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TAXATION AND GOVERNMENT REVENUE AT MICRO LEVEL

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A common aspect is that higher tax-rates can increase supply elasticity; but nevertheless it may diminish the consumption of commodities which can result in smaller revenue to the government. The trade literature has shown empirically, the existence of a revenue-maximizing tariff. In this paper we shall show mathematically that, gradually increasing tax will attain a level at which the revenue function is at a maximum and beyond this level the revenue via taxation diminishes. For an analytical treatment, we set up a dynamic micro market model, in the usual notation, and we assume that for a single commodity with a price adjustment mechanism, the demand function and the supply function with taxation take the form

$$\begin{aligned} Q_d &= a - bP, \\ Q_s &= -c + d(P - T); \quad \text{and} \\ \frac{dP}{dt} &\propto E_d (= \text{excess demand}) \Leftrightarrow \frac{dP}{dt} = jE_d \end{aligned}$$

Here a, b, c, d are positive parameters; T is the tax-rate and $j (> 0)$ is the adjustment speed of $P(t)$.

Thus, the time path of the price function takes the form $P(t) = (P(0) - \bar{P}_T)e^{-kt} + \bar{P}_T$; where $\bar{P}_T = P + \frac{d}{b+d}T$, $\bar{P} = \frac{a+c}{b+d} > 0$ and $k = j(b+d) > 0$. Noting that the Intertemporal Equilibrium is *dynamically stable*, the following results are obtained via algebraic techniques:

The selling price rises by $\frac{d}{b+d}T = P^*(\leftarrow T)$, the consumption falls by $\frac{bd}{b+d}T = Q^*$ and the government revenue is given by $M_T = T\bar{Q} - \frac{bd}{b+d}T^2$ which is a quadratic function of T , representing a parabolic path for M_T over T . Moreover,

- (i) $0 < P^* < \frac{T}{2}$, provided that the demand curve is steeper than the supply curve;
- (ii) $0 < Q^* \leq \frac{T}{2}\sqrt{bd}$.

Revenue maximizing tariff exists when $0 < T \leq \frac{ad-bc}{2bd}$ (normal range) and the government revenue $M_T \leq \frac{(ad-bc)^2}{4bd(b+d)}$, taking the maximum at the end value of the normal range. Hence, we conclude that a relatively smaller portion of the levy can pass on to the consumer if the demand elasticity exceeds the supply elasticity, while the government revenue achieves a maximum.