

Marron-Wand Test Suite

The figures that follow contain the density and mean square error plots for the Marron-Wand test suite that were omitted from Coppejans and Gallant (2000).

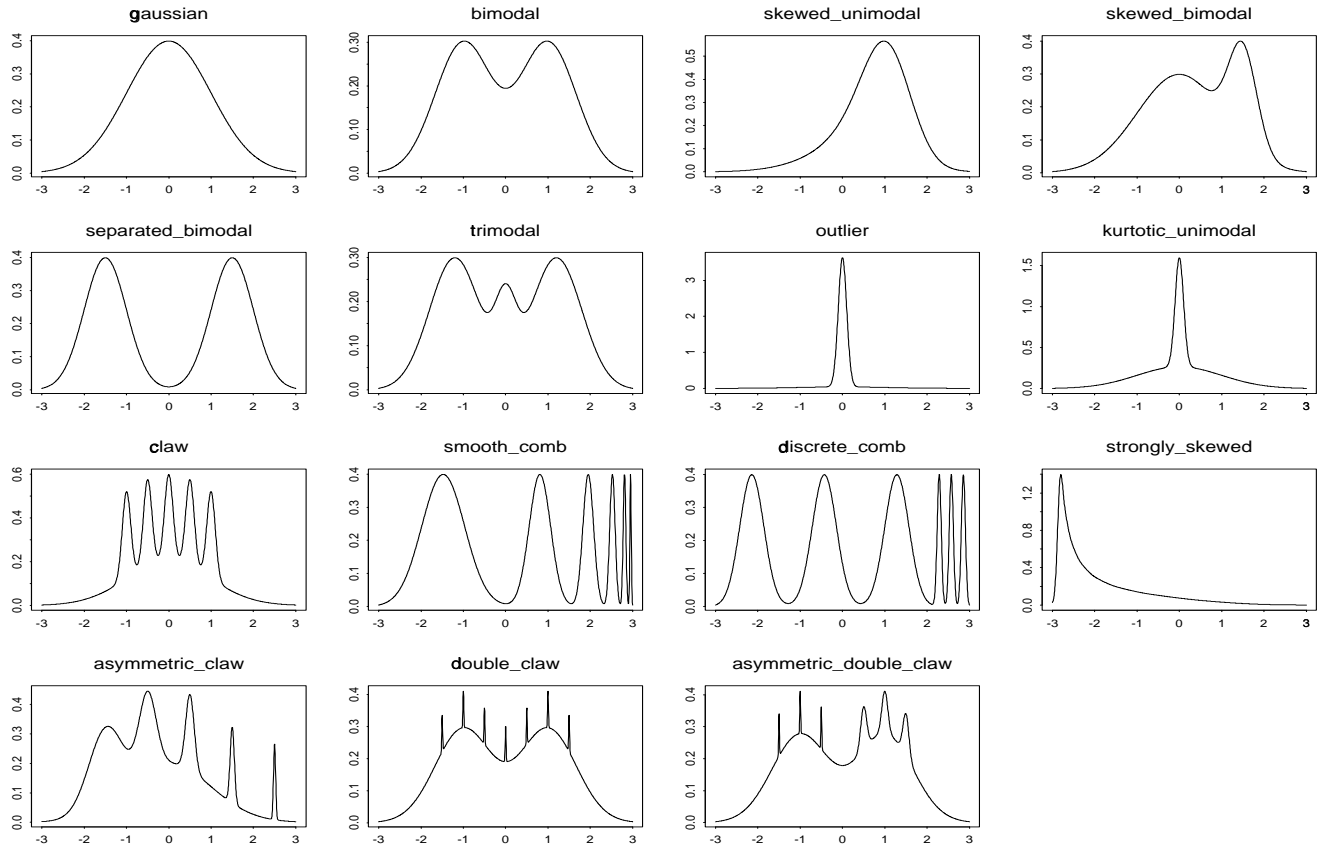


Figure 0. The Marron-Wand Test Suite. In each panel is plotted one of the fifteen densities proposed by Marron and Wand (1992) as a battery for use in evaluating density estimators. The densities are in order of increasing difficulty of estimation by method of moments as determined by Gallant and Tauchen (1999). The labels at the top of each panel are as in Marron and Wand.

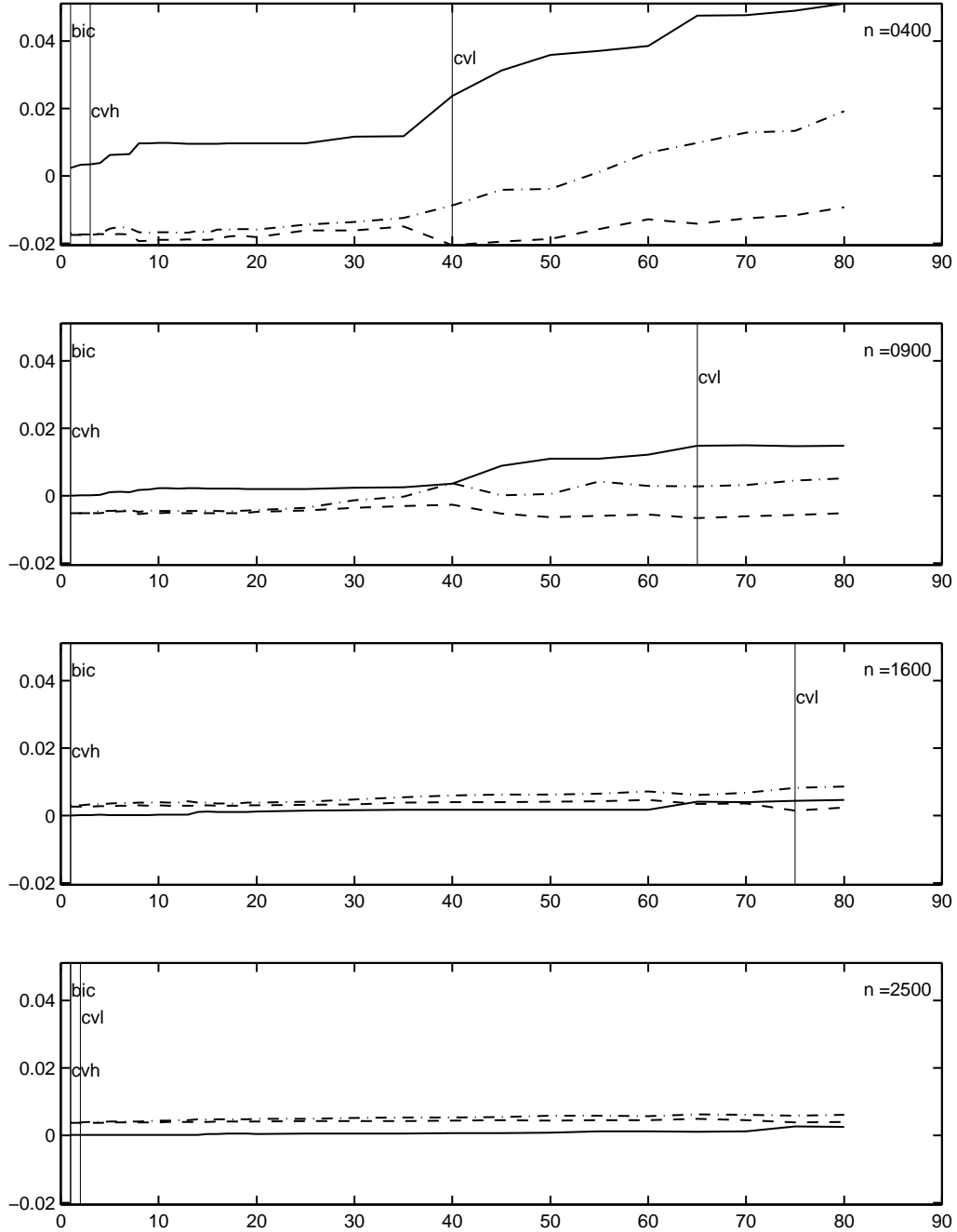


Figure 1. Gaussian. Plotted is the integrated squared error (ISE) and its cross validated estimate (CV) for a realization of size n , as shown in each plot, from the gaussian density of the Marron-Wand test suite. Solid line is ISE, dashed line is its leave-one-out CV estimate (CVL), and dashed and dotted line is the average of ten, 10% hold-out-sample CV estimates (CVH). Vertical lines indicate BIC, CVL, and CVH choices of K , as marked.

