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

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

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

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

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

  - participation constraint: contract must provide the reservation value

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

- 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

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

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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
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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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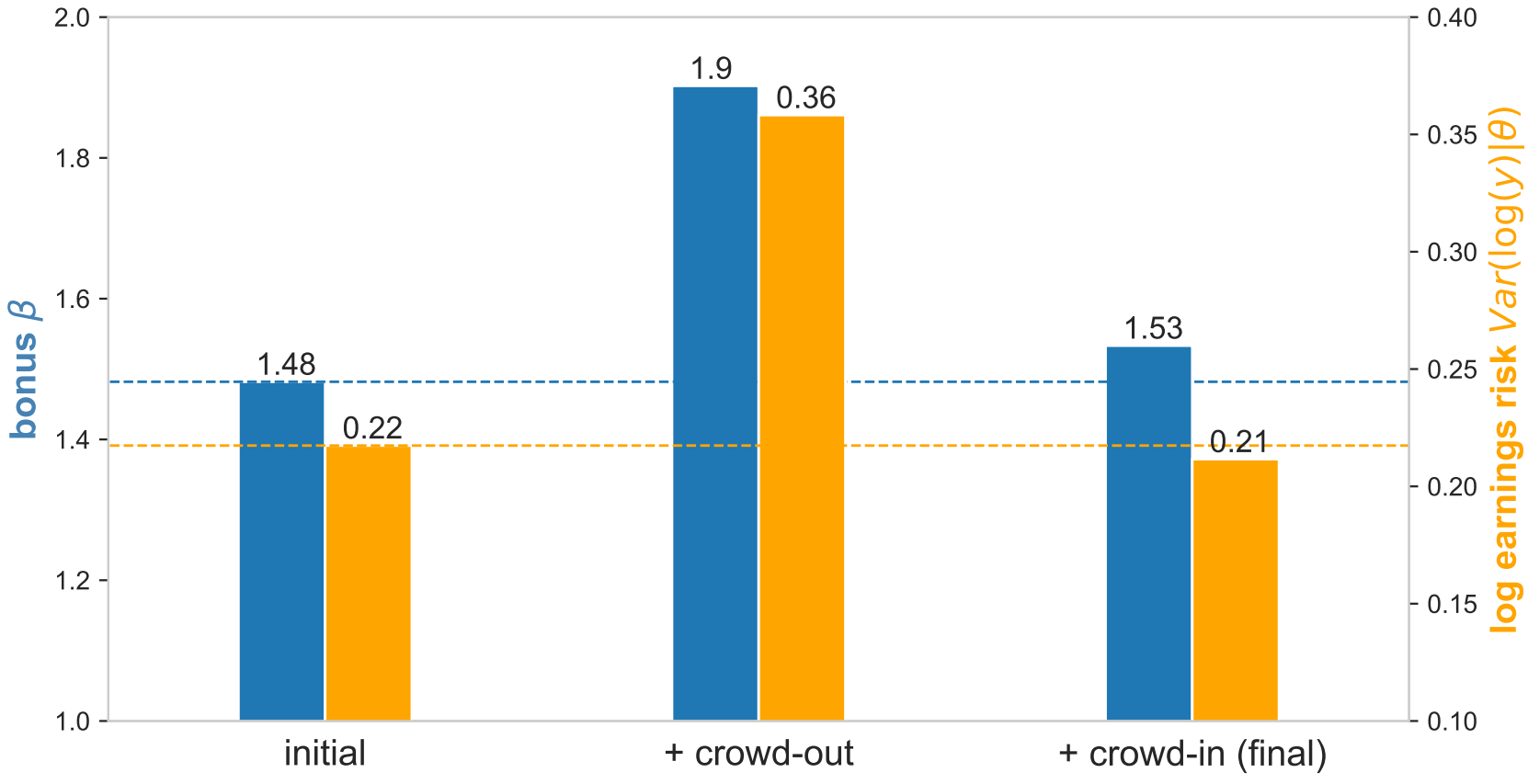
- Is our analysis robust to alternative foundations? Yes!
  - Holmström Milgrom 1987 w/ linear taxes: slope of contract is also $\frac{h'(\ell)}{1-\tau}$
  - Edmans Gabaix 2011 (continuous output shocks, CRP taxes): $\frac{h'(\ell)}{1-p}$
  - Edmans Gabaix Sadzik Sannikov 2012 (dynamic model, CRP): $\propto \frac{h'(\ell_t)}{1-p}$
  - 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%
- Quantitative model
  - Workers draw simultaneously labour productivity and a type of job
    - job types: performance-pay or fix-pay (no agency frictions).
  - Conditional on a type of job, productivity θ is Pareto-lognormal
    - Perf-pay jobs on average more productive $\rightarrow$ 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)

