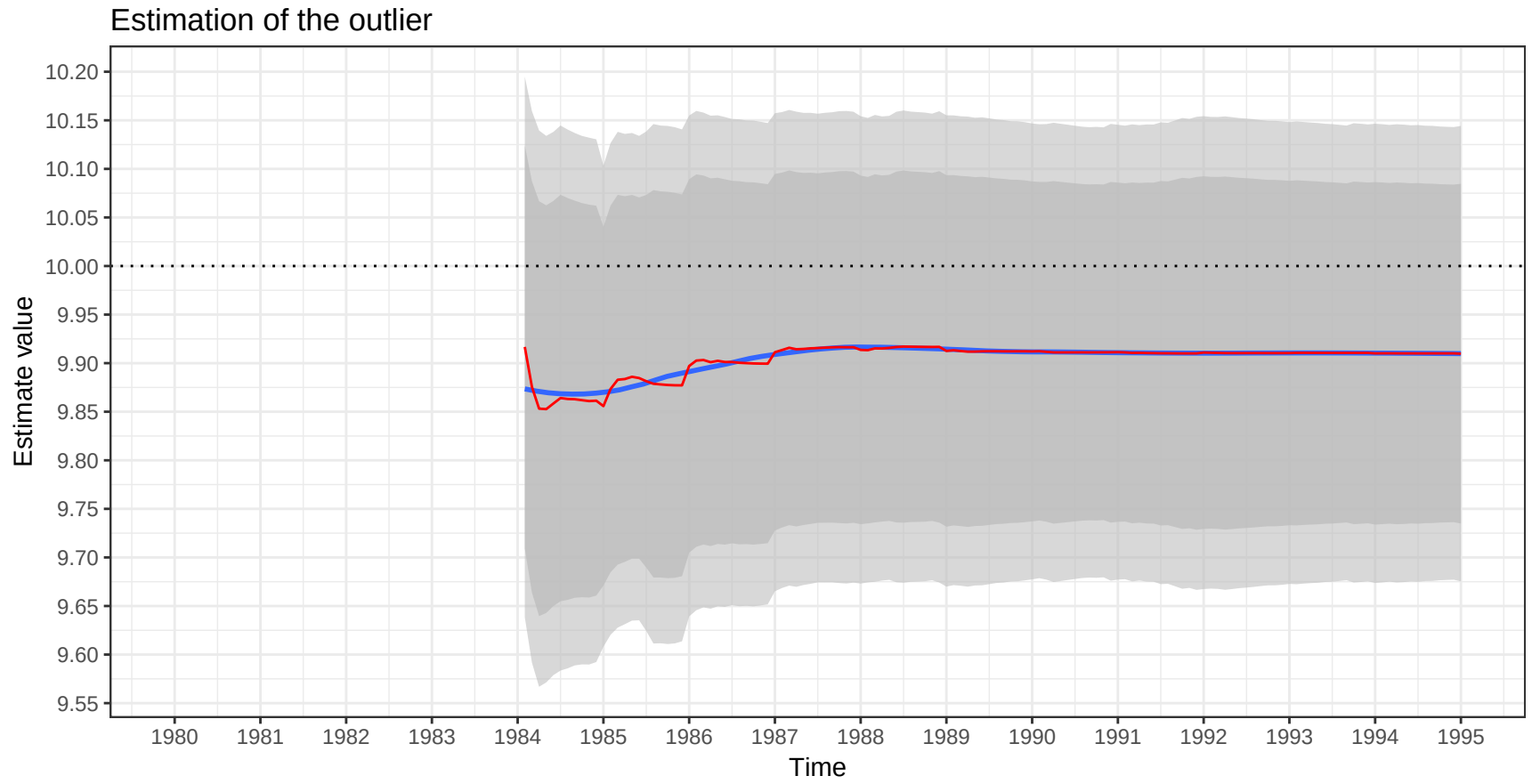


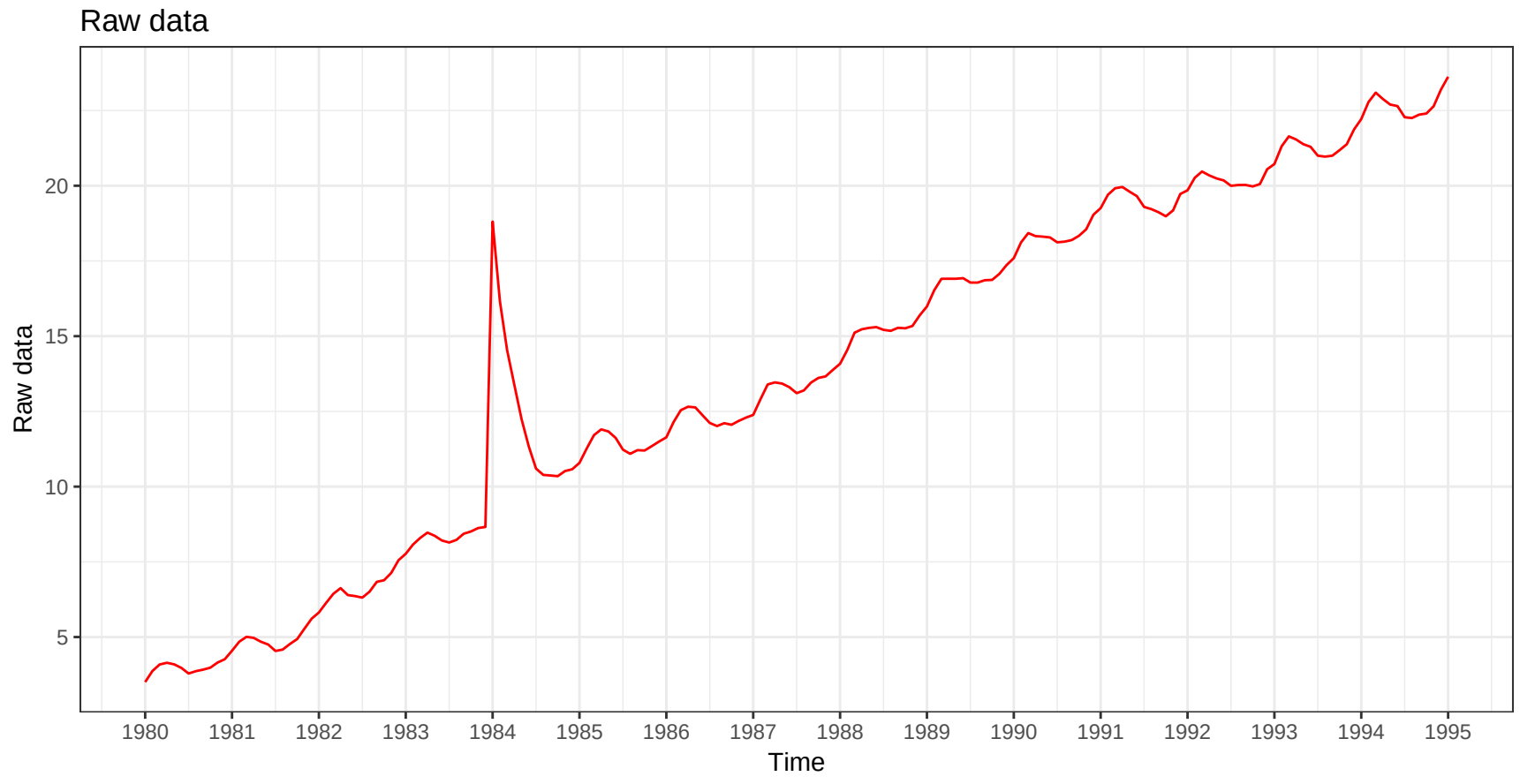
Estimate value of a TC(1984−01)
ARIMA (1,1,0)(0,1,1) − additive decomposition
(1−B)(1−B12)(1−0.3B)Xt=(1−0.6B12)at





Estimate value of a TC(1984−01)
ARIMA (1,1,0)(0,1,1) − additive decomposition
(1−B)(1−B12)(1−0.3B)Xt=(1−0.6B12)at





Estimate value of a TC(1984−01)
ARIMA (1,1,0)(0,1,1) − additive decomposition
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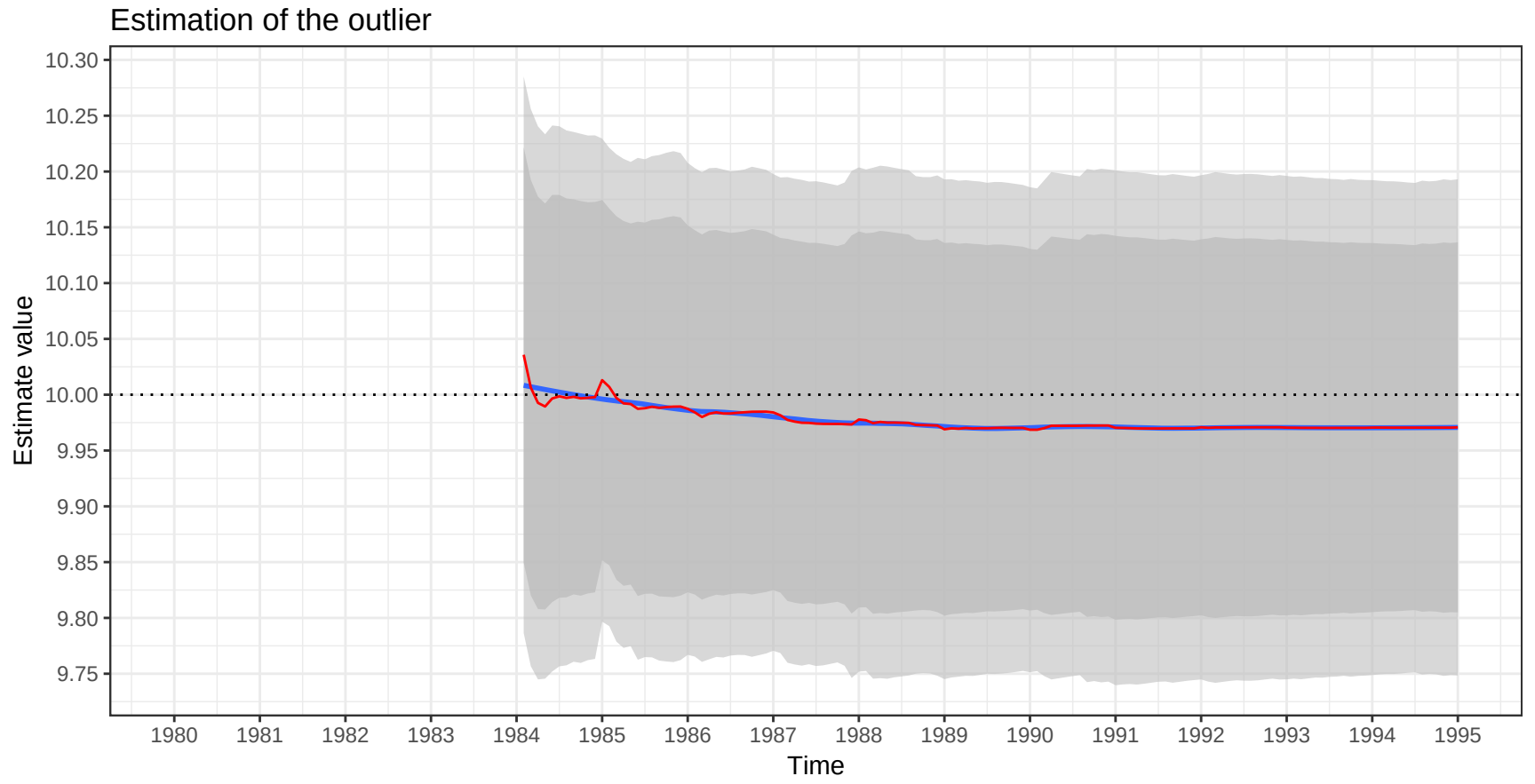

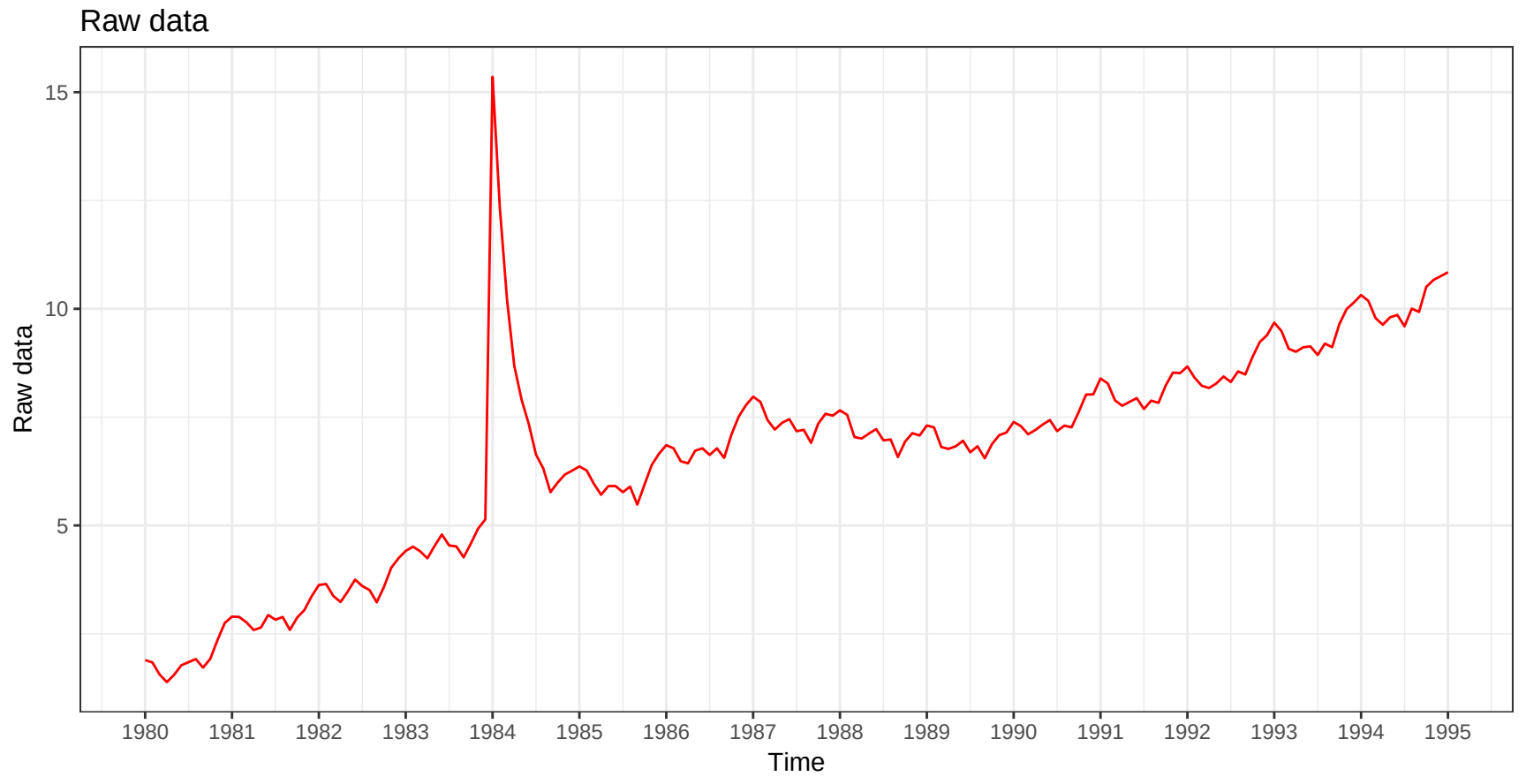

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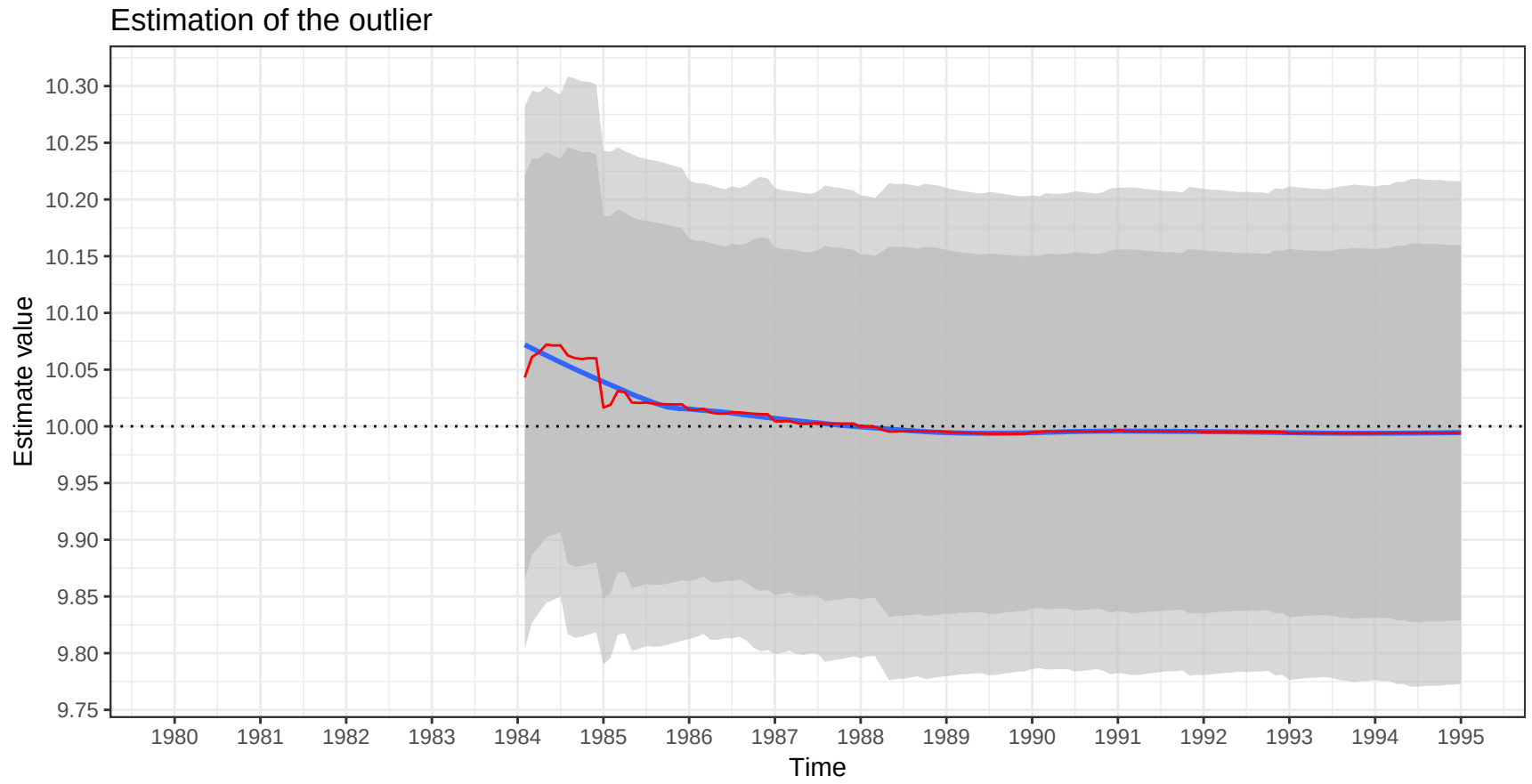

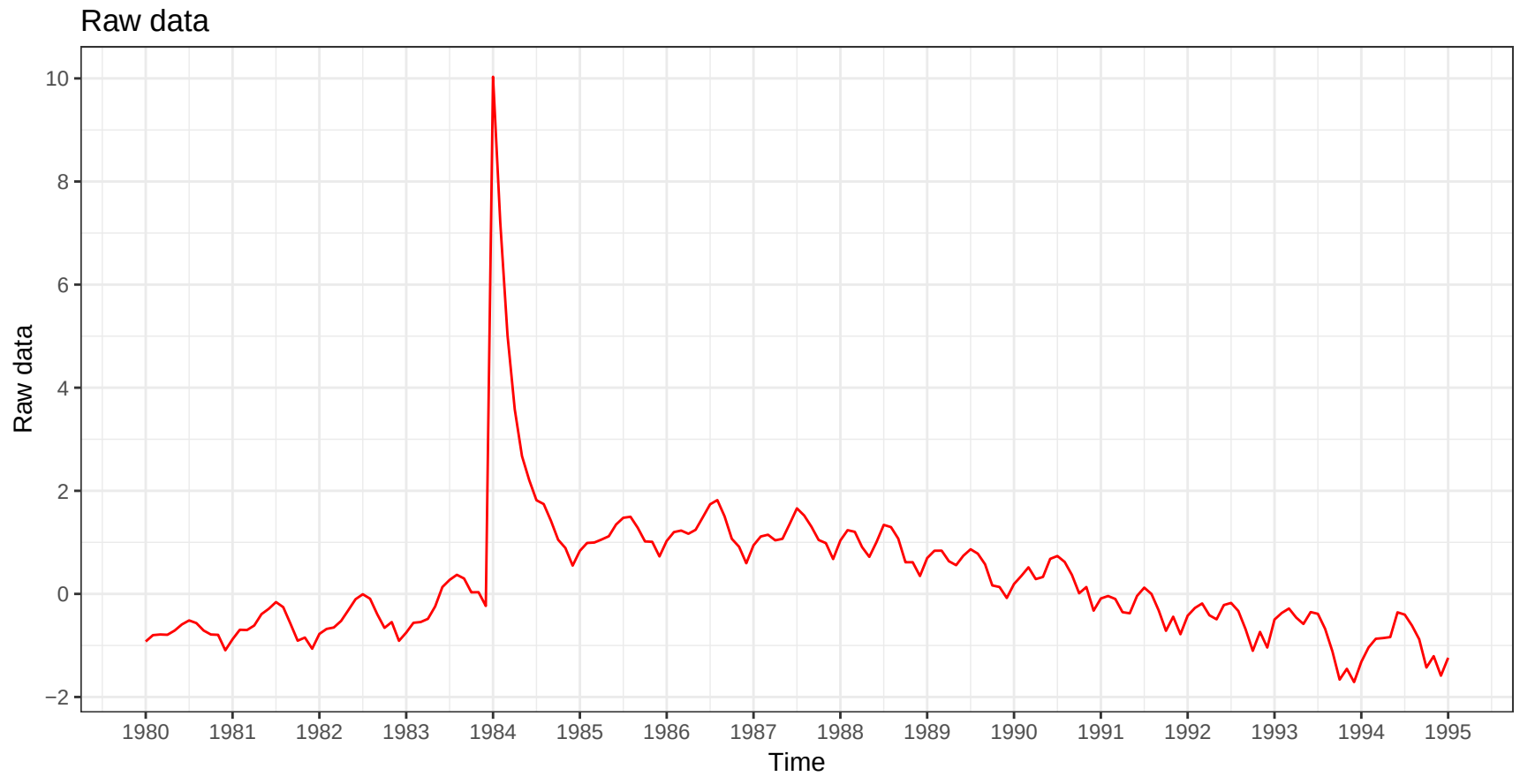

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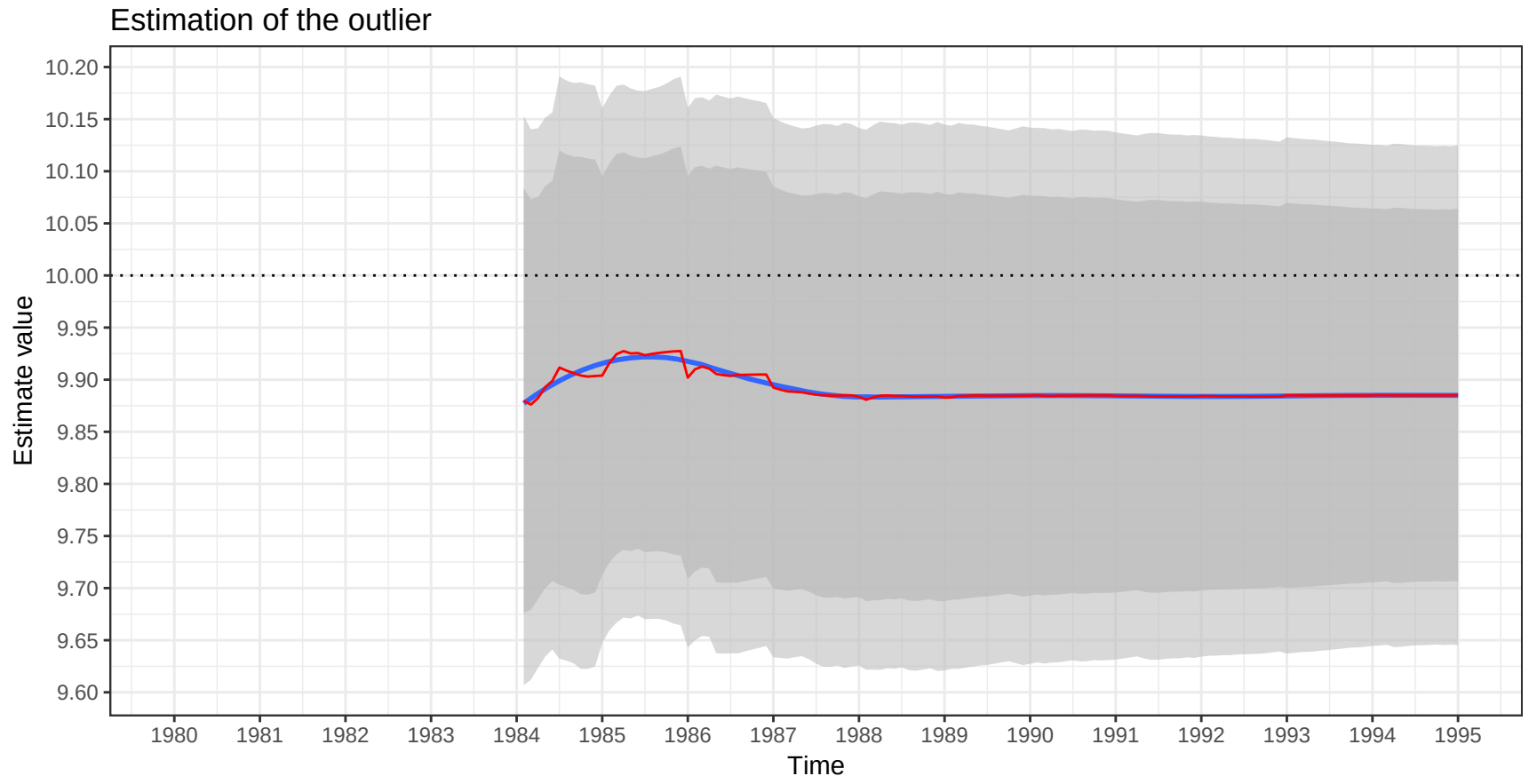

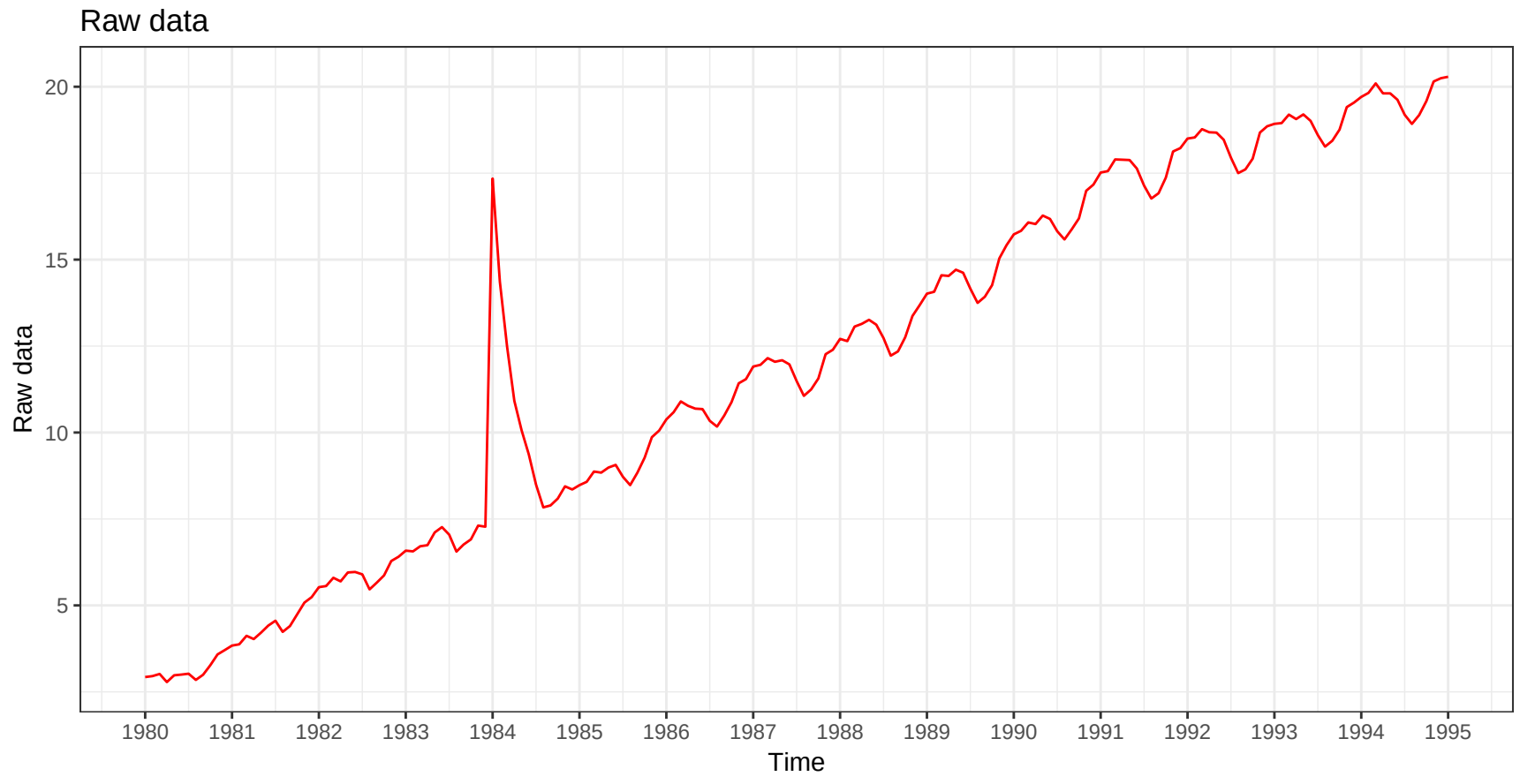

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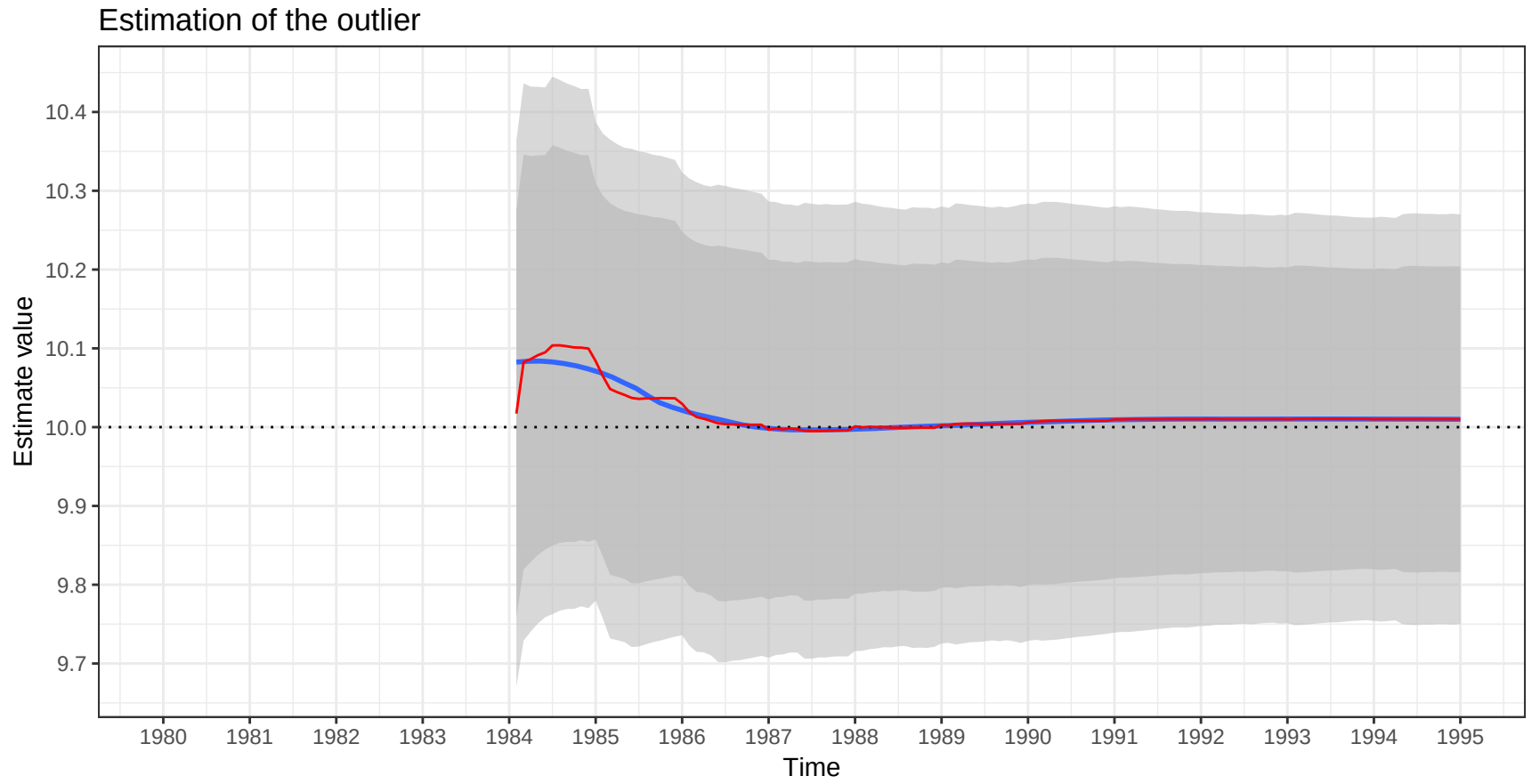

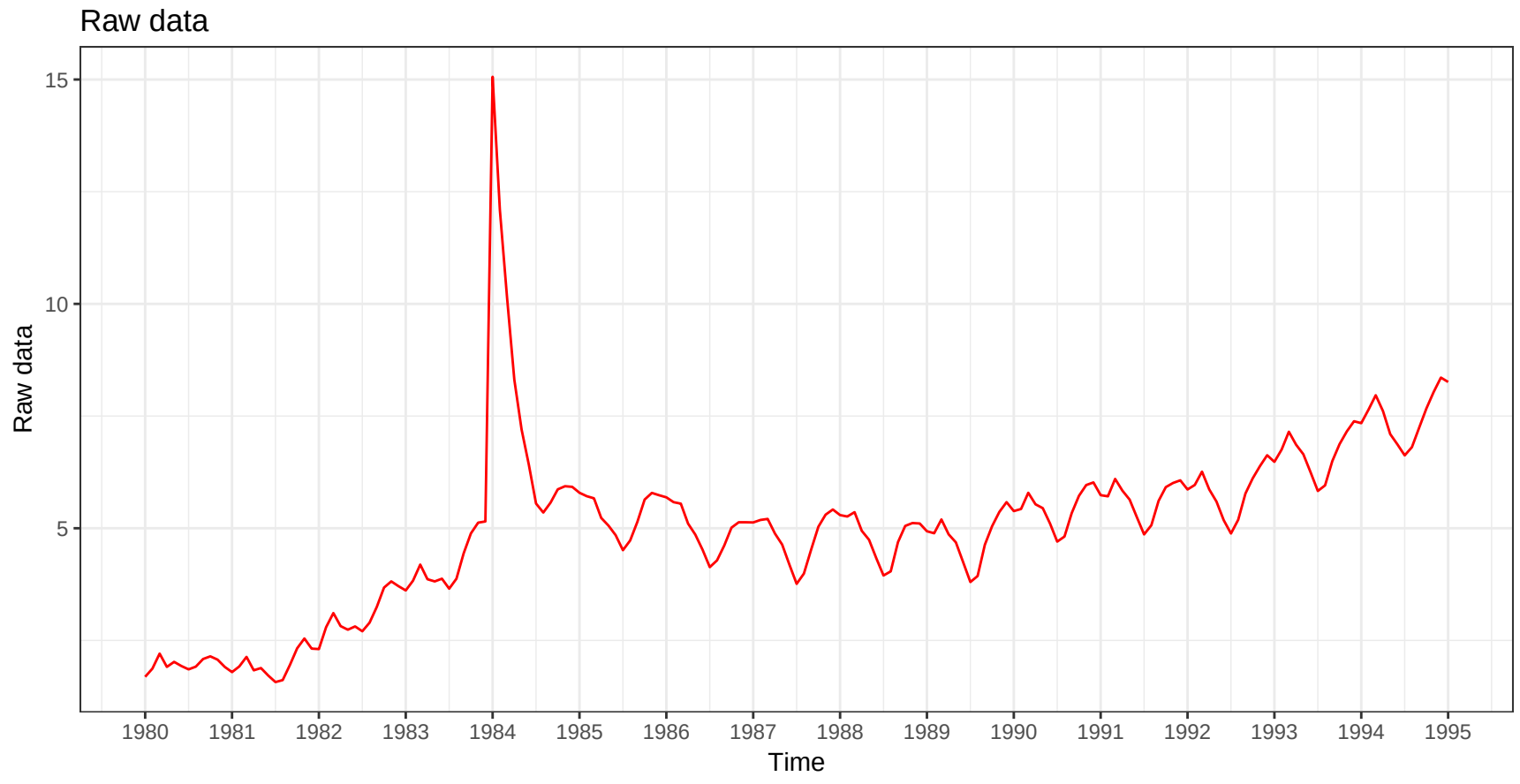

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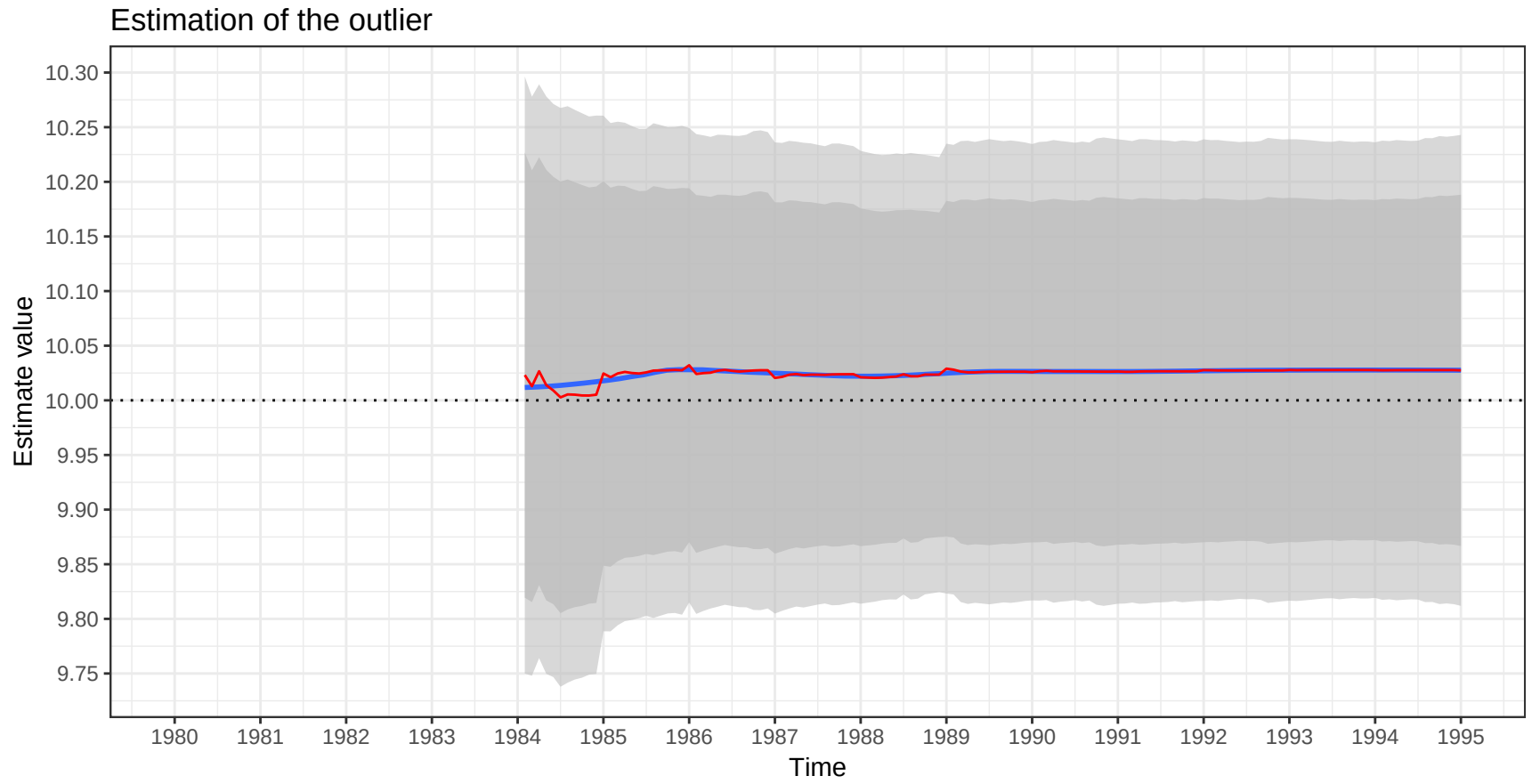

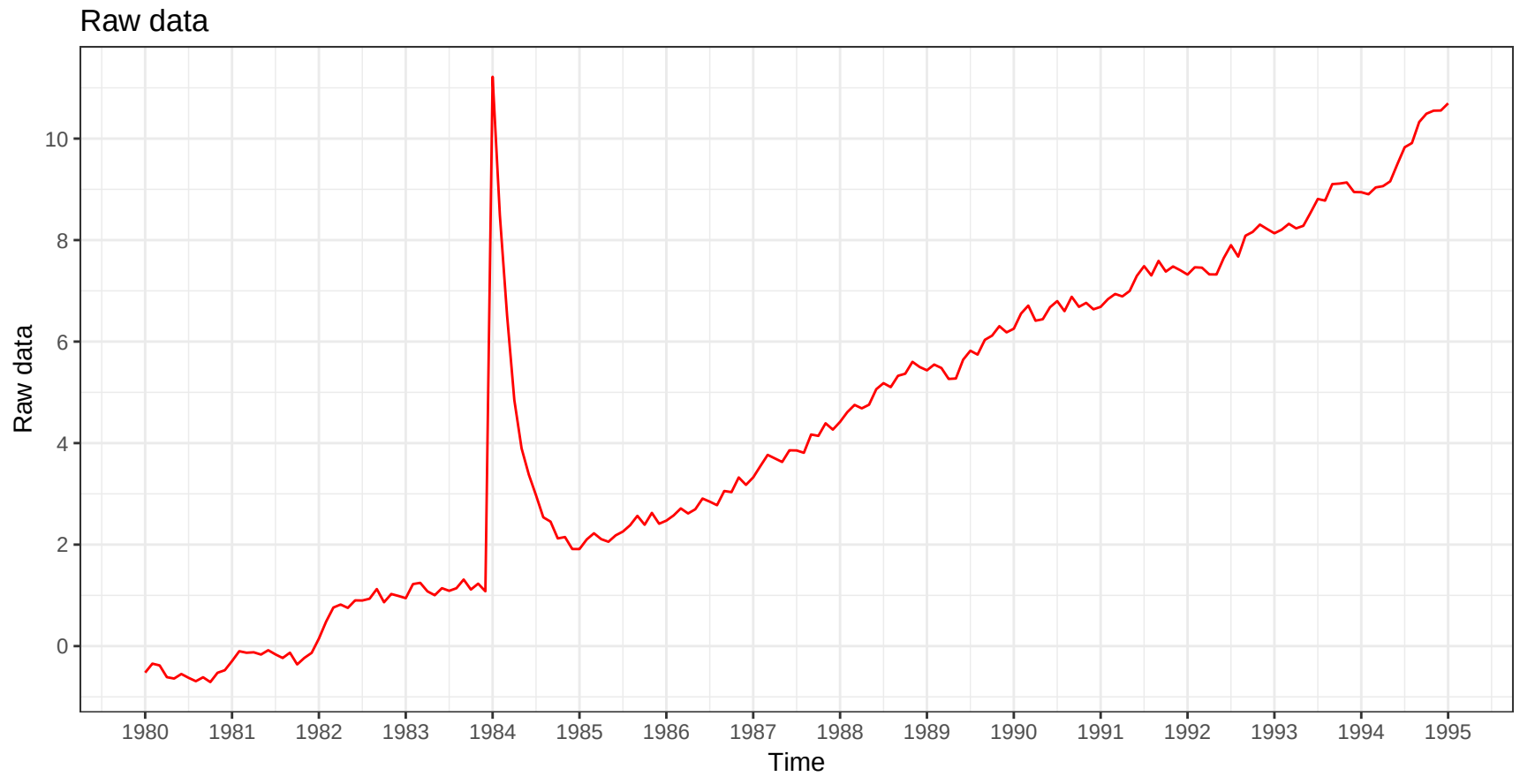

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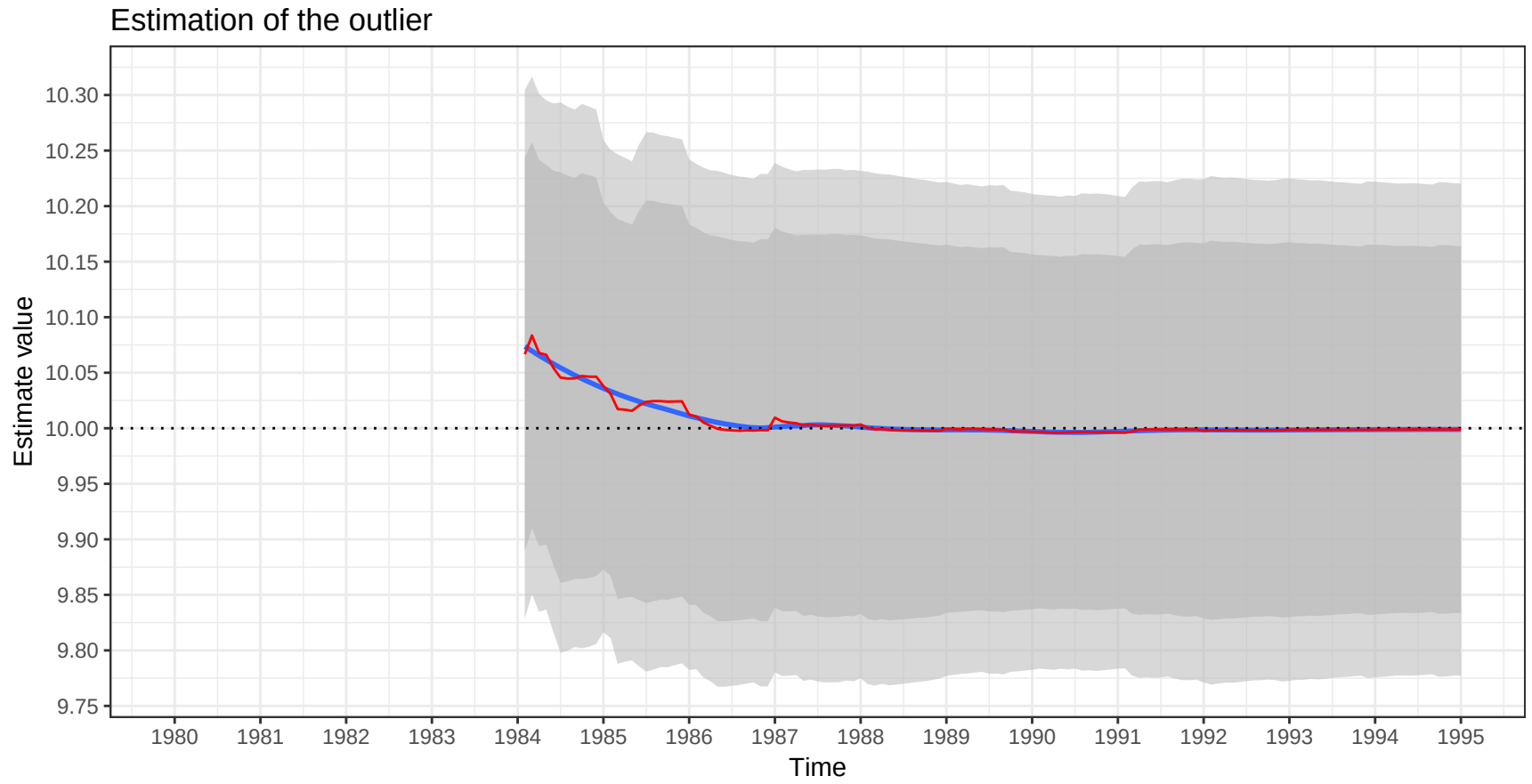

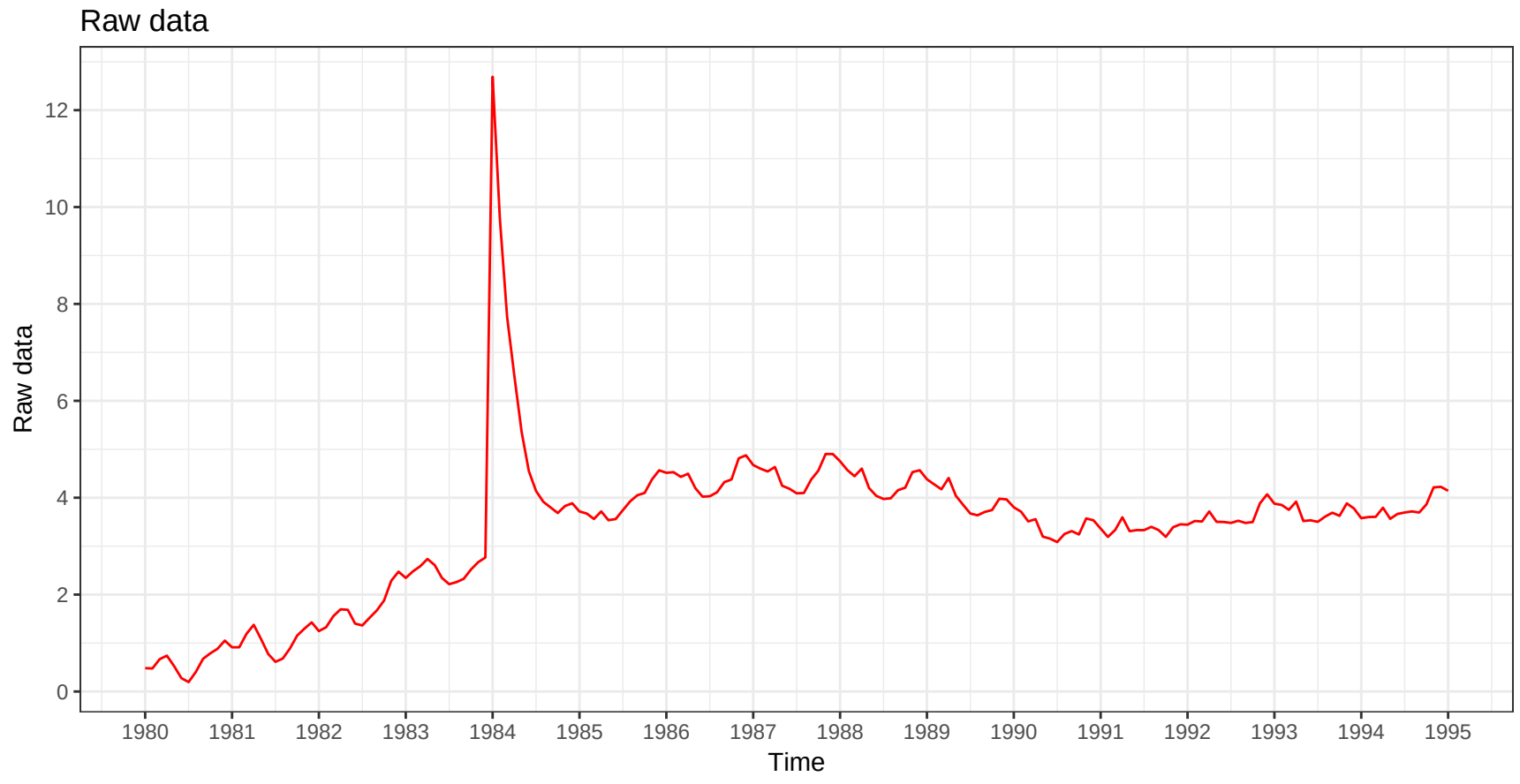

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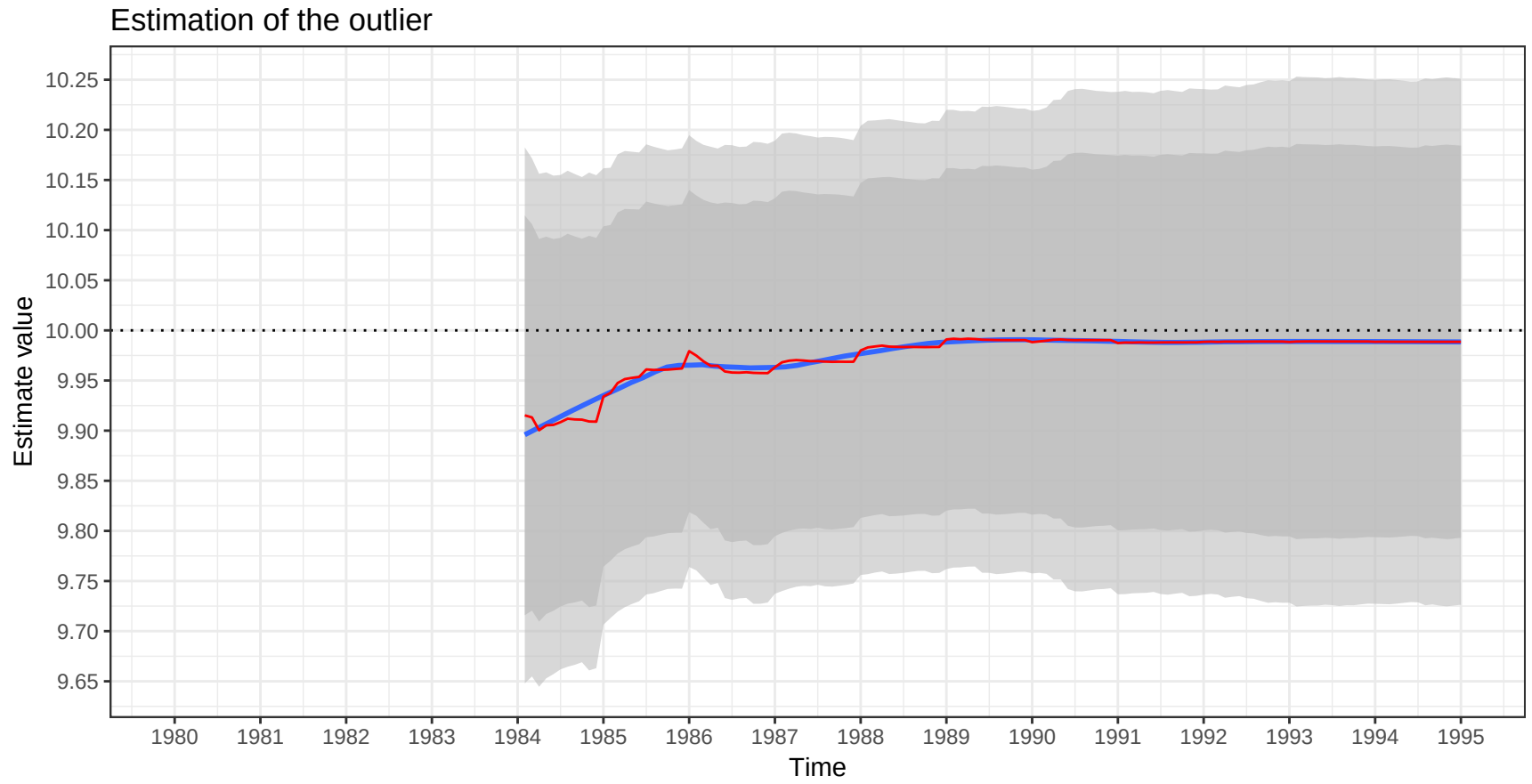

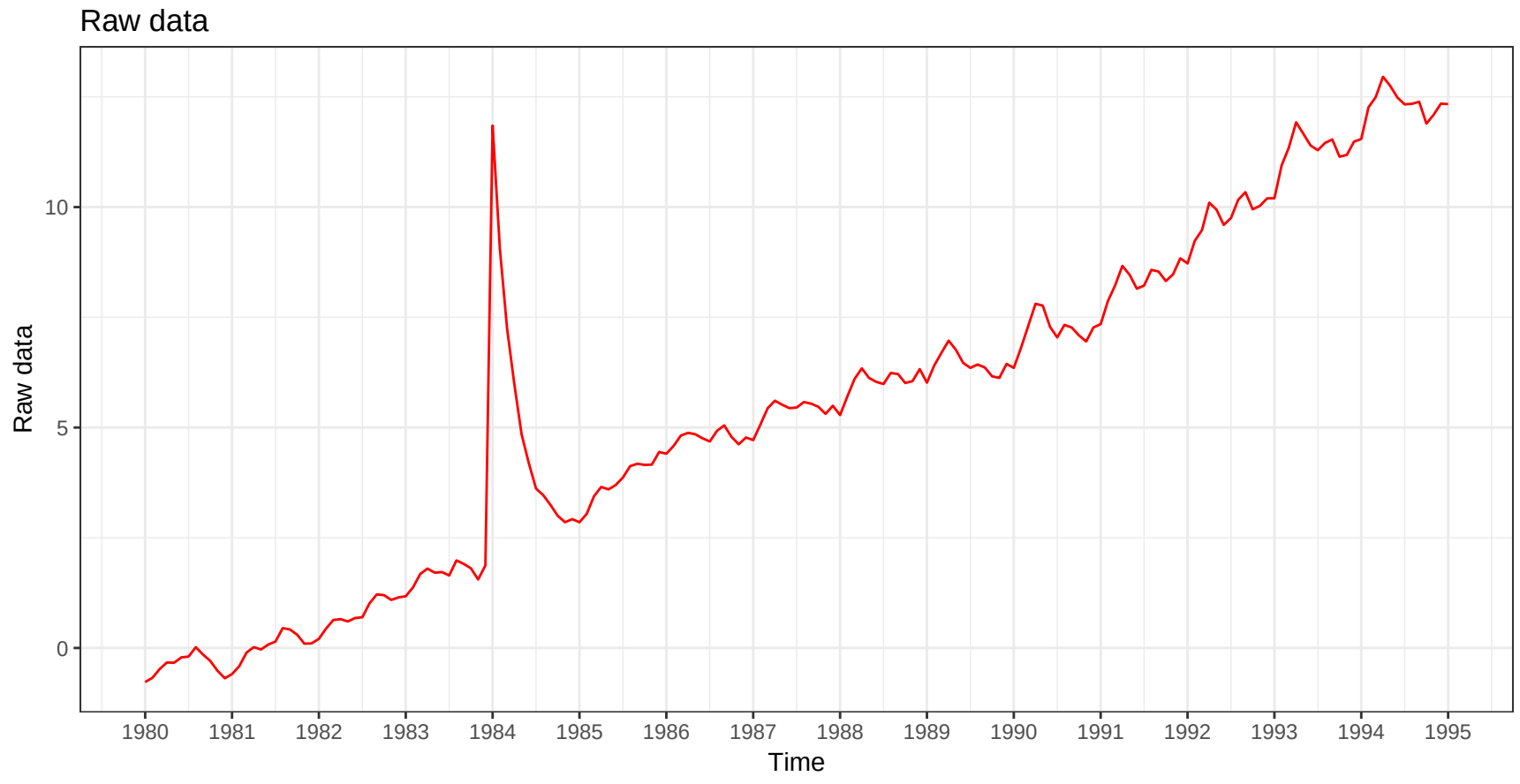

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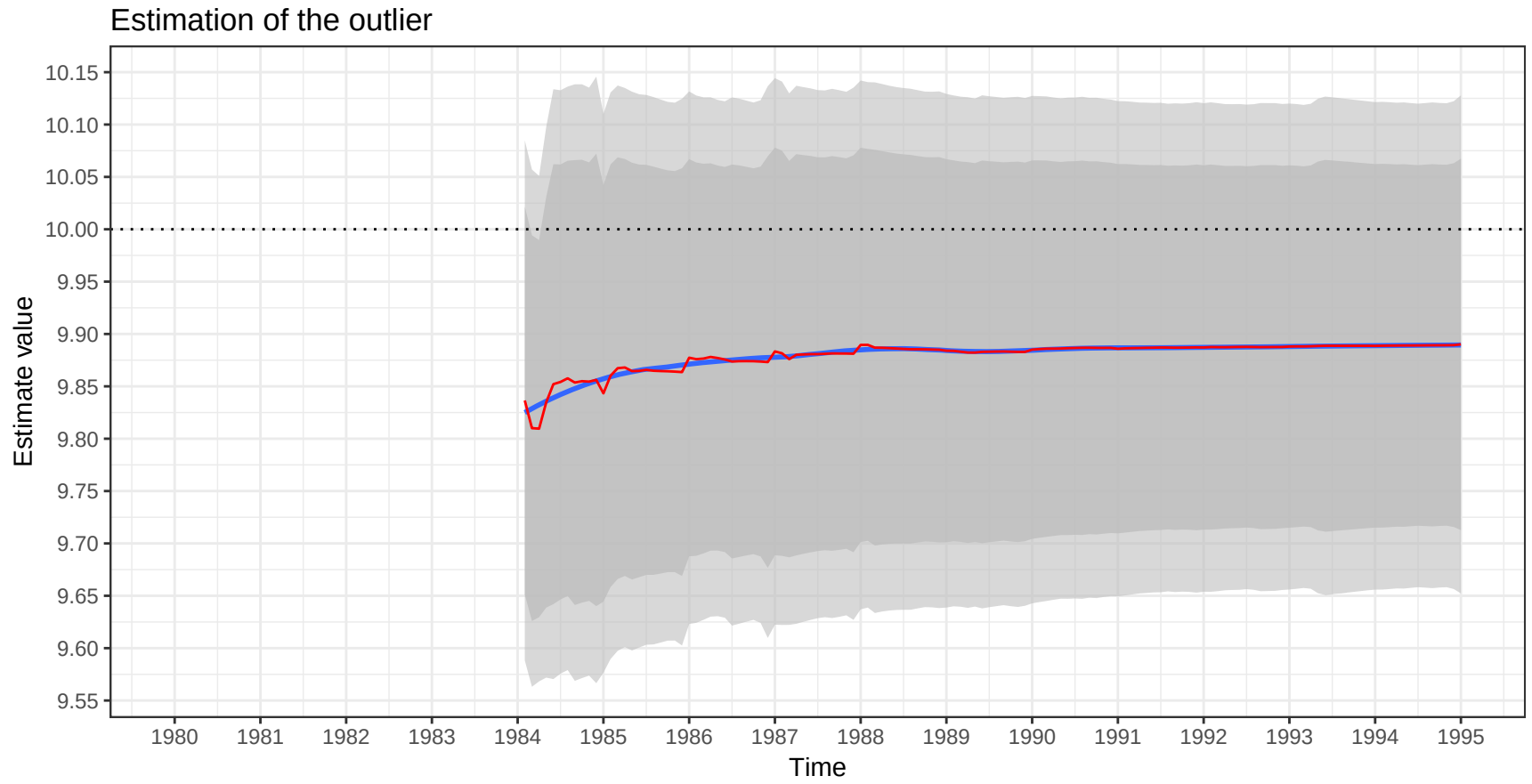
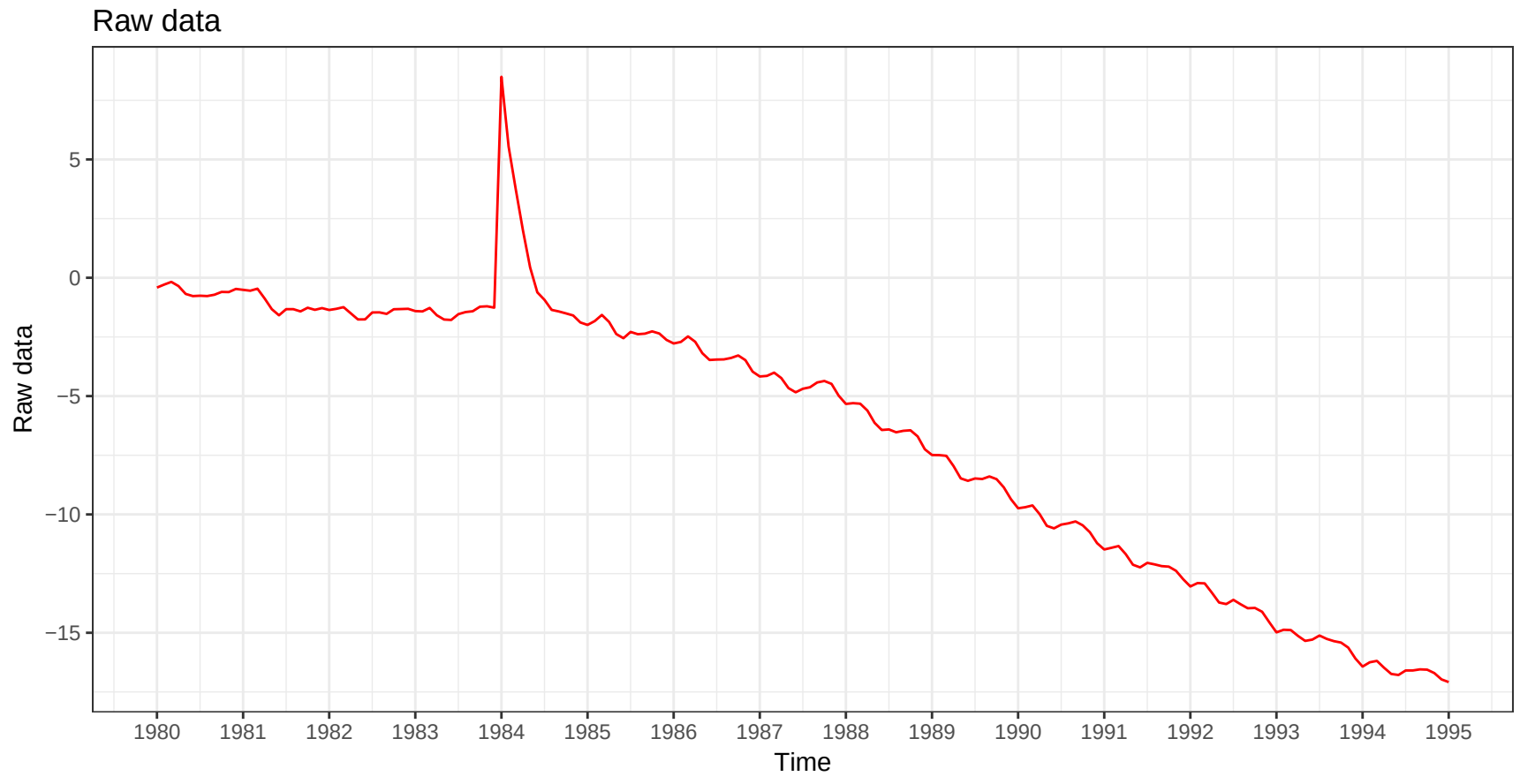
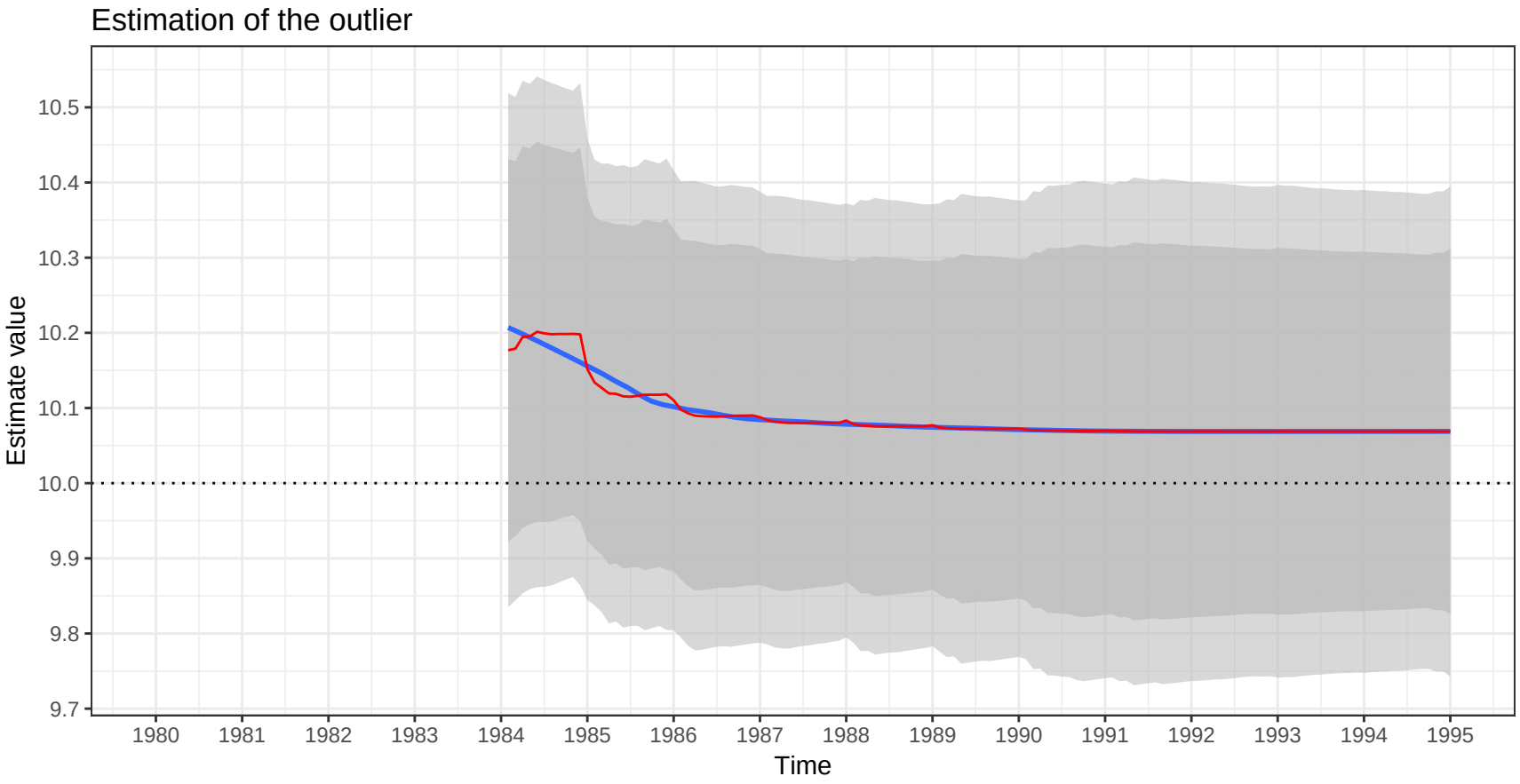
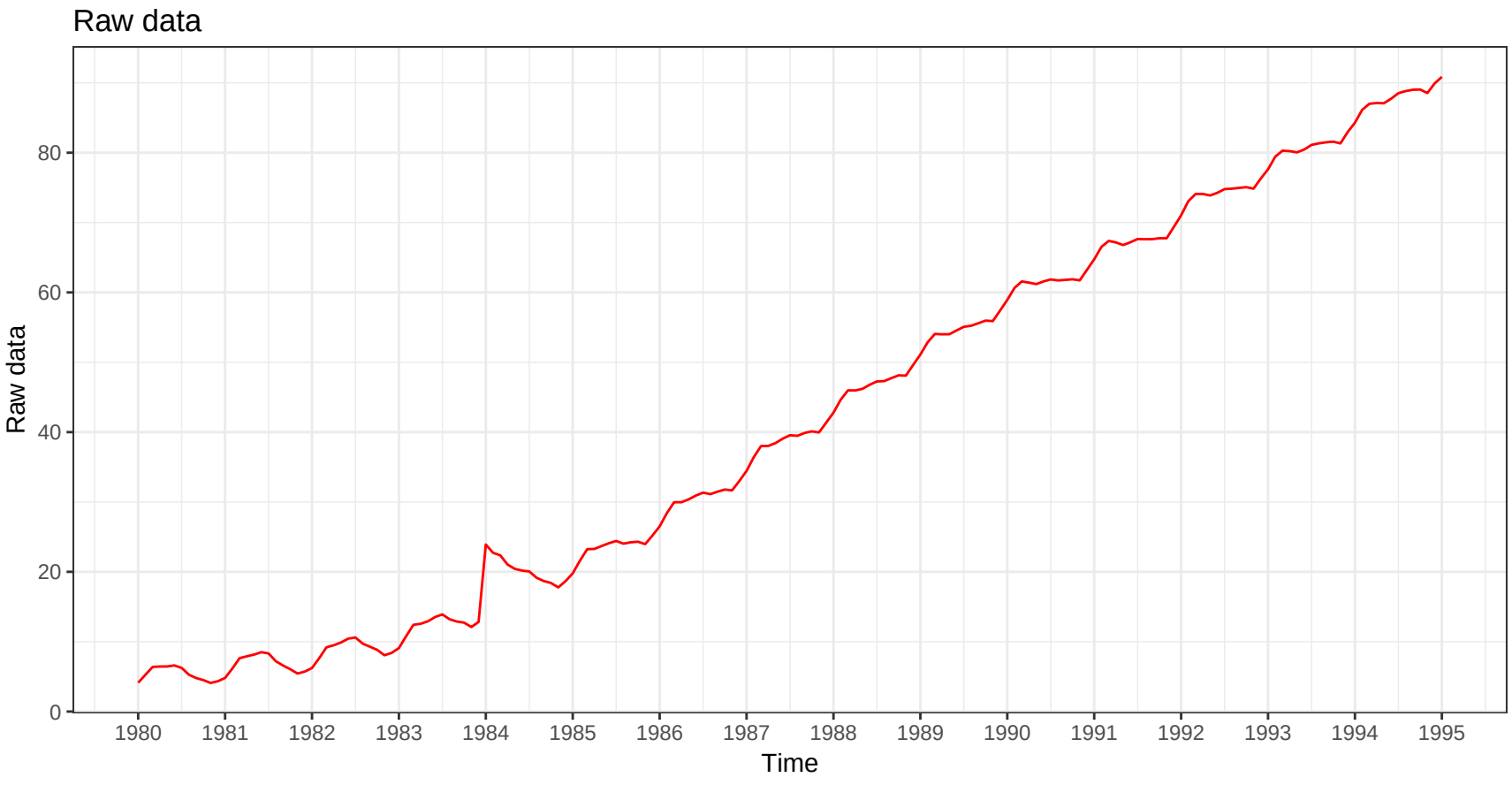




Estimate value of a TC(1984−01)
ARIMA (1,1,0)(0,1,1) − additive decomposition
(1−B)(1−B12)(1−0.7B)Xt=(1−0.5B12)at





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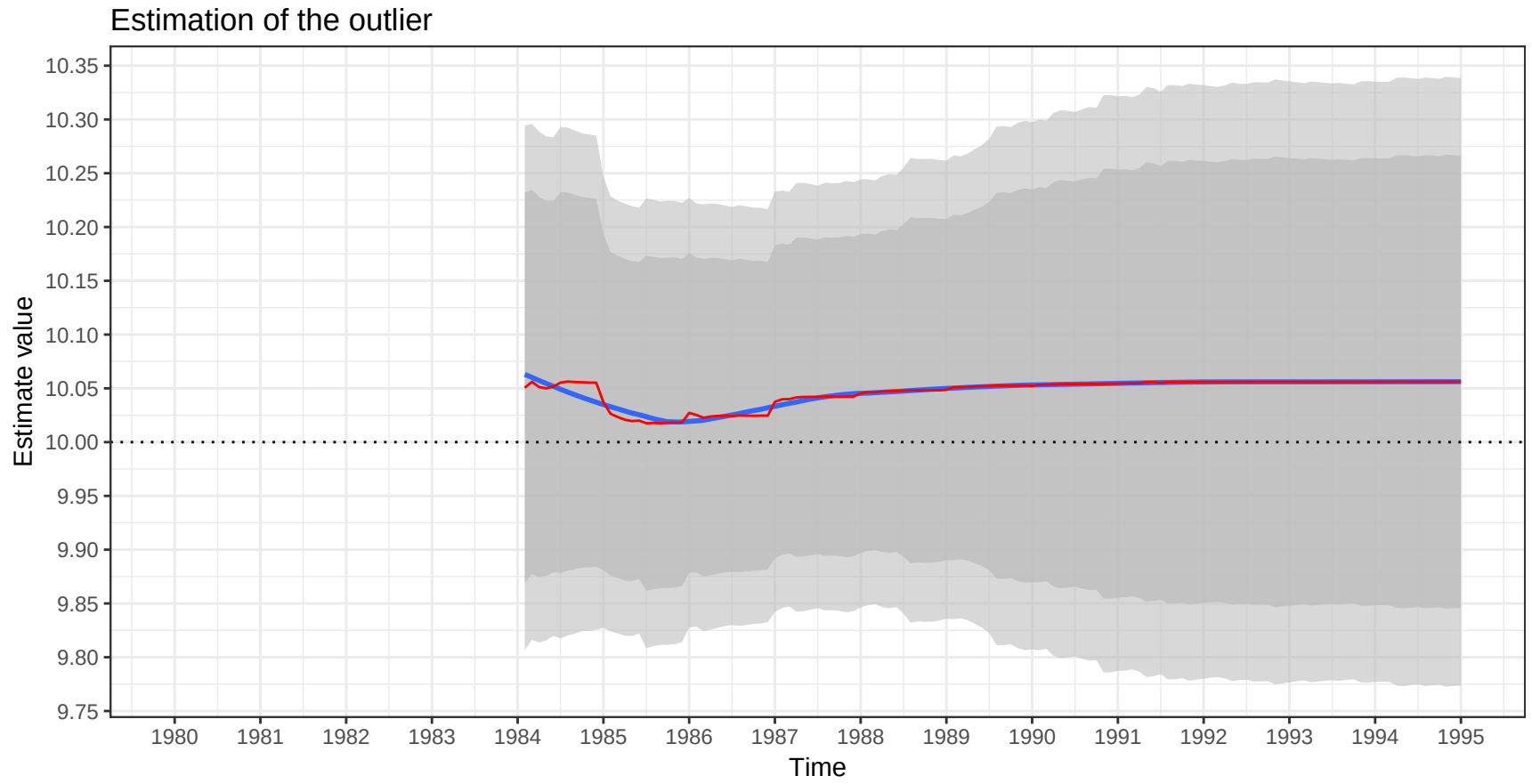

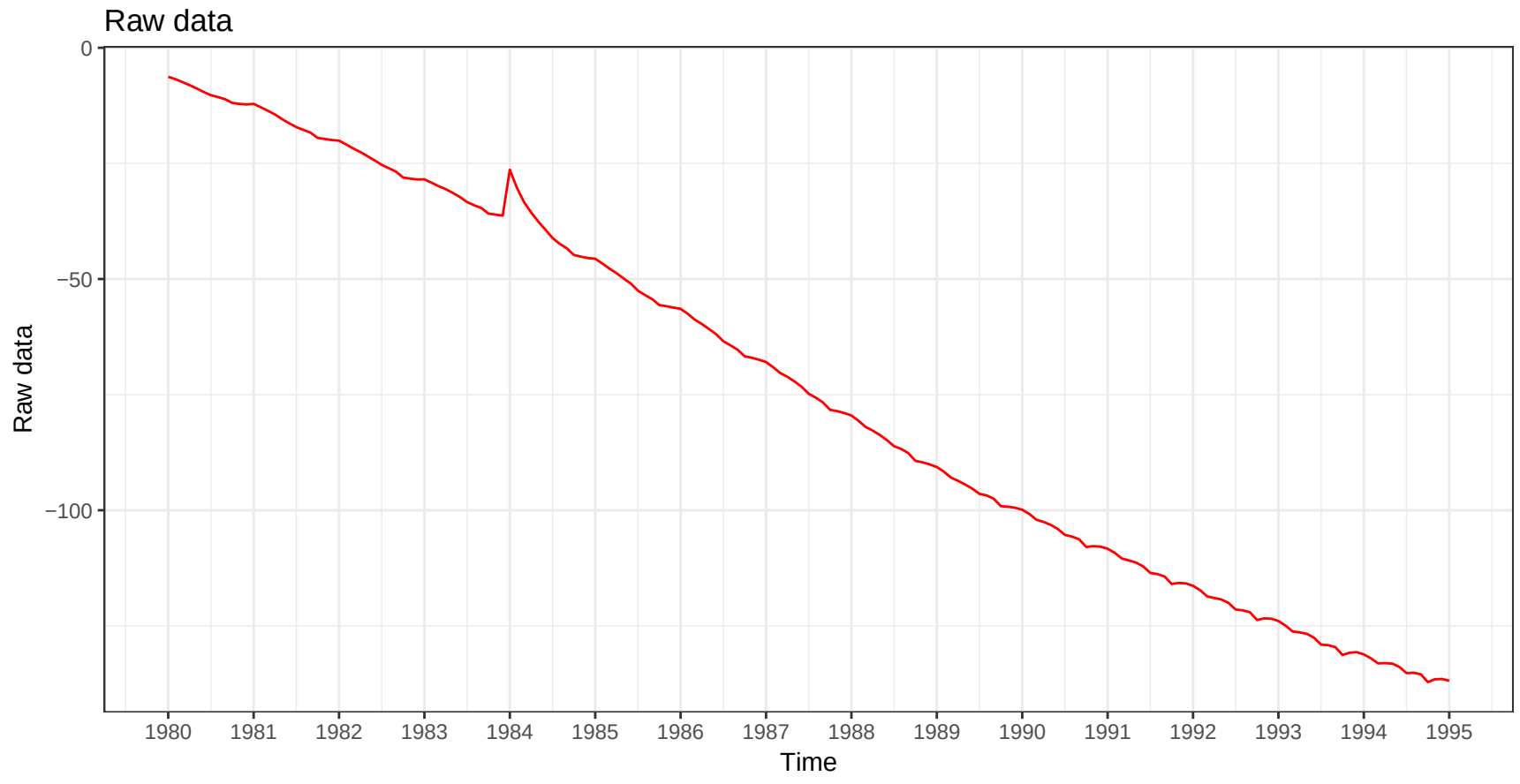

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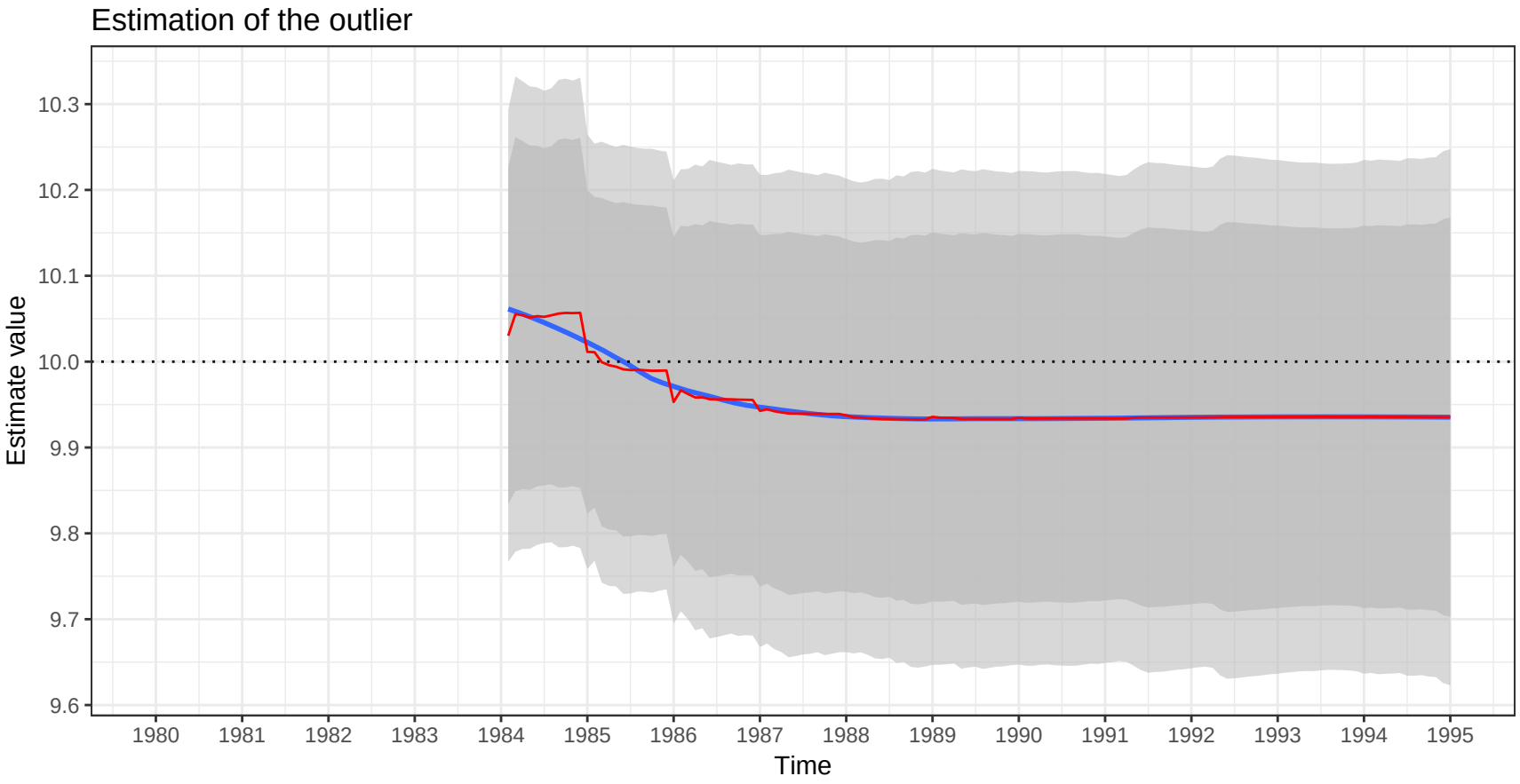