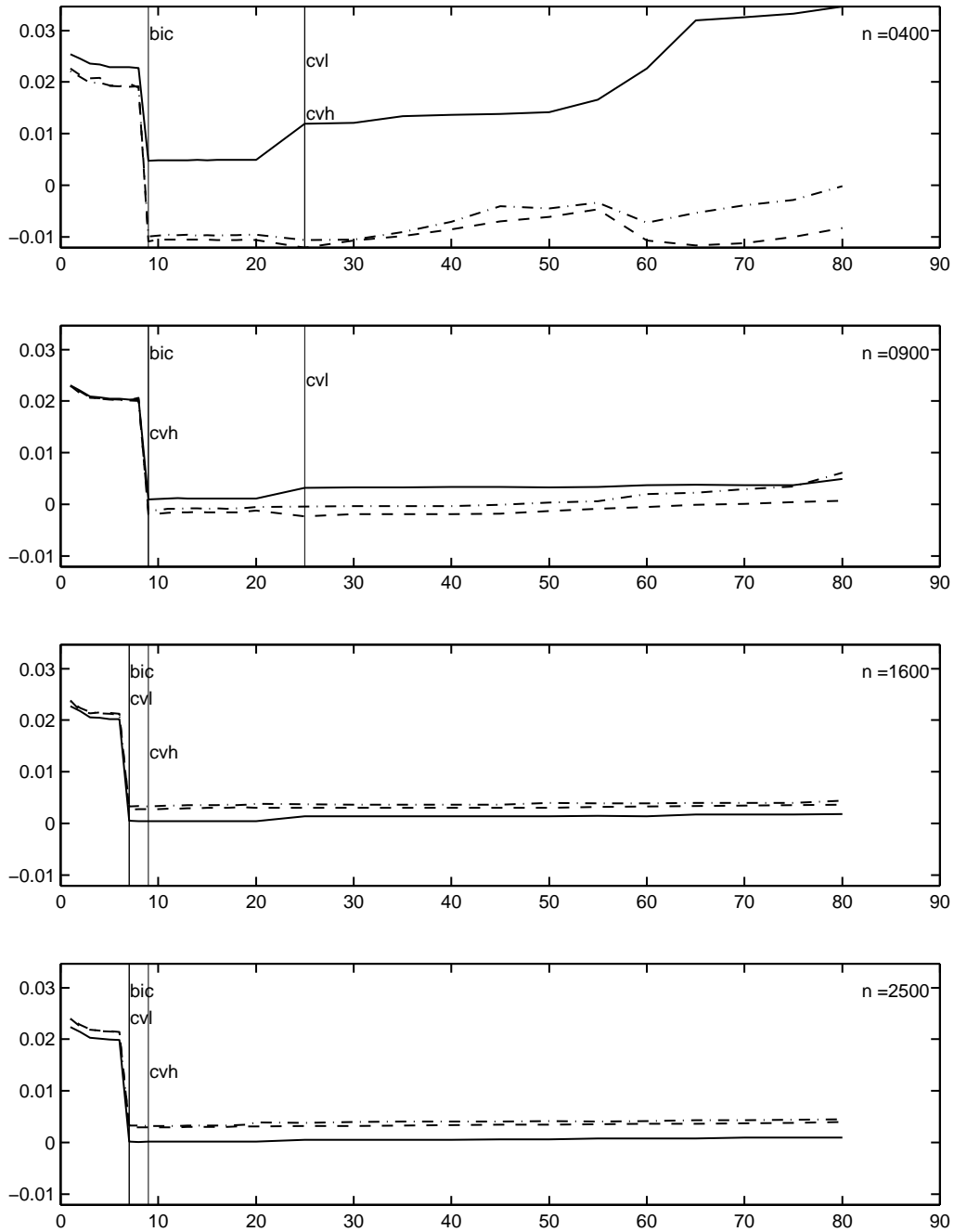


Figure 2. Bimodal. Plotted is the integrated squared error (ISE) and its cross validated estimate (CV) for a realization of size n , as shown in each plot, from the bimodal density of the Marron-Wand test suite. Solid line is ISE, dashed line is its leave-one-out CV estimate (CVL), and dashed and dotted line is the average of ten, 10% hold-out-sample CV estimates (CVH). If present, the upper dotted horizontal line is ISE achieved by a cross-validated kernel estimate and lower dotted line is best kernel ISE for this realization. Vertical lines indicate BIC, CVL, and CVH choices of K , as marked.

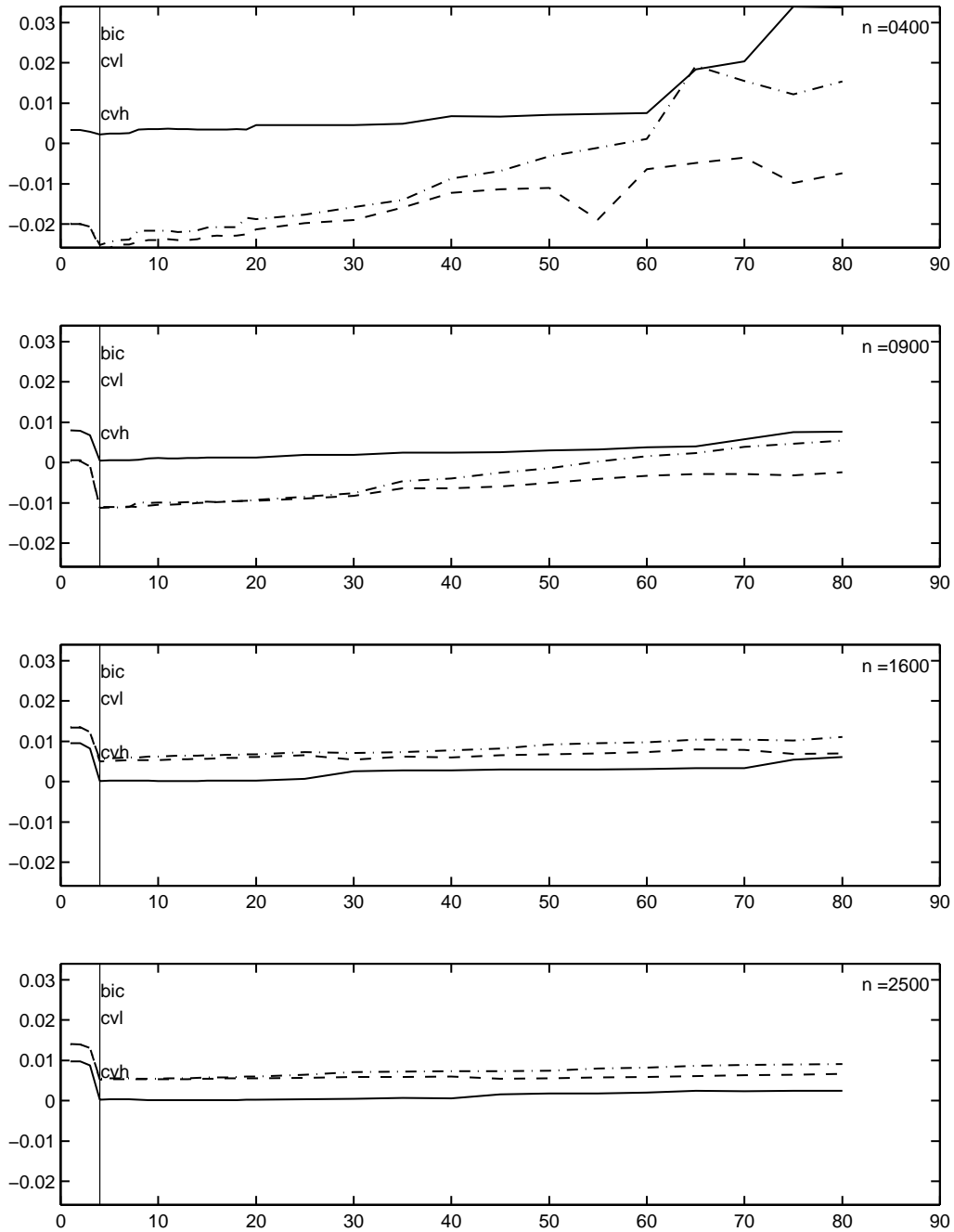


Figure 3. Skewed Unimodal. Plotted is the integrated squared error (ISE) and its cross validated estimate (CV) for a realization of size n , as shown in each plot, from the Skewed Unimodal density of the Marron-Wand test suite. Solid line is ISE, dashed line is its leave-one-out CV estimate (CVL), and dashed and dotted line is the average of ten, 10% hold-out-sample CV estimates (CVH). If present, the upper dotted horizontal line is ISE achieved by a cross-validated kernel estimate and lower dotted line is best kernel ISE for this realization. Vertical lines indicate BIC, CVL, and CVH choices of K , as marked.

