# Merger Patterns, Costly Exit, and Aggregate Implications

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* The views expressed in these slides are those of the author and do not necessarily reflect the official views of the Bank of Japan.

# Outline

- Background & contribution
- Baseline model
- Extension and results
- Aggregate implications

# Merger and exit

- **Background**
  - Mergers have mostly been studied from a micro perspective.
  - Recently, they have also gained attention in macroeconomics.

- **Motivation**
  - Macro models assume mergers by high-productivity acquirers.
  - However, empirical evidence suggests that low-productivity firms are highly incentivized to become acquirers.

- **Approach & Contribution**
  - I extend an existing macroeconomic model of mergers by incorporating costly exit.
  - Costly exit makes mergers a better alternative to firm exit.
  - This extension improves the model's fit to empirical merger patterns.

# Literature

- **Resource Reallocation Theories**:
  - Hopenhayn and Rogerson (1993)
  - Acemoglu et al. (2018)

- **Mergers Theories**:
  - Jovanovic and Rousseau (2002)
  - Rhodes-Kropf and Robinson (2008)
  - David (2021)

- **Empirical Micro-Level Merger Pattern**:
  - Pryshchepa et al. (2013)
  - Bruyland et al. (2019)
  - Zhang (2022)

# Baseline model (David 2021)

- Merger technology: $z_m = s(z_a, z_t) = A z_a^{\gamma} z_t^{\nu}$

- Merger gain: $\Sigma(z_a, z_t) = V(z_m) - V(z_a) - V(z_t)$

- Bargaining and individual gains:

$$\Sigma_a(z, z_t) = \beta \Sigma(z, z_t), \qquad \Sigma_t(z_a, z) = (1-\beta)\Sigma(z_a, z)$$

Where:

- $z_m$ : Post-merger productivity
- $z_a, z_t$ : Productivity of the acquirer and target
- $A, \gamma, \nu$ : Parameters governing merger efficiency
- $\beta$ : Acquirer's bargaining power

# Baseline model (David 2021)

- Firms' value function:

$$rV(z) = \max_{\lambda(z),\mu(z)} \pi(z) - C\big(\lambda(z)\big) - C\big(\mu(z)\big)$$
$$+\lambda(z)\theta_a \mathbb{E}[\Sigma_a(z, z_t)] + \mu(z)\theta_t \mathbb{E}[\Sigma_t(z_a, z)]$$

- First order conditions:

$$C'\big(\lambda(z)\big) = \theta_a \mathbb{E}[\Sigma_a(z, z_t)], \qquad C'\big(\mu(z)\big) = \theta_t \mathbb{E}[\Sigma_t(z_a, z)]$$

- Acceptance regions (matching sets generating positive combined gains):

$$\gamma_a(z) = \{z_t \colon \Sigma(z, z_t) \geq 0\}, \qquad \gamma_t(z) = \{z_a \colon \Sigma(z_a, z) \geq 0\}$$

# Empirical validation for US firms (David 2021)

## Empirical productivity distributions

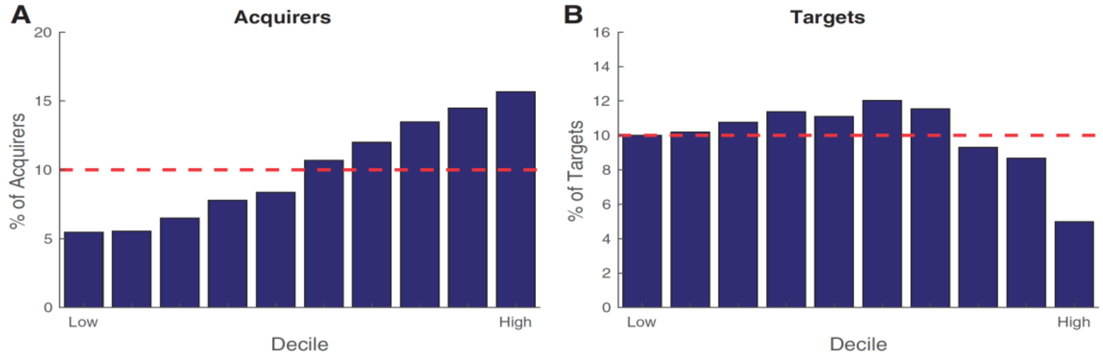



FIGURE 2

Marginal distributions of transacting firms

*Notes*: Figure displays the proportion of acquiring and target firms that fall into each decile of the firm size distribution (measured by profitability). Data are from SDC Platinum and Compustat.

