Malas Notches

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Introduction

- Important new development in public economics - the sufficient statistic approach, which "derives formulas for the welfare consequences of policies that are functions of high-level elasticities rather than deep primitives" (Chetty (2009), p 451).

- Feldstein (1999): for a proportional income tax t, marginal excess burden (MEB) only depends on behavioral responses via the elasticity of taxable income (ETI), e.
    - e measures the *intensive margin* response to a change in t i.e. the change in the taxable income of a given individual to t

- Now a large literature on empirical estimates of e (e.g. Gruber and Saez (2002), Saez, Slemrod, and Giertz (2012), Kleven and Schultz (2014), Weber (2014)).

Introduction

- Saez (2001) showed that the Feldstein formula could be extended to a proportional income tax with an allowance (single-bracket tax), with one more sufficient statistic a of the income distribution, constant if the top tail of the income distribution is Pareto
- Also, he showed that revenue-maximising tax rate depends only on e, a and the welfare maximising tax rate depends on e, a and a welfare weight $\bar{g}$

This Paper

- The "sufficient statistics" approach fails with notches
- Specifically, $MEB = \frac{te+C}{1-t-te-C}$ where $C > 0$ is a correction factor
  - This is the formula for the MEB of a *proportional* tax (Feldstein (1999)) plus a correction factor C
- But, correction factor is complex (does not depend on simple sufficient statistics) and is quantitatively important for a calibrated version of the model
  - At baseline values, ignoring C underestimates the MEB by about 86%, and the revenue-maximising tax is overestimated by around 100%
- Application to VAT: MEB is underestimated by about 50%

Tax Notches

- Some notches in income taxes:
  - PIT; Pakistan has notches of up to 5% (Kleven and Waseem (2013)), Ireland, an emergency income levy with a notch of up to 4% (Hargaden (2015)), small notches in the federal PIT in the US (Slemrod (2013)).
  - notches in the CIT in Costa Rica (Bachas and Mauricio (2015)).
- Notches in housing transactions taxes in the UK and the US (Best and Kleven (2014), Kopczuk and Munroe (2014)).
- Slemrod (2013): many examples of commodity tax notches
  - a marginal change in some characteristic can change the product classification so as to produce a discrete change in the tax liability e.g. the US Gas Guzzler Tax
- Most important case: a VAT threshold can be a tax notch (Liu & Lockwood (2015))

Related Literature

- Already known that due the sufficient statistic approach is limited due to externalities
- Saez, Slemrod and Giertz (2012); positive externalities if “socially valuable” activities can be deducted from income tax e.g. charitable giving/mortgage interest payments
- Chetty (2010): possible positive fiscal externalities with income tax evasion if (part of) the cost of evasion is a transfer payment (e.g. a fine to the government)
- By contrast, our results nothing to do with externalities- rather, difference between intensive margin and total ETI.

The Set-Up

- Individual taxpayers indexed by a skill or taste parameter $n \in [\underline{n}, \bar{n}]$, distributed with density $h(n)$.
- A type n individual has preferences over consumption c and taxable income z of $u(c, z; n) = c - d(z; n)$
- Assume $d_z, d_{zz} > 0, d_n, d_{nz} < 0$
- Iso-elastic case: $d(z; n) = \frac{n}{1+1/e}(z/n)^{1+1/e}$
- The budget constraint is $c = z - T(z)$, where $T(.)$ is the tax function.
- Household n's utility over z is $u(z; n) = z - T(z) - d(z; n)$.
- For any marginal rate t, $z(1-t, n)$ is household n's optimal taxable income
    - In iso-elastic case, $z(1-t, n) = (1-t)^e n$

Kinks and Notches

- For simplicity, we focus on a two-bracket tax; results extend straightforwardly to the highest tax in a piecewise-linear tax system with any number of brackets.
- So, kinked and notched two-bracket taxes are:

$$T_K(z) = \begin{cases} t_L z, & z \leq z_0 \\ t_L z_0 + t_H(z - z_0), & z > z_0 \end{cases}$$

$$T_N(z) = \begin{cases} t_L z, & z \leq z_0 \\ t_H z, & z > z_0 \end{cases}$$

Bunching

- With either a kink or a notch, all types in an interval $n \in [n_L, n_H]$ will bunch at taxable income z_0.
- With both a kink and a notch: $z(1 - t_L; n_L) = z_0$
- With a kink, n_H is defined by $z(1 - t_H; n_H) = z_0$
- With a notch, n_H is defined by

$$(1 - t_L)z_0 - d(z_0; n_H) = v(t_H; n_H)$$

where $v(t; n) \equiv max_z (1 - t)z - d(z; n)$

The Bunching Effect on Revenue

- Tax revenue R depends on t_H both directly, and indirectly, via its effect on bunching i.e. $R(t_H, n_H(t_H))$
- So:

