

Redistribution with Performance Pay

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 - piece rates, commissions, bonuses, stock options Lemieux MacLeod Parent '09
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 - question 1: how do taxes affect level & performance sensitivity of wages?
- Standard (Mirrlees) models of taxation assume exogenous wage rates
 - common concern: overestimate the benefits of raising tax progressivity
 - why? crowd-out of private insurance via higher performance sensitivity
 - question 2: how is optimal policy altered w/ performance-pay contracts?

Key findings: Tax policy prescriptions from standard models are actually robust to endogenous wages in the form of performance-based contracts

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- **Positive analysis:** raising tax progressivity hardly affects the sensitivity of earnings to performance
 - **crowd-out** of private insurance: steeper pre-tax earnings schedule ...
 - almost fully offset by countervailing **crowd-in effect** through effort
 - consistent with **empirical evidence** that taxes hardly affect earnings risk
- **Normative analysis:** the optimal rate of progressivity is strictly lower than with exogenous wage risk
 - novel optimal tax formula accounts for crowd-out and fiscal externalities
 - but **small welfare loss** from setting taxes ignoring endog. private insurance

WORKER – FIRM RELATIONSHIP

- Agents indexed by **exogenous innate ability** $\theta \in \Theta \subset \mathbb{R}_+$
 - preferences $\log(c) - h(\ell)$ in cons. c , labor effort $\ell \in [0, 1]$, h str. convex
 - earnings y , consumption $c = R(y)$: where $R(y) = \frac{1-\tau}{1-p} y^{1-p}$
 - p is the **rate of progressivity** Feldstein '69, Benabou '00

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- Worker who provides effort ℓ produces
$$\begin{cases} \theta & \text{with prob. } \ell \\ 0 & \text{with prob. } 1 - \ell \end{cases}$$
 - moral hazard: firm observes worker's ability and output, but not effort
 - contract: **effort** $\ell(\theta)$, **base pay** $\underline{y}(\theta)$, **bonus pay** $e^{\beta(\theta)} \cdot \underline{y}(\theta)$
 - $\hookrightarrow \beta(\theta) > 0$: incomplete insurance against output risk within the firm

- Firm maximizes **expected profit** taking taxes & reservation value as given

$$\Pi(\theta) = \max_{\{\ell, \underline{y}, \beta\}} \theta \cdot \ell - [(1 - \ell) \cdot \underline{y} + \ell \cdot e^{\beta} \underline{y}]$$

- incentive constraint**: contract must induce the worker to provide effort ℓ

$$\ell \in \arg \max_l (1 - l) \log(R(\underline{y})) + l \log(R(e^{\beta} \underline{y})) - h(l)$$

- participation constraint**: contract must provide the reservation value

$$(1 - \ell) \log(R(\underline{y})) + \ell \log(R(e^{\beta} \underline{y})) - h(\ell) \geq U(\theta)$$

- Free-entry** (zero profits) on labor market θ pins down equilibrium $U(\theta)$

- **Key:** incentive constraint pins down the optimal amount of risk (bonus) to which the firm exposes the worker in order to elicit an effort level ℓ

$$\beta(\theta) = \frac{h'(\ell(\theta))}{1-p}$$

- Moral hazard intuition: higher effort requires a higher bonus

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- Compare this model of endogenous wage setting to standard Mirrlees
 - Mirrlees: effort ℓ leads to a single earnings level (full insurance) $\theta\ell$
 - in our model, average earnings $(1-\ell)\underline{y} + \ell e^\beta \underline{y}$ are exactly the same, $\theta\ell$
 - but the dispersion of earnings around the mean is endogenous to taxes: β

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- higher tax progressivity reduces consumption risk, hence effort incentives
- firm responds by raising pre-tax earnings risk β so to preserve incentives

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② **indirect crowd-in** via product of elasticities $\varepsilon_{\beta, \ell} \cdot \varepsilon_{\ell, 1-p}$

- higher progressivity reduces effort (standard): $\varepsilon_{\ell, 1-p} = \frac{\partial \log(\ell)}{\partial \log(1-p)} > 0$
- ... but eliciting lower effort requires weaker incentives $\varepsilon_{\beta, \ell} = \frac{\partial \log(\beta)}{\partial \log(\ell)} > 0$

- Relative strength of these counteracting forces? Recall $\beta = \frac{h'(\ell)}{1-p}$

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 - **key insight:** $\varepsilon_{\beta,\ell} = \frac{\ell h''(\ell)}{h'(\ell)} =$ inverse of Frisch elasticity of labor effort
 - hence $\varepsilon_{\beta,\ell} \cdot \varepsilon_{\ell,1-p} \approx 1$, so that the direct crowd-out is (approx) offset
 - note: $\varepsilon_{\ell,1-p} \neq$ Frisch \rightsquigarrow exact structural expression leads 90% offset
- Reasoning is **robust to the value of labor effort elasticity**
 - intuition: suppose Frisch is small, so ℓ doesn't react much to tax change
 - but then this tiny effort change requires a huge change of bonus
 - thus, the indirect crowd-in is large even though effort is almost inelastic