## Model-implied distributions

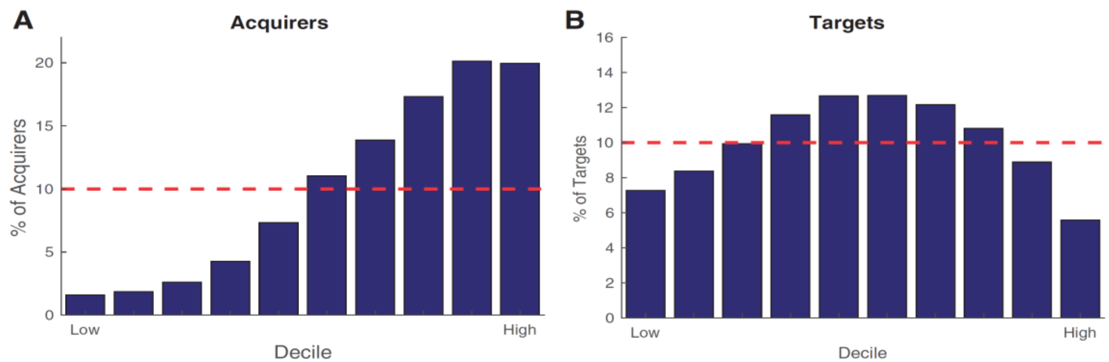


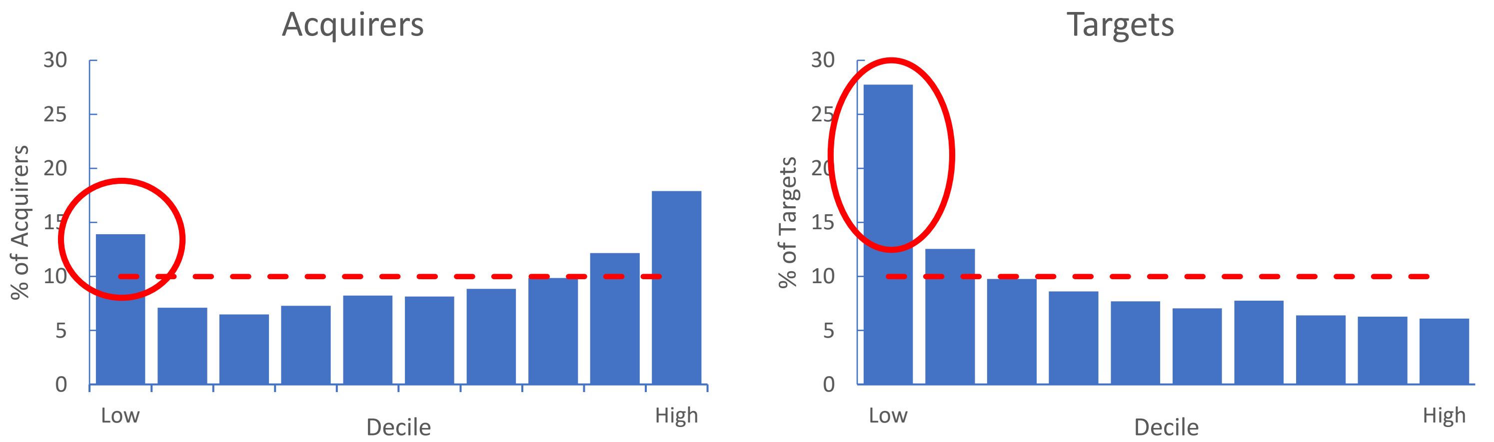

FIGURE 5

Model-implied marginal distributions of transacting firms

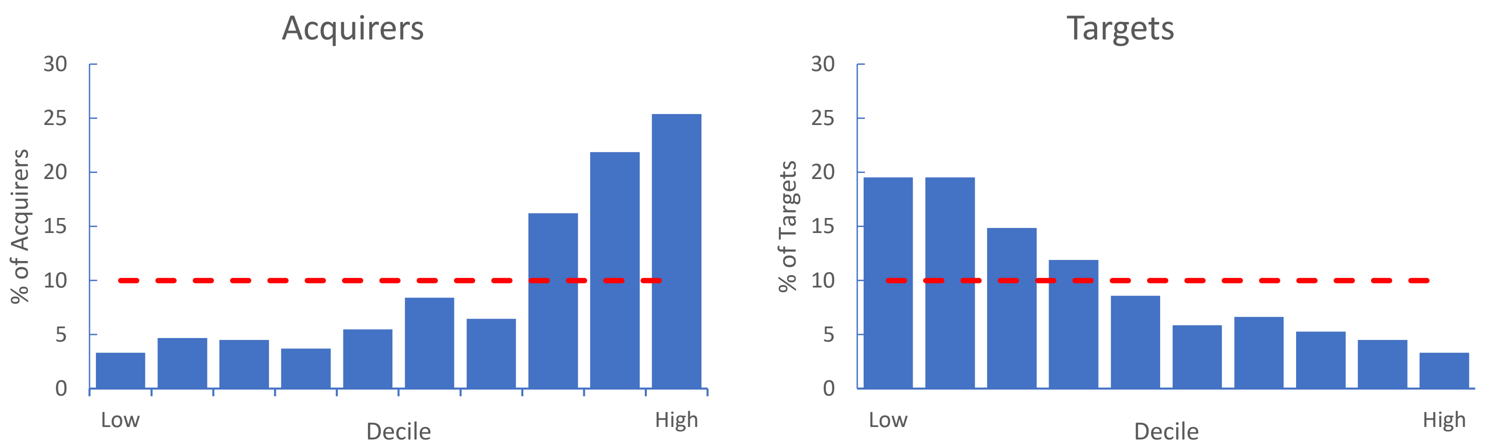
*Notes*: Figure displays the proportion of transacting firms that fall into each decile of the firm size distribution (measured by profitability) in model-simulated data.

# Empirical validation using Japanese data

## Empirical distributions (Japanese listed firms, consistent with other countries' patterns)




## Model-implied distributions (calibrated using Japanese data)



# Model extension

1. Add the exit cost, $c_{exit}(z)$, to the value function.

$$rV(z) = \max_{\lambda(z),\mu(z)} \pi(z) - c_{exit}(z) - C\big(\lambda(z)\big) - C\big(\mu(z)\big)$$
$$+\lambda(z)\theta_a \mathbb{E}[\Sigma_a(z, z_t)] + \mu(z)\theta_t \mathbb{E}[\Sigma_t(z_a, z)]$$

, where $$c_{exit}(z) = \begin{cases} c_{exit}, & if\ z \leq \tilde{z} \\ 0, & otherwise \end{cases}$$

- Usual exit threshold $\tilde{z}$ exists.
- Firms exit incur a fixed exit cost.

# Model extension

2. A firm exits if its expected value is negative, with a threshold $\tilde{z}$:

$$E[V(\tilde{z})] = \tau V(\tilde{z}) + (1-\tau)V(\tilde{z}(1-\rho)) = 0$$

3. Add a productivity shock to the value function:

$$\begin{aligned} rV(z) = \max_{\lambda(z),\mu(z)} \quad & \pi(z) - c_{exit}(z) + \tau\big[V\big(z(1-\rho)\big) - V(z)\big] \\ & -C\big(\lambda(z)\big) - C\big(\mu(z)\big) \\ & +\lambda(z)\theta_a \mathbb{E}[\Sigma_a(z, z_t)] + \mu(z)\theta_t \mathbb{E}[\Sigma_t(z_a, z)] \end{aligned}$$

, where $\tau$ denotes an exogenous rate of having a negative shock of $\rho$.

- Firms choose the optimal search intensity λ and μ given the shock characteristics τ and ρ.
- The value V enters the RHS because shocks affect the optimal choice of λ and μ.

# Model extension

4. Reflect the shock and the voluntary exit in the stationary equilibrium conditions.

(Stationary equilibrium condition for each type z)

$$M\int \lambda(z_a)\theta_a\Phi(\Sigma\big(z_a, s^{-1}(z, z_a)\big)\Gamma(\mathrm{z_t})dG(z_a) + \tau MdG(\frac{z}{1-\rho}) + M_e dF(z)$$

$$= \lambda(z)\theta_a MdG(z)\int \Phi(\Sigma(z, z_t))\Gamma(\mathrm{z_t})$$

$$+\mu(z)\theta_t MdG(z)\int \Phi\big(\Sigma(z_a, z)\big)\Lambda(\mathrm{z_a})$$

$$+\tau MdG(z) + \delta MdG(z), \qquad for\ z > \tilde{z},$$

$$M_e dF(z) = MdG(z), \qquad for\ z \leq \tilde{z}$$

(Aggregate stationarity condition)

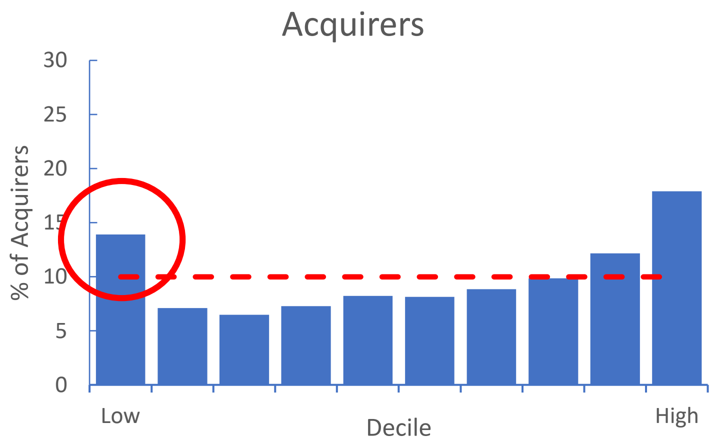
$$[1 - F(\hat{z})]M_\mathrm{e} = \big\{\delta + G(\tilde{z}) + \int \mu(z)\theta_t\big[\int \Phi\big(\Sigma_t(z_a, z)\big)\Lambda(\mathrm{z_a})\big]dG(z)\big\}M$$

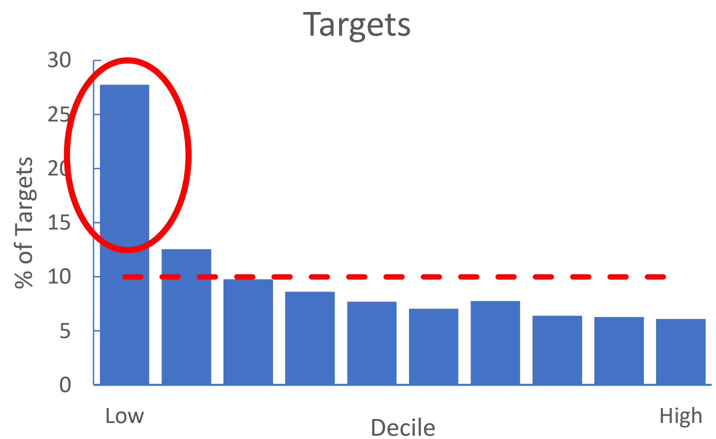
# Model intuition

- Low-productivity firms face a higher risk of incurring exit costs.
- Therefore, they are strongly incentivized to become either acquirers or targets.
- As a result, a peak emerges at the lower tail of the productivity distribution in the merger market.

