Supplementary material to the paper "Adaptive false discovery rate control under independence and dependence"

G. Blanchard and É. Roquain

In this note, we present additional simulations carried out in the framework of Section 3.4 of the JMLR paper "Adaptive false discovery rate control under independence and dependence" (we use below the same notation as in the paper). The main point here is to explore additional regions of the parameter space. As reported in Remark 20 of the paper, overall these additional simulations confirm the qualitative conclusions of the paper, in particular the good behavior of the procedure Storey-α and BR-2S-α.

1 Robustness when π_0 and/or ρ are very close to 1

Figure 1 reports a comparison plot between the FDR of the main studied procedures. The case $\pi_0 = 0.95$ is qualitatively similar to the case $\pi_0 = 0.8$ (reported in the paper in Figure 4, bottom left plot). The case $\rho = 0.95$ differs slightly from the case $\rho = 0.5$ (reported in the paper in Figure 2 bottom left plot) to the extent that the FDR of median-LSU (resp. FDR08-$\frac{1}{2}$) stays below the target level (resp. can be above the target level, for large π_0). In both cases, the FDR of Storey-α is still controlled at the target level.

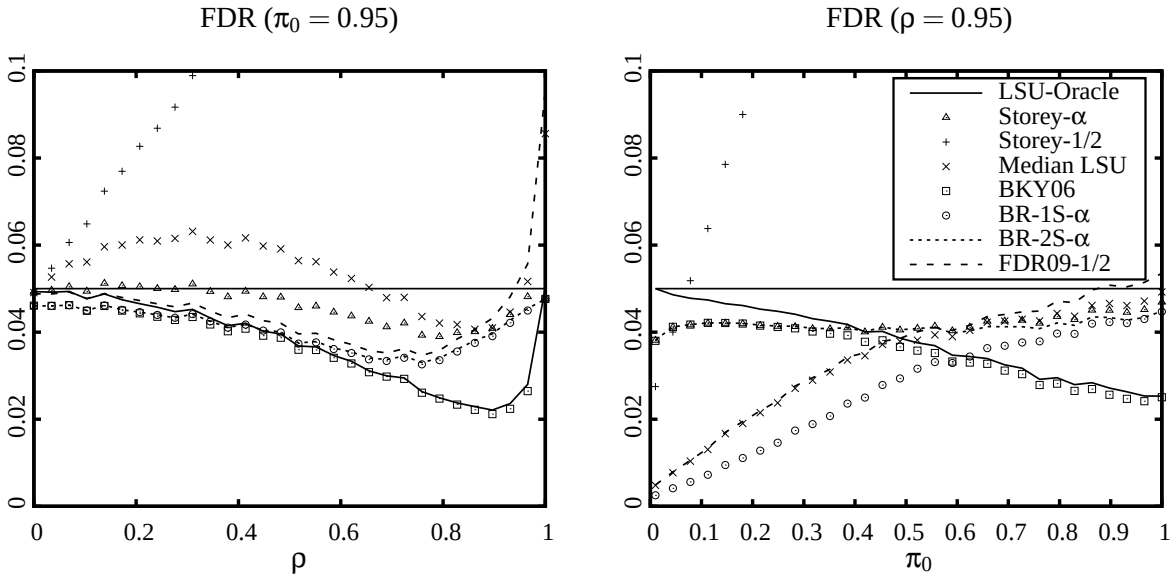

Figure 1: Left: $\pi_0 = 0.95$, ρ varies. Right: $\rho = 0.95$, π_0 varies. Other parameters as in the paper ($\bar{\mu} = 3$, $m = 100$, $\alpha = 5\%$).

2 Robustness of Storey-α when both π_0 and ρ are $\simeq 1$

Figure 2 represents the FDR of the Storey-α for $(\rho, \pi_0) \in [0.8, 1]^2$. We clearly see that the FDR of Storey-α is below or extremely close to α in that range.

