Lecture 2: Tax avoidance and excess burden

Economics 336

University of Toronto

Introduction

In Lecture 1, we saw how interventions that distort prices induce departures from the Pareto frontier. This raises some questions for tax systems.

How do we measure the welfare loss ("excess burden") from such distortions in a way that is economically meaningful? comparable among individuals?

How do we estimate the size of real world distortions in the tax system? What should we do about tax avoidance by taxpayers?

Consumer surplus

Consider a single consumer with demand for a single good $x(p)$. We want a monetary measure of the change in consumer welfare resulting from a price change from p^0 to p^1.

Example: Effect of an excise tax

What is taxpayer's welfare loss from an excise tax t on X?

- marginal willingness to pay is inverse demand curve: $x^{-1}(X)$
- consumer surplus at initial price q is: $\int_q^\infty x(p)dp$
- change in consumer surplus is: $\Delta CS = \int_q^{q+t} x(p)dp$

Note: ΔCS includes the tax revenue, which is a transfer from taxpayer to government. The excess burden of the tax nets out revenue:

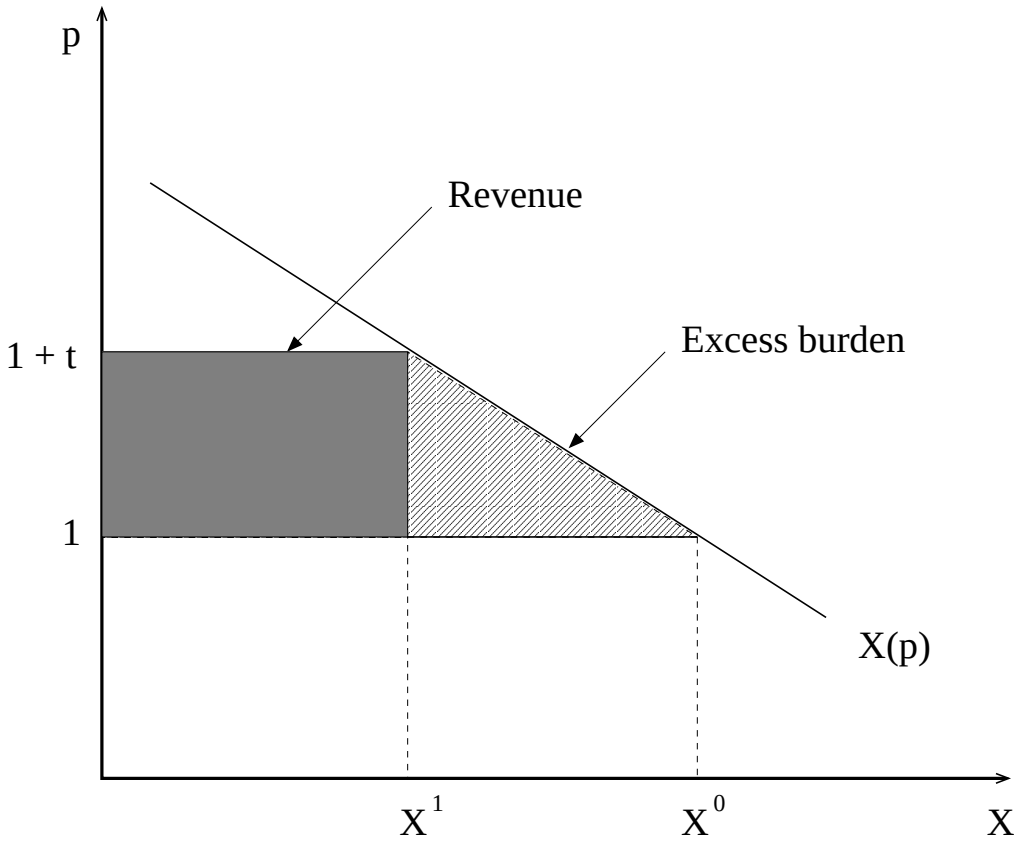


Figure : Excess burden and consumer surplus

Application: The 2010 TTC fare increase

In January, the TTC increased the token price of a trip from \$2.25 to \$2.50 (and Metropasses commensurately). What was the cost of this to TTC passengers/taxpayers? Was the change socially desirable?

