High Marginal Tax Rates on the Top 1%?
Lessons from a Life Cycle Model with Idiosyncratic Income Risk

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Motivation: Income Share of Top 1 % in the U.S.

We should start by emphasizing the factual importance of the top 1 percent. It is tempting to dismiss the study of this group as a passing political fad due to the slogans of the Occupy movement or as the academic equivalent of reality TV. But the magnitudes are truly substantial. Based on pre-tax and pre-transfer market income (excluding nontaxable fringe benefits such as health insurance but including realized capital gains) per family reported on tax returns, the share of total annual income received by the top 1 percent has more than doubled from 9 percent in 1976 to 20 percent in 2011 (Piketty and Saez, 2003, and the World Top Incomes Database). There have been rises for other top shares, but these have been much smaller: during the same period, the share of the group from 95th to 99th percentile rose only by 3 percentage points. The rise in the share of the top 1 percent has had a noticeable effect on overall income inequality in the United States (Atkinson, Piketty, and Saez 2011, Section 2.2).

Figure 1 depicts the US top 1 percent income share since 1913. Simon Kuznets (1955) famously hypothesized that economic growth would first be accompanied by a rise in inequality and then by a decline in inequality. At first glance, it is tempting...
Motivation: Top Marginal Income Tax Rates

During the twentieth century, top income tax rates have followed an inverse U-shaped time-path in many countries, as illustrated in Figure 3. In the United States, top income tax rates were consistently above 60% from 1932 to 1981, and at the start of the 1920s, they were above 70% (of course, varying proportions of taxpayers were subject to the top rate). High income tax rates are not just a feature of the post-World War II period, and their cumulative effect contributed to the earlier decline in top income shares. While many countries have cut top tax rates in recent decades, the depth of these cuts has varied considerably. For example, the top tax rate in France in 2010 was only 10 percentage points lower than in 1950, whereas the top tax rate in the US was less than half its 1950 value.

Figure 4 plots the changes in top marginal income tax rates (combining both central and local government income taxes) since the early 1960s against the changes over that period in top 1% income shares for 18 high-income countries in the World Top Incomes Database. It shows that there is a strong correlation between the reductions in top tax rates and the increases in top 1% income shares.

Source: Piketty and Saez (2013, figure 1).
Motivation

- Large secular increase in earnings, income and wealth inequality: increasing share of the ”Top 1%”
- Popular and scientific calls for increasing marginal tax rates at the top, e.g. Diamond and Saez (2011), Reich (2010), Piketty (2014)
Motivation

- Large secular increase in earnings, income and wealth inequality: increasing share of the ”Top 1%”
- Popular and scientific calls for increasing marginal tax rates at the top, e.g. Diamond and Saez (2011), Reich (2010), Piketty (2014)
- Scientific basis: Diamond/Saez (2011): Revenue maximizing top marginal tax rate above fixed income threshold \( \bar{y} \):

\[
\tau_h = \frac{1}{1 + a \cdot \epsilon}
\]

- \( a = \frac{1}{1 - 1/(y_{m}/\bar{y})} \) measures thickness of tail of income distribution
- \( \epsilon \): Average elasticity of earnings (in top bracket) w.r.t. net of tax rate \( \epsilon = \frac{d \log(y)}{d \log(1 - \tau)} \)
- Generalization to dynamic models: Badel and Huggett (2016)
- Diamond/Saez estimates: \( a = 1.5 \) and \( \epsilon = 0.25 \)

\( \rightarrow \tau_h = 0.73 \) maximizes tax revenue from top 1% earnings
Details of the Formula (relevant for this paper)

