

Online Appendix

to

Target Revaluation after Failed Takeover Attempts –
Cash versus Stock

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Appendix B. Long-run returns with forward-looking sample selection

In this section, we explore what one can learn from the analysis of long-run abnormal returns *conditional* on future takeover activities, i.e., when firms are sorted into groups based on takeover bids they receive in the future. In particular, we ask whether conditioning on not receiving any future takeover bid helps to better identify the effect of the (initial) failed bid on the target’s stand-alone value. Such conditional long-run analysis mirrors the approach in the seminal paper by Bradley, Desai, and Kim (1983), who analyze targets of failed bids that do not receive a takeover offer in the five years after deal failure.²⁸

First, we consider the biases involved in conditioning on the absence of future bids. Long-run returns in such a sample capture the joint effect of the failed takeover attempt and of the absence of future bids. As a result, the long-run returns (starting from before the announcement of the failed bid) are downward-biased estimates of the effect of the failed bid on the target’s stand-alone value. This is because the ex-ante market price incorporates that the firm will be taken over with positive probability at some point over the next years, but the sample construction implies zero – i.e., abnormally low – successful takeover activity. This is the relevant bias affecting the analysis of Bradley, Desai, and Kim (1983).

Note that the nature of the bias depends on the goal of the conditional analysis. For example, if the objective was to estimate the effect of the permanent disappearance of a takeover bid – i.e., to estimate the loss of target value as the takeover probability goes from almost 100% to 0% – then identifying a sample in which future takeover activity is eliminated (to 0%) as in Bradley, Desai, and Kim (1983) is warranted.²⁹ However, such an analysis of long-run returns starting from the post-announcement target value would be affected by a different bias, with the opposite sign, because the post-announcement target value reflects that the probability of success is strictly less than 100%. This is because a rational market will anticipate the possibility of deal failure (over 11% of all deals fail, cf. Panel A of Table 1). As a result, long-run returns conditional on the absence of a future takeover reflect a decrease in takeover probability of less than 100%, implying that these long-run returns are an upward-biased measure of the “permanent” disappearance of the bid.

Returning to the objective of our analysis, i.e., to measure the effect of a failed bid on target valuation, the approximate magnitude of the bias is easy to gauge. As we show in the empirical analysis in the main paper, 20% of matched control firms are taken over within 5 years. Assuming an average takeover premium of 46.2% (cf. Panel A of Table 1), conditioning on the absence of any future bid over the next five years, produces a bias of roughly $46.2\% \cdot 0.2 \approx 9\%$. This ballpark estimate overstates the bias somewhat since it ignores discounting. In what follows, we propose two approaches to assess the

²⁸ The content of this section heavily benefited from comments by an anonymous referee.

²⁹ Here, absence of a takeover attempt over a five-year horizon proxies for the permanent absence of future bids.

magnitude of the bias more precisely, including the effect of discounting.

Theoretical calculation of bias in constant-growth-model. First, we employ a constant-growth model of stand-alone cash flows with a growth-adjusted discount rate of \bar{r} . The (admittedly strong) assumptions of constant growth and an all-equity firm allow us to obtain intuitive expressions. Let λ denote the (exponential) arrival rate of takeover attempts and π the takeover premium paid over the prevailing market price. Then, the unconditional stock-market value of a firm, V_U , is:

$$V_U = \frac{1}{\bar{r} - \lambda\pi}. \quad (\text{B.1})$$

Here, the expected yearly premium $\lambda\pi$ accounts for growth due to future takeover activity. The value of a firm conditional on not being taken over for T years is:

$$V(T) = (1 - e^{-\bar{r}T}) \frac{1}{\bar{r}} + e^{-\bar{r}T} \frac{1}{\bar{r} - \lambda\pi}. \quad (\text{B.2})$$

Intuitively, this conditional value is a weighted average of the stand-alone value, $\frac{1}{\bar{r}}$, and the unconditional value, V_U . The larger T the greater the weight on the stand-alone value. Combining the two equations, the look-ahead bias of conditioning on the absence of takeover activity for T years, $\Delta = \frac{V(T) - V_U}{V_U}$, is given by:

$$\Delta = -\frac{\lambda\pi}{\bar{r}} (1 - e^{-\bar{r}T}) < 0. \quad (\text{B.3})$$

To obtain an estimate for the magnitude of the bias if one conditions on the absence of takeover activity for $T = 5$ years, we choose $\lambda = 4.1\%$ per year. This is the empirical estimate for matched control firms, i.e., firms that look like actual targets just before the latter receive a (failed) takeover attempt. We choose $\pi = 46.2\%$ and set $\bar{r} = 6\%$. The resulting bias is -8.2% of firm value, an economically significant look-ahead bias, and similar in magnitude to the ballpark estimate above. We note that the bias is fairly insensitive to the choice of the growth-adjusted discount rate. For $\bar{r} = 4\%$, we obtain an bias of -8.6% , whereas $\bar{r} = 8\%$ produces a bias of -7.8% . Subtracting the (negative) bias allows us, under the modeling assumptions, to retrieve the unbiased estimate.

