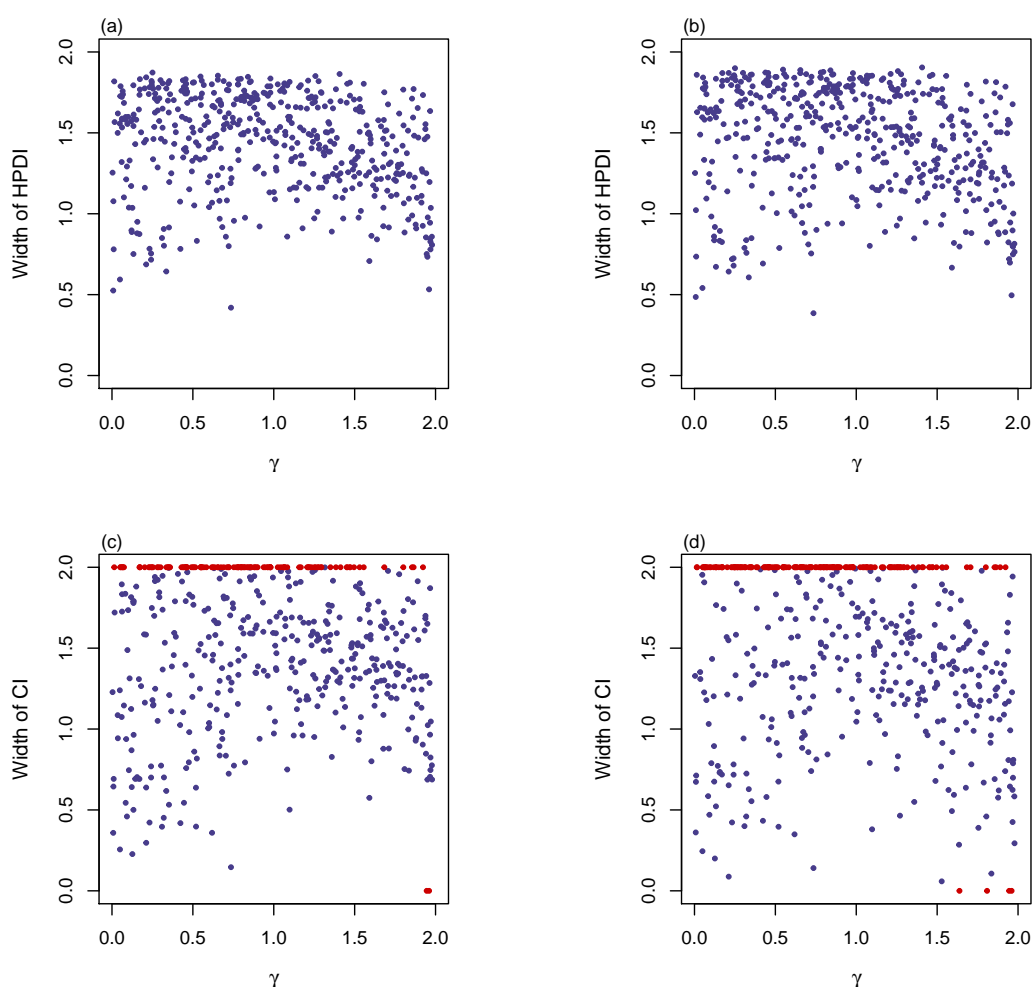
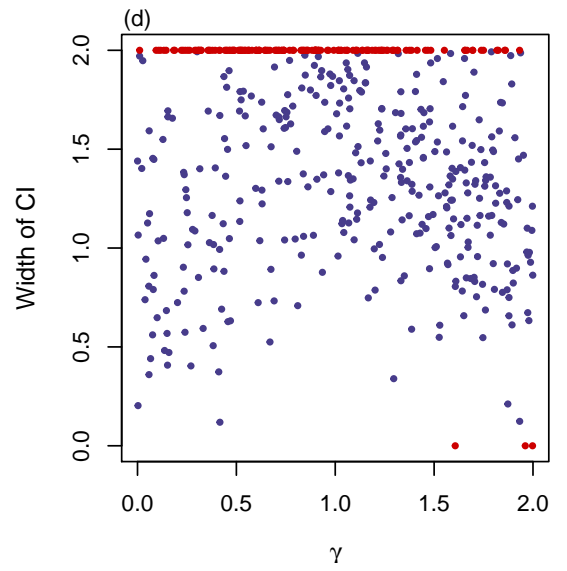
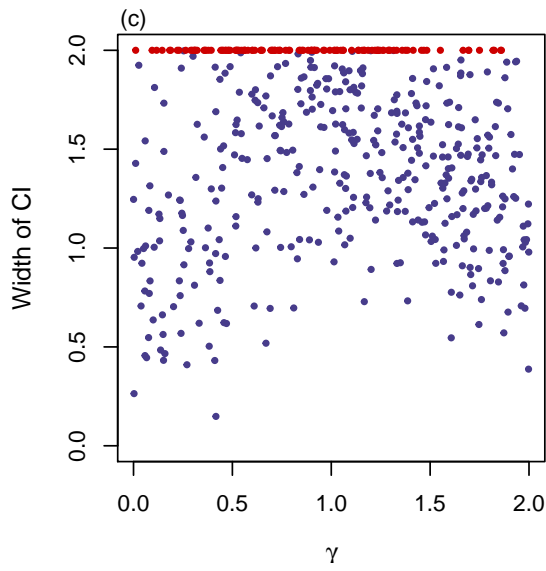
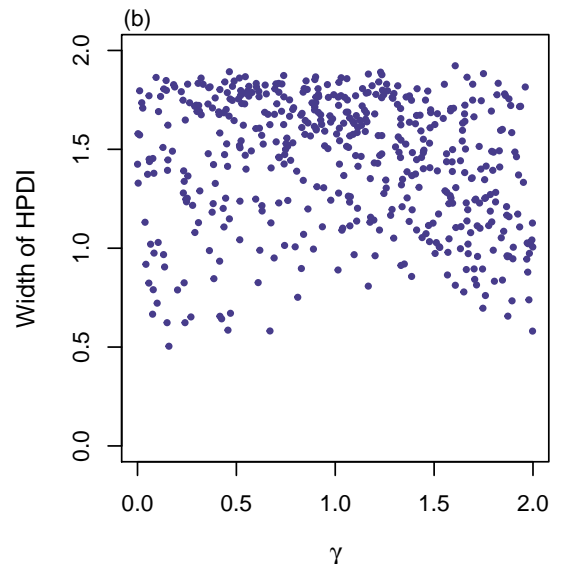
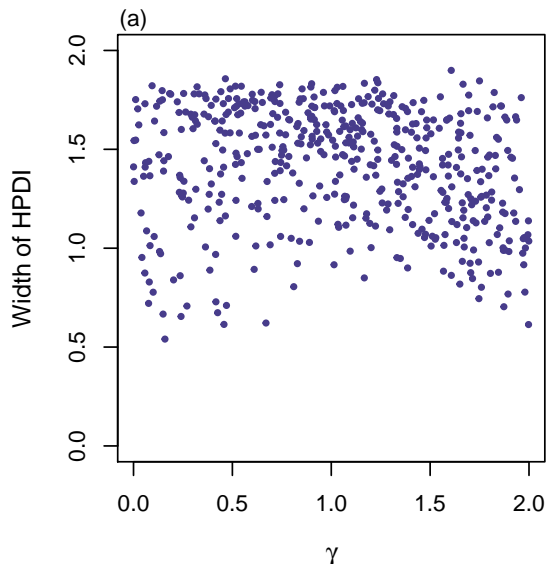


## Additional file 2: Supplementary Figures S23–S44

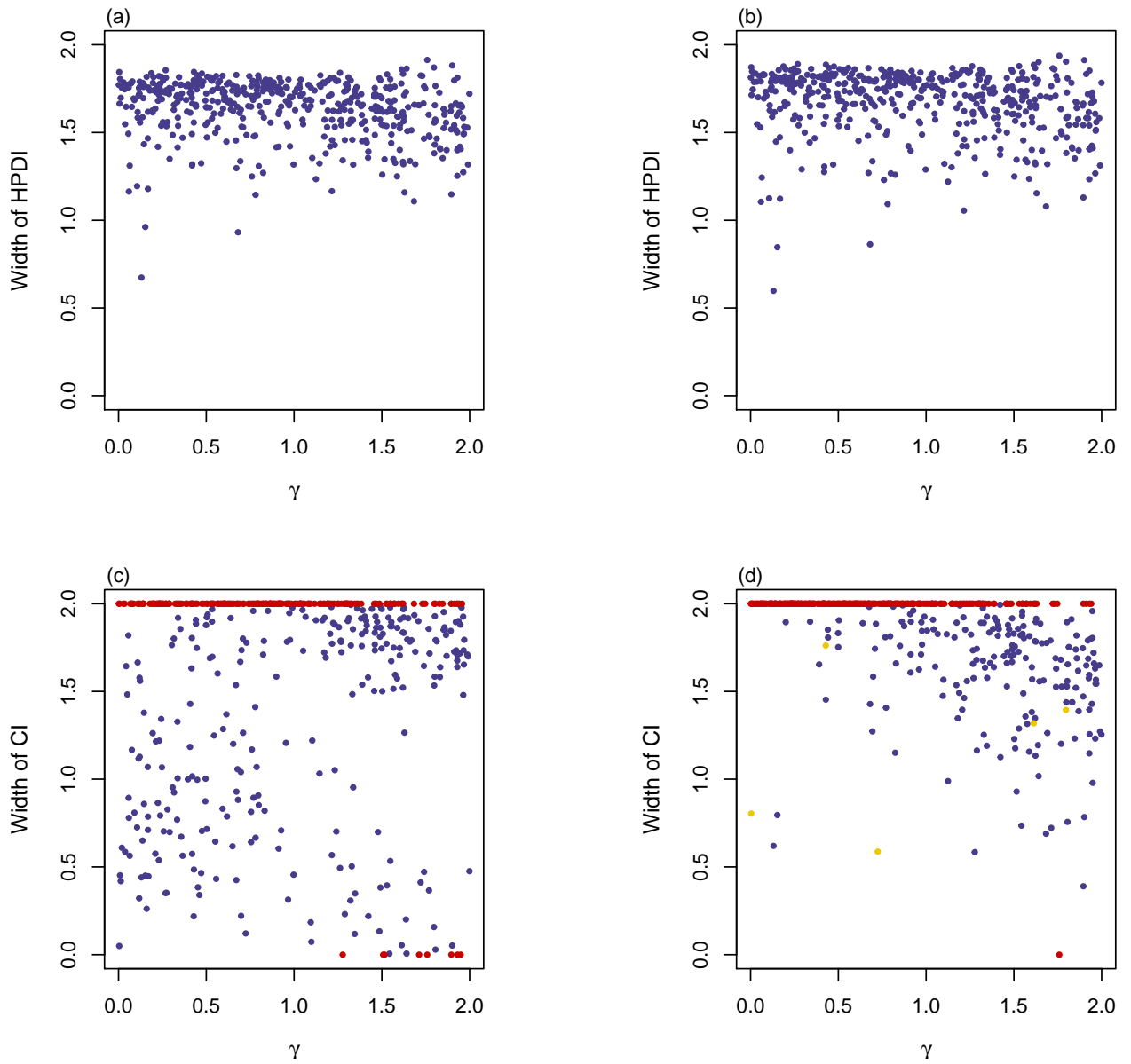


**Supplementary Figure S23** Widths of HPDIs or CIs against true value of  $\gamma$  for qualitative trait with  $n = 500$ ,  $\text{MAF} = 0.3$  and  $\rho = -0.05$ . The red points represent the widths of the noninformative intervals or the empty sets.  
(a) BN method; (b) BU method; (c) PF method; (d) Fieller's method