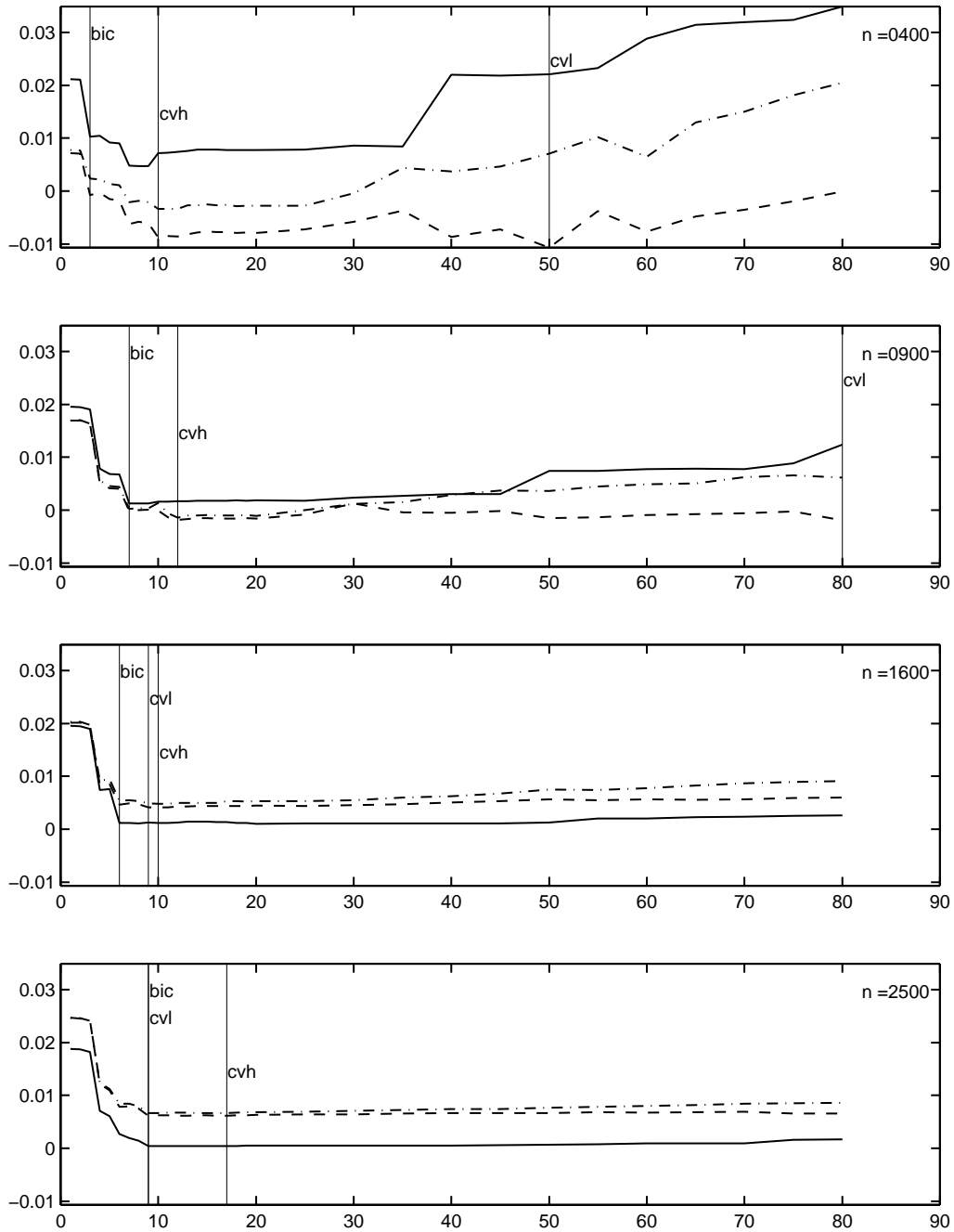


Figure 4. Skewed Bimodal. Plotted is the integrated squared error (ISE) and its cross validated estimate (CV) for a realization of size n , as shown in each plot, from the skewed bimodal density of the Marron-Wand test suite. Solid line is ISE, dashed line is its leave-one-out CV estimate (CVL), and dashed and dotted line is the average of ten, 10% hold-out-sample CV estimates (CVH). If present, the upper dotted horizontal line is ISE achieved by a cross-validated kernel estimate and lower dotted line is best kernel ISE for this realization. Vertical lines indicate BIC, CVL, and CVH choices of K , as marked.

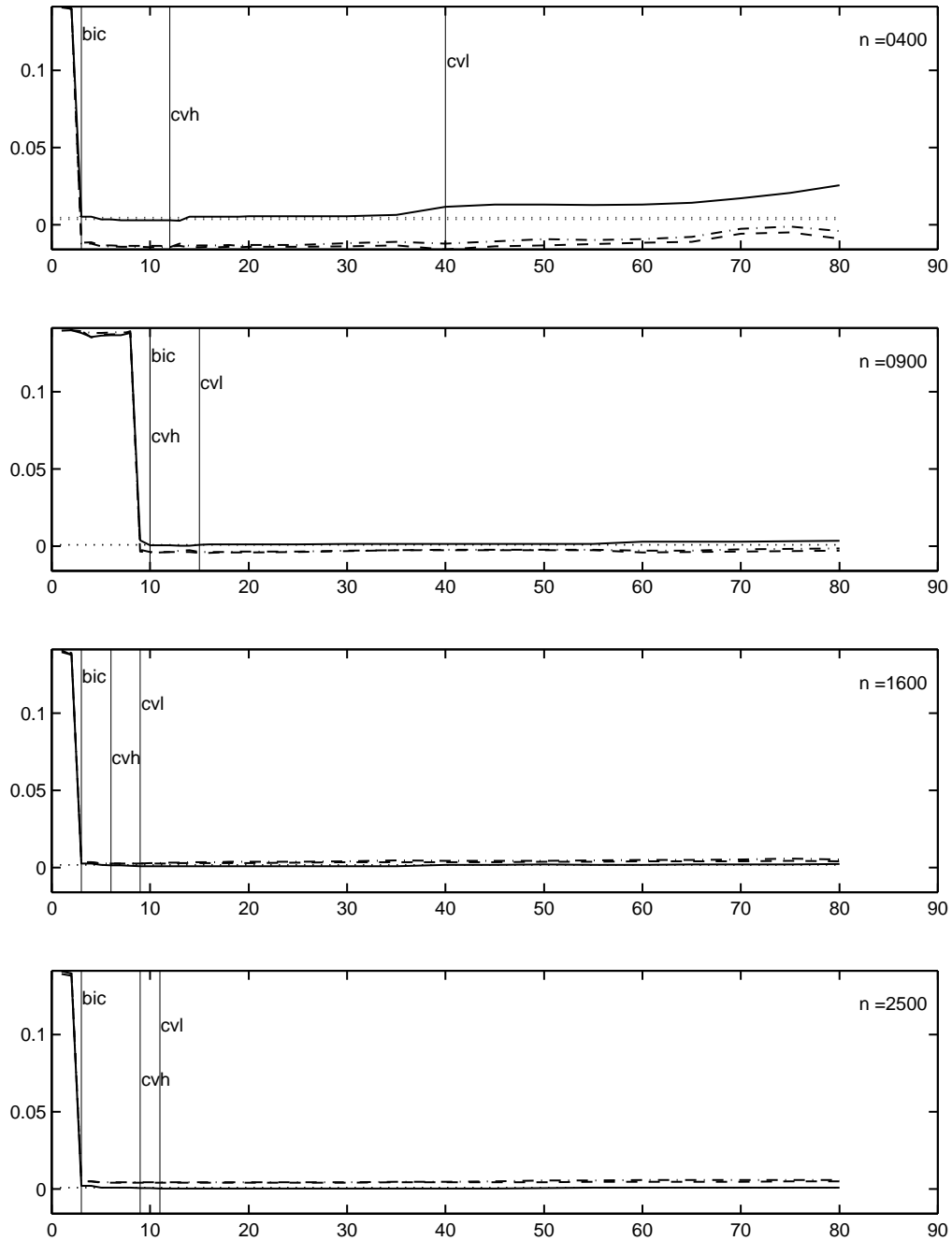


Figure 5. Separated Bimodal. Plotted is the integrated squared error (ISE) and its cross validated estimate (CV) for a realization of size n , as shown in each plot, from the separated bimodal density of the Marron-Wand test suite. Solid line is ISE, dashed line is its leave-one-out CV estimate (CVL), and dashed and dotted line is the average of ten, 10% hold-out-sample CV estimates (CVH). If present, the upper dotted horizontal line is ISE achieved by a cross-validated kernel estimate and lower dotted line is best kernel ISE for this realization. Vertical lines indicate BIC, CVL, and CVH choices of K , as marked.

