

# **An Efficiency Perspective on the Gains from Mergers and Asset Purchases**

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Comments Welcome

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## Inferring Efficiency Gains from Acquisitions

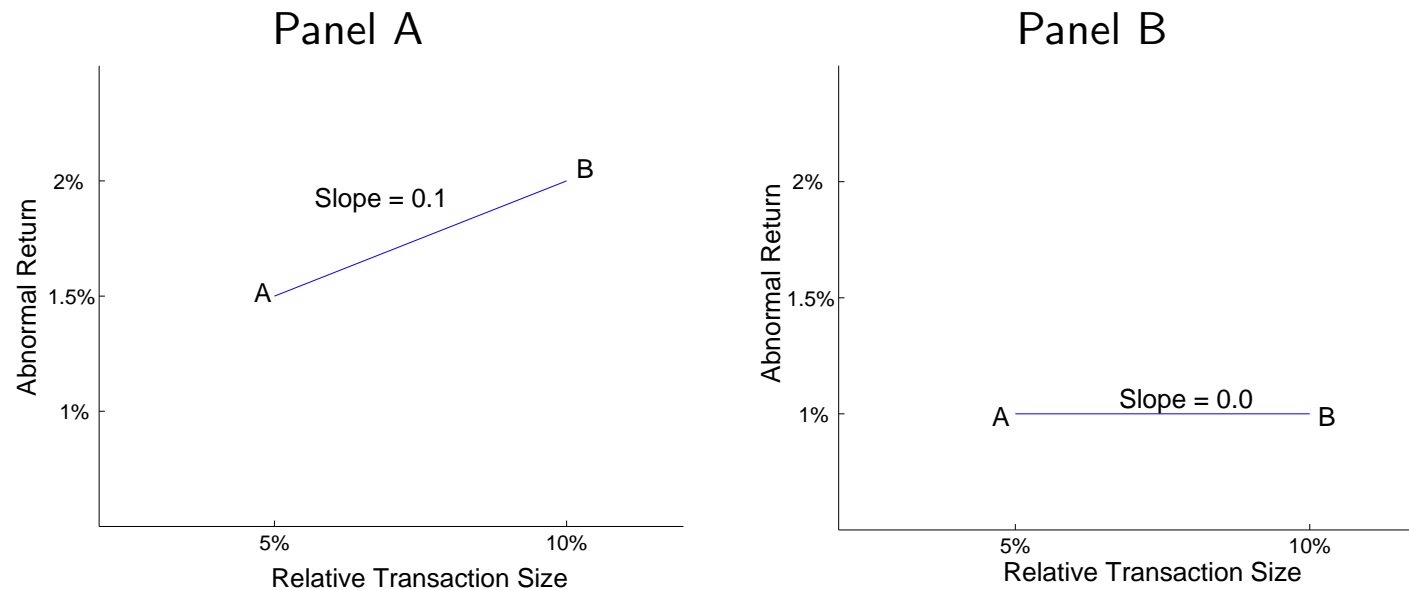
- The literature uses the abnormal return from the announcement of the transaction to evaluate acquisitions.
- It is difficult to infer efficiency gains to acquirers from abnormal return data.
  - Market timing - Shleifer and Vishny (2003).
  - Equal versus value weighting - Moeller et al. (2005)
- We propose a sharper method of identifying efficiency gains using abnormal returns from acquisitions.
- We apply this method to evaluate whether previously documented differences in returns to mergers and asset purchases reflect differences in efficiency gains.

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## Our Insight

- Efficiency gains arise when acquirers generate higher cash flows from the acquired assets than prior to the transaction (See Jovanovic and Rousseau (2002); Yang (2006); and Warusawitharana (2007)).
- The acquirer retains some of the gains from the acquisition.
- If there were efficiency gains in a sample of acquisitions and this is anticipated in the abnormal return then larger transactions would lead to higher abnormal returns.
- A positive coefficient of relative deal value on abnormal returns provides evidence of efficiency gains.

## Graphical Representation



Notes: The figures plot two pairs of acquisitions with relative deal values of 5% and 10%. The deal announcement signals that assets in place are worth 1% more. In Panel A, efficiency gains leads to an increase in the value of the acquired assets by 10%. No such gains arise in Panel B. The slope of the lines measure the efficiency gains.

