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ABSTRACT

We investigate the transition from private to public ownership of companies that had previously been subject to leveraged buyouts. As they go to the public markets for equity, such firms face an information asymmetry problem. Behavioral effects are also likely to be at work. We show that the combination of informational and behavioral effects will cause firms to handle information in particular ways, leading to an equilibrium pattern in which disappointing performance after the initial public offering should be expected. We find empirical support for this theory by studying 62 reverse LBOs that went public between 1983 and 1987. There is strong evidence that the performance of the reverse LBOs before going public overestimates their likely performance after the initial public offering. The market appears to anticipate this pattern.

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1. Introduction

Handling the flow of information from a firm to the capital market is a major responsibility of its managers. The transmission is likely to be costly and incomplete because of substantial differences in participants' ability to monitor and verify conditions. The theme of this paper is that information handling -- the preparation of information for investors, and the making of decisions based on private information -- has a significant impact on recorded firm performance. To make our discussion concrete, we focus on a critical event in a firm's life, the transition from private to public ownership through an initial public offering of stock (IPO).

When a firm switches from private to public ownership, it faces an information asymmetry problem. Typically, little reliable information is available about private firms. Potential investors in an IPO have to base their evaluation almost exclusively on the offering prospectus. By contrast, the degree of information asymmetry between the management of a public company and its shareholders is considerably smaller. Clearly, the success of the IPO will depend on the way managers handle the problem of transmitting information to the market. An additional complication is that at the time of the IPO, both managers and investors may fall prey to well-known, documented behavioral effects (non-rational tendencies).

We show that information asymmetry and behavioral motives affect the incentives and the behavior of managers, leading to an equilibrium pattern in which disappointing performance after the IPO should be expected.

Our empirical sample consists of "reverse LBOs": companies that were taken private through a leveraged buyout (LBO) and then went public again in an IPO. Managers of such firms typically have a significant ownership share, which gives them a strong incentive to secure a high price for their offering. Recent research indicates

that a very large fraction of LBOs go public again. Kaplan (1990) reports that 45% of a sample of large LBOs completed between 1979 and 1986 later returned to public ownership. Moreover, reverse LBOs tend to be larger than the average IPO.[1] This suggests that transitions from the LBO form to public ownership have become a widespread and economically significant phenomenon. Our results thus have implications for a large fraction of LBOs, and more generally for firms switching from tightly held to diffuse ownership.

We find strong evidence that the pre-IPO performance of reverse LBOs overestimates their likely subsequent performance. Reverse LBOs make significant performance gains just before their initial public offering. We find that their operating income as a percentage of total assets grew by about 7 percentage points in the pre-offering year. Comparison firms in the same industries show a slight decline in the same performance measure. Moreover, in the pre-offering year, reverse LBOs outperform continuing LBOs. In the year after the offering, however, reverse LBOs disappoint. Their performance worsens dramatically in the first public year, falling by about 3 points, which is 10 points below the change in their own previous year and 4 points below their public comparison firms.

We identify three possible explanations for this pattern of superior performance before the IPO, followed by disappointing performance: (1) managers use their private information to choose the time to go public, (2) managers manipulate earnings before going public, and (3) because of behavioral propensities on the part of managers and/or investors, firms tend to go public when they experience good times, with a subsequent regression toward the mean in performance.

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[1] The largest IPO completed so far in 1991 is the Duracell reverse LBO, which raised $450 million in its May 2 offering. Duracell was taken private in 1988 by a team supported by Kohlberg, Kravis, and Roberts. Other recent or planned reverse LBOs include RJR Nabisco, Caldor, AnnTaylor, and Filene's Basement.

An intriguing question is whether the market manages to disentangle the information it receives, and thus to anticipate the disappointing performance in the post-IPO era. If the aftermarket performance of reverse LBO stocks is normal, that would indicate that the market appropriately discounts informational effects. If it is below average, that would suggest that the market is "fooled" at the time of the IPO, and realizes its mistake later. Our evidence indicates that the market is not fooled: over the two years following the IPO, reverse LBOs' stocks *outperform* comparison firms, although the difference in performance is not statistically significant.

Previous work on LBOs has not addressed the re-entry issue. We know of only one study of reverse LBOs, and it focuses on the private period, not on the return to public ownership.[2] The extensive IPO literature, to the best of our knowledge, has been devoted almost exclusively to the share price performance of new issues, not to operating performance.[3]

The paper is organized as follows. In section 2 we show how information asymmetry leads to a pattern of disappointing firm performance after an IPO -- a phenomenon that may be reinforced by several documented behavioral tendencies. Section 3 presents the data and test methodology. In section 4 we examine how reverse LBOs perform relative to continuing LBOs. Section 5 compares the performance of reverse LBOs before and after the IPO. Section 6 examines the stock price performance of reverse LBOs after the IPO. Section 7 discusses the implications of our results, and section 8 concludes.

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[2] Muscarella and Vetsuypens (1990).

[3] Elton, Gruber, and Rentzler (1987, 1989) analyze the performance of publicly offered commodity funds and also find a pattern of disappointing post-offering performance. However their context is very different from ours since -- as they show -- the performance of commodity funds is essentially random, which implies that it can be neither influenced nor predicted by management (a crucial difference from the IPOs we analyze).

2. Information handling and disappointing performance

Our hypotheses fall into two categories, relating to information asymmetry and behavioral motives.

2.1 Information asymmetry effects:

Adverse selection in the IPO process -- Hidden information:[4] LBOs that want to go public again will have difficulty giving the market credible information about their future prospects. Even a firm with genuinely good prospects typically cannot offer concrete evidence as to its future, and firms with mediocre prospects can make claims that cannot be decisively refuted.

In its pricing of an IPO, the market will take into account the possibility that the firm is a lemon (Akerlof 1970) -- that is, its future performance will be disappointing relative to the past. Indeed, this is essentially the hidden information problem discussed by Myers and Majluf (1984). They consider a situation in which managers know more than the market does about the future prospects of the firm. Assuming that managers act in the interest of the existing shareholders, they have an incentive to issue stock when the market overvalues the firm (when the managers' private information is unfavorable). The market is not fooled, however. The very fact that the firm issues stock immediately reveals information about its true state to the market.

