Income taxation
ECON4624 Empirical Public Economics – Fall 2016

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Why is it important?

- An important source of revenue in most countries (60 - 70%)
- Affect labour and capital (savings) supply and overall economic activity – how much depend on the elasticity of labour (capital) supply.
- Creates an efficiency loss - a dead weight loss - magnitude depend on the compensated supply elasticity
- Tax reforms can be used to estimate how labour supply responds to wage changes – important topic.
How does income taxation affect labour supply

Two important decisions (margins):

1. **Extensive margin** – participation; work or not. Decision depends on participation tax-rate; the effective tax rate on earned income, taking into account all taxes on earned income and lost benefits.

2. **Intensive margin** – how much labour one should supply if one participates. Depend on the marginal tax rate on income.

*Important*: The intensive margin does not only affect hours at work, also effort at work, training, actions taken to shelter income from taxation etc. To assess the welfare effects of income taxation one must consider how all margins are affected. Reported Taxable Income is – given some assumptions – a sufficient statistic for measuring the efficiency loss associated with income taxation (Feldstein 1995); Saez et al (2012).
Kleven: How can Scandinavians tax so much?

The same question that funded ESOP: Based on economic theory it is (is it?) a paradox that Scandinavian work and produce so much.

Kleven discusses three explanations.

1. Little tax evasion and a broad tax base implies a low elasticity of taxable income.

2. Scandinavian countries counters the effect of high participation tax rate by subsidizing services that are complementary to work (child care, old age care, education ..).

3. Social cultural factors. Trust in people, and in government etc.
**Kleven: How can Scandinavians tax so much?**

income taxes, top marginal tax rate and participation tax rate

<table>
<thead>
<tr>
<th></th>
<th>Denmark</th>
<th>Norway</th>
<th>Sweden</th>
<th>Germany</th>
<th>United Kingdom</th>
<th>United States</th>
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</thead>
<tbody>
<tr>
<td><strong>Tax revenue /GDP</strong></td>
<td>48.2%</td>
<td>42.8%</td>
<td>45.8%</td>
<td>36.3%</td>
<td>35.0%</td>
<td>24.8%</td>
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<tr>
<td><strong>Shares of tax revenue</strong></td>
<td></td>
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<tr>
<td>Income taxes</td>
<td>64.2%</td>
<td>70.7%</td>
<td>68.4%</td>
<td>68.7%</td>
<td>54.8%</td>
<td>70.0%</td>
</tr>
<tr>
<td>Property taxes</td>
<td>3.8%</td>
<td>2.9%</td>
<td>2.4%</td>
<td>2.4%</td>
<td>11.8%</td>
<td>12.2%</td>
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<tr>
<td>Consumption taxes</td>
<td>31.6%</td>
<td>26.4%</td>
<td>28.8%</td>
<td>28.4%</td>
<td>32.8%</td>
<td>17.9%</td>
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<tr>
<td><strong>Income tax distortions</strong></td>
<td></td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>Top marginal tax rate</td>
<td>69.8%</td>
<td>60.8%</td>
<td>73.6%</td>
<td>59.3%</td>
<td>62.7%</td>
<td>43.3%</td>
</tr>
<tr>
<td>Participation tax rate</td>
<td>87.0%</td>
<td>77.6%</td>
<td>76.7%</td>
<td>63.0%</td>
<td>55.6%</td>
<td>36.6%</td>
</tr>
</tbody>
</table>

**Notes and Sources:** The data on tax revenue/GDP (source: Index of Economic Freedom, Heritage Foundation) and on revenue shares (source: OECD Tax Revenue Statistics) are from 2012. Referring to OECD tax classification numbers, we define income taxes = 1000 + 2000 + 3000, property taxes = 4000, and consumption taxes = 5000. Income taxes include all taxes on income, profits, and capital gains (1000), social security contributions (2000), and taxes on payroll and workforce (3000). The data on the top marginal income tax rates (source: Piketty, Saez, and Stantcheva 2014) are from 2011 for Germany and from 2010 for the other five countries. The calculation of participation tax rates is described in detail in the notes to Figure A1 in the online Appendix. These tax rates are from 2010 for Germany and United States and from 2009 for the other four countries (sources: OECD National Accounts, OECD Government Revenue Statistics, OECD Social Expenditure Statistics, Penn World Table 7.0).
Kleven: How can Scandinavians tax so much?
Participation tax rates and Marginal tax rates in Norway

Figure 2.2  Effective average tax rate when a person moves from social security benefits\textsuperscript{1} to full-time employment. 2012. Percent

\textsuperscript{1} The calculations are based on unemployment benefits in the various countries as calculated in OECD Tax and Benefit 2012. The benefit level is that paid in the first year of unemployment.

