Optimal Income Taxation: Mirrlees Meets Ramsey

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The views expressed herein are those of the authors and not necessarily those of the Federal Reserve Bank of Minneapolis or the Federal Reserve System.
How should we tax income?

- What **structure of income taxation** offers best trade-off between benefits of public insurance and costs of distortionary taxes?

- Proposals for a flat tax system with universal transfers
  - Friedman (1962)
  - Mirrlees (1971)

- Others have argued for U-shaped marginal tax schedule
  - Saez (2001)
This Paper

We compare 3 tax and transfer systems:

1. **Affine tax system**: \( T(y) = \tau_0 + \tau_1 y \)
   - constant marginal rates with lump-sum transfers

2. **HSV tax system**: \( T(y) = y - \lambda y^{1-\tau} \)
   - function introduced by Feldstein (1969), Persson (1983), and Benabou (2000)
   - increasing marginal rates without transfers
   - \( \tau \) indexes progressivity: \( 1 - \tau = \frac{1-T'(y)}{1-T(y)/y} \)

3. **Optimal tax system**
   - fully non-linear
Main Findings

- Marginal tax rates in the United States should be increasing in income, NOT flat or U-shaped.

- Best tax and transfer system in the HSV class typically better than the best affine tax system:
  - More valuable to have marginal tax rates increase with income than to have lump-sum transfers.

- Welfare gains from tax reform sensitive to planner’s taste for redistribution - may be tiny.

- The shape of the optimal schedule sensitive to the amount of fiscal pressure:
  - As it increases, the optimal schedule becomes first flatter, and then U-shaped.

- Agents differ wrt unobservable log productivity $\alpha$
- Planner only observes earnings $x = \exp(\alpha) \times h$
- Think of planner choosing $(c, x)$ for each $\alpha$ type
- Include incentive constraints, s.t. each type prefers the earnings level intended for their type
- Allocations are constrained efficient
- Trace out tax decentralization $T(x(\alpha)) = x(\alpha) - c(\alpha)$
Novel Elements of Our Analysis

1. We explore a range of Social Welfare Functions
   - Utilitarian SWF as a benchmark
     ⇒ Strong desire for redistribution
   - Alternative SWF that rationalizes amount of redistribution embedded in observed tax system

2. We show the importance of fiscal pressure
   - Important not only for the level of the optimal rates but also for the shape
   - Diamond-Saez formula provides limited intuition

3. Our model has a distinct role for private insurance
   - Standard decentralization of efficient allocations delivers all insurance through tax system
     ⇒ Very progressive taxes
Environment 1

- Standard static Mirrlees plus partial private insurance (quantitatively important)

- Heterogeneous individual labor productivity with two stochastic components

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

- \( \varepsilon \) is privately-insurable, \( \alpha \) is not
  - Agents belong to large families
  - \( \alpha \) common across all members of a family \( \Rightarrow \) cannot be pooled within family
  - \( \varepsilon \) purely idiosyncratic & orthogonal to \( \alpha \) \( \Rightarrow \) can be pooled within family

- Planner sees neither component of productivity
Environment 2

- Common preferences

\[ u(c, h) = \log(c) - \frac{h^{1+\sigma}}{1 + \sigma} \]

- Production linear in aggregate effective hours

\[
\int \int \exp(\alpha + \varepsilon) h(\alpha, \varepsilon) dF_\alpha dF_\varepsilon = \int \int c(\alpha, \varepsilon) dF_\alpha dF_\varepsilon + G
\]
Planner’s Problems

- Seeks to maximize SWF denoted \( W(\alpha) \)
- Only sees total family income \( y(\alpha) = \int \exp(\alpha + \varepsilon) h(\alpha, \varepsilon) dF_{\varepsilon} \)

First Stage

- Planner offers menu of contracts \( \{c(\tilde{\alpha}), y(\tilde{\alpha})\} \)
- Family heads draw idiosyncratic \( \alpha \) and report \( \tilde{\alpha} \)

Second Stage

- Family members draw idiosyncratic \( \varepsilon \)
- Family head tells each member how much to work
- Total earnings must deliver \( y(\tilde{\alpha}) \) to the planner
- Must divide consumption \( c(\tilde{\alpha}) \) between family members
Nature of the Solution

