Lecture 9: Multitasking

Compensation in Organizations

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Discussion: Alexander (2020)

Examples of Gaming

Paper	Setting	Gaming Described	Δ Worker+Firm Surplus?
Roy (1952)	US steelworkers	deliberate slacking	ambiguous
Oyer (1998)	US manufacturing	higher end of year sales	price decreases (weak $-$)
Larkin (2014)	software salespeople	higher last day sales	price decreases (weak $-$)
Courty and Marschke (2004)	federal bureaucrats	graduation date of trained workers	earnings reductions ($-$)
Alexander (2020)	doctors in New Jersey	sorting patients	ambiguous

Discussion: Tayan (2019)

(Note: popular press article not peer reviewed research)

Gaming vs. Multitasking

- I view gaming as manipulating the rules, typically via timing, to improve payouts.
  - Example: Closing a deal early to increase commission.
  - Example: Grading more leniently on a standardized test that is used for benchmarking.
  - Example: Working very hard for the first 4 hours of a shift and relaxing for the remaining 4.
- Multitasking involves choosing how much effort to spend on different tasks.
  - Example: Seeing more patients for less time vs. fewer patients for more time.
  - Example: Teaching more tested material at the expense of untested material.
  - Example: Producing more oil now rather than shutting down for maintenance.
- There are many situations that are both gaming and multitasking.
  - Example: Spending time opening fake bank accounts s opposed to real accounts at Wells Fargo.

Paper	Setting	Performance Pay Change	Multitasking Impact?
Dumont et. al. (2008)	doctors in Quebec	less	↑ teaching and time per service, ↓ volume
Tayan (Pop. Press 2019)	Wells Fargo bankers	more?	↑ fake accounts
Alexander (2020)	doctors in New Jersey	more	no impact
Gong et. al (2021)	doctors in China	more	↑ intensity, ↓ inpatient stays
Dinerstein and Opper (2023)	teachers in NYC	more	↑ tests scores, ↓ grades & attendance

Dumont et. al. (2008)

Table 6
Impact of mixed compensation on practice variables, pediatrics and general surgery

	Fixed effects OLS				Pooled Tobit					
	Volume / year	Income / year	Hours / week	Clinical hours/ week Tot.	Hosp.	Priv. Cl.	Non-Clinical hours/ week Tot.	Admin.	Teach.	Research hours/ week
Pediatrics (Control group: pediatricians paid only under the FFS scheme after reform)										
Treatment effect	-12.99***	15.83***	-1.87*	-2.88**	0.34	-3.46*	3.92***	3.27*	0.48	-9.56**
St. Error	3.72	6.62	1.12	1.14	1.33	1.83	1.40	1.85	1.19	4.03
Effect of the reform	-12.99***	15.83***	-1.87*	-2.88**	0.49	-2.92**	1.56*	0.48	0.61	-2.01*
St. Error	3.72	6.62	1.12	1.14	1.20	1.48	0.80	0.68	0.56	1.06
% effect of the reform	-12.81	8.69	-3.75	-6.55	2.20	-15.88	27.89	25.14	13.88	-38.20
Log likelihood	-	-	-	-	-3 423	-3 757	-2 678	-2 078	-1 653	-1 147
Hausman test[a]	53.86	37.68	41.10	44.97	-	-	-	-	-	-
Test of parallel trend[b]	0.92	0.48	0.28	1.22	2.27	7.60	9.03	2.55	7.99	9.05
General Surgery (Control group: general surgeons paid only under the FFS scheme after reform)										
Treatment effect	-15.32***	18.37***	-2.70	-1.83	0.04	-4.68**	0.62	0.27	0.53	-1.36
St. Error	3.81	4.28	2.48	2.37	2.54	2.00	1.27	1.64	1.04	1.59
Effect of the reform	-15.32***	18.38***	-2.70	-1.83	0.06	-1.02	0.07	-0.83	0.38	-1.07
St. Error	3.81	4.38	2.48	2.37	2.52	0.83	0.95	0.75	0.66	0.77
% effect of the reform	-10.72	8.14	-4.81	-3.77	0.14	-31.47	0.81	-23.05	8.37	-21.53
Log likelihood	-	-	-	-	-4 509	-3 014	-3 093	-2 459	-1 916	-1 235
Hausman test[a]	39.41	8.07	169.10	26.50	-	-	-	-	-	-
Test of parallel trend[b]	1.46	0.98	1.13	0.71	4.81	0.96	1.19	2.08	2.49	2.08

Significance levels: *10%; **5%; ***1%.