- Static model of labor supply. Labor productivity $e$ distributed Pareto with tail parameter $a_e$ in population.
- Constant marginal tax rate $\tau$ above threshold $\bar{y}$. Discard revenue.
- Peak of the Laffer curve if $\bar{y}$ is held fixed (alternatively, if share of population subject to top marginal rate -say top 1%- fixed): 
  \[
  \tau_h = \frac{1}{1 + a \cdot \epsilon} \quad \text{and} \quad \tau_{h1\%} = \frac{1}{1 + \epsilon}
  \]
  where 
  \[
  \epsilon = \frac{1}{a} \cdot \epsilon_u + \left[ 1 - \frac{1}{a} \right] \cdot \epsilon_c
  \]
- Assume preferences given by 
  \[
  U(c, n) = \frac{c^{1-\gamma}}{1-\gamma} - \lambda \frac{n^{1+1/\chi}}{1+1/\chi}
  \]
Details of the Formula (continued)

- Suppose $\gamma = 0$: No income effects. Then $\epsilon_u = \epsilon_c = \chi$, $a = \frac{ae}{1+\chi}$ and
  
  $$
  \tau_h = \frac{1}{1 + a \cdot \chi} \quad \text{and} \quad \tau_h^{1\%} = \frac{1}{1 + \chi},
  $$

- With income effects ($\gamma > 0$): Then $\epsilon_u = \frac{1-\gamma}{\gamma+1/\chi}$, $\epsilon_c = \frac{1}{\gamma+1/\chi}$ and
  
  $$
  \tau_h = \tau_h(\chi, \gamma, ae) \quad \text{and} \quad \tau_h^{1\%} = \tau_h^{1\%}(\chi, \gamma, ae)
  $$

- Basic upshots:
  - Exact tax experiment important: $\tau_h$ vs $\tau_h^{1\%}$.
  - (Obviously) Frisch labor supply elasticity $\chi$ important.
  - Size of the income effect (parameterized by $\gamma$) important.
  - Labor productivity process $e$ at the top (through $ae$) important.
Objective of this project

- Evaluate Diamond/Piketty/Saez recommendations in a (relatively standard) heterogeneous households macro model

**Key ingredients** of the analysis:
- Life cycle model with endogenous labor supply, savings decisions
- Incomplete markets and general equilibrium
- Ex ante and ex post heterogeneity: Redistribution vs. Insurance
- Progressive tax schedule that adjusts to changes in $\tau_h$
- Maximization over tax-reform-induced transition paths:

  - Evolution of wealth distribution and factor prices over time
  - Welfare impact on transitional generations

→ We use rare but large labor productivity shocks not observed in survey data (Castaneda/Diaz-Gimenez/Rios-Rull, 2003)
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**Key challenge**: How to generate realistic earnings and wealth distribution at the top 1%?

→ We use rare but large labor productivity shocks not observed in survey data (Castaneda/Diaz-Gimenez/Rios-Rull, 2003)
Central Result I: Revenue Maximization

- Peak of Laffer curve from top 1% earners is at higher marginal tax rates ($\tau_h = 87\%$) than advocated by Diamond and Saez.

- Intuition:
  - Productivity realizations at the very top large, persistent (but not permanent)
  - Given calibrated preferences, individuals at the very top of productivity distribution maintain labor supply even at very high marginal tax rates

  $\Rightarrow$ Uncompensated elasticity of earnings w.r.t. tax rate is low at the top (strong income effects).
Central Result II: Welfare Maximization

- Revenue maximizing $\tau_h = 87\%$ rate is not welfare maximizing, but not that far off. Social welfare maximized at $\tau_h = 79\%$.

- Intuition: High tax progressivity
  - is detrimental for macro aggregates
    - lower capital stock
    - lower wages
  - hurts the top 1% who receive weight in social welfare function
  - but provides social insurance against never making it into Top 1%.
The Model: Overview

- Large-scale OLG model as in Auerbach and Kotlikoff (1987)
- Neoclassical production sector
- Life cycle structure with population growth, retirement age $j_r$, uncertain survival, terminal age $J$
- Consumption-savings, labor supply decisions s.t. idiosyncratic wage risk (Bewley, Huggett, Aiyagari, Imrohoroglu, Kaplan and Violante)
  - Wage is given by $e(j, s, \alpha, \eta)w$
  - Preferences

$$U(c, n) = \frac{c^{1-\gamma}}{1-\gamma} - \lambda \frac{n^{1+1/\chi}}{1+1/\chi}$$

