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Firm size and the gains from acquisitions ☆

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Abstract

We examine a sample of 12,023 acquisitions by public firms from 1980 to 2001. The equally weighted abnormal announcement return is 1.1%, but acquiring-firm shareholders lose $25.2 million on average upon announcement. This disparity suggests the existence of a size effect in acquisition announcement returns. The announcement return for acquiring-firm shareholders is roughly two percentage points higher for small acquirers irrespective of the form of financing and whether the acquired firm is public or private. The size effect is robust to firm and deal characteristics, and it is not reversed over time.

JEL classification: G31; G32; G34

Keywords: Acquisitions; Bidder; Size effect; Organizational form

1. Introduction

In this paper, we examine the gains to shareholders of firms that announce acquisitions of public firms, private firms, or subsidiaries of other firms. We consider these different types of acquisitions together since corporations making such

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acquisitions could be acquiring similar assets.[1] Typically, acquisitions are sizable investments for the firms that undertake them. We form a sample of all such purchases over $1 million by public firms from 1980 to 2001 recorded by the Securities Data Corporation. After imposing some additional sampling criteria, we obtain a sample of 12,023 acquisitions. Such a comprehensive sample has not been studied before. The equally-weighted average announcement return for acquiring-firm shareholders in our sample is 1.1%, representing a gain of $5.61 per $100 spent on acquisitions. If the capital markets' assessment is unbiased, this gain represents the economic benefit of the acquisition for the shareholders of the acquiring firm together with the stock-price impact of other information released or inferred by investors when firms make acquisition announcements.

The equally-weighted average announcement return implies that the wealth of acquiring-firm shareholders increases when acquisitions are announced. Strikingly, however, the average dollar change in the wealth of acquiring-firm shareholders when acquisition announcements are made is negative. From 1980 to 2001, the sample firms spent roughly $3.4 trillion on acquisitions and the wealth of the shareholders of these firms fell by $303 billion dollars (in 2001 dollars), for a dollar abnormal return, defined in Malatesta (1983) as the abnormal return times the firm's equity capitalization cumulated over the event window, of −$25.2 million per acquisition. The dollar abnormal return can differ in sign from the percentage abnormal return if the percentage abnormal return differs in sign for large and small firms. This is the case here. We define small firms in a given year to be firms whose capitalization falls below the 25th percentile of NYSE firms that year. Acquisitions by small firms are profitable for their shareholders, but these firms make small acquisitions with small dollar gains. Large firms make large acquisitions that result in large dollar losses. Acquisitions thus result in losses for shareholders in the aggregate because the losses incurred by large firms are much larger than the gains realized by small firms. Roughly, shareholders from small firms earn $9 billion from the acquisitions made during the period 1980-2001, whereas the shareholders from large firms lose $312 billion. Though it is common to focus on equally-weighted returns in event studies, it follows from these numbers that value-weighted returns lead to a different assessment of the profitability of acquisitions. The value-weighted return is −1.18%.

After documenting that small firms are good acquirers and large firms are not, we examine possible explanations for this size effect, defined as the difference between the abnormal returns of small acquirers and large acquirers. First, roughly one quarter of the firms acquiring public firms are small whereas half of the firms acquiring private firms are small. If acquiring private firms is more profitable than acquiring public firms, this could explain the size effect. Fuller et al. (2002) show for

[1] Kaplan and Weisbach (1992) have a sample of 282 large acquisitions. They find that almost 44% of the acquisitions are subsequently divested. 216 of their acquisitions are acquisitions of public companies. The acquired assets are then spun off in some cases and acquired by other companies in most cases. Hence, in their sample, the same assets most likely are first organized as a public firm and then as a division. In this paper, we use the term subsidiary acquisition to denote the acquisition of a subsidiary, division, or branch.

a sample of firms that make five or more acquisitions in the 1990s that abnormal returns are higher for firms acquiring private firms or subsidiaries than for firms acquiring public firms. Second, small firms are more likely to pay for acquisitions with cash than with equity. Travlos (1987) and others show that acquisitions of public firms paid for with equity are accompanied by lower announcement returns. However, Chang (1998) and Fuller et al. (2002) show that acquisitions of private firms paid for with equity do not have lower announcement returns than private acquisitions paid for with cash. Third, small and large acquirers have different characteristics. The literature has shown that a number of acquiring-firm and deal characteristics are related to announcement returns for public-firm acquisitions. For instance, Lang et al. (1991) and Servaes (1991) show that high q bidders have higher announcement abnormal returns for tender offer acquisitions and public-firm acquisitions, respectively, and Maloney et al. (1993) find that bidders with higher leverage have higher abnormal returns. We find that controlling for a wide variety of acquiring-firm and deal characteristics does not alter the size effect. In all of our regressions, the estimate of the size effect is positive and significantly different from zero at the 1% probability level.

A number of explanations have been offered for why the stock price of firms announcing an acquisition can be negative. Roll (1986) hypothesizes that managers of bidding firms may suffer from hubris, so they overpay. Travlos (1987) points out that firms with poor returns generally pay with equity, and Myers and Majluf (1984) show that firms that issue equity signal that the market overvalues their assets in place (the equity signaling hypothesis). A related hypothesis, formalized by McCardle and Viswanathan (1994) and Jovanovic and Braguinsky (2002), is that firms make acquisitions when they have exhausted their internal growth opportunities (the growth opportunities signaling hypothesis). Jensen (1986) argues that empire-building managements would rather make acquisitions than increase payouts to shareholders (the free cash flow hypothesis). Recently, Dong et al. (2002) show that firms with higher valuations have worse announcement returns. This could be because highly valued acquirers communicate to the market that these high valuations are not warranted by fundamentals, perhaps because they are undertaking efforts to acquire less overvalued assets with more overvalued equity (the overvaluation hypothesis).[2] Finally, Mitchell et al. (2004) show that there is a price pressure effect on the stock price of the bidder for acquisitions paid for with equity because of the activities of arbitrageurs (the arbitrageur hypothesis).

For these hypotheses to explain the size effect for some or all types of acquisitions, they have to be more pertinent for large firms than for small firms. This is not implausible. Generally, the incentives of managers in small firms are better aligned with those of shareholders than is the case in large firms. In particular, Demsetz and Lehn (1985) find that managers in small firms typically have more firm ownership than managers in large firms. Managers of large firms might be more prone to hubris, perhaps because they are more important socially, have succeeded in growing

[2] Shleifer and Vishny (2003) provide a model in which overvalued firms find it advantageous to acquire less overvalued firms to lock in real assets, but they make no predictions about abnormal returns.

the firm, or simply face fewer obstacles in making acquisitions because their firm has more resources. A firm may be large because its equity is highly valued, so a large firm is more likely to be overvalued. A firm that is further along in its lifecycle might be more likely to be large and to have exhausted its growth opportunities. Agency costs of free cash flow occur when a firm no longer has growth opportunities, which could be more likely for large firms than for small firms. Finally, arbitrageurs are unlikely to use their resources for a merger when the acquirer is a small firm because it will be too difficult and costly to establish large short positions.

We investigate whether these hypotheses are helpful in understanding the size effect. We provide evidence that managers of large firms pay more for acquisitions. The premium paid increases with firm size after controlling for firm and deal characteristics. Large firms are also more likely to complete an offer. This is consistent with hubris being more of a problem for large firms. We find that the combined dollar return of the acquired and acquiring firms for acquisitions of public firms is positive and significant for small firms but significantly negative for large firms. In other words, there are no dollar synergy gains for acquisitions by large firms given how synergy gains are typically computed (following the method proposed by Bradley et al. 1988), but there are dollar synergy gains for acquisitions by small firms. Percentage synergy returns are positive for acquisitions by large firms as well as by small firms, but they are significantly higher for acquisitions by small firms. Of course, the synergy gain estimate for acquisitions by large firms could be made negative by the adverse information revealed about the acquirer through the acquisition announcement rather than by the adverse impact on shareholder wealth of the acquisition itself, although it is not clear why large acquirers reveal relatively more adverse information than do small acquirers.