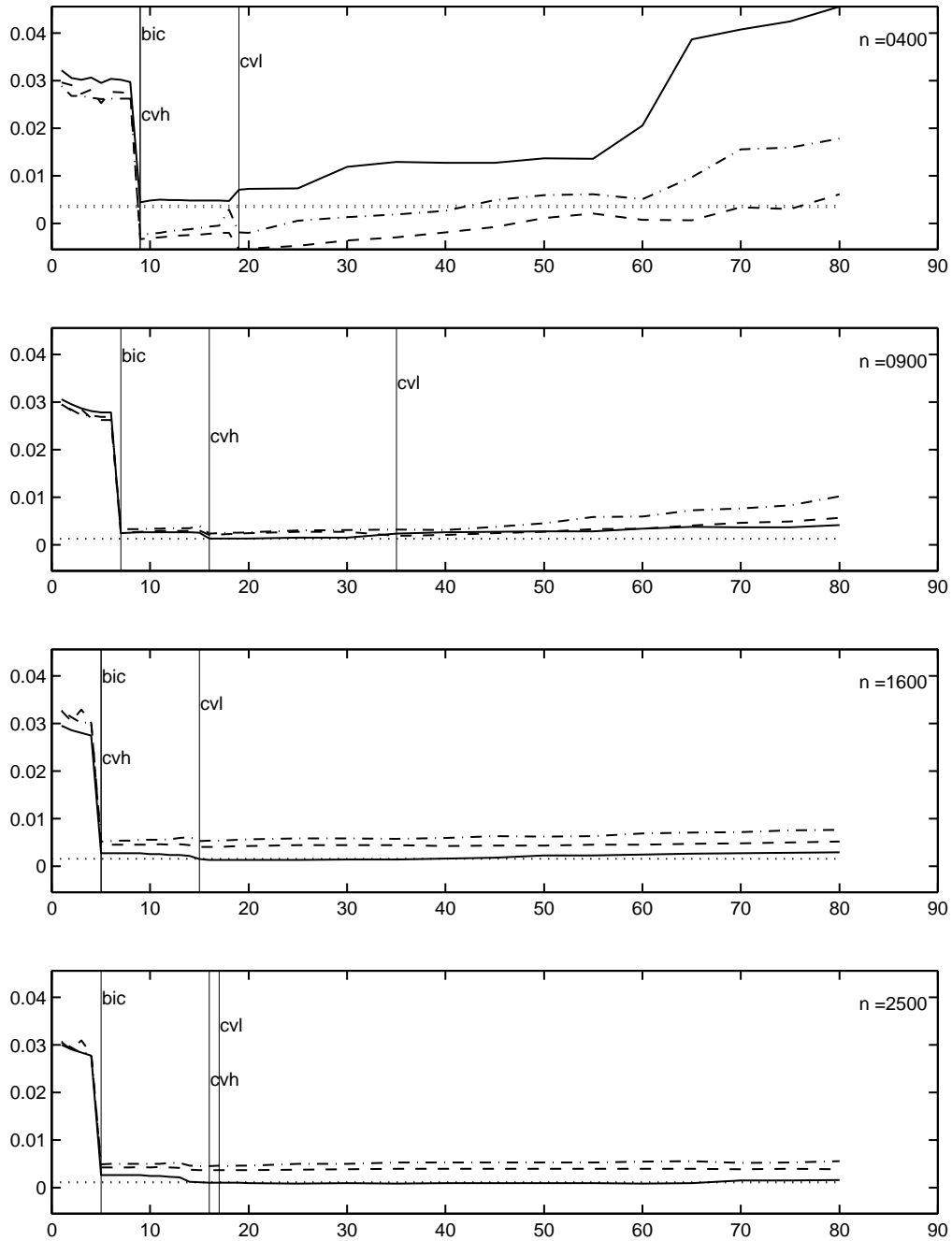


Figure 6. Trimodal. Plotted is the integrated squared error (ISE) and its cross validated estimate (CV) for a realization of size n , as shown in each plot, from the trimodal density of the Marron-Wand test suite. Solid line is ISE, dashed line is its leave-one-out CV estimate (CVL), and dashed and dotted line is the average of ten, 10% hold-out-sample CV estimates (CVH). Upper dotted horizontal line is ISE achieved by a cross-validated kernel estimate and lower dotted line is best kernel ISE for this realization. Vertical lines indicate BIC, CVL, and CVH choices of K , as marked.

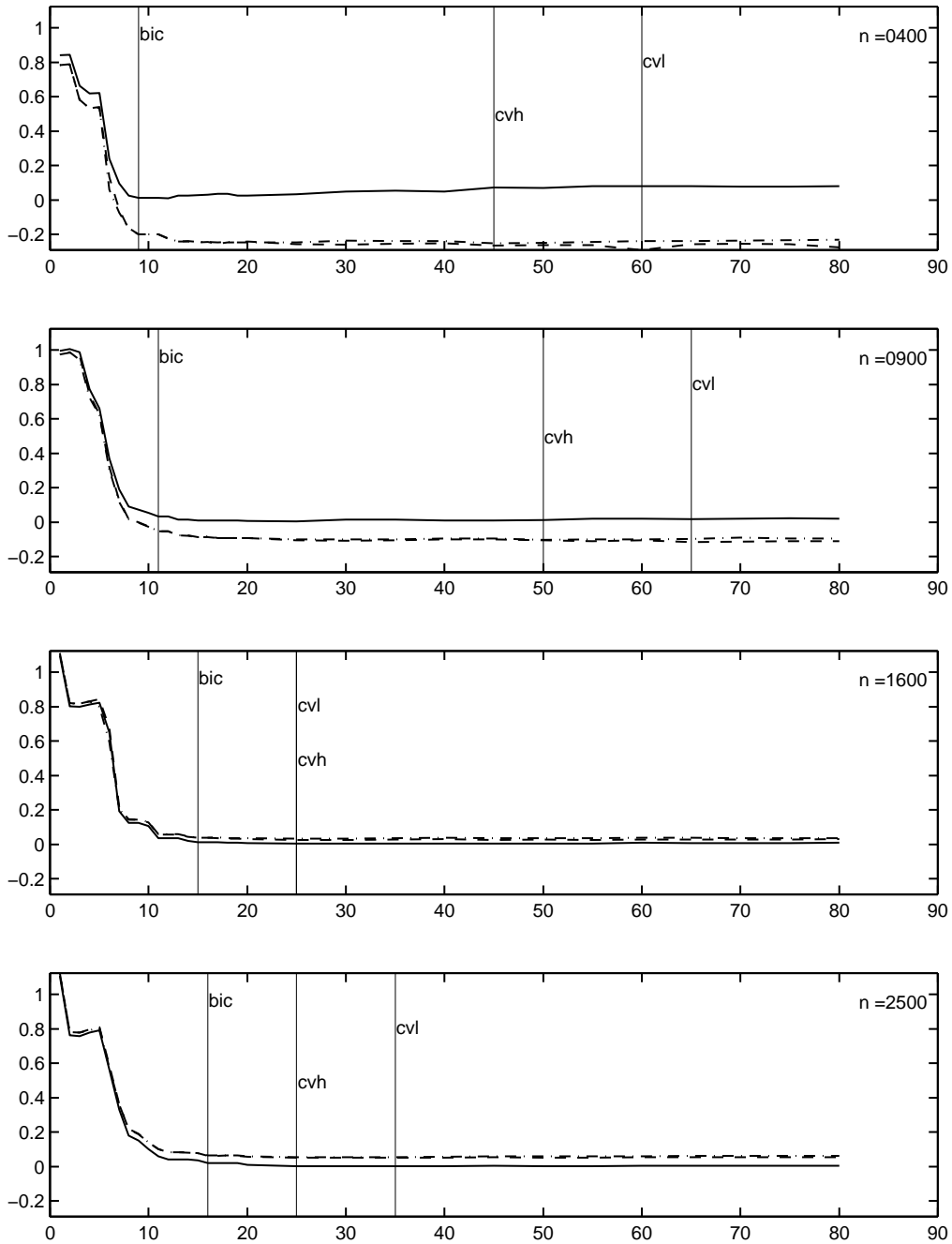


Figure 7. Outlier. Plotted is the integrated squared error (ISE) and its cross validated estimate (CV) for a realization of size n , as shown in each plot, from the outlier density of the Marron-Wand test suite. Solid line is ISE, dashed line is its leave-one-out CV estimate (CVL), and dashed and dotted line is the average of ten, 10% hold-out-sample CV estimates (CVH). If present, the upper dotted horizontal line is ISE achieved by a cross-validated kernel estimate and lower dotted line is best kernel ISE for this realization. Vertical lines indicate BIC, CVL, and CVH choices of K , as marked.