Naive answer: Because TTC handles 250 million equivalent-to-cash trips per year, the cost of the increase was $\$0.25 \times 250 = \$62.5$ million.

But this overstates cost because revenue increase is benefit to taxpayers, and understates it because it ignores trips foregone at the higher price. A better approach: Calculate excess burden.

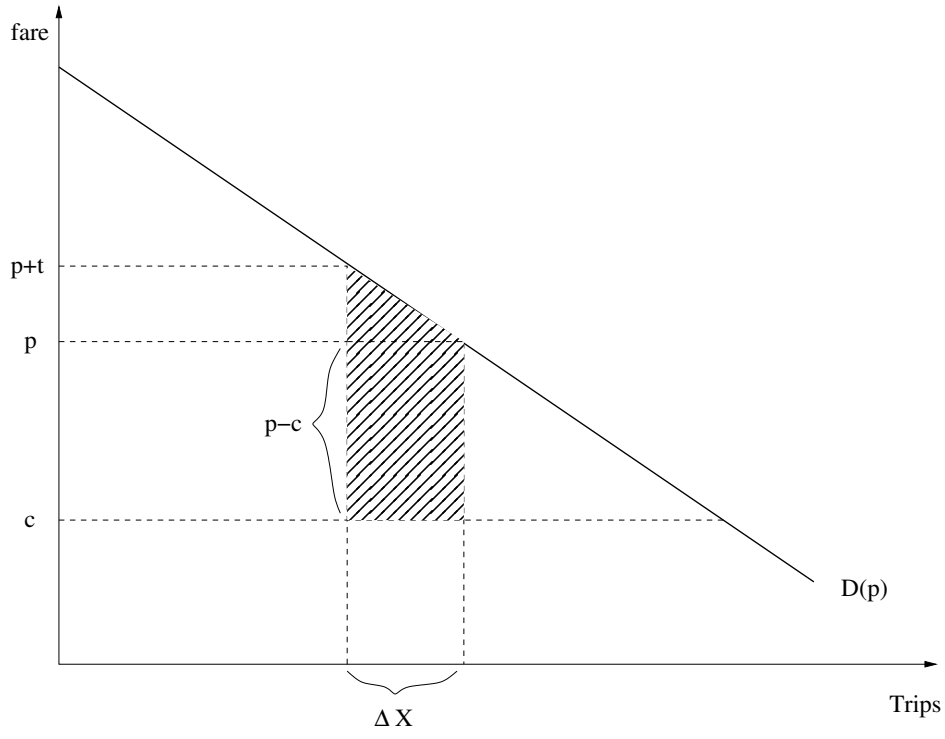


Figure : Excess burden of a fare increase

Solving for EB

From TTC 2009 Budget document:

FARE INCREASE SCENARIO	ANNUAL REVENUE IMPACT ($M)	ANNUAL RIDERSHIP IMPACT (M)
$0.25 Standard Pro-Rata	$50.4	(11.5)
0.25 Standard Pro-Rata, Metropass + 1 trip	$57.5	(12.1)
$0.25 Standard Pro-Rata, Metropass + 2 trips*	$62.5	(12.5)