We also provide evidence that is inconsistent with the overvaluation hypothesis. In contrast to the market value of a firm's equity, the book value of a firm's assets is unlikely to be correlated with the overvaluation of the firm's stock price. Consequently, if the size effect is due to the fact that large firms tend to be overvalued, it should disappear when we use the book value of the firm's assets as a size measure. Nonetheless, we find that the size effect holds when we use the book value of a firm's assets instead of the firm's market value of equity. Though the outcome of the acquisitions by large firms is consistent with the existence of agency costs of managerial discretion, there is little support for the free cash flow hypothesis. Finally, we investigate the hypothesis that the market makes systematic mistakes in evaluating acquisitions that it rectifies over time. In this case, acquisitions by small firms would be followed by negative abnormal returns and acquisitions by large firms would be followed by positive abnormal returns. This explanation cannot account for the size effect. The market seems fairly efficient in incorporating the information conveyed by acquisition announcements in the stock price.

The paper is organized as follows. In Section 2 we describe our sample and document that abnormal returns for acquisition announcements are significantly positive and negatively correlated with firm size. In Section 3, we demonstrate that the size effect is robust to firm and deal characteristics. In Section 4, we investigate possible explanations for the size effect. We conclude in Section 5.

2. Announcement returns for successful acquisitions

To estimate the shareholder gains from acquisitions, we consider acquisition announcements that are successful and result in a completed transaction. In Sections 3 and 4, we include unsuccessful acquisition announcements to investigate whether this focus introduces a bias in our analysis and find that it does not. We first describe our sample and then estimate the gains to shareholders.

2.1. The sample

The sample of acquisitions comes from the Securities Data Company's (SDC) U.S. Mergers and Acquisitions Database. We select domestic mergers and acquisitions with announcement dates between 1980 and 2001. We consider only acquisitions in which acquiring firms end up with all the shares of the acquired firm or subsidiary, and we require the acquiring firm to control less than 50% of the shares of the target firm before the announcement. We further require that (1) the transaction is completed, (2) the deal value is greater than $1 million, (3) a public or private U.S. firm or a non-public subsidiary of a public or private firm are acquired, and (4) the acquirer is a public firm listed on the Center for Research in Security Prices (CRSP) and Compustat during the event window. Deal value is defined by SDC as the total value of consideration paid by the acquirer, excluding fees and expenses. After collecting these acquisitions, we eliminate those in which the deal value relative to the market value of the acquirer is less than 1%. The market value of the acquirer is defined as the sum of the market value of equity, long-term debt, debt in current liabilities, and the liquidating value of preferred stock. We also require that the number of days between the announcement and completion dates is between zero and one thousand.

Our requirements yield a sample of 12,023 successful offers. Slightly more than half of the acquisitions are by large firms, which we define as those with a market capitalization above the 25th percentile of NYSE firms in the year in which the acquisition is announced. Table 1 shows the number of acquisitions by year. The number of acquisitions does not increase monotonically through time: it falls in 1990 and in recent years. The number of acquisitions in the 1990s is dramatically larger than in the 1980s. In our tests, we will often use time dummies to take into account these changes. Interestingly, though there are normally fewer acquisitions by small firms than by large firms, this is not the case for most of the 1990s.

2.2. The gains to acquiring-firm shareholders

The most traditional way to evaluate bidder returns is to estimate abnormal percentage returns with standard event study methods (following Brown and Warner, 1985). We estimate these abnormal returns over the three-day event window $(-1, +1)$ using market model benchmark returns with the CRSP equally-weighted index returns. The parameters for the market model are estimated over the $(-205, -6)$ interval, and the p-values are estimated using the time-series and cross-sectional

Table 1
Sample distribution by announcement year and acquirer size
The sample contains all completed U.S. mergers and acquisitions between 1980 and 2001 listed on SDC where the publicly traded acquiring firm gains control of a public, private, or subsidiary target whose transaction value is at least $1 million and 1% of the acquirer's market value. Small (large) acquirers have a market capitalization equal to or less (greater) than the market capitalization of the 25th percentile of NYSE firms in the same year.

Announcement	Acquirer size		
year	Large	Small	All
1980	16	6	22
1981	83	30	113
1982	93	56	149
1983	111	103	214
1984	170	111	281
1985	125	32	157
1986	187	58	245
1987	173	43	216
1988	151	74	225
1989	166	138	304
1990	164	92	256
1991	156	148	304
1992	220	255	475
1993	277	356	633
1994	411	393	804
1995	394	502	896
1996	523	553	1,076
1997	689	828	1,517
1998	827	681	1,508
1999	649	466	1,115
2000	582	303	885
2001	353	275	628
All	6,520	5,503	12,023

variation of abnormal returns. We also calculate abnormal returns by subtracting the value-weighted CRSP market return from the firm's return. Our results are not sensitive to using either definition of abnormal returns.

The equally-weighted abnormal return for our sample of successful offers is given in the first row of Table 2. It is 1.10% and highly significant. The median abnormal return is 0.36% and is also significant. On average, therefore, shareholders of acquiring companies benefit from acquisitions. This result is quite different from the result obtained in samples restricted to acquisitions of public companies, since authors studying such samples typically find that shareholders do not gain from acquisitions; Andrade et al. (2001) report insignificant negative abnormal returns from 1973 through 1998.

The equally-weighted abnormal return gives the same weight to a company with a capitalization of $100 million dollars and a company with a capitalization of $100 billion dollars. Yet a given abnormal return has much more of an economic impact if

Table 2
Announcement abnormal returns and dollar abnormal returns: sorted by acquirer size
The sample contains all completed U.S. mergers and acquisitions between 1980 and 2001 listed on SDC where the publicly traded acquiring firm gains control of a public, private, or subsidiary target whose transaction value is at least $1 million and 1% of the acquirer's market value. Small (large) acquirers have a market capitalization equal to or less (greater) than the market capitalization of the 25th percentile of NYSE firms in the same year. $CAR_{(-1,+1)}$ denotes the three-day cumulative abnormal return (in percent) measured using the market model. $ANPV_{(\$2001)}$ denotes the inflation-adjusted (base 2001 dollars) abnormal dollar returns in millions, defined as the gross change in the value of the acquirer's equity minus the predicted change from the market model. The value-weighted cumulative abnormal return, $VWCAR_{(-1,+1)}$, is the sum of the dollar abnormal returns across acquirers divided by the aggregate market capitalization of acquirers. ANPV/TV is the abnormal dollar return divided by the total transaction value reported by SDC and represents the dollar gain per dollar spent on acquisitions. The final row for each sub-group lists the number of observations. The difference tests are based on *t*-tests for equality in means and a Wilcoxon-test for equality of medians. Median values are in brackets. The sum of the abnormal dollar returns across acquisitions is reported in italics.

	All (1)	Large (2)	Small (3)	Difference (2)−(3)
$CAR_{(-1,+1)}$	1.102[a]	0.076	2.318[a]	−2.242[a]
	[0.362][a]	[−0.027]	[0.940][a]	[−0.967][a]
$ANPV_{(\$2001)}$	−25.2[a]	−47.9[a]	1.7[a]	−49.6[a]
	[0.5][a]	[−0.1][a]	[0.6]	[−0.7][a]
	−$302,742	*−$312,061*	*$9,319*	
$VWCAR_{(-1,+1)}$	−1.177	−1.249	1.272	
ANPV/TV	5.613[b]	2.961	8.755[a]	−5.794
	[1.874][a]	[−0.152]	[3.791][a]	[−3.943][a]
n	12,023	6,520	5,503	

[a] Statistical significance at the 1% level.
[b] Statistical significance at the 5% level.

earned by the larger firm. Any assessment of the economic significance of gains to acquiring-firm shareholders should put more weight on the return of a company with a capitalization of $100 billion dollars than on one with a capitalization of $100 million dollars. One possible approach is to estimate the dollar abnormal return made by acquiring-firm shareholders. This measure, introduced by Malatesta (1983), subtracts from the gross change in the value of the acquirer's equity the predicted change from the market model. The second row of Table 2 shows that the average dollar abnormal return for our sample is −$25.2 million in 2001 dollars. This negative average dollar abnormal return is not caused by a few sample years. There are only seven years where the average dollar abnormal return is positive (1982, 1984, 1990, 1991, 1993, 1995, and 1996). Aggregating the dollar abnormal returns across firms, we find that the aggregate loss amounts to $303 billion in 2001 dollars over our sample period. In our sample, the equally-weighted abnormal return and

the equally-weighted dollar abnormal return have opposite signs. Such a situation can arise when there is a size effect. If large firms and small firms have different announcement returns, a value-weighted average abnormal return should reflect the announcement returns of large firms. The value-weighted average abnormal return is presented in the third row. It corresponds simply to the sum of the dollar abnormal returns across acquirers divided by the aggregate market capitalization of acquirers. As expected, the value-weighted average abnormal return is negative (−1.18%).