We offer a different model of a somewhat parallel situation. In our setting, managers do not know in advance exactly how the firm will perform, but they do know the expected value of its performance. Outside investors have a prior probability distribution on this expected value. The firm's realized performance is revealed when it

[4] The terms "hidden action" and "hidden information" are due to Kenneth Arrow (1985). They replace the more traditional but less descriptive "moral hazard" and "adverse selection."

goes public. This formulation allows us to distinguish between two potential hidden information problems:

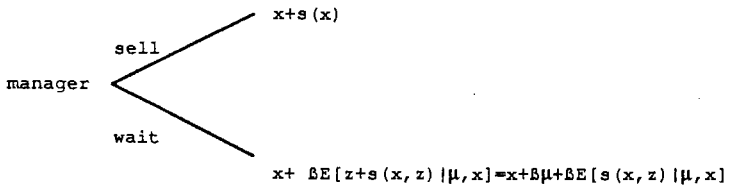
- firms may choose to go public (thereby revealing their realized performance) when they get a good draw relative to their own mean;
- bad firms (i.e., those with low expected per-period earnings) may be more likely to go public than good firms.

We shall see that even if the first effect is present, the second effect need not be.

Suppose there are two periods, 1 and 2, and privately held firms can go public at the end of either period. All managers have the same discount factor ß. The market pays m per dollar of expected per-period earnings. Consider a firm with expected per-period earnings μ. At the end of period 1 the manager observes the firm's realized period 1 earnings, x. He then decides whether to take the firm public. If he decides to sell, he reports x in the offering prospectus, with supporting attestations from his accountant. If he waits, we assume that he has to sell the firm at the end of period 2; then the prospectus will report the firm's realized earnings in period 2, namely z, as well as x.

We assume that ß and m are common knowledge. The manager knows μ, but the market has only a prior distribution on μ, $p(\mu)$, which is common knowledge. The per-period earnings distribution is given by $f(x;\mu)$, also common knowledge. Earnings are i.i.d.. We use s(x) to denote the dollar amount paid by the market for the firm, if the manager sells in period 1, and s(x,z) the dollar amount paid by the market if the manager sells at the end of period 2.

At the end of period 1 (after observing x), the manager faces the following choice:



The manager will make his decision according to the rule: "Sell at the end of period 1 if $x>h(\mu)$, where h is some function to be determined (the "cutoff curve"); otherwise sell in period 2."

For $x = h(\mu)$, the manager is indifferent between waiting and selling, so that at that point:

$$s(x) = \beta\mu + \beta E_z[s(x,z) \mid \mu,x] \qquad (1)$$

The timing of the IPO reveals information to the market about the quality of the firm: if the manager sells in period 1, then it must be that $\mu<h^{-1}(x)$. If he sells in period 2, then $\mu\geq h^{-1}(x)$.

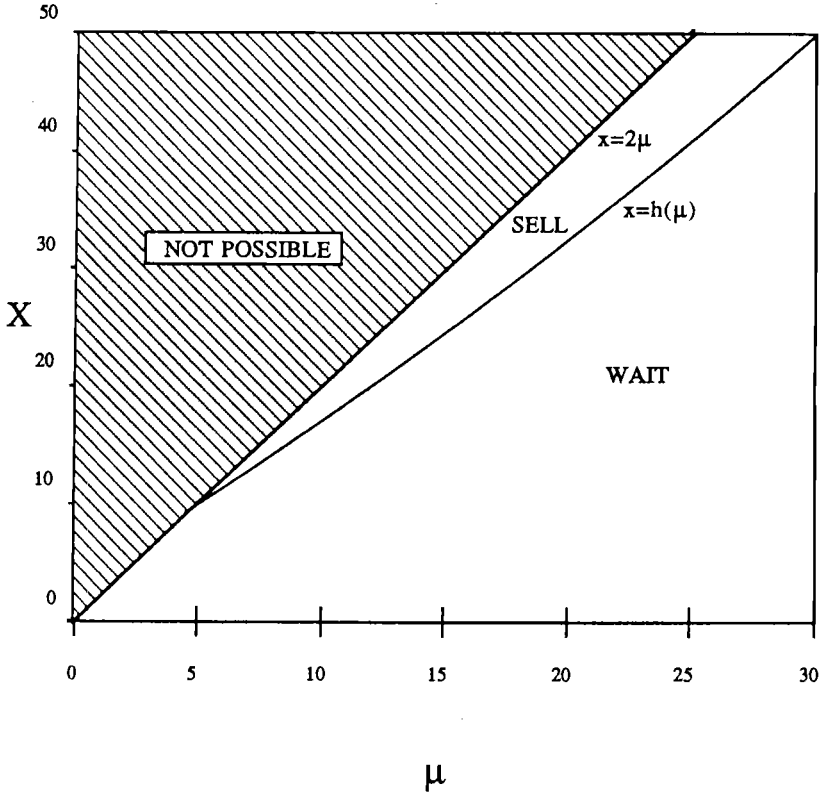
As an example, in the appendix we derive the equation of the cutoff curve $x=h(\mu)$ under the following additional assumptions: earnings are uniformly distributed over $(0,2\mu)$, and the investors' prior on μ is given by $p(\mu) = K\mu^2e^{-\mu}$, for some constant K ($0\leq\mu<\infty$). The equation of the curve is:

$$2m + m\frac{\mu^2e^{-\mu} - y^2e^{-y}}{(\mu+1)e^{-\mu} - (y+1)e^{-y}} = \beta\mu + \beta m(1+\mu) \qquad (2)$$

Choosing for instance $\beta=0.75$ and $m=10$, we obtain the curve shown in figure 1.

Figure 1

CUTOFF CURVE



Changing the values of the parameters reveals some intuitive properties of the $x=h(\mu)$ schedule. As ß decreases, the $x=h(\mu)$ schedule shifts to the right: a more impatient manager has a lower selling threshold in terms of period 1 realized earnings. Put differently, if it is common knowledge that the manager is exceptionally impatient (for instance, if he is selling for liquidity reasons), the market pays more, other things equal. In our setting, competition between investors prevents them from taking

advantage of managerial impatience. More generally, sales in desperation may do better. The seller of an automobile can avoid the lemon accusation if she can convincingly demonstrate that she has been transferred overseas.

A perhaps less intuitive result is that the second potential hidden information effect mentioned earlier -- worse firms sell early -- is not present in our setting. Indeed, the reverse is found: high-μ firms are more likely to sell in the first period than are low-μ firms. By staying private until period 2, low-μ firms are able to mix with high-μ firms that stayed private only because they got a bad draw in the first period.