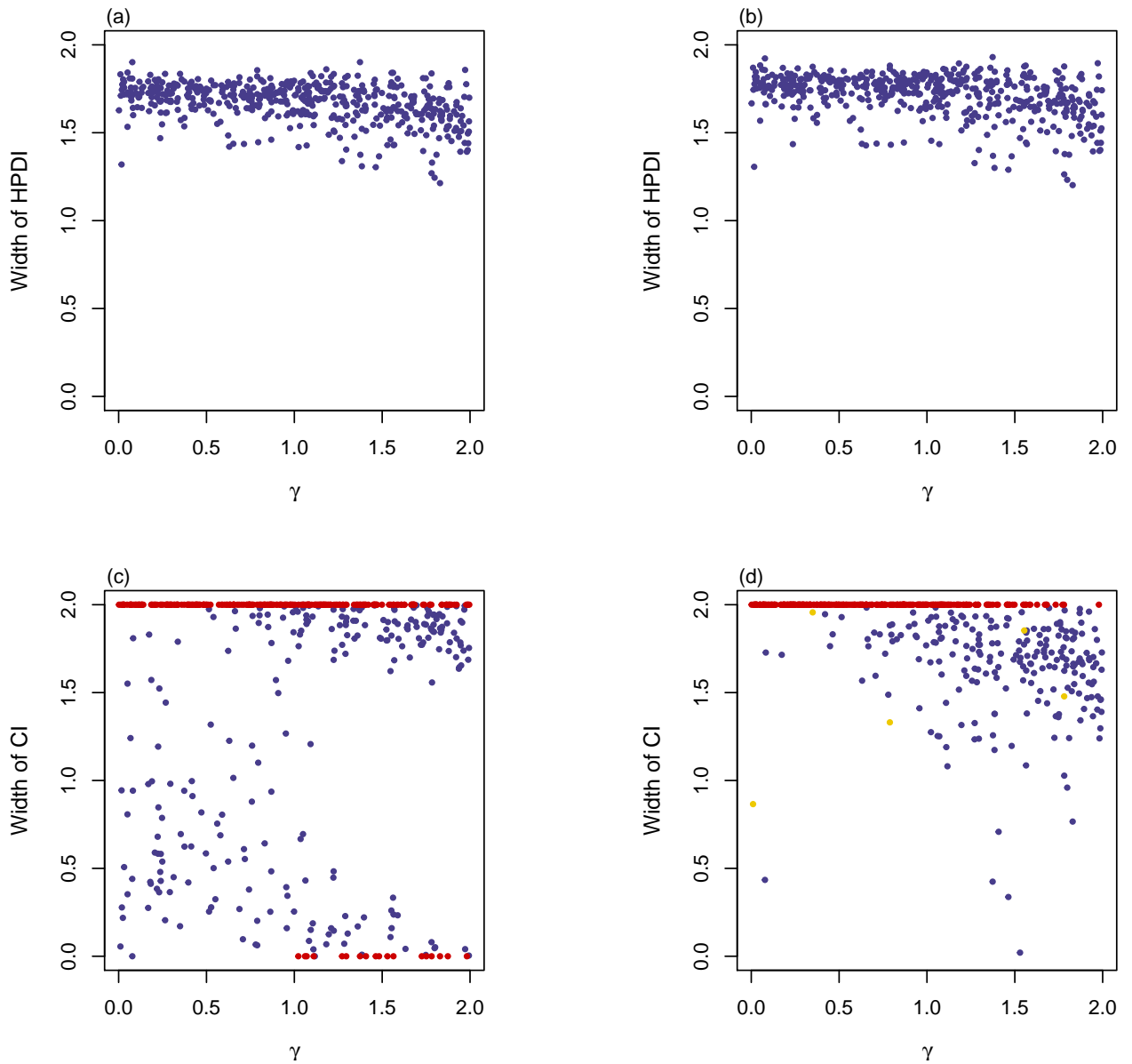


**Supplementary Figure S24** Widths of HPDIs or CIs against true value of  $\gamma$  for qualitative trait with  $n = 500$ ,  $MAF = 0.3$  and  $\rho = 0.05$ . The red points represent the widths of the noninformative intervals or the empty sets.

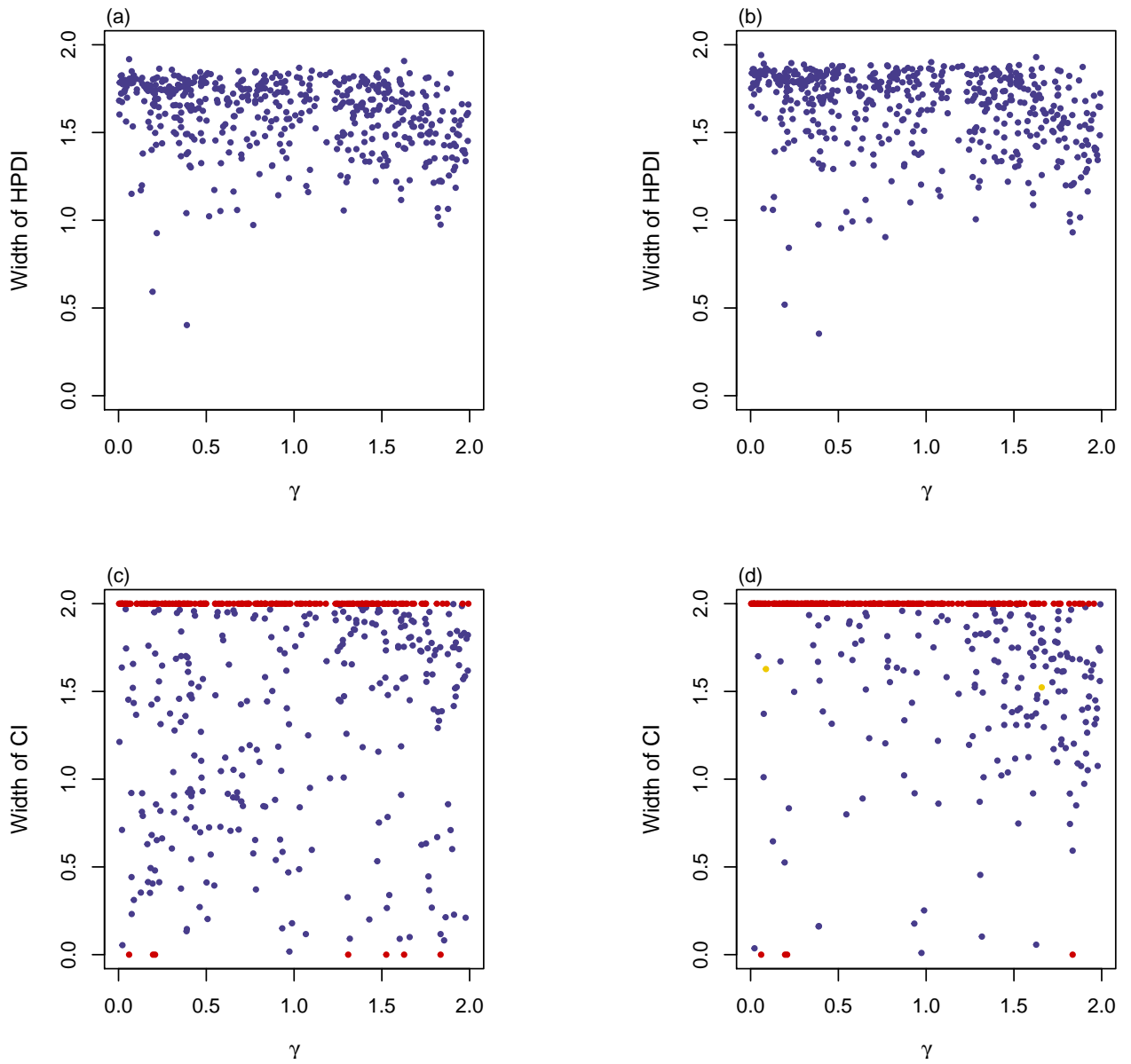
(a) BN method; (b) BU method; (c) PF method; (d) Fieller's method



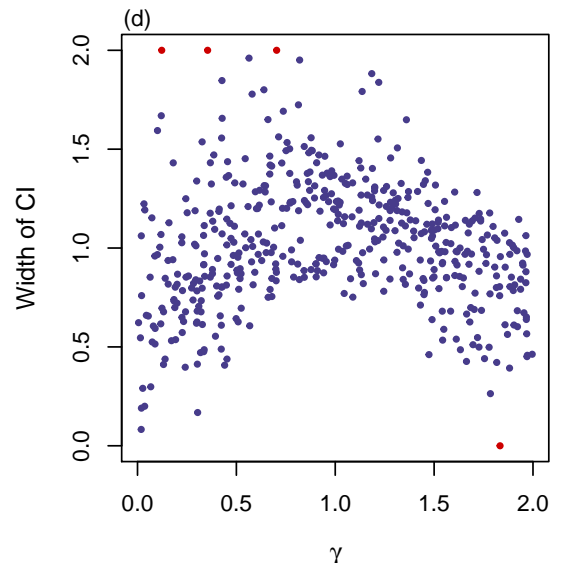
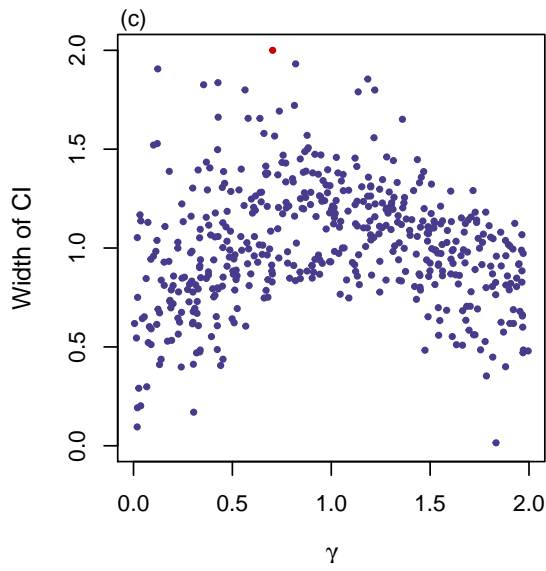
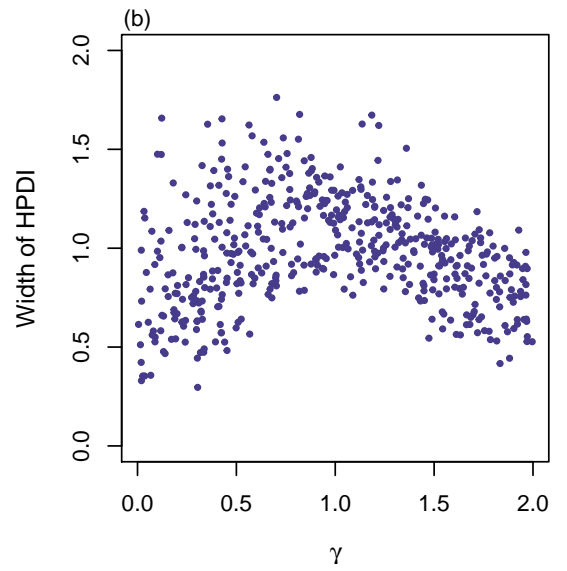
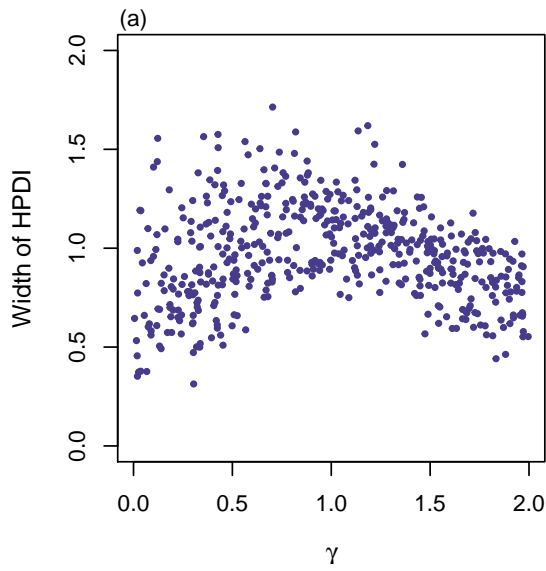
**Supplementary Figure S25** Widths of HPDIs or CIs against true value of  $\gamma$  for qualitative trait with  $n = 500$ ,  $\text{MAF} = 0.1$  and  $\rho = -0.05$ . The red points represent the widths of the noninformative intervals or the empty sets, and the yellow points represent the widths of the discontinuous intervals. **(a)** BN method; **(b)** BU method; **(c)** PF method; **(d)** Fieller's method