The existence of a size effect in acquiring-firm abnormal returns can be established by dividing the sample into small and large acquiring firms. Table 2 shows that large firms have an insignificant equally weighted abnormal return of 0.08% and a value-weighted abnormal return of –1.25%. In contrast, small firms have an equally weighted abnormal return of 2.32%, significantly higher than that of large firms, and a value-weighted abnormal return of 1.27%.

A legitimate concern is that announcements might be more unexpected for small firms than for large firms. As a result, the announcement returns of large firms would be pulled towards zero compared to small firms. If this were the case, however, the size effect would be even larger for the type of acquisitions where the abnormal return of large firms is negative.

3. Is the size effect explained by firm and deal characteristics?

We first show how firm and deal characteristics differ between large and small acquirers. We then explore whether these differences explain why the abnormal returns of large and small acquirers differ. To do that, we compare abnormal returns for similar deals across large and small acquirers and then use multivariate regressions.

3.1. The relation of acquiring-firm size to firm and deal characteristics

Table 3 shows deal and acquiring-firm characteristics for our sample. We report the information for the whole sample and for large and small firms. The dollar value of acquisitions is much larger for large firms than small firms. This is not surprising, but what is surprising is that the acquisitions by small firms are larger relative to firm market value (defined as book value of assets minus book value of equity plus market value of equity) or relative to their market value of equity, than are the acquisitions by large firms. Asquith et al. (1983) show that bidder returns increase in the ratio of the target's equity capitalization to the bidder's equity capitalization. This ratio is larger for small acquirers, so that we will have to investigate whether this characteristic helps explain the size effect. It also takes longer for large firms to complete an acquisition than for small firms. This may not be surprising since regulatory issues are typically more important for large firms.

We expect competition for a target to decrease the return to the acquirer. We use as a proxy for competition whether multiple firms make a public bid for the same target. With this proxy, competition is rare, but it is more frequent for large

Table 3
Summary statistics: sorted by acquirer size
The sample contains all completed U.S. mergers and acquisitions between 1980 and 2001 as listed by SDC where the publicly traded acquiring firm gains control of a public, private, or subsidiary target whose transaction value is at least $1 million and 1% of the acquirer's market value. Small (large) acquirers have a market capitalization equal to or less (greater) than the market capitalization of the 25th percentile of NYSE firms in the same year. The transaction value ($ million) is the total value of consideration paid by the acquirer, excluding fees and expenses. Relative size is the transaction value divided by the equity market capitalization of the acquirer at the end of the fiscal year prior to the acquisition announcement. Competed deals have at least one other bidder for the same target. The liquidity index for the target is calculated as the value of all corporate control transactions for $1 million or more reported by SDC for each year and two-digit SIC code divided by the total book value of assets of all Compustat firms in the same two-digit SIC code and year. The number of days to completion is measured as the number of calendar days between the announcement and effective dates. The cash (equity) in payment is the percent cash (equity) payment of the transaction value. Pure cash (equity) deals are when 100% of the consideration is cash (equity). Acquisitions are defined as tender offers, hostile, and competed deals as reported by SDC. Conglomerate deals involve targets with a two-digit SIC code other than that of the bidder. The percent public, private, and subsidiary targets are the proportions in each sample. In Panel B, Cash includes cash and marketable securities and debt is total assets minus the book value of equity. The firm market value is total book assets minus the book value of equity plus market capitalization. Tobin's q is defined as the firm market value divided by the book value of assets. Operating cash flow (OCF) is sales minus the cost of goods sold, sales and general administration, and working capital change. Book-to-market is defined as in Fama and French (1993). Median values are in brackets.

	Large	Small	All
Panel A: *Deal characteristics*			
Transaction value (TV)	450.10	29.70[a]	257.67
	[75.70]	[11.50][a]	[31.00]
TV/assets	0.1041	0.2811[a]	0.1851
	[0.0412]	[0.0955][a]	[0.0614]
Relative size	0.1928	0.5016[a]	0.3342
	[0.0803]	[0.1863][a]	[0.1185]
Competed deals	0.0183	0.0049[a]	0.0121
Days to completion	92.70	68.10[a]	81.45
	[68.00]	[35.00][a]	[52.00]
Liquidity index for target	0.1099	0.1039[c]	0.1072
	[0.0450]	[0.0480][a]	[0.0453]
Cash in payment (%)	51.25	57.17[a]	53.96
Equity in payment (%)	35.55	28.31[a]	32.23
Pure cash deals (%)	40.09	40.85	40.44
Pure equity deals (%)	28.45	20.04[a]	24.60
Hostile deals (%)	0.63	0.25[a]	00.46

Table 3 (*continued*)

	Large	Small	All
Tender-offers (%)	6.04	1.45[a]	03.94
Conglomerate deals (%)	40.54	43.65[a]	41.96
Public target (%)	30.08	12.38[a]	21.97
Private target (%)	38.19	56.21[a]	46.44
Subsidiary target (%)	31.73	31.42	31.59
Panel B: *Acquirer characteristics*			
Cash/assets (book)	0.1445 [0.0663]	0.1607[a] [0.0730][a]	0.1519 [0.0684]
Assets (book)	4,618.6 [959.5]	214.6[a] [74.4][a]	2,602.9 [302.2]
Assets (market)	6,744.5 [1,687.3]	256.0[a] [130.7][a]	3,774.7 [530.4]
Equity (market)	3,072.6 [806.7]	92.2[a] [72.8][a]	1708.5 [263.2]
Debt/assets (book)	0.4667 [0.4620]	0.4707 [0.4452][b]	0.4686 [0.4548]
Debt/assets (market)	0.2872 [0.2650]	0.3333[a] [0.2925][a]	0.3092 [0.2782]
Tobin's q	2.5136 [1.5402]	1.8629[a] [1.3515][a]	2.2158 [1.4461]
OCF/assets (market)	0.1141 [0.0896]	0.1464 [0.0907]	0.1286 [0.0902]
Book-to-market	0.4805 [0.4270]	0.6354[a] [0.5425][a]	0.5514 [0.4757]

[a] Statistical significance between large and small at the 1% level.
[b] Statistical significance between large and small at the 5% level.
[c] Statistical significance between large and small at the 10% level.

acquirers than for small acquirers. However, our measure suffers from the fact that while sometimes there are multiple potential acquirers, the competition among them takes place privately. Boone and Mulherin (2002) show that, in the 1990s, an acquisition by one public bidder can follow a private auction in which many firms participate. Here our measure of competition would indicate no competition, even though there might have been strong competition in the private auction. Another

problem with our proxy for competition is that in a competitive market, a firm might choose to increase the premium offered to deter competition. Hence, we might conclude that there is no competition when in fact potential competition strongly impacts the premium. An alternative proxy for competition is whether a particular acquisition takes place in an active mergers and acquisitions market. As a measure of how active the market for mergers and acquisitions is in an industry, we use (following Schlingemann et al., 2002) the value of all corporate control deals in a particular year and two-digit SIC code divided by the book value of all assets in the corresponding year and two-digit SIC code. We find the mean value for this liquidity index to be marginally higher for large firms than for small firms, but the opposite occurs with medians.