- Benevolent government (values transitional generations)
  - Chooses optimal (within parametric class) progressive labor income tax reform $\tau_h, \tau_l$ and required time path of government debt $B_t$.
  - Takes other elements of fiscal policy as fixed $\tau_c, \tau_k, \tau_{ss}$. 
The Model
Households: Labor productivity

- Households are ex ante and ex post heterogeneous w.r.t. labor productivity

- Wage is given by $w \cdot e(j, s, \alpha, \eta)$:
  - Wage rate of the economy $w$
  - Deterministic education level $s \in \{n, c\}$ determined at birth
  - Deterministic age component $\epsilon_{j,s}$
  - Fixed effect $\alpha$ determined at birth
  - Stochastic component $\eta$ following education specific Markov chain with states $\eta \in \mathcal{E}_s$ and transition matrix $\pi_s(\eta, \eta')$. 
The Model
Households: Decision making

- At each point in time households choose
  - consumption $c$
  - labor supply $n$ and thus earnings $y = w \cdot e \cdot n$
  - savings in the risk free asset $a$ at return $r_n = r(1 - \tau_k)$ and with tight borrowing constraint

- Preferences

$$U(c, n) = \frac{c^{1-\gamma}}{1-\gamma} - \lambda \frac{n^{1+1/\chi}}{1+1/\chi}$$
The Model
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- Preferences

$$U(c, n) = \frac{c^{1-\gamma}}{1-\gamma} - \lambda \frac{n^{1+1/\chi}}{1+1/\chi}$$

- Dynamic optimization problem:

$$v(j, s, \alpha, \eta, a) = \max_{c,n,a' \geq 0} U(c, n) + \beta \psi_{j+1} \sum_{\eta'} \pi_s(\eta' | \eta) v(j + 1, s, \alpha, \eta', a')$$

$$(1 + \tau_c)c + a' + T(y) + T_{ss}(y) = (1 + r_n)a + b(j, s, \alpha, \eta) + y$$
The Model

Households: Decision making

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  - consumption $c$
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$$(1 + \tau_c)c + a' + T(y) + T_{ss}(y) = (1 + r_n)a + b(j, s, \alpha, \eta) + y$$
The Model

Government

- Collects revenue from
  - consumption taxes $\tau_c$
  - flat capital income tax $\tau_k$
  - progressive labor earnings tax $T(\cdot)$

- Finances exogenous expenditure stream $G$

- Chooses time path of debt $B_t$

- Runs a PAYG progressive social security system

- Budget constraint

$$r\tau_k \int a'(.) d\Phi + \tau_c \int c(.) d\Phi + \int T(we(j, s, \alpha, \eta)n(.)) d\Phi$$

$$= G + (r - n)B$$
**Definition of Recursive Competitive Equilibrium**

Given $G$, $B$, tax system $(\tau_c, \tau_k, T)$ and social security system $(\tau_{ss}, \bar{y}_{ss})$, a stationary recursive competitive equilibrium is value and policy functions $(v, c, n, a')$ for the household, optimal input choices $(K, L)$ of firms, prices $(r, w)$ and an invariant probability measure $\Phi$ such that

- Given prices $(r, w)$ and government policies $(\tau_c, \tau_k, T, \tau_{ss}, \bar{y}_{ss})$, the value function $v$ satisfies the Bellman equation and $(c, n, a')$ are the associated policy functions.
- Given prices $(r, w)$, the optimal choices of the representative firm satisfy
  \[
  r = \Omega \epsilon \cdot \left[ \frac{L}{K} \right]^{1-\epsilon} - \delta_k,
  \]
  \[
  w = \Omega (1 - \epsilon) \left[ \frac{K}{L} \right]^\epsilon.
  \]
- Government policies satisfy the government budget constraints.
Definition of Recursive Competitive Equilibrium (cont.)