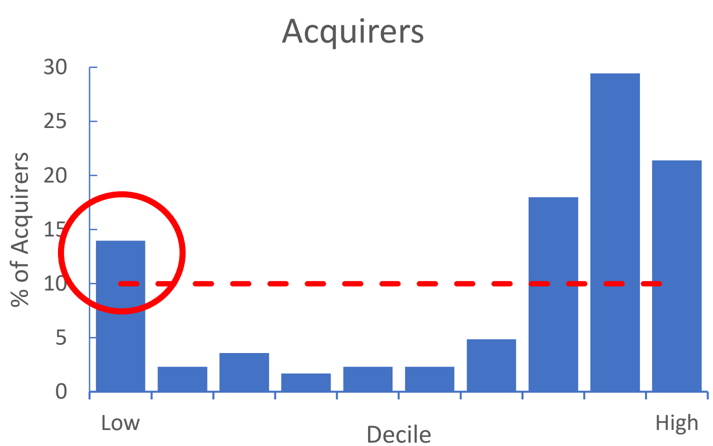
# Empirical validation of the extended model

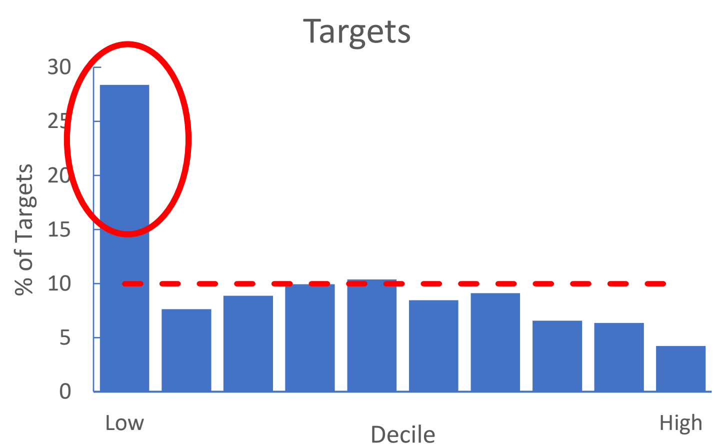
## Empirical distributions (Japanese listed firms, consistent with other countries’ patterns)




## Model-implied distributions (calibrated using Japanese data)



# Policy simulations

- Policy scenarios considered:
  - Reduction in Exit Costs
  - Taxation or Subsidization on Merger Gains

# Policy simulations

- The deviation from the baseline economy is measured using the following indicators:
  - Output:

$$\Delta \log Y = \underbrace{(1-\alpha)\Delta \log M}_{\text{nunber of firms}} + \underbrace{(1-\alpha)\Delta \log \bar{Z}}_{\text{productiviy}}$$

  - Productivity:

$$\Delta \log \bar{Z} = \underbrace{\left[\log \int_{\hat{z}}^{\infty} z d\tilde{G}_{cf}(z) - \log \int_{\hat{z}}^{\infty} z dG(z)\right]}_{\text{intensive margin}} + \underbrace{\left[\log \int_{\hat{z}_{cf}}^{\infty} z dG_{cf}(z) - \log \int_{\hat{z}}^{\infty} z d\tilde{G}_{cf}(z)\right]}_{\text{selection}}$$

  - Consumption:

$$\Delta C = \Delta Y - (\Delta Y_s + \Delta Y_f + \Delta Y_e + \Delta Y_{exit})$$

$Y_s$: resources denoted to search activities on the merger market
$Y_f$: to fix cost of the production
$Y_e$: to new firm creation

# Policy simulations

- Exit cost reduction & merger tax/subsidy on merger gains
- Impact on **matching efficiency** and **resource losses** from firm entry, exit, and search frictions.

| | Exit cost | | Tax/subsidy rate | |
|---|---|---|---|---|
| | -1% | -10% | 10% | -10% |
| Output/TFP | -1.2 | -4.7 | 0.6 | -0.9 |
| Number of firms | -0.6 | -3.5 | 0.3 | -0.5 |
| Intensive margin | 0.1 | 0.9 | -0.2 | 0.2 |
| Selection | -0.7 | -2.1 | 0.5 | -0.6 |
| Consumption | 0.7 | -1.9 | -2.1 | 0.8 |
| Consumption share of output | 1.8 | 2.7 | -2.5 | 1.6 |
| Merger rate | -12.7 | 19.0 | 2.0 | -8.8 |
| Exit rate | 0.4 | 1.2 | -0.2 | 0.3 |

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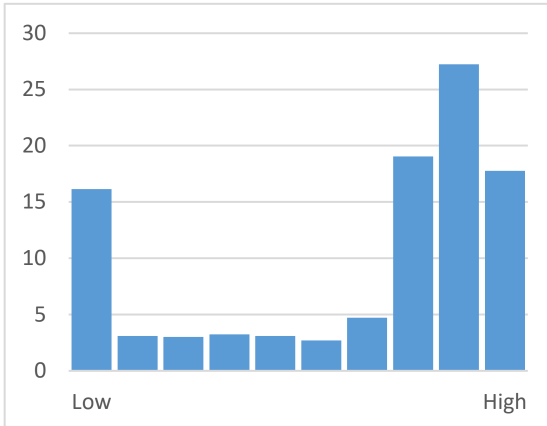
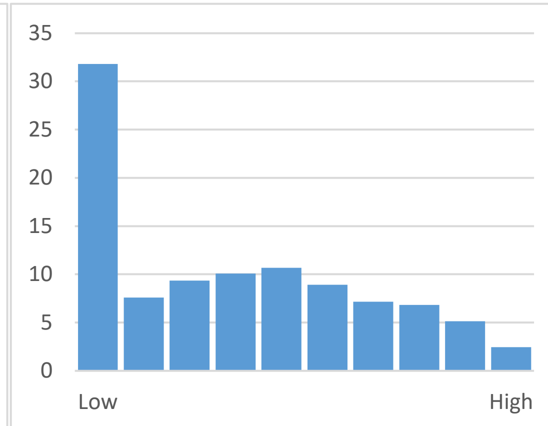
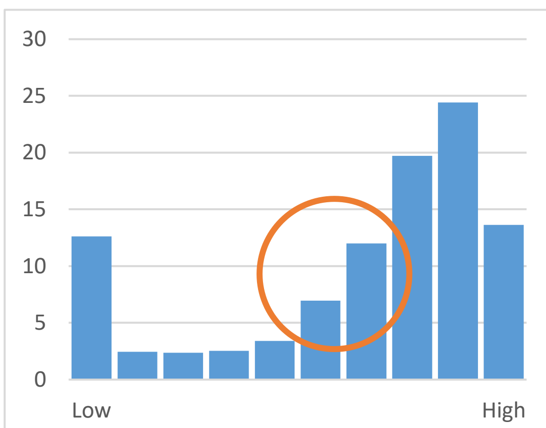
# Policy simulations: productivity distribution

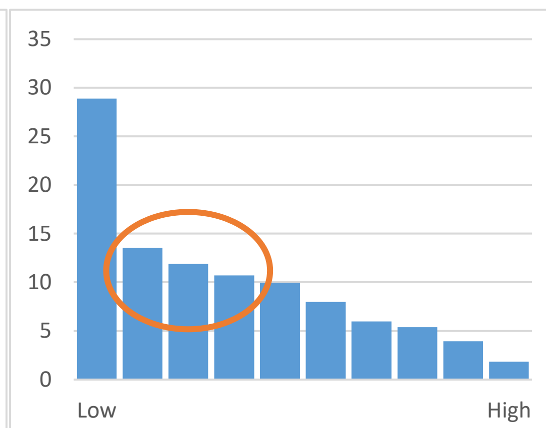
- Exit cost: -1%




- Exit cost: -10%



# Policy simulations

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# Policy Implications

- Mild reductions in exit costs can improve economic welfare, while excessive reductions may be detrimental.
  - When mergers generate insufficient gains, the negative effects of resource loss and a decline in the number of firms may outweigh the benefits.