• Planner cannot condition individual allocations on $\varepsilon$, given free within-family transfers
  
  • equally cheap for any family member to deliver income to the planner, and equally valuable to receive consumption
  
• Thus, planner cannot take over private insurance

⇒ Distinct roles for public and private insurance

• Note: Extent of private risk-sharing is exogenous with respect the tax system
Planner’s Problem: Second Best

\[
\begin{align*}
\max_{c(\alpha), y(\alpha)} & \quad \int W(\alpha) U(\alpha, \alpha) dF_\alpha \\
\text{s.t.} & \quad \int y(\alpha) dF_\alpha \geq \int c(\alpha) dF_\alpha + G \\
& \quad U(\alpha, \alpha) \geq U(\alpha, \tilde{\alpha}) \quad \forall \alpha, \forall \tilde{\alpha}
\end{align*}
\]

where \( U(\alpha, \tilde{\alpha}) \equiv \left\{ \begin{array}{c}
\max_{\{c(\alpha, \tilde{\alpha}, \epsilon), h(\alpha, \tilde{\alpha}, \epsilon)\}} \int \left\{ \log(c(\alpha, \tilde{\alpha}, \epsilon)) - \frac{h(\alpha, \tilde{\alpha}, \epsilon)^{1+\sigma}}{1+\sigma} \right\} dF_\epsilon \\
\text{s.t.} \quad \int c(\alpha, \tilde{\alpha}, \epsilon) dF_\epsilon = c(\tilde{\alpha}) \\
\int \exp(\alpha + \epsilon) h(\alpha, \tilde{\alpha}, \epsilon) dF_\epsilon = y(\tilde{\alpha}) \\
U(\alpha, \tilde{\alpha}) = \log(c(\tilde{\alpha})) - \frac{\Omega}{1 + \sigma} \left( \frac{y(\tilde{\alpha})}{\exp(\alpha)} \right)^{1+\sigma} \\
\text{where} \quad \Omega = \left( \int \exp(\epsilon)^{\frac{1+\sigma}{\sigma}} dF_\epsilon(\epsilon) \right)^{-\sigma}
\end{array} \right. \]
Planner’s Problem: Ramsey

\[ \max_{\tau} \int W(\alpha) \left\{ \int u(c(\alpha, \varepsilon), h(\alpha, \varepsilon))dF_\varepsilon \right\} dF_\alpha \]

s.t. \[ \int \int c(\alpha, \varepsilon)dF_\alpha dF_\varepsilon + G = \int \int \exp(\alpha + \varepsilon)h(\alpha, \varepsilon)dF_\alpha dF_\varepsilon \]

where \( c(\alpha, \varepsilon) \) and \( h(\alpha, \varepsilon) \) are the solutions to

\[
\begin{align*}
\max \{ c(\alpha, \varepsilon), h(\alpha, \varepsilon) \} & \quad \int \left\{ \log c(\alpha, \varepsilon) - \frac{h(\alpha, \varepsilon)^{1+\sigma}}{1+\sigma} \right\} dF_\varepsilon \\
\text{s.t.} & \quad \int c(\alpha, \varepsilon) dF_\varepsilon = y(\alpha) - T(y(\alpha); \tau) \\
& \quad y(\alpha) = \int \exp(\alpha + \varepsilon)h(\alpha, \varepsilon)dF_\varepsilon
\end{align*}
\]
Social Preferences

- Assume SWF takes the form $W(\alpha; \theta) = \exp(-\theta \alpha)$
  - $\theta$ controls taste for redistribution
  - $W(\alpha; \theta)$ function could be micro-founded as a probabilistic voting model

- Nests standard SWFs used in the literature:
  - $\theta = 0$: Utilitarian [our benchmark]
  - $\theta = -1$: Laissez-Faire Planner
  - $\theta \to \infty$: Rawlsian
Empirically Motivated SWF

• Progressivity built into current tax system informative about politico-economic demand for redistribution

• Assume planner (political system) choosing tax system in HSV class:  \( T(y) = y - \lambda y^{1-\tau} \)

• Assume planner has SWF in class \( W(\alpha; \theta) = \exp(-\theta \alpha) \)

• What value for \( \theta \) gives observed \( \tau \) as solution to Ramsey problem?

