Tax Progressivity, Performance Pay, and Search Frictions

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Introduction

Classic Trade-Off of Progressive Taxation:
Provides some insurance (or redistribution) but distorts incentives.

- A large literature studies this trade-off in frameworks where wages (labor productivities) are exogenous.
- The distortion is typically coming from the (intensive margin) of the labor supply.
  - New and (old) Dynamic Public Finance.
  - Conesa and Krueger (2005), Conesa, Kitao and Krueger (2008).
- This paper: wage shocks are partially endogenous due to search and moral hazard frictions.

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- We use the environment of job-to-job transitions and performance pay developed in Ábrahám, Alvarez and Forstner (2014).
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- We show there that this environment is capable to replicate facts regarding wage dynamics within and across job spells.
- The effects of progressivity: The dispersion of gross and net wages differs.
  - It provides insurance for workers against 'job offer' risk.
  - It affects the ability of firms the provide effort incentives.
    - Gross wage differences implementing the same net wage differences increase in the level of wages → incentives.
    - Flattening of net wages → flattening wealth effects.

Literature

- Relatively small literature on search friction and taxation and on the interaction between tha tax system and firm-provided insurance.
  - Optimal taxation and search frictions: Golosov, Maziero and Menzio (2014).
  - Tax progressively and optimal labor contracts: Lamadon (2014).

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  - Tax progressively and optimal labor contracts: Lamadon (2014).
- Another aspect of endogenous wage processes, which is not in this paper: Human capital.
  - Optimal taxes: Kapicka and Neira (2013), Stantcheva (2014), Peterman (2014), Ábrahám, Koehne and Pavoni (2014).
  - Tax reforms: Keane (2012), Badel and Huggett (2014)

The model

Overview

Key model elements:

- Risk-neutral firms offer long-term employment contracts to risk-averse workers.
- A moral hazard problem arises from the assumption that match output depends stochastically on the worker's unobservable effort.
- Workers' and firms' commitment to contracts is limited.
- When a worker receives an outside offer, the present and the potential future employer compete for him by offering new contracts.

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Quantitative analysis:

- Calibration to (micro) labor market data from the U.S.
- Revenue neutral experiments with different levels of tax progressivity.

Firms

- Run by risk-neutral entrepreneurs.
- Operate a linear production technology:

$$y = Y(z, A) = zA \tag{1}$$

  - z Match-specific productivity level
  - A Worker-specific stochastic productivity factor

- $z \in \mathcal{Z} = \{z_1, z_2, \ldots, z_N\}$ is drawn from the distribution $F(z)$ when a firm and a worker meet and remains constant over time.
- The value of A depends stochastically on a worker's effort level ϵ:

$$A = \begin{cases} A^+ & \text{with probability} \quad \pi(\epsilon) \\ A^- & \text{with probability} \quad 1 - \pi(\epsilon) \end{cases} \tag{2}$$

  - $A^+ > A^-$

Workers

- Ex-ante identical and risk-averse.
- Derive utility $u(c)$ from consumption and suffer disutility $g(\epsilon)$ from exerting effort while working.
- While unemployed:
  - Enjoy consumption level b.
  - Receive a job offer with probability λ_u associated with match type z.
- While employed in a z-type match:
  - Consume period net wage $(1 - T(w)))w$ and exert effort ϵ.
  - Receive outside job offer with probability λ_e of match type $\tilde{z}$.
  - (When their current match is destroyed, workers immediately receive a new offer with probability λ_r.)

Government

- Finances exogenous government expenditure G from the receipts of tax revenue.

Employment contracts

- Firms make take-it-or-leave-it offers in terms of long-term contracts.
- They cannot observe a worker's effort.
- Firms can commit to wage payments only as long as profits are non-negative.
- Workers can quit to unemployment or report outside job offers.
- In both cases the original contract becomes void.

$\Rightarrow$ *Repeated moral hazard and two-sided limited commitment.*

Competition for workers

- When a worker reports an outside job offer, the two firms start competing for the worker by offering new contracts.
- Bidding takes place in the form of Bertrand competition (in terms of expected lifetime utilities U that contracts promise to the worker).
- Firms are willing to bid up to the break-even level of utility $U^*(z)$ that solves $V(U^*(z), z) = 0$.
- Relevant (reported) outside offers lead to an increase in lifetime utility for the worker, either at his current employer or through a job-to-job transition.

