Redistribution with Performance Pay

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Positive & normative study of taxation with performance-based earnings

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- High fraction ($\approx 50\%$) of all jobs feature pay-for-performance
  - piece rates, commissions, bonuses, stock options Lemieux MacLeod Parent '09
  - fruit harvesters, real estate brokers, sales workers, bankers, CEOs, etc
  - **question 1:** how do taxes affect level & performance sensitivity of wages?

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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

RELATED LITERATURE

- Performance-pay labor contracts: theory and empirics
  Foster Rosenzweig '94, Prendergast '99, Shearer '04, Guiso Pistaferri Schivardi '05, Lemieux MacLeod Parent '09, Bloom Van Reenen '10, Lazear Oyer '10, Frydman Jenter '10, Bandiera Barankay Rasul '11, Edmans Gabaix '11, Edmans Gabaix Sadzik Sannikov '12, Bell Van Reenen '14, Edmans Gabaix '16, Abraham Alvarez-Parra Forstner '16, Lamadon '16, Edmans Gabaix Jenter '17, Friedrich Laun Meghir Pistaferri '19, Lamadon Mogstad Setzler '19, Grigsby Hurst Yildirmaz '19

- Taxation and performance-pay labor contracts: empirics
  Rose Wolfram '02, Frydman Molloy '11, Dale-Olsen '12, Bird '18

- Taxation with endogenous wage risk: theory
  Blomqvist Horn '84, Rochet '91, Kaplow '91, Cremer Pestieau '96, Golosov Tsyvinski '07, Chetty Saez '10, Kapicka Neira '13, Findeisen Sachs '16, Stantcheva '17, Makris Pavan '17, Sleet Yazici '17, Doligalski '19, Haufler Perroni '20

- Taxation with endogenous consumption risk: theory
  Attanasio Rios-Rull '00, Krueger Perri '11, Park '14, Abraham Koehne Pavoni '16, Heathcote Storesletten Violante '17, Chang Park '19, Raj '19

- Taxation with endogenous wages but no risk: theory
  Hungerbuehler Lehmann Parmentier Van der Linden '06, Rothschild Scheuer '13/14/16, Stantcheva '14, Piketty Saez Stantcheva '14, Ales Kurnaz Sleet '15, Ales Sleet '16, Ales Bellofatto Want '17, Sachs Tsyvinski Werquin '20

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 z, consumption $c = R(z)$: where $R(z) = \frac{1-\tau}{1-p} z^{1-p}$
  - 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 $\underline{z}(\theta)$, bonus pay $e^{\beta(\theta)} \cdot \underline{z}(\theta)$

    $\hookrightarrow$ $\beta(\theta) > 0$: incomplete insurance against output risk within the firm

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

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

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

$$\ell \quad \in \quad \arg\max_{l} \quad (1-l) \, \log\left(R\left(\underline{z}\right)\right) \; + \; l \, \log\left(R\left(e^{\beta} \underline{z}\right)\right) \; - \; h\left(l\right)$$

  - participation constraint: contract must provide the reservation value

$$(1-\ell) \, \log\left(R\left(\underline{z}\right)\right) \; + \; \ell \, \log\left(R\left(e^{\beta} \underline{z}\right)\right) \; - \; h\left(\ell\right) \quad \geq \quad U\left(\theta\right)$$

- 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

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

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- Moral hazard intuition: higher effort requires a higher bonus
- 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 $(1-\ell)\,\underline{z} + \ell\, e^{\beta}\underline{z}$ are exactly the same, $\theta\ell$
  - but the dispersion of earnings around the mean is endogenous to taxes: β

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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 to $> 90\%$ 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

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- Is our analysis robust to alterative forms of performance pay? Yes!
  - Piece rates, commisions
    - Holmström Milgrom 1987 w/ linear taxes, slope of contract is also $\frac{h'(\ell)}{1-\tau}$
  - Stock options, non-linear commisions
    - Edmans Gabaix 2011, continuous output shocks, CRP taxes: $\frac{h'(\ell)}{1-p}$
  - Incentives by promotions
    - Edmans Gabaix Sadzik Sannikov 2012, dynamic model, CRP: $\propto \frac{h'(\ell_t)}{1-p}$