- These results depend on:
  - The baseline distribution of mergers
  - The functional form of the merger technology
  - Key parameters such as exit costs and search friction

# Conclusion

- Developed a macroeconomic model incorporating mergers and exits
- Validated empirical patterns.
- Derived welfare implications for exit and merger policies.
- Future works:
  - Analytical exercises to examine model properties.
  - Additional policy simulations.

# References


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# Appendix

# David (2021, ReStud): merger market

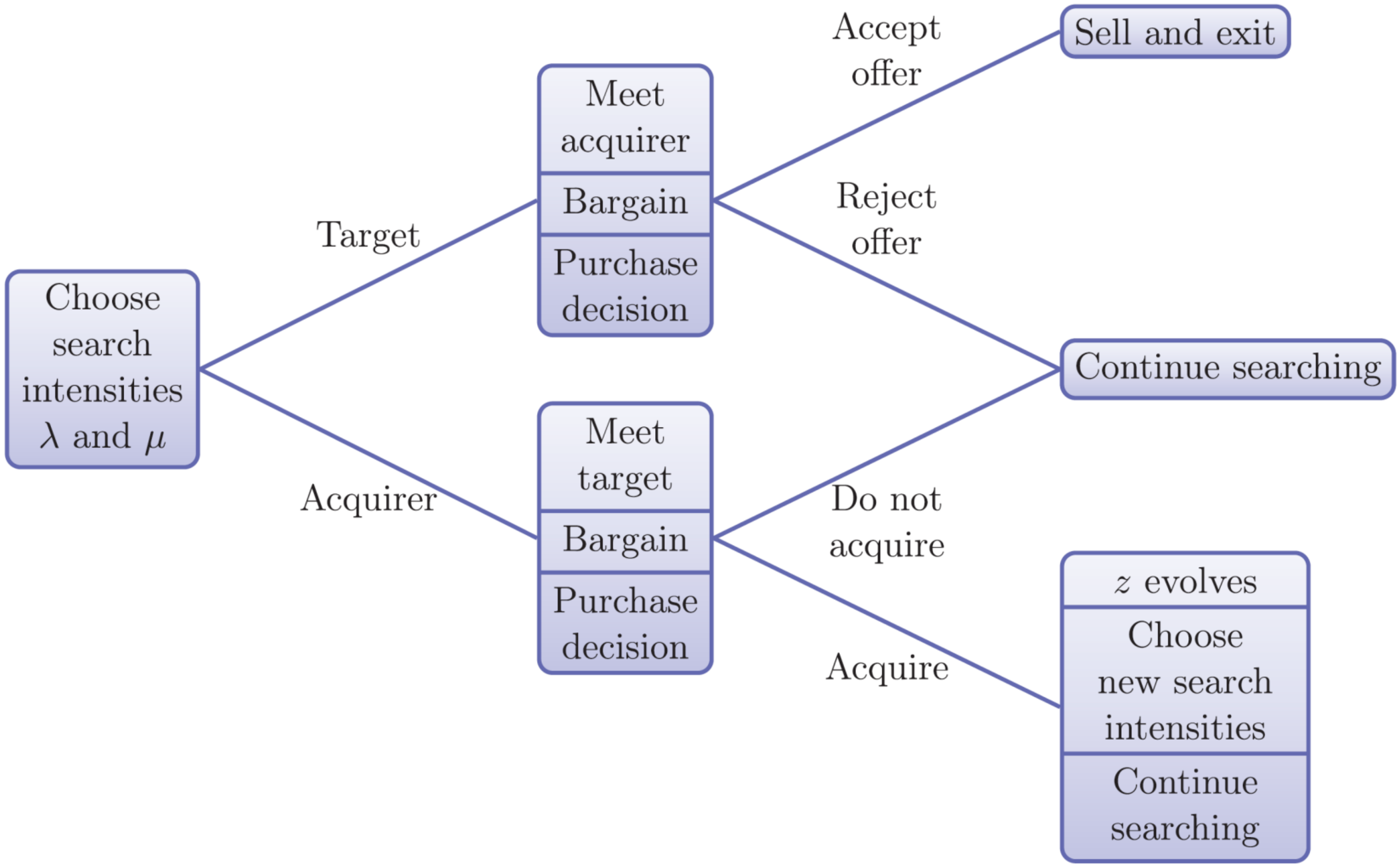



FIGURE 3
The timing of actions on the merger market

# David (2021, ReStud): general setup

- Infinite-horizon economy (continuous time)

- Measure L of Identical households
  - inelastically supply labor L to firms and value consumption C of a single homogeneous good.

- A continuum of competitive firms of (endogenous) mass M
  - Production function:

$$q(z) = z^{1-\alpha} l(z)^{\alpha}, \qquad \alpha < 1$$

  - Profit maximization yields:

$$r(z) = \frac{1}{1-\alpha}\Pi z, \qquad l(z) = \frac{1}{1-\alpha}\frac{\alpha}{W}\Pi z, \qquad \tilde{\pi}(z) = \Pi z, \qquad \alpha < 1 (1)$$

  - Net profit:

$$\pi(z) = \Pi z - c_f \ (2)$$

# David (2021, ReStud): merger market

- Merger technology

$$z_m = s(z_a, z_t) = A z_a^{\gamma} z_t^{\nu} (3)$$

- Bargaining
  - Merger gain:

$$\Sigma(z_a, z_t) = V(z_m) - V(z_a) - V(z_t) (4)$$

  - Purchase price:

$$\mathrm{P}(z_a, z_t) = V(z_t) + (1-\beta)\Sigma(z_a, z_t)$$

where $\beta$ denotes the bargaining power of the acquirer

  - Merger premium:

$$\frac{\mathrm{P}(z_a, z_t) - V(z_t)}{V(z_t)} = \frac{(1-\beta)\Sigma(z_a, z_t)}{V(z_t)} (5)$$

  - Individual gains for acquirer and target:

$$\Sigma_a(z, z_t) = \beta\Sigma(z, z_t), \qquad \Sigma_t(z_a, z) = (1-\beta)\Sigma(z_a, z) (6)$$

# David (2021, ReStud): merger market

- Search technology
  - Firms choose search intensities $\lambda(z)$ and $\mu(z)$ of meeting a potential target and acquirer, respectively, at the convex costs of $C(x) = \frac{B}{\eta} x^{\eta}, \eta > 1,$ for $x = \lambda, \mu$.
  - Denote by $dG(z)$ the distribution of firms types in the market.
  - Aggregate meeting rate:

$$\min\{\int \lambda(z) dG(z), \int \mu(z) dG(z)\}$$

  - Market tightness on the acquire and target sides:

$$\theta_a = \min\left\{\frac{\int \mu(z) dG(z)}{\int \lambda(z) dG(z)}, 1\right\}, \qquad \theta_t = \min\left\{\frac{\int \lambda(z) dG(z)}{\int \mu(z) dG(z)}, 1\right\}$$

  - Meeting rates at which $z_a$ meet $z_t$ and $z_t$ meet $z_a$:

$$\lambda(z_a)\theta_a \underbrace{\frac{\mu(z_t) dG(z_t)}{\int \lambda(z) dG(z)},}_{\Gamma(z_t)} \qquad \mu(z_t)\theta_t \underbrace{\frac{\lambda(z_a) dG(z_a)}{\int \mu(z) dG(z)}}_{\Lambda(z_a)} (7)$$