- Market clearing:
  - The labor market clears:
    \[ L = \int e(j, s, \alpha, \eta)n(j, s, \alpha, \eta, a)d\Phi \]
  - The capital market clears
    \[ (1 + n)(K + B) = \int a'(j, s, \alpha, \eta, a)d\Phi \]
  - The goods market clears
    \[ Y = \int c(j, s, \alpha, \eta, a)d\Phi + (n + \delta)K + G \]
- The invariant probability measure \( \Phi \) is consistent with the population structure of the economy, with the exogenous processes \( \pi_s \), and the household policy function \( a'(\cdot) \).
Calibration of Initial Equilibrium: Overview

- Standard calibration for household demographics, preferences and technology parameters. Key parameters \((\gamma = 1.5, \chi = 0.6)\)

- Exception: \(e(j, s, \alpha, \eta)\) process. Want realistic earnings and wealth distribution.

- Goal: realistic earnings and wealth distribution

- Procedure to determine \(w \cdot e(j, s, \alpha, \eta)\)
  - Choose aggregate TFP such that \(w = 1\)
  - Use \(\varepsilon_{j,s}\) and \(\alpha\) estimates from PSID
  - Estimate baseline Markov chain \(\{\eta_{s,1}, \ldots, \eta_{s,5}\}\) from PSID
    \(\rightarrow\) normal labor earnings (roughly bottom 99%)
  - Augment with very high earnings realizations \(\{\eta_{s,6}, \eta_{s,7}\}\)
    \(\rightarrow\) follows Castaneda/Diaz-Jimenez/Rios-Rull (JPE, 2003)
Calibration: High Earnings Realizations

No college education

Normal labor earnings (median productivity = 1)

\[ \eta_6 = 19.72035 \]

\[ \eta_7 = 654.01236 \]

College education

Normal labor earnings (median productivity = 1)

\[ \eta_6 = 8.3134 \]

\[ \eta_7 = 654.0124 \]

Ballpark numbers: If median income is $50,000, average income of \( \eta_6 \) people is $450,000, of \( \eta_7 \) people $20,000,000 (population share 0.036%).
### Exogenously Calibrated Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value/Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survival probabilities {ψ_j}</td>
<td>HMD 2010</td>
</tr>
<tr>
<td>Population growth rate n</td>
<td>1.1%</td>
</tr>
<tr>
<td>Capital share in production ϵ</td>
<td>33%</td>
</tr>
<tr>
<td>Threshold positive taxation (\bar{y}_l)</td>
<td>35% of (y^{med})</td>
</tr>
<tr>
<td>Top tax bracket (\bar{y}_h)</td>
<td>400% of (\bar{y})</td>
</tr>
<tr>
<td>Top marginal tax rate (\tau_h)</td>
<td>39.6%</td>
</tr>
<tr>
<td>Consumption tax rate (\tau_c)</td>
<td>5%</td>
</tr>
<tr>
<td>Capital income tax (\tau_k)</td>
<td>28.3%</td>
</tr>
<tr>
<td>Government debt to GDP (B/Y)</td>
<td>60%</td>
</tr>
<tr>
<td>Government consumption to GDP (G/Y)</td>
<td>17%</td>
</tr>
<tr>
<td>Bend points (b_1, b_2)</td>
<td>0.184, 1.114</td>
</tr>
<tr>
<td>Replacement rates (r_1, r_2, r_3)</td>
<td>90%, 32%, 15%</td>
</tr>
<tr>
<td>Pension Cap (\bar{y}_{ss})</td>
<td>200%</td>
</tr>
<tr>
<td>Inverse of Frisch elasticity (\chi)</td>
<td>0.6</td>
</tr>
</tbody>
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### Other Endogenously Calibrated Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Target/Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology level $\Omega$</td>
<td>0.922</td>
<td>$w = 1$</td>
</tr>
<tr>
<td>Depreciation rate $\delta_k$</td>
<td>7.6%</td>
<td>$r = 4%$</td>
</tr>
<tr>
<td>Initial marginal tax rate $\tau_l$</td>
<td>12.2%</td>
<td>Budget balance</td>
</tr>
<tr>
<td>Time discount factor $\beta$</td>
<td>0.977</td>
<td>$K/Y = 2.88$</td>
</tr>
<tr>
<td>Disutility from labor $\lambda$</td>
<td>36</td>
<td>$\bar{n} = 33%$</td>
</tr>
<tr>
<td>Coeff. of Relative Risk Aversion $\gamma$</td>
<td>1.5</td>
<td>$\epsilon = 0.25$</td>
</tr>
</tbody>
</table>