CALIBRATION

- Data on performance-pay jobs (Lemieux et al. 2009)
  - perf-pay jobs account for 45% of private sector jobs
  - earnings higher in perf-pay jobs by 40%
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- Data on performance-pay jobs (Lemieux et al. 2009)
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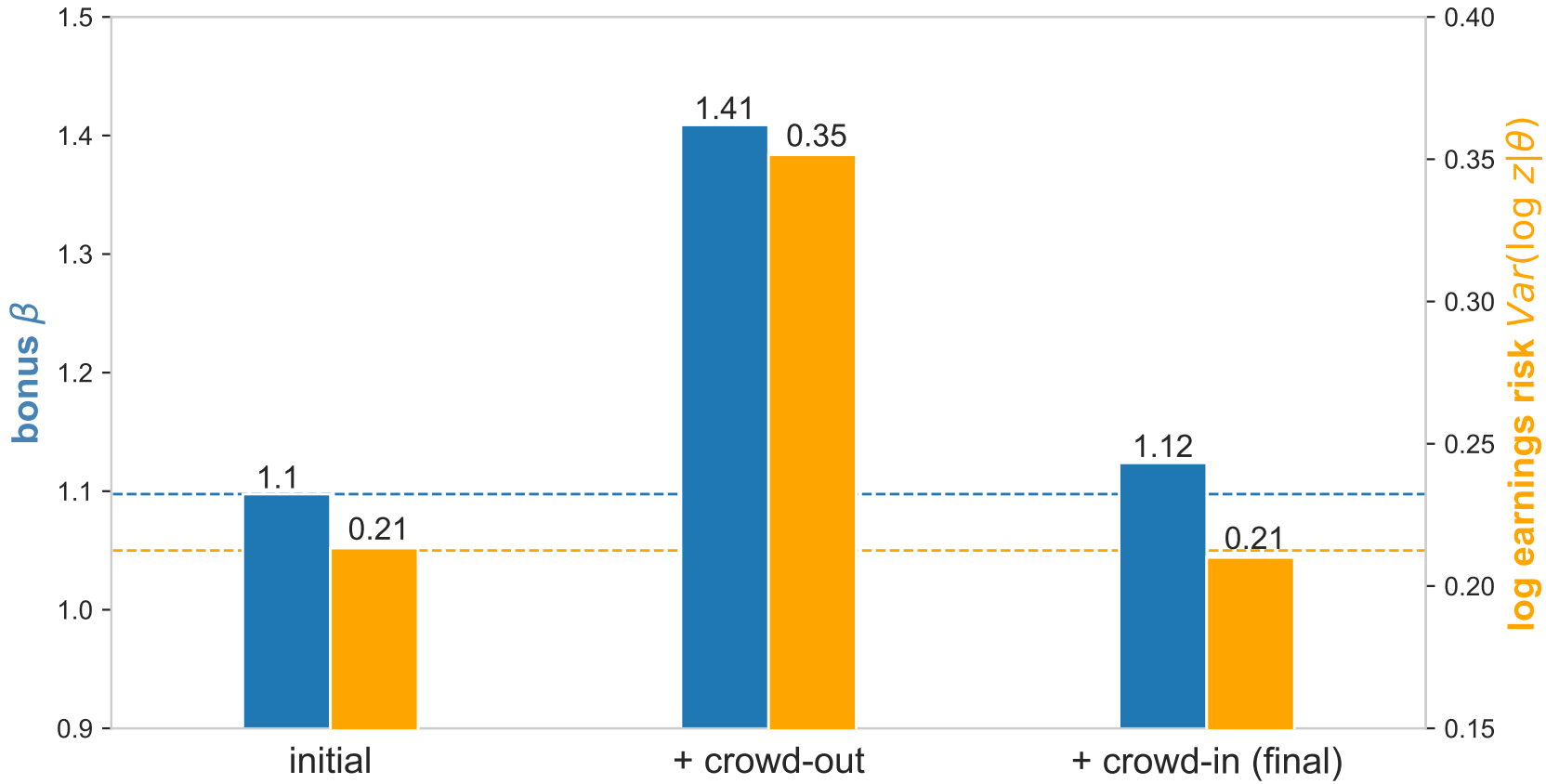
- Quantitative model
  - Workers draw ability θ and a job type (perf-pay job or fix-pay job)
  - Conditional on a job type, ability θ is Pareto-lognormal
    - Perf-pay jobs have higher average $\theta \rightarrow$ diff. in mean earnings
    - Risky bonus $\rightarrow$ diff. in variance of log earnings
    - 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 $Var(\log y \mid \theta)$
  - ... but is almost exactly offset by the crowd-in effect



Optimal policy

- Policy hardly affects earnings risk $\rightarrow$ set policy as in the standard model?
- Not exactly: **endogeneity of earnings risk matters for welfare**
- Ind. utility: $U(\theta) = \ell \log(R(e^{\beta}\underline{z}(\theta))) + (1-\ell)\log(R(\underline{z}(\theta))) - h(\ell)$
- Impact of progressivity change on utility:

