Written Exam for the M.Sc. in Economics winter 2013-14

Tax Policy

Final Exam
10 January 2014

(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 5 pages in total

Exam - Tax Policy - Fall 2013

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: Firm taxation

In the basic model of Chetty and Saez (2010) without agency problems, a firm owns cash of X, at the beginning of the period (representing retained earnings from previous periods). It pays dividends D, raises new equity of E and invests I in productive capital where $X = D + I - E$. The government levies a corporate tax t_c on firm profits and a dividend tax t_d on dividend distributions. Assuming that the firm is liquidated at the end of the period, the value of the firm is given by:

$$V = (1 - t_d)D - E + \frac{(1 - t_d)[(1 - t_c)f(I) + X - D] + E}{1 + r} \tag{1}$$

(1A) **Q**: Provide a brief explanation for equation (1). **Q**: Show that a value-maximizing firm never issues new shares and pays dividends at the same time and explain why.

(1B) **Q**: Show how the dividend tax affects dividend payments and investment under the "new view" where $(1 - t_c)f'(X) < r$ and explain the intuition for these results. **Q**: Relate briefly to the empirical study of the US dividend tax cut in 2003 by Chetty and Saez (2005).

(1C) Chetty and Saez (2010) develop the model to take into account agency problems. Specifically, it is assumed that the management maximizes

$$V^M = \alpha(1 - t_d)\left[D + \frac{(1 - t_c)f(I) + X - D}{1 + r}\right] + \frac{1}{1 + r}\frac{g(J)}{1 + \gamma} \tag{2}$$

where $J = X - I - D$. **Q**: Explain the meaning of agency problems and how they are captured by the objective function (2) while paying special attention to the three parameters α, J and γ. **Q**: Derive the first-order conditions for I and D and use them to show that when α and γ are sufficiently large, the investment level will be at the value-maximixing level defined by $(1 - t_c)f'(I^*) = r$ and dividends will be positive [**Hint**: you may start by rewriting equation (2) in terms of $\omega \equiv \alpha(1 - t_d)(1 + \gamma)$]. **Q**: Argue how the dividend tax affects dividend payments and investment of such a firm and relate briefly to the empirical study of the US dividend tax cut in 2003 by Chetty and Saez (2005).

Part 2: 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 $u(X_1, .., X_n, L)$ 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 $q = (w, q_1, .., q_N)$. 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.

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

(2A) **Q**: Show that the optimal commodity tax system satisfies:

$$\frac{\lambda - \mu}{\lambda} = -\frac{\sum_j t_j S_{jk}}{X_k} \text{ for } k = 1, ..., n \tag{3}$$

where λ 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 repect 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 (3).

(2B) **Q**: Explain with your own words (no algrebra needed) how optimal commodity taxation changes if there is more than one individual in the economy. **Q**: Explain with your own words (no algrebra needed) how optimal commodity taxation changes if the individual has self-control problems in the way assumed by O'Donoghue and Rabin (2003).

(2C) 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, with reference to the figure in Annex A, the empirical strategy used by the paper and its findings. **Q**: What does the model outlined under question (2A) implicitly assume about the incidence of commodity taxes?

Part 3: Shorter questions

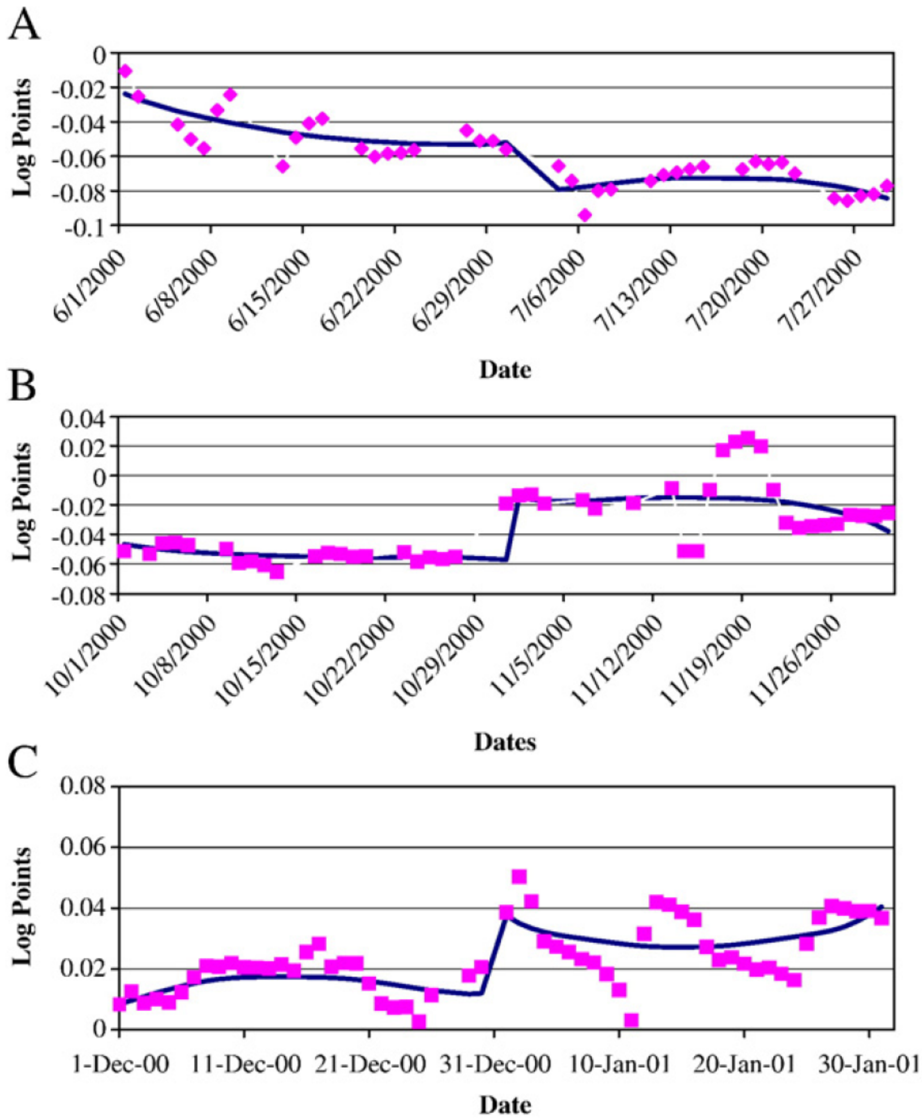
(3A) Diamond and Saez (2011) show that the optimal marginal tax rate at income level z can be expressed as:

