



Winning Isn't Everything

Corruption in Sumo Wrestling — Mark Duggan & Steven D. Levitt (AER, 2002)

Felipe Ovando Turra

Roadmap

- 1 Why Study Corruption?
- 2 The Institutional Setting
- 3 The Incentive Mechanism
- 4 Evidence I: Strong Performance on the Bubble
- 5 Effort or Corruption?
- 6 Payment in Kind: Reciprocity
- 7 Insider Allegations
- 8 Conclusions & Policy

The empirical problem of corruption

A central topic — but hard to measure

- Most economists agree corruption **reduces efficiency** (Shleifer & Vishny, 1993), so firms and governments build incentives for honesty (Becker & Stigler, 1974).
- A minority view: it can be *welfare-enhancing* “grease” (Leff, 1964).
- But corruption is **illicit by nature**: participants try not to leave a trail.
- Most evidence is therefore **anecdotal**; systematic proof rarely appears in standard data.

The methodological challenge

Researchers must adopt **nonstandard approaches** to ferret out *indirect* evidence of corruption.

A short history of corruption empirics

Clever, indirect detection strategies

- **Quetelet (1846 / Stigler, 1986)**: a suspicious gap in the height distribution of French conscripts, right below the **1.57 m** army minimum.
- **Porter & Zona (1993)**: collusion in highway-construction auctions via designated bidders.
- **Mauro (1995)**: cross-country corruption indices correlate with *lower growth* (causality unclear).
- **Fisman (2001)**: Suharto-connected firms' stock prices fall when his health weakens.
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Why sumo? An ideal laboratory

Four reasons this case study is valuable

- ① **If corruption thrives *here*, no institution is safe.** Sumo is Japan's national sport: a 2,000-year tradition built on honor, ritual, and history.
- ② Japan ranks **relatively clean** in cross-country comparisons (Transparency International, 2000).
- ③ The institutional framework is **simple**: incentives are easy to model.
- ④ The data needed to test for match rigging are **readily available**.

The disclaimer that became famous

Sumo *per se* is not of direct interest to economists — but the **method** may transfer to substantive applications.

How sumo works: the basics

The tournament (*basho*)

- Each *basho*: ~66 wrestlers (*rikishi*), **15 bouts** each.
- One match per wrestler per day, over 15 days.
- **Kachi-koshi**: winning record (≥ 8 wins) $\Rightarrow$ rise in rankings.
- **Make-koshi**: losing record $\Rightarrow$ fall in rankings.

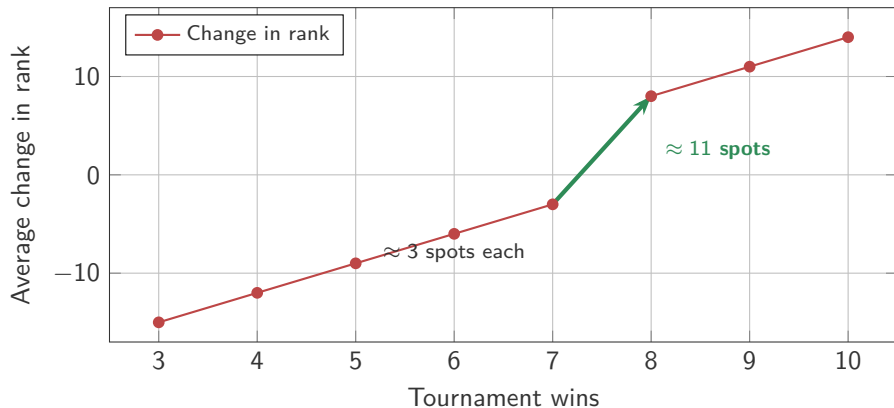
Why rank (*banzuke*) matters

- Source of **prestige**.
- Basis for **salary**.
- Determines **perks** (servants, no chores, etc.).