We note that our actual sample construction in the main paper also implies a small conditioning bias. We require that there be no announcement of another bid by the time of failure. Hence, our sample is restricted to firms that are not taken over for, on average, 60 trading days (the average time from announcement to failure, see Panel B of Table 1). For the conditioning horizon of $T = 60/250$ years, the estimated bias is -0.45% . Hence, this bias is orders of magnitude smaller. Most importantly, this bias should apply equally to cash and stock targets and should, thus, not affect our differential results. We note that restricting ourselves to deals failing in a short amount of time (less than 250 trading days) limits the magnitude of the bias.

Empirical estimation. In order to estimate the bias empirically, without relying on functional-form assumptions, we consider two subsamples of firms. Subsample 1 consists of firms receiving a takeover bid that ultimately fails, and that do not receive a bid in the subsequent five years. Subsample 2 consists of matched control firms that do not receive a bid over the same period. The estimates for the second subsample capture the empirical bias inherent in estimating long-run returns for the first subsample. Subtracting the bias from the estimated returns in Subsample 1, we would obtain the unbiased estimate of the (stand-alone) value implications of a takeover bid.

While this approach is conceptually superior to employing the constant-growth model in that it does not rely on functional form assumptions, it is hard to implement in practice. The “ballpark” estimate of an 8% bias over five years suggests that we would need to statistically detect abnormal returns of -1.6% p.a., which is implausible given stock-market noise. For completeness we implement the approach empirically nevertheless.

For each failed bid in the large sample between January 1980 and December 2003, we determine whether the respective target and its control firm are not taken over within five years. (The sample of failed bids ends in December 2003 due to the forward-looking selection criterion.) For example, Oneida Limited received a takeover bid from Libbey, which failed in July 1999. Since Oneida did not receive a subsequent successful takeover bid until June 2004, it would be considered “not taken over.” To calculate the performance of targets that have not been taken over, we rely on the calendar-time-portfolio methods (see Appendix A.2), now applied to this subset of targets. Thus, continuing with our example from above, Oneida is included in the 60-month portfolio between August 1999 and December 2003, its last month as a listed company.

We obtain the following results for abnormal returns:

1. Long-run returns for **actual** targets post failure conditional on not being taken over for 5 years. All alpha estimates are insignificant.
 - (a) Cash targets: 0.14% p.a.
 - (b) Stock targets: 0.69% p.a.
2. Long-run returns for **matched control** firms conditional on not being taken over for 5 years. All alpha estimates insignificant.
 - (a) Matched firms of cash targets: -1.87% p.a.
 - (b) Matched firms of stock targets: 2.8% p.a.
 - (c) All matched firms (cash + stock + hybrid): -0.57% p.a.

Hence, the analysis of the post-failure returns does not reject the hypothesis that these portfolios have normal returns. We also see that the return estimates are rather noisy. For example, the 95% confidence interval for the yearly alpha of the matched control firms ranges from -6.67% to 5.54% . We can neither reject the hypothesis that the bias estimate of -0.57% p.a. is equal to the conceptual bias of -1.6% per year, nor that it is zero. In short, while the sample-selection bias (over 5 years) can be economically meaningful, i.e., around 8% of the equity value, the noise in long-run-returns analyses is orders of magnitude larger.

Table B.1. Summary Statistics – Successful Bids

The sample consists of all unsuccessful pure-cash and pure-stock bids from the *main sample*, as described in Section 2. Time to completion is in trading days. Dollar values are based on historical transaction values, converted to 2010 \$bn using Consumer Price Index (CPI) Conversion Factors. Target size is the target's market value of equity in 2010 \$bn. Relative deal size is the transaction value over the acquirer's market value of equity. Offer premium is normalized by the target's market capitalization at one month prior to the announcement of the bid, and truncated between 0 and 2. Hostile and Tender offer are dummy variables indicating hostile bids and tender offers, respectively. The q ratio is the market value of equity plus assets minus the book value of equity all over assets. Experienced acquirers (dummy variable) have attempted (successfully or not) at least ten acquisitions in the five years up to the year of the takeover bid in question. All non-deal-related variables are measured at the end of the year prior to the deal's announcement, and all q variables are winsorized at the 1st and 99th percentiles. The p-values in the last column are for a two-sided difference-in-means test.