- Model-implied average tax elasticity of earnings in top 1% is $e = 0.25$, same as assumed by Diamond and Saez (2011).
# Macroeconomic Aggregates in Benchmark Economy

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Capital</td>
<td>289%</td>
</tr>
<tr>
<td>Government debt</td>
<td>60%</td>
</tr>
<tr>
<td>Consumption</td>
<td>58%</td>
</tr>
<tr>
<td>Investment</td>
<td>25%</td>
</tr>
<tr>
<td>Government Consumption</td>
<td>17%</td>
</tr>
<tr>
<td>Av. hours worked (in %)</td>
<td>33%</td>
</tr>
<tr>
<td>Interest rate (in %)</td>
<td>4%</td>
</tr>
<tr>
<td>Tax revenues</td>
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</tr>
<tr>
<td>- Consumption</td>
<td>2.9%</td>
</tr>
<tr>
<td>- Labor</td>
<td>11.9%</td>
</tr>
<tr>
<td>- Capital income</td>
<td>4.0%</td>
</tr>
<tr>
<td>Pension System</td>
<td></td>
</tr>
<tr>
<td>Contribution rate (in %)</td>
<td>12.5%</td>
</tr>
<tr>
<td>Total pension payments</td>
<td>5.1%</td>
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</table>
## Earnings and Wealth Distribution

### Model and Data

#### The Labor Earnings Distribution

<table>
<thead>
<tr>
<th>Quintiles</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>90-95</th>
<th>95-99</th>
<th>99-100</th>
<th>Gini</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>0.0</td>
<td>5.6</td>
<td>10.9</td>
<td>17.2</td>
<td>66.3</td>
<td>10.9</td>
<td>18.9</td>
<td>22.8</td>
<td>0.649</td>
</tr>
<tr>
<td>US Data</td>
<td>-0.1</td>
<td>4.2</td>
<td>11.7</td>
<td>20.8</td>
<td>63.5</td>
<td>11.7</td>
<td>16.6</td>
<td>18.7</td>
<td>0.636</td>
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</table>

#### The Wealth Distribution

<table>
<thead>
<tr>
<th>Quintiles</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>90-95</th>
<th>95-99</th>
<th>99-100</th>
<th>Gini</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>0.0</td>
<td>0.9</td>
<td>4.2</td>
<td>11.5</td>
<td>83.4</td>
<td>14.1</td>
<td>25.3</td>
<td>30.6</td>
<td>0.809</td>
</tr>
<tr>
<td>US Data</td>
<td>-0.2</td>
<td>1.1</td>
<td>4.5</td>
<td>11.2</td>
<td>83.4</td>
<td>11.1</td>
<td>26.7</td>
<td>33.6</td>
<td>0.816</td>
</tr>
</tbody>
</table>
Thought Experiment: Tax Reform-Induced Transition

• Start from initial steady state with (crude approximation of) current US tax system and earnings and wealth distribution

• Unexpected one time change in tax policy
  • Set $\bar{y}_h$ to the top 1% labor earnings threshold
  • Change in top marginal tax rate $\tau_h$

• Reform $(\bar{y}_h, \tau_h)$ induces transition path to new long-run equilibrium

• Government budget balance:
  • Set $\tau_l$ to balance intertemporal budget
  • Sequence of government debt balances sequential budgets
Thought Experiment: Tax Reform-Induced Transition

Initial equilibrium: 
\[ \bar{y}_l = 0.35 \cdot y^{\text{med}}, \quad \tau_l = 11.1\% \]
\[ \bar{y}_h = 4.0 \cdot y^{\text{aver}}, \quad \tau_h = 39.6\% \]
The Top 1% Laffer curve

