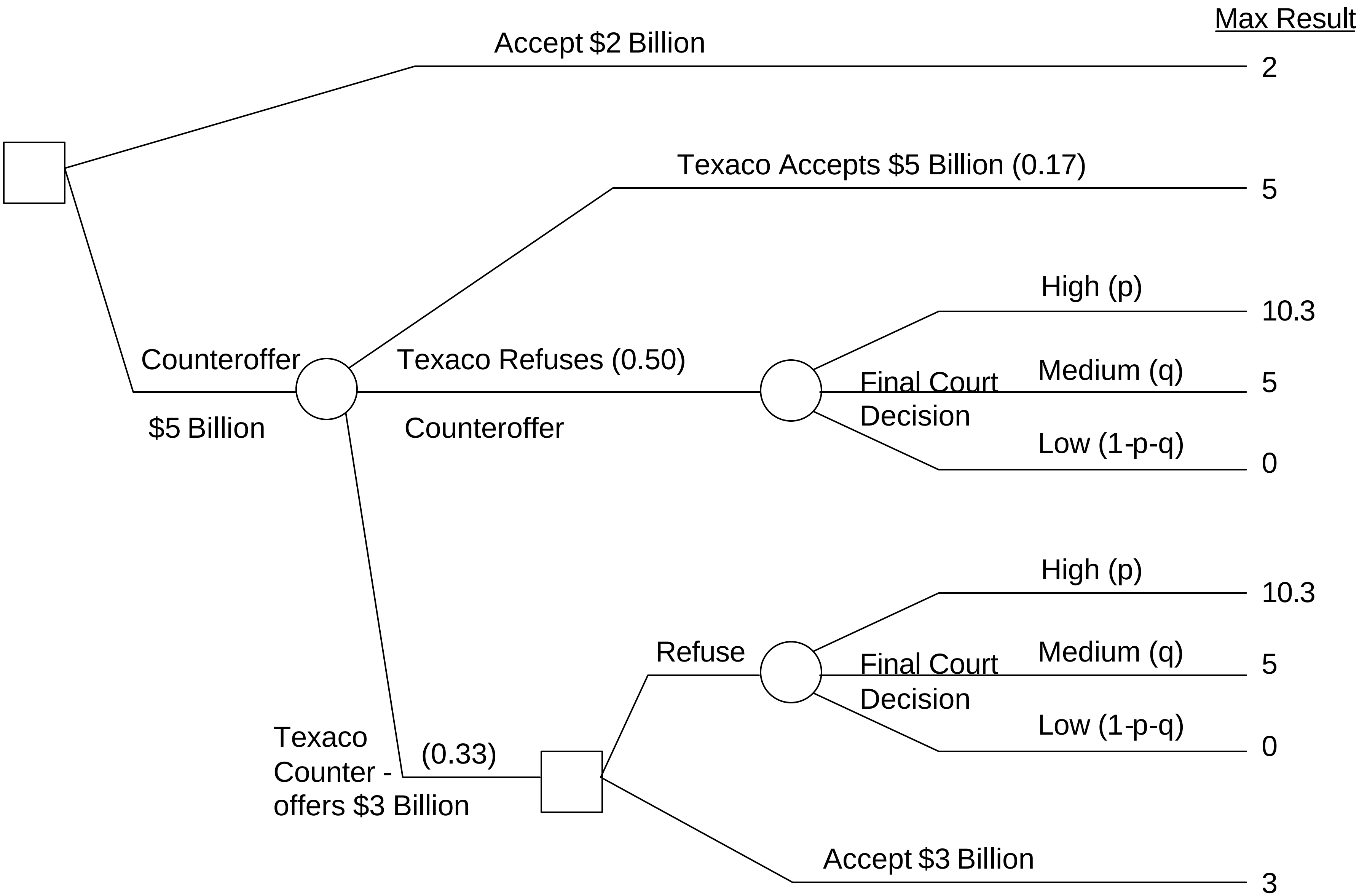
EXTRA PROBLEM 7: SENSITIVITY ANALYSIS



A. Create a two-way sensitivity graph that shows optimal strategies for Liedtke for all possible values of p and q

Strategy A = Accept \$2 billion.

Strategy B = Counteroffer \$5 billion, then refuse if Texaco offers \$3 billion.

Strategy C = Counteroffer \$5 billion, then accept if Texaco offers \$3 billion.

EMV(A) = 2

EMV(B) = 0.17 (5) + 0.5 [p 10.3 + q 5 + (1-p - q) 0] + 0.33 [p 10.3 + q 5 + (1-p - q) 0]

= 0.85 + 8.549 p + 4.15 q.

EMV(C) = 0.17 (5) + 0.5 [p 10.3 + q 5 + (1-p - q) 0] + 0.33 (3)

= 1.85 + 5.15 p + 2.5 q.