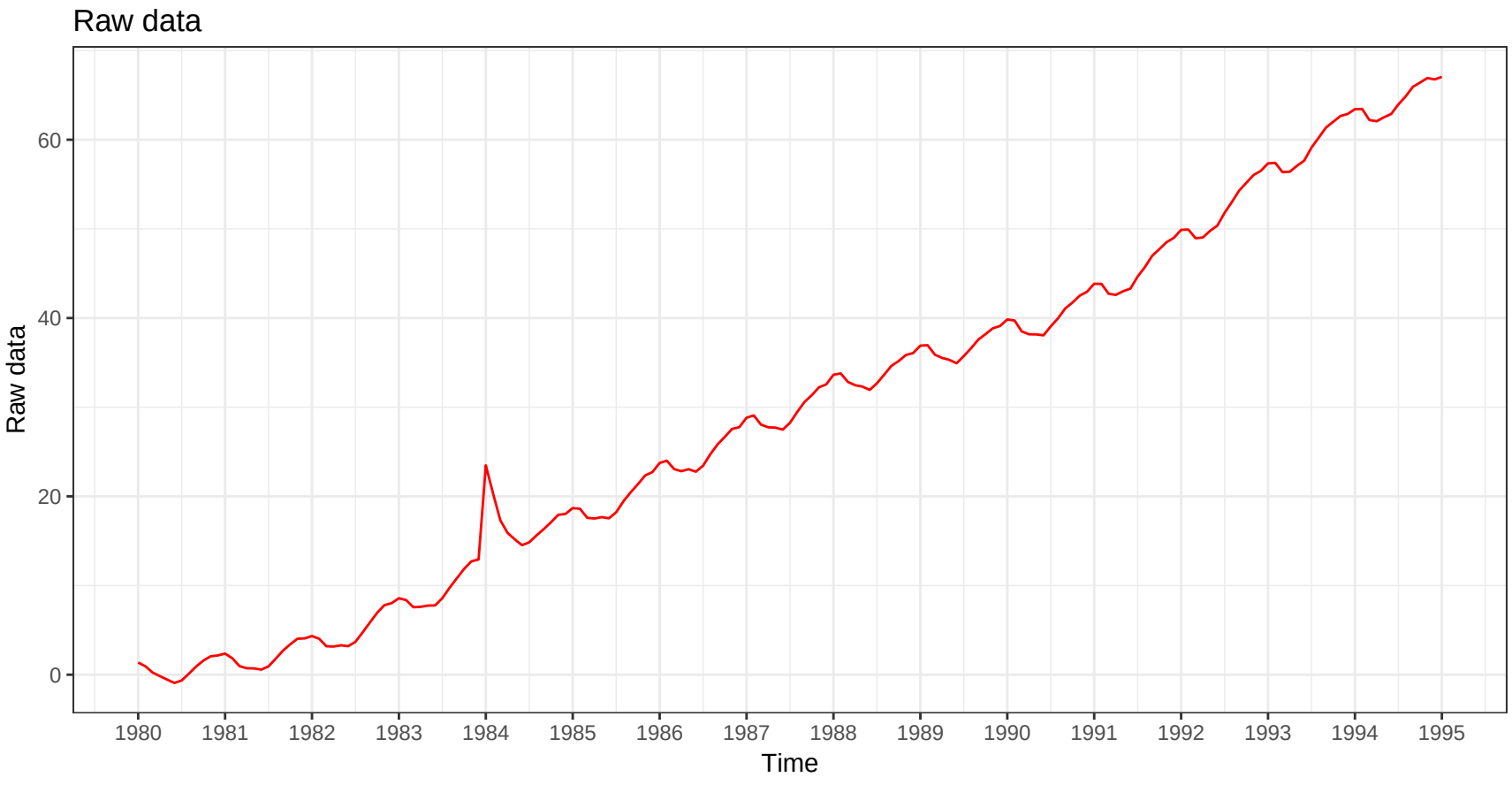

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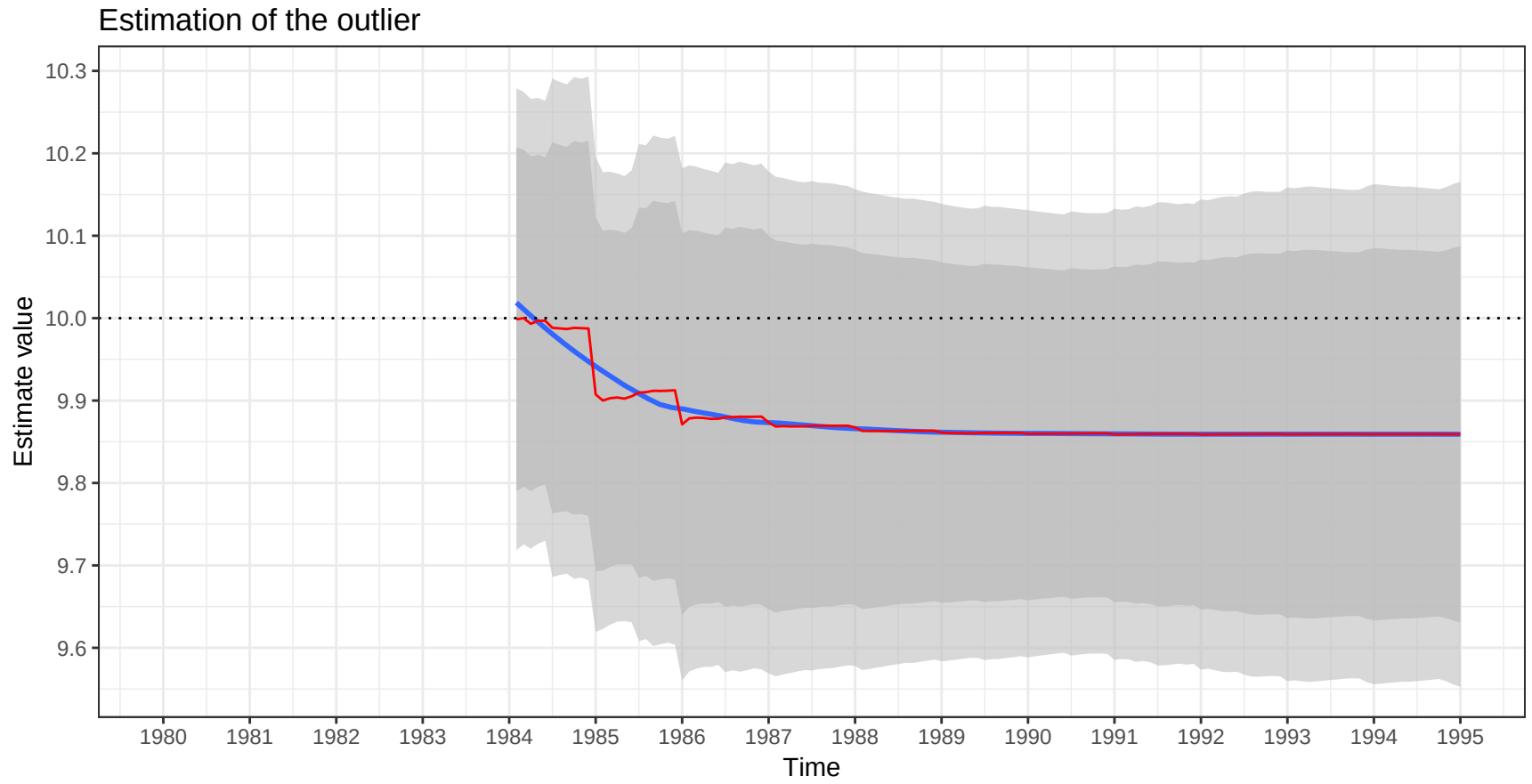

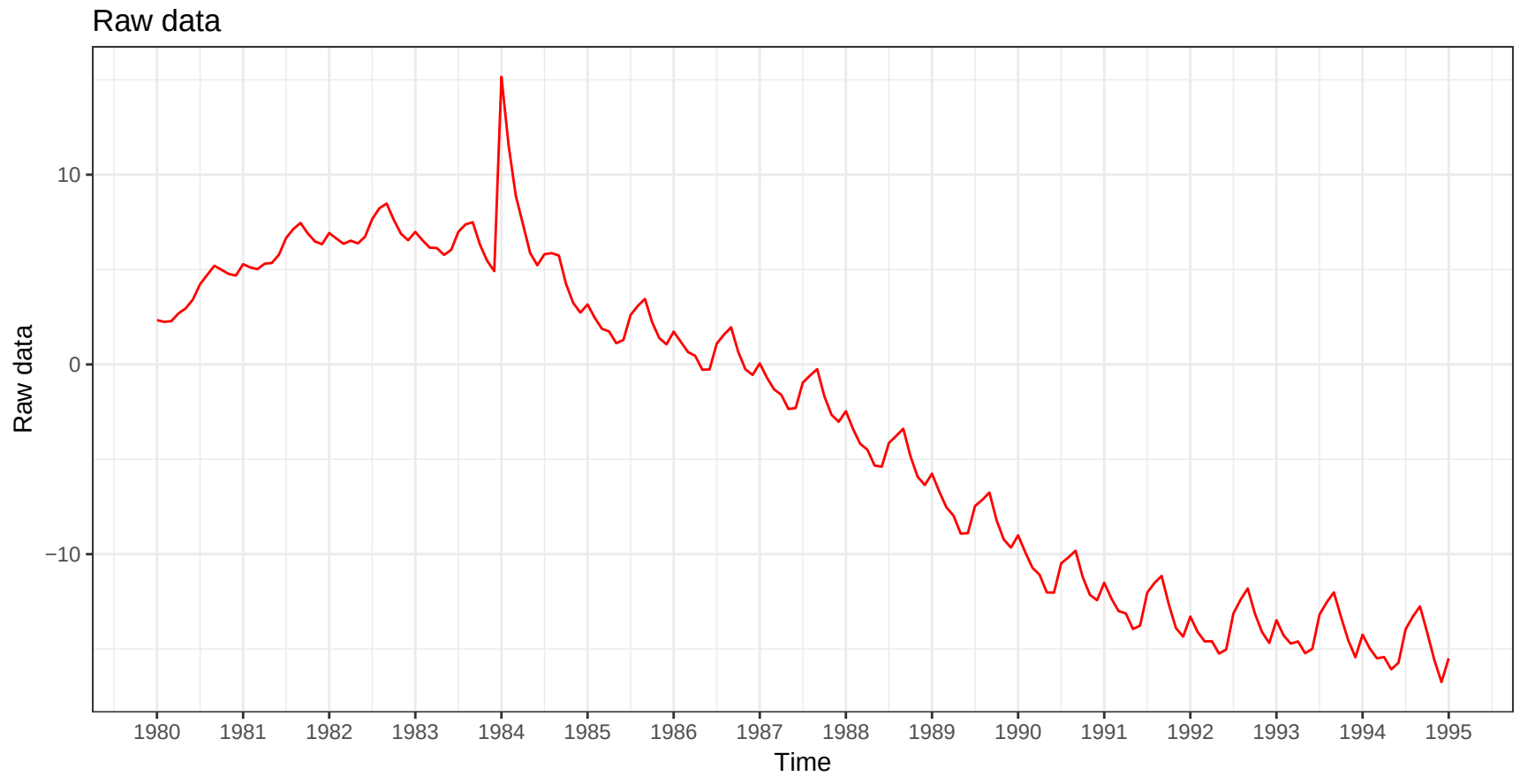

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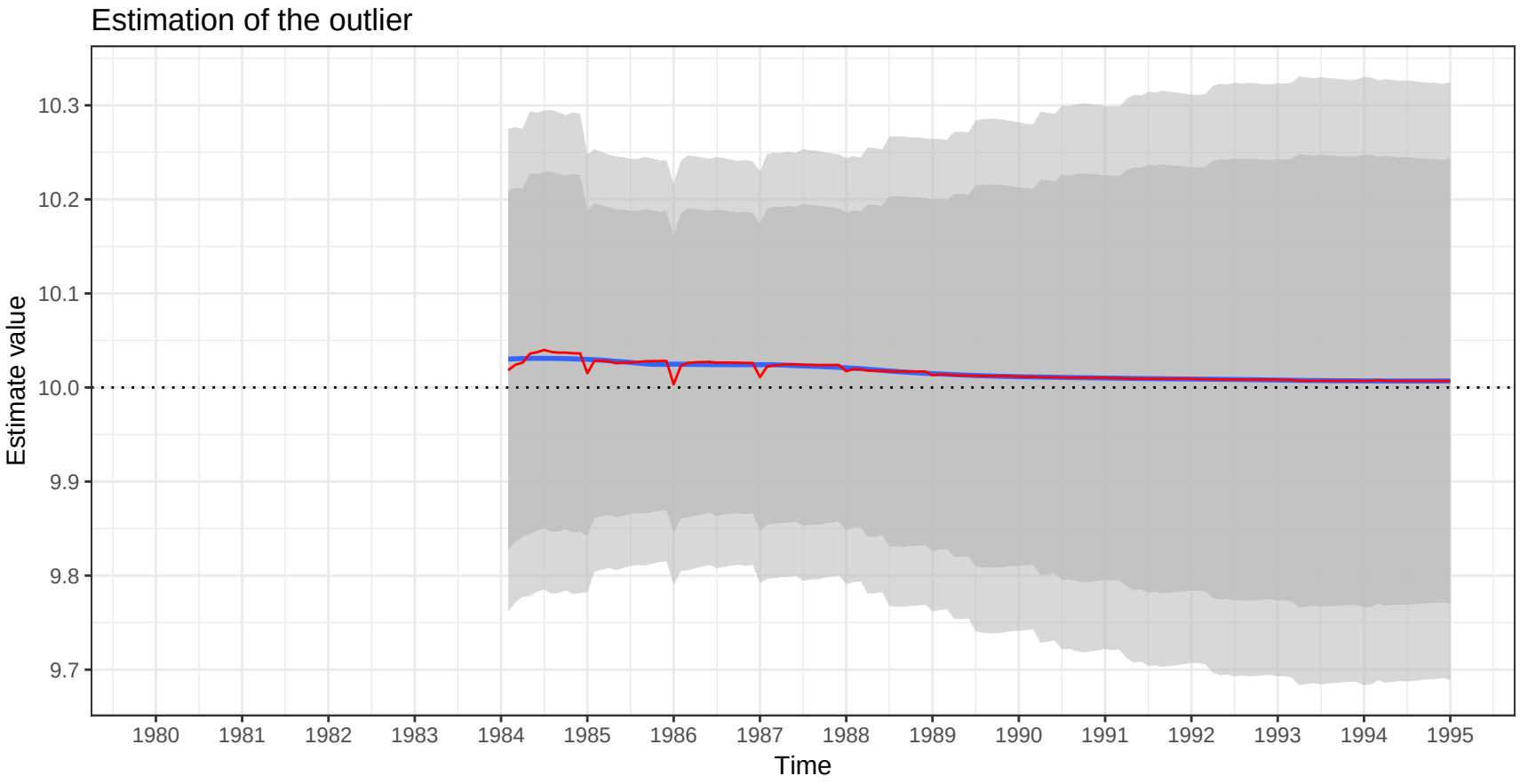

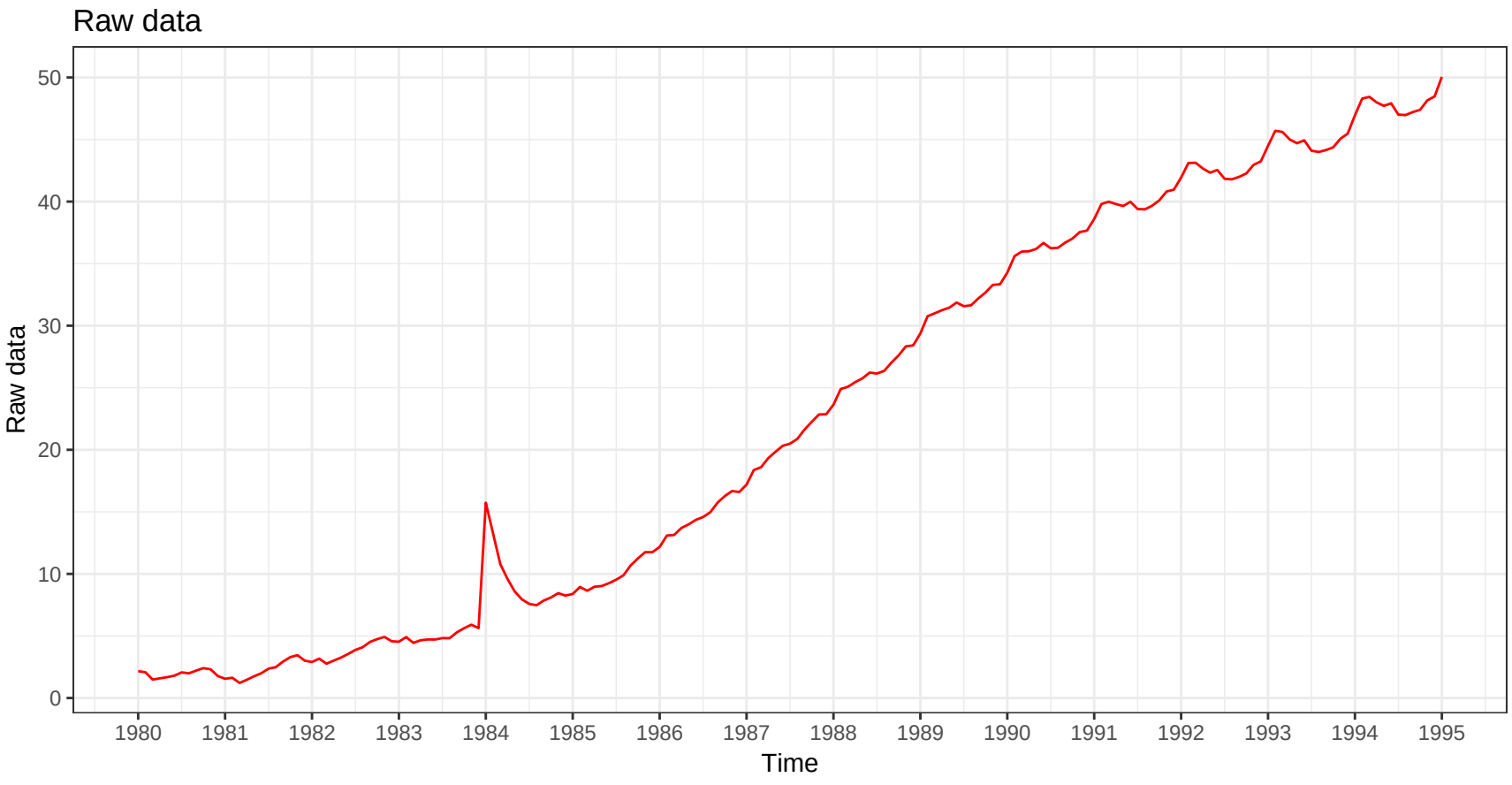

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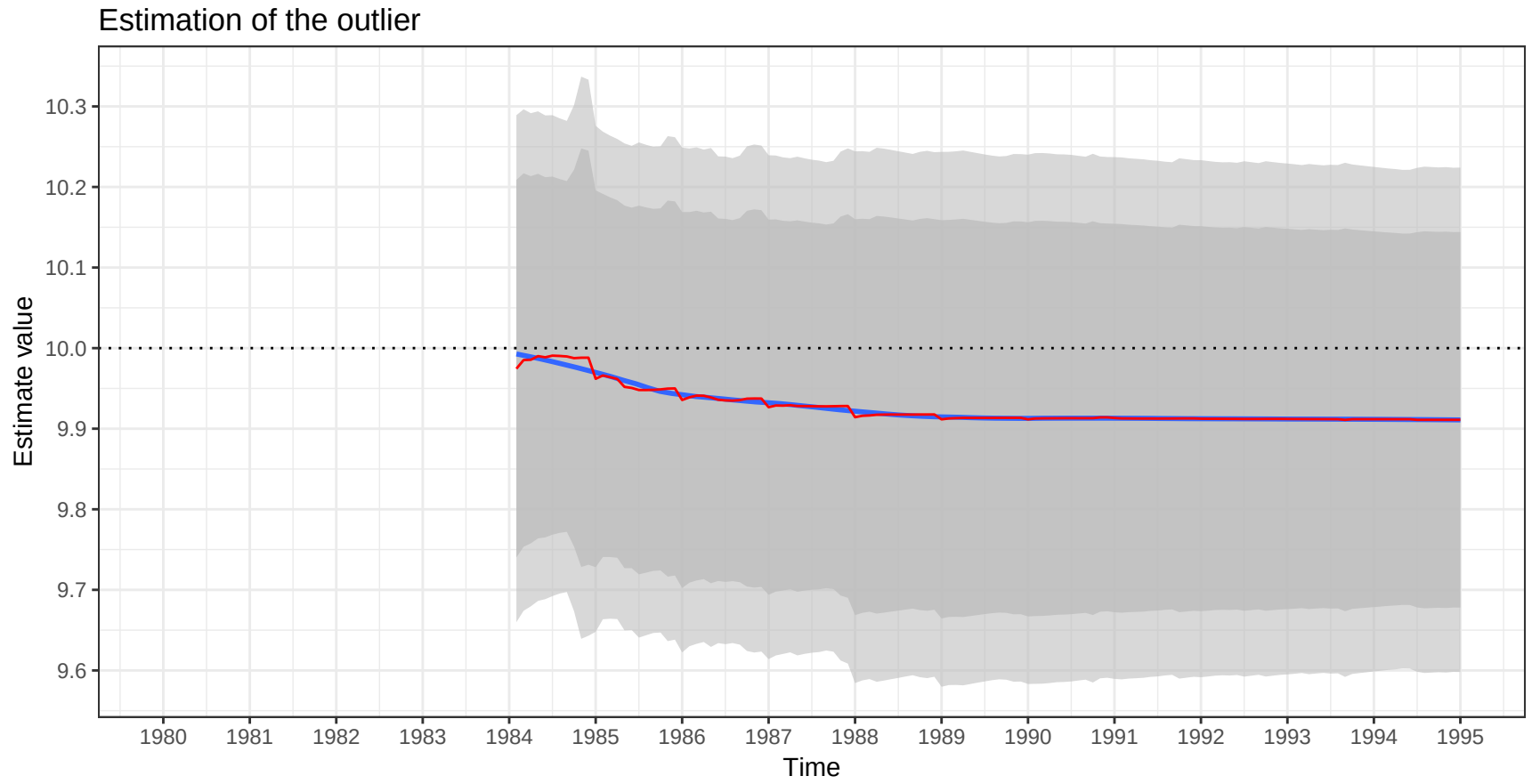

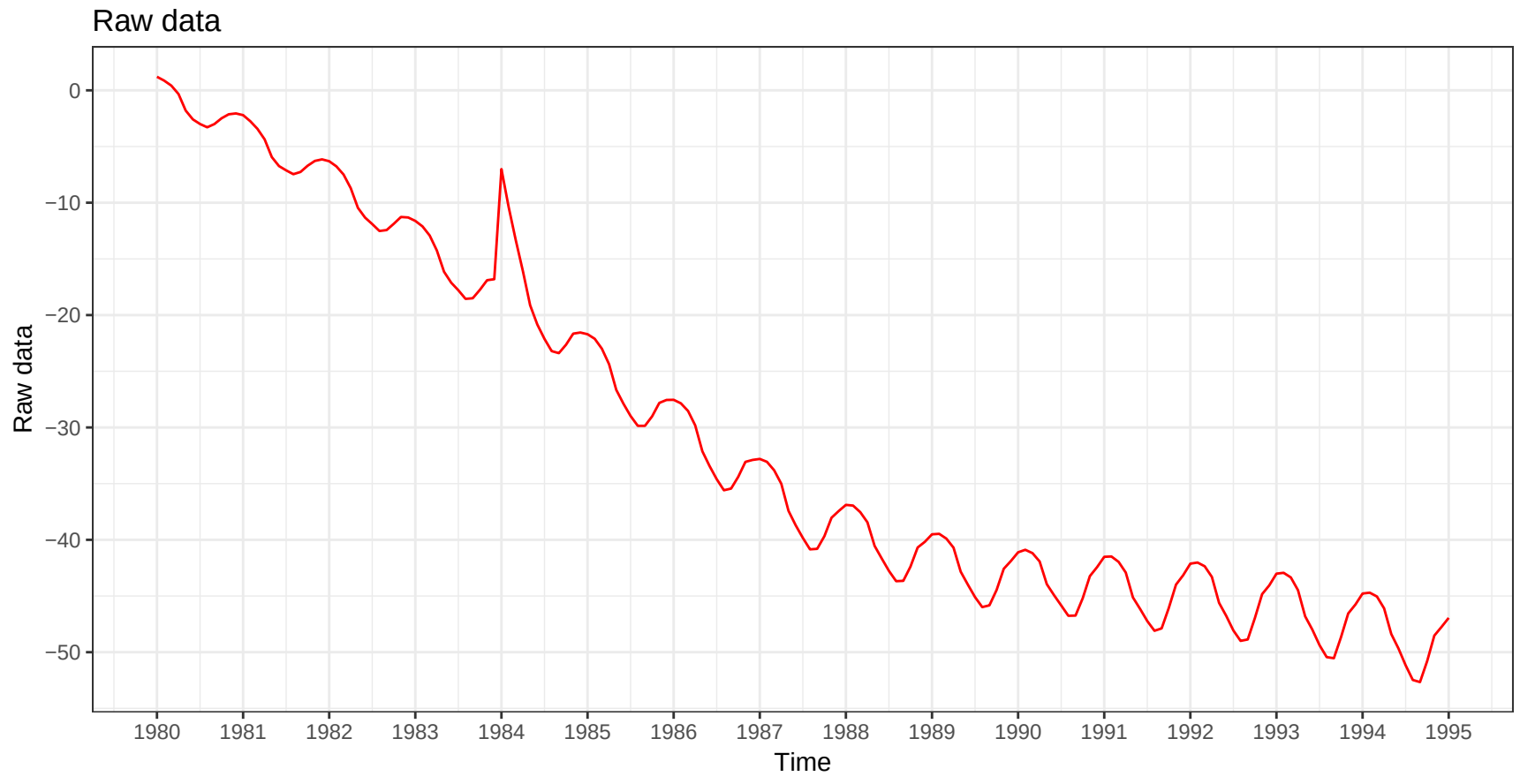

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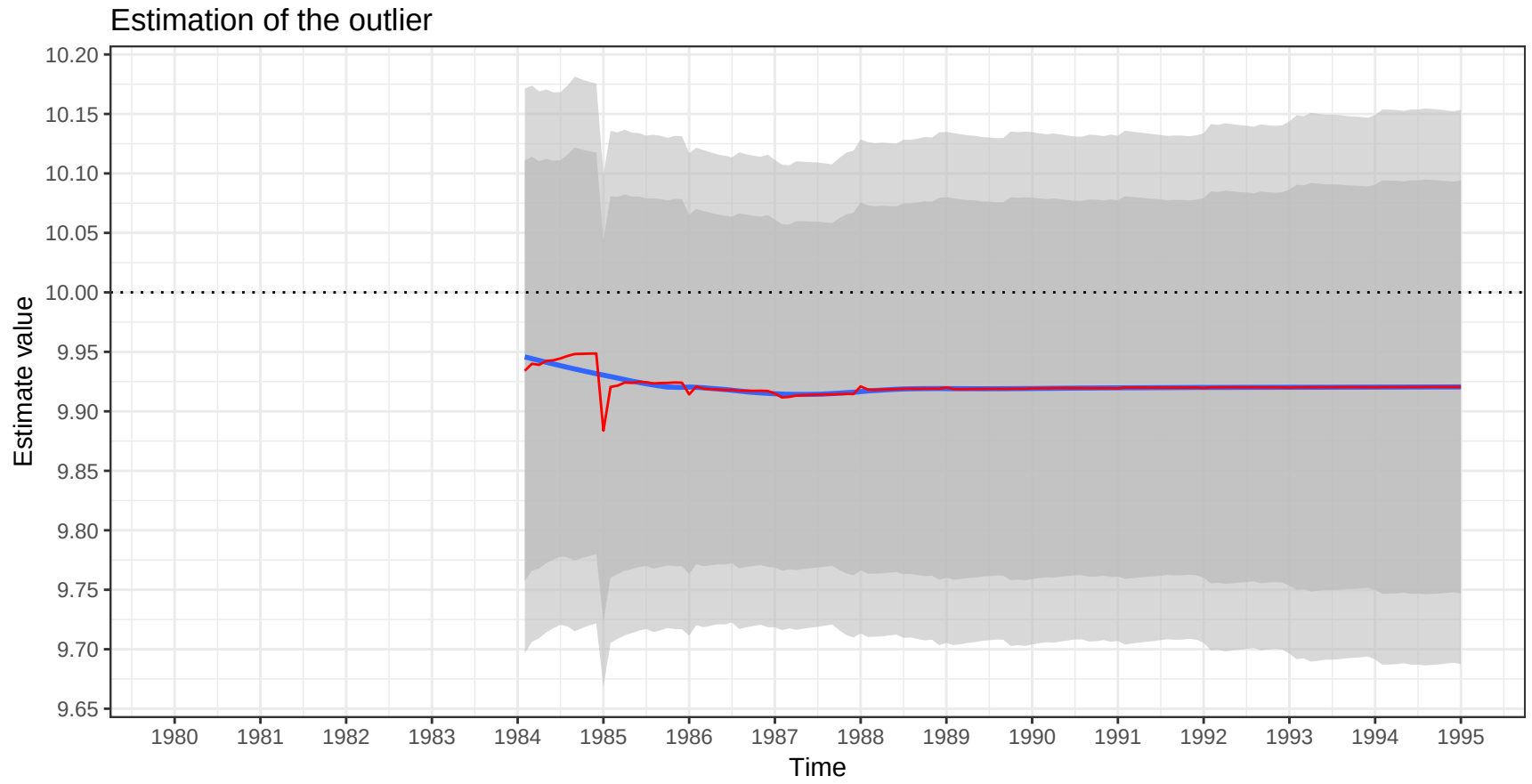

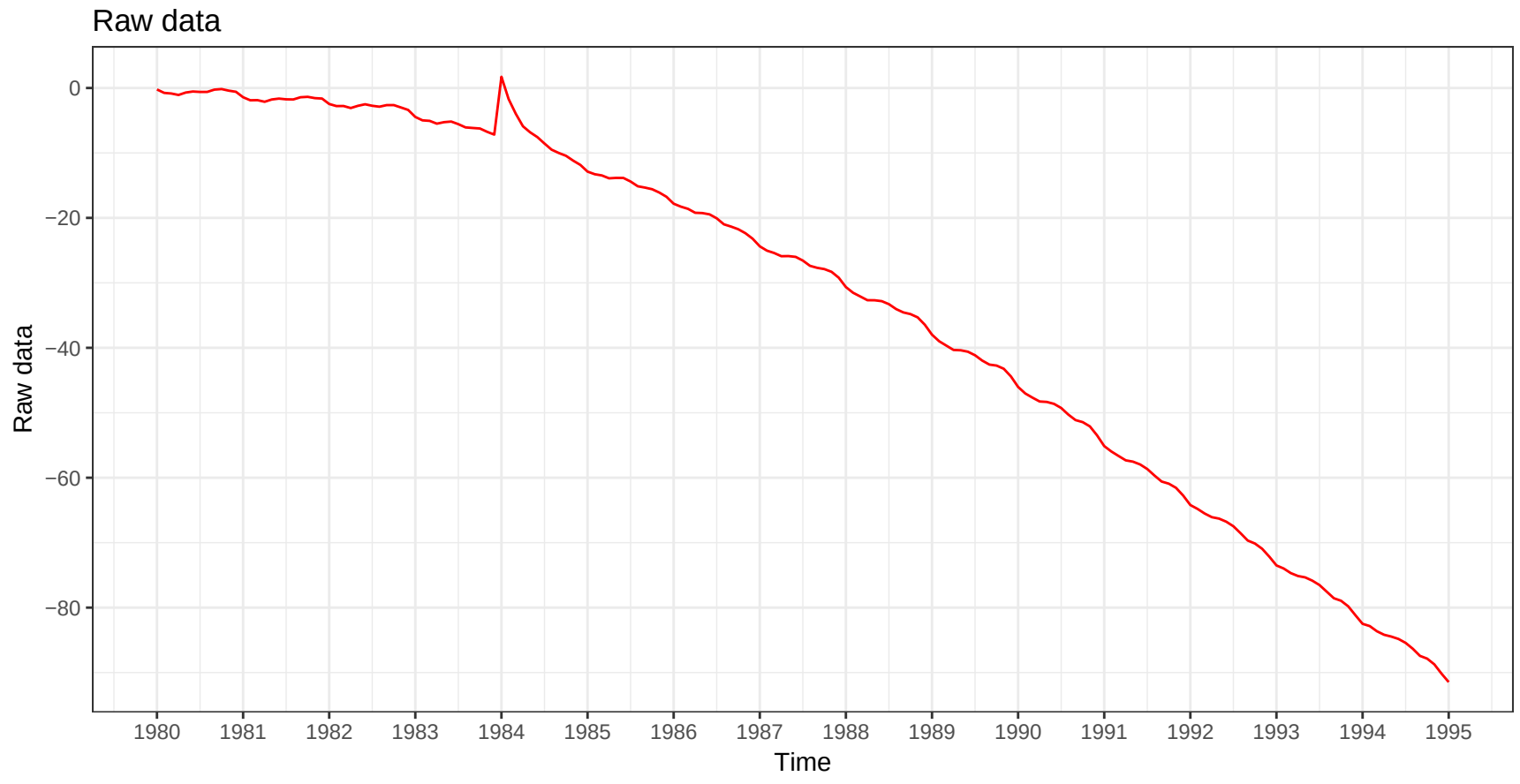

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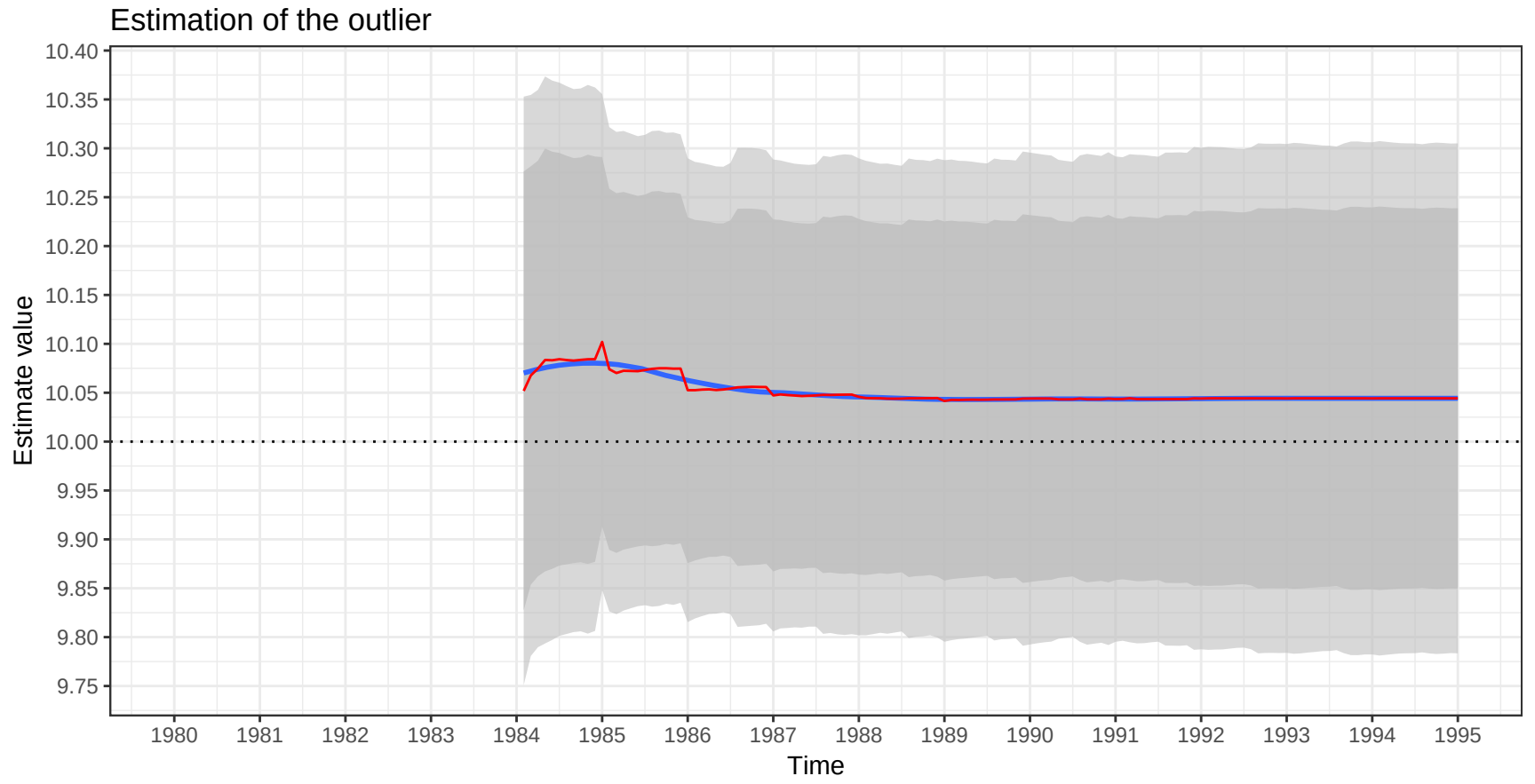

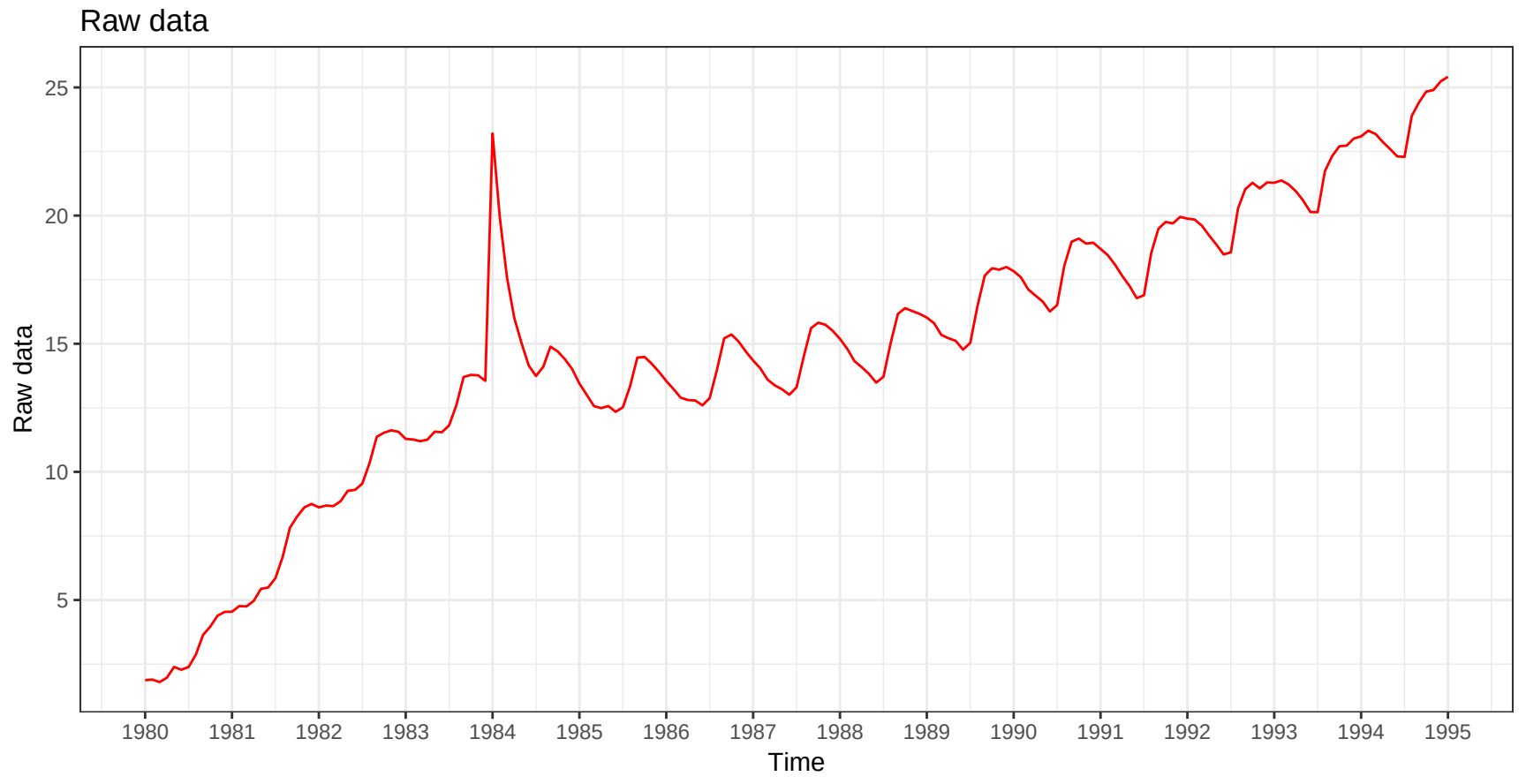

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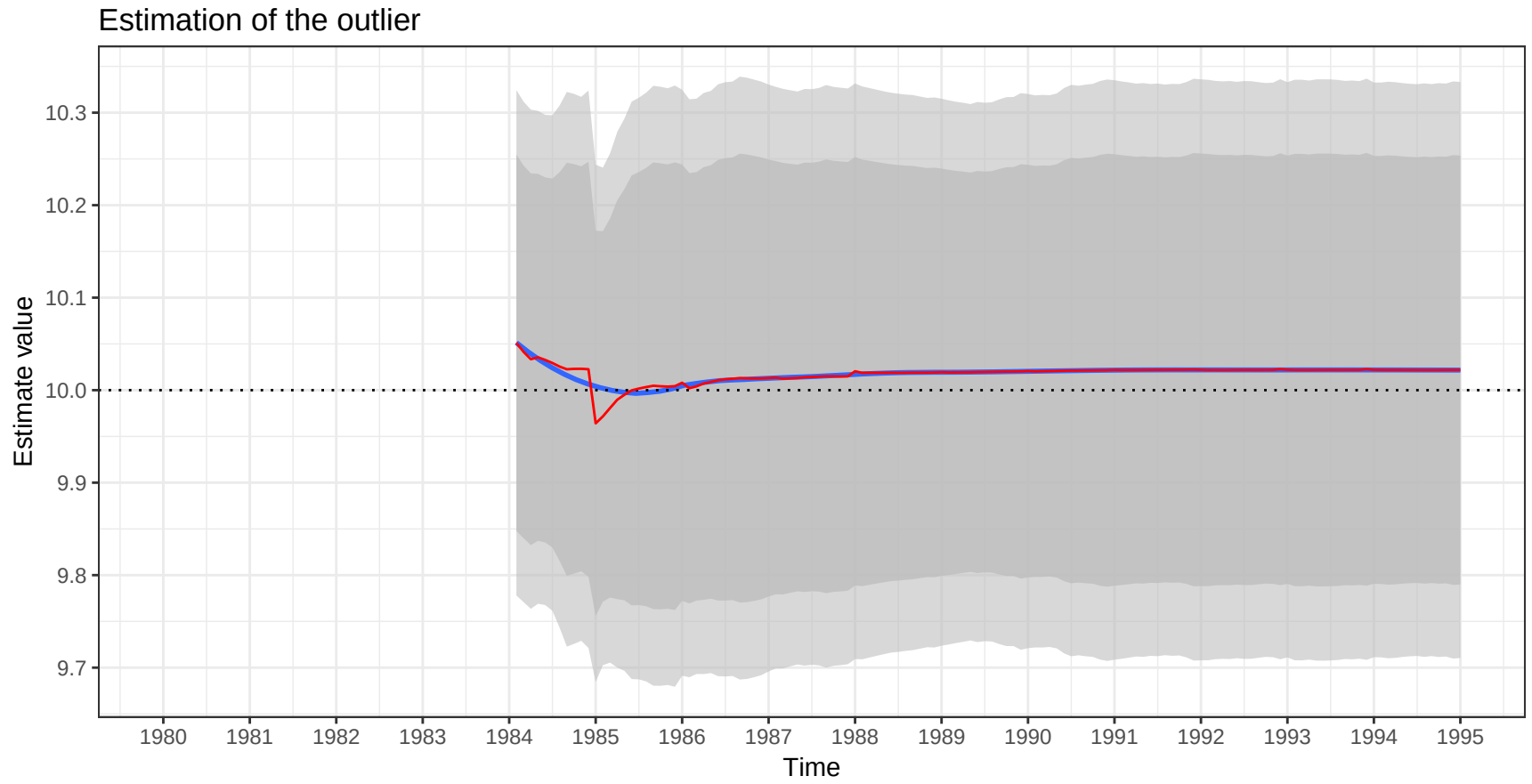

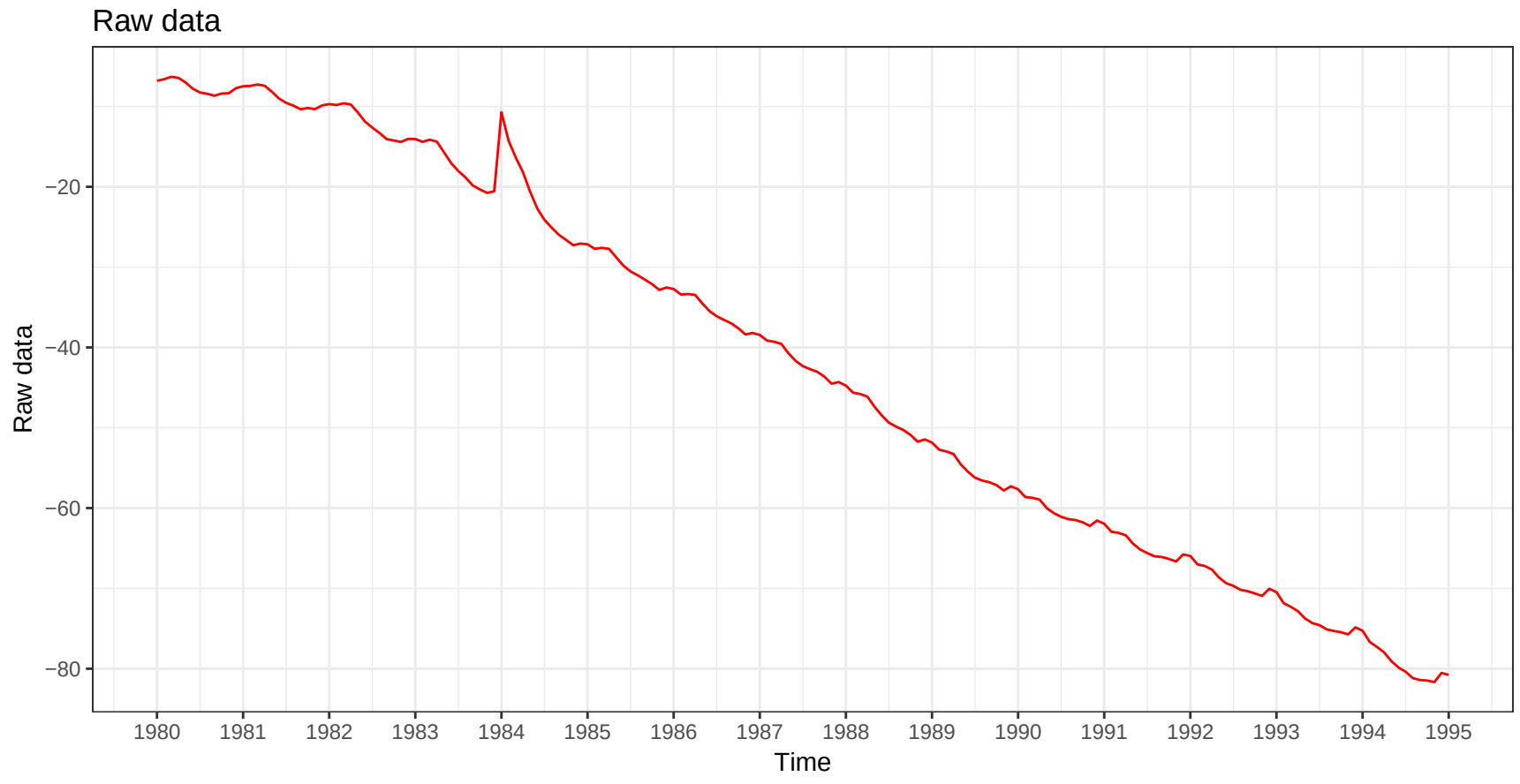

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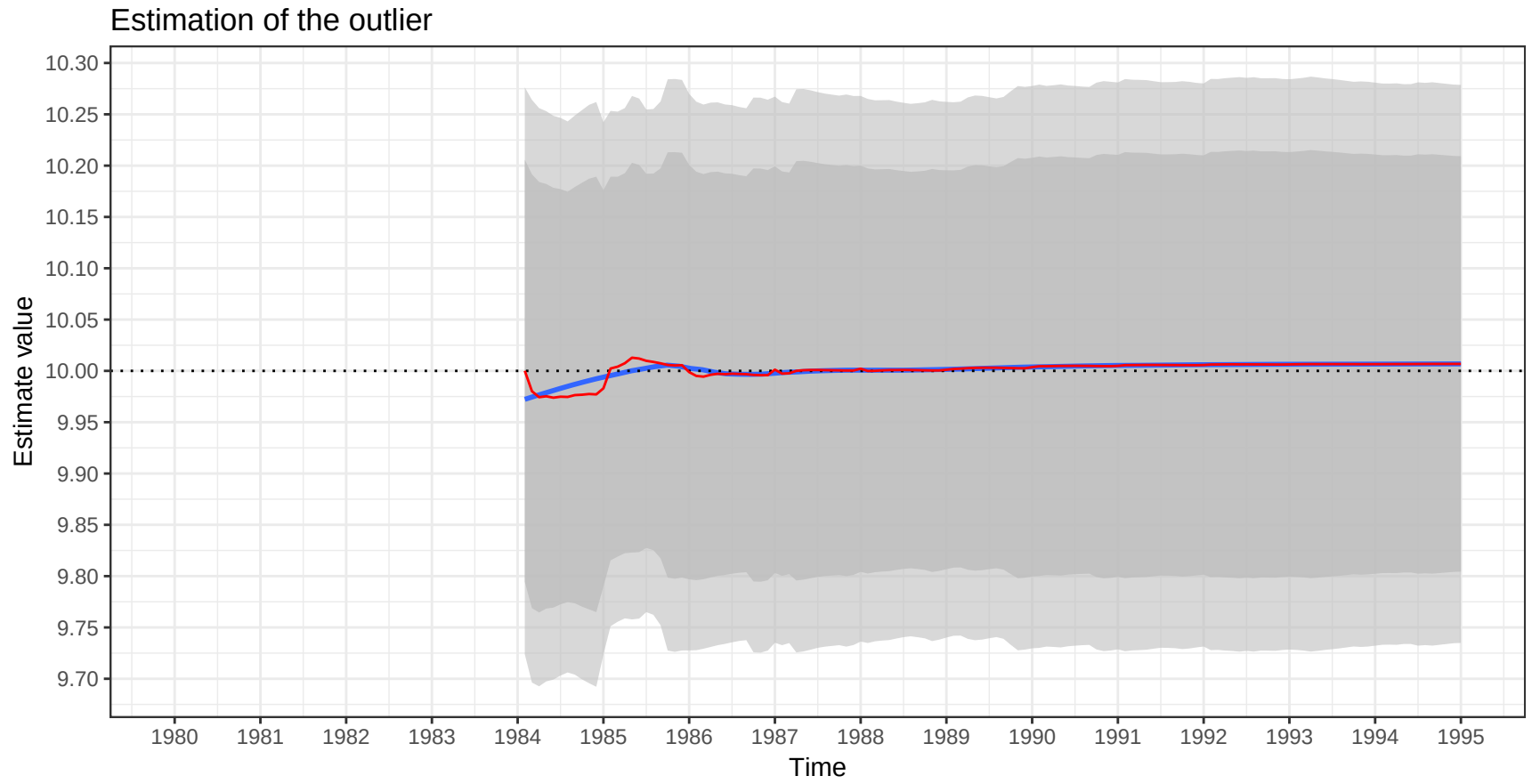
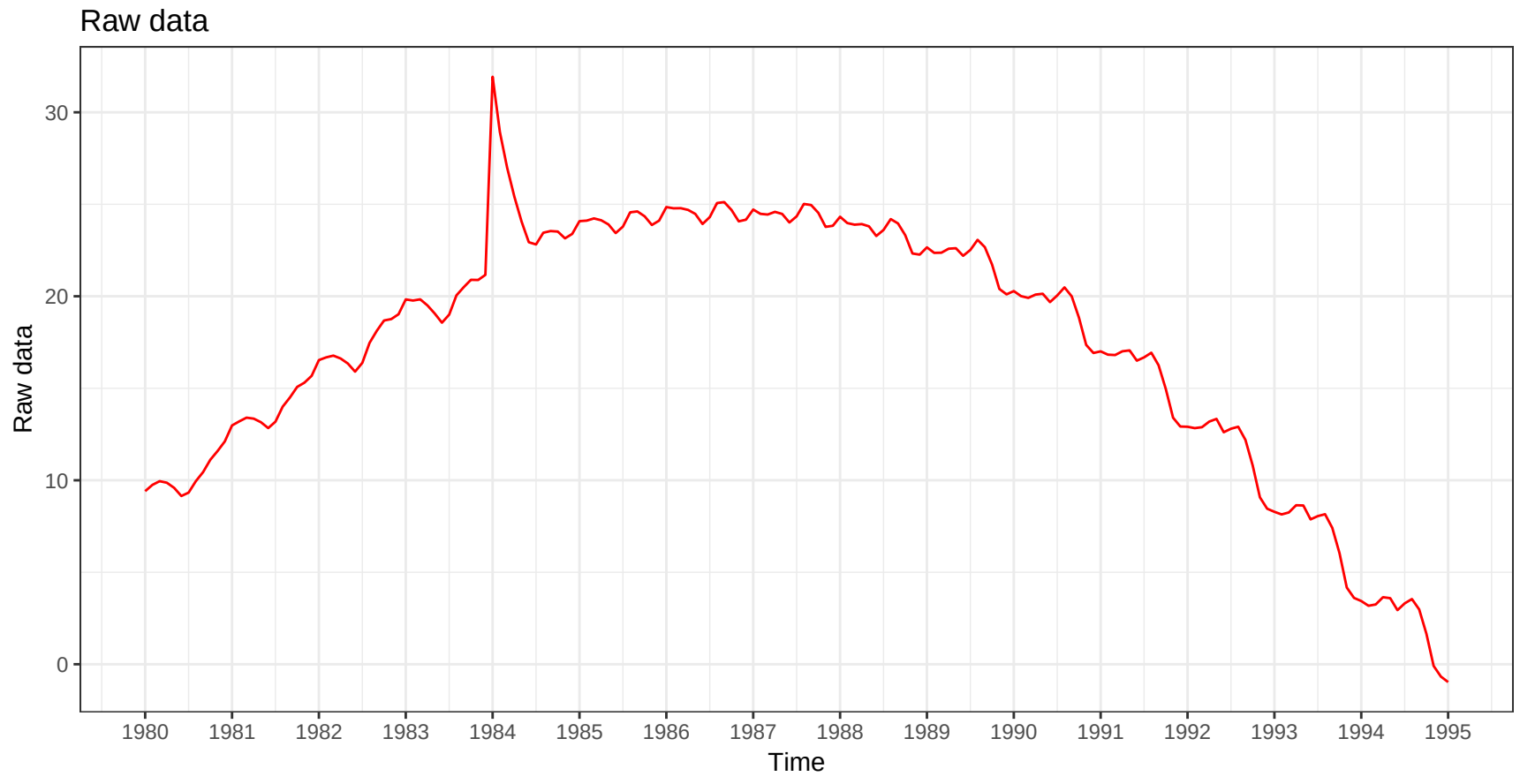
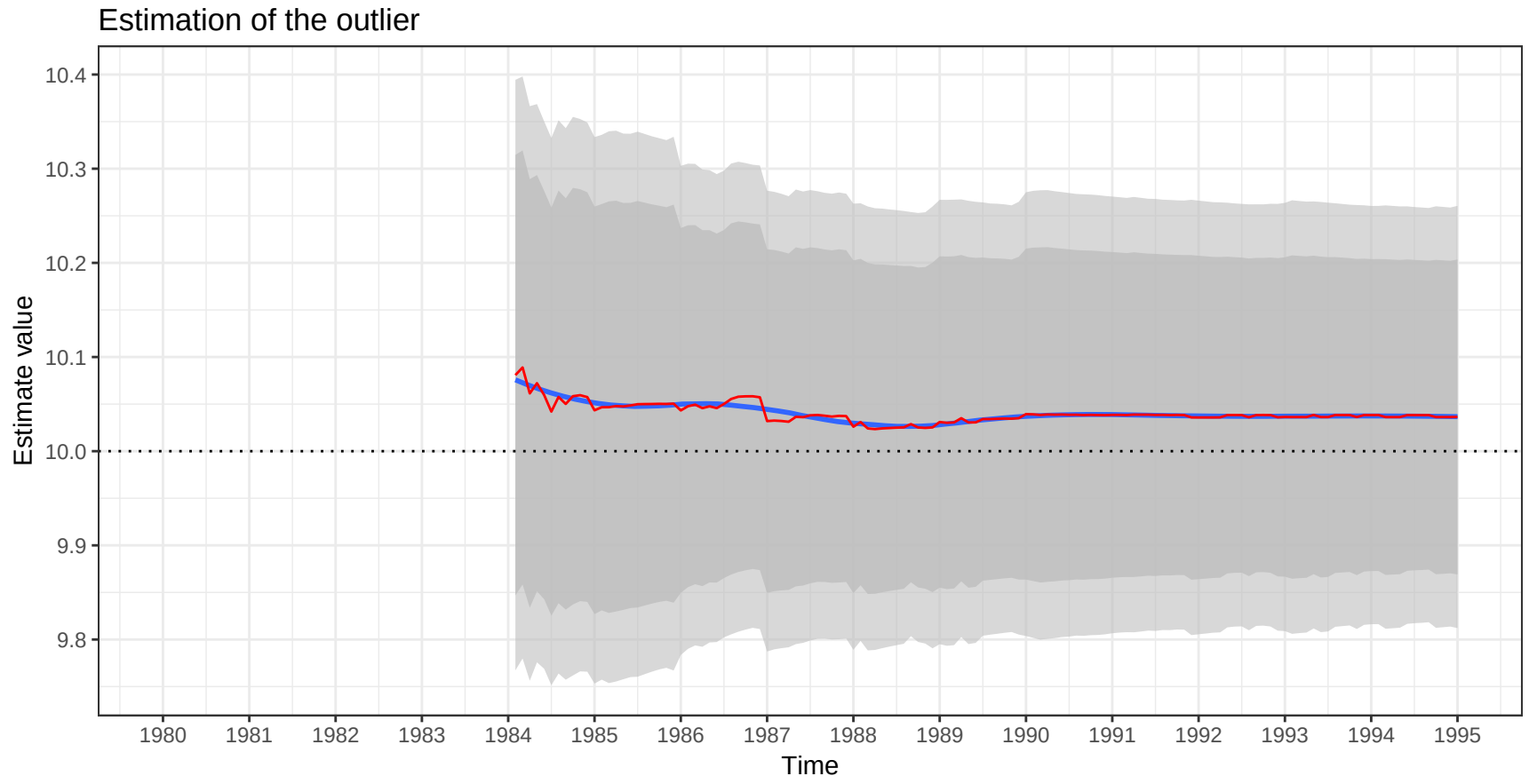
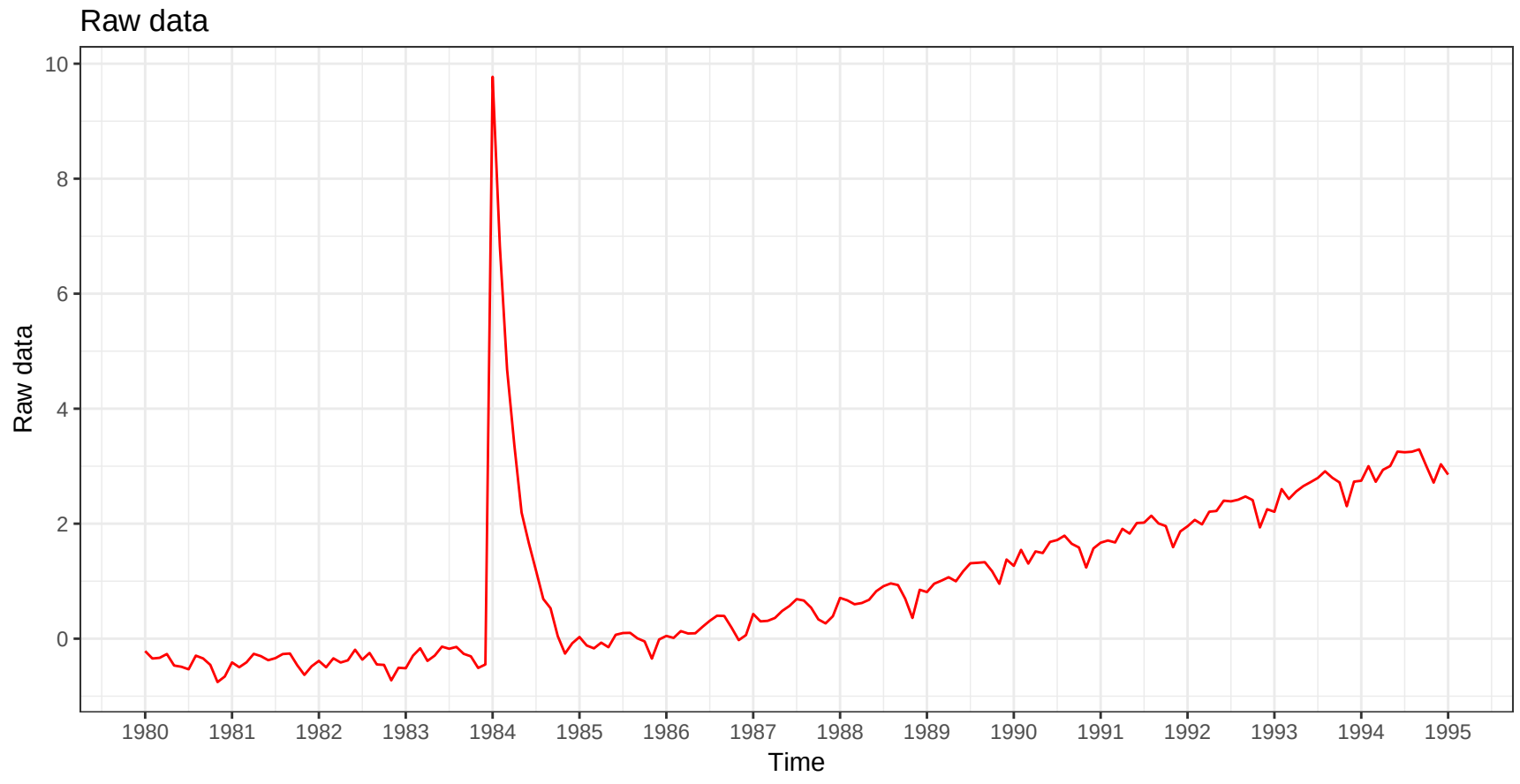




Estimate value of a TC(1984−01)
ARIMA (0,1,1)(1,1,1) − additive decomposition
(1−B)(1−B12)(1+0.4B12)Xt=(1−0.5B)(1−0.5B12)at





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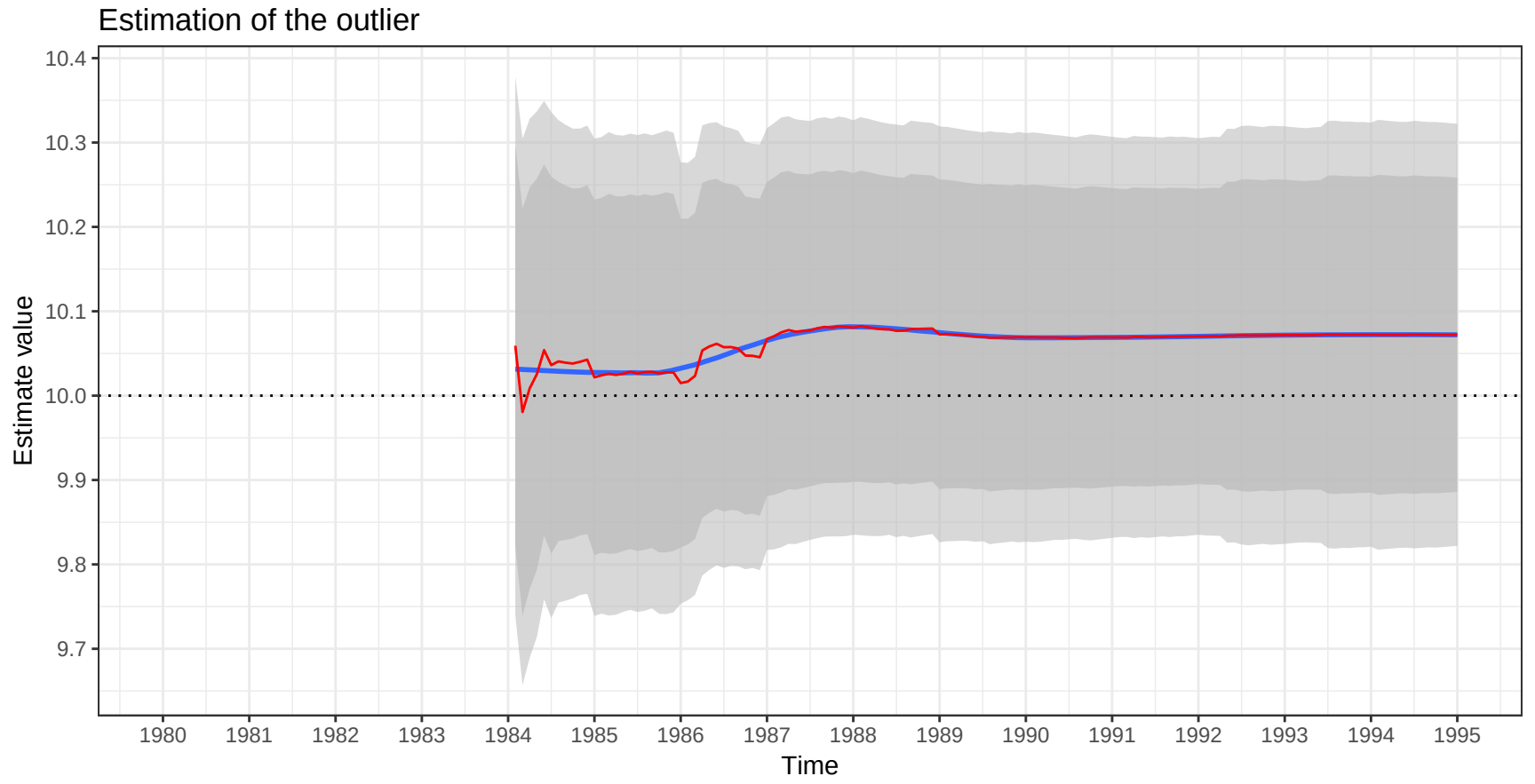

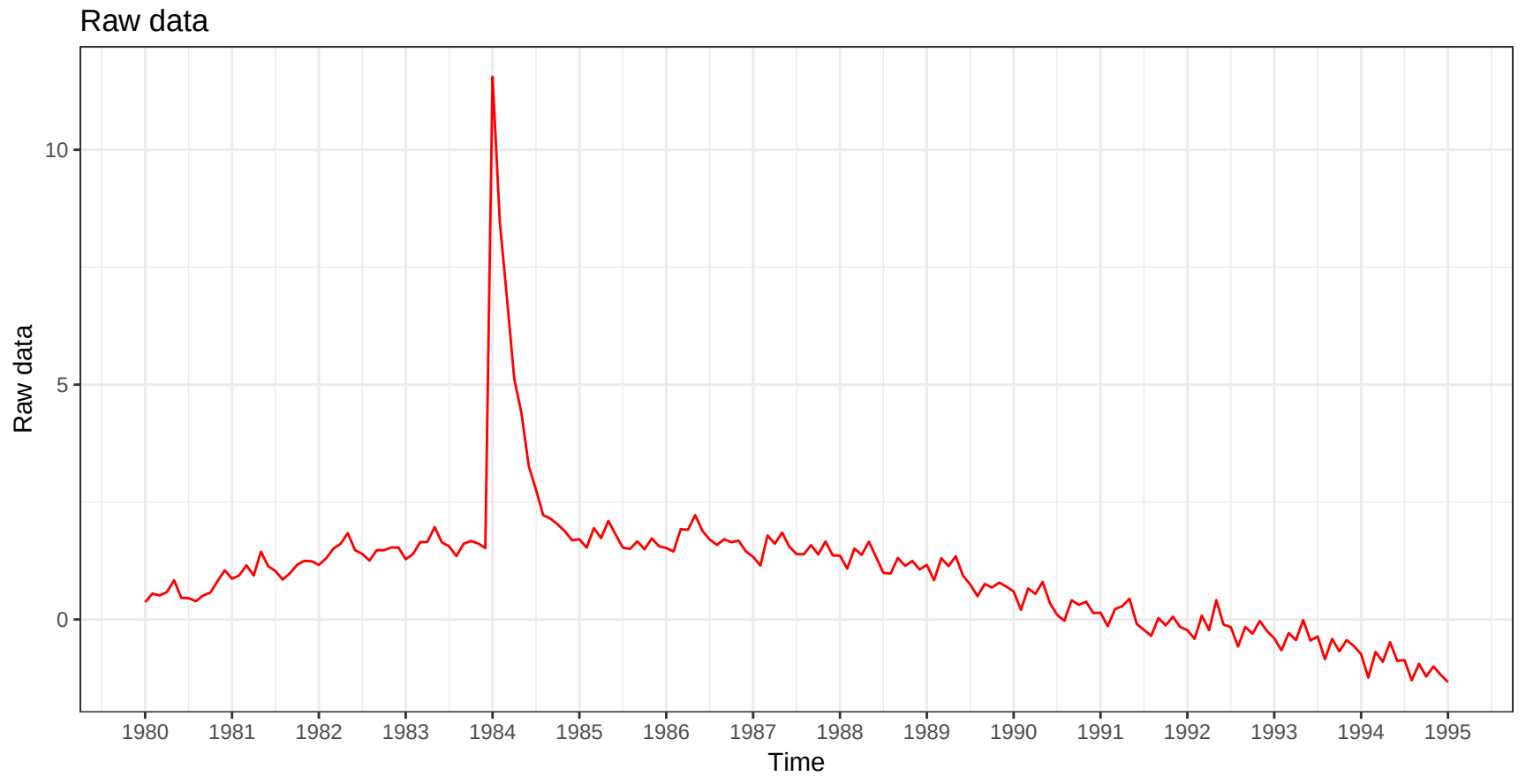

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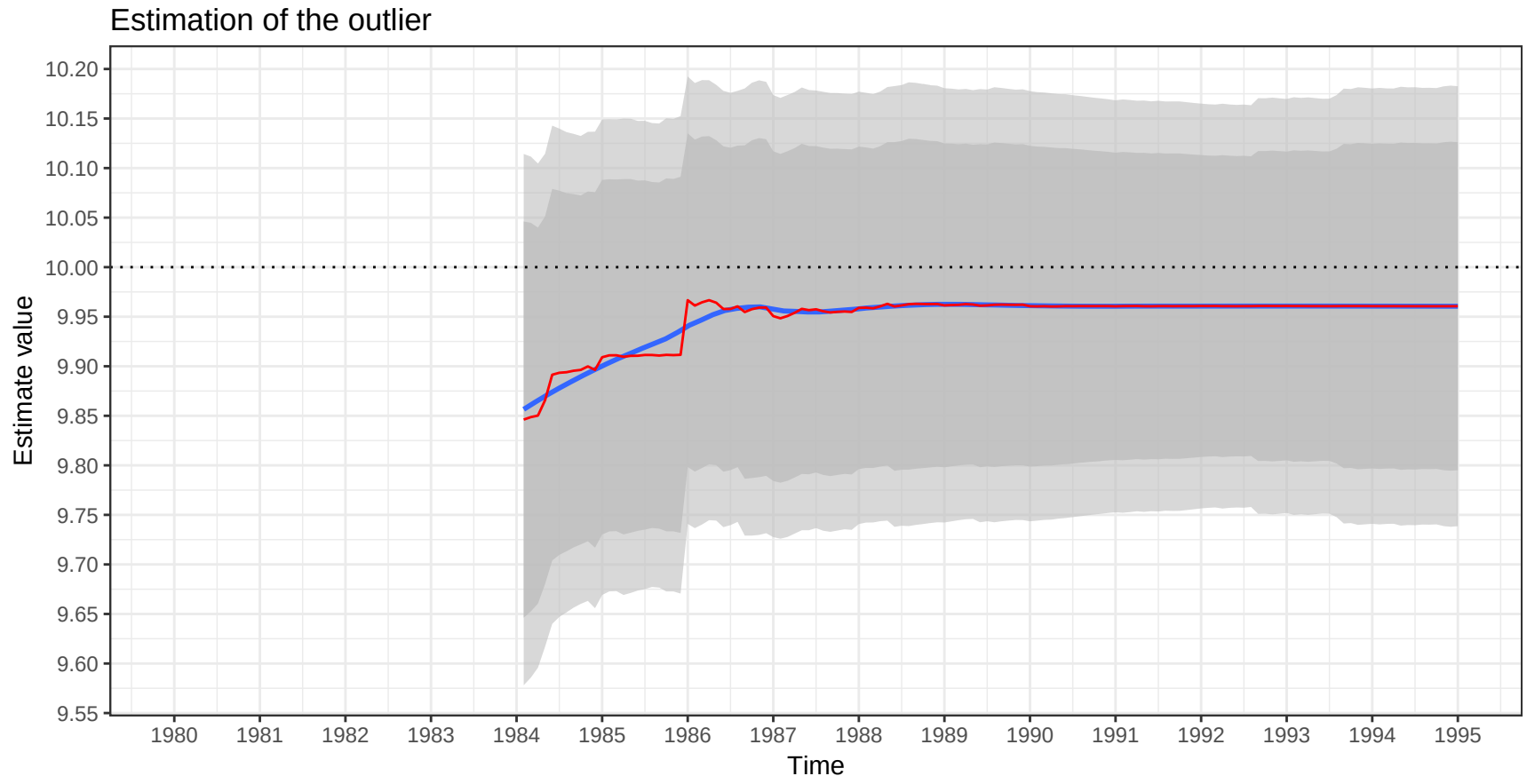
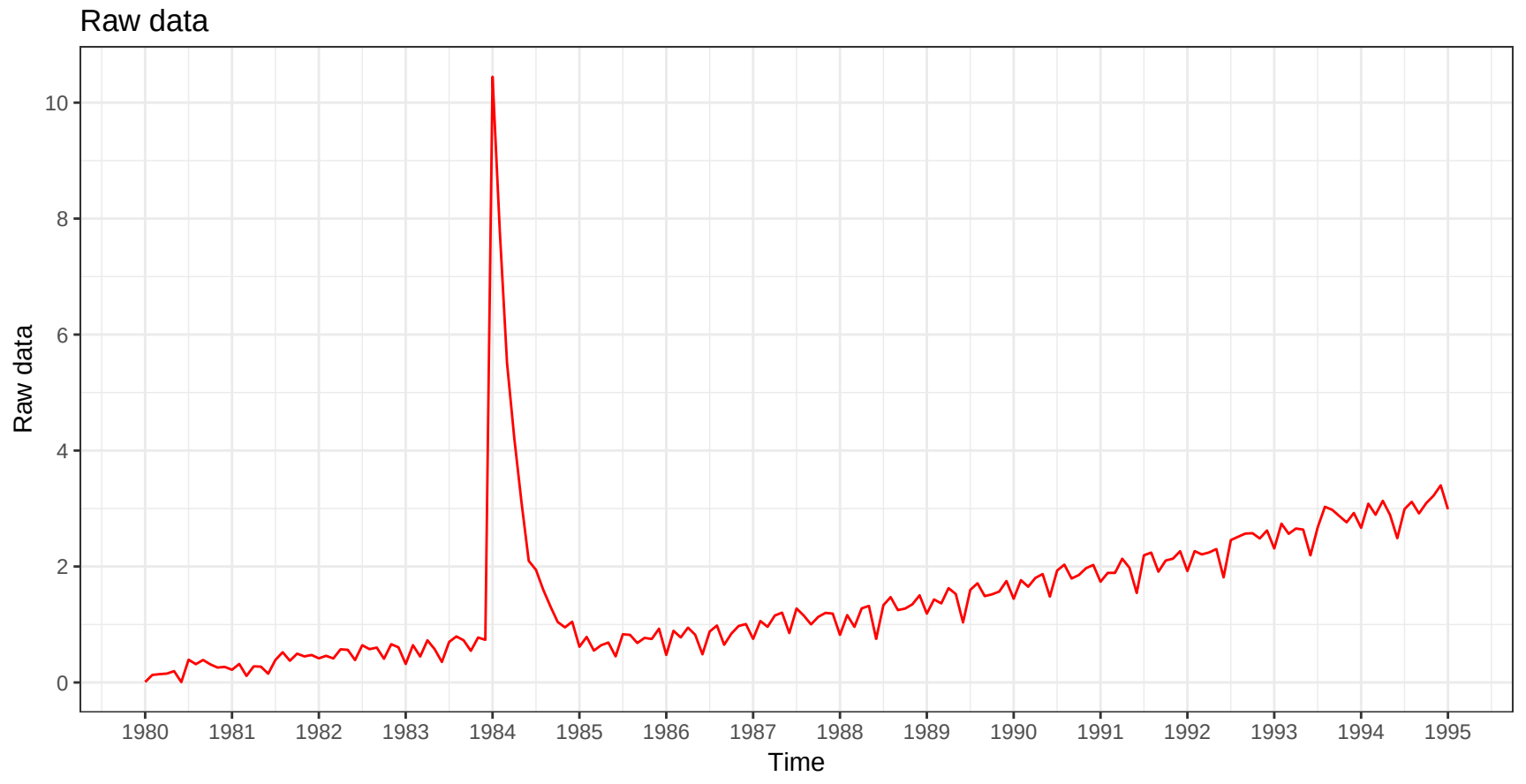
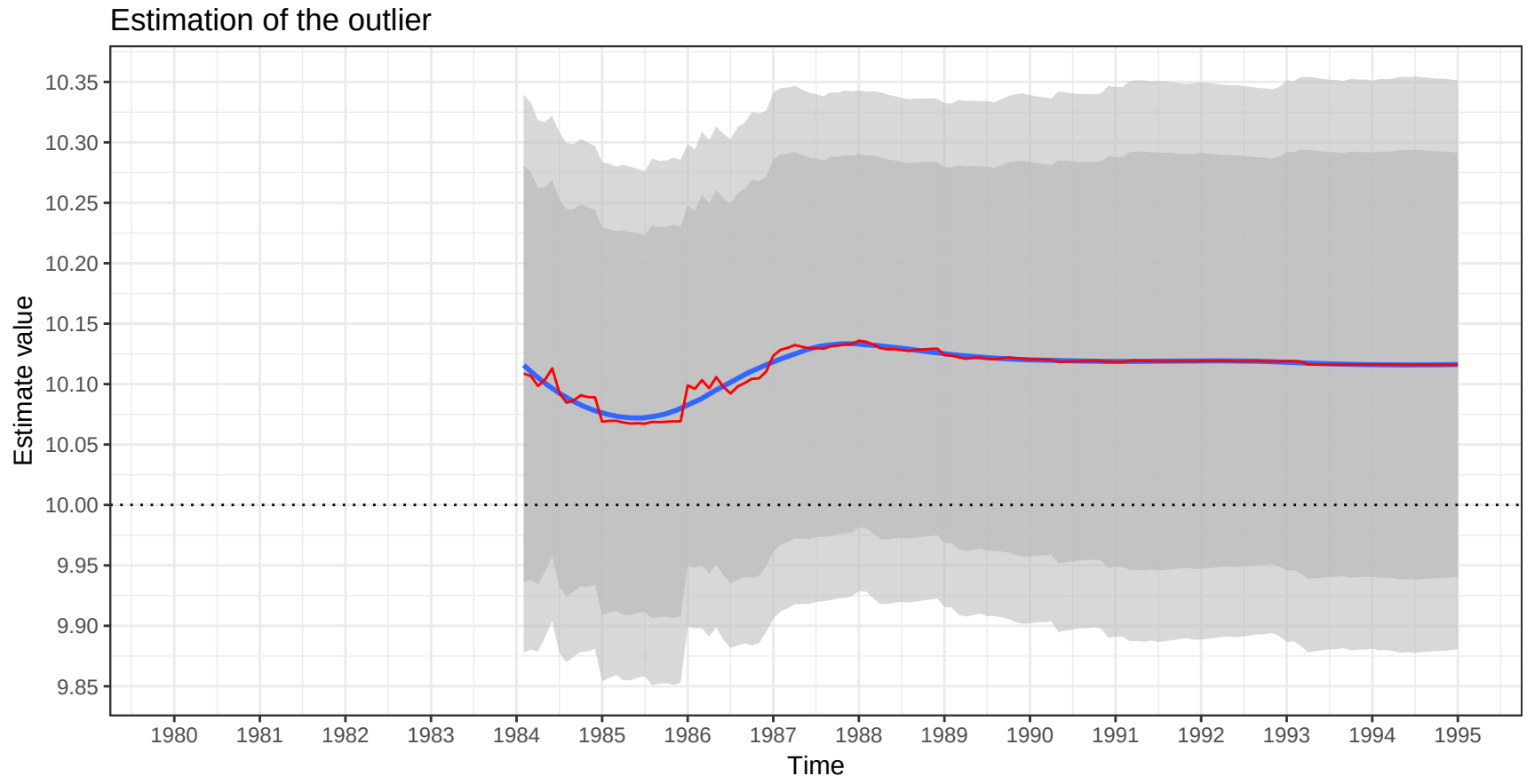
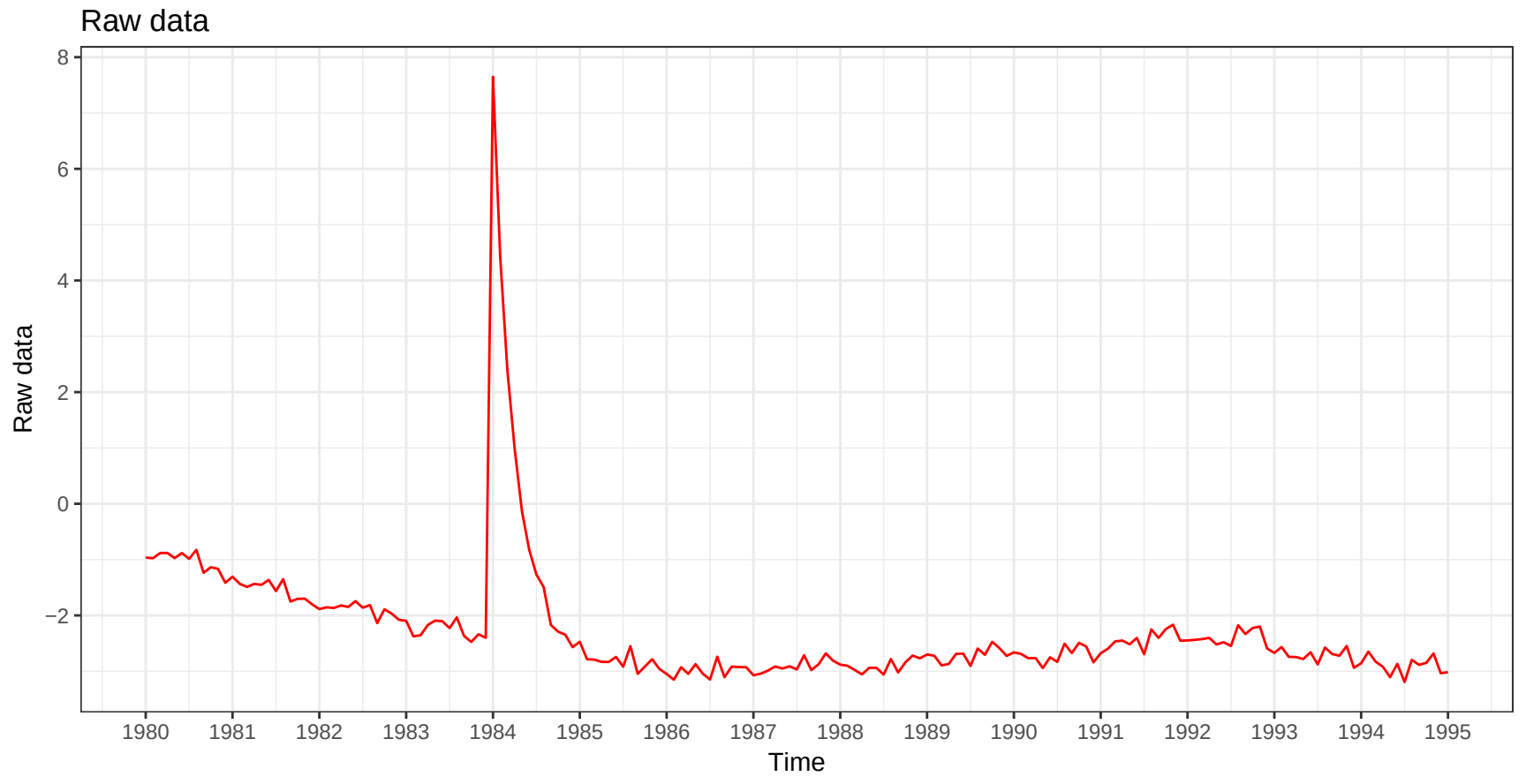




