

Motivation

Mergers and Acquisitions (M&A) reallocate resources, including both physical assets and human capital

- Prior research on the gains from acquisitions primarily focuses on the restructuring of physical assets after M&A (Maksimovic et al., 2011).
- Fewer studies of the impact of M&A on human capital reallocation (Lagaras, 2021; Gehrke et al., 2021).
- It is a **theoretically ambiguous** question as firms have **less** control over employees relative to physical assets.

This Paper

This paper examines the following four questions:

1. **Turnovers rates** for departing, staying, and new employees around M&A
2. **Cross-sectional determinants** of turnover rates across different types of employees
3. **Productivity changes** for all types employees around M&A
4. **Spillover effects** of post-merger labor restructuring on the productivity of firms not involved in the merger

Empirical Approach & Data

Empirical Approach

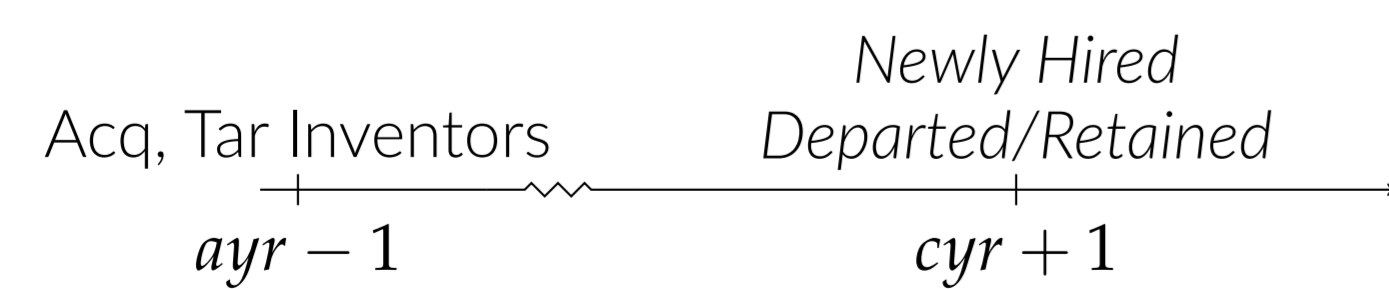
I analyze the reallocation of a particular type of employees, i.e., *inventors*, through M&A.

- Highly skilled employees & Key input to innovation
- Track an inventor's **employment history**
- Provide an **individual-level productivity measure** by patent-based metrics.

Innovative Deal Sample

- Thomson Financial's SDC Platinum Dataset
- Completed deals announced after Jan 1, 1984 and completed before Dec 31, 2014
- Both acquirer and target firms have at least one inventor one year before the deal announcement
- 803 completed innovative deals

Inventor Sample



- PatentsView Dataset
- Identify inventors associated with the innovative deals both pre-merger (acquirer or target inventors) and post-merger (newly hire inventors).
- 262,457 *acquirer inventors*, 15,471 *target inventors*, and 62,491 *newly hired inventors*.

Inventor Turnovers

- A significant **higher** turnover rate in *target* inventors.

$$y_{i,t} = \alpha_{s(m)} + \alpha_t + \beta_1 I(Post) + \beta_2 I(Merger) + \beta_3 I(Merger) \times I(Post) + \gamma X_{i,t-1} + e_{i,m,t} \quad (1)$$

	AcqLeave%		TarLeave%		New%		SizeChange%	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>I(Post)</i>	-0.039 (0.032)	-0.036 (0.036)	0.095* (0.053)	0.091 (0.069)	0.031 (0.032)	0.052 (0.033)	0.398** (0.15)	0.416** (0.18)
<i>I(Merger)</i>	0.022*** (0.0080)		0.014 (0.013)		0.014** (0.007)		0.004 (0.030)	
<i>I(Post) × I(Merger)</i>	-0.010 (0.011)	-0.003 (0.009)	0.054*** (0.021)	0.045** (0.019)	0.005 (0.009)	-0.000 (0.036)	0.046 (0.036)	0.009 (0.034)
<i>Controls</i>	Yes	No	Yes	No	Yes	No	Yes	No
<i>Stack FE</i>	Yes	No	Yes	No	Yes	No	Yes	No
<i>Deal FE</i>	No	Yes	No	Yes	No	Yes	No	Yes
<i>Year FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Observations</i>	3125	3096	2849	2826	3124	3098	3127	3100
<i>R²</i>	0.443	0.763	0.426	0.698	0.633	0.823	0.542	0.765