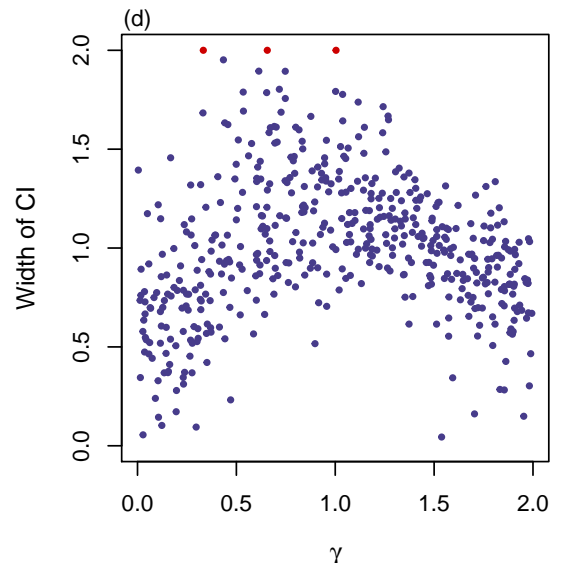
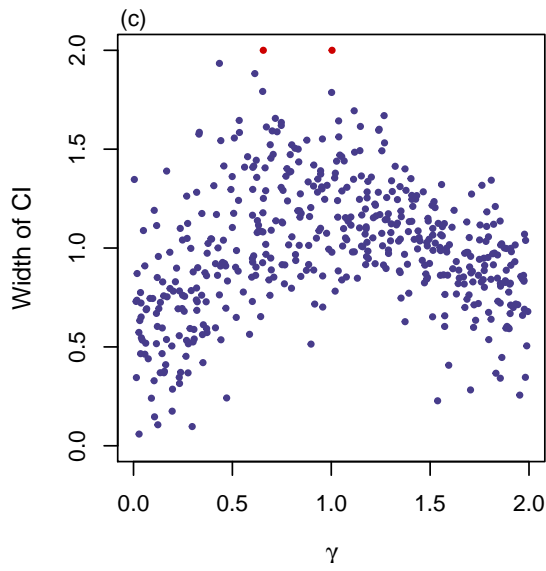
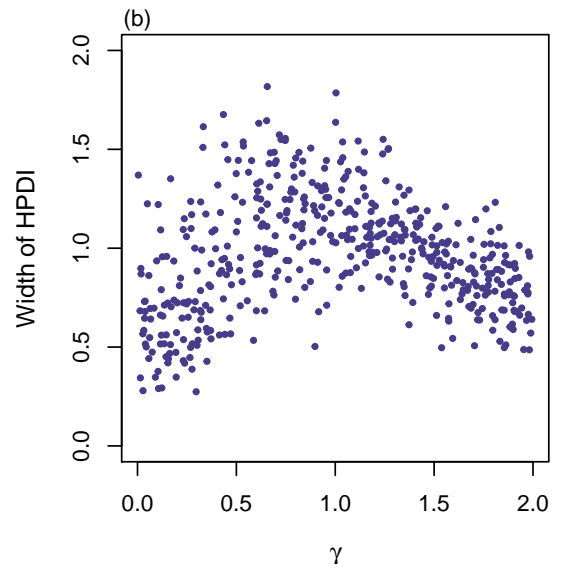
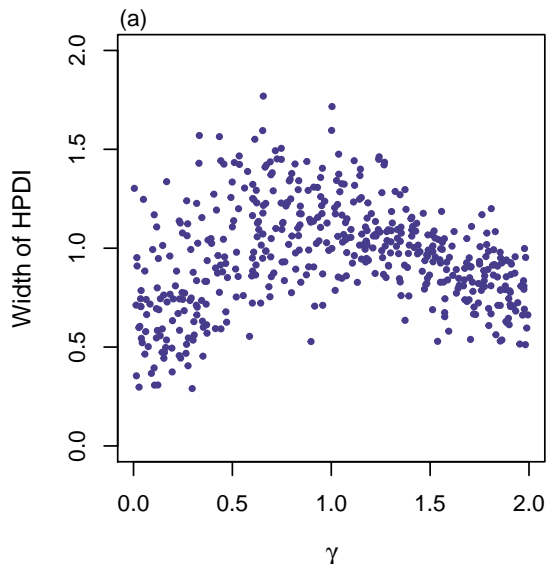
**Supplementary Figure S26** Widths of HPDIs or CIs against true value of  $\gamma$  for qualitative trait with  $n = 500$ ,  $\text{MAF} = 0.1$  and  $\rho = -0.05$ . The red points represent the widths of the noninformative intervals or the empty sets, and the yellow points represent the widths of the discontinuous intervals. **(a)** BN method; **(b)** BU method; **(c)** PF method; **(d)** Fieller's method



**Supplementary Figure S27** Widths of HPDIs or CIs against true value of  $\gamma$  for qualitative trait with  $n = 500$ ,  $\text{MAF} = 0.1$  and  $\rho = 0.05$ . The red points represent the widths of the noninformative intervals or the empty sets, and the yellow points represent the widths of the discontinuous intervals. **(a)** BN method; **(b)** BU method; **(c)** PF method; **(d)** Fieller's method

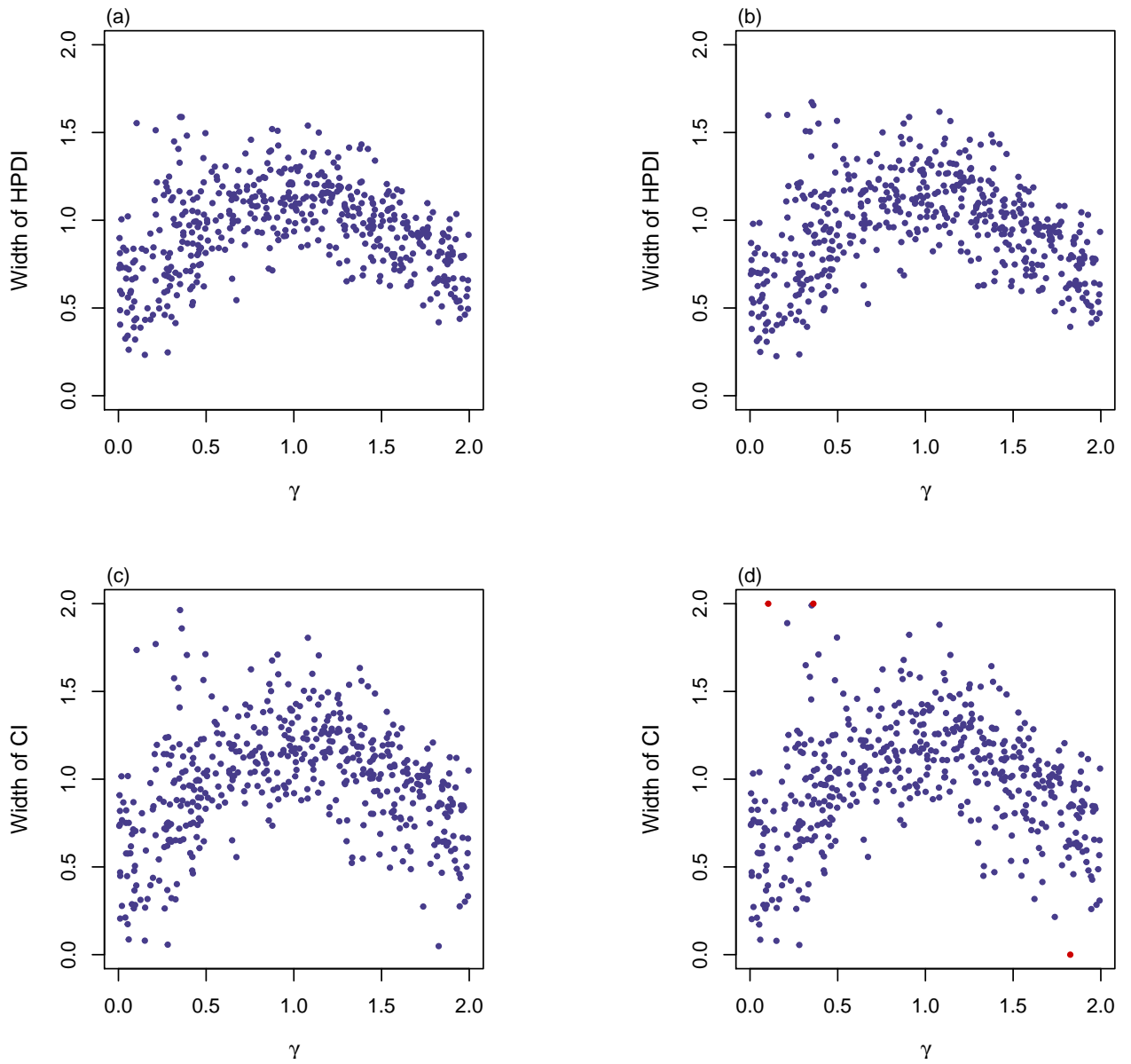


**Supplementary Figure S28** Widths of HPDIs or CIs against true value of  $\gamma$  for qualitative trait with  $n = 2000$ ,  $MAF = 0.3$  and  $\rho = 0$ . The red points represent the widths of the noninformative intervals or the empty sets. **(a)** BN method; **(b)** BU method; **(c)** PF method; **(d)** Fieller's method



**Supplementary Figure S29** Widths of HPDIs or CIs against true value of  $\gamma$  for qualitative trait with  $n = 2000$ ,  $MAF = 0.3$  and  $\rho = -0.05$ . The red points represent the widths of the noninformative intervals or the empty sets.