## A Simple Model

- Two period model in which firms make an acquisition in the first period and earn profits and disband in the second period.
- The firms have profitability  $z^i$  drawn from a distribution  $f(z)$  and initial capital stock  $K_0$ .
- The aggregate supply of targets is given by  $Q(p)$ , where  $p$  equals the per unit price of capital. These targets operate at a lower average productivity than acquirers.
- The assets under management in the second period  $K_1^i$  equals  $K_0 + I^i$ , where  $I^i$  equals the size of the acquisition for the  $i^{\text{th}}$  firm.
- The second period profits in the second period equals  $z^i (K_1^i)^\alpha$ , where  $0 < \alpha < 1$  incorporates decreasing returns to scale.

## Model Solution

The value of the firm is given by the solution to the following:

$$V_1 = \max_I z(K_0 + I)^\alpha - pI.$$

The solution to the above maximization problem yields:

$$I_1 = \left( \frac{\alpha z}{p} \right)^{1/(1-\alpha)} - K_0$$
$$V_1 = \frac{p}{\alpha} [I(1 - \alpha) + K_0].$$

Let  $V_0 = z(K_0)^\alpha$  be the value of the firm prior the acquisition. The increase in the firm value from the acquisition is given by

$$\frac{V_1}{V_0} - 1 = \frac{p(1 - \alpha)}{\alpha} \frac{I}{V_0} + \frac{pK}{\alpha z} - 1.$$

## Empirical Questions

- Are there efficiency gains in acquisitions?
- Do efficiency gains vary with different types of acquisitions?
- Do variations in efficiency gains account for observed differences in mean abnormal returns across types of acquisitions?

## Data

- Broad sample of acquisitions obtained from SDC Platinum database. The sample dates from 1/1/85 to 06/30/06.
- We use SDC to distinguish between mergers - the combination of two firms into one asset purchases - transfer of operating assets from one firm to another.
- Compute abnormal returns using the market model and CRSP data.
- Derive firm characteristics from Compustat and governance index IRRC.



## Value and Size Bins

Panel A: Asset Purchases

Size Bins	Value Bins			Total
	Small	Medium	Large	
Small	-0.38	1.16	3.22	1.90
Medium	0.40	1.23	2.96	1.54
Big	0.17	0.34	1.72	0.50
Total	0.14	0.94	2.86	1.31

Panel B: Mergers

Size Bins	Value Bins			Total
	Small	Medium	Large	
Small	0.31	1.68	2.91	1.92
Medium	0.49	0.59	-0.26	0.29
Big	0.07	-0.25	-1.57	-0.43
Total	0.25	0.77	0.76	0.59

Notes: The tables present the mean abnormal returns by various size and relative deal value bins. The cut-offs for each value equal the 30<sup>th</sup> and 70<sup>th</sup> percentiles. The transactions cluster on the off diagonal.

## Overall Efficiency Gains

Regressors	Coefficient	Standard Error	Coefficient	Standard Error
Relative Value	4.848	(0.722)**		
Relative Size			3.042	(0.475)**
Log Size	-0.260	(0.042)**	-0.294	(0.040)**
Merger	-0.654	(0.190)**	-0.661	(0.191)**
High-Tech	-0.331	(0.196) <sup>+</sup>	-0.347	(0.200) <sup>+</sup>
Stock Dummy	-0.569	(0.274)*	-0.661	(0.278)*
Number of Bidders	-0.253	(0.474)	-0.168	(0.487)
Tender Offer	-0.061	(0.317)	-0.073	(0.328)
Not Friendly Flag	-0.004	(0.585)	0.372	(0.768)
Tobin's Q	-0.393	(0.262)	-0.347	(0.270)
Cashflow	-1.107	(1.466)	-0.358	(1.497)
Leverage	-0.824	(0.707)	-0.987	(0.714)
Industry M&A	-0.719	(1.506)	-0.487	(1.552)
Same Industry	-0.021	(0.153)	0.018	(0.154)
Observations	12896		12862	
Adjusted R-squared	0.018		0.018	

Takeaway: There is evidence of efficiency gains from acquisitions.

## Mergers versus Asset Purchases

Regressors	Merger Dummy	Merger $\times$ Rel. Value	More Interactions
Log Size	-0.260 (0.042)**	-0.239 (0.042)**	-0.228 (0.042)**
Relative Value	4.848 (0.722)**	9.141 (0.953)**	9.311 (0.957)**
Merger	-0.654 (0.190)**	0.332 (0.214)	0.780 (0.239)**
Merger * Rel. Value		-8.844 (1.381)**	-9.056 (1.389)**
Merger * High-Tech			-0.643 (0.368) <sup>+</sup>
Merger * Stock Dummy			-1.553 (0.626)*
Observations	12896	12896	12896
Adjusted R-squared	0.018	0.023	0.024

Takeaway: Asset purchases lead to more efficiency gains than mergers.