Exercise: Calculate the EB of the fare increase

A general formula for excess burden

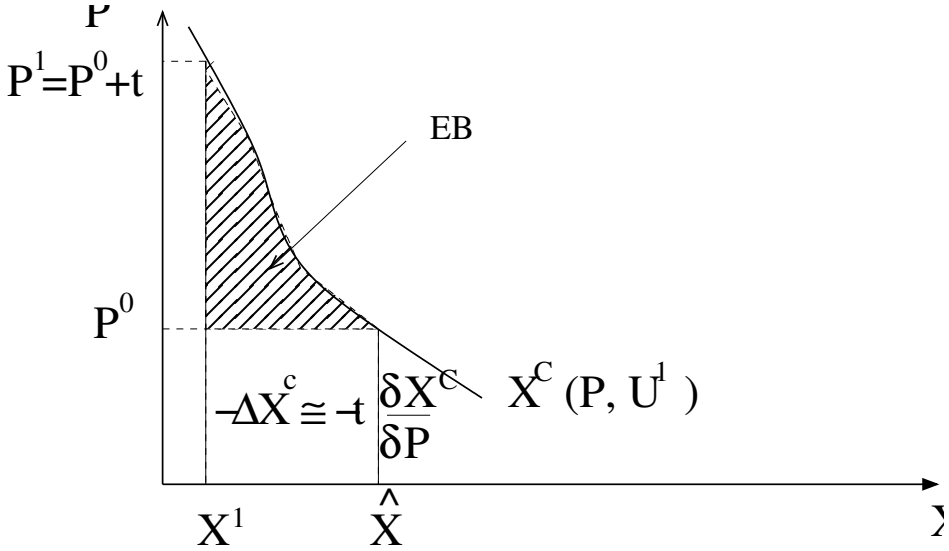


Figure : Measuring excess burden from the demand curve

Using formula for area of a triangle,

$$EB \approx -\frac{1}{2}t\Delta X \approx -\frac{1}{2}t^2\frac{\partial X}{\partial p} = -\frac{1}{2}\frac{t}{p}(tX)\frac{p}{X}\frac{\partial X}{\partial p} = \frac{1}{2}\frac{t}{p}\cdot TAXREV\cdot\varepsilon$$

(where $\Delta X \approx t\partial X/\partial p$) (where $\varepsilon = -(p/X)\partial X/\partial p$ is demand elasticity)

Implications?

Exercise: Excess burden with multiple taxes

Example: A consumer supplies labour and buys gin and rum. Suppose that the initial tax on rum is $t_r > 0$, and a positive tax on gin is introduced. Label the change in excess burden in the two markets, and write down the formula for it. Show that the change in EB is negative if t_g is small.

