

The passenger (player 1) can Pay or Not Pay the ticket, the firm (player 2) can Check or Not Check the passenger. So we have a simple  $2 \times 2$  game. Problem is what are payoffs. We rule out the (realistic) case where the passenger always pays the ticket because she is inherently honest.

A possibility is the following

	C	NC
P	0 0	-1 1
NP	-M M	1 0

Then the (unique) mixed equilibrium has

$$p = \frac{M}{M+1} \quad q = \frac{2}{2+M}$$

For instance with  $M = 10$  we get  $p = 10/11, q = 1/6$ . With  $M = 20$  the passenger almost always pays, the firm almost never checks - which is not entirely satisfactory. We would like to get that the equilibrium entails that the passenger almost always pays but the firm checks with probability not too far from  $1/2$ .

Anyway, here are the payoffs.  $1 - p = \frac{1}{M+1}, 1 - q = \frac{M}{2+M}$

Firm:

$$p(1 - q) + M(1 - p)q = \frac{M}{M+1}$$

Passenger:

$$-p(1 - q) - M(1 - p)q + (1 - p)(1 - q) = -\frac{M}{M+2} < 0$$

Possible modification of payoff matrix: with  $a > 0$

	C	NC
P	a 0	-1 1
NP	-M M	1 0