This highly stylized model yields some testable predictions: among reverse LBOs, we should find a large number whose future prospects will not live up to a naive extrapolation of their promising recent past. They go public this year because they know that this year's performance is above average. Moreover, since they chose to stay private last year, last year's performance must have been below the firm's true potential, or at least below the performance required to make it a go-public year. This suggests that, even if hidden information were the only effect at work, we should expect a strong gain in performance from the year before the IPO to the year of the IPO.

Performance manipulation -- Hidden action: In evaluating an IPO, investors rely on the information provided in the offering prospectus. Managers, who are close to owners and typically own significant equity themselves, have a strong interest in boosting reported performance just before the IPO, so as to improve the offering price. They can do this in two ways, which we label *inspection period striving* and *performance borrowing*.

Consider a worker whose annual pay is set by examining the value of his product in a brief inspection period, say a day, and then multiplying that value by the 220 working days in the year. He would work like a devil on the day he is being

watched. Consider now a corporate manager who owns 10% of a company that normally earns $1 million and will sell at eight times earnings when it goes public. Every additional $1,000 the firm earns in the year before going public will mean another $800 for him. That is an extraordinary stimulus, in comparison with the $2.59 median increase in CEO compensation per $1,000 increase in firm value reported by Jensen and Murphy (1990) in a cross-sectional study of publicly held firms. Managers are likely to exert extraordinary effort before the IPO of a firm in which they hold significant equity.

The managers will benefit if they can find new ways to boost earnings. Perhaps the easiest way will be to borrow performance from other periods. To borrow from the future, they can discount prices to boost sales temporarily, or defer expenses (such as R&D or employee development) that will yield returns only over a longer period in the future. Managers can even borrow past performance. If an IPO is planned two years hence, they can soft-pedal this year's earnings to boost those of next year, in that way improving both the growth record and the earnings in the pre-IPO year. Whether because of inspection period striving or performance borrowing, we would expect the firm's operating performance to improve more rapidly than normal during the year before an IPO.

The proposition that managers inflate current performance in order to improve the offering price does not in any way imply that investors are fooled. Such performance tilting may go on even though it is costly, may be fully disentangled, and may even be *expected* to be disentangled. The problem may rest in the system, which does not permit ready transmission of information. Stein (1989) models a similar situation in a signal-jamming framework:

> The stock market uses earnings to make a rational forecast of firm value--higher earnings today will be correlated with higher earnings in the

future. Knowing this, managers will attempt to manipulate stockholders' signals, pumping up earnings to raise forecasted value. In equilibrium the market is *not fooled* by this jamming: it correctly conjectures that there will be a certain amount of earnings inflation, and takes this into account in making its predictions. In spite of being unable to fool the market, managers are "trapped" into behaving myopically. The situation is analogous to the prisoner's dilemma. The preferred cooperative equilibrium would involve no myopia on the part of the managers, and no conjecture of myopia (and hence no discounting of inflated earnings) by the stock market. Unfortunately, this cannot be sustained as a Nash equilibrium. If the market conjectures no myopia, managers will have an incentive to fool it by boosting current earnings.

Whether or not the market actually figures out performance manipulation, of course, is ultimately an empirical question, to which we turn in section 6. But in principle at least, it is not necessary that the market be fooled for manipulation to occur in equilibrium.

Some degree of performance manipulation probably occurs in any firm.[5] This is one reason why accounting measures of performance are known to be unreliable. But in the case of an IPO, managers have very large *additional* incentives to present the company in the best possible light. We are concerned with manipulation that is above the norm for publicly held firms.[6]

2.2 Behavioral explanations: In addition to informational effects, we believe that less than fully rational behavior of some parties -- what we call behavioral

[5] Zeckhauser and Pound (1990) build on this observation to study the effectiveness of monitoring by large shareholders. They argue theoretically -- and verify empirically -- that the presence of a large shareholder is likely to defuse the need for earnings manipulation, for both incentive and signaling reasons.

[6] An instructive example is provided by the Regina company, which is part of our sample. Regina, a maker of vacuum cleaners, went public in 1985. The CEO, who held about 50% of the stock during the buyout, sold one tenth of his stake for $2.1 million. Regina exhibited very strong stock price performance in the first two years following its IPO. In 1988, the CEO abruptly resigned and confessed to having manipulated the firm's reported results. (The resignation was prompted by a surge in customer complaints about quality.) The stock price dropped sharply, indicating that the extent of manipulation was a surprise to most investors.

decision -- may create a situation in which firms will be more likely to go public when they experience unusually good performance relative to previous years.[7]

The buyers of IPOs may display behavioral strategies. We suspect that investors will shun a firm with poor earnings growth, quite apart from the offering price. Shiller's (1988) startling survey evidence indicates that most IPO investors do not seem to take the IPO price into account in their decision to invest. Given that price matters little, a low price cannot redeem an IPO with a poor past record, and investors will prefer firms with an apparent upward momentum.

Why might investors "overpay" for firms with strong past growth? Such a strategy by individual investors is consistent with prospect theory (Kahneman and Tversky 1979), which posits *decreasing returns to losses* as well as to gains. Firms with upward momentum have a price change distribution offering a high probability of small gains (if earnings continue to rise) and a small probability of a big drop (if earnings go flat or fall). Since big losses are underweighted in utility terms relative to small gains, the gamble may look attractive even though its expected value is negative. Thus, if many investors behave according to prospect theory, firms with good growth prospects will be advantaged in going public: they will reap more than they are worth on a discounted expected value basis.

The sellers -- including the firm's managers -- may also fall prey to behavioral strategies. They may be reluctant to sell when they cannot get as much for

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[7] Self-selection of this nature is a prominent explanation in the studies by Elton, Gruber, and Rentzler (1987, 1989) of publicly offered commodity funds. They find that the funds' performance after the IPO is considerably lower than the past performance reported in the prospectus. Their interpretation is that "commodity trading advisers' performance is random and that the ones who are selected as advisers to public funds are the ones who, by pure chance, had a sequence of good returns." But it is somewhat difficult to accept their conclusion that this is not evidence against investor rationality. If investors were truly rational, they would find out that commodity trading advisers' performance is random, and hence would not put a premium on advisers with shining past performance. At the very least their finding reflects a *belief* on the part of commodity trading advisers that investors irrationally believe that performance is not random.

the firm as they could have received earlier. One sees this pattern in homeowners who refuse to sell when real estate prices have fallen. Perhaps not selling makes the loss of value less painful, because it is not realized. Perhaps they still nurture the hope that prices will bounce back. We are positing a reluctance-to-sell effect that applies even if current earnings fully capture all relevant information about future earnings. Previous studies have documented this "disposition effect" in other contexts. Shefrin and Statman (1985) find that investors tend to sell their winning investments early (possibly because of the satisfaction from realizing a good investment) and hold on to their losing ones (possibly to avoid regret). Ferris, Haugen, and Makhija (1988) find that trading volume for stocks that have declined in value is lower than for stocks whose value has increased.