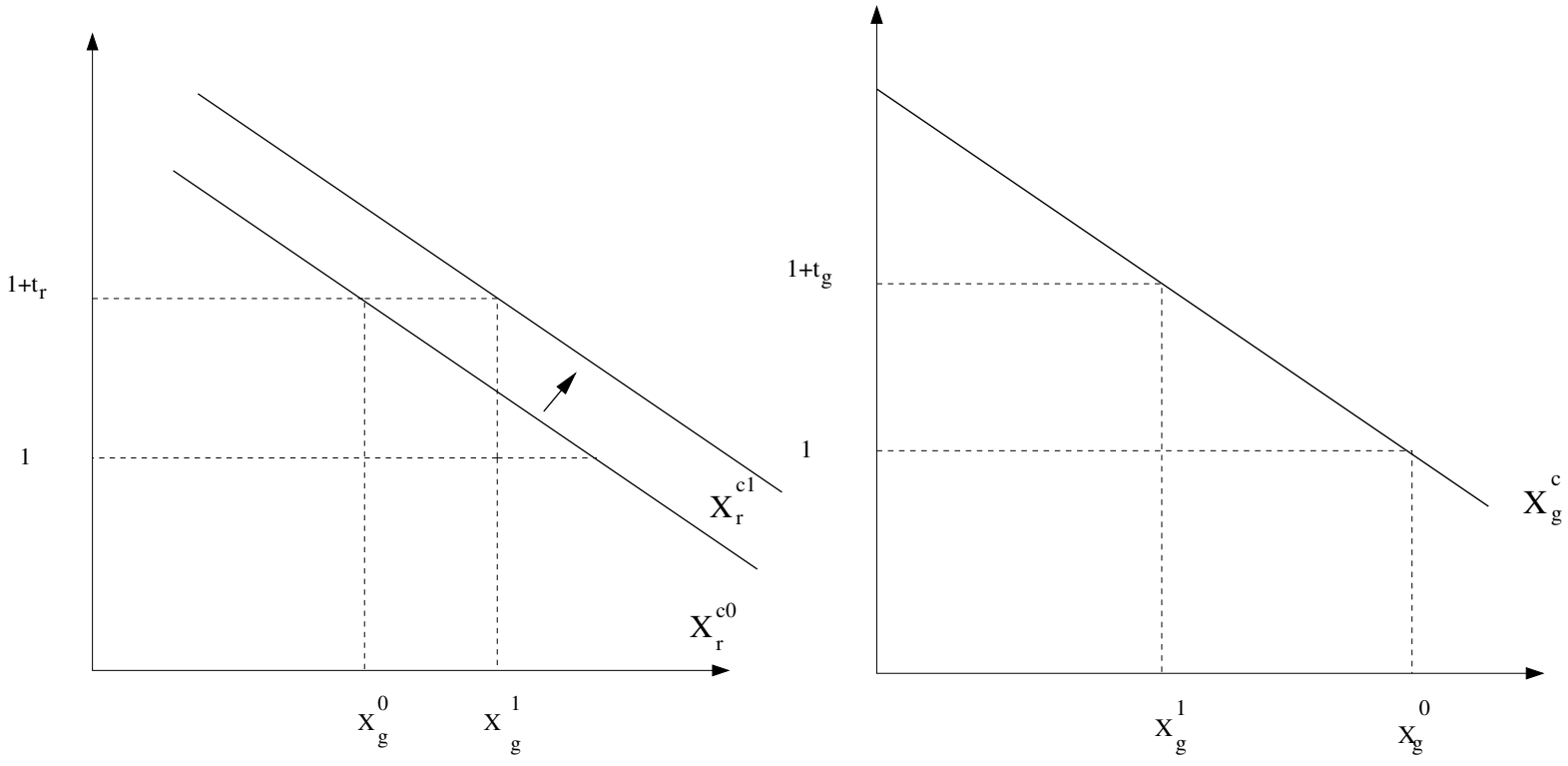
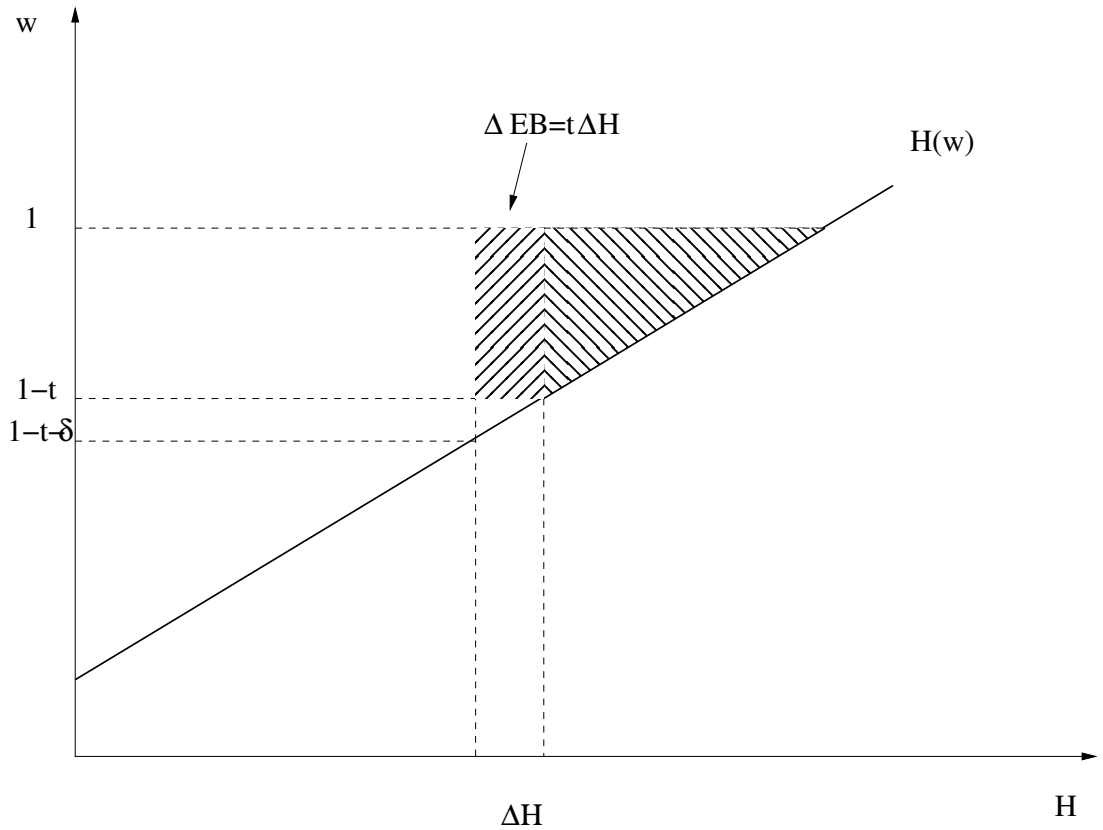


Figure : EB in rum and gin markets

Excess burden of income taxes

One of the most important taxes to think about is the personal income tax on labour income (over half of government revenue).