- Peak of NPV Laffer curve at 87%.
- Policy reform reduces wealth at top drastically along transition.
- Labor supply at top even less elastic to $\tau_h$ in long run.
Linking results to Diamond/Saez: Saez (2001) Formula

Revenue maximizing marginal tax rate above a threshold $y^*$

$$\tau_h = 1 \left( 1 + a \cdot \epsilon_c - (\epsilon_c - \epsilon_u) \right)$$

Subst. effect \hspace{1cm} Inc. effect

In the model, at benchmark $\tau_h$ and peak $\tau_h$

- Pareto distribution parameter $a = 1.80 \Rightarrow a = 1.18$
- Average compensated tax rate elasticity $\epsilon_c = 0.41 \Rightarrow \epsilon_c = 0.43$
- Strong income effect $\epsilon_c - \epsilon_u = 0.31 \Rightarrow \epsilon_c - \epsilon_u = 0.32$

$\Rightarrow$ According to formula: Top 1% rate: $\tau_h = 70\%$ vs. peak $\tau_h = 84\%$
Linking results to Diamond/Saez: Saez (2001) Formula

Revenue maximizing marginal tax rate above a threshold $y^*$

\[
\tau_h = \frac{1}{1 + a \cdot \epsilon_c - (\epsilon_c - \epsilon_u)}
\]

Subst. effect Inc. effect

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$\Rightarrow$ According to formula: Top 1% rate: $\tau_h = 70\%$ vs. peak $\tau_h = 84\%$

Note: formula works well for right inputs. But $a, \epsilon_c, \epsilon_u$ not policy invariant
The Welfare-Maximizing Top 1% Tax Rate

Measuring Social Welfare

- Current generations

\[ v_1(j, s, \alpha, \eta, a + \Psi_1(j, s, \alpha, \eta, a)) = v_0(j, s, \alpha, \eta, a) \]

- Future generations

\[ Ev_t(1, s, \alpha, \bar{\eta}, +\Psi_t) = Ev_0(1, s, \alpha, \bar{\eta}, 0) \]

- Total transfers

\[ W = \int \Psi_1(j, s, \alpha, \eta, a) \, d\Phi_1 + \sum_{t=1}^{\infty} \left( \frac{1 + n}{1 + r_0} \right)^t \Psi_t \]

- Optimal tax system minimizes \( W \)
Fehr/Kindermann (2014) show that to a first order approximation (of the value function) this is equivalent to maximizing

\[
W = \int \lambda(j, s, \alpha, \eta, a) \cdot v_1(j, s, \alpha, \eta, a) \, d\Phi_1 \\
+ \sum_{t=1}^{\infty} \left( \frac{1 + n}{1 + r_0} \right)^t \lambda_t \cdot E v_t(1, s, \alpha, \bar{\eta}, 0)
\]

with

\[
\lambda(j, s, \alpha, \eta, a) = U_c\left[ c_1(j, s, \alpha, \eta, a), n_1(j, s, \alpha, \eta, a) \right]^{-1} \quad \text{and} \quad \lambda_t = E\left[ U_c\left[ c_t(1, s, \alpha, \bar{\eta}, 0), n_t(1, s, \alpha, \bar{\eta}, 0) \right] \right]^{-1}
\]
The Welfare-Maximizing Top 1% Tax Rate

![Graph showing the welfare effect of top marginal tax rates. The x-axis represents the top marginal tax rate (\(\tau_h\)), and the y-axis represents the welfare effect (CV). Two curves are depicted: one for aggregate welfare and another for long-run welfare. The optimal tax rate is indicated by a vertical line at \(\tau_h = 0.8\).]
Results: Transitional Dynamics

Further results

Kindermann, Krueger

Top Marginal Taxes

June 2019
Welfare gains for future cohorts: Ex ante redistribution or Ex post insurance? Mainly better ex post insurance!
Results: Ex ante redistribution?

Why are the low skilled ($s = n$)/high $\alpha$ so much better off?

Why are the low skilled ($s = n$)/low $\alpha$ only marginally better off?
Results: Ex ante redistribution?

