MGRM Hedging Revisited

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MGRM's Hedging Revisited

MGRM's Hedging Practices

- Turn off alarm
- Get out of bed

The Academic Debate

- Eat eggs
- Drink coffee

Empirical Results

The Importance of the Loss Function

- It seems the academic debate has really been a debate about the loss function used to evaluate the performance of MGRM's hedging practices.
  - Most of the academic criticism evaluated MGRM from the perspective of a mimimum-variance (or volatility reduction) loss function that is standard in that literature
  - Culp & Miller point out that MGRM were more in line with Holbrook Working's carrying-charge (or arbitrage) hedging
- This suggests a loss function based more on the profitability of trading than variance reduction.
  - Cash flows may have been reduced from the no-hedge position, but this is a secondary motivation at most

Alternative Loss Functions

- To this end we evaluate the following loss functions:

$$r_{m,t+1} = \ln\left[\Delta S_{t+1} - \gamma_m^* \Delta F_{t+1}\right] - \ln\left[\Delta S_{t+1} - \gamma_0 \Delta F_{t+1}\right]$$

and

$$v_{m,t+1} = \left[\Delta S_{t+1} - \gamma_m^* \Delta F_{t+1}\right]^2 - \left[\Delta S_{t+1} - \gamma_0 \Delta F_{t+1}\right]^2$$

where

- γ_m is the fixed hedge ratio from 0.0 to 1.0 by 0.05
- $\gamma_0 = 0.0$ is the no-hedging benchmark

Loss Functions Continued

We base our findings on the average loss values

$$\bar{r}_m = (n)^{-1} \sum_{t=R}^{T} r_{m,t+1}$$

and

$$\bar{v}_m = (n)^{-1} \sum_{t=R}^{T} v_{m,t+1}$$

for $m = 1, \ldots, 21$ where $\gamma_m = 0.0, 0.05, \ldots, 0.95, 1.0$.