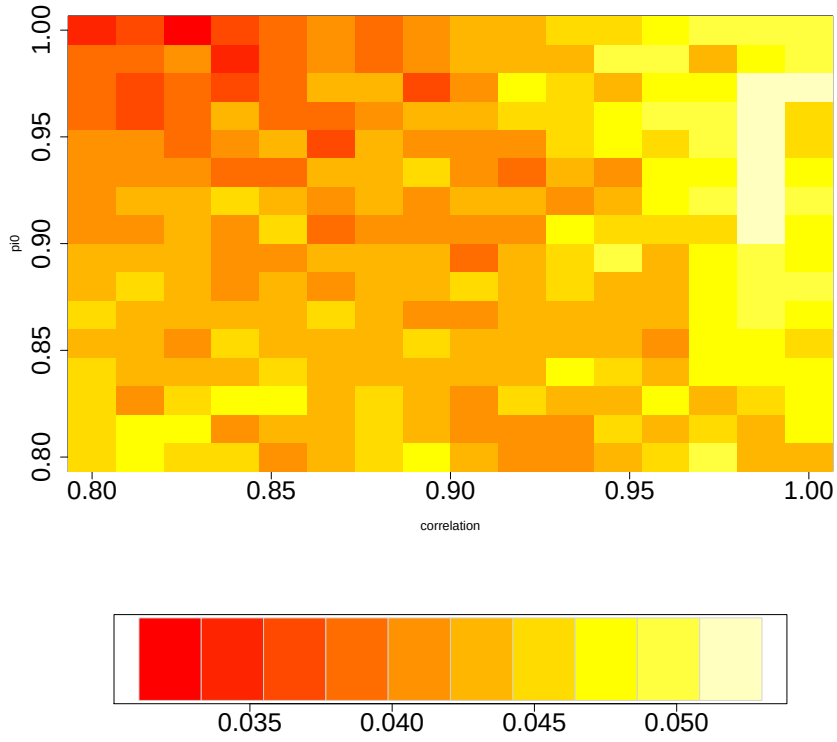

Figure 2: Top: FDR of Storey-α in function of ρ (X-axis) and π_0 (Y-axis). 10000 simulations. $\alpha = 0.05$. Bottom: the color range.

3 Case of small or large number of hypotheses *m*

The results are qualitatively very similar to the ones shown in Figure 2 of the paper. See Figure 3 on the next page.

4 Case where $\alpha = 0.01$ and $\alpha = 0.1$

Fig. 4 shows the behavior of the procedures for other standard values of α. It is qualitatively the same as for $\alpha = 0.05$.

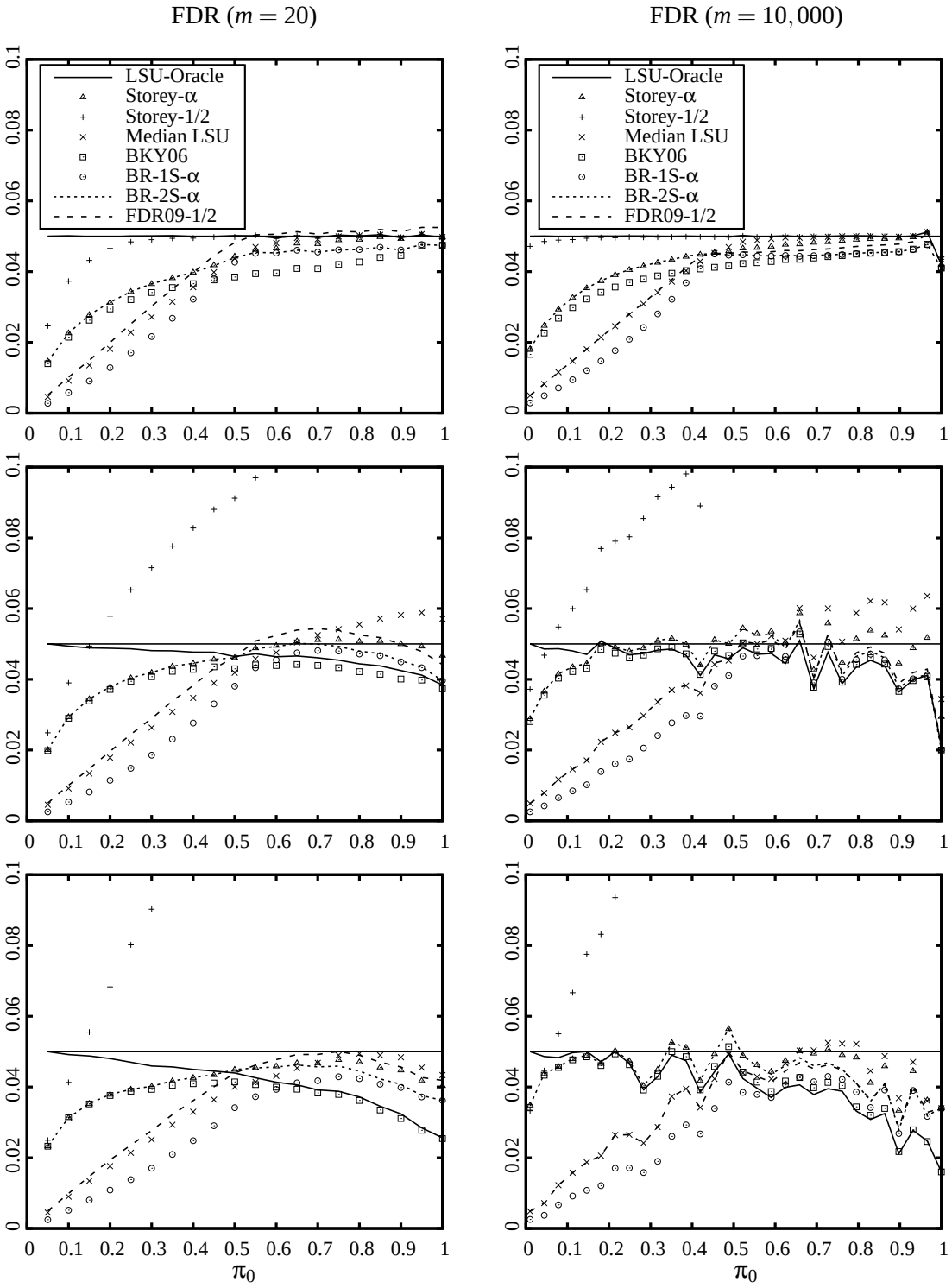

Figure 3: Left: $m = 20$, right: $m = 10,000$; π_0 varies; from top to bottom: $\rho = \{0; 0.5; 0.8\}$. To reduce the computational burden for $m = 10,000$, we performed less repetitions of the experiments, hence the added variability.