- Why are the low skilled \((s = n)/\text{high } \alpha\) so much better off?
- Why are the low skilled \((s = n)/\text{low } \alpha\) only marginally better off?
Results: Ex ante redistribution?

Mostly because

- Reduction in average tax rates is highest in the middle of the earnings distribution, not at the very bottom
- Aggregate wages fall substantially (in medium/long run)
- Also: lower skilled have the lower probability to climb up to the high income region
Results: Ex ante redistribution?

![Graph showing change in average tax rate vs income (relative to median) for different educational levels. The graph compares high/HS, high/COL, low/COL, and low/HS categories.]

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Better ex post insurance!

- For the bottom 99%, mean consumption increases, variance of consumption declines, with tax reform ...
- ...despite the fact that aggregate consumption falls by 7%.
Better ex post insurance!

- Consumption of top 1% takes the entire hit.
- Matters for aggregate welfare, but not all that much.
Sensitivity Analysis

• High Earnings Dispersion is Key for Optimal Tax Result
  • Version of model without high earnings realizations (no $\eta_6, \eta_7$).
  • Earnings and wealth distribution grossly counterfactual at top 1%.
  • Optimal top marginal tax rate approximately 35%.

• Preferences $U(c, n) = \frac{c^{1-\gamma}}{1-\gamma} - \lambda \frac{n^{1+1/\chi}}{1+1/\chi}$

• Frisch elasticity $\chi$ has only moderate impact on the results
• Importance of size of income effect as parameterized by $\gamma$

<table>
<thead>
<tr>
<th>Variable</th>
<th>$\gamma = 2$</th>
<th>$\gamma = 1.5$</th>
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<tbody>
<tr>
<td>$e_c$</td>
<td>0.38</td>
<td>0.41</td>
</tr>
<tr>
<td>$e_u$</td>
<td>0.01</td>
<td>0.10</td>
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<tr>
<td>Peak Laffer NPV</td>
<td>95%</td>
<td>87%</td>
</tr>
<tr>
<td>Peak Laffer $t = \infty$</td>
<td>98%</td>
<td>91%</td>
</tr>
<tr>
<td>Welfare Max</td>
<td>89%</td>
<td>79%</td>
</tr>
<tr>
<td>Welfare Max SS</td>
<td>95%</td>
<td>82%</td>
</tr>
</tbody>
</table>
To Sum Up...

- Life cycle general equilibrium model with realistic earnings and wealth inequality

- Peak of Laffer curve for top 1% earners at higher rates than projected by Diamond/Saez ($\tau_h = 87\%$)
  - persistent and very high productivity shocks
  - income effects important at the very top

- Very high marginal tax rate on top 1% labor earnings ($\tau_h = 79\%$) is optimal in terms of aggregate welfare
  - detrimental to macro aggregates
  - but strong welfare gains from ex post insurance
What is Next?

- Potentially (VERY?) problematic assumption 1: labor productivity process invariant to tax system
  - human capital accumulation (Krueger and Ludwig 2016, Badel and Huggett 2016)
  - entrepreneurial activity (Cagetti/de Nardi 2007, Brüggemann 2016)
- Potentially (VERY?) problematic assumption 2: Closed economy? How elastic are the location decisions of the ”super stars”? (Akcigit, Baslandze and Stantcheva 2016)
- Administrative data can give quantitatively crucial insights into
  - who the top 1% actually are and
  - how long they stay up there.
THANK YOU FOR COMING AND LISTENING!
Sensitivity Analysis

<table>
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<tr>
<td>Peak Laffer NPV</td>
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<td>87%</td>
<td>79%</td>
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<tr>
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<td>98%</td>
<td>91%</td>
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<tr>
<td>Welfare Max</td>
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<td>79%</td>
<td>64%</td>
</tr>
<tr>
<td>Welfare Max SS</td>
<td>95%</td>
<td>82%</td>
<td>69%</td>
</tr>
</tbody>
</table>

- Not only peak of Laffer curve at lower rate, also lesser additional revenues from increasing $\tau_h$
Calibration of initial equilibrium