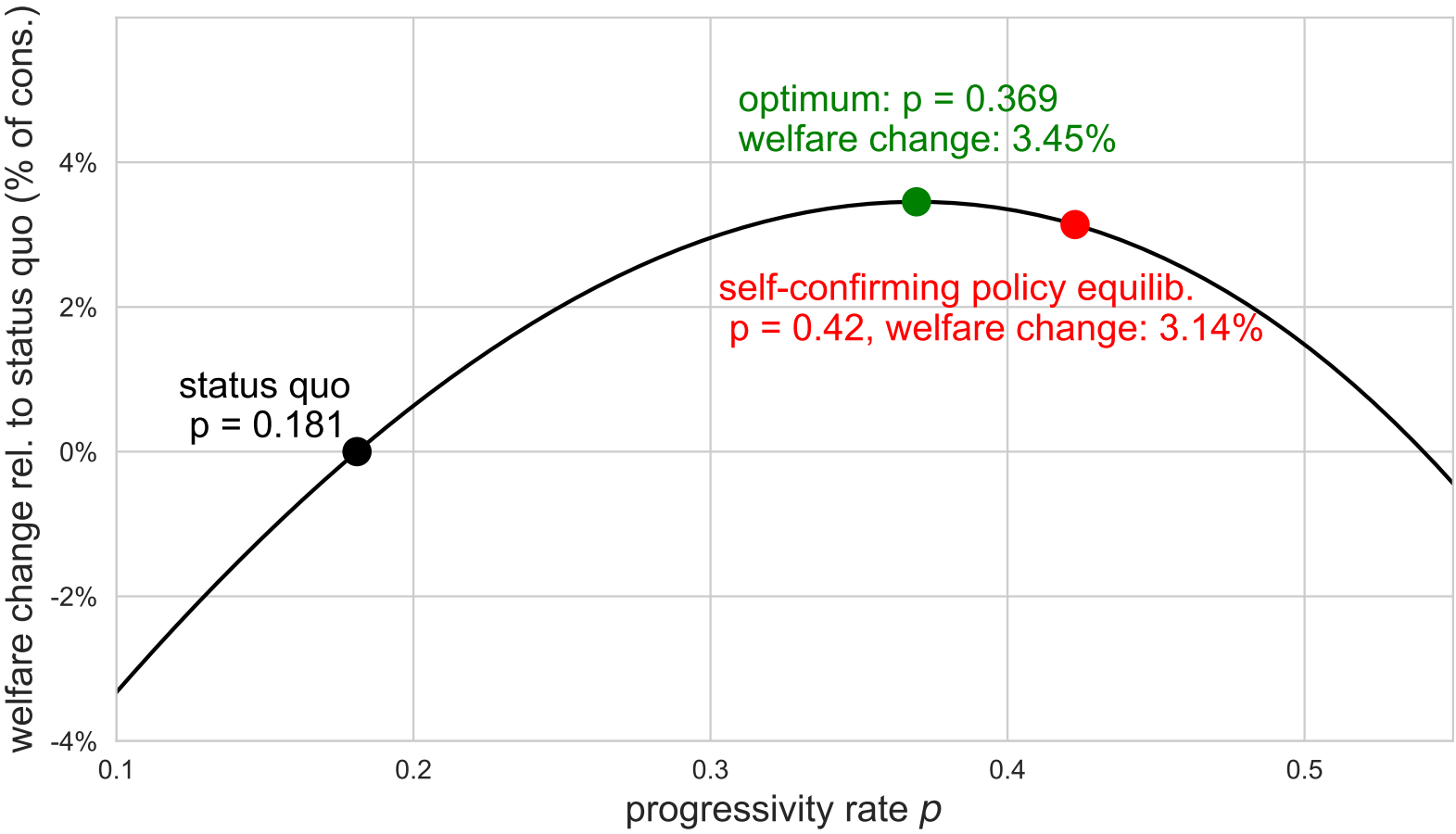
$$\frac{dU(\theta)}{d1-p} = \overbrace{\frac{\partial U(\theta)}{\partial 1-p}|_{\beta,\ell}}^{\text{standard}} + \overbrace{\left(\frac{\partial \beta}{\partial 1-p} \times \frac{\partial U(\theta)}{\partial \beta}\right)|_{\ell}}^{\text{crowd-out}} + \overbrace{\frac{\partial \ell}{\partial 1-p} \times \underbrace{\frac{\partial U(\theta)}{\partial \ell}}_{=0 \text{ by envelope}}}^{\text{effort adjustment incl. crowd-in}}$$

- Crowd-in does not have 1st order welfare impact bc of envelope thm
- Even if crowd-out is fully offset, welfare is still affected as if it was not!