Finally, behavioral motives may play an indirect part, if one or more party *believes them to be present.* Sellers may be persuaded that buyers overvalue a record of strong earnings growth, when in fact buyers do not make this error. Or buyers may think (incorrectly) that sellers are subject to the disposition effect. If either side thinks the other is prey to such biases, it will act accordingly,[8] which by itself will create a skewed set of offerings. Companies going public will be disproportionately strong.

If only behavioral effects influenced which private firms went public -- as would be the case if there were no information asymmetries -- we would expect these firms to perform just as well in the next period as other firms with similar above-average records. That is, they would perform somewhat less well than in the current period, because of regression toward the mean. If IPOs experience a sharper fall in performance during the year following the IPO than other firms that experienced

[8] Indeed, through a process of infinite regress, all that is necessary is that each side thinks the other thinks he believes there is a bias, and so on.

similar performance in the year before the IPO, then nonbehavioral effects must be at work. We shall now turn to some empirical data to investigate these effects.

3. Sample and data

Our primary sample consists of 62 reverse LBOs, companies that went public between 1983 and 1987. We identified these companies from the following sources:

- Going Public: The IPO Reporter regularly publishes IPO prospectus summaries, which indicate whether the offering firm previously underwent an LBO. Its January 1988 issue included a list of reverse LBOs for 1987.

- Mergers and Acquisitions published a list of reverse LBOs in its November/December 1987 issue (Ferenbach 1987).

Our sample includes all of the 62 reverse LBOs identified in these sources. For each company, we collected performance data for periods before and after the IPO. Pre-IPO performance data were gathered from the IPO prospectus. Most often, when the IPO does not occur at the end of a fiscal year, the prospectus reports figures for the months immediately preceding the IPO, as well as the equivalent figures for the preceding year (making comparisons possible between years). Post-IPO performance data were obtained from COMPUSTAT. Operating income and total assets were noted for the calendar year in which the IPO occurred and for the following year.

We are interested in assessing the improvement in firms' operating performance. We chose operating income after depreciation (OI) normalized (divided) by total assets (AT) as our measure of performance. Performance improvement was measured as the change in this ratio: $\Delta OI/AT(year)=OI/AT(year)-$

OI/AT(year_1).[9] We use an improvement measure because investors assessing a firm presumably value the *improvement* of its earnings in addition to their *level*. A company with superior earnings growth before the IPO, with EPS going from $1.50 to $2.00 at the time of the IPO, may well sell for more than one with successive earnings of $2.00 and $2.00.[10] The choice of operating income allows us to to focus on the real effects of governance and ownership changes. Implicitly, our choice of performance measure assumes that accounting depreciation is an acceptable proxy for economic depreciation.

4. Reverse vs. continuing LBOs

4.1 Reverse vs. continuing LBOs: Would one expect reverse LBOs at the end of their private period to perform better or worse than other LBOs? One conjecture --we might call it the "LBO form outdated" theory -- would be that reverse LBOs are mediocre performers. In this view, they go public again because they have exhausted the benefits of the LBO ownership form. Or, they need to go public because their profits are insufficient to cover their debt load. (Most reverse LBOs do devote significant funds to debt reduction.)

We predict by contrast -- on the basis of the arguments of section 2 -- that in most instances going public is an indicator of good times. Strong results before going public may reflect the need to convince the finicky capital market of the firm's favorable prospects. If so, LBOs may wait for a good year before attempting to go

[9] With this convention, if a firm has an operating income/assets ratio of 1% in year 0 and 2% in year 1, ΔOI/AT(year 1)=1%.

[10] "I want a minimum 30% growth rate in earnings and revenues [in an IPO]" says a fund manager interviewed by Business Week, May 13, 1991.

public again. Then reverse LBOs, in the pre-offering year, should outperform continuing LBOs.

We wish to test the following null hypothesis:

H_0: In the year before they go public, reverse LBOs perform as well as continuing LBOs.

Our alternative hypothesis is:

H_1: In the year before they go public, reverse LBOs perform better than continuing LBOs.

This question has received little attention so far in the LBO literature. Even though studies of LBOs are based on samples containing both reverse and continuing LBOs, most do not analyze whether these two groups fare differently. One exception is Kaplan's (1989) study of management buyouts (MBOs). To test whether his results (which point to strong operating improvements during the management ownership period) suffer from sample selection bias, he compares various measures of performance for (1) LBOs that have public debt outstanding but have no public equity, and (2) a combined class of reverse MBOs and MBOs that were eventually sold back to public companies. He finds that in general the second group exhibits stronger performance than the first.

We gathered data on the operating performance of a sample of continuing LBOs: those companies among the LBOs listed by Lehn and Poulsen (1989) that filed 10-k forms. We found 25 such LBOs, four of which were dropped from the sample, either because the LBO was too recent (in one case the buyout occurred two months before the latest 10-k form we could find), or because the data we found were not usable.

There is no guarantee that our selection procedure yields an unbiased sample of continuing LBOs. After all, firms with public debt might be special. But there is no

entirely satisfactory way to obtain data on a cross-section of continuing LBOs, since LBOs without public debt generally do not report their performance results.

Finding 1: In the year before they go public, reverse LBOs perform better than continuing LBOs.

We use ΔOI/AT as our measure of operating performance, and we focus on the latest year for which we could find performance information in the 10-k forms. In the period before they go public again, reverse LBOs outperform continuing LBOs (Table 1). The performance difference is significant, more than 8% on our measure. Reverse LBOs had more variable performance as well. Despite this variability, on a Wilcoxon signed-rank test, the difference in performance was significant at the 0.001 level. Our choice of a nonparametric test reflects a conservative approach, tending to favor the null hypothesis that LBOs are similar to control firms. The evidence is clear. Reverse LBOs perform substantially better than their peers in the year before going public, which suggests that favorable results are critical to going public at a price attractive to the sellers.