The One Task Assumption

- So far we have assumed that there is a single, productive task.
- This captures many jobs and environments well.
- The trade-off is between exerting effort and not exerting effort.
- But some jobs have more than one type of productive effort.
  - Question: Can you give examples?
- Some jobs have destructive tasks!
  - Question: Can you give examples?

The Multitasking Model: Dropping Uncertainty

- We want to capture a new force (multiple tasks)
- To keep things simple, we drop noise/luck/uncertainty (ϵ)
- We no longer need to think about certainty equivalents, variances, etc.
- We also will assume an outside option of 0 for the worker.

The Multitasking Model: Adding Multiple Tasks

- The worker will have two tasks, numbered 1 and 2.
- The cost of exerting effort e_1 at task 1 and e_2 will be $c(e_1, e_2)$
- We will assume this function is increasing in each argument, but not much else.
- Output is given by $y = ae_1 + be_2$, where a, b can be positive or negative.
- We can only pay based on some measurement of effort: $m(e_1, e_2)$

Table of Contents

Model

- Output is $y = ae_1 + be_2, a > 0, b > 0$
- Cost of effort is:

$$c(e_1, e_2) = \begin{cases} 0 & \text{if } e_1 + e_2 \leq 2\bar{e} \\ (e_1 + e_2 - 2\bar{e})^2/2 & \text{if } e_1 + e_2 \geq 2\bar{e} \end{cases}$$

- Only task 1 effort is measured: $m = e_1$
- Only what is measured is rewarded: $w(m) = \alpha + \beta m = \alpha + \beta e_1$
- Assume that without incentives (if $\beta = 0$) the worker supplies all "free effort" (total effort up to $2\bar{e}$) and splits total effort evenly across the two tasks:

$$e_1 = e_2 = \bar{e}$$

First-Best Solution

See the board!

Equilibrium Solution (What Actually Happens)

See the board!

Equilibrium Solution (What Actually Happens)

Theorem 1

The firm uses high-powered incentives ($\beta^* = a$) and the worker focuses entirely on task 1 ($e_1^* = a + 2\bar{e}, e_2^* = 0$) if:

$$a \geq 2\bar{e}\frac{b-a}{a}$$

Otherwise the firm uses a flat salary ($\beta^* = 0$) and total effort is low and evenly split ($e_1^* = e_2^* = \bar{e}$)

Deepwater Horizon

- Cost reductions were rewarded (e_1).
- But improving “safety” or “latent risk” was not.
- Part of this is not nefarious: cost reductions are easy to measure.
- Avoided disasters are impossible to measure!
- In some instances incentives are worse than no incentives!

Counterterrorism at the FBI

- The FBI was created to fight traditional crime, like murders.
- Traditional crime is easy to measure:
  - How many suspects did you bring in?
  - How much evidence did you collect?
  - Was there a conviction?

Counterterrorism at the FBI

- During the 1990s, the FBI tried to also handle domestic terrorism.
- But how do you measure this?
- Terrorism is rare.
- Successful counterterrorism prevents things from happening.

Table of Contents

Discussion: Lavy (2009)

“Screening with Multitasking” (Dinerstein and Opper 2023)

- Still a working paper. Main focus is on screening.
- However, the paper shows evidence of multitasking or teaching to the test.
- NYC increased weight on test scores for teacher tenure.
- Teacher valued-added for test scores rose, while teacher value-added for attendance and grades fell.
- However tenure became a more effective sorting mechanism: they got better teachers (main focus of paper).

“Screening with Multitasking” (Dinerstein and Opper 2023)

Table 4: Effect of Policy Change on Probationary Period Output

	Test Score	Test Score	Untargeted Index	Untargeted Index
Incentive	0.0302***	0.0187**	-0.0576*	-0.0644**
	(0.00881)	(0.00869)	(0.0303)	(0.0307)
Fixed Effects	Cohort	Teacher	Cohort	Teacher
N Teachers	16724	16724	16724	16724
Mean DV	0.102	0.102	0.0244	0.0244
N	100405	100405	100405	100405

This table shows the causal effect of the tenure policy change on targeted and untargeted output in the probationary period. The columns switch between cohort and teacher fixed effects. An observation is a teacher-subject-year. Standard errors are clustered by teacher. The sample covers years 2006 to 2014. The teachers with more than 3 years of experience are only included if they finished the standard probationary period before the tenure policy change. We include teachers with targeted and untargeted measures. All outcome units are test score student standard deviations.

“Untargeted” includes attendance, grades and graduation, while ”targeted” are the test scores.