

# Redistribution with Performance Pay

**Paweł Doligalski<sup>1</sup>   Abdoulaye Ndiaye<sup>2</sup>   Nicolas Werquin<sup>3</sup>**

<sup>1</sup>University of Bristol

<sup>2</sup>NYU Stern

<sup>3</sup>Federal Reserve Bank of Chicago & Toulouse School of Economics

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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

- **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  $y$ , 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  $\ell$  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  $\ell$

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

- 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  $\theta$  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  $\ell$

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

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- Compare this model of endogenous wage setting to standard Mirrlees
  - Mirrlees: effort  $\ell$  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:  $\beta$

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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  $\varepsilon_{\beta, \ell} = \frac{\partial \log(\beta)}{\partial \log(\ell)} > 0$

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

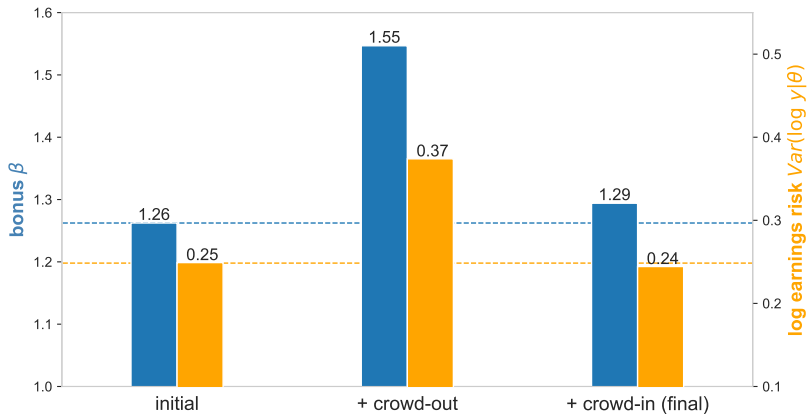
## CALIBRATION

- Data on performance-pay jobs (Lemieux et al. 2009)
  - perf-pay jobs account for 45% of private sector jobs
  - 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  $\theta$  and a type of job
    - job types: performance-pay or fix-pay (no agency frictions).
  - Conditional on a type of job, ability  $\theta$  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)

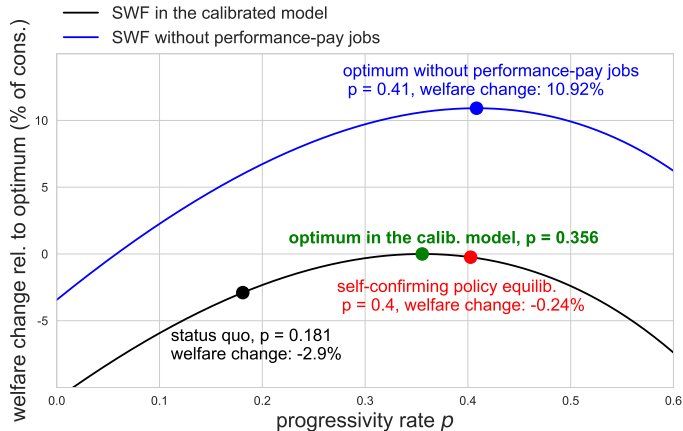
- Consider a large reform: let's double the level of progressivity  $p$ 
  - Crowd-out increases strongly both  $\beta$  and  $Var(\log y | \theta)$
  - ... but is almost exactly offset by the crowd-in effect



## Optimal rate of tax progressivity (for Utilitarian planner)

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

- Exogenous-risk model ( $\varepsilon_{\beta, 1-p} = \varepsilon_{\beta, \ell} = 0$ ):
  - $p^*$  increasing in the total variance of log-earnings  
 $\text{Var}(\log y) = \text{Var}(\log \theta) + \text{Var}(\log y \mid \theta)$
  - $p^*$  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
  - more fiscal and welfare effects of crowd-out, but they cancel out here
- **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



## SEPARATE TAXATION OF BONUSES

- Suppose we can tax bonuses and base pay separately
    - tax on base pay  $\tau_y \cdot \underline{y}$ , tax on bonus  $\tau_b \cdot b$
  - Starting from uniform tax  $\tau_y = \tau_b > 0$ , there is a tax reform which
    - raises  $\tau_y$  and lowers  $\tau_b$ :  $\hat{\tau}_y > 0, \hat{\tau}_b = -\frac{y}{b\ell} \cdot \hat{\tau}_y < 0$
    - keeps expected utility of all agents unchanged
    - raises labor effort  $\hat{\ell} > 0$  and raises tax revenue
  - Why? Labor effort is more sensitive to bonus tax than base-pay tax
    - $\frac{\hat{\ell}}{\ell} = \tilde{\varepsilon} \cdot \left( \frac{\hat{\tau}_y}{1-\tau_y} - \frac{\hat{\tau}_b}{1-\tau_b} \right)$ , where  $\tilde{\varepsilon} > 0$ .
- ⇒ There are efficiency gains from taxing bonuses at the lower rate
- ⇒ Redistribute by taxing base pay, reduce distortions with low bonus tax

## 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
- Main findings:
  - pre-tax earnings risk is insensitive to tax progressivity
  - optimal progressivity is lower than with exo. risk, but gains are small
- Several extensions left for future research
  - taxes may affect extensive margin of performance-pay job creation
  - departures from constrained efficiency and perfect competition