Estimate value of a TC(1984−01)
ARIMA (0,1,1)(1,1,1) − additive decomposition
(1−B)(1−B12)(1+0.4B12)Xt=(1−0.5B)(1−0.5B12)at





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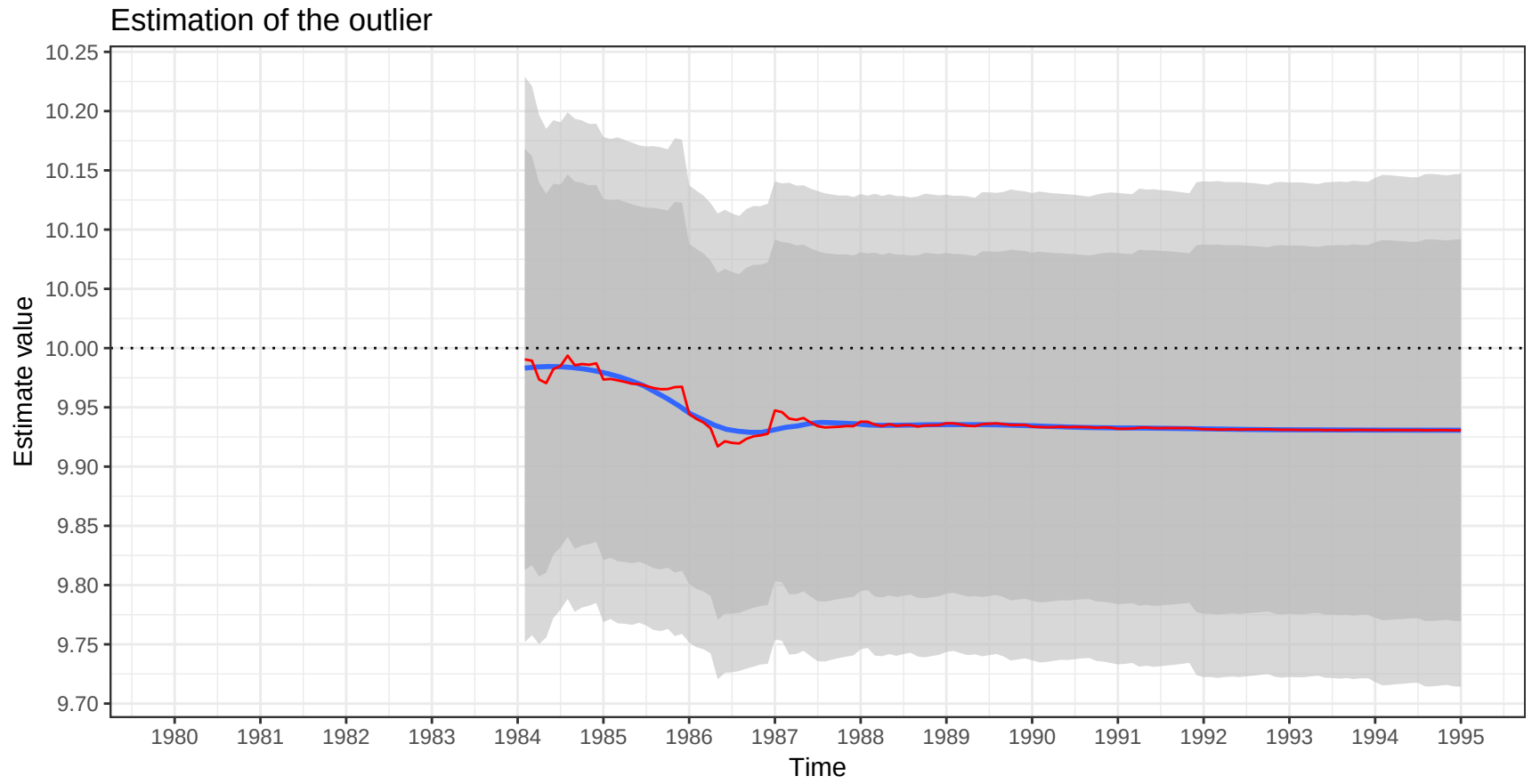
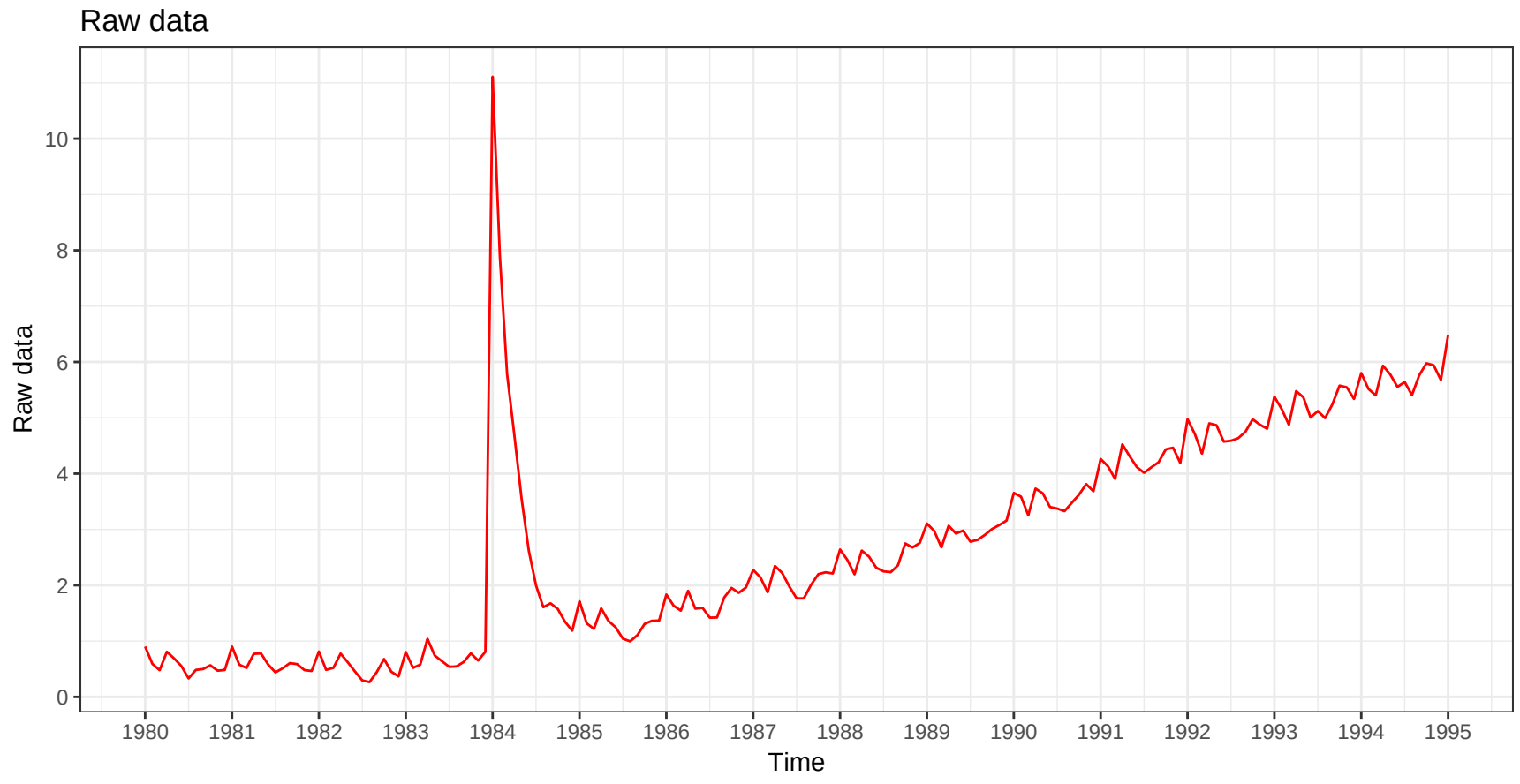
ARIMA (0,1,1)(1,1,1) − additive decomposition
(1−B)(1−B12)(1+0.4B12)Xt=(1−0.5B)(1−0.5B12)at

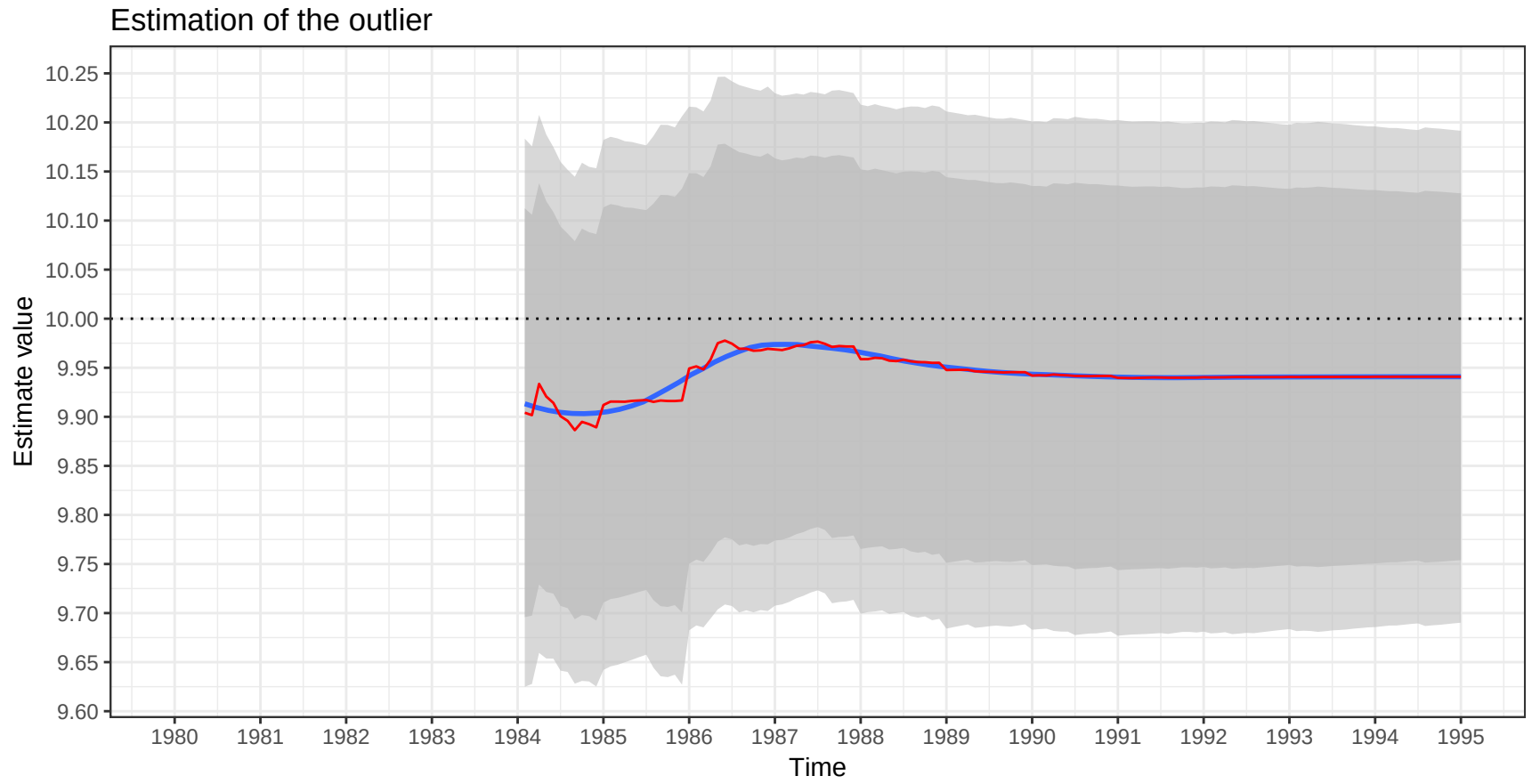


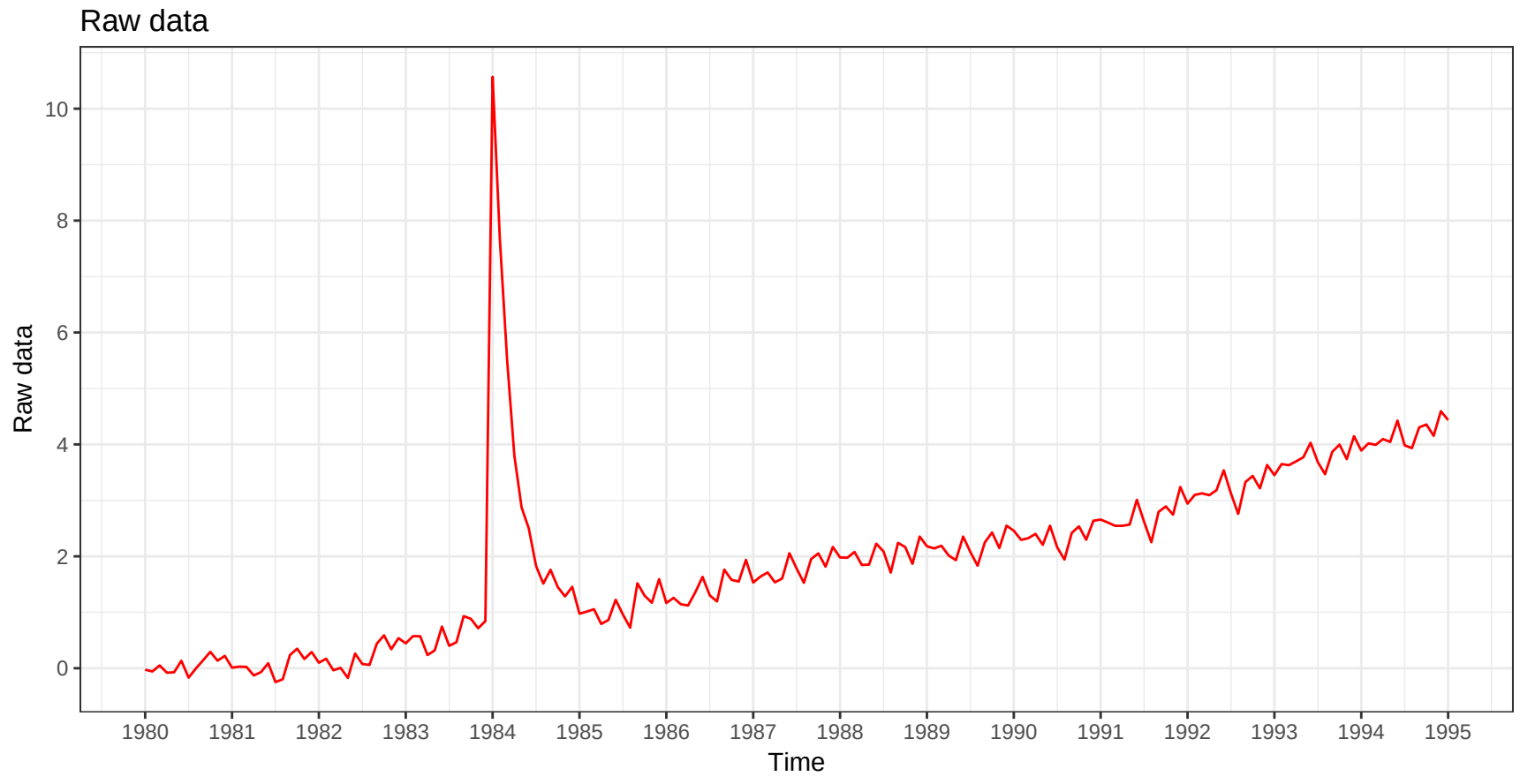


Estimate value of a TC(1984−01)

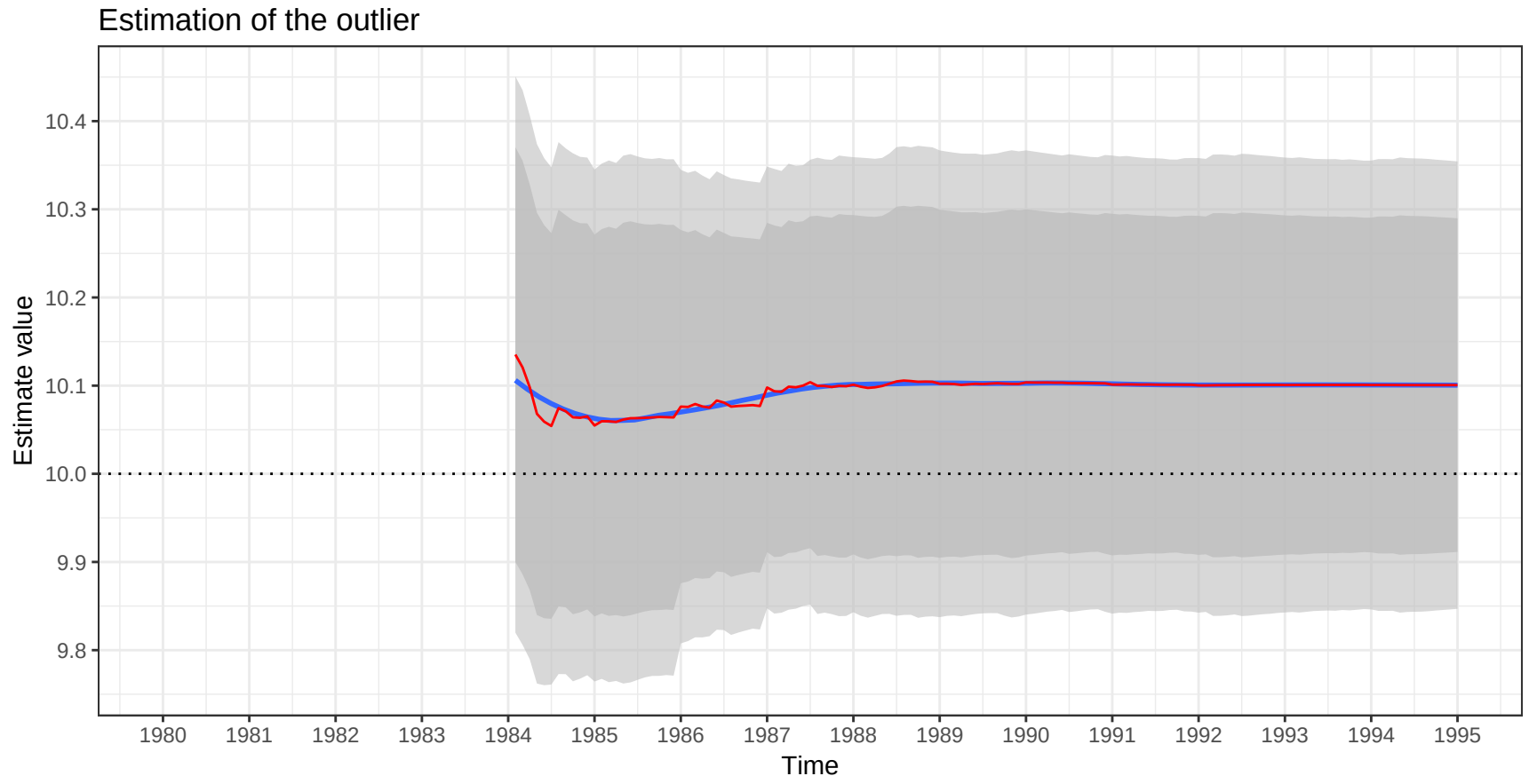
ARIMA (0,1,1)(1,1,1) − additive decomposition

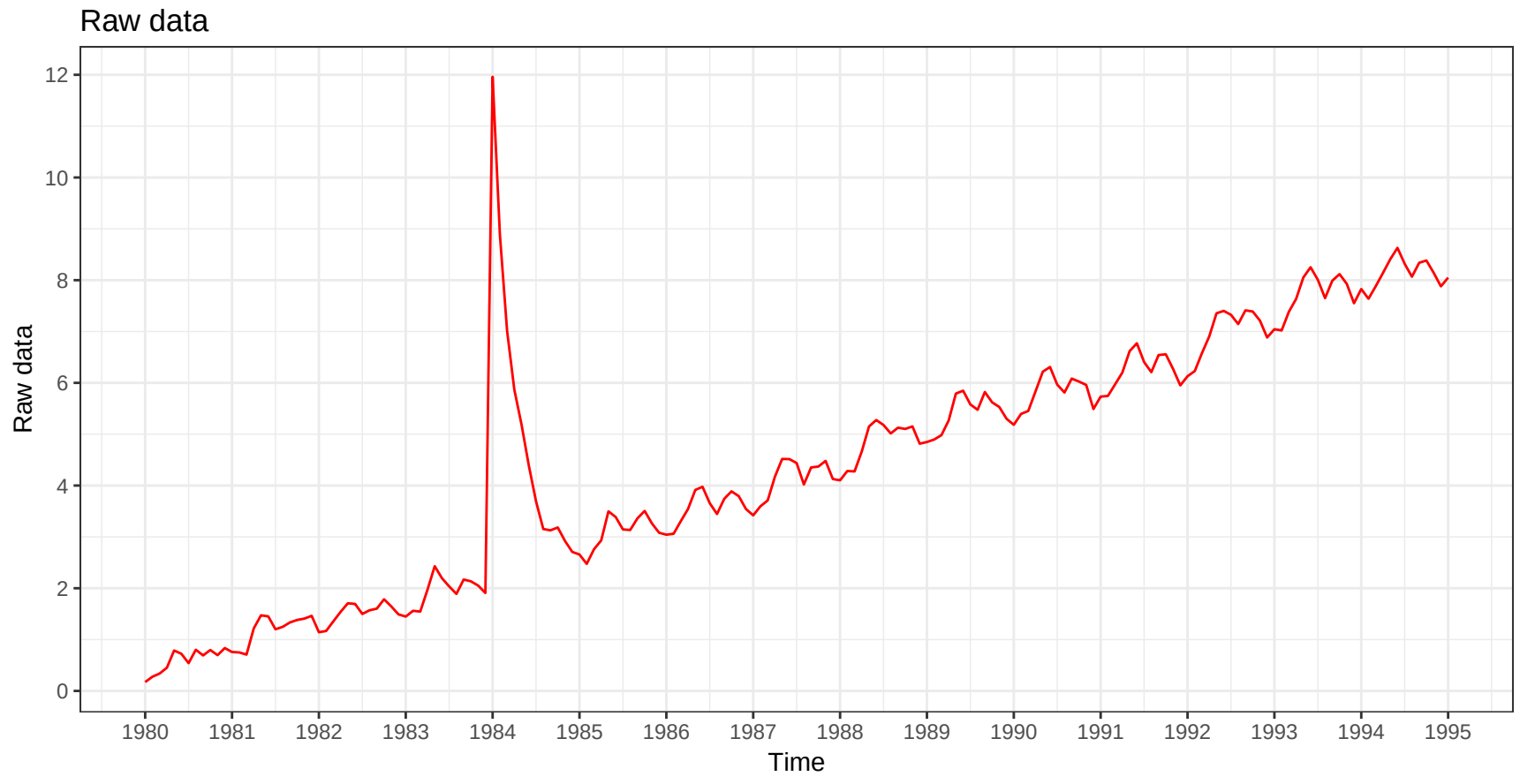
(1−B)(1−B12)(1+0.4B12)Xt=(1−0.5B)(1−0.5B12)at





Estimate value of a TC(1984−01)
ARIMA (0,1,1)(1,1,1) − additive decomposition
(1−B)(1−B12)(1+0.4B12)Xt=(1−0.5B)(1−0.5B12)at





Estimate value of a TC(1984−01)
ARIMA (0,1,1)(1,1,1) − additive decomposition
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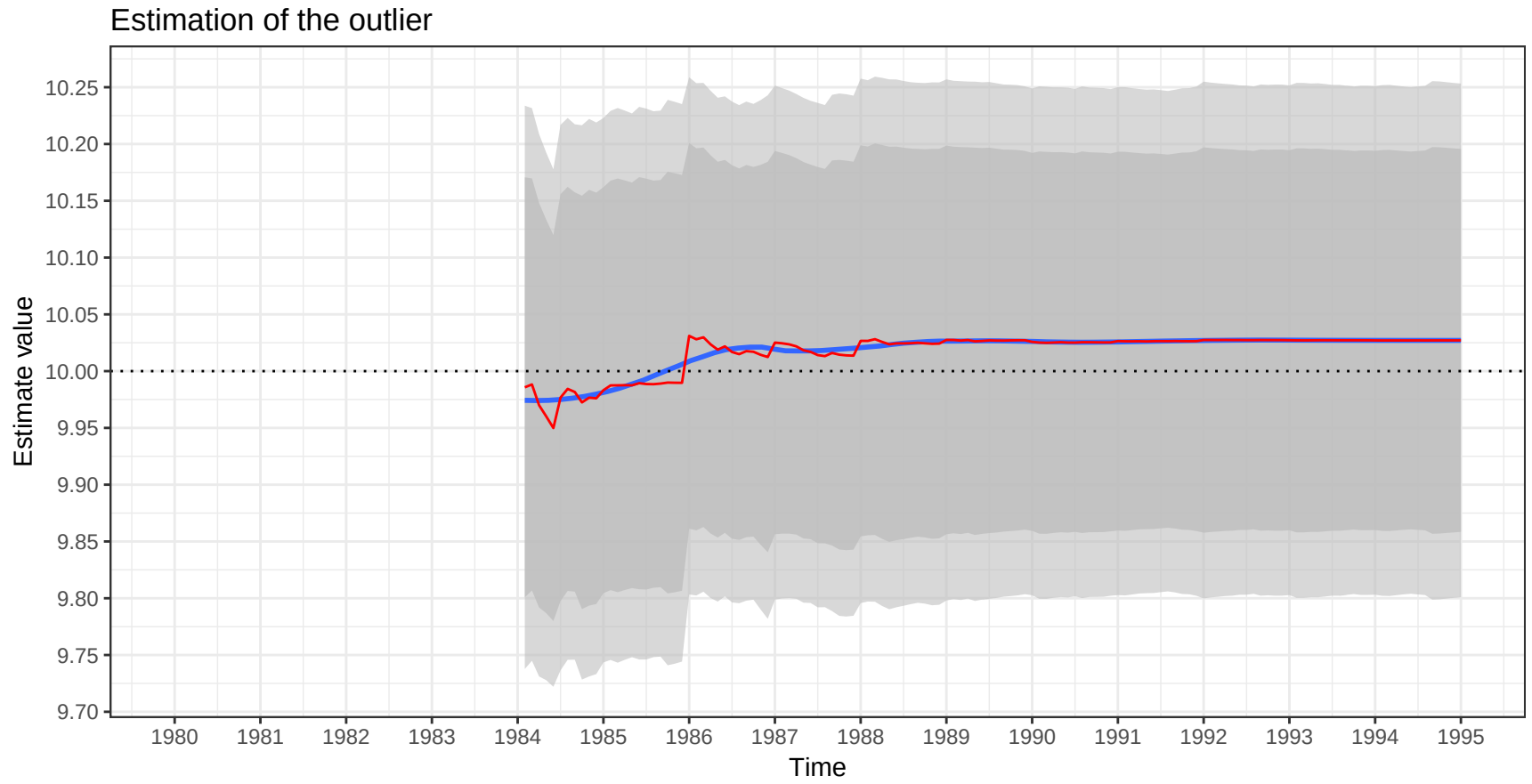
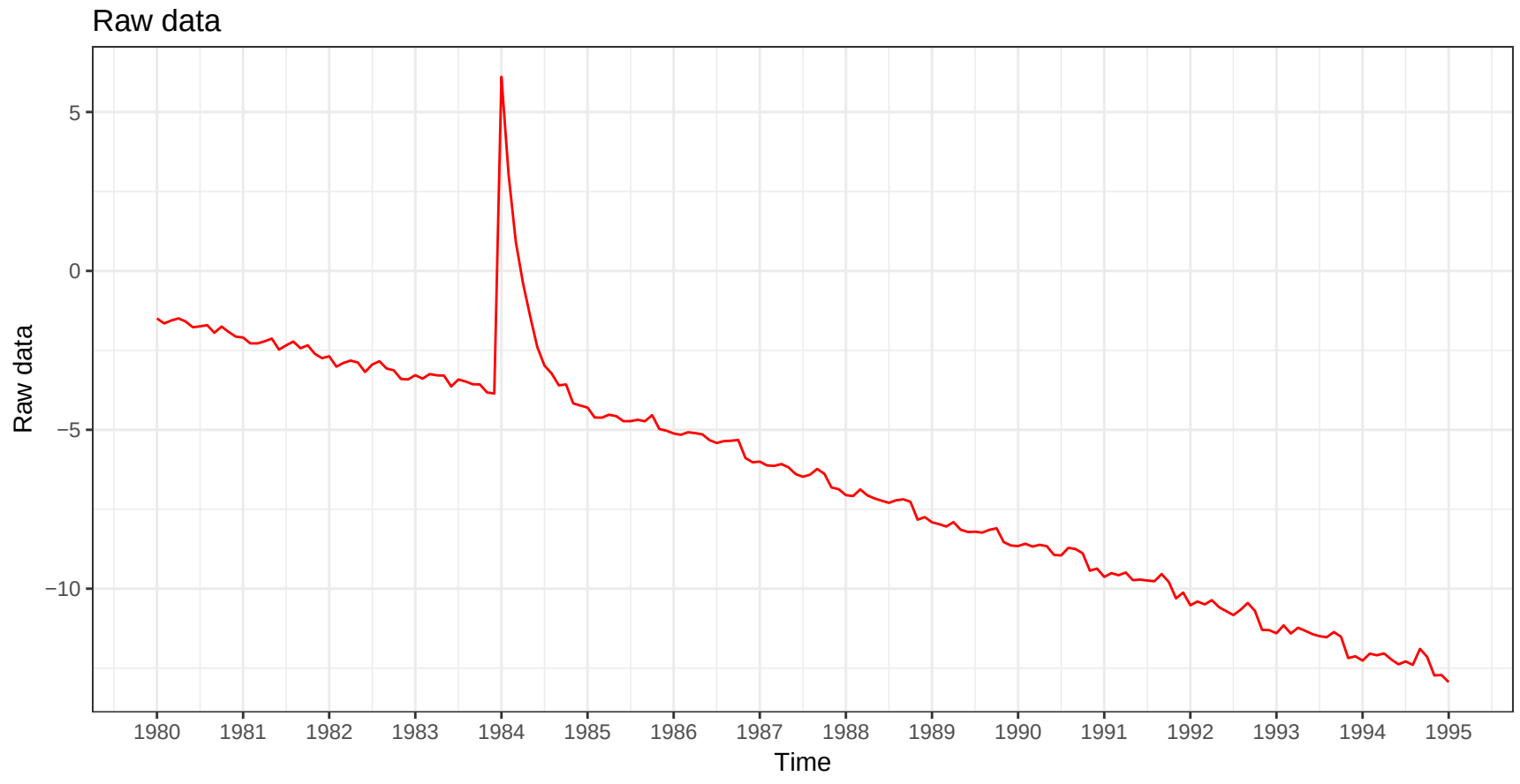
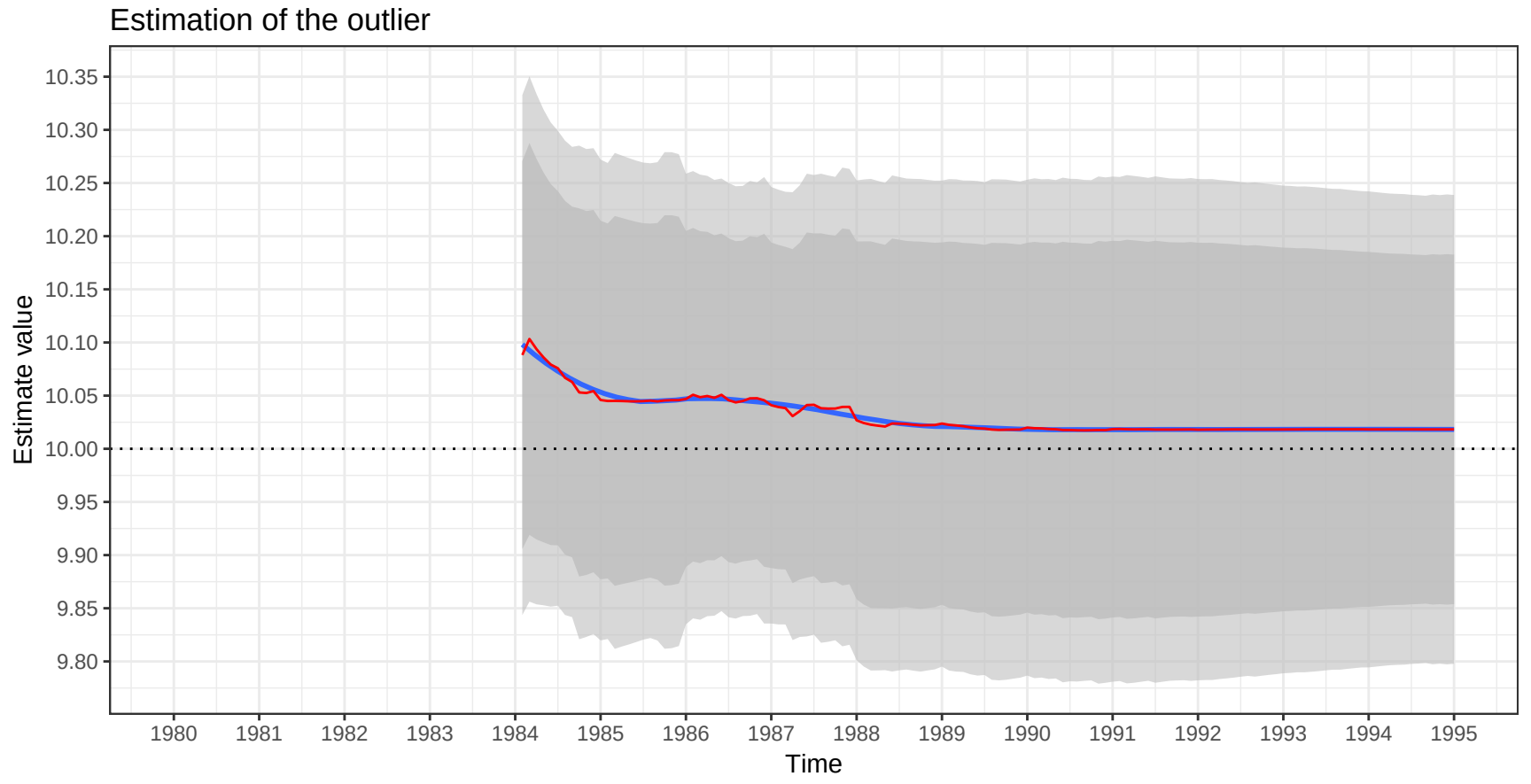
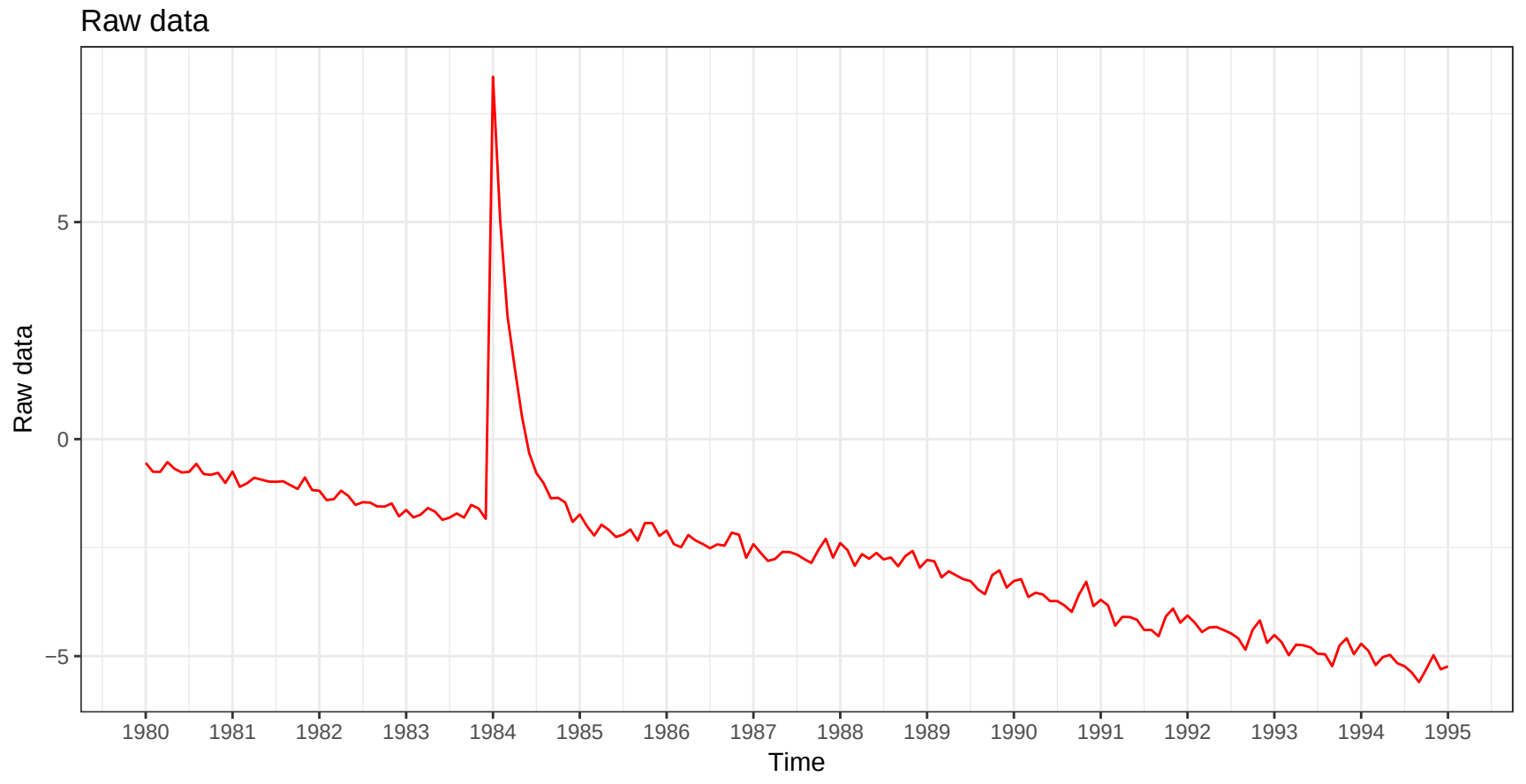


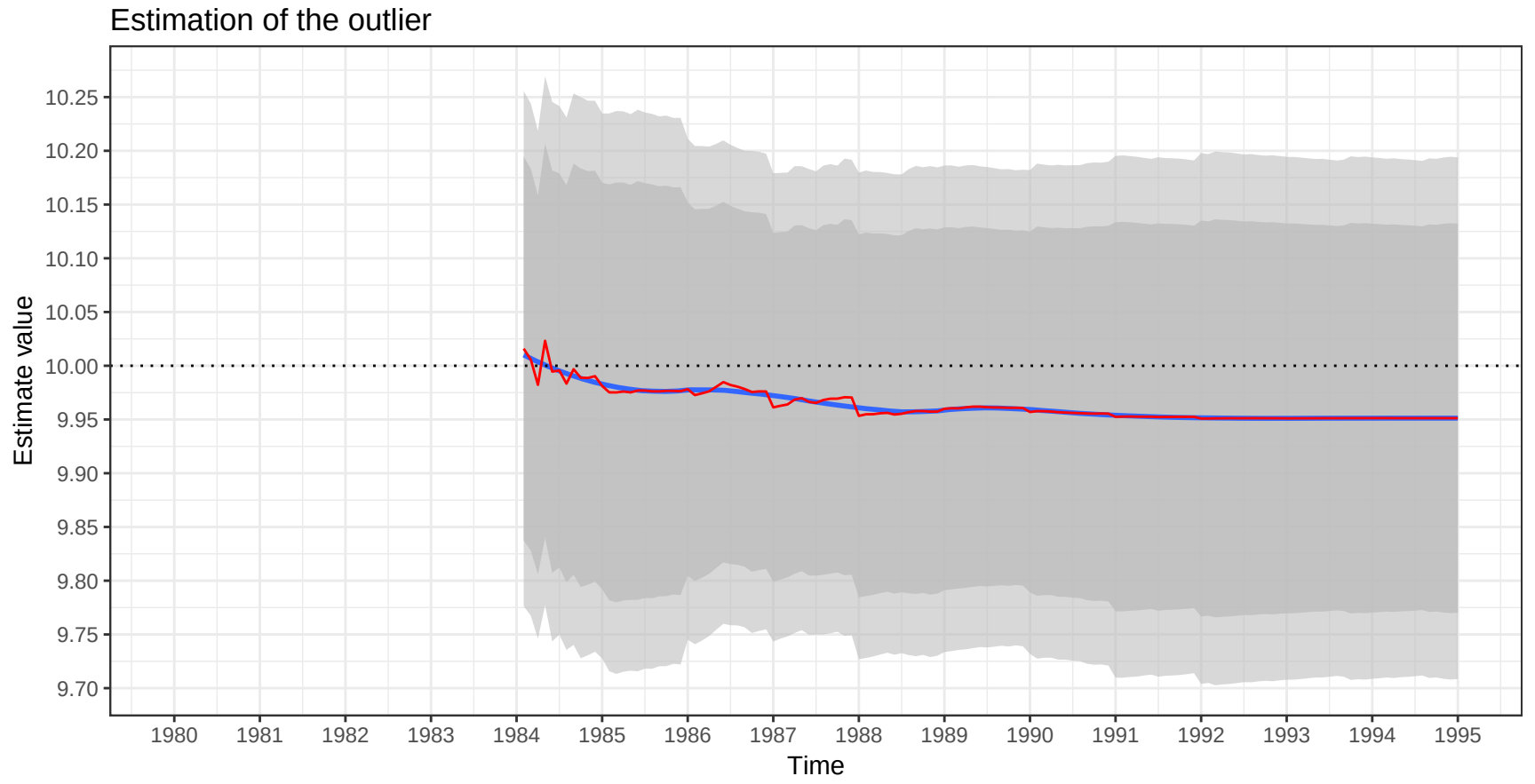


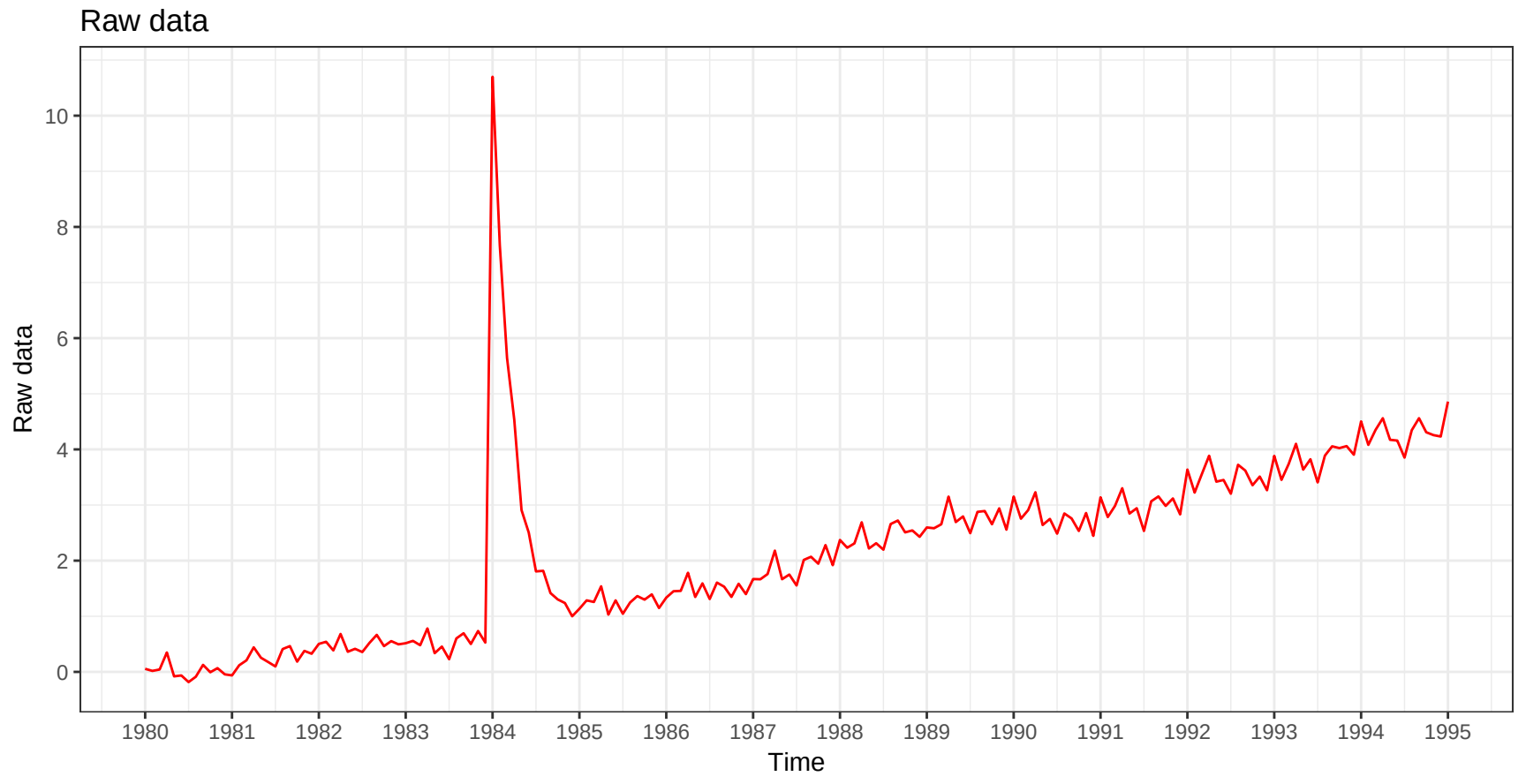
Estimate value of a TC(1984−01)
ARIMA (0,1,1)(1,1,1) − additive decomposition
(1−B)(1−B12)(1+0.4B12)Xt=(1−0.5B)(1−0.5B12)at





Estimate value of a TC(1984−01)
ARIMA (0,1,1)(1,1,1) − additive decomposition
(1−B)(1−B12)(1+0.4B12)Xt=(1−0.5B)(1−0.5B12)at

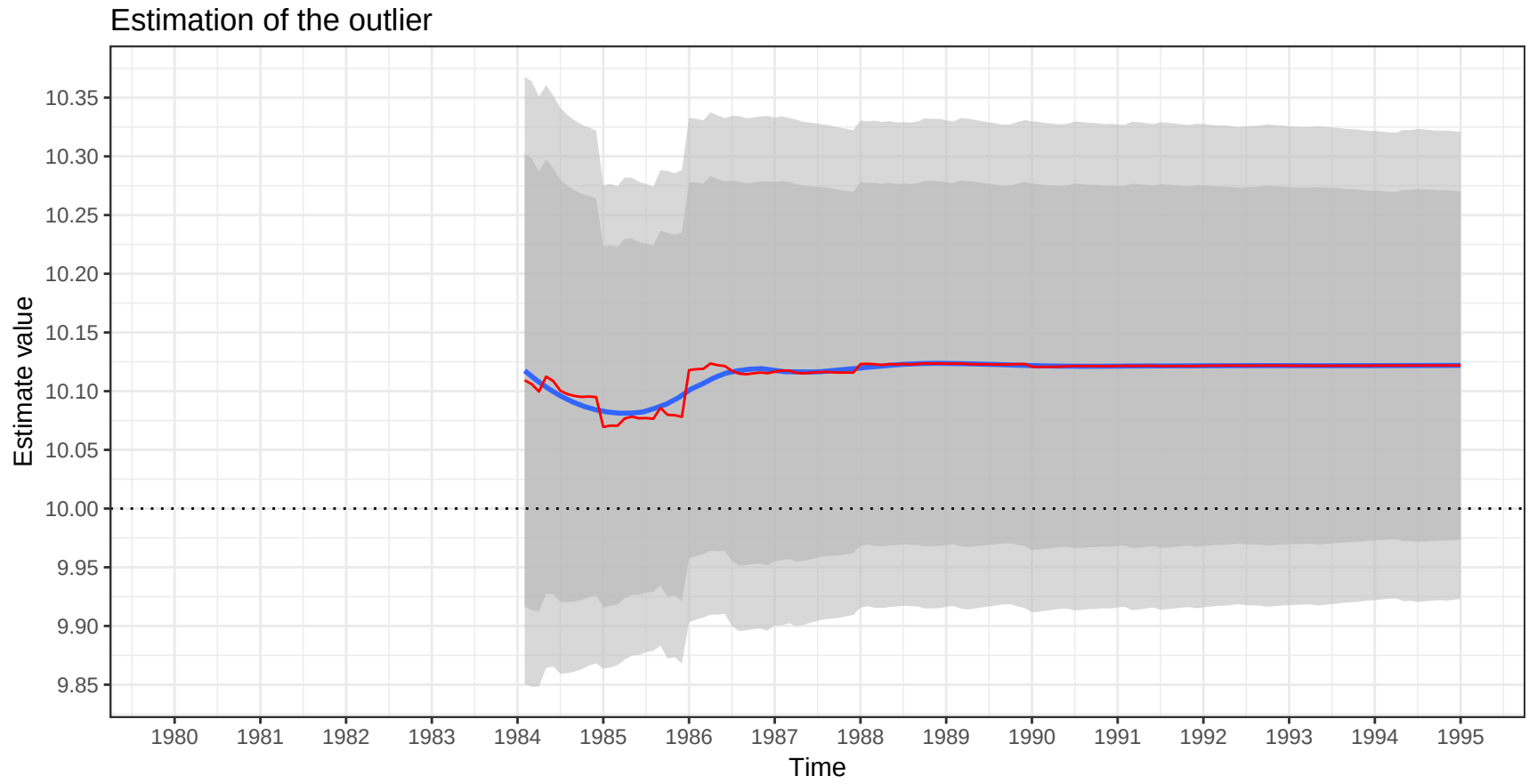


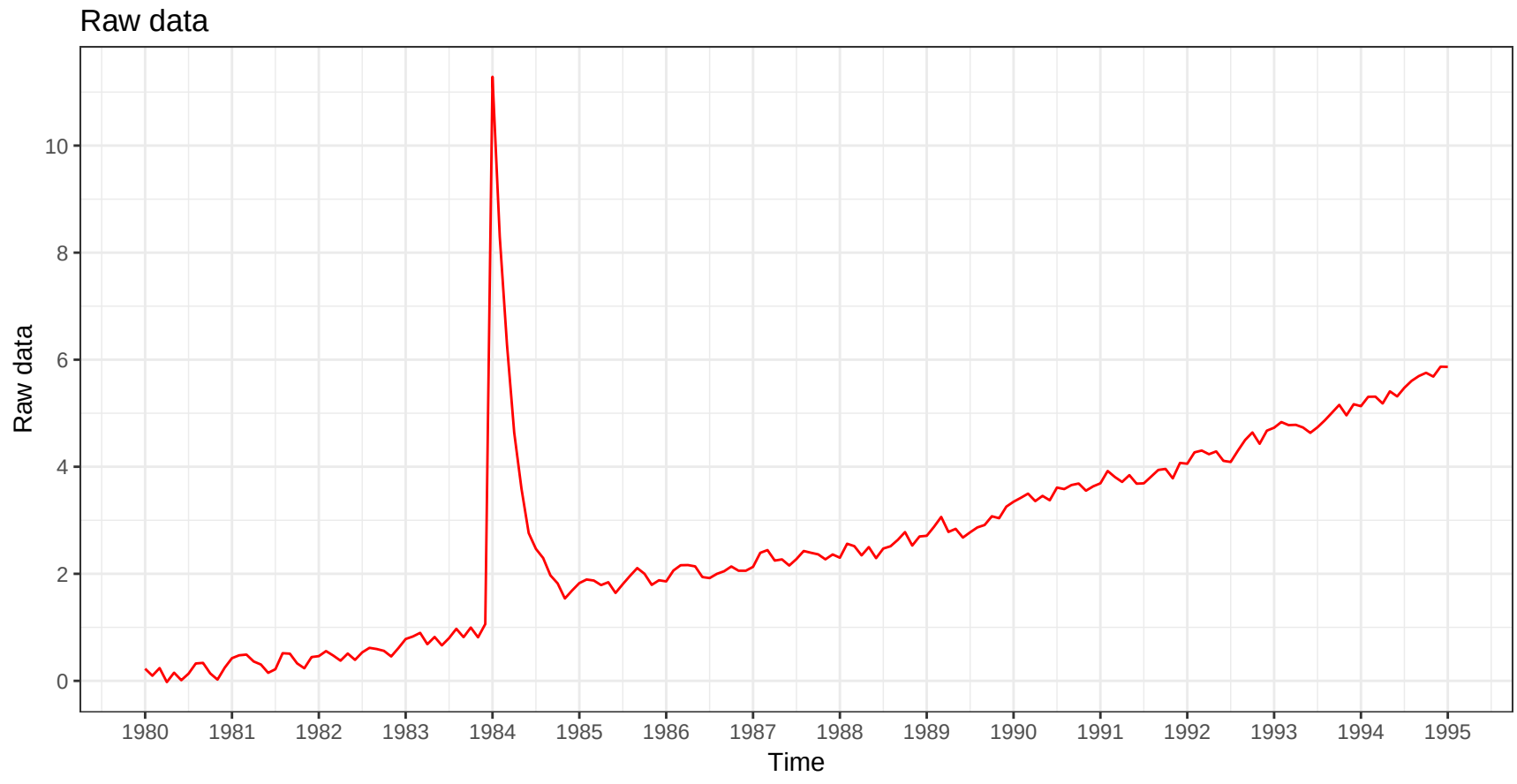


Estimate value of a TC(1984−01)

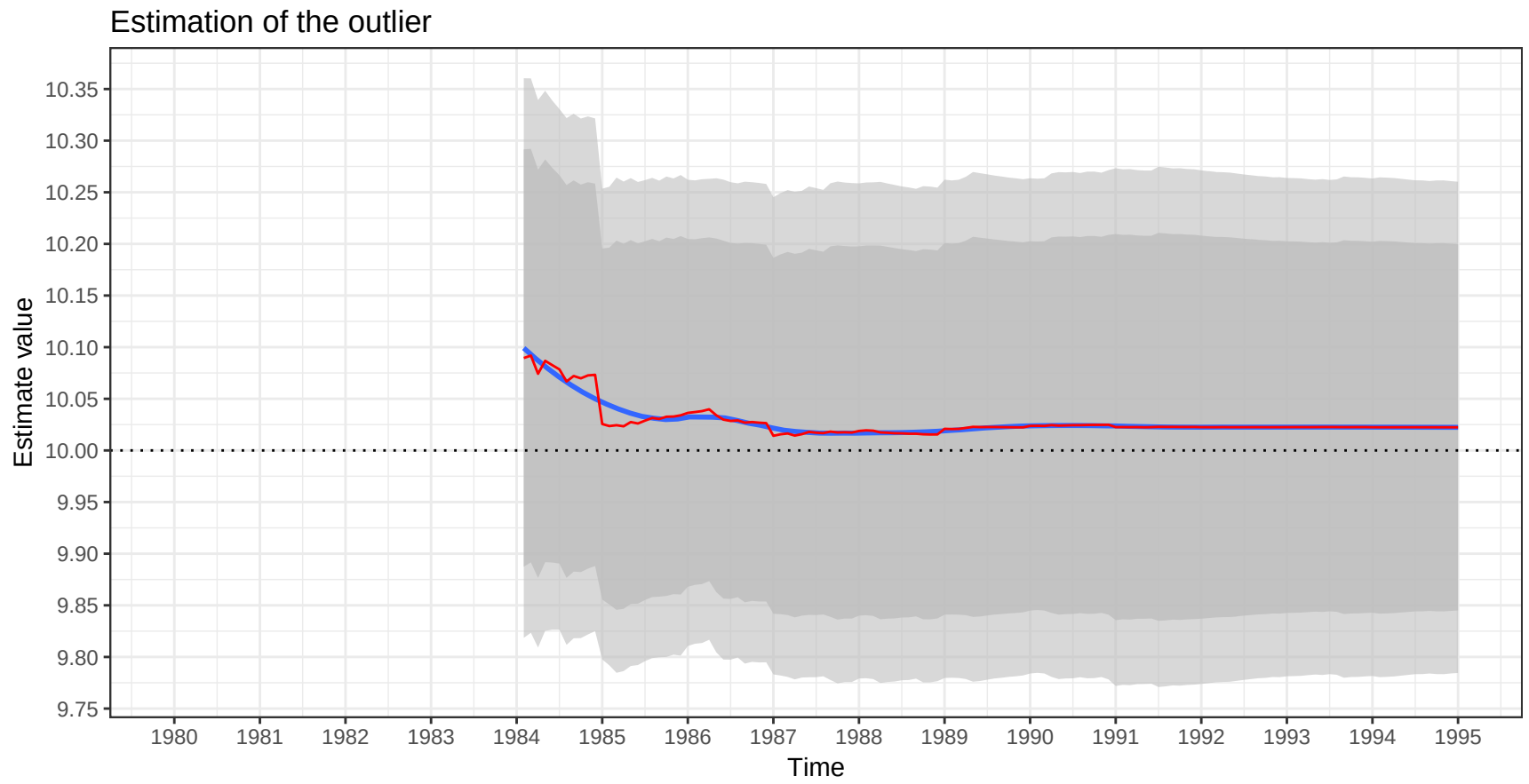
ARIMA (0,1,2)(0,1,1) − additive decomposition

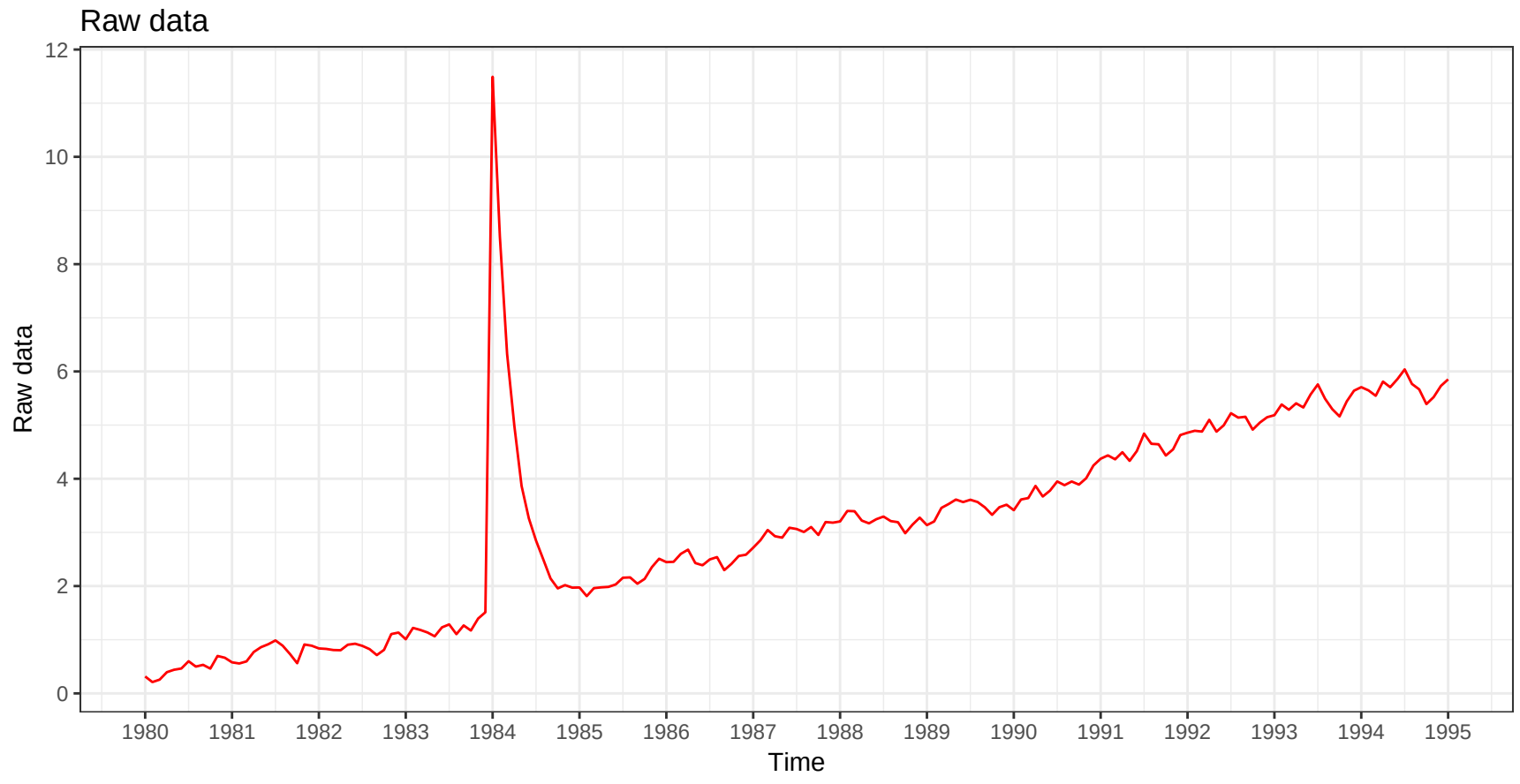
(1−B)(1−B12)Xt=(1−0.23B−0.19B2)(1−0.56B12)at



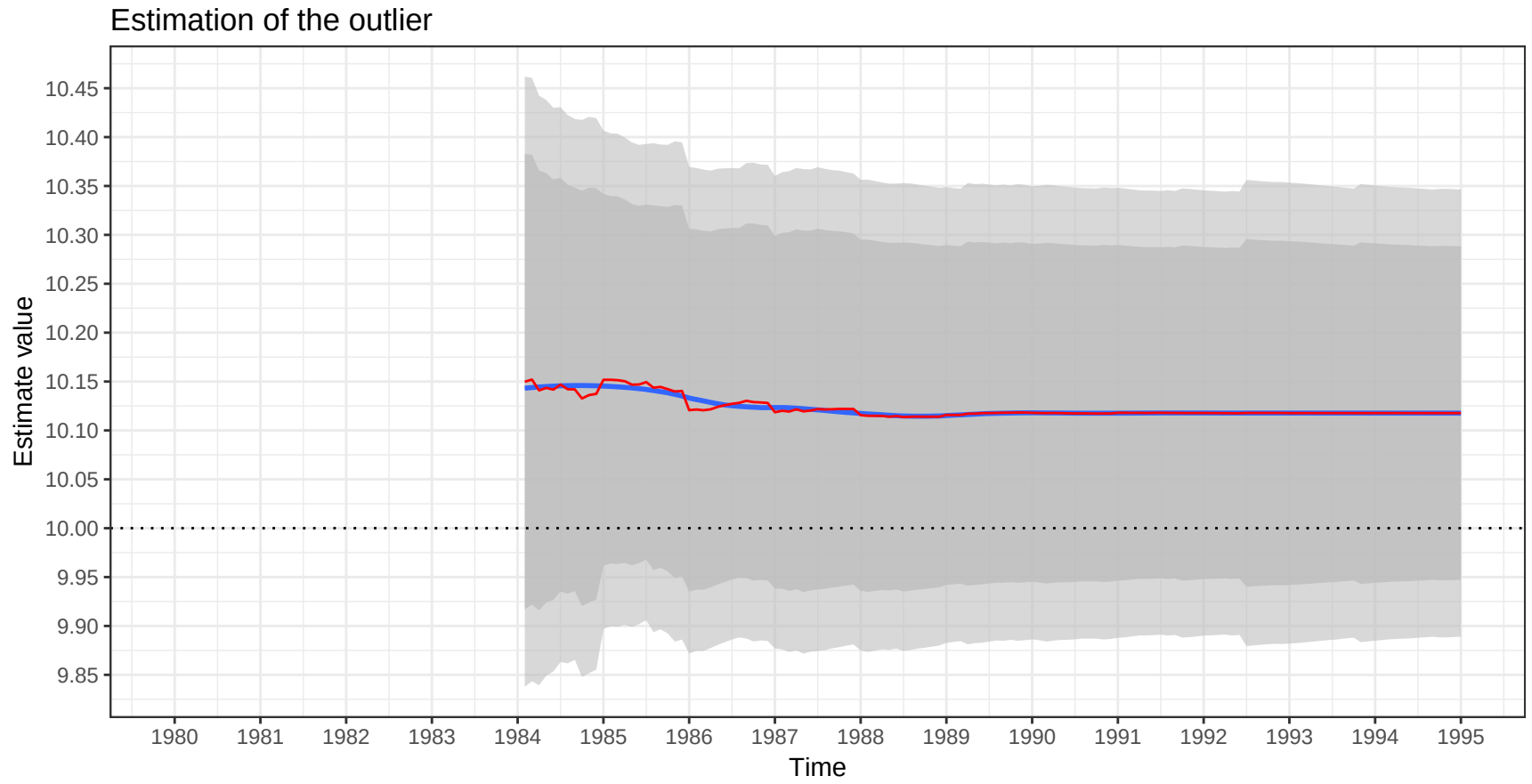


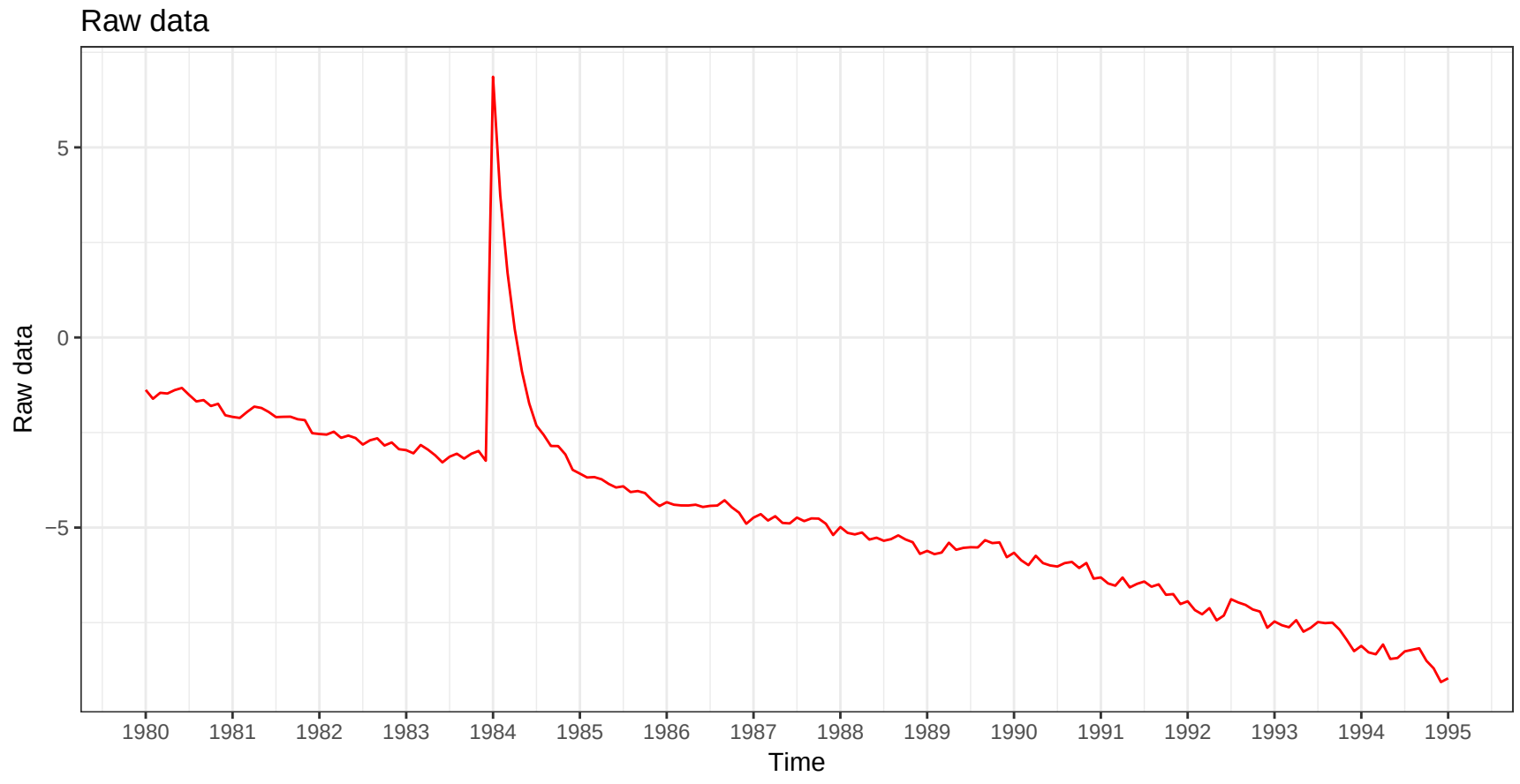
Estimate value of a TC(1984−01)
ARIMA (0,1,2)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.23B−0.19B2)(1−0.56B12)at





Estimate value of a TC(1984−01)
ARIMA (0,1,2)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.23B−0.19B2)(1−0.56B12)at





Estimate value of a TC(1984−01)

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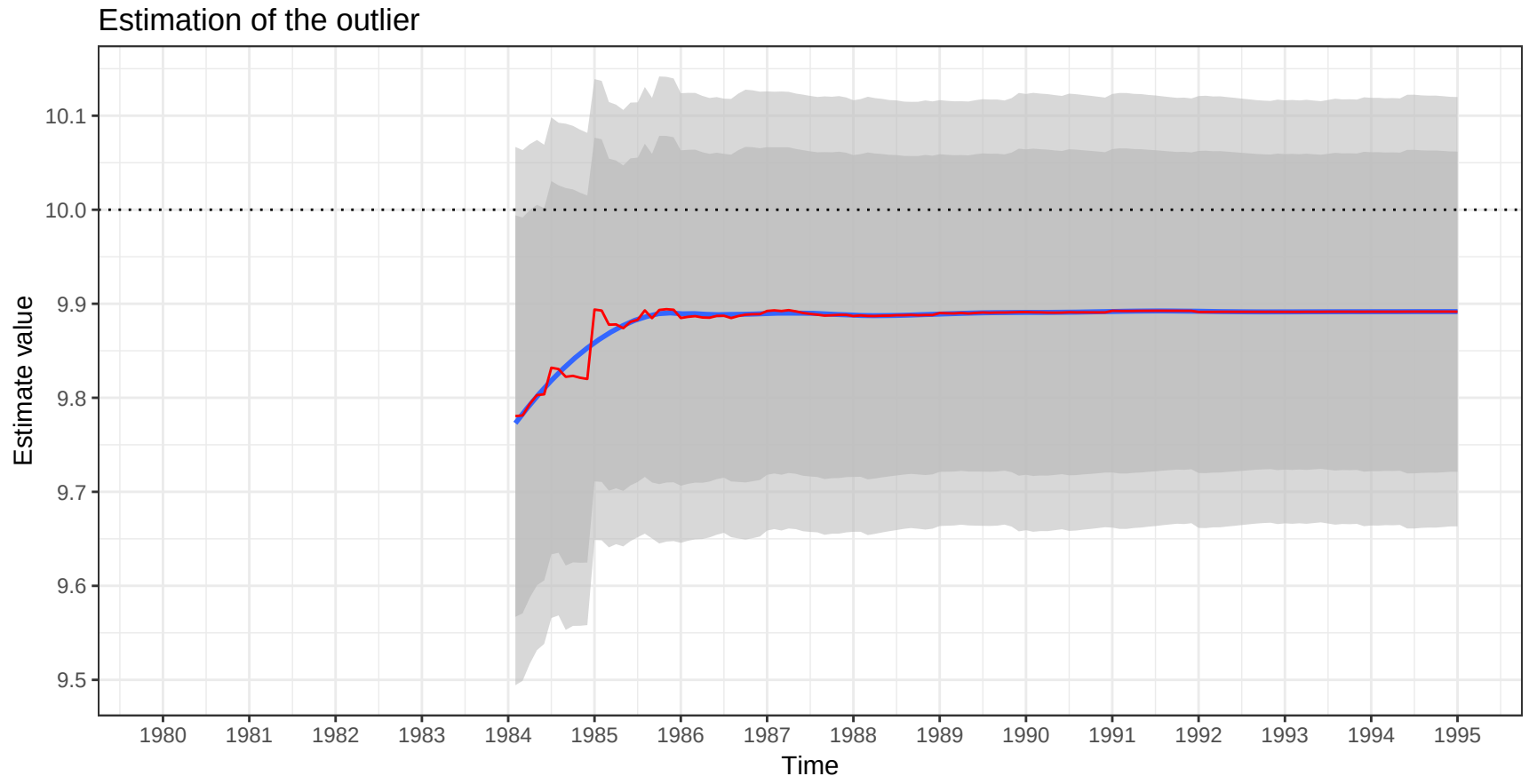
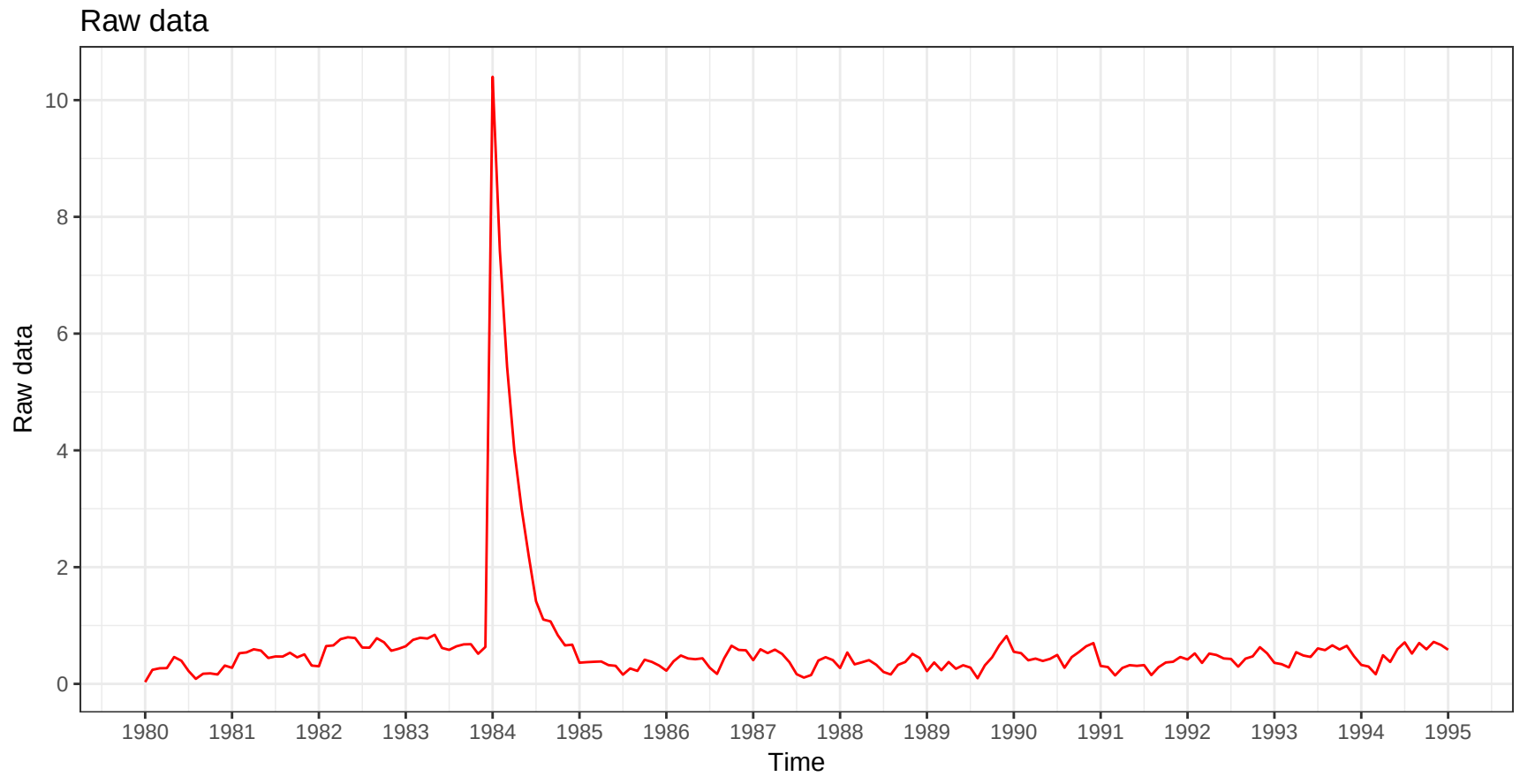
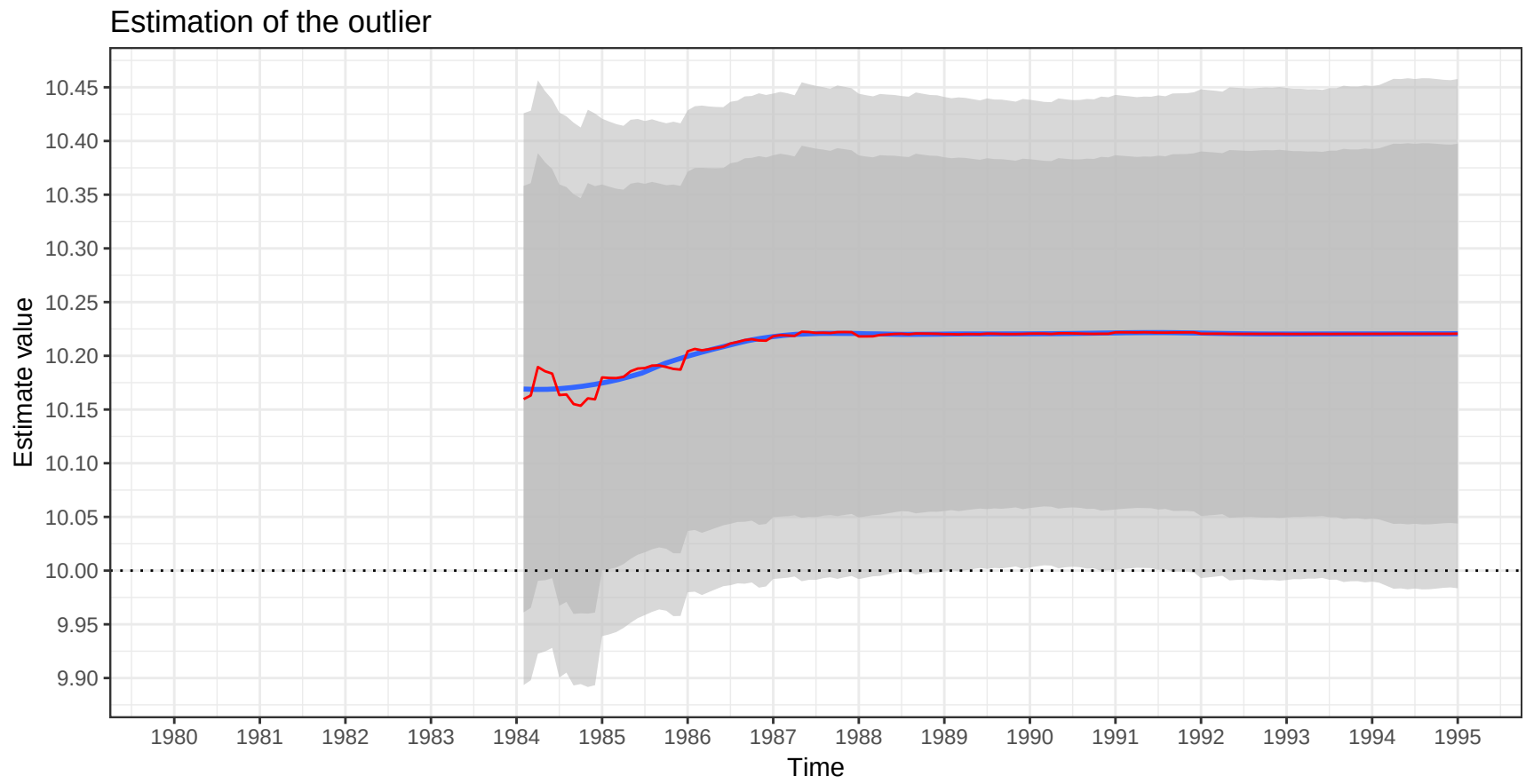
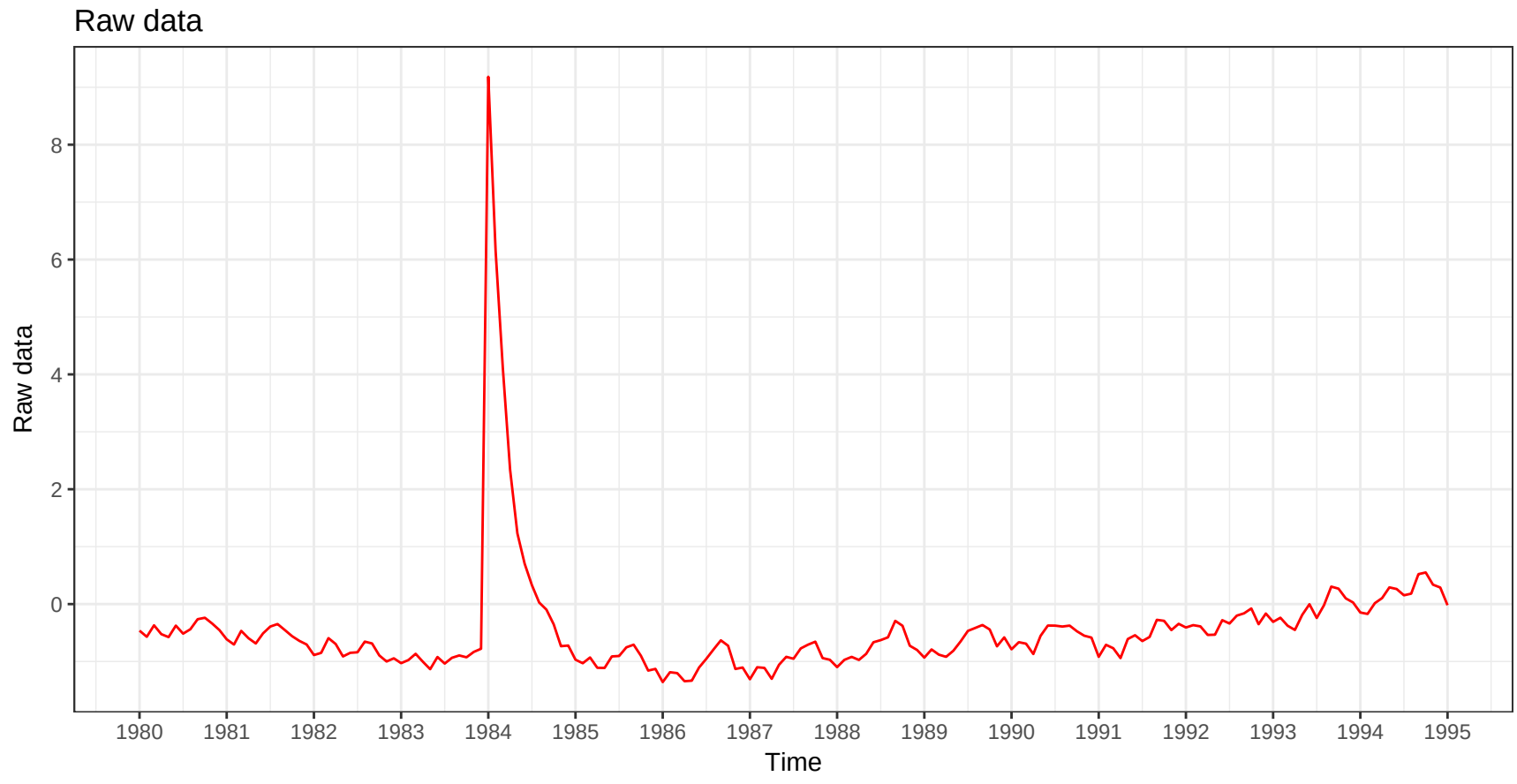