The firm's contract design problem

An optimal contract $\mathcal{C}^*$ solves

$$V(U, z) \quad = \quad \max_{\{w,\epsilon,U^+,U^-\}}$$

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+ & \quad \lambda_e \underbrace{\sum_{\tilde{z}\in\mathcal{Z}}\Big[V_o(U^+,z,\tilde{z})\pi(\epsilon)+V_o(U^-,z,\tilde{z})(1-\pi(\epsilon))\Big]f(\tilde{z})}_{\textit{exp. continuation value, outside offer}}\Bigg\}
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Policy functions: $w(U,z)$, $\epsilon(U,z)$, and $\{U^+(U,z), U^-(U,z)\}$

Promise-keeping

Promise-keeping constraint (PKC):

$$U \quad \leq \quad u((1 - T(w))w) - g(\epsilon)$$

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\end{aligned}
$$

where

$$
U_o(U^i, z, \tilde{z}) = \max\Big\{U^i, \min\Big[U^*(z), U^*(\tilde{z})\Big]\Big\}
$$

Incentive-compatibility

Incentive-compatibility constraint (ICC):

$$
\begin{aligned}
g'(\epsilon) \quad = \quad & \pi'(\epsilon)\beta\psi(1-\delta)\Bigg\{(1-\lambda_e)\Big[U^+ - U^-\Big] \\
& + \lambda_e \sum_{\tilde{z}\in\mathcal{Z}} \Big[U_o(U^+, z, \tilde{z}) - U_o(U^-, z, \tilde{z})\Big] f(\tilde{z})\Bigg\}
\end{aligned}
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Participation constraints

Worker's participation constraint (WPC):

$$U^n \leq U^i(U, z), \quad i \in \{+, -\}$$

where $U^n := \frac{u(b)}{1-\psi\beta}$.

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Firm's participation constraint (FPC):

$$U^i(U, z) \leq U^*(z), \quad i \in \{+, -\}$$

where $U^*(z)$ solves $V(U^*(z), z) = 0$.

Calibration

Setup of the quantitative analysis

Calibration:

- Calibrated to U.S. micro data (SIPP 2004 panel) on:

  ▸ Data details

  - Labor market transitions (E-U, U-E, E-E).
  - Individual (residual) wage dynamics within and between jobs.

  ▸ Functional Forms

- Use a flexible functional form to approximate the progressivity of the US tax system.

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Tax experiments:

- Compare stationary equilibria for different levels of tax progressivity.

Income tax function

- Specification from Heathcote, Storesletten & Violante (2011):

$$T(w) = t(\tilde{w}) = 1 - \tau_0 \tilde{w}^{-\tau_1} \quad , \quad \tilde{w} = \frac{w}{\bar{w}} \tag{3}$$

  - $t(\cdot)$ average tax rate
  - w individual labor income
  - $\bar{w}$ average labor income

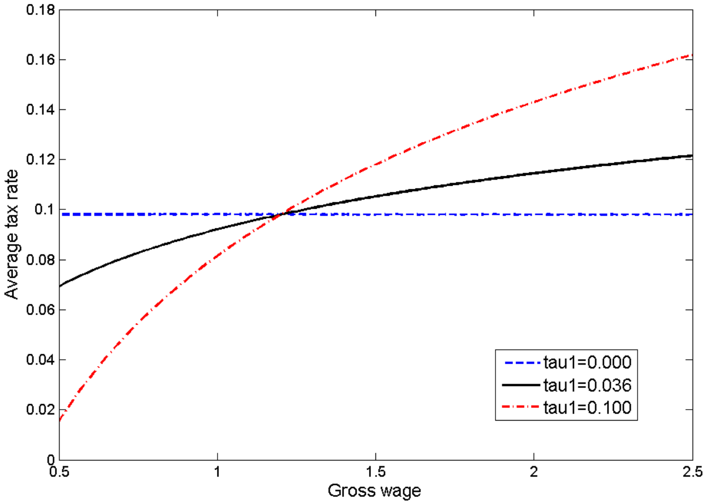
- Parameter estimates for the baseline economy (scenario B) from Guner, Kaygusuz & Ventura (2013):

$$\tau_0 = 0.902 \quad , \quad \tau_1 = 0.036 \tag{4}$$

  - Based on micro data from the U.S. IRS (all households).

- Counterfactual scenarios:
  - $\tau_1 = 0.0$ flat-rate tax (scenario A)
  - $\tau_1 = 0.1$ increased progressivity (scenario D)

Average tax rates in comparison



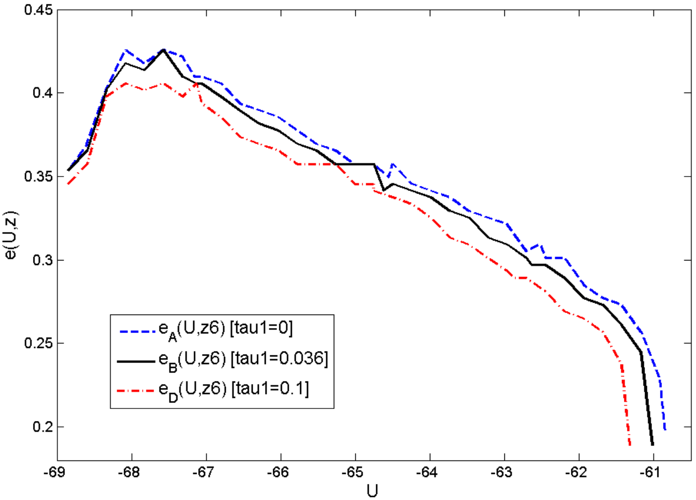
Average tax rates for different degrees of progressivity