NOW CONSTRUCT THREE INEQUALITIES:

- EMV(A) > EMV(B) $\Leftrightarrow$

  $2 > 0.85 + 8.549\, p + 4.15\, q \Leftrightarrow$

  $0.135 - 0.485\, q > p$. (1)

- EMV(A) > EMV(C) $\Leftrightarrow$

  $2 > 1.85 + 5.15\, p + 2.5\, q \Leftrightarrow$

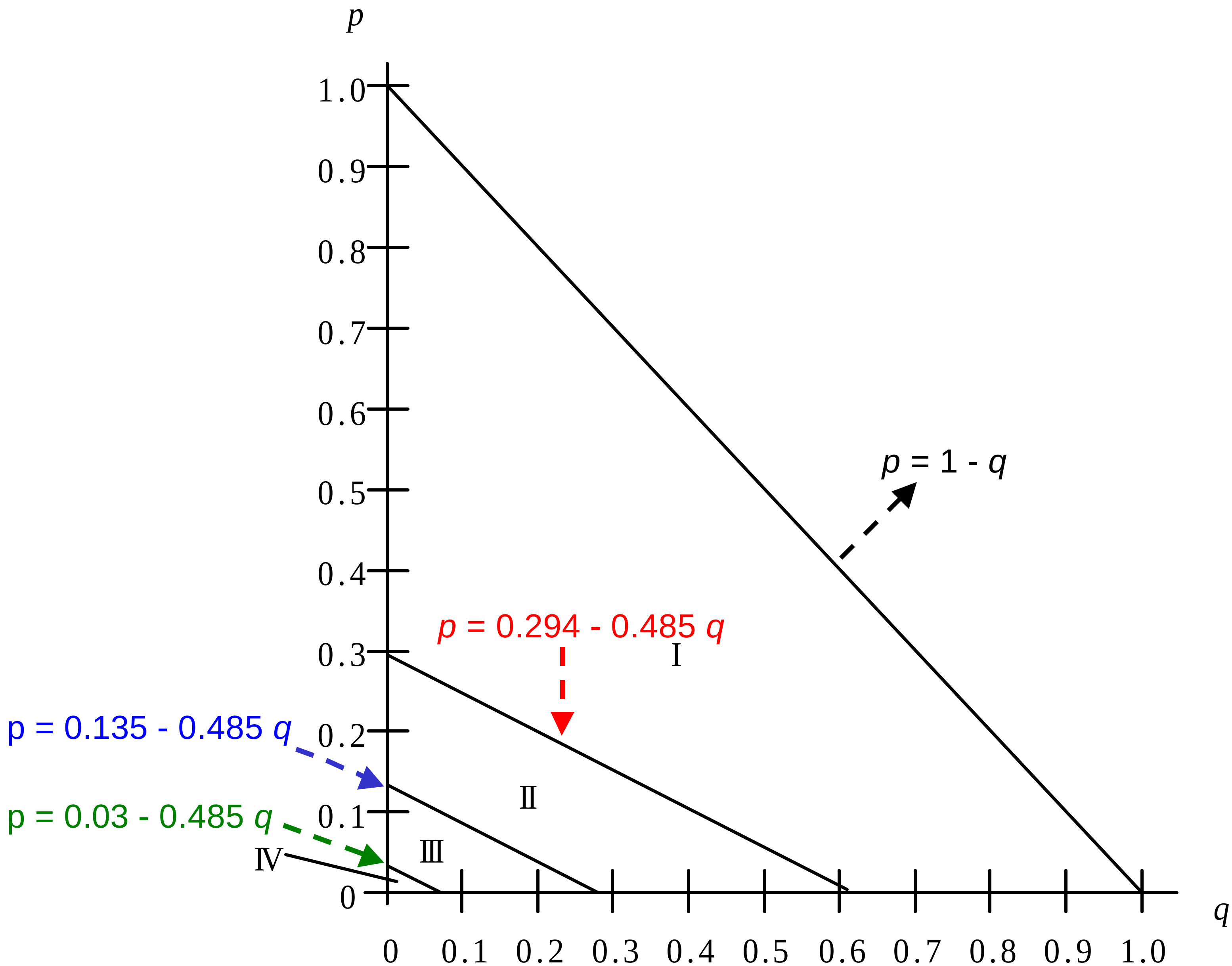
  $0.03 - 0.485\, q > p$. (2)