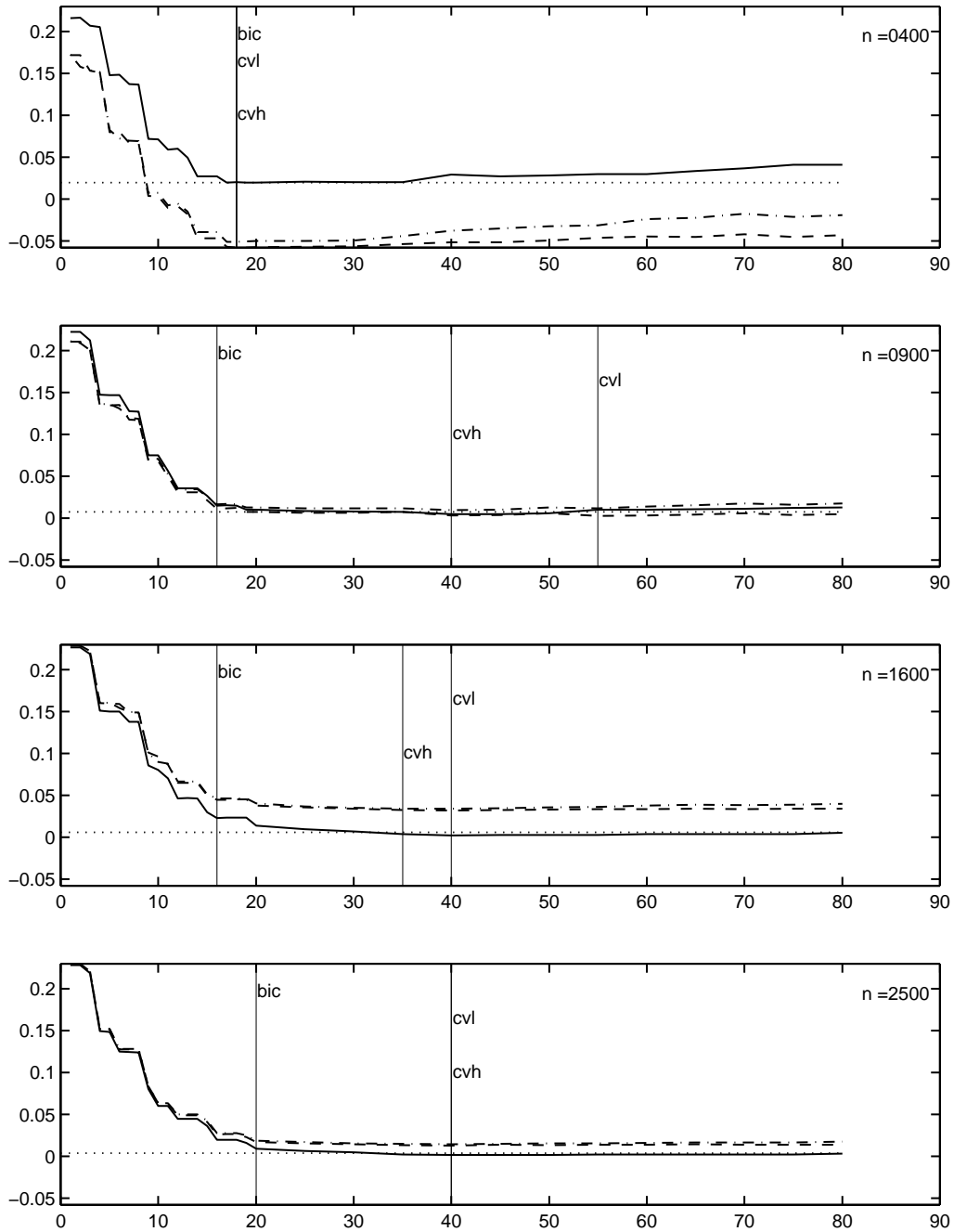


Figure 8. Kurtotic Unimodal. Plotted is the integrated squared error (ISE) and its cross validated estimate (CV) for a realization of size n , as shown in each plot, from the kurtotic unimodal density of the Marron-Wand test suite. Solid line is ISE, dashed line is its leave-one-out CV estimate (CVL), and dashed and dotted line is the average of ten, 10% hold-out-sample CV estimates (CVH). If present, the upper dotted horizontal line is ISE achieved by a cross-validated kernel estimate and lower dotted line is best kernel ISE for this realization. Vertical lines indicate BIC, CVL, and CVH choices of K , as marked.

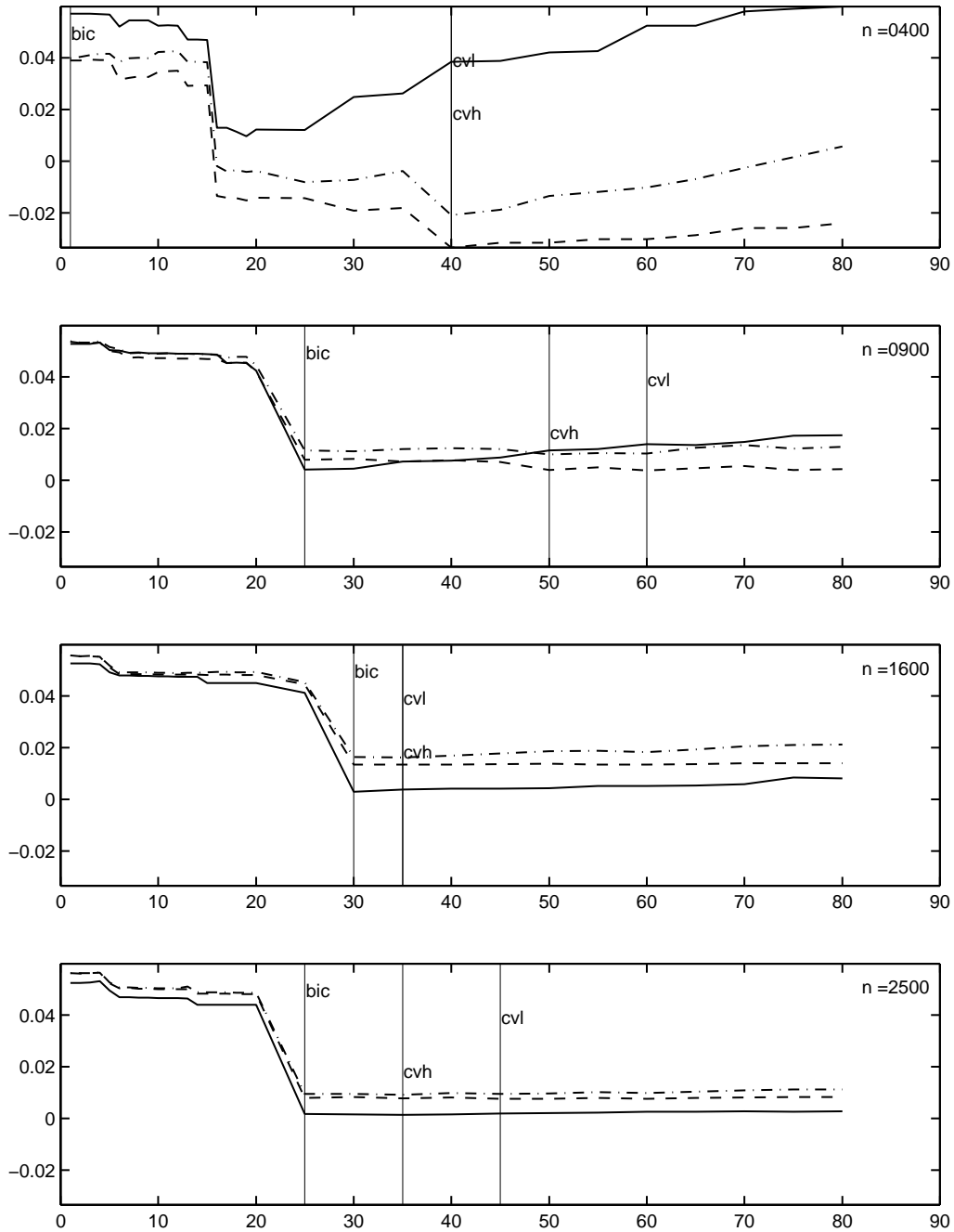


Figure 9. Claw. Plotted is the integrated squared error (ISE) and its cross validated estimate (CV) for a realization of size n , as shown in each plot, from the claw density of the Marron-Wand test suite. Solid line is ISE, dashed line is its leave-one-out CV estimate (CVL), and dashed and dotted line is the average of ten, 10% hold-out-sample CV estimates (CVH). If present, the upper dotted horizontal line is ISE achieved by a cross-validated kernel estimate and lower dotted line is best kernel ISE for this realization. Vertical lines indicate BIC, CVL, and CVH choices of K , as marked.