Variable	Cash Bids					Stock Bids					p-value
	Mean	Median	Std. dev.	Min	Max	Mean	Median	Std. dev.	Min	Max	
Time to completion	55.72	46.00	34.62	7	230	84.29	74.00	38.67	25	239	0.000
Transaction value in 2010 \$bn	0.72	0.22	1.52	0.00	17.40	1.65	0.25	5.80	0.00	70.51	0.000
Target size in 2010 \$bn	0.48	0.14	1.04	0.00	11.40	1.10	0.17	4.20	0.00	65.16	0.000
Relative deal size	0.70	0.08	6.03	0.00	137.03	0.60	0.24	3.25	0.00	79.38	0.709
Offer premium in %	47.41	40.50	35.71	0	200	48.46	38.75	42.88	0	200	0.634
Hostile	0.02	0.00	0.15	0	1	0.01	0.00	0.08	0	1	0.019
Tender offer	0.49	0.00	0.50	0	1	0.03	0.00	0.17	0	1	0.000
q of acquirer	2.15	1.63	1.76	0.51	15.20	3.38	2.14	3.27	0.51	15.20	0.000
q of target	1.88	1.44	1.42	0.50	9.91	2.63	1.73	2.29	0.50	9.91	0.000
q of acquirer > q of target	0.60	1.00	0.49	0	1	0.65	1.00	0.48	0	1	0.128
Experienced acquirer	0.25	0.00	0.43	0	1	0.20	0.00	0.40	0	1	0.045
% of target sought	98.39	100.00	6.87	50.20	100	99.05	100.00	5.65	52.00	100	0.064
N	639					629					

Table B.2. Determinants of Cash Offers

OLS regressions with the medium of exchange as the dependent variable. The sample Main consists of all unsuccessful bids in the *main sample* as defined in Section 2, the sample Main, Pure of all unsuccessful pure-cash and pure-stock bids from the *main sample*. Cash is expressed as a fraction of the total payment (and hence equal to a dummy for cash in the sample of pure deals in the last three columns). Target size is the target's market value of equity in 2010 \$bn. Relative deal size is the transaction value over the acquirer's market value of equity. Offer premium is normalized by the target's market capitalization at one month prior to the announcement of the bid, and truncated between 0 and 2. We include indicator variables for whether the bid was hostile or a tender offer. Experienced acquirers (dummy variable) have attempted (successfully or not) at least ten acquisitions in the five years up to the year of the takeover bid in question. All non-deal-related variables are measured at the end of the year prior to the unsuccessful deal's announcement, and all q variables are winsorized at the 1st and 99th percentiles. Industry fixed effects are based on one-digit SIC codes. Robust standard errors are in parentheses. */**/** denote significance at the 10%/5%/1% level, respectively.

	Cash $\in [0, 1]$			Cash $\in \{0, 1\}$		
Log(target size)		0.005 (0.01)	-0.006 (0.01)		0.009 (0.01)	-0.009 (0.01)
Log(rel. deal size)	-0.056*** (0.01)	-0.065*** (0.01)	-0.051*** (0.01)	-0.070*** (0.01)	-0.079*** (0.01)	-0.061*** (0.01)
Offer premium			0.009 (0.02)			-0.025 (0.03)
Hostile			0.141** (0.06)			0.183** (0.07)
Tender offer			0.474*** (0.02)			0.529*** (0.02)
q of acquirer		-0.030*** (0.00)	-0.022*** (0.00)		-0.030*** (0.00)	-0.022*** (0.00)
q of target		-0.033*** (0.01)	-0.022*** (0.00)		-0.039*** (0.01)	-0.024*** (0.01)
Exp. acquirer	0.000 (0.02)	-0.015 (0.02)	-0.006 (0.02)	-0.018 (0.03)	-0.036 (0.03)	-0.019 (0.03)
% of target sought	-0.005*** (0.00)	-0.004*** (0.00)	-0.004** (0.00)	-0.005*** (0.00)	-0.005** (0.00)	-0.005** (0.00)
Industry & year FE	Y	Y	Y	Y	Y	Y
Sample	Main	Main	Main	Main, Pure	Main, Pure	Main, Pure
	2,082	2,082	2,082	1,451	1,451	1,451

Table B.3. Cash vs. Stock Revaluation Differences in a Controlled Regression Framework – Large Sample

OLS regressions with target CAR from 25 days before announcement to 25 days after deal failure as the dependent variable. The sample Large consists of all unsuccessful bids, including those by non-public acquirers, in the *large sample* as defined in Section 2; the sample Large, Pure of all unsuccessful pure-cash and pure-stock bids, including those by non-public acquirers, from the *large sample*. Cash is expressed as a fraction of the total payment (and hence equal to a dummy for cash in the sample of pure deals in the last two columns). Target size is the target’s market value of equity in 2010 \$bn. Offer premium is normalized by the target’s market capitalization at one month prior to the announcement of the bid, and truncated between 0 and 2. We include indicator variables for whether the bid was hostile or a tender offer. All non-deal-related variables are measured at the end of the year prior to the unsuccessful deal’s announcement, and all q variables are winsorized at the 1st and 99th percentiles. Industry fixed effects are based on one-digit SIC codes. A constant term is always included in the absence of fixed effects. Robust standard errors are in parentheses. */**/** denote significance at the 10%/5%/1% level, respectively.

