

Target-firm information asymmetry and acquirer returns*

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Abstract. We show that acquirer returns are significantly higher in stock-swap acquisitions of difficult-to-value targets, as measured by R&D intensity and idiosyncratic return volatility. This finding contributes to an explanation of the determinants of, and value gains from, using stock as a method of payment. The effects of target-valuation uncertainty on both the method of payment and the market reaction to acquisitions are more likely to be apparent in samples of private acquisitions, as these effects can be masked in samples of acquisitions of publicly held targets. Nevertheless, our results hold for publicly traded targets in multivariate analysis.

JEL Classification: G34, G32

1. Introduction

Three decades of evidence on takeovers of publicly traded targets by publicly traded acquirers demonstrates that such takeovers are at best wealth neutral for bidding firm stockholders, and potentially wealth destroying.¹ Recent evidence, however, identifies a sub-sample of takeover announcements that result in positive abnormal returns for acquiring firm stockholders: takeovers of targets that are not publicly listed (Chang, 1998; Fuller, Netter, and Stegemoller, 2002; Moeller, Schlingemann, and Stulz, 2004; and Faccio, McConnell, and Stolin, 2006). However, despite considerable investigation into the source of such gains, there is little understanding of why takeovers of non-public targets result in positive returns for acquirers while acquisitions of publicly traded targets do not.

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¹ See, for example, Jensen and Ruback (1983) and Andrade, Mitchell, and Stafford (2001).

Particularly compelling is the result that announcement returns are significantly negative on average when acquirers use stock to acquire publicly traded targets (Travlos, 1987), whereas the opposite is true for takeovers of privately held targets (Chang, 1998). A widely accepted rationale for the negative returns associated with stock payments for public targets is adverse selection: managers use stock as currency to pay for acquisitions only when that stock is overvalued.² A further puzzle, therefore, is why the method of payment is associated with such different valuation effects in acquisitions of public versus private firms.

In this paper, we investigate the relation between the method of payment and acquirer returns. Importantly, we find that the method of payment affects acquirer announcement returns when a target is difficult to value irrespective of the target's public status. Specifically, acquirers in our sample of acquisitions garner higher announcement returns when they use stock to acquire targets with low levels of sales, when research and development (R&D) expenses exceed sales, or when the target's idiosyncratic return volatility is high. Even after controlling for other factors that have been found to affect acquirer returns, we find that acquirer announcement returns are significantly higher when acquirers use stock to acquire difficult-to-value targets.

The finding that the method of payment has a significantly positive effect on acquirer announcement returns for acquisitions of firms that are difficult to value is suggestive of one of the causes of the method of payment effect that has puzzled researchers in this area. Specifically, this finding is most consistent with the notion that the method of payment affects acquirer returns because the use of a stock-swap mitigates information asymmetry about the target (Hansen, 1987). For example, the use of stock as a method of payment helps a publicly traded acquirer share the risk of a target's overvaluation with the target's owners. Conversely, when the acquirer pays with cash the acquirer bears all of the risk of overvaluation. Our evidence is consistent with the notion that there are gains from sharing the risk of overpayment with the target's owners.

While we also analyze public targets, our study focuses primarily on privately held targets for several reasons. First, and most importantly, there is likely to be substantially more information asymmetry concerning a privately held target's value (relative to a publicly traded target), because privately held companies are more opaque than publicly traded companies. This difference in information asymmetry suggests that this setting is one in which the information asymmetry problem concerning the target firm is both the greatest *and* the most lopsided in favor of the target. Second, takeovers of privately held firms are much less likely to elicit competing bids. This difference is mainly due to the Williams Act of 1968 that

² Myers and Majluf (1984) provide the theoretical framework for adverse selection in equity issuance that is supported by the work of Travlos (1987), Amihud, Lev and Travlos (1990), and Houston and Ryngaert (1997), among others, in a takeovers setting.

mandates disclosure and waiting periods for acquisition of publicly traded targets but does not apply to acquisitions of privately held firms. Third, Officer (2004) shows that in acquisitions of public firms the length of time between announcement and completion influences the method of payment choice. This consideration is generally less important in acquisitions of privately held firms as those acquisitions are typically announced only when completed. Thus, there are fewer factors affecting the method of payment decision in acquisitions of privately held targets and we, therefore, have a cleaner measure of the role of this choice.

In sum, our results provide empirical support for the conjecture that the use of a stock-swap mitigates information asymmetry about the target thereby increasing the returns to acquirers when there is substantial informational asymmetries about the value of the target. The remainder of this paper proceeds as follows. In the following section, we describe our sample of acquisitions of both private and public companies and provide preliminary analysis of sample characteristics. Section 3 provides more complete empirical analysis of acquirer cumulative abnormal returns and their relation to target characteristics. Section 4 discusses the implications of our results, and Section 5 concludes the paper.

2. Sample construction and preliminary analysis

We construct a sample of acquisitions of private companies from the Securities Data Corporation (SDC) Merger and Acquisitions database for our analysis of the anomalous announcement returns to acquirers of privately held target firms. In addition, we rely on two securities regulations that govern the financial reporting of acquisitions of private targets to gather financial data of the target firms. Regulation S-X states, "If securities are being registered to be offered to the security holders of the business to be acquired, the financial statements. . . shall be furnished for the business to be acquired . . ." In general, the acquirer files the required information in an S-4 statement. In addition, if the takeover is a "material" transaction, the acquirer must disclose details about the transaction in an 8-K. Depending on the transaction year and the method of payment, acquisitions that are 10% to 20% or more of the acquirer's total assets must file target financial statements since these transactions meet the level of materiality as defined by the Securities and Exchange Commission.³ We find the target's financial data in the following SEC filings of the acquirer: 8-Ks (75.1%), S-4s (18.0%), S-1s (3.4%), proxy statements (2.5%), and S-3s (1.0%).

From an initial sample of 4,801 domestic, industrial, and private firms that are acquired from 1995 to 2004, we select those transactions that have deal value (total

³ See Rodrigues and Stegemoller (2007) for detail regarding the requirements for filing target financial statements.

consideration paid by the acquirer) of \$50 million or more and that are purchased by an acquirer traded on the NYSE, Nasdaq, or AMEX. There are 1,296 transactions that satisfy these criteria. The deal value is 10% or more of the acquirer's assets in 843 of these private acquisitions. We base our search for additional information about the target on these 843 acquisitions in which there is a higher probability that we will find target financial data in SEC filings. We exclude the transaction from our sample if in a reasonable period after the takeover announcement we do not find an 8-K or S-4 describing the private target and the acquisition. We find 735 transactions that satisfy our data requirements and that have at least one year of audited financial data for the target.

Over the same time period of 1995 to 2004, we construct a sample of completed acquisitions of publicly traded targets. The acquirer in these takeovers must be a U.S. firm that has CRSP data in the month of the takeover and must have purchased 50% or more of the targets shares in the acquisition. Subsequent to the transaction, the acquirer must own 100% of the target's shares. The target must have CRSP data in the month of the takeover, deal value of at least \$1 million, and COMPUSTAT data for the year of the acquisition. These selection criteria result in 1,944 transactions of public acquirers purchasing public targets.