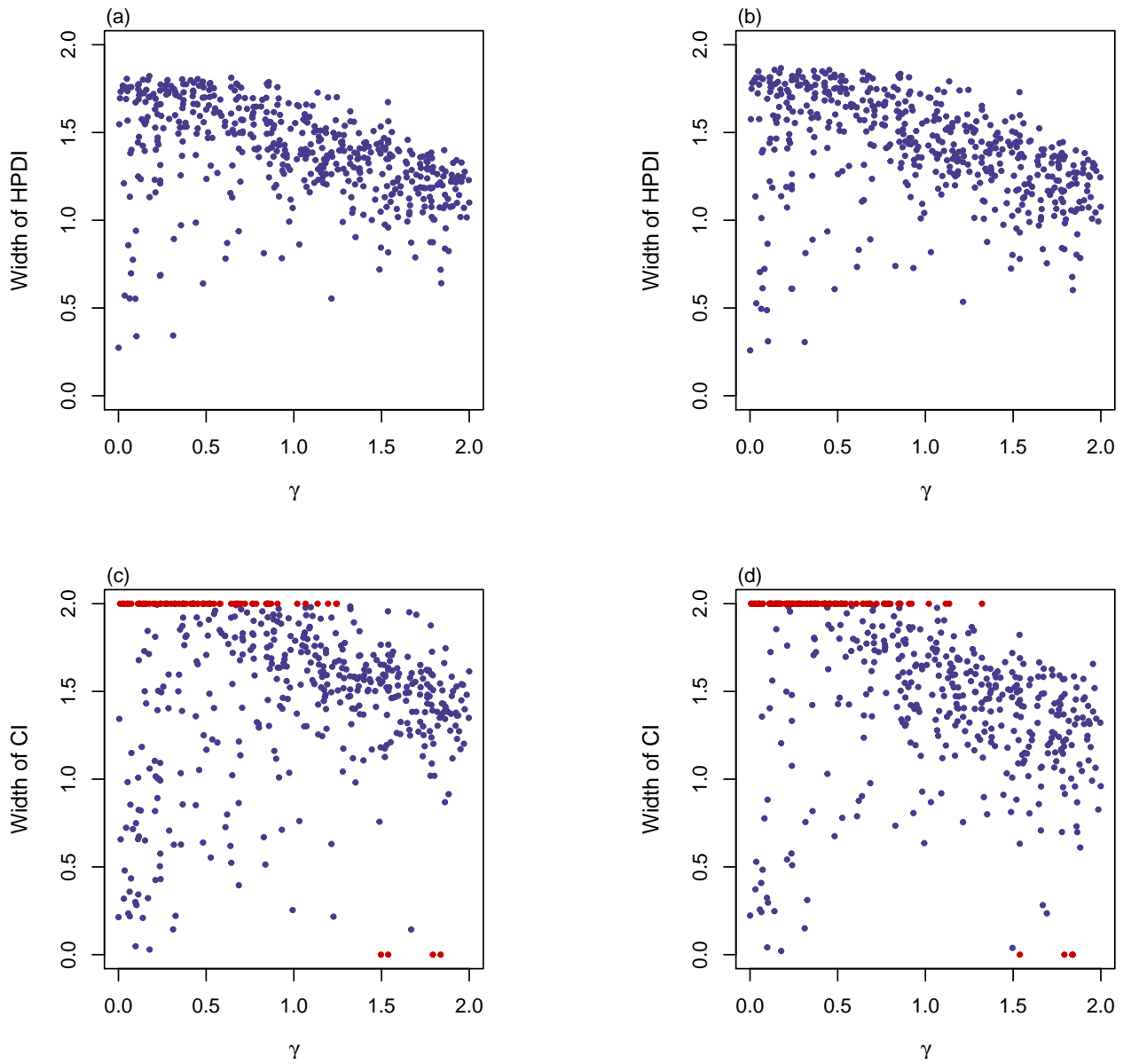
(a) BN method; (b) BU method; (c) PF method; (d) Fieller's method



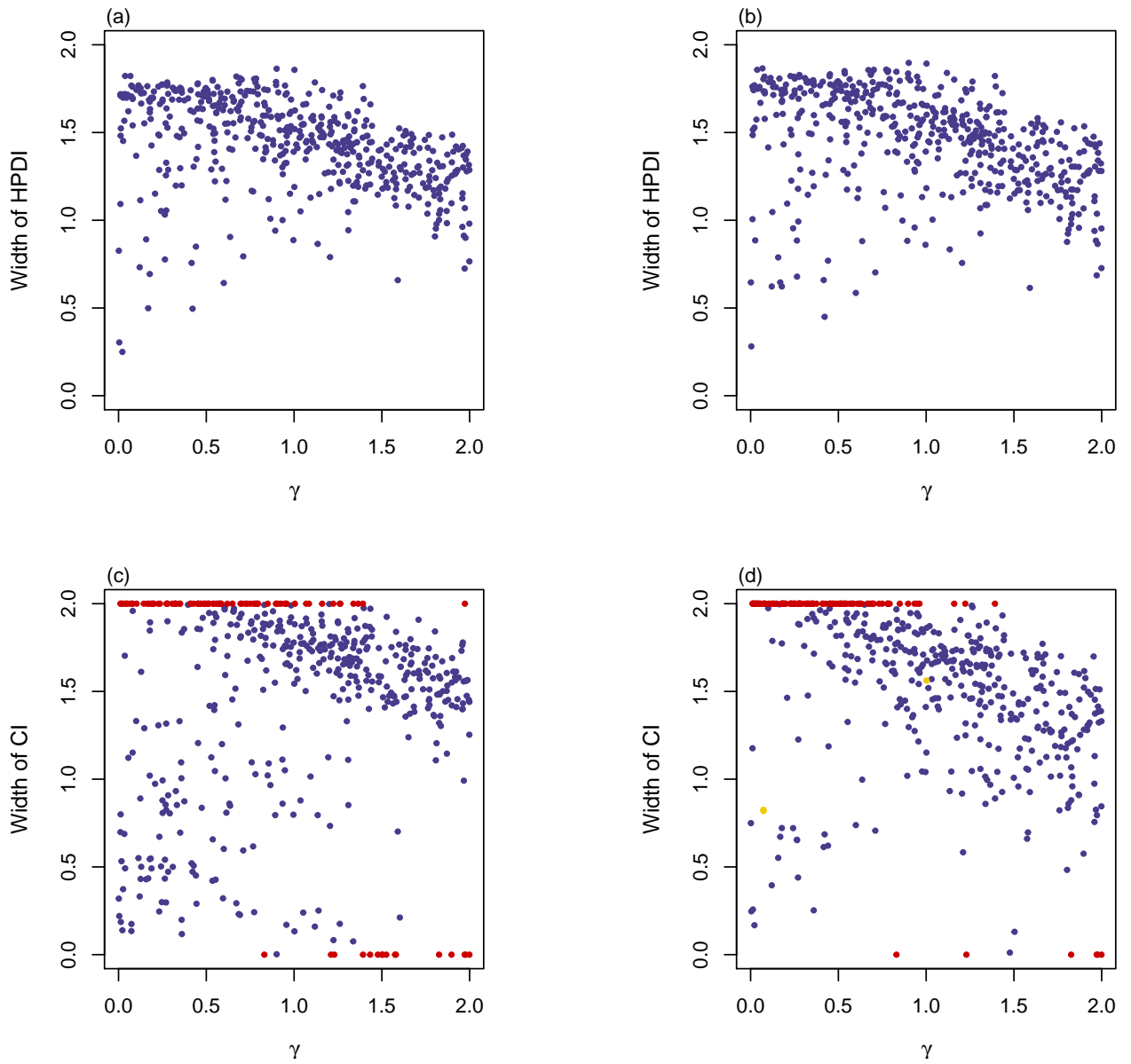
**Supplementary Figure S30** Widths of HPDIs or CIs against true value of  $\gamma$  for qualitative trait with  $n = 2000$ ,  $MAF = 0.3$  and  $\rho = 0.05$ . The red points represent the widths of the noninformative intervals or the empty sets.