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

where $T'(z)$ is the marginal tax rate at income level z; $e(z)$ is the elasticity of taxable income at income level z; $H(z)$ and $h(z)$ are the cummulative distribution function and the density function decribing the pre-tax distribution of income and $G(z)$ is the social value of a dollar increase in disposable income of individuals with incomes above z measured relative to the social value of public funds ; **Q**: Explain each of the determinants of the optimal marginal tax rate.

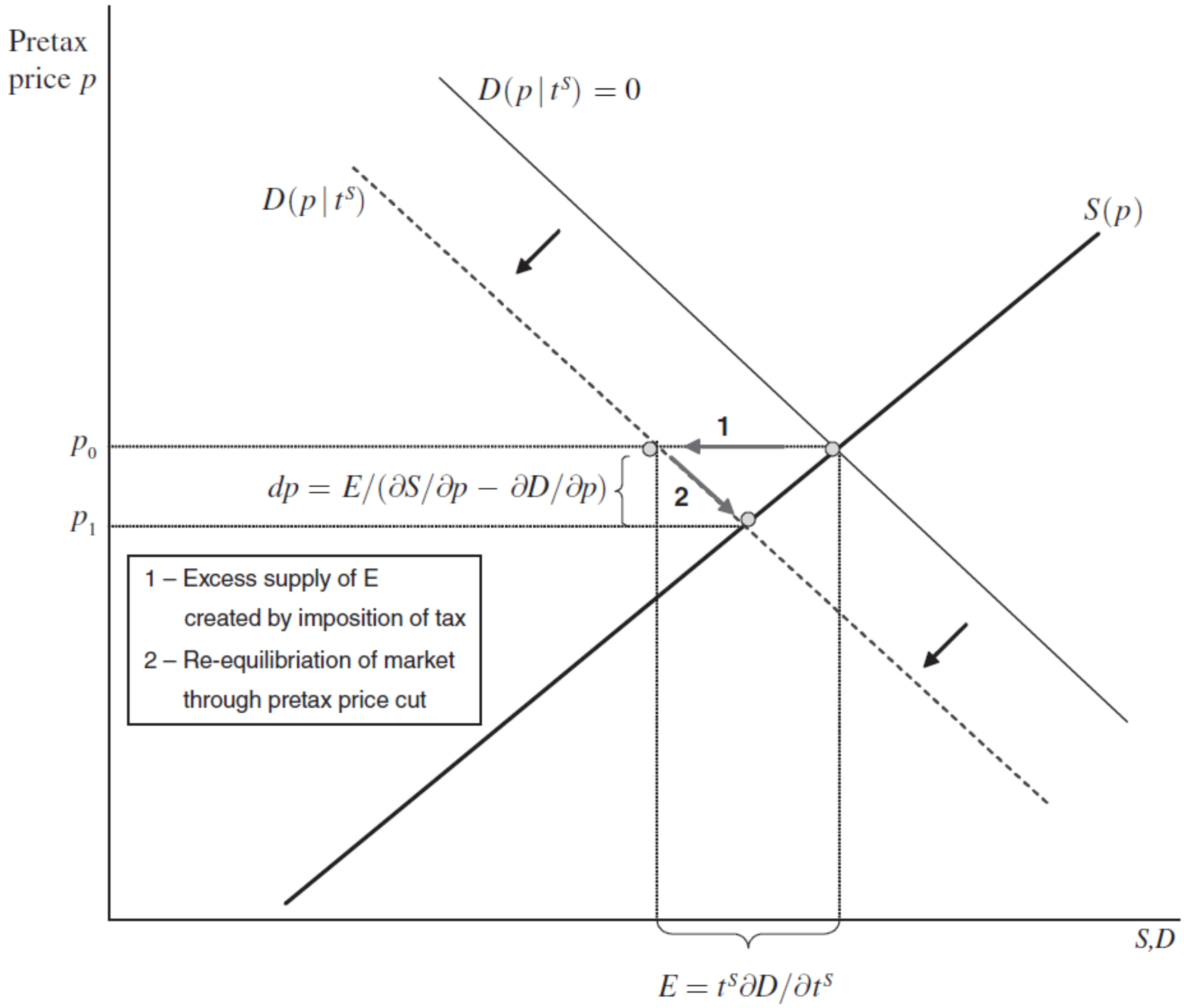
(3B) **Q**: What determines the incidence of sales taxes on consumers in the theoretical model of tax salience by Chetty, Kroft and Looney (2009)? Explain with reference to the figure in Annex B.

Annex A



Source: Doyle and Samphanthrak (2008)

Annex B



Source: Chetty, Kroft and Looney (2009)