Earlier research shows that equity offers for the acquisition of public firms have lower returns (e.g., Travlos, 1987). In contrast, equity offers for the acquisition of private firms have higher abnormal returns (e.g., Chang, 1998; Fuller et al., 2002). Cash is used more frequently in acquisitions by small firms. Using the SDC definition of hostility, hostile offers have lower abnormal returns (see Schwert, 2000). Few offers are hostile in our sample, but small firms are half as likely to make a hostile offer. Similarly, small firms are much less likely to make tender offers than large firms. Though not reported in Table 3, small firms are never white knights in our sample, while large firms sometimes are. Morck et al. (1990) show that acquirers of public firms have lower abnormal returns for diversifying acquisitions. We define a transaction as diversifying if the target and acquirer have different two-digit SIC codes (using the SIC codes reported by SDC). Small firms are more likely to make diversifying acquisitions than are large firms. Though we do not report this information in Table 3, large firms that acquire public firms are more likely to use options in their offer, make an offer with a collar, have termination fees, and face litigation in the acquisition process.

Next we provide information on the organizational form of the assets acquired. Zingales (1995) presents a model in which the acquirer of a private firm or a subsidiary faces a different bargaining situation than the acquirer of a public firm. With the acquisition of a public firm, the free-rider problem identified by Grossman and Hart (1980) comes into play, so that the shareholders of public firms get a better deal when their firm is acquired than do the shareholders of private firms. However, the owners of private firms or subsidiaries might be more likely to be looking to sell them, either to exit or to raise funds. In such cases, the acquirer might benefit from providing a liquidity service. Most of the existing empirical evidence on acquisitions is on acquisitions of public firms. However, there is evidence that the abnormal return associated with the announcement of acquisitions of private firms and subsidiaries is higher. Fuller et al. (2002) show this for a sample of repeat acquirers in the 1990s and Chang (1998) shows this for a sample of firms acquiring private firms with equity. In our sample, almost half of the acquisitions are private-firm acquisitions. Public-firm acquisitions represent less than one quarter of the sample. Large firms are more than twice as likely as small firms to acquire a public firm. It could therefore be that the size effect is explained by the fact that large firms are more likely to acquire a public firm. In the following, it will therefore be important

for us to investigate whether the size effect holds irrespective of the organizational form of the acquired firm. The probability that a subsidiary will be acquired is roughly the same for a small and a large firm.

Panel B of Table 3 provides characteristics of the acquiring firm. Free cash flow theory predicts that firms with empire-building managers and poor investment opportunities prefer to invest the firm's excess cash flow rather than pay it to shareholders. Such firms accumulate excess cash, so that firms with excess cash are more likely to make poor acquisitions (see Harford, 1999). However, small firms have a higher mean and median ratio of cash to total assets, which deepens the puzzle of the size effect. Maloney et al. (1993) show that firms with higher leverage make better acquisitions and small firms have higher leverage than large firms. We also estimate Tobin's q using the market value of the firm's assets divided by the book value. As mentioned earlier, the existing evidence is that firms with higher q values make better acquisitions. Small firms have lower q values than large firms, so that differences in q cannot explain the size effect. Finally, we report the equity book-to-market (BM) ratio, computed as in Fama and French (1993). Dong et al. (2002) argue that firms with low BM ratios are more likely to be overvalued. Small firms have higher BM ratios. There is no significant difference between the operating cash flows of large and small firms.

3.2. *Abnormal returns, firm size, deal characteristics, and firm characteristics*

We show in Table 4 how abnormal returns differ between large and small firms depending on the organizational form of the assets acquired and the form of payment. We report both abnormal returns and dollar abnormal returns for the rows without the size breakout to show that abnormal returns and dollar abnormal returns can lead to different conclusions because of the size effect. When we compare small firms and large firms, we only report equally-weighted (and not dollar or value-weighted) abnormal returns to save space since we already take into account size differences by splitting the sample.

We find that acquisitions have positive abnormal returns irrespective of how they are financed, but the dollar abnormal return is significantly negative when equity is used in payment. For each type of financing, there is a significant difference between small and large firms that ranges from 1.478% for acquisitions paid with cash to 2.986% for those paid with equity only. Strikingly, small firms have significant positive abnormal returns in excess of 2% for each type of financing.

In Panel B, we show that acquisitions of private firms have significantly positive abnormal returns. The highest abnormal returns are for equity and mixed offers as one would expect from the results of Chang (1998) and Fuller et al. (2002). Turning to public targets in Panel C, the abnormal return is significantly negative for the whole sample. Cash offers have an insignificant positive abnormal return, but the other acquisitions have a significant negative abnormal return. The only negative abnormal return for small firms in Table 4 is when they acquire public targets with equity only. Large firms have a significant negative abnormal return for each form of financing – even cash. Finally, we report results for acquisitions of subsidiaries. The

abnormal returns are significant irrespective of how the acquisition is financed. Acquisitions of subsidiaries are the most profitable acquisitions, followed by acquisitions of private firms.

Table 4
Announcement abnormal returns sorted by organizational form of acquired assets, form of payment, and size

The sample contains all completed U.S. mergers and acquisitions between 1980 and 2001 as listed by SDC where the publicly traded acquiring firm gains control of a public, private, or subsidiary target whose transaction value is at least $1 million and 1% of the acquirer's market value. Small (large) acquirers have a market capitalization equal to or less (greater) than the market capitalization of the 25th percentile of NYSE firms in the same year. Each row includes the mean three-day cumulative abnormal return (%). Inflation-adjusted dollar abnormal returns (base 2001, $ million), defined as the gross change in the value of the acquirer's equity minus the predicted change from the market model, are reported in brackets for the 'All' rows with the number of observations listed below. The groups mixed, equity, and cash are defined as transactions paid for with a mix of cash, equity, and other considerations, all equity, and all cash, respectively. Difference tests are based on *t*-tests for equality in means.

	Mixed (1)	Equity (2)	Cash (3)	All (4)	Difference tests		
					(1)−(2)	(2)−(3)	(1)−(3)
Panel A: *Full sample*							
All	1.452[a] [−22.0][a] $n=4{,}203$	0.153[a] [−79.5][a] $n=2{,}958$	1.377[a] [5.1] $n=4{,}862$	1.102[a] [−25.2][a] $n=12{,}023$	1.300[a] [57.5][a]	−1.223[a] [−84.6][a]	0.076 [−27.2][a]
Small	2.620[a]	2.026[a]	2.171[a]	2.318[a]	0.594	−0.146	0.449
Large	0.227	−0.960[a]	0.693[a]	0.076	1.187[a]	−1.653[a]	−0.466[a]
Difference	2.394[a]	2.986[a]	1.478[a]	2.242[a]			
Panel B: *Private targets*							
All	1.799[a] [−3.5] $n=1{,}970$	1.493[a] [−9.2] $n=1{,}553$	1.208[a] [1.2] $n=2{,}060$	1.496[a] [−3.0] $n=5{,}583$	0.305 [6.7]	0.286 [−10.4]	0.591b [−3.7]
Small	2.395[a]	2.701[a]	1.519[a]	2.138[a]	−0.306	1.182[a]	0.875[b]
Large	0.781[a]	0.502[a]	0.813[a]	0.697[a]	0.279	−0.311	−0.032
Difference	1.614[a]	2.199[a]	0.706[b]	1.441[a]			
Panel C: *Public targets*							
All	−0.401[a] [−101.2][a] $n=1{,}047$	−2.023[a] [−183.3][a] $n=1{,}199$	0.364 [−33.1] $n=396$	−1.022[a] [−128.2][a] $n=2{,}642$	1.622[a] [82.1]	−2.387[a] [−150.2][c]	−0.765[c] [−68.1]
Small	2.010[a]	−0.747[a]	2.843[a]	0.920[a]	2.757[a]	−3.589[a]	−0.833
Large	−1.315[a]	−2.445[a]	−0.418[a]	−1.697[a]	1.130[a]	−2.027[a]	−0.897[b]
Difference	3.325[a]	1.698[a]	3.260[a]	2.616[a]			

Table 4 (*continued*)

	Mixed (1)	Equity (2)	Cash (3)	All (4)	Difference tests		
					(1)−(2)	(2)−(3)	(1)−(3)
Panel D: *Subsidiary targets*							
All	2.513[a]	2.721[a]	1.688[a]	2.002[a]	−0.207	1.033[c]	0.825[a]
	[15.4][a]	[−5.3]	[14.8][c]	[13.9][a]	[20.7]	[−20.1]	[0.6]
	$n=1{,}186$	$n=206$	$n=2{,}406$	$n=3{,}798$			
Small	3.353[a]	5.394[a]	2.857[a]	3.190[a]	−2.040	2.537[b]	0.497
Large	1.587[a]	−0.058	0.854[a]	1.009[a]	1.645[b]	−0.912	0.733[a]
Difference	1.767[a]	5.452[c]	2.003[a]	2.181[a]			

[a] Statistical significance at the 1% level.
[b] Statistical significance at the 5% level.
[c] Statistical significance at the 10% level.