Optimal rate of tax progressivity (for Utilitarian planner)

$$\frac{p^*}{(1-p^*)^2} = \frac{Var(\log\theta) + \kappa_1\left(1+\varepsilon_{\beta,1-p}\right)Var\left(\log z \mid \theta\right)}{\kappa_2 \cdot \varepsilon_{\ell,1-p} + \kappa_3(1-p^*)\varepsilon_{\beta,\ell}\cdot\varepsilon_{\ell,1-p}Var\left(\log z \mid \theta\right)}$$

- Exogenous-risk model (β exog., $\varepsilon_{\beta,1-p} = \varepsilon_{\beta,\ell} = 0$):
  - numerator simplifies to $Var(\log\theta) + \kappa_1 Var\left(\log z \mid \theta\right)$
  - p^* increases in ex-ante inequality inequality and ex-post risk
  - p^* decreases in the labor effort elasticity $\varepsilon_{\ell,1-p}$
- Performance-pay model ($\beta = \frac{h'(\ell)}{1-p}$):
  - $\varepsilon_{\beta,1-p} = -1 \Rightarrow$ crowding-out offsets gains of insuring ex-post risk
  - $\varepsilon_{\beta,\ell} > 0 \Rightarrow$ negative fiscal externality from crowding-in
  - more fiscal and welfare effects of crowd-out, but they cancel out
- Consequence: strictly lower optimum progressivity than w/ exog. risk



- SCPE: progressivity chosen when endogenous earnings risk is ignored
- Quantitatively: only 0.31% welfare loss from ignoring endogenous earnings risk when choosing progressivity
- If instead all jobs had perf-pay, welfare loss would increase to 1.4%

SEPARATE TAXATION OF BONUSES

- Suppose we can tax bonus and base pay separately
  - tax on base pay $t_{\underline{z}} \cdot \underline{z}$, tax on bonus $t_b \cdot b$
- Starting from uniform tax $t_{\underline{z}} = t_b > 0$, there is a tax reform which
  1. raises $t_{\underline{z}}$ and lowers t_b: $\hat{t}_{\underline{z}} > 0, \hat{t}_b = -\frac{\underline{z}}{b\ell} \cdot \hat{t}_{\underline{z}} < 0$
  2. keeps expected utility of all agents unchanged
  3. raises labor effort $\hat{\ell} > 0$ and raises tax revenue
- Why? Labor effort is more sensitive to bonus tax than base-pay tax
  - $\varepsilon_{\ell,1-t_b} > 0 > \varepsilon_{\ell,1-t_{\underline{z}}} \rightarrow$ higher base-pay tax increases effort!
- Efficiency gains from taxing bonuses at the lower rate than base pay
- Redistribute by taxing base pay, reduce distortions with low bonus tax

Fix a tax rate on base pay $t_{\underline{z}}$ and optimise with **top bonus tax rate** τ_b

$$\frac{\tau_b}{1-\tau_b} = \frac{1 - G - \frac{t_{\underline{z}}}{1-\tau_b}\kappa_1 e_{\underline{z}} - \frac{\tau_b - t_b}{1-\tau_b}\kappa_2 e_\ell}{\rho_b \cdot e_{\ell b}}$$

- ρ_b: Pareto param. of bonus dist., G: avg welfare weight at the top
- $e_{\ell b}$ is average elasticity of expected bonus $\ell \cdot b$ at the top
  - includes level responses $\hat{b}$ and frequency responses $\hat{\ell}$
- $\frac{t_{\underline{z}}}{1-\tau_b}\kappa_1 e_{\underline{z}}$: 'spillover effect' of changing τ_b on base pay
  - spillover depends on the crowd-out and crowd-in: $\kappa_1 e_{\underline{z}} = \varepsilon_{co} - \rho_b \overline{\varepsilon_{ci} e_\ell}$
- $\frac{\tau_b - t_b}{1-\tau_b}\kappa_2 e_\ell$: correction term for freq. responses when bonus tax nonlinear

Quantitatively (top bracket incl. top 5% of earners):

- Optimum with a linear joint tax on $\underline{z}$ and b: $t_{\underline{z}} = t_b = \tau_b = 63\%$
- Optimal bonus top tax: $t = t_b = 63\%, \tau_b = 42\%$, with 0.9% welfare gain

CONCLUSION

- Labor income taxation with performance pay
  - endogenous private insurance constrained by moral hazard frictions
  - analysis of tax incidence and optimal taxation in this environment
- Main findings:
  - pre-tax earnings risk is insensitive to tax progressivity
  - optimal progressivity is lower than with exo. risk, but gains are small
  - efficiency gains from lower taxation of bonuses than base pay
- Several extensions left for future research
  - taxes may affect extensive margin of performance-pay job creation
  - departures from constrained efficiency and perfect competition