		Target CAR (B-25, F+25)		
Cash	0.108** (0.04)	0.077* (0.04)	0.144*** (0.05)	0.114** (0.05)
Log(target size)		-0.030** (0.01)		-0.037** (0.01)
Offer premium		0.299*** (0.06)		0.306*** (0.07)
Hostile		0.123*** (0.04)		0.121*** (0.04)
Tender offer		0.146*** (0.05)		0.188*** (0.06)
q of target		-0.010 (0.02)		0.013 (0.02)
Industry & year FE	N	Y	N	Y
Sample	Large	Large	Large, Pure	Large, Pure
N	675	675	518	518

Table B.4. Returning Bidders – Summary

This table summarizes facts about returning bidders after initial failed bids for the same target (but before the end of the data set in 2008). We consider the *main sample* in the first two columns, and extend to the *large sample*, including bids by non-public acquirers, in the last two columns. Time to next bid is in calendar days.

	Main sample		Large sample	
Number of observations	236		675	
Received subsequent bid	134		409	
	Successful	Failed	Successful	Failed
	101	33	262	147
Subsequent bids by returning bidders	15	4	40	28
Average time to next bid by returning bidder	539.7	604.5	581.7	688.1

Table B.5. Value of Future Takeover Bid – Pure Deals

OLS regressions of the value of next takeover bid (log in 2010 \$bn) following a failed takeover bid for the same target as the dependent variable. The sample Main*, Pure consists of all unsuccessful pure-cash and pure-stock bids from the *main sample* (as defined in Section 2) that were followed by a successful takeover bid for the same target, conditional on the availability of the dollar value of the next offer. The sample Large*, Pure also includes non-public acquirers. Cash is equal to a dummy indicating 100% cash, rather than 100% stock, as the method of payment. Previous (contemporaneous) target size is the target’s market value of equity in 2010 \$bn one month prior to the previous unsuccessful (next) bid’s announcement. Offer premium is normalized by the target’s market capitalization at one month prior to the announcement of the bid, and truncated between 0 and 2. We include an indicator variable for whether the bid was hostile and for tender offers, and control for the years passed between the two deal announcements under consideration (Years between). The target’s q ratio is measured at the end of the year prior to the unsuccessful deal’s announcement, and is winsorized at the 1st and 99th percentiles. Industry fixed effects are based on one-digit SIC codes. Robust standard errors are in parentheses. */**/** denote significance at the 10%/5%/1% level, respectively.

	Log(next offer value)					
Cash $\in [0, 1]$	0.077 (0.27)	0.134 (0.15)	-0.039 (0.10)	-0.041 (0.06)	-0.019 (0.08)	-0.028 (0.05)
Log(prev. target size)	1.059*** (0.10)	0.929*** (0.05)			0.197*** (0.04)	0.111*** (0.03)
Log(cont. target size)			0.968*** (0.03)	0.977*** (0.02)	0.842*** (0.04)	0.890*** (0.03)
Offer premium	0.869** (0.35)	0.734*** (0.19)	0.271** (0.12)	-0.000 (0.07)	0.388*** (0.10)	0.094 (0.08)
Hostile	-0.874 (0.57)	0.378** (0.18)	0.109 (0.15)	0.071 (0.06)	-0.154 (0.12)	0.076 (0.05)
Tender offer	0.018 (0.32)	0.073 (0.19)	-0.096 (0.12)	0.036 (0.07)	-0.058 (0.08)	0.039 (0.06)
q of target	-0.240* (0.12)	-0.041 (0.07)	-0.009 (0.04)	-0.021 (0.02)	-0.069 (0.04)	-0.035* (0.02)
Years between	0.060* (0.03)	0.033* (0.02)	-0.017 (0.01)	-0.000 (0.01)	-0.007 (0.01)	0.000 (0.01)
Industry & year FE	Y	Y	Y	Y	Y	Y
Sample	Main*, Pure	Large*, Pure	Main*, Pure	Large*, Pure	Main*, Pure	Large*, Pure
N	73	185	73	185	73	185
R^2	0.867	0.852	0.984	0.981	0.988	0.983
Adjusted R^2	0.749	0.816	0.969	0.977	0.976	0.979