# David (2021, ReStud): value functions and decision rules

- Firms' value function:

$$rV(z) = \max_{\lambda(z),\mu(z)} \pi(z) - C\big(\lambda(z)\big) - C\big(\mu(z)\big)$$
$$+\lambda(z)\theta_a \mathbb{E}[\Sigma_a(z, z_t)] + \mu(z)\theta_t \mathbb{E}[\Sigma_t(z_a, z)] (8)$$

- First order conditions:

$$C'\big(\lambda(z)\big) = \theta_a \mathbb{E}[\Sigma_a(z, z_t)], \qquad C'\big(\mu(z)\big) = \theta_t \mathbb{E}[\Sigma_t(z_a, z)] (9)$$

- Acceptance regions (matching sets generating positive combined gains):

$$\gamma_a(z) = \{z_t : \Sigma(z, z_t) \geq 0\}, \qquad \gamma_t(z) = \{z_a : \Sigma(z_a, z) \geq 0\} (10)$$

# David (2021, ReStud): entry and exit

- Assume that incumbent firms are subject to an exogenous exit shock at rate $\delta$.
- Exit rate of firm $z$:

$$\delta + \mu(z)\theta_t \int \Phi(\Sigma_t(z_a, z))\Lambda(z_a)$$

- To enter, entrepreneurs must expend $c_e$ to draw $z$ from an exogenous distribution $F(z), z \in (z_{min}, \infty)$.
- Free entry condition:

$$\int V(z)dF(z) = c_e (11)$$

- After the entry, the firm begins operations if the drawn type exceeds the threshold $\hat{z}$, which, from equation (8), satisfies:

$$\pi(\hat{z}) = -\left\{\lambda(\hat{z})\theta_a \mathbb{E}[\Sigma_a(\hat{z}, z_t)] + \mu(\hat{z})\theta_t \mathbb{E}[\Sigma_a(z_a, \hat{z})] - C\big(\lambda(\hat{z})\big) - C\big(\mu(\hat{z})\big)\right\}(12)$$

# David (2021, ReStud): stationary equilibrium

- Average productivity:

$$\bar{Z} = \int_{\hat{z}}^{\infty} z dG(z)$$

- Aggregate output, productivity, and wages:

$$Y = (M\bar{Z})^{1-\alpha} L^{\alpha}, \qquad TFP = (M\bar{Z})^{1-\alpha}, \qquad W = \alpha (M\bar{Z})^{1-\alpha} L^{\alpha-1} (13)$$

- The stationarity condition for each type $z \geq \hat{z}$:

$$\begin{aligned} M \int \lambda(z_a)\theta_a \Phi(\Sigma\big(z_a, s^{-1}(z, z_a)\big)\Gamma(\mathrm{z_t}) dG(z_a) + M_e dF(z) \\ = \lambda(z)\theta_a M dG(z) \int \Phi(\Sigma(z, z_t))\Gamma(\mathrm{z_t}) \\ + \mu(z)\theta_t M dG(z) \int \Phi\big(\Sigma(z_a, z)\big)\Lambda(\mathrm{z_a}) \\ + \delta M dG(z) \qquad (14) \end{aligned}$$

- Aggregate stationarity condition:

$$[1 - F(\hat{z})] M_{\mathrm{e}} = \big\{\delta + \int \mu(z)\theta_t \big[\int \Phi\big(\Sigma_t(z_a, z)\big)\Lambda(\mathrm{z_a})\big] dG(z)\big\} M (15)$$

# David (2021, ReStud): stationary equilibrium

- Labor market clearing:

$$L = \frac{1}{1-\alpha}\frac{\alpha}{W}\Pi M\bar{Z}(16)$$

- Goods market clearing:

$$Y = C + Y_s + Y_f + Y_e, \qquad \text{where}(17)$$

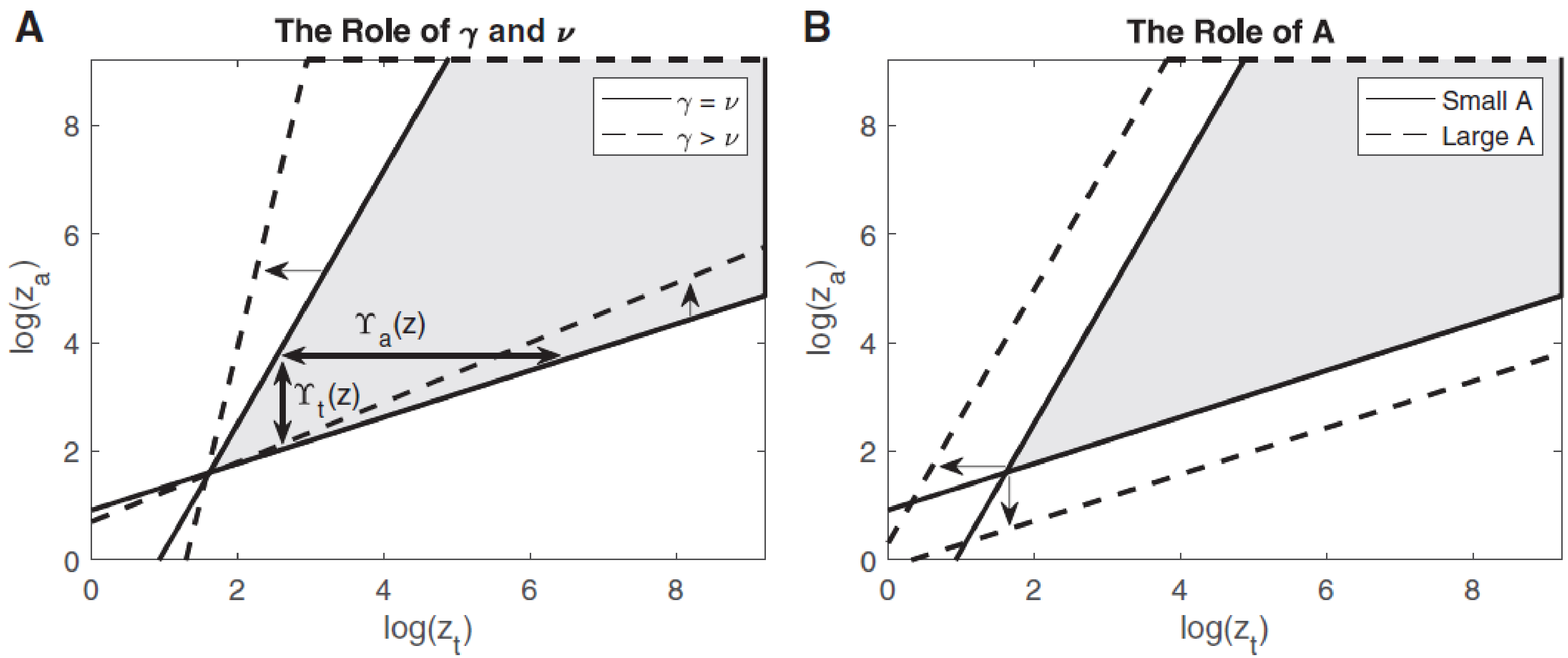
$Y_s = M\left[\int C_\lambda\big(\lambda(z)\big)dG(z) + \int C_\mu\big(\mu(z)\big)dG(z)\right]$ denotes the total resources denoted to search activities on the merger market, $Y_f = Mc_f$ to fix cost of the production, and $Y_e = M_e c_e$ to new firm creation.