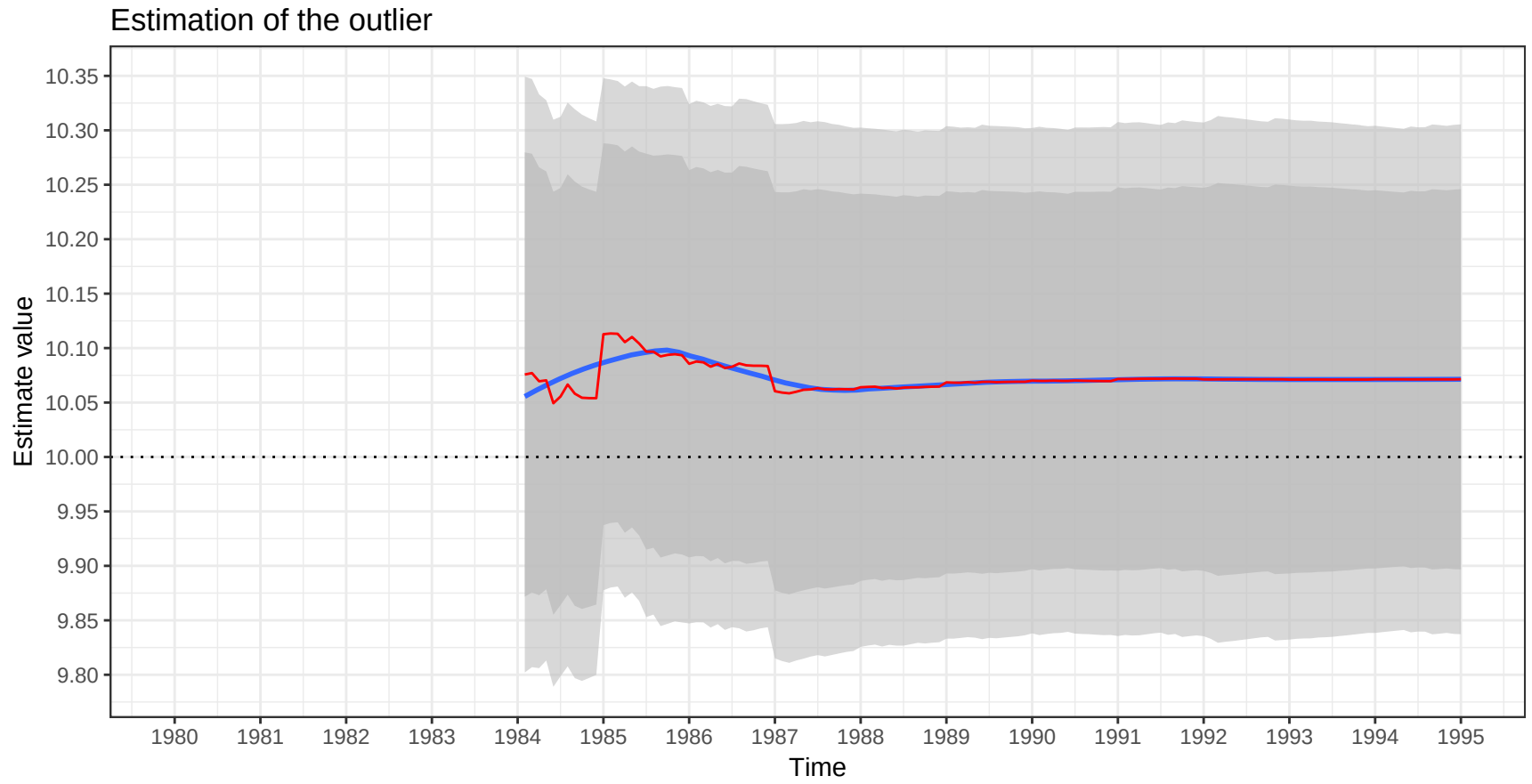


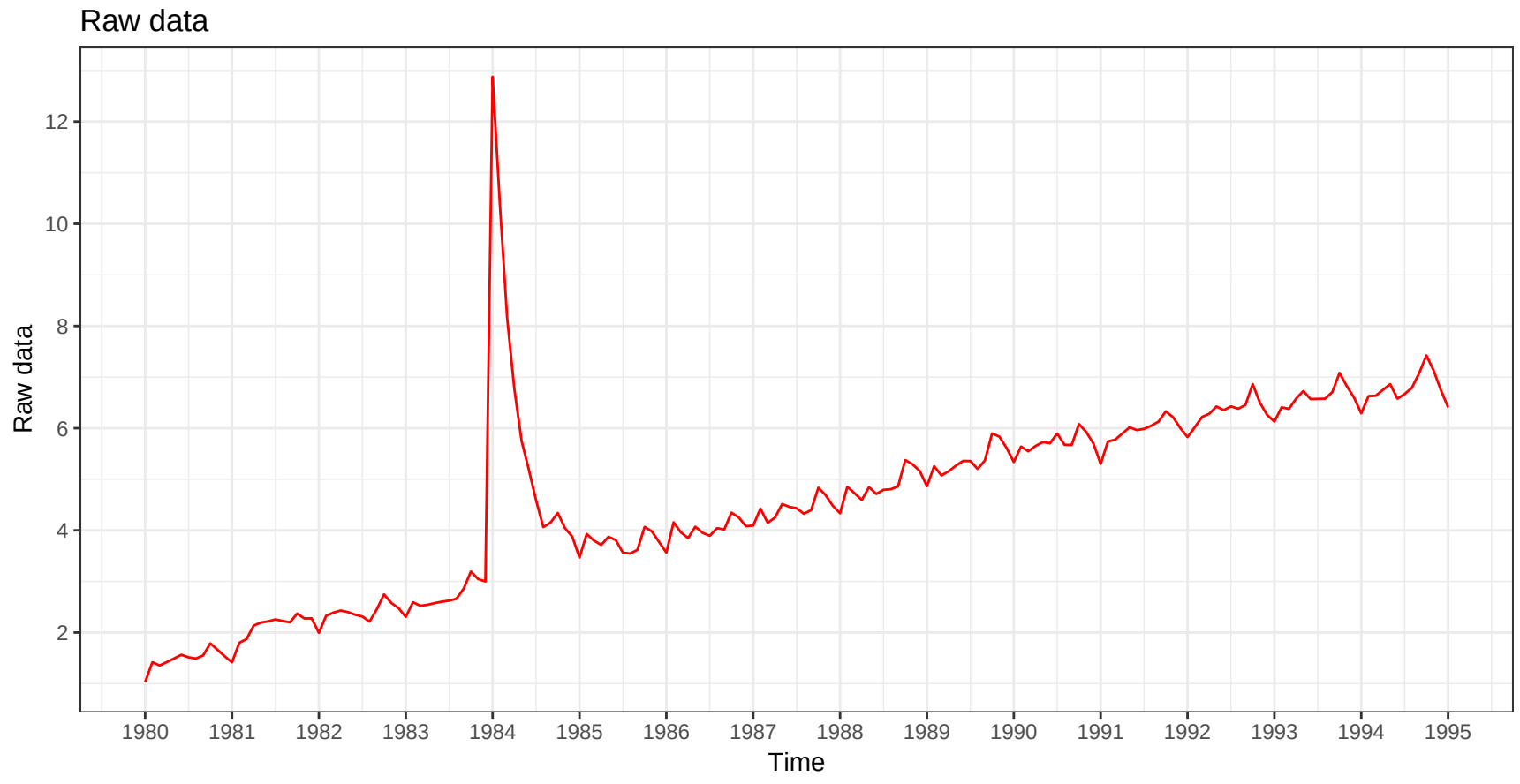
Estimate value of a TC(1984−01)
ARIMA (0,1,2)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.23B−0.19B2)(1−0.56B12)at





Estimate value of a TC(1984−01)
ARIMA (0,1,2)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.23B−0.19B2)(1−0.56B12)at





Estimate value of a TC(1984−01)

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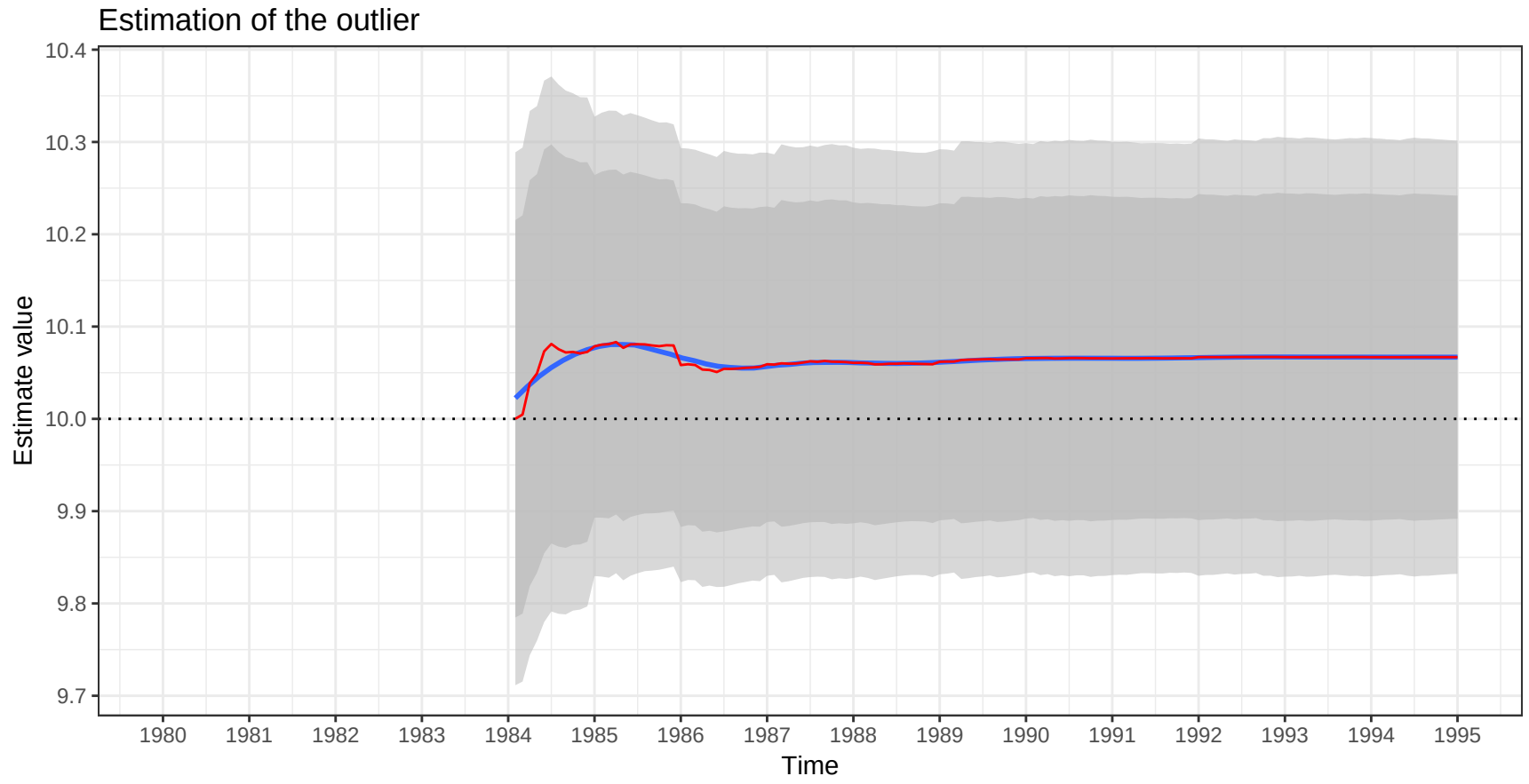
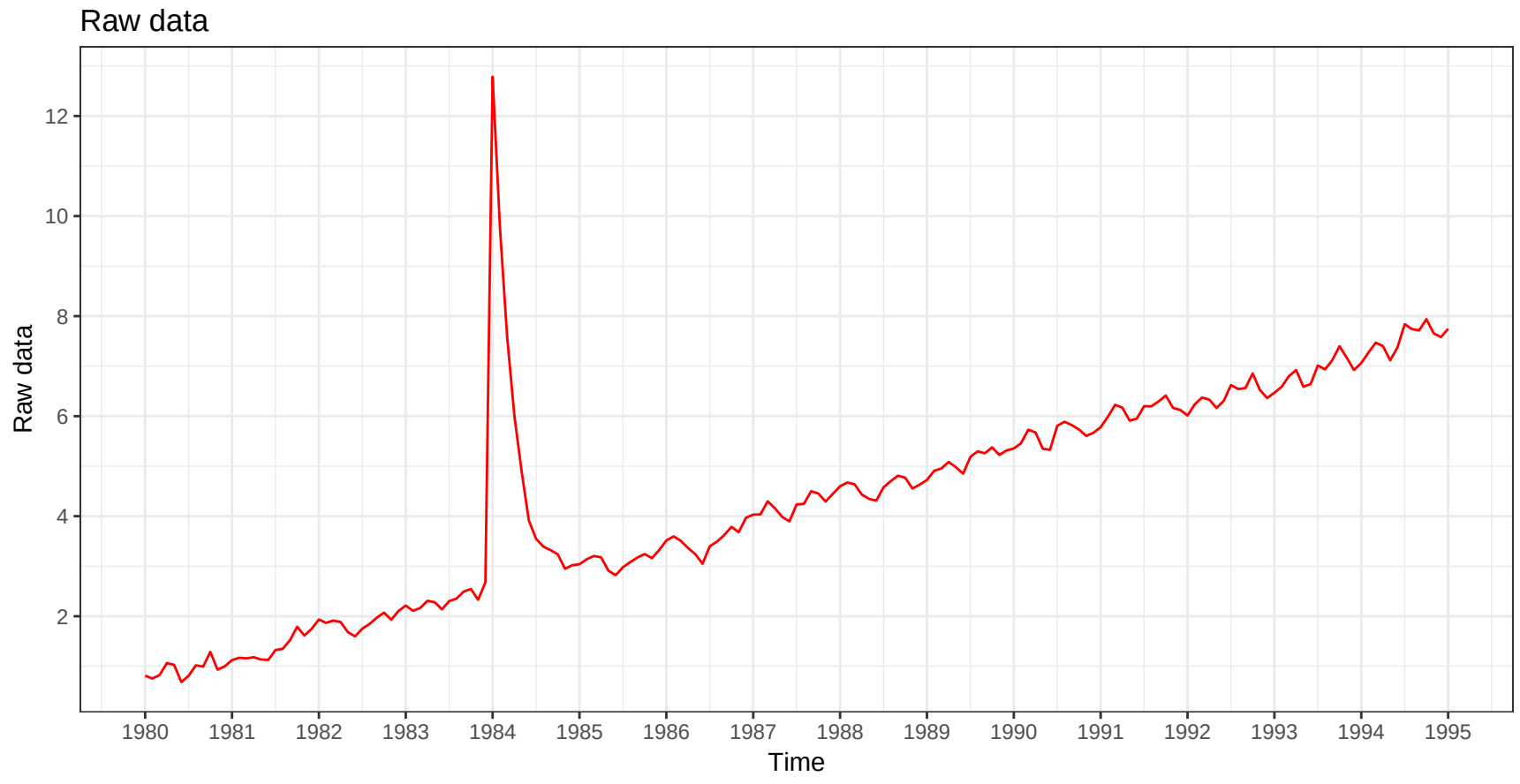
(1−B)(1−B12)Xt=(1−0.23B−0.19B2)(1−0.56B12)at





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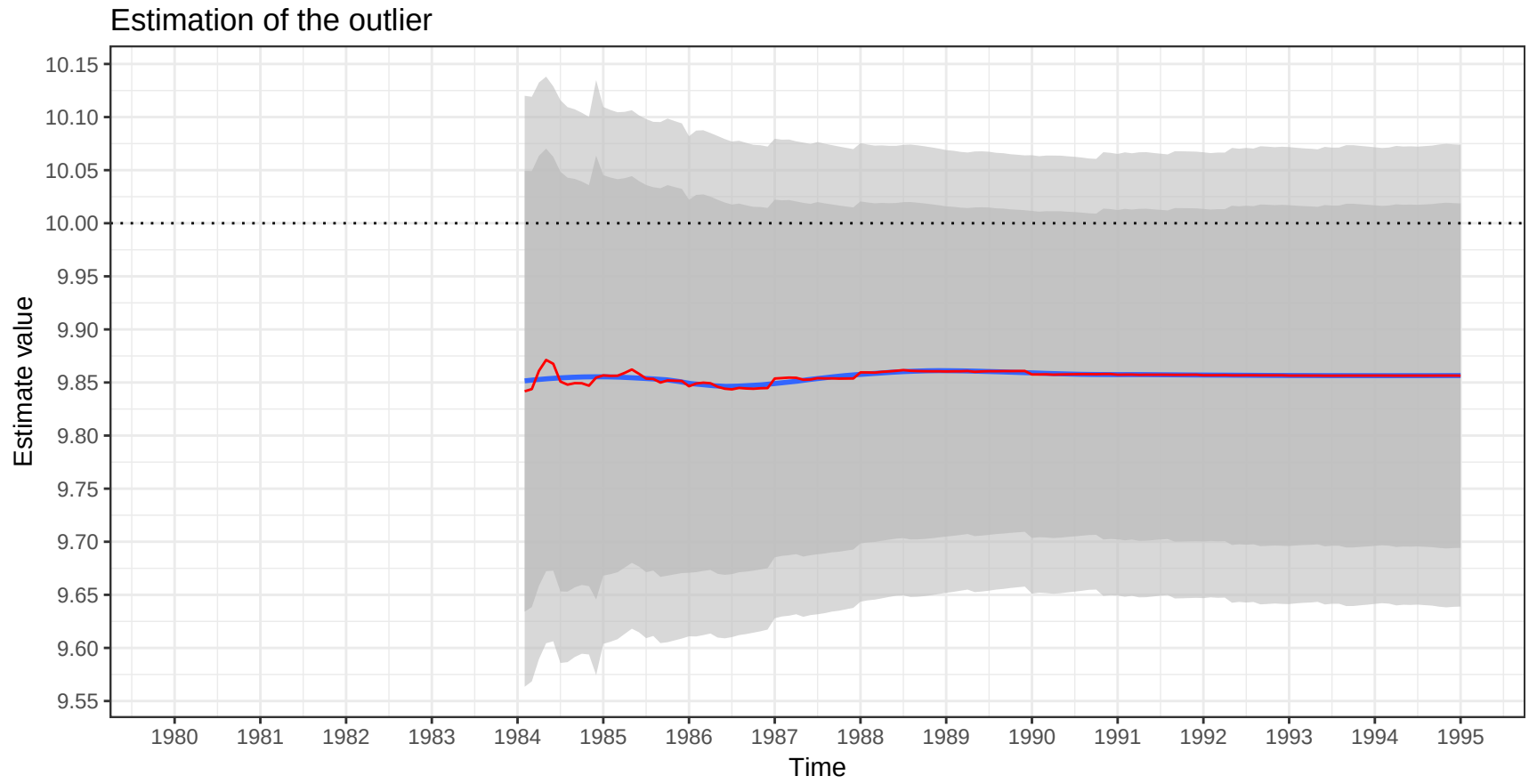

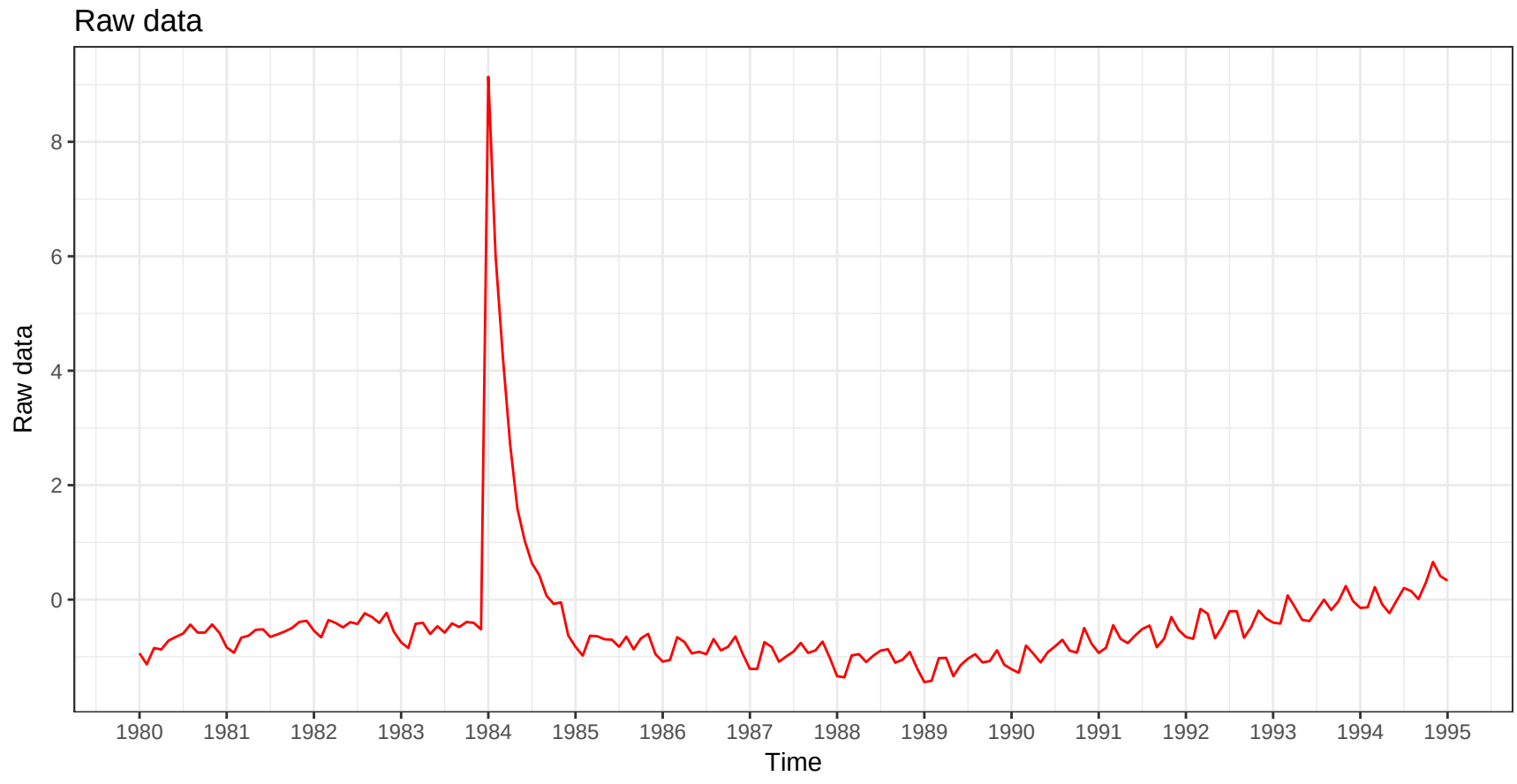

Estimate value of a TC(1984−01)
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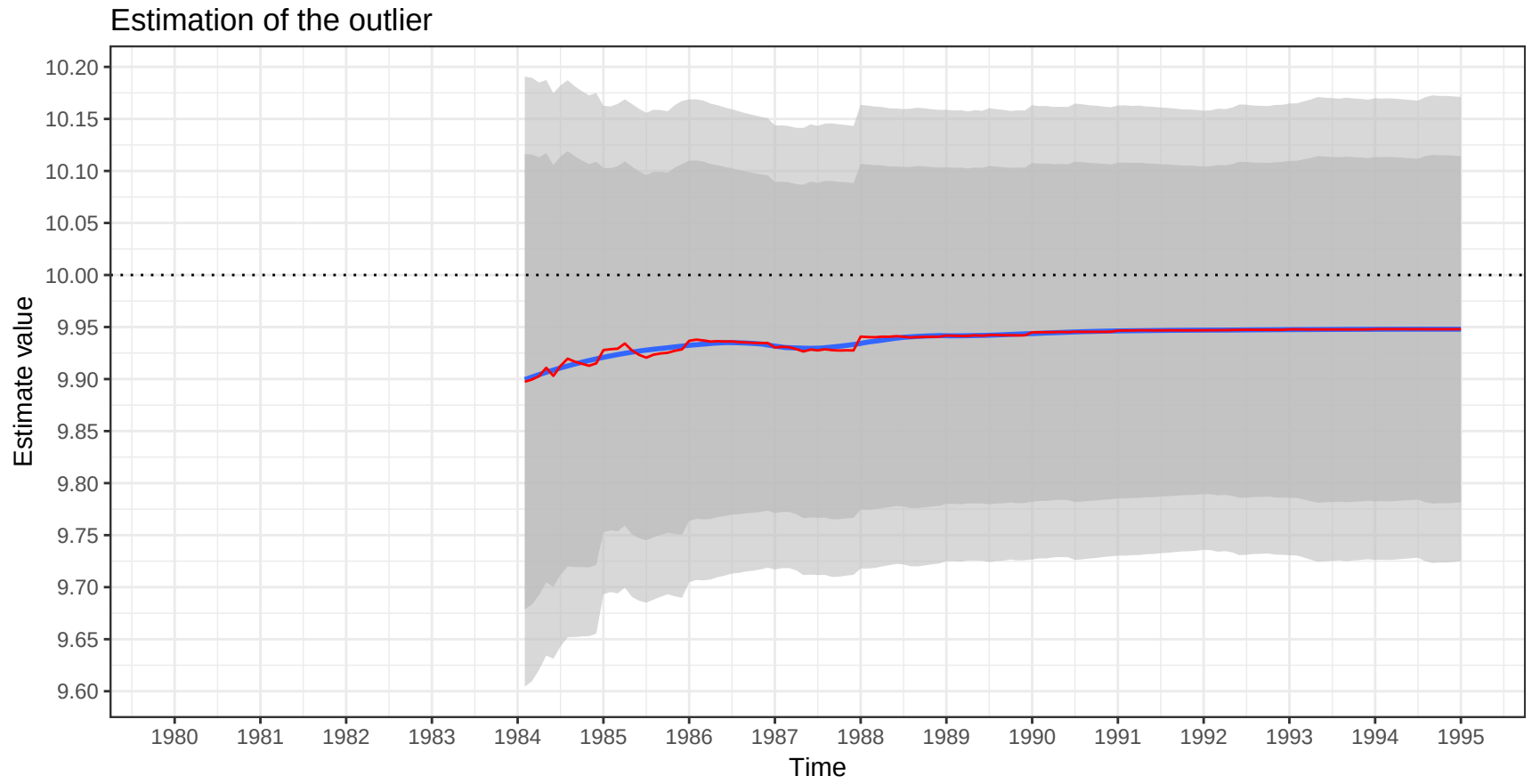
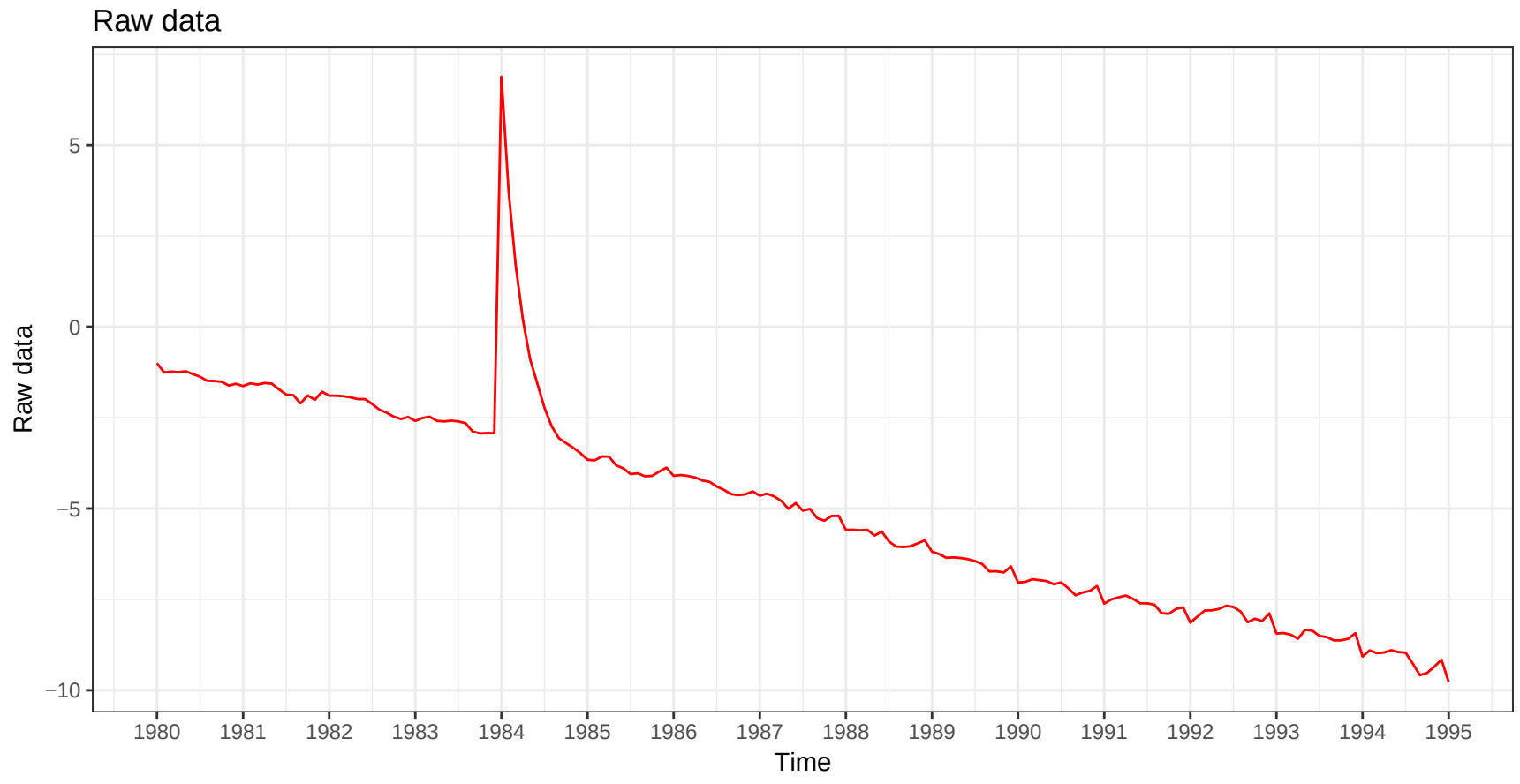
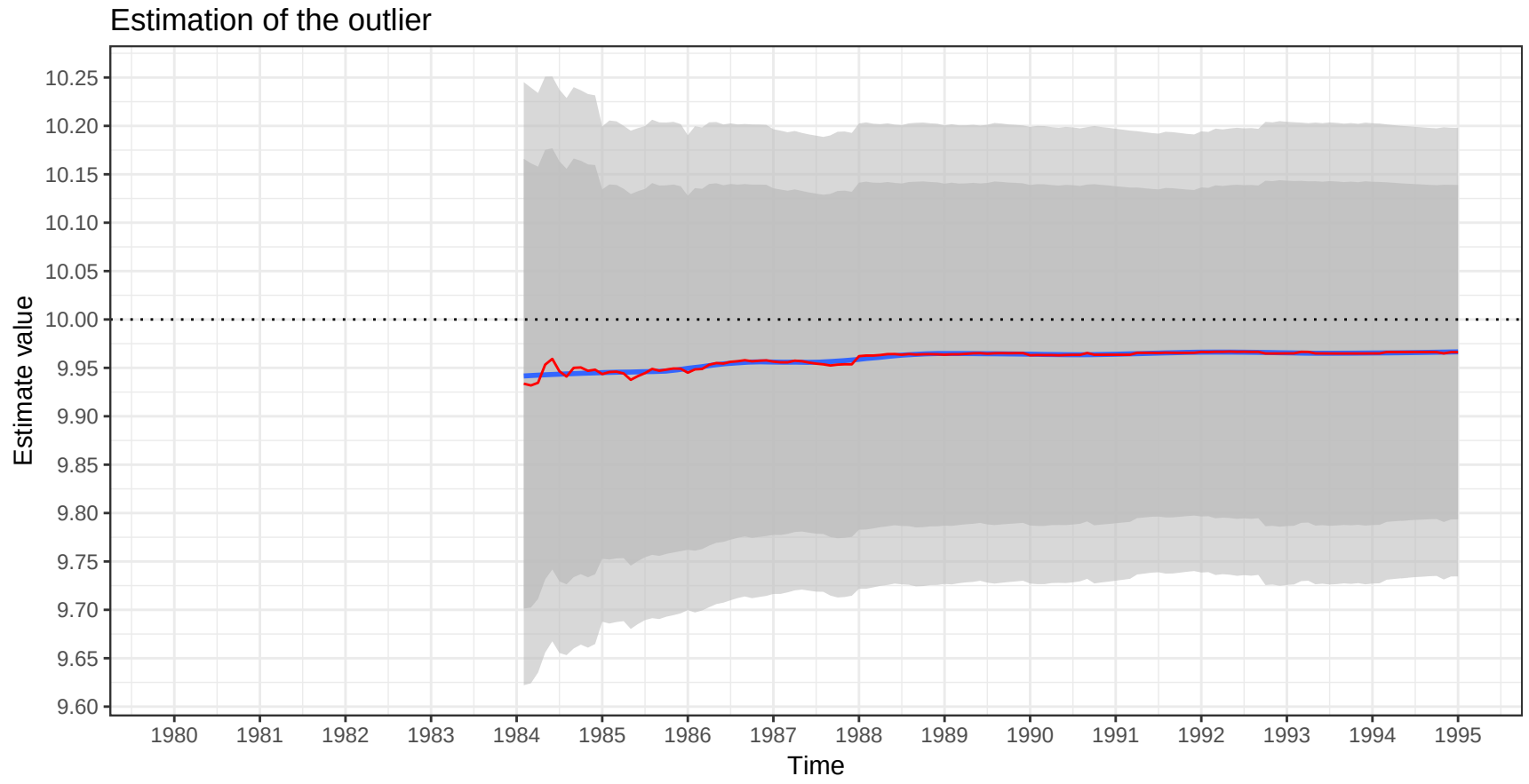
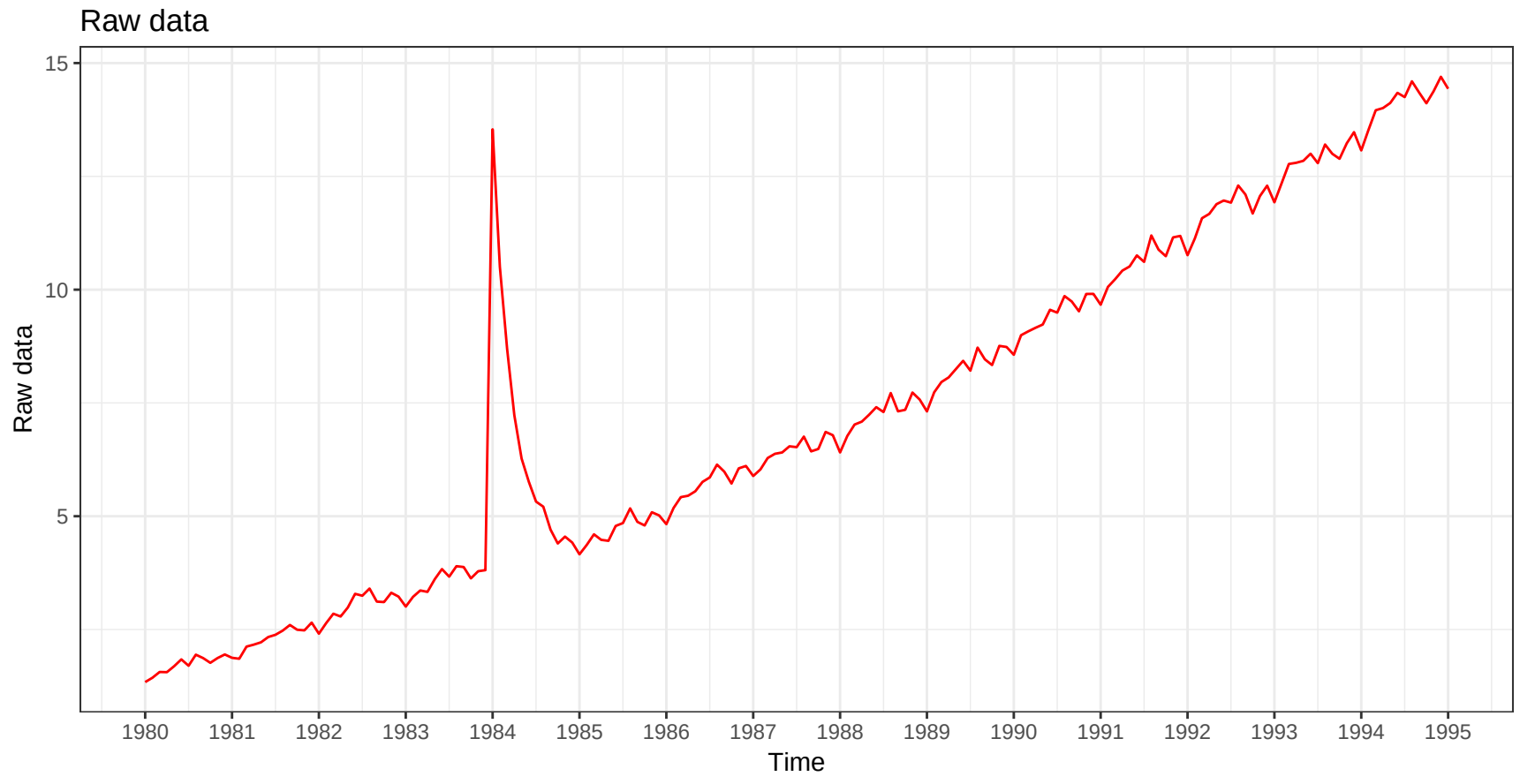
(1−B)(1−B12)Xt=(1−0.23B−0.19B2)(1−0.56B12)at





Estimate value of a TC(1984−01)
ARIMA (0,1,2)(0,1,1) − additive decomposition
(1−B)(1−B12)Xt=(1−0.23B−0.19B2)(1−0.56B12)at

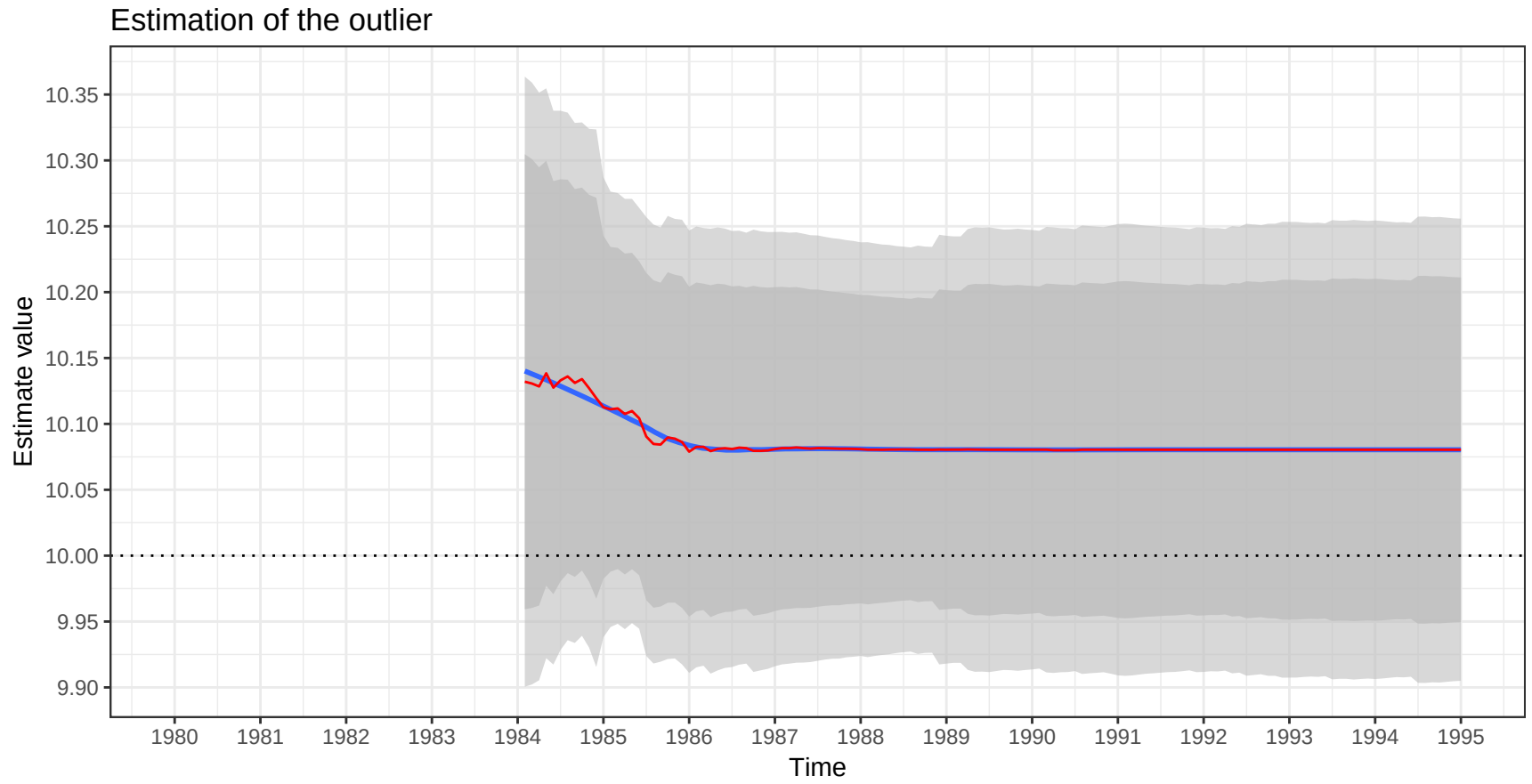


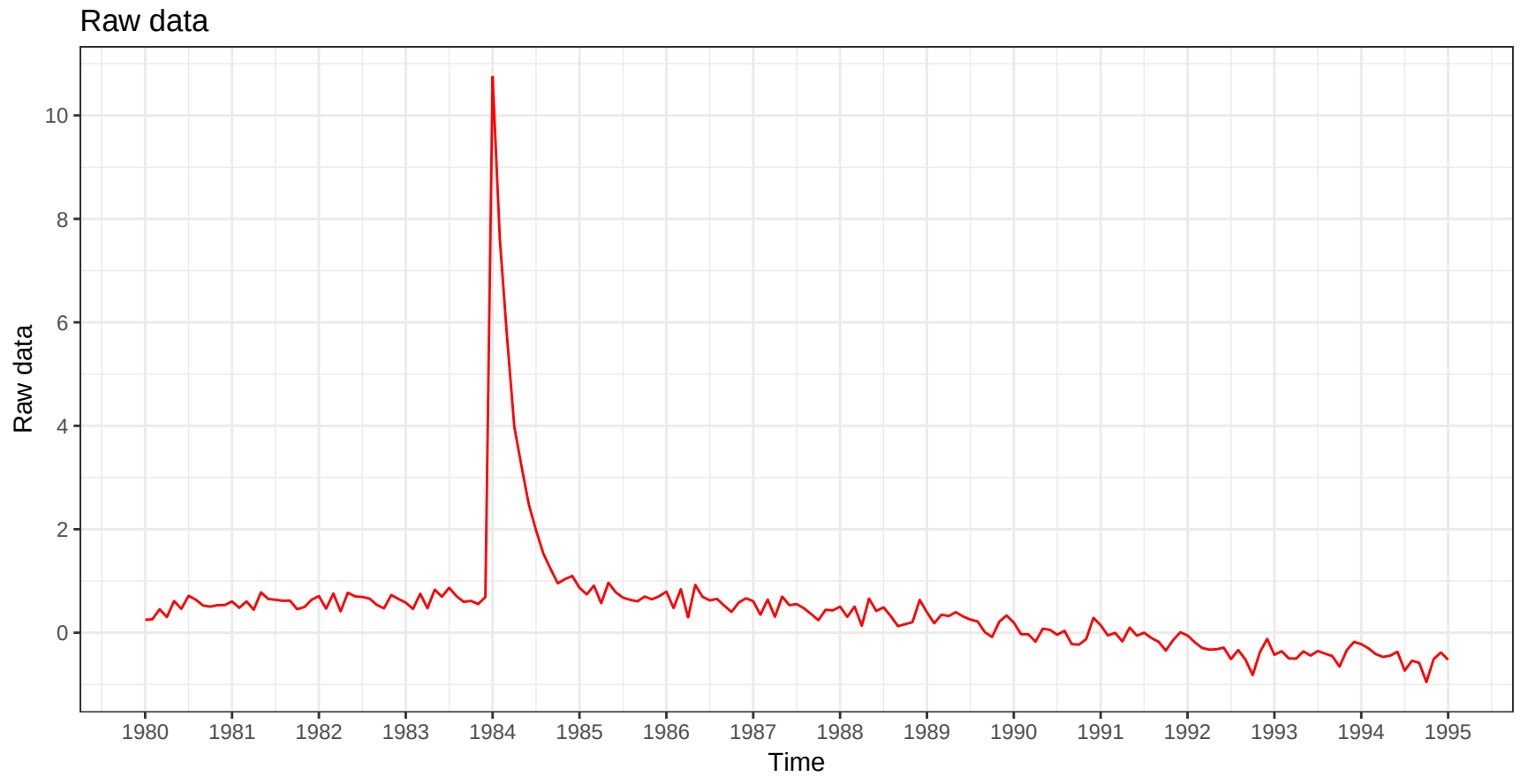


Estimate value of a TC(1984−01)

ARIMA (1,1,1)(0,1,1) − additive decomposition

(1−B)(1−B12)(1+0.3B)Xt=(1−0.6B)(1−0.3B12)at

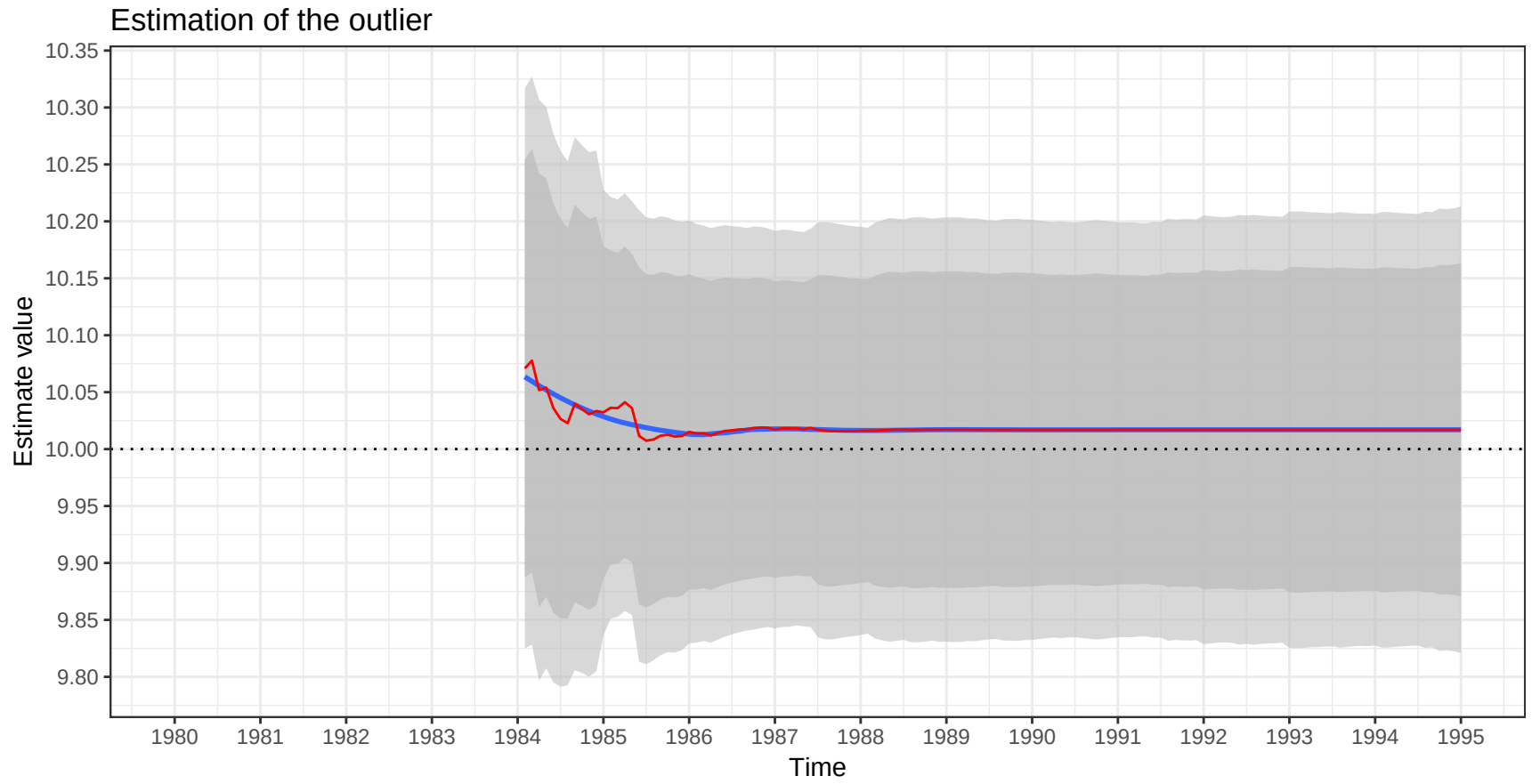


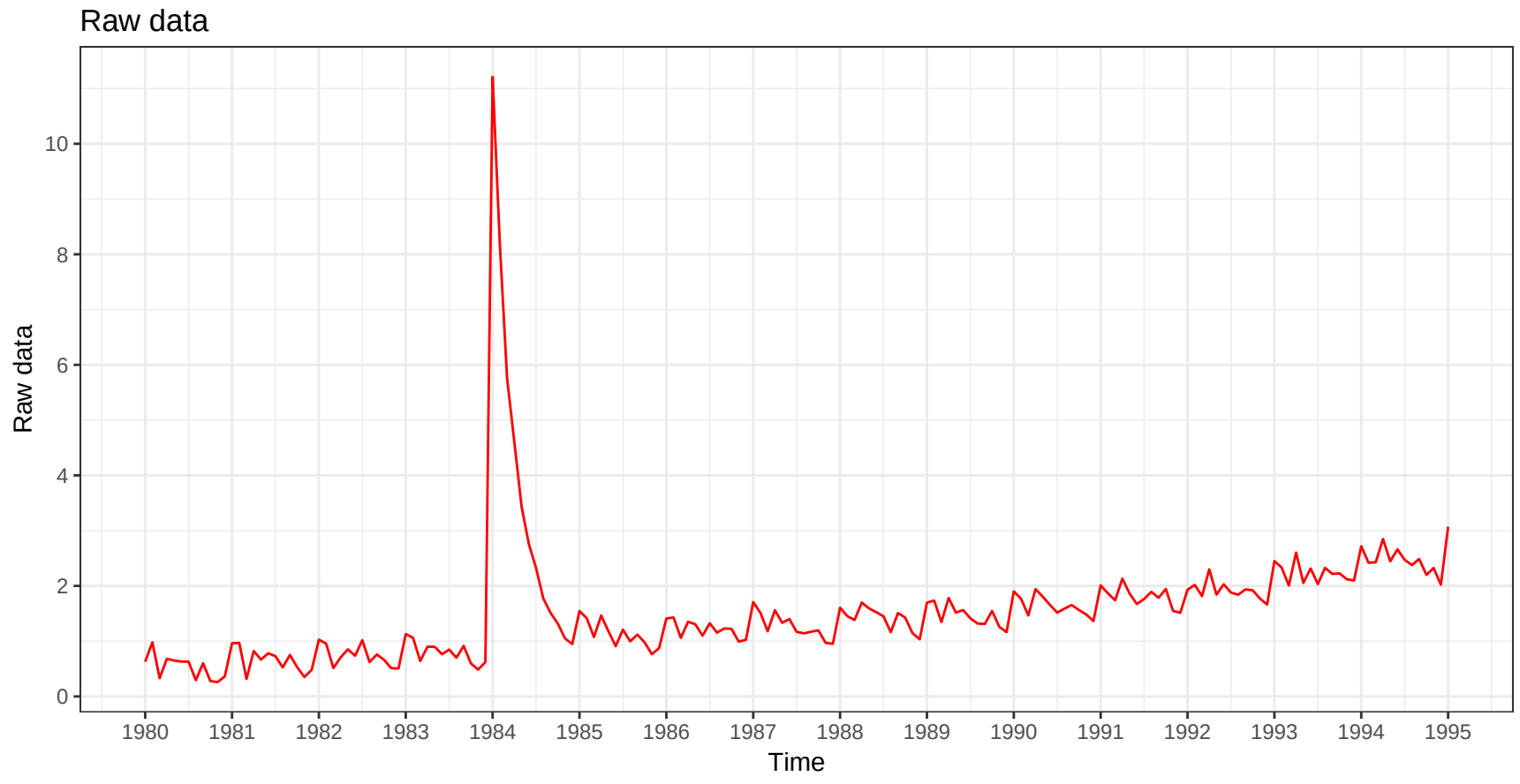


Estimate value of a TC(1984−01)

ARIMA (1,1,1)(0,1,1) − additive decomposition

$(1-B)(1-B12)(1+0.3B)Xt=(1-0.6B)(1-0.3B12)at$

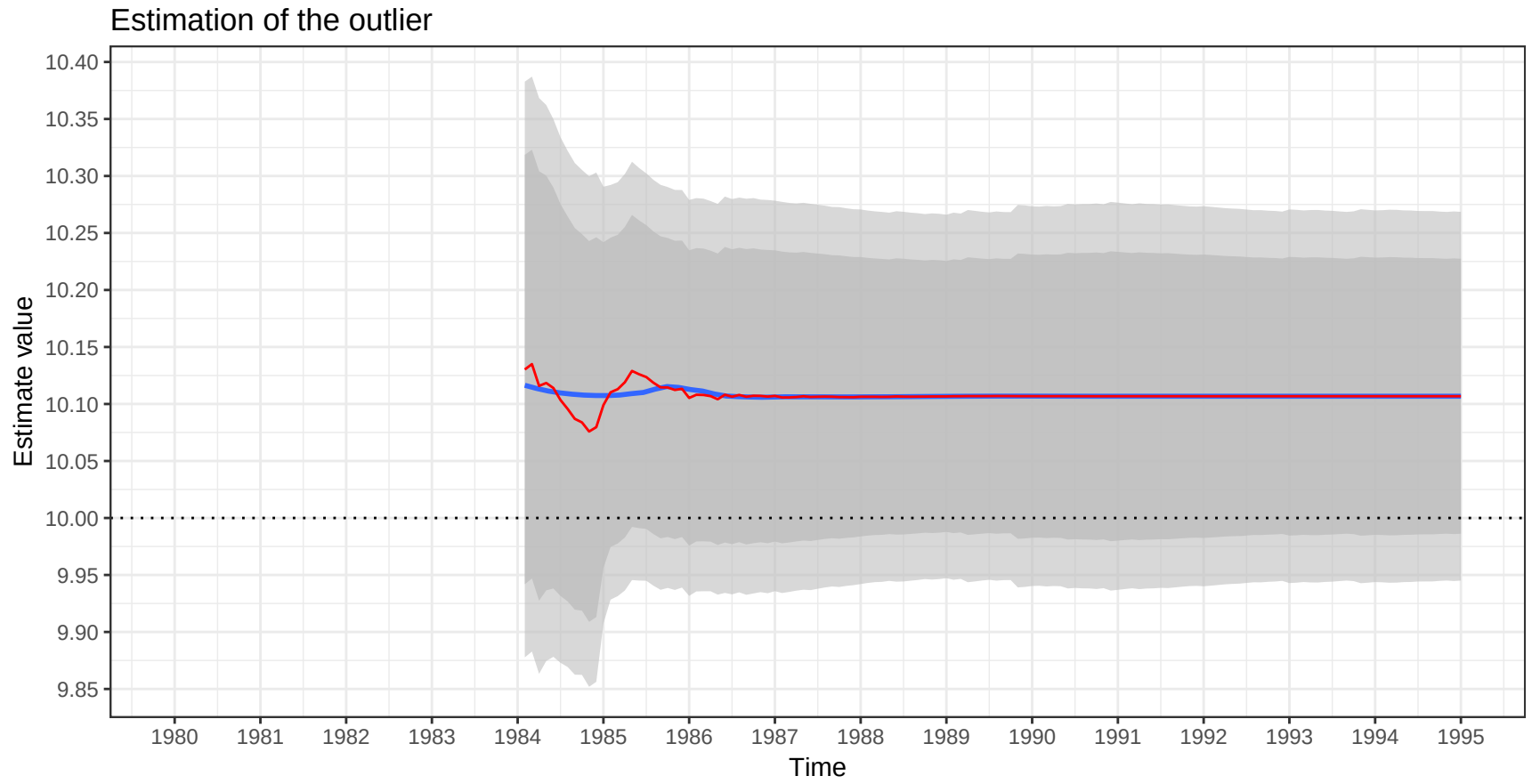


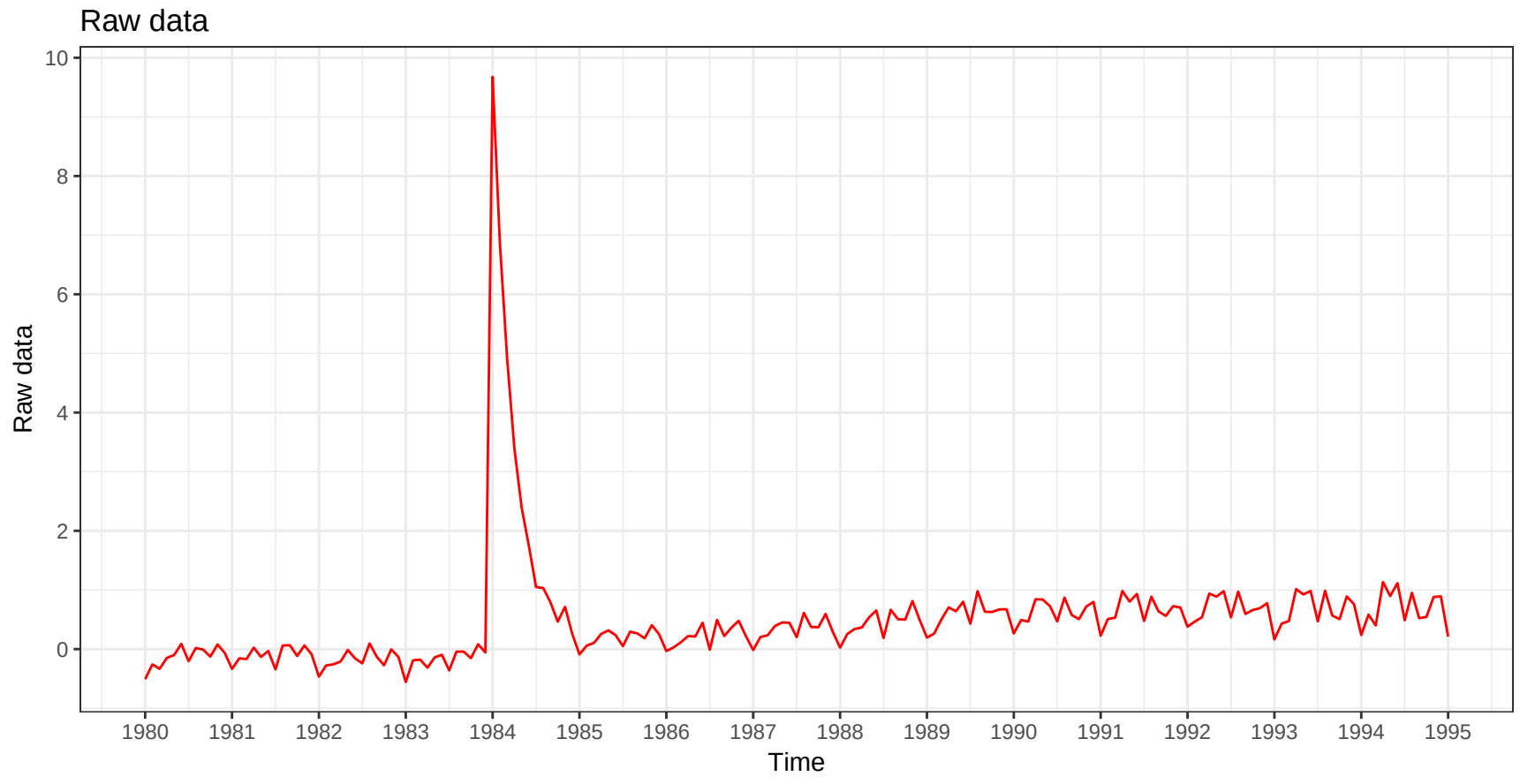


Estimate value of a TC(1984−01)

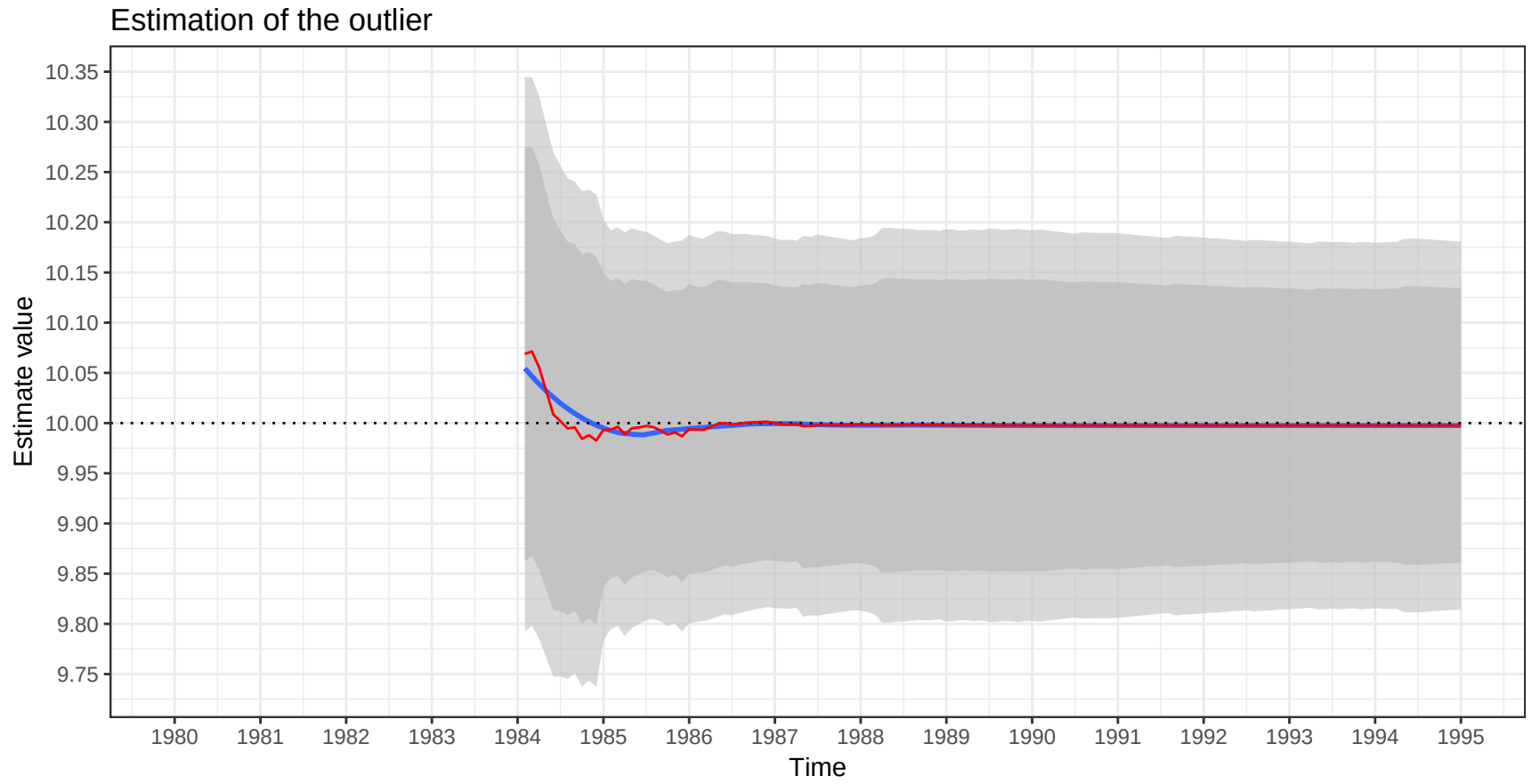
ARIMA (1,1,1)(0,1,1) − additive decomposition

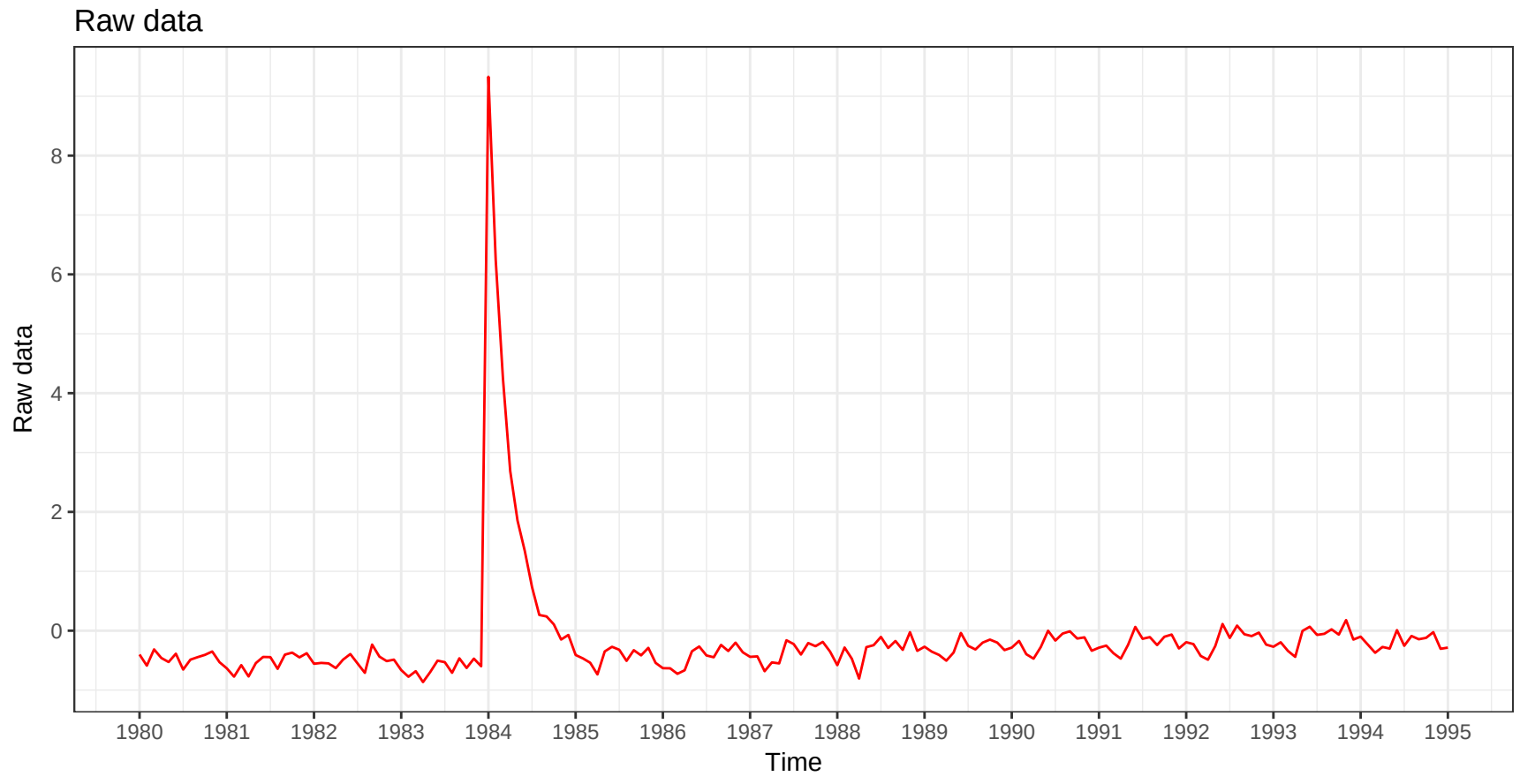
(1−B)(1−B12)(1+0.3B)Xt=(1−0.6B)(1−0.3B12)at



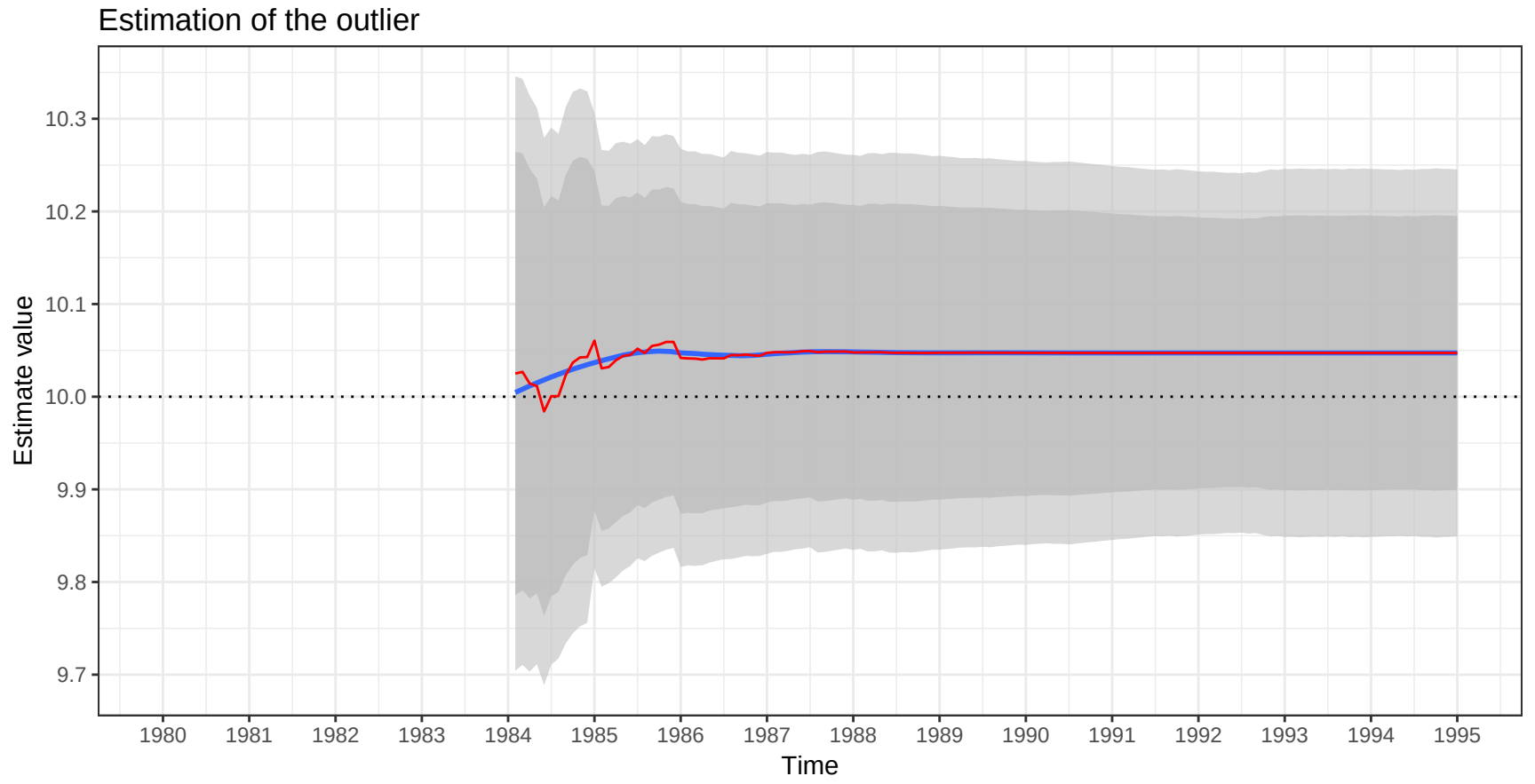


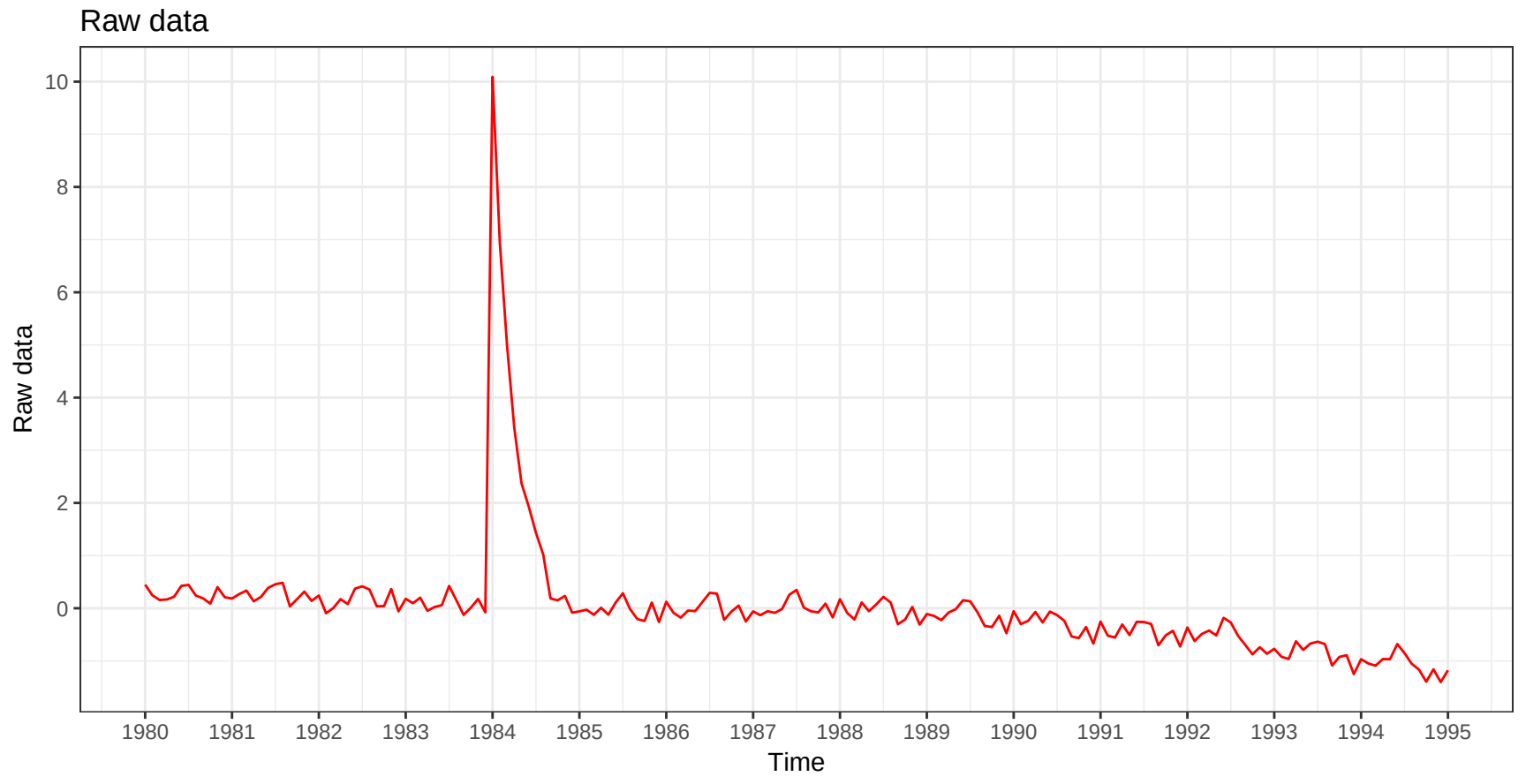
Estimate value of a TC(1984−01)
ARIMA (1,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)(1+0.3B)Xt=(1−0.6B)(1−0.3B12)at