  • Let \( \tau^*(\theta) \) denote welfare-maximizing choice for \( \tau \) given \( \theta \)

  • Empirically Motivated SWF \( W(\alpha; \theta^*) \) s.t. \( \tau^*(\theta^*) = \tau^{US} \)

  • related to inverse optimum problem

• Ramsey planner with \( \theta = \theta^* \) choosing a tax and transfer scheme in the HSV class would choose exactly \( \tau^{US} \)
Baseline HSV Tax System: \( T(y; \lambda, \tau) = y - \lambda y^{1-\tau} \)

- Estimated on PSID data for 2000-2006
- Households with head / spouse hours \( \geq 260 \) per year
- Estimated value for \( \tau = 0.161, R^2 = 0.96 \)
Calibration: Wage Distribution

• Heavy Pareto-like right tail of labor earnings distribution (Saez, 2001)

• Assume Pareto tail reflects uninsurable wage dispersion

• $F_\alpha :$ Exponentially Modified Gaussian $EMG(\mu_\alpha, \sigma^2_\alpha, \lambda_\alpha)$

• $F_\varepsilon :$ Normal $N(\frac{-\sigma^2_\varepsilon}{2}, \sigma^2_\varepsilon)$

• $\log(w) = \alpha + \varepsilon$ is itself EMG $\Rightarrow w$ is Pareto log-normal

• $\log(wh)$ is also EMG, given our utility function, private insurance model, and HSV tax system

• Normal variance coefficient in the EMG distribution for log earnings: $\sigma^2_y = \left(\frac{1+\sigma}{\sigma+\tau}\right)^2 \sigma^2_\varepsilon + \sigma^2_\alpha$. 
Use micro data from the 2007 SCF to estimate $\alpha$ by maximum likelihood $\Rightarrow \lambda_\alpha = 2.2$ and $\sigma_y^2 = 0.4117$
Calibration

- Frisch elasticity $= 0.5 \Rightarrow \sigma = 2$

- Progressivity parameter $\tau = 0.161$ (HSV 2016)

- Govt spending $G$ s.t. $G/Y = 0.188$ (US, 2005)

- Variance of normal component of SCF earnings + external evidence on importance of insurable shocks
  $\Rightarrow \sigma^2_\varepsilon = \sigma^2_\alpha = 0.1407$

  - Variance of insurable shocks consistent with HSV (2016)

  - Total variance of log wages (0.488) and variance of log consumption (0.246) consistent with empirical counter parts
Bottom of Wage Distribution

- Difficult to measure distribution of offered wages at the bottom, given selection into participation

- Low and Pistaferri (2015) estimate distribution of latent offered wages within a structural model in which workers face disability risk and choose participation

<table>
<thead>
<tr>
<th>Percentile Ratios</th>
<th>Model</th>
<th>LP</th>
</tr>
</thead>
<tbody>
<tr>
<td>P5/P1</td>
<td>1.48</td>
<td>1.48</td>
</tr>
<tr>
<td>P10/P5</td>
<td>1.24</td>
<td>1.20</td>
</tr>
<tr>
<td>P25/P10</td>
<td>1.44</td>
<td>1.40</td>
</tr>
</tbody>
</table>
Numerical Implementation

- Maintain continuous distribution for $\varepsilon$
- Assume a discrete distribution for $\alpha$
- Baseline: 10,000 evenly-spaced grid points
- $\alpha_{\text{min}}$: $2$ per hour ($5\% \text{ of the average} = $41.56$)$
- $\alpha_{\text{max}}$: $3,075$ per hour ($$6.17m \text{ assuming } 2,000 \text{ hours} = 99.99\% \text{ percentile of SCF earnings distn.}$)
- Set $\mu_\alpha$ and $\sigma^2_\alpha$ to match $E[e^\alpha] = 1$ and target for $\text{var}(\alpha)$ given $\lambda_\alpha = 2.2$
Wage Distribution

\[ \text{Density} \]

\[ \text{Wage} \left( \exp(\alpha + \varepsilon) \right) \]

\[ x \times 10^{-3} \]
Quantitative Analysis

- U.S. tax system approximated by HSV with $\tau = 0.161$

- Focus on three optimal systems:
  1. HSV tax function: $T(y) = y - \lambda y^{1-\tau}$
  2. Affine tax function: $T(y) = \tau_0 + \tau_1 y$
  3. Mirrless tax function (second best allocation)
Quantitative Analysis: Benchmark