Table I provides descriptive statistics on target and acquirer size, acquirer announcement cumulative abnormal returns (CARs), and acquirer market value dollar gains for our sample of acquisitions of privately held targets. (We focus on the private targets in our first four tables since there is comparatively less known about the characteristics of these private firms. While the overall conclusions of our paper apply to both private and public targets, we believe that informational asymmetries about firm value are most acute in these firms.) The announcement date of approximately 75% of the transactions in our sample of private targets is between 1995 and 2000. The average (median) acquirer market value of equity is \$3.2 billion (\$695 million) and the average (median) target deal value is \$244 million (\$127 million). Median acquirer and target size are largest in 2000 where the acquirer and target size is \$1.9 billion and \$161 million, respectively; the largest average acquirer and target size is \$7 billion in 2000 and \$367 million in 1999, respectively.

In Columns 3 and 4 of Table I, we report the acquirer market value dollar gain and the acquirer CAR. We measure the CAR from day -1 to day $+1$ around the takeover announcement using the firm return minus the CRSP value-weighted market return. The acquirer's dollar gain is the product of the CAR and the acquirer's market value of equity five days prior to the announcement. In general, these deals increase the value of the acquirer: the average (median) dollar gain to the acquirer is \$21.2 (\$9.3) million.

Moeller, Schlingemann, and Stulz (2004) find that larger acquirers earn average abnormal returns of about 2% less than smaller acquirers and suggest that there may be a hubris effect at work – larger acquirers tend to be overconfident about

Table I. Size and cumulative abnormal returns of private takeovers from 1995 to 2004

This table describes our sample of takeovers by public acquirers of privately held targets from 1995 to 2004. All acquirers are publicly traded firms listed on the NYSE, Nasdaq, or AMEX. Column (1) is the acquirer's market value of equity (\$m's) for the acquirer five days prior to the acquisition. Column (2) is the deal value of the target as listed in SDC (\$m's), measured as the total value of the consideration paid by the acquirer, excluding fees and expenses. Dollar gain is described in column (3) and is the product of CAR and acquirer market value of equity. Column (4) presents mean cumulative abnormal returns (CAR) by year in which the takeover announcement occurs. CAR is the firm return minus the CRSP value-weighted market return for the period -1 to $+1$, where 0 is the takeover announcement date. Column (5) presents the number of observations per year. ^a, ^b, or ^c denotes statistical significance at the 1%, 5%, or 10% level (respectively). Means are the first number presented, and medians are in brackets

	(1) Acquirer market value	(2) Target deal value	(3) Dollar Gain	(4) CAR	(5) N
1995	727 [350]	169 [123]	39.6 [5.7]	3.6% ^a [2.5% ^a]	26
1996	1,467 [568]	185 [115]	16.8 [15.2]	3.1% ^a [2.4% ^a]	91
1997	2,569 [483]	173 [94]	1.1 [12.3]	4.7% ^a [2.7% ^a]	84
1998	951 [513]	179 [117]	31.7 [16.9]	6.1% ^a [4.4% ^a]	97
1999	4,790 [936]	367 [136]	288.6 [5.5]	5.5% ^a [1.0% ^b]	110
2000	7,021 [1,877]	332 [161]	-141.6 [3.8]	1.9% [1.0%]	149
2001	3,613 [533]	196 [135]	-94.4 [4.4]	1.9% ^c [1.5% ^b]	49
2002	1,394 [620]	214 [133]	55.5 [7.0]	2.0% [1.3% ^c]	35
2003	969 [522]	160 [116]	36.6 [23.0]	6.7% ^a [3.8% ^a]	47
2004	921 [738]	248 [177]	4.6 [2.2]	1.2% [0.6%]	47
All	3,195 [695]	244 [127]	21.2 [9.3]	3.8% ^a [2.4% ^a]	735

their acquisition strategies (Roll, 1986). Moeller, Schlingemann, and Stulz (2005) show that the large losses to a few acquirers in 1998 to 2001 are concentrated in very large firms that are significantly overvalued. We also find evidence of large loss deals similar to Moeller, Schlingemann, and Stulz (2005). In 2000 and 2001, the average dollar gain is -\$142 million and -\$94 million, respectively. In 10 deals, the loss to the acquirer is more than \$1 billion: eight of these are in 2000 and

there is one each in 1999 and 2001.⁴ If we remove these deals from the sample, the average dollar gain for the remaining transactions is \$87.6 million.⁵

The average acquirer CAR in our sample of acquisitions of privately held targets is 3.8%, which, as in prior literature, is significantly different from zero at the 1% level. The average CAR for our sample is greater than the CARs found by Moeller, Schlingemann, and Stulz (2004) (they report an average acquirer CAR of 1.1% for private targets) or Fuller, Netter and Stegemoller (2002) (they report an average acquirer CAR of 2.1%). However, there are large differences in target firm size between the studies. Moeller et al. and Fuller et al. require that the deal value be only \$1 million while we require a deal value of \$50 million to increase the probability of finding financial data on the target. As a result, the samples in the other papers include many small firms where the impact on the acquirer may be substantively smaller since the acquired assets represent a smaller fraction of the acquiring firm. For example, Fuller et al. report that the average (median) deal value for private targets in their sample is \$69 million (\$18 million) compared to \$244 million (\$127 million) in our sample. Fuller et al. also report that acquirer CARs are positively related to deal value for acquisitions of private targets, consistent with our results.

Our analysis of CARs for the year 2000 provides additional evidence that this period is an unusual one. In 2000 prior to and including the market peak in March, there are 71 deals in our sample with a statistically significant average CAR of 4.3%. For the remainder of 2000, there are 78 transactions with an average CAR of -0.4%. Thus, our data confirm previous findings that returns to acquirers of privately held targets are positive on average, though there are periods in which the deals are not as well received by the market.

In Table II, we present descriptive statistics for target characteristics that may contribute to the variation in acquirer CARs for acquisitions of privately held firms. More than 65% (483) of all acquirers in our sample use some stock as a method of payment, and in 38.8% of deals stock is the primary method of payment. We define the method of payment as “stock” if at least 90% of the consideration paid for the target is acquirer stock. Changing the definition to “majority stock” (at least 50%) or “completely stock” (100%) does not change the qualitative conclusions in this paper. The median fraction of stock used as a method of payment is 50%, and more than 25% of sample acquirers use stock as the sole currency in the acquisition.

⁴ For these ten transactions the average CAR is -20.5% and the average acquirer Q is 44.6. The acquiring companies are mainly in the technology industry: the companies are Qualcomm, CIENA, Broadcom, Sun Microsystems, E.piphany, i2 Technologies, Sycamore Networks, New Focus, Covad Communications, and Phone.com. These findings are consistent with Moeller, Schlingemann, and Stulz (2005) who note that the largest losses by all acquirers were in the same period and concentrated in primarily high-Q firms.

⁵ Removing the ten large loss deals has no qualitative impact on our main results.

