

Written Exam at the Department of Economics summer school 2017

Tax Policy

Final Exam

18 August 2017

(3-hour closed book exam)

Please note that the language used in your exam paper must correspond to the language for which you registered during exam registration.

This exam question consists of 7 pages in total

NB: If you fall ill during the actual examination at Peter Bangsvej, you must contact an invigilator in order to be registered as having fallen ill. Then you submit a blank exam paper and leave the examination. When you arrive home, you must contact your GP and submit a medical report to the Faculty of Social Sciences no later than seven (7) days from the date of the exam.

Exam - Tax Policy - Summer 2017

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: Paternalism

In the model developed by O'Donoghue and Rabin (2003), a consumer has the following utility in period t :

$$u_t = \rho \ln(x_t) + \sigma \ln(y_t) + z_t - \gamma \ln(x_{t-1}) \quad (1)$$

where x denotes consumption of potato chips, y denotes consumption of carrots and z denotes consumption of other things and ρ , σ and γ are positive parameters. The consumer's lifetime utility evaluated in period t is given by:

$$U^t = u_t + \beta(\delta u_{t+1} + \delta^2 u_{t+2} + \delta^3 u_{t+3} + \dots) \quad (2)$$

Before-tax prices are normalized to one and z is untaxed, hence the consumer in each period faces the following budget constraint:

$$B = p_x x_t + p_y y_t + z_t$$

where $p_x = 1 + t_x$ and $p_y = 1 + t_y$ are the after-tax prices of potato chips and carrots respectively and B is income (which is exogenous).

(1A) **Q:** Interpret the parameters β and δ and indicate which values (or ranges of values) you would expect for individuals *with* self-control problems and for individuals *without* self-control problems respectively? **Q:** Show that a consumer maximizing U^t demands the following quantities in period t :

$$x^* = \frac{\rho - \beta\delta\gamma}{p_x}$$

$$y^* = \frac{\sigma}{p_y}$$

$$z^* = B - (\rho - \beta\delta\gamma + \sigma)$$

Assume that the government needs to raise a fixed amount of revenue R in each period with the taxes on carrots and potato chips:

$$R = t_x x^* + t_y y^*$$

(1B) **Q:** Show that in period t the government maximizes the long-run utility of the consumer by setting tax rates so as to maximize the following expression:

$$\tilde{U}^t = u_t + \delta u_{t+1} + \delta^2 u_{t+2} + \delta^3 u_{t+3} + \dots$$

Q: Discuss why the government should maximize a different function than the consumer's utility function. Include the notion of "optimal paternalism" in the discussion.

(1C) **Q:** Show that the optimal tax on potato chips in period t can be characterized as:

$$\frac{t_x}{1 + t_x} = \frac{\mu_t - \frac{\rho - \delta\gamma}{\rho - \beta\delta\gamma}}{\mu_t}$$

where μ_t is the Lagrangian multiplier associated with the government revenue constraint in period t . **Q:** Compare the formula to the inverse elasticity rule that emerges from the Ramsey problem when cross-elasticities are zero and discuss the role played by β in shaping optimal taxes on potato chips.

Part 2: Firm taxation

Consider a firm with retained profits of X . At the beginning of period 0, the firm decides how many dividends to pay out to the shareholders, D , how much new equity to raise, E , and how much to invest, I . Investment generates profits of $f(I)$ in the course of period 0 where $f(\cdot)$ is a strictly concave function. The firm is liquidated at the beginning of period 1. At this stage, retained earnings of $X + f(I) - D$ are paid out to the shareholders as a dividend and E is returned as repayment of capital. Corporate profits are taxed at t^C and dividends are taxed at t^D . As an alternative to investing in the firm, shareholders can invest in bonds, which yield a tax free return of

r . Assume that the firm's investment decision is designed to maximize firm value.

(2A) **Q:** Write down an expression for the value of the firm and interpret it. **Q:** Show how a change in the dividend tax affects firm investment under the old view of firm taxation and explain the result [*hint: you may assume that the firm finances marginal investment with equity ($E > 0$) and does not pay out dividends ($D = 0$)*].

(2B) Yagan (2015) estimates the effect of the dividend tax on corporate investment. **Q:** Explain the identification strategy and comment briefly on the main results with reference to Column 2 in the table in Annex A. **Q:** Discuss whether the empirical results are consistent with the theoretical model considered in (2A).

(2C) Chetty and Saez (2005) estimate the effect of the dividend tax on dividend pay-outs. **Q:** Explain the identification strategy and briefly discuss the main results with reference to the figures in Annex B. **Q:** Discuss verbally whether dividend taxes affect dividend pay-outs in period 0 and period 1 in the theoretical model developed in (2A) [*note: no calculations needed*] and whether the empirical results of Chetty and Saez (2005) are consistent with these predictions.

Part 3: Shorter questions

(3A) From the analysis of optimal commodity taxation follows the "Corlett-Hague rule", which implies that

$$\frac{t_1}{q_1} > \frac{t_2}{q_2} \text{ if and only if } \varepsilon_{20} > \varepsilon_{10}$$

where t_k is the tax rate of commodity k ; q_k is the tax-inclusive consumer price of commodity k ; and ε_{k0} is the compensated elasticity of demand for good k with respect to the wage rate w . **Q:** Provide an intuitive explanation for this result. **Q:** Can the result rationalize some otherwise puzzling features of real-world commodity taxes?