Simulated vs. empirical statistics

Statistic		Model	Data
Labor market transitions:			
E-U flows	τ^{eu}	0.025	0.024
U-E flows	τ^{ue}	0.491	0.548
E-E flows	τ^{ee}	0.039	0.039
Log wage changes between jobs:			
Mean	$\mu^{bet}(\Delta \ln w)$	0.062	0.029
Std.	$\sigma^{bet}(\Delta \ln w)$	0.444	0.364
Frac. neg.	$\varpi_{-}^{bet}(\Delta \ln w)$	0.352	0.384
Log wage changes within a job:			
Mean	$\mu^{win}(\Delta \ln w)$	0.013	0.007
Std.	$\sigma^{win}(\Delta \ln w)$	0.092	0.142
Frac. neg.	$\varpi_{-}^{win}(\Delta \ln w)$	0.353	0.335
Cross-sectional wages:			
Mean	$\mu(w)$	1.232	1.146
Log Std.	$\sigma(\ln w)$	0.274	0.505

Results

Policy function for effort



Policy functions for effort, z_6-match

Effort

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- Incentive provision is limited at binding participation constraints.

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- Effort is decreasing in promised utility $\leftarrow$ wealth effects.
- Incentive provision is limited at binding participation constraints.
- Increased progressivity is leading to lower effort for a given utility level.
- $U^*(z)$ is declining for most z as incentive provision is more costly with progressivity.
  - For high wage levels, the same net wage cost more for the firm so it decides to ask lower effort.
  - For low wage levels, future income prospects become worse $\rightarrow$ you need to increase period utility $\rightarrow$ effort is reduced because of wealth effects.

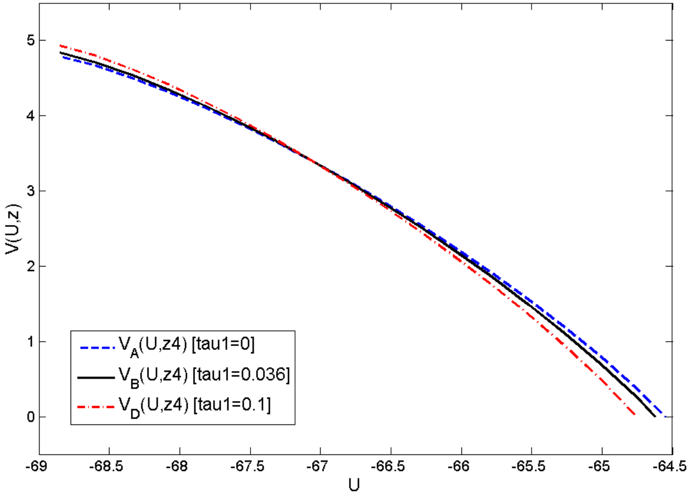
Changes in critical utility levels

	A $[\tau_1 = 0]$		B $[\tau_1 = 0.036]$	D $[\tau_1 = 0.1]$	
	$U^*(z)$	$\Delta(B)$	$U^*(z)$	$U^*(z)$	$\Delta(B)$
z_3	-67.154	*-0.009*	-67.145	-67.125	*0.020*
z_4	-64.554	*0.071*	-64.624	-64.756	*-0.131*
z_5	-62.516	*0.124*	-62.640	-62.871	*-0.231*
z_6	-60.847	*0.171*	-61.018	-61.324	*-0.306*
z_7	-59.469	*0.200*	-59.669	-60.033	*-0.364*
z_8	-58.311	*0.221*	-58.532	-58.934	*-0.402*
z_9	-57.321	*0.237*	-57.558	-57.991	*-0.433*
z_{10}	-56.458	*0.250*	-56.708	-57.165	*-0.458*

Changes in expected match output

	A		B	D	
	$[\tau_1 = 0]$		$[\tau_1 = 0.036]$	$[\tau_1 = 0.1]$	
Aggregate:	$E(y)$	$\Delta(B)$	$E(y)$	$E(y)$	$\Delta(B)$
	1.6557	*0.004*	1.6517	1.6427	*-0.009*
By match type:	$E(y\|z)$	$\Delta(B)$	$E(y\|z)$	$E(y\|z)$	$\Delta(B)$
z_3	1.197	*0.002*	1.195	1.189	*-0.005*
z_4	1.389	*0.003*	1.386	1.378	*-0.007*
z_5	1.555	*0.005*	1.550	1.541	*-0.008*
z_6	1.708	*0.005*	1.703	1.694	*-0.008*
z_7	1.863	*0.003*	1.860	1.852	*-0.008*
z_8	2.025	*0.004*	2.020	2.009	*-0.012*
z_9	2.196	*0.005*	2.192	2.181	*-0.011*
z_{10}	2.347	*0.003*	2.344	2.332	*-0.012*

