Empirical public economics, part II

Thor O. Thoresen, room 1125, Friday 10-11
Reading


This lecture

• Discuss how we can identify distributional effects of tax reform, exemplified with the Norwegian reform of 2006
  – Reduction in marginal tax rate on wage income
  – Increased taxation of dividends
Distributional effects of taxes and tax changes

• Descriptions of tax redistributional effects depend on
  – The definition of well-being
  – The time frame
  – Behavioral reactions
  – Measurement of effects
    ◆ Measure of inequality used
    ◆ Equivalence scales

• Here
  – Focus on micro data techniques to describe distributional effects
  – Short-term effects
    ◆ No life-cycle studies
Taxation of individuals, Norway 2014

• Modified dual income tax
  – Additional tax on dividends above a standard rate of return: 46.7 %
    [Corporate tax: 27 %. Then 27+(1-27)27=46.7]

• Wage income
  – Social security insurance: 7.8 %
  – Ordinary income: 27 %
  – Two-tier surtax: 9 % and 12 %
  – Allowances: job expenses
  – Maximum: 7.8+27+12=46.8 %

• Separate schedules for pensioners, self-employed
Taxation of individuals, cont’d

• Indirect taxation
  – VAT: 25 %
  – Lower VAT on food: 15 %
  – Lower VAT on some other services (hotels, transport, cinema): 8 %

• Wealth taxation
  – 1% above NOK1,000,000

• Wealth transfer taxation (inheritance tax)
  – Abolished in 2014
Marginal tax on wage income
Overview Norwegian tax system, 2011

• Tax burden in percent of GDP: Norway 43 percent (OECD, 2011)

• A broad tax base (billion NOK, 2011)

<table>
<thead>
<tr>
<th>Tax Category</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual taxpayers</td>
<td>376</td>
</tr>
<tr>
<td>Income tax</td>
<td>265</td>
</tr>
<tr>
<td>Employee’s social insurance</td>
<td>98</td>
</tr>
<tr>
<td>Tax on net wealth</td>
<td>13</td>
</tr>
<tr>
<td>Businesses</td>
<td>72</td>
</tr>
<tr>
<td>Property tax</td>
<td>7</td>
</tr>
<tr>
<td>Employer’s social contribution</td>
<td>139</td>
</tr>
<tr>
<td>Indirect tax</td>
<td>314</td>
</tr>
<tr>
<td>VAT</td>
<td>212</td>
</tr>
<tr>
<td>Excises and custom duties</td>
<td>102</td>
</tr>
<tr>
<td>Petroleum tax (transfers to the Government Pension Fund)</td>
<td>245</td>
</tr>
<tr>
<td>Inheritance and gift tax</td>
<td>2</td>
</tr>
<tr>
<td>Other taxes</td>
<td>29</td>
</tr>
<tr>
<td>Total</td>
<td>1,184</td>
</tr>
</tbody>
</table>
Normative tax analysis and the efficiency/equity trade-off

• Mirrlees model
  – Increase in tax:
    ♦ Generates increased revenue (mechanical effect)
    ♦ Secondary negative effect on revenue because people (assumingly) work less
    ♦ Third effect of the welfare evaluation depends on the welfare assigned to the individual from the planner/social decision maker (SDM)

• Okun’s leaky bucket
  – The (disputed) trade-off (negative relationship) between income equality and economic growth

• See articles by Røed and Strøm (2002) and Brewer, Saez and Shephard (2009)
Distribution of what?

• Utility-based distributional effects
  – Decreasing marginal utility of goods or money
  – Policy changes measured by equivalent and compensating variation
  – Risk aversion and veil of ignorance (Rawls)
  – Ordinal or cardinal utility?

• More common to study income distributions

• Other characteristics of well-being
  – Capability approach (Amartya Sen)
    ✤ Opportunities and abilities to generate valuable outcomes, taking into account relevant personal characteristics and external factors
  – Opportunities
  – Endowments and ambitions (Dworkin)
Aggregation of results: Gini inequality index

- Gini index can be derived from Lorenz curve
Useful characteristics of the Gini coefficient

• Scale independence
  – Size of the economy or how it is measured do not influence inequality

• Transfer principle
  – A transfer from the rich to the poor reduces inequality (rank dep.)

• Close link with Lorenz curve (F=the cumulative distribution function, q=quantile)
  \[ 1 - 2 \int_{0}^{1} L(F; q) dq \]

• Generalized Gini (\( \nu \)=ineq aver, \( \mu \)=average)
  \[ G(X) = -\nu 2 \text{cov} \left( \frac{X}{\mu(X)} - (1 - F(X))^{\nu-1} \right) \]
Alternative inequality index: Atkinson measure

• Attractive as it is founded on welfare function reasoning

\[ W = \sum_{i}^{n} U(y_i) = \frac{1}{1-\varepsilon} \sum_{i}^{n} y_i^{1-\varepsilon} \]

• Equally distributed equivalent income, \( y_{EDE} \)

\[ \zeta = y_{EDE} = \left[ \frac{1}{n} \sum_{i=1}^{n} y_i^{1-\varepsilon} \right]^{\frac{1}{1-\varepsilon}}, \quad \varepsilon \neq 1 \]

• The fraction of income which could be sacrificed if the rest is divided equally (efficiency/equity trade-off), \( I(\varepsilon) \)

\[ I(\varepsilon) = 1 - \frac{\zeta}{\mu} \]
Graphical exposition of the Atkinson measure
Comparison of well-being in different households