<table>
<thead>
<tr>
<th>Tax System</th>
<th>Tax Parameters</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSV&lt;sup&gt;US&lt;/sup&gt;</td>
<td>$\lambda : 0.839$ $\tau : 0.161$</td>
<td>welfare $T'(y)$ $TR/Y$</td>
</tr>
<tr>
<td>HSV</td>
<td>$\lambda : 0.817$ $\tau : 0.330$</td>
<td>2.08 $-7.22$ 0.466 0.063</td>
</tr>
<tr>
<td>Affine</td>
<td>$\tau_0 : -0.259$ $\tau_1 : 0.492$</td>
<td>1.77 $-8.00$ 0.492 0.279</td>
</tr>
<tr>
<td>Mirrlees</td>
<td>2.48 $-7.99$ 0.491 0.213</td>
<td></td>
</tr>
</tbody>
</table>
Benchmark: Mirrlees vs Ramsey

A. Log Consumption

- Mirrlees
- HSV
- Affine

B. Hours Worked

C. Marginal Tax Rate

D. Average Tax Rate
Quantitative Analysis: Benchmark

• Optimal HSV better than optimal affine
  ⇒ Increasing marginal rates more important than lump-sum transfers

• Moving to fully optimal system generates substantial gains (2.5%)

• The optimal marginal tax rate is around 50%
Quantitative Analysis: Sensitivity

What drives the results?

1. **Eliminate insurable shocks:** \( \tilde{v}_\alpha = v_\alpha + v_\varepsilon \) and \( \tilde{v}_\varepsilon = 0 \)

2. **Utilitarian SWF,** \( \theta = 0 \)

   \( \Rightarrow \) Various SWFs including **Empirically motivated SWF**

3. **Increase the amount of fiscal pressure**

4. **Wage distribution has thin Log-Normal right tail:** \( \alpha \sim N \)
### Sensitivity: No Insurable Shocks

<table>
<thead>
<tr>
<th>Tax System</th>
<th>Tax Parameters</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>welfare</td>
</tr>
<tr>
<td>HSV$^{US}$</td>
<td>$\lambda : 0.842$</td>
<td>$\tau : 0.161$</td>
</tr>
<tr>
<td>HSV</td>
<td>$\lambda : 0.804$</td>
<td>$\tau : 0.383$</td>
</tr>
<tr>
<td>Affine</td>
<td>$\tau_0 : -0.283$</td>
<td>$\tau_1 : 0.545$</td>
</tr>
<tr>
<td>Mirrlees</td>
<td></td>
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</tr>
</tbody>
</table>

- No insurable shocks $\Rightarrow$ larger role for public redistribution
- Want higher tax rates and larger transfers
- Optimal HSV worse than optimal affine
  $\Rightarrow$ Distinguishing insurable shocks from uninsurable shocks is important
Social Welfare

- Consider alternative SWFs:
  - $\theta = -1$: Laissez-Faire Planner
  - $\theta \to \infty$: Rawlsian

- Empirically motivated SWF: $W(\alpha; \theta^*)$ s.t. $\tau^*(\theta^*) = \tau^{US}$
  - Closed form expression for $\theta^*$!

$$\sigma^2_\alpha \theta^* - \frac{1}{\lambda_\alpha + \theta^*} = -\frac{1}{\lambda_\alpha - 1 + \tau} - \sigma^2_\alpha (1 - \tau) + \frac{1}{1 + \sigma} \left\{ \frac{1}{(1 - g)(1 - \tau)} - 1 \right\}$$

- Simple in Normal case ($\lambda_\alpha \to \infty$)

$$\theta^* = -(1 - \tau) + \frac{1}{\sigma^2_\alpha} \frac{1}{1 + \sigma} \left\{ \frac{1}{(1 - g)(1 - \tau)} - 1 \right\}$$

- $\theta^*$ increasing in $\tau$ and $g$
- $\theta^*$ declining in $\sigma$ and $\sigma^2_\alpha$
- $\theta^*$ increasing in $\lambda_\alpha$ (holding fixed $\text{var}(\alpha) = \sigma^2_\alpha + \frac{1}{\lambda^2_\alpha}$)
Social Welfare Functions