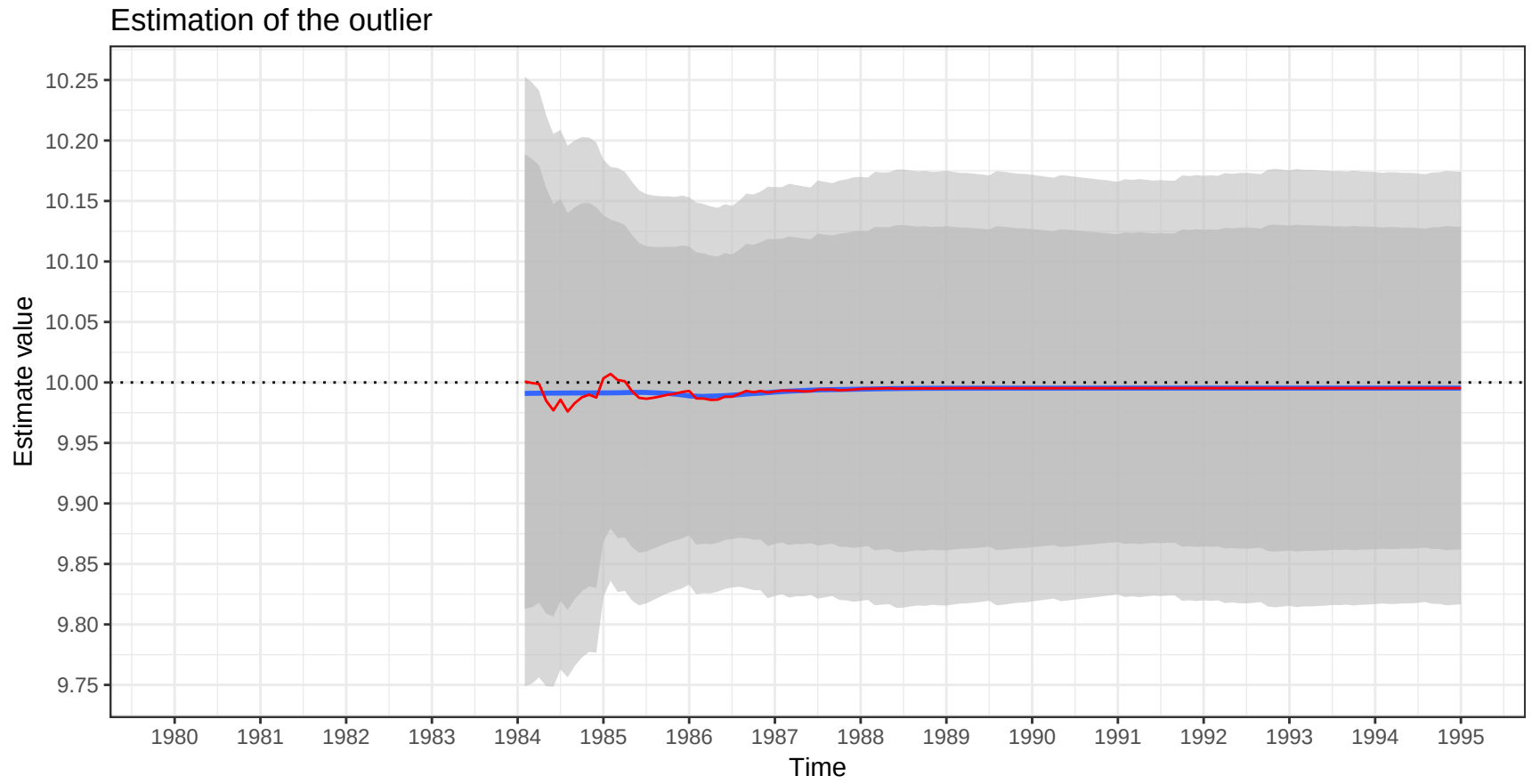


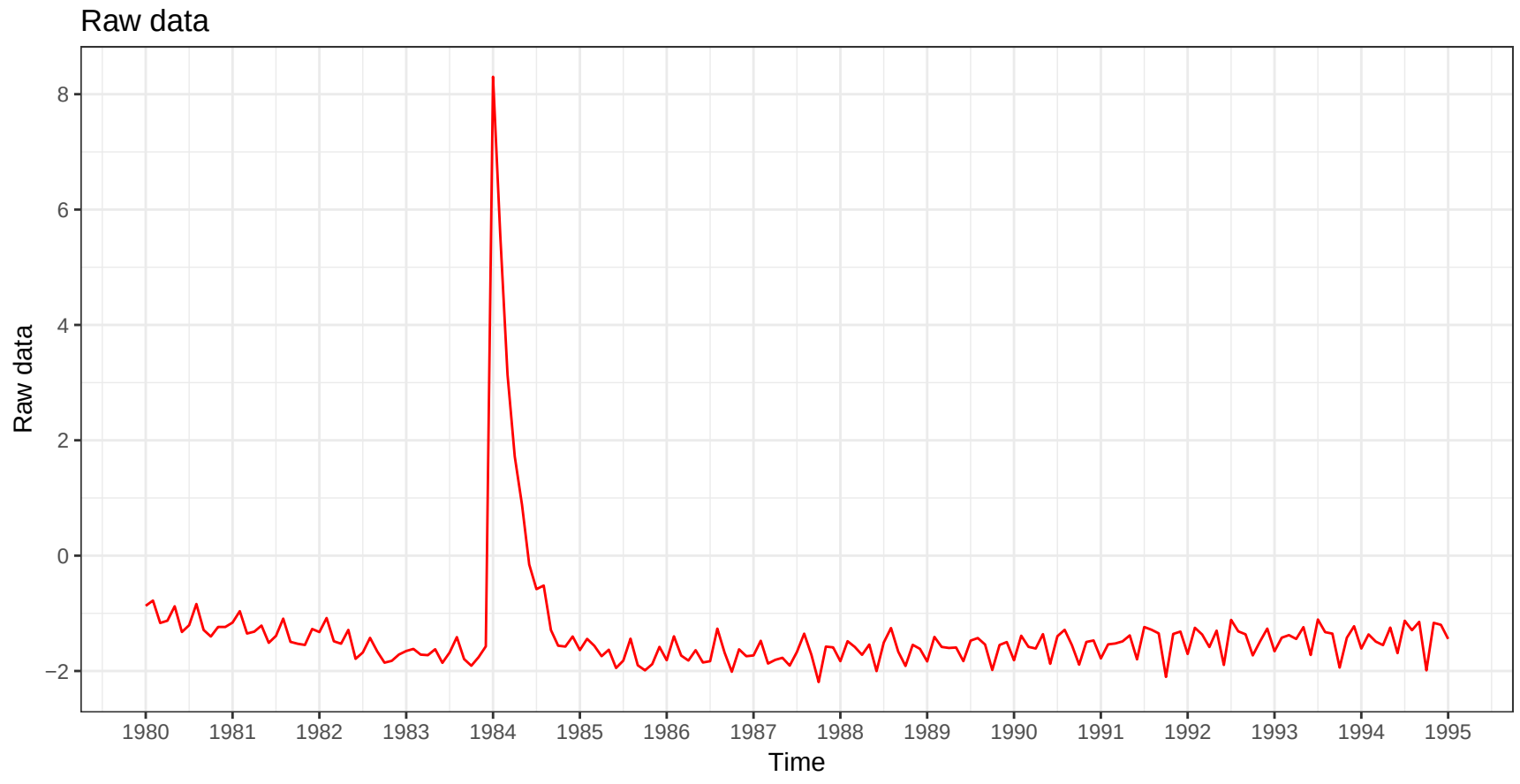
Estimate value of a TC(1984−01)
ARIMA (1,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)(1+0.3B)Xt=(1−0.6B)(1−0.3B12)at





Estimate value of a TC(1984−01)
ARIMA (1,1,1)(0,1,1) − additive decomposition
(1−B)(1−B12)(1+0.3B)Xt=(1−0.6B)(1−0.3B12)at

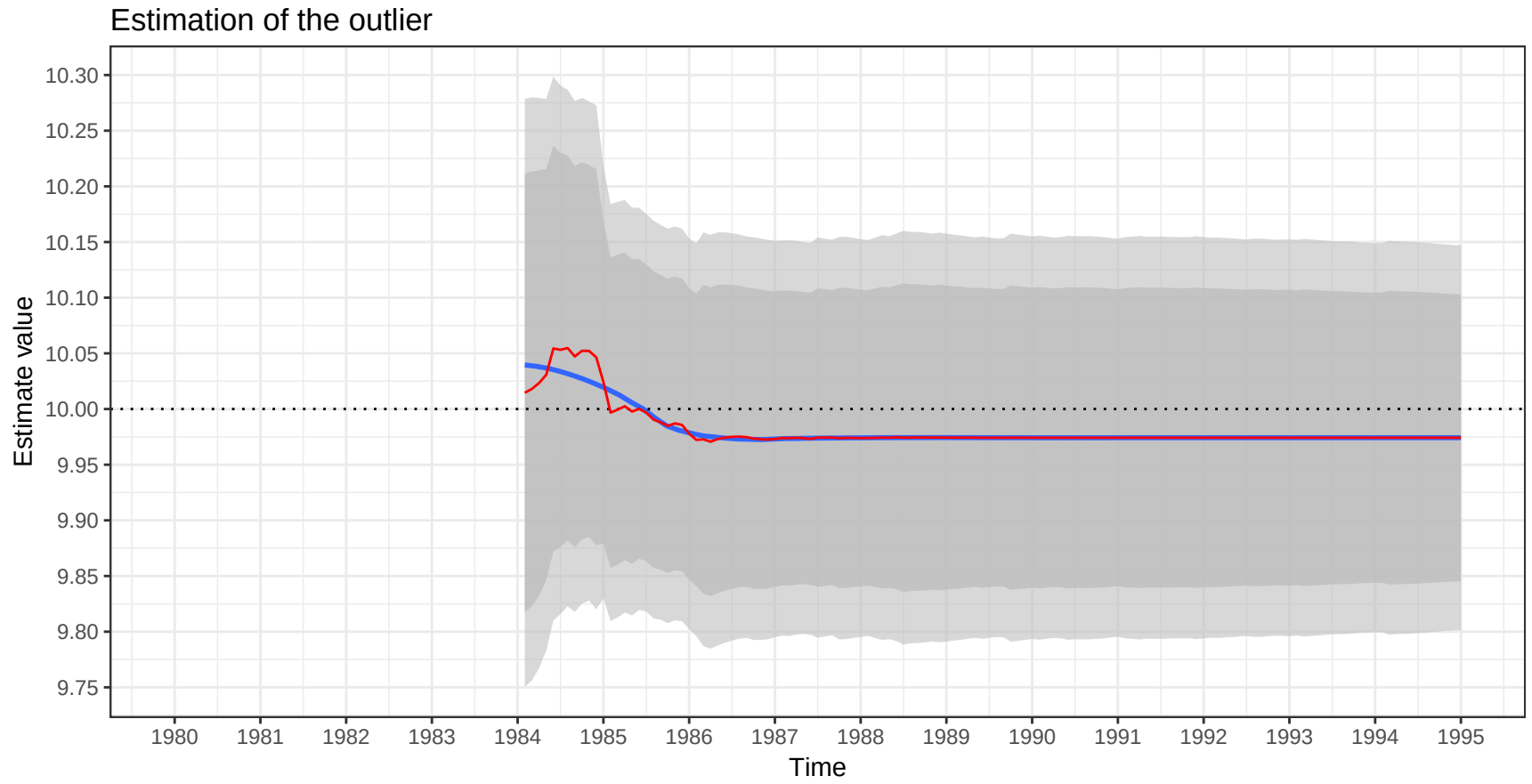


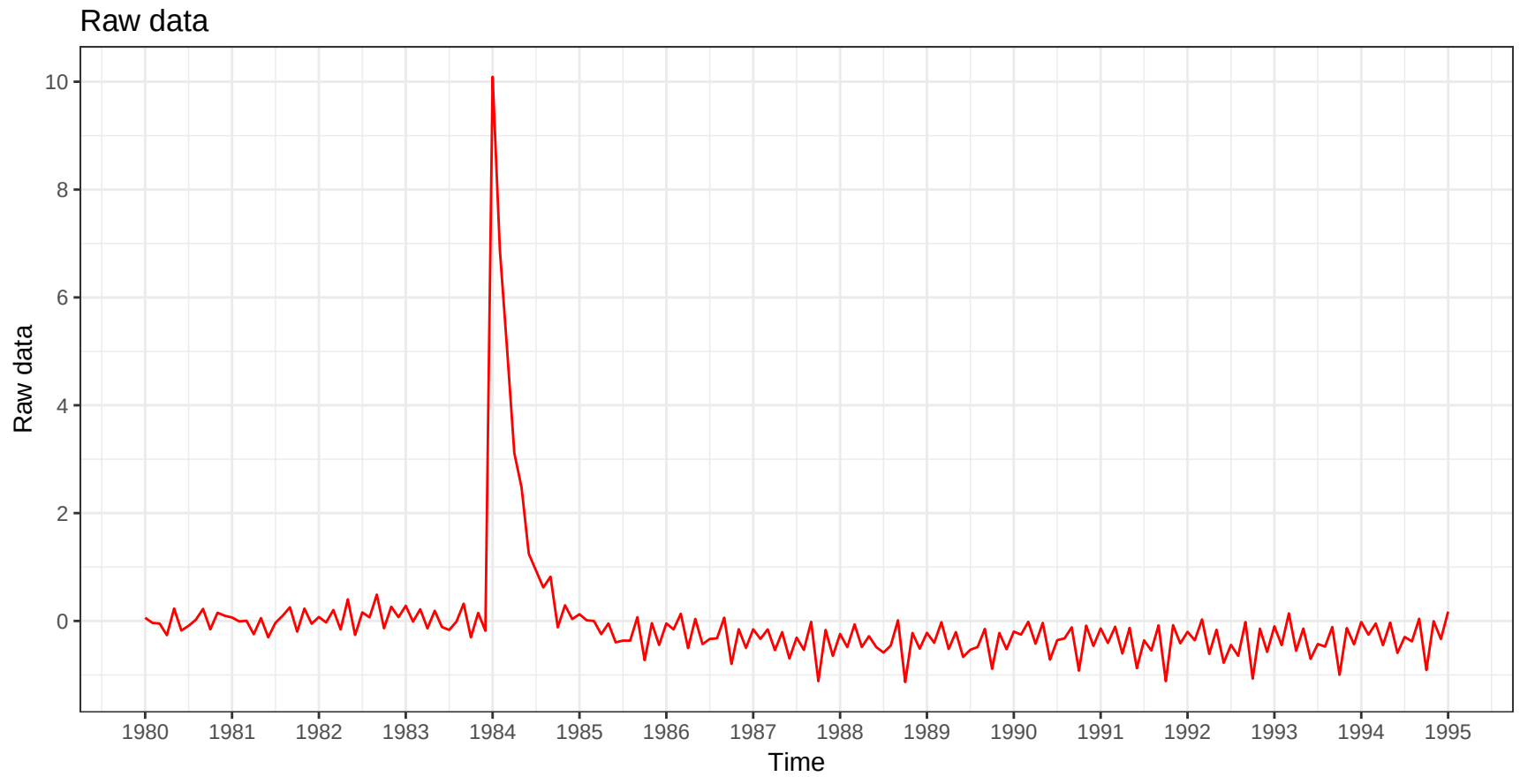


Estimate value of a TC(1984−01)

ARIMA (1,1,1)(0,1,1) − additive decomposition

(1−B)(1−B12)(1+0.3B)Xt=(1−0.6B)(1−0.3B12)at





Estimate value of a TC(1984−01)
ARIMA (1,1,1)(0,1,1) − additive decomposition
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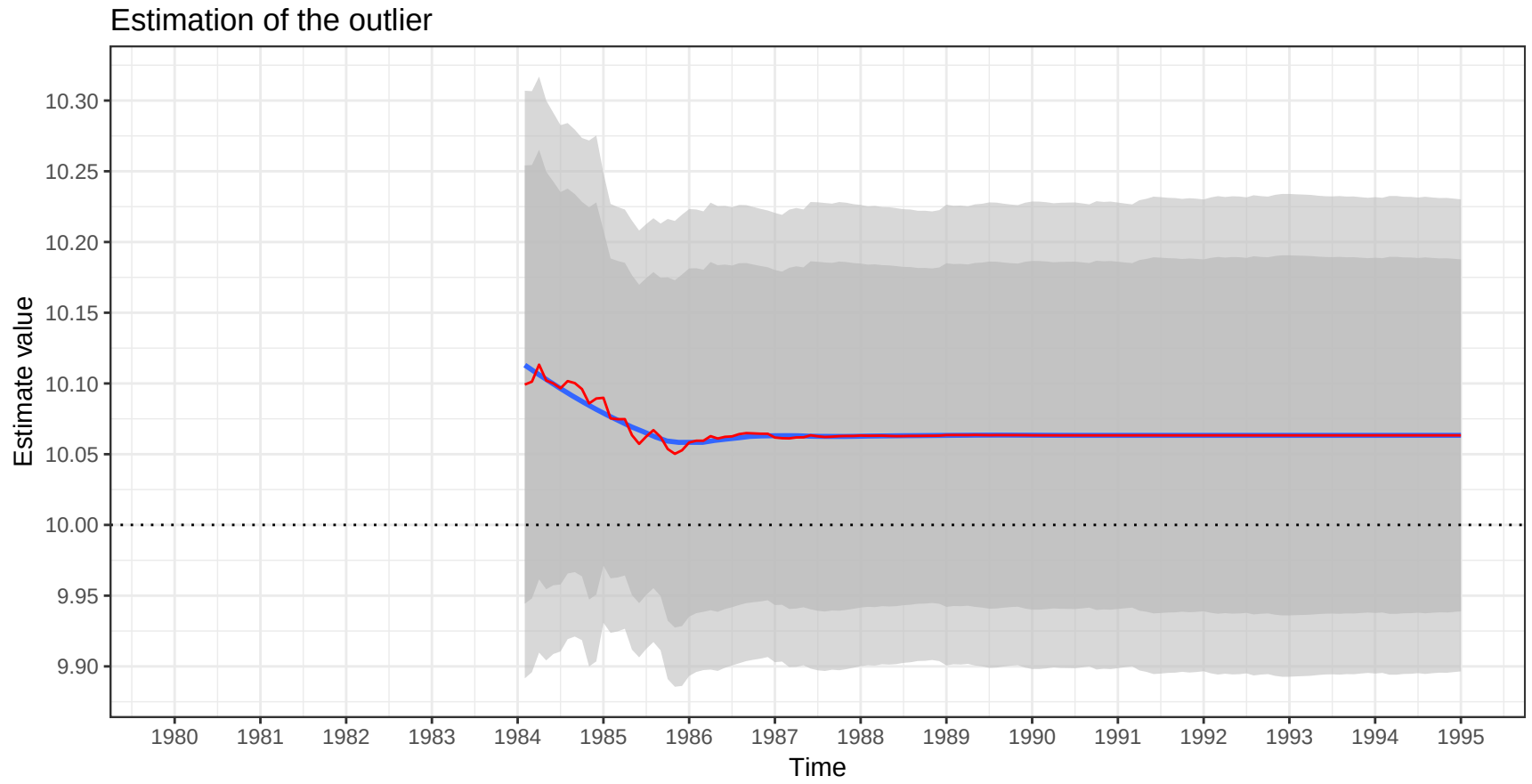

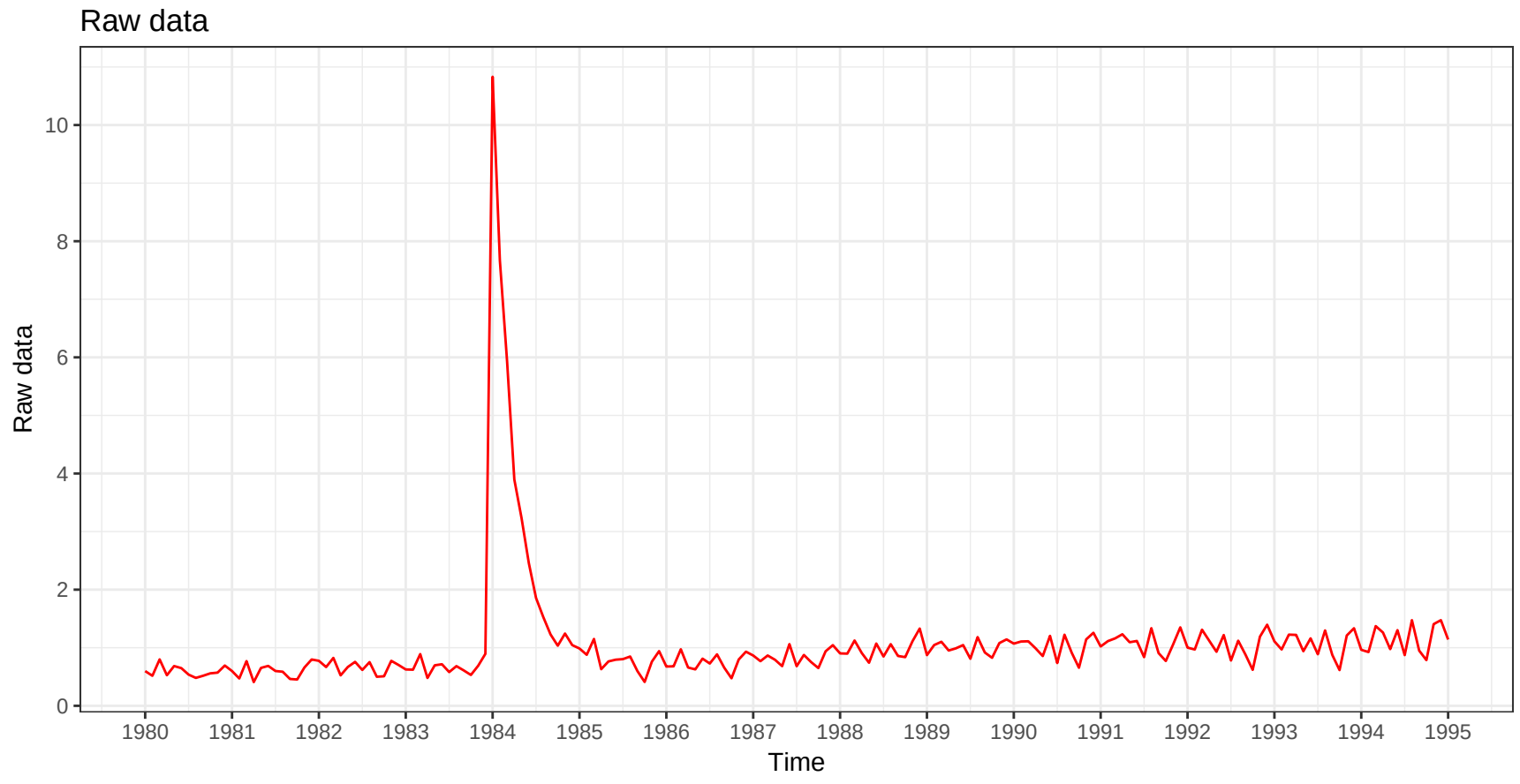

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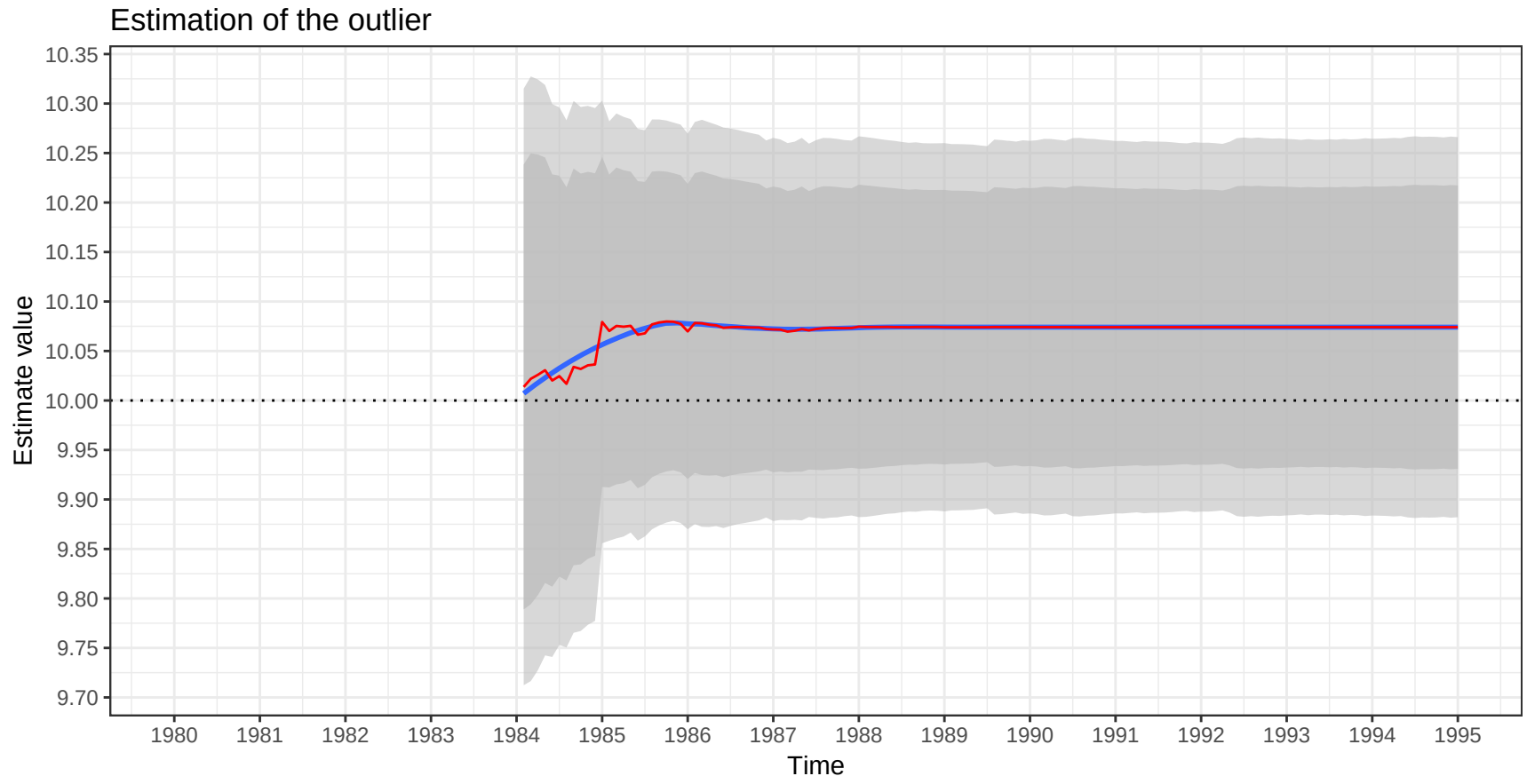

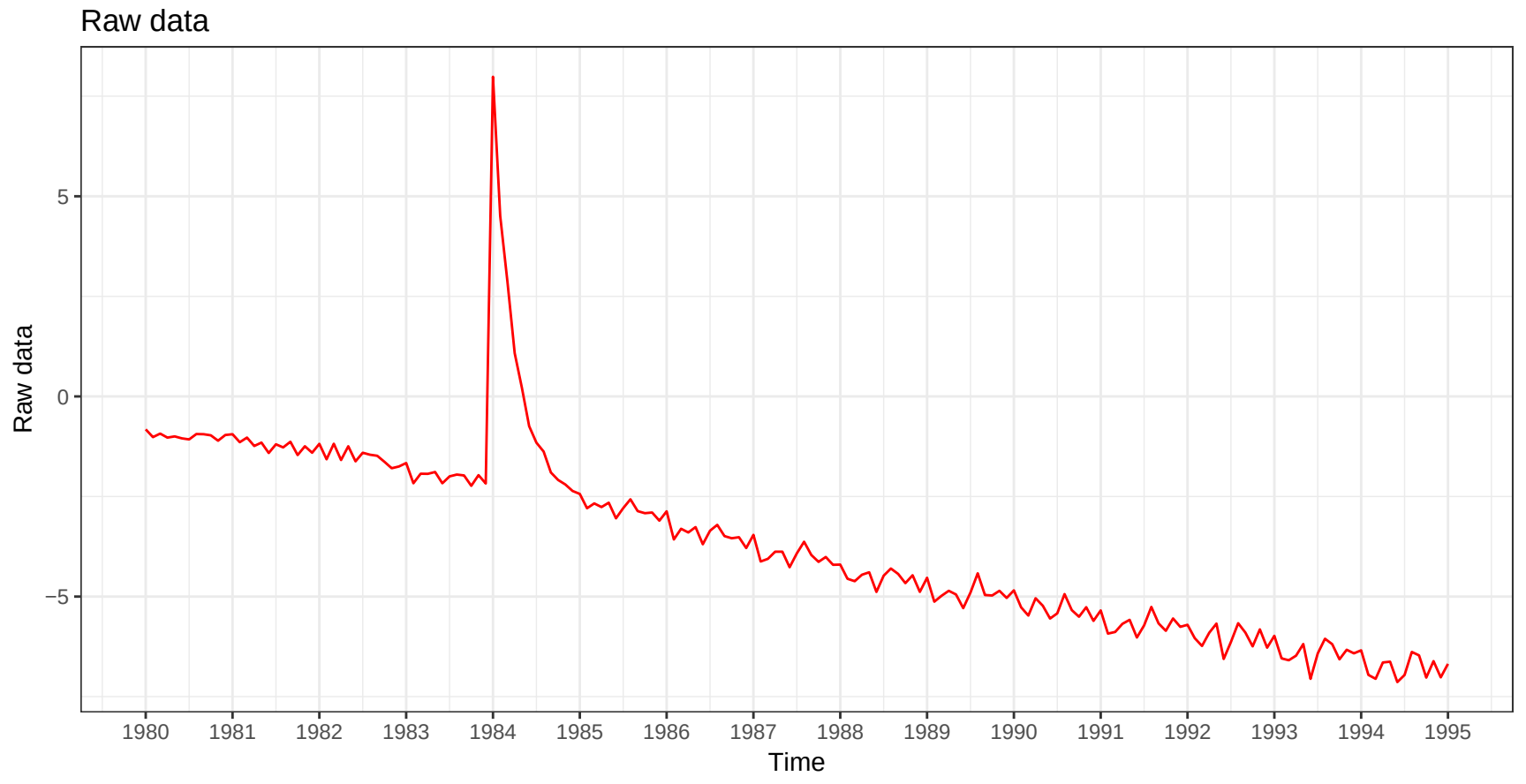

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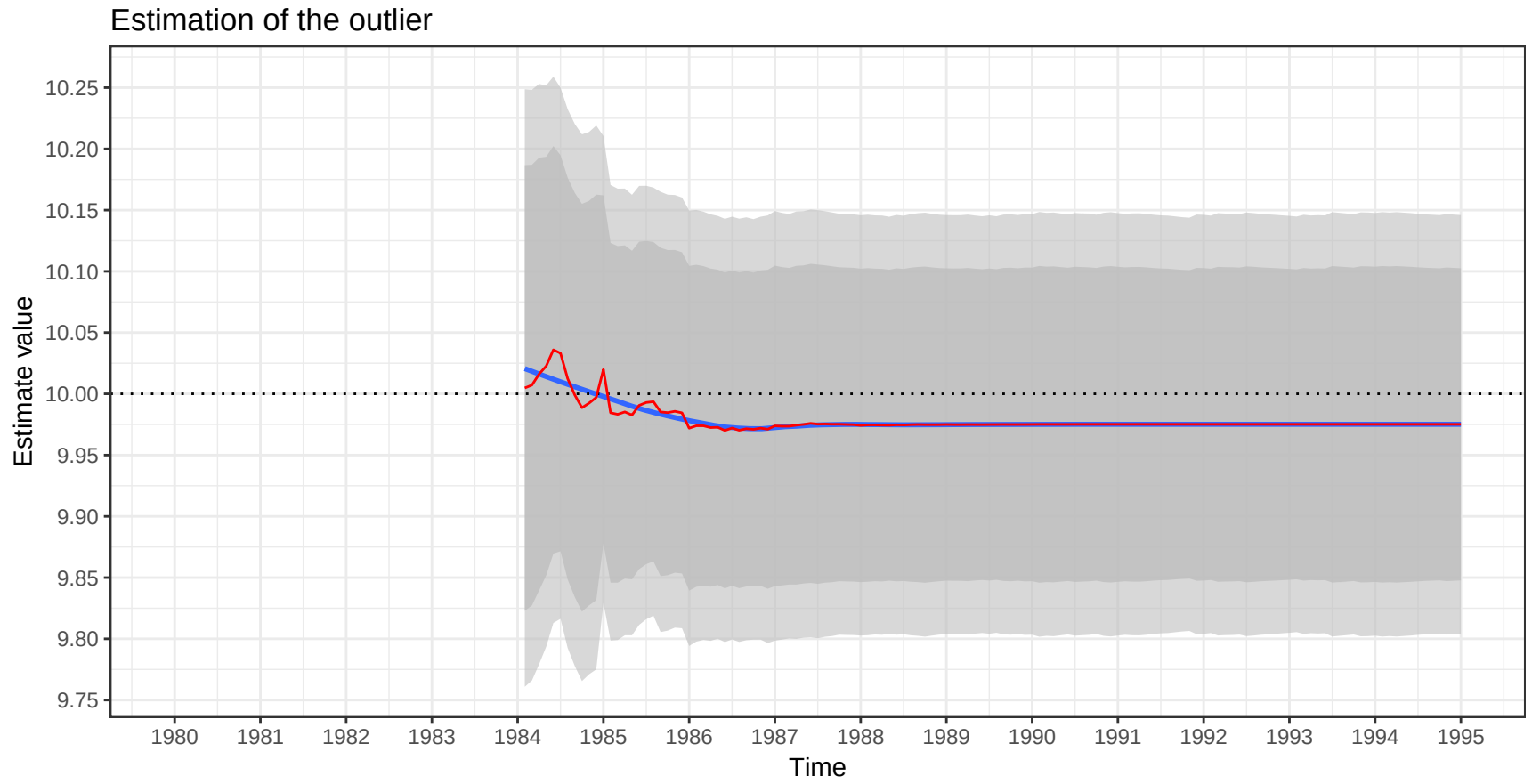
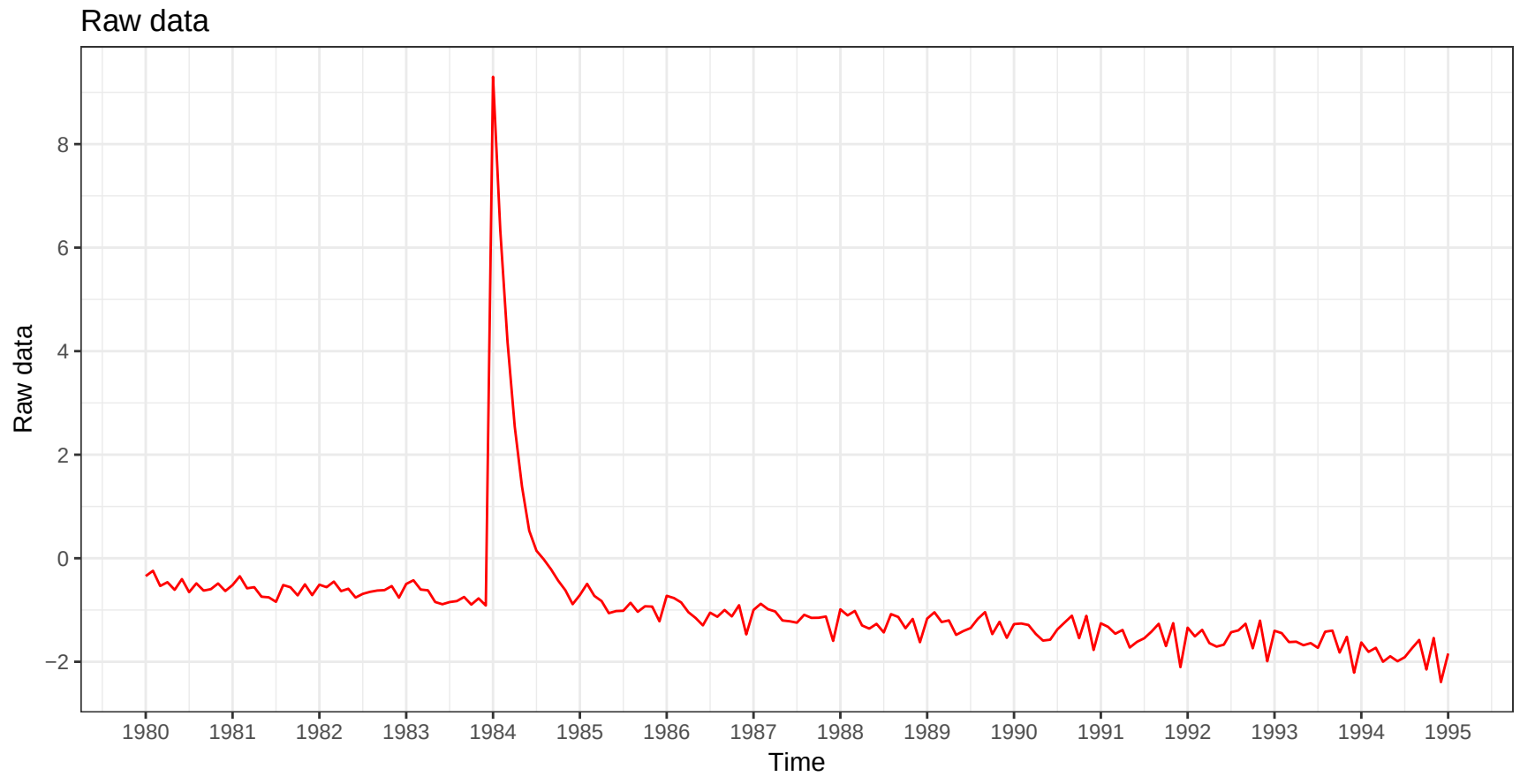
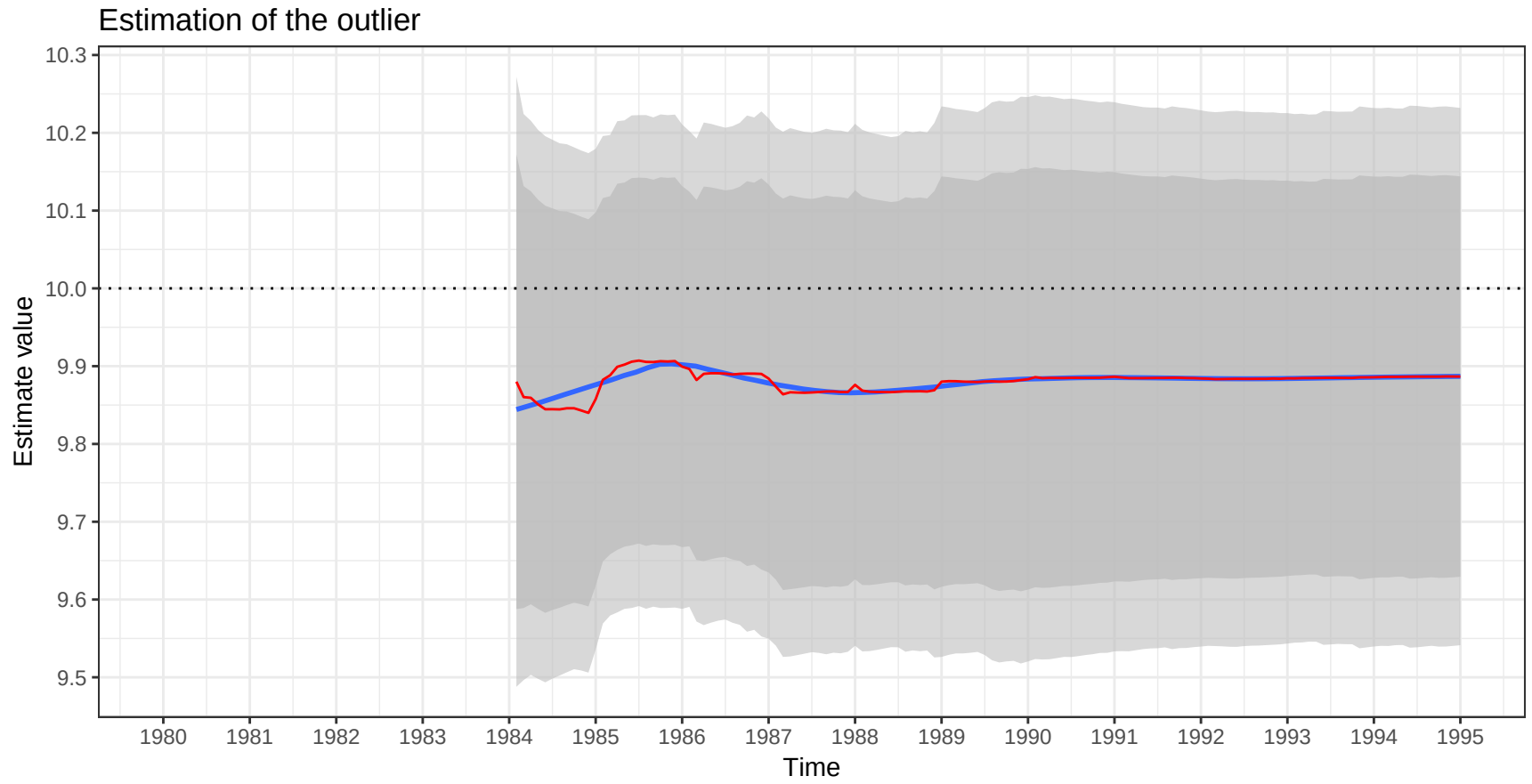
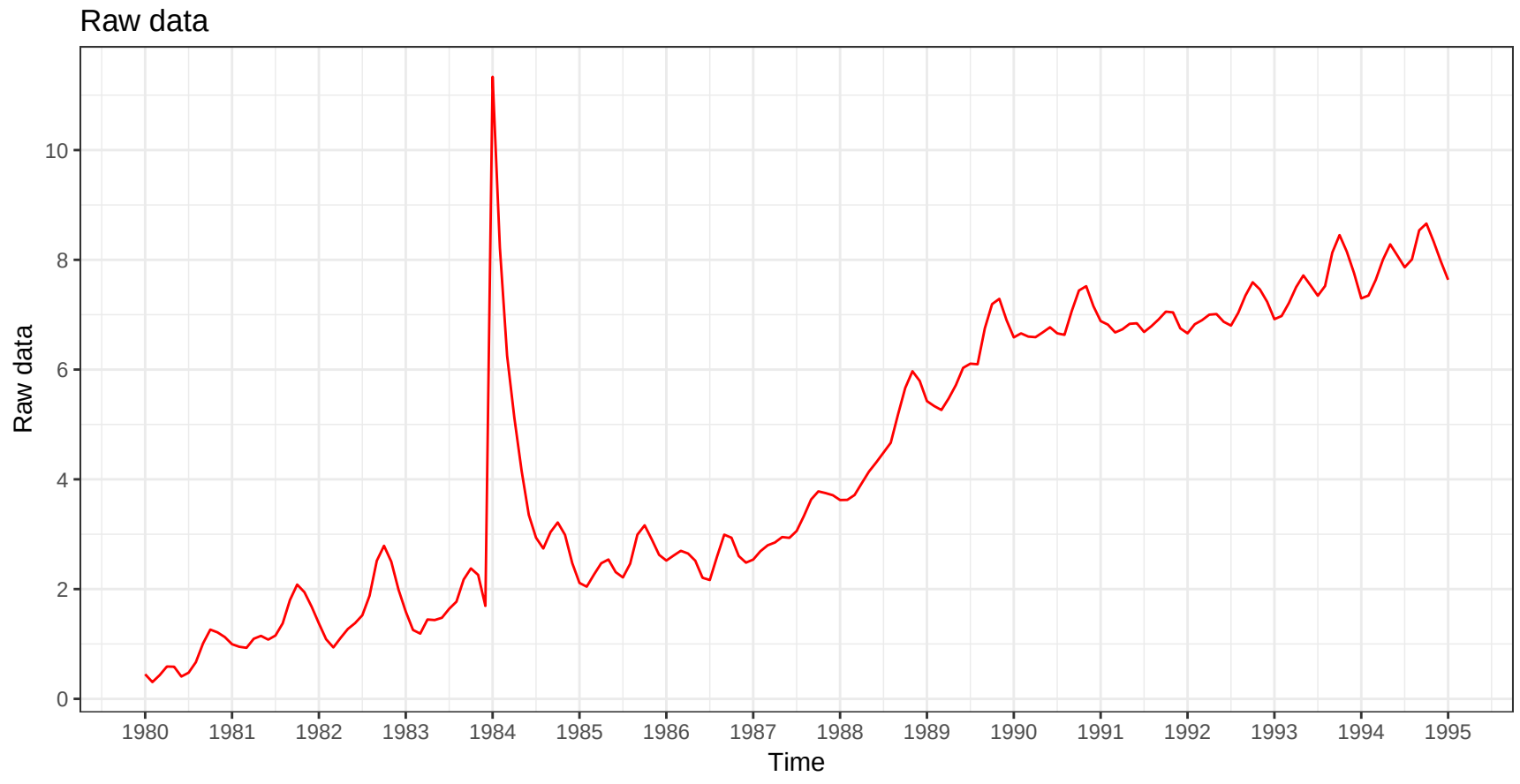




Estimate value of a TC(1984−01)
ARIMA (2,1,0)(0,1,1) − additive decomposition
(1−B)(1−B12)(1−0.6B+0.5B2)Xt=(1−0.8B12)at





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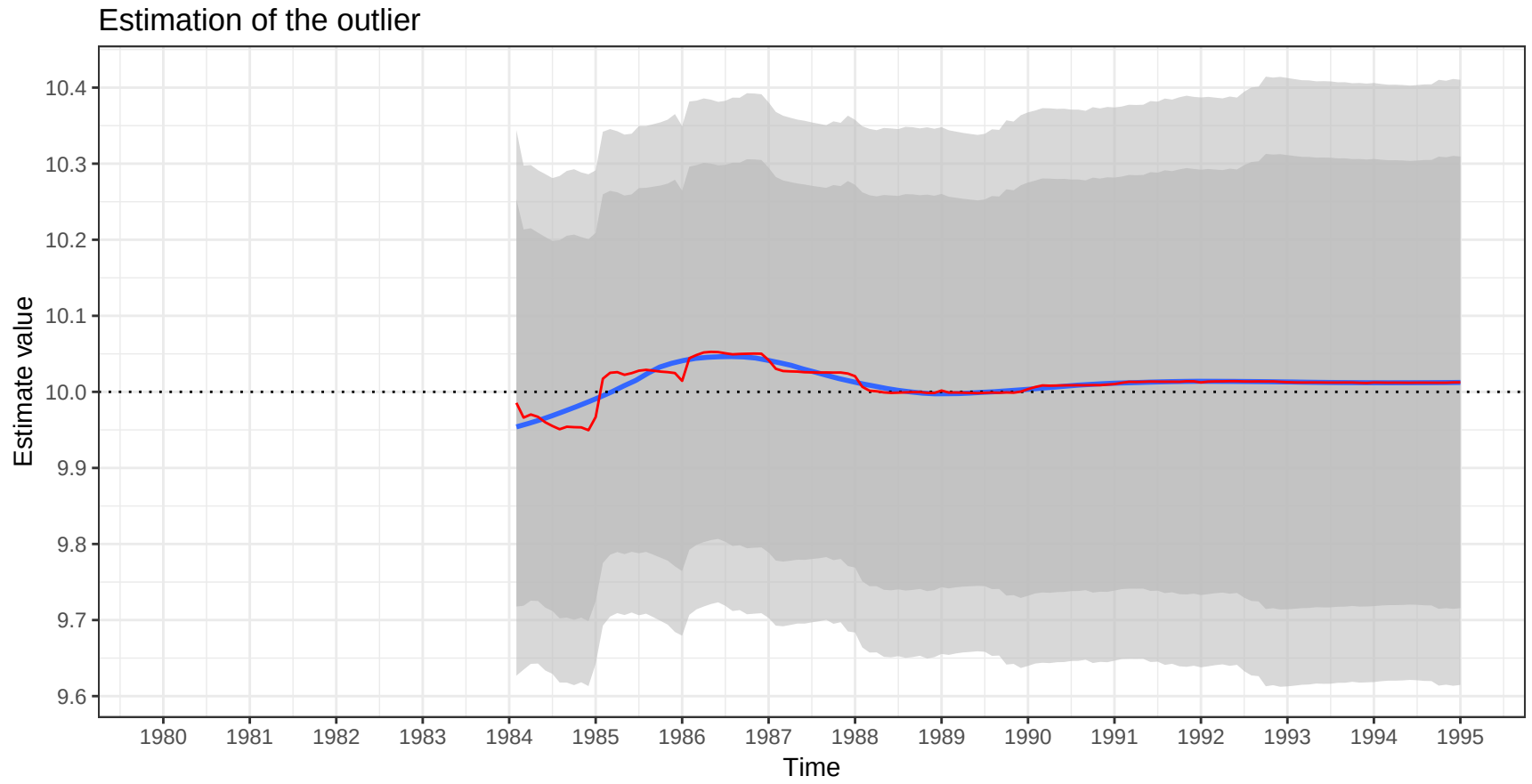

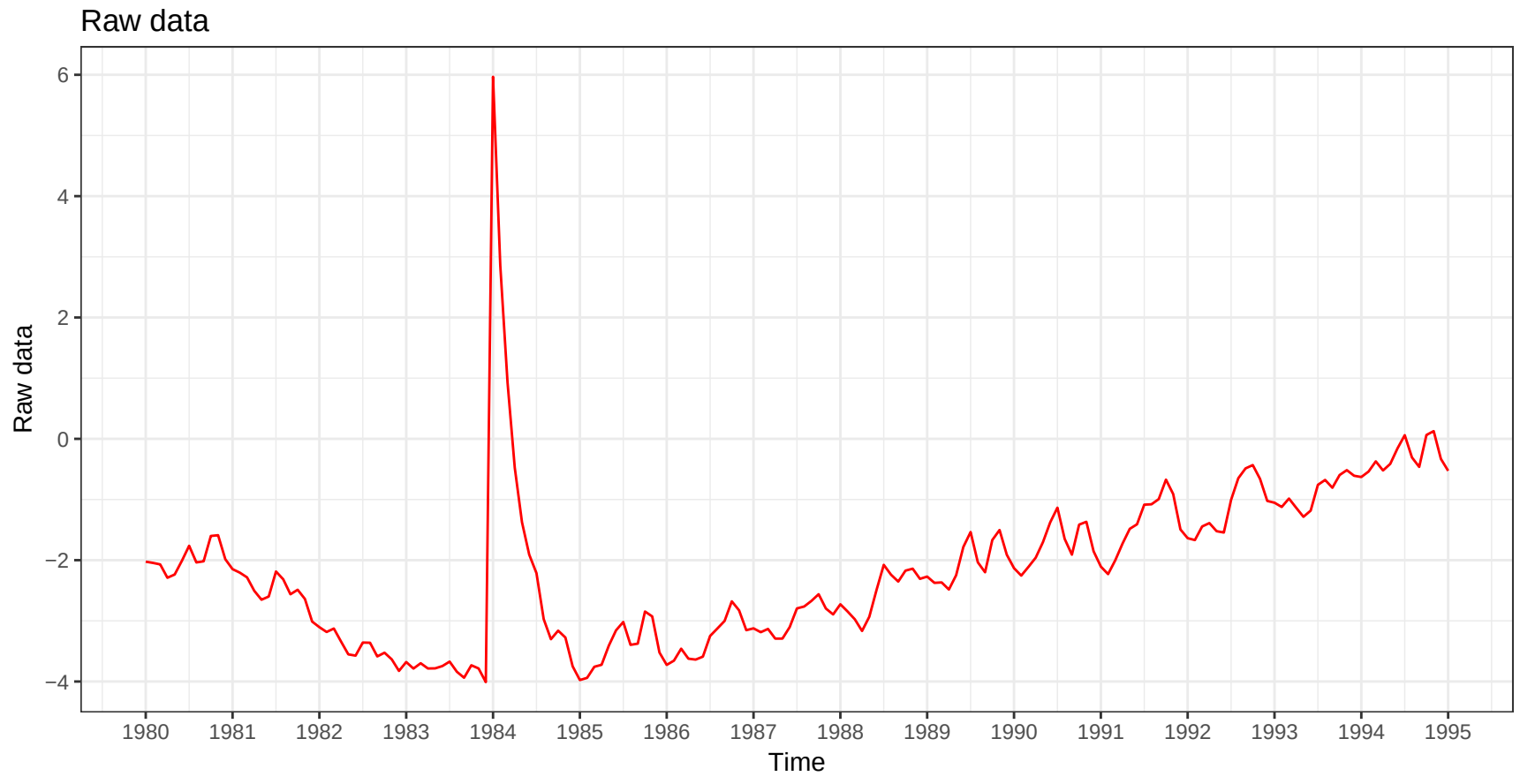

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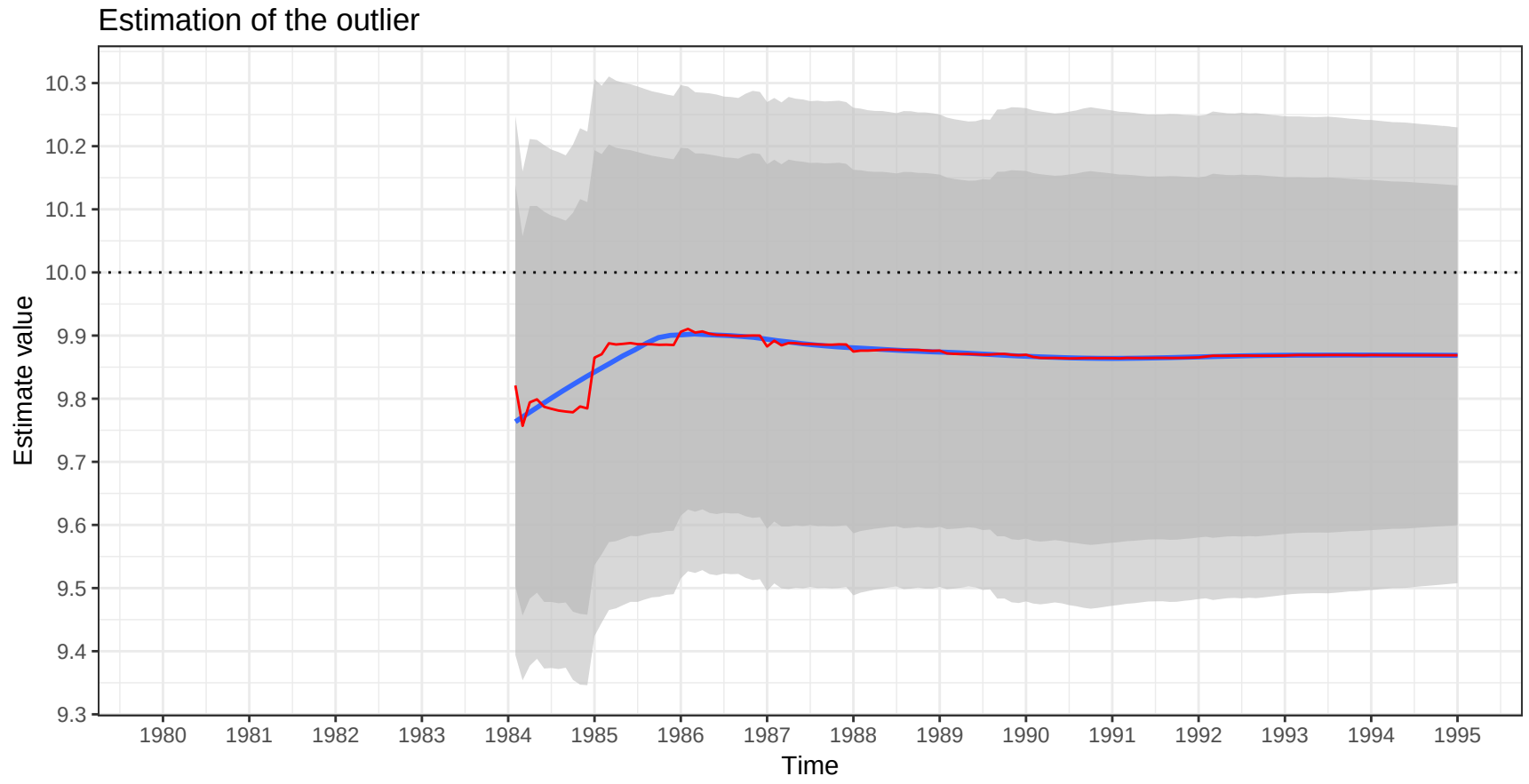

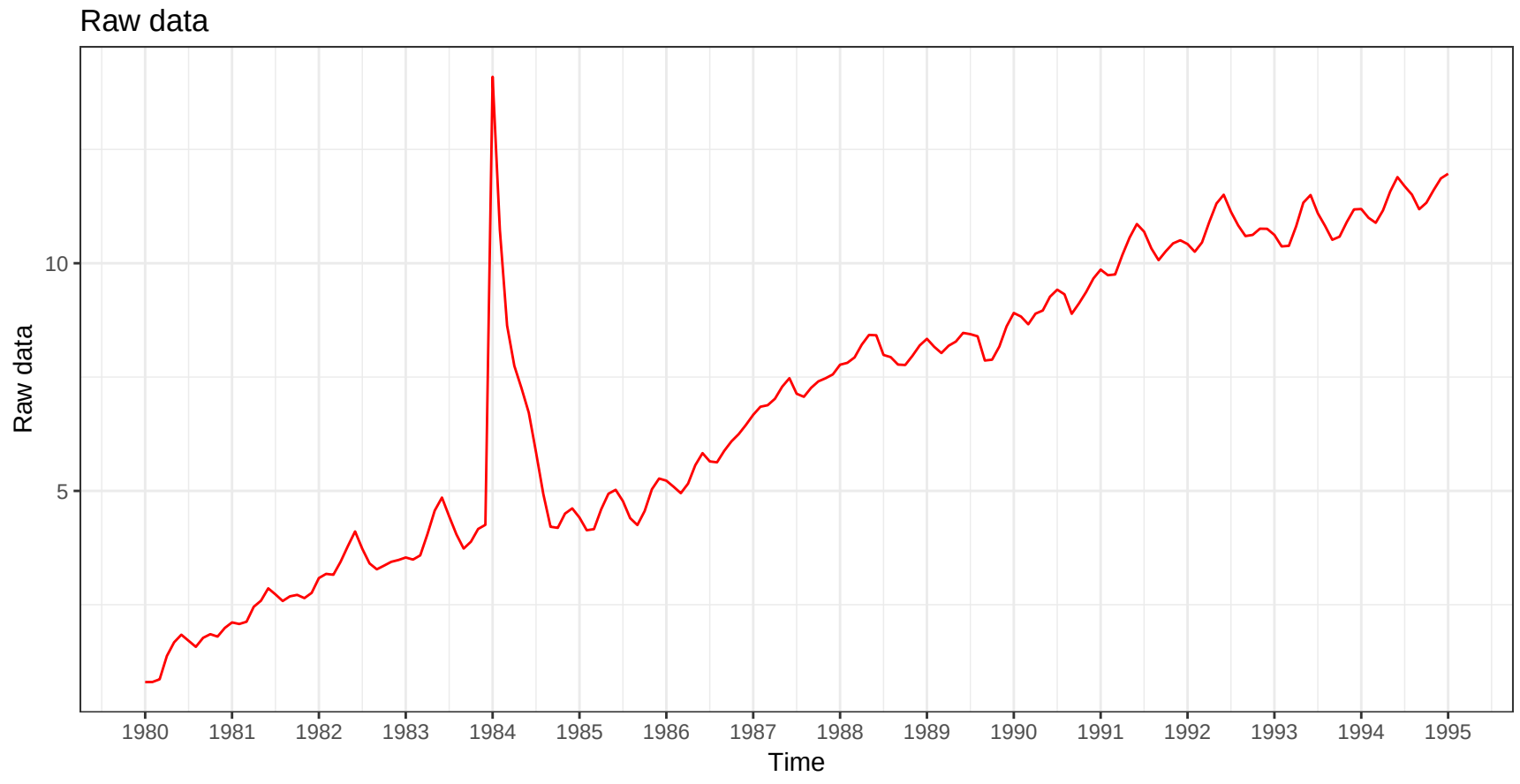

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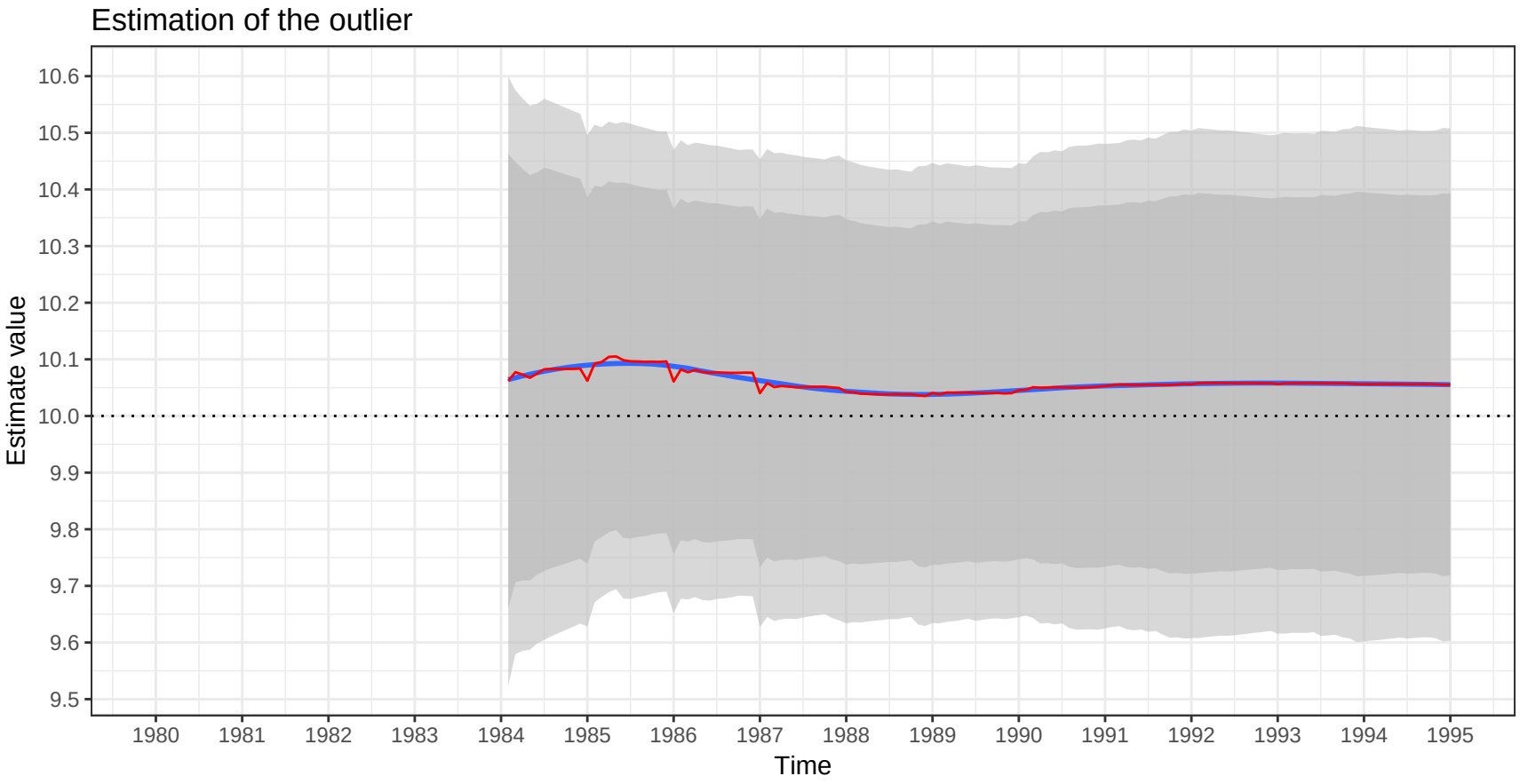

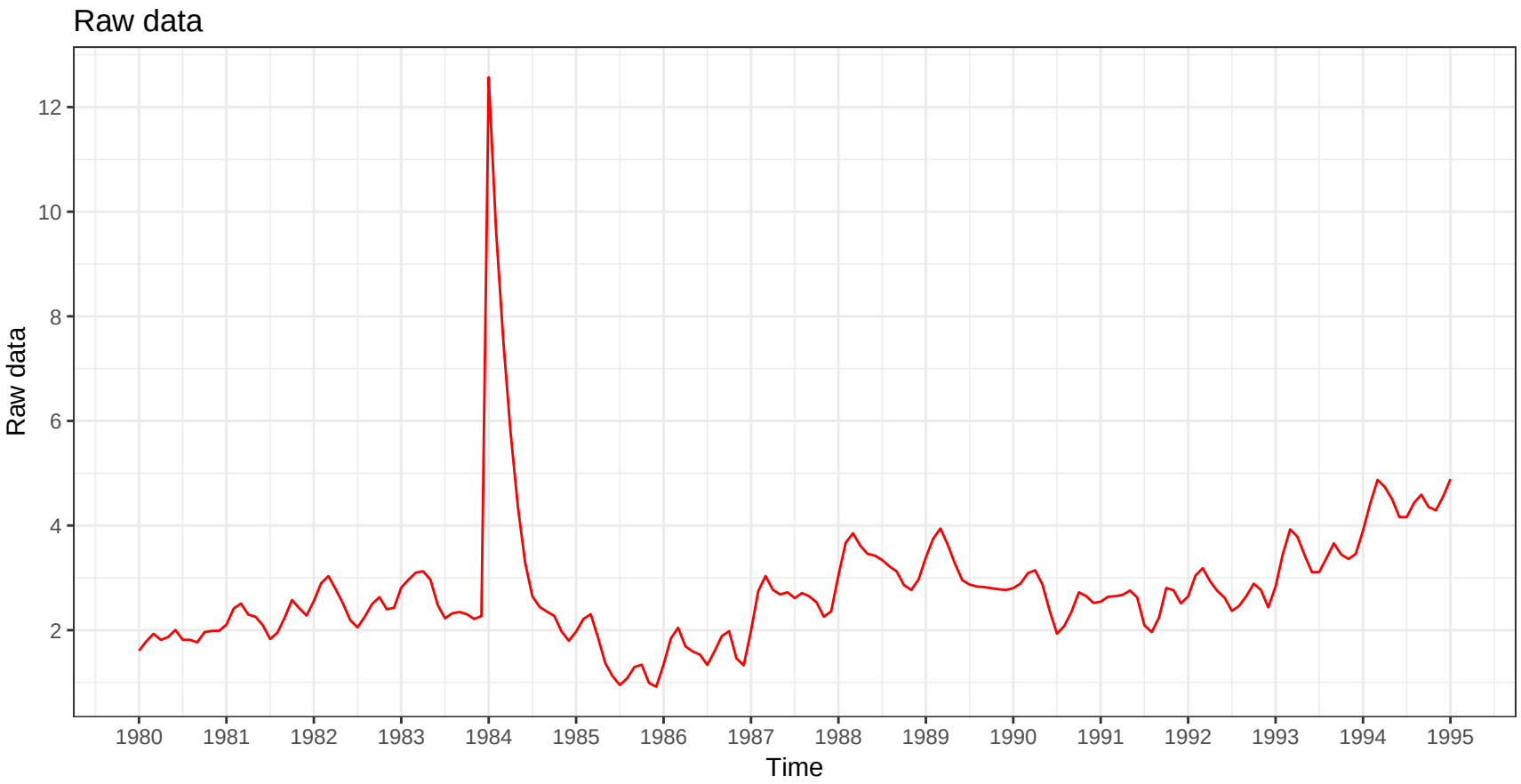

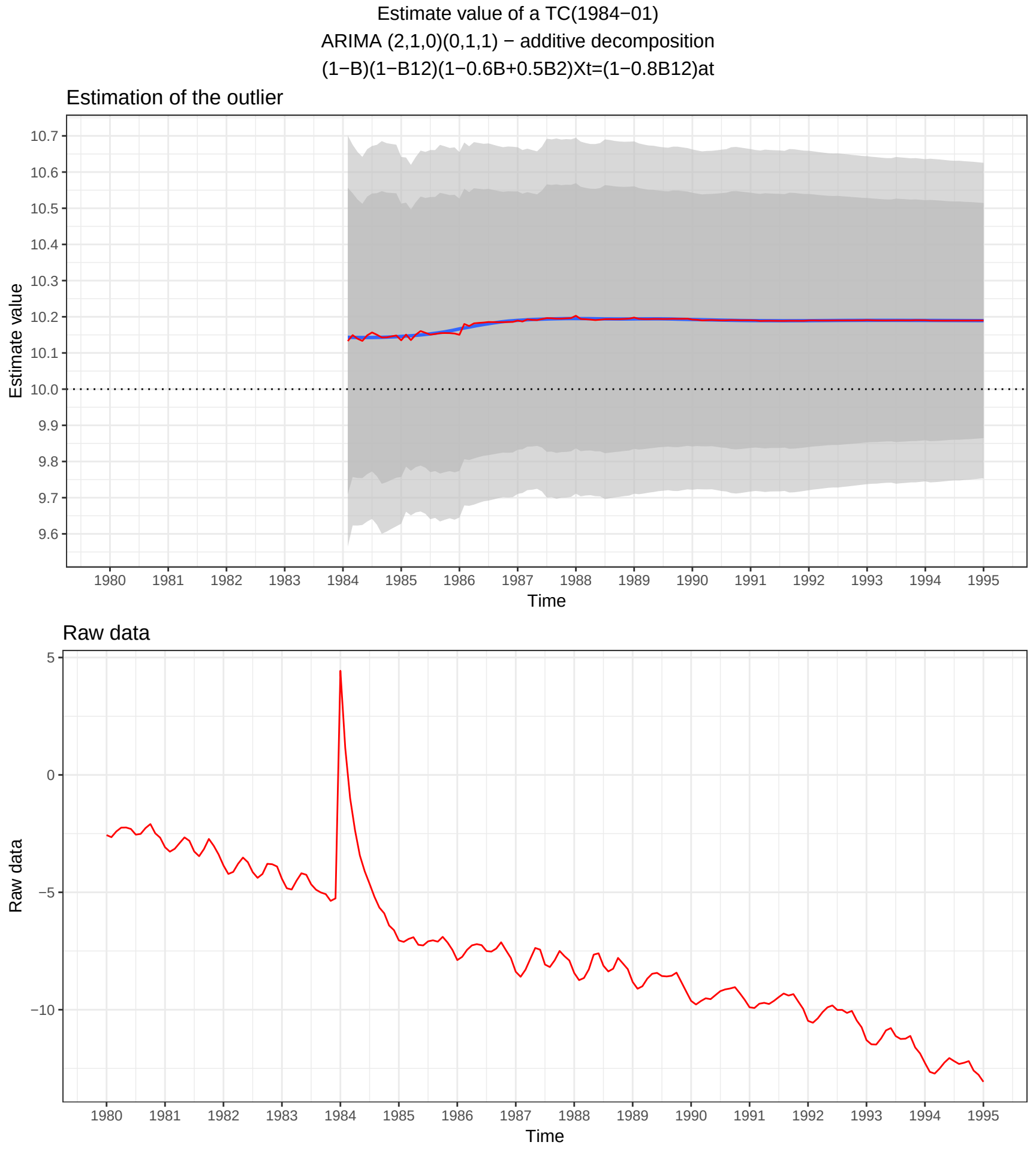
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Estimation of the outlier
Estimate value
10.7
10.6
10.5
10.4
10.3
10.2
10.1
10.0
9.9
9.8
9.7
9.6
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time
Raw data
Raw data
5
0
−5
−10
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
Time

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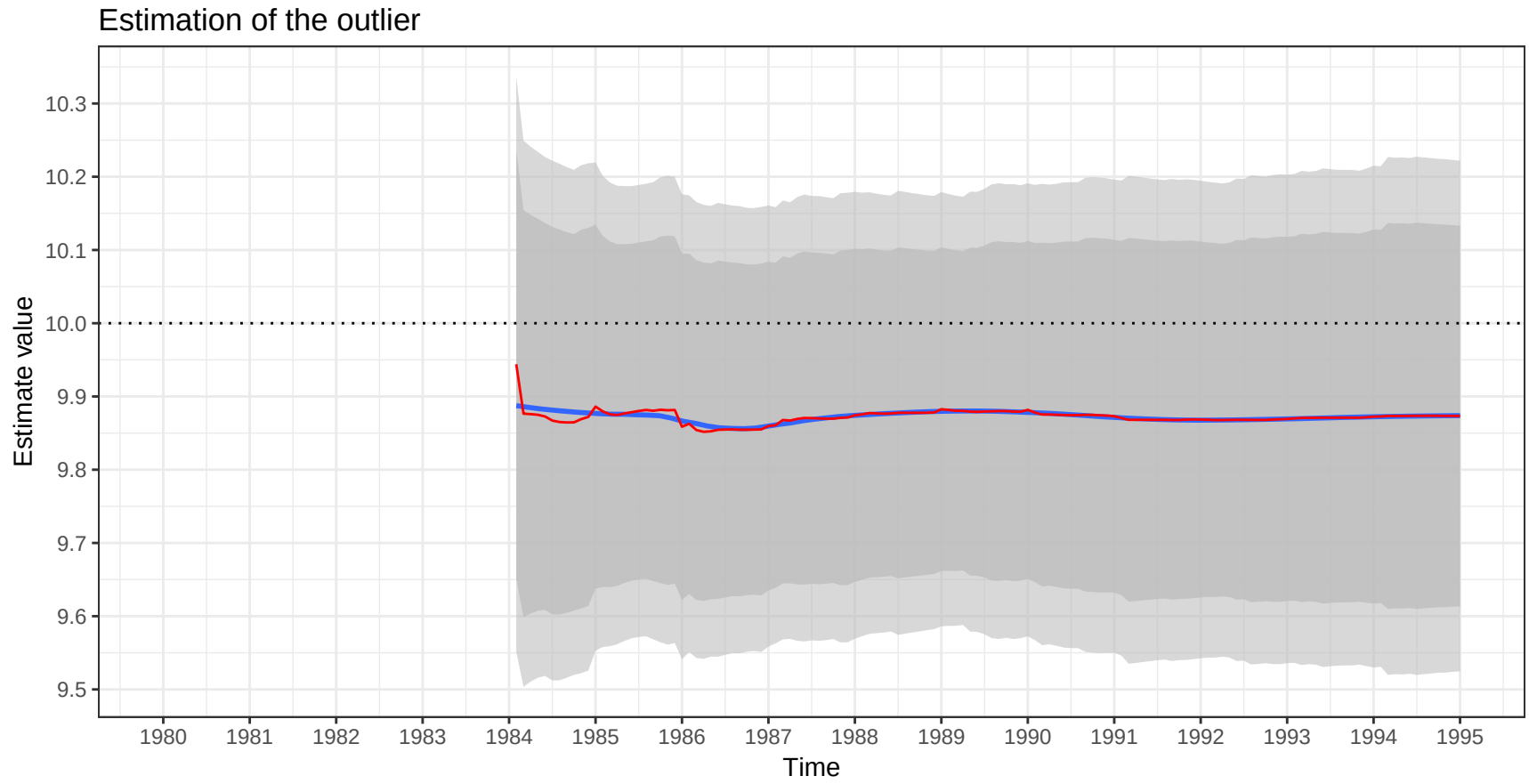

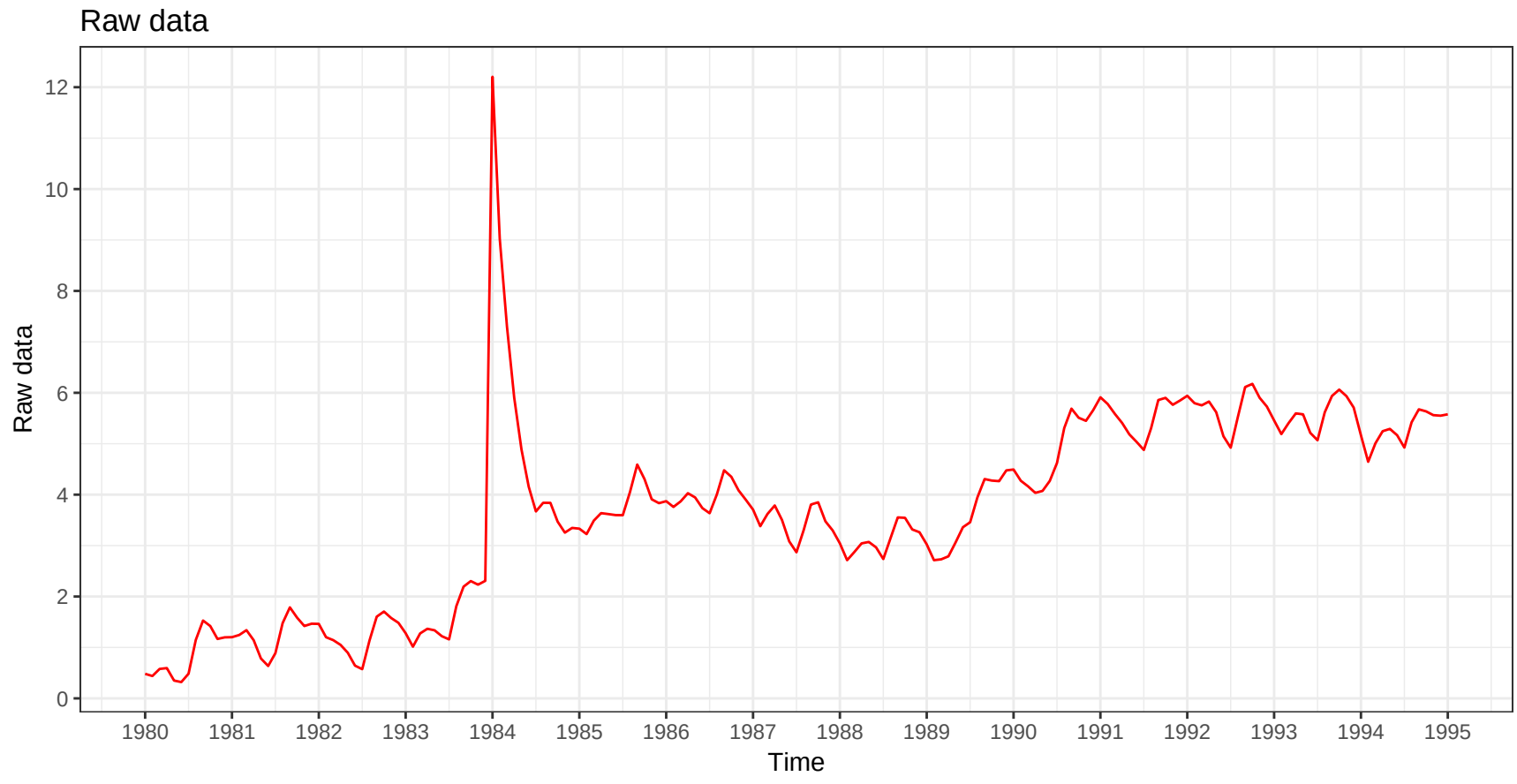

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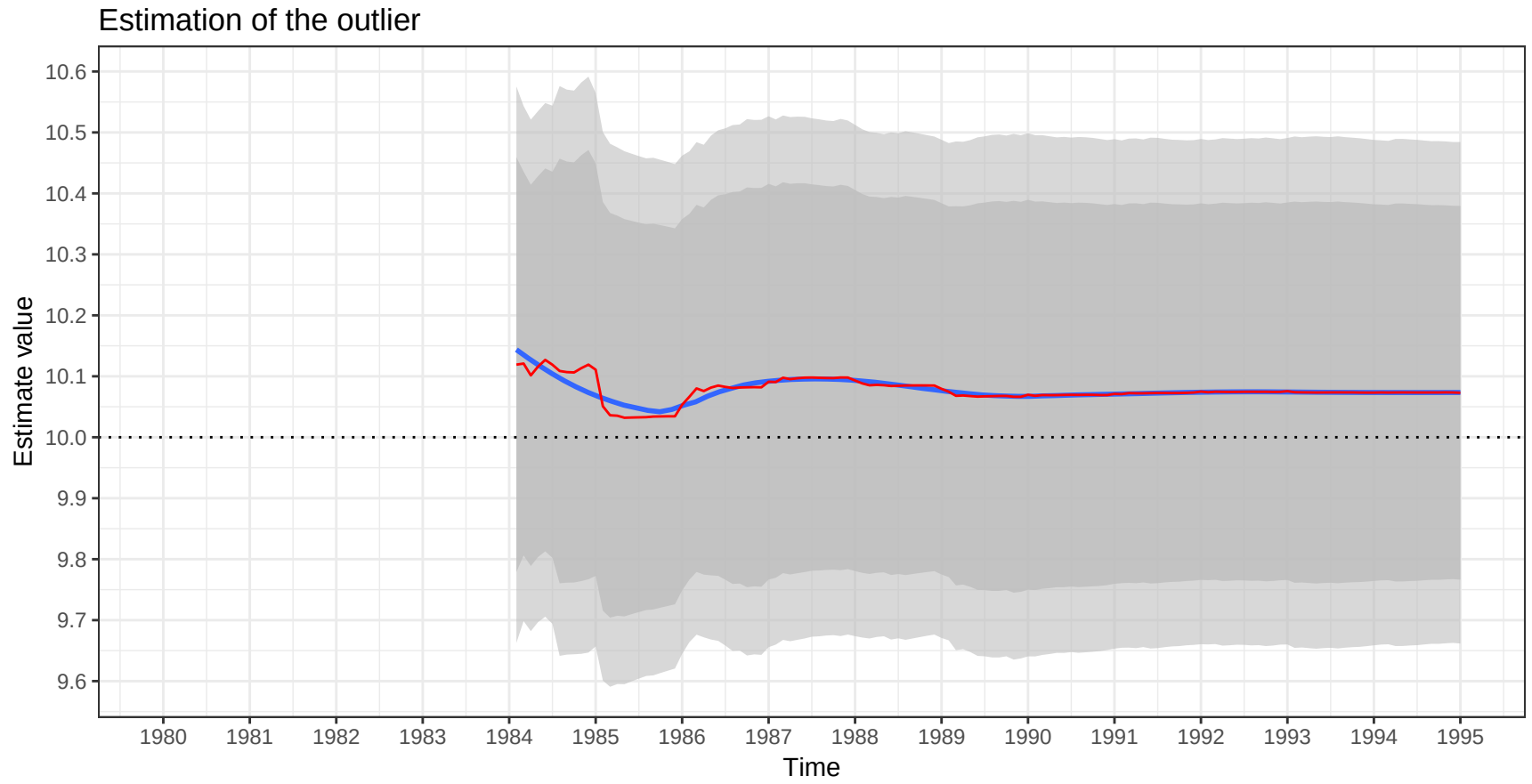