# David (2021, ReStud): sorting

- Merger technology generates sorting among transacting firms.
  - Productive acquires buy productive targets.
- Following matching set (static example) explains this pattern:

$$\beta A z_a^{\gamma} z_t^{\nu} \geq z_a \Rightarrow \log z_a \leq \frac{1}{1-\gamma}\log(\beta A) + \frac{\nu}{1-\gamma}\log z_t$$

$$(1-\beta) A z_a^{\gamma} z_t^{\nu} \geq z_t \Rightarrow \log z_a \leq -\frac{1}{\gamma}\log((1-\beta) A) + \frac{1-\nu}{\gamma}\log z_t$$



# David (2021, ReStud): parameter estimation

- Method: the simulated method of moments
- Data: Refinitiv SDC Platinum Database and Compustat
- Codes: available online

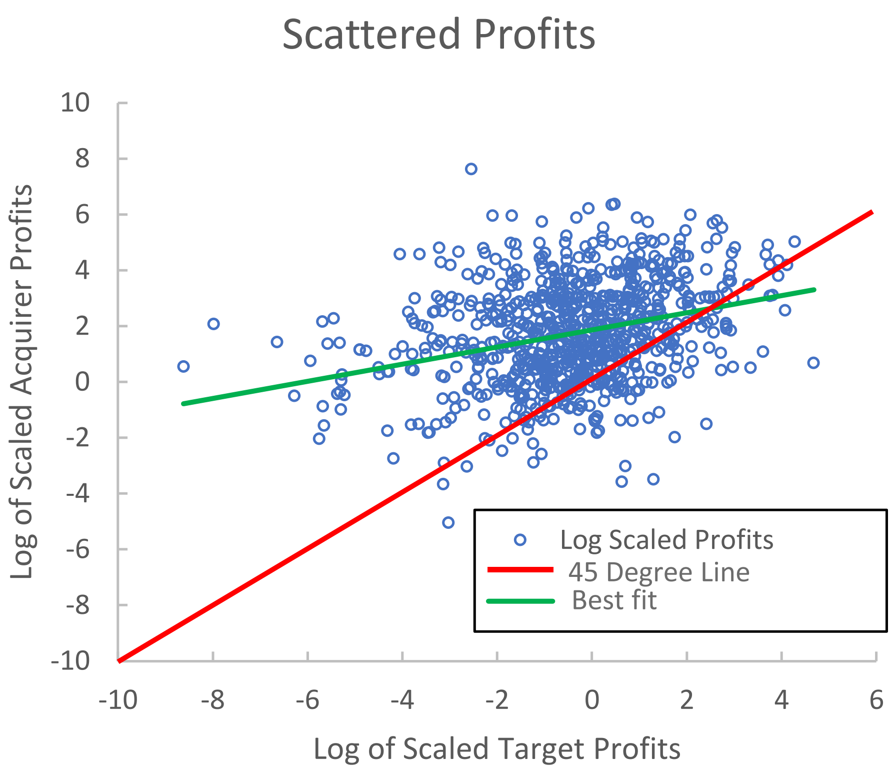
*Parameter estimates*

| Parameters | $\gamma$ | $\nu$ | $A$ | $\beta$ | $\eta$ | $B(\times 10^{11})$ | $c_f$ |
|---|---|---|---|---|---|---|---|
| | 0.91 | 0.54 | 1.05 | 0.51 | 14.23 | 3.39 | 0.06 |
| | (0.008) | (0.008) | (0.009) | (0.009) | (0.166) | (0.038) | (0.005) |
| Moments | med.$(z_a)$ | med.$(z_t)$ | $z_t(p_{10})$ | mn.$(prem)$ | cv$(z_t)$ | *acq. rate* | Pr$(entry)$ |
| Data | 0.57 | −0.01 | 0.10 | 0.47 | 3.92 | 0.04 | 0.48 |
| Model | 0.56 | 0.00 | 0.07 | 0.47 | 3.91 | 0.04 | 0.48 |

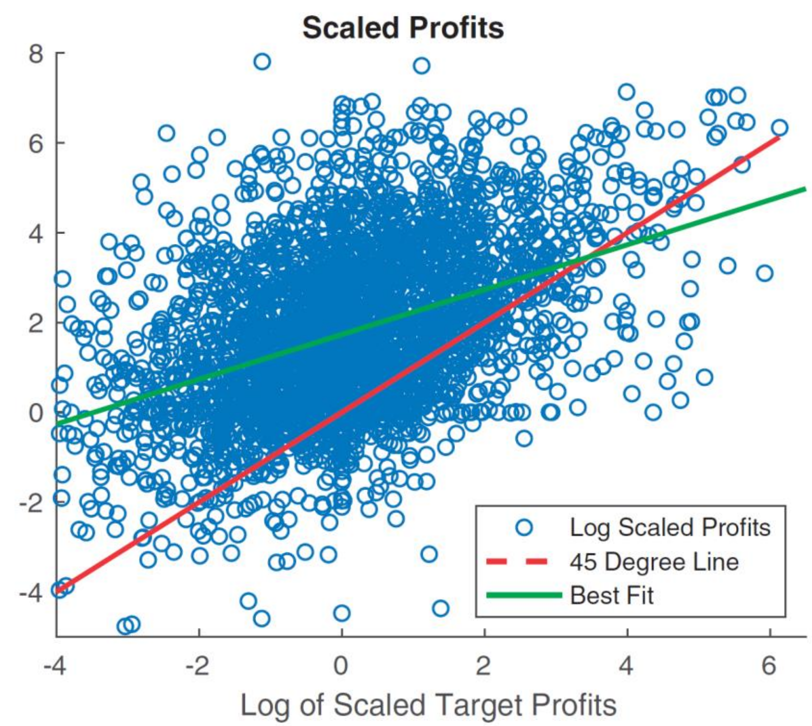
*Notes*: Top panel reports parameter estimates and bootstrapped standard errors. Bottom panel reports the values of the target moments and the simulated model counterparts.

# Data – Joint distribution of acquirers and targets

Japan (present study)




US (David, 2021)




Note: The figures display the log of profits after rescaling by deviating each firm from the median in its industry.

# Parameters in the model

- Merger technology:

$$z_m = s(z_a, z_t) = A z_a^{\gamma} z_t^{\nu}$$

- Individual gains for acquirers and targets (by the Nash bargaining):

$$\Sigma_a(z, z_t) = \beta \Sigma(z, z_t), \qquad \Sigma_t(z_a, z) = (1 - \beta)\Sigma(z_a, z)$$

- Cost function:

$$C(x) = \frac{B}{\eta} x^{\eta}, \eta > 1, \text{ for } x = \lambda, \mu$$

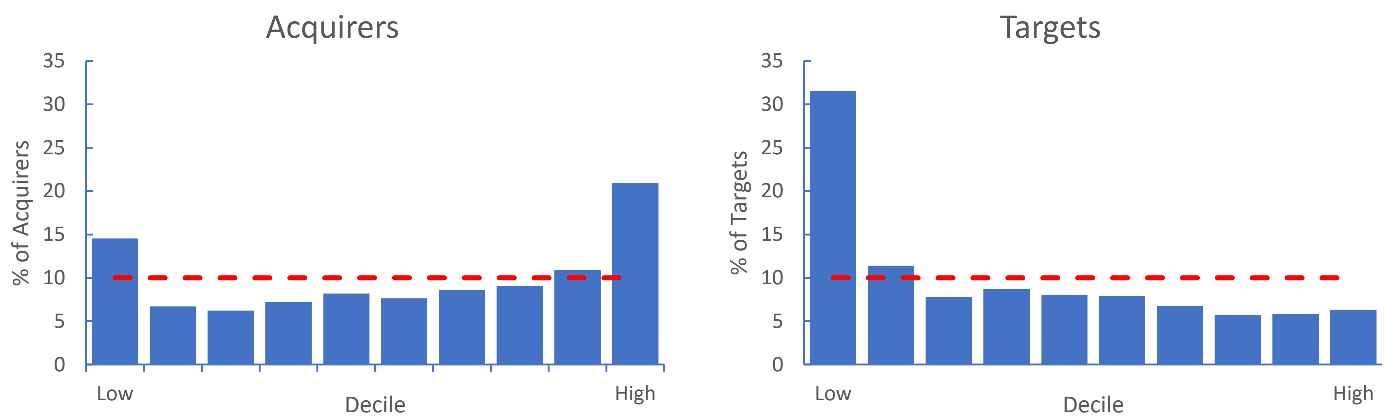
- Net profit:

$$\pi(z) = \Pi z - c_f$$

# Data – Marginal distributions of transacting firms

Japan (present study)