(a) BN method; (b) BU method; (c) PF method; (d) Fieller's method

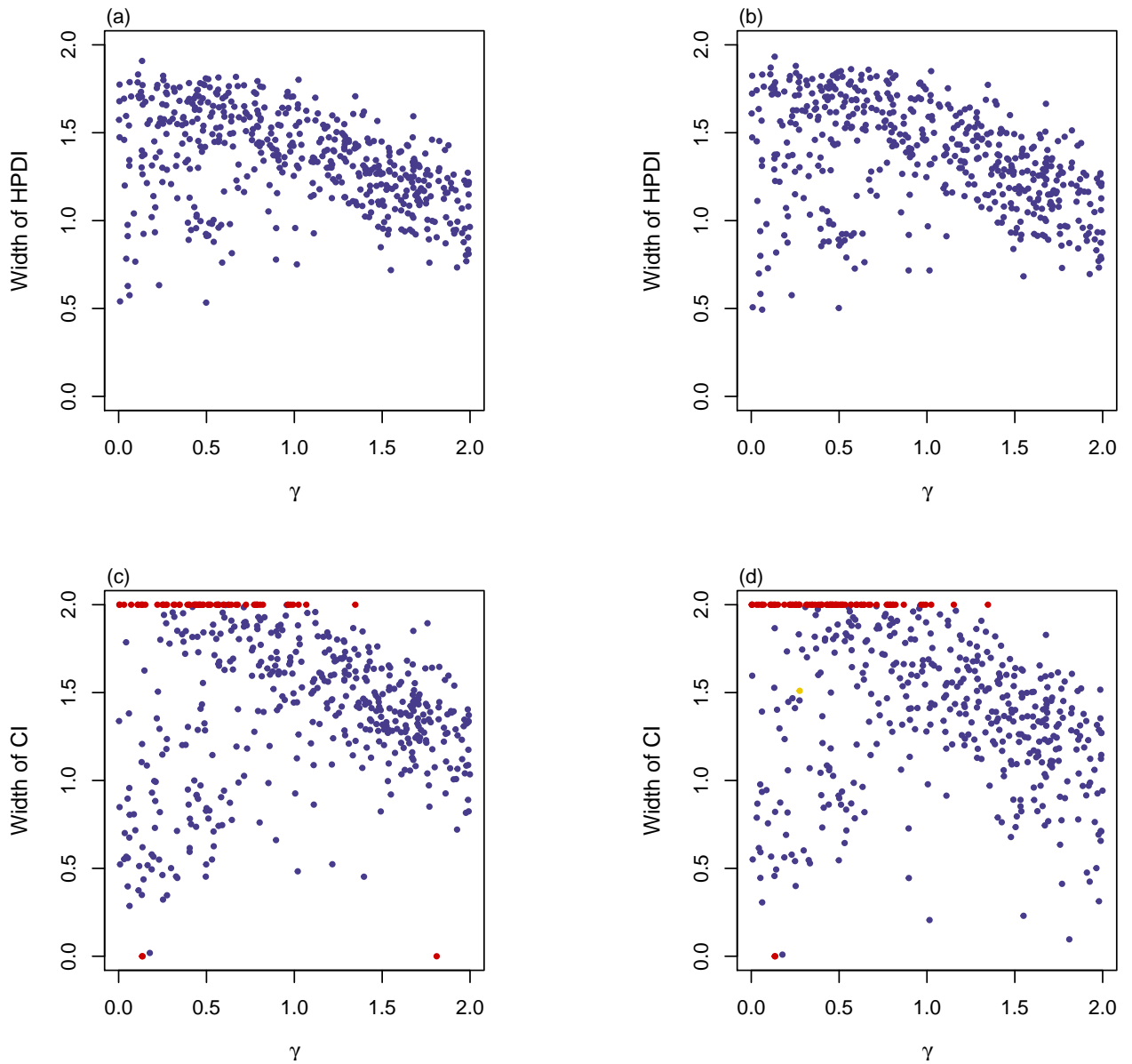




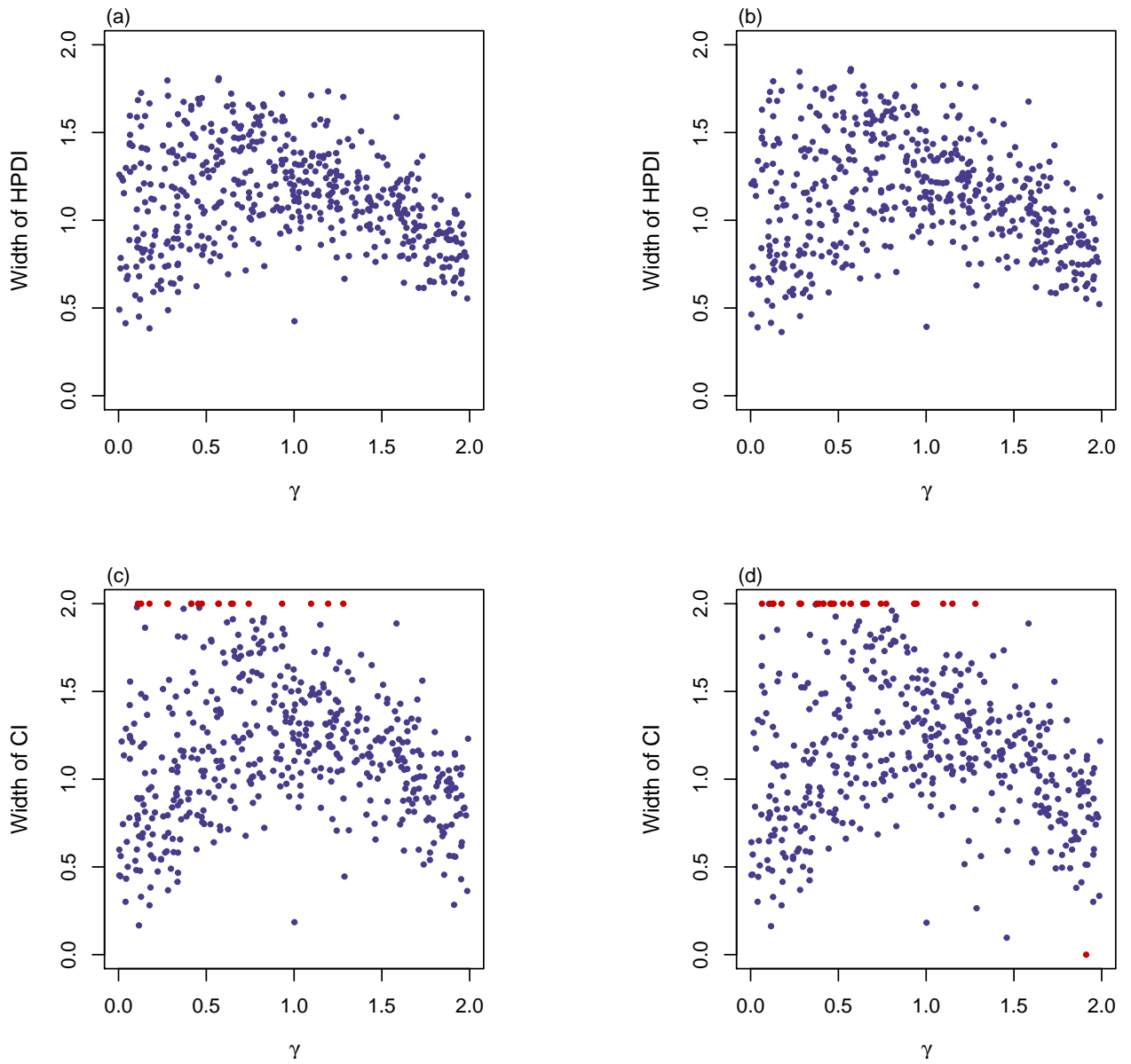
**Supplementary Figure S31** Widths of HPDIs or CIs against true value of  $\gamma$  for qualitative trait with  $n = 2000$ ,  $MAF = 0.1$  and  $\rho = 0$ . The red points represent the widths of the noninformative intervals or the empty sets. **(a)** BN method; **(b)** BU method; **(c)** PF method; **(d)** Fieller's method



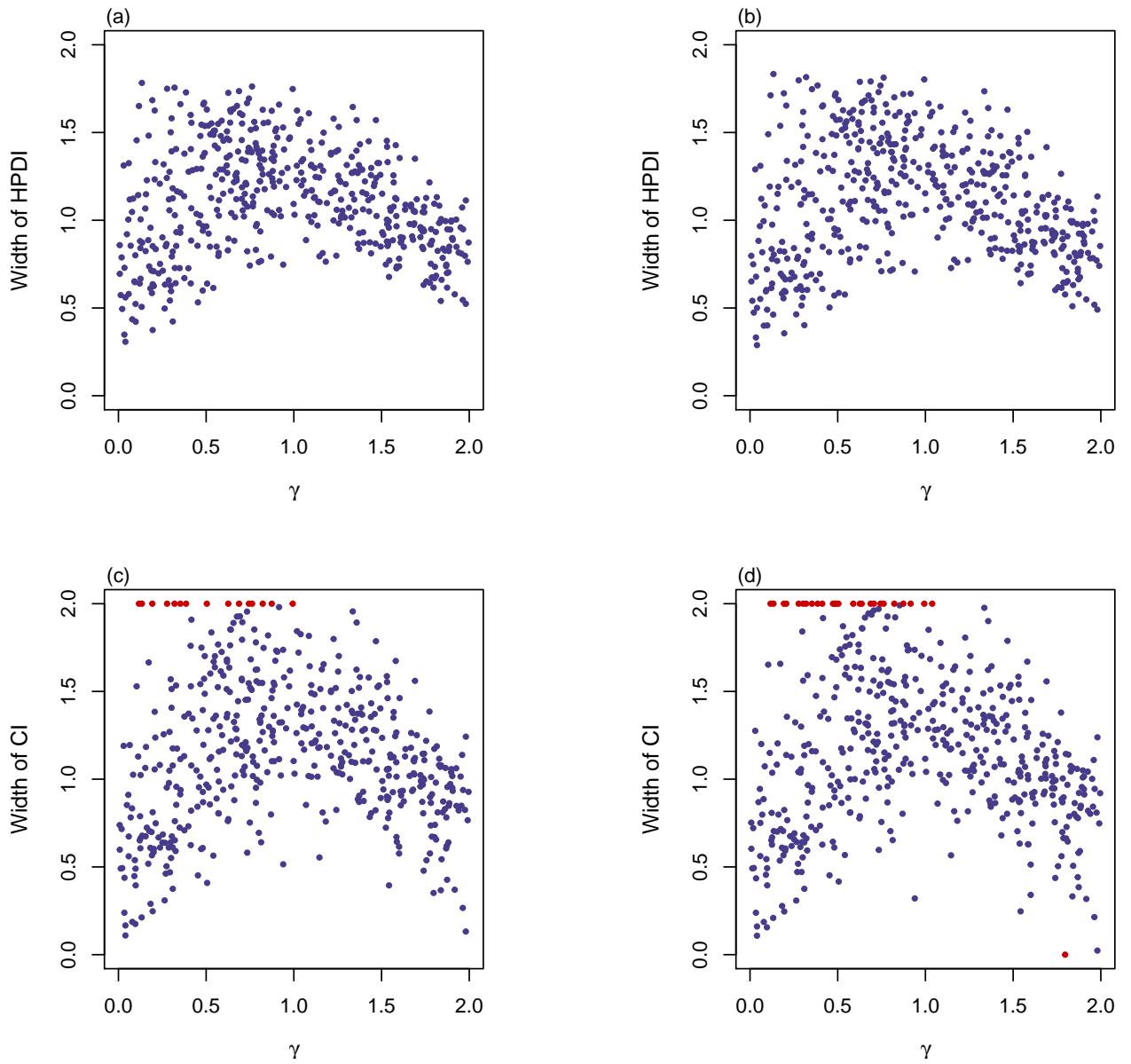
**Supplementary Figure S32** Widths of HPDIs or CIs against true value of  $\gamma$  for qualitative trait with  $n = 2000$ ,  $MAF = 0.1$  and  $\rho = -0.05$ . The red points represent the widths of the noninformative intervals or the empty sets, and the yellow points represent the widths of the discontinuous intervals. **(a)** BN method; **(b)** BU method; **(c)** PF method; **(d)** Fieller's method



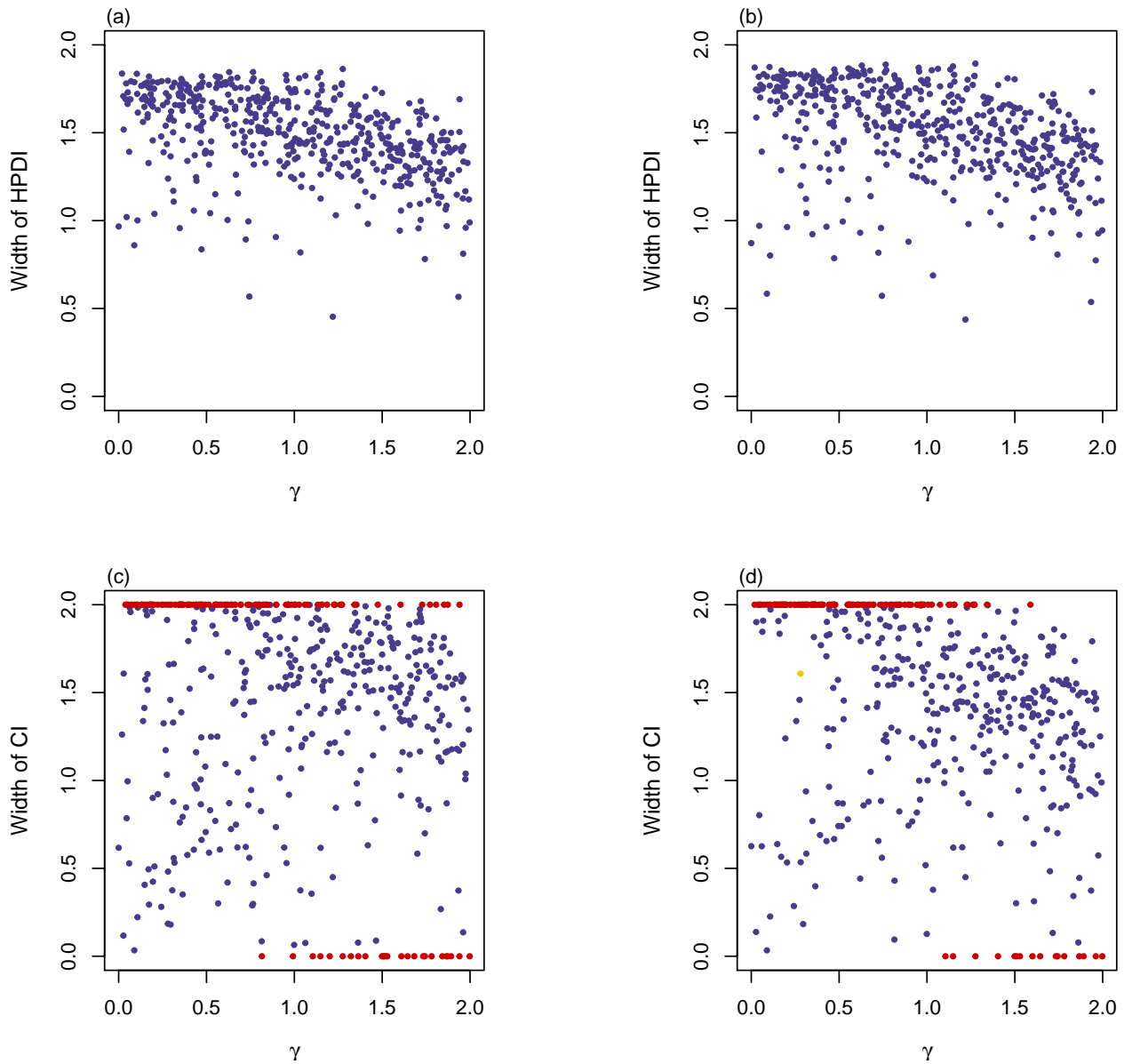
**Supplementary Figure S33** Widths of HPDIs or CIs against true value of  $\gamma$  for qualitative trait with  $n = 2000$ ,  $MAF = 0.1$  and  $\rho = 0.05$ . The red points represent the widths of the noninformative intervals or the empty sets, and the yellow point represents the width of the discontinuous interval. **(a)** BN method; **(b)** BU method; **(c)** PF method; **(d)** Fieller's method