- Conclusion: the pre-tax bonus is practically insensitive to policy!
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- Is our analysis robust to alternative foundations? Yes!
 - Holmström Milgrom 1987 w/ linear taxes: slope of contract is also $\frac{h'(\ell)}{1-\tau}$
 - Edmans Gabaix 2011 (continuous output shocks, CRP taxes): $\frac{h'(\ell)}{1-p}$
 - Edmans Gabaix Sadzik Sannikov 2012 (dynamic model, CRP): $\propto \frac{h'(\ell_t)}{1-p}$
 - arbitrary tax schedule & utility: contract is linear in *utility* space with slope $h'(\ell)$

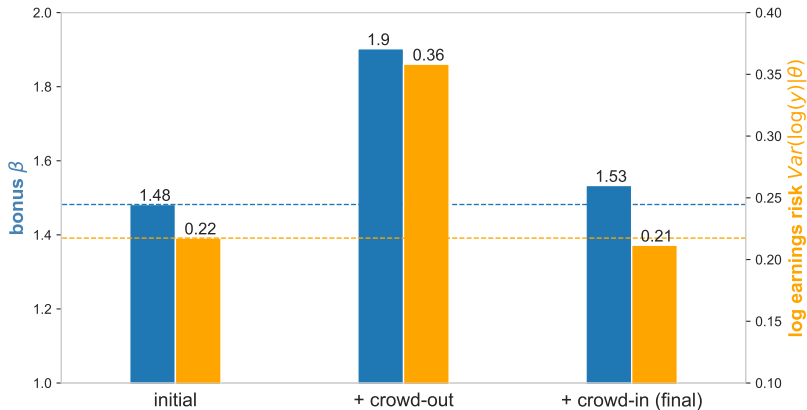
CALIBRATION

- **Data on performance-pay jobs** (Lemieux et al. 2009)
 - perf.-pay jobs account for 45% of private sector jobs
 - mean hourly wage higher in perf.-pay jobs by 30%
 - variance of log earnings higher in perf.-pay jobs by 42%

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- **Quantitative model**
 - Workers draw simultaneously ability θ and a type of job
 - job types: performance-pay or fix-pay (no agency frictions).
 - Conditional on a type of job, ability θ is Pareto-lognormal
 - Perf-pay jobs have higher average $\theta \rightarrow$ diff. in mean hourly wages
 - Risky bonus \rightarrow diff. in variance of log earnings
 - Other params \rightarrow unconditional moments (Heathcote & Tsujiyama 2019)
 - Frisch elasticity $\varepsilon = 0.5$ (Keane 2011, Chetty et al. 2011)
 - The initial rate of progressivity is $p = 0.181$ (Heathcote et al 2017)

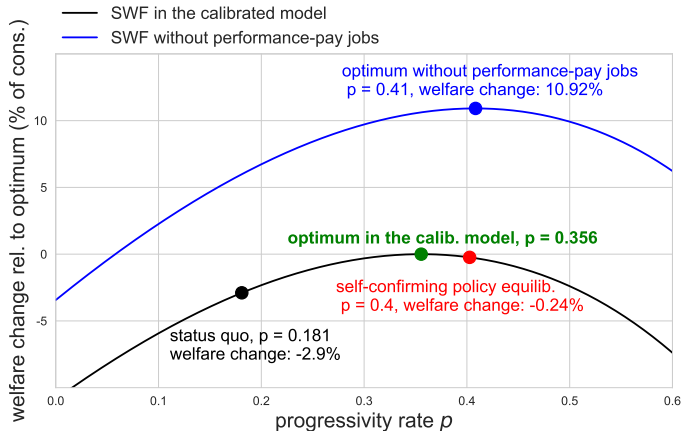
- Consider a large reform: let's double the level of progressivity p
 - Crowd-out increases strongly both β and $Var(\log y | \theta)$
 - ... but is almost exactly offset by the crowd-in effect



Optimal rate of tax progressivity (for Utilitarian planner)

$$\frac{p^*}{(1 - p^*)^2} = \frac{Var(\log \theta) + (1 + \varepsilon_{\beta, 1-p}) \cdot Var(\log y | \theta)}{\varepsilon_{\ell, 1-p} + (1 - p^*) \cdot \varepsilon_{\beta, \ell} \cdot \varepsilon_{\ell, 1-p} \cdot Var(\log y | \theta)}$$

- Exogenous-risk model ($\varepsilon_{\beta, 1-p} = \varepsilon_{\beta, \ell} = 0$):
 - p^* increasing in the total variance of log-earnings
 $Var(\log y) = Var(\log \theta) + Var(\log y | \theta)$
 - p^* decreasing in the labor effort elasticity $\varepsilon_{\ell, 1-p}$
- Moral hazard:
 - $\varepsilon_{\beta, 1-p} = -1 \Rightarrow$ crowding-out offsets gains of insuring ex-post risk
 - $\varepsilon_{\beta, \ell} > 0 \Rightarrow$ negative fiscal externality from crowding-in
- **Consequence:** strictly lower optimum progressivity than w/ exog. risk



- **SCPE:** progressivity chosen when endogenous earnings risk is ignored
- **Quantitatively:** only 0.24% welfare loss from ignoring endogenous earnings risk when choosing progressivity

CONCLUSION

- Labor income taxation when compensation is based on performance
 - endogenous private insurance constrained by moral hazard frictions
 - analysis of tax incidence and optimal taxation in this environment
- Several extensions left for future research
 - taxes may affect extensive margin of performance-pay job creation
 - departures from constrained efficiency and perfect competition
 - empirically test predictions on impact of taxes on earnings structure