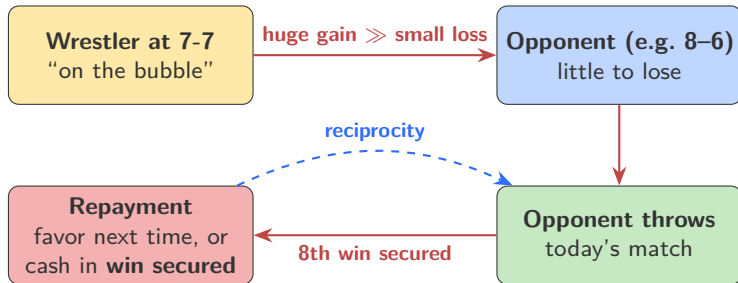
The number that drives everything

The **eighth win** flips a wrestler from demotion to promotion — worth far more than any other victory.

The key institutional feature: a sharp nonlinearity



Visualizing the corrupt exchange



The forward-looking incentive to rig grows monotonically as the tournament approaches its end.

The data: a decade of sumo bouts

Almost the universe of top-rank matches

- Top division (*Sekitori*), **January 1989 – January 2000**.
- 6 tournaments/year, ~ 70 wrestlers, 15 bouts each $\Rightarrow$ over **64,000 wrestler-matches** ($\sim 32,000$ bouts); **281 wrestlers**.
- $< 5\%$ of observations dropped: missing data, coding errors, or early withdrawal due to injury.

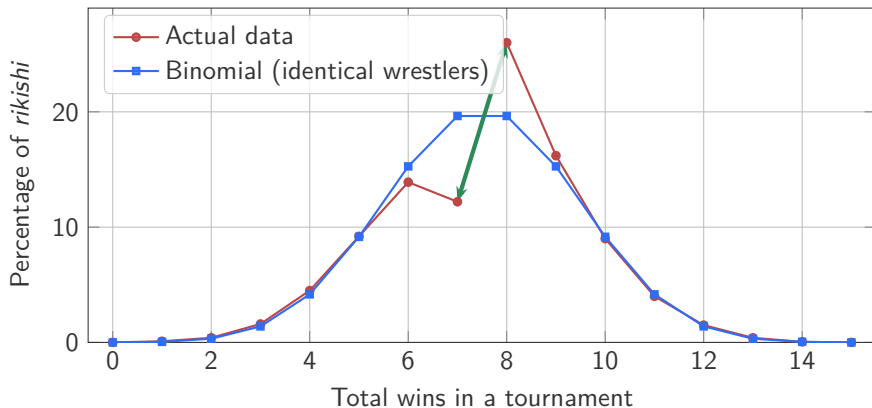
Observed for each match

Both competitors, the winner, the month/year, and the day (15 days, one bout per wrestler per day); the **stable** (*heya*) of each wrestler for $\sim 98\%$ of the sample.

A rich panel

~ 554 observations per wrestler (max. 990), and the same two wrestlers meet ~ 10 times — enough within-pair variation to identify *wrestler-opponent* fixed effects.

Distribution of wins: actual vs. binomial



~26.0% finish with exactly 8 wins vs. 12.2% with 7 — against a binomial prediction of 19.6% each.

The regression: do bubble wrestlers over-win?

Linear probability model (Eq. 1)

$$\text{Win}_{ijt} = \beta \text{Bubble}_{ijt} + \gamma \text{Rankdiff}_{ijt} + \lambda_{ij} + \delta_{it} + \varepsilon_{ijt}.$$

$$\text{Bubble}_{ijt} = \begin{cases} +1 & \text{only wrestler } i \text{ is on the margin,} \\ -1 & \text{only opponent } j \text{ is on the margin,} \\ 0 & \text{neither or both.} \end{cases}$$

Identification, tightened step by step

- Add **wrestler** and **opponent** fixed effects.
- Add **wrestler-opponent interactions** λ_{ij} : identification comes only from *deviations within the same pairing*.