Our standard model says personal income tax at rate t reduces wage rate from w_0 to $w = w_0 - t$. Setting $w_0 = 1$ for simplicity:



A useful formula

Applying our general formula,

$$EB \approx \frac{1}{2} t^2 \frac{\partial H}{\partial w}$$

or

$$\frac{EB}{TAXREV} \approx \frac{1}{2} t \cdot \varepsilon$$

where

$\varepsilon = \frac{w}{H} \frac{\partial H}{\partial w}$ is the elasticity of labour supply and $TAXREV = twH$

But the (compensated) elasticity of hours worked is usually estimated to be in $[0, 0.2]$ for prime age males.

So, using our formula, excess burden is:

If tax responsiveness is so small, why bother worrying about excess burden?

In reality, tax response is more than just hours worked: Income taxation may change many aspects of behaviour, e.g.:

1. Participation (secondary earners, retirement)
2. Occupation, location of employment, and effort on the job

Also "pure avoidance activities" like shifts to:

1. Tax-advantaged compensation (self-employment, stock options and pension, payments in kind, etc.)
2. Saving in tax-advantaged forms (capital gains instead of interest income, real estate rents, etc.)
3. Tax evasion

All such avoidance activities create excess burden. So our previous geometric analysis applies, with *elasticity of reported taxable income (ETI)* in place of the hours elasticity.

Exercise: Tax shelters and excess burden

- In our tax system, capital gains income is taxed less than interest or labour income. (Why?)
- So tax avoidance behaviour should cause people to take more of their capital income as capital gains, rather than as interest or dividend income.
- Explain in qualitative terms why this creates excess burden in the tax system.

Estimating the ETI from tax reforms

We want to know how much taxable income responds to changes in tax rates.

A natural way to estimate is to examine actual responses to real-world tax reforms.

Estimating the ETI informs us about two separate but related questions:

- If we raise tax rates by 1 per cent, how much will revenue go up?
- If we raise \$1 more in revenue, how much will excess burden go up?

Feldstein (JPE, 1995) estimates ETI using tax return data around the 1986 US Tax Reform Act: looks at changes in income for individual taxpayers, from 1985 to 1988.

Difference-in-difference estimation

Standard problem in empirical research: knowing the "counterfactual" outcome if the reform had not been enacted. We need a control group.

Randomized trials are rare in public finance. Next best is a *quasi-experiment*: a policy reform that creates a "treatment" group who are affected by a policy change, and a "control" group who are not.

TRA86 was a "tax-flattening" reform: top MTR was 50% in 1985, but only 28% in 1988. Suggests a treatment group and two possible controls:

bracket	1985 MTR	observations
highest	49–50	57
high	42–45	197
medium	22–38	3538

Formalizing the difference-in-difference approach

We want to estimate how a taxpayer's taxable income responds to tax rate changes. A regression model:

$$\Delta \log Y_i = \alpha + e\Delta \log(1 - \tau_i) + u_i$$

The change in income depends not only on tax rates, but on *unobservable* changes in the economy, α. If all taxpayers i faced the same tax change, .

If treatment and control groups affected differently by tax reform, but in the same way by underlying economic changes, then we have a valid quasi-experiment.

Consider two groups l, h with different tax rate changes. Averaging over individuals in brackets l, h and differencing gives the difference-in-difference estimator

$$\hat{e} = \frac{\Delta\overline{\log Y_h} - \Delta\overline{\log Y_l}}{\Delta \log(1 - \tau_h) - \Delta \log(1 - \tau_l)}$$

Estimates (dependent variable is adjusted taxable income):

bracket	$\Delta \log(1-\tau)$	$\Delta \log TI$
highest (49-50)	+42.2	+44.8
high (42-45)	+25.6	+20.3
medium (22-38)	+12.2	+6.4
differences:		
highest–high	+16.6	+24.5
high–medium		
highest–medium		

Estimated elasticities (fill in the blanks yourself):

- for highest–high: $\hat{\gamma} = 24.5/16.6 \approx 1.48$
- for other control groups: and

All estimated elasticities exceed one, implying much stronger responses to taxation than previously estimated.