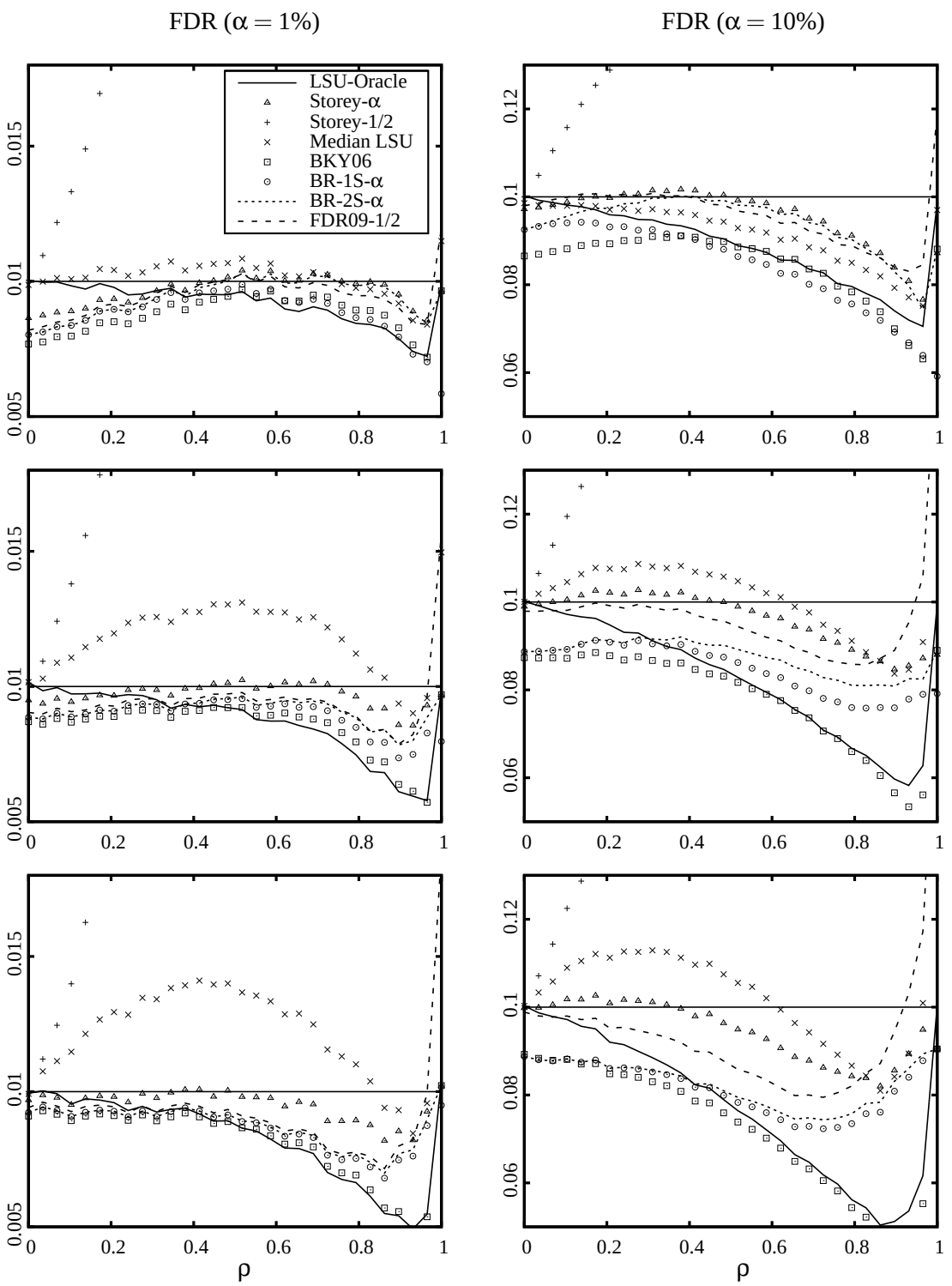

Figure 4: Left: $\alpha = 1\%$, right: $\alpha = 10\%$; ρ varies; from top to bottom: $\pi_0 = \{0.6; 0.8; 0.9\}$. The latter choice of parameters for π_0 was motivated by trying to concentrate on the ranges where the FDR control appeared to be the more likely to be violated from the experiments with $\alpha = 5\%$.