Table II. Descriptive statistics of target firm characteristics

This table presents a description of privately-held target firm characteristics. *Stock* is equal to one if the method of payment is at least 90% stock. *Blockholder* is an indicator variable equal to one if an individual owner of the target has a 5% or greater ownership stake in the newly merged firm. *Development stage* is equal to one if the target firm has sales of less than \$500,000 or if the firm's research and development expenditures exceed sales. *Intangibles* is intangibles from the balance sheet divided by total assets. *Earnout* is equal to one if any portion of method of payment is an earnout. *Discount* is based on the excess of the average public acquisition multiple over the same private acquisition multiple (deal value to total assets, deal value to net income, deal value to EBITDA, and deal value to sales) for industry-, size-, and profitability-matched portfolios of publicly traded targets from the sample of public acquisitions in Table V. Because of outliers in the acquisition multiple data, discount estimates are truncated: estimates smaller than -1 are discarded from the sample. The average multiples-based discount is the equally-weighted average of the discount for each target firm computed using the number of multiples available for each private target (i.e., if the private target has negative EBITDA, then only the deal value to total assets and deal value to sales multiples are used).

	25 th percentile	50 th percentile	75 th percentile	# (%) of total observations
Stock				285 (38.8%)
Percentage paid with stock	0.000	0.500	1.000	483 (65.7%)
Earnout				64 (8.7%)
Blockholder				86 (11.7%)
Development stage				109 (14.8%)
Sales (\$ millions)	6.9	36.5	100.5	711 (96.7%)*
R&D/sales	0.000	0.000	0.236	331 (45.0%)**
Intangibles	0.000	0.000	0.074	295 (40.1%)
Discount	-0.161	0.174	0.517	404 (55.0%)

*64 firms have sales of less than \$500,000.

**101 firms have research and development expenditures greater than revenues.

In untabulated results, we find evidence that the method of payment differs across acquisitions by the same acquirer. When we consider the acquisition immediately preceding and after our sample acquisition, we find that 25% of our sample acquirers change the amount of stock used in these transactions by 51% or more. This evidence is consistent with the notion that the characteristics of the target play a significant role in the acquirer's method-of-payment decision (Fuller, Netter, and Stegemoller, 2002). Contrary to the frequent use of stock, we find an infrequent use of earnouts in acquisitions of private firms (8.7% of sample). Thus, earnouts do not appear to be a common means of resolving information asymmetries in our sample of private takeovers (Cain, Denis, and Denis, 2006).

Chang (1998) suggests that acquirer abnormal returns in stock-swap acquisitions of private firms are significantly positive because the payment of acquirer stock to the owners of the private target can form a new blockholder in the acquiring firm. Chang hypothesizes that this effect is related to the monitoring benefits associated

with a new blockholder. In Chang's sample, 38% of acquisitions of privately held targets create a new blockholder in the acquirer. We determine blockholder formation – defined as an individual from the target holding 5% or more of the equity in the merged firm – as follows. First, all transactions in which the method of payment is all cash or in which the product of the percentage stock used and the relative size of the transaction is less than 5% of the acquiring firm are determined to not form a blockholder. Second, all transactions in which the product of the following three variables is greater than 5% are assumed to form a new blockholder in the acquiring firm: the percentage holding of the largest individual blockholder of the target firm prior to the acquisition, the target ownership in the merged firm or, if target ownership is not available, the relative size of the target to the merged firm (target deal value plus the acquirer market value 5 days prior to the announcement)), and the percentage stock in the method of payment. Third, for the remainder of the deals for which we do not have target ownership data, we examine the most recent proxy statement of the acquiring firm after the completion of the transaction to determine whether a blockholder is formed from an owner of the target firm. In Table II, we report the formation of a new blockholder in only 11.7% of our sample transactions.

Table II contains descriptive statistics for two variables based on target accounting data that we use to proxy for the difficulty of valuing the target at the time of the acquisition: a “development stage” indicator variable and a continuous measure of the fraction of intangibles on the target firm's balance sheet (intangibles divided by total assets). The development stage indicator variable is equal to one if the target has sales of less than \$500,000 or if the firm's R&D expenditures exceed sales. There are 109 firms in our sample that satisfy at least one of these criteria. However, R&D expenditures exceeding sales almost entirely drives this development stage indicator variable: 101 targets have R&D expenditures greater than sales and just eight development stage targets only meet the requirement that sales are less than \$500,000. Our results do not significantly change by excluding these eight observations suggesting that our findings are driven by defining a development stage firm as one for which R&D expenditures exceed sales. We also reclassify a target as development stage (or not) according to the firm's *previous* year sales and R&D expenditures to control for the possibility that we spuriously identify development stage firms based on one year of accounting data. This reclassification yields 20 additional development stage firms and results in more significant findings than those reported.

As a secondary proxy for the difficulty of target valuation that is available for most of our sample, we measure the amount of intangibles reported on the target firm's balance sheet. Table II shows that 295 firms (40.1%) in our sample report a positive amount of intangibles; 25% of our private targets have intangibles exceeding 7.4% of total assets. As “intangibles” is a very broad accounting category,

we document some facets of the intangibles reported by private targets in the Appendix. We are able to find a description of the intangibles in the notes to the private firm's financial statements for all but 15 sample firms reporting intangibles. The most often reported intangible is goodwill; it comprises, on average, 63% of intangibles and is the largest intangible for 187 out of the 280 (66.8%) private firms. Goodwill relates directly to the target's own acquisitions of firms that are themselves difficult to value, as the accumulation of goodwill through the acquisition process is dependent of the nature of assets and businesses acquired in prior transactions. The second most prominent category of intangibles (by proportion) is the value of employment contracts, customer agreements, advertising rights, network affiliations, and deferred pension assets (categorized as "Other" in the Appendix), closely followed by broadcasting rights. As demonstrated by the categorizations in the Appendix, the intangibles reported by private firms that are subsequently acquired would be difficult for both the acquirer and investors to accurately value.

We experiment with other proxies for the difficulty in valuing the target's assets, including the age of the firm, whether a privately held target is covered in either Compustat or IBES, the impact of industry affiliation, and whether the bid for the private target is the first bid in the target's industry in the past year (as in Song and Walkling, 2005). None of these measures is reliably related to acquirer announcement returns. Age of the firm, for example, while intuitively appealing, may not adequately distinguish between the types of assets employed in the cross-section of firms – two firms of the same age can be in different businesses that entail considerably different amounts of uncertainty about future prospects.

Table II also reports statistics for the acquisition discount for private targets. Officer (2007) shows that privately held firms are acquired at a 15% to 30% discount relative to the average acquisition multiple paid for comparable publicly held targets. As greater acquisition discounts imply higher bidder announcement returns (all else equal, as illiquid assets are acquired "cheap"), it is important to control for the effect of the discount when explaining acquirer returns in acquisitions of privately held companies.⁶

We compute this discount by comparing the acquisition multiple for private targets to the average acquisition multiple in a portfolio of publicly traded targets

⁶ Under the US tax code, a cash acquisition generates an immediate personal capital gains tax liability for the target shareholders while a stock-swap does not, potentially creating a relation between the method-of-payment choice and announcement returns. However, any "discount" for acquirers driven by the favorable tax treatment of stock swaps should be controlled by the introduction of the discount variables noted above.

of similar size, profitability, and line of business. Our measure is:

$$1 - \frac{X_{PVT,i}}{\bar{X}_{PUB,t-k}}$$

where X_{PVT} is a valuation multiple for the private target and X_{PUB} is the average valuation multiple from a portfolio of comparable publicly traded targets. This is the measure in Officer (2007) multiplied by -1 , so that acquisition discounts will be positive numbers. We use the following four multiples: deal value to total assets, deal value to net income, deal value to EBITDA, and deal value to sales. The numerator of each multiple, deal value, is the total value of consideration paid by the acquirer, excluding fees and expenses. The denominator is collected from COMPUSTAT for the publicly traded targets and from SEC filings for the private targets.