3.3. Does size proxy for acquiring-firm and deal characteristics?

The comparisons in Table 4 ignore that firms and deals differ in other dimensions than in the form of financing and the organizational form of assets. To take into account other determinants of abnormal returns, we estimate a multiple regression.

In Table 5, regression (1) uses all the acquisitions for which we have data, regardless of the type of acquisition, and controls for acquiring-firm and deal characteristics. To capture the size effect, we use a dummy variable that equals one if the acquiring firm is small. Controlling for firm and deal characteristics, we find that the abnormal return of an acquisition is 1.59 percentage points higher if it involves a small acquirer. Keeping everything else the same, firms that make acquisitions of private firms and public firms have significantly lower abnormal returns than firms that make acquisitions of subsidiaries. Whether an acquisition is paid for with equity is not correlated with abnormal returns when the whole sample is used.

Cash acquisitions have significantly lower abnormal returns. This is surprising in light of the evidence for public acquisitions. The reason for this result is that acquisitions of private firms financed with equity or with a mix of securities have higher abnormal returns, while acquisitions of public firms in general have lower abnormal returns. There are two plausible explanations for the higher abnormal returns of all-equity and mixed offers. First, the ownership of the private firm being acquired is normally highly concentrated, so that the owners of the firm can obtain inside information about the true value of the equity they receive as payment for their shares. This conveys favorable information about the true value of the acquirer's shares as in the analysis of private placements of equity by Hertzel and Smith (1993). Second, the owners of the private firm become large shareholders of the acquirer, so that they have incentives to monitor the management of the acquiring firm as suggested by Chang (1998) and Fuller et al. (2002). In a regression

Table 5
Cross-sectional regression analysis of announcement abnormal returns
The sample contains all completed U.S. mergers and acquisitions between 1980 and 2001 as listed by SDC where the publicly traded acquiring firm gains control of a public, private, or subsidiary target whose transaction value is at least $1 million and 1% of the acquirer's market value. The dependent variable is the three-day cumulative abnormal return measured using the market model. Private, public, small, conglomerates, tender-offer, hostile, competed, all equity, and all cash are dummy variables that take the value one for acquisitions of private firms, of public firms, by firms whose capitalization is below the 25th percentile of NYSE firms that year, of firms in another two-digit SIC code than the acquirer, if the acquisition is a tender offer, if it is hostile according to SDC, if there is more than one bidder, if only equity is used to pay for the acquisition, and if only cash is used, respectively. The transaction value ($ million) is the total value of consideration paid by the acquirer, excluding fees and expenses. Relative size is the transaction value divided by the equity market capitalization of the acquirer at the end of the fiscal year prior to the acquisition announcement. The liquidity index for the target is calculated as the value of all corporate control transactions for $1 million or more reported by SDC for each year and two-digit SIC code divided by the total book value of assets of all Compustat firms in the same two-digit SIC code and year. Tobin's q is defined as the firm market value divided by the book value of assets. Operating cash flow (OCF) is sales minus the cost of goods sold, sales and general administration, and working capital change. Significance is based on White-adjusted standard errors with *p*-values reported below each coefficient.

	Sample				
	All (1)	All (2)	All (3)	Small (4)	Large (5)
Intercept	0.0150[a]	0.0503[a]	0.0465[a]	0.0316[a]	0.0184[a]
	0.000	*0.001*	*0.001*	*0.001*	*0.001*
Private	−0.0037[c]	−0.0042[c]	−0.0043[b]	−0.0058	−0.0016
	0.085	*0.051*	*0.045*	*0.104*	*0.443*
Public	−0.0320[a]	−0.0297[a]	−0.0297[a]	−0.0242[a]	−0.0311[a]
	0.000	*0.001*	*0.001*	*0.002*	*0.001*
Small	0.0159[a]				
	0.000				
ln equity (market)		−0.0051[a]			
		0.001			
ln assets (book)			−0.0050[a]		
			0.001		
Conglomerate	−0.0036[c]	−0.0039[b]	−0.0037[b]	−0.0038	−0.0045[b]
	0.051	*0.033*	*0.042*	*0.236*	*0.016*
Tender offer	0.0153[a]	0.0153[a]	0.0154[a]	0.0201	0.0147[a]
	0.001	*0.001*	*0.001*	*0.175*	*0.001*
Hostile	−0.0116	−0.0109	−0.0109	−0.0387	0.0052
	0.195	*0.221*	*0.222*	*0.129*	*0.553*
Competed	−0.0067	−0.0054	−0.0056	−0.0302[c]	0.0005
	0.299	*0.391*	*0.375*	*0.057*	*0.944*

Table 5 (*continued*)

	Sample				
	All (1)	All (2)	All (3)	Small (4)	Large (5)
All equity	−0.0029	−0.0027	−0.0033	0.0001	−0.0073[b]
	0.341	*0.380*	*0.276*	*0.982*	*0.021*
All cash	−0.0039[b]	−0.0031	−0.003	−0.0046	−0.0053[b]
	0.047	*0.112*	*0.129*	*0.173*	*0.011*
Relative size	0.0119[a]	0.0110[a]	0.0112[a]	0.0126[a]	−0.0072[c]
	0.001	*0.001*	*0.001*	*0.001*	*0.056*
Tobin's q	−0.0007[c]	−0.0005	−0.001[a]	−0.0008	−0.0007
	0.064	*0.213*	*0.006*	*0.251*	*0.117*
Debt/assets$_{(mkt.)}$	0.0007	−0.0003	0.0133[b]	0.0021	0.0029
	0.876	*0.952*	*0.013*	*0.784*	*0.542*
Liquidity index	−0.0089[a]	−0.0073[b]	−0.0077[c]	−0.0156[b]	−0.0058[b]
	0.003	*0.014*	*0.009*	*0.021*	*0.040*
OCF/assets$_{(mkt.)}$	0.0006	0.0003	0.0005	−0.0003	0.0017
	0.811	*0.905*	*0.853*	*0.929*	*0.635*
n	9,712	9,712	9,712	4,583	5,129
Adjusted-R^2	0.052	0.055	0.055	0.04	0.04

[a] Statistical significance at the 1% level.
[b] Statistical significance at the 5% level.
[c] Statistical significance at the 10% level.

not reported here, we find that the abnormal return for acquisitions of private firms does not increase more with the size of the transaction when it is financed with equity only, which is inconsistent with the monitoring hypothesis, which proposes that the incentives to monitor increase with the large shareholder's stake.

Following Asquith et al. (1983), bidder return regressions generally control for the size of the target relative to the size of the acquirer for acquisitions of public firms, to adjust for the impact of an acquisition on the equity market capitalization of the acquiring firm. If a dollar spent on acquisitions has the same positive return irrespective of the size of the acquisition the abnormal return should increase in the size of the target relative to the size of the acquirer. However, if an acquisition is paid for with equity, a larger acquisition will result in a greater increase in the number of shares outstanding at completion of the acquisition, so that if there is a downward-sloping demand for the shares of the acquirers, the abnormal return will fall with the relative size of the acquisition. In the literature, the relative size variable is often significant, but the sign of the coefficient varies across studies. For instance, the

relative size is positive in Asquith et al. (1983) but negative in Travlos (1987). Since the relative size variable falls as bidder size increases, all else equal, it follows that bidder returns are negatively related to bidder size when the variable has a positive coefficient.[3] Regression (1) uses relative size, defined as the sum of all consideration paid, excluding fees and costs, divided by the market value of equity of the acquirer as an explanatory variable. This variable has a significant coefficient of 0.0119. The significance of the coefficient on the size dummy variable does not depend on whether we control for the value of the target relative to the value of the acquirer, but adding the relative size variable to the regression reduces the magnitude of the coefficient on the size dummy variable from 0.199 (not reported) to 0.0159. In any case, the size effect is not the same as the relative size effect.