Table 1

Comparison of industry-adjusted performance between reverse and continuing LBOs[a]
Performance measure is ΔOI/AT(reverse LBO)-ΔOI/AT(industry)

Descriptive statistics	ΔOI/AT mean		
reverse LBOs	6.90%		
continuing LBOs	-1.24%		
	min	median	max
reverse LBOs	-18.10%	6.10%	38.69%
continuing LBOs	-10.31%	0.00%	14.76%
z-statistic (Wilcoxon signed-rank test)	-3.40		
p-value	<0.1% (two-tailed test)		

[a] Year of reference is the IPO year for reverse LBOs, and the latest year for which data were available for continuing LBOs.

4.2 Continuing LBOs vs. comparison public firms: One might wonder whether our results are driven by some special feature of our sample of continuing LBOs. This does not seem to be the case (Table 2). Each continuing LBO was matched with a randomly selected control firm in the same COMPUSTAT four-digit Standard Industrial Classification (SIC) category. Our procedure was to select the next firm in alphabetical order for which data were available for the relevant years, and whose total assets were between 50% and 200% of those of the continuing LBO. We set aside the size filter if it was not satisfied by any firm in the same four-digit SIC code.

Consistent with previous studies based on operating performance, we find that our continuing LBOs do better than similar public firms in their industry. A Wilcoxon matched-pairs signed ranks test shows this difference to be statistically significant (at the 5% level for a two-tailed test).

Table 2

Comparison of performance for
21 continuing LBOs and 21 matched control firms
Year of reference is the latest year for which
performance data were available for the continuing LBOs.

Descriptive statistics	ΔOI/AT mean		
continuing LBOs	1.28%		
control firms	-2.83%		
	min	median	max
continuing LBOs	-10.22%	0.19%	29.25%
control firms	-24.97%	-1.08%	3.26%
Wilcoxon matched-pairs signed-rank test			
Smaller sum of ranks	50*		
(*) p-value	<5% (two-tailed test)		

5. Reverse LBO performance before and after the initial public offering

5.1 Reverse LBOs disappoint: Consistent with our informational and behavioral hypotheses, we have found that LBOs that choose to go public have outperformed their peers. Is this merely because they are unusually good firms? Or do they manipulate performance or select propitious times to go public? To make a determination, we compared the post- and pre-public offering performance of reverse LBOs.

We wish to test the following null hypothesis:

H_0: In the year after going public, reverse LBOs perform as well as other firms on average.

Our alternative hypothesis is:

H_1: In the year after going public, reverse LBOs perform worse than other firms on average.

We compare, for each matched pair of companies, ΔOI/AT(IPO year) (i.e., the *improvement* in operating performance before the IPO) with the same measure for the following year, ΔOI/AT(IPO year+1). Descriptive statistics on accounting data for reverse LBOs and the control sample (Table 3) suggest two patterns.[11] First, performance of reverse LBOs improves more in the year before the IPO than does that of the control firms. Second, this improvement in performance is not sustained in the year after the IPO: indeed, reverse LBOs tend to do worse in their first public year than the control firms in that same year. The significance of these findings was confirmed by a Wilcoxon matched-pairs signed rank test. The results -- significant at the 1% level -- point to a very strong pattern of "disappointing" reverse LBO performance after the IPO.

[11] The procedure for choosing control firms is identical to that described in section 4.

Table 3

Comparison of performance improvement before vs. after the IPO
for reverse LBOs and matched control firms

	ΔOI/AT(IPO YEAR)			ΔOI/AT(IPO YEAR+1)			ΔOI/AT(IPO YEAR+1) -ΔOI/AT(IPO YEAR)		
Descriptive statistics		mean			mean			mean	
reverse LBOs		6.58%			-2.77%			-9.35%	
control firms		-1.46%			0.87%			2.33%	
	min	median	max	min	median	max	min	median	max
reverse LBOs	-16.13%	4.68%	32.25%	-25.85%	-1.89%	10.69%	-52.79%	-6.14%	11.87%
control firms	-29.81%	-0.29%	11.72%	-24.94%	0.66%	45.42%	-25.91%	-1.26%	54.59%

Wilcoxon matched-pairs signed-ranks test on
ΔOI/AT(IPO YEAR+1)-ΔOI/AT(IPO YEAR)

Sum of ranks reverse LBO<control	293*
Sum of ranks reverse LBOs>control	1660

(*) p-value<1% (two-tailed test)

Finally, we repeat our analysis of pre- and post-offering performance using industry-adjusted numbers (Table 4). We use the mean of the four-digit SIC code firms as an industry benchmark. The results indicate that reverse LBOs perform considerably better than the industry average just before the IPO, but less well in the following year.

Table 4
Industry-adjusted performance improvement for reverse LBOs
Performance measure is ΔOI/AT(reverse LBO)-ΔOI/AT(industry)

	year before IPO	year after IPO
mean	6.90%	-2.59%
t-statistic	5.16*	-2.89**

(*) p-value<0.1% (two-tailed test)
(**) p-value < 0.2% (two-tailed test)

Hence we obtain:

Finding 2: In the year after going public, reverse LBOs perform worse than other firms on average.

5.2 The performance loss cannot be explained by lost managerial incentives: While these findings are consistent with the mechanisms presented in section 2, one might wonder whether they are not simply the results of other effects. One possibility is that managers' incentives are altered in the course of the IPO. According to Jensen (1989), LBOs resolve the "central weakness of the public corporation, the conflict between managers and shareholders." Under an LBO, incentives are aligned both through management ownership (which ensures that managers are appropriately rewarded or penalized for their actions) and through debt financing, because heavy debt service obligations prevent managers from investing in projects with negative present value. If going public alters one or both of these mechanisms, our results may simply show that the enterprise has returned to the traditional form of corporate governance and suffered its associated agency problems.

It is not clear, however, that managers' incentives are significantly diminished by a reverse LBO. They remain exceptionally powerful. Management's ownership stake remains high even after the reverse LBO, and the firm's indebtedness, although in general reduced in the course of a reverse LBO, remains quite substantial.[12] Most reverse LBOs mention debt reduction (in various forms) as

[12] In our sample, officers and directors owned collectively a median 72.3% of the equity of their firm before the initial public offering, and 49% after the equity offering. As a benchmark, Morck, Shleifer and Vishny (1988) report that, for a sample of 1980 Fortune 500 firms, the mean combined stake of all board members was 10.6% (median 3.4%).