The portfolio of comparable public targets must be in the same Fama and French (1997) industry as the private target, have total assets within 60% of total assets for the target in the year prior to the acquisition announcement, and have similar levels of profitability (i.e., earnings before interest, taxes, depreciation, and amortization divided by total assets). We define “similar profitability” as (1) if the sample firm’s profitability is negative, then so must the matched firm’s be and (2) if the sample firm’s profitability is positive then the matched firm’s profitability must be within ± 0.10 . Similar to Officer (2007), we adjust the multiples for outliers: estimates smaller than -1 are discarded from the sample (to be consistent with the implicit upper bound of $+1$). The discount we use is the equal-weighted average discount for each target firm computed using the multiples available for each private target (e.g., when the private target has negative EBITDA, only deal value to total assets and deal value to sales are used.)

We are able to compute the discount measure for 404 firms in our sample. The median (average) discount is 17.4% (14%). The loss of 331 firms from the sample for the parts of our analysis that rely on discount data is less extreme than the sample loss in Officer (2007) because much of our data for private targets is hand collected and therefore more carefully scrutinized.

It is important to note that target accounting data is sometimes disclosed at the acquisition announcement date, but is more often disclosed later. While we condition our analysis of acquirer announcement CARs on information that may not be fully disclosed to the market at the announcement, it is reasonable to expect that market participants are at least partially informed about the nature of the target’s business and its financial makeup at the acquisition announcement. This contention is consistent with untabulated results which show that acquirer CARs around the date on which the target’s financials are fully disclosed to the market are statistically indistinguishable from zero on average. However, in unreported results, we find that if the target provides comprehensive disclosure prior to the

Table III. Target firm characteristics by industry

This table presents a subset of variables from Table II describing the method of payment and target firm characteristics. With the exception of the *# of bids* column, columns represent the mean of observations by industries based on two-digit SIC codes.

Target industry	# of bids	Stock	Development Stage	Intangibles
Agriculture, Forestry, Fishing, and Mining	6	0.167	0.000	0.006
Construction and Basic Materials	36	0.056	0.000	0.027
Food and Tobacco	9	0.000	0.000	0.168
Textiles, Clothing, and Consumer Products	18	0.056	0.000	0.036
Logging, Paper, Printing, and Publishing	20	0.050	0.000	0.123
Chemicals and Petroleum	45	0.111	0.200	0.067
Machinery and Equipment Supply (incl. Computers)	117	0.453	0.205	0.047
Transportation	25	0.080	0.000	0.073
Telecommunications	54	0.315	0.130	0.226
Utilities	8	0.625	0.000	0.127
Wholesale Distributors and Retail	63	0.365	0.016	0.060
Business Services	247	0.615	0.255	0.082
Recreation, Entertainment, Services (not incl. Business Services), and Conglomerates	87	0.264	0.057	0.115
<i>Total</i>	<i>735</i>	<i>0.386</i>	<i>0.150</i>	<i>0.084</i>

acquisition announcement, then this disclosure substantially mitigates our principal results, which we believe are driven by uncertainty about the value of the target.

In Table III, we document target characteristics by industry affiliation. We base industry definitions on the two-digit SIC. Approximately half (49.5%) of our sample firms are concentrated in the Business Services (33.6%) and Machinery and Equipment Supply (15.9%) industries. There are a relatively high percentage of firms in the development stage in the Business Services (25.5%) and Machinery and Equipment Supply (20.5%) industries, and the acquirers in these industries are two of the three most frequent users of stock as a method of payment – 61.5% and 45.3%, respectively. Further, seven of 13 industries have no development stage private firms; in six of the seven non-development-stage industries, fewer than 20% of the acquirers use stock as the primary method of payment, in five industries fewer than 10% of the acquirers use stock as the primary method of payment. Table III also demonstrates considerable variation in average intangibles across industries. Average scaled intangibles range from 0.6% in the Agriculture, Forestry, Fishery, and Mining industry to 22.6% in the Telecommunications industry.

Table IV. Cumulative abnormal returns by method of payment and information asymmetry proxies

This table presents mean cumulative abnormal returns (CAR) by whether the target is in the development stage (Panel A) and by whether the target's assets are comprised of 10% intangibles or more (Panel B). *Stock* and *Development Stage* are defined in the legend to Table II. The last row (column) of each panel presents the *p*-value from a *t*-test of difference in means between the CARs in the column (row) above (to the left). The number of observations is in brackets. ^a, ^b, or ^c denotes statistical significance at the 1%, 5%, or 10% level (respectively).

Panel A			
	Development Stage	Not Development Stage	<i>p</i> -value
Stock	5.8% ^b [86]	4.0% ^a [199]	0.41
Not Stock	-5.8% ^b [23]	3.8% ^a [427]	0.00
<i>p</i> -value	0.00	0.85	
Panel B			
	Intangibles ≥ 10% of Total Assets	Intangibles < 10% of Total Assets	<i>p</i> -value
Stock	10.3% ^a [44]	3.5% ^a [241]	0.04
Not Stock	4.7% ^a [120]	2.8% ^a [330]	0.12
<i>p</i> -value	0.09	0.55	

3. The relation between acquirer CARs and proxies for the difficulty of valuing a target

3.1. UNIVARIATE RESULTS

As noted above, we employ two proxies for the difficulty of valuing a target: the development stage indicator variable and the fraction of intangibles on the target's balance sheet. Due to possible multiple interpretations of the level of intangibles, we focus on the development stage indicator variable in our regression analysis.⁷ However, in our univariate results, we differentiate the sample on the basis of both measures for additional information about the impact of uncertainty. Table IV contains average acquirer announcement CARs for sub-samples of our data based

⁷ For example, a large amount of Goodwill on the target's balance sheet could indicate that the firm has acquired several other firms. To do so, the firm might be well established and profitable, a counter-indicator of the difficulty in valuation of firms.

on these two proxies. Panel A demonstrates the interaction of the development stage indicator variable and the method of payment. Acquirers of targets in the development stage suffer statistically significant *negative* CARs of -5.8% on average when stock is *not* the primary method of payment. The transactions accounting for these negative returns are diverse. The targets are primarily from the Business Services, Chemical and Petroleum, Telecommunications, and Machinery and Equipment Supply industries. Further, the acquirers and targets vary in size: acquirer size ranges from \$91 million to \$232 billion and target deal value ranges from \$50 million to \$2 billion.

Conversely, for developmental targets, acquirers using stock for at least 90% of the consideration experience significantly positive CARs of 5.8% on average. When stock, rather than cash, is the primary method of payment, acquirers of development-stage targets earn more positive announcement returns; the difference is both statistically and economically significant. We find qualitatively identical results when we dissect the sample based on the level of the target's intangibles (Panel B). For targets reporting intangibles in excess of 10% of total assets, acquirer returns are significantly more positive when stock is used as the primary method of payment (10.3% on average) than when it is not (4.7% on average).

This distinct difference in average acquirer announcement returns for targets that are difficult to value suggests that the effect of the method of payment on acquirer returns is the most pronounced when the information environment surrounding the target firm is the most opaque.

