HW1_PRANJAL

2023-01-14

Q1

Issues:

1. Installation of nleqslv with "install.packages(nleqslv)"
2. Wrong formula for alpha -> corrected with -1 to the first segment.
3. Wrong formula for "temp" and "diag(temp)" for dqdp; added -1 before both. Same issue in dqdp_logit.
4. Wrong formula for quant_logit -> corrected with +1 in denominator and + instead of - before alpha*p.

After these changes foc_logit gives 0 vector and post-merger prices and UPP matches desired result.

Q2

```
simres = nleqslv(rawdata$prices,fn=f.foc_logit, #CHANGED
                c=calres$c*c(0.9,0.9,1,1),fNum=fNum2,
                alpha=calres$alpha,xsi=calres$xsi)
```

New merger prices under new marginal costs are:

1.042042 1.042042 1.006144 1.006144

Q3

```
simres = nleqslv(rawdata$prices,fn=f.foc_logit, #CHANGED
                c=calres$c,fNum=c(1,1,1,1),
                alpha=calres$alpha,xsi=calres$xsi)
```

New merger prices under collusion in the post-merger scene are: 1.734383 1.734383 1.627240 1.627240

Q4

- Improvement in Unobserved Quality

Post Merger we see an increase in the unobserved quality of the merged products due to workforce and IP sharing. The unobserved quality of merging products rises by 10%.

```
simres = nleqslv(rawdata$prices,fn=f.foc_logit, #CHANGED
                c=calres$c,fNum=fNum2,
                alpha=calres$alpha,xsi=calres$xsi*c(1.1,1.1,1,1))
```

New merger prices: 1.1099058 1.1099058 0.9989174 0.9989174