\textsuperscript{2} Based on 67\% of the average wage in the various countries, in calculating both the benefits and the amount of the wage income from full employment.

\textsuperscript{3} Based on 100\% of the average wage in the various countries, in calculating both the benefits and the amount of the wage income when moving into full employment. The spouse/cohabitant is assumed to stay at home in both cases. Sources: OECD and the Ministry of Finance.

Figure 2.5  Marginal tax rate on wage income (excluding employers’ social security contribution). 2014 rules for a wage earner in tax class 1 with only wage income and standard reliefs. NOK thousands

Source: Ministry of Finance.
Kleven: How can Scandinavians tax so much?

Third-party reporting and tax evasion

Figure 2
Tax Take and Third-Party Reporting across Countries

A: Tax Take versus Fraction Self-Employed
Kleven: How can Scandinavians tax so much?
A broad tax-base & little tax evasion ⇒ low elasticity of taxable income

Figure 3
Graphical Evidence on Taxable Income Responses in Denmark

A: Labor Income Responses to 1987 Reform

B: Capital Income Responses to 1987 Reform

Source: Kleven and Schultz (forthcoming).
Notes: The figure shows the evolution of labor income (panel A) and capital income (panel B) between 1982 and 1993 for groups that experienced, respectively, tax cuts or tax increases as a result of the 1987 reform. The figure is based on a balanced panel of individuals who are observed throughout the period. The vertical line at 1986 denotes the last pre-reform year (as the reform was passed in parliament during 1986 and changed tax rates starting from 1987), and income levels in 1986 are normalized to 100 in all groups. Both panels show that income trends are completely parallel in the years prior to the reform and then start to diverge precisely in 1987, the first year of reform-induced tax changes. Most of the effect of the tax reform materializes within three years. The figure reports difference-in-differences (DD)
Kleven: How can Scandinavians tax so much?

participation tax rate and employment
Kleven: How can Scandinavians tax so much? work subsidies
Kleven: How can Scandinavians tax so much?

Social factors

Figure 6
Tax Take versus Social and Cultural Indicators across Countries

A: Tax Take versus Trust

B: Tax Take versus Beliefs about the Poor

C: Tax Take versus Social Capital Index (Civic Participation, Voter Turnout, Crime)

D: Tax Take versus Charitable Donations
Elasticity of labour supply (taxable income) (Saez et al)

simple static model with a proportional tax rate and no income effects

Individuals maximize \( u(c, l) = c - a^{\frac{1}{\lambda}}l^{\lambda} \) where \( \lambda = 1 + \frac{1}{\varepsilon} \)
given the constraint \( c = (1 - \tau)wl + E \)
f.o.c. \( (1 - \tau)w = al^{\frac{1}{\varepsilon}} \)
labour supply \( \log l = \alpha + \varepsilon \log (1 - \tau)w \)

\( \varepsilon = \) compensated and uncompensated labour supply elasticity
(leisure demand elasticity), critical parameter to assess the
efficiency loss of income taxation and hence for optimal taxes

with income effects log linearize optimal supply \( l(w(1 - \tau), E) \) and
obtain \( \log l = \alpha + \varepsilon \log (1 - \tau)w - \eta E \) - can recover \( \varepsilon^{\text{compensated}} \) by
using Slutsky.
Elasticity of labour supply (taxable income)

Consumption

leisure

Higher tax rate

E
Estimating the elasticity of labour supply
use wage variation to estimate labour supply elasticity

\[ \log l = \alpha + \beta \log w + \varepsilon \]

use cross sectional wage variation to estimate \( \beta \) (supply elasticity) with OLS

Many problems

- unmeasured individual characteristics, propensity to work, drive, energy, competitiveness are positively correlated with \( w \) ⇒ positive correlation between \( w \) and \( \varepsilon \) ⇒ upward bias in wage elasticity.
- division bias
- selection into work
- it is the elasticity of taxable income (ETI) that matters (for efficiency loss associated with income taxation)

solution: use variation in tax rates to estimate (ETI) (reforms - not cross sectional variation in marginal tax rates)
Elasticity of taxable income

ETI as a sufficient statistic for calculating efficiency loss of taxation (optimal income tax).

Suppose a person can work ($l$) in $N$ activities to earn taxable income ($TI$), and exert effort $E$ to “hide” income from taxation.