Previous research (Travlos, 1987; Houston and Ryngaert, 1997) identifies an adverse selection consideration for acquiring firms that use equity for acquisitions. Analogous to Myers and Majluf (1984), extant research suggests that the negative relation between acquirer returns and stock as the method of payment in public acquisitions signals that acquiring firm managers with private information issue stock when it is overvalued. This negative impact should be more acute the more difficult it is to value the acquirer. In Table V, we consider whether uncertainty about acquirer valuation affects the CAR for acquisitions of private companies when stock is the method of payment.

In Panel A, of Table V, we present a two-by-two matrix indicating whether the private target acquired with at least 90% equity is a development stage or non-development stage firm and whether the acquirer is more or less difficult to value. We proxy for the difficulty of valuation for acquiring firms with being above or below median acquirer idiosyncratic volatility, measured as the standard deviation of the market-adjusted residuals of daily stock returns from 205 days to 6 days prior to the announcement. We find no evidence that acquirer idiosyncratic volatility is associated with acquirer returns in this subsample with this test.

As noted above, acquisitions of private targets provide a sample of takeovers in which there is considerable uncertainty about the value of the target firm. All else

Table V. Cumulative abnormal returns for stock transactions by target and bidder information asymmetry proxies

This table presents mean cumulative abnormal returns (CAR) for takeovers in which the method of payment consists of at least 90% stock. Transactions are grouped by whether *acquirer volatility* is above or below the median volatility for all acquirers in each respective (public or private target) sample. *Acquirer volatility* is the standard deviation of the market-adjusted residuals of the acquirer's daily stock returns measured from 205 days to 6 days prior to the acquisition announcement. *Target volatility* is the same as *acquirer volatility* except that we use target stock returns for calculation. *Development Stage* is defined in the legend to Table II. The last row (column) of each panel presents the *p*-value from a *t*-test of difference in means between the CARs in the column (row) above (to the left). The number of observations is in brackets. ^a, ^b, or ^c denotes statistical significance at the 1%, 5%, or 10% level (respectively).

Panel A: Private targets			
	Above median acquirer volatility	Below median acquirer volatility	<i>p</i> -value
Development stage	5.9% ^b [81]	5.0% [5]	0.83
Not development stage	4.9% ^a [134]	2.3% ^c [65]	0.18
<i>p</i> -value	0.71	0.55	
Panel B: Public targets			
	Above median acquirer volatility	Below median acquirer volatility	<i>p</i> -value
Above median target volatility	-4.2% ^a [376]	-1.7% ^a [98]	0.00
Below median target volatility	-1.1% [131]	-1.6% ^a [333]	0.63
<i>p</i> -value	0.00	0.83	

equal, the magnitude of valuation uncertainty should be less for public (relative to private) firms. However, the acquirer's mitigation of risk via the method of payment should have the same affect on acquirer announcement returns.

Therefore, we also consider a sample of 1,944 public targets. These public targets are substantially larger than private targets; the average public deal value is \$1.2 billion as compared to \$244 million in the private sample. Comparative acquirer returns are similar to those reported in the acquisition literature with average CAR in acquisitions of publicly traded firms equal to -1.26% (compared to 3.8% for the sample of acquisitions of private firms). The fact that these public targets follow SEC disclosure requirements leads to substantially more information availability about their assets, business operations, and growth prospects. However, due to the large size of these target firms, only 3% of these firms match our "development

stage” criteria, having sales less than \$500,000 or R&D greater than sales. Thus, we use target idiosyncratic return volatility to proxy for difficulty of valuation in this sample.

In Panel B of Table V, we repeat the two-by-two analysis for public targets acquired with equity. Of the 1,944 public acquisitions, 938 use at least 90% equity in the transaction. The results show significant evidence of the effect of information asymmetry on acquirer announcement returns in acquisitions of publicly traded targets. Specifically, the model in Hansen (1987) predicts that stock is more useful than cash in resolving information asymmetry when uncertainty or asymmetry is mostly about the *target* firm. We find that announcement returns for acquirers are significantly less negative when uncertainty about value, which we proxy for with idiosyncratic return volatility, is high for the target but low for the acquirer (−1.7%) compared to cases in which return volatility is high for both parties (−4.2%). As the table contains only stock-swap offers, this result suggests that there is incremental value to the acquirer from a stock-swap offer when information asymmetry, or uncertainty, is greater about the target than the acquirer.

That interpretation is somewhat undermined by the role of the target volatility in this sample. Specifically, acquirer announcement returns are not only significantly less negative when the acquisition involves a target (acquirer) with high (low) uncertainty about valuation (as predicted in the Hansen (1987) model), but also when the reverse is true (the acquirer has above median, and the target below median, return volatility). This latter result is not consistent with our hypothesis or the Hansen model, but perhaps reflects the inappropriateness of a stock-swap offer in acquisitions of publicly traded firms when both acquirer and target have more uncertainty about their intrinsic values.

The remainder of this section provides multivariate tests of these basic results, and Section 4 offers a discussion of potential interpretations of our findings.

3.2. MULTIVARIATE RESULTS

Table VI, Panel A presents the results of our multivariate regressions for private acquisitions. The dependent variable in all regressions is the acquirer’s CAR, as defined in Table I. We report the results from five different models. The first two regressions employ the full sample of acquisitions of privately held firms.⁸ The results of the first two regressions in Table VI support our univariate findings, as the development stage indicator variable has significantly positive coefficients when interacted with the stock indicator variable. We change the stock variable from an indicator (90% stock equals one, otherwise equal to zero) to a continuous variable in regression (2) and find an increase in both the size of the coefficient and

⁸ One observation is lost because of data constraints for the independent variables.

Table VI. Multivariate analysis of acquirer returns and private target firm characteristics

This table presents results from ordinary least squares regressions (OLS) where acquirer CAR is the dependent variable. *Relative size* is the ratio of target deal value to acquirer market value 5 days prior to bid announcement. *Acquirer volatility* is defined in the legend of Table V. *Acquirer Q* is the market value of the acquiring firm (the market value of equity plus the book value of the firm's debt) scaled by the total assets of the acquirer. *Acquirer (Target) is a dotcom* is a binary variable equal to one if the acquirer (target) has a ".com" in the company's name. The definitions of the remaining independent variables are in the legend of Table II. Regression (2) uses a continuous variable for *Stock* as opposed to the other regressions where *Stock* is a binary variable equal to one when the method of payment is comprised of at least 90% stock. Regression (3) removes all acquisitions where the target value is less than 20% of the acquirer market value 5 days prior to the takeover announcement. The regression (5) applies a treatment model to regression (3) to allow for the possibility of the method of payment being endogenously determined. The independent variables of the selection equation (in Panel B) include *Year -1 abnormal return*, which is measured using the firm return minus the CRSP value-weighted market return for the period -12 to -1, where 0 is the month of the takeover announcement. Year and industry fixed effects based on two-digit SIC codes are included, but not reported, in every regression in Panels A and B. Standard errors are reported in brackets, and ^a, ^b, or ^c indicates that the coefficient is statistically significantly different from zero at the 1%, 5%, or 10% level (respectively). Standard errors are adjusted using White's (1980) correction for heteroskedasticity.