Firms' value function



Value functions, z_4-match

Welfare

- Firms' profits increase for low wage workers.
- Progressivity makes net wages less dispersed (across job offers) $\rightarrow$ Firms can provide the same utility with lower 'average' wages.
- For low wages, this effect offsets the the reduced capability of giving incentives.
- For higher wages, the incentive effect dominates so the profits shrink.
- But the distribution of wages (life-time utilities) adjust, and overall profits increase with progressivity.

Changes in firm profits from hiring an unemployed worker

	A $[\tau_1 = 0]$		B $[\tau_1 = 0.036]$	D $[\tau_1 = 0.1]$	
	$V(U^n, z)$	$\Delta(B)$	$V(U^n, z)$	$V(U^n, z)$	$\Delta(B)$
z_3	1.758	*-0.062*	1.820	1.944	*0.125*
z_4	4.788	*-0.049*	4.837	4.933	*0.096*
z_5	7.802	*-0.044*	7.846	7.932	*0.086*
z_6	11.050	*-0.034*	11.084	11.156	*0.072*
z_7	14.526	*-0.027*	14.554	14.612	*0.058*
z_8	18.170	*-0.021*	18.192	18.237	*0.046*
z_9	21.918	*-0.013*	21.930	21.961	*0.030*
z_{10}	25.721	*-0.004*	25.725	25.738	*0.013*

Changes in average firm profits

	A $[\tau_1 = 0]$		B $[\tau_1 = 0.036]$	D $[\tau_1 = 0.1]$	
Aggregate:	$E[V(U,z)]$	$\Delta(B)$	$E[V(U,z)]$	$E[V(U,z)]$	$\Delta(B)$
	6.8648	*-0.030*	6.8948	6.963	*0.068*

Conclusion

- Firms provide a (constrained) efficient level of insurance for workers for within job shocks $\rightarrow$ Tax progressivity can make things only worse.
- However firms are not providing insurance for between job (offer) risk. $\rightarrow$ Tax progressivity improves insurance.
- Quantitatively the second effect dominates (at least locally around the estimated progressivity of the US tax system).

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Future work:

- Improve calibration.
- Allow surplus sharing.
- Unemployment insurance and minimum wages.

Appendix

Data background (1/2)

The SIPP 2004 panel:

- Longitudinal survey of representative households in the U.S.
- Households are interviewed every 4 months.
- At each interview, detailed monthly labor market information for each household member over the preceding 4 months (the *wave*) is collected.
- In particular, information on up to two wage or salary jobs of an individual (employer i.d., starting and ending dates, earnings, . . .) is recorded for each wave.
- We include observations from January 2004 to December 2006.
- We restrict the sample to male workers aged 20 to 65 years who were employed in at least one month over the panel span in a job that was neither self-employment nor family work without pay.

Back

Data background (2/2)

- We classify individuals as *employed*, *unemployed*, or *not in the labor force* based on their labor market status in the second week of each month.
- Our measure of *monthly job-to-job transitions* comprises all workers in the sample who (i) were employed in the second week of both months, (ii) were not unemployed in any of the weeks in between, (iii) held main jobs with different employers in the second weeks of each months, and (iv) did not return to a job that was previously recorded as their main job.
- For those individuals who do not report an hourly pay rate (around 1/2 of the sample), we impute an individual's *real hourly wage* at his main job from total earnings on this job over the wave, the number of hours typically worked on that job, and the total number of weeks employed in that job over the wave.
- *Residual wages* are estimated through a pooled regression of log real hourly wages on five education groups, a non-white dummy, four regional groups, as well as year dummies.

Back

Functional forms and distributions

- CRRA utility from consumption: $u(c) = \left(c^{1-\sigma}\right)/(1-\sigma), \quad \sigma > 0$
- Disutility from effort: $g(\epsilon) = \epsilon^{\gamma}, \quad \gamma > 0$
- Probability of high worker productivity: $\pi(\epsilon) = 1 - \exp\{-\rho\epsilon\}, \quad \rho > 0$
- Normalization of worker productivity levels: $A^{-} = 1, \quad A^{+} = 1 + \Delta A$
- Weibull sampling distribution for match-specific productivity levels:

$$z \sim WB(\zeta_0, \zeta_1, \zeta_2)$$

  - $(\zeta_0, \zeta_1, \zeta_2)$ are the shift, shape, and scale parameters of $F(\cdot)$.
  - The distribution is discretized with a total of 15 productivity levels.

Back