Table 1: excess win % on the bubble, by day

TABLE 1—EXCESS WIN PERCENTAGES FOR WRESTLERS ON THE MARGIN FOR ACHIEVING AN EIGHTH WIN,
BY DAY OF THE MATCH

On the Margin on:	(1)	(2)	(3)	(4)	(5)	(6)
Day 15	0.244 (0.019)	0.249 (0.019)	0.249 (0.018)	0.255 (0.019)	0.260 (0.022)	0.264 (0.022)
Day 14	0.150 (0.016)	0.155 (0.016)	0.152 (0.016)	0.157 (0.016)	0.168 (0.019)	0.171 (0.019)
Day 13	0.096 (0.016)	0.107 (0.016)	0.110 (0.016)	0.118 (0.016)	0.116 (0.019)	0.125 (0.019)
Day 12	0.038 (0.017)	0.061 (0.018)	0.064 (0.017)	0.082 (0.018)	0.073 (0.020)	0.076 (0.021)
Day 11	0.000 (0.018)	0.018 (0.018)	0.015 (0.018)	0.025 (0.018)	0.010 (0.021)	0.012 (0.021)
Rank difference	—	0.0053 (0.0003)	—	0.0020 (0.0003)	—	-0.0020 (0.0004)
Constant	0.500 (0.000)	0.500 (0.000)	—	—	—	—
R^2	0.008	0.018	0.030	0.031	0.0634	0.0653
Number of observations	64,272	62,708	64,272	62,708	64,272	62,708
Wrestler and opponent fixed effects	No	No	Yes	Yes	Yes	Yes
Wrestler-opponent interactions	No	No	No	No	Yes	Yes

The alternative hypothesis: just more effort?

A serious rival explanation

Bubble wrestlers have **more to gain**, so they might simply **try harder** — producing the same over-winning *without* any rigging.

The strategy of the paper

The authors line up a **battery of independent tests**, each of which the effort story *cannot* explain but the collusion story *predicts*.

Five lines of attack

- ① Reversal in the **next meeting** (reciprocity).
- ② Win rates move with **collusion-supporting factors**.
- ③ Rigging **vanishes under media scrutiny**.
- ④ **Stable-level** reciprocity agreements.
- ⑤ **Named “corrupt”** vs. “clean” wrestlers behave differently.

Table 2: determinants of excess win likelihood on the bubble

Variable	(1)	(2)	(3)
Wrestler on bubble	0.126 (0.026)	0.117 (0.026)	0.135 (0.029)
High media scrutiny	-0.188 (0.071)	-0.177 (0.071)	-0.146 (0.080)
Opponent in running for a prize this tournament	-0.149 (0.041)	-0.129 (0.039)	-0.156 (0.049)
Number of meetings between two opponents in the last year	-0.047 (0.019)	-0.043 (0.018)	-0.046 (0.020)
Wrestler on bubble in his last year of competing	-0.036 (0.023)	-0.0195(0.022)	-0.0346(0.025)
Years in sumo for wrestler on bubble	0.0077(0.0037)	0.0077(0.0038)	0.0091(0.0040)
Winning percentage in other bubble matches between these two stables	0.272 (0.082)	0.293 (0.080)	–
R^2	0.016	0.074	0.246
Wrestler and opponent fixed effects?	No	Yes	Yes
Wrestler-opponent interactions?	No	No	Yes

How is the thrown match repaid?

If it's collusion, the loser must be compensated

- Payment can be **cash** or a **promise to return the favor**.
- **74%** of wrestlers who meet on the bubble face each other *again within a year*.

Table 3: the tell-tale reversal

- The wrestler who *won* on the bubble is **~7–10 pp less likely** to win the **very next meeting** with the same opponent.
- The effect **does not extend** beyond the next match — deals span exactly **two bouts**.
- Wrestlers who *lost* on the bubble show **no** such reversal — as collusion (not effort) predicts.

Table 3: win % in preceding and subsequent matches

TABLE 3—WIN PERCENTAGES IN PRECEDING AND SUBSEQUENT MATCHES
(For Two Wrestlers Who Meet When One is on the Margin in the Final Three Days of a Tournament)