Panel A					
Dependent variable: CAR	(1) OLS; Stock ≥ 90%	(2) OLS; Stock = cont.	(3) OLS; Stock ≥ 90%; Rel. sz. ≥ 20%	(4) OLS; Stock ≥ 90%	(5) Treatment; Stock ≥ 90%
Intercept	-0.004 [0.046]	-0.021 [0.047]	-0.040 [0.072]	-0.049 [0.052]	-0.044 [0.077]
Stock	-0.005 [0.031]	0.017 [0.033]	-0.005 [0.069]	-0.007 [0.045]	0.010 [0.056]
Development stage	-0.065 ^b [0.029]	-0.122 ^a [0.041]	-0.183 ^a [0.066]	-0.081 ^c [0.049]	-0.088 ^b [0.039]
Development stage * Stock	0.084 ^b [0.036]	0.149 ^a [0.047]	0.208 ^b [0.087]	0.141 ^b [0.060]	0.142 ^a [0.051]
Log (acquirer market value)	-0.005 [0.005]	-0.004 [0.005]	-0.002 [0.011]	-0.002 [0.006]	-0.003 [0.006]
Relative size	0.033 ^b [0.013]	0.032 ^b [0.013]	0.028 ^b [0.014]	0.029 ^a [0.011]	0.029 ^a [0.011]
Acquirer volatility	0.439 [0.506]	1.202 ^c [0.697]	0.572 [0.651]	0.596 [0.652]	0.574 [0.517]
Acquirer volatility * Stock	0.310 [0.720]	-0.663 [0.926]	0.652 [1.515]	0.035 [1.160]	0.216 [0.742]
Acquirer Q	0.000 [0.000]	0.000 [0.000]	0.001 ^a [0.000]	0.000 [0.000]	0.000 [0.000]
Acquirer is a dotcom	0.023 [0.045]	0.027 [0.045]	0.078 [0.072]	0.197 ^b [0.089]	0.190 ^a [0.063]

Table VI. (Continued)

Dependent variable: CAR	(1) OLS; Stock $\geq$ 90%	(2) OLS; Stock = cont.	(3) OLS; Stock $\geq$ 90%; Rel. sz. $\geq$ 20%	(4) OLS; Stock $\geq$ 90%	(5) Treatment; Stock $\geq$ 90%
Target is a dotcom	0.047 [0.052]	0.052 [0.052]	-0.181 [0.145]	0.072 [0.105]	0.063 [0.056]
Blockholder	0.029 [0.018]	0.031 [0.019]	0.041 ^c [0.022]	0.027 [0.022]	0.027 [0.018]
Discount				0.025 ^b [0.013]	0.027 ^b [0.012]
λ					-0.015 [0.027]
Adjusted R^2	0.0742	0.0757	0.1322	0.1183	
F-statistic	2.60	2.73	2.38	3.35	
N	734	734	357	404	404

Panel B: Probit

Dependent variable: Stock	
Intercept	-2.174 ^b [1.067]
Log (acquirer market value)	0.044 [0.079]
Relative size	0.092 [0.170]
Development stage	0.787 ^b [0.375]
Acquirer Q	0.109 ^a [0.034]
Year -1 abnormal return	0.190 [0.138]

the level of significance of our interaction term (Development stage * Stock). This result suggests that acquirers experience the most positive announcement CARs when buying development-stage firms using stock as a method of payment. In unreported results, we use alternative levels of equity funding, ranging from 50% to 100%, with no substantive changes in our results.

We include several control variables in our regressions as suggested by existing research focusing on acquirer returns. Relative size has a significantly positive coefficient in both regressions, while the blockholder indicator variable, acquirer market value, and acquirer Q are insignificant in both full-sample specifications. Moeller, Schlingemann, and Stulz (2007) find a negative relation between announcement returns for acquirers of public firms using stock-swaps and acquirer idiosyncratic return volatility. They suggest that this volatility serves as a proxy for information asymmetry about the acquirer (in contrast to our focus on proxies for the difficulty

of valuing the target). We find that acquirer idiosyncratic return volatility has little predictive power for acquirer average announcement CARs in our analysis and is actually positive and significant at the 10% level in regression (2). Interestingly, there is no significant relation between acquirer CARs and acquirer size in our sample (contrary to the findings in Moeller, Schlingemann, and Stulz, 2004, for a more general sample of acquisitions). We also include variables indicating whether the target or the acquirer is a dotcom company. In general, these variables are insignificant.⁹

Regressions (3) through (5) vary the basic specification in the first column of Table VI. Because privately held firms are typically much smaller than publicly traded acquirers, the results in the first two regressions in Table VI could be affected by the inclusion of acquisitions of very small targets by very large acquirers for which the value impact of the acquisition (as measured by the announcement CAR) is likely to be small. Thus, regression (3) replicates the specification in regression (1) using only those transactions in which the value of the target firm is at least 20% of the acquirer's market value. The coefficient on the interaction of the development stage variable with the stock indicator is of substantially greater magnitude in regression (3) (doubling in size) and statistically significant at the 5% level. This difference suggests that the effect of the method of payment for R&D-intensive targets on acquirer CARs is much more pronounced when the acquisition could be expected to have the greatest value consequences for the acquiring firm. The acquirer's Q is significantly positive in regression (3), consistent with Lang, Stulz and Walking's (1989) analysis of public targets, as is the indicator variable for blockholder formation, consistent with Chang (1998). However, the evidence for acquirer Q and blockholder formation is weak since it is only significant in this model in which we examine relatively large targets.

Regression (4) incorporates the acquisition discount measure, resulting in a loss of sample size. Controlling for the target's valuation discount is important in this context, since acquirer returns could be driven by the ability of acquirers to purchase privately held targets at a discount (Officer, 2007). Regression (4) demonstrates this explanation (the coefficient on the discount variable is positive and significant at the 5% level), and that the interaction of acquiring a developing firm using stock as the method of payment still produces significantly more positive acquirer announcement CARs even after controlling for the private acquisition discount.

Regression (5) presents results that control for the potential endogeneity of the method of payment choice. While regressions (1) through (4) demonstrate that acquirers earn a significantly more positive return when offering stock to an R&D

⁹ An additional factor affecting premiums for private firms might be tax considerations. Erickson and Wang (2007), for example, note that S corporations might benefit from tax advantages in premiums paid. However, we find that only 43 firms in our sample are S corporations and an indicator variable for these firms has no impact on our results.

intensive target, the target characteristics themselves (i.e., R&D intensity) could influence the acquirer's method-of-payment choice. For example, Hansen (1987) presents a model in which the acquirer protects itself against potential overpayment for the target firm by offering its own stock as a method of payment, and such "lemons" protection would seemingly be more valuable in acquisitions of privately held firms with considerable valuation uncertainty.

Therefore, the regression in column (5) is the second stage of a two-stage approach to controlling for endogeneity. This method is similar to that of Heckman (1979); however, we actually observe the endogenous variable in the second stage, thus we use a two-stage treatment model.¹⁰ Specifically, in the first-stage probit regression (Panel B of Table VI) the endogenous variable (stock) is regressed against potential explanatory variables. The second stage model is regression (5) in Panel A of Table VI. If λ (the product of the correlation between the error terms of the two equations and the standard error of the outcome regression) is not different from zero, then we can conclude that endogeneity does not play a significant role in our model.