- **I(Merger)=0**: matched firms based on observables (1) important *drivers* for being in a merger; (2) indicate firms' pre-merger innovation activity

Cross-Sectional Analysis

- OLS Linear Probability Model for inventors in the merging firms
- The turnover is **greater** for inventors with a **poorer** match in their skillset with that of either the target or acquiring firms.
- The likelihood of a target inventor staying with the merged firm is **unrelated** to the inventor's **pre-merger innovation productivity**.
- **Newly hired inventors** patent in **different** areas relative to the staying inventors, and are more pre-merger **productive**.

Productivity Changes for Inventors

- Poisson Diff-in-Diff (Cohn et al., 2022)

$$E[y_{j,m} | \mathbf{x}] = e^{x\beta} = e^{\beta_0 + \beta_1 I(Post) + \beta_2 I(Merger) \times I(Post) + \alpha_t + \alpha_{j,m} + \epsilon_{j,m,t}} \quad (2)$$

- **Inventors in the combined entity** increase their innovation productivity around the merger
 - Mainly driven by *acquiring staying inventors* and *newly hired inventors*
 - Consistent with the evidence that the *combined entity* increase their innovation activity around the merger
- **Departed inventors** increase their innovation productivity around the merger

	All Inventors (Combined Entity)		All Departed Inventors		Combined Entity	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>I(Post)</i>	0.036*** (0.0029)	-0.11*** (0.026)	0.079*** (0.0063)	0.13*** (0.022)	0.020 (0.030)	-0.091 (0.063)
<i>I(Post) × I(Merger)</i>	-0.013*** (0.0037)	0.20*** (0.035)	0.042*** (0.0091)	0.075*** (0.024)	0.034 (0.045)	0.24*** (0.079)
<i>Year FE</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Inventor FE</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>N</i>	3507846	3437575	559145	545531	14028	14028

Spillover Effects

- *Non-merging firms* hiring these departed inventors experience significant **increase** in innovation productivity around the merger relative to control firms.