$TI = z = \sum w_i l_i - E$ is taxed at a flat rate $\tau$

generating income has convex costs $\theta_i(l_i)$ and hiding income has convex costs $g(E)$

individual utility: $U(c, E, l) = c - g(E) - \sum \theta_i(l_i)$ and 
$c = (1 - \tau)z + E$

social welfare: $W(\tau) = (1 - \tau)z + E - g(E) - \sum \theta_i(l_i) + z\tau$
Elasticity of taxable income

ETI as a sufficient statistic for calculating efficiency loss of income taxation (optimal income tax).

Define $\varepsilon = \frac{dz}{d(1-\tau)} \frac{(1-\tau)}{z}$

Differentiate with respect to the tax rate (take account of the fact that all $I$ and $E$ will be functions of $\tau$) and use the first order conditions for optimal individual behavior ($g'(E) = \tau$ and $(1 - \tau)\omega_i = \theta_i'(l_i)$). we get $\frac{dW}{d\tau} = -z + z + \tau \frac{dz}{d\tau} = -\varepsilon z \left(\frac{\tau}{1-\tau}\right)$.

(The revenue maximizing tax rate solves $z - \varepsilon z \left(\frac{\tau}{1-\tau}\right) = 0 \Rightarrow \tau^* = \frac{1}{1+\varepsilon}$)

Change in welfare is independent of which activities that causes a change in $z$. The reason is that individuals have, through maximization of $U$, chosen activities such that the marginal cost of generating one extra unit of consumption is the same across activities.
Elasticity of taxable income

In Saez et al they focus on the marginal tax rate for income in the top tier, with taxable income above \( \bar{Z} \); there are \( N \) individuals with average taxable income \( z^m \).

Otherwise the analysis above capture the first part in Saez et al. They show that marginal excess burden of extra taxes collected through an increase in the income tax rate is

\[
\frac{\epsilon \cdot a \cdot \tau}{1 - \tau - \epsilon \cdot a \cdot \tau}
\]

They assume that the income above \( \bar{Z} \) is Pareto distributed and \( a \) is a measure of the thickness of the tail.

The key parameter to find (estimate) in order to find the marginal excess burden of extra taxes is \( \epsilon \) (compensated taxable income elasticity)
Elasticity of taxable income

Complications (reasons why the elasticity of taxable (reported) income is not a sufficient statistic for welfare analysis)

- Externalities (activities to hide income may have positive or negative effects on other sources of government revenue (or on other individuals).
- Log term responses
- ..
Estimating $\epsilon$

- Not possible to use variation in marginal tax rate across individuals. Why?
Estimating $\epsilon$

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- Use tax reform, a reform that changes the tax structure (marginal tax rate) as sources of exogenous variation in tax rates. Tax reform to instrument for the tax rate: if marginal tax rate decreases from 50% to 40% for individuals earning 500 - 800.000 in 2000; use the new tax-rate (40%) for individuals in the 500 - 800.000 bracket in 1999. Tax-rate is then exogenous to their earnings in year 2000.
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- Suppose the reform is $x\%$ increase in net of tax rate (lower marginal tax rate) for a population $\mathcal{T}$. To find $\epsilon$ we must find the % change in $z$ caused by the tax change (since $\epsilon = \frac{\% z}{\%(1-\tau)}$)
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- Suppose the reform is $x\%$ increase in net of tax rate (lower marginal tax rate) for a population $T'$. To find $\epsilon$ we must find the % change in $z$ caused by the tax change (since $\epsilon = \left(\frac{\%z}{\% (1-\tau)}\right)$)

- Compare before and after taxable income for $T'$. What must we assume to claim that this change is caused by the tax change?
Estimating $\epsilon$ using change in income share to control for other “things” that move income over time
Estimating \( \epsilon \) using change in income share to control for other “things” that move income over time

Can estimate the elasticity of taxable income (using the 1986 change in marginal tax rate) as

\[
\epsilon = \frac{\ln p_{1988} - \ln p_{1986}}{\ln(1 - t_{p1988}) - \ln(1 - t_{p1986})} \approx \frac{\ln 0.13 - \ln 0.09}{\ln 0.71 - \ln 0.55} = 1.44
\]
Estimating $\epsilon$

- Compare before and after taxable income for $T'$ with individuals who were not treated with an increase in the net of tax rate, or who was less treated. DiD.
- Many papers that exploit such reforms - elasticity estimates varies from far above 1 to close to 0. Some of these estimates indicate that one could collect more taxes by reducing the tax rate.
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Their estimates are low (many model specifications find a negative elasticity (income effects))
The idea is that one can use sharp increases in the marginal tax rate at certain points to estimate compensated elasticities by measuring the magnitude of bunching observed at the kink points in the budget set.

Saez finds modest effects (not much bunching); largest effect for low income.
bunching at kink points, Saez 2010
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