## APPENDIX A
## PROOF OF LEMMA 1

The risk-free profit $\Phi(p) = (p-r)d(p)$ is quasiconcave, since $p-r$ is monotonic and thus quasiconcave, $d(p)$ is concave and thus quasiconcave, and the product of two quasiconcave functions are quasiconcave. From (7) and (8), the first-order derivative of the profit loss function $\Lambda(p)$ is $d'(p)m\int_{C-d(p)}^{B} f(u)\mathrm{d}u$, which is increasing in $p$. Thus $-\Lambda(p)$ is concave in $p$. Since $E[R(p)] = \Phi(p) - \Lambda(p)$, it can be readily shown that the sum of a quasiconcave function and a concave function is quasiconcave.

## APPENDIX B
## PROOF OF THEOREM 2

Since $\bar{d}(p)$ includes both inelastic and elastic traffic demand, its elasticity is smaller, i.e. $\bar{\sigma}(p) < \sigma(p)$ for any $p$. The first-order condition of (15) amounts to

$$\bar{p} = \bar{r} - \frac{\bar{d}(\bar{p})}{\bar{d}'(\bar{p})} \Rightarrow \bar{p} = \frac{\bar{r}}{1-\bar{\sigma}(\bar{p})^{-1}} \tag{22}$$

by substituting (2). This implies that $1 < \bar{\sigma}(\bar{p})$. At the optimal spot price $p^*$, $d(p^*) < C$ always holds as discussed in Sec. 3.3. Thus substituting (2) into (12), and applying the one-sided Chebyshev Inequality (Chebyshev-Cantelli Inequality) to upper bound $\Pr(\epsilon > C - d(p^*))$,

$$p^* < \frac{r}{1-\sigma(p^*)^{-1}} + ma, \text{ where } a = \frac{\theta^2}{\theta^2 + (C - d(p^*) - \mu)^2}.$$

$\mu$ and $\theta$ are the mean and standard deviation of $\epsilon$, respectively. Now assume that $p^* \geq \bar{p}$, which implies

$$\frac{\bar{r}}{1-\bar{\sigma}(\bar{p})^{-1}} < \frac{r + ma\left(1-\sigma(p^*)^{-1}\right)}{1-\sigma(p^*)^{-1}}.$$

$1 < \bar{\sigma}(\bar{p}) \leq \bar{\sigma}(p^*) < \sigma(p^*)$ by (3), and $0 < 1-\bar{\sigma}(\bar{p})^{-1} < 1-\sigma(p^*)^{-1}$. Thus,

$$\bar{r} < r + ma\left(1-\sigma(p^*)^{-1}\right),$$

which contradicts with condition (16).

## APPENDIX C
## PROOF OF LEMMA 3

Substituting (12) into (7),

$$\begin{aligned} E[R(p^*)] &= (p^*-r)d(p^*) - m\int_{C-d(p^*)}^{B} \left(d(p^*) - C + u\right) f(u)\mathrm{d}u \\ &> (\bar{p}-r)d(\bar{p}) - m\int_{C-d(\bar{p})}^{B} \left(d(\bar{p}) - C + u\right) f(u)\mathrm{d}u \\ &> (\bar{p}-r)d(\bar{p}) - (d(\bar{p}) - C + B)m \cdot \Pr\left(\epsilon > C - d(\bar{p})\right) \end{aligned}$$

The first inequality is due to the optimality of $p^*$, and the second due to the fact that $d(\bar{p}) - C + B \geq d(\bar{p}) - C + u$. $p^* < \bar{p}$, thus $E'[R(\bar{p})] < 0$ due to quasiconcavity. From (11)

$$m \cdot \Pr\left(C - d(\bar{p})\right) < \bar{p} + \frac{d(\bar{p})}{d'(\bar{p})} - r.$$

$\bar{p} + \frac{d(\bar{p})}{d'(\bar{p})} = \bar{r}$ from (22). Thus,

$$\begin{aligned} E[R(p^*)] &> (\bar{p}-r)d(\bar{p}) - (d(\bar{p}) - C + B)(\bar{r} - r) \\ &= (\bar{p}-\bar{r})d(\bar{p}) + (\bar{r}-r)(d(\bar{p}) - d(\bar{p}) + C - B) \\ &= E[\bar{R}(\bar{p})] + (\bar{r}-r)(C-B). \end{aligned}$$

$C > B$ always holds as discussed in Sec. 3.3.