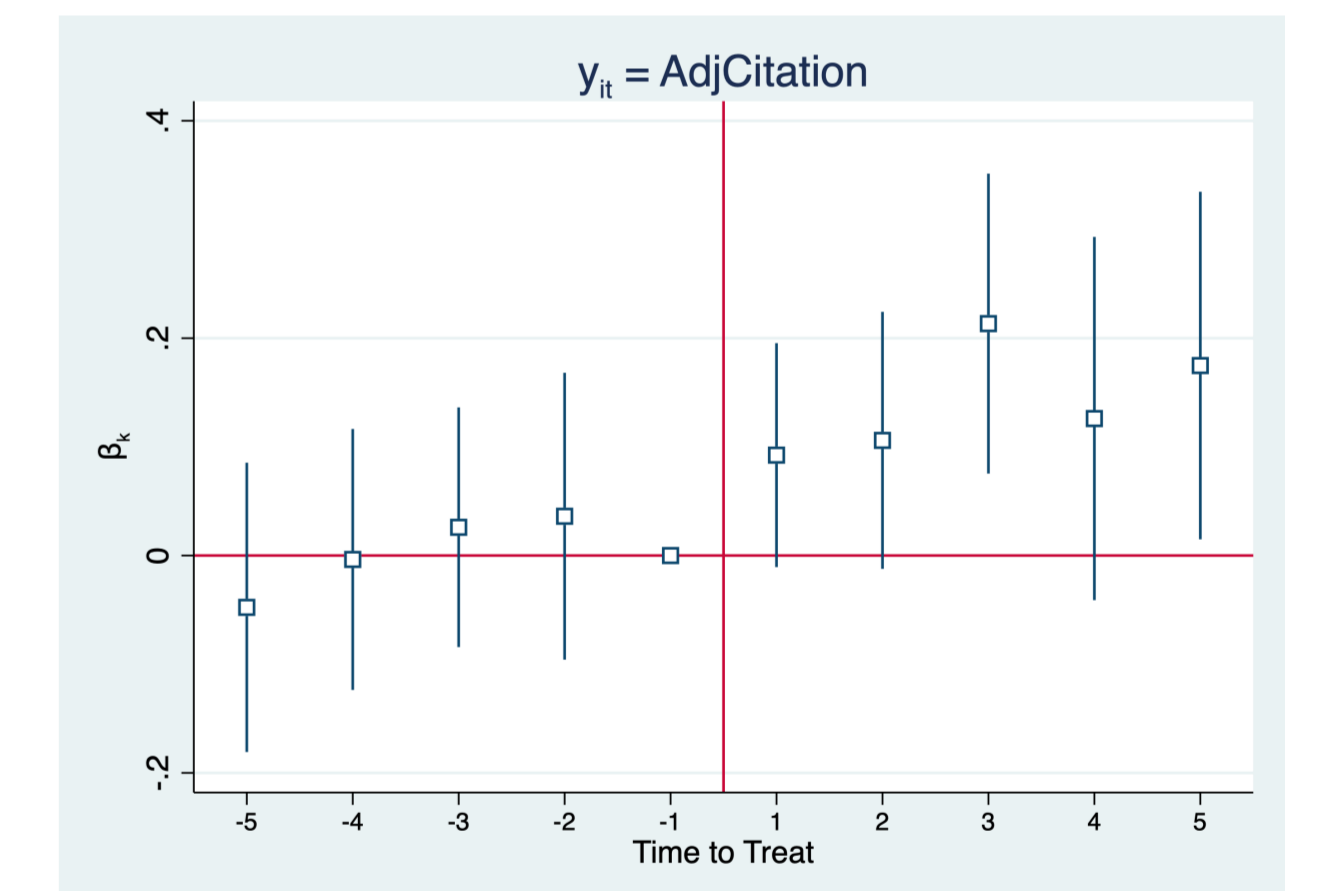
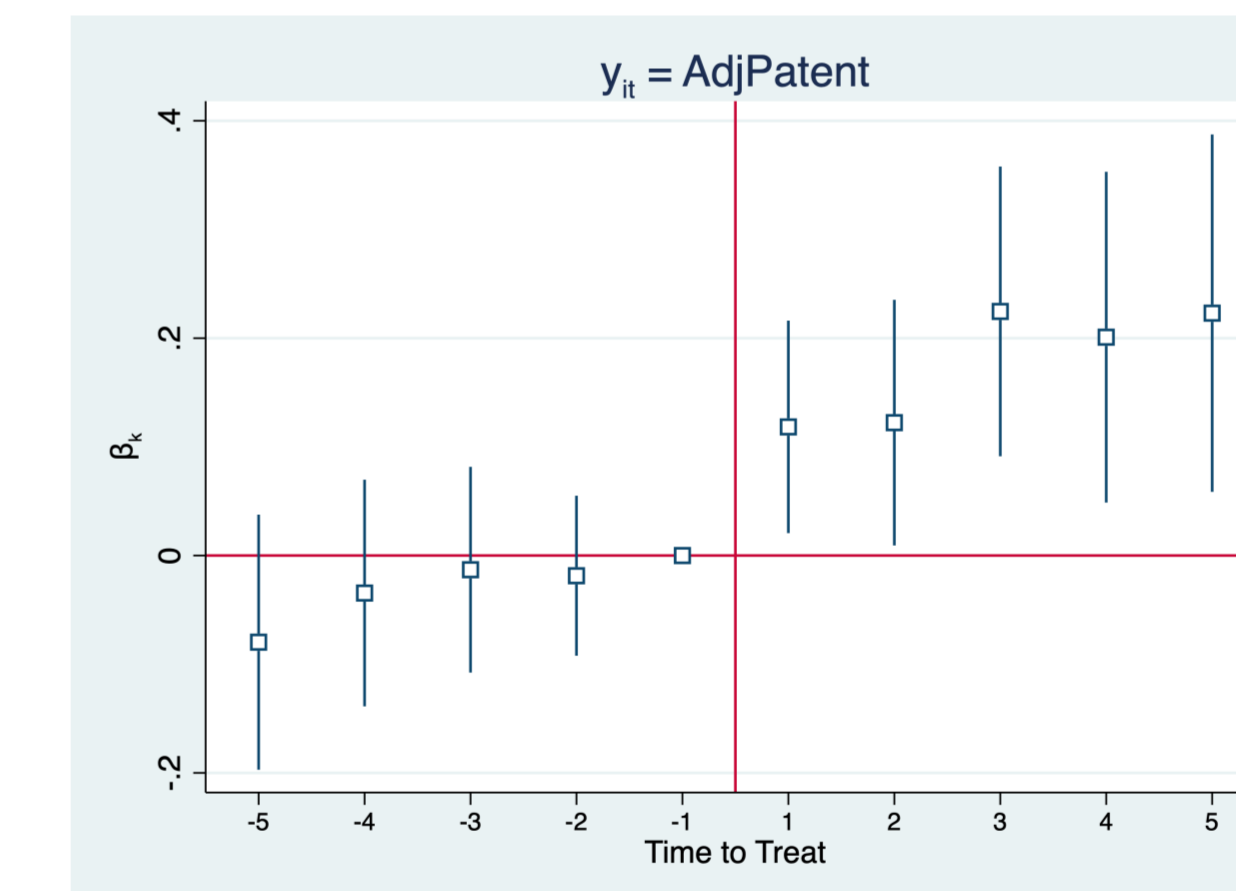
	AdjPatent (1)	AdjCPatent (2)
<i>Post</i>	-0.0051 (0.050)	-0.037 (0.057)
<i>Post × Treat</i>	0.20*** (0.061)	0.15** (0.062)
<i>Pair-Firm FE</i>	Yes	Yes
<i>Year FE</i>	Yes	Yes
<i>N</i>	8372	8366