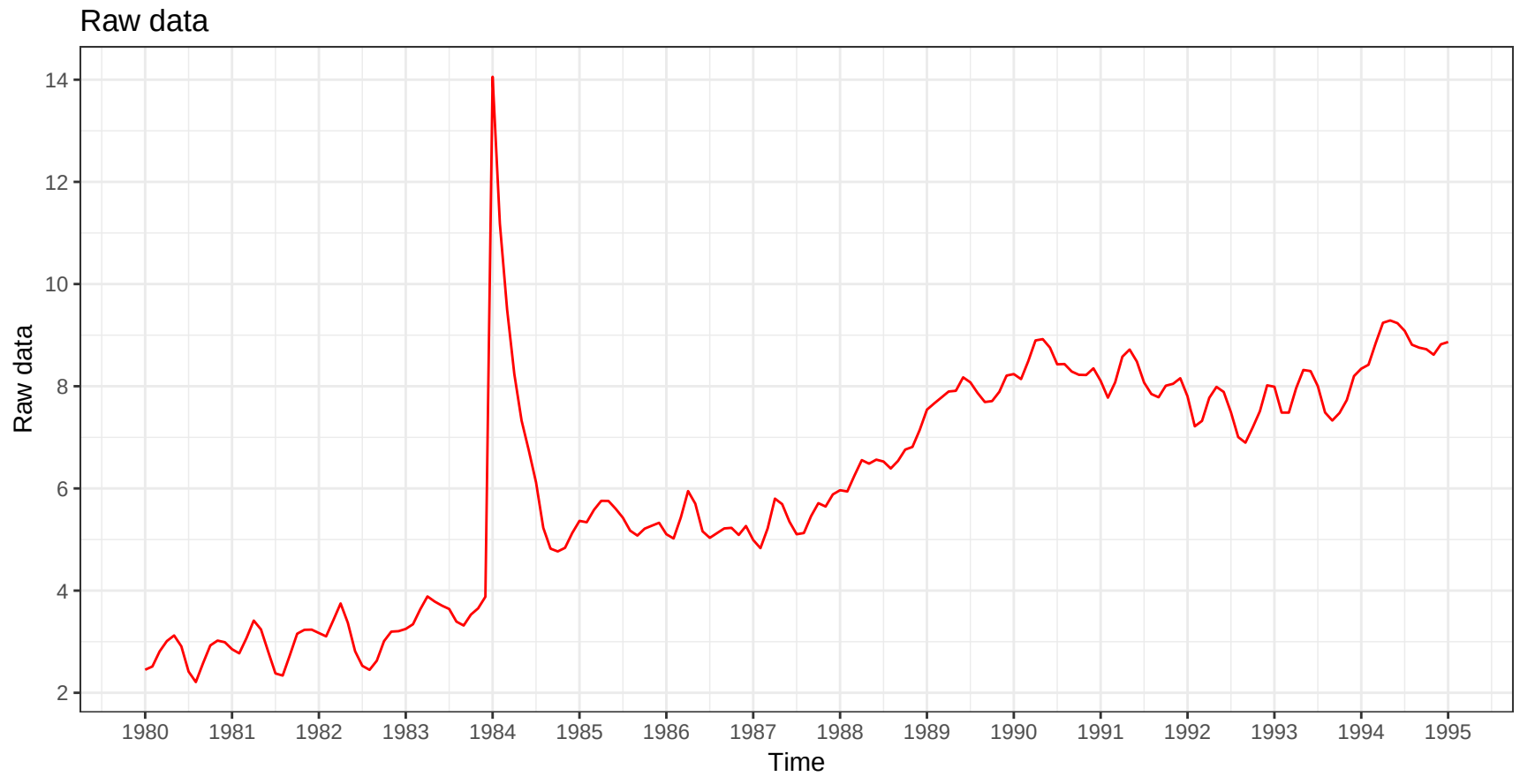

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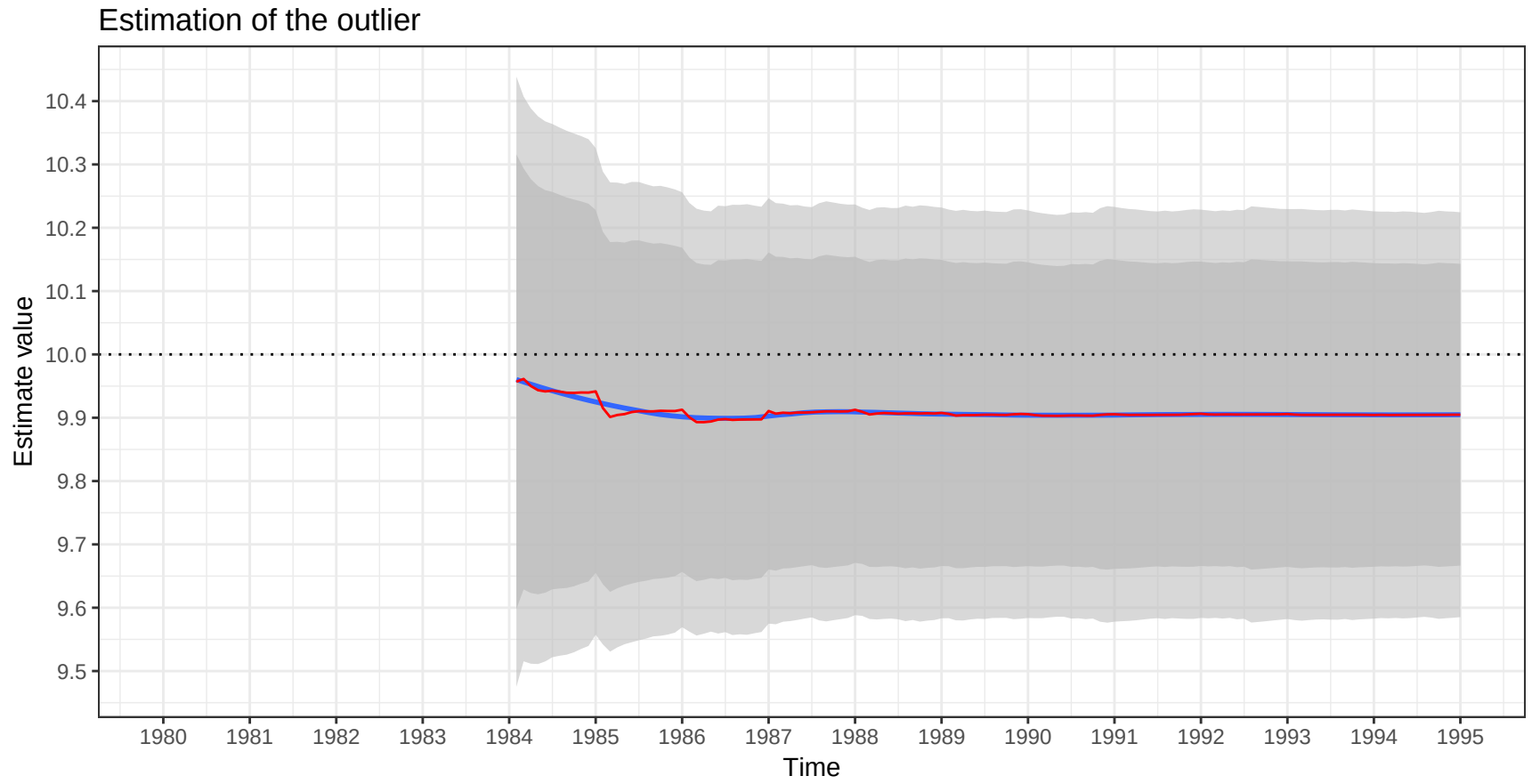

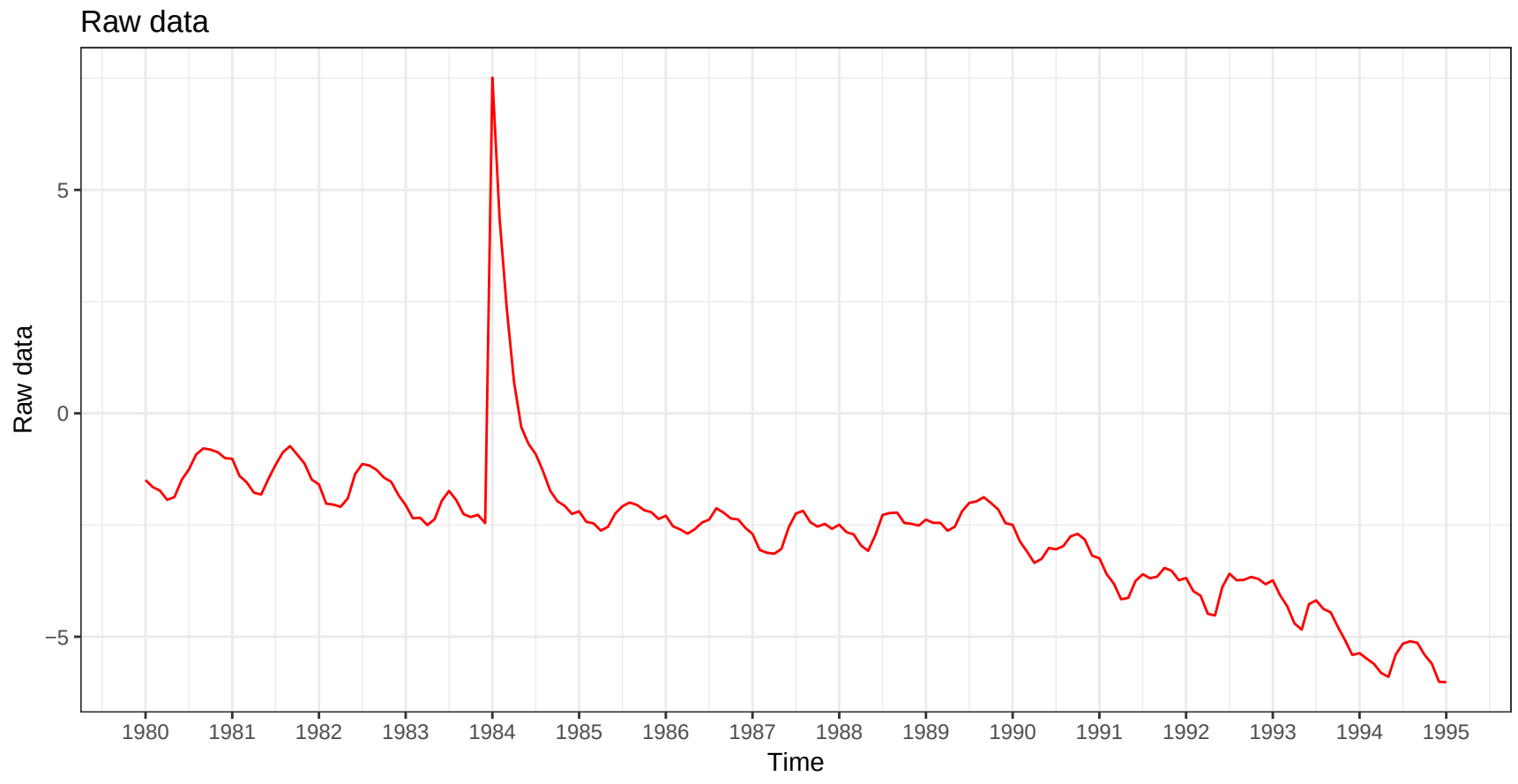

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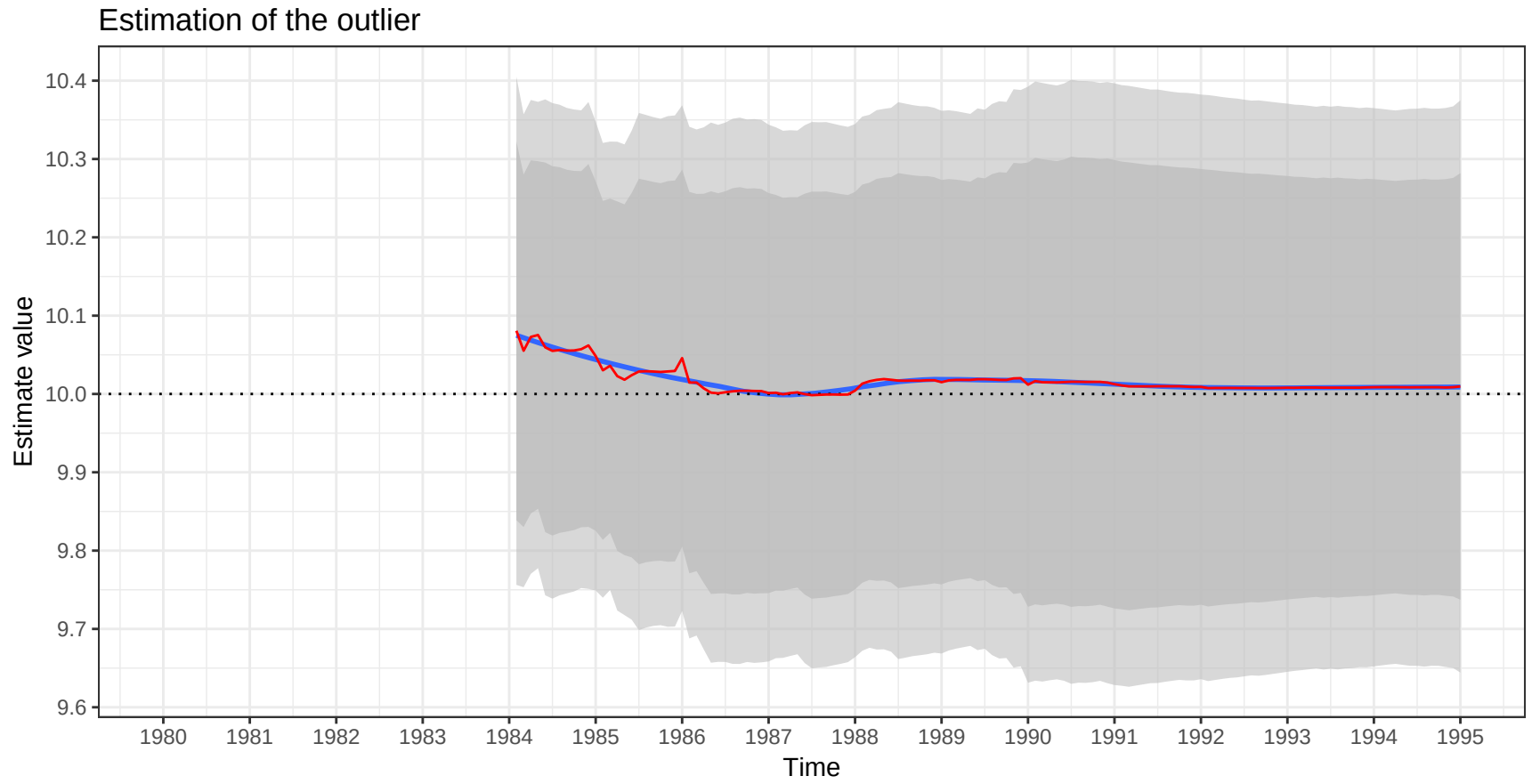

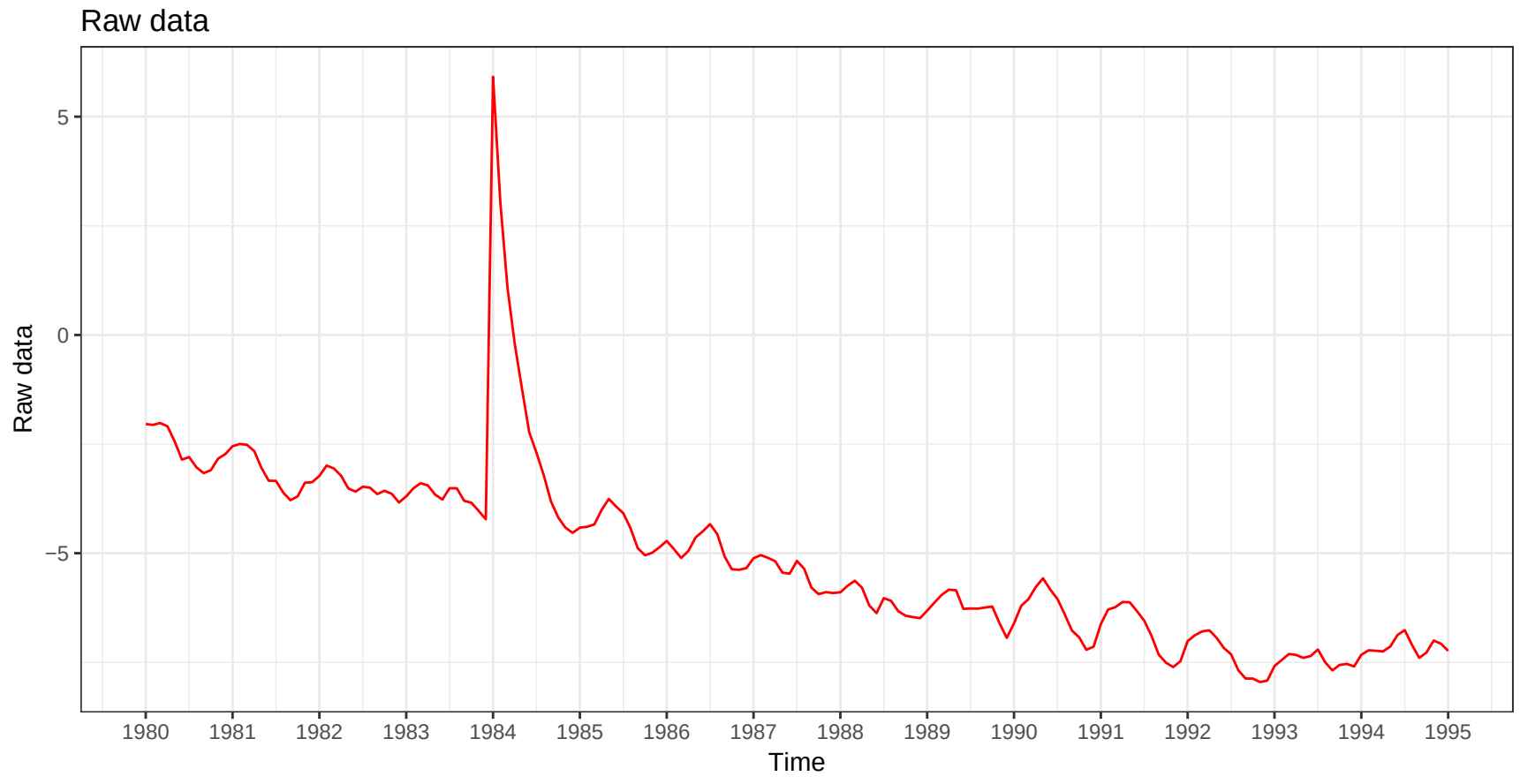

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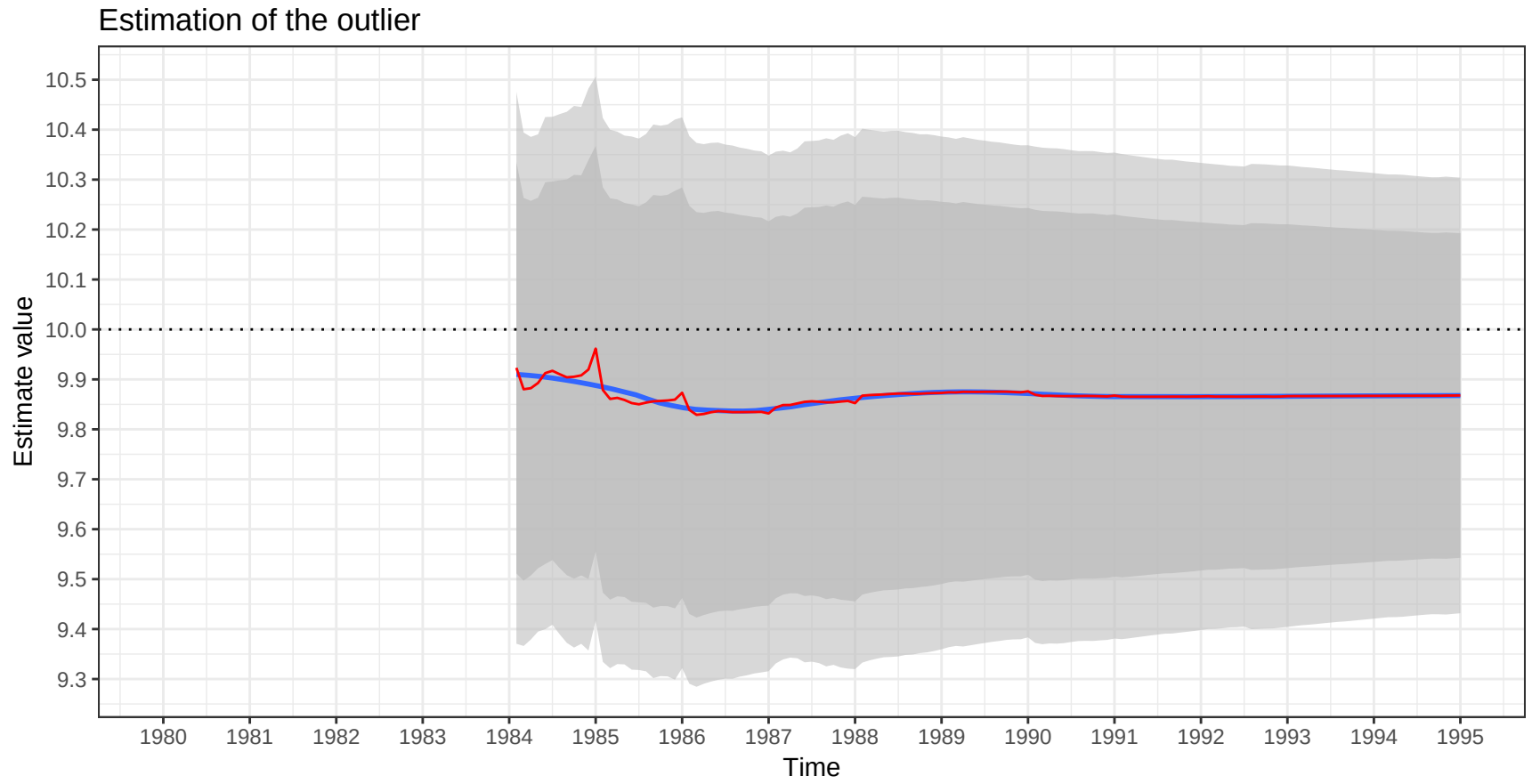

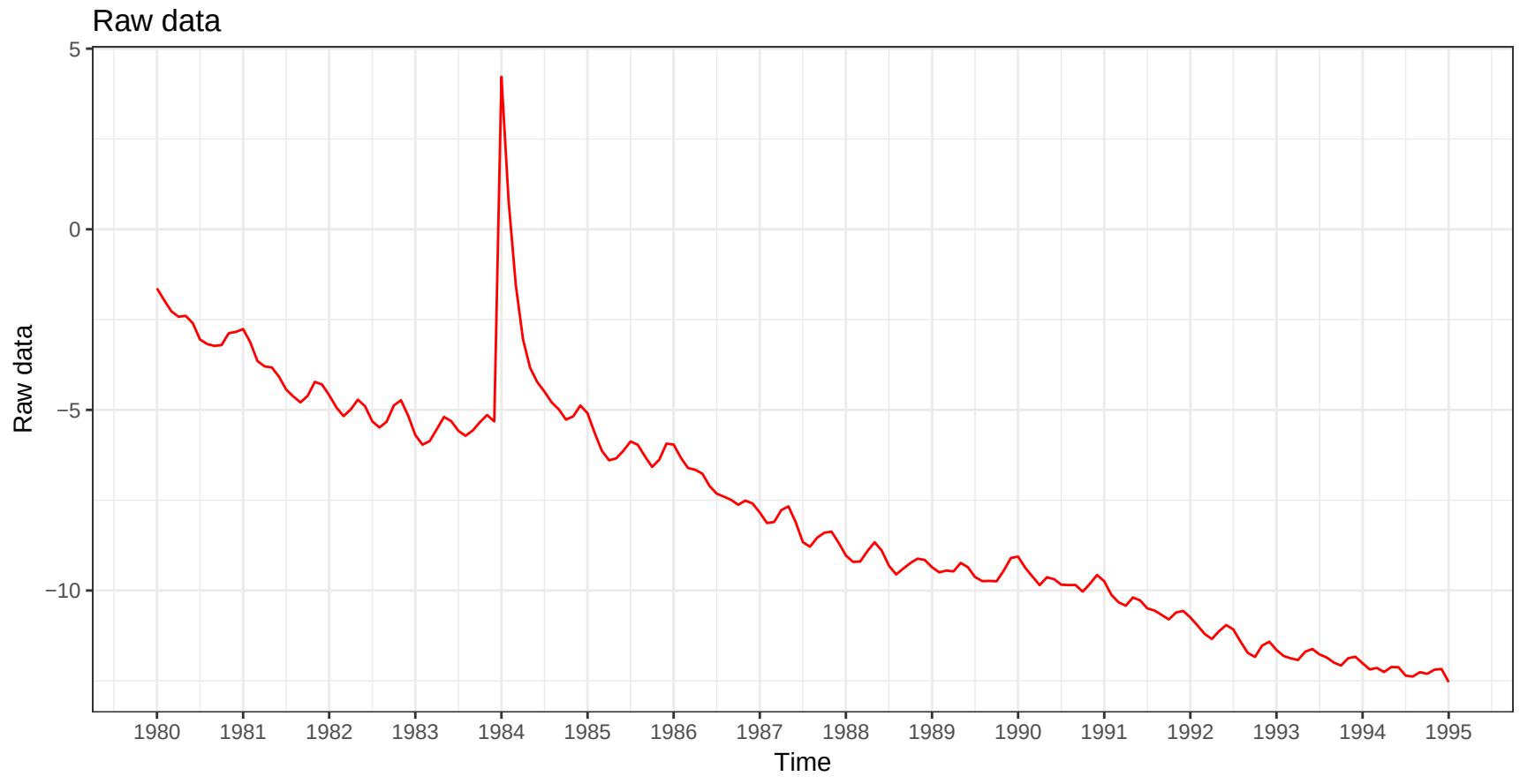

Estimate value of a TC(1984−01)
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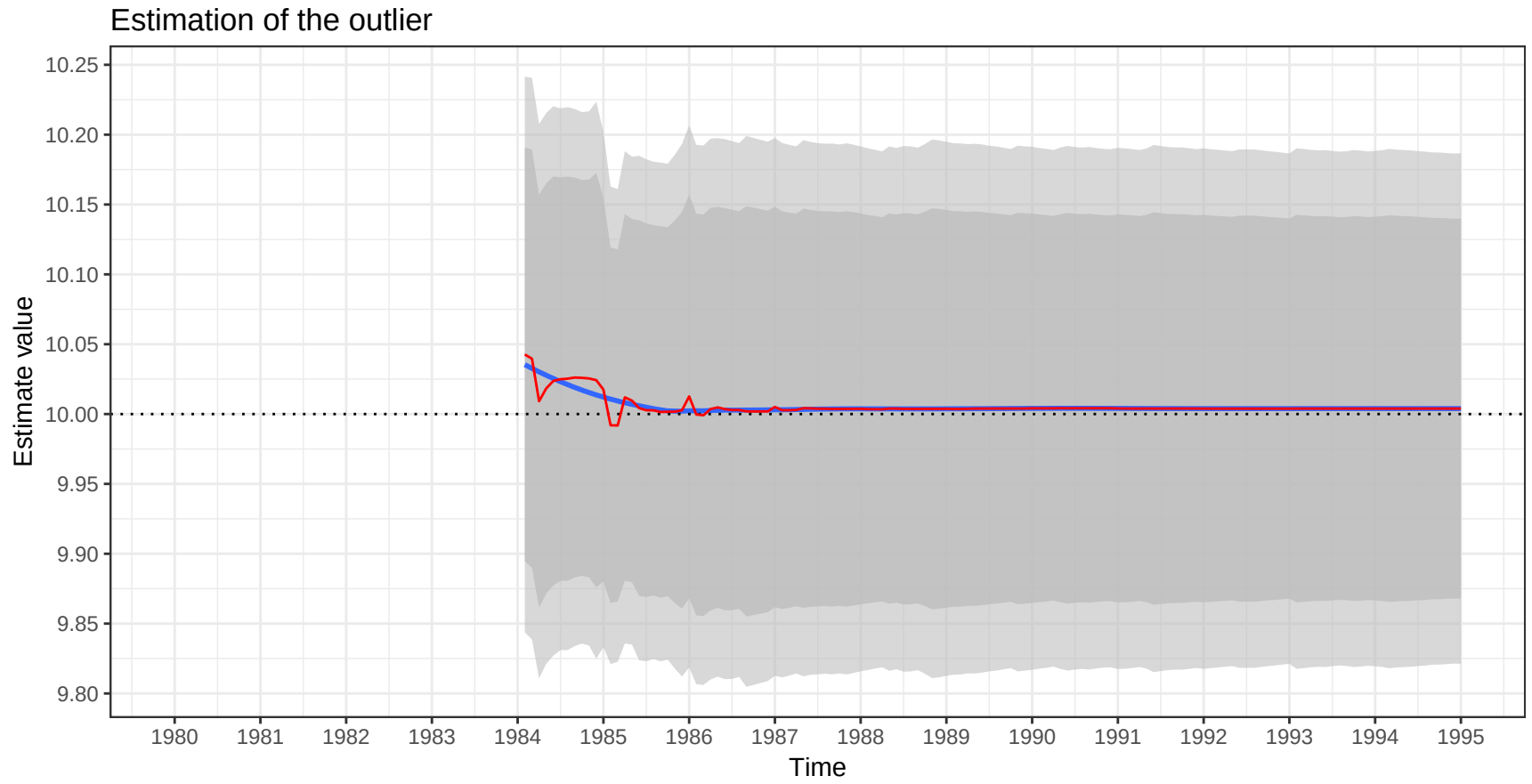
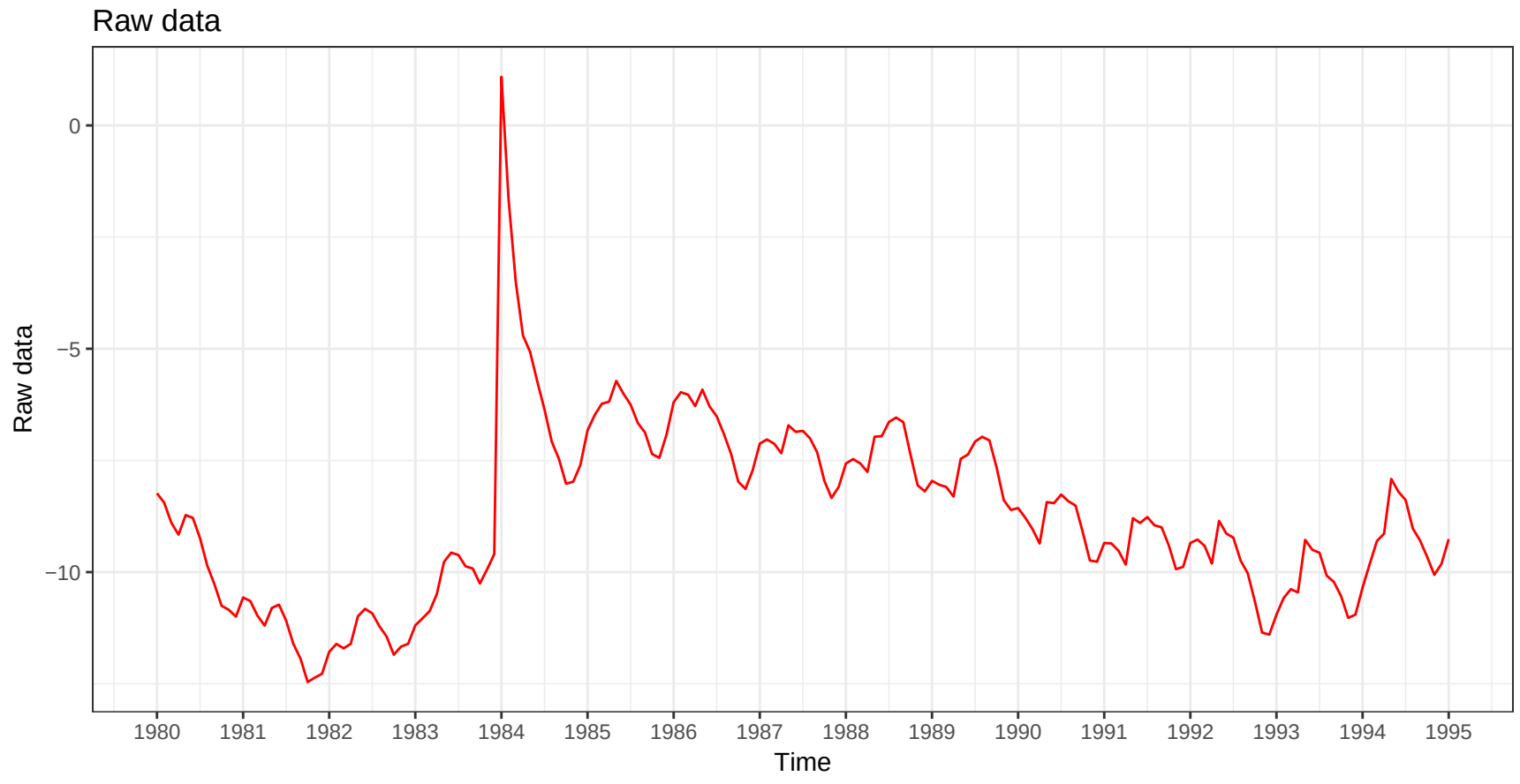
(1−B)(1−B12)(1−0.4B)Xt=(1+0.4B+0.4B2)(1−0.4B12)at





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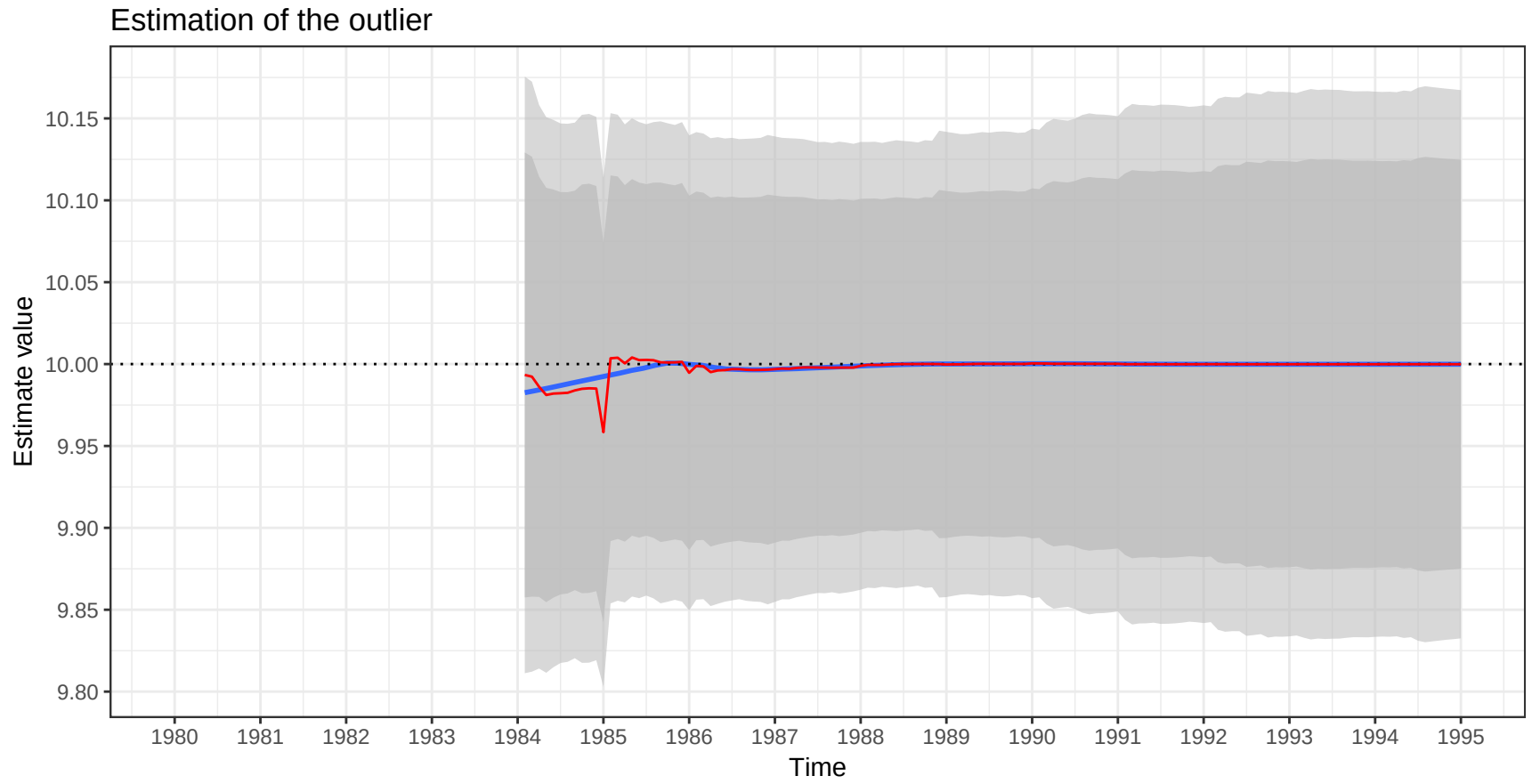

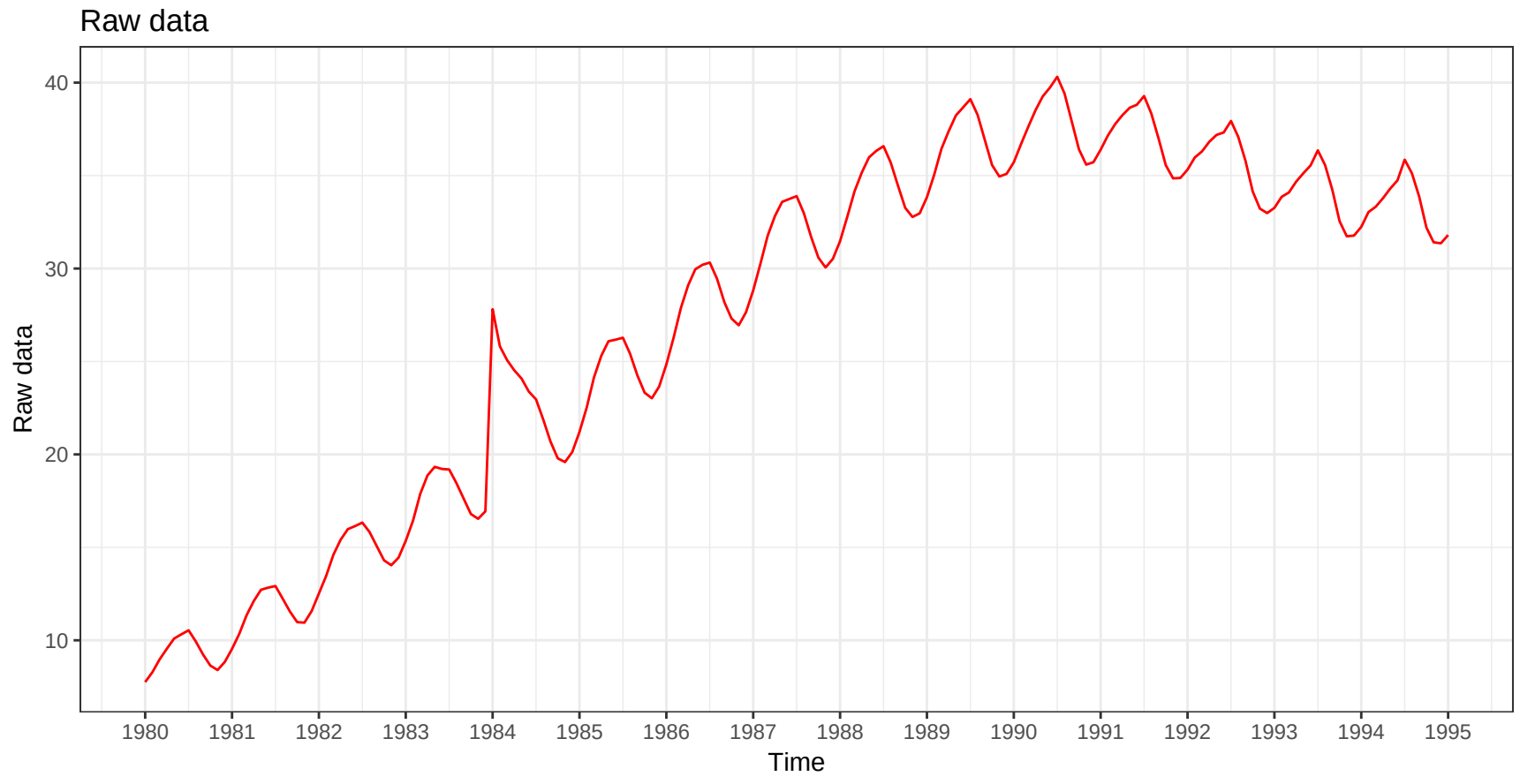

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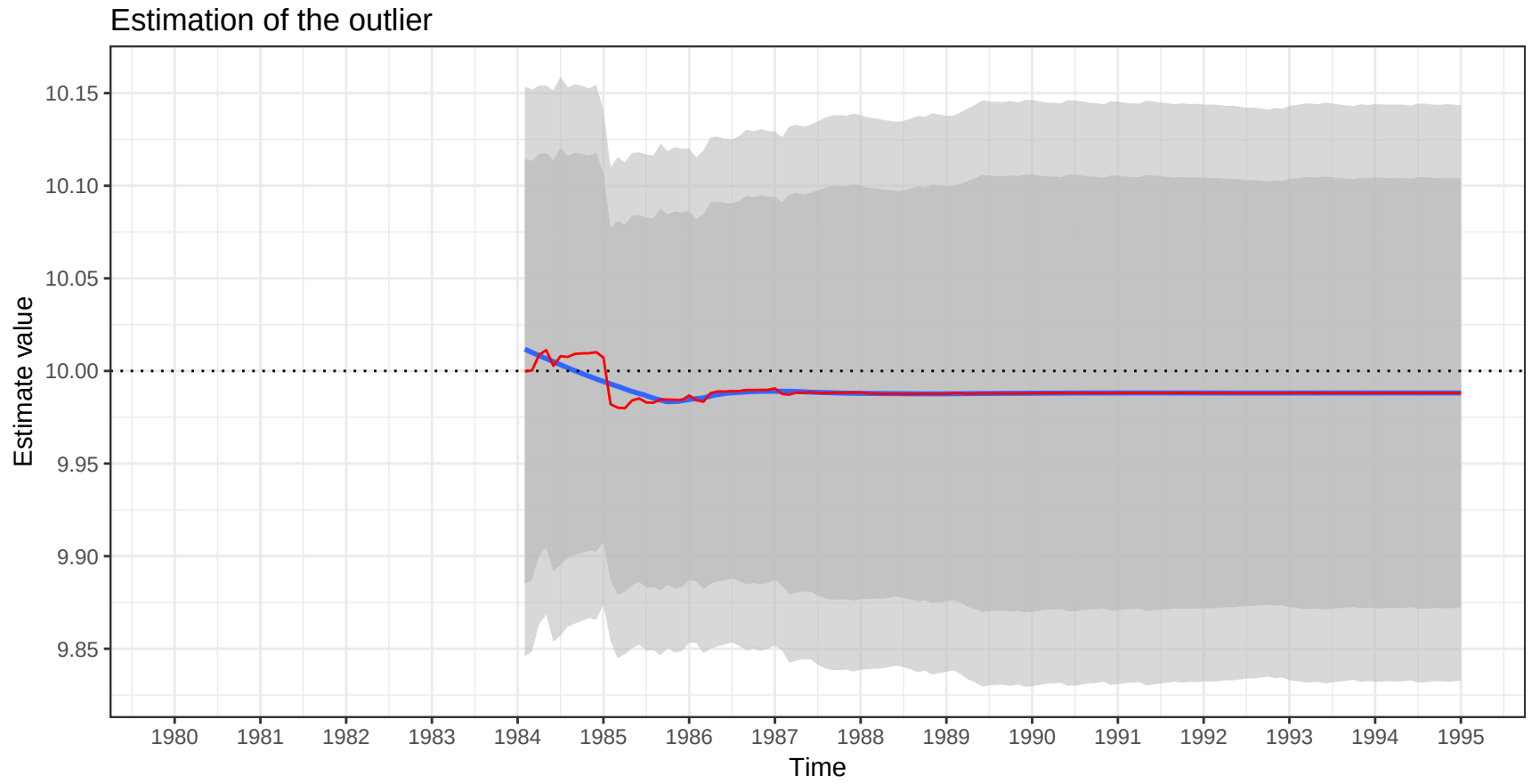

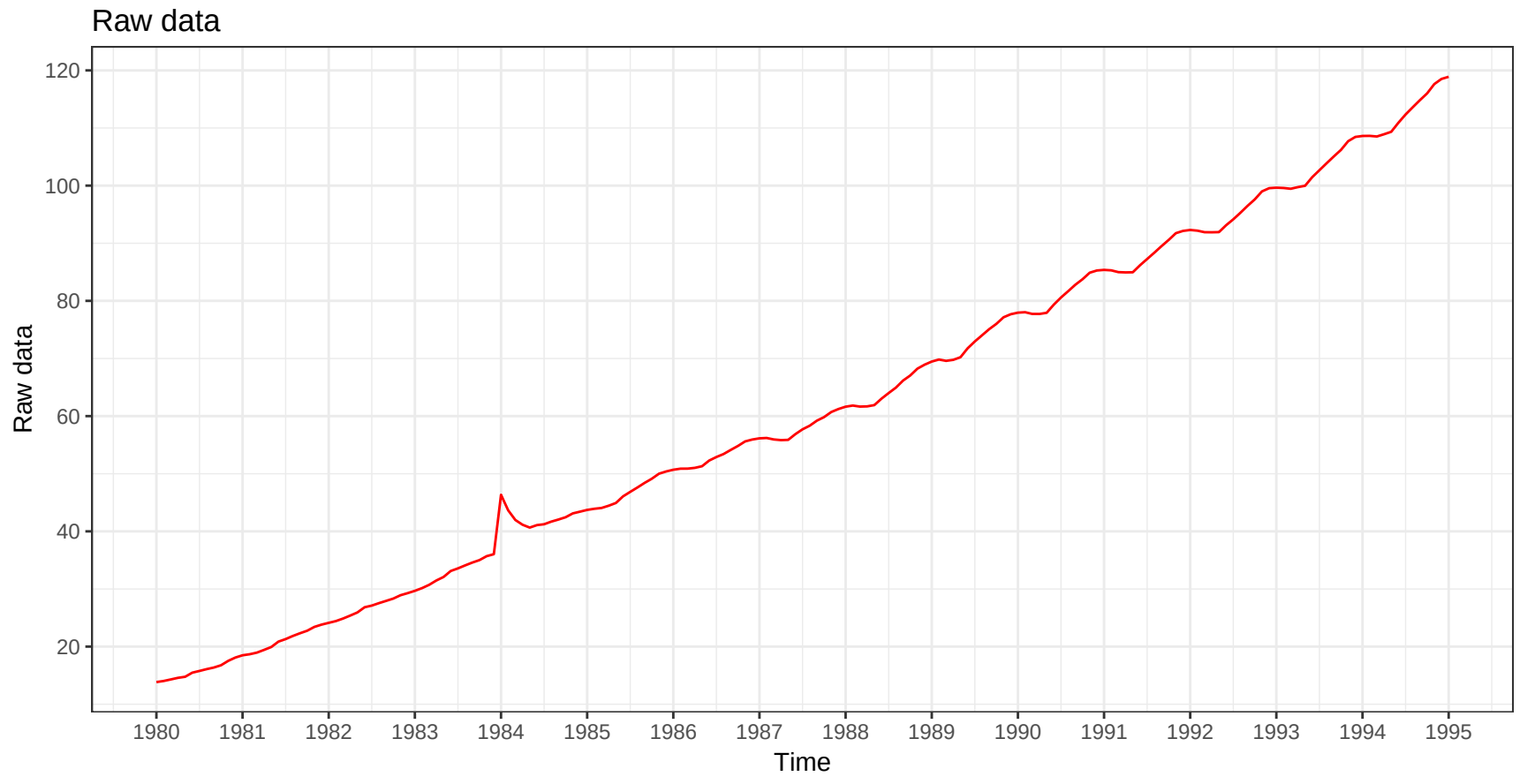

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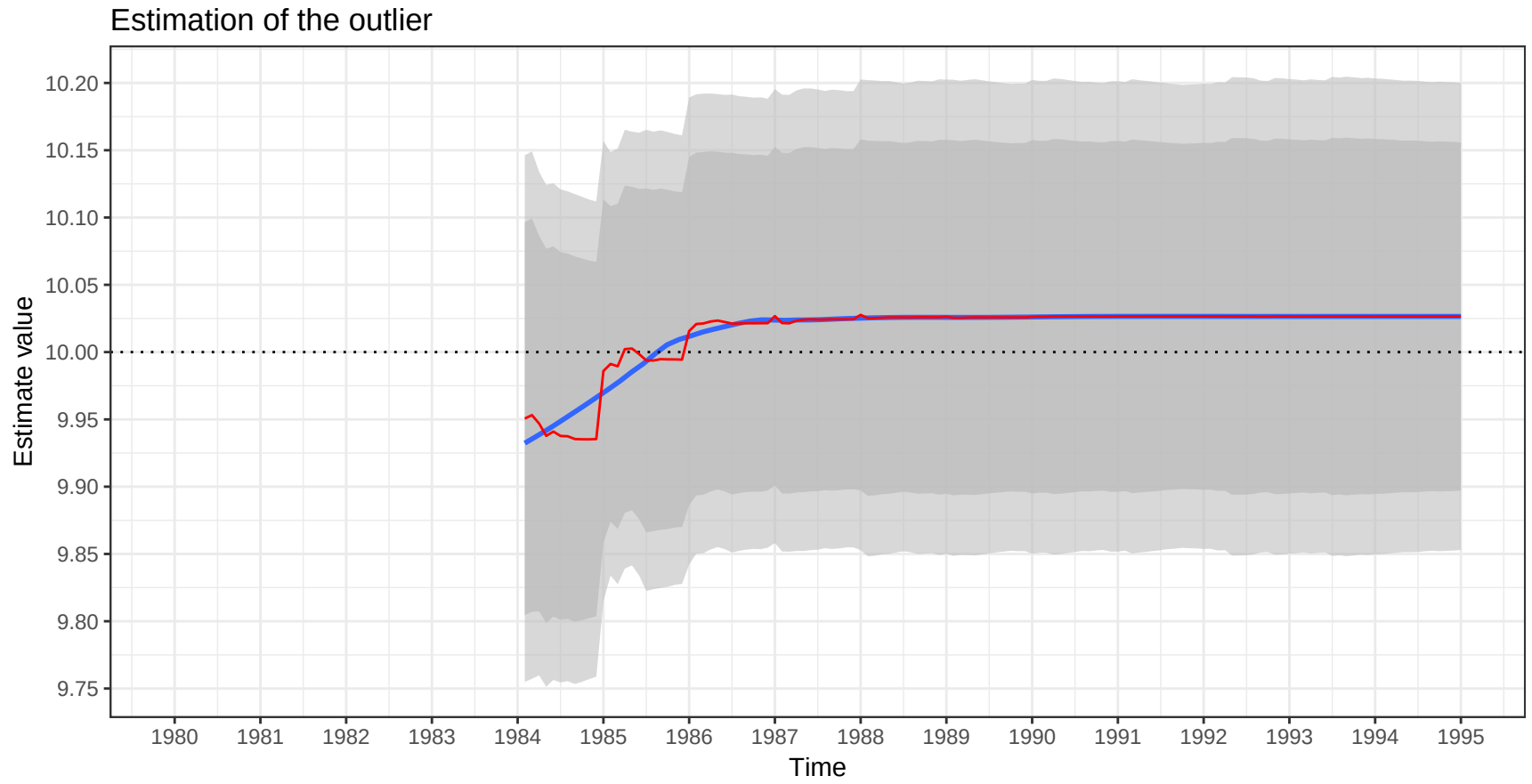

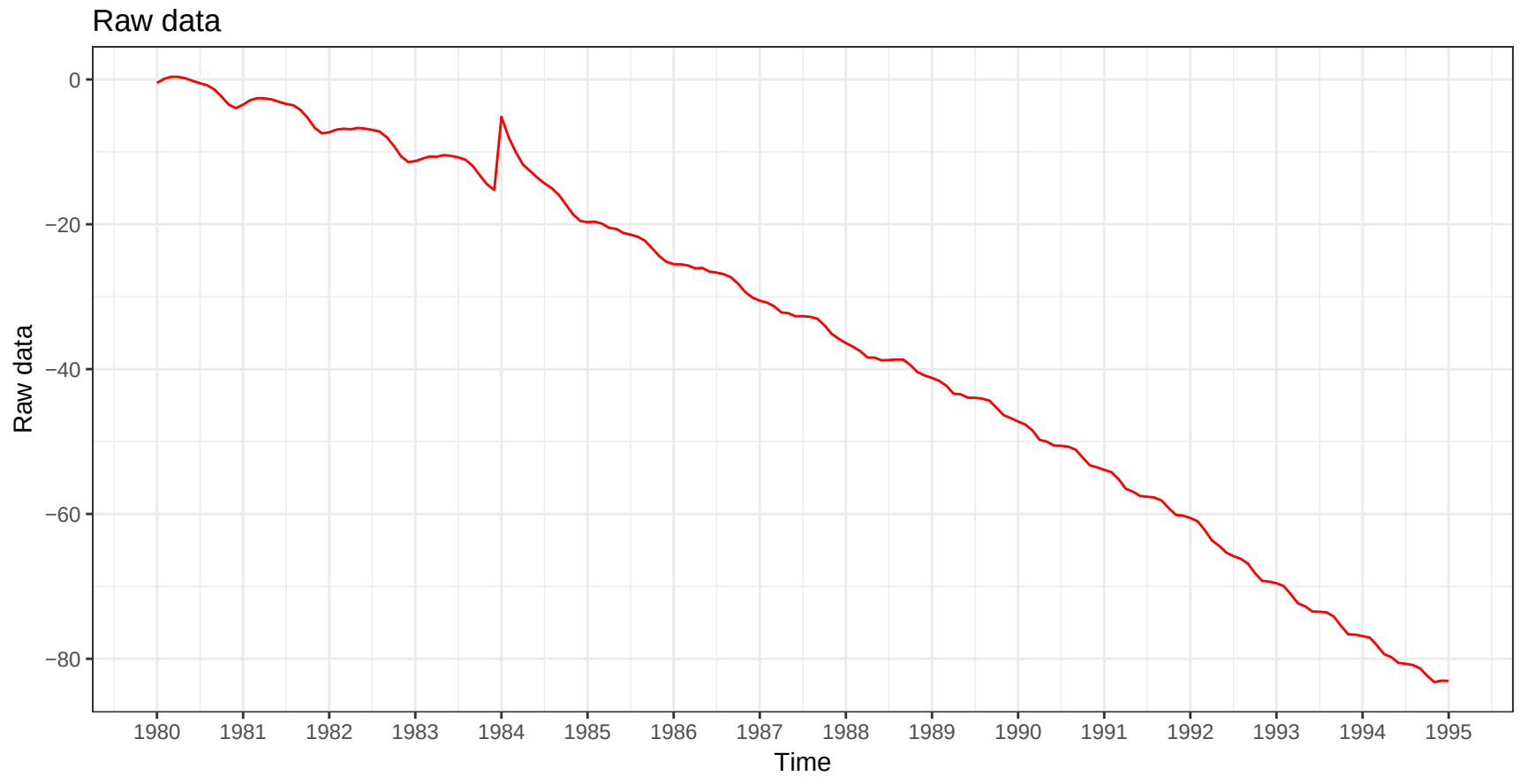

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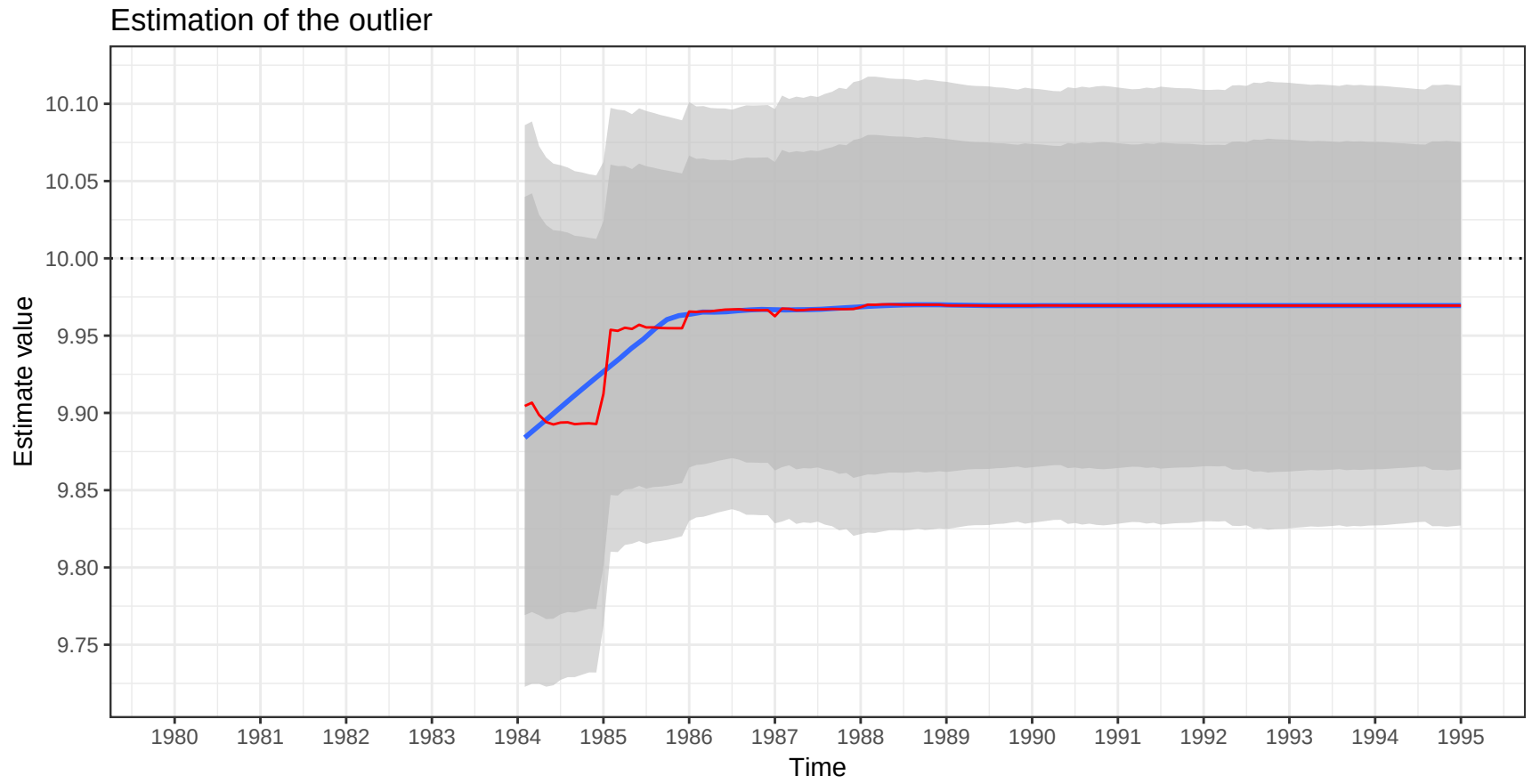

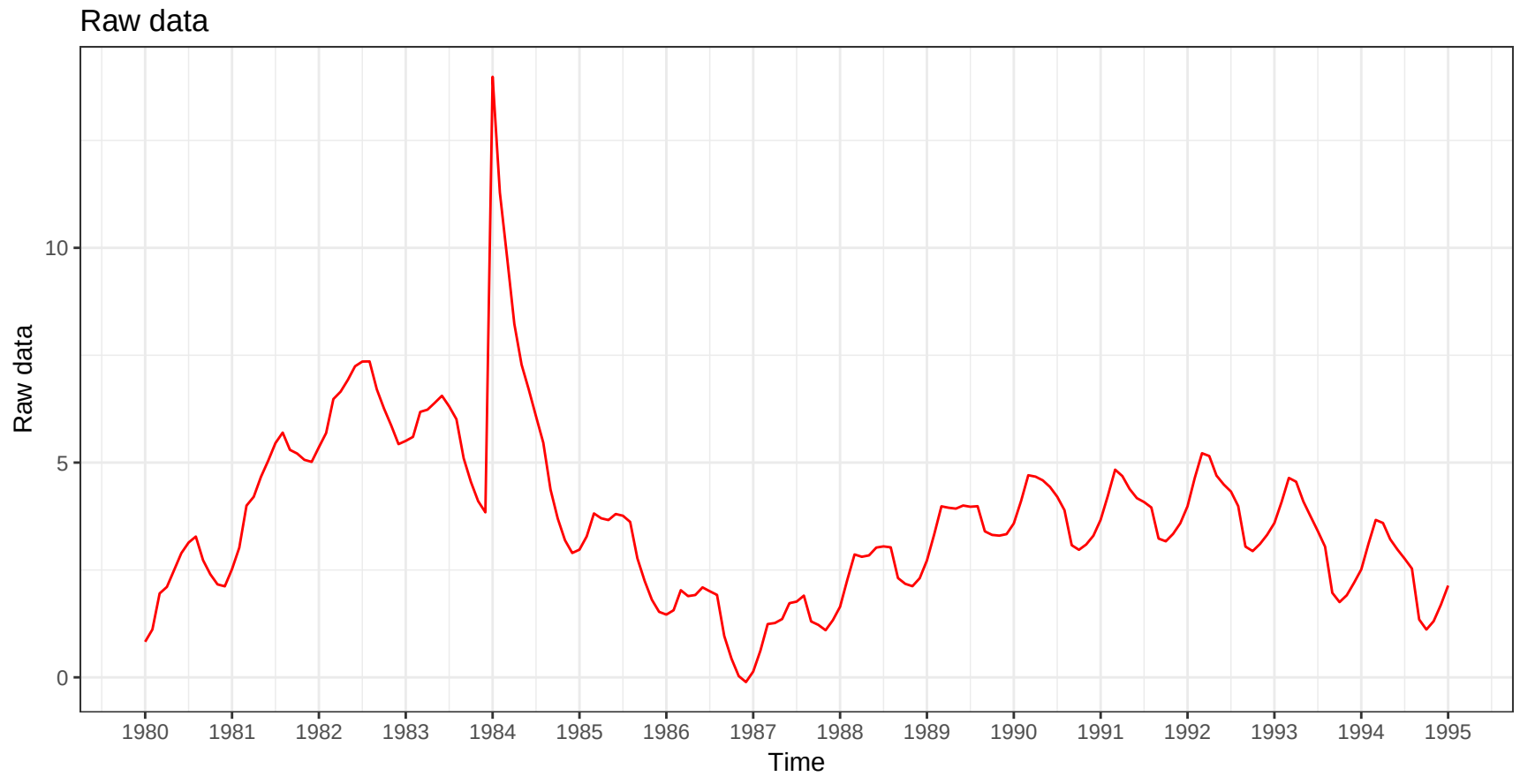

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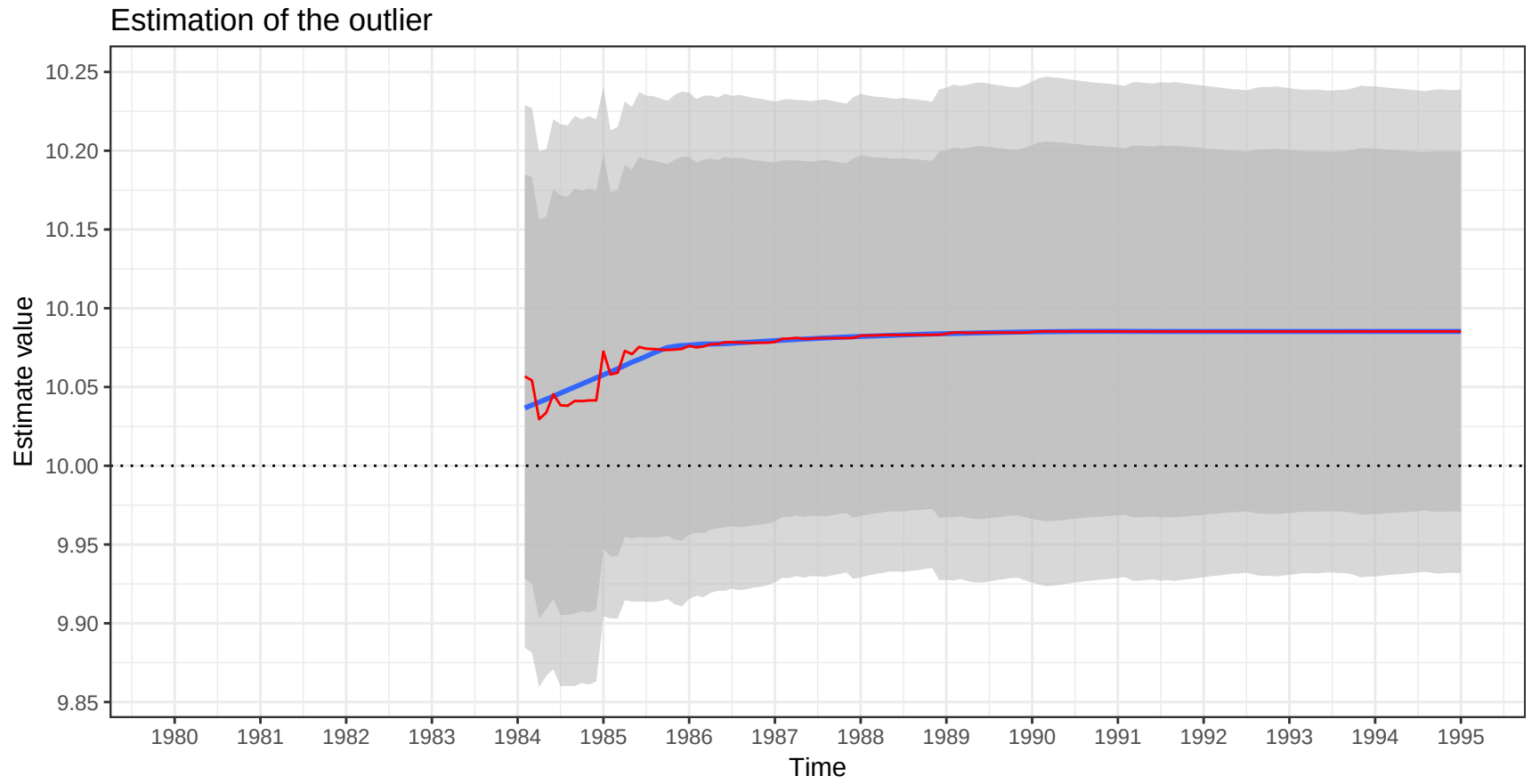

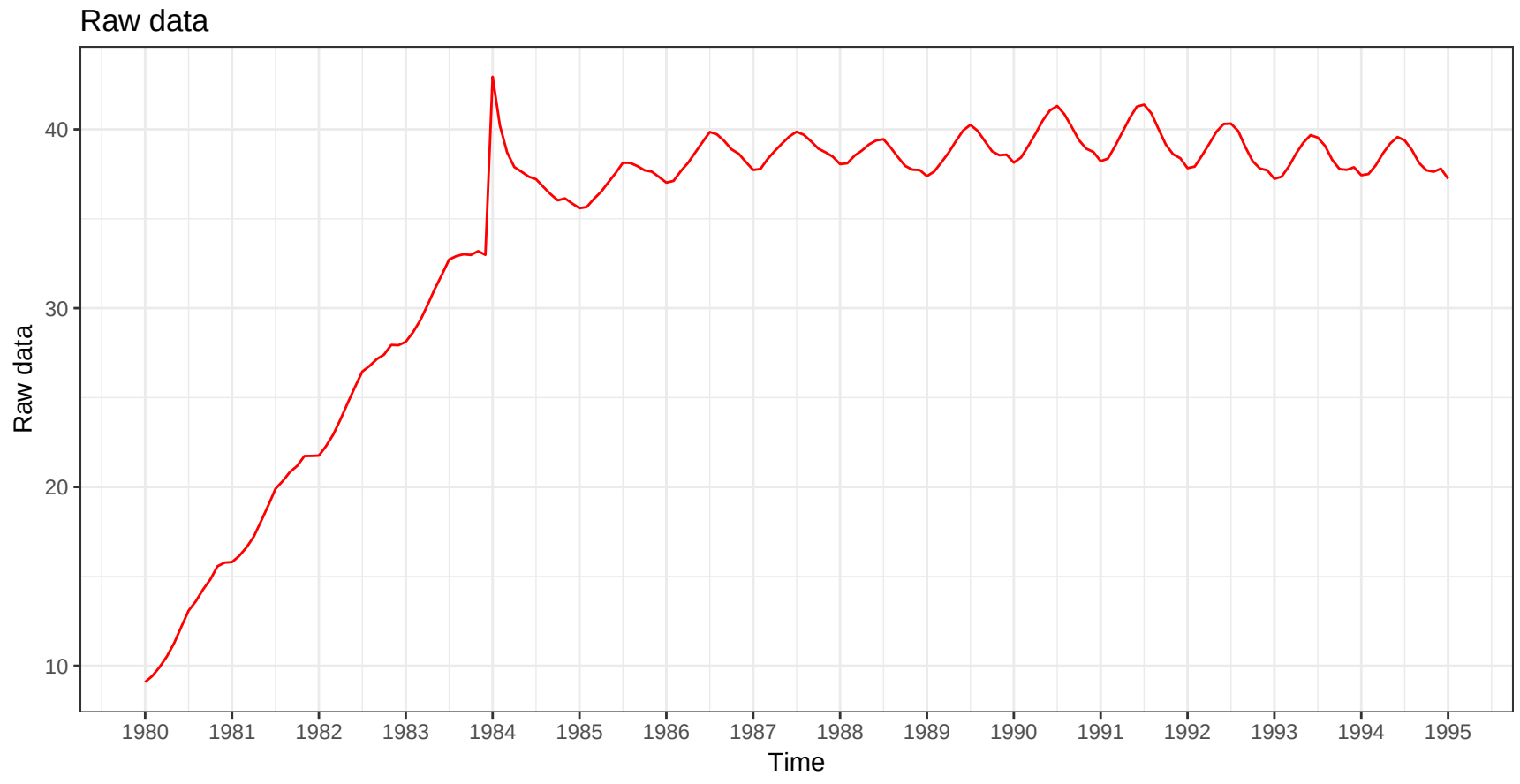

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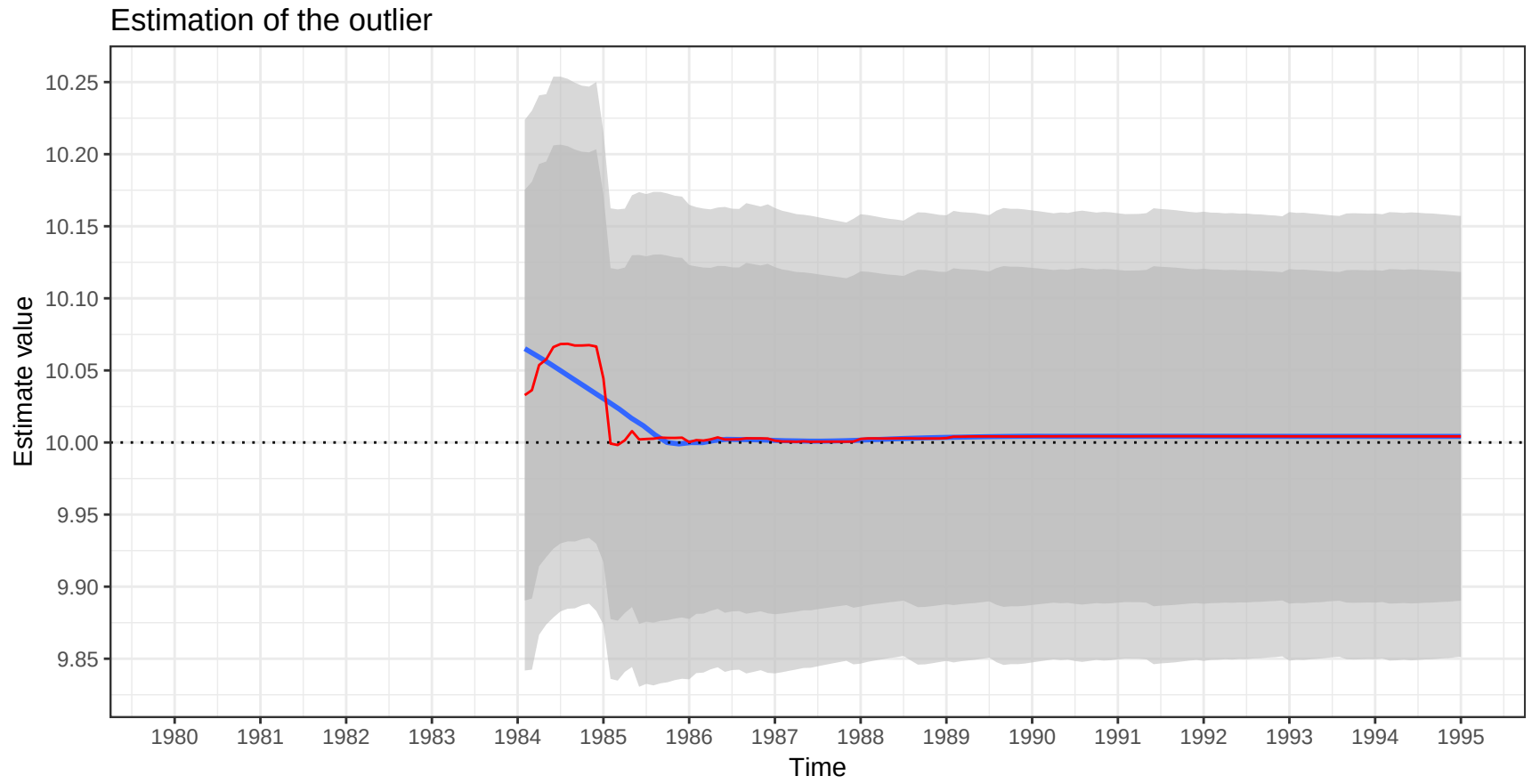

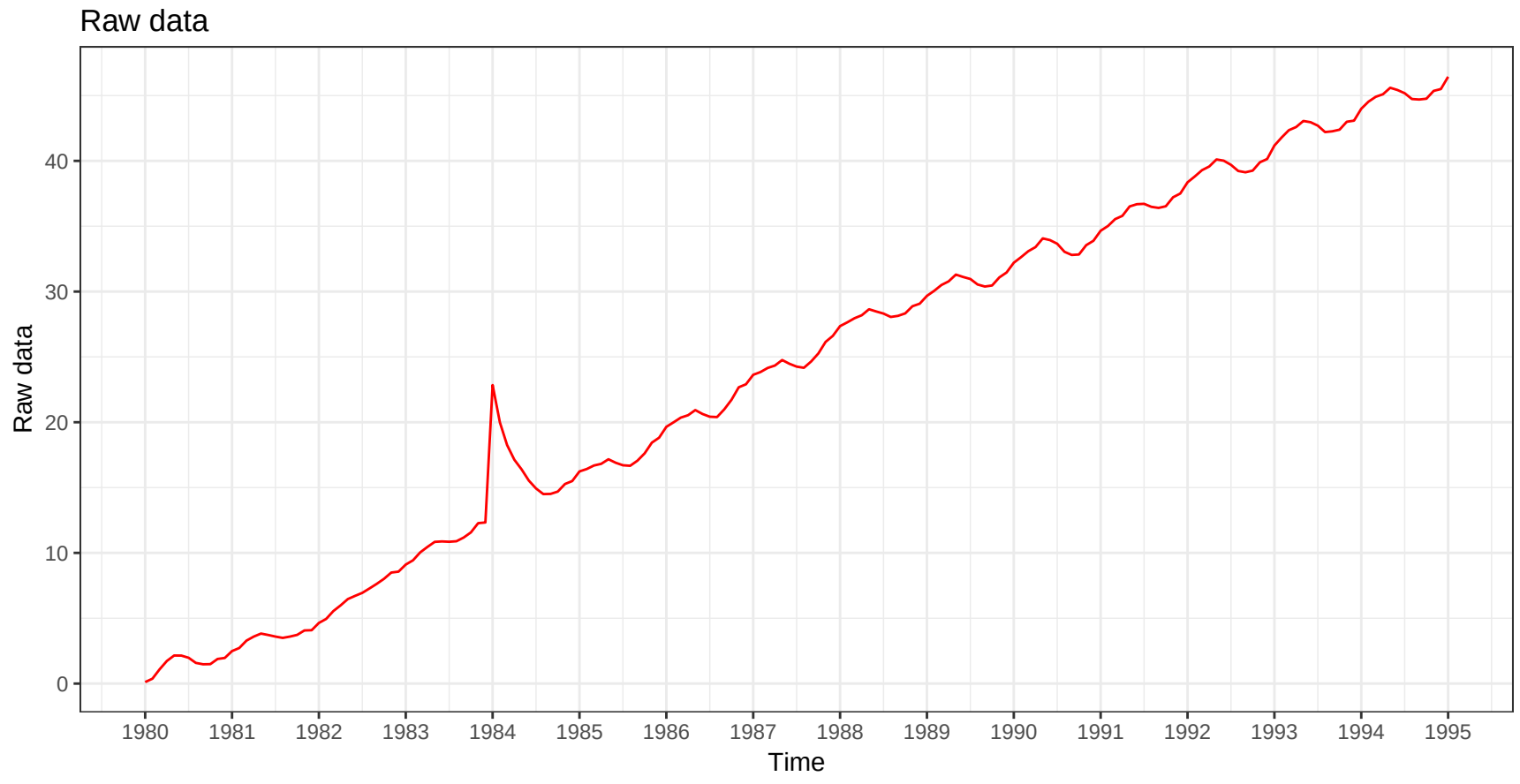

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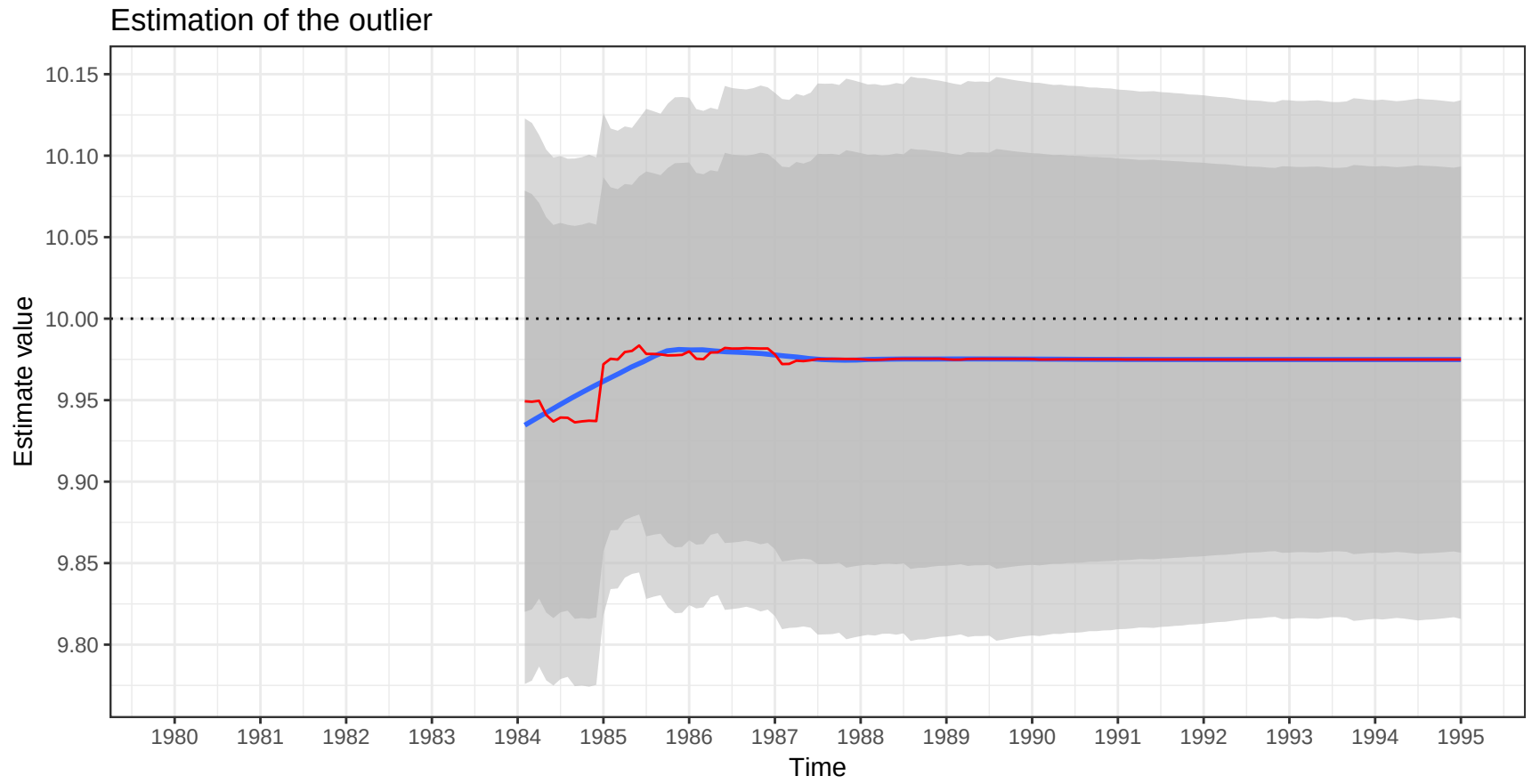