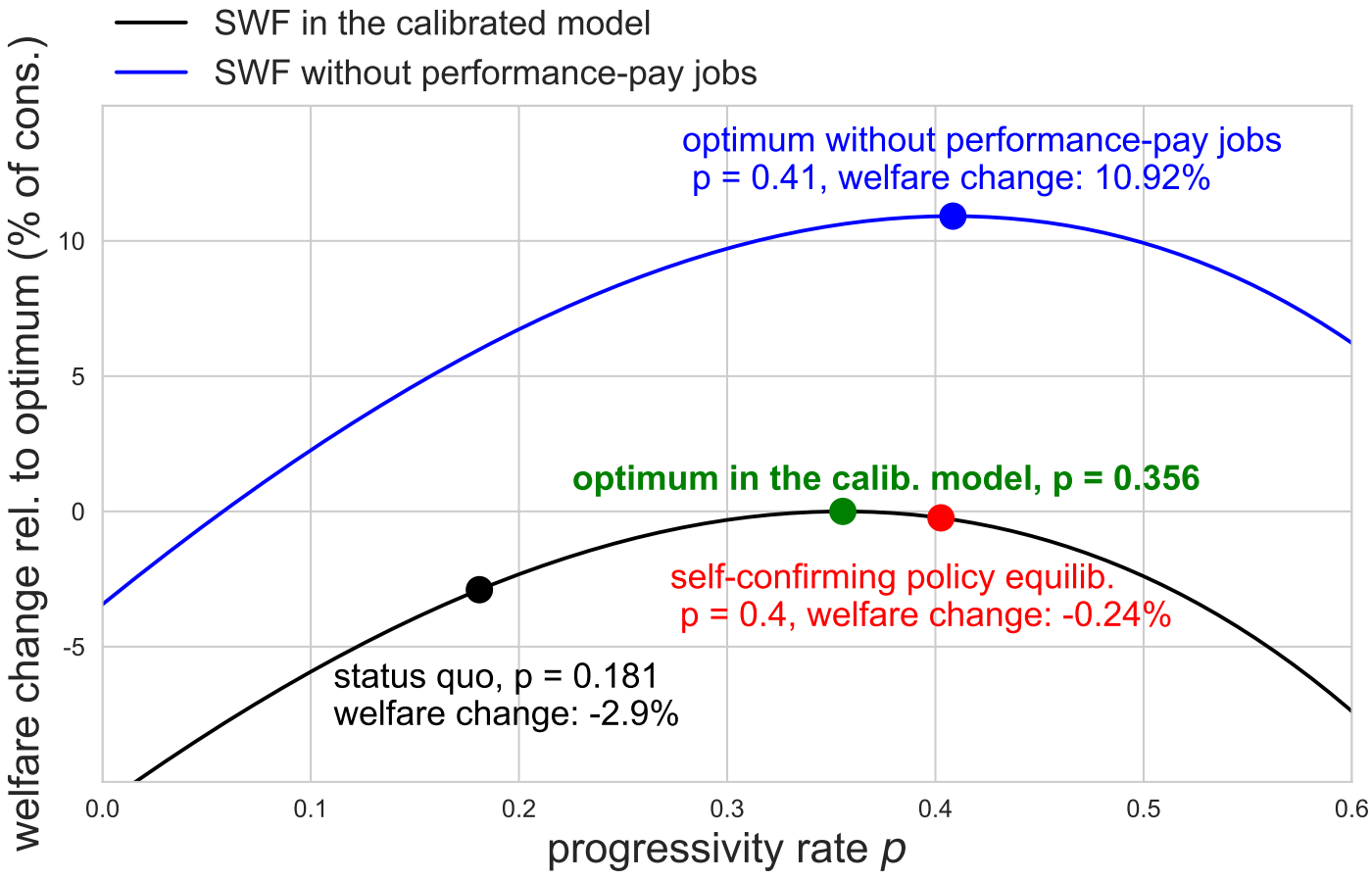
- Consider a large reform: let's double the level of progressivity p
  - Crowd-out increases strongly both β and $Var(\log(y) \mid \theta)$
  - ... but is almost exactly offset by the crowd-in effect



Optimal rate of tax progressivity (for Utilitarian planner)

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

- Exogenous-risk model ($\varepsilon_{\beta,1-p} = \varepsilon_{\beta,\ell} = 0$):
  - p^* increasing in the total variance of log-earnings $Var(\log y) = Var(\theta) + Var(\log y \mid \theta)$
  - 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

FURTHER RESULTS AND 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