Profitability measure: EBITDA




US (David, 2021)

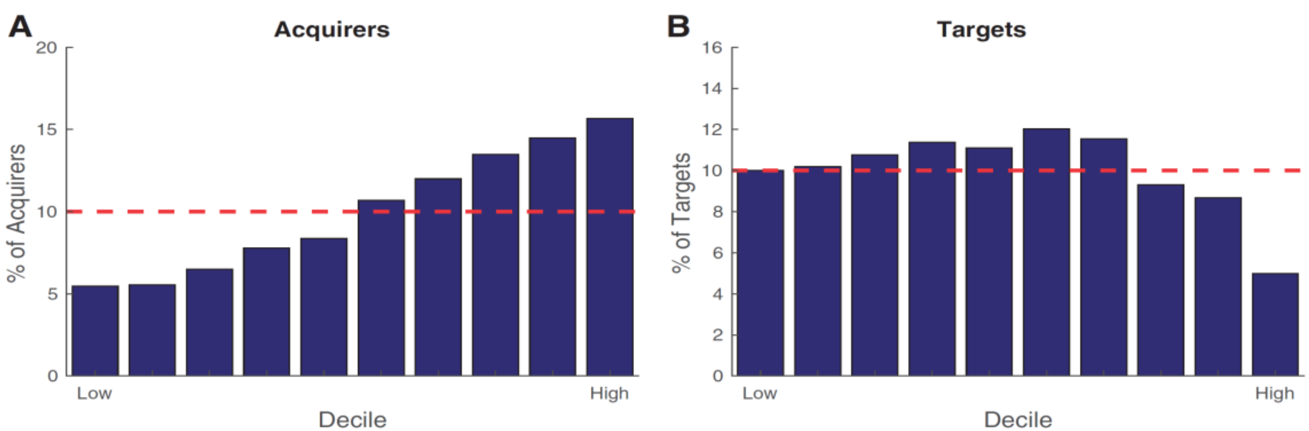



FIGURE 2

Marginal distributions of transacting firms

*Notes*: Figure displays the proportion of acquiring and target firms that fall into each decile of the firm size distribution (measured by profitability). Data are from SDC Platinum and Compustat.

# Data – Unique patterns for Japanese firms

- Many low-productivity targets (about 30%)
  - About 20% of these are loss-makers.
  - In the US, targets are almost uniformly distributed.

- U-shaped distribution of acquirers
  - U.S. acquirers exhibit a monotonous distribution.

- Weak positive sorting
  - Relatively few mergers between low-productivity firms

# For a better fit

- In the David model,
  - the convexity of the merger technology, $\gamma$ and $\nu$, largely determines the distribution.
  - This property is evident from the FOC, which determines the search intensity $\lambda$ and $\nu$:

(Acquirer's FOC)

$$C'\big(\lambda(z)\big) = \theta_a \mathbb{E}[\Sigma_a(z, z_t)]$$

$$\Rightarrow \lambda(z) = \left(\frac{\theta_a}{B}\mathbb{E}[\beta \max\{V(Az^\gamma z_t^\nu) - V(z) - V(z_t), 0\}]\right)^{\frac{1}{\eta-1}}$$

  - When $\gamma < 1$, the second term $V(z)$ is dominant, so $\lambda$ is decreasing in $z$.
  - When $\gamma \geq 1$ and $Az_t^\nu > 1$, the first term $V(Az^\gamma z_t^\nu)$ is dominant, so $\lambda$ is decreasing in $z$.

# For a better fit

- Therefore, it is not possible to generate a U-shaped distribution from the original model.
- We need to provide stronger merger incentives to firms in the left tail.
- Intuitively, left-tail firms face the exit risk and we want to exploit it.
- So, we add <u>permanent negative shocks</u> and <u>exit costs</u> to the model.

# Re-estimation – results

- It fails to reproduce the sharp peak on the left tail (next page).

Japan (present study)

| Parameters | $\gamma$ | $\nu$ | $A$ | $\beta$ | $\eta$ | $B$ (×10^24) | $cf$ |
|---|---|---|---|---|---|---|---|
| | 1.01 | 0.29 | 1.14 | 0.94 | 9.65 | 2.46 | 0.02 |
| Moments | med.(za) | med.(zt) | zt (p10) | mn.(prem) | cv(zt) | acq. rate | Pr(entry) |
| Data | 0.65 | -0.33 | 0.27 | 0.39 | 4.66 | 0.0005 | 0.82 |
| Model | 0.67 | -0.31 | 0.20 | 0.39 | 4.49 | 0.0005 | 0.82 |

US (David, 2021)

| Parameters | $\gamma$ | $\nu$ | $A$ | $\beta$ | $\eta$ | $B\left(\times 10^{11}\right)$ | $c_f$ |
|---|---|---|---|---|---|---|---|
| | 0.91 | 0.54 | 1.05 | 0.51 | 14.23 | 3.39 | 0.06 |
| | (0.008) | (0.008) | (0.009) | (0.009) | (0.166) | (0.038) | (0.005) |
| Moments | med. $(z_a)$ | med. $(z_t)$ | $z_t\,(p_{10})$ | mn. $(prem)$ | cv $(z_t)$ | *acq. rate* | Pr $(entry)$ |
| Data | 0.57 | −0.01 | 0.10 | 0.47 | 3.92 | 0.04 | 0.48 |
| Model | 0.56 | 0.00 | 0.07 | 0.47 | 3.91 | 0.04 | 0.48 |

*Notes*: Top panel reports parameter estimates and bootstrapped standard errors. Bottom panel reports the values of the target moments and the simulated model counterparts.

# Model extension – Details

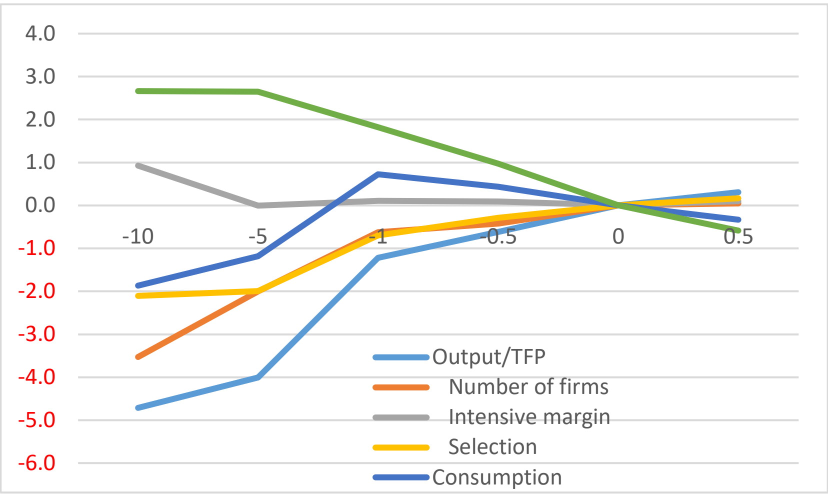
5. Estimate the model with the new parameters, $\tau, \rho, c_{exit}\ z_{min},$ and following new moments:
   - Distribution: $zt(p10), za(p10), za(p30), za(p100),$
   - Voluntary exit rate: $\delta_{vol}$
   - $cv(z_t)$ is excluded to improve the fit.