The coefficients of the other variables in regression (1) are similar to those of earlier studies, with some exceptions. As in Morck et al. (1990), conglomerate acquisitions have lower abnormal returns. Acquiring-firm shareholders gain more with tender offers. Almost all tender offers are acquisitions of public firms paid for with cash. Consequently, an acquisition of a public firm paid for with cash through a tender offer has a higher abnormal return than an acquisition of a public firm paid for with equity in a merger. Our proxy for q has a negative significant coefficient, which is surprising since the earlier literature (see Lang et al. 1989; Servaes, 1991) shows a positive relation between abnormal returns and q, but the effect is economically trivial.[4] As expected, acquisitions in industries with more mergers and acquisitions activity, i.e., industries with a high liquidity index, have lower abnormal returns. Potential competition therefore lowers returns to acquiring-firm shareholders. Finally, the coefficient on leverage, defined as the firm's total debt over the firm's market value, is insignificant, which is surprising in light of Maloney et al. (1993).

In Table 4, we split the sample into large and small firms, but in a regression we can use a continuous measure of size. In regression (2), we replace the size dummy with the logarithm of the market capitalization of the acquiring firm's equity. This coefficient is negative and significant, providing further evidence of the size effect.

We estimate regression (1) for each type of organizational form of the acquired firm and for each type of financing separately to make sure that the size effect is pervasive across types of acquisitions, and this is indeed the case (results not reported). The lowest estimate of the size effect, 1.25%, is for acquisitions of private

[3] Schwert (2000) finds a positive coefficient on bidder size when examining cumulative abnormal returns from day 63 before the announcement to day 126 after the announcement. His abnormal returns are market model abnormal returns assuming an intercept of zero. The average bidder size in Schwert (2000) is much higher than in our study. Using our sample until 1996, our abnormal returns, and Schwert's (2000) explanatory variables (using only SDC information for hostility), we find that the coefficient on bidder size becomes positive, but insignificant, when we eliminate firms with assets below $250 million.

[4] Earlier evidence by Servaes (1991) for acquisitions of public firms and by Lang et al. (1989) for tender offers shows that high q bidders have higher abnormal returns. If we consider only large-firm acquisitions and use a dummy variable for firms with q below the sample median (regressions not reported), the dummy variable is significantly negative for cash acquisitions in the 1980s, which is consistent with the earlier literature, but the dummy variable is not significant in the 1990s.

firms, and the highest estimate, 3.49%, is for acquisitions of public firms. All estimates are significant at better than the 1% level. When we turn to acquisitions of public firms or acquisitions financed with equity, the relative size variable becomes insignificant. We also investigate whether the size effect is robust to controlling for year and industry effects. After adding dummy variables for two-digit SIC code-based major industry classification for acquired firms or acquirers, as well as year dummies, we find that the impact of size remains unaffected (regressions not reported in the table).

As explained earlier, our sample uses only completed offers. At the time of the acquisition, investors do not know whether the acquisition will succeed. The problem with taking into account offers that do not succeed is that the data on uncompleted acquisitions are likely to be much better for acquisitions of public firms because such offers have to be made to public shareholders. Nevertheless, we estimate our regressions using both completed and unsuccessful offers. Though we do not report these regressions, none of our conclusions concerning the size effect depend on whether we use only successful acquisitions or also include unsuccessful acquisitions.

4. Why do large firms have lower announcement abnormal returns than small firms?

In this section, we explore whether the hypotheses advanced to explain the negative abnormal returns associated with acquisitions are more pertinent for acquisitions by large firms. We first examine whether the overvaluation, equity signaling, growth opportunities signaling, and free cash flow hypotheses can explain the size effect. This would require these hypotheses to predict lower returns for acquisitions by large firms, but the hypotheses would not apply to acquisitions by small firms or at least would apply less to them. We then examine whether large firms are more prone to overpay and to undertake offers with negative synergy. Finally, we investigate long-run returns following acquisitions by small and large firms.

4.1. Can overvaluation, signaling, or agency explain the size effect?

We saw in Table 3 that large firms have a higher Tobin's q proxy and a lower BM ratio than small firms. Dong et al. (2002) and others believe that these variables proxy for overvaluation. Since by definition large firms have a high equity capitalization, it could simply be that they are more likely to be overvalued. When they announce the acquisition, they might signal something about their true value to the market, especially when they use equity. The overvaluation hypothesis of Dong et al. (2002) seems hard to disentangle from the equity signaling hypothesis and the growth opportunities signaling hypothesis.

If size proxies for overvaluation, either because of market inefficiency as in Dong et al. (2002) or because of private information as in the signaling hypotheses, equity market capitalization should explain more of the abnormal returns than will the book value of assets. An increase in the stock price necessarily increases a firm's equity market capitalization, but it does not necessarily increase the book value of a

firm's assets. To examine this hypothesis, we use the log of book value of firm assets as our size measure in regression (3) in Table 5. We find that the coefficient on the book value of assets is negative and significant and the adjusted R^2 of regression (3) is essentially the same as the adjusted R^2 of regression (2). This evidence is not supportive of the hypothesis that size proxies for overvaluation.

Another way to examine whether the overvaluation and signaling hypotheses explain the size effect is to estimate regression (1) separately for small and large firms. If these hypotheses are relevant for large firms but not small ones, regression (1) would have a size effect because it is misspecified, in that the variables that influence bidder returns do so differentially for large and small firms. Regressions (4) and (5) in Table 5 estimate regression (1) separately for small and large firms. Only one variable has a significantly different impact on small and large firms: the coefficient on the relative size of the acquisition. The relative size coefficient is significantly positive for small firms and significantly negative for large firms. The signaling hypotheses do not predict this difference in the sign of the relative size coefficient. However, if large acquirers systematically overpay for acquisitions, a negative association between bidder gains and bidder size is expected. This suggests that the hubris hypothesis might be relevant for large firms but not small ones. We investigate this possibility more directly for public offers below using premium data for these offers. Finally, if acquisitions are positive net present value projects for small firms, larger acquisitions would lead to a higher net present value and hence a larger abnormal return if the net present value per dollar invested does not depend on the size of the acquisition. The opposite would be the case for large firms if acquisitions are negative net present value project for these firms.

Mitchell et al. (2004) provide evidence that arbitrageurs put pressure on the stock price of the acquiring firm for all-equity offers for public firms. This is because they establish long positions in target stock and short positions in bidder stock. This price pressure effect should be larger as the size of the acquisition relative to the market capitalization of the bidder increases. From our regressions, this is not the case for the sample as a whole. However, when we estimate our regression for the sample of offers by large firms for public firms paid for with equity, we find a coefficient of -0.061, significant at the 1% level. In contrast, the coefficient on small firms is insignificant and much closer to zero. This evidence is consistent with the hypothesis of Mitchell et al. (2004) applying to large but not small firms.

We also examine, but do not report the estimated regressions, whether the size effect is simply the result that young firms are small. It is not implausible that growth opportunities would be more important for young firms than older ones. However, when we add the age of the firm, measured as the number of years the firm's stock returns have been reported by CRSP, that variable is insignificant.

4.2. *Do large firms overpay?*

Roll's hubris hypothesis predicts that managers are overconfident and overpay. When Malmendier and Tate (2002) measure overconfidence by the options a manager has left unexercised, they find evidence that overconfident managers make

more acquisitions and that abnormal returns are lower. There are good reasons to think that managers of large firms might be more prone to overconfidence. Such managers might have made the firm large or, if not, they might have to overcome more obstacles to become CEOs than managers of small firms. Since we have data on premiums for public offers, we can investigate whether large firms pay more.

As reported by Officer (2003), the data on premiums have a number of problems. SDC reports three pieces of information on premiums. First, they provide the value of the different components of the offer (i.e., the aggregate value of cash, stock, and other securities offered by the bidder to the target shareholders). Second, they provide the initial offer price. Third, they list the terminal offer price. Unfortunately, the premium data are not available for all acquisitions of publicly traded firms. Further, while the components data are available for roughly three-quarters of our sample and the terminal offer price is available for a slightly larger number of acquisitions, the initial offer price is not provided by SDC for more than half of our sample. Since we are interested in understanding the announcement abnormal returns, the best approach is to use the components data, which are available at the time of the announcement. The premium is then defined as the value of the components divided by the market value of the target 50 days prior to the announcement day. We follow Officer (2003) and truncate the premium so that it takes values between zero and two. Alternatively, we follow Schwert (2000) and define the premium as the market model residual for the target firm cumulated over the period starting 63 days prior to the announcement to 126 days after the announcement day.

