ECON 8000/9000 Empirical Energy Economics
PS4: Replication Exercise: Consumer Valuation Ratio (VR) and Implied Discount Rate (IDR)
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Instruction and Notes:

- Deadline: Sunday 3/1 @ 5pm
- Submission: Please compile all results into a single PDF.
- Group: Everyone can work together, but only **up to two students** can submit the assignment together. If so, make sure you include both names at the top when you submit.
- Here I write instructions using Stata. You can use other software if you like.
- This study has a replication package online. I recommend you follow my instructions below, which are slightly less complicated than the online package.

Q1. Replicate Busse et al. (2013) AER "Are Consumers Myopic? Evidence from New and Used Car Purchases" Table 9 using Valuation Ratio (VR)

We have covered in class how to compute IDR by assuming valuation ratio $\gamma = 1$. The authors produce Table 9. In this problem set, we will replicate the first column (aka using NHTSA VMT and survival rate) for (i) used car, (ii) new car with demand elasticity -4, and (iii) new car with demand elasticity -5. Instead of re-computing IDR, you will compute VR.

TABLE 9—NEW AND USED CARS: IMPLICIT DISCOUNT RATES

	Market	Assumed demand elasticity	NHTSA VMT, NHTSA survival rates (%)	VMT from used car transactions, NHTSA survival rates (%)	VMT from trade-ins, NHTSA survival rates (%)
Q1 versus Q4	Used	NA	11.8	4.4	7.3
	New	−2	−4.0	−6.8	−6.2
	New	−3	1.0	−3.0	−1.9
	New	−4	5.5	0.5	2.1
	New	−5	9.8	3.7	5.8
Q1 versus Q3	Used	NA	5.9	0.1	1.9
	New	−2	−3.6	−6.6	−5.9
	New	−3	1.5	−2.6	−1.5
	New	−4	6.1	0.9	2.5
	New	−5	10.4	4.2	6.3
Q2 versus Q4	Used	NA	20.9	11.0	16.2
	New	−2	0.3	−3.5	−2.5
	New	−3	6.7	1.4	3.1
	New	−4	12.6	5.8	8.3
	New	−5	18.3	10.0	13.2

Valuation ratio (VR, or γ) can be computed like the following:

$$\Delta WTP = \gamma \cdot \left(\underbrace{\sum_{t=0}^{T} \frac{p_e \cdot m \cdot e_k}{(1+r)^t} \cdot Prob(survive_t)}_{\text{NPV of energy cost for } k} - \underbrace{\sum_{t=0}^{T} \frac{p_e \cdot m \cdot e_j}{(1+r)^t} \cdot Prob(survive_t)}_{\text{NPV of energy cost for } j} \right)$$

In particular, you are tasked to fill in all the question marks for this table:

- We will assume real discount rate as:
- $r = 5\%$ **for used cars**
- $r = 3\%$ **for new cars**
- This assumption is based on
- Real APR for used cars is from 2.8% to 16.9% in this period
- Real APR for new cars is from -0.9% to 9% in this period

	Market	|Elas|	Assumed real APR	VR
Q1 vs Q4	Used	NA	5%	?
	New	4	3%	?
	New	5	3%	?
Q1 vs Q3	Used	NA	5%	?
	New	4	3%	?
	New	5	3%	?
Q2 vs Q4	Used	NA	5%	?
	New	4	3%	?
	New	5	3%	?

Here are some info:

- Use “BKZ_2013_IDR_Spreadsheet_AER.xlsx” which is also from their replication file on AEAweb.
- Use ΔWTP and ΔNPV to compute valuation ratio (VR) γ.

Tasks:

- 1. Fill in all question marks (?) in a table similar to “PS4_VR_forstudent.xlsx” or a latex table and summarize your results in a PDF.
- 2. Interpret your results.
- 3. Are your results, broadly speaking, consistent with results in Busse et al. (2013) Table 9?