

Written Exam for the M.Sc. in Economics Winter 2014-15

**Tax Policy**

Final Exam

February 18, 2015

(3-hour closed book exam)

Please note that the language used in your exam paper must correspond to the language of the title for which you registered during exam registration. I.e. if you registered for the English title of the course, you must write your exam paper in English. Likewise, if you registered for the Danish title of the course or if you registered for the English title which was followed by “eksamen på dansk” in brackets, you must write your exam paper in Danish.

**This exam question consists of 2 pages in total (excluding the front page).**

# Exam - Tax Policy - Fall 2014 (resit)

Read carefully before you start:

The exam consists of three parts each with a number of subquestions. You are supposed to answer ALL questions and subquestions. Good luck!

## Part 1: Commodity taxation

Consider an economy with  $n$  goods that have fixed producer prices normalized to 1 so that the consumer price on good  $j$  equals  $q_j = 1 + t_j$ . There is a single individual who is endowed with unearned income  $Z$ , faces a fixed wage rate  $w$  and maximizes utility  $u(X_1, \dots, X_n, L)$  over the consumption of the  $n$  goods and the labor supply  $L$  subject to the budget constraint. Utility maximization yields demand functions  $X_j(q, Z)$  and the indirect utility function  $V(q, Z)$  where  $q = (w, q_1, \dots, q_n)$ . Define  $\alpha = \partial V / \partial Z$  as the marginal utility of income. The government sets the  $n$  commodity tax rates so as to maximize  $V(q, Z)$  subject to the constraint that the tax revenue equals an exogenous requirement  $T$ .

$$\sum_{j=1}^n t_j X_j(q, Z) = T$$

(1A) **Q:** Show that the optimal commodity tax system satisfies:

$$\frac{\lambda - \mu}{\lambda} = -\frac{\sum_j t_j S_{jk}}{X_k} \text{ for } k = 1, \dots, n \quad (1)$$

where  $\lambda$  is the social marginal value of government revenue,  $\mu \equiv \alpha + \lambda(\sum_j t_j \partial X_j / \partial Z)$  is the social net marginal value of private income and  $S_{jk}$  is the first-derivative of the compensated demand for good  $j$  with respect to the consumer price on good  $k$  [**Hint:** use the Slutsky equation:  $\partial X_j / \partial q_k = S_{jk} - X_k \partial X_j / \partial Z$  and Roy's identity:  $\frac{\partial V}{\partial q_k} = -\alpha X_k$ ]. **Q:** Interpret equation (1), which is known as the Ramsey rule.

(1B) Doyle and Samphanthrak (2008) estimate the incidence of a particular commodity tax, the gasoline tax, by studying the repeal and subsequent reinstatement of gasoline taxes in the U.S. states of Indiana and Illinois **Q:** Explain the empirical strategy and the identifying assumption of the paper with your own words.

(1C) In 2011, Denmark introduced a surtax on fatty foods. The tax was applied at the rate of DKK 16 per kilo of saturated fat contained in foodstuffs and was levied in addition to the general value added tax at the rate of 25%. **Q:** Provide arguments based on the paper by O'Donoghue and Rabin (2003) that a higher tax on fatty foods than on other commodities may indeed be optimal.

## Part 2: Optimal income taxation

Consider an economy where the distribution of the individuals' pre-tax earnings is described by the cumulative distribution function  $H(z)$  and the density function  $h(z)$ . Individuals have quasilinear preferences, which eliminates income effects of tax changes. The government has a preference for equality, in particular let  $G(z)$  denote the average social welfare weight on individuals with income larger than  $z$  relative to the average social welfare weight across all individuals.

The government can implement a general non-linear income tax function  $T(z)$ . The marginal tax rate at a given income level  $z$  is thus given by  $T'(z)$ . Behavioral responses to taxation are captured by the elasticity of pre-tax earnings with respect to  $1 - T'(z)$

$$e(z) = \frac{\partial z}{\partial 1 - T'(z)} \frac{1 - T'(z)}{z}$$

(2A) Consider a small increase in the marginal tax rate from  $T'(z)$  to  $T'(z) + \Delta\tau$  in the small income range between  $z$  and  $z + \Delta z$ . **Q:** Derive the mechanical revenue effect (" $\Delta M$ "), the behavioral revenue effect (" $\Delta B$ ") and the social welfare cost (" $\Delta W$ ") of this policy change. **Q:** Explain the expressions with your own words.

(2B) **Q:** Show that the optimal marginal tax rate at income level  $z$  is characterized by:

$$\frac{T'(z)}{1 - T'(z)} = \frac{1 - G(z)}{e(z)} \cdot \frac{1 - H(z)}{zh(z)}$$

**Q:** Explain the roles played by  $e(z)$ ,  $G(z)$ ,  $H(z)$  and  $h(z)$  in determining the optimal marginal tax rate at income level  $z$ .

(2C) **Q:** Use the formula to derive the optimal marginal tax rate applying to the individual with the highest income in the economy? **Q:** What is the intuition for this result and what are the implications for practical policy making?

## Part 3: Shorter questions

(3A) **Q:** How should a reduction in the dividend tax rate affect dividend payments under the "new view" of dividend taxation? **Q:** Is this prediction supported by the empirical evidence presented by Chetty and Saez (2005)?

(3B) **Q:** What has been the overall trend in corporate tax rates in the OECD countries over the last 30 years. **Q:** How can this trend be explained by the theory of international tax competition and what policy recommendations can be drawn from this theory?