Muscarella and Vetsuypens (1990) report the following median leverage values:

- pre-LBO accounting leverage: 43.2%
- LBO market leverage: 93.4%
- pre-IPO accounting leverage: 78.6%
- post-IPO accounting leverage: 55.5%

a motivation for the equity offering,[13] but the goal may be to reduce *excessive* debt, not to escape the discipline of debt altogether. Moreover, it is unlikely that either present owners or investors would be attracted by a transaction that significantly relaxed a beneficial discipline. In short, the lost-incentives hypothesis does not offer a convincing explanation for the disappointing performance of reverse LBOs.

5.3 Informational effects are at work: Were there no information asymmetry, the superior pre-IPO performance of reverse LBOs would be due solely to some feature of the preferences of the sellers and buyers of these firms, such as the behavioral effects outlined above. If high performers tend to be selected for IPOs, and no one is fooled, then an ordinary level of regression toward the mean must be expected. If we find merely this level, that would suggest there are no further effects due to the imperfect flow of information. On the other hand, if IPOs experience a sharper fall in performance during the year following the IPO than other firms that experienced similar performance in the year before the IPO, nonbehavioral effects must be at work.

How much regression toward the mean should we expect if only behavioral effects were at work? Some clues can be found by looking at publicly quoted control firms that performed as well as our reverse LBOs before their offering. For each reverse LBO, we chose a comparison firm with a similar performance improvement in

[13] All but 5 of the 62 reverse LBOs in our sample listed debt reduction as one of the main (or the only) uses for the proceeds of the IPO.

the pre-offering year.[14] The performance of this comparison firm in the following year provides a benchmark measure of standard regression toward the mean.[15]

We wish to test the following hypothesis:

H_0: In the year after going public, reverse LBOs will perform as well as other firms with similar previous-year performance. That is, they will exhibit normal regression toward the mean.

The alternative hypothesis is:

H_1: In the year after going public, reverse LBOs will perform worse than other firms with similar previous-year performance. This implies either some manipulation of performance (hidden action) or a decision to go public on the basis of private information (hidden information).

[14] The selection procedure was as follows: we put the reverse LBOs in alphabetical order. For the first half (second half) we picked the firm in the same four-digit SIC code that had a ΔOI/AT closest above (closest below) that of the reverse LBO in the year before the IPO. In the first half, there were nine cases in which such a matched firm did not exist. (In the second half, there were two.) For these cases, we chose as a matched firm the firm that had a ΔOI/AT closest (without regard to direction) to that of the reverse LBO in the year before the IPO (again in the same four-digit SIC code).

[15] This benchmark method is likely to yield an overestimate of regression toward the mean (and hence an underestimate of informational effects). Ideally we should use control firms that performed as well as our reverse LBOs before their offering, *once informational effects have been corrected.* Presumably this other set of control firms would exhibit less regression toward the mean than the one we used. This method is not practical, however, since we do not know in the first place what portion of the total effect is attributable to each cause.

Table 5
Regression toward the mean effects
Comparison of reverse LBOs and public firms
that experienced similar performance in the pre-offering year

	year before IPO	year after IPO
reverse LBOs	6.58%	-2.77%
matched firms in SIC code	5.63%	-0.56%
industry means	-0.32%	-0.18%
2) average ΔOI/AT (industry-adjusted) for:		
reverse LBOs	6.90%	-2.59%
matched firms in SIC code	5.96%	-0.38%

The results in Table 5 suggest that even though (as expected) the performance of our comparison firms exhibits strong regression toward the mean, that pattern can account for only about two-thirds of the disappointing performance of our reverse LBOs. Evidently additional effects must also be at work. This finding is consistent with our hypothesis regarding informational phenomena.

Finding 3: Informational effects must be at work.

6. Stock price performance

How (if at all) does the disappointing operating performance of reverse LBOs translate into stock price movements? Recent evidence presented by Ritter (1991) and Chu (1989) indicates that in the long run the stock market turns out to be disappointed by IPOs -- suggesting that on average IPOs may well be overpriced rather than underpriced. They investigate horizons of several years. Because most reverse LBOs are recent, data limitations force us to look at a two-year horizon.

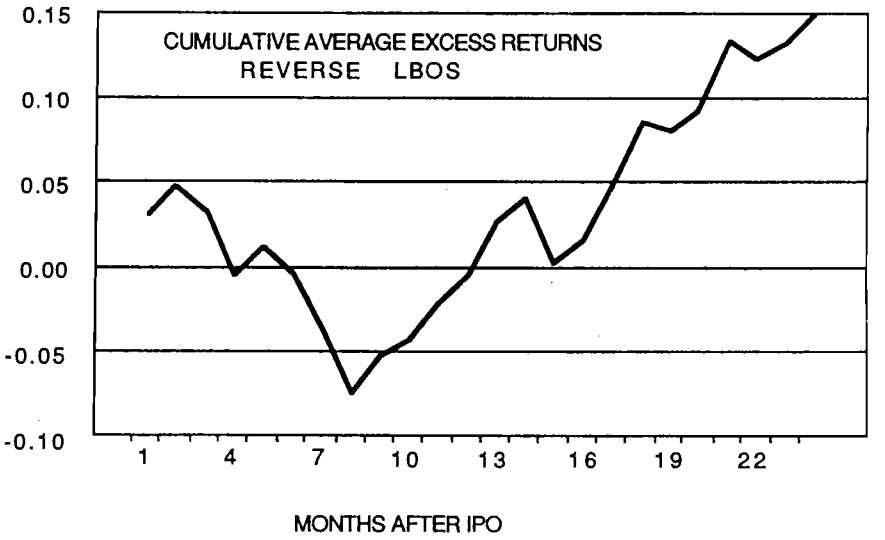
We wish to assess the following null and alternative hypotheses:

H_0: Although the operating performance of reverse LBOs is disappointing, implying problems of information asymmetry, the market understands this process. Hence stock prices of reverse LBOs will exhibit normal performance on average.

H_1: The disappointing operating performance of reverse LBOs is insufficiently anticipated. Hence stock prices of reverse LBOs will exhibit poor performance on average.

Our results are summarized in figure 2:[16]

Figure 2



[16] Data were obtained from the CRISP data tapes. The methodology is the same as in Ritter's 1991 study, to which we refer the reader. We used the same control firms here as in the earlier sections. We also compared the terminal payoffs of buy-and-hold portfolios of reverse LBOs vs. control firms, with similar results.

Finding 4: Reverse LBOs' stocks do not underperform comparison firms over a two-year horizon after the IPO. In fact, they outperform them: the two-year cumulative average excess return is 15.22%. The t-statistic, however, is 1.41, indicating that the difference is performance is not statistically significant. The variability in the sample is such that superior performance is difficult to demonstrate statistically.[17]

In his study of the long-run performance of IPOs, Ritter (1991) finds that IPOs underperform comparison firms on average, although large IPOs exhibit normal performance. Since reverse LBOs are much larger than the typical IPO, our results are consistent with his.

In a study of the stock price performance of spinoffs, Cusatis, Miles, and Woolridge (1991) find that they significantly outperform various market indices over a three-year period. It could be that our sample of reverse LBOs is a mixture of firms that are part large IPOs and part spinoffs, which would explain our finding of positive but not statistically significant abnormal stock price performance.

We also find -- consistent with previous studies -- that reverse LBOs are subject to short-run underpricing, in the sense that they experience (economically and statistically) significant gains in the first trading day (2.60% -- t-statistic 2.50).

Our findings indicate that the market is not surprised by the pattern of performance before and after the IPO. This suggests that reverse LBOs are more correctly priced at the time of the offering than the average IPO, which is susceptible

[17] There may have been a true positive excess performance, which would have proved significant in a larger sample. How might this have arisen? Reverse LBOs were a new phenomenon. It is hard to get the pricing right with relatively little experience. Moreover, arbitrageurs may have been hesitant to take on uncertainties (as opposed to risks), particularly since the time to payout could be significant. Finally, at the time of the IPO it is hard to predict performance beyond a year. Sophisticated analysts may decipher the various effects that lead post-IPO performance to be disappointing, and hence issue cautious one-year forecasts. Less sophisticated investors might take this first-year forecast as an accurate indication of the reverse LBO's true long-term performance: a too negative evaluation would be the result.

to more short-run underpricing (above 10% on average) and more long-run underpricing.

7. Implications.

7.1 LBO performance. Although our main concern is with information asymmetry and behavioral decision, and their implications for firm performance, our findings also contribute to an understanding of leveraged buyouts. LBOs have been the subject of intense debate. Do buyout premiums reflect real operating improvements? Kaplan (1989) and Smith (1990) find that operating performance improves significantly after an LBO. Our findings and hypotheses have implications for previous LBO studies, which (for data availability reasons) used samples containing a large proportion of reverse LBOs. Earlier studies addressed the issue of potential selection bias: are reverse LBOs a small, special category of LBOs, or can one generalize from them to all LBOs? Since recent evidence indicates that a very large proportion of LBOs go public again (Kaplan 1990), this may well be a nonissue.

On the other hand, inasmuch as earlier studies implied that the performance gains experienced before the IPO could be sustained afterward, they gave too much weight to the good-year performance: it should have been offset with the following-year performance, which we have shown to be disappointing. The real bias of earlier LBO studies may not have been in the selection of the firms in the sample, but rather in the choice of the period of observation. This problem of sample period bias has not commonly been recognized.

7.2 The transition from private to public ownership: Taken together, our hypotheses suggest the following story for the transition from private to public

ownership. After a few years under private ownership, the firm (say an LBO) has an exceptionally good year. Given behavioral propensities (buyers behaving according to prospect theory undervalue big losses relative to small gains, sellers are subject to the "disposition effect"), the firm may decide on an IPO. As a consequence of these behavioral phenomena alone, reverse LBOs would be disproportionately good performers before the IPO, and their performance would regress toward the mean subsequently.

We observe greater deterioration in performance than the behavioral theory alone would suggest. Information asymmetry must also play a role in the explanation. Perhaps the firm has a year that is not only exceptionally good, but uncharacteristically good relative to privately discernible future prospects. The managers (together with the LBO specialists) make plans for taking the firm public. At this point they begin to work even harder, to make the company look even better to investors. (Their own dollars are at stake, and each dollar of incremental earnings will be magnified by the marginal P/E ratio.) They probably also defer expenses and borrow future sales (even if the long-term effect may hurt the company).[18] After the

[18] Managers of LBO firms also have particular incentives to manipulate accounting numbers at the time of going private. By understating the true value of the company, as substantial purchasers of stock, they might stand to get a better deal for themselves. However, contrary to this hypothesis, DeAngelo (1986) finds that managers do not systematically pump down earnings before a buyout. Her finding makes our results all the more striking. If earnings are hard to deflate, one might think that if anything they would be harder to inflate. (To inflate earnings, an outside party has to forego a receipt, pay more, or buy earlier.) But our results suggest that significant inflation of earnings does take place before the reverse LBO's IPO.

Perhaps checks on management are stronger at the buyout stage, possibly because of the element of coercion present in that situation. A smart stockholder of a company going private who suspects downward manipulation of earnings does not have a fairly-priced "exit" option, but he can exercise his "voice" option, say by suing the management. (In contrast, a smart investor who figures out the manipulation of performance at the time of an IPO always has the exit option of not buying. Besides, since no fiduciary responsibility has been breached, the prospects for a successful lawsuit are limited.) In this light, DeAngelo's evidence suggests that it is not an equilibrium strategy for management to understate performance at the time of the buyout and then bear the consequences of a lawsuit. Our evidence, for public offerings as opposed to going-private transactions, indicates that it may well be an equilibrium strategy for management to overstate performance at the time of the IPO, even though the market may decipher the manipulation. Indeed, to the extent that such manipulation will be expected, pumping up earnings seems both inevitable and rationalizable, and possibly justifiable.

firm goes public, it will not perform as well for three reasons: (1) previous performance has been tilted, (2) the year following an exceptional one is likely to be less impressive, and (3) the flat prospects foreseen by management are likely to materialize.

In this reverse LBO process, we expect LBO specialists (such as Kohlberg, Kravis, and Roberts) to play a leading role: they raise the initial capital and provide close monitoring. In contrast to traditional IPO owners, LBO owners have expertise in financial markets, which may allow them to create a more competitive process for their offerings, thus achieving a more favorable price/earnings ratio when they go public.

Specialists demand a higher return on their monetary investment than the market does. Typically they rid themselves of an investment stake when the returns it is generating are less than they can earn elsewhere by deploying their capital and energies in new deals. That is, they will sell stock whose returns would be considered attractive by most market participants. Selling off part of a highly leveraged company facilitates diversification for the LBO owner, who is likely to have concentrated and leveraged assets. Reverse LBOs in essence transfer ownership to more patient and diversified hands.

Why do LBO specialists demand a higher return than the market? One reason is that they bring a lot of human capital to the deal, which has to be remunerated. Moreover, human and financial capital are hard to disentangle. There are advantages in having them together: for instance, as a controlling owner, an LBO specialist would have difficulty providing assurance to outside investors that they will not be expropriated-- say, through stock options or bonus arrangements -- especially in a private company. Thus a governance structure in which the main provider of capital also serves as the monitor of management may entail lower agency costs than

the investor/ monitor/management governance structure typical of the public corporation.

7.3 Related problems: The phenomena we discuss relate to a wide range of selling situations in which information is asymmetric and the item is offered only when the seller wishes. The owner of an undeveloped piece of land tries to sell it after a building deal falls through, a deal potential buyers will not know about but can possibly infer. In a phenomenon that parallels earnings manipulation, sellers of houses frequently repaint the inside to suggest that it has been well maintained, even though they know that the buyer will prefer her own color scheme, and that the ploy will be recognized. In today's depressed real estate markets, behavioral effects reveal themselves: transferred homeowners incur the inefficiencies of renting their old houses, waiting for the market to come back.

8. Conclusion

There are powerful reasons not to expect reverse LBOs to sustain the exceptionally good performance they delivered in their most recent period under private ownership. It is interesting that investors have correctly disentangled these factors, whereas the LBO literature appears to have overlooked them, and relied instead on extrapolative expectations of past performance.

We have identified two types of reasons for the post-IPO decline in performance: some are behavioral, others result from the information asymmetry problem faced by private firms as they go to the public markets. In both types, the managers' handling of information is a central factor. Lest our paper should be

misinterpreted, we stress that neither our model nor our empirical results suggest that IPOs or reverse LBOs are inferior firms, or become so when they go public.

We find strong empirical confirmation by looking at a sample of reverse LBOs: the performance of a reverse LBO before it goes public overestimates its likely performance after the initial public offering. Moreover, pre-offering performance is markedly superior to that of comparison firms. In the post-offering year, by contrast, comparison firms do better. Evidence on aftermarket stock price performance indicates that the market is not fooled: it does not appear to be surprised by the disappointing reverse LBO performance after the IPO.

Appendix

In this appendix we derive the equation of the "cutoff curve" for the model of section 2.

If the manager sells in period 1, then it must be that $\mu<h^{-1}(x)$. The market's posterior distribution of expected per-period earnings is then:

$$g[\mu \mid x;\ \mu<h^{-1}(x)] = \frac{p(\mu)f(x;\mu)}{\int_0^{h^{-1}(x)} p(\mu)f(x;\mu)d\mu}$$

$$\text{The market pays: } s(x) = m\frac{\int_0^{h^{-1}(x)} \mu p(\mu)f(x;\mu)d\mu}{\int_0^{h^{-1}(x)} p(\mu)f(x;\mu)d\mu}$$

Similarly, if the manager sells in period 2, then $\mu\geq h^{-1}(x)$. In this case, the market's posterior distribution of earnings is:

$$g[\mu \mid x,z;\ \mu\geq h^{-1}(x)] = \frac{p(\mu)f(x;\mu)f(z;\mu)}{\int_{h^{-1}(x)}^{\infty} p(\mu)f(x;\mu)f(z;\mu)d\mu}$$

$$\text{The market pays: } s(x,z) = m\frac{\int_{h^{-1}(x)}^{\infty} \mu p(\mu)f(x;\mu)f(z;\mu)d\mu}{\int_{h^{-1}(x)}^{\infty} p(\mu)f(x;\mu)f(z;\mu)d\mu}$$

We now assume that earnings are uniformly distributed over $(0,2\mu)$. (This implies that $\mu \geq \frac{x}{2}$.) The expressions for $s(x)$ and $s(x,z)$ become:

$$s(x) = m \frac{\int_{\frac{x}{2}}^{h^{-1}(x)} \mu p(\mu) \frac{d\mu}{\mu}}{\int_{\frac{x}{2}}^{h^{-1}(x)} p(\mu) \frac{d\mu}{\mu}} \quad \text{and} \quad s(x,z) = m \frac{\int_{h^{-1}(x)v\frac{z}{2}}^{\infty} \mu p(\mu) \frac{d\mu}{\mu^2}}{\int_{h^{-1}(x)v\frac{z}{2}}^{\infty} p(\mu) \frac{d\mu}{\mu^2}}$$

where $h^{-1}(x)v\frac{z}{2}$ designates $\max[h^{-1}(x), \frac{z}{2}]$.

Assume now that $p(\mu) = K\mu^2 e^{-\mu}$, for some constant K $(0 \leq \mu \leq \infty)$. Then:

$$s(x) = m \frac{\int_{\frac{x}{2}}^{h^{-1}(x)} \mu^2 e^{-\mu} d\mu}{\int_{\frac{x}{2}}^{h^{-1}(x)} \mu e^{-\mu} d\mu} \quad \text{and} \quad s(x,z) = m \frac{\int_{h^{-1}(x)v\frac{z}{2}}^{\infty} \mu e^{-\mu} d\mu}{\int_{h^{-1}(x)v\frac{z}{2}}^{\infty} e^{-\mu} d\mu}$$

By integration by parts:

$$\int \mu e^{-\mu} d\mu = -\mu e^{-\mu} + \int e^{-\mu} d\mu = -\mu e^{-\mu} - e^{-\mu}$$

$$\int \mu^2 e^{-\mu} d\mu = -\mu^2 e^{-\mu} + 2\int \mu e^{-\mu} d\mu$$

Suppose that $x = h(\mu)$, so that the manager is indifferent between selling and waiting. Writing $y = \frac{x}{2}$ and $w = \frac{z}{2}$, we get:

$$s(x) = 2m + m\frac{\mu^2 e^{-\mu} - y^2 e^{-y}}{(\mu+1)e^{-\mu} - (y+1)e^{-y}}$$

$$s(x,z) = m(1+\mu vw)$$

It is easily verified that: $E_z[s(x,z) \mid \mu,x] = m(1+\mu)$

Equation (1) now becomes:

$$2m + m\frac{\mu^2 e^{-\mu} - y^2 e^{-y}}{(\mu+1)e^{-\mu} - (y+1)e^{-y}} = \beta\mu + \beta m(1+\mu) \qquad (2)$$

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