Turning first to the first-stage probit in Panel B of Table VI, the significant explanatory variables for the method of payment choice are the variable indicating whether the firm is in the development stage and acquirer Q. Acquirers are more likely to offer stock as a method of payment to the owners of privately held target firms when the target is in the development stage and when the value of that stock is high relative to book value.

The lack of significance in the second-stage regression (regression (5) in Panel A) of the coefficient on λ indicates that it may not be important to control for endogeneity in this context. In the treatment model, the interaction of the development stage indicator variable and stock as a method of payment is again significantly positive, confirming that the key result in Panel A holds even after controlling for possible endogeneity of the method of payment choice.

In untabulated results, we explore the relation between earnout use and acquirer CARs. Earnouts can be used as an alternate contractual device to resolve valuation uncertainty in settings in which the information environment surrounding the target is opaque (Cain, Denis, and Denis, 2006), since an earnout allows the payment from the acquirer to the former owners of the privately held target to be conditional on future performance of the target-firm's business. Regardless of the specification, there is no statistically significant relation between earnout use and acquirer announcement CAR in our sample.

In Table VII, we repeat the analysis of Table VI for acquisitions of public targets. In column (1), we report the regression using whether the target is a development stage company as our measure of uncertainty. In regression (2), we use the idiosyn-

¹⁰ See Hochberg (2005) for a more detailed explanation of treatment models.

Table VII. Multivariate analysis of acquirer returns and public target firm characteristics

This table presents results from ordinary least squares regressions where acquirer CAR is the dependent variable and the independent variables are firm characteristics of the acquirer and its publicly traded target. Regressions (1) and (2) define *Stock* as a binary variable equal to one if stock is at least 90% of the method of payment. In regression (3) *Stock* is a continuous variable. All other variables are defined in previous tables. Year and industry fixed effects based on two-digit SIC codes are included, but not reported. Standard errors are reported in brackets, and ^a, ^b, or ^c indicates that the coefficient is statistically significantly different from zero at the 1%, 5%, or 10% level (respectively). Standard errors are adjusted using White's (1980) correction for heteroskedasticity.

	(1) OLS; Stock = 90%	(2) OLS; Stock = 90%	(3) OLS; Stock = continuous
Intercept	-0.003 [0.015]	-0.002 [0.014]	-0.001 [0.015]
Stock	0.002 [0.011]	0.003 [0.010]	-0.009 [0.012]
Development stage	-0.040 ^b [0.017]		
Development stage * Stock	0.046 ^c [0.027]		
Target volatility		0.259 ^a [0.122]	0.010 [0.129]
Target volatility * Stock		0.198 [0.186]	0.542 ^a [0.199]
Log (acquirer market value)	-0.002 [0.001]	-0.002 ^c [0.001]	-0.002 [0.001]
Relative size	-0.014 ^b [0.006]	-0.014 ^a [0.004]	-0.014 ^a [0.005]
Acquirer volatility	0.919 ^b [0.388]	0.454 [0.417]	1.106 ^b [0.477]
Acquirer volatility * Stock	-1.061 ^b [0.428]	-1.320 ^a [0.433]	-1.971 ^a [0.504]
Acquirer Q	0.000 [0.001]	0.001 [0.001]	0.001 [0.001]
Acquirer is a dotcom	0.011 [0.052]	0.032 [0.057]	0.037 [0.056]
Target is a dotcom	0.057 [0.046]	0.055 [0.045]	0.059 [0.044]
Adjusted R ²	0.0686	0.0856	0.1091
F-statistic	4.98	5.66	7.05
N	1,944	1,868	1,868

cratic volatility of the target's stock return as the measure of uncertainty. In both of these regressions, we proxy for the use of stock with an indicator variable equal to one if the acquirer uses 90% stock or more in the acquisition. In the regression in column (3), the independent variable "stock" is continuous.

Our basic finding that acquirer returns are greater when stock is used in the acquisition of targets with uncertain valuation is confirmed in this sample. When using the development stage indicator, or when entering stock as a continuous variable, the measure of uncertainty interacted with the use of stock is positive and significantly different from zero. In this sample, we also confirm the findings of Travlos (1987) and Houston and Ryngaert (1997) that acquirer returns are more negative when stock is used by acquirers with more uncertain valuation, consistent with the expectation that the use of stock may be indicative of adverse selection.

4. Discussion

Section 3 demonstrates, in both univariate and multivariate settings, that acquirers have significantly higher abnormal announcement returns when they use stock to acquire opaque and difficult-to-value targets (i.e., those with R&D expenses exceeding sales, sales less than \$500,000, or high idiosyncratic return volatility). These results are consistent with theoretical predictions about negotiating an acquisition in the presence of both adverse selection and information asymmetry.

Hansen (1987) suggests that acquiring firms can protect themselves against the cost of buying a “lemon” by offering target shareholders a contingent pricing contract that at least partly offsets any overpayment revealed *ex post*.¹¹ The sub-samples of privately held target firms that we identify as being difficult to value are target firms for which considerable information asymmetry or uncertainty is likely to exist about the value of the target’s assets and opportunities, as R&D- and intangibles-intensive firms are highly speculative.

Thus, our results are consistent with the notion that acquirer returns around acquisition announcements reflect the gains derived from the sharing of valuation risk with target shareholders via a stock swap when there is considerable information asymmetry about the target’s value. Hansen’s (1987) theoretical analysis provides specific assumptions that support such a conclusion. Specifically, Proposition 1 in Hansen (1987) demonstrates that the expected wealth gain for acquirer shareholders from a stock-swap acquisition *strictly exceeds* the expected wealth gain for acquirer shareholders from an equivalent cash acquisition if there is information asymmetry *only* about the target’s value (and the target is reasonably large relative to the

¹¹ Several other papers consider the effects of asymmetric information on the choice of method of payment, though, in general, they do not focus on asymmetric information with respect to target valuation. For example, Berkovitch and Narayanan (1990) and Fishman (1989) address the importance of method of payment in the presence of competing bidders or in pre-empting competition, and Eckbo, Giammarino, and Heinkel (1990) argue that the value of the bidder is revealed by the mix of cash and securities used as payment for the target.

acquirer¹²). Intuitively, because a stock-swap offer allows former target shareholders to participate in future wealth gains in the merged firm, an acquirer can convince target shareholders to sell at a relatively lower price in a stock-swap offer relative to making a cash-only offer for the target firm. A stock-swap offer thereby resolves the information asymmetry problem that restricts trade when cash-only offers are employed.

Therefore, our empirical findings are consistent with the predictions of the theoretical model in Hansen (1987), under the (arguably reasonable) assumption that information asymmetry mostly concerns the target (at least relative to the acquirer) in acquisitions of privately held firms. However, the empirical literature does not frequently employ the “wealth gain” predictions of the Hansen (1987) model – this model is most frequently cited as a theoretical reference for the method of payment *choice*. If we are to rely on the wealth gain predictions from Hansen (1987) (e.g., Proposition 1), therefore, it is incumbent on us to provide some evidence that acquirers choose the “correct” (or predicted) method of payment in a contracting situation potentially fraught with information asymmetry. In our sample, 79% of acquirers of informationally-opaque private companies¹³ use stock as the primary method of payment, providing support for the contention that stock is the optimal method of payment when the acquirer faces considerable information asymmetry about the value of the target’s assets and opportunities. However, this fact begs the question: why do the other 21% of acquirers use cash as the method of payment?