• Aggregate individual income and the household level
• Equivalence scale used to account for the number of household members
  – Economies of scale in the household
  – Concave form (in the number of household members) is common
    ✷ For example, square root of number of household members
• The individual is the unit of analysis
  – Each member of society counts, equally
Two basic commands of the tax system

• **Vertical equity**
  – Those with higher abilities should pay more tax
  – Ability to pay/equal sacrifice
  – Pre-tax income often used as measured of ability
    ◦ Progressive tax system

• **Horizontal (in)equity**
  – Equal persons should pay the same
  – But who are the equals?
  – Pre-tax income used to define equals
    ◦ HI often measured by studies of the transformation from pre-tax to post-tax income distributions
  – Criticism
    ◦ Kaplow and Shavell, 2001: HI not grounded in welfare economics
Vertical equity (VE)

• With individual income data at hand, how can we measure the redistributional effects of taxes?

• Example of practical question
  – ”is the tax schedule more redistributive after a reform than prior to a reform?”

• It is particularly interesting to assess the contribution of policy-makers
  – Isolate the effects of policies from other effects (demographical changes, business cycle)
Measure of redistribution: Reynolds-Smolensky index (based on the Gini coefficient)

- $G_X$ and $G_Y$ symbolizing pre-tax and post-tax income inequality measured by Gini, respectively, the Reynolds-Smolensky redistributional effect is defined as:

$$\Pi_{RS} = G_X - G_Y$$
Measure of redistribution: Blackorby-Donaldson (based on the Atkinson measure)

• With $I_X$ and $I_Y$ symbolizing pre-tax and post-tax income, income inequality measured by Atkinson index, the Blackorby-Donaldson redistributional effect is defined as

$$\Pi_{BD}(\varepsilon) = \frac{I_X(\varepsilon) - I_Y(\varepsilon)}{1 - I_X(\varepsilon)}$$

• It measures the proportion of after-tax income the social decision maker would hypothetically pay to convert a flat tax system into the given one
Redistributional effects, 1992-2004, Blackorby-Donaldson index (dotted upper line), $\varepsilon=0.75$
Redistributuional effect, 2000-2008, Reynolds-Smolensky index

Redistribution

Year


Standard income definition
Imputed firm return income
Imputed housing income
Imputed firm return and housing income
Pin down tax policy effects *per se* on the observed outcomes

- Fixed income approach, see Kasten, Sammartino and Toder (1994)
  - Pre-tax income distributions are kept fixed, a base year being chosen and exposed to taxation as per the various tax schemes of the period
  - Used to study Norwegian tax policy 2005-2013 (rød-grønn government) in Lian, Nesbakken and Thoresen (2013)

Fixed income approach for Norway 2005-2013
Transplant-and-compare procedure to identify tax policy effects


• One schedules is transplanted into the other by using an isoelastic transformation function

\[ g(x) = Ax^b \quad A > 0, b > 0 \]

• Making an isoelastic transformation means that pre-tax income distributions, in logarithms, differ only by location and scale, differ only by the intercept \( \ln A \) and the slope parameter \( b \).
Example of use: obtaining 1992-adjusted 2004-values of post-tax income

\[ \ln x_{i}^{1992} = a + b \ln x_{i}^{2004} + \varepsilon_{i}, \]

\[ y_{i}^{\hat{g}} = e^{a + \hat{b} \ln y_{i}^{2004} + \varepsilon_{i}} \]
Transplant-and-compare method, cont.

- Redistribution for each year are adjusted for pre-tax income inequality differences between years (N=distribution of post-tax income, F=distribution of pre-tax income, g=deformation function)

\[
\langle N_{2000}^{g00}, F_C \rangle, \langle N_{2001}^{g01}, F_C \rangle, \ldots, \langle N_{2008}^{g08}, F_C \rangle
\]
Given the ambition to discuss the effects of policies

• Behavioral effect of changes in tax schedules should be accounted for
  – Timing effects
  – Labor supply effects

• When using income as a measure of well-being
  – There may be missing income components
    • Income from housing is for example a challenge in the Norwegian context
For example, how can we account for behavioral effects of the Norwegian tax reform of 2006?
Changes in marginal tax rates influence pre-tax income distribution through labor supply effects

• Use elasticity estimates from the ETI literature (see previous empirical public economics lecture):
  – 0.2 (Aarbu and Thoresen, 2001)
  – 0.1 (Thoresen and Vattø, 2012)
  – 0.3 (more in accordance with international results, see Saez, Slemrod and Giertz, 2009).

• But it turns out that the labor supply effects (due to the reform in 2006) do not have any substantial effect on the income distribution
Timing effects of the reform are more important
Income concept that is robust against dividend timing effects

• Employing a shareholder register that comprises ownership data for all corporations and individual owners
• Assigning to the owners their entitlement to after-tax profits of the firms
• Calculate tax on this imputed return (after the reform)
• Establish an alternative common base series
The redistributional effects of tax policies, Norway 2000-2008: common base evidence

Common base redistribution

- Standard income definition
- Imputed firm return income
- Imputed housing income
- Imputed firm return and housing income
Concluding remarks

• The measurement of tax equity is a controversial issue
  – For example the definition of well-being is disputed
• Many empirical studies will focus on effects on income inequality
• Important to identify effects of tax policies on observed outcomes