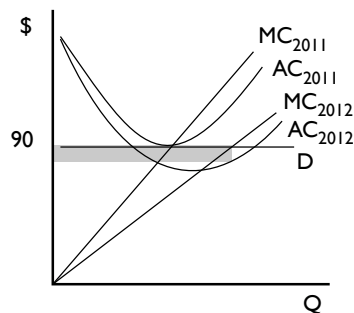


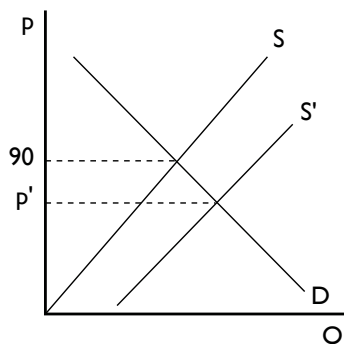
## Second Midterm Exam Answers

1. *NaturalGas\_a.*

- (a) A perfectly competitive, profit maximizing firm always sets price of output times marginal product of a factor equal to the price of the factor. For example, for labor it sets  $pMP_L = w$ . For gas the equation is  $90MP_g = p_g$ . In 2011, this gives  $MP_g = 4/90$  and in 2012 it gives  $MP_g = 2/90$ .
- (b) Since the firm is profit maximizing, it keeps on using more gas until the value of the product of the marginal unit of gas equals the cost of the marginal unit of gas. With the gas price lower, the firm makes higher profits by using more gas even though diminishing returns set in and the marginal product of gas is lower.
- (c) Since the price of a factor of production has fallen, both marginal and average cost curves shift down. The AC curve shifts down less at low quantities and more at high quantities since the importance of variable costs becomes greater at larger quantities. Since the firm made zero profit before, it must now be making rents since its costs are lower. The rents are shown by the shaded box.



- (d) In the long run, the rents will attract more firms to enter the electricity market by using natural gas. The increased supply will lower electricity prices, eventually pushing them down until a typical natural gas generator again earns zero profits.



2. *SpanishBonds*. On April 19, 2012, the Spanish government sold about €2.5 billion of government bonds.

- (a) The formula is

$$P = \frac{3}{1 + 0.346} + \frac{3}{(1 + 0.0346)^2} + \frac{100}{(1 + 0.0346)^2}$$

This solves to a price of €99.12.

- (b) The higher yield on the Spanish government bond says that it is more risky to lend to the Spanish government than to a typical US car buyer. This is pretty amazing since governments have the authority to raise taxes and are thus considered super low risk. Bond traders must believe there is a high enough probability that Spain will default on its bonds or leave the Euro.