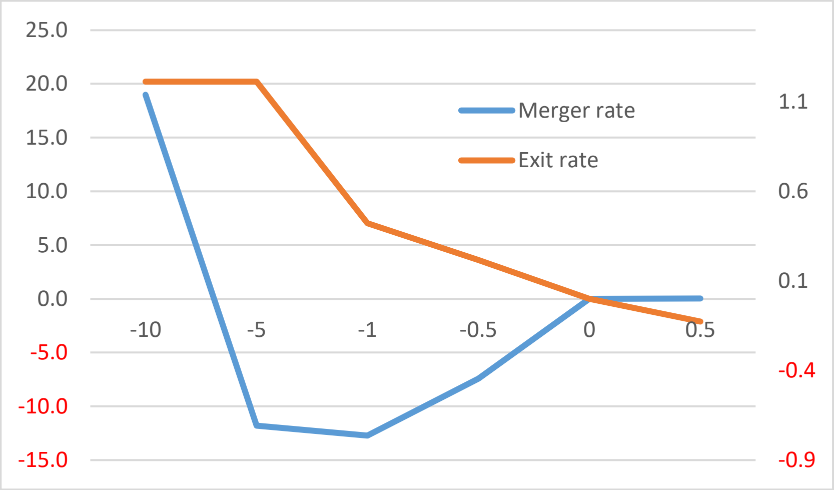
New estimates

| Parameters | $\gamma$ | $v$ | $A$ | $\beta$ | $\eta$ | $B$ (×10^24) | z^ | $\tau$ | $\rho$ | $c\_exit$ | $cf$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.81 | 0.31 | 1.19 | 0.96 | 10.56 | 3.73 | 9.37 | 0.04 | 0.94 | 0.82 | 0.00 |
| Moments | med.(za) | med.(zt) | mn.(prem) | acq. rate | Pr(entry) | zt (p10) | zt (p100) | za (p10) | za (p30) | za (p100) | $\delta vol$ |
| Data | 0.65 | -0.33 | 0.39 | 0.0005 | 0.82 | 0.28 | 0.06 | 0.14 | 0.06 | 0.18 | 0.04 |
| Model | 0.79 | -0.21 | 0.37 | 0.0005 | 0.81 | 0.28 | 0.04 | 0.14 | 0.04 | 0.21 | 0.05 |

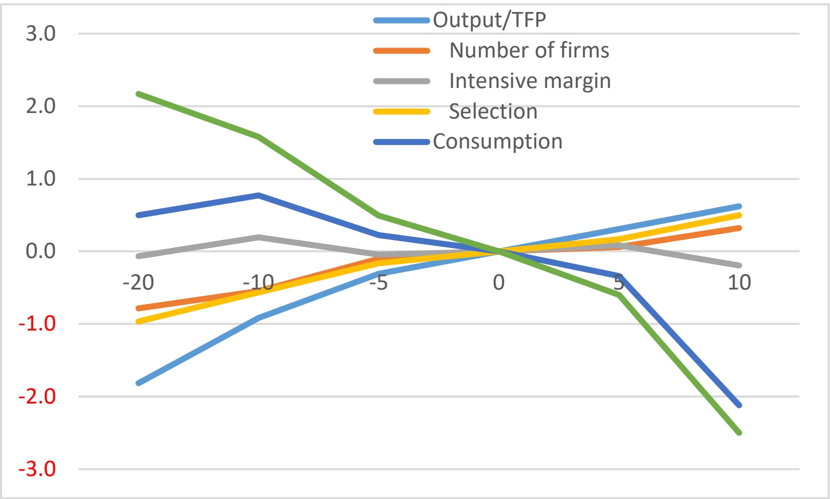
# Sensitivity analyses

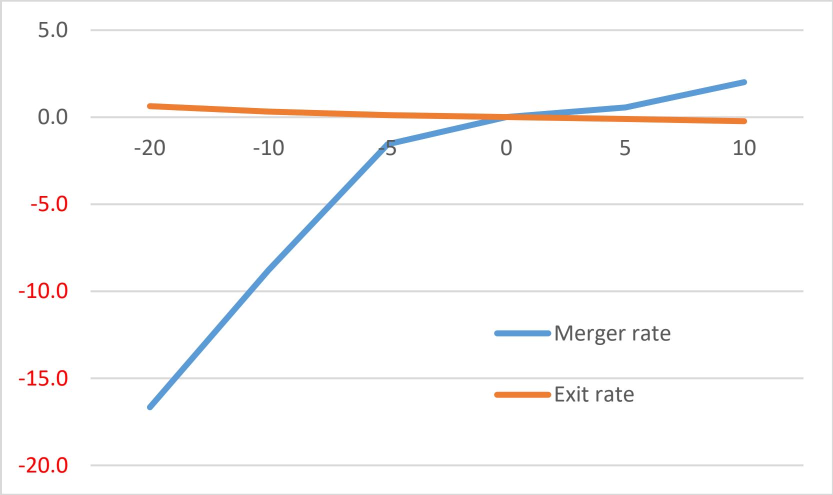
## Exit cost



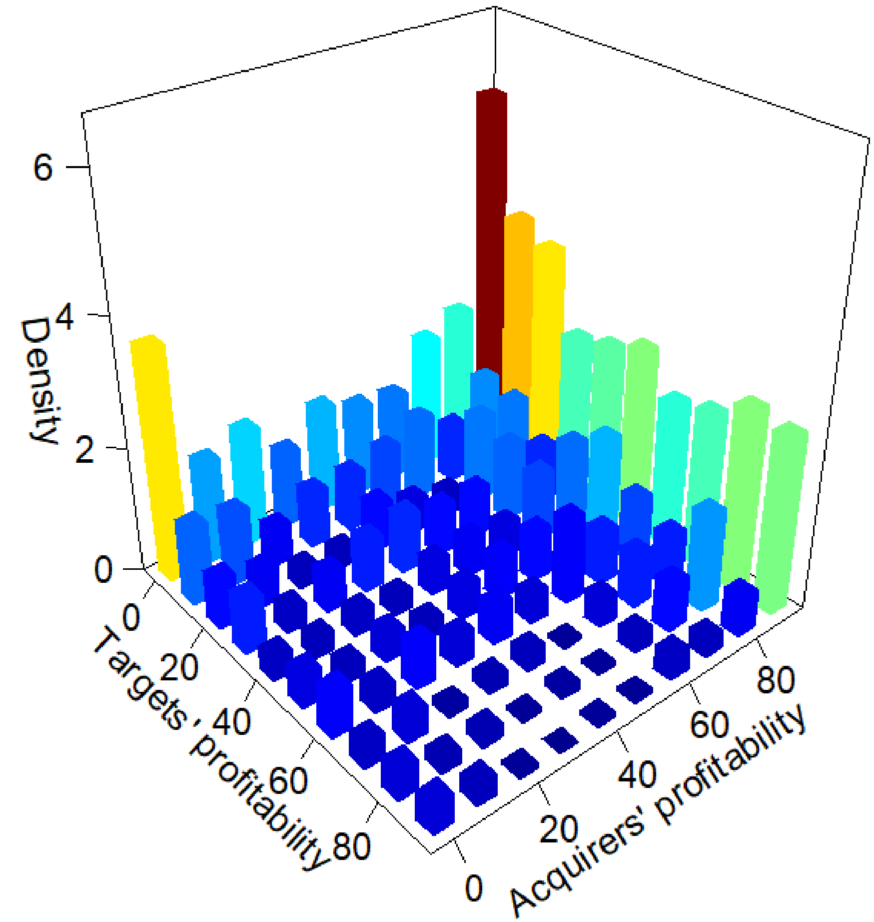




## Tax / subsidy



# Three-Dimensional Distribution of Transacting Firms (Japan)




Notes: Figure displays the joint distribution of acquiring and target firms across deciles of the profitability distribution, where profitability is measured by EBITDA. Heights represent the relative frequency of merger pairs at each decile combination. Data are from SDC Platinum.