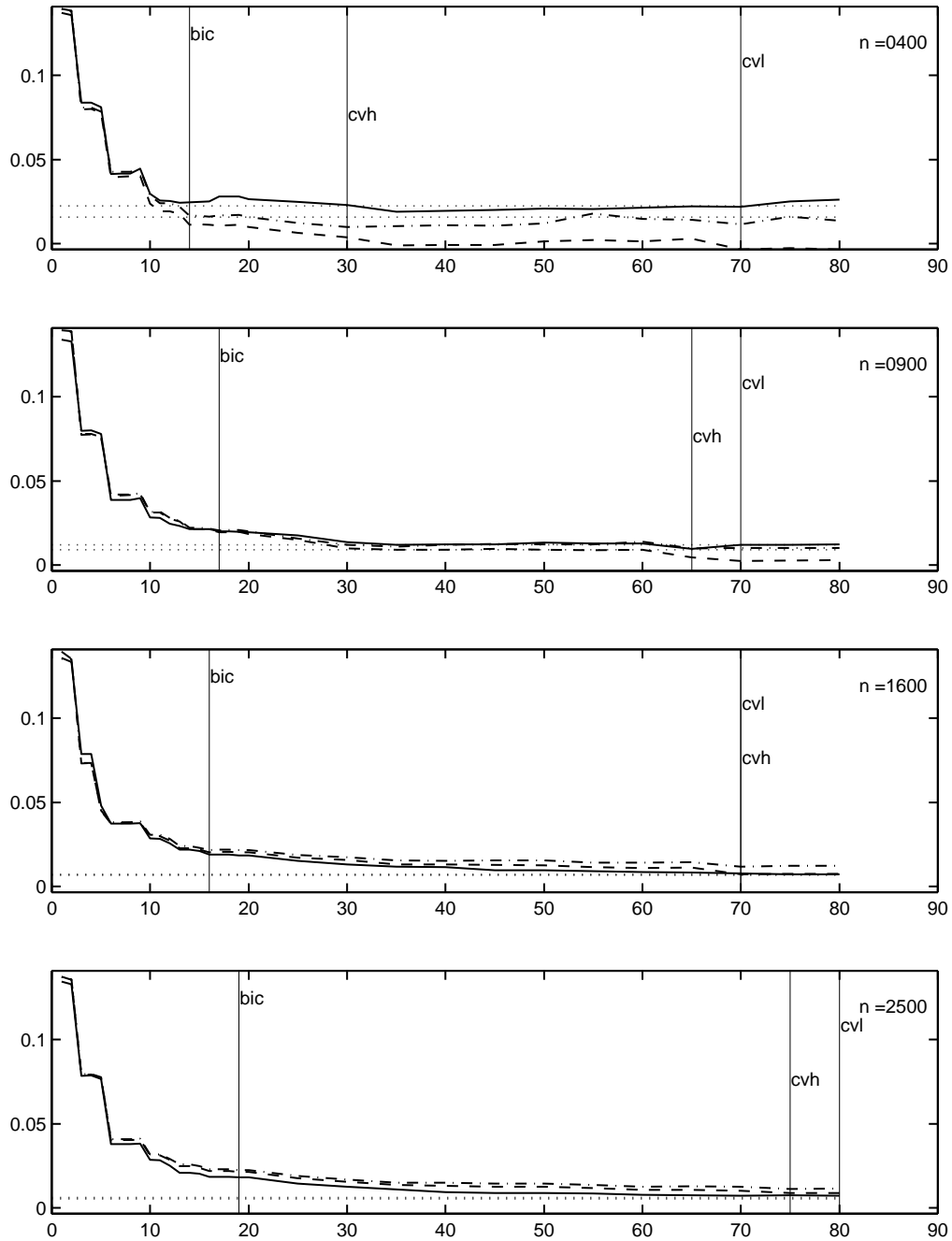


Figure 10. Smooth Comb. Plotted is the integrated squared error (ISE) and its cross validated estimate (CV) for a realization of size n , as shown in each plot, from the smooth comb density of the Marron-Wand test suite. Solid line is ISE, dashed line is its leave-one-out CV estimate (CVL), and dashed and dotted line is the average of ten, 10% hold-out-sample CV estimates (CVH). Upper dotted horizontal line is ISE achieved by a cross-validated kernel estimate and lower dotted line is best kernel ISE for this realization. Vertical lines indicate BIC, CVL, and CVH choices of K , as marked.

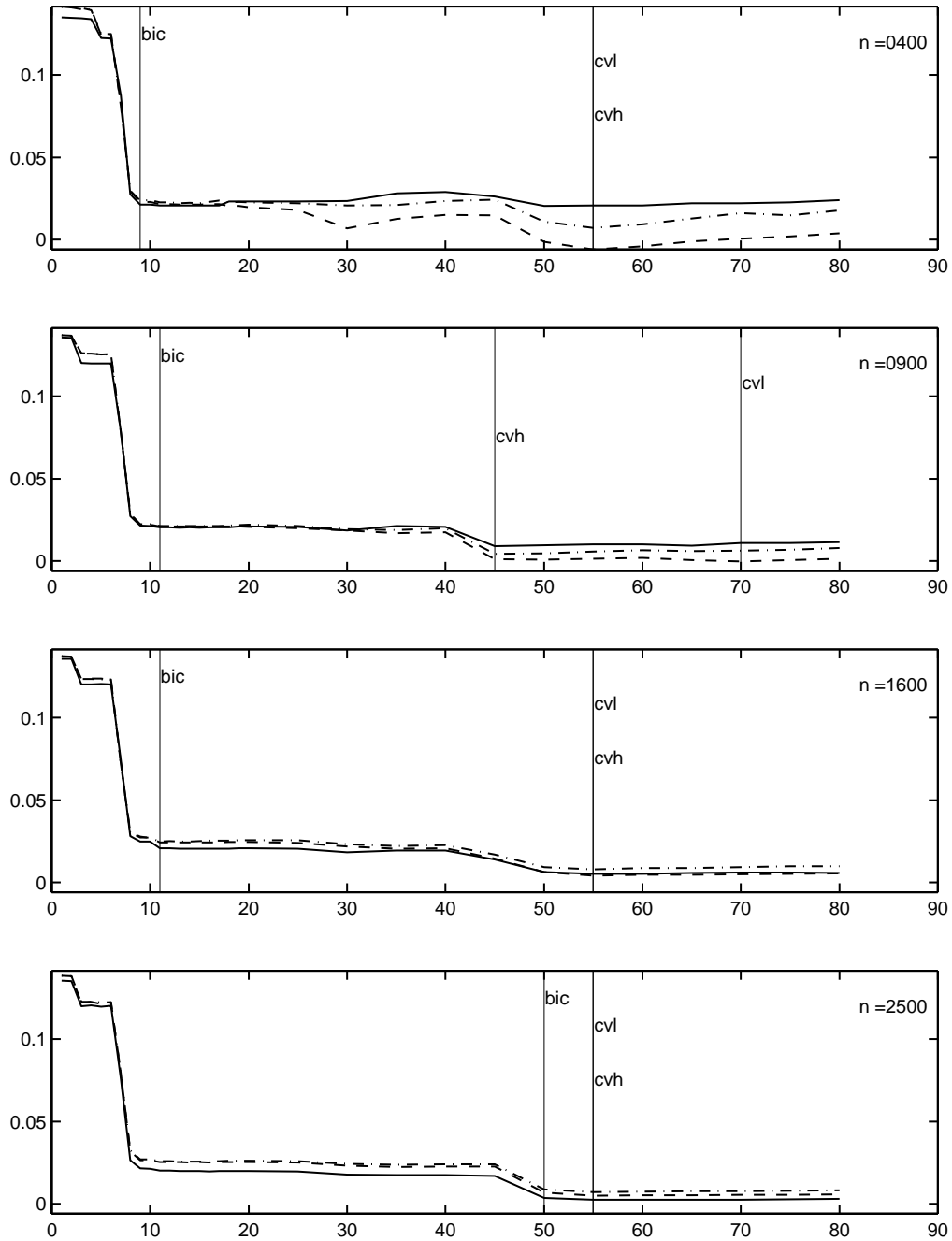


Figure 11. Discrete Comb. Plotted is the integrated squared error (ISE) and its cross validated estimate (CV) for a realization of size n , as shown in each plot, from the discrete comb density of the Marron-Wand test suite. Solid line is ISE, dashed line is its leave-one-out CV estimate (CVL), and dashed and dotted line is the average of ten, 10% hold-out-sample CV estimates (CVH). If present, the upper dotted horizontal line is ISE achieved by a cross-validated kernel estimate and lower dotted line is best kernel ISE for this realization. Vertical lines indicate BIC, CVL, and CVH choices of K , as marked.

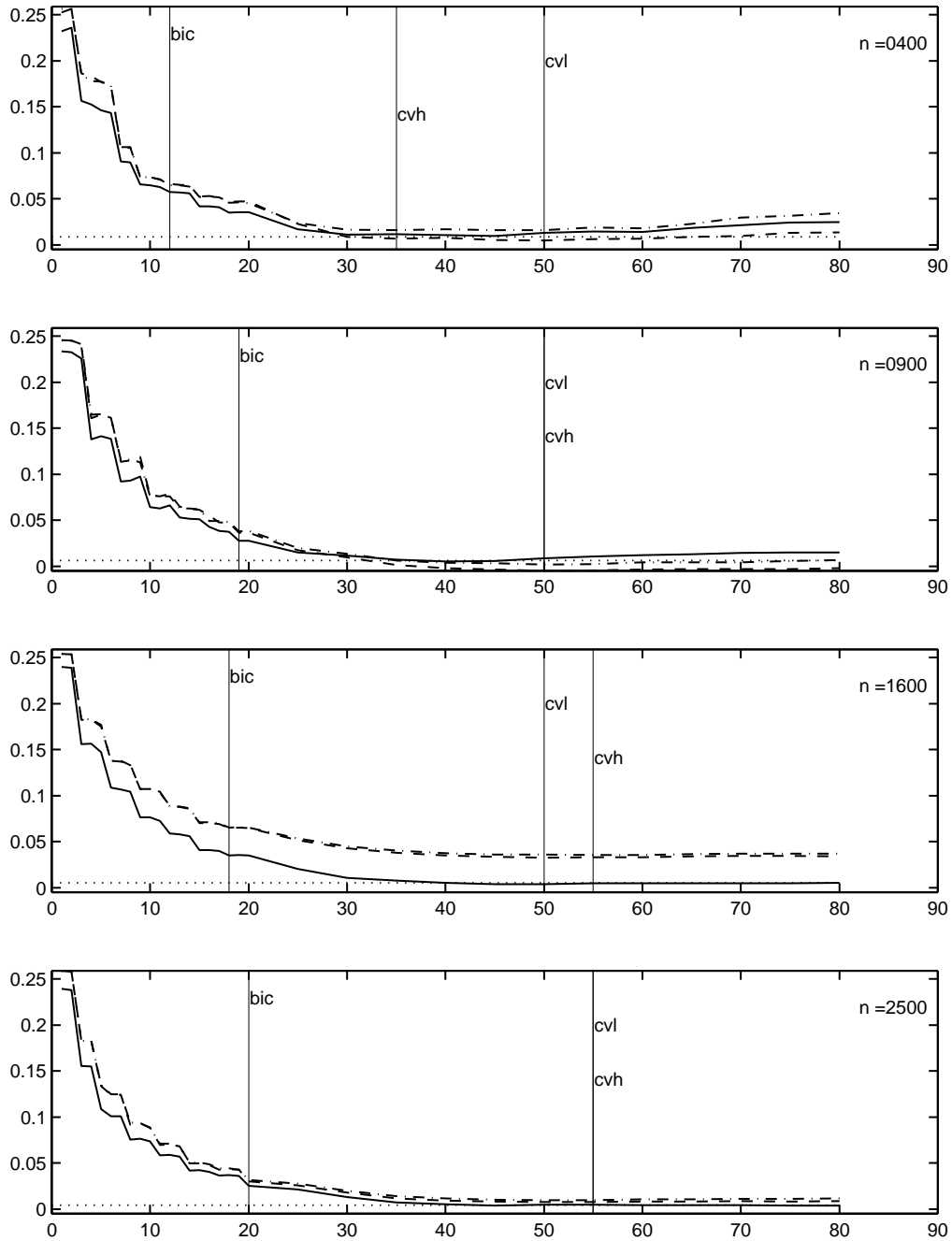


Figure 12. Strongly Skewed. Plotted is the integrated squared error (ISE) and its cross validated estimate (CV) for a realization of size n , as shown in each plot, from the strongly skewed density of the Marron-Wand test suite. Solid line is ISE, dashed line is its leave-one-out CV estimate (CVL), and dashed and dotted line is the average of ten, 10% hold-out-sample CV estimates (CVH). If present, the upper dotted horizontal line is ISE achieved by a cross-validated kernel estimate and lower dotted line is best kernel ISE for this realization. Vertical lines indicate BIC, CVL, and CVH choices of K , as marked.

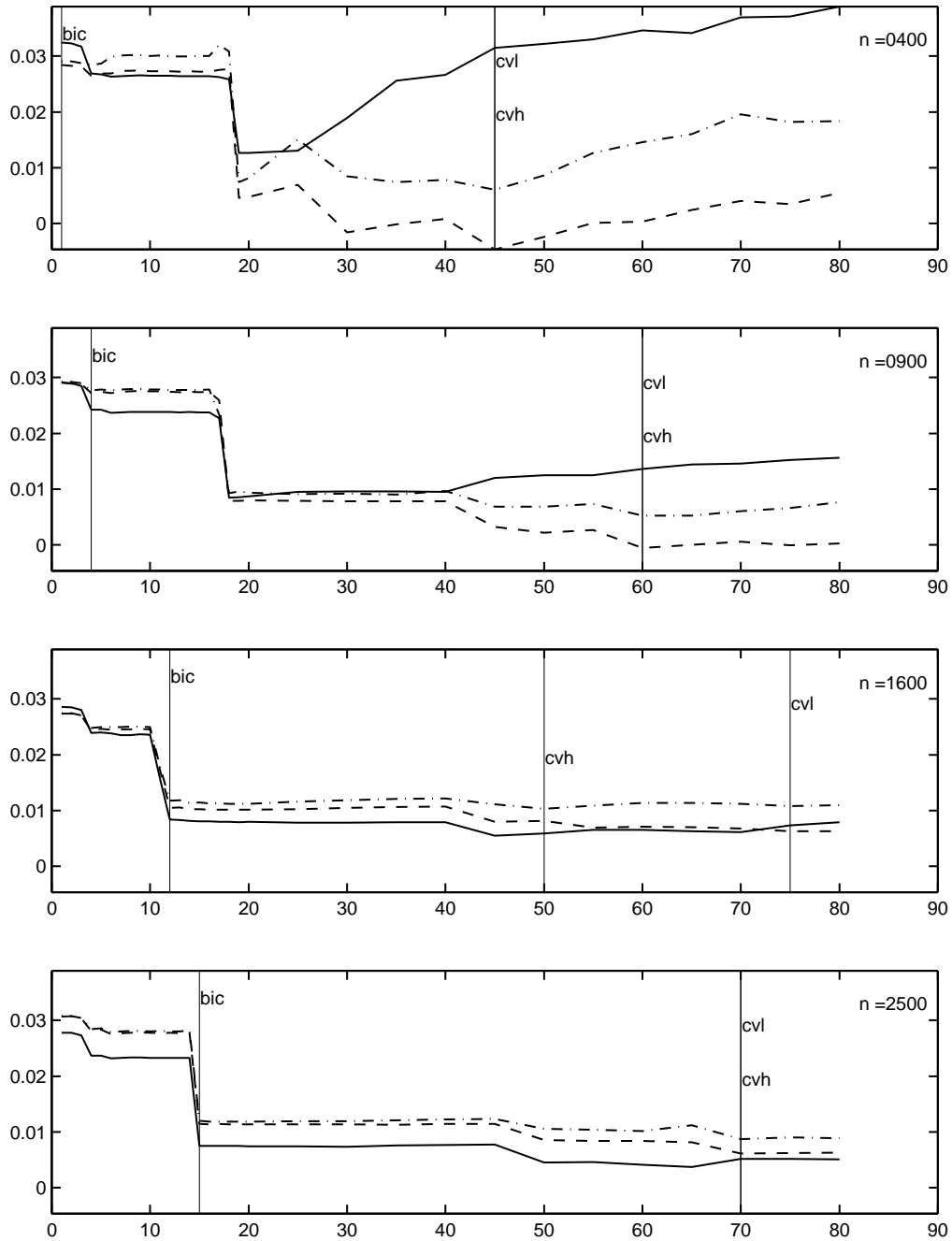


Figure 13. Asymmetric Claw. Plotted is the integrated squared error (ISE) and its cross validated estimate (CV) for a realization of size n , as shown in each plot, from the asymmetric claw density of the Marron-Wand test suite. Solid line is ISE, dashed line is its leave-one-out CV estimate (CVL), and dashed and dotted line is the average of ten, 10% hold-out-sample CV estimates (CVH). If present, the upper dotted horizontal line is ISE achieved by a cross-validated kernel estimate and lower dotted line is best kernel ISE for this realization. Vertical lines indicate BIC, CVL, and CVH choices of K , as marked.