## Types of Mergers

Regressors	Interaction with Relative Value Terms for Mergers Only			
	Baseline	Stock Dummy	Public Target	Both Interactions
Log Size	-0.276 (0.076)**	-0.276 (0.076)**	-0.266 (0.076)**	-0.265 (0.076)**
Relative Value	1.046 (1.081)	1.077 (1.120)	8.011 (1.751)**	7.777 (1.625)**
Stock Dummy	-0.800 (0.326)*	-0.787 (0.361)*	-0.632 (0.329) <sup>+</sup>	-0.730 (0.357)*
Stock Dummy * Rel. Value		-0.089 (2.323)		0.732 (2.307)
Public Target	-2.788 (0.499)**	-2.786 (0.511)**	-0.645 (0.502)	-0.655 (0.503)
Public Dummy * Rel. Value			-13.442 (2.062)**	-13.485 (2.106)**
Observations	4516	4516	4516	4516
Adjusted R-squared	0.035	0.034	0.048	0.048

Takeaway: Evidence of efficiency gains in mergers with private targets versus public targets. No impact of stock financing on efficiency gains.

## Impact of Firm Size on Efficiency Gains

Regressors	All Acquisitions	Asset Purchases	Mergers
Log Size	-0.085 (0.047) <sup>+</sup>	-0.094 (0.057) <sup>+</sup>	0.026 (0.091)
Relative Value	14.806 (2.031)**	10.426 (2.678)**	14.327 (3.287)**
Log Size * Rel. Value	-1.897 (0.321)**	-0.085 (0.492)	-2.349 (0.468)**
High-Tech	-0.363 (0.195) <sup>+</sup>	-0.126 (0.251)	-0.642 (0.310)*
Stock Dummy	-0.567 (0.274)*	0.720 (0.570)	-0.779 (0.325)*
Observations	12896	8380	4516
Adjusted R-squared	0.021	0.025	0.042

Takeaway: Efficiency gains decrease with firm size for mergers but not asset purchases.

## Abnormal Return and Governance Index

Regressors	Asset Purchases		Mergers	
	Baseline	With Controls	Baseline	With Controls
Log Size	-0.079 (0.082)	-0.123 (0.085)	-0.251 (0.101)*	-0.127 (0.124)
Relative Value	7.974 (2.093)**	7.485 (2.106)**	-5.728 (1.261)**	-4.928 (1.377)**
Governance Index	-0.083 (0.041)*	-0.089 (0.041)*	0.023 (0.054)	0.020 (0.055)
High-Tech	0.087 (0.291)	0.192 (0.332)	-1.000 (0.337)**	-0.853 (0.364)*
Stock Dummy	0.300	0.391	-1.112	-0.913
Observations	2512	2512	1608	1608
Adjusted R-squared	0.016	0.020	0.040	0.050

Takeaway: Corporate governance affects acquirer returns for asset purchases but not mergers.

## Governance, Returns and Efficiency Gains

Regressors	All Acquisitions		Split by Type	
	Baseline	Interaction	Asset Purchases	Mergers
Log Size	-0.163 (0.070)*	-0.158 (0.070)*	-0.120 (0.085)	-0.119 (0.124)
Relative Value	0.248 (1.186)	5.963 (3.839)	20.493 (8.028)*	-1.179 (3.905)
Governance Index	-0.047 (0.033)	-0.001 (0.036)	-0.014 (0.048)	0.064 (0.065)
G-Index * Rel. Value		-0.607 (0.374)	-1.401 (0.788) <sup>+</sup>	-0.396 (0.387)
Observations	4120	4120	2512	1608
Adjusted R-squared	0.027	0.028	0.023	0.050

Takeaway: Governance affects returns to asset purchases through differences in efficiency gains.

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## Robustness of our Results

- We examine the robustness of our results to different computations of abnormal returns.
- We obtain similar findings, albeit with smaller coefficients, when we scale transaction size with market value of equity than the market value of the firm.
- Our results are broadly robust to using different treatments of the relative value outliers in the sample.
- We find similar results for the comparison between mergers and asset purchases after eliminating all transactions with private targets.



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## Conclusions

- The study proposes using the sensitivity of abnormal returns to transaction size as a method of identifying efficiency gains.
- Using this method we find significant variation in anticipated efficiency gains across different types of acquisitions:
  - Mergers versus asset purchases
  - Mergers with private versus public targets
  - Acquisitions by small and large firms
  - Acquisitions by firms with strong and weak governance.
- Variation in efficiency gains accounts for most of the differences in mean abnormal returns between these acquisitions.