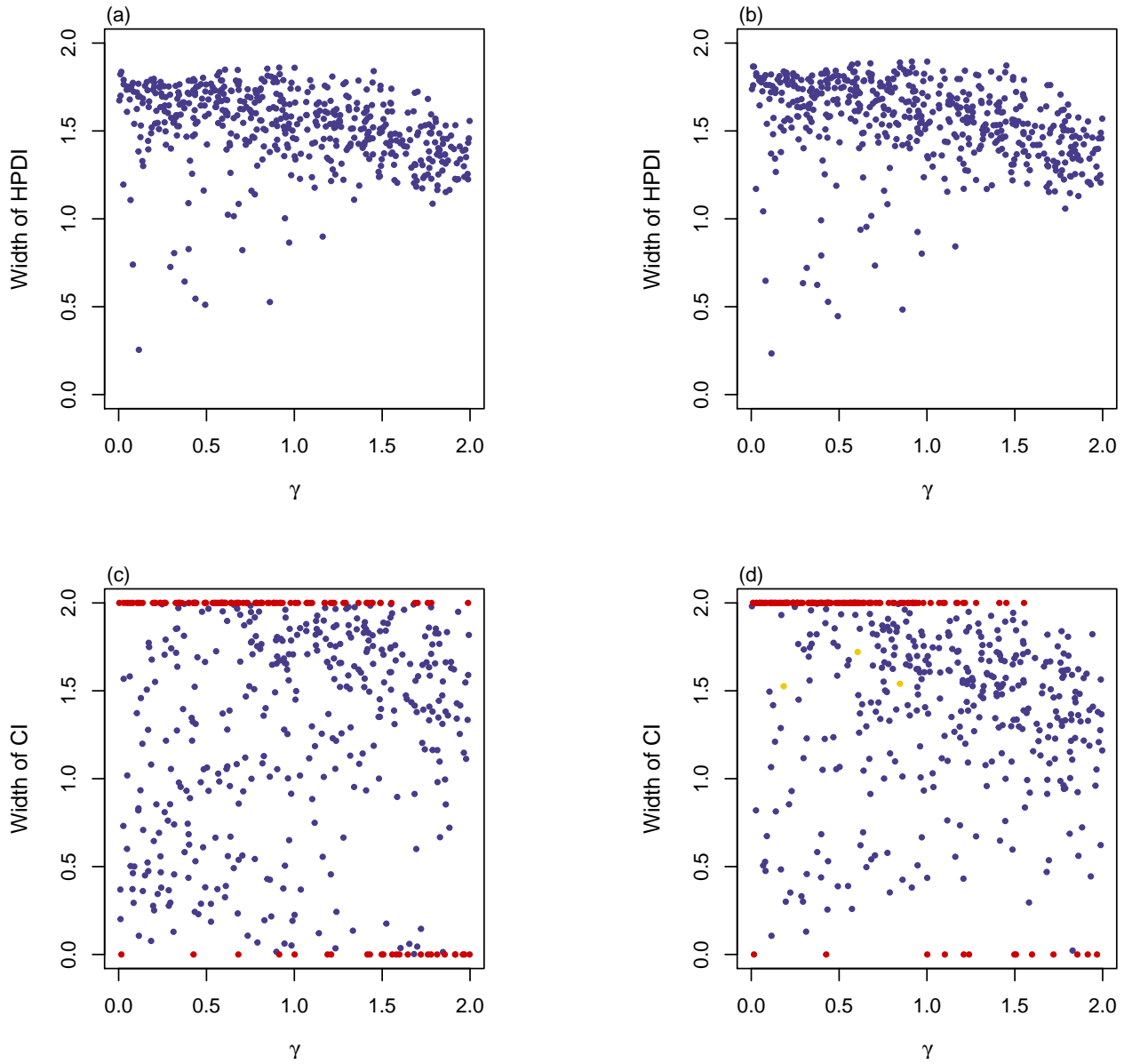
**Supplementary Figure S34** Widths of HPDIs or CIs against true value of  $\gamma$  for quantitative trait when  $(\sigma_0^2, \sigma_1^2, \sigma_2^2) = (1, 1.2, 1)$  with  $n = 500$ ,  $\text{MAF} = 0.3$  and  $\rho = -0.05$ . The red points represent the widths of the noninformative intervals or the empty sets. **(a)** BN method; **(b)** BU method; **(c)** PF method; **(d)** Fieller's method



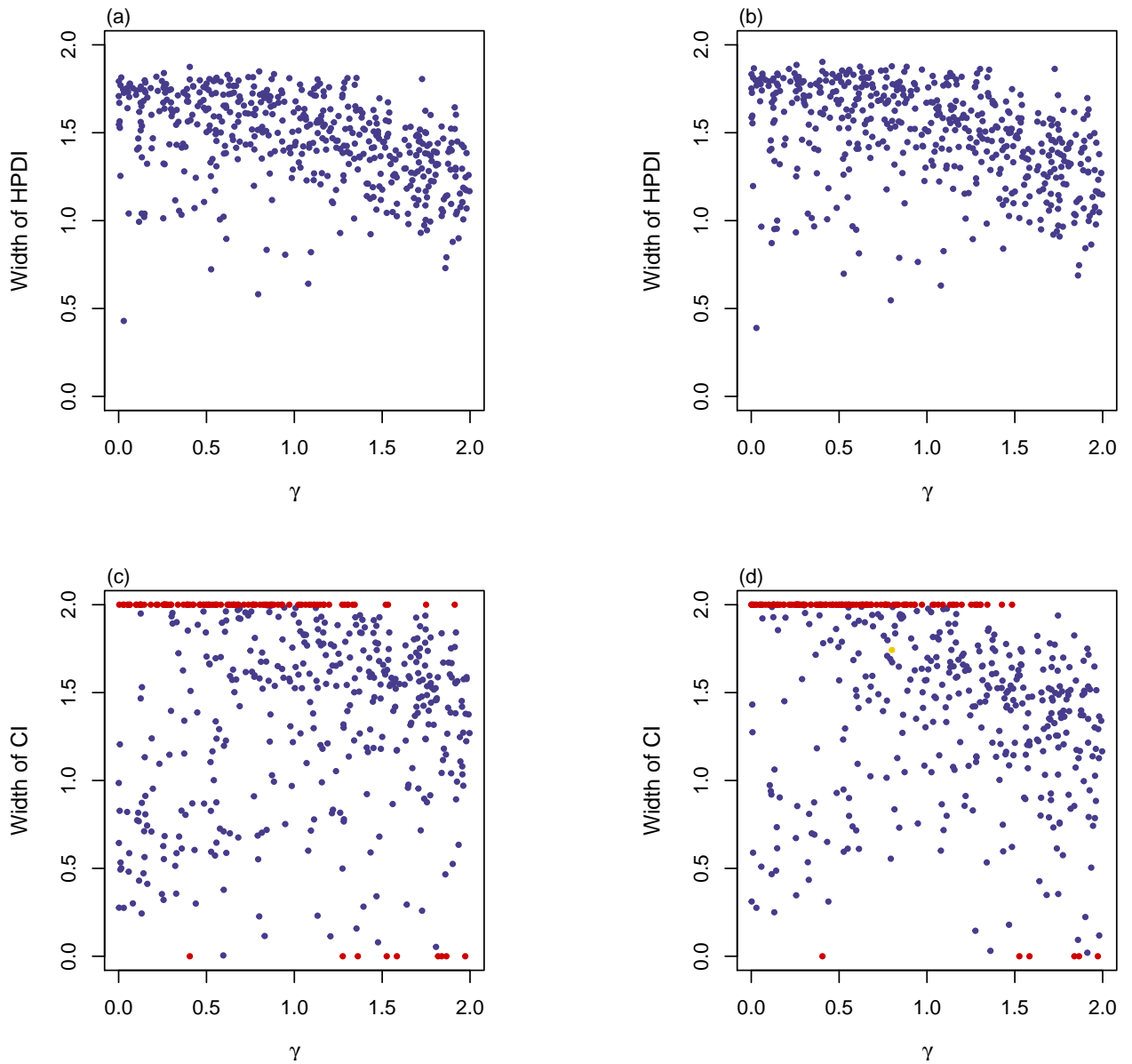
**Supplementary Figure S35** Widths of HPDIs or CIs against true value of  $\gamma$  for quantitative trait when  $(\sigma_0^2, \sigma_1^2, \sigma_2^2) = (1, 1.2, 1)$  with  $n = 500$ ,  $\text{MAF} = 0.3$  and  $\rho = 0.05$ . The red points represent the widths of the noninformative intervals or the empty sets. **(a)** BN method; **(b)** BU method; **(c)** PF method; **(d)** Fieller's method



**Supplementary Figure S36** Widths of HPDIs or CIs against true value of  $\gamma$  for quantitative trait when  $(\sigma_0^2, \sigma_1^2, \sigma_2^2) = (1, 1.2, 1)$  with  $n = 500$ ,  $\text{MAF} = 0.1$  and  $\rho = 0$ . The red points represent the widths of the noninformative intervals or the empty sets, and the yellow point represents the width of the discontinuous interval. (a) BN method; (b) BU method; (c) PF method; (d) Fieller's method

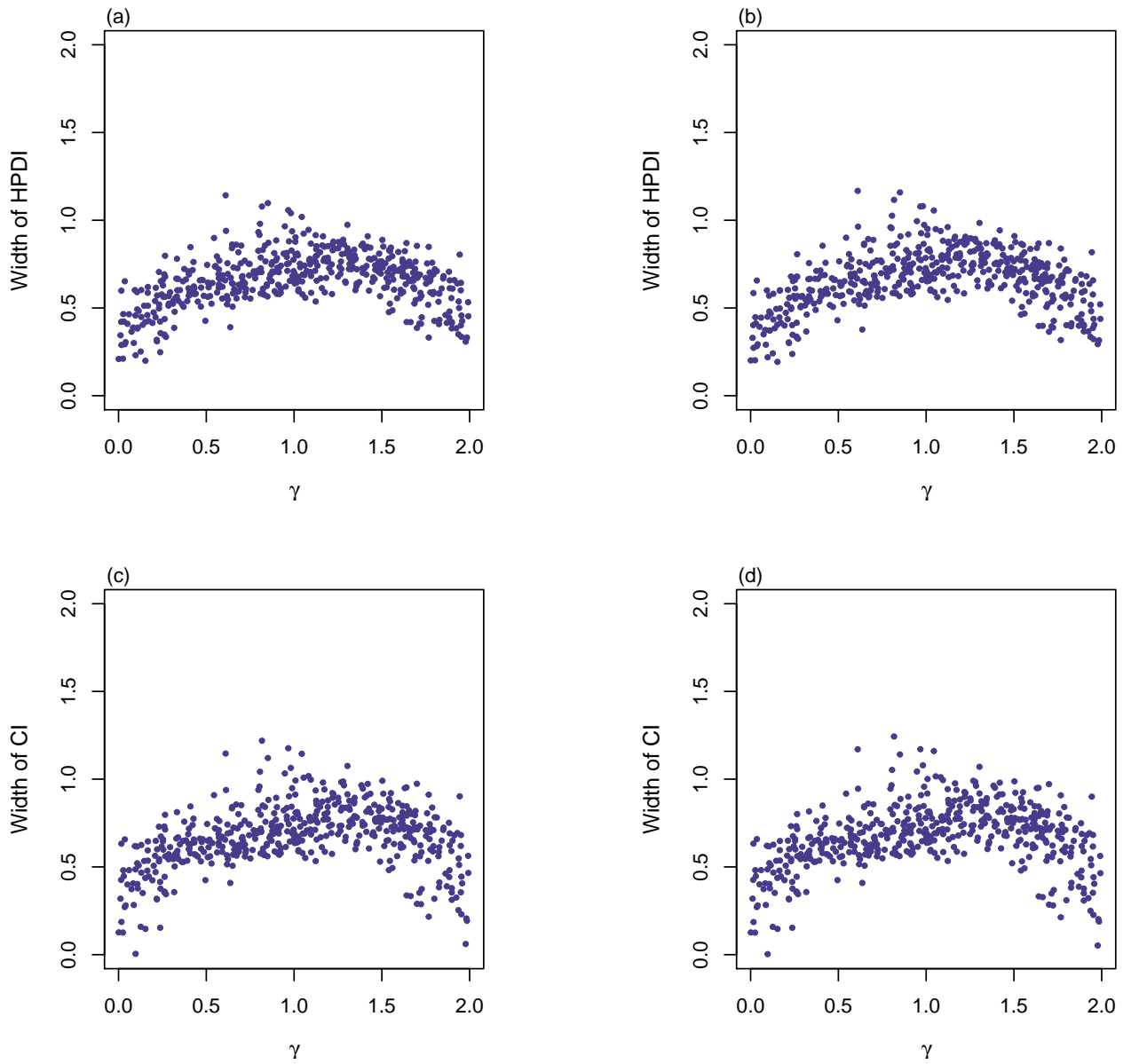


**Supplementary Figure S37** Widths of HPDIs or CIs against true value of  $\gamma$  for quantitative trait when  $(\sigma_0^2, \sigma_1^2, \sigma_2^2) = (1, 1.2, 1)$  with  $n = 500$ ,  $\text{MAF} = 0.1$  and  $\rho = -0.05$ . The red points represent the widths of the noninformative intervals or the empty sets, and the yellow points represent the widths of the discontinuous intervals. (a) BN method; (b) BU method; (c) PF method; (d) Fieller's method

