

Final Exam
(25 points)

Because nation "US" cannot believe that its future people are as important as "us" current people, it is unable to establish policies that include externality costs in fossil fuel prices (e.g. gasoline prices). But the nation might enact some policies promoting alternative energy, as long as fossil fuel consumers are affected only indirectly. A 4-year price support policy affecting the sale of solar panels (SPs) to households is under consideration. Policy objectives include encouraging the domestic production of SPs and reducing worldwide, energy-caused pollution. Any governmentally purchased SPs will be donated to island countries to assist poorer people being subjected to sea level rise while also lowering their fossil fuel emissions.

Without any US government interventions the representative US consumer behaves as if they have a separable energy budget B for buying only fuel (F) and SPs (S) with preferences given by

$$U_h = F_h S_h^{0.5} \quad \text{and } B=12.$$

There are 100 million consumers. Assume a partial equilibrium situation in which the price of F is always 1. Commencing in the initial year ($t=0$) US SP producers behave as if they have the aggregate total variable cost function

$$TVC = \frac{4-t}{128} S^2 \quad t = 0,1,2,3.$$

The support policy promises that for 4 years starting in year 0 the support price in all 4 years will be fixed at 20% larger than year 0's expected competitive price. In return, all SP producers are required to commit 50% of their *increased* profits to investments in advanced production processes. A consequence of this requirement is variable costs should decrease each of the 3 years after the first. This is caused by capital investments and improved knowledge (and is displayed in the cost function). The support policy will be removed at the end of $t=3$.

- (8 pts) a. Imagine a table with Years 0-9 in the first column. The rest of the table is empty except for column headings. These column headings identify every effect the nation might regard as important to the analysis of this policy. List and individually explain these headings. Mention noteworthy considerations as needed. Ideally, your agency's analysts will be able to quantify all entries needed to complete this table (but not today).
- (17 pts) b. Make some progress in quantifying entries for your imagined 10-year table. Explain your choices and limitations. Contributing results for multiple columns is more important than contributing results for multiple years, but all achievable estimates are important. Show all the needed work clearly.