There are several factors unrelated to information asymmetry (and therefore omitted from Hansen’s model) that can affect the method of payment in the acquisition of a private company. Target shareholders frequently regard an acquisition of their privately held firm as an opportunity to obtain liquidity (Faccio and Masulis, 2005; and Poulsen and Stegemoller, 2007).¹⁴ In some instances, target owners are willing to reduce their selling price in exchange for immediate liquidity thereby inducing the acquirer to substitute optimal contracting (stock as the method of payment) for lower pricing (Officer, 2007). Acquirers will also deviate from the

¹² Note that regression (3) in Table VI constrains the empirical analysis to a sample of acquisitions of private firms where the target is reasonably large relative to the acquirer ($\geq 20\%$ of the acquirer’s market capitalization).

¹³ Information opacity as measured by the development-stage indicator variable in Panel A of Table IV, $86/(86+23) = 0.79$.

¹⁴ Selling a private firm with valuable – but difficult to value – growth opportunities to a public firm potentially offers access to “internal funds” to which the entrepreneur running a private firm may not otherwise have access. Bidders can benefit from acquisitions of these targets if the rents from access to internal capital at least partially accrue to the bidder. Note that our asymmetric information proxy variables such as R&D expenditures can also serve as a proxy for firms having substantial growth opportunities and capital needs.

optimal method of payment predicted in Hansen's model, even in the face of information asymmetry about the target firm, for control-related reasons. As Amihud, Lev, and Travlos (1990) demonstrate, in a relatively large stock-swap acquisition in which there is a potential dilution of control of the acquirer's dominant shareholders, the acquirer has an incentive to use a non-voting method of payment that will not reduce the control of shareholders already in place.

We observe that acquiring-firm managers often pay cash to avoid relinquishing control even though cash is the "suboptimal" method of payment under asymmetric information in two ways. First, we examine deals in our sample of 735 acquisitions of privately held firms that would have resulted in a blockholder (a shareholder of at least 5%) in the acquiring firm had stock been the method of payment. We can identify the largest individual owner for 55 acquisitions of privately held targets in which the acquirer did not use any stock as a method of payment. If these transactions had been stock-swaps (the method of payment being 100% stock), then the largest individual owner in 26 deals (47.3%) would have become a 5% blockholder in the acquiring firm. For comparison, of 122 actual stock-swaps for which we can identify the largest individual target owner, only 30.3% (37) created a blockholder in the acquiring firm. Second, we consider the interaction of the method of payment and ownership levels of acquiring-firm officers. For acquisitions of privately held targets in which the relative size of the target to the acquirer is greater than 20% and acquiring-firm officers own 5% or more of the acquirer, cash is preferred to stock as the method of payment by a 1.75-to-1 ratio. For the same level of officer ownership, but for transactions in which the relative size is less than 20%, stock is preferred to cash by a 2.5-to-1 ratio. Thus, there is evidence that one motive for using cash is to avoid diluting control, despite its disadvantage in informationally-opaque environments.

Therefore, we interpret our results as consistent with acquirers trading off the benefits and costs of the two main methods of payment (cash and stock) for privately held targets. If target shareholder liquidity and acquirer shareholder control considerations are not important, the model in Hansen (1987) predicts that acquirers will use stock as the method of payment. Our findings suggest that acquirer announcement returns reflect the gains from sharing some of the valuation-risk with target shareholders by making a stock-swap offer for a difficult-to-value target.

More broadly, the positive acquirer returns from stock-swap acquisition offers shown here are likely to be prevalent in acquisitions of both public and private targets. However, confounding factors surround acquisitions of public firms, and these factors appear to make the announcement returns to stock swap acquirers of public firms (negative or zero) different from the announcement returns to stock swap acquirers of private firms (significantly positive). For example, proposed acquisitions of public firms are typically announced 9 to 12 months prior to com-

pletion, confounding the interpretation of announcement returns as a clean measure of the value of the acquisition to the acquirer, and it is much more likely that the information asymmetry problem is more evenly distributed between the two parties when one publicly traded firm acquires another. One way to interpret the findings in this paper is that samples of acquisitions of private firms offer an ideal laboratory for Hansen's (1987) model, as the information asymmetry problem is the most lopsided with respect to the target and returns are the cleanest measure of the value of the acquisition to the acquirer. Therefore, the effects we identify (positive announcement returns to stock-swap acquirers of opaque targets) are likely to be obscured by other factors in samples of acquisitions of publicly held firms, making the announcement returns to acquirers of privately held firms appear anomalous. Despite these obscuring factors, we find support for our hypothesis in a sample of publicly traded targets.

5. Conclusion

In this paper, we document significantly and substantially higher announcement returns to stock-swap acquirers when the target is difficult to value. The empirical relations that we identify are most likely to be observed in samples of acquisitions of privately held firms because information asymmetry between the negotiating parties and market participants is more likely to be one sided (relative to acquisitions of publicly traded firms). However, we confirm the importance of the difficulty of valuation in a sample of public targets also, despite the fact that many offsetting considerations make it more difficult to observe the impact on acquirer returns in isolation.

One way to interpret our results is in the context of Hansen's (1987) model of information asymmetry: there is a reward to acquirers for using stock as the acquisition currency when the target's assets and operations are difficult to value. Furthermore, the positive relation between acquirer returns and proxies for the opacity of the target's value when stock is the method of payment is the most pronounced in the portion of our sample for which the target's financials are not publicly disclosed at the time of the acquisition. In other words, acquirer returns are most positive when the acquirer uses a contingent method of payment (stock) for targets possessing characteristics (R&D- or intangibles-intensity) that would result in market participants finding it difficult to assess the benefit of the acquisition to the acquirer. In this case, using stock to acquire the target mitigates concerns about overpayment by the acquirer. Importantly, we confirm this result when we control for other considerations through multivariate analysis in a sample of public targets using the idiosyncratic risk of the target firm as a measure of uncertainty.

Appendix: Categorization of intangibles for acquired private firms

This table describes the components of intangibles as found in the notes to the financial statements of 280 target firms. There are 295 sample firms with intangibles on the balance sheet; however, we did not find the breakdown of intangibles for 15 firms. The last column, *Other*, contains items such as acquisition fees, employment contracts, network affiliations, deferred pension assets, customer agreements, and lease and advertising rights. In the first row of numbers, averages are reported on top with the median in brackets below.

	Goodwill	Non- compete agreements	Customer lists	Deferred financing fees	Patents	Trade names, trademarks, copyrights	Broadcast (and other) licensing agreements and rights	Product development	Software, technology	Other
Proportion of intangibles	0.630 [0.840]	0.038 [0.000]	0.034 [0.000]	0.021 [0.000]	0.035 [0.000]	0.022 [0.000]	0.065 [0.000]	0.029 [0.000]	0.037 [0.000]	0.089 [0.000]
Value-weighted proportion	0.643	0.017	0.031	0.009	0.005	0.054	0.118	0.004	0.023	0.096
Firms with a non-zero observation	218	60	34	34	26	25	28	19	21	84
# of firms where item is largest intangible	187	8	6	5	10	5	20	9	11	19

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