Variable	All Matches on the Margin		Only Matches in Which the Wrestler on the Margin Wins		Only Matches in Which the Wrestler on the Margin Loses	
	(1)	(2)	(3)	(4)	(5)	(6)
One or two matches prior to the bubble match	-0.002 (0.009)	0.005 (0.012)	0.020 (0.011)	0.019 (0.017)	-0.041 (0.016)	-0.035 (0.022)
Bubble match	0.151 (0.010)	0.164 (0.014)	—	—	—	—
First meeting after bubble match	-0.073 (0.011)	-0.062 (0.015)	-0.082 (0.015)	-0.079 (0.020)	-0.056 (0.020)	-0.040 (0.027)
Second meeting after bubble match	-0.002 (0.013)	0.005 (0.016)	0.031 (0.017)	0.028 (0.022)	-0.061 (0.023)	-0.039 (0.030)
Three or more meetings after bubble match	-0.010 (0.006)	0.012 (0.011)	0.013 (0.007)	0.022 (0.014)	-0.045 (0.008)	-0.013 (0.017)
Constant	0.500 (0.000)	—	0.500 (0.000)	—	0.500 (0.000)	—
Wrestler-opponent interactions?	No	Yes	No	Yes	No	Yes
R^2	0.008	0.271	0.002	0.279	0.002	0.279

Reciprocity and its limits

The “price” of a thrown match

Roughly **two-thirds** of the excess wins on the bubble are **returned** the next time the two wrestlers meet.

Implication: payment-in-kind is not the whole story

- Two-thirds of a match “down the road” is **too cheap** to be the sole compensation.
- Rumors point to **cash transfers** as well — though the authors find *no direct evidence* on this channel.

No negative serial correlation otherwise

Adding multiple lags of past outcomes yields *positive* coefficients: the reversal is specific to the post-bubble match, not a general within-pair pattern.

Do the data confirm the whistle-blowers?

Naming names

Two former wrestlers publicly identified **29 “corrupt”** and **14 “clean”** wrestlers (Itai, 2000; Onaruto, 2000; *Shukan Post*, 2000).

- Only **43 of 281** wrestlers (15%) are named — but they are prominent, so **>60%** of matches involve at least one named wrestler.

The test (interactions with bubble status)

- If allegations are true, **corrupt** wrestlers should excel on the bubble; **clean** ones should not.

Table 4: excess bubble win % by alleged status

TABLE 4—EXCESS WIN PERCENTAGES ON THE BUBBLE FOR WRESTLERS LABELED BY SUMO INSIDERS AS “CORRUPT” OR “CLEAN”

		Wrestler on the Bubble Is Identified as:		
		Corrupt	Status Unknown	Clean
Opponent of wrestler on the bubble is identified as:	Corrupt	0.260 (0.037)	0.270 (0.021)	-0.010 (0.038)
	Status unknown	0.271 (0.021)	0.181 (0.019)	0.041 (0.031)
	Clean	0.036 (0.027)	-0.033 (0.035)	0.022 (0.074)

Tying it all together

The unifying logic

An artificial **nonlinearity** in payoffs $\Rightarrow$ gains from trade $\Rightarrow$ corruption.

The weight of the evidence

- Bubble wrestlers **over-win**, increasingly so as the tournament ends.
- The pattern **reverses** in the next meeting (payment in kind).
- It **vanishes** under media scrutiny and against prize contenders.
- It is **coordinated across stables** and **matches the insiders' accusations**.

Increased effort **cannot** reconcile this constellation of facts.

How to combat corruption

Three policy lessons

- ① **Remove the distortion.** The rigging links directly to the imposed nonlinearity — flatten the payoff and the gains from trade vanish.
- ② **Raise the cost of detection.** Media scrutiny *alone* eliminated the behavior; any rise in expected punishment should work.
- ③ **Use insiders.** Whistle-blowers had **accurate** information; combine their incentives with *objective data analysis* for corroboration.

Why isn't it fixed?

Barriers to entry shield a **single sumo league** from competitive pressure — and the nonlinearity itself makes otherwise meaningless final-day matches **exciting for fans**.

Take-home message

The method, not the sumo, is the point

Clear incentives + creative use of data = overwhelming statistical evidence of corruption.

- Corruption leaves **statistical fingerprints** even when no paper trail exists.
- The **details** (the data source, the tell-tale pattern) will vary from one setting to the next ...
- ... but the **template** — model the incentives, then hunt for the predicted distortion — generalizes.
- A blueprint for studying corruption in **substantive** economic settings.

Wherever there is a sharp nonlinearity in incentives, look for the bubble.

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Thank you!

Questions?

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Duggan & Levitt — “Winning Isn’t Everything: Corruption in Sumo Wrestling” (AER, 2002)