

## Self Test

### Energy Safety and Security

Circle whether the following statements are True or False.

1. **True False**. Suppose you have two independent random variables  $X_1$  and  $X_2$  representing price in two markets with identical mean  $\mu$  and variance  $\sigma^2$ . The price in the  $i$ th market can take on two values ( $X_{i1}$ ) and ( $X_{i2}$ ) and is described by the probability distribution:

$X_{i1}$  occurs with probability  $P(X_1)$

$X_{i2}$  occurs with probability  $P(X_2)$

Then the expected value and variance for the average of two random variables ( $\frac{X_1 + X_2}{2}$ ) are

$$E\left(\frac{X_1 + X_2}{2}\right) = \mu \text{ and } \sigma_{\bar{x}}^2 = \frac{\sigma^2}{2}.$$

2. **True False** The expected loss from an energy accident ( $EL$ ) depends on the investment in safety precautions ( $X$ ). If  $EI = 10.14\exp(-0.4X)$ , the optimal level of investment in precaution is  $X=3.5$ .

3. **True False** The U.S. Price Anderson Bill of 1957 may have led to an increased quantity of nuclear power at lower prices.

4. **True False** If Saudi Arabia decided to cut off all oil exports to the United States, the effect on the price of oil in the US in the short run would be an increase of \$400.00 Assume the short run price elasticity of demand is -0.04, the current price of oil is \$100, and that the U.S. consumed 95 mb/d of which 10 mb/d came from Saudi Arabia. (No country is able to make up for Saudi Arabia in the short run)

5. **True False** The expected price of oil next week is \$110 per barrel when the probability of receiving \$90 per barrel is 60% and the probability of receiving \$120 per barrel is 40%

6. **True False** The variance of the above situation is \$216

7. **True False** Both equipment and human failures can cause accidents.

8. **True False**. Suppose world oil production plus lease condensate is 74 million barrels per day and 17 million barrels per day passes through the Straits of Hormuz. The short run elasticity of oil demand is -0.05 and Brent crude oil is \$111 per barrel. If the Straits of Hormuz are blocked off, oil price would increase to \$510 per barrel. (Contributed by Yi Yanli)

9. **True False**. According to US Nuclear Regulatory Commission 2012, in the event of a nuclear energy accident, the government would have been responsible for the first \$11.6 billion and the utility would cover the rest of the damages. (Contributed by Cui Lumin)

10. **True False**. Risk, externalities, economies of scale, reducing cost, and macroeconomics variables, are the reasons why government intervention could be considered in the energy market in order to minimize the risk of disruptions. (Contributed by Steven Farfan)

11. **True False**. Strategic government oil stockpiles are criticized for being expensive to maintain and that the government is taking on a task that should rightly be done by the private sector. (contributed by Xu Yun)

12. **True False**. In a situation of information failure, the preferred government policy is to punish firms after an accident such as require firms to pay liabilities, fines and even inflict jail sentences if accidents are found to be the result of negligence or failure to follow required safety standards. (Contributed by Song Zenglei)

13. **True False**. Let  $X$  be the amount of investment in safety precaution a firm can undertake in millions of dollars. The expected loss from accidents in millions of dollars is  $EL = 15\exp(-0.5X)$ . The level of investment in precaution that minimizes net expected losses is  $X=4.03$ .