- EMV(B) > EMV(C) $\Leftrightarrow$

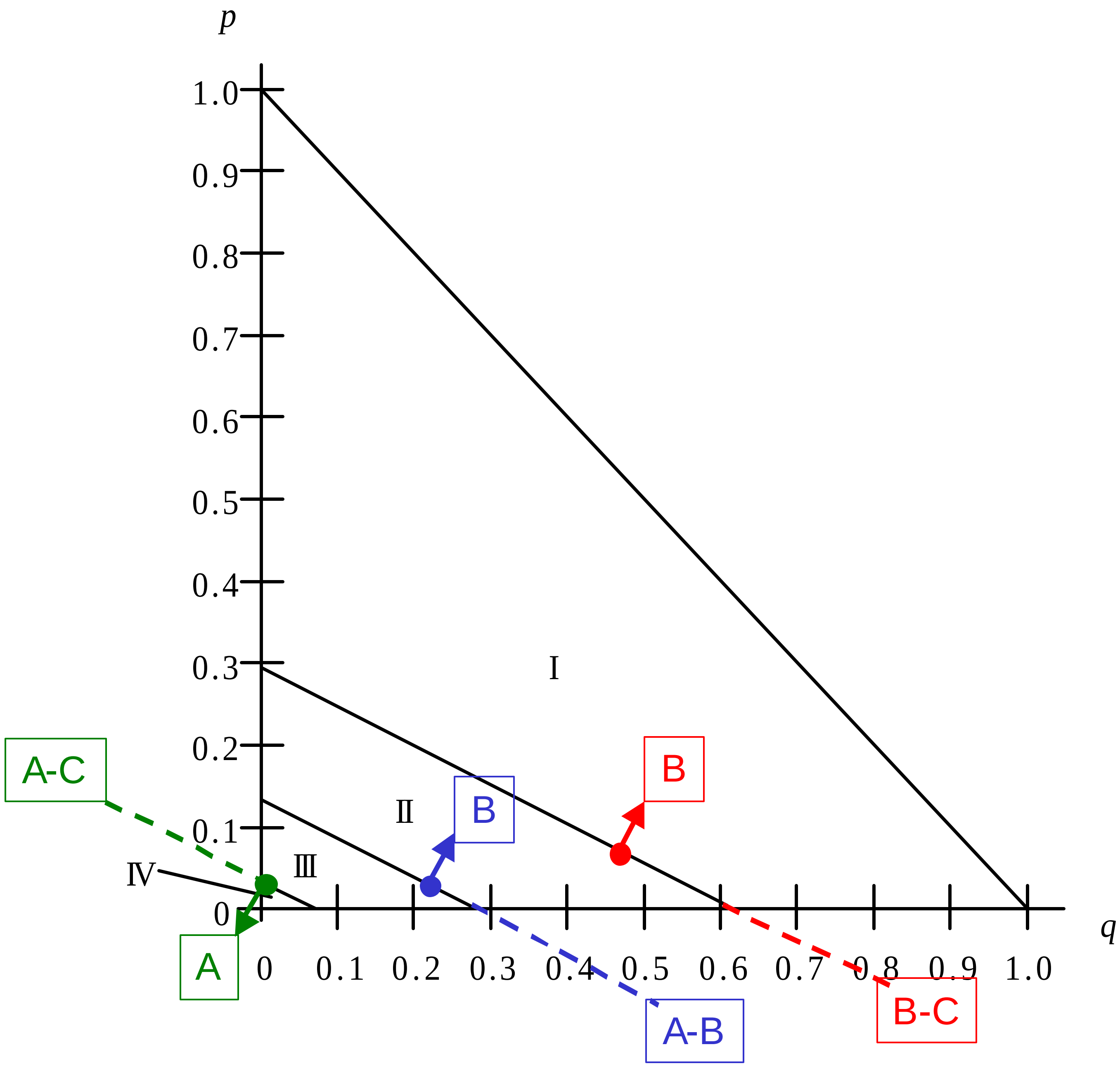
  $0.85 + 8.549\, p + 4.15\, q > 1.85 + 5.15\, p + 2.5\, q \Leftrightarrow$

  $p > 0.294 - 0.485\, q$. (3)

Plot these three inequalities as lines on a graph with p on the vertical axis and q on the horizontal axis. Note that only the region below the line $p + q = 1$ is feasible because $p + q$ must be less than or equal to one.