Relative Pareto Weight \( \exp(-\theta \alpha) \)

Laissez-Faire: \( \theta = -1 \)

Empirically Motivated: \( \theta^* = -0.566 \)

Utilitarian: \( \theta = 0 \)
## Sensitivity: Alternative SWFs

<table>
<thead>
<tr>
<th>SWF</th>
<th>Mirrlees Allocations</th>
<th>Welfare Change</th>
<th>Mirrlees</th>
<th>Affine</th>
<th>HSV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\theta$ $T'(y)$ $TR/Y$ $\Delta Y$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laissez-Faire</td>
<td>$-1$ 0.083 $-0.082$ 9.72</td>
<td>3.15</td>
<td>3.14</td>
<td>2.98</td>
<td></td>
</tr>
<tr>
<td>Emp. Motivated</td>
<td>$-0.57$ 0.314 0.051 0.16</td>
<td><strong>0.05</strong></td>
<td>$-0.48$</td>
<td>$-$</td>
<td></td>
</tr>
<tr>
<td>Utilitarian</td>
<td>0 0.491 0.213 $-7.99$</td>
<td>2.48</td>
<td>1.77</td>
<td>2.08</td>
<td></td>
</tr>
<tr>
<td>Rawlsian</td>
<td>$\infty$ 0.711 0.538 $-22.55$</td>
<td>708.28</td>
<td>649.14</td>
<td>354.90</td>
<td></td>
</tr>
</tbody>
</table>
Empirically-Motivated SWF

A. Log Consumption

B. Hours Worked

C. Marginal Tax Rate

D. Average Tax Rate
HSV vs Affine with Various SWFs

Welfare Gains (%)
Taste for Redistribution ($\theta$)

Mirrlees
HSV
Affine
SWF Sensitivity: Summary

- Optimal tax system very sensitive to assumed SWF
- Welfare gains moving from the current tax system to the optimal one can be tiny
- Affine system works well when preference for redistribution is either very strong or very weak:
  - In the first case, want large lump-sum transfers
  - In the second, want lump-sum taxes
- For intermediate tastes for redistribution ($\theta \in [-0.88, 0.16]$), HSV is better than affine
Sensitivity: Stronger Fiscal Pressure

- Saez (2001) found a U-shaped marginal schedule to be optimal

- His intuition: Want to make sure welfare is targeted only to the very poor

- We don’t find this. Why?

- Key is degree of revenue requirement: to finance
  - exogenous public expenditure $G$
  - endogenous universal lump-sum transfers $Tr$
Increasing versus U-Shaped Marginal Rates

- Tax rates at the top always tend to be high
  - Extract as much tax revenue as possible (close to the top of the Laffer curve)
  - Asymptotic rates indicated by Saez (2001): $\frac{1+\sigma}{\sigma+\lambda_\alpha}$

- Tax rates in the middle tend not to be high
  - Keep labor supply distortions low where the heaviest population mass is located

- Tax rates at the bottom sensitive to fiscal pressure
  - Enough revenue from taxing the rich $\Rightarrow$ low rates $\Rightarrow$ increasing schedule
  - More fiscal pressure $\Rightarrow$ higher rates $\Rightarrow$ declining or U-shaped schedule
U-shaped Tax Rates with High $G$

A. Log Consumption

B. Hours Worked

C. Marginal Tax Rate (with $\alpha$)

D. Marginal Tax Rate (with income)

Income ($y$)

Baseline $g = 0.50$

$g = 0.75$
Alternative Ways to Increase Fiscal Pressure

A. Marginal Tax Rate (with $\alpha$)

- Baseline $\theta = 1$
- No private insurance
- Elastic labor, $\sigma = .5$

B. Marginal Tax Rate (with income)
Reinterpreting the Literature

- Why does Saez (2001) find U-shaped rates?
  - Saez calibration implies very high fiscal pressure, in part because he rules out private insurance

- U-shaped profile for marginal rates not a general feature of an optimal tax system

- Diamond-Saez equation provides limited intuition for the shape of the optimal schedule
### Sensitivity: Log-Normal Wage