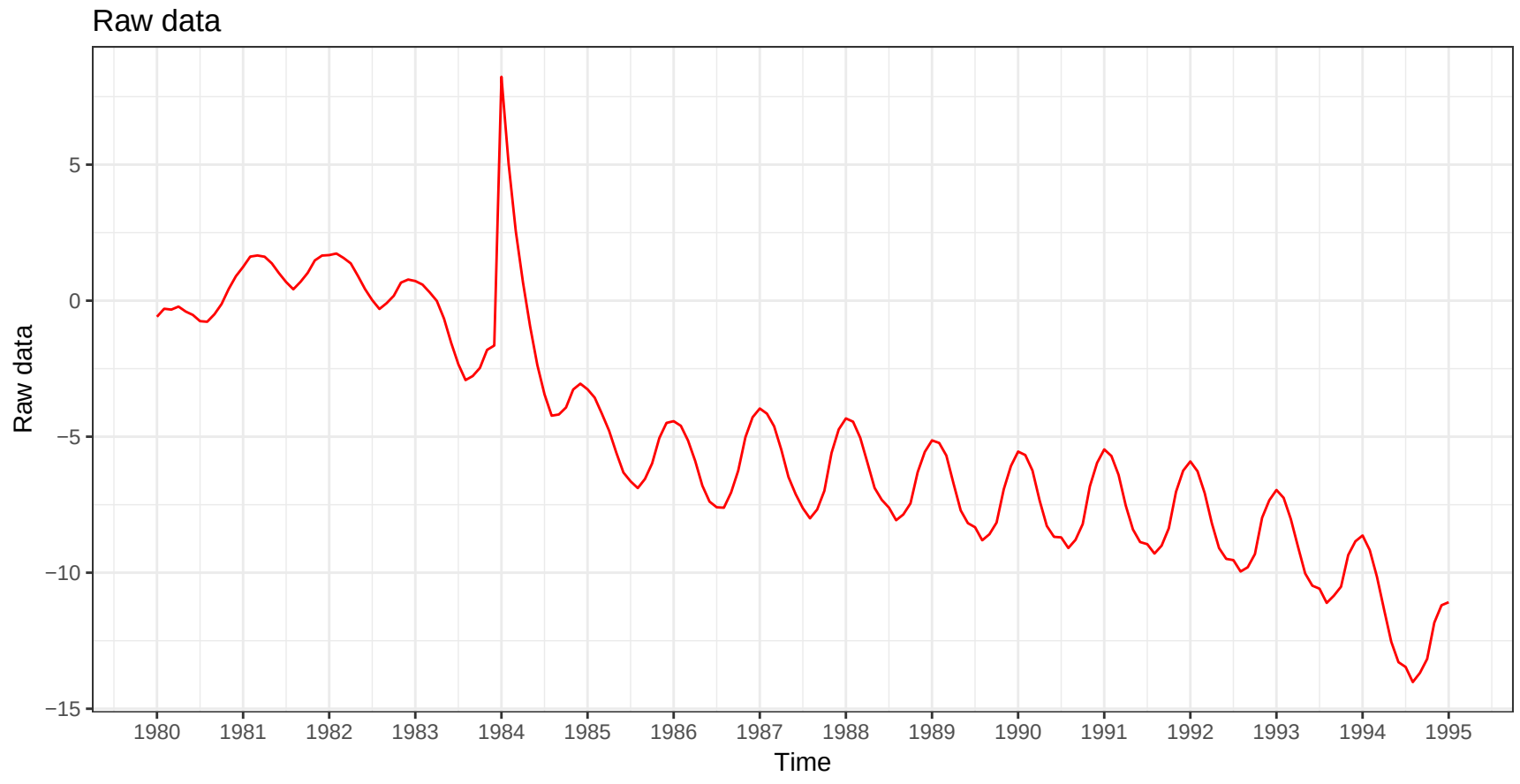

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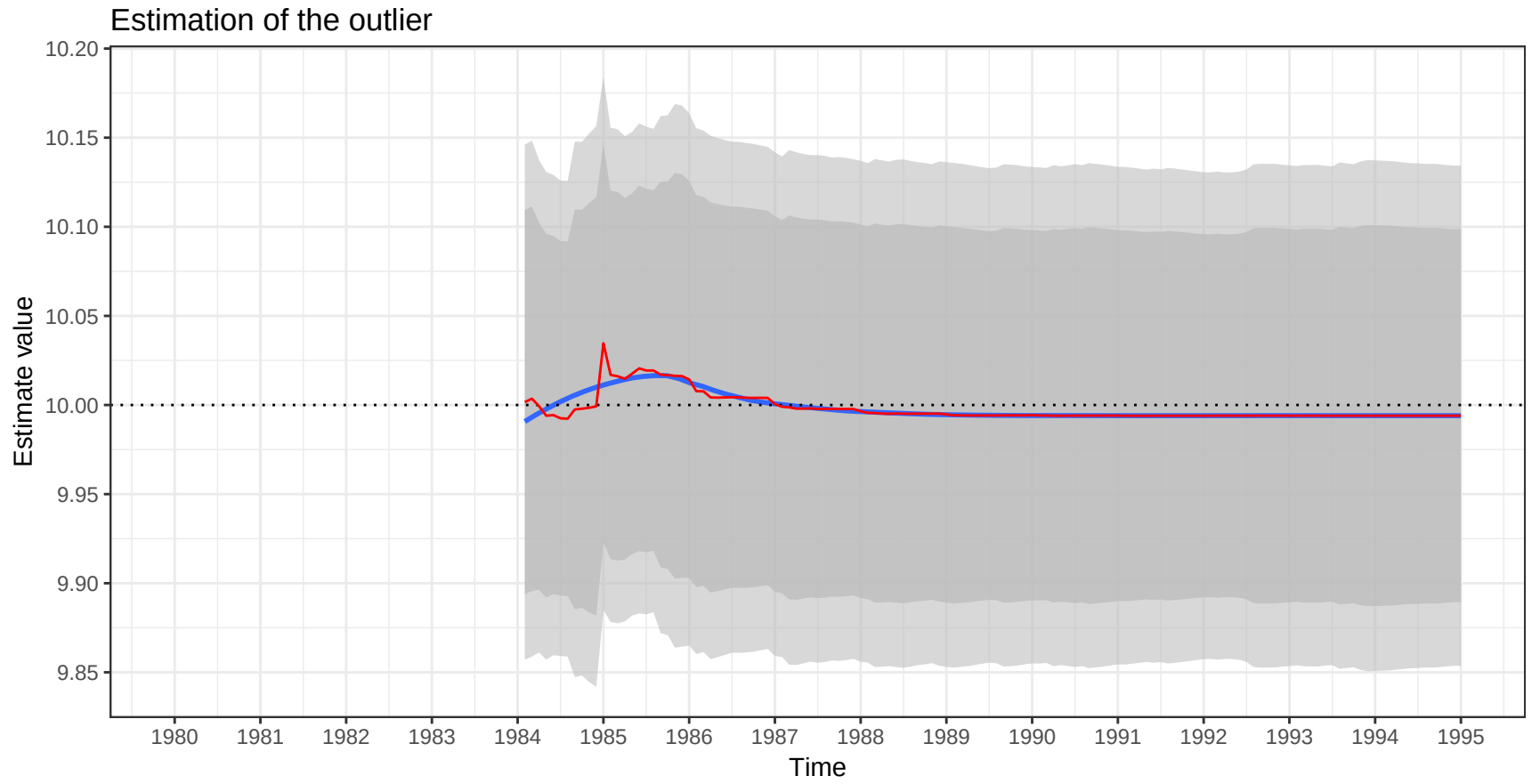

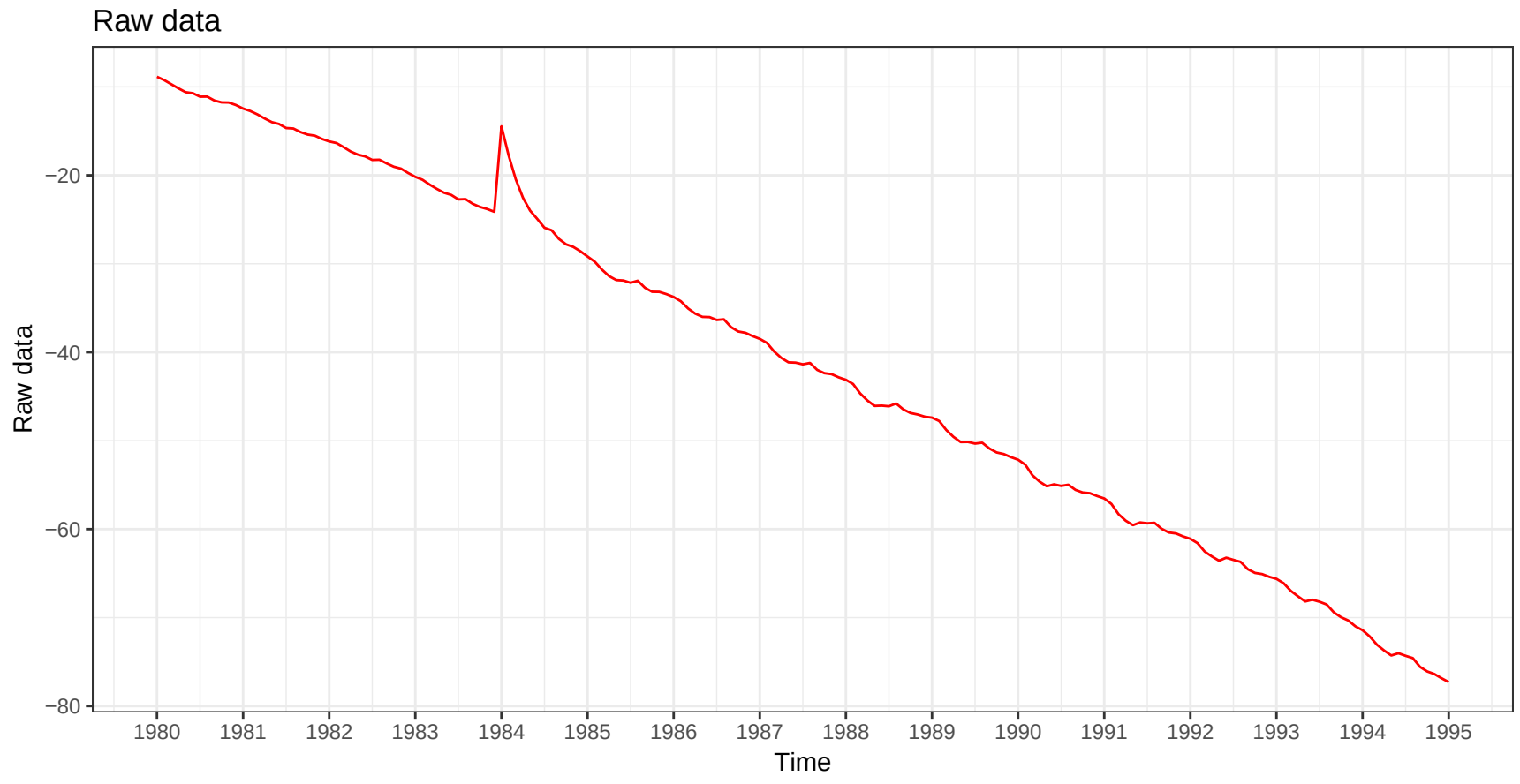

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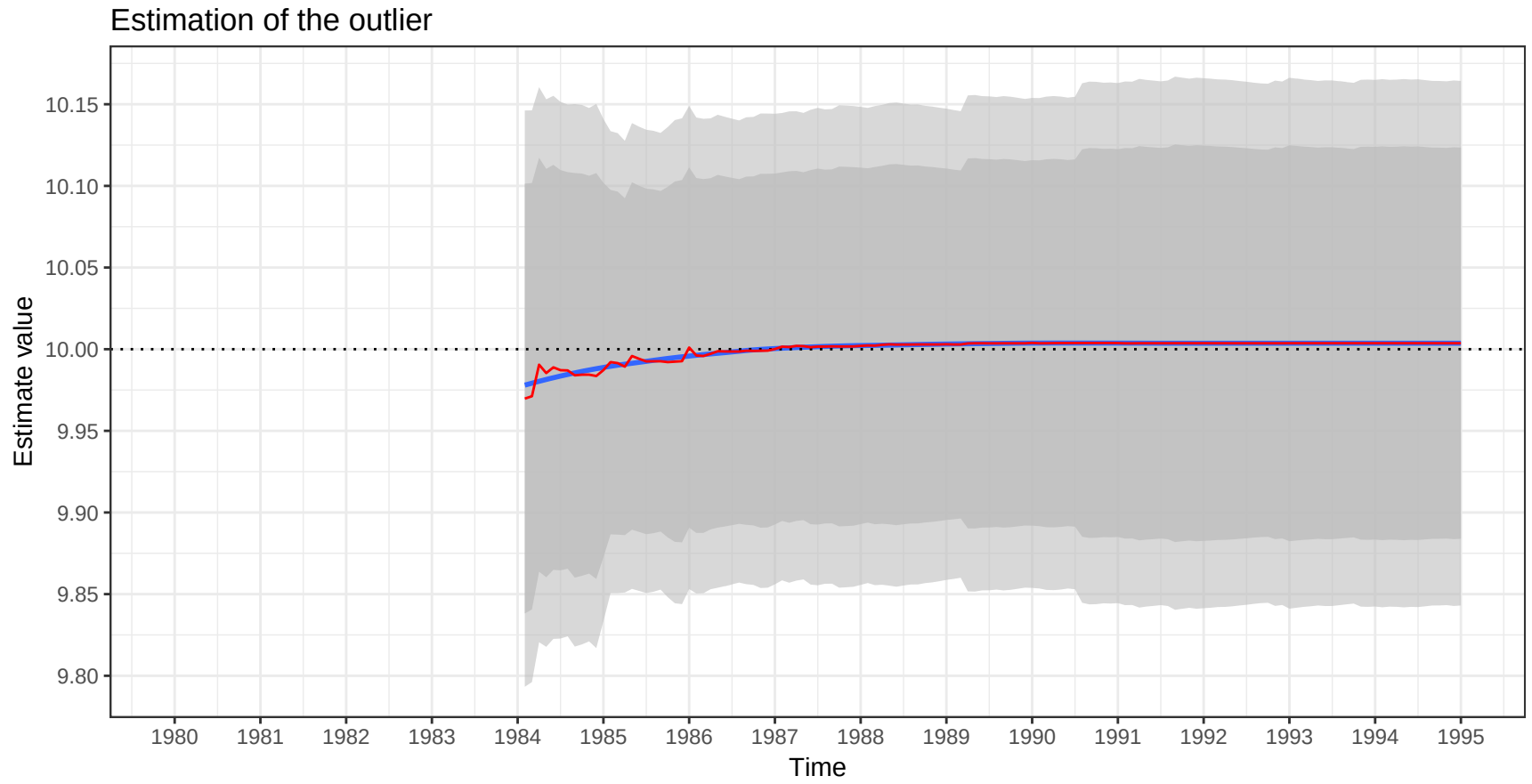
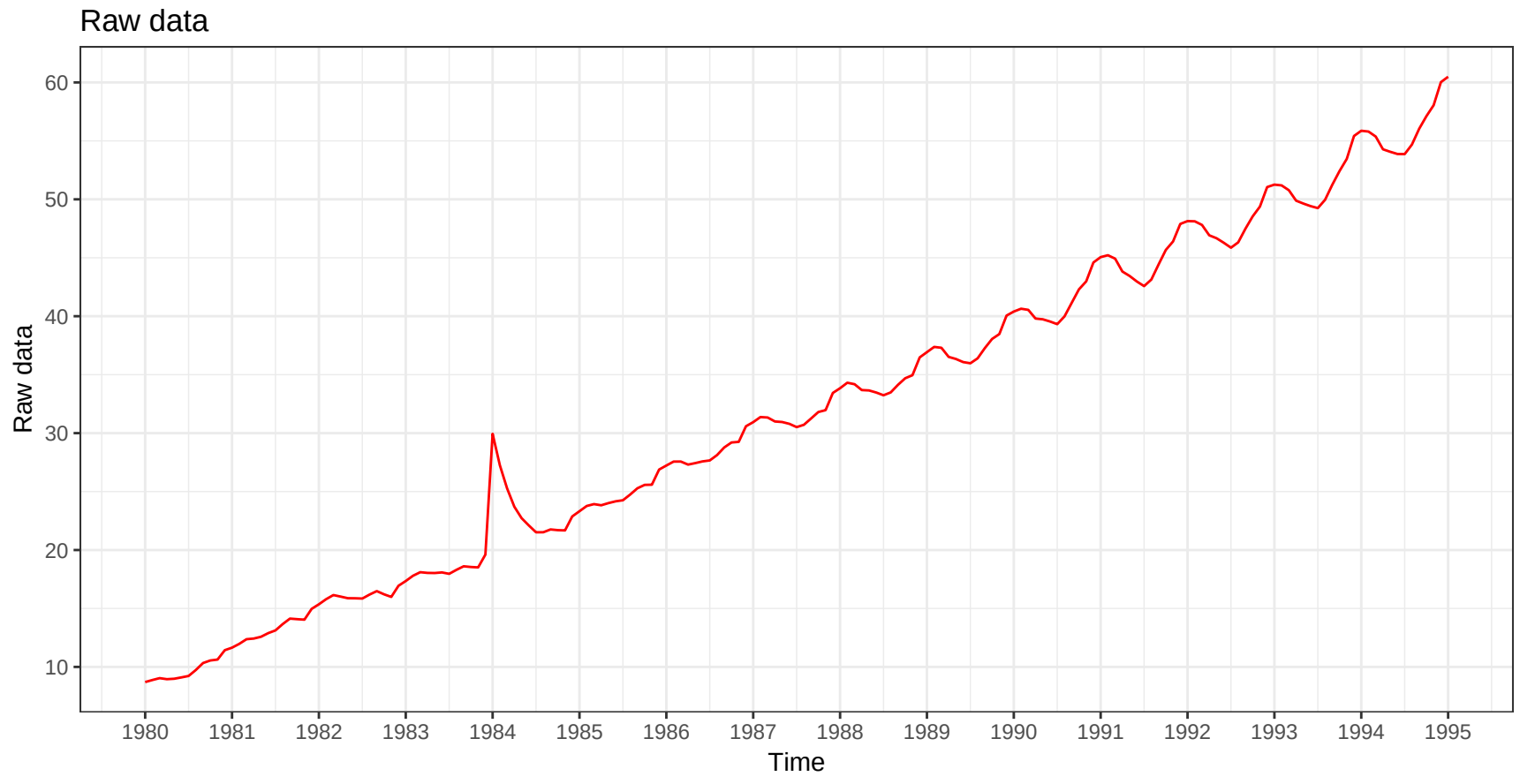
(1−B)(1−B12)(1−0.4B)Xt=(1+0.4B+0.4B2)(1−0.4B12)at

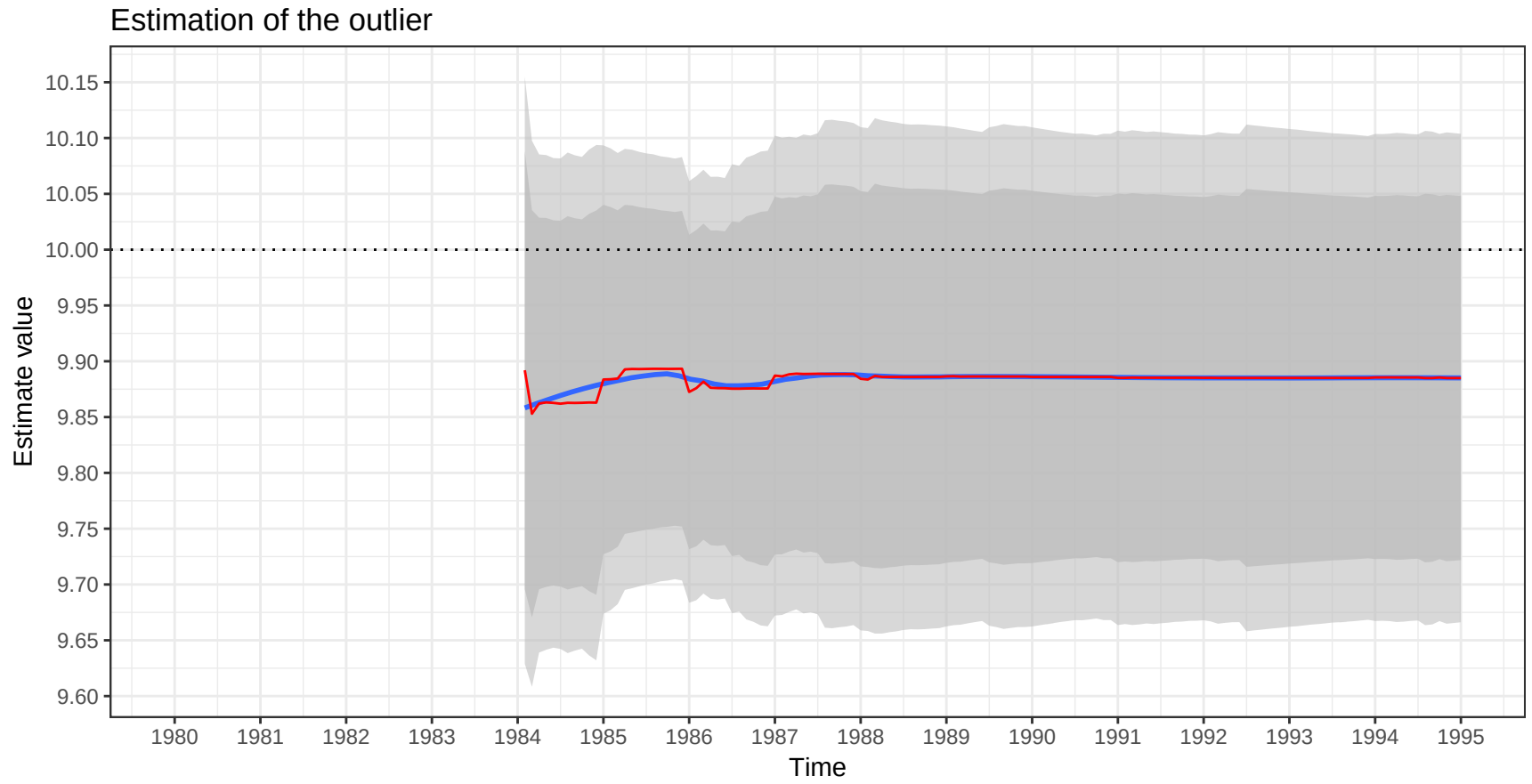


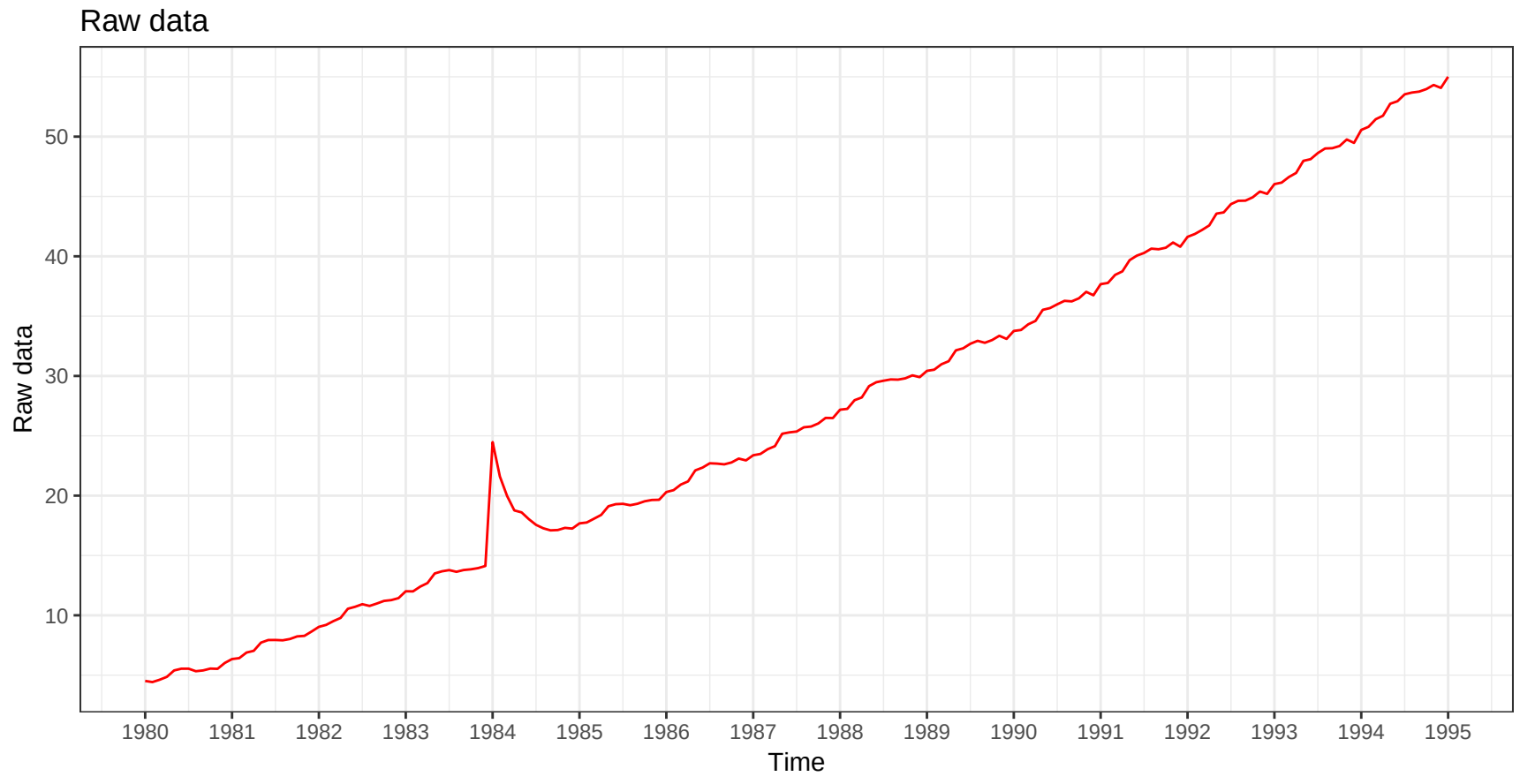


Estimate value of a TC(1984−01)

ARIMA (3,1,0)(0,1,1) − additive decomposition

(1−B)(1−B12)(1+0.10B−0.17B2−0.34B3)Xt=(1−0.48B12)at





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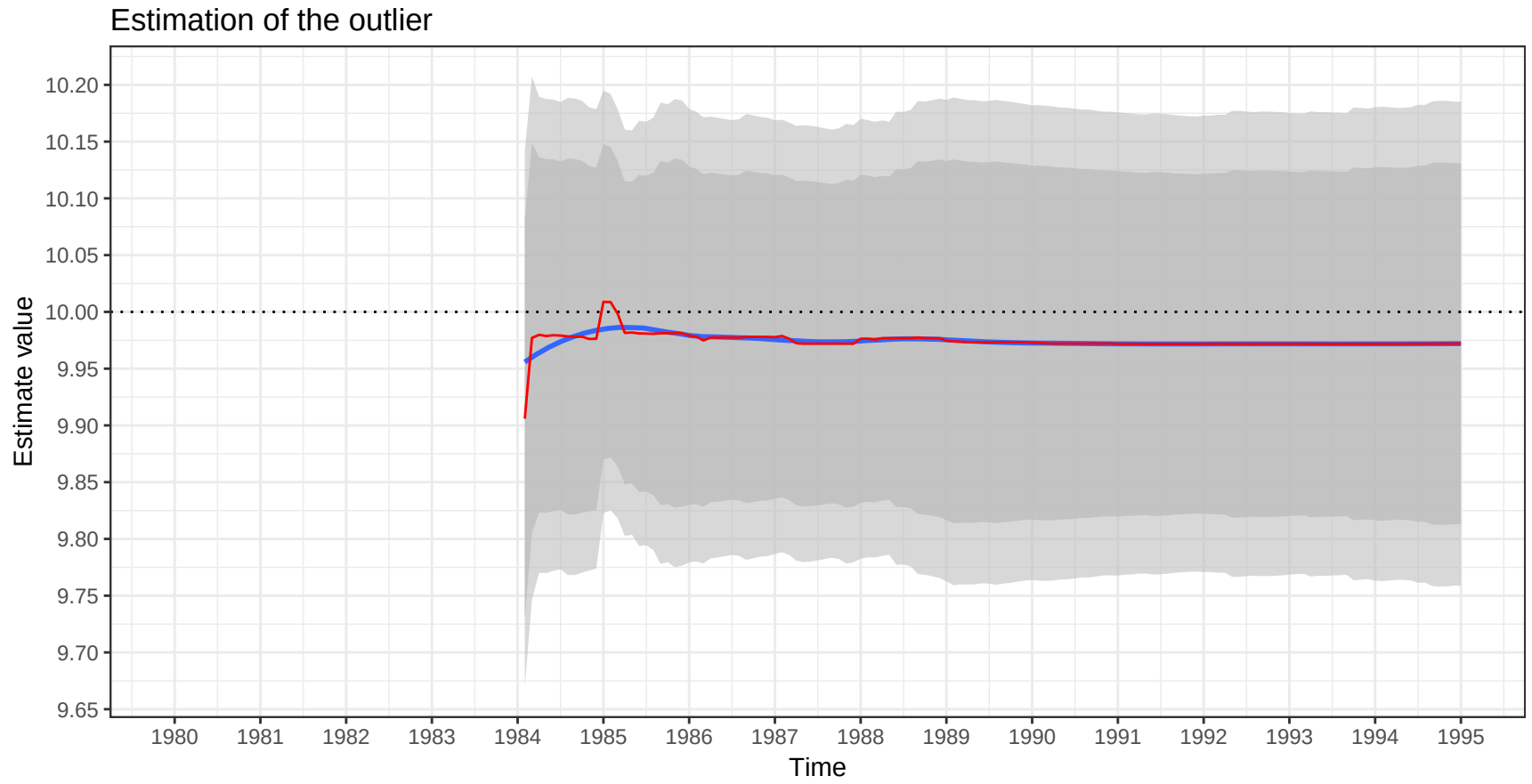

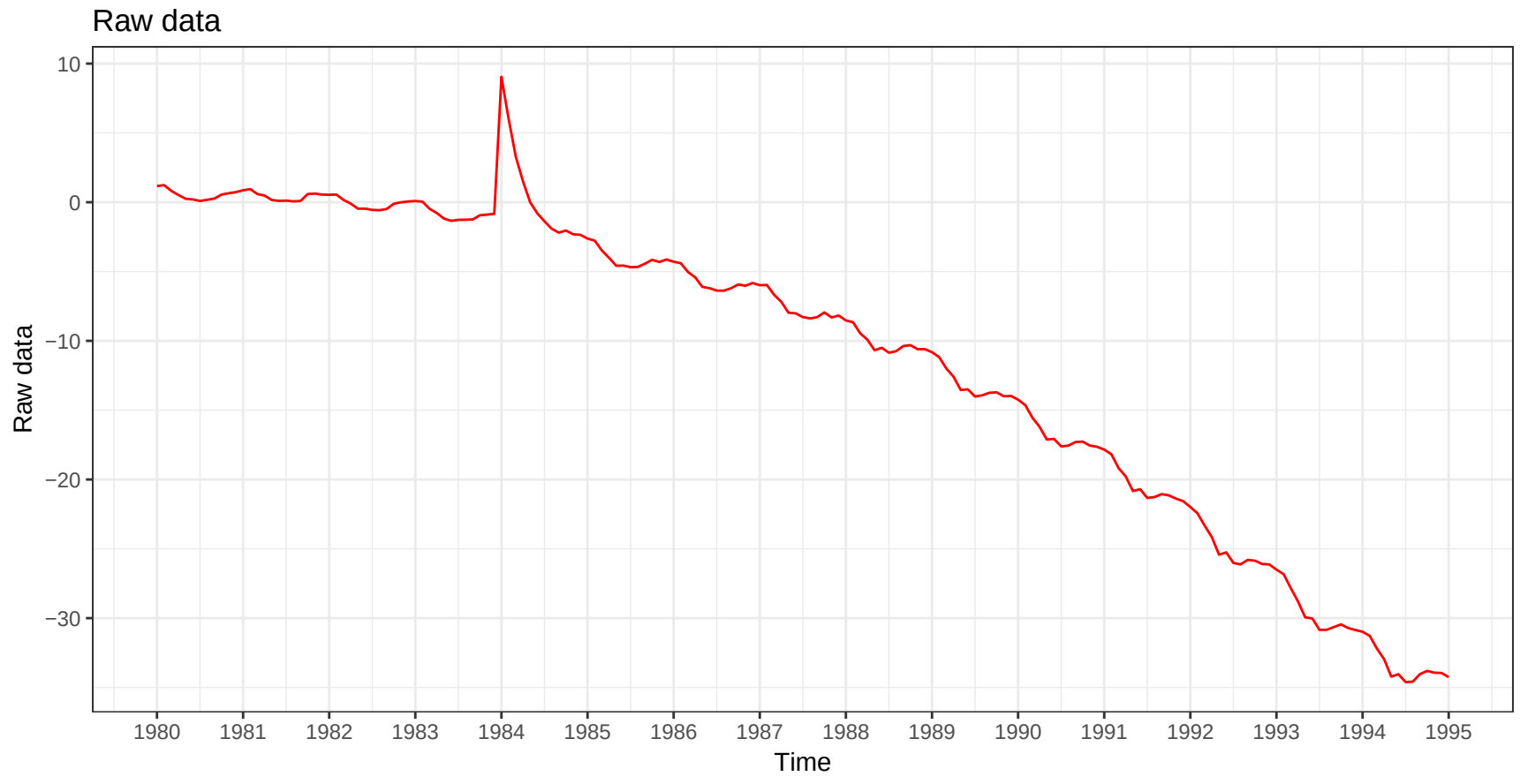

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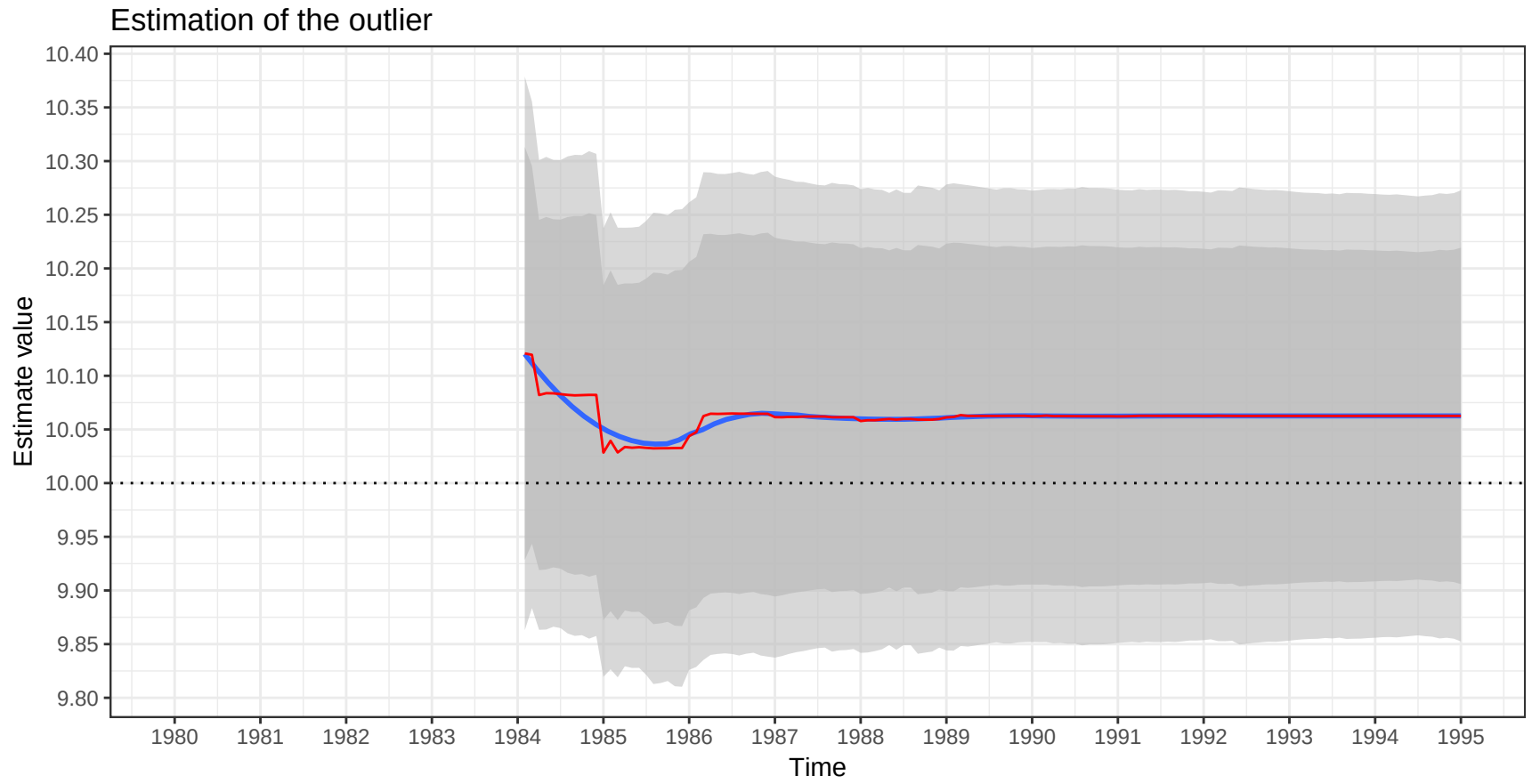

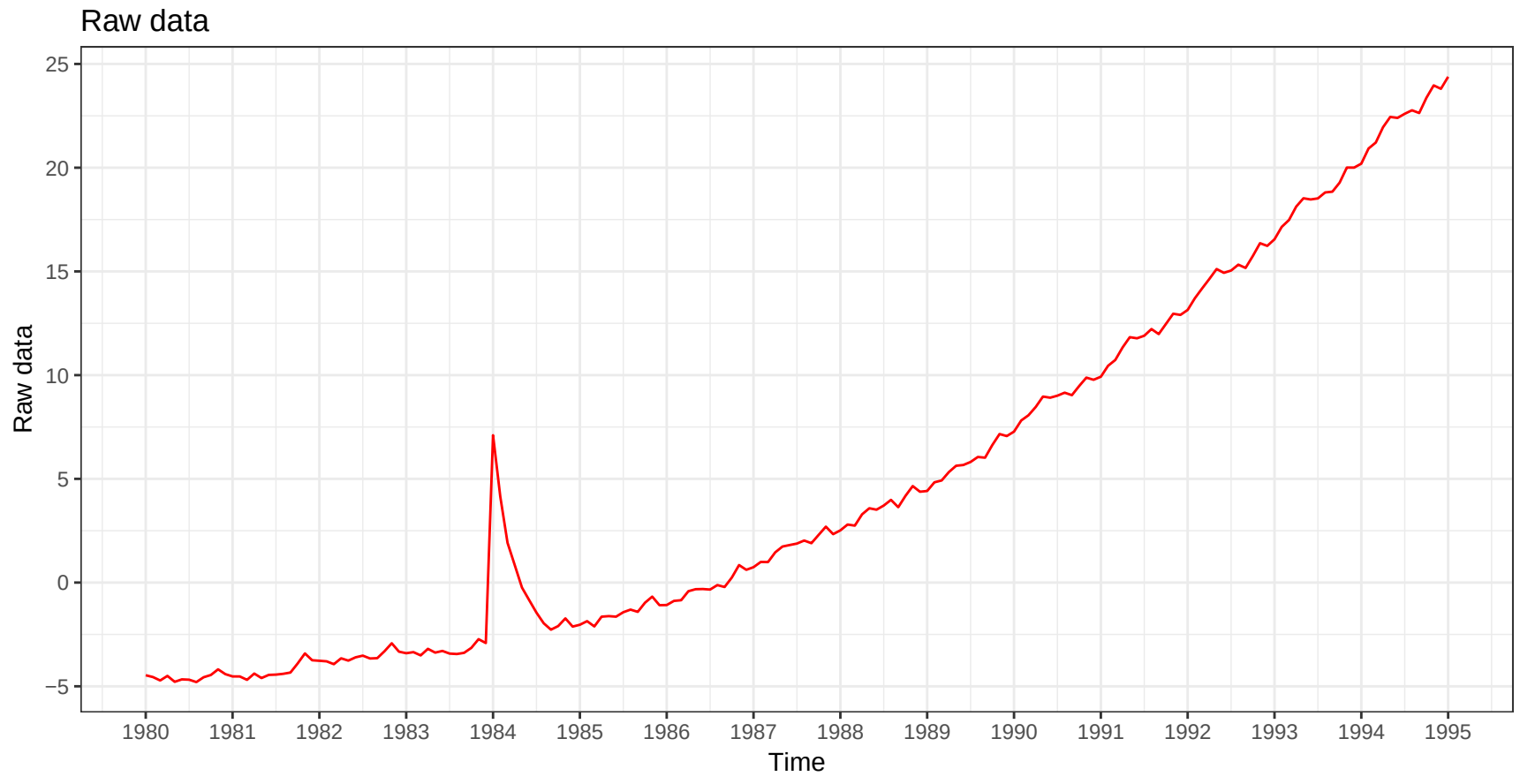

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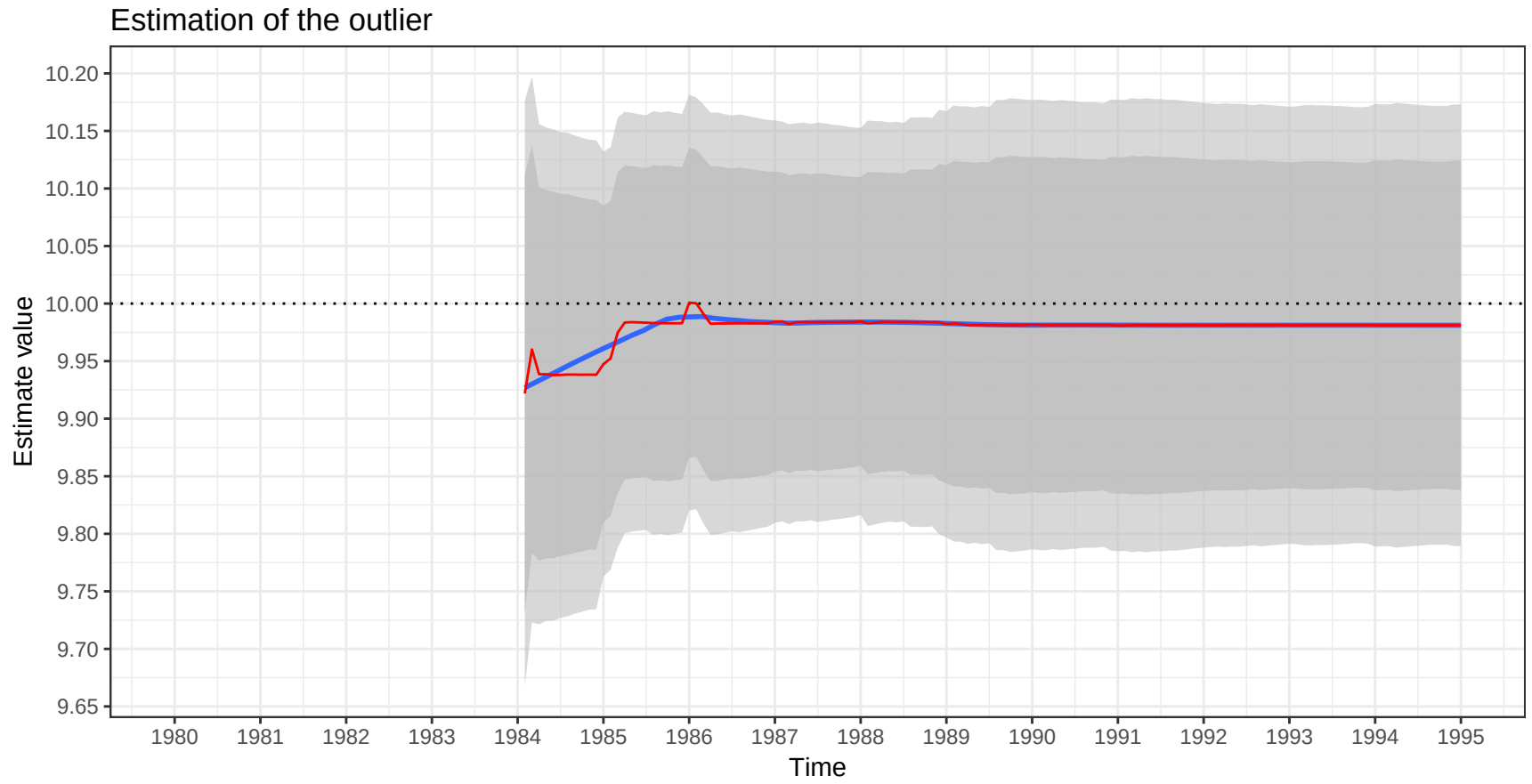

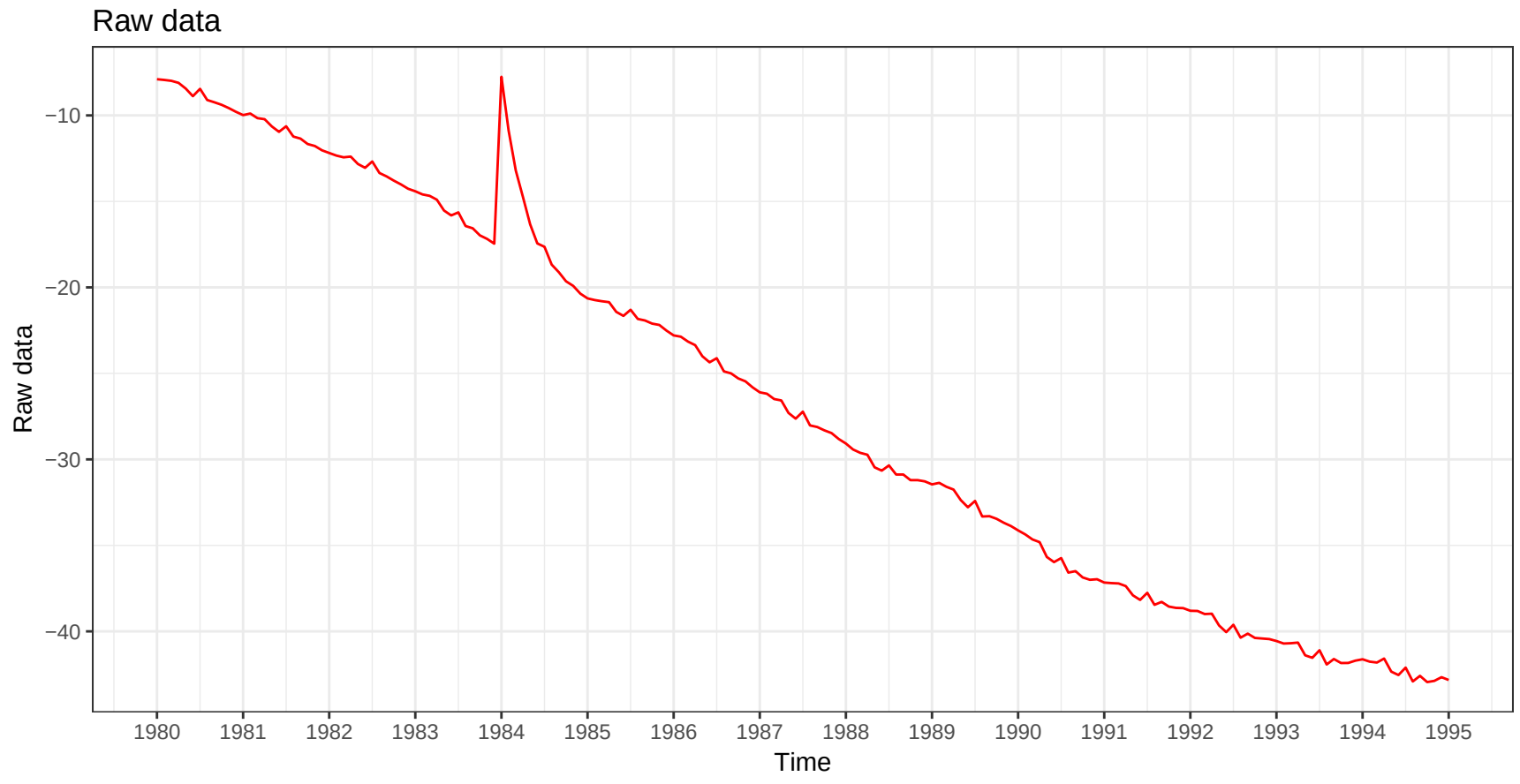

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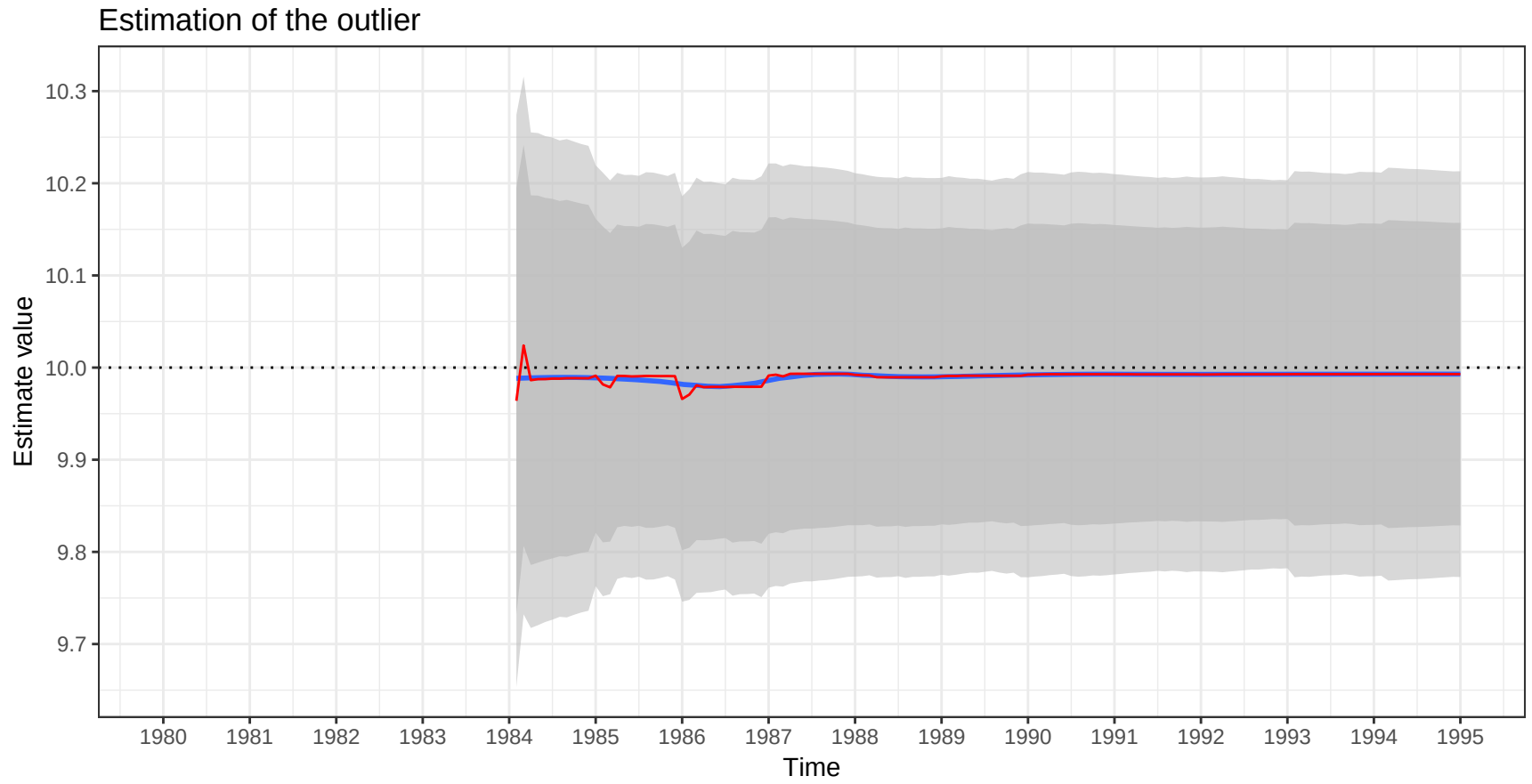

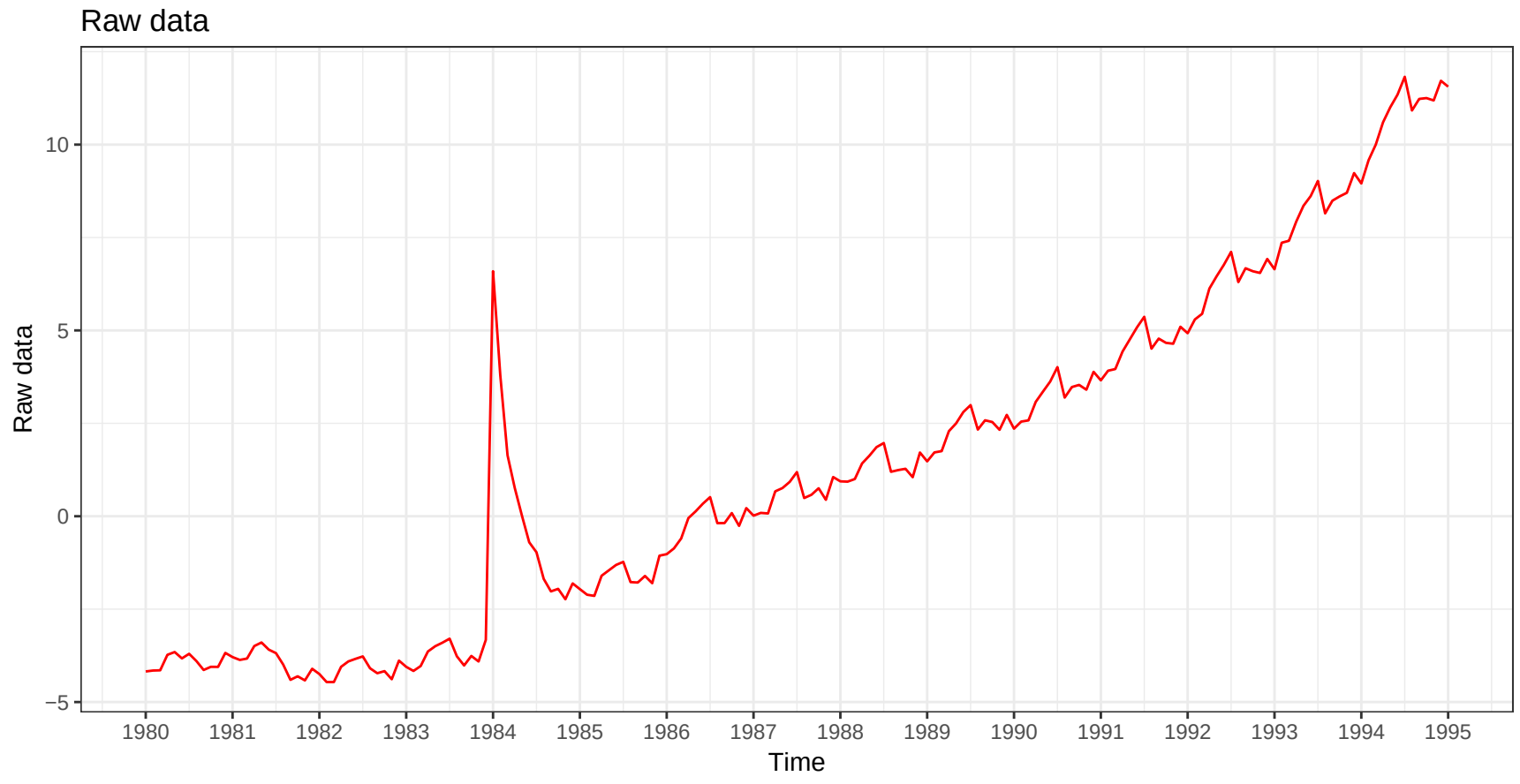

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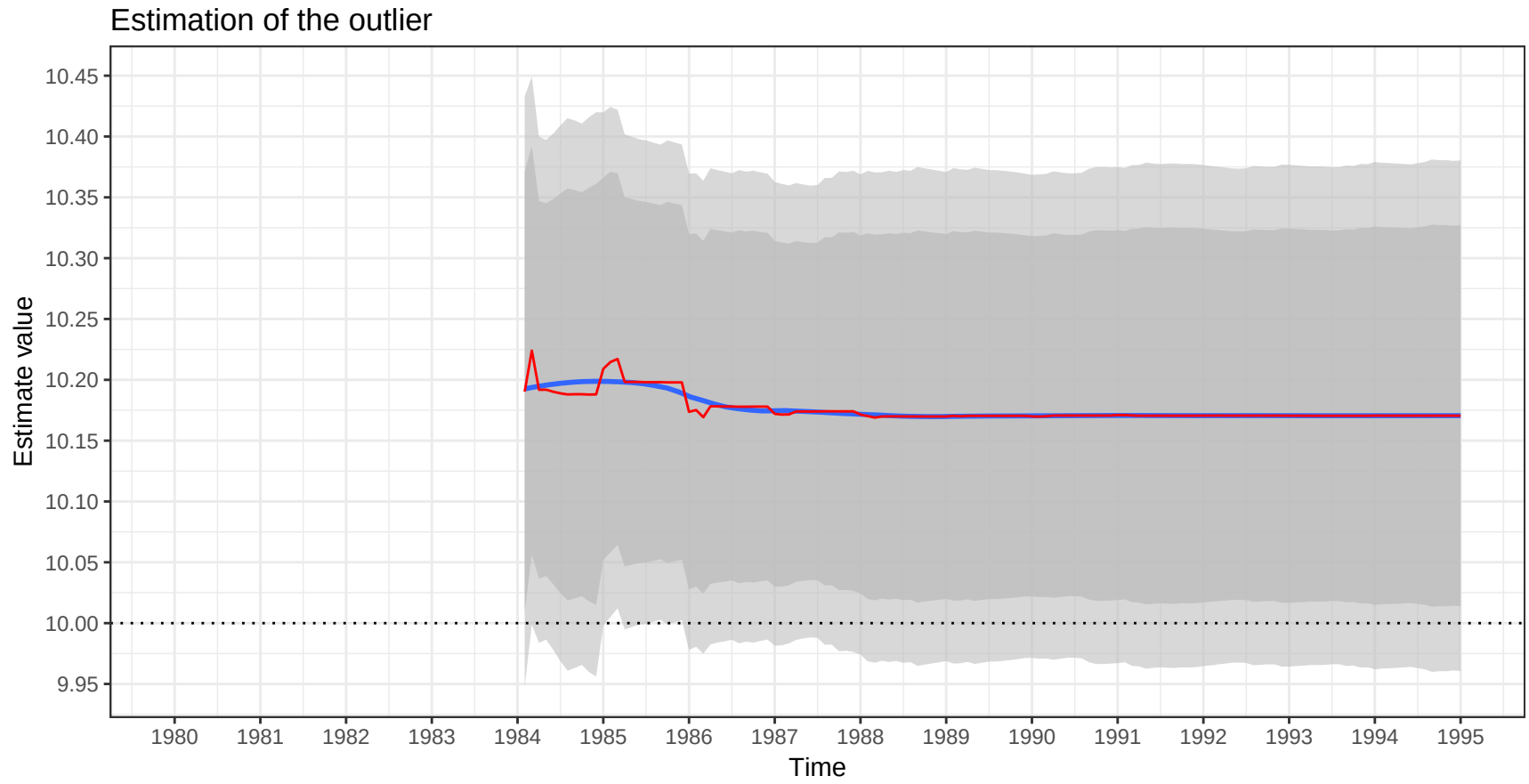

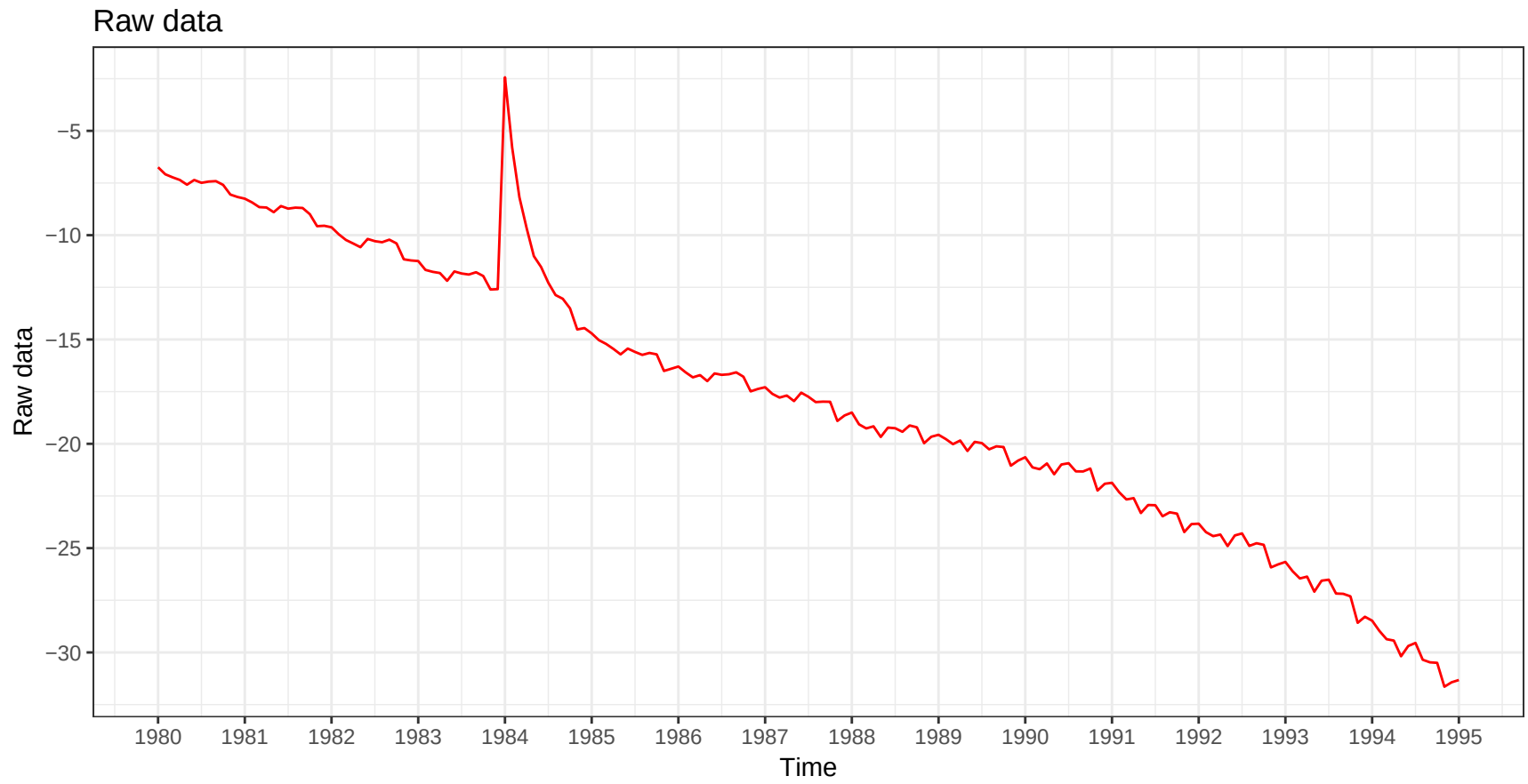

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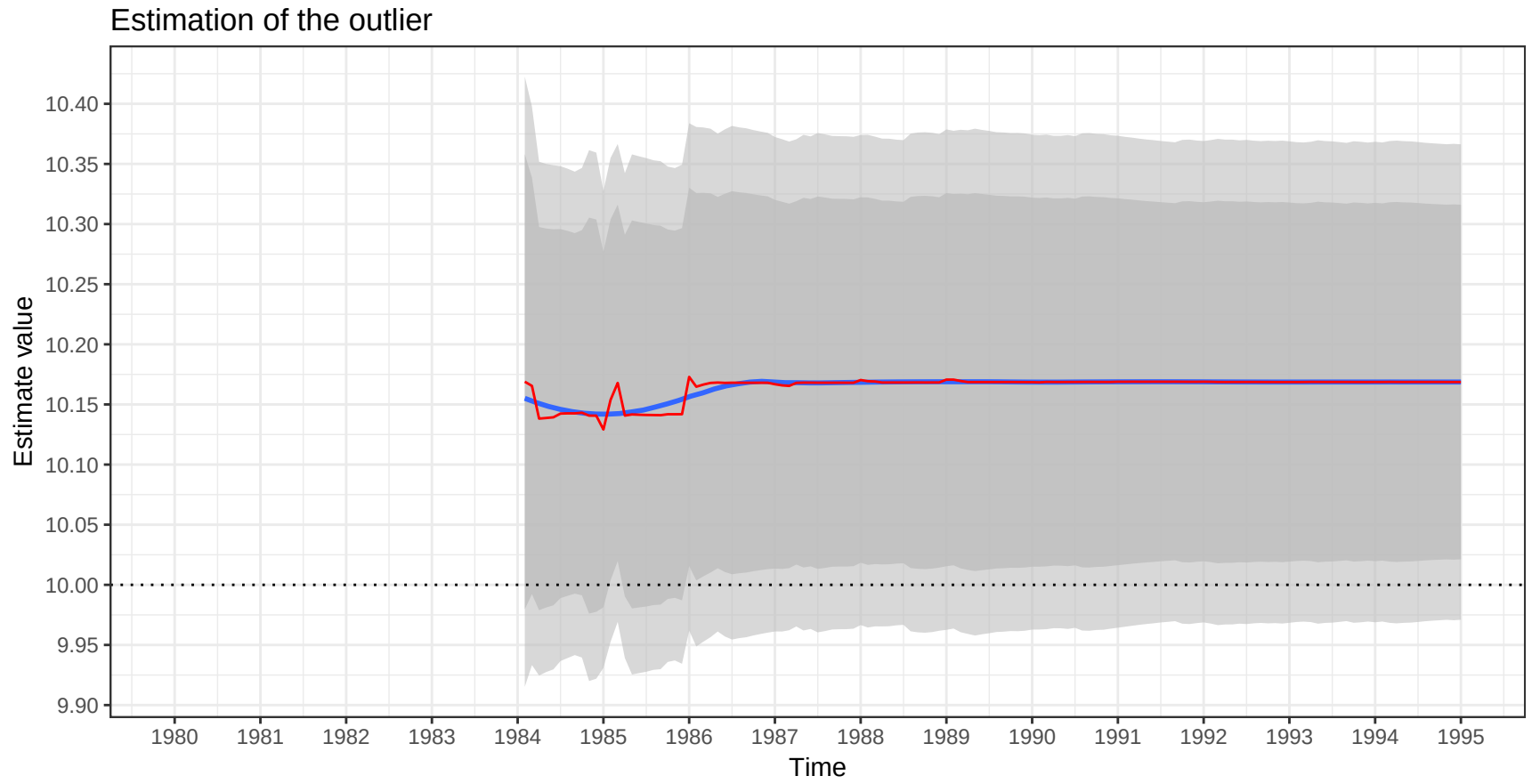

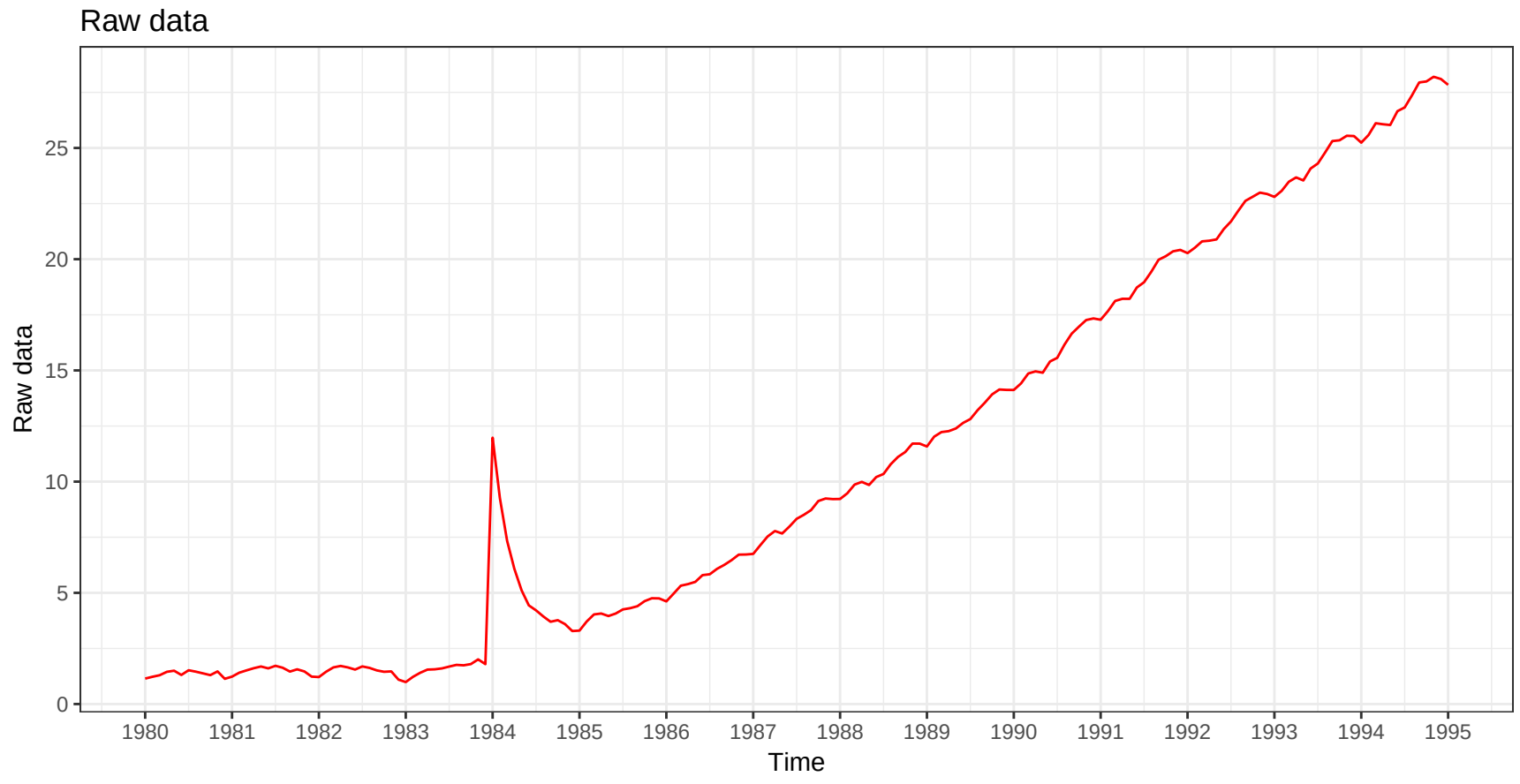

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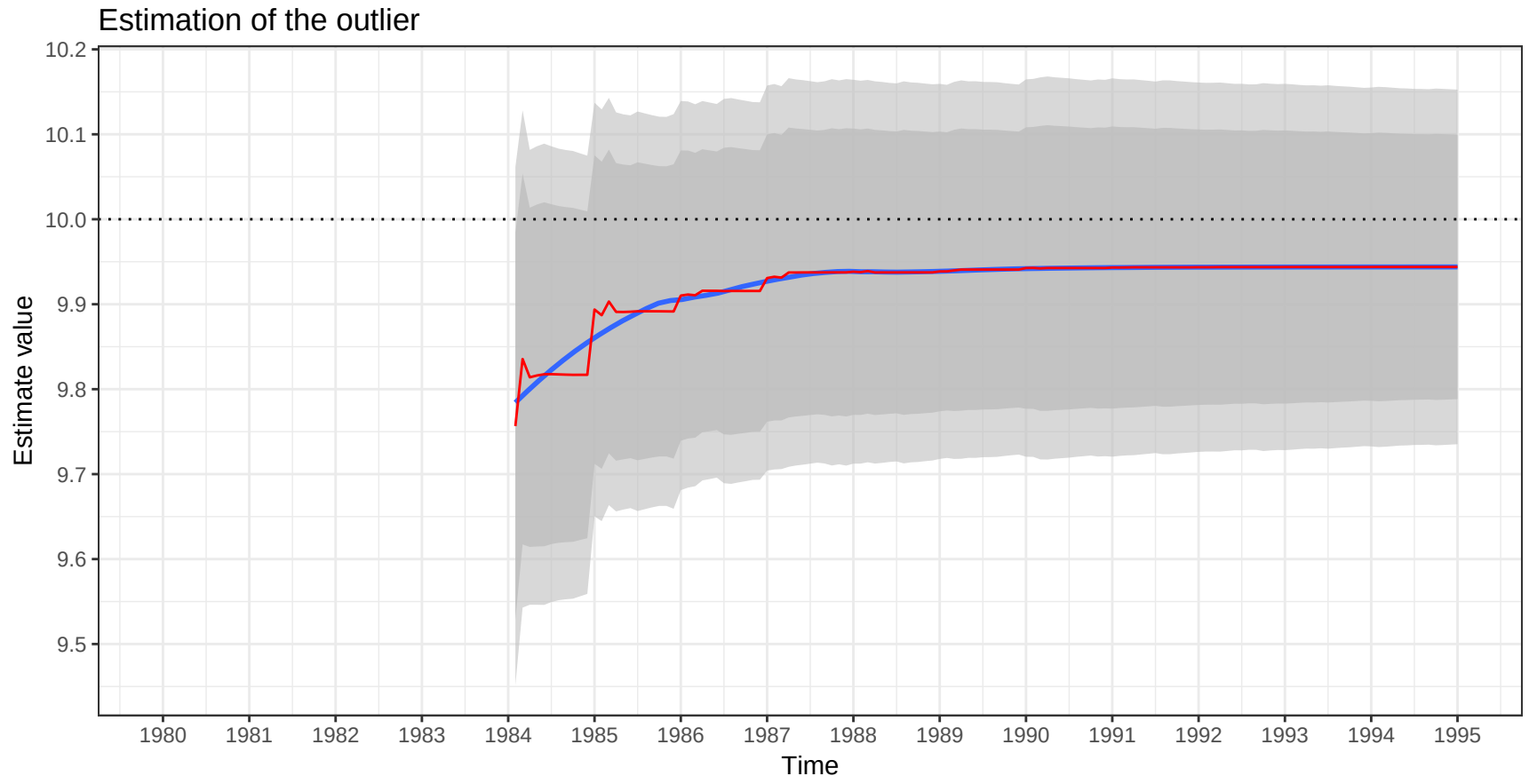

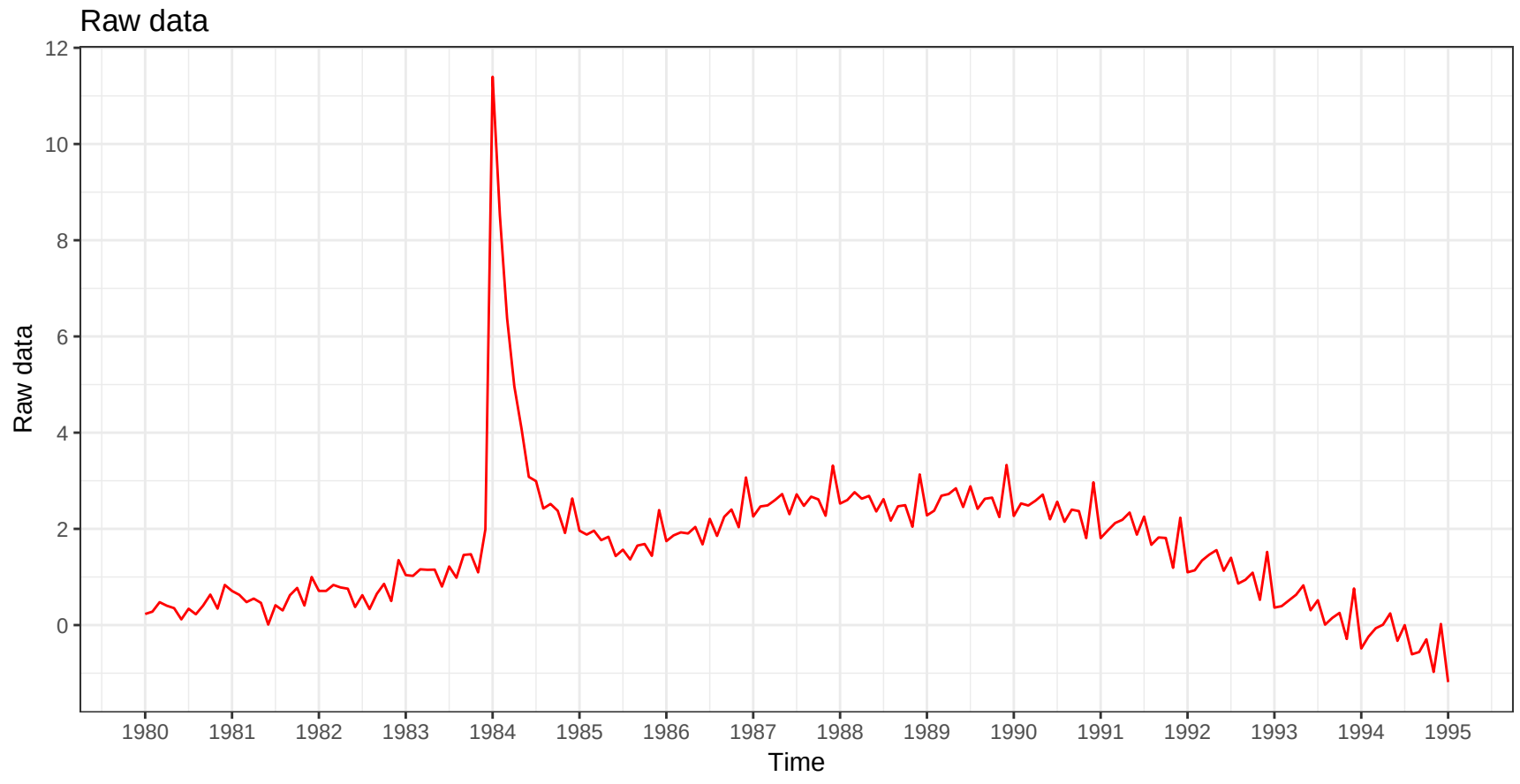

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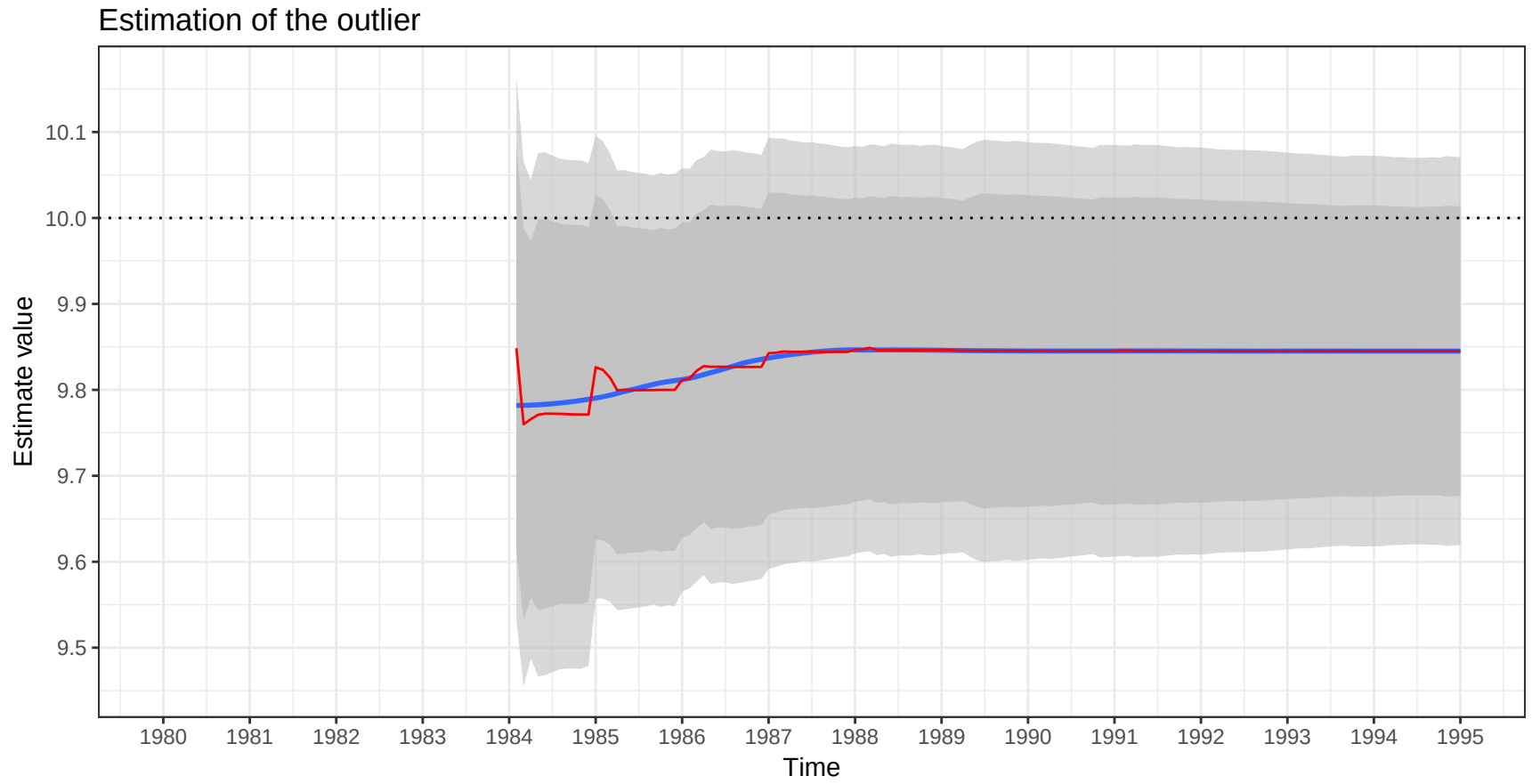