These three lines divide the graph into four separate regions, labeled I, II, III, and IV.


p
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
I
II
III
IV
A-C
A
B
B
A-B
B-C
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
q

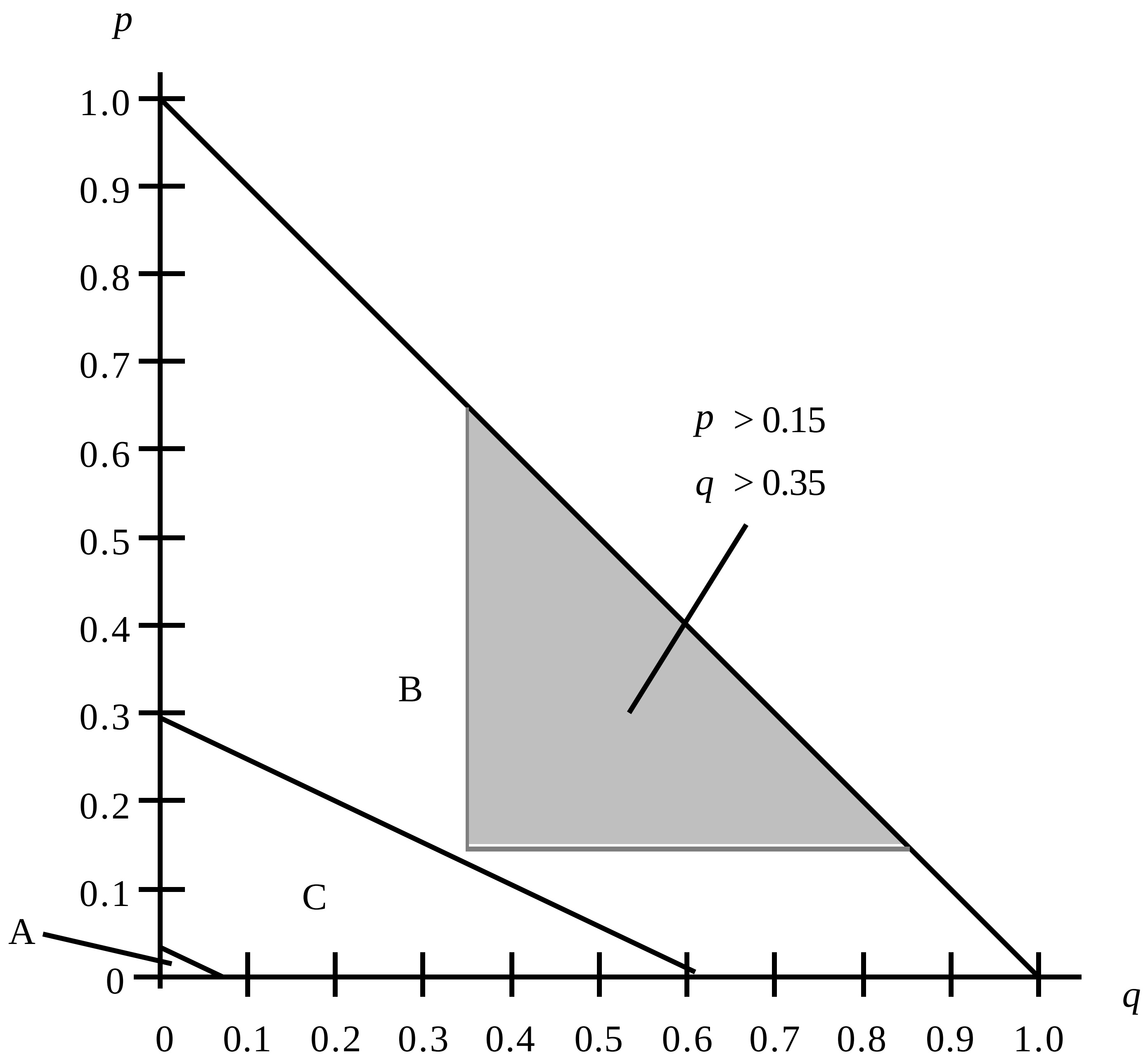
Inequality (3) divides regions I and II. For points above this line, $p > 0.294 - 0.485\, q$, and so EMV(B) > EMV (C).

Inequality (1) divides regions II and III. For points above this line, $p > 0.135 - 0.485\, q$, and EMV(B) > EMV(A). As a result of this, we know that B is the preferred choice in region I and that C is the preferred choice in region II [where EMV(C) > EMV (B) > EMV(A)].

Inequality (2) divides regions III and IV. For points above this line, $p > 0.03 - 0.485\, q$, and EMV(C) > EMV (A). Thus, we now know that C is the preferred choice in region III [where EMV(C) > EMV(A) and EMV(C) > EMV(B)], and A is preferred in region IV.

Thus, we can redraw the graph, eliminating the line between regions II and III

B. If Liedtke thinks that p must be at least 0.15 and q must be more than 0.35 can he make the decision without further probability assessment.


p
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
p > 0.15
q > 0.35
B
C
A
q
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0

Conclusion:

The shaded area in the figure represents those points for which $p > 0.15$ and $q > 0.35$. Note that all of these points fall in the “Choose B” region. Thus, Liedtke should adopt strategy B: **Counteroffer \$5 billion, then refuse if Texaco offers \$3 billion.**