Chapter 3: The effect of taxation on behaviour

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Introduction

- The most important empirical question for economics: the behavorial response to taxes
- Calibration of macro-models of Dynamic general stochastic equilibrium models (DGSE)
- Calibration of optimal income taxation models
  - The sufficient statistics approach
- What elasticities ?
- The example of labour supply (labour demand, saving, risk-bearing are important as well)

Outline

- 1. A story of 4 elasticities of labor supply
- 2. The elasticity of reported income to the net-of tax
- 3; The elasticity of migration to tax rate (mobility)

1. A story of 4 elasticities of labor supply

- *Puzzle* : Macroeconomic models of fluctuation in hours of work over the business cycle or across countries imply much larger labor elasticities than microeconometric estimates of hours elasticities

- Discrepancy between the micro (small) and macro (large) elasticities

Effect on labor supply

- Estimation of 4 types of elasticity
- First Distinction between margins of response
  - Intensive (hours conditional on employment) vs extensive (participation)
  - The elasticity of aggregate hours (the relevant parameter for calibrating a representative agent model) is the sum of the extensive and the intensive weighted by hours of work

Second distinction

- Distinction between timing of response
  - intertemporal substitution (Frisch), steady state (Hicks)
  - Hicks : effect of the tax in the steady state if the tax revenues are returned to the consumer (to neutralize the income effect)
  - Frisch : intertemporal setting where the tax change is anticipated keeping constant the marginal utility of wealth
- Combinaison of the two distinctions to provide 4 elasticities

Frisch elasticities

- Analysis of intertemporal decisions when making the distinction between anticipated and unanticipated changes
- Anticipated changes have only substitution effects that can be unambiguously signed
- Unanticipated changes have also income effect and then cannot be signed without other assumptions.
- The major changes tend to be few and far between so that in the periods between announcements, the effects are anticipated.
  - the announcement of a raise in capital taxes has a once and negative income effect for those, before the annoucement, were planning to save.
  - As well as this, the raise makes consumption in any period more expansive relative to consumption before.
  - For any periods after the announcement, these effects are anticipated

Frisch demand/supply

- When utility is additively separable, and in a world of perfect certainty and capital markets, rational agents will keep the marginal utility of discounted expenditure constant from period to period.

- Frisch demand/supply functions of current goods depend on the current prices and the constant marginal utility of expenditure

Moving from one elasticity to another

- We can move from Marshallian to Hicksian elasticities by using the Slutsky equation.
- To move from the Marshallian which are static to the Frisch elasticity which are dynamic, we need one extra parameter
- How willing the consumer is to move expenditure from period to period.
- The inter-temporal elasticity of substitution provides the bridge between the Marshallian and Frisch responses.

The intertemporal elasticity of substitution

- It indicates how a (discounted) expenditure changes following an equi-proportional change in all (discounted) prices.

- The elasticity of intertemporal substitution is defined as the percent change in consumption growth per percent increase in the net interest rate

Another distinction

- Methods of estimation : the source of variation
  - Micro (quasi-experiments), macro (macro data cross-countries differences)

Results of estimates

TABLE 1—MICRO VS. MACRO LABOR SUPPLY ELASTICITIES

		Intensive Margin	Extensive Margin	Aggregate Hours
Steady State	micro	0.33	0.26	0.59
(Hicksian)	macro	0.33	0.17	0.50
Intertemporal	micro	0.54	0.28	0.82
Substitution (Frisch)	macro	[0.54]	[2.30]	2.84

Note: Each cell shows a point estimate of the relevant elasticity based on meta analyses of existing micro and macro evidence. Micro estimates are identified from quasi-experimental studies; macro estimates are identified from cross-country variation in tax rates (steady state elasticities) and business cycle fluctuations (intertemporal substitution elasticities). The aggregate hours elasticity is the sum of the extensive and intensive elasticities. Macro studies do not always decompose intertemporal aggregate hours elasticities into extensive and intensive elasticities. Therefore, the estimates in brackets show the values implied by the macro aggregate hours elasticity if the intensive Frisch elasticity is chosen to match the micro estimate of 0.54. Sources are described in the appendix.

References

- Are micro and macro labour supply elasticities consistent? A review of evidence on the intensive and extensive margins

Raj Chetty, Adam Guren, Day Manoli, & Andrea Weber

American Economic Review Papers and Proceedings 101: 471-75, 2011

2 Elasticity of taxable reported income (ETRI)

- Sufficient statistics for Optimal income taxation
  - It is not necessary to estimate the structural parameters of the underlying individual preferences
- Less narrow that the labor supply elasticity
- ETRI = Labor supply responses
  - + fringe benefits responses
  - + Increased expenditures for tax professionals
  - + different business organization
  - + tax avoidance
  - + tax evasion.

Outline of the section

- Why is it the crucial parameter in an abbreviated income tax formula ?

- Estimates of the parameter

Linearized budget constraint

- Warning : the tax domain may not be convex. (A local optimum may not be a global one)
- z : the reported taxable income
- $c = z(1 - t) + E$
- 1-t: the slope of the tangent : the constant marginal net-of -tax rate
- E: the intersection of the linearized budget curve with the vertical axis: virtual income created by the tax/transfer budget constraint
- Z (1-t,E) : the reported income supply function
- Here, we assume away the income effects.