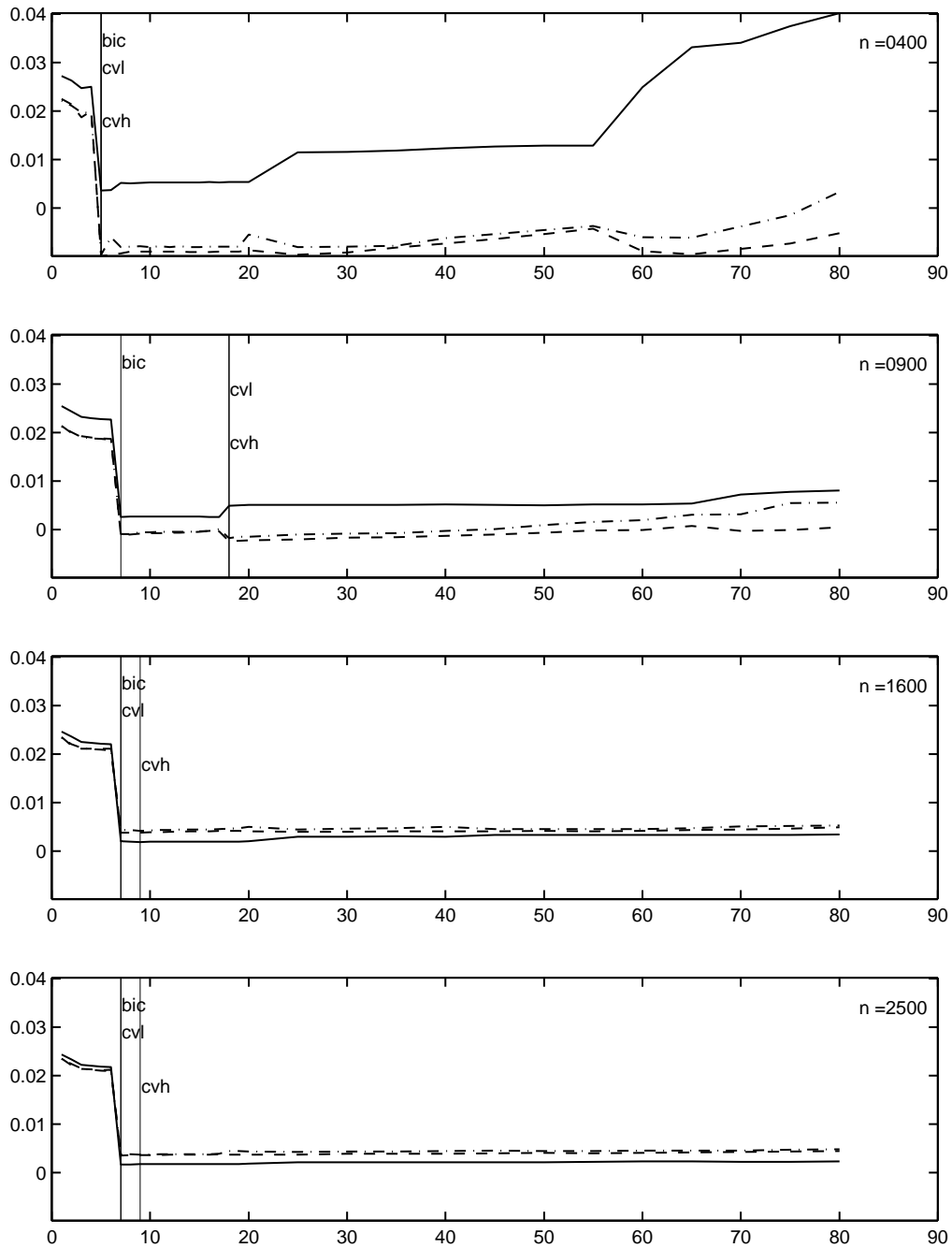


Figure 14. Double Claw. Plotted is the integrated squared error (ISE) and its cross validated estimate (CV) for a realization of size n , as shown in each plot, from the double claw density of the Marron-Wand test suite. Solid line is ISE, dashed line is its leave-one-out CV estimate (CVL), and dashed and dotted line is the average of ten, 10% hold-out-sample CV estimates (CVH). If present, the upper dotted horizontal line is ISE achieved by a cross-validated kernel estimate and lower dotted line is best kernel ISE for this realization. Vertical lines indicate BIC, CVL, and CVH choices of K , as marked.

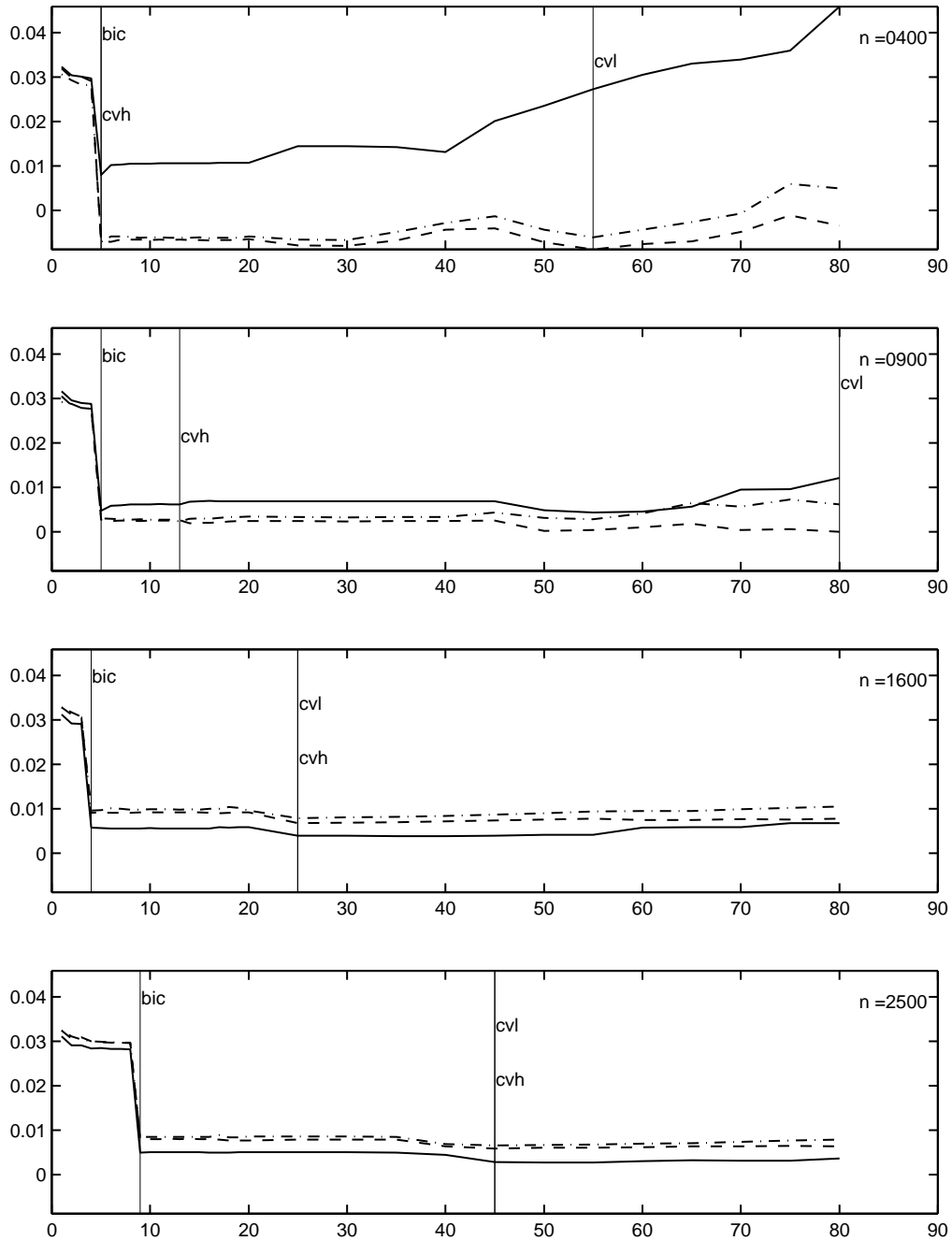


Figure 15. Asymmetric Double Claw. Plotted is the integrated squared error (ISE) and its cross validated estimate (CV) for a realization of size n , as shown in each plot, from the asymmetric double claw density of the Marron-Wand test suite. Solid line is ISE, dashed line is its leave-one-out CV estimate (CVL), and dashed and dotted line is the average of ten, 10% hold-out-sample CV estimates (CVH). If present, the upper dotted horizontal line is ISE achieved by a cross-validated kernel estimate and lower dotted line is best kernel ISE for this realization. Vertical lines indicate BIC, CVL, and CVH choices of K , as marked.

1 References

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- Fenton, Victor M., and A. Ronald Gallant (1996), “Qualitative and Asymptotic Performance of SNP Density Estimators,” *Journal of Econometrics* 74, 77–118.
- Gallant, A. Ronald, and George Tauchen (1999), “The Relative Efficiency of Method of Moments Estimators,” *Journal of Econometrics* 92, 149–172.
- Marron, J. S., and M. P. Wand (1992) “Exact Mean Integrated Squared Error,” *The Annals of Statistics* 20, 712–736.