Wage process

- The baseline wage process

\[ \log e(j, s, \alpha, \eta) = \alpha_s + \varepsilon_{j,s} + \eta_{j,s} \]

with

\[ \eta_{j,s} = \rho_s \eta_{j-1,s} + \nu_{j,s} \quad \nu_{j,s} \sim N(0, \sigma_{\nu,s}^2). \]

- Estimates from PSID

<table>
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<tr>
<th></th>
<th>(\rho_s)</th>
<th>(\sigma_{\nu}^2)</th>
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<td>(s = n)</td>
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<td>0.9850</td>
<td>0.0180</td>
<td>0.1517</td>
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Results

Transitional Dynamics: Macroeconomic Aggregates

![Graph showing changes in macroeconomic aggregates over the transition years.](image-url)
Results

Transitional Dynamics: Hours and Tax Revenues
Results

Transitional Dynamics: Wages, Interest Rates

![Graph showing the change in wages and interest rates over the years of transition.](image)

![Graph showing the change in capital, labor supply, and consumption over the years of transition.](image)
More on the Formula

• Diamond/Saez (2011): Revenue maximizing top marginal tax rate:

\[ \tau_h = \frac{1}{1 + a \cdot e} \]

• Why might the formula potentially be wrong/misleading/not useful?

1. \( a, e \) are not constants, but depend on policy: \( a(\tau_h), e(\tau_h) \). Fixed point problem!

2. Formula only applies to very specific tax experiment that leaves remainder of tax code completely unchanged.

3. It does not apply to dynamic general equilibrium models.

• Note: Badel and Huggett (2016) develop generalized formula that tackles problem 3 (but not items 1 and 2).
Related Literature (selective and likely incomplete)

More on the Top 1%

- Household income of 389,436 in 2013 to make it into Top 1%
- Top 1% earned 19% of all AGI, paid 35% of federal income taxes.
- Having (reporting?) top incomes is transitory: between 1999 and 2007, of those reporting income of 1 Mill. or more
  - Only 50% did so for one year
  - 2/3 did so for one or two year
  - Only approx. 10% for all years
- What do they do (Bakija et al.2012)? Of top 0.1% income earners:
  - 60% executives, managers, supervisors, and financial professionals
  - Small but important minority at the very top are sports/entertainment stars and entrepreneurs
  - Almost 50% of earned income of this group from pass-through entities (sole proprietorships, partnerships, S-corps)
• $\eta_7$ shock is large, persistent, but strongly mean reverting.

• Relative to model with permanently high productivity (or static model), superstars (for given level of wealth):
  
  • Work more (and respond less to increases in marginal tax rate)
  • Save more and consume less
Policy Functions of Superstars

Our Model vs. Permanent Superstars: Hours and Asset Accumulation

---

**Graph 1:**
- **X-axis:** Wealth $a$
- **Y-axis:** Labor Hours $l$
- **Legend:**
  - Dynamic Model
  - Permanent Income Consumer

**Graph 2:**
- **X-axis:** Wealth $a$
- **Y-axis:** Savings $a^+$
- **Legend:**
  - Dynamic Model
  - Permanent Income Consumer
Labor Supply Elasticity to Tax Changes of Superstars, Decomposition of Laffer Curve

- Net of Tax Elasticity
- Change in Labor Tax Revenue

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Why Dynamics, Why Transition?

- Value of Dynamic Model
  - Importance of wealth accumulation for labor supply response, especially of high $\eta$ individuals.
  - Laffer curve very different in long run since wealth distribution shifts to the left.
  - Factor price response qualitatively different than in static model ($w$ down rather than up).

- Importance of Transitional Dynamics
  - For $t = 1$ Laffer curve similar to that static model. Steady state overstates revenue maximizing $\tau_h$.
  - Factor price response differs in short run ($w$ up), long run ($w$ down).
  - Importance of transitional generations in social welfare. Steady state overstates welfare maximizing $\tau_h$. 
## Comparison of Static and Dynamic Model

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</tr>
<tr>
<td><strong>$\gamma$</strong></td>
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<td>1.50</td>
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$t = t = 1$  

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<td>$\tau_{sim}$</td>
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