- Poisson Diff-in-Diff
- Control firms are firms...
 - not involved in the merger
 - do not hire departed inventors but have other external hires
 - chosen from PSM: $\ln(AT)$, $\ln(1+Inventors)$, $\ln(1+AdjPatents)$, $\ln(1+AdjPatents_{5Y})$
- Other Controls: $\ln(SpillSIC)$, $\ln(SpillTec)$, $\ln(R\&D)$, and $\ln(MV)$

Parallel Trend Analysis

- Parallel Trend assumption holds during the pre-merger five-year window between firms hiring departed inventors and the matched firms with other external hires.
- The effect is most significant three years after deal completion
- Dynamic diff-in-diff

$$E[y_{i,t} | \mathbf{x}] = e^{x\beta} = e^{\alpha_t + \alpha_i + \beta_0 + \beta_1 I(Post) + \beta_2 I(Treat) + \beta_3 I(Post) \times I(Treat) + \gamma Controls_{i,t} + \epsilon_{i,t}}$$



Conclusion

- Mergers have an economically important impact on the restructuring and productivity of the labor force.
- The results suggest labor reallocation can plausibly be a source of merger gains that goes *beyond* the scope of merging firms.

References

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- Gehrke, B., Maug, E., Obermberger, S., and Schneider, C. (2021). Post-merger Restructuring of the Labor Force. *IZA Working Paper*, page 92.
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