The mean and median premiums are larger for acquisitions by large firms than for those by small firms when we estimate the premium using the components data and using the target market model residuals. The mean (median) premium for acquisitions by large firms is 68% (61%). In contrast, the mean (median) premium for acquisitions by small firms is 62% (52%). The difference in premiums between acquisitions by large and small firms is significant at the 5% level for the means and medians. However, this result depends on how the premium is computed. In particular, if the premium is computed using the initial or terminal price, it does not hold. This may not be surprising because the sample using the initial price has fewer small firms and the terminal price is affected by stock returns over the life of the offer, which themselves might depend on firm size.

There is ample evidence in the literature that firm and deal characteristics affect the premium paid by the bidder (see, for recent papers, Officer, 2003; Schwert, 2000). It could therefore be that large firms pay more because they acquire targets or enter deals that require a large premium rather than because they are large firms. In Table 6, regression (1) relates the components-based premium paid to firm and deal characteristics using similar specifications as in the recent literature. The variables we use have the same impact on the premium as they do in other papers. Since we lose almost 600 acquisitions and end up with a sample that is biased towards large firms, we use the logarithm of equity market capitalization as our size measure so that we can capture meaningful variation in firm size. There is a strong size effect in the regressions whether estimated using a dummy variable (not reported) or the natural

Table 6
Determinants of the bidder premium and the probability of success
The sample for this table contains all offers by U.S. firms to acquire publicly traded U.S. firms between 1980 and 2001 as listed by SDC where the publicly traded acquiring firm gains control of a public target whose transaction value is at least $1 million and 1% of the acquirer's market value. In model (1), the dependent variable in an OLS regression is the premium, defined as the aggregate value of cash, stock, and other securities offered by the bidder to the target shareholders divided by the market value of equity of the target 50 days prior to the takeover announcement. Premium values that are less than zero or larger than two are eliminated. In models (2) and (3) the dependent variable in a logistic regression is equal to one if the bid is classified by SDC as successful and zero otherwise. The variable *ln*(Equity) is the natural logarithm of the market value of equity. Toehold is a dummy variable equal to one if the acquirer holds at least 5 percent of the target shares and zero otherwise. Conglomerates, tender offer, hostile, competed, and all cash are dummy variables that take value one for acquisitions of firms in another two-digit SIC code than the acquirer, if the acquisition is a tender-offer, if it is hostile according to SDC, if there is more than one bidder, and if only cash is used, respectively. Significance is based on White-adjusted standard errors for model (1) and quasi-ML robust standard errors for models (2) and (3) with *p*-values reported below each coefficient. For models (2) and (3) the pseudo-R^2 is reported and *P*(success) denotes the base case predicted probability of success.

	(1) (OLS)	(2) (Logistic)	(3) (Logistic)
Intercept	0.8379[a]	1.7579[b]	1.9381[a]
	0.000	*0.012*	*0.005*
Premium		0.1207	0.0874
		0.525	*0.638*
All cash	−0.1478[a]	−0.586[a]	−0.6401[a]
	0.000	*0.006*	*0.002*
Toehold	−0.1063	2.1977[b]	
	0.113	*0.011*	
ln(Equity$_{(bidder)}$)	0.0343[a]	0.4169[a]	0.401[a]
	0.000	*0.001*	*0.001*
ln(Equity$_{(target)}$)	−0.0329[a]	−0.1827[b]	−0.1862[b]
	0.001	*0.020*	*0.017*
Tender offer	0.1346[a]	1.7541[a]	1.8846[a]
	0.000	*0.001*	*0.001*
Hostile	0.0326	−3.2637[a]	−3.1851[a]
	0.392	*0.001*	*0.001*
Conglomerate	−0.0499[b]	−0.5197[a]	−0.462[a]
	0.016	*0.002*	*0.005*
Tobin's q$_{(bidder)}$	0.0091	−0.0467[c]	−0.0466[c]
	0.103	*0.077*	*0.076*
Tobin's q$_{(target)}$	−0.0117	0.0514	0.0469
	0.195	*0.481*	*0.510*

Table 6 (*continued*)

	(1) (OLS)	(2) (Logistic)	(3) (Logistic)
Compete	0.0437	−1.6784[a]	−1.7312[a]
	0.250	*0.001*	*0.001*
P(success)		0.886	0.882
n	1,761	1,761	1,761
Adjusted-R^2 [pseudo-R^2]	0.039	0.292	0.284

[a]Statistical significance at the 1% level.
[b]Statistical significance at the 5% level.
[c]Statistical significance at the 10% level.

logarithm of the acquirer's equity market capitalization.[5] The size effect holds in regressions in which the dependent variable is a premium computed using the initial price, the terminal price, or the market model cumulated residuals.

If large firms pay more, presumably they should have more success in making acquisitions. Otherwise, it would mean that acquiring-firm size just proxies for firm or deal characteristics that affect the premium but are ignored in our premium regression. Of the offers made by small firms, 13.67% are unsuccessful. In contrast, large firms fail 11.05% of the time. Again, however, firm and deal characteristics affect outcomes. We therefore estimate logistic regressions predicting the outcome of the deal in regressions (2) and (3) in Table 6. We use variables similar to those used in recent studies (see e.g., Officer, 2003; Schwert 2000). We estimate one regression without the toehold variable since presumably this variable is endogenously determined and one regression with the toehold variable. The results are similar to those obtained for the premiums. We find that large firms are significantly more likely to succeed when they attempt to acquire a public company.

The evidence on premiums and probability of success is consistent with hubris being more of a factor for the managers of large firms. Could this explain the size effect? We add the premium offered to the abnormal return regression for public offers. Doing so reduces the sample size. When we estimate regression (1) of Table 5 on the reduced sample, the coefficient on the size dummy corresponds to an abnormal return difference between small and large firms of 2.63%. The difference becomes 2.68% when we add the premium as an explanatory variable in the regression. When we estimate the regression separately for large and small firms, the coefficient on the premium is significant and negative for large firms, but insignificant and close to zero for small firms. Consequently, the greater premium paid by large firms decreases the average abnormal return of large firms. If a large premium is more likely to reflect overpayment for large firms than for small firms, it

[5]Officer (2003) uses the natural logarithm of the acquirer's equity market capitalization in his premium regressions and reports a significant positive coefficient also.

would explain why the coefficient on the premium is not significant for the sample as a whole but is significant for large firms.

4.3. Do small firm acquisitions have synergy gains?

Large firms pay more. If a firm pays too much, it just redistributes wealth from the shareholders of the acquiring firm to the shareholders of the acquired firm. Overpayment therefore does not affect the wealth of diversified shareholders. However, an acquisition that reduces the total value of the acquired and acquiring firms makes diversified shareholders worse off. Alternatively, an acquisition that has a synergy gain increases the combined value of the acquired and acquiring firms. Bradley et al. (1988) show that on average, acquisitions have a synergy gain for their sample of tender offer acquisitions in the 1970s and 1980s. We examine here whether the synergy gains from acquisitions by small firms differ from the synergy gains from acquisitions by large firms.

We measure the impact of the acquisition announcement on the combined value of the acquiring and acquired firm in percent and in dollars following the method of Bradley et al. (1988). We start by forming a time-series of portfolio returns in event-time for each sample transaction, where the portfolio is a value-weighted average of the target and bidder return accounting for a toehold if SDC reports one. The percentage gain over an event window, $CARC_i$, is defined as the cumulative abnormal return over the event window for the portfolio. Abnormal returns are defined as market model residuals, with the parameters estimated over the $(-205, -6)$ event window relative to the announcement day. The change in the capitalization of the acquiring and acquired firms over an event window, $\$CARC_i$, is defined as the combined value of the acquiring and acquired firms multiplied by the abnormal return.