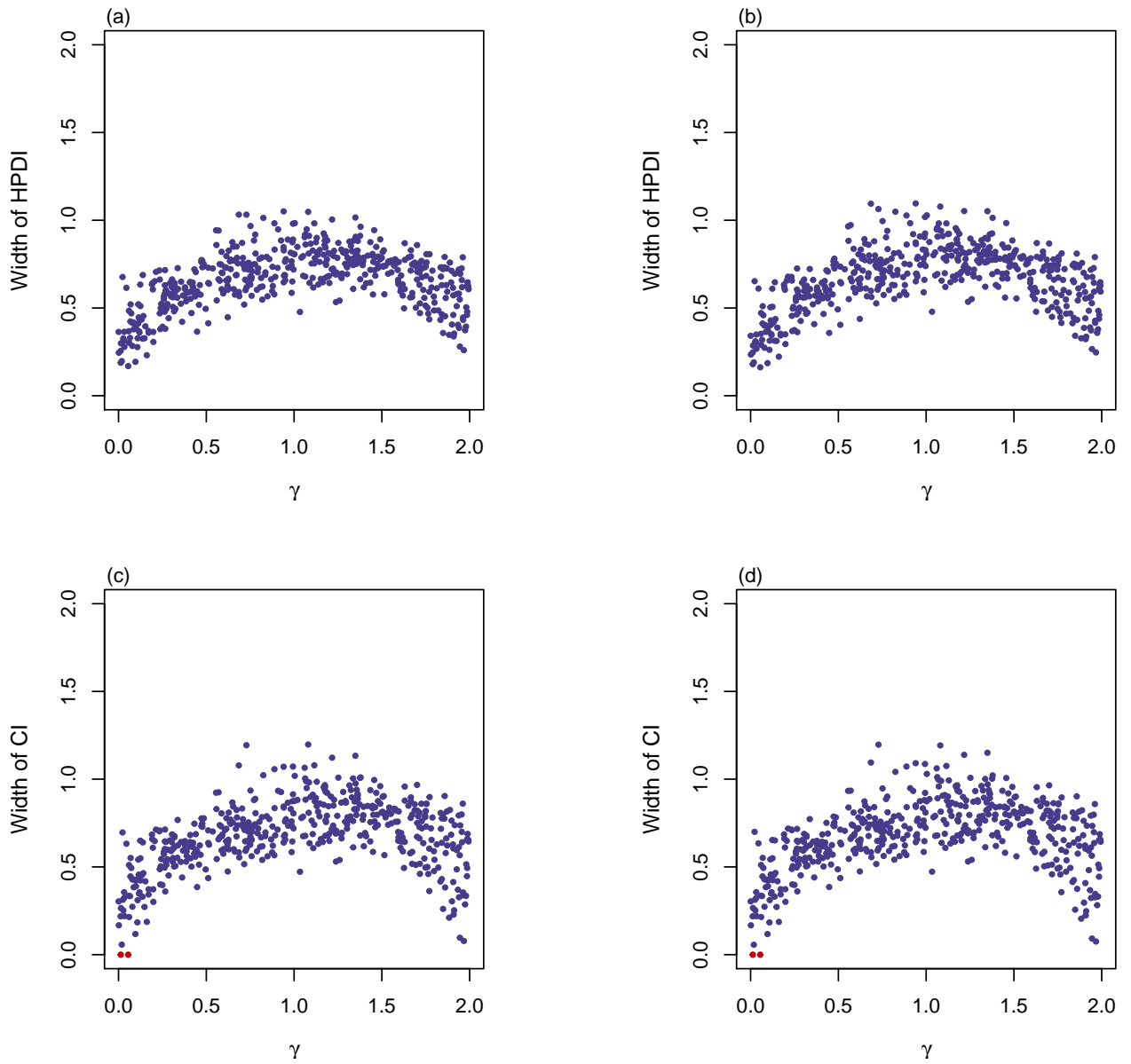


**Supplementary Figure S38** Widths of HPDIs or CIs against true value of  $\gamma$  for quantitative trait when  $(\sigma_0^2, \sigma_1^2, \sigma_2^2) = (1, 1.2, 1)$  with  $n = 500$ ,  $\text{MAF} = 0.1$  and  $\rho = 0.05$ . The red points represent the widths of the noninformative intervals or the empty sets, and the yellow point represents the width of the discontinuous interval.  
**(a)** BN method; **(b)** BU method; **(c)** PF method; **(d)** Fieller's method

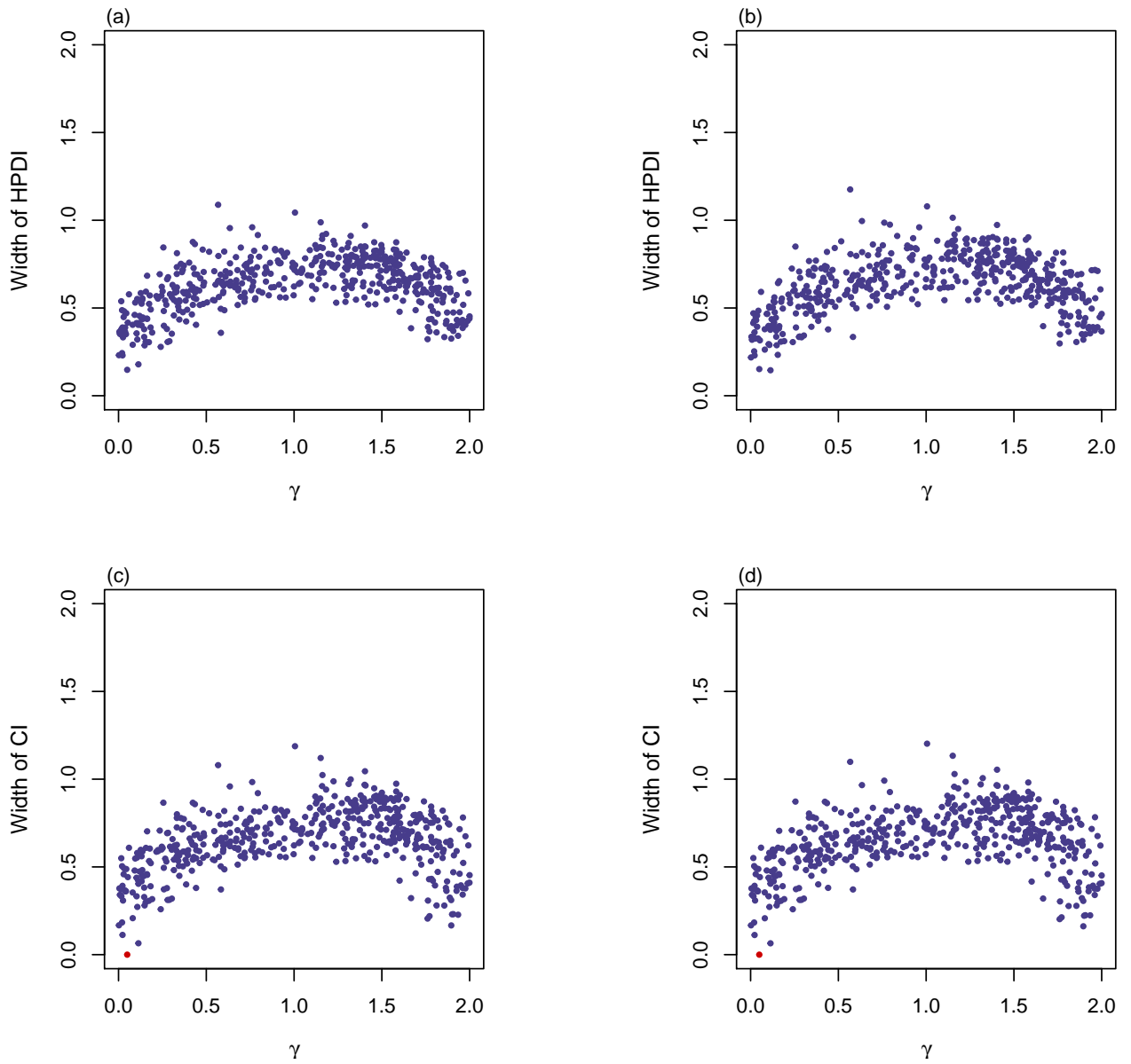




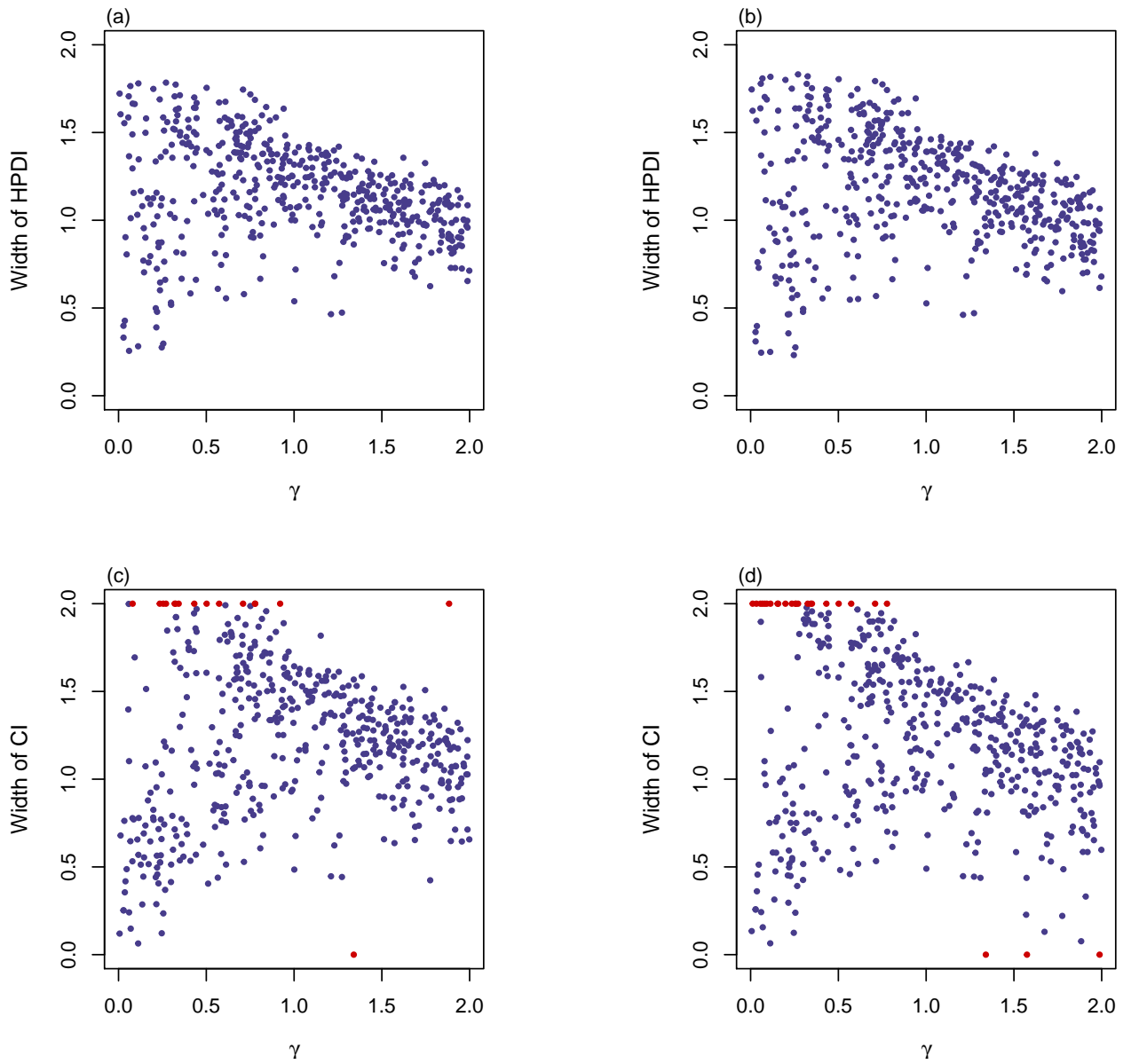
**Supplementary Figure S39** Widths of HPDIs or CIs against true value of  $\gamma$  for quantitative trait when  $(\sigma_0^2, \sigma_1^2, \sigma_2^2) = (1, 1.2, 1)$  with  $n = 2000$ , MAF = 0.3 and  $\rho = 0$ . **(a)** BN method; **(b)** BU method; **(c)** PF method; **(d)** Fieller's method