Historical Results

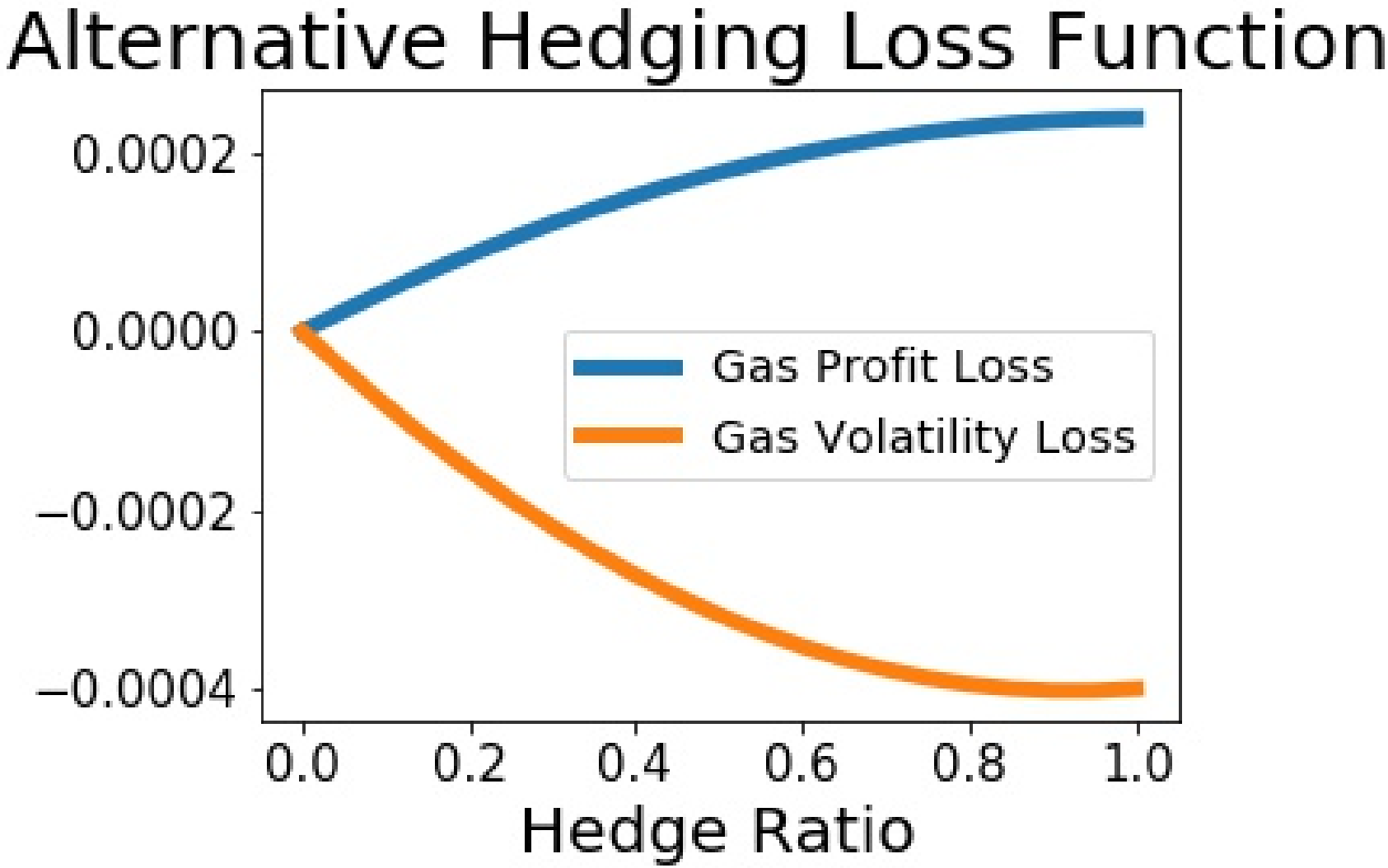

Figure 1: Loss Functions for Gasoline

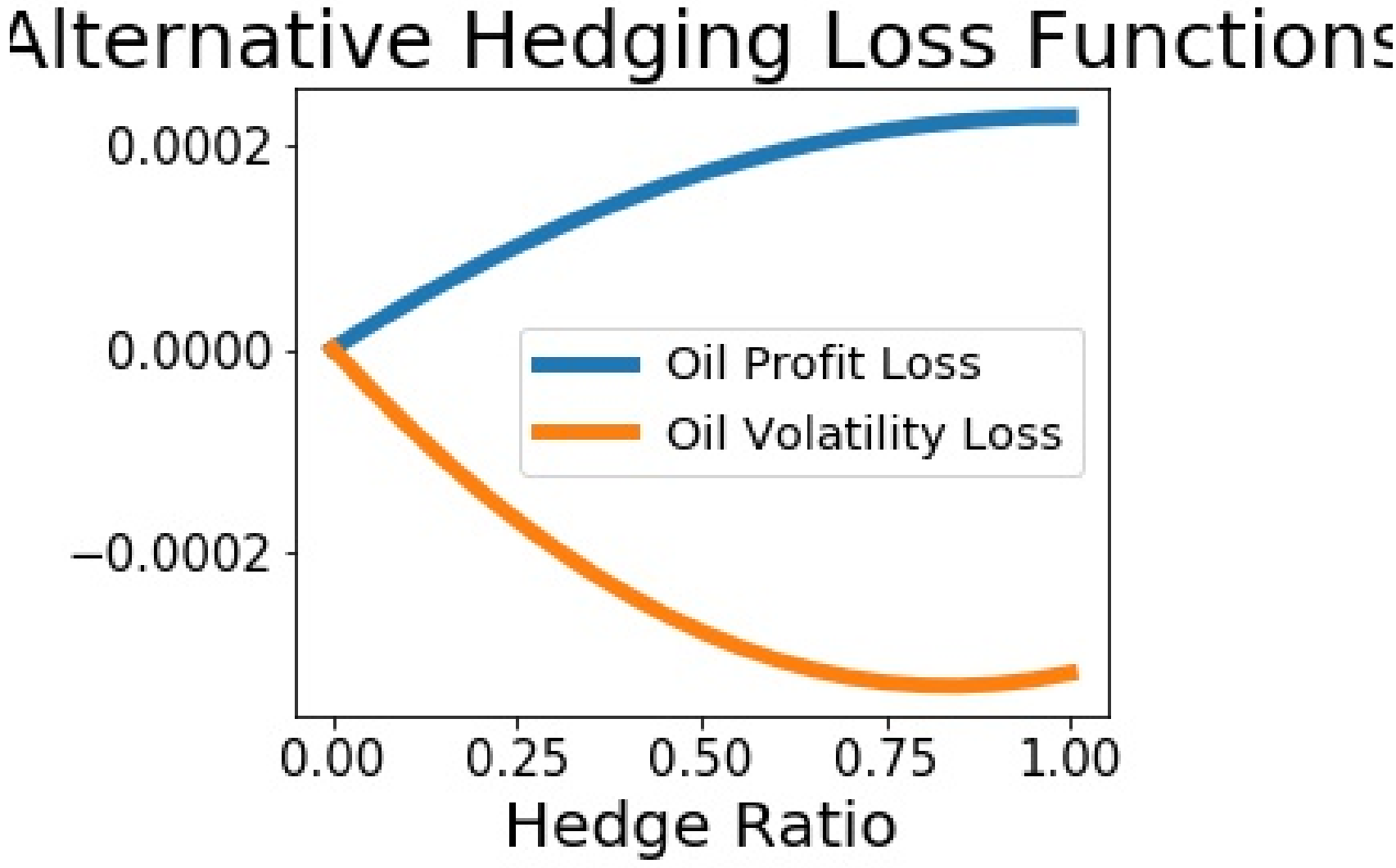

Figure 2: Loss Functions for Heating Oil

The Bootstrap Hedging Simulator

The Bootstrap Snooper

- These simple graphs tell quite a story, but one has to account for data snooping
- We employ the bootstrap to estimate the sampling distribution of the two loss functions
- Specifically we employ the Stationary Bootstrap of Politis & Romano (JASA 1994)

Bootstrap Results

Bob

```
{r kable} library(knitr) gas.prf <-
read.csv("/tables/gas-profit-res.csv", header=T)
#kable(gas.prf, caption="Summary Statistics: Gas
Profit/Loss Function", format=) head(gas.prf)
```

Summary

Next Steps

- Out bootstrap results are strongly suggestive, but we need to formalize our tests
- Employ the following: White's RC, Hansen's SPA, Romano & Wolf's MCP
- One of Pirrong's strong criticisms was that MGRM did not properly dynamically hedge
  - We will then include his BAG estimator as the benchmark
  - Also include more recent advancements in dynamic heding (such as Alizadeh et al's MRS-BEKK)
- Other measures of loss:
  - Total terminal cash flows
  - Keep track of liquidity problems (e.g. percentage of simulations with capital losses below some threshold)
- Consider other strategies to augment MGRM's historical hedging practices
  - Synthetic capital policies
  - Option-based delta hedging