Table 7 reports the results for the percentage and dollar change in the combined value of the acquiring and acquired firms. For the whole sample, the average cumulative portfolio abnormal return is a significant 1.35%. The dollar abnormal return is a loss of \$42.417 million with a t-statistic of -1.701. When we turn to the sample of large firms, we find a significant average abnormal return of 0.68%. The dollar abnormal return represents a loss of \$55.501 million with a t-statistic of -1.747. In contrast, the portfolio return for small firms is 3.80% with a z-statistic of 8.254 and is significantly higher (p-value < 0.001) than for large firms. The dollar abnormal return is \$5.337 million with a t-statistic of 4.908.

The acquisition announcements of large firms are consistent with the existence of negative synergies. In other words, the firm resulting from the merger is worth less than the constituent firms on their own. In contrast, announcements by small firms exhibit positive synergies when using the percentage abnormal return measure.

4.4. Post-event stock price performance

So far, we have assumed that the market incorporates information in stock prices efficiently, so that the announcement return is an unbiased estimate of the impact of

Table 7
Synergy gains: sorted by acquirer size
The sample for this table contains all completed U.S. mergers and acquisitions between 1980 and 2001 as listed by SDC where the publicly traded acquiring firm gains control of a public target whose transaction value is at least $1 million and 1% of the acquirer's market value. The percentage synergy gain, *CARC*, follows Bradley et al. (1988) and is defined as the cumulative abnormal return over the $(-1,+1)$ event window for a value-weighted portfolio of the target and bidder return. The weights for the bidder and the target are based on the market value of equity two days prior to the announcement. The target weight adjusts for the percentage of target shares held by the acquirer prior to the announcement of the deal. Abnormal returns are defined as market model residuals, where the parameters are estimated over the $(-205, -6)$ event window relative to the announcement day. The dollar value synergistic gain over an event window, $\$CARC_i$, is defined as *CARC* times the sum of the market value of equity for the bidder and the target in million dollars, adjusted for the percentage of target shares held by the acquirer prior to the announcement of the deal. The *z*-statistics are based on cross-sectional and time-series variation (see Bradley et al. (1988)) and the *t*-statistic is based on only cross-sectional variation.

	All	Large	Small
CARC	1.352[a]	0.700[a]	3.803[a]
z-statistic	8.091	4.062	8.254
$\$CARC$	−$42.417[b]	−$55.501[b]	$5.337[a]
t-statistic	−1.701	−1.747	4.908

[a] Statistical significance at the 1% level.
[b] Statistical significance at the 10% level.

an acquisition on the wealth of acquiring-firm shareholders. If this is not the case, it could be that the size effect is reversed over time and disappears. To examine this possibility, we compare long-term returns following acquisition announcements for small and large firms separately using the calendar-time approach recommended by Fama (1998).

For each calendar month we form an equally-weighted portfolio of firms that made an acquisition in the past three years, measured relative to the completion date of the transaction, provided that there are at least ten such firms, both for the whole sample of acquisitions of a particular type and separately for large and small firms. The time-series of portfolio returns net of the risk-free return over the sample period is regressed on the four factors from the Fama and French (1992, 1993) and Carhart (1997) models. The intercept reflects the average monthly abnormal return for the sample. The difference between small and large acquirers' abnormal returns is calculated as the intercept in a regression of the return of a long position in the portfolio of small acquirers and a simultaneous short position in the portfolio of large acquirers.

In Table 8, we report the post-event long-term results for the whole sample and various subsamples. For the whole sample, the monthly abnormal return is 0.018% and insignificant. Long-term abnormal returns would be a source of concern if taking into account these returns would change the conclusions we draw from the announcement returns. There is no consistent pattern of this happening. Very few

Table 8
Calendar-time post-event monthly abnormal returns
The sample for this table contains all completed U.S. mergers and acquisitions between 1980 and 2001 as listed by SDC where the publicly traded acquiring firm gains control of a public, private, or subsidiary target whose transaction value is at least $1 million and 1% of the acquirer's market value. Each monthly abnormal return is calculated using a time-series regression, where the dependent variable is the equally weighted portfolio return in each calendar month of all bidders within each subgroup that have an event during the 36 months prior to the measurement month. The independent variables are the Fama-French (1993) and Carhart (1997) factors. At least ten firms per month per subgroup must exist to calculate a portfolio return for that subgroup and month. The intercept of the time-series regression for each subgroup is the monthly abnormal return (in percentage). The sample is divided into size (i.e., large, small), organizational form (i.e., private, public, subsidiary), and the form of payment (i.e., mixed, equity, cash). Difference denotes the intercept of the regression of the returns on a long position in the small and a short position in the large firms. For each cell *p*-values are reported in italics.

Form	Payment	All	Large	Small	Difference
Panel A: *Whole sample*					
All	All	0.018	0.076	−0.031	−0.132
		0.848	*0.420*	*0.846*	*0.426*
Panel B: *Sorted by organizational form of acquired assets*					
Private	All	0.029	0.273[b]	−0.266	−0.588[a]
		0.815	*0.035*	*0.150*	*0.006*
Public	All	0.040	0.045	0.155	0.058
		0.697	*0.675*	*0.433*	*0.778*
Subsidiary	All	0.000	−0.021	0.092	0.084
		0.999	*0.844*	*0.589*	*0.641*
Panel C: *Sorted by form of payment*					
All	Mix	−0.004	−0.008	−0.002	−0.028
		0.741	*0.944*	*0.991*	*0.886*
All	Equity	0.178	0.293[c]	0.016	−0.349
		0.209	*0.060*	*0.948*	*0.205*
All	Cash	0.104	0.080	0.143	0.057
		0.346	*0.472*	*0.402*	*0.734*
Panel D: *Sorted by organizational form of acquired assets and form of payment*					
Private	Mix	−0.065	0.177	−0.257	−0.482[c]
		0.659	*0.251*	*0.234*	*0.059*
	Equity	0.287	0.539[b]	−0.234	−0.763[b]
		0.138	*0.018*	*0.433*	*0.034*
	Cash	0.206	0.235	0.054	−0.158
		0.154	*0.140*	*0.785*	*0.464*
Public	Mix	−0.092	−0.092	0.032	0.027
		0.447	*0.452*	*0.905*	*0.924*
	Equity	0.189	0.152	0.820[b]	0.324
		0.191	*0.320*	*0.030*	*0.344*

Table 8 (*continued*)

Form	Payment	All	Large	Small	Difference
	Cash	0.396[b]	0.287[c]	0.764[b]	0.348
		0.012	0.091	0.027	0.362
Subsidiary	Mix	0.105	0.078	0.186	0.109
		0.449	*0.585*	*0.392*	*0.648*
	Equity	0.316	0.162	0.173	−0.056
		0.391	*0.693*	*0.772*	*0.934*
	Cash	0.012	0.002	0.087	0.095
		0.917	*0.986*	*0.647*	*0.635*

[a] Statistical significance at the 1% level.
[b] Statistical significance at the 5% level.
[c] Statistical significance at the 10% level.

subsamples have significant long-term returns. Private-firm acquisitions by large firms have positive long-term abnormal returns, while private-firm acquisitions by small firms have negative, yet insignificant, long-term abnormal returns. The difference between these abnormal returns is significant at the 1% percent level. Acquisitions of public firms paid for with cash have significant positive abnormal returns.

5. Conclusion

We have shown that small firms fare significantly better than large firms when they make an acquisition announcement. Overall, the abnormal return associated with acquisition announcements for small firms exceeds the abnormal return associated with acquisition announcements for large firms by 2.24 percentage points. Except for acquisitions of public firms paid for with equity, small firms gain significantly when they announce an acquisition. Large firms experience significant shareholder wealth losses when they announce acquisitions of public firms irrespective of how the acquisition is financed. We find that this size effect is robust. It holds (1) in the 1980s as well as in the 1990s, (2) across subsamples of acquisitions constructed based on the form of payment or the organizational form of the assets acquired, and (3) in regressions that control for firm and deal characteristics. There is no evidence that the size effect is reversed over time. Large firms offer larger acquisition premiums than small firms and enter acquisitions with negative dollar synergy gains. The evidence is therefore consistent with managerial hubris playing more of a role in the decisions of large firms. Further work is therefore required to investigate how the size effect relates to managerial incentives and firm governance.

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