(3B) Johannesen, Tørsløv and Wier (2017) study corporate tax avoidance in developing countries by estimating how firms' reported profits correlate with

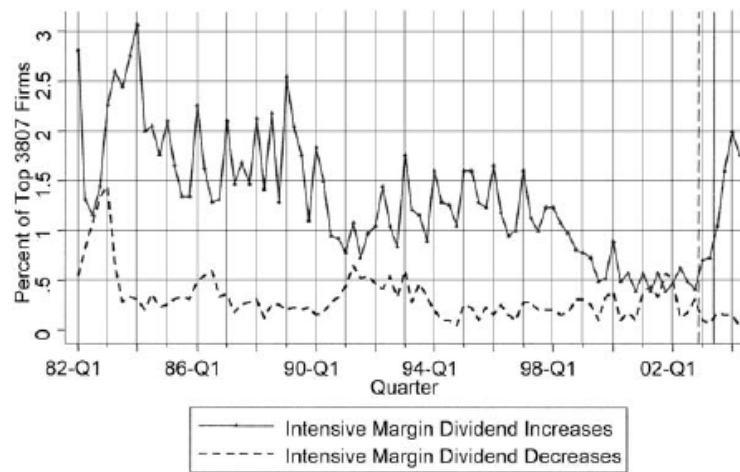
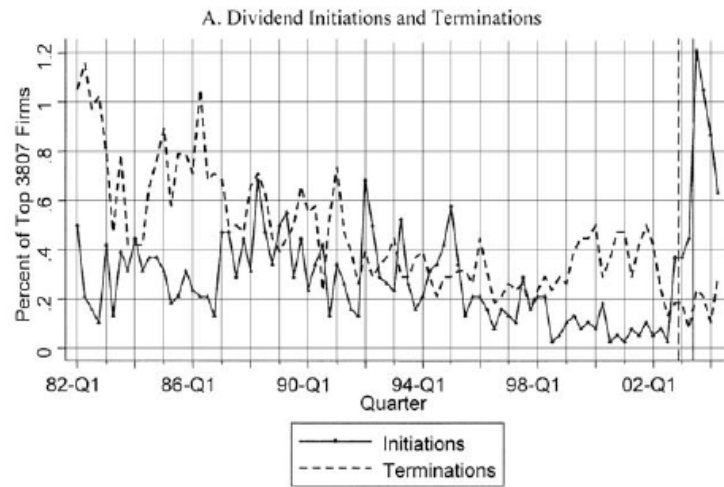
incentives for cross-border profit shifting conditional on production inputs **Q:** Explain how the paper's empirical methodology differs from that of previous paper in the literature. **Q:** Discuss the main results with reference to the table in Annex C.

Annex A

TABLE 2—EFFECT OF THE 2003 DIVIDEND TAX CUT ON INVESTMENT, NET INVESTMENT,
AND EMPLOYEE COMPENSATION

Dependent variable: Dep. var. winsorized at: Panel:	Investment					
	95th percentile			99th percentile		
	Unbalanced		Balanced	Unbalanced		Balanced
	(\$ per lagged capital)		(\$ per 96–97 cap.)	(\$ per lagged capital)		(\$ per 96–97 cap.)
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A. Investment</i>						
C-Corp × Post-2003	0.0008 (0.0044)	−0.0002 (0.0042)	−0.0063 (0.0226)	−0.0104 (0.0068)	−0.0118 (0.0066)	−0.1884 (0.1483)
Lagged controls		X			X	
Firm FE's			X			X
Observations (firm-years)	333,029	333,029	85,624	333,029	333,029	85,624
Clusters (firms)	73,188	73,188	7,784	73,188	73,188	7,784
R^2	0.01	0.07	0.53	0.01	0.05	0.55
Pre-2003 C-corp mean	0.2428	0.2428	0.2939	0.2828	0.2828	0.3682
Pre-2003 C-corp SD	0.2514	0.2514	0.3070	0.4181	0.4181	0.6478
Implied ε wrt $(1 - \tau_{div})$	0.01 [−0.08, 0.09]	0.00 [−0.08, 0.08]	−0.05 [−0.4, 0.3]	−0.09 [−0.19, 0.02]	−0.10 [−0.2, 0.01]	−1.18 [−3.01, 0.64]

Annex B



Annex C

Table 4: Zero profits, cross-sectional model

	Dependent variable: Indicator for zero profits							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Low/middle- income	High-income	Low/middle- income	High-income	All countries	All countries	All countries	All countries
Parent tax rate	-0.364*** (0.0610)	-0.164*** (0.0550)	-0.303*** (0.105)	-0.166*** (0.0290)	-0.308*** (0.0520)	-0.281*** (0.0650)	-0.333*** (0.0306)	-0.276*** (0.0558)
Average foreign affiliate tax rate								
Parent tax rate x GNI per capita (standardized)					0.0877** (0.0393)	0.0727* (0.0373)	0.123*** (0.0363)	0.0877* (0.0453)
Average foreign affiliate tax rate x GNI per capita (standardized)								
Parent tax rate x Governance (standardized)								
Average foreign affiliate tax rate x Governance (standardized)								
Observations	16,517	80,388	24,841	134,421	96,599	208,531	96,884	209,233
R-squared	0.060	0.056	0.065	0.045	0.057	0.048	0.058	0.049
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes