“The Principal Agent Problem, Asymmetric Information and Leveraged Buyouts: How Who Does the Buying Affects Who Gets Bought”

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1. Introduction

In the large and flourishing business of taking public companies private, it seems logical that there be noteworthy differences between deals that involve the managers of the companies acquired and deals that do not involve them. After all, managers almost always have more information about their firms than outsiders. They might better grasp their company's growth prospects, for example, understanding the value of a drug in the pipeline or the potential to surpass a competitor in the near term in ways unapparent to common stockholders. Those managers would stand to gain enormous profits if they could convince a financial sponsor to help them take their publicly undervalued company private.

On the other hand, institutional investors like private equity firms do not have access to the kind of information managers do. They are reliant on public information and personal connections to scout out potential acquisitions. Occasionally, their only sources may be SEC filings, especially if the management of a potential target is not excited by the prospect of a buyout and is unwilling to cooperate. If a firm publicly shows obvious signs of undervaluation, therefore, we can expect institutional investors to get involved, just as we would expect increased activity in the stock market. But when management participates in a buyout, it is difficult to say what signals that firm might send to the markets.

In addition to these informational asymmetries, institutional investors and management often have different and not always mutually compatible goals. When a company's managers participate in a buyout, they are investing for personal gain. But private equity firms invest on others' behalf. As personal wealth managers for institutional investors and the super-wealthy, private equity firms do better when their investments generate substantial returns, but often collect their fees regardless. Holding companies operate somewhat similarly to private equity. In

addition to financing their acquisitions with their own (and borrowed) capital, these firms manage their subsidiaries very closely over a longer time frame than a typical institutional investor. Unlike private equity, they may not be planning on a five- to ten-year exit strategy.

Despite these observations, literature on buyouts and going private transactions to date has not focused on identifying differences between pure private equity buyouts and those in which management participate. Work in this field has largely examined the phenomenon as a whole, looking into the general characteristics of firms that go private from the internal perspective of the target, not the buyer. The impetus for a buyout, however, often does not always originate within the target company and its management. And so far, little theory has proved useful for describing and differentiating that impetus.

The purpose of this study is to develop and test theories about what makes individual firms attractive to different buyout agents. We work principally with the distinction between leveraged buyouts led by management and those led by private equity firms, the two sub-categories of buyouts where we expect the greatest differences. Our findings provide strong evidence that private equity firms and management do not look at buyouts the same way. Data suggests that financial institutions are interested in larger firms with strong acquisitional history, where the potential to generate returns for their investors is higher. Managers, on the other hand, appear to buy out smaller companies not faring well in the equity markets. In one specification, a 1 percent decrease in market to book ratio can make a firm about 20 percent more likely to undergo a management buyout.

These results support both the general understanding of the principal agent problem in corporate management and attest to the obvious informational asymmetries between management and public investors. If private equity funds, representing would-be equity holders'

interests, and management, representing their own, were targeting the same thing and had the same information, we would expect no significant divergence between the companies both buyout. The fact that there are substantial differences is especially curious considering that most if not all management buyouts also involve private equity sponsors. It is clear that some managers are capable of making a pitch effective enough to lead financial sponsors away from the type of firms in which they typically invest.

In investigating these buyouts, we learn much about these agents' motivations. We also provide evidence that literature on going private transactions should accommodate the perspective of the acquirer, something little research has demonstrated to date. From here, economists will be better positioned to answer secondary questions about buyouts, such as how they add value and for whom. These deals comprise billions of dollars each year and are rarely conducted without controversy. A firm grasp of the economic factors behind them is essential to understanding the role they play in complex financial markets.

It is worth noting that distinguishing between the buyout agents is not always easy, since most transactions involve multiple parties. Management will often approach private equity to help finance a deal. Investment banks playing the role of both creditor and manager are sometimes involved. And many firms treat each investment differently. Some they run as an operating firm might, while others they strip and sell in a matter of months. One of the biggest challenges of this and future papers will be to accurately and fairly categorize the data. We begin with entrenched management's involvement because it is one of the simplest possible distinctions.

Now is an excellent time to be studying buyouts, a relatively new phenomenon. The huge leverage required only became widely available in the late 1980s. Today, private equity funds

manage roughly $1 trillion in capital between close to 2,000 firms, each one conducting anywhere from two to dozens of deals every year. Their targets are sometimes household names — J. Crew, Eddie Bauer, AMC Entertainment, Domino's, Hertz, Burger King — and other times firms of which only specialists have heard. Management buyouts continue to occur on a frequent basis. The junk-bond raiders of the early 80s, the famed "Barbarians at the Gate" who took RJR Nabisco private, have evolved into a fully fledged alternative investment industry, which is of enormous importance to institutional investors around the world. Most importantly, the industry's decades of deal-making now comprise a database that supports meaningful econometric analysis.

2. Literature Review

Our study is not the first to examine the micro-level characteristics of public firms that go private. Throughout the 1980s, as management buyouts became increasingly popular, researchers turned their attention to the economic forces behind the phenomenon. Maupin (1987), notably, uses financial and stock market variables to successfully predict about 80 percent of firms that go private in her sample. As large and sometimes unsuccessful buyouts continued to make headlines, economists also began to examine the sources of value in these transactions and ways to explain the 30 to 50 percent premium typically paid on pre-announcement equity prices. DeAngelo, DeAngelo and Rice (1984) argue that the 30.4 percent premium they find derives from reduced public ownership expenses and improved incentive structures for executive decision makers. Lehn and Poulsen (1988), Jensen (1986) and Kaplan (1987, 1989) expand on the value of reducing agency costs, which we discuss below, in addition to finding evidence for the gains from improved tax structures and operational cost reductions in going private.

Most recently, Bharath and Dittmar (2009) expand the empirical and theoretical basis for going private transactions. Their research neatly articulates the now well-developed theory of the agency costs and public ownership expenses saved by going private. Replete with reversible theories drawn from the extensive literature on the decision to IPO, their model accurately predicts about 83 percent of the going private decisions in their sample. Their findings support the importance of the informational costs of public ownership to the decision to go private, as well as the benefits of liquidity in public markets. Their research also supports the value of reducing agency costs created by high free cash flows, especially pre-1990s.

The alternative stream of research to that summarized by Bharath and Dittmar is the theory of financial distress. Largely developed by Opler and Titman (1993), the financial distress

model argues that when the costs of financial distress are high, going private may provide less benefit. It is important to understand that the agency costs and financial distress models share many of the same predictions. But when the theories do diverge, agency costs models have proved to be more useful. Weir et al.'s (2008) investigation of public to private transactions in the U.K. finds poor evidence for the predictive value of financial distress models when they differ from agency cost theories. Using data from 115 transactions matched with an equal number of firms that stayed public from 1998-2001, they find less R&D spending does not lead to going private, though Opler and Titman had earlier found it did. Contrary to what financial distress hypothesizes, Weir et al. also find that better stock market performance and older firm age do not lead to going private.

In sum, current literature supports that candidates for public to private transactions are likely to suffer greater costs of public ownership, especially in the production and distribution of financial information. They are also likely to be less liquid and small, stable, and financially unconstrained. They show high free cash flows in certain periods and a high book-to-market ratio. An array of macroeconomic variables, like the availability of cheap debt, also affects in intuitive ways the decision to go private.

None of these studies, however, focuses on how the behaviors of various buyout agents diverge. Only Weir et al. begin to investigate the problem. They propose that private equity looks for high growth potential in a shorter time frame, higher free cash flow, a greater degree of asset collateralization, low market to book ratio, low R&D spending, and bigger and older firms — all proxies for lower potential financial distress. The model, however, has limited explanatory value for the involvement of private equity firms along these lines. Only relative diversification proves

to be valuable for describing the involvement of private equity firms. Our own theories on diversification and private equity involvement will be discussed below.

Bharath and Dittmar also conduct some sub-sample analysis, but do not develop theory specific to the buyout agent. Instead, they find that their agency and public ownership costs model is broadly consistent across each buyout agent, with a few minor exceptions. Private equity and management buyers are less likely than holding or operating companies to pursue firms with high R&D or capital expenditures. And firms with higher debt are more likely to attract private equity, which Bharath and Dittmar suggest could indicate a need for financial restructuring. Their sub-sample analysis, however, only includes firms that go private under the legal definition circumscribed by the SEC's form 13e-3 and may exclude many takeovers by private equity firms considered in this study.

Ljungqvist et al. (2008) is one of the only studies to solely investigate the determinants of private equity funds investment decisions, though the analysis focuses on whether to invest or not, not necessarily where. Their data does not include the micro characteristics of targets and is not restricted to public to private deals. The authors find, however, that funds investment more and earn better returns when investment opportunities peak, competition slacks and debt is cheap. Young funds appear to invest more in riskier targets regardless of market conditions, and tend to become more conservative over time.

The private equity industry alone, of course, is also the focus of its own academic attention. As Wright et al. (2008) point out, approximately 100 studies delve into private equity's returns to investors, profitability and productivity, its effects on employment and wages, its growth and investment strategies, the association of debt and firm failure, the gains from reselling assets, and the duration of private equity firms' effects. Research is particularly

concerned with the returns on private equity and generally concludes that, at least in the US, private equity funds return slightly better than the S&P500 net of fees (Kaplan and Schoar 2005).

Research is also drawn to the more controversial aspects of post-buyout firm behavior. There is, however, little to no evidence that private equity activity leads to pervasive layoffs or wage reductions. In fact, shareholders of public to private targets earn substantial returns, firm productivity and profitability improve directly after buyouts, risk is decreased and net taxes to the government are positive (Palepu 1990). Though some debt holders absorb loses, they are far outweighed by the gains to equity holders. Lastly, Kaplan (1989) finds that buyouts also typically lead to large increases in operating performance in the first three years.

Literature on the principal agent conflict, which we employ to help explain differences in private equity's and management's behaviors, is extensive and multi-disciplinary. While research in economics has focused on conflict between executives' personal interests and that of shareholders, others have considered the theory in light of policy making, institutional design, bureaucratic organization and other areas traditionally considered under the umbrella of political science. The essential problem is general. It can arise in any situation that involves cooperation. Its basics, however, rarely vary. The principal is an actor with resources but no immediate means to deploy them. He delegates some or all authority to an agent, who is expected to act "as an extension of the self" and further the principal's interests (Braun and Gusten 2003). In most economic applications, both actors are considered to be rationally self-interested and operating according to their own set of preferences. If incentives are properly aligned, there is often no conflict. But when the agent, working for his personal welfare, neglect's the principal's interests, agency costs can arise.

Jensen and Meckling's (1976) coinage of the term agency costs solidified the relationship between principal agent issues and the theory of the firm. "The separation of ownership and control," they argued, can cost firms in multiple ways. The principle must expend resources to monitor the agent (attending shareholder meetings, research, etc.). The agent faces bonding expenditures (auditing, control systems, compensation incentives, etc.). And there is likely a residual loss. These costs appear frequently in corporate contexts because shareholders' and executives' information is almost never symmetrical. For example, a manager may use loose funds to renovate his offices rather than pay a dividend without declaring that choice to shareholders. Or, in the case of a buyout, a manager may chose to take his firm private and at a price below what the firm is actually worth.

The distribution and generation of these agency costs ultimately impact the ownership structure of a firm as manager-owners move towards an optimal mix of debt and equity that minimizes the agency costs associated with each. Note that the Modigliani-Miller (1963) theory of the irrelevancy of corporate capital structure, which argues that firms are worth the same whether they are highly levered or not, excludes the possibility of agency costs.

Jensen's (1986) extension of Jensen and Meckling's theories to the ownership changes associated with a buyout and the agency costs of free cash flow is perhaps the most relevant to this study. He argues that "payouts to shareholders (dividends) reduce the resources under managers' control, thereby reducing managers' power." Managers, therefore, have strong incentives not to make payouts to shareholders and instead to grow firms beyond their optimal size. A leveraged buyout, Jensen argues, reduces agency costs by better aligning management's and equity holders' interests. Top-level managers typically receive a 10 to 20 percent portion of the private company's equity, which is subordinated to debt acquired in the buyout transaction.

That personal investment in equity increases the incentives for managers to guide the firm as a whole, rather than themselves, to success. Moreover, servicing debt acquired in a buyout soaks up free cash flow, the primary source of previous agency costs.

Opler and Titman (1993) and Lehn, Netter, and Poulsen (1990) empirically support Jensen's findings. Both use Tobin's *q*, the ratio of a firm's market value to its replacement cost of assets, to measure the size of agency costs. Since this variable also acts as a proxy for growth prospects, its significance and negative sign in their results suggests that buyouts are more likely to occur when firms have run out of growth options. At that point, conflict between shareholders, who want dividends, and managers, who want to invest, would be greatest. Outside of this literature on incentive realignment, however, little work has been done on how the principal agent problem might apply to buyouts.

3. Theoretical Model and Hypotheses

In this study, management is defined as upper level executives with both the personal wealth and the authority to initiate a buyout. This group is commonly considered to coincide with the "C-suite": CEO, COO, CFO, etc. Private equity refers more specifically to a private equity fund, raised by a firm's general partners (GPs) from a variety of limited partners (LPs), such as the super-wealthy or pension funds. Some of these funds target specific sectors, like infrastructure or real estate, while others invest more generally. They typically deploy their capital over a number of years and aim to exit each investment in about five to ten years. Private equity firms are paid fees, commonly 2 percent of total assets under management, and carry, often about 20 percent of returns on their investments after LPs have been paid a pre-negotiated amount. A leveraged buyout is specific type of private equity investment in which a fund or a consortium of funds, using substantial amounts of borrowed cash, buys 100 percent of the equity of a public company, removing it from exchanges and public markets. A management buyout is effectively the same, except that executives or a group of executives form part of the consortium buying the equity. Managers could personally take anywhere from 1 to 100 percent of the total equity.

During a buyout, it is clear that management, the takeover agent and others involved in going private deals may often be at loggerheads during the negotiation process. Our contention, however, is that there are fundamental differences between companies likely to attract a management led buyout and those not. The purpose of this section will thus be to develop hypotheses for how management and private equity will respond to a variety of firm-specific

factors. We form three basic principles, which we intend to govern only the decision to go private, not firm behavior post-buyout or in a general sense.

1. Management seeks primarily to increase the personal benefits they receive from the firm, both in the form of compensation and executive perquisites.
2. Private equity managers seek primarily to increase the value of their invested equity over a limited time-horizon.
3. Managers have access to more information about their companies than outsiders and have at least some control over its release.

According to principles 1 and 2, we therefore expect a buyout to occur when either management can benefit personally or private equity funds generate returns. Principle 3 allows for management to see potential returns where private equity does not. If managers stand to gain from a buyout, they can use that informational asymmetry to pitch their firms to financial sponsors that might participate in the transaction. But if they stand to lose, managers can conceal information about the potential profitability of their companies in order to avoid private equity attention.

If the principle agent problem did not apply to leveraged buyouts, there would be no conflict between the management of potential targets and acquirers. Management would be interested in whatever is best for shareholders, and visa versa. This is clearly not the case. There are some lemons, for example, that shareholders would be happy to hand over to a private equity fund, if only managers were willing to sell. Others firms face the opposite dilemma. Shareholders rejected the Blackstone Group's recent tender for the energy giant Dynergy despite

management's warnings that the firm would struggle without immediate outside investment. These types of conflicts are indicative of the agency problems that arise in corporate contexts, especially when information is asymmetrical.

After a buyout, of course, the gap between shareholder and management is closed. Often, they become the same entity. But this does not mean that the interests of one always prevail over the other. Instead, net agency costs are brought to zero because either a) the manager, made owner of the firm, continues to behave in a way that promotes her personal welfare over that of the firm but now pays for it in corresponding decreases in the value of her equity. Or b) the manager changes her behavior, either voluntarily or under compulsion. She may simply be replaced. In this sense, corporate agency costs can be resolved in two ways: in favor of shareholders or management.

The direction in which agency costs are resolved depends on who does the buying. We expect private equity to mitigate them in favor of equity holders and maximize the value of their stake even if it comes at a cost to management. Their goal is to eliminate any residual loss and minimize monitoring expenditures. In fact, these firms are known for replacing CEOs with turn-around specialists, whom they reward with equity rather than cash, determined cost cutting, and stripping assets. They are also known for dividend recapitalization — saddling a firm with debt to pay its shareholders (the private equity fund) a dividend — a classic example of their propensity to favor shareholders. Private equity firms are also, of course, in the business of buying and selling companies. Their business rests on the potential to increase the value of their equity in an acquisition during its tenure under their management. The returns they pay to their limited partners depend on that increase. Their ability to raise funds in the future, and the ultimate success of their firm, depends on establishing a reputation for strong, consistent returns.

Managers, however, choose most frequently to increase the resources under their management now and in the future, even if that decision comes at the expense of stockholders. In going private, managers escape the agency costs that they bear while the firm is public. The executive is spared having to prepare quarterly reports, meet earnings predictions, and other bonding expenditures. A buyout affords them the opportunity to continue to act in their personal interest with minimal opposition from public equity markets. In other words, if management's behavior is increasingly rejected by shareholders, executives may chose to resolve agency conflicts by shouldering a greater share of them in a buyout and continuing to act in a pro-growth way. Of course, they will still have to answer to creditors if their actions lead to the failure of the firm. Note, however, that growth-oriented behavior need not be directly self-interested. Because firms tend to reward middle managers with promotion, executives at many levels should be expected to place a premium on sales growth (Jensen 1986).

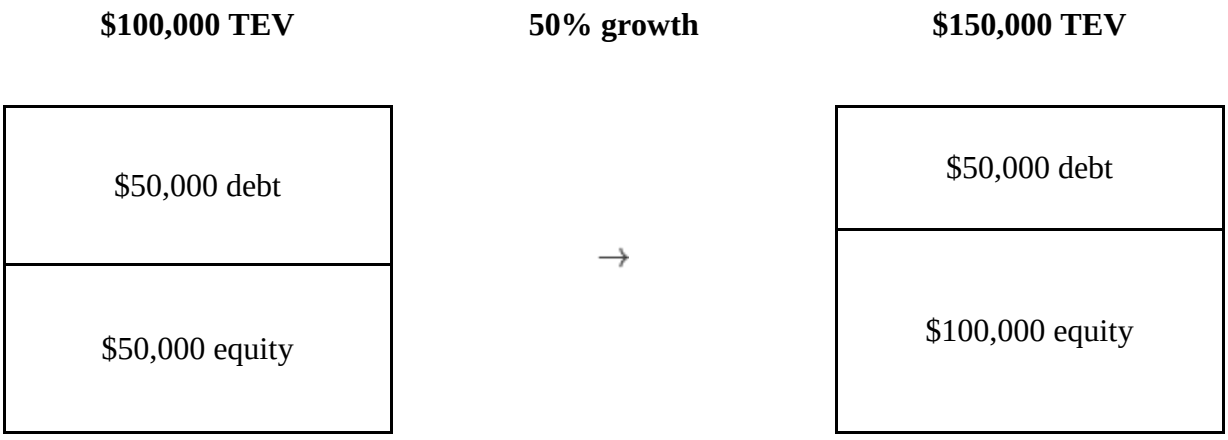
It is also important to note that the vast majority of management buyouts involve private equity and other financial sponsors. It is unlikely that these investment firms would be willing to finance a deal that does not promise returns in the near-term. Management, therefore, must be willing to channel some of the residual loss recovered from agency costs into equity, which would benefit both themselves and their investor-sponsors. They must also be able to convince their co-investors that going private will yield positive returns. Anecdotally, CEOs are known to do this by arguing that real, profitable growth is possible only as a private company, where investments are not subject to the monitoring scrutiny of shareholders and analysts. CEOs might, as principle No. 3 suggests, also have information about the value of their firm that the public either does not or can not understand.

The purpose of this study is to investigate whether firms where we suspect agency costs are resolved in favor of management differ from firms where private equity might mitigate these issues. In some cases, it is likely that these companies are too similar to distinguish. Firms with high agency costs seem equally likely to be either the object of a hostile takeover or a defensive buyout from management. In less extreme cases, however, it seems that firm-specific factors may influence whether management or private equity, given that both have access to different information and have goals not always mutually compatible, is willing to engage in a buyout. That decision depends at least in part on whether the monitoring costs and residual loss, so important to private equity, outweigh the bonding expenditures so vexing to management. We discuss these factors and others below.

3.1 — Private equity calculus

Like most investors, private equity firms are in the business of generating returns. They do this by buying a firm, increasing the value of their equity, then selling the firm, or exiting. The success of any private equity deal is measured by difference between the entry and the exit price. The success of a private equity firm itself is vested in the size of that difference over a string of deals. When it comes to leveraged buyouts, however, returns to investment are complicated by leverage ratios, the cost of debt and cyclical patterns in valuations. In fact, private equity firms can sometimes generate substantial returns even if their acquisitions experience little or even negative earnings growth while under their management. This seemingly incongruous fact is made possible by leverage and changes in valuations. By building a basic model for how private equity firms deploy these tools, we can develop a framework for how they make investment decisions.

Leverage can dramatically increase the returns to investment for private equity managers. For example, assume a 50% difference between entry and exit valuations and a 50% leverage ratio. The returns to private equity managers would be as follows (TEV stands for total enterprise value):



In this case, private equity investors would have doubled the value of their equity. As leverage increases, its effect on returns to equity becomes even greater. Return is calculate as 100*a / (1-L)*100, where a is growth in TEV and L is leverage ratio. As a multiple of growth in TEV, a, return is simply 1/(1-L).

Leverage	Return as multiple of growth in total enterprise value (TEV)	Return assuming 50% growth in TEV	Return assuming 25% growth in TEV
0%	1x	50%	25%
20%	1.25x	63%	31%
40%	1.6x	83%	42%
60%	2.5x	125%	63%
80%	5x	250%	125%
100%	∞	∞	∞

To some extent, leverage ratios are exogenous factors for established firms. They are not determined internally, but rather depend on the availability and cost of debt from other financial sponsors. In the recent financial crisis, for example, private equity firms have been unable to secure the degree of leverage widely deployed in the mid-2000s. When leverage is hard to come by, the difference between entry and exit prices becomes more important to generating returns. Conversely, this means that when credit is flowing easily, private equity firms can generate substantial returns without seeing enormous increases in the value of their target's TEV. Of course, firms also stand to lose substantial amounts from highly-leveraged deals. Since the target company itself is used as collateral for the debt used to purchase it, funds are unlikely to get much or any of their equity back if the firm goes bankrupt. Senior creditors, like the banks from which the funds borrowed, would be paid off first.

Assuming firms are looking for a 25% rate of return, a figure that many executives point to as an industry standard, the following chart highlights the change in valuation needed at various degrees of leverage to reach that figure.

Leverage	**Change in TEV required**
0%	25%
20%	20%
40%	15%
60%	10%
80%	5%

Of course, this analysis assumes no debt payment, which can cut both ways. Interest expense paid to financial sponsors eats away at a company's cash flow, which could be paid out

to investors as a dividend and thus a return on their initial invested capital. At the same time, because debt from a leveraged buyout is serviced by the acquisition's cash flow, paying down debt increases the equity stake of private equity investors without requiring additional injections of capital, thus also increasing returns. Cheaper debt is obviously preferable, however, especially when dealing with a financial strained acquisition. Moreover, the best private equity targets will be able to easily manage and pay down a large debt burden. The cost of debt thus does not directly affect which firms private equity companies target, except to exclude those firms whose debt servicing potential is not sufficient, given a certain cost of debt.

So far, a firm's likelihood of attracting private equity acquirers is a function of available leverage, debt servicing ability, and potential changes in TEV. Assuming private equity scouts are targeting a 25% rate of return, a target's attractiveness is thus subject to the following constraints, where A is *expected* percentage growth in TEV, L is the degree of leverage, C is the cost of debt per quarter, and F is the free cash flow per quarter:

$$A/(1-L) \geq .25$$

and the debt constraint

$$L \cdot TEV \cdot C \leq F$$

Private equity firms principally make their money by accurately and consistently predicting *A*. Often, they look for cyclical variations in company valuations. A natural gas company, for example, trading at 5x earnings before interest, taxes, depreciation and

amortization (EBITDA), when it traded for 8x in 2000, could signal a future upswing in value even without changes in earnings. At times, private equity firms also look for signs that a firm is being mismanaged by benchmarking its metrics across competitors. A shipping firm with outsize sales, general, and administrative costs (SG&A) compared to peers, for example, could be ripe for a management turn around. So could a firm where the separation of ownership and control has lead to substantial residual loss from agency costs. But regardless of why investors expect acquisitions to increase in value, the ideal private equity target remains the firm with the mix of debt-load capacity and value-growth potential that produces the largest returns.

What makes most private equity funds different from hedge funds or common stockholders is both the amount of debt they employ and the hands-on role they take in managing their portfolio companies. Anyone could take out a loan and invest heavily in a firm that shows signs of undervaluation, but only private equity funds generally have access to the amount of debt and equity required to buy the *entirety* of large corporations. Once they own a firm, private equity funds also have a number of tools that common stockholders do not. As the majority stakeholders, they can replace management, split up the firm or try to increase the value of their equity in ways that average stockholders cannot. Many private equity firms let their portfolio companies work together as well, using, for example, a common purchasing firm for raw materials. Some funds also have a Rolodex of managers who specialize in turning firms around, as mentioned above. If you are a common shareholder, you have no power to replace an entrenched CEO who has been with the company for twenty years or more but is doing little to earn his keep.

There are a number of reasons why the ideal private equity target may not always be the ideal target for management takeovers. The most obvious is that the above analysis considers

gains from going private to equity holders exclusively. But as we know from our discussion of the principle agent problem, the interests of management and shareholders often conflict, and managers may in fact be motivated to take their firms private for reasons apart from returns on equity. It is granted that in many leveraged buyouts managers become substantial stakeholders in their firms and would stand to gain huge amounts from a successful entry and exit according to the private equity model. But in general managers do not subsist by serially buying and selling companies, and may not look at a leveraged buyout on a limited investment horizon. More important may be the benefits to managers of running a private company — more control over cash flow, less compensation oversight, no stringent need to meet quarterly earnings predictions, and so on. The private equity business model, however, would require managers to sell their company after taking it private. Even if this re-exit comes in the form of a second IPO that leaves them in charge, managers would still face drastic changes in control over free cash flow and executive perquisites. Moreover, a second IPO would undo all the benefits of going private that research has shown to motivate managers to make the switch.

Undoubtedly there are a large number of leveraged buyouts led by management and private equity which were motivated by the same research, the same benchmarking, the same potential to make large sums in a few years. We predict, however, that managers will be on the whole motivated to pursue a leveraged buyout for a variety of reasons more closely related to their personal welfare than the return-focused calculus of private equity firms. In the end, managers usually want to remain managers, while private equity wants to make their money back. This leads us to our first hypothesis:

H1: We predict that private equity will pursue acquisitions that show signs of undervaluation both in terms of historic trading multiples and industry peer comparisons. The greater stake management assumes in taking a firm private, however, the less important potential returns to equity will become.

Detailed below is a further discussion of factors commonly associated with the decision to go private and analysis of how they may impact each buyout agent.

3.2 — Information

All public companies face substantial costs in producing and distributing information to equity holders. Jensen and Mecklin (1976) would likely consider these bonding expenditures shouldered by management, not shareholders. As Kaplan (1989) points out, these include the production of financial reports, auditing and accounting according to SEC requirements, operating stockholder and investor relations departments and time spent by upper management on issues related to being listed. Producing and distributing this information is best seen as an investment in share price. When the investment exceeds the return, going private can be an attractive option. Poor returns on information can happen for a variety of reasons, as Bharath and Dittmar point out.

i. Firms can face adverse selection from investors who are concerned about the completeness and accuracy of the information they receive. This is particularly difficult problem for firm small firms, and those with concentrated ownership and other indicators of low visibility. For those companies, the return on information investments is smaller.
ii. A lack of liquidity can prevents effective adjustment of share prices to new information.

iii. Information can be less accessible or harder to produce, a phenomenon which Bharath and Dittmar call the costs of serendipitous information, after Subrahmanyam and Titman (1999). For example, investors stumbling upon information about a new Ford truck model are more likely to process that information than a news release from a Pfizer about a cancer drug reaching the second step of FDA approval process. Thus firms involved in high-tech, complicated industries are likely to face smaller returns on informational investments, and may stand to benefit from going private transactions.

The magnitude of the costs of information production is debated. DeAngelo and DeAngleo (1987) report that the average *direct* costs of public ownership, excluding the cost of time management spends on issues related to public ownership, range from $75,000 to $200,000, though they obviously vary depending on firm size. Intuitively, these figures too small to be the motivations behind large buyouts, especially given the costs of large premiums over share prices commonly paid. Recent research into the effect of the 2002 Sarbanes-Oxley act (Sarbox) supports that intuition, finding that smaller firms are more affected by informational costs. Bartlett (2009) reports that the act, which is generally considered to have substantially raised the informational costs of being public (Zingales 2006), led smaller firms to avoid high-yield debt subject to Sarbox reporting requirements. Becker and Pollet (unpublished) also find support for the argument that Sarbox has pushed smaller firms to go private.

It is important to note that many of Bharath and Dittmar's findings on the importance of informational costs are also explained by other theories discussed below. Analyst coverage, for example, which is considered a measure of visibility and thus the size of informational costs, also affects liquidity. And liquidity is important for multiple reasons beyond the effective

adjustment of stock price to new information. We will try to narrow our predictions as much as possible here.

For private equity managers, who approach each investment with an exit strategy in mind, short-term cost saving on information production would not be a substantial source of value. That exit strategy is often a re-IPO, after which the target would re-incur the costs of being public. But even if the exit strategy is not to re-IPO, it is unlikely that informational costs savings alone would produce the returns demanded by LPs.

For management, however, these costs can be important. Investments into information eat into their personal wealth, as well as the cash flow available to invest and expand the scope of their influence (Kaplan 1989). It is the managers, we hypothesize, who stand to gain the most from marginal reductions in informational costs, which amounts to minimizing the bonding expenditures of agency costs. This leads us to our second hypothesis.

H2: We predict that poor returns on investments in information production and dissemination will attract management buyouts, but not be an important concern for private equity.

3.3 — Free cash flow

Agency theory, as already referenced above, suggests that high free cash flow generates significant costs in public companies. Instead of disbursing cash to stockholders, managers often choose instead to grow their firms, increasing the assets under their control beyond the optimal size. These investments often come at below the cost of capital or are wasted on organizational

inefficiencies (Jensen 1986). These subprime investments are part of the source of the residual loss associated with principal agent conflict.

There are several ways to reduce agency costs. The first is debt, something that almost all going private transactions require to a high degree. Debt dramatically decreases the amount of future free cash flow available to managers. It guarantees, in effect, future payments to bond holders. Jensen (1986) confirms this with the simple observation that public firms engaging in leverage-increasing transactions experience 2 to 20 percent increase in share price, while those cutting down debt experience decreases. Investors know debt payments are more secure than promises to pay dividends, and are thus less concerned about future cash flows being used unwisely.

An alternative route to reducing cash flow agency costs lies in better aligning shareholders' incentives with management's. This can be accomplished by tying executive compensation to long-term success. The consortium of private equity firms that took over Dunkin' Brands Inc. in 2005, for example, required the breakfast chain's CEO to buy into his firm. Many executives also now receive their compensation in the firm of stock options that do not mature for years.

For private equity, the agency costs of high cash flow are powerful ways to realize value in their acquisitions. We expect these agents to be interested in firms where costs could be significantly reduced by replacing management or better aligning their incentives — firms with out-sized free cash flow. Of course, the executives of these firms should be alarmed at the prospect of a takeover. Because private equity and operating firms become the majority equity holders in their acquisitions, cutting these costs often means reducing resources under management's control, or replacing existing management all together, in order to maximize their

value. It may be the case, then, that the best targets for private equity firms in terms of free cash flow are also the best targets for *defensive* management buyouts. Managers may be willing to take on substantial risks to protect their own positions at their firms.

Even when the buyout is not defensive, however, agency theory also predicts that management will be attracted to high free cash flow for other reasons. If the need to placate shareholders has hamstrung efforts to increase the resources under their purview, managers might be attracted to going private as a means to freeing themselves of responsibility to common stockholders. As a private firm, executives will be better positioned to push cash into risky or net-negative NPV investments that shareholders typically eschew.

Free cash flow is also crucial for a reason apart from agency theory — servicing acquisitions' post-private debt. The ability to take on debt is important to all buyout agents. The higher the cash flow, the greater the possible leverage, and the better the returns for private equity investors. Higher cash flow also means faster debt servicing and less financial constraint for post-private firms. Similarly, debt service is equally crucial to management, who often have personal collateral invested in the post-private firm. The factors above lead to our third hypothesis.

H3: High free cash flows will attract management and private equity equally.

3.4 — Capital structures

The question of optimal corporate structure itself is well addressed in economic literature. Modigliani-Miller (1963) argues that a firm's debt-equity mix does not affect its value, while Jensen and Meckling (1976) develop a theory of ownership based on the distribution and

generation of agency costs. Scott (1976) and others later describe a debt/equity mix in accordance with a firm's liquidation value of assets, corporate tax rates, and size.

Our theory looks at debt-equity mix from the standpoint of managers, who actually decide how much of each take on. For them, the public market is a source of substantial capital for growth. As Bharath and Dittmar point out, the lower the relative cost of capital in equity markets, the greater the advantages to staying public. Therefore firms facing liquidity problems in the form of the poor stock value or turnover, and thus a higher cost of equity, are also more likely go private. Equity capital, of course, is also most important to firms in periods of high growth and investment and that need additional capital most. Large, mature firms are thus more likely to make the switch to private ownership than younger companies with room to grow.

We expect the buyout agents to react to debt and equity in the following way. Consider a spectrum of capital structures. On the far left is pure equity. On the far right is pure debt. Under agency theory, we expect management to opt for capital structures on the left side of this spectrum. Tipping the balance in favor of equity will maximize the free cash flow available for growth investments, and minimize future requirements to pay dividends to stockholders or interest to bondholders. We also expect managers to favor equity over debt because of the relative monitoring power of bondholders over stockholders. Owners of corporate debt have considerably more leeway than stockholders to ensure management has their interests in mind. Argawal and Nagarajan (1990) find support for this theory, reporting that all-equity firms tend to have family relationships among top management and greater levels of managerial stock holdings. We therefore expect that managers are unlikely to take highly-leveraged firms private. Not only would these firms already benefit from lower agency costs, but the post-private firm

would face a capital structure closer to the right of the spectrum, the side we predict management to disfavor.

We expect private equity managers, on the other hand, to favor capital structures on the right side of the spectrum. Private equity is a debt-happy industry. Fund mangers, in fact, will often load additional debt onto their acquisition shortly after going private and pay themselves a dividend. Targets with large debt loads might also signal a need for financial restructuring which private equity firms could provide. Of course, private equity firms should still be interested in an acquisition target with relatively little debt that could be loaded with more latter on. But we expect them, on the whole, to be less sensitive to potential targets' leverage ratios. This leads us to our fourth hypothesis:

H4: Private equity firms will be less sensitive to a target's debt load than management.

3.5 — Risk

Going private transactions unquestionably involve risk. But according to agency theory and our general principles, different buyout agents should be attracted to targets with different risk profiles. We expect management, who invests its own money, to be overall more risk averse than other agents. Mangers should be less likely to take private companies with large market capitalization (outlay risk), which would require both more of their own capital and taking on more debt, which as discussed above we predict management will avoid. This prediction is somewhat complicated that management can simply take a smaller piece of a bigger deal, minimizing their personal risk. It seems unlikely, though, that private equity firms and other

financial sponsors would participate in a transaction if management was unwilling to risk a substantial amount of their own capital.

We expect private equity, however, to be attracted to bigger deals. The more leverage these firms can put into their deals, the greater the potential returns for their limited partners. Since private equity firms are typically comprised of individual funds capitalized by people other than their mangers, we can also expect them to tolerate more outlay risk in order to secure those returns. This brings us to our fifth hypothesis.

H5: Management will eschew large amounts of outlay risk, while private equity will be attracted to bigger deals.

3.6 — Corporate Complexity

Private equity managers often say they "see investments where others don't."[1] What they mean, in effect, is that they can pick out undervalued assets in complex corporate structures — misplaced, underutilized assets that would be worth more outside their current firm's context. There is some logic behind this assertion. Private equity analysts cover a broad range of industries and are used to valuing a variety of assets. Industry analysts, who cover companies for the research divisions of investment banks, for example, are highly specialized. They are less likely to see the potential value of an IT firm's laser printing unit, say, than a private equity analyst who has done diligence on the printing industry. In this sense, private equity helps unravel corporate complexity, unlocking assets that can fully realize their economic value elsewhere. This behavior has been widely cited anecdotally ("corporate raiders" and "barbarians

[1]Interview with Keith Jarett, a former private equity fund manager and venture capitalist.

at the gate") and Weir (2008) finds some support that private equity is attracted to firms where there are assets that can be stripped and sold. We therefore predict that private equity will be most attracted to older, bigger firms with expansive acquisition histories, a diversified asset base, and complicated corporate structures.

According to agency theory, management should not be interested in going private as a means to selling off a variety of undervalued assets. We predict, however, that management will be attracted to complex, diverse firms for two reasons. First, as noted above, these firms are likely also the candidates of hostile takeovers from private equity. Management may elect to go private as a *defensive* maneuver to protect the resources under their purview. Secondly, for large, mature, complex firms, growth is not a simple story. Management may elect to go private in order to continue to expand their operations with investments shareholders may have disfavored. We predict that both *defensive* management buyouts and others will gravitate towards firms for whom downscaling is an attractive an option as further growth.

H7: Private equity will be most attracted to complex, mature and diverse firms that offer the potential to spin off assets and break up the company. Management will also be attracted to complex, mature and diverse firms, especially when other agents are threatening a takeover.

Table 3.1 — Summary of predicted effects of various factors on targets' attractiveness to buyout agents.

		Private Equity	***Management buyouts***
Information	*High cost and poor returns*	*none*	+
Free cash flow	*High free cash flow*	+	+
Capital structures	*High leverage*	+	-
Corporate complexity	*Diversity*	+	-
	Complexity	+	+
Risk	*High outlay risk*	+	-

4. Empirical Strategy

4.1 — Sample selection

There is some debate on how best to define "going private." As Bartlett (2009) points out, there are two conceptual elements to being a public company: being listed on a national exchange or trading platform, and being subject to periodic reporting requirements by the SEC. Studies tend to inconsistently define going private based on one of these two elements. Some studies, e.g. Lehn and Poulsen (1989), define going private as "when shareholders of public corporation are bought out...by a bidder who takes a concentrated ownership position in a reconstituted, privately held firm." Others have looked at firms that stop filing reports with the SEC, despite the fact that those firms may have moved onto a different exchange or ceased to exist all together. Other, earlier studies have surveyed *The Wall Street Journal* and hand picked going private transactions according to criteria not explicitly laid out in their literature.

For the purposes of this study, we examine going private transactions in the form of leveraged buyouts involving financial sponsors. We define going private as a transaction in which a single or consortium of financial sponsors acquires a publicly traded company, taking its equity off national exchanges and trading platforms. Note this need not mean the buyers are private companies themselves, nor that all reporting requirements to the SEC are negated. As mentioned above, post-private firms often take on substantial high-yield debt which comes with reporting requirements of its own.

In previous studies, researchers have used SEC's Rule 13e-3, aptly put to use by Borden and Yunis (2007) and Bharath and Dittmar. The 13e-3 form is filed whenever the purchaser of a public company is an "affiliate" of that company. "Affiliate" is defined under the Securities Exchange Commission Act of 1934 as "a person that directly or indirectly through one or more

intermediaries controls, is controlled by or is under common control with the issuer" (Borden and Yunis 10-03). A deal would file a 13e-3 if management did not acquire a controlling stake, but was still retained or their compensation was increased. J. Crew's management's recent decision to sell itself to three private equity firms, for example, filed a 13e-3. For these reasons, the 13e-3 identifies deals that involved management, even when transactions also involve private equity as a financial sponsor.

As Bharath and Dittmar point out, the 13e-3 filings likely exclude many deals that fit our general definition of going private. The Blackstone Group's 2007 acquisition of 100 percent of the equity of Hilton Hotels, for example, did not file a 13e-3. They may also include many deals not considered a leveraged buyout. Because our research is focused on the differences between the targets of private equity and management, it makes little sense to use only 13e-3 filings. We suspect that reliance on that sample has led earlier researchers to falsely conclude that there are no differences between the two buyout agents.

Thus, to build our sample, we use Thomson Securities Data Company platinum instead of 13e-3. This database already contains categories that can efficiently identify leveraged buyouts as well as statistics on management participation in those deals. Drawing on records from 1962 to 2010, we screen for completed acquisitions of public firms which SDC tags as

a. A leveraged buyout,
b. Acquiror is a leveraged buyout firm,
c. Acquiror immediate parent is a financial sponsor,
d. Acquirior is a financial sponsor,
e. Acquirior ultimate parent is a financial sponsor.

This generates a list of 1,362 deals from 1980 to December, 2010. The year by year breakdown is the following:

Announcement Date	Total Deal Value ($ Mil)	Number of Deals
1980	435.0	1
1981	527.8	5
1982	1,053.1	13
1983	4,732.3	20
1984	7,006.0	35
1985	20,764.1	35
1986	22,005.6	54
1987	25,201.8	57
1988	67,850.7	99
1989	20,516.4	48
1990	3,317.7	21
1991	58.8	7
1992	1,828.4	16
1993	1,082.3	21
1994	6,930.9	17
1995	4,608.1	17
1996	6,582.1	34
1997	16,896.2	61
1998	11,172.5	53
1999	19,999.2	69
2000	14,912.8	82
2001	4,814.5	43
2002	8,544.2	52
2003	5,106.4	67
2004	25,773.7	46
2005	63,543.3	57
2006	308,248.4	109
2007	226,228.5	85
2008	10,752.6	43
2009	8,770.2	40
2010	43,976.7	55
Industry Total	963,240.3	1,362

Of these 1,362 firms, only 622 had solid data in COMPUSTAT. Several of the excluded firms were simply not in the database. Others were manually removed if they met any of the following criteria.

1) Common shares outstanding is equal to 0.

2) Total sales is missing.

3) Total assets is missing.

4) Firm was public for less than three years.

To ensure that targets were properly matched with COMPUSTAT data, lists of company names from SDC and COMPUSTATA were compared.

All explanatory data are figures from target firms' annual reports, obtained from CRSP, IBES or COMUPSTAT. SDC provided the explanatory variable, MGMT, which is equal to 1 if the acquiring group includes management in any proportion, 0 otherwise.

5. Results

5.1 — Logistic Results

In the three years leading up to a buyout, several key differences emerge between management led- and private equity led-deals. Logistic analysis shows that managers tend to buy out smaller firms that receive less attention in the equity markets but maintain strong free cash flows. Private equity firms, meanwhile, are interested in bigger, higher valued companies. These results suggest that at small, low-visibility companies top executives are likely to know more about their firm's potential than the market, and may opt to go private in order to make a profit personally or avoid the costs of consistent undervaluation on public exchanges. Private equity's focus on bigger, higher-valued firms, on the other hands, indicates that these investors are interested in firms with the potential to improve operations in other ways.

```
Logistic results for key variables against MGMT, which is equal to 1 if the firm went
private in a management-led buyout, 0 otherwise:

                                                LR chi2(6)      =      48.59
                                                Prob > chi2     =     0.0000
Log likelihood = -360.40732                     Pseudo R2       =     0.0632

------------------------------------------------------------------------------
       MGMT  |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
No. analysts |  -.1221116   .0411554    -2.97   0.003    -.2027748   -.0414484
Log of sales |  -.1684453   .0663833    -2.54   0.011    -.2985541   -.0383365
Mark. to book|  -.4740672    .179469    -2.64   0.008    -.8258201   -.1223144
Acqu. / sales|  -.7662791   .8180457    -0.94   0.349    -2.369619     .837061
Free CF/sales|   .5695941   .2980074     1.91   0.056    -.0144896    1.153678
Debt / sales |   .0550864   .1378188     0.40   0.689    -.2150336    .3252063
------------------------------------------------------------------------------
```

Analyst coverage: The coefficient and z-score for the number of analysts covering a buyout target are perhaps our most significant result. They suggest that firms with one additional analyst are about 3% more likely to be bought out in a private equity-led transaction. Firms with more analyst coverage benefit both from lower costs of information production, since the analysts do it for them, and from stock that responds quickly to new information, since analysts

disseminate their reports en masse to traders. If no analysts cover a company's common stock, it is unlikely the security is frequently traded, which can increase the relative cost of equity. This result suggests that managers are more sensitive to these costs of producing information and their stock's ability to shift to reflect changes in actual value. Conversely, the result suggests that reducing informational costs is not an important value driver for private equity buyers.

If fewer analysts cover a given firm, the likelihood of informational asymmetries between management and stockholders is also greater. And if there is more informational asymmetry, management is more likely to have a perspective on their firms' potential value that stockholders do not. These results suggest that management is prone to opt for a buyout when there is the greatest gap between what they know and what the public knows about their company. It is an open question, however, why managers would make an investment in going private rather than in distributing information on the latent value of their firm. Both options, if successful, would substantially contribute to mangers' personal wealth either in the form of returns on their investment or in increases in the value of their stock and the company as a whole.

Log of sales: As the z-score and coefficient of the log of sales indicate, private equity firms are also attracted to bigger firms, where the pay-off is larger. Bigger firms tend to have more analyst coverage as well, complicating the above result. The correlation is not so large as to suggest a strong colinearity problem, however, especially since the overall regression is improved by the addition of the log of sales. Nor does removing analyst coverage change the sign of any other variable or affect its significance in a problematic way.

Correlation between the log of sales and analyst coverage:

	lsale	analyst
Log of sales	1.0000	
No. analysts	0.4372	1.0000

Bigger deals do not necessarily mean higher returns in percentage terms, but they do mean more money in raw numbers. Bigger deals also mean more management and performance fees for the private equity scouts who put together the deals. Bigger deals also minimize transaction costs (legal fees, etc.) incurred by private equity firms by lowering the number of deals needed to fully deploy any given fund. Since our theory predicts that management, on the other hand, is less interested in the size of returns or deal fees, it makes sense that executives would trend towards smaller targets or at least be size-neutral.

The log of sales variable also suggests that management is more risk averse than private equity funds. The latter, unlike managers, is investing others' money at limited risk. It is worth noting that management-led deals almost all involve private equity and loans from other financial institutions, making the sheer amount of funds required to take down a big target not a prohibitive issue. It is obvious, however, that financial institutions are much quicker to loan one million than a hundred, leading management toward smaller deals simply because they are easier to put together.

Market to book ratio: While we anticipated the significance of a target's market to book ratio, its sign is the opposite of what we expected. These results suggest that firms with higher market to book ratios are more likely to be the targets of private equity-led buyouts. This does not necessarily contradict our assertion that private equity managers are most concerned with scouting out undervalued firms. As we shall see below, changes in a firm's market to book ratio over time also affect a firm's likelihood of becoming a private equity target. In addition, it is possible that raw market to book ratio is not a good proxy for valuation as private equity firms see it, especially when the figure is compared across all industries. Some sectors, such as energy or steel, are more asset-driven than others and have different standards for market to book ratios.

The market to book results also corroborate that poor reception in the equity market is a primary motivating factor for management to pursue a buyout. As mentioned above, this makes good sense. A target company's managers they would see the effects of this undervaluation first hand and likely be frustrated with the informational asymmetries between them and the public. Both are strong reasons for any CEO to buyout her own company.

Free cash flow: The coefficient and z-score of free cash flow as a percentage of sales suggest that management is more concerned with free cash flow than private equity scouts, perhaps because the latter can finance an acquisition's debt by selling assets and downsizing in ways management might be unwilling to. As the owners and operators of a newly bought out company, management also stands to lose more *personally* from bankruptcy. It is possible that managers are unwilling to take a firm private without a guarantee its free cash flow can handle the new debt load.

Acquisitions and debt: Acquisitions and debt as a percentage of sales both proved insignificant. The sign of neither coefficient can be determined with a solid degree of confidence. This result suggests that, on average, the level of those factors does not drive deals in the 3 years leading up to a buyout.

5.2 — Firm Characteristics Over Time Results

In addition to the differences discussed above, the targets of private equity and management-led buyouts evolve in divergent ways over their lifetimes. Looking at the averages across key variables both 1 to 3 years and 4 to 6 years before a buyout, along with the differences between the two, we find additional support for heterogeneity in private equity's and management's approach to a buyout.

Logistic regression of key variables against MGMT including levels for 4 to 6 years before a buyout and differences:

				LR chi2(10)	=	54.03
				Prob > chi2	=	0.0000
Log likelihood = -375.25965				Pseudo R2	=	0.0672

MGMT	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Levels						
Log of sales	-.2755344	.0608623	-4.53	0.000	-.3948222	-.1562465
Mark. to bk.	-.7380273	.1843287	-4.00	0.000	-1.099305	-.3767497
Acqu. / sales	-2.728115	1.886704	-1.45	0.148	-6.425988	.9697572
Free CF/sales	.6516214	.3700058	1.76	0.078	-.0735766	1.376819
Debt / sales	-.2658295	.1367001	-1.94	0.052	-.5337567	.0020977
Differences						
Log sales dif	-.0578334	.194269	-0.30	0.766	-.4385936	.3229268
Mk.to.bk dif	-.5950855	.2118673	-2.81	0.005	-1.010338	-.1798332
Acq/sales dif	-.0375924	.8613516	-0.04	0.965	-1.72581	1.650626
CF/sales dif	.5247799	.3337268	1.57	0.116	-.1293125	1.178872
Debt/sale dif	-.1940887	.1894557	-1.02	0.306	-.5654151	.1772376

These results suggest a variety of inferences. First – firms that are debt heavy, highly valued, acquisitive and have strong sales relative to firms bought by management are likely to be private equity targets in the future. This is especially true if the firm's market to book ratio grows over the next six years, as suggested by our difference variable for market to book.

Management, meanwhile, targets smaller, slower growing firms with cash flows that improve over time. Firms that are improving their position in the equity markets are unlikely to be bought out by their managers. This adds further support to the importance of informational asymmetries to management buyouts. When the market fails to value a firm as executives think it should, they look to go private.

There are some colinearity and specification problems here that affect the results. Different specifications do not corroborate the results above. For example, controlling for the levels in the three years leading up to a buyout, instead of four to six, changes the difference in market to book factor's sign and significance. In that regression, reported below, only acquisitions as a percentage of sales seems informative, adding credence again to the idea that

private equity targets firms with a strong buying history that may have the potential to spin off some assets.

Logistic regression of key variables against MGMT including levels for 1 to 3 years before a buyout and differences:

					LR chi2(10)	= 54.03
					Prob > chi2	= 0.0000
Log likelihood = -375.25965					Pseudo R2	= 0.0672

MGMT	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Levels						
Log of sales	-.2755344	.0608623	-4.53	0.000	-.3948222	-.1562465
Mark. to bk.	-.7380273	.1843287	-4.00	0.000	-1.099305	-.3767497
Acqu. / sales	-2.728115	1.886704	-1.45	0.148	-6.425988	.9697574
Free CF/sales	.6516214	.3700058	1.76	0.078	-.0735766	1.376819
Debt / sales	-.2658295	.1367001	-1.94	0.052	-.5337567	.0020977
Differences						
Log sales dif	.2177009	.189707	1.15	0.251	-.1541179	.5895198
Mk.to.bk dif	.1429418	.1338897	1.07	0.286	-.1194772	.4053607
Acq/sales dif	2.690523	1.734497	1.55	0.121	-.7090294	6.090075
CF/sales dif	-.1268415	.2885706	-0.44	0.660	-.6924296	.4387465
Debt/sale dif	.0717408	.1352625	0.53	0.596	-.1933688	.3368504

Ultimately, a combination of both levels and difference factors is necessary to best measure the effects of each variable on a firm's likelihood of going private via either agent. The following regression seems to make the most sense given the colinearity concerns mentioned above and theoretical specification. It includes the levels for 1 to 3 years before a buyout and the differences, as in the first regression, and adds a difference variable for the log of assets.

```
Logistic regression of key variables against MGMT, including levels and differences
across both time periods:
                                                  LR chi2(10)     =      58.55
                                                  Prob > chi2     =     0.0000
Log likelihood = -373.00417                       Pseudo R2       =     0.0728

------------------------------------------------------------------------------
        MGMT |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
Levels
Log sales 1-3|  -.2802262   .0610175    -4.59   0.000    -.3998183    -.160634
Mk.to.bk 1-3 |  -.8161077   .1915588    -4.26   0.000    -1.191556   -.4406594
Acq/sales 1-3|  -3.162439   1.900191    -1.66   0.096    -6.886745    .5618673
CF/sales 1-3 |   .6203786   .3694735     1.68   0.093    -.1037762    1.344533
Debt/sale 1-3|  -.2720859   .1370291    -1.99   0.047     -.540658   -.0035139

Differences
Mk.to.bk dif |   .1700784   .1409607     1.21   0.228    -.1061994    .4463562
Acq/sales dif|   2.666086   1.716883     1.55   0.120    -.6989423    6.031114
CF/sales dif |   -.069061   .2860068    -0.24   0.809    -.6296239     .491502
Debt/sale dif|   .0287211   .1280013     0.22   0.822    -.2221568     .279599
Log asset dif|    .471206   .1971811     2.39   0.017     .0847381    .8576738
------------------------------------------------------------------------------
```

Sales: This regression includes the contemporary level of sales, which both our theory and our results so far have suggested should be significant. It suggests here, as above, that private equity firms prefer bigger targets. The difference factor for sales was excluded because its effect is accounted for by other difference factors included here, such as the difference in log of assets. Including it would likely result in over-specification, where an excess of explanatory variables makes some less significant, while including both levels and the difference factor obviously presents colinearity issues.

Market to book ratio: The two market to book ratio factors included here demonstrate how both the level and changes over time of valuation affects the regression. As in our original, single-period regression, these results were not predicted by our theory. They suggest that firms valued highly *later* in their lifetimes are likely to become private equity targets. The difference factor, as in earlier regressions, is insignificant. For private equity, this means that scouts are either hoping to significantly improve these companies' operations after the buyout or that these

firms are still undervalued, despite the higher levels. For management, this means that poor reception in the equity market makes them less willing to participate.

Note that we chose the contemporary market to book ratio over the lagged factor because the later is highly correlated with the difference variable.

	mktobk	mktobkdif
mktobk	1.0000	
mktobkdif	-0.9292	1.0000

It also makes sense theoretically that valuation over the past few years would be most relevant to a buyout. The current ratio determines what kind of bargain acquirers are getting. Including both levels, of course, presents the same colinearity problems mentioned above.

Acquisitions: The coefficient and z-score for contemporary level of acquisitions suggest that private equity targets buy more than their management counterparts, a trend that could be driving the investment firms' interest. The difference variable is also interesting, though slightly less significant, and offers a number of interpretations. Private equity targets could, as we predicted, be older, more mature firms that are starting to slow down their growth. Or they could be firms lacking the cash to make acquisitions. Private equity investors could provide that cash.

From a manager's standpoint, the results for acquisitions are also consistent with the agency theory detailed above. The difference variable suggests that managers who have been ramping up their acquisitions are keen to take their firms private, possibly because they have pushed their firms beyond optimal size, leading shareholders to resist further buying and capping the level of contemporary acquisitions. The results for the last variable, changes in the log of assets, corroborate this result. Firms increasing their book value are likely to be bought out by their managers, perhaps because those managers want to free reign to continue to increase that

value, or because they have information that suggests those assets are worth more than the market grants.

Including the contemporary level of acquisitions instead of the lagged factor both improves the overall significance of the regression and makes sense theoretically. The 1 to 3 year averages effectively describe the firm being acquired, which matters much more than levels over that firm's life time. As per usual, including both levels prompts colinearity concerns.

Free cash flow: Controlling for changes in free cash flow as a percentage of sales, the contemporary level offers largely the same result as in the single-period regression above. Management is interested in higher free cash flows, possibly because they are putting their own money on the line. As mentioned above, private equity also has more options to generate cash flows, including asset stripping managers may be unwilling to undergo. The insignificance of the difference variables suggests that changes in free cash flow does not prompt a buyout.

Debt: Unlike in the single-period regression, these results suggest that private equity firms are indeed debt prone. Their targets show significantly more contemporary debt at a 95% significance level. The insignificance of the difference variable, as with acquisitions, suggests changes in debt are not driving deals. Though this result fits the theory detailed above, inconsistency over our multiple regressions leads us to question its validity. It is possible that there are some endogeneity problems here, too, since bigger firms are likely to have more debt, and bigger firms are more likely to be private equity targets.

In sum, our results show conclusively that there are essential differences between the targets of private equity firms and management buyouts. This runs contrary to the understanding of buyouts in current literature, which considers the motivations to go private largely the same no

b matter who does the buying. Here, however, management targets are shown to be smaller, undervalued firms with low debt, a solid book and growth potential. Private equity targets, on the other hand, are bigger, debt-laden, acquisitive and higher valued firms. These results seem to support our theory that management and private equity approach the buyout from divergent sides of the principal agent conflict, and each with different sets of information.

It is also important to remember that the vast majority of management buyouts involve private equity sponsors. This raises the following question: Why would private equity scouts stray from their typical deals to invest in management-led buyouts? Management, in their pitch to private equity, must use their information asymmetries to provide evidence of growth potential not apparent to the wider market. There is little reason for a private equity fund to get involved otherwise. Because management is usually retained when it leads the buyout, private equity investments in these deals may also be based more faith in leadership rather than the calculus of valuation and returns. These deals are smaller, after all. The model may more appropriately be described in a venture capital vein. Regardless, much more research into the relationship between management and their private equity investors is needed.

5.3 — Going-private results

A final analysis considered averages 4 to 6 years before a buyout to be data for firms that did not go private and let 1 to 3 years averages describe firms that did. This assumes that the important corporate transformations leading up to a buyout occur in the three years before one, and of course ignores several issues in sample selection. But looking at how averages change for firms that go private via both buyout agents, it is still clear that the firms evolve in divergent ways.

Averages for firms that went private in a management-led buyout:

	4 to 6 years pre buyout	1 to 3 years pre buyout	Difference
Log of sales	4.75	4.90	+ .15
Log of assets	4.51	4.66	+ .15
Market to book ratio	.739	.589	- .15
Acquisitions / sales	.017	.030	+ .013
Debt / sales	.334	.304	- .03
Free cash flow / sales	-.008	.019	+ .027

Averages for firms that went private in a private equity-led buyout:

	4 to 6 years pre buyout	1 to 3 years pre buyout	Difference
Log of sales	5.27	5.44	+ .17
Log of assets	5.26	5.39	+ .13
Market to book ratio	1.08	.807	- .273
Acquisitions / sales	.037	.046	+ .09
Debt / sales	.447	.481	+ .034
Free cash flow / sales	-.052	.047	+ .099

This data tells an interesting story. Firms that go private in a management-led deal see increases in sales, assets, acquisitions and free cash flow and a decrease in debt. Their market valuation, however, drops. This corroborates the results above. Management seems to buy out their firms when equity markets are most hostile or when they are most likely to have information that the public either does not or has chosen to ignore.

Private equity targets also see increases in sales, assets, acquisitions and free cash flow, along with a jump in debt. Their market to book ratio falls about 25 percent, slightly more than the decrease management targets see. This suggests that private equity firms, as described in our theory, are looking for undervalued firms that could see increases in their net worth in the future.

Future studies could build off this analysis by further studying how leveraged buyout firms evolve over time, perhaps using tools like the Cox Hazard model.

6. Conclusion

Our results show conclusively what current literature on going private had not established, that the leveraged buyout is a different phenomenon when different buyers are involved. The targets of management buyouts are small firms that are trying to grow but have not been well received or gotten very little attention in the equity markets. Their perspective seems to best encompass the view put forth by Bharath and Dittmar, where executives personally weight the benefits of being public against being private given the information at hand. When the equity market undervalues firms, stops providing the capital they need, or costs them too much in bonding expenditures, management buyouts become more likely.

Private equity firms, on the other hand, are interested in bigger firms that are faring better in the equity markets. This is important because it suggests that private equity funds are looking for a target with at least mixed reception in public markets, making the possibility of an exit via a second IPO look favorable. Private equity would struggle to make the returns it is known for by taking firms burdened by the costs of being public private, then taking them public again a few years later. Either way, it is clear that the internal debate on public costs vs. private benefits, such as the costs of producing information, is not a major part of the private equity calculus.

Much more research is needed to answer two essential questions that arise from this study. First, how private equity firms benchmark targets' valuations, since market to book ratio seems to be relatively unimportant. And second, why private equity firms participate in management buyouts that deviate so much from the targets they approach alone. It is unclear what information management presents to investment firms that was unavailable in public data. It is also unclear why managers are unable or unwilling to disseminate that information to public shareholders. This question has important implications for efficient markets and the

incorporation of information into equity prices that should be further explored. A good first step would be a careful study of the *outcomes* of leveraged buyouts, looking into what determines their profitability. Of course understanding how various actors approach the buyout is a necessary first step towards doing so, as it is for any further research into the role these alternative investments are coming to play in lives of companies and the people who own them.

Appendix:

Logistic regression of key variables over two periods, 1-3 years and 4-6 years before the buyout, against MGMT, which is equal to 1 if the firm went private in a management-led buyout, 0 otherwise:

```
                                                  LR chi2(10)     =      47.37
                                                  Prob > chi2     =     0.0000
Log likelihood = -354.39215                       Pseudo R2       =     0.0626

------------------------------------------------------------------------------
        MGMT |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
Log of sales  4-6|  -.1503418   .1876636    -0.80   0.423    -.5181557     .217472
Mark. to book 4-6|  -.1562623    .136957    -1.14   0.254    -.4246931    .1121685
Acqu. / sales 4-6|  -2.744065   1.735653    -1.58   0.114    -6.145882    .6577519
Free CF/sales 4-6|   .1406634   .2972677     0.47   0.636    -.4419707    .7232974
Debt / sales  4-6|  -.0012626   .1272862    -0.01   0.992     -.250739    .2482137
-------------+----------------------------------------------------------------
Log of sales  1-3|  -.1224775   .1928014    -0.64   0.525    -.5003613    .2554063
Mark. to book 1-3|   -.542969   .2135526    -2.54   0.011    -.9615244   -.1244135
Acqu. / sales 1-3|  -.3442243   .8881546    -0.39   0.698    -2.084975    1.396527
Free CF/sales 1-3|   .5007971   .3250308     1.54   0.123    -.1362515    1.137846
Debt / sales  1-3|   .0595368   .1674984     0.36   0.722     -.268754    .3878276
-------------+----------------------------------------------------------------
```

Including both levels pushes most variables into insignificance. There are significant colinearity problems with this regression, however, which affects its results. The correlation between many variables and their lags is very high.

	Sale	Saleslag	Freecf	Freecflag	Debt	Debtlag
Sales	1.0000					
Saleslag	0.9417	1.0000				
Freecf	0.2815	0.2399	1.0000			
Freecflag	0.2364	0.2781	0.6805	1.0000		
Debt	-0.0580	0.0030	-0.1237	-0.0643	1.0000	
Debtlag	-0.0547	-0.0074	-0.5108	-0.4405	0.5518	1.0000

Interestingly, though, the level of market to book ratio during three years before the buyout is the only significant variable. This adds further evidence to the trend that management is interested in firms with lower valuations, while private equity targets tend to have bigger ratios.

Looking at the differences between each variable and its lag, we find mixed evidence that changes in market to book may also play a role in picking buyout targets. Taken by themselves, the difference variables are not very informative:

```
Logistic regression of key variables differenced across two periods. The lag was
subtracted from the contemporary variable, making the difference variable positive if
the factor increased:

                                                  LR chi2(5)      =       2.27
                                                  Prob > chi2     =     0.8101
Log likelihood = -401.13986                       Pseudo R2       =     0.0028

------------------------------------------------------------------------------
        MGMT |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
Log sale dif |  -.1061856   .1601847    -0.66   0.507    -.4201417    .2077706
Mk.to.bk dif |   .0560122   .0782107     0.72   0.474     -.097278    .2093024
Acq/sale dif |   .1987061   .5379305     0.37   0.712    -.8556184    1.253031
CF/sale  dif |   .1649946   .2095922     0.79   0.431    -.2457985    .5757878
Debt/sale dif|  -.0610927    .093815    -0.65   0.515    -.2449668    .1227814
-------------+----------------------------------------------------------------
```

Since we know the levels of several variables are significant in our model, it makes little sense to only include the difference variables. These results are likely suffering from some omitted variable bias from the excluded level factors, which are correlated with the dependent variable, and cannot be used with confidence.

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