<table>
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<tr>
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<th>Outcomes</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>welfare</td>
</tr>
<tr>
<td>HSV$_{US}$</td>
<td>$\lambda : 0.828$ $\tau : 0.161$</td>
<td>—</td>
</tr>
<tr>
<td>HSV</td>
<td>$\lambda : 0.813$ $\tau : 0.285$</td>
<td>0.88</td>
</tr>
<tr>
<td>Affine</td>
<td>$\tau_0 : -0.230$ $\tau_1 : 0.451$</td>
<td>2.19</td>
</tr>
<tr>
<td>Mirrlees</td>
<td></td>
<td>2.28</td>
</tr>
</tbody>
</table>

- Log-normal distribution $\Rightarrow$ thin right tail
- Optimal HSV worse than optimal affine
- Optimal affine nearly efficient
Why Distribution Shape Matters

- Want high top marginal rates when (i) few agents face those marginal rates, but (ii) can capture lots of revenue from higher-income households.
## Extension: Polynomial Tax Functions

<table>
<thead>
<tr>
<th>Tax System</th>
<th>Tax Parameters</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>welfare</td>
</tr>
<tr>
<td>HSV$^{US}$</td>
<td>$\lambda$ 0.839, $\tau$ 0.161</td>
<td>–</td>
</tr>
<tr>
<td>Affine</td>
<td>$\tau_0$ −0.259, $\tau_1$ 0.492</td>
<td>1.77</td>
</tr>
<tr>
<td>Cubic</td>
<td>$\tau_0$ −0.212, $\tau_1$ 0.370, $\tau_2$ 0.049, $\tau_3$ −0.002</td>
<td>2.40</td>
</tr>
<tr>
<td>Mirrlees</td>
<td></td>
<td>2.48</td>
</tr>
</tbody>
</table>
Extension: Type-Contingent Taxes

- Productivity partially reflects observable characteristics (e.g. education, age, gender)

- Some fraction of uninsurable shocks are observable:
  \( \alpha \rightarrow \alpha + \kappa \)

- Heathcote, Perri & Violante (2010) estimate variance of cross-sectional wage dispersion attributable to observables, \( v_\kappa = 0.108 \)

- Planner should condition taxes on observables: \( T(y; \kappa) \)

- Consider two-point distribution for \( \kappa \) (college vs high school)
Extension: Type-Contingent Taxes

- Significant welfare gains relative to non-contingent tax
- Conditioning on observables ⇒ marginal tax rates of 42%

<table>
<thead>
<tr>
<th>System</th>
<th>Outcomes</th>
<th>wel.</th>
<th>$Y$</th>
<th>$T'(y)$</th>
<th>$TR/Y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSV$^{US}$</td>
<td>$\lambda : 0.834, \tau : 0.161$</td>
<td>−</td>
<td>−</td>
<td>0.319</td>
<td>0.015</td>
</tr>
<tr>
<td>HSV</td>
<td>$\lambda^L : 1.069, \tau^L : 0.480$</td>
<td>6.21</td>
<td>−2.80</td>
<td>0.416</td>
<td>0.147</td>
</tr>
<tr>
<td></td>
<td>$\lambda^H : 0.595, \tau^H : 0.073$</td>
<td></td>
<td></td>
<td></td>
<td>−0.019</td>
</tr>
<tr>
<td>Affine</td>
<td>$\tau^L_0 : -0.403, \tau^L_1 : 0.345$</td>
<td>6.15</td>
<td>−2.53</td>
<td>0.421</td>
<td>0.420</td>
</tr>
<tr>
<td></td>
<td>$\tau^H_0 : -0.032, \tau^H_1 : 0.452$</td>
<td></td>
<td></td>
<td></td>
<td>0.008</td>
</tr>
<tr>
<td>Mirrlees</td>
<td></td>
<td>6.54</td>
<td>−2.53</td>
<td>0.418</td>
<td>0.368</td>
</tr>
<tr>
<td></td>
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<td>0.007</td>
</tr>
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</table>
Conclusions

- Optimal marginal tax schedule increasing in income, and neither flat nor U-shaped

- Ramsey and Mirrlees tax schemes not far apart: can approximately decentralize Mirrlees with a simple tax scheme

- Welfare gains moving from the current tax system to the optimal one hinge on the choice of SWF, may be tiny

- Optimal schedule sensitive to the degree of fiscal pressure