Assumption on top income taxation

- Income tax liabilities are skewed in many countries, US & France.
- The US : 86% for the last quintile, 39% for the last decile.
- The tax schedule is piecewise linear (not true in Germany piecewise quadratic).
- The tax filers of the last bracket face a constant marginal tax rate. We focus on that group above some threshold z*
- If z* = 0, flat tax

The aggregate elasticity

- The elasticity of reported taxable income to the net-of-tax rate.

$$e = \frac{\delta z}{\delta(1-t)} \frac{1-t}{z}$$

The percent change in reported income when the net-of-tax increases by 1%

- The average income reported by taxpayers in the top bracket z_m
- The aggregate elasticity wrt to the net-of-tax rate = $e_m = \frac{\delta z_m}{\delta(1-t)} \frac{1-t}{z_m}$
- $e_m = \Sigma e_i \, z_i / \Sigma \, z_i$
- The average individual elasticity weighted by the share of individual incomes in total income

Impact of a small reform of the top rate

- Reasoning of Emmanuel Saez RES 2001
- dt with no change in the tax schedule below z*
- Two effects on tax revenue. (T= tz so dT= zdt +dzt)
  - First a mechanical increase in tax revenue due to the fact that taxpayers face a higher tax rate above z* (zdt)
  - Second a behavioural response that reduces the report taxable income in the top bracket (dzt)

Interpretation of the mechanical effect

- dM measures dW if utility is assumed to be quasi-linear because of the envelope theorem

- V(1-t,E)=max u(z(1-t)+E,z)
- dV= u_c (-zdt+dE)
- Because quasilinearity : u_c =1
- dV= -zdt =dM, individual by individual

Assessing the mechanichal effect (dM)

- dM = N*(z_m- z*)dt > 0
- F(z): the CDF of the reported income before the tax change.
- N*= N (1- F(z*)) the number of people in the top bracket
- *Absent any behavioural response*

Assessing the behavioral effect (dB)

- The change in average reported income is
- $dz_m = -\frac{e_m z_m dt}{1-t}$
- Because of the definition of the ETRI
- $Total\ change\ in\ revenue\ dB = \mathrm{N} * dz_m t$
- $= -\mathrm{N} * e_m z_m \frac{t}{1-t} dt < 0$
- Assuming that the total number of taxpayers in the top bracket remains the same (absent any extensive margin response)

Total effect on tax revenue

- dT = dM +dB = N*(z_m- z^*)dt − N*$e_m z_m \frac{t}{1-t}\ dt$
- = N* (z_m- z^*)(1- $e_m \frac{z_m}{z_m - z^*} (\frac{t}{1-t})\ dt$
- If z* = 0, linear tax,
- The Laffer rate (which maximizes the tax revenue) should correspond to dT=0
- t*= 1/1+e_m

Assumption on the upper tail

- If the top tail of the distribution follows a Pareto law (a reasonable assumption) for z> z*
- a: the Pareto parameter >1
- F(z)= C/z^{1+a}
- The ratio $\frac{z_m}{z*}$ = a/a-1 is constant (does not depend on $z*$)
- For a =2, the average income of income greater than some threshold is always twice this threshold
- The ratio $\frac{z_m}{z_m - z*}$ = a
- a: an inequality parameter

Effect of a small reform on tax revenues

- Depends on two parameters + tax rate
- dT= dM (1-$\frac{t}{1-t} e_m$a) < dM
- The fraction of tax revenue lost due to the behavioral response is
  - Increasing in the tax rate
  - Increasing in the ETRI
  - Increasing in the inequality paremeter a

The marginal excess burden in terms of extra taxes collected

- For each extra € of taxes raised on top incomes, the gvt imposes an extra cost equal to -dB/dT
- -dB/dT = $\frac{e_m a t}{1-t-e_m a t}$
- The marginal efficiency cost of funds (MECF) =1-dB/dT
- = $\frac{1-t}{1-t-e_m a t}$
- Valid as long as income effects are assumed away, even if individuals have heterogeneous utility functions

Illustration for the US

- Top 1% income cut-off
- t= 35%
- Piketty & Saez estimate a = 1.6
- e_m= 0.5 the mid to upper range of the estimates from the literature
- An increase of $1 in tax induces a marginal excess burden (-dB/dT) in proportion of tax revenue = 0,76%.
- MECF= 1,76

Optimal marginal tax rate for the top income

- The optimal tax should be such that a small tax change does not change the welfare. The change in welfare incorporates the changes in tax revenues.
- Then dW=dT=0
- So from dT= dM (1-$\frac{t}{1-t} e_m$a) we deduce
- t*= 1/1+ae_m

Comment

- With respect to the Laffer rate, the impact of the ETRI is magnified by the Pareto parameter (less than doubled for OECD countries).
- The Saez paradox.
  - The higher the inequality of pre tax incomes in the upper tail, the lower the revenue-maximizing tax rate, while the demand for more redistribution should be more intense.
- For the US, with the previous values of parameters, t*= 56%

For more information

- Emmanuel Saez, Seth Giertz, Joel Slemrod

- The elasticity of taxable income with respect to marginal tax rates : A critical review

- NBER WP n° 15012
- May 2009