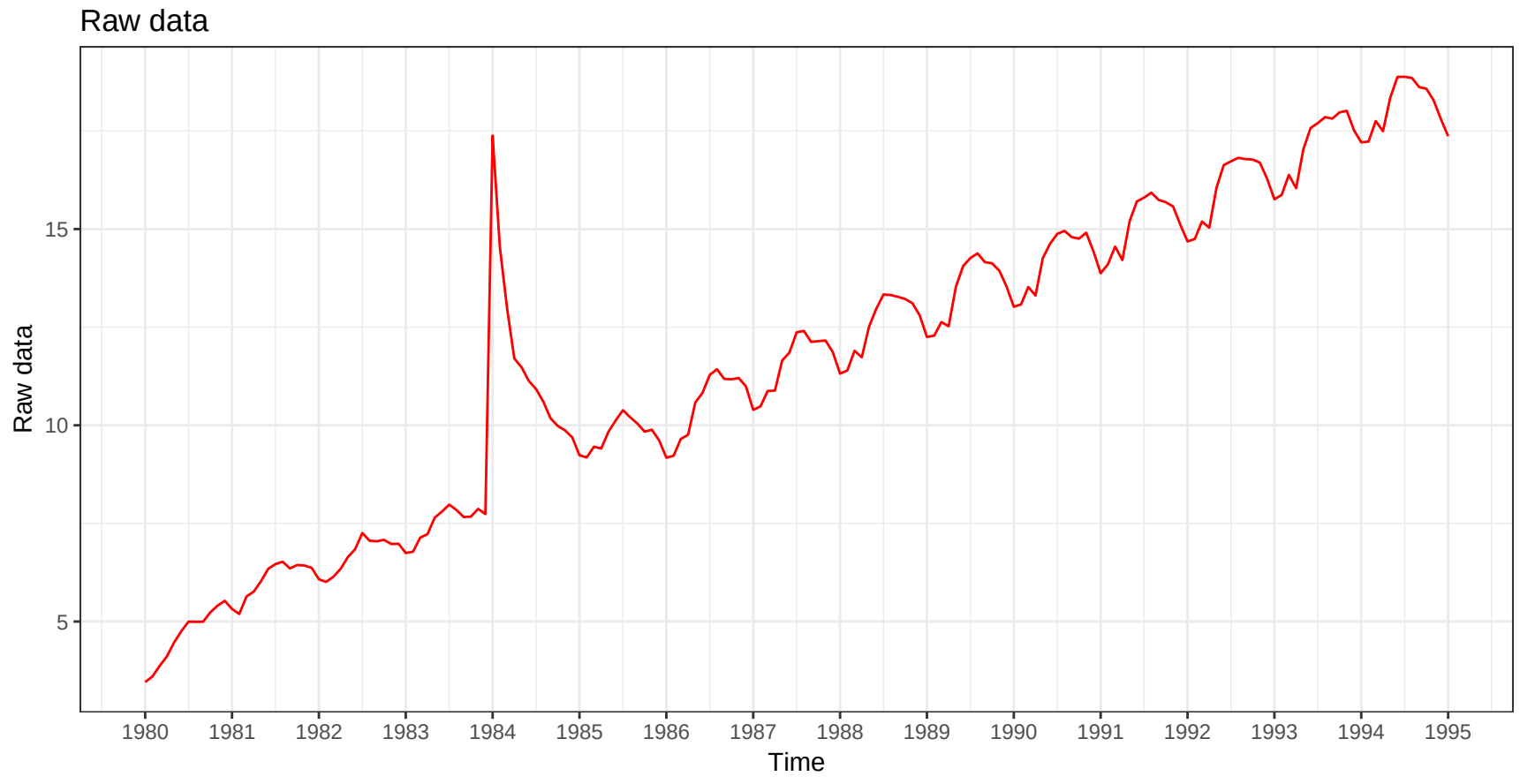

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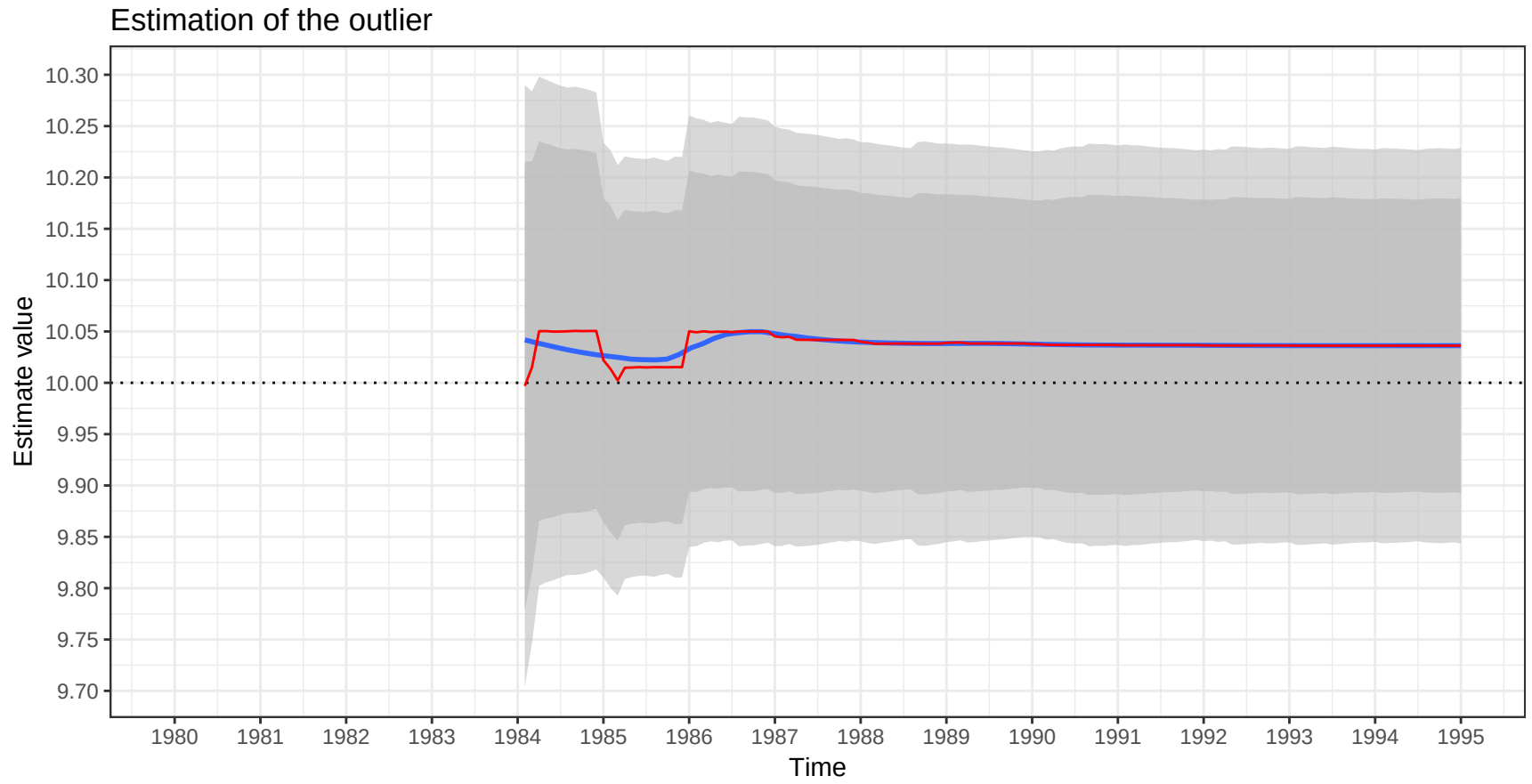
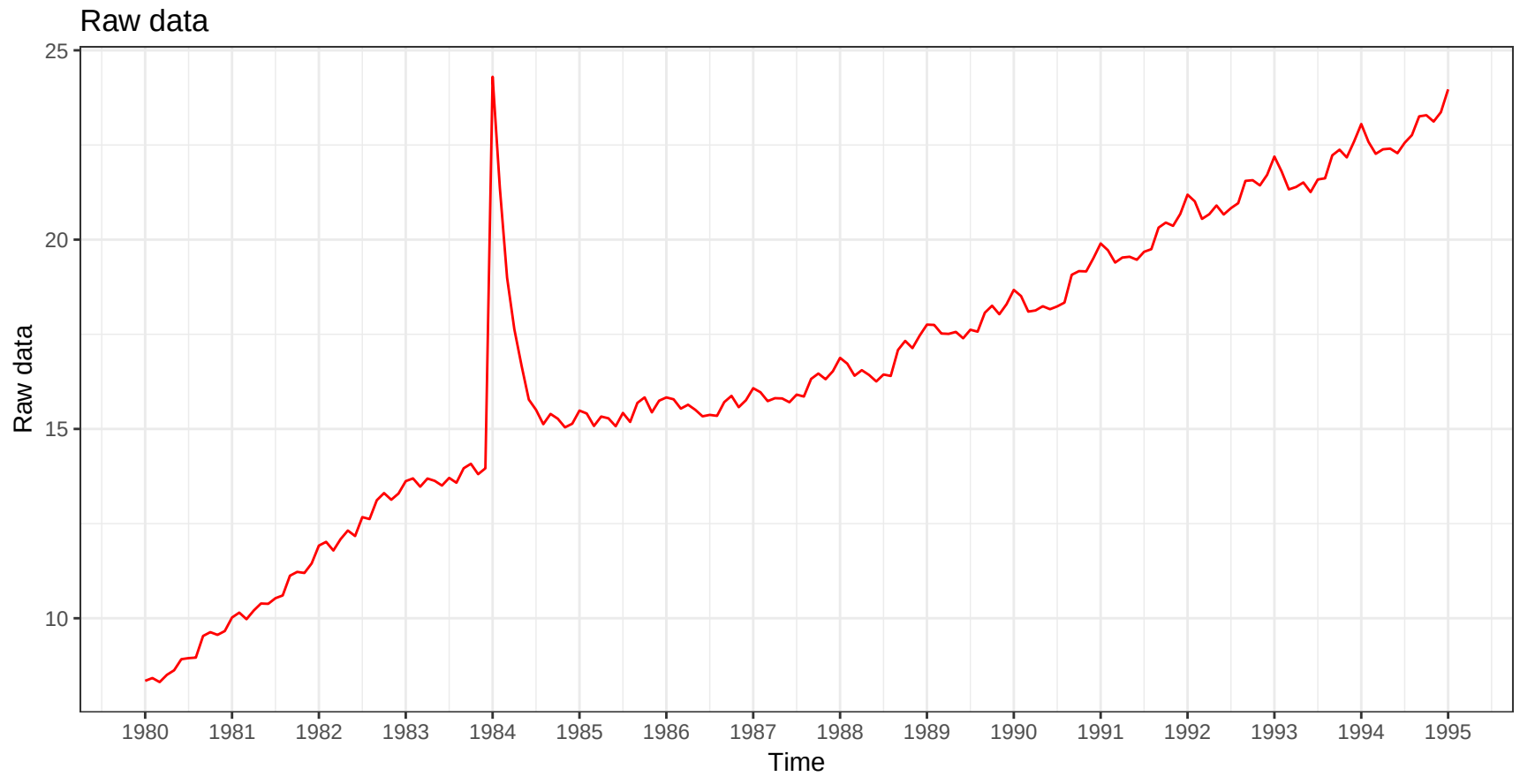
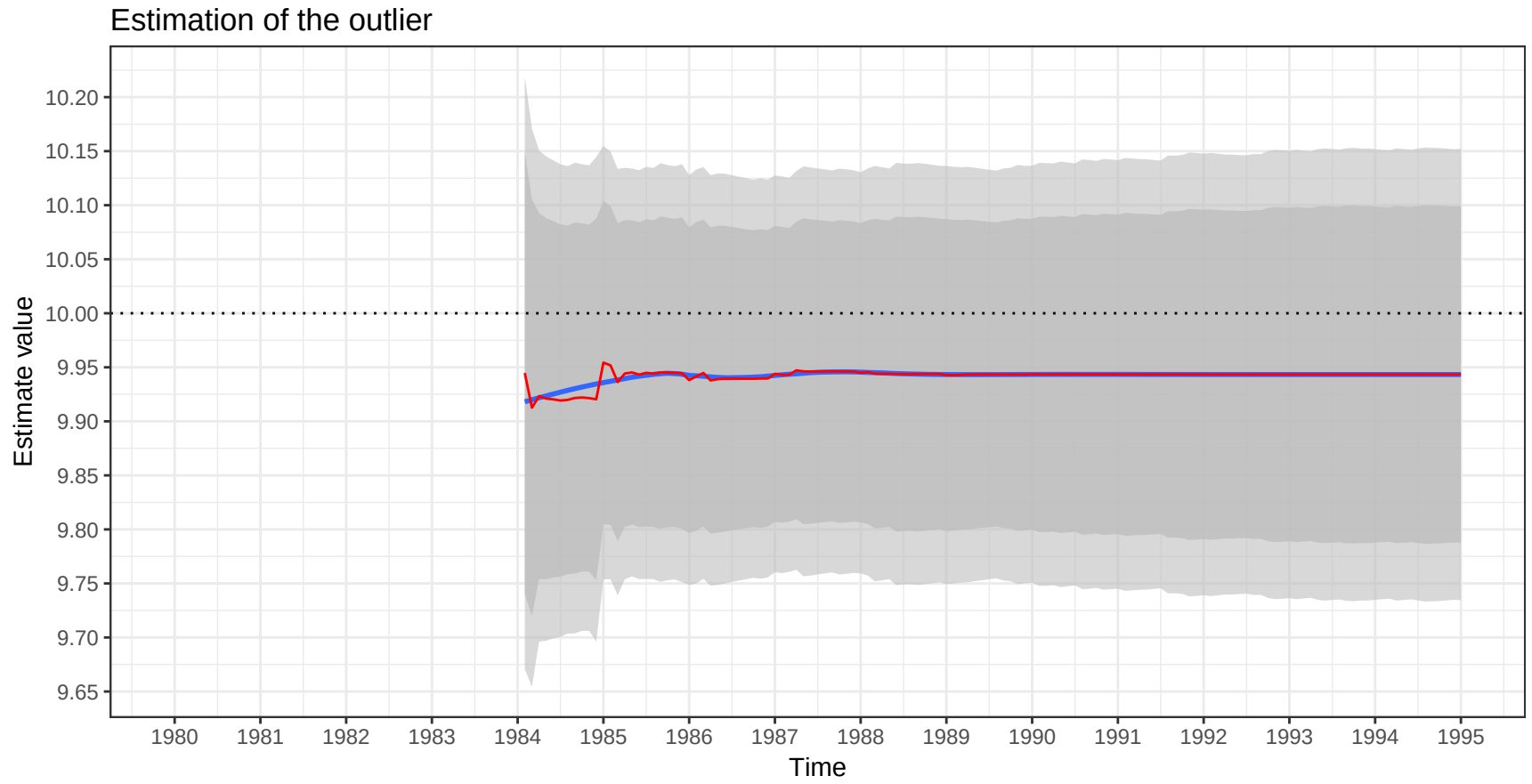
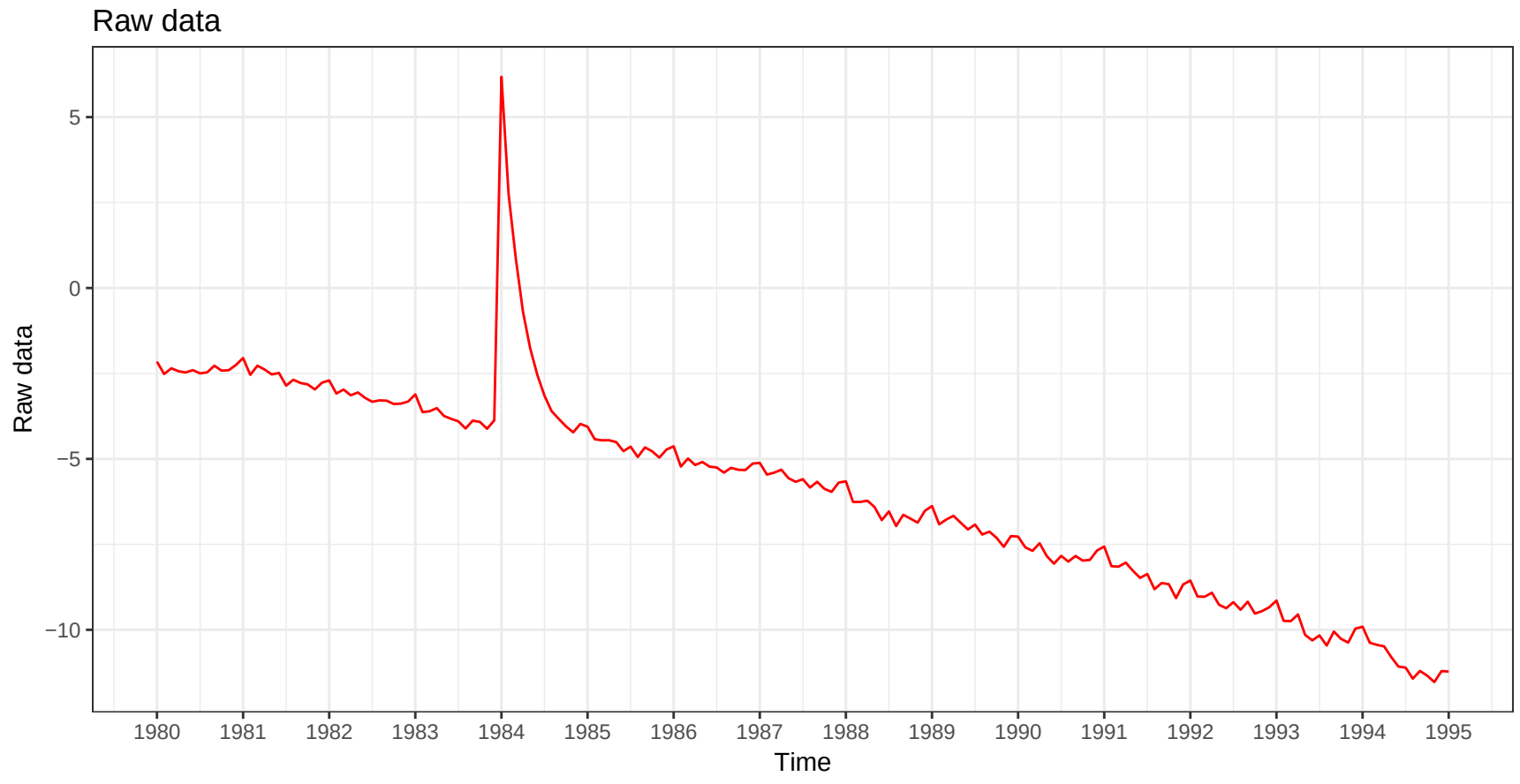




Estimate value of a TC(1984−01)
ARIMA (3,1,0)(0,1,1) − additive decomposition
(1−B)(1−B12)(1+0.5B−0.3B3)Xt=(1−0.4B12)at





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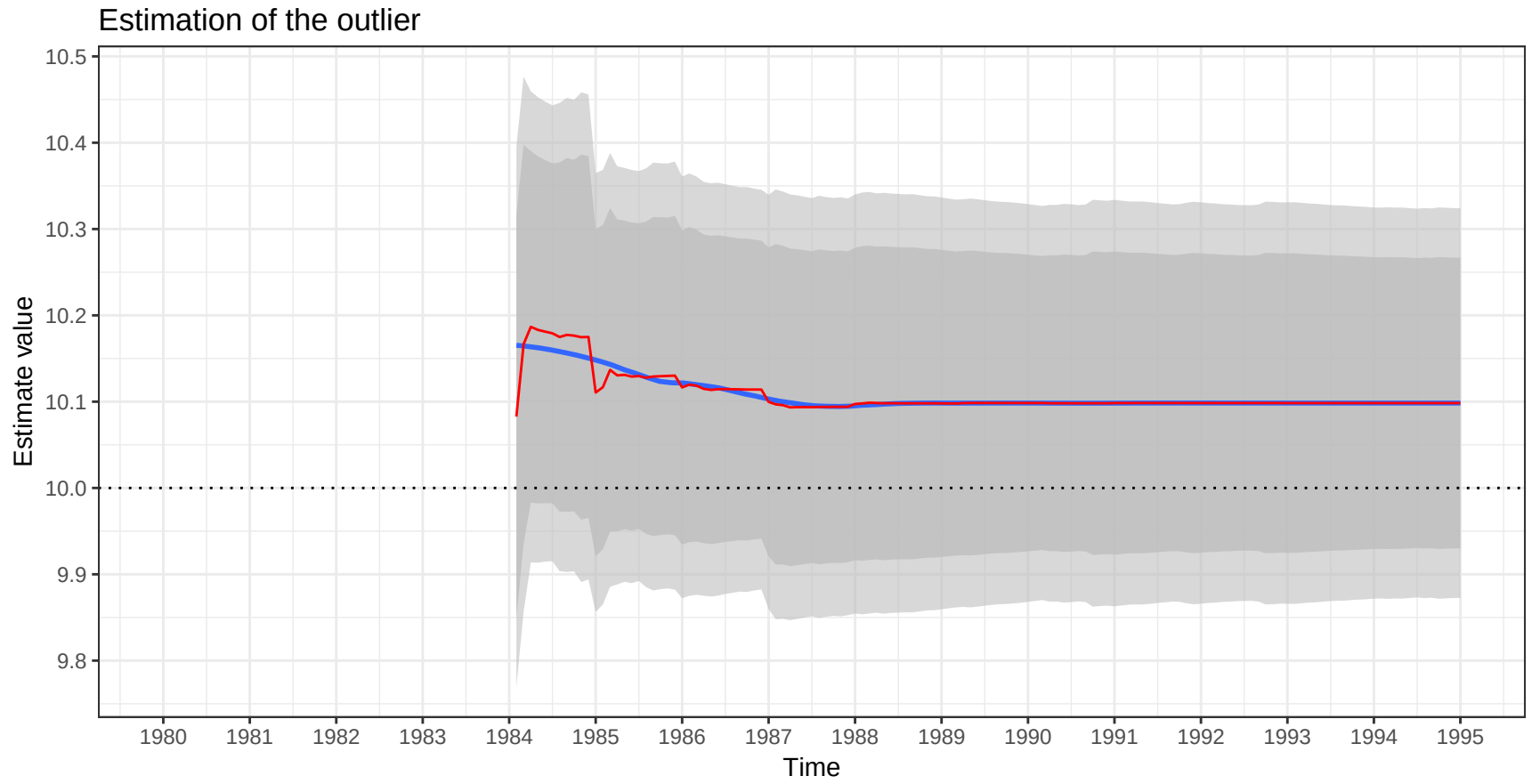

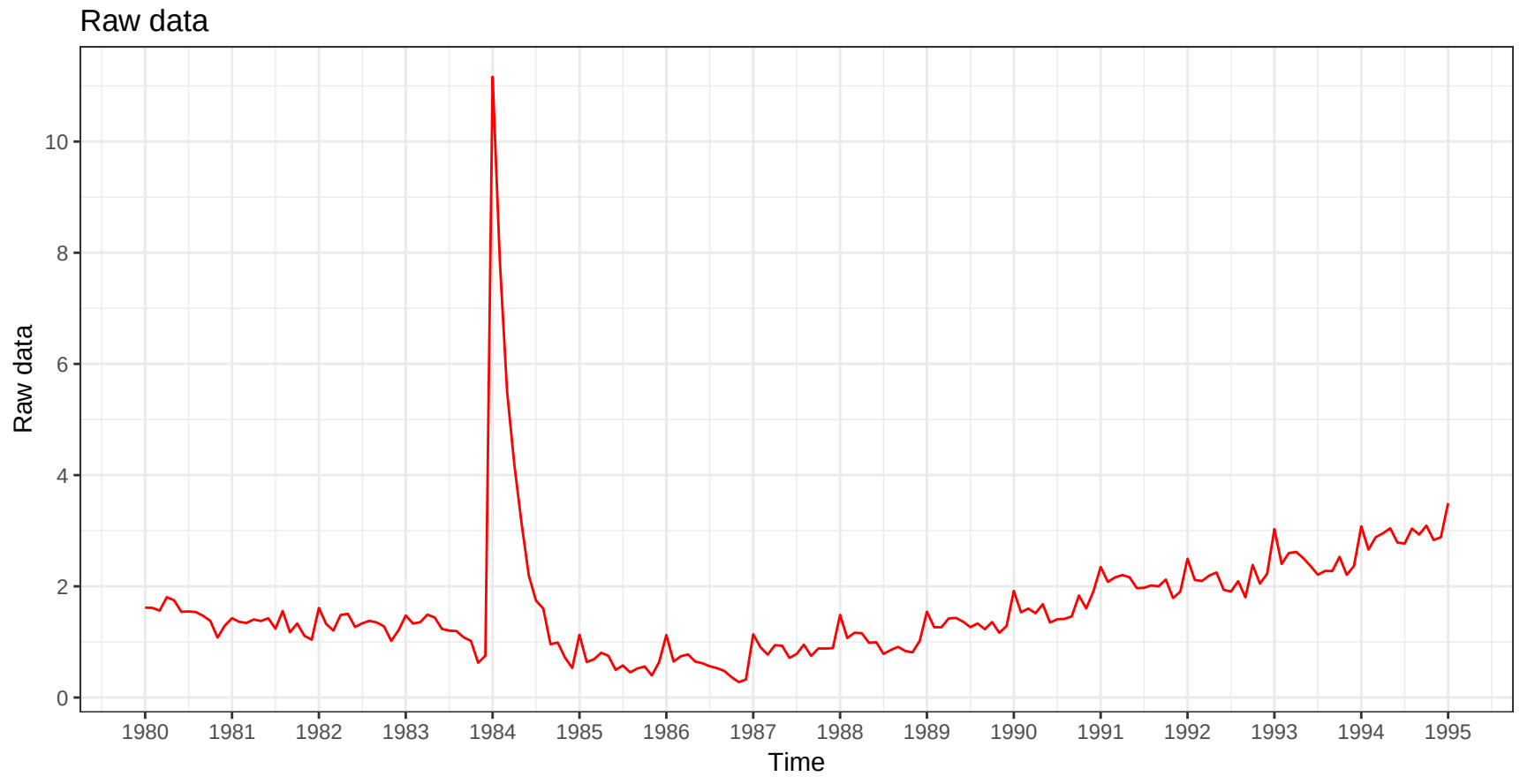

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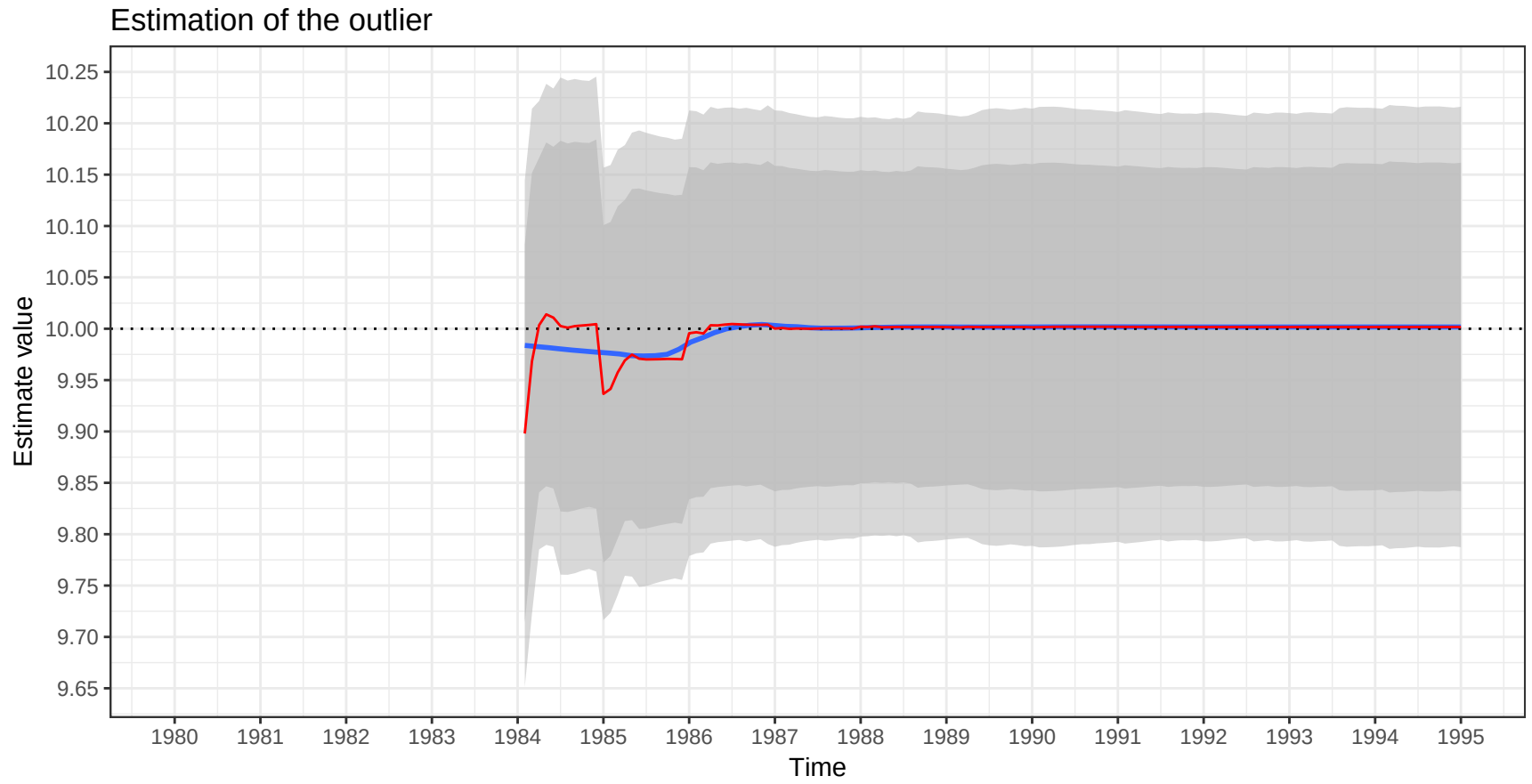

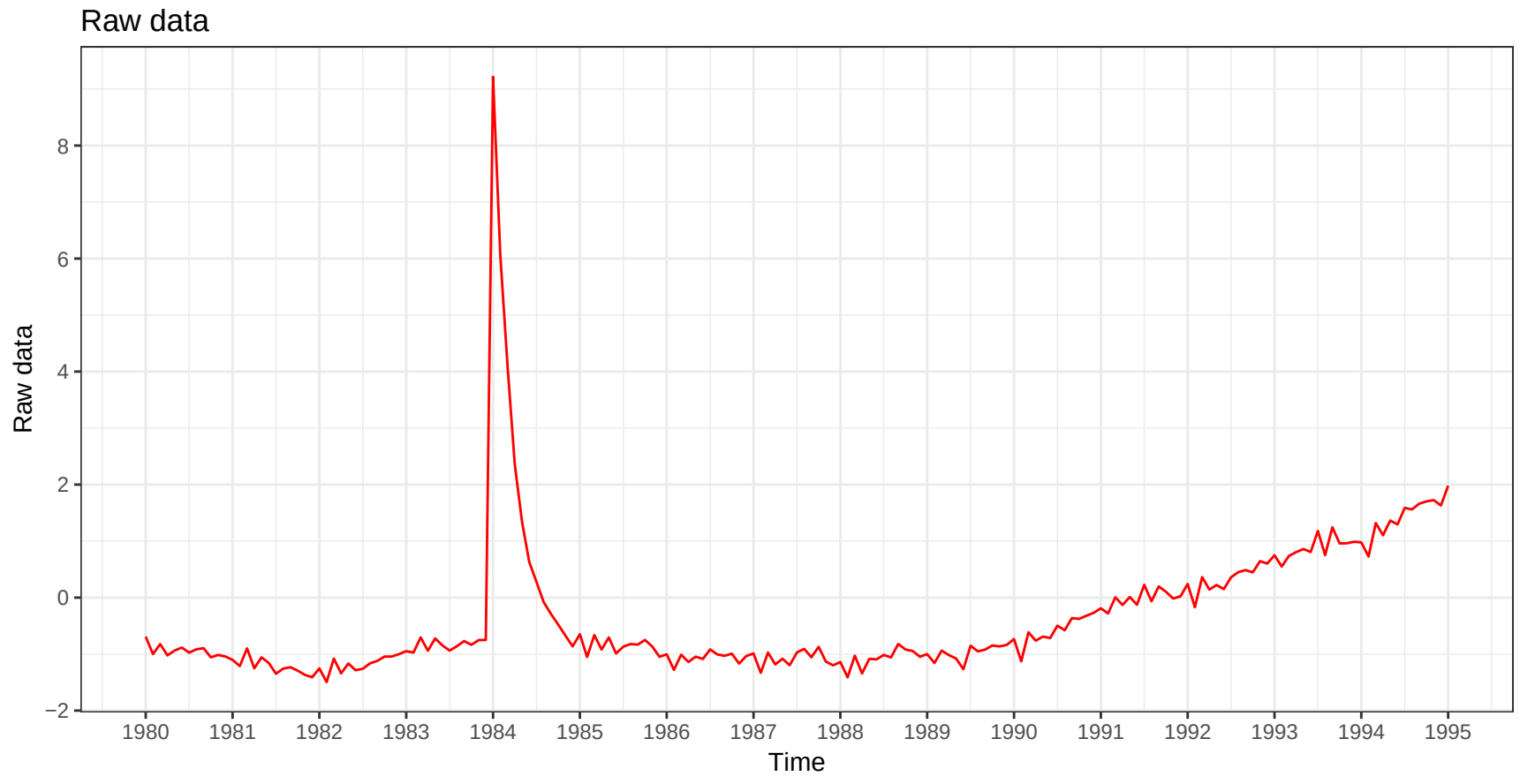

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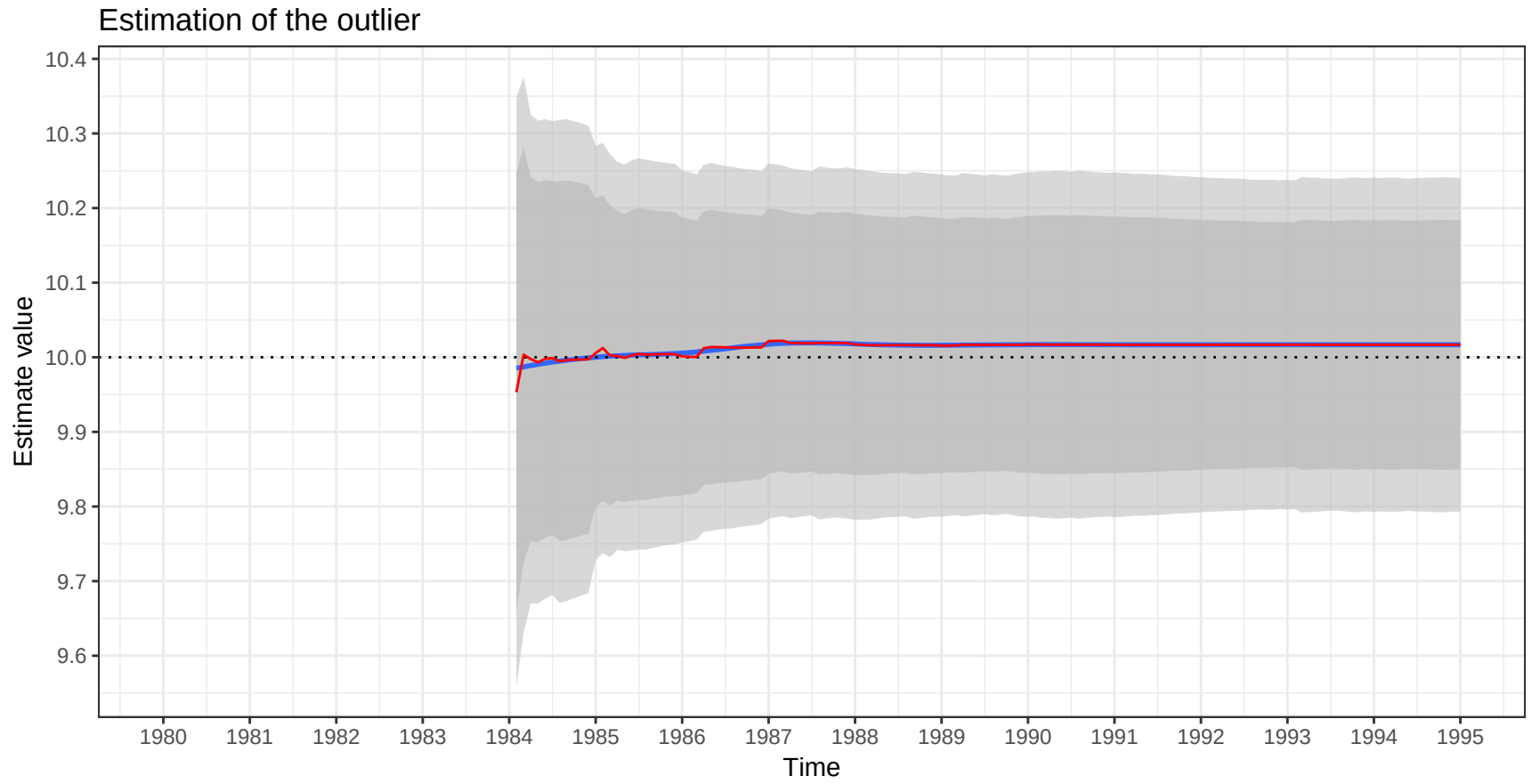

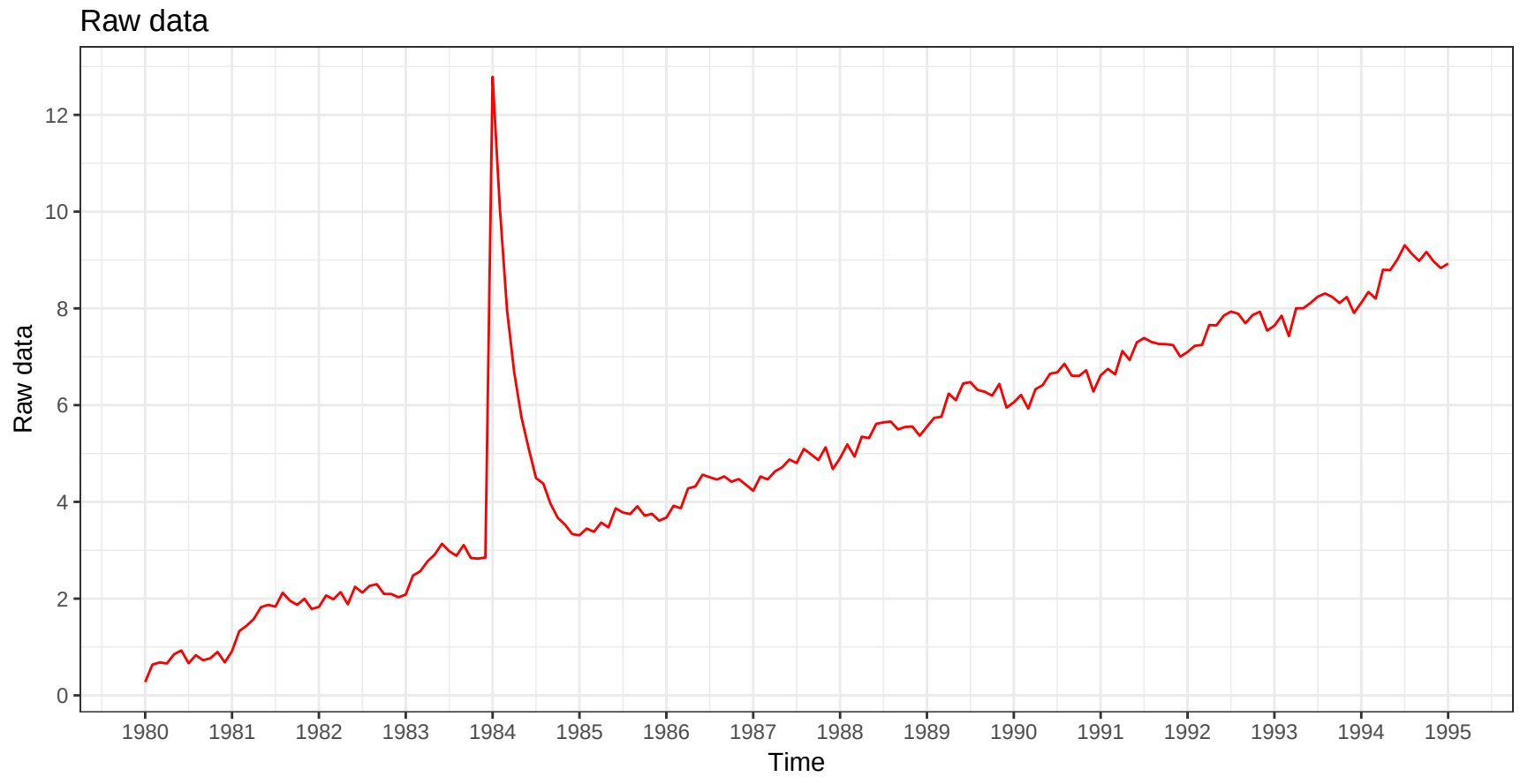

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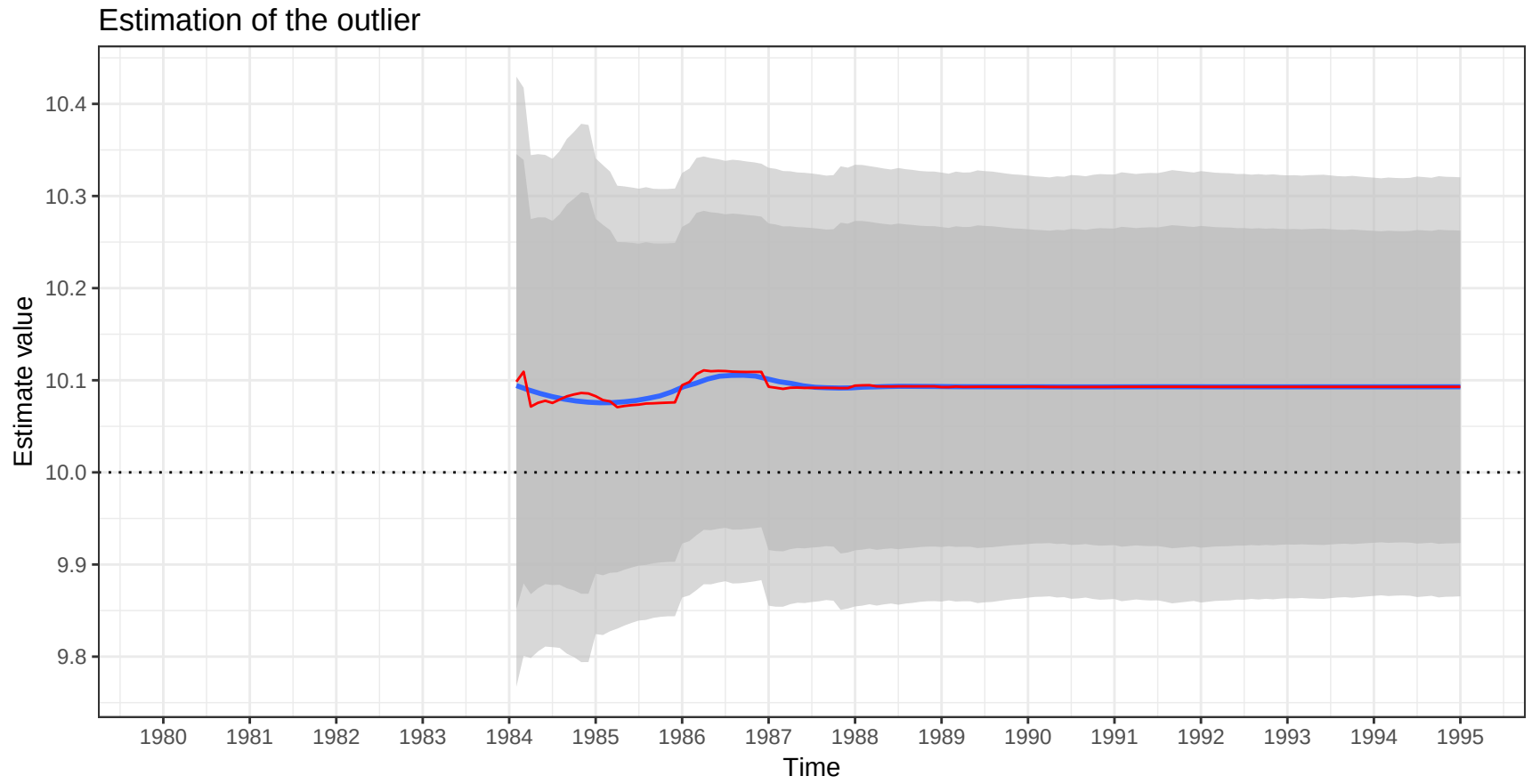

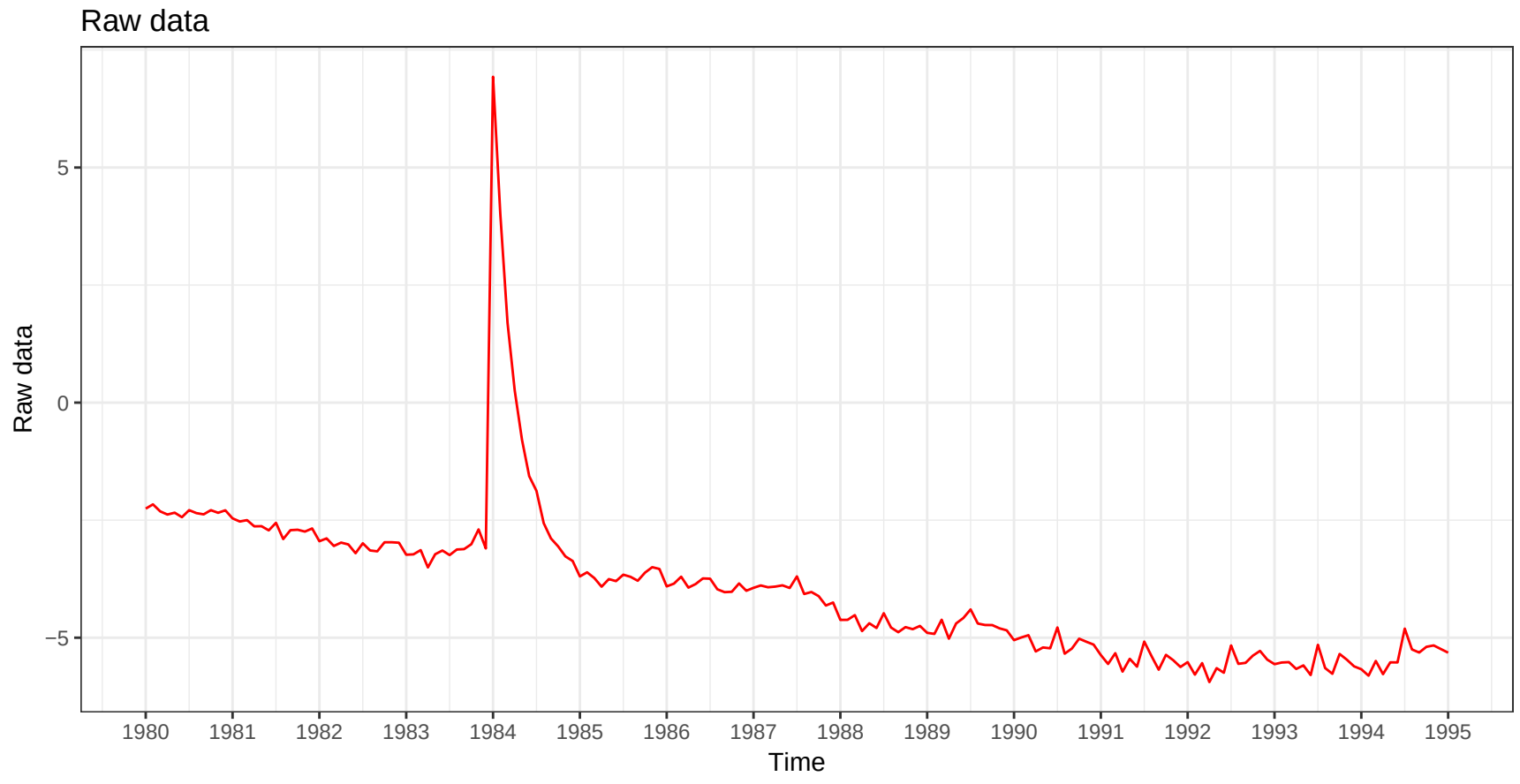

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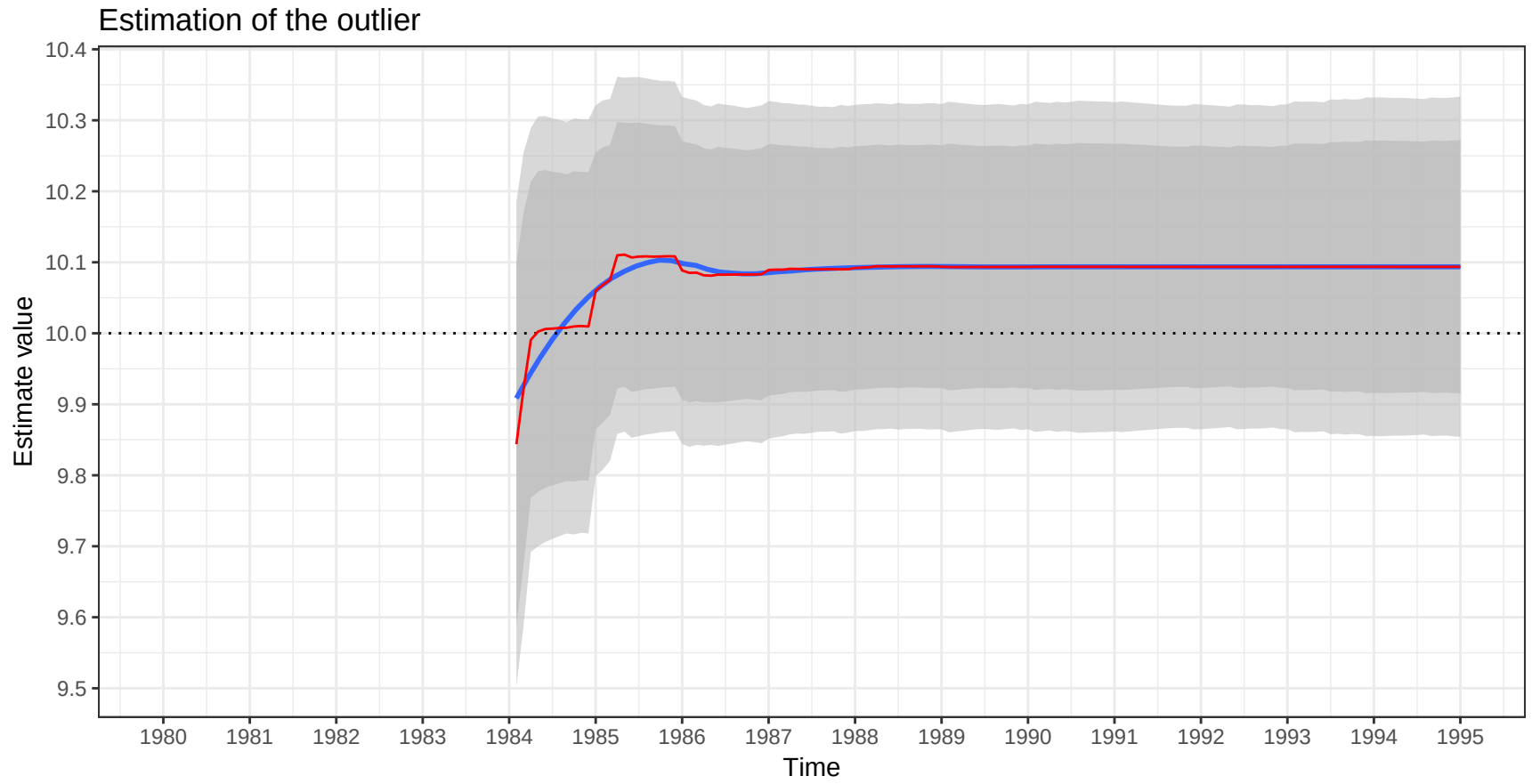

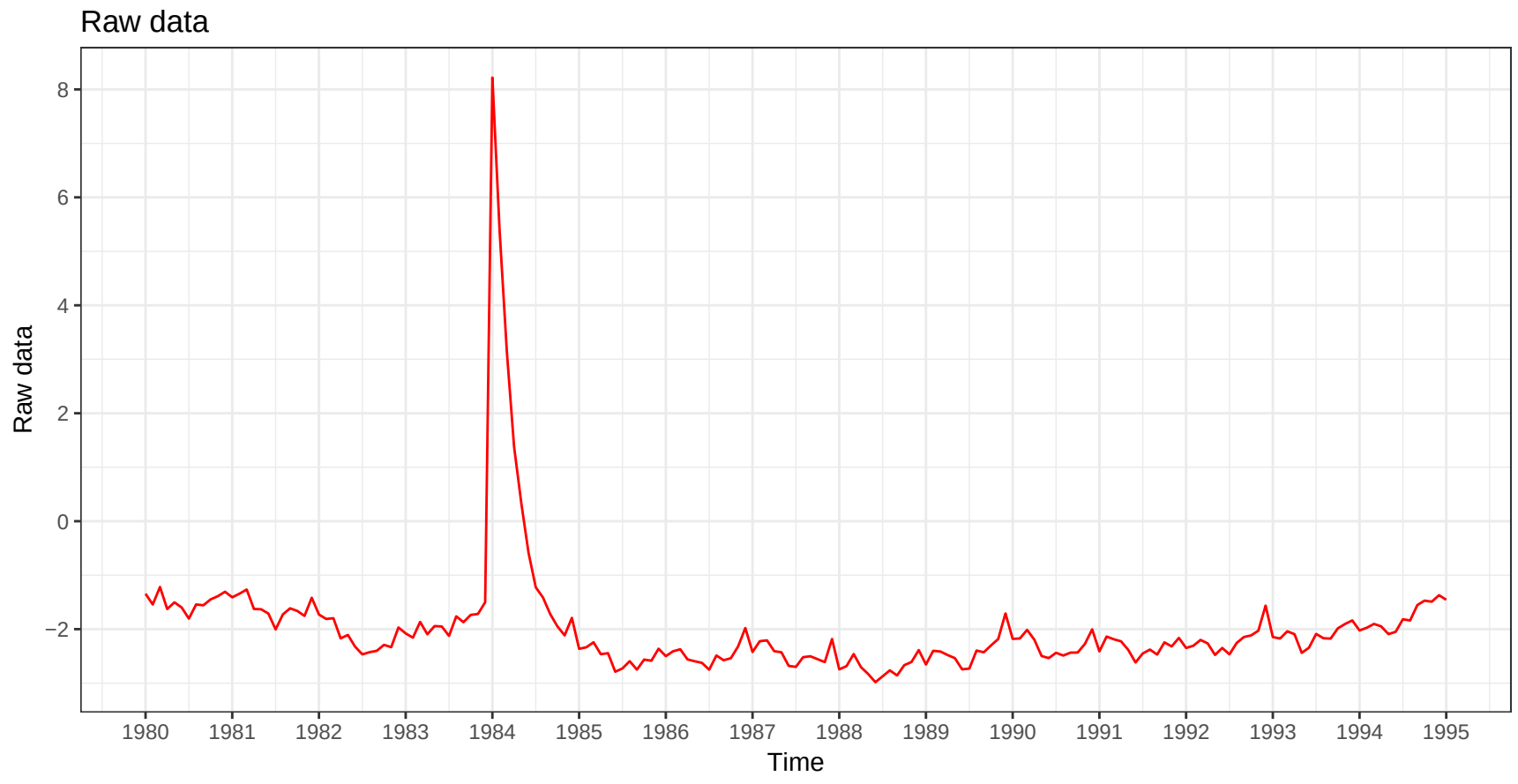

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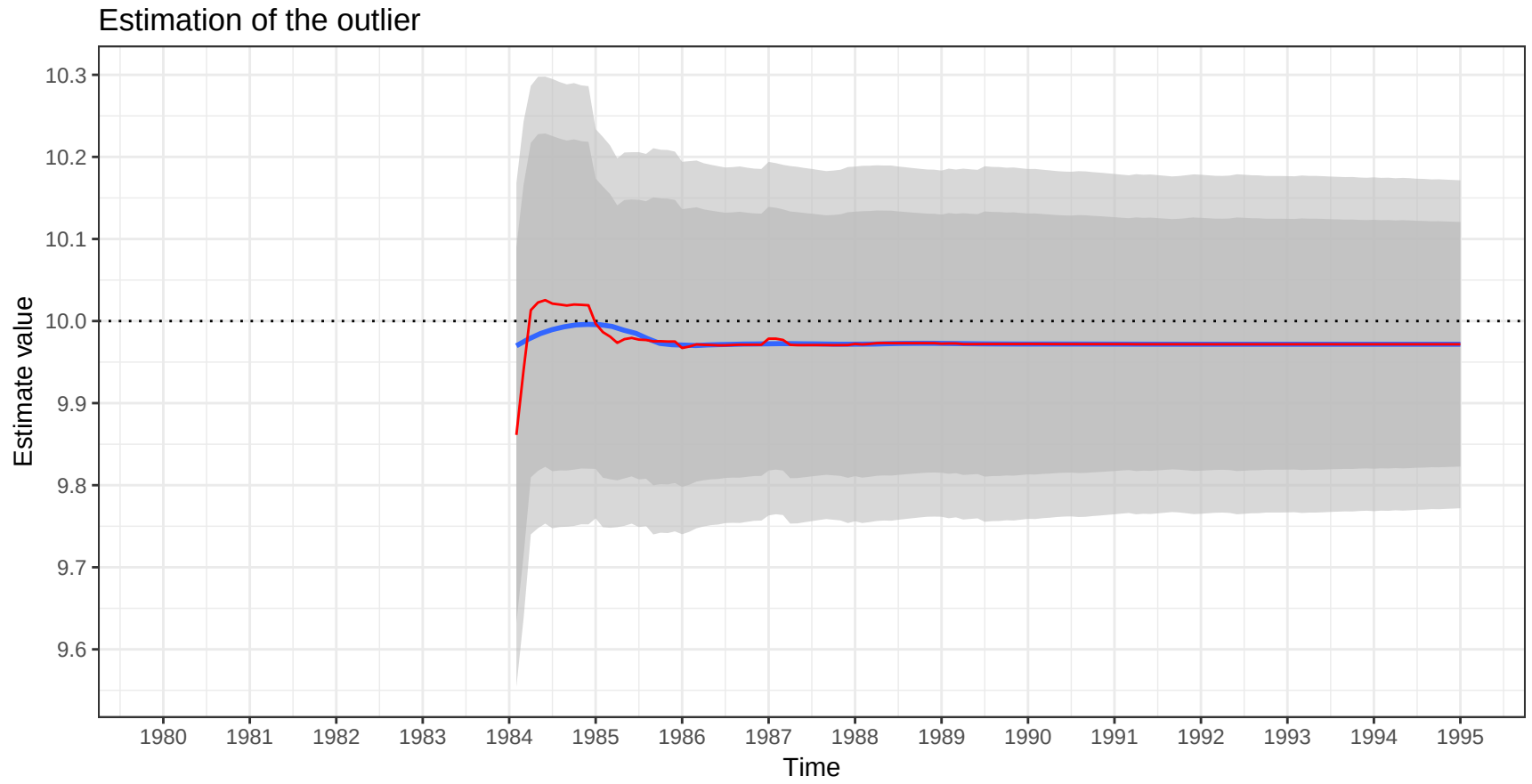

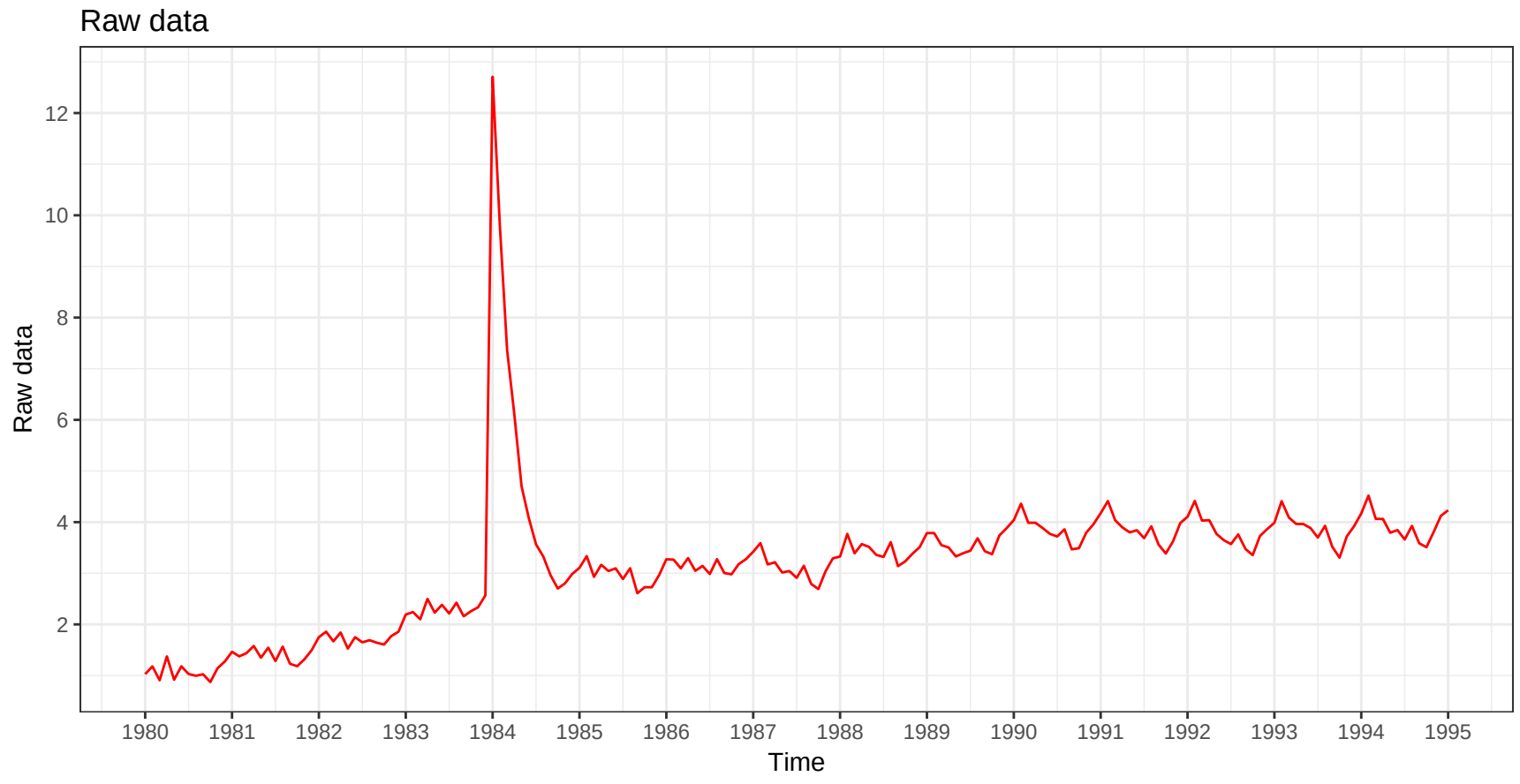

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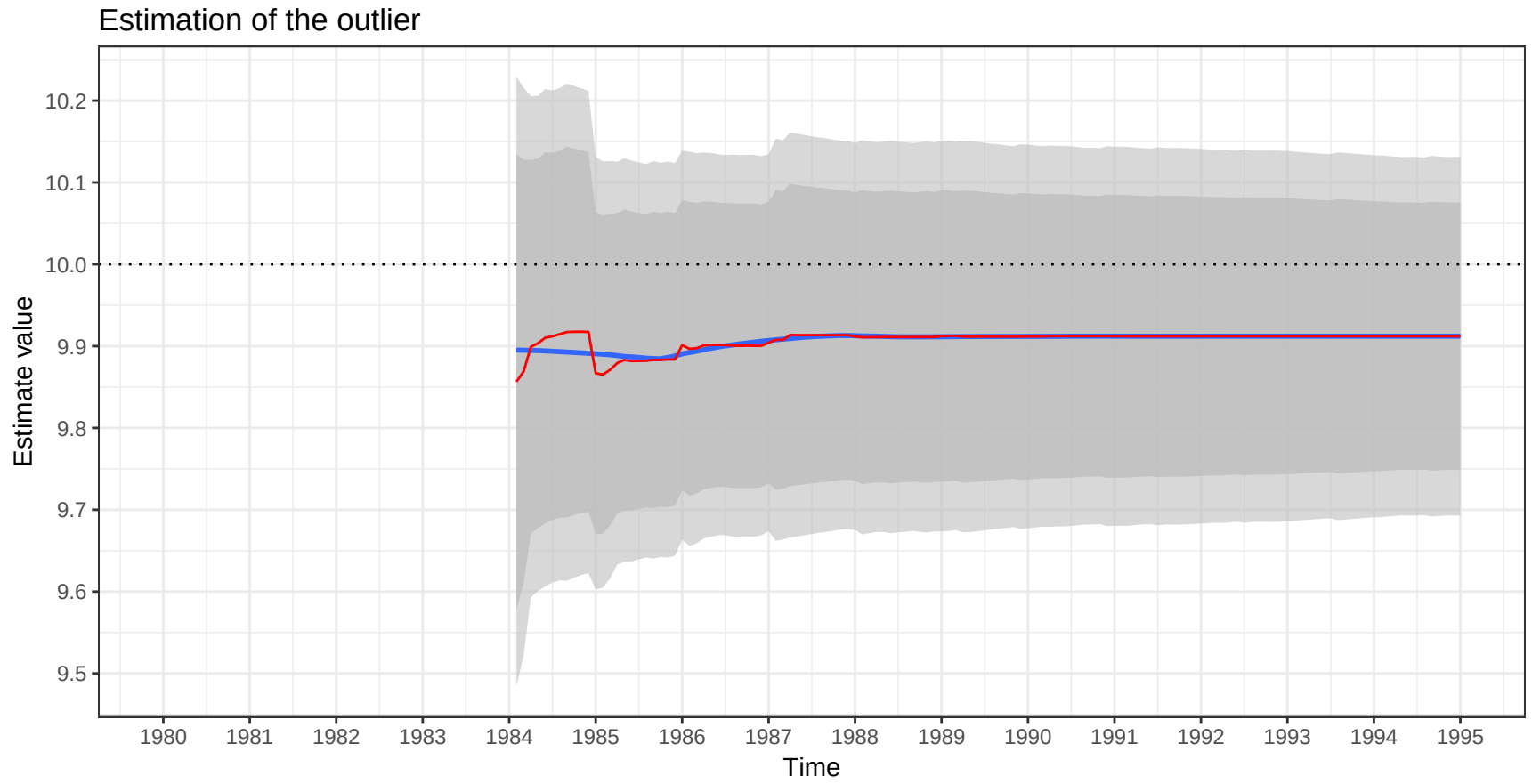

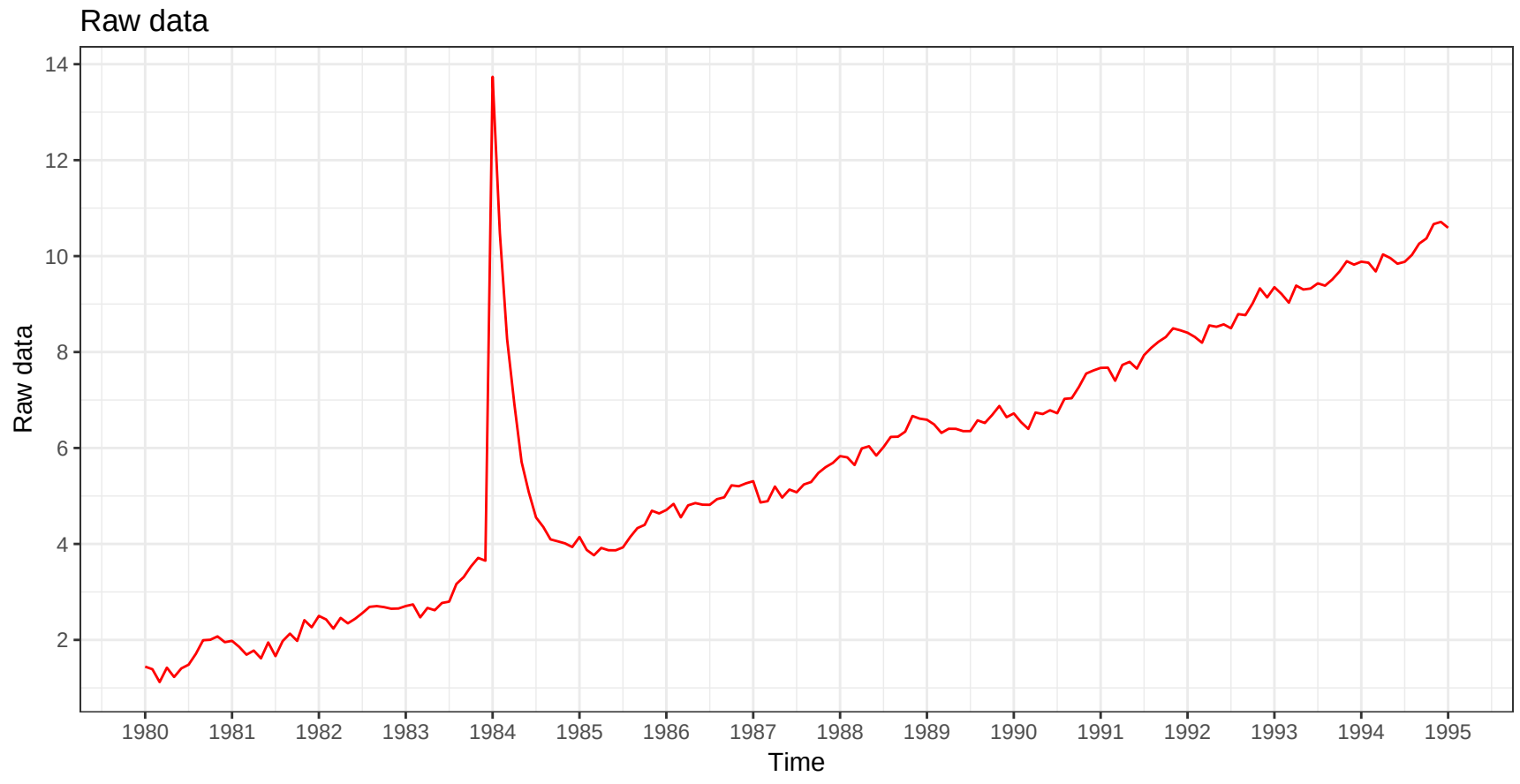

Estimate value of a TC(1984−01)
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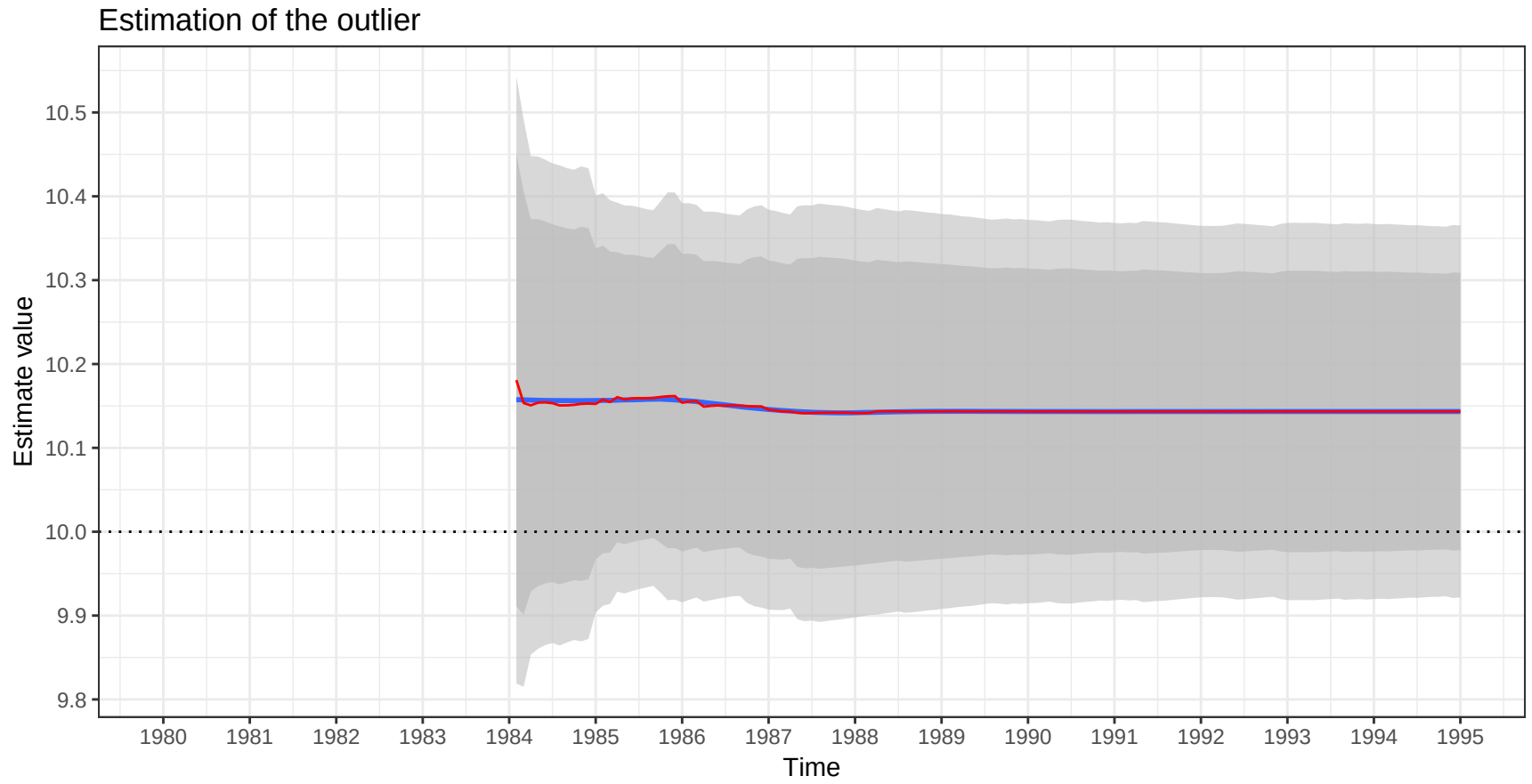

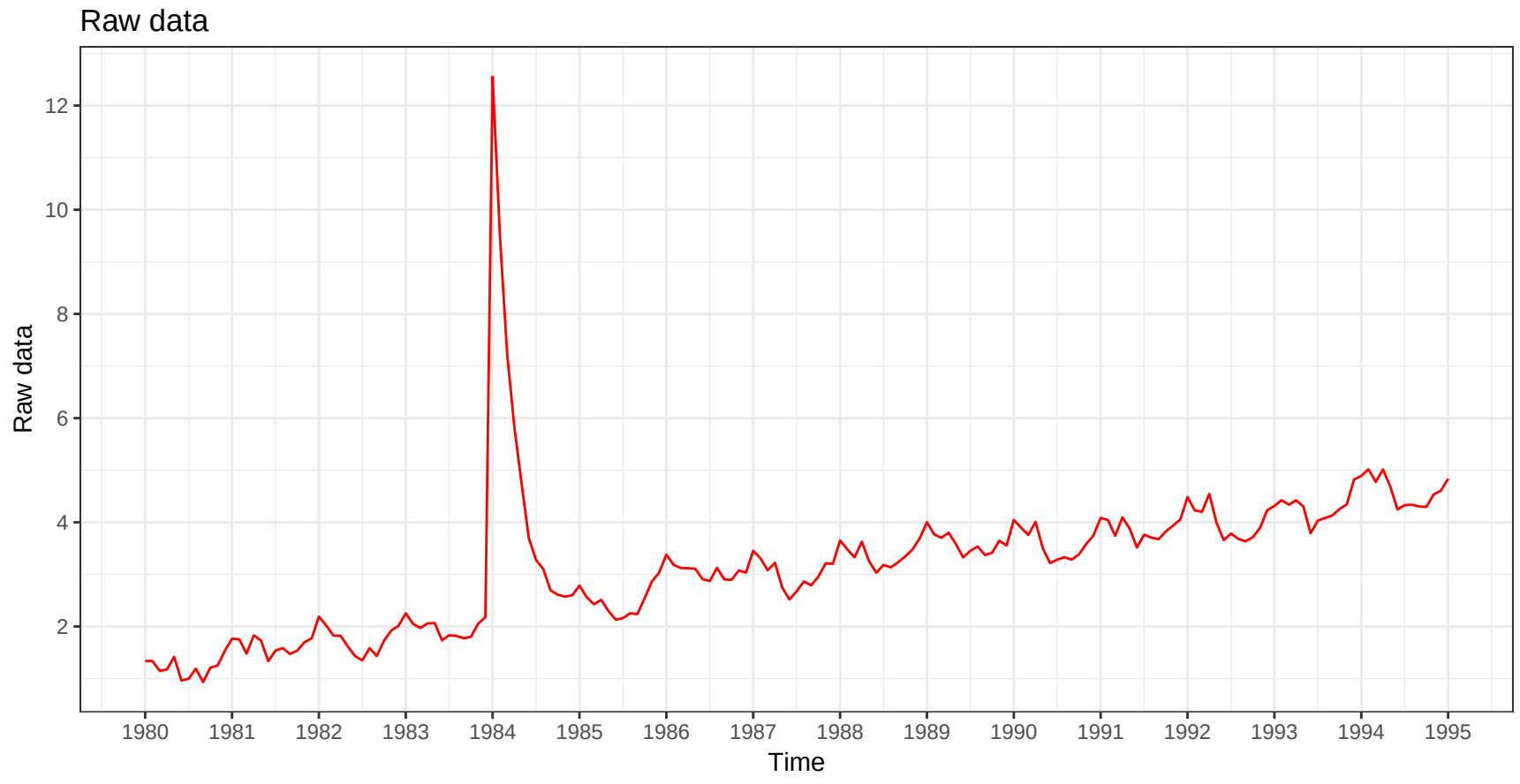
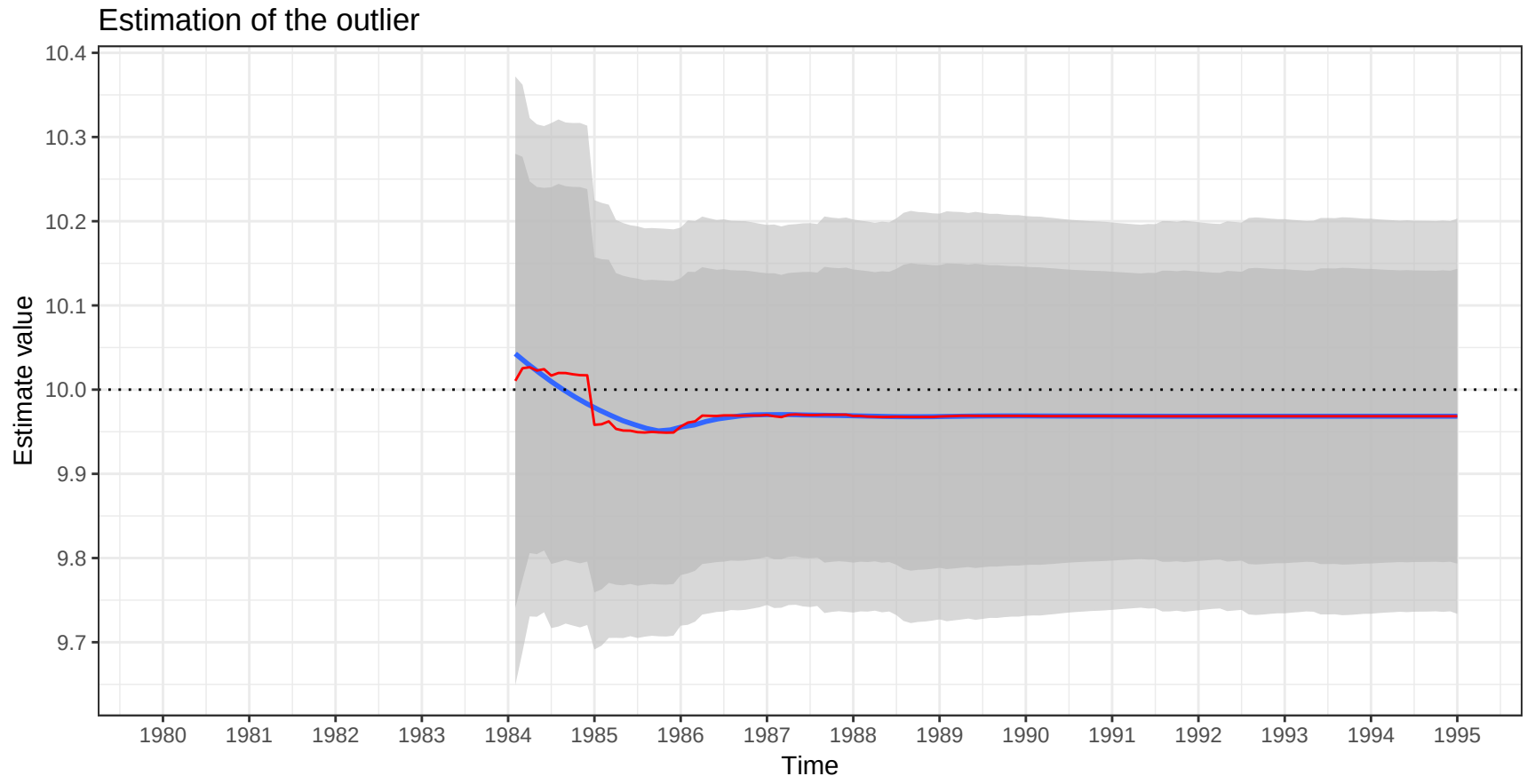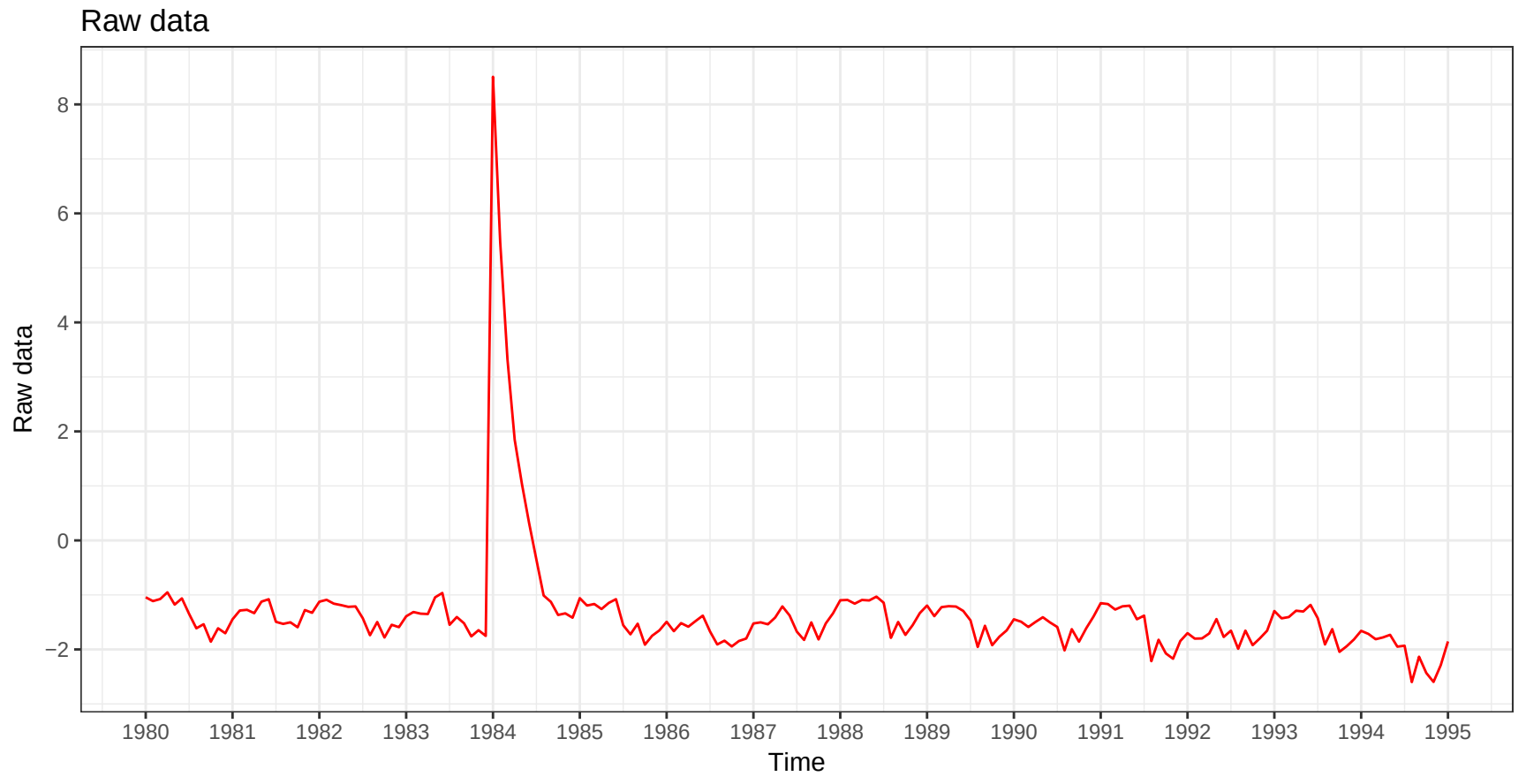
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