Retail energy providers (REPs) can employ different strategies such as offering demand response (DR) programs, participating in bilateral contracts, and employing self-generation distributed generation (DG) units to avoid financial losses in the volatile electricity markets. In this paper, the problem of setting dynamic retail sales price by a REP is addressed with a robust optimization technique. In the proposed model, the REP offers price-based DR programs while it faces uncertainties in the wholesale market price. The main contribution of this paper is using a robust optimization approach for setting the short-term dynamic retail rates for an asset-light REP. With this approach, the REP can decide how to participate in forward contracts and call options. They can also determine the optimal operation of the self-generation DG units. Several case studies have been carried out for a REP with 10,679 residential consumers. The deterministic approach and its robust counterpart are used to solve the problem. The results show that, with a slight decrease in the expected payoff, the REP can effectively protect itself against price variations. Offering time-variable retail rates also can increase the expected profit of the REPs.