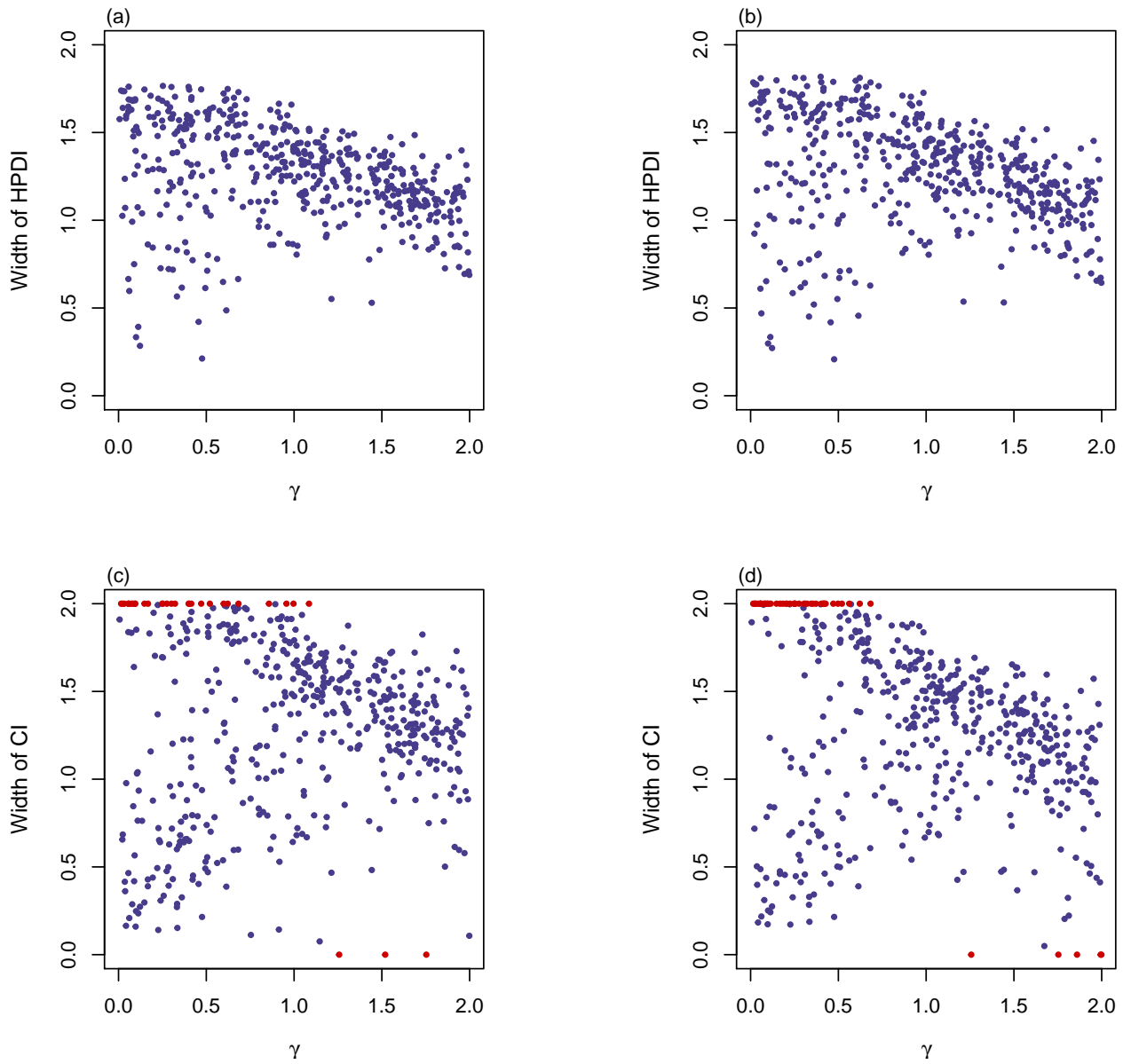
**Supplementary Figure S40** Widths of HPDIs or CIs against true value of  $\gamma$  for quantitative trait when  $(\sigma_0^2, \sigma_1^2, \sigma_2^2) = (1, 1.2, 1)$  with  $n = 2000$ ,  $\text{MAF} = 0.3$  and  $\rho = -0.05$ . The red points represent the widths of the noninformative intervals or the empty sets. **(a)** BN method; **(b)** BU method; **(c)** PF method; **(d)** Fieller's method



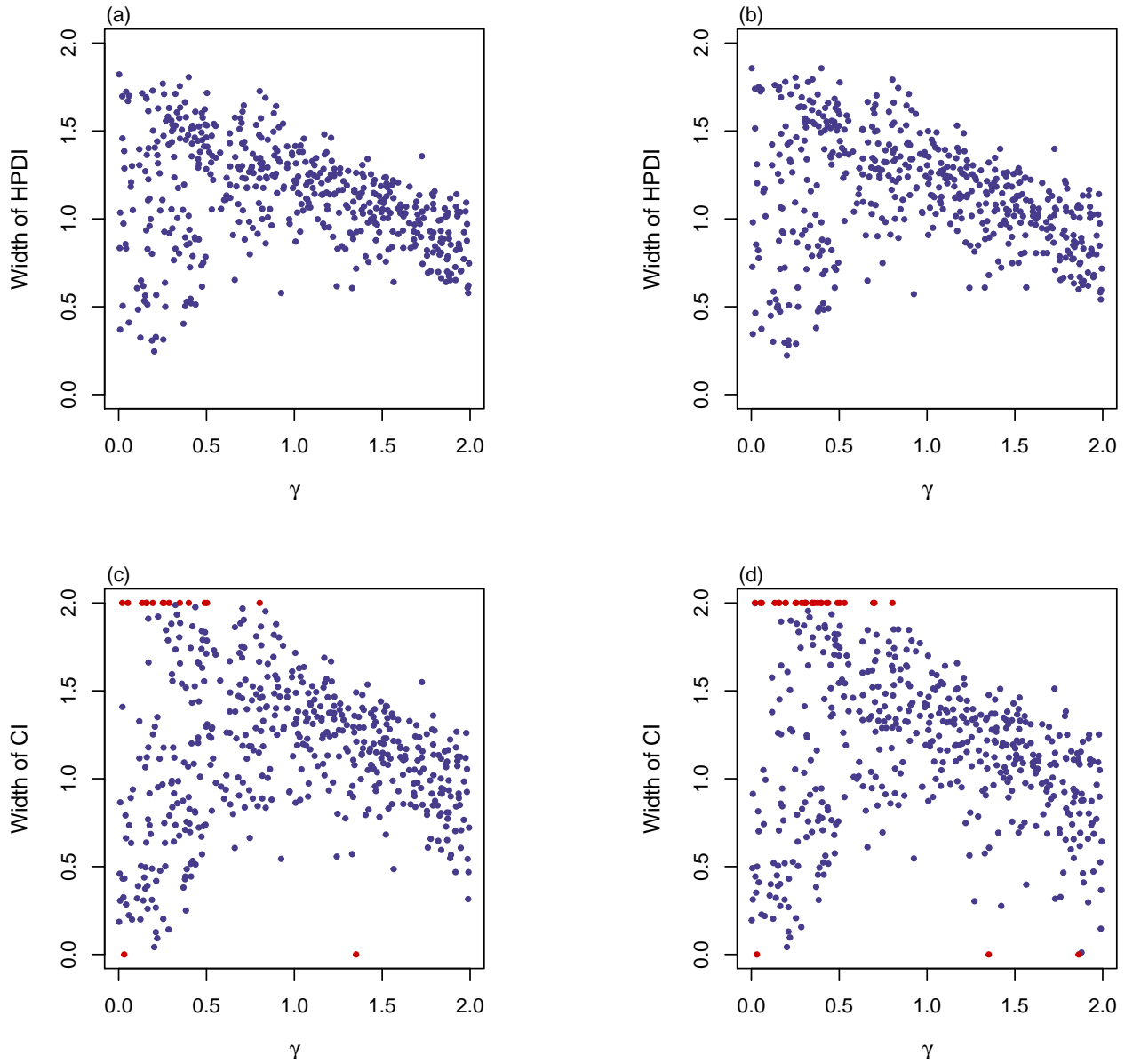
**Supplementary Figure S41** Widths of HPDIs or CIs against true value of  $\gamma$  for quantitative trait when  $(\sigma_0^2, \sigma_1^2, \sigma_2^2) = (1, 1.2, 1)$  with  $n = 2000$ ,  $\text{MAF} = 0.3$  and  $\rho = 0.05$ . The red points represent the widths of the noninformative intervals or the empty sets. **(a)** BN method; **(b)** BU method; **(c)** PF method; **(d)** Fieller's method



**Supplementary Figure S42** Widths of HPDIs or CIs against true value of  $\gamma$  for quantitative trait when  $(\sigma_0^2, \sigma_1^2, \sigma_2^2) = (1, 1.2, 1)$  with  $n = 2000$ , MAF = 0.1 and  $\rho = 0$ . The red points represent the widths of the noninformative intervals or the empty sets. **(a)** BN method; **(b)** BU method; **(c)** PF method; **(d)** Fieller's method



**Supplementary Figure S43** Widths of HPDIs or CIs against true value of  $\gamma$  for quantitative trait when  $(\sigma_0^2, \sigma_1^2, \sigma_2^2) = (1, 1.2, 1)$  with  $n = 2000$ ,  $\text{MAF} = 0.1$  and  $\rho = -0.05$ . The red points represent the widths of the noninformative intervals or the empty sets. **(a)** BN method; **(b)** BU method; **(c)** PF method; **(d)** Fieller's method



**Supplementary Figure S44** Widths of HPDIs or CIs against true value of  $\gamma$  for quantitative trait when  $(\sigma_0^2, \sigma_1^2, \sigma_2^2) = (1, 1.2, 1)$  with  $n = 2000$ ,  $\text{MAF} = 0.1$  and  $\rho = 0.05$ . The red points represent the widths of the noninformative intervals or the empty sets. **(a)** BN method; **(b)** BU method; **(c)** PF method; **(d)** Fieller's method