ETI and the Laffer curve

ETI therefore matters for estimating the excess burden of the tax. But it also matters for a more practical reason: estimating the revenue to be gained from a tax increase.

Write government revenue as a function of the tax rate:

$$R(t) = tY(1 - t)$$

This is sometimes called the "Laffer curve" (it's just a revenue function though).

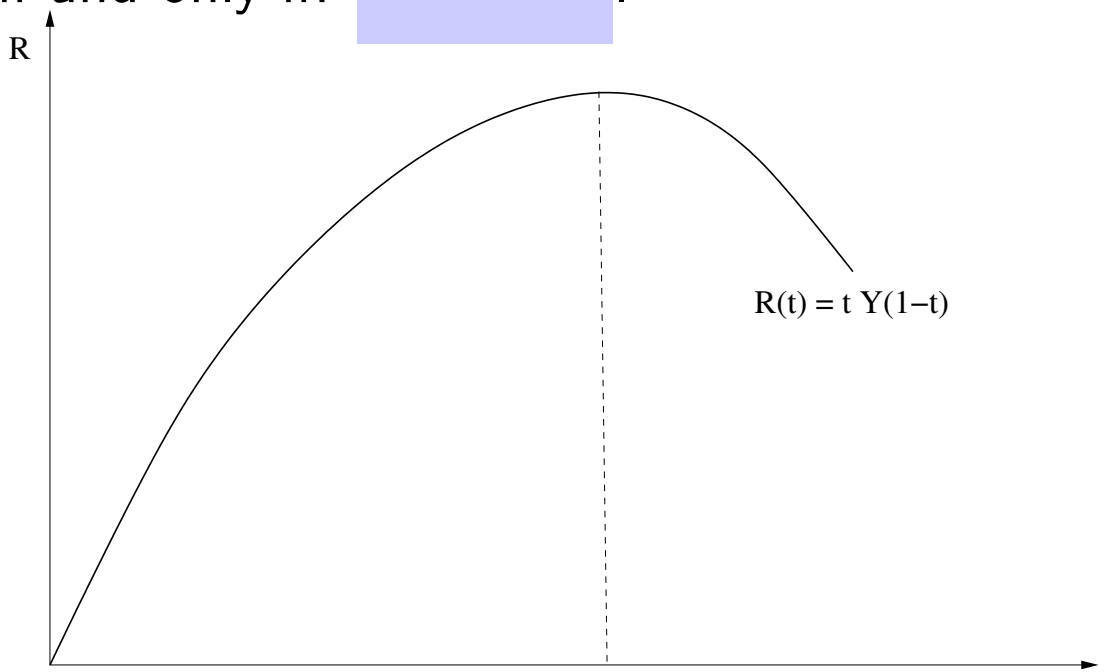
If the tax rate is increased by one percentage point, how much does revenue go up?

- mechanical approach: assume tax base unchanged. So revenue would rise by:
- behavioural approach: including avoidance response, the tax base would shrink, so revenue would rise by:

Revenue effects of tax increases

Graded exercise: Write marginal revenue as a function of t and e

So $\partial R/\partial t \geq 0$ if and only if: .



So based on Feldstein's estimates, the US was on side of the Laffer curve before 1986.

Problems with the methodology

1. Inequality trends: The DD approach is based on the assumption that, without the reform, the two groups would change exactly the same on average over time. (The "parallel trends" assumption.)
   Does this make sense for Feldstein's treatment and control groups?
   Lots of reasons why inequality might have been increasing in the 1980s (see "Wall Street").
2. Shifting income to other taxable forms: There is evidence that taxpayers responded by shifting income out of corporations into the personal tax base, and of shifting income through time (through stock options and capital gains realizations). But the impact of this on revenue and welfare is a lot smaller than Feldstein argues. (Why?)

Still, on balance, the ETI framework gives convincing evidence of a big response to taxes.