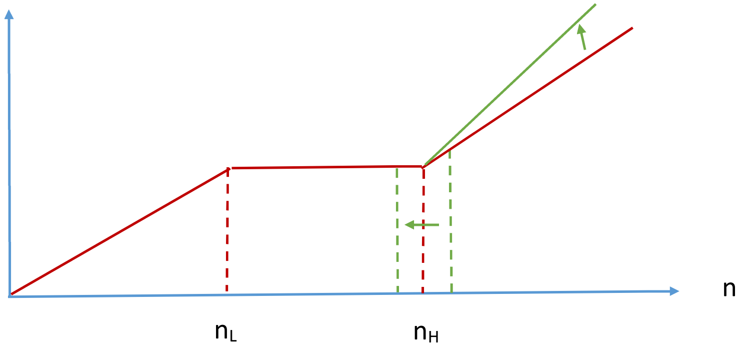
$$\frac{dR}{dt_H} = \underbrace{\frac{\partial R}{\partial t_H}}_{intensive} + \underbrace{\frac{\partial R}{\partial n_H}\frac{\partial n_H}{\partial t_H}}_{bunching}$$

- In the kink case, the bunching effect is zero, because $\frac{\partial R}{\partial n_H} = 0$
- In the notch case, $\frac{\partial R}{\partial n_H} = (t_L z_0 - t_H z(1 - t_H; n_H))h(n_H) < 0$

The Bunching Effect on Tax Revenue with A Kink

Assume iso-elastic disutility so $z(1-t;n) = (1-t)^e n$

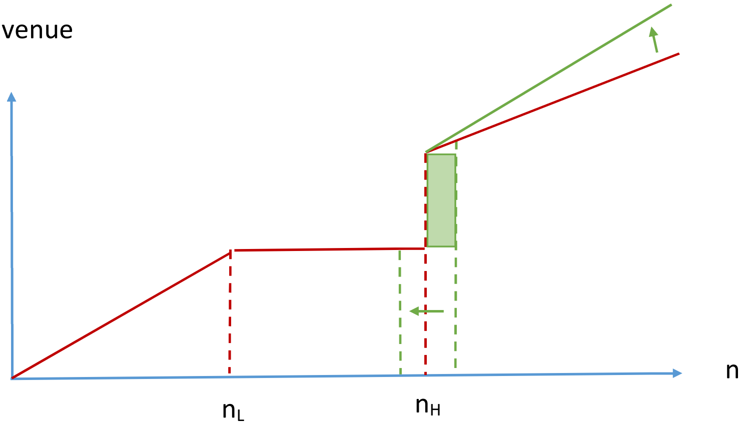
Tax revenue



The Bunching Effect on Tax Revenue with a Notch

Assume iso-elastic disutility so $z(1-t;n) = (1-t)^e n$

Tax revenue



Marginal Excess Burden with a Notch

- Generally, $MEB = -\frac{dW/dt_H}{dR/dt_H}$, where welfare W is calculated assuming that tax revenue is redistributed as a lump-sum back to households.
- With iso-elastic utility and a Pareto upper tail of the income distribution:

$$MEB = \frac{t_H e + C}{1 - t_H(1+e) - C},$$

$$C = \frac{(1-t_H)(t_H(1-t_H)^e - t_L z_0/n_H)(1-a)(1+e)}{(1-t_H)^{1+e} - (z_0/n_H)^{1+1/e}} > 0$$

- C cannot be written in terms of sufficient statistics e, a (depends also on tax parameters t_H, t_L, z_0, and on n_H, which is endogenous)

The Welfare-Maximizing Top Rate of Tax with a Notch

- Government's objective is $W = \int_{\underline{n}}^{\bar{n}} G(v(n))h(n)dn$
- G is strictly concave, so government has a redistribution objective, $G' = g$ are the welfare weights
- Also, government budget constraint is that R must exceed some exogenous amount
- Then, the welfare-maximising level of t_H is $t^* = \frac{1-\bar{g}-C}{1+e}$, where $\bar{g}$ is the average welfare weight on all top-rate taxpayers
- Special case of revenue-maximising t_H is $\bar{g} = 0$ i.e. $t^* = \frac{1-C}{1+e}$

Calibration

parameter	baseline value	range	sources
e	0.25	0.1- 0.4	SSG (2012), Kleven and Schultz (2014)
a	1.5	1.01-2.0	Piketty and Saez (2003)
$t_H - t_L$	0.03	0.0- 0.05	Kleven and Waseem (2013)
t_L	0.2		
z_0	2.168		20% of population have $z \geq z_0$

The Marginal Excess Burden

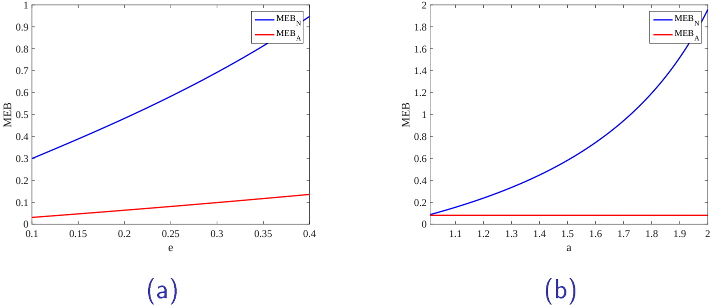
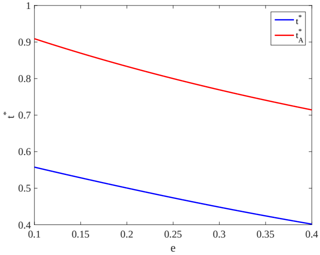
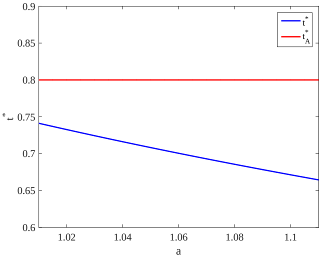


Figure: MEB as e, a vary

The Welfare-Maximizing Top Rate of Tax



(a)



(b)

Figure: t^* as e, a vary ($\bar{g} = 0.25$)

A Simple Model of VAT Registration

- Simplified version of Liu and Lockwood (2015) : a single industry with a large number of small traders producing a homogeneous good
- Every small trader combines his own labor input with an intermediate input to produce output via a fixed coefficients technology
- Buyers have perfectly elastic demand for the good (like the assumption made implicitly in the taxable income literature that labor demand is perfectly elastic at a fixed wage.)
- This is formally equivalent to the notched income tax model.
- But MEB is the marginal excess burden on *producers* (demand is perfectly elastic)

A Simple Model of VAT Registration

- Key variable is s, units of input required per unit of output.
- If $s = 0$, then the MEB of the VAT is mathematically identical to income tax case: $MEB = \frac{e\frac{t}{1+t} + C}{1 - \frac{t}{1+t}(1+e) - C}$.
- If $s > 0$, then MEB is similar, but details are more complex, because a change in the statutory rate of VAT also changes the effective tax on non-registered firms via unrecovered input VAT
- Important to consider $s > 0$, as empirically relevant (for the UK, $s = 0.45$)

Calibration

parameter	baseline value	range	sources
e	0.25	0.1- 0.4	SSG (2012), Kleven and Schultz (2014)
a	1.06		Luettmer (1995)
$t_R - t_N$	0.17/0.14		LL: $t = 0.2, s = 0.0/0.45$
t_N	0.0/0.16		LL: $t = 0.2, s = 0.0/0.45$
z_0	2.168		LL : 37.5% of firms have $z \geq z_0$

LL=Liu and Lockwood (2016)

The Marginal Excess Burden of VAT

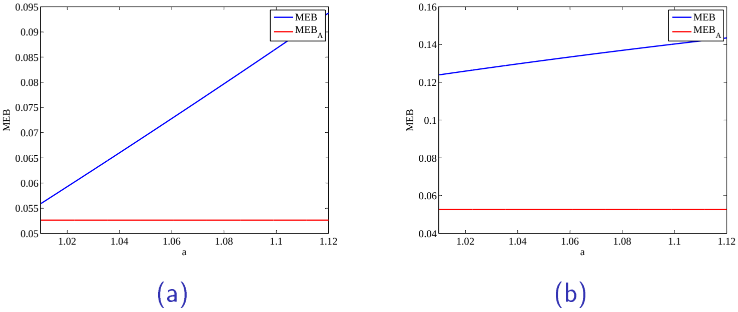


Figure: MEB as a varies ($s = 0.0, 0.45$)

Conclusions

- We show that sufficient statistic approach does not apply to notched tax systems due to the fact that bunching response has a first-order effect on tax revenue
- Formulae for MEB and revenue-maximising top rate of tax can be written as proportional tax formulae plus a correction factor
- But, correction factor is complex (does not depend on simple sufficient statistics) and is quantitatively important
- For example, at baseline values, the MEB is underestimated by about 86%, and the revenue-maximising tax is overestimated by around 30%, and the errors can be much larger for some parameter values.
- Analysis can be applied to VAT; treating